THE DEVELOPMENT OF THE GLASS INDUSTRY ON THE RIVERS TYNE AND WEAR , 1700 - 1900.

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PART II : 1850 - 1900.

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CHAPTER SIX: THE CHANGING FACE OF THE NORTH-EAST GLASS INDUSTRY, 1850 - 1900

To Collingwood Bruce writing in 1863, "probably no section of the manufactures of the Tyne and Wear has experienced more marked changes during the last twenty five years than that of glass."[1] Even looking at the industry from a distance the changes in the appearance and character of the north-east glass industry during the middle of the century are still striking. Looking at the glass industry during the last fifty years of the nineteenth century it is difficult to find much in common with the industry that had flourished in the region for the previous hundred and fifty years. By the 1870s local glass firms were operating on a new scale, the centre of the industry within the region had made a significant shift, certain branches of the industry had disappeared completely and new branches had become established. These changes were startling but they were to be followed by even more dramatic and disturbing changes during the last thirty years of the century.

Again, the individual branches of the industry during this period will be looked at in detail in the following three chapters but it is worth beginning by looking at the north-east glass industry as a whole during the last half of the nineteenth century and the general factors influencing its development, or more accurately its decline, during this period. This broad development is perhaps best looked at in two roughly chronological phases. The first phase, occurring during the 1850s and 1860s, saw a shift in the location of the industry away from the traditional inland centres of the industry to the coastal towns of South Shields and Sunderland. The second phase which occurred during the last thirty years of the century, saw the general decline of the industry, and in particular the disappearance of its major branch, flat glass. Of these two phases, the second was

undoubtedly the more serious and must merit the fuller discussion.

The shift away from the old inland centres was partly a consequence of the establishment of new glass firms at the coast, but also in part a consequence of the closure of many of the old firms on the Tyne. Many of these older firms, although undoubtedly ailing during the 1830s and early 1840s, postponed their closure until after the repeal of the glass duties with the result that in terms of numbers of firms, the shift to the coast did not become fully visible until the 1850s. In terms of quantities of glass produced, however, the shift was already apparent during the 1830s, as the excise statistics (figure 23) illustrate.[2] What caused this shift? There is no one obvious answer but a significant factor must have been the increasingly bad shipping facilities in the upper reaches of the Tyne, and in particular the silting of the river, which prevented ships of large burden docking at Newcastle with ease. Newcastle Corporation, in whose care the river Tyne remained until the 1850s, proved far less diligent in meeting its responsibilities than its counterpart on the Wear, the River Wear Commissioners. On the Wear, docks capable of admitting ships of large burden had been constructed during the 1830s but it was not until the early 1860s that the Tyne was improved to match. According to one commentator, until the 1860s the Tyne remained substantially unimproved and unfit to meet the demands of its increasingly heavy industry:[3]

> The Tyne may be taken in 1860, and perhaps 1861, just immediately preceding its improvement, as at its very lowest point of decadence as a navigable river. It might not at that time be absolutely in a worse state than it had occasionally reached previously; but, relatively to the trade carried on and to its position as regards neighbouring rivers, it was at its very worst. Vessels of moderate size and draught were detained for weeks after loading unable to get to sea at the top of high water; other vessels were thumping and grounding on the bar in vain attempts to get to sea; and a state of things existed seriously detrimental and which, if continued, would have been most disastrous - indeed ruinous - to the trade and reputation of the port.

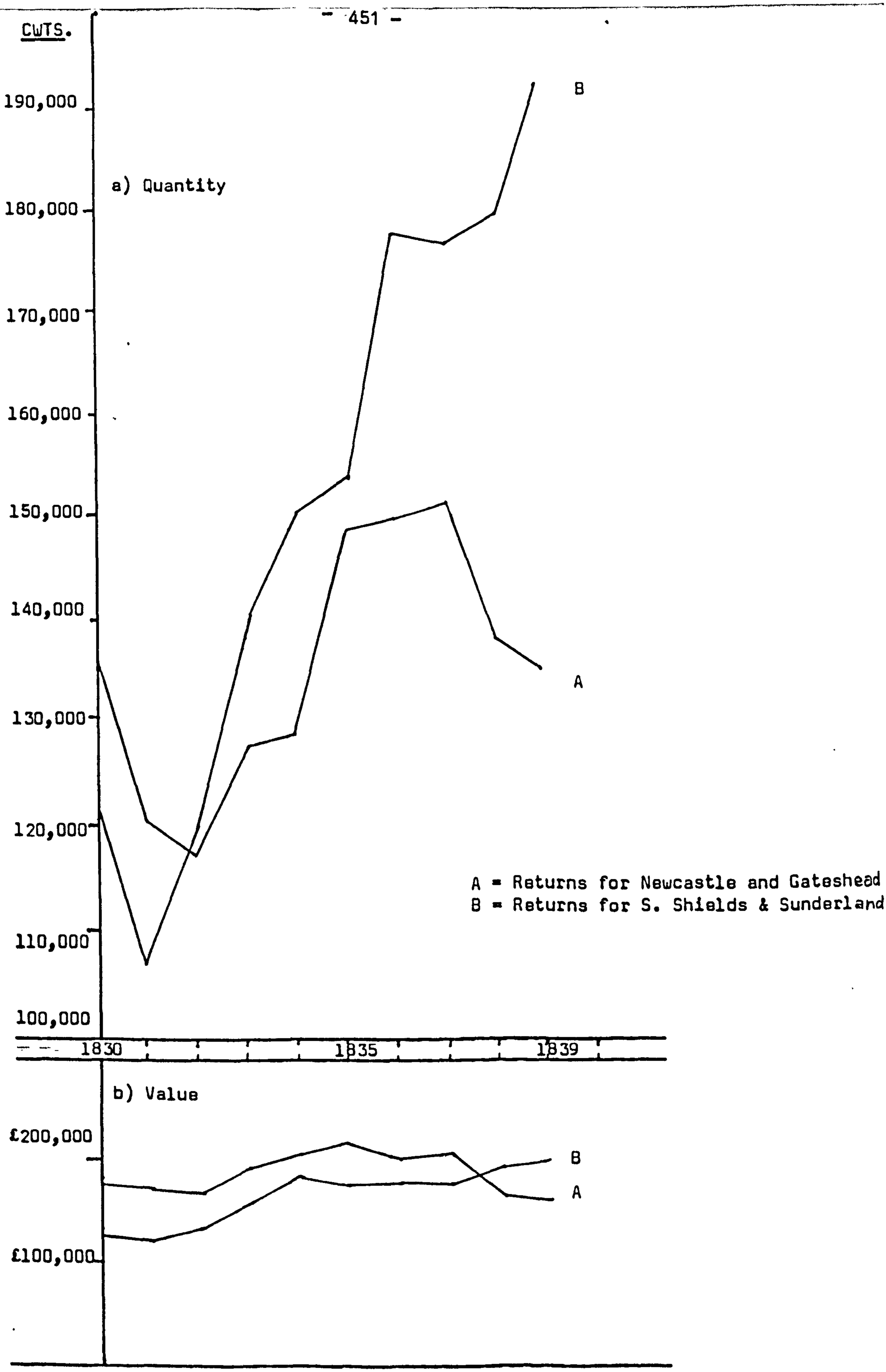


Figure 23 : Excise returns for the Northumberland and Durham collections, 1830 - 1839

By the 1850s railways of course provided an alternative means of distributing goods but there is no doubt that water transport remained important for the glass industry's raw material needs; notably clay, sand and soda. By the 1860s silver sand from Fontainebleu in France had become the standard fine quality sand used for glass manufacture and Tyne customs entries provide evidence that several firms, including the Tyne Plate Glass Company and several of the pressed glass firms, imported Fontainebleu sand by sea in quantity. The Tyne Plate Glass Company is worth mentioning as typifying the shift to the coast within the region. When cast plate was first introduced at South Shields in 1816 the polishing works had been erected at Newcastle because of the town's better shipping facilities. In 1868 it was moved back to Shields and, interestingly the works' owners had considered this desirable at least eighteen years previously according to R.W. Swinburne's evidence to the Admiralty enquiry into the state of the Tyne in 1850:[4]

> - In addition to your glass establishments at South Shields, are you concerned in a similar establishment at Newcastle?
> - We have a part of our works at Newcastle, unfortunately so; we should be very glad to remove them to Shields if we could.

The one exception to the general shift to the coast was the pressed glass industry. By the 1870s two of the four largest pressed glass firms in the region were inland, one at Newcastle and one at Gateshead where several smaller firms also existed and continued to exist to the end of the century. The survival of the flint glass industry at Gateshead is perhaps explained by the fact that flint or pressed glass goods, being less bulky than flat glass or bottles, were more suitable for railway transport; all the Gateshead pressed glass firms were well placed to enjoy good railway transport. It is perhaps also partly explained by the greater initiative shown by the local pressed glass firms during this period enabling them to overcome difficulties which to other firms were insurmountable. Interestingly, pressed glass is frequently the exception to many of the generalisations made about the north-

east glass industry as a whole during this period. It was the one branch of the industry that adapted well to the post-repeal economic conditions and it was the one branch of the industry that experienced something of a growth rather than a decline during the last thirty years of the century.

The decline of the industry in Newcastle during the 1840s and 1850s was, as we have seen, lamented by commentators at the time, but the events of the following decades were to give even greater cause for outcry. The second broad phase in the development of the north-east glass industry during the last half of the century is its rapid deterioration and decline from 1870 onwards. This was a period of severe difficulties and general depression for the British glass industry as a whole but for the north-east industry in particular. The north-east industry was a notorious casulty of the period and its deterioration was unsparingly described, not only by local newspapers but by trade journals such as The Builder and The Pottery Gazette.[5] When the British Association met in Newcastle in 1863 a whole chapter of its hand-book on local industries was devoted to glass. On its return in 1887 glass had been relegated to the small section on "Decayed Industries". Very few qualifications can be made to these gloomy contemporary observations. It cannot be doubted that the north-east glass industry did decline in the sense of losing its traditional major importance in the national industry. The census returns (figure 24) show this quite clearly, despite an overall increase in the numbers employed in the local industry since the 1840s. Looking at the individual branches of the industry further confirms the area's loss. By 1900 only five bottle firms were left in the area as compared to eleven in 1870 and of these five only three - the Ayres Quay Bottle Company, the Londonderry Bottle works and Alexander & Austin - could be said to have been important firms. The manufacture of sheet and plate glass had disappeared from the area completely as had the manufacture of blown flint

table ware. The blown flint trade was only represented by a few small firms producing chimneys and globes for oil lamps and light bulbs. Only the pressed glass trade,which, by 1900, included eight firms producing a great variety of table and household ware,maintained the north-east's traditional predominance in the glass industry.

What were the causes of this decline? What factors acted so adversely on the north-east glass industry during this period? If the factors favouring the rise of the north-east industry during the eighteenth and early nineteenth centuries were primarily local - cheap coal, easy sea carriage to London - then the influential factors during the last half of the nineteenth century were primarily national; that is they concerned the position of the British glass industry as a whole and the national conditions in which the industry was operating during this period.

In order to explore these national conditions it is necessary to return to the repeal of the glass duties in 1845 and, of equal importance, the repeal of the protective customs duties that accompanied it. Repeal gave birth to economic conditions quite unlike those the British glass industry had become accustomed to over the preceding century and, broadly speaking, the post-repeal period was characterised by three quite new features. Firstly, it was a period of severe foreign competition from foreign goods in the home market. Secondly, it was a period which enjoyed an unprecedented demand for glass, thanks to the reduction of prices following repeal. Thirdly, it was a period of unprecedented technological advance in the glass industry. The one common thread linking these three aspects of the period is low manufacturing costs. At its very broadest the last half of the nineteenth century was a period in which low manufacturing costs were desirable, possible and necessary for survival. Low manufacturing costs was the single most

FIGURE 24: Census returns showing the numbers employed in the glass industry, 1841 - 1901

Year		Males*	Females*	Total for Northbld. and Durham (% total Great Britain)	Total for Great Britain
1841	Durham	855	3	1,402 -	-
	Northumberland	544	-		
1851	Durham	1679	51	2,546(22.57%)	11,282
	Northumberland	752	64		
1861	Durham	2291	51	3,156(20.98%)	15,046
	Northumberland	746	68		
1871	Durham	3024	166	3,703(18.44%)	20,081
	Northumberland	475	38		
1881	Durham	2732	152	3,212(14.85%)	21,630
	Northumberland	308	20		
1891	Durham	2474	210	2,956(11.30%)	26,160
	Northumberland	255	17		
1901	Durham	2373	269	2,947(9.80%)	30,081
	Northumberland	272	33		

* includes young persons and children

important factor in the success or failure of any firm during this period.

The aspect of the economic conditions that provoked most comment and alarm from contemporaries was the severity of foreign competition. Broadly speaking, the period following the repeal of the customs duties on imported glass during the late 1840s and early 1850s saw British change from a glass exporting to a glass importing country. This dramatic change has been set out graphically by Professor Turner (fig. 25).[6] The general figures of course include several different types of glass from a number of countries: window glass from Belgium, plate glass from France and later America, blown table ware from Belgium and Germany, pressed glass from America and black bottles from Belgium and Germany. Even without separate tables for each type of glass it seems safe to take as true the contemporary claims that all branches of the industry suffered from this foreign competition - with the possible exception of high class, expensive flint glass. The first point to be made about this foreign competition is that in all cases the major attraction of the foreign glass in the British market appears to have been its cheapness. Frequently the foreign glass was said to be inferior in quality and strength to English manufacture, but this was evidently less important to the customer than its low selling price. The damage done to the British industry was thus caused not so much by the fact of competition - the rapidly growing demand for glass was to a certain extent able to accommodate the increased quantity on the market - but by the effect on prices. The major influence on prices throughout this period appears to have been the levels set by the foreign glass and not the manufacturing costs or profit levels of the British manufacturer. In some cases prices fell to a level that was quite uneconomic for the British manufacturer. For instance in October 1881 the price of plate glass fell to 1s 3d per foot, the lowest ever known. At this price at least one firm, the Tyne Plate Glass Company,

was forced to manufacture at a loss being hard pressed to keep even the natural cost of production at 1s 4.3d per foot.[7] The firm claimed that a rise in price of 6d per foot would add up to £30,000 a year to the firm's return and make all the difference between manufacturing at a loss and realising a fair profit. In 1886 the price of sheet glass was said to be the lowest ever known and, according to James Hartley jr., even though the volume of trade through his firm had increased the enormous depreciation in the value of the article they were producing meant that they were manufacturing at a loss.[8]

Although it was recognised that foreign manufacturers had the advantage of cheaper labour and more efficient machinery, most manufacturers also appear to have believed that the fundamental cause of the low prices was dumping - or foreign manufacturers selling glass in Britain below cost price after profits had been secured in their own protected home markets. According to a correspondent to the Sunderland Daily Echo in 1885:[9]

> They (foreign manufacturers) have a monopoly at home and regulate their prices once a year so that they can command large profits. What they cannot sell they send into the English market free of tax and can afford to do so with a small profit here as they have large profits at home.

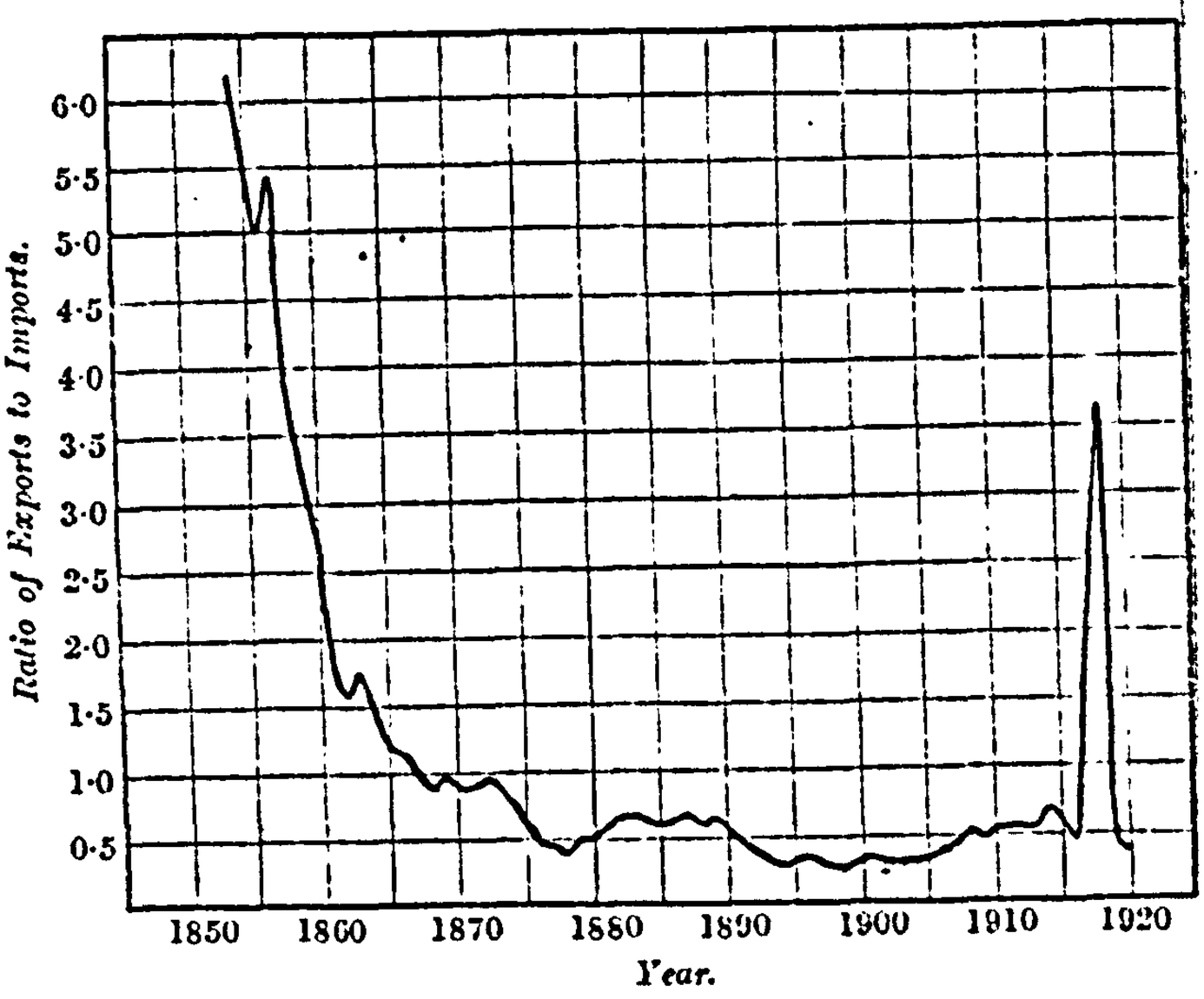
Adam Dodds, the Manager of Sowerby's Ellison Glass Works Ltd., and the Chairman of the Pressed Glass Manufacturers' Association gave the Tariff Commission a more concrete example in 1907:

> Goods sold at 2s per dozen in the United States are sold at London at 1s 3d - about what they cost to produce - including freight. Our association attaches very great importance to this question of dumping glass .... American tumblers can be bought at 1s 3d, which would not pay the makers if they ran a factory selling nothing else so they must be selling them to us at less than the price at which they can profitably make them. Their own markets are secured, and they are thus enabled to export their surplus here, and selling these tumblers at their bare cost enables them to make tumblers at a lower cost to sell in their own markets at a greater profit.

Whether or not the low prices were in fact due to dumping rather than more

Figure 25

Curve showing value of the ratio $\frac{Exports}{Imports}$ *(glassware only) for the United Kingdom.*



Glass Exports from and Imports into the United Kingdom in Thousands of Pounds.

Year.	Exports. £1000	Imports. £1000	$\frac{Exports}{Imports}$	Year.	Exports. £1000	Imports. £1000	$\frac{Exports}{Imports}$
1851	328	—	—	1886	970	1545	0·63
2	379	—	—	7	1021	1674	0·61
3	518	—	—	8	1109	1907	0·58
4	573	92†	6·22	9	1147	1782	0 64
5	507	83†	6·08	1890	1065	2085	0·51
6	582	117†	4·98	1	1013	2300	0·44
7	659	122	5·42	2	885	2434	0·36
8	569	148	3·84	3	766	2443	0·31
9	607	232	2·62	4	715	2685	0·27
1860	653	244	2·68	5	790	2475	0·32
1	599	345	1·71	6	892	2742	0·33
2	644	408	1·58	7	871	3007	0·29
3	759	434	1·75	8	885	3285	0·27
4	762	556	1·37	9	916	3209	0·29
5	745	630	1·18	1900	1034	3200	0·32
6	806	713	1·13	1	1057	3530	0·30
7	803	894	1·00	2	1098	3697	0·30
8	789	920	0·86	3	1102	3727	0·30
9	886	922	0·96	4	1010	3379	0·30
1870	833	931	0·89	5	1107	3399	0·33
1	878	995	0·88	6	1278	3269	0·39
2	1122	1207	0·93	7	1400	3049	0·46
3	1343	1461	0·92	8	1356	2669	0·51
4	1184	1587	0·75	9	1372	2780	0·49
5	1068	1719	0·60	1910	1573	2920	0·54
6	917	1860	0·49	1	1684	3054	0·55
7	854	1908	0·45	2	1821	3281	0·56
8	756	2050	0·37	3	1814	3449	0·53
9	783	1574	0·50	4	1551	2239	0·69
1880	922	1776	0·52	5	1244	1979	0·63
1	955	1674	0·57	6	1304	2890	0·45
2	1086	1679	0·65	7	1186	624	1·90
3	1084	1606	0·67	8	1052	290	3·63
4	1052	1616	0·65	9	1461	3458	0·42
5	966	1632	0·59	1920	3211	8507	0·38

* The figures are taken from the annual *Statistical abstract for the United Kingdom.*

† Does not include bottles, but their value in 1857 was only £2,222.

For 1844, the exports and imports in terms of weight instead of value are :—

	Flint and Cut. cwt.	Plate. sq. ft.	Crown. cwt.	German Sheet. cwt.	Other (not Bottles). cwt.	Bottles. cwt.
Exports	10,734	84,571	7,926	7,520	—	184,628
Imports	1,437	16,768	3,178	171	386	—

efficient methods of production there is no doubt that the dumping theory was widely accepted among both manufacturers and men and became a major constitutent of the arguments for the reintroduction of protective tariffs (see below).

Interestingly, the potential threat of foreign competition had been recognised long before its real effects were felt. According to R.L. Chance, giving evidence to the 1835 Commissioners:

> Belgium is before us in the manufacture of glass as regards cheapness ... ... I conceive the manufacturers of Belgium to be the most formidable opponents to thoseof this country in the manufacture of window glass.

According to Apsley Pellatt, writing in the 1840s,[10] the aims of French manufacturers of flint glass were "large quantity and low price" rather than quality which the English manufacturer at present aimed at; he correctly predicted that "circumstances and competition may however prove the disadvantage of our present management at no distant period and compel home manufacturers to adopt a more economical arrangement". Pellatt was in no doubt that the excise regulations were largely to blame for preventing the English manufacturer adopting a more economical process of manufacturing at an earlier date; the excise had compelled English manufacturers to produce glass in separate meltings or "journeys" whereas on the continent manufacturers worked comparatively continuously recharging pots whilst others were being worked.

Low cost was also an important consideration for the second aspect of the post repeal conditions; the development of a mass market for glass. Repeal provided many opportunities for manufacturers to exploit this new demand and the rapid growth of the pressed glass industry can largely be attributed to the industry's success in supplying a low quality but cheap article to completely new consumers in the less well off classes (see Chapter nine). Not all branches of the glass industry adapted so well. The excise

had protected high cost processes and skilled labour, it had encouraged firms to command a market by quality rather than by cheapness and many firms proved reluctant to make the changes necessary in order to produce goods cheaply in quantity. Certain firms did adapt to the new conditions created by the demands of the new mass market. In flat glass Pilkingtons and Chances both began to produce on a large, low cost scale, both recognising the crucial importance of new technological advance such as the Siemens gas producer furnaces and the Siemens tank furnaces (see below). Other flat glass firms were not so foresighted and in other branches of the industry, notoriously blown flint glass, the failure of English firms to produce low cost glass for the mass market proved a boon for the foreign manufacturer importing cheap glass into Britain.

Although the blame for the high level of foreign glass imported into the country was frequently put on Britain's commercial policy, the British glass industry was not altogether blind to its own shortcomings. As one writer to The Pottery Gazette confessed in 1897:[11]

> Where we have failed in glass making is not from the want of talent but from adaptability; we have not adapted our labour and make to the wants of the community, nor have we adapted our make to the improvements of the time in common goods consumed by the million.

If certain sections of the British glass industry did fail to adapt their make to the needs of the consumers of common goods, it was not through the lack of means to do so. The third feature of the period was the unprecedented technological advances made in the industry, all contributing to a large reduction in manufacturing costs. The details of the developing glass technology of the late nineteenth century have been described in more detail elsewhere,[12] but briefly the most significant advances concerned furnaces and the two single most important advances in furnace technology were: firstly the gas producing furnace pioneered and patented by the Siemens during the

1860s; and secondly, the tank furnace which, by liberating manufacturers from the necessity of halting work to recharge the pots, introduced the possibility of working continuously around the clock. Although the tank furnace had, again, been perfected and patented by the Siemens in 1870 and 1872, the principle had been understood in a more elementary way since the 1860s and had already been explored by a number of English bottle manufacturers, notably T. Warren of Glasgow, who took out a number of patents for regenerative gas furnances in 1868, and John Cannington of Lancashire.[13]

The advent of the continuous tank both in Britain and on the continent accelerated the downward price spiral that had already been set in motion by the demands of a mass market and foreign competition. By the 1880s prices had fallen to levels that had recently been considered impossible and indeed to a certain degree were still impossible for firms who had failed to keep pace with the new technology. This then is the context in which the decline of the north-east industry during the last thirty years of the century must be seen. It was a period during which the British glass industry found itself compelled to adapt to the new and difficult conditions of a highly competitive mass market in direct contradiction to the whole history of its development up till 1850.

At the time it was considered that, nationally, the British glass industry had failed to adapt itself to the new and difficult conditions. Commentators on the British glass industry during the last quarter of the nineteenth century were generally unanimous in their view that its state was parlous, and that this was largely due to its failure to defend itself against large quantities of cheap glass entering the domestic market from abroad. Although there were extreme differences of opinion over who or what was to blame for this situation, the deterioration of the British glass

industry in the face of foreign competition was never in doubt; it was generally spoken of as being severely depressed, in grave difficulties or, even, on its last legs. Later commentators have done their best to qualify the over-pessimism of contemporary impressions. Professor Turner has quite rightly pointed out that the "decline" of the British industry should be seen as a relative decline; the census returns (figure 24) show a distinct increase in the number of people employed in the industry; therefore it can only be said to have declined in relation to the progress made in other countries.[14] A further qualification has been made by Professor Barker who points out that the different branches of the industry must be looked at separately, and that when this is done two of the branches - flat glass and bottles - can be seen to have had quite creditable records in introducing low cost manufacturing techniques to compete with foreign glass.[15] Both Turner and Barker also point out that the deterioration of the British industry varied from region to region with some parts of the country experiencing a distinct growth throughout this period. These qualifications are important but unfortunately they do far less to mitigate the dire picture of the state of the glass industry in the north-east that emerges so strongly from contemporary sources. Why did the north-east suffer so severely?

Turning again to contemporary comments we find extreme differences of opinion amongst local men on the causes of the industry's decline. On the one hand the local glass industry was accused of engineering its own decline through its own lack of initiative. On the other blame was placed on circumstances beyond the control of the local industry, namely the country's policy of free trade. Both views were vigourously propounded throughout the last thirty years of the century with, unsurprisingly, those within the industry calling for fair trade and a change in government policy, those without calling for a more adventurous attitude on the part of the local industry.

The case for the reintroduction of protective tariffs had been voiced ever since the repeal of the customs duties during the 1840s. In 1863 R.W. Swinburne had introduced the subject into his paper to the British Association:[16]

> The English makers of plate and window glass have represented to our government that their cost of labour is sixty per cent. more than their foreign rivals, who are allowed to import their produce into this country duty free, whereas the continental duties are prohibitory. In many articles the English manufacturer could compete with the foreign rival. He asks no protection but desires equal terms with the others, and he will take his chance in the competition. The English manufacturers of glass universally complain that our diplomatists negotiate treaties and tariffs without preconsultation with persons versant in the trade.

It was not until the 1880s however that the argument gathered strength through the Fair Trade Movement and finally the Tariff Reform Movement. The feeling that the plight of the British industry was due to circumstances beyond its control - namely commercial policy - was in many ways understandable and it is hardly surprizing that so many glass manufacturers and glass workers should have become vociferous advocates of protection. The north-east men were no exception. In 1885, on the initiative of the Sunderland bottlemakers, a large Fair Trade meeting was held in Sunderland at which the town's two Liberal M.P.s faced questions on tariff reform from both manufacturers and men. The meeting heard some passionate denunciations of free trade from the glass men but only sympathy not support from the two M.P.s, both of whom were firm defenders of free trade. Alderman Storey promised to bring the question before the Royal Commission on the Depression in Trade but his fundamental message was bleakly realistic:[17]

> He could not blame the foreigner as much as some of them might do. For many years we had done his manufacture for him and taken the loaf out of his mouth in the same way as it was said he was now taking the loaf out of our mouth. Now the foreigner was going to have a share in the loaf and although it might be hard for the English working man to bear, we could not fairly complain.

The antidote to the local Fair Trade sentiment was provided by the local

Liberal papers all of which argued strongly for free trade. As early as 1850 the Gateshead Observer was urging the local glass trade not to "whine for protection" but to "contend in the schools of emulation and competition".[18] The Sunderland Fair Trade meeting was followed up by an editorial in the Sunderland Daily Echo condemning the "enervating hypnotism" of looking to protection as the only answer.[19] The paper charged the failure of the local industry to the lack of enterprise of the manufacturers and the following April published a further attack, this time on the conservatism and stubborness of the bottleworkers themselves.[20] Until the emergence of a popular Fair Trade Movement the Sunderland Daily Echo had been sympathetic towards the glass workers in their disputes with their employers, thereafter it adopted a far more critical attitude.

In looking at contemporary comments on the state of the glass industry, particularly from the 1880s onwards, it is important to remember that the subject was coloured by the wider, national, political issue of Free Trade versus Protection. This was an emotive subject and to the later observer the vehemence of the argument can sometimes appear to cloud rather than clarify the actual situation; for protectionists commercial policy was solely to blame, free traders accused the only other possible cause - the failings of British manufacturers and workers. The protectionists' argument culminated in the report of the Tariff Commission which came to the predictable conclusion that there was an overwhelming case for a change in the fiscal system to equalise conditions in the home market. The free traders replied by arguing firstly that the damage done to the glass industry was grossly exaggerated ("the British glass industry is the one of all others which Tariff Reformers insist on consigning to an untimely grave"), and secondly that the damage might in fact have been a good thing ("the industry has profited by the severe lesson taught in consequence of failure to move with the times").[21]

Looking at the question more dispassionately it is of course easy to see that there was some truth in the arguments of both sides. On the one hand it is true that foreign competion was "unfair" in the sense that foreign manufacturers did have more favourable conditions in their domestic markets and British manufacturers were disadvantaged by the tariffs imposed against them in foreign countries. On the other hand there is no doubt at all that considerable faults existed within the British industry and a major one was indeed a lack of enterprise and foresight on the part of both manufacturers and men. But of the two it certainly seems that the latter, namely a conservatism within the industry, was the greater factor in the local industry's decline. The major flaw in the Tariff Reformers' arguments, and one the Free Traders in the north-east made much of, was the fact that several British firms appeared to be meeting the new competition from abroad with equanimity. Comparatively successful firms such as the Yorkshire bottle firms and the Lancashire flat glass firm Pilkingtons were all cited by Free Traders in the north-east as evidence that the fault did not lie in circumstances beyond the local industry's control.

What practical issue did this conservatism and lack of foresight of both men and manufacturers have on the north-east industry? To take first the conservatism of the men, it meant a reluctance, and in certain cases a refusal to adapt to new systems of working and new methods of calculating wages that were more appropriate to the needs of the late nineteenth century industry, even though in certain cases the new systems would have brought distinct benefits. Throughout the last half of the nineteenth century questions of wages and working practices were determined by the men less by rational appraisal and more by custom, prejudice and the defensive attitude that characterised the glass workers both individually and collectively throughout this period. This defensive attitude was in some measure justified by past experience; there is no doubt that many manufacturers saw the reduction

of manufacturing costs as simply a matter of reducing wages. However, justified or not, there is also no doubt that the defensiveness of the men encouraged a suspicion of change in any shape or form and this hindered rather than helped the progress of the local industry during this period.

Perhaps the best example of the effects of the men's defence of the traditional working practices was the question of working hours. Traditionally hours had been fixed by the method of production whereby glass was produced in separate meltings, or "journeys" inbetween which production was completely halted whilst the pots and furnances were recharged. This was common to all English glass works although the length of the "journey" varied according to the type of glass produced: flint glass houses worked six hour journeys, bottle houses twelve hour journeys and flat glass houses twelve to fourteen hour journeys. This was not an economical method of production and following the repeal of the glass duties some attempts were made to change the British system. A notable success was the pressed glass firm of Sowerby and Neville which introduced an eight hour journey in place of the traditional six hour journey c. 1851. According to Samuel Neville,[22] their men had objected to it at the time but the firm had insisted and the workmen now agreed that the eight hour shift was in every respect superior to the six hour shift, not least because it enabled them to get three clear nights sleep a week. The eight hour shift had since been adopted by all the other pressed glass firms in the region but the six hour shift still prevailed in the blown flint houses, a fact which Neville attributed to "custom". This comment was echoed by David Martin the owner of a small blown flint glass house at Gateshead and the only blown flint manufacturer to work an eight hour shift. Martin had previously been employed in a large pressed glass works and found that the eight hour shift suited him better. The only

reason why the other blown flint glass houses did not also change he believed to be "prejudice".

Some change also occurred in the sheet glass industry by the 1860s: Hartleys had introduced four ten hour journeys in place of the traditional three journeys of twelve or fourteen hours. James Hartley told the 1865 Children's Employment Commission that he saw no prospect of working six journeys a week although this was "an object at which we are constantly aiming". No change had occurred in the bottle industry and this was to prove the branch of the industry in which the men were most resistant to change.

With the introduction of continuous tank furances the whole question of working hours became a more critical one since the men's reluctance to alter their traditional hours of work proved a potential obstacle to the full exploitation of the new process. The degree to which the potential for continuous production was realised varied from industry to industry according to how easily the traditional system could be adapted to it. The pressed glass houses, which had already established an eight hour shift system, took happily to continuous production. By 1882 Sowerby's Ellison works were working round the clock with three shifts working eight hour turns.[23] The bottle houses found it less easy to adapt because the men insisted on retaining the old system whereby two teams worked twelve hour turns. This was not so economical as a three shift system for, as the men themselves were only too ready to admit, working conditions at the continuous tanks were considerably more exhausting than at the old pot furnaces; the heat was greater and where the tank was not constructed or installed correctly gas leaked into the working area or, at worst, caught alight at the working hole itself.[24] As early as 1879 the Ayres Quay Bottle Company had been experimenting with three turns of eight hours[25] but the new system never

succeeded in becoming established despite its many advantages. The question was brought to a somewhat ridiculous climax during the 1890s when the movement for shorter hours was taken up by the bottle makers. In 1891 the Sunderland bottle makers began demands for a reduction in hours to a 10¼ hour journey with 1¼ hours for meals. They were offered instead an eight hour journey with three teams working but this they refused.[26] In Yorkshire an attempt to introduce a three shift system met with a strike and the bottle makers' secretary, Alfred Greenwood, stated his union's firm opposition to the system to the Royal Commission on Labour of 1894:[27]

> I should like to state here and now for the information of the Commission, as I may not have another opportunity of doing so, that the men see no reason why three shifts should be introduced.

J.J. Candlish of the Londonderry Bottle Works also gave evidence to this Commission but he was in no doubt at all as to the benefits of the three shift system and the misapprehension that lay behind the men's rejection of it:[28]

> The result (of a three shift system) would be this, that instead of the men being in the works 114½ hours in black glass and 119 hours in pale glass they would actually be in the works 136 hours; that is the three gangs would divide the 136 hours and the men individually, instead of being in the works 57¼ hours in black glass and 59¼ hours in pale glass, would actually be in the works only 45⅓ hours in each case ..... That would reduce the working hours in the week by fourteen for each man, it would have the effect of employing 50% more bottle hands in the trade than are now employed because we should employ three gangs instead of two, and it would increase the output of bottles 20 per cent., which would mean a very lessened cost of production.
>
> - Do your men object to that ? - Yes they object to it.
> - On what ground? - Because they do not understand it, I think that is the truth.
> - What objection do they assign? What reason do they assign? Some years ago the experiment was tried in Yorkshire, as you have heard from Mr. Greenwood, it was not successful for one reason and another, and the consequence is the men have a prejudice against it.

Two years later in 1893 the men at the Londonderry Bottle Works began to agitate for a 9½ hour journey. Candlish again proposed a three shift

system of eight hour journeys but this was again refused.[29]

Suspicion of change also affected any attempt to alter the traditional method of calculating the wages of the skilled glass worker. For all branches of the British glass industry the method of payment for the skilled men that had developed over the centuries was an extremely complicated one, incorporating a mass of piecemeal decision and regional variations. In essence it was a combination of time and piece work. In the bottle industry for instance the skilled bottle makers were paid on the basis of producing 62 dozen quart bottles a journey with everything over this amount paid as overwork. Different size bottles were catered for by detailed calculations as to how many were equivalent to 62 dozen quarts. These calculations were frequently extremely complex and according to one bottle maker the whole system "really can be described in the phraseology of the ancient trade guilds as a 'mystery' which no outsider can thoroughly hope to comprehend by two or three days study".[30] Although the basis of the system was piece work it was not a system of piece work that left the worker vulnerable to low wages and long hours. On the contrary the system was one which reinforced the status of the skilled glass worker, as distinct from the unskilled labourers who were paid by the week, and if anyone was left vulnerable by the system it was the manufacturer to whom the system meant high manufacturing costs.

There seems little doubt that the skilled glass workers considered their long established method of payment a fundamental part of their working practice and one that was to be protected at all costs, despite its unsuitability for an industry aiming at mass production. The skilled workers' attitude towards any change in the system is well summed up by

a comment in the blown flint glass makers' magazine in August 1887 following the union's rejection of a proposal to accept a guaranteed weekly wage. The change was rejected as not necessary but the men's main objection was that "it would bring down the glass makers to the labourers' levels". In 1846 as we have seen, John Sowerby's attempt to introduce a weekly wage had met with fierce opposition. At Hartleys, a strike in 1891 was in part provoked by the firm's attempt to introduce payment by footage of glass in the warehouse rather than by the cylinder. The men's main objection was that they would lose money because of the breakage that inevitably occurred in the warehouse. Even when a breakage allowance was proposed, however, they still refused and it is certainly possible to see in their refusal a reluct-tance to see themselves as an integrated part of a whole manufacturing process; a reluctance to remove the distinctions that existed between them and the unskilled labourers and warehousemen. Pilkingtons, it should be noted, had been paying their sheet glass makers on a footage system since 1870.

The over-defensiveness of the men and their suspicion of even reasonable change did not escape criticism at the time, but neither did the failure of the local manufacturers to respond positively to changes in the industry.[31] Since low manufacturing costs depended far more on the introduction of new technology than the men's acceptance of new working practices, the failure of the manufacturers certainly was the greater factor in the local industry's decline. A convenient way of assessing the response of the local manufacturers to change is to look at the introduction of gas fired furnaces and tank furnaces in the region. Were local manufacturers quick to realise the potential for greater and cheaper production that these developments offered? In the case of flat glass the answer must be no. Hartley's did not get around to replacing the old coal fired furnaces with gas furnaces until

1873; Pilkingtons had introduced them during the early 1860s. Nor was the firm any less tardy with tank furnaces which were not erected until the year long strike in 1891 by which time it was too late to save the firm: Pilkingtons had had twelve tanks in operation since 1877. An equal lack of foresight can be seen at the plate glass works at South Shields where it was not until c. 1880 that the old coal fired furnaces were replaced with the more efficient gas furnaces. The consequences of the failures of both flat glass firms in this respect will be looked at in more detail in the following chapter but for the moment it should be said that this was a significant factor in the demise of both firms, and furthermore that in both cases the failure was connected to a misplaced confidence in the region's traditional manufacturing strengths and in particular its advantages of cheap coal.

The record of the local bottle firms in this respect is more creditable By the early 1870s several of the younger firms had introduced tank furnaces (see figures 26A and B) and they were soon followed by the larger, older firms. The first of the older firms to adopt the new process was the Ayres Quay Bottle Company which pulled down an old house to erect a tank house in November 1879.[32] A second tank was erected in 1885.[33] J.J. Candlish erected a first tank at the Londonderry Bottle Works in 1886[34] and a second in 1891 which was said to have several modifications to his original design and to be quite unique in the country in its perfect ventilation and delightfully cool working conditions.[35] Tanks were also erected at the Southwick bottle works during the 1880s. There is no doubt that the local bottle manufacturers displayed a more realistic understanding of the industry's needs than their colleagues in the flat glass industry and in this context it is worth quoting at length a reported speech given by Sir James Laing, the senior partner in the Ayres Quay Bottle Company, to the Sunderland Chamber of

Commerce in 1896; a speech prompted by the sight of the recent demolition of Hartleys' works. Laing's implicit criticism of firms like Hartleys which failed to "go with the times" is unmistakable:[36]

> ...But with regard to one branch of the glass trade, the bottle trade, he remarked. For upwards of eighty years his father, himself and his partners had seen many and varied changes, and the only thing they had found to save them was to make up their minds to go with the times. Five or six- and - twenty years ago they had sent bottles to Gothenburg under the old system and at one time, as they could not agree on terms, the contract stopped. Well shortly after that, from their agent in London they received an intimation that bottles from Gothenburg were being sent into that city. Well, at the time, he said, they must go and see what they were doing in Gothenburg. Their old friends Messers Jno. Scott, Walker and Hall went there and saw a new process in operation. In this country at that time they were making bottles ten hours of the twenty-four and burning coals the rest of the day but according to the new or "tank" system they could make bottles the whole of the twenty-four hours. Well, he said, when these gentlemen made their report there was no help for it; they must raze their works and erect new plants. This they did and what had been the result? formerly they had six cones and the number they now had was equal to sixteen of those old cones, while they could turn out daily 80,000 bottles per day. He merely mentioned this to show that the loss of trade was often due to circumstances within the control of proprietors of the works. His firm certainly had had slight troubles with their work people but on the whole had got on amicably and their men had good employment, earned good wages, and the public generally benefited.

It can scarcely be doubted that the failure of both manufacturers and men to respond positively to new economic conditions and new technological developments in the industry was a significant factor in the decline of many of the north-east firms. One further factor in this decline should also be mentioned and that is strikes. It is impossible to look at this period without taking into account the friction that so frequently and visibly existed between manufacturers and men. Although, again, extreme difference of opinions are to be found in contemporary comments over who was to blame for this friction it was generally agreed that the inability of manufacturers and men to unite their efforts against the foreigner was a critical obstacle to the revival of the local glass industry.

There is no doubt that the many strikes that occurred during this period (which will be looked at in detail in the appropriate chapters)

FIGURE 26A: Table showing the number of glass bottle houses and furnaces in operation in Great Britain, December 1872[37]

	Number of Houses			Type of furnaces in operation			
	Number Working	Number standing	Total	4 pot	6 pot	Tank	Total
Yorkshire district (22 firms)	69	6	75	61	8	0	69
Lancashire district (7 firms)	17	1	18	1	0	16	17
Glasgow district (9 firms)	17	5	22	4	2	11	17
North of England district (16 firms)	53	17	70	43	0	10	53
Blaydon on Tyne district (2 firms)	4	5	9	4	0	0	4
Other districts (9 firms)	17	5	12	11	3	3	17
Totals	177	39	216	124	13	40	177

Source: Royal Commission on Labour, 1893-4 Vol 33. Appendix LXXXI.

FIGURE 26B: Detail of the North of England and Blaydon Districts

Firm	Situate	Number of Houses			Type of furnaces in operation			
		Working	Standing	Total	4 pot	6 pot	Tank	Total
A & E Featherstonhaugh	Deptford	7	-	7	7	-	-	7
Laing,Horn & Scott	Ayres Quay	6	-	6	6	-	-	6
W. Kirk & Co.	Ayres Quay	5	-	5	5	-	-	5
Alexander & Austin	Southwick	6	-	6	6	-	-	6
J. Candlish	Diamond Hall	4	-	4	4	-	-	4
Laing, Horn & Scott	Bishopwearmouth Bridge	2	-	2	2	-	-	2
R. Fenwick	Bishopwearmouth Bridge	2	-	2	2	-	-	2
J.W. Moore	Southwick	2	-	2	2	-	-	2
Newcastle Building Society	Hylton	-	2	2	-	-	-	-
J. Candlish	Seaham Harbour	6	1	7	6	-	-	6
N. Lambert	Shields	3	1	4	-	-	3	3
T. Walker	Hartlepool	1	1	2	1	-	-	1
	Bill Quay	-	4	4	-	-	-	-
G. Warren	St. Lawrence	1	-	1	1	-	-	1
G. Davison	Blyth	3	-	3	-	-	3	3
T. Ridley	St. Peter's	1	-	1	1	-	-	1
	Hartley	-	6	6	-	-	-	-
	Mushroom	-	1	1	-	-	-	-
J. Bowron	Stockton	4	1	5	-	-	4	4
Alexander & Austin	Blaydon	4	-	4	4	-	-	4
Cuthbert Gardner	Blaydon	-	5	5	-	-	-	-

did harm the local industry as a whole. Most obviously, strikes accelerated the demise of certain firms and this was clearly seen during the 1882-3 bottle strike which emasculated the industry almost beyond the point of recovery. Secondly, strikes caused orders, on which the glass houses depended, to be placed elsewhere; some of the bottle firms which managed to weather the 1882-3 strike found themselves forced to close soon after re-opening because of lack of orders. Thirdly, strikes encouraged the departure of skilled workers from the district; according to the membership of the bottle makers' society there were 391 bottle makers in the district at the commencement of the 1882-3 strike, by the end only 260 remained, the rest having gone to Lancashire or Scotland to look for work.[38] The drain of men was even more apparent during the strikes at Hartleys in 1884 and 1891. The Knights of Labour, which prided itself on being an international organisation, actively encouraged the emigration of some of the workers to America. During the 1884 strike the Sunderland Daily Echo commented on this:[39]

> The glass makers have a trade society which is unique in its way as it is literally an international one and is in fact the only trade union which can, with strict accuracy, be so described.... The advantages of this extended combination are obvious and they are being practically illustrated in the present emergency. Owing to the expected stoppage at Messers Hartley's works it has been decided to send a portion of those employed there to other places where labour is known to be in demand and a few men have already left for Pittsburg in America while a second contingent is expected to leave in a few days. The expenses of emigration are, we understand, defrayed by the union which is not only numerically but financially strong.

During the 1891 strike thirty sheet glass blowers left for America, twenty three of whom returned to Sunderland ten months later to collect their families and belongings, telling tales of the high wages and good employment they had found in America.

It is almost impossible to compare the effects of labour disputes in different areas of the country; was, for instance, the north-east bottle

strike of 1882-3 more damaging to the local industry that the Yorkshire bottle manufacturers' lock out of 1891-27? Partly because of this it is hard to accept some of the contemporary comments blaming union activity alone for the local industry's decline. All branches of the glass industry in all areas of the country experienced some degree of labour difficulties during this period. Perhaps more significantly most of Britain's foreign competitors experienced strikes and lock outs and in some cases with a far greater degree of bitterness; during the 1892 strike in Belgium two glass factories were razed by fire. What can be said about labour disputes in the north-east however is that they certainly aggravated the existing difficulties and not least of all diverted attention from the far more urgent issue of foreign competition.

It should also be said that those firms who did survive the difficulties of the period were, on the whole, those who enjoyed comparatively good relationships between manufacturers and men. The most notable example is the Londonderry Bottle Works owned by the Candlish family which, even at the time, was frequently singled out as a shining example of what could be achieved when manufacturers and men worked together in harmony. In 1886, on the occasion of the installation of the first continuous tank at the works the Newcastle Daily Chronicle noted that:[40]

> The firm have previously economised both time and method being ably helped by the workmen who have gone so far as to alienate themselves from the general union of their trade so that they might be better able to assist the energy and foresight of their employers. The consequence has been that while other works have been idle, the Londonderry Bottle Works have enjoyed a fair immunity from depression and been kept going with comparative briskness.

This fraternal relationship owed much to the personal initiative of the firm's owners, the Candlish family. The founder of the firm, John Candlish, had taken care to provide for the well being of his workforce by establishing a free library, a savings bank, a building society, and

encouraging a wide range of musical and sporting activities. This interest in the workforce was continued by his brother Robert and his nephew John Joseph. By the time J.J. Candlish assumed control of the firm the workmen had separated themselves from the other north-east bottle makers to form a union of their own. Decisions about the factory were discussed by a joint committee of workmen and managers. The militant Alfred Greenwood of the Yorkshire bottle makers described it to the Royal Commission on Labour as a "model factory". The evidence that JJ. Candlish gave to this Commission makes it clear that his own ideas on the relationship between him and his workforce went even further. He described in some detail his plans for giving the workmen an interest in the factory by making them shareholders. This, he maintained, was quite possible since they had considerable personal savings, which, at the present time, went into the co-operative stores and the savings bank. The only difficulty he foresaw was in persuading the men themselves to risk their savings in this way, he himself was convinced of its feasibility:[41]

> The question has been mooted, but, as I say, it has arisen only within the last few years prominently, and it is a thing that is new. It is rather slow work to get the men to work up to it and, in justice to the workmen, I must say it is rather slow work on the side of the employer to become reconciled to it, and make up his mind that it really is the best thing to do.
> - But you have arrived at that point? I have arrived at that point.

All the evidence suggests that Candlish's solicitude was recognised and appreciated by the workforce. When John Candlish found himself in difficulties following the collapse of the District Bank his workmen offered to help him by working without pay for a month. J.J. Candlish told the Royal Commission on Labour that there had been only one strike in the firm's history and that had occurred when the men were part of the bottle makers' society and had been obliged to come out with the rest. Many presentations were made to the Candlishs by their men, most usually

at the annual New Year's Ball held for the workforce at the firm's expense.[42]

The Ayres Quay Bottle Company also appears to have realised the benefits to both sides of good labour relationships. Following the 1882-3 strike the firm made a positive effort to inform its workforce of the factors at work in the trade depression by paying the expenses of a deputation of men to travel to London in order to see the conditions in the London bottle trade at first hand. This according to the Sunderland Daily Echo.[43]

> ... convinced them of a truth they scarcely recognised before namely that the Belgian manufacturers were under selling the English makers and thatsacrifices must be made if even the remnant of the trade which is left in the district is to be kept. The workmen are now, we believe, prepared to co-operate with the employers in the most effective manner by accepting such a reduction in wage rates as will enable the employers to compete successfully with their Belgian rivals.

As a result the men agreed to increase the basic rate of their wages from 62 dozen to 70 dozen and to reduce the rates of overwork by 7d per gross, as a result of which the firm was enabled to secure an important contract guaranteeing full production for the following year. Pressed glass firms also appear to have enjoyed reasonably cordial labour relationships.

It has been said in this chapter that none of the later qualifications made to the pessimistic contemporary comments on the state of the glass industry nationally apply to the north-east. Nevertheless some qualifications can be made to the picture of the north-east's decline. The first is that despite the overall decline some individual firms did survive and did so with credit; notably the Londonderry Bottle Company, the Ayres Quay Bottle Company, Sowerby's Ellison Glass works Ltd., Henry Greener & Co., and several other pressed glass firms. The records of patents taken out by north-east glass manufacturers during the last half of the century (appendix 5) show that the north-east was not completely lacking in

initiative and foresight. The second qualification is that thanks to the technological improvements in the industry, the actual output of the region's glass industry had not reduced so substantially as appearances might suggest: as J.J. Candlish told the Tariff Commission "the actual out put of the district is considerably greater than it was in the days before it was ruined".[44] (In view of the decreasing value of the finished product and the equivalent increase from other regions this qualification is a small one).

These are certainly qualifications but unfortunately they cannot disguise the overall decline in the region's glass industry during this period and in particular the loss of the manufacture of flat glass. The histories of the individual firms in the area must now, of course, be looked at in a more detailed way for their fortunes and failures varied considerably: some firms clearly suffered from a lack of managerial ability, others were forced to close because of strikes, others were successful. Looking at the area as a whole, however, some generalisations can perhaps be made. Broadly speaking the north-east appears to have suffered more than other areas from the national depression because of the failure of many firms in the area to adapt to a changing economic situation, the main features of which were severely competitive trade and unprecedented technological advances. The north-east firms, in common with other British firms, were to a certain degree handicapped by the commercial policy of the country and the discontent of their men but it is difficult to avoid the conclusion that the fundamental failure occurred within the industry at all levels and that it was, in simple terms, a failure to move with the times.

CHAPTER SEVEN: THE FLAT GLASS INDUSTRY

Although the repeal of the glass duties in 1845 had abolished the legal distinctions between crown, sheet and plate glass, the flat glass industry remained, for the most part, divided between firms which manufactured ordinary window glass and firms which manufactured plate. With the notable exception of rolled plate glass which, although having more in common with plate glass than sheet, was only manufactured by sheet glass firms (due entirely to the fact that its inventor, James Hartley, was a sheet glass manufacturer) the two types of manufacture remained separate. The one, brief, exception was R.W. Swinburne & Co. whose plate glass works at South Shields manufactured sheet glass until 1859 but thereafter concentrated on plate glass alone. It was not until Pilkingtons embarked on the manufacture of plate glass in 1876 that the two branches of the flat glass industry were once more brought together in one firm.

The distinction between the plate glass firms and the ordinary window glass firms must be made for in certain respects sheet, rolled plate, and plate glass were quite separate types of manufacture, serving different markets and attracting different degrees of competiton both at home and abroad. Although both plate and sheet served the same broad market, namely the building industry, the increasing sophistication of construction techniques created increasingly specialised demands for glass. In the first half of the century crown, broad and plate glass had been sold according to quality and had been more or less interchangeable depending on the desired appearance of the building. In the second half of the century glass was sold by its more practical features such as size, thickness and weight per square foot, which features to some extent restricted its possible uses; heavy plate glass, for instance, became quite unsuitable for certain glazing purposes, such as glass roofing, but uniquely suitable

for others, such as the glazing of shop windows. Plate and window glass also encountered different degrees of foreign competition. The main competition for sheet glass came from cheap Belgian or German glass. The main competition for plate glass came from France and the main attraction of the French glass over the English plate was its better quality; a consequence, it was said, of its different chemical make up.[1] The different economic conditions in which the sheet and plate manufacturers operated is reflected in the existence of two, quite separate, manufacturers' associations. The Crown and Sheet Glass Manufacturers' Association, dominated during the 1860s by the Pilkingtons, Chance Bros. and James Hartley, was a continuation of the pre-1845 Crown Glass Manufacturers' Association. The Plate Glass Manufacturers' Association was probably formed in 1858 and had as its first chairman R.W. Swinburne.[2]

The north-east flat glass industry must, therefore, be looked at in its two branches. Plate glass was represented in the area by the plate glass works at South Shields which was occupied until 1868 by R.W. Swinburne & Co., and by the Tyne Plate Glass Company until its closure in 1891. Sheet and rolled plate glass were manufactured at five north-east works: the Wear Glass Works of James Hartley, the Wearmouth or Southwick Works, the Hendon Plate Glass Works, the Pallion or North East Glass Works and the South Durham Glass Works at Hartlepool. All of these, save the latter, were at Sunderland. None of these glass works survived beyond 1900 and, despite the differences between the plate and sheet industries, broad similarities can be found in the individual histories of their failures. Broadly speaking, their failures all owed less to the conditions of either the sheet or plate trades than to the failure on the part of managers and directors to look realistically at the needs of the glass industry and in particular the need for low cost production. This is particularly true

of the two works which dominated the north-east industry - the plate glass works at Shields and the Wear Glass Works - and was particularly striking in both their cases for both works undoubtedly possessed the potential to survive and could conceivably have achieved a more creditable record during this period had their owners acted with more foresight.

1. The Plate Glass Works at South Shields

Although the Wear Glass Works of James Hartley was the more important from a national point of view, the plate glass works at South Shields was the more interesting from a local point of view for its development provides some interesting comment on the attitudes towards the glass industry held by some of the area's leading industrialists. Looking at the history of the works from 1850 until its closure in 1891, one of the most striking aspects is the succession of illustrious names connected with it - among them Robert Stephenson, Sir William Hutt, Nicholas Wood, R.P. Philipson and Charles Mark Palmer. In view of the involvement of these wealthy men, some of well proven business ability, the lamentable history of the works then becomes all the more surprising. In theory, at least, it possessed many advantages. Looking at its history in more detail, however, it becomes apparent that one possible reason for the works' poor performance over this period was that it continued to be carried on in much the same spirit as glass works on Tyneside had traditionally been carried on, that is as a subsidiary or complementary activity to other more important industrial activities such as coal mining. Traditionally, glass works on Tyneside had had their success well assured by the simple fact of the cheapness of the local coal. Past experience had given ample proof that it was possible for an industrialist to run a successful glass works without devoting the whole of his entrepreneurial energies to it. Acting on this past experience, those local industrialists who took on the plate glass works at South Shields appear to have done so in the belief that the glass industry was naturally suited to Tyneside and therefore needed neither attention nor, more importantly, capital investment.

The involvement of the glass works' various directors in other, more demanding, industrial activities need not necessarily have affected the

the glass works in an adverse way. It was not, after all, an unusual situation and until 1872 the works possessed a very competent managing director in R.W. Swinburne to take care of its day to day affairs. In this case however there are clear signs that the major directors' distance from the realities of the glass trade made them poor judges of the changing needs of the industry, and in particular the need for investment in low cost production techniques. For instance, until the 1880s the various directors appear to have placed great confidence in the belief that cheap coal was the most significant factor in low cost production; the phrase "no glassworks in England is more favourably situated for cheap labour and production" was repeated many times by Charles Mark Palmer and his advisers during the 1870s. Whilst this had certainly once been true, a more realistic assessment of the firm's position at that time would have seen that, thanks to the adoption of gas furnaces by the other English plate glass firms, no glass works in England was producing a more uneconomic or poorer quality product. Although Charles Mark Palmer eventually made a valiant effort to tackle the real problems of the works, he,like his predecessors, was almost certainly distracted for far too long by his confidence in the natural strength of the local industry. It is difficult to avoid the conclusion that, despite the prestige of being owned by men like Palmer, the glass works would have been far better served by directors who, like the Pilkingtons, concentrated all their resources on the glass industry and were able to recognize, assess and keep abreast of the changing circumstances of trade and technology.

The formation of R.W. Swinburne & Co. clearly illustrates the attitude that saw glass as a subsidiary industrial activity. The major figures in the new company (which took over the South Shields works from the Cooksons in 1845) were William Hutt and Nicholas Wood, both of whom were motivated

primarily by their existing interests - namely the colliery consortium of John Bowes & Partners and the Brandling Junction Railway. Both men were partners with John Bowes; Wood in addition was the engineer to, and a Director of, the Brandling Junction Railway. Hutt and Wood's interest in the glass works stemmed from the fact that John Bowes & Partners owned Marley Hill colliery from which coals suitable for glass works were obtained. Marley Hill was to the south-west of Gateshead and some distance from the glass works but, as a letter from Hutt to John Bowes in 1843 sets out, the Brandling Junction Railway provided a convenient means of transporting the coals to Shields.[3]

> I am going on Monday down to South Shields to see Swinburne and endeavour to arrange a contract with the Cooksons and with Shortridge. I have made proposals to the Brandling Company to know whether they would reduce the railway dues to South Shields on our understanding to send a certain quantity of coals down their line, they have replied that they are ready to consider the application if the coals be bona fide intended for a land sale. I believe that Swinburne is willing to take the Marley Hill coals at 13/- per chaldron. Now the case stands thus, the working charges of the coal, supposing there was a vend of 20,000 chaldrons, are at the rate of 3/4½ per chaldron (so Grey calculates). The present charges of the railway down to South Shields are 4/1½d per chaldron so that under present circumstances our outgoings would be 11/6d leaving a profit of 1/6d per chaldron ..... Nicholas Wood thinks that the Brandling Company will not reduce their dues lower than 6d, or below 3/6½d, which would leave a profit of nearly 2/- but Nicholas Wood thinks I may persuade Swinburne to give 13/3 or 13/6d for the coals and Shortridge is expected to give more. The small basis they have assigned us makes me anxious to secure a land sale.

Marley Hill, was by this time, already supplying much of Cookson's needs. The coal was sent down to Shields by keel from the staithes at Teams and the two major advantages of using the railway were firstly that it was cheaper and secondly that it was more reliable; Cookson's works required three keels of coals a day but, because of the inefficiency of John Grey the manager of the staithes, the supply was frequently short and Cookson was forced to buy elsewhere. Hutt attached great importance to securing the Cookson's custom by means of a contract and, thanks to his persistence, the contract signed in September 1844 gave John Bowes & Partners a more favourable arrangement than they had first envisaged:[4]

> I do not much doubt that we shall realize in a little time the scheme I explained to you about the glass house coal. By dint of daily pleading and coaxing I have got the Brandling Railway in order for sending our coals to Cooksons. We are to pay 3/- and every chaldron consequently yields a profit of 2/3d. I saw Swinburne, Wood and Grey and the railway people yesterday. I have great confidence that we shall start on Monday.

Hutt's interest in the glass works at South Shields was originally nothing more than as a useful customer for the Marley Hill coals. Nicholas Wood's interest, however, was more long standing and more extensive. By the end of 1843 Wood was already involved with R.W. Swinburne in a scheme to buy the works from the Cooksons. Wood already owned land and various investments in South Shields and may have been planning to acquire the glass works as early as 1840 when Swinburne and he had collaborated in a rather underhand attempt to take the Brandling Railway directly into the glass works. (The Commission of Enquiry into the Brandling Junction Railway[5] had severely criticised Swinburne and Wood for this business. Swinburne had purchased £22,000 worth of land at Shields "on behalf of the railway company" although none of the directors save Wood knew anything about it. The Enquiry found that the proposed new line at Shields was of no possible benefit to the railway company and had recommended that the purchased land be "thrown back on the purchasers" i.e. Wood and Swinburne.)

Wood, as a Director of the Brandling Company, had a double interest in the supply of coals from Marley Hill and, knowing this, Hutt appears to have engineered himself into the new partnership specifically to prevent Wood's possible domination of the whole operation. Hutt first learnt of Wood's ambitions towards the glass works from Swinburne himself who called on Hutt in December 1843 asking for an introduction to a London banker - J.A. Smith - whom Swinburne hoped would help in raising some capital for the new concern. Hutt's surprise in learning of Wood's intentions is evident from his subsequent letter to John Bowes.[6] He was also "a good

deal startled" to learn from Swinburne that Nicholas Wood was not only the engineer to the railway company but a director of it. Hutt's main concern was that the coal contract would be negotiated on less favourable terms to John Bowes & Partners but he was evidently impressed with the potential of the new company:

> I think he (Swinburne) will probably be successful. He only wants £30,000 at the outside. The Cooksons take a mortgage on the real property, charge an interest for the plant and ask nothing for the goodwill of the business.

Hutt decided to assist Swinburne as much as he could and reported to Bowes at the end of January 1844, that he and Swinburne were "huge friends" in consequence, and that Swinburne had promised that the new concern would continue to take coals from Marley Hill because "their men had got accustomed to the coals and liked them, which is always a matter of great importance in works of that kind.".

At first Hutt only intended to buy a share in the new company for his nephew but eventually decided to take a share himself; this may have been a consequence of the improvement in the glass trade that also made the Cooksons more reluctant to sell: [7]

> Swinburne has concluded matters with the Cooksons. After they found that he was in a position to treat for the purchase of the property and that the glass trade was improving, some of the partners became reluctant to sell it. That is they did not refuse to sell but they proposed terms which made the sale very difficult and on the other hand they offered him very favourable terms if he would renounce his engagements with me (for my nephew) and join them. Swinburne behaved well. He offered to go on with me and took some pains to get the terms mitigated - but I saw how the matter was and I told Swinburne to take care of himself. In this way the matter will be concluded. My nephew will be excluded but Swinburne will be made a partner. He came here yesterday to express his obligations. He assures me that he will do everything he can for the coals which, he says, are by far the best and the cheapest the firm can obtain. If he does what he promised, and I have no reason to doubt that he will, the sale of coals will be worth to us £1,5000 or £2,000 per annum.

The new company included, besides Swinburne, Hutt and Wood, Robert Stephenson, George Hudson and R.P. Philipson. Its exact composition is not

known but it seems likely that Hutt and Wood were the major partners. By 1850 Swinburne's two brothers William Alfred, who managed the London warehouse at 93, Upper Thames Street, and Thomas James, who helped in the management of the works, were also partners. The initial capital of the company is not known but the purchase price of the land was £30,000 which was mortgaged to the Cooksons and paid off by 1848.[8]

For the first fifteen years of its life the new company appears to have fulfilled its expectations. The abolition of the excise duties in 1845 had stimulated demand for all types of flat glass but, in particular, the hitherto expensive plate glass, as the Gateshead Observer reminded its readers in 1850:[9]

> Mr. Snowball, the draper, had had an old shop remodelled and given it a plate glass aspect - (plate glass in Bottle Bank!) It was reopened on Saturday and crowded with customers, thereby attesting the truth of Byron's lines:-
>
> Maidens, like moths, are ever caught with glare
> And plate glass wins its way where crown glass might despair.

The company made the most of this increased demand: a new casting table was installed in 1850 and by 1863 the works was producing 1,240,000 square feet of polished plate a year. This was more than four times what the works had produced under the Cooksons. At the 1851 Great Exhibition the company gave ample proof that it was also making the most of the new opportunities for experimentation that the lifting of the excise duties had created. Besides ordinary plate glass, the firm exhibited coloured, perforated and patterned glass plus plate glass coloured in imitation of semi-precious stones such as marble, jasper and malachite.[10] R. W. Swinburne took out patents improving the manufacture of plate glass in 1855 and 1861; the latter made an important contribution to the economy of the process by removing the need for a double fusion of the materials. Thomas James Swinburne also took out a patent, for annealing ovens, in 1855.

In his address to the British Association in 1863 R.W. Swinburne voiced considerable optimism both about the flat glass trade, which had improved "beyond all anticipation" since 1845, and the plate glass works at South Shields. Notwithstanding, five years later, at the beginning of 1868, the works closed with little prospect, it was said, of their being reopened.[11] The precise causes of the closure are not known but it seems fair to assume that the difficulties of R.W. Swinburne & Co. were not dissimilar to the later difficulties of their successors, the Tyne Plate Glass Co., namely heavy financial losses caused by low selling prices and high production costs. One possible cause is that the abandonment of the manufacture of sheet and crown glass in 1859 was already having adverse consequences. The decision to abandon the manufacture of ordinary window glass was said to have been precipitated by a bad fire in 1859 which destroyed the blowing houses at the Shields works.[12] There were certainly more fundamental reasons behind the decision, the most obvious of which was that the company was aware of the increasing domination of the sheet glass industry by the three leading firms - Pilkingtons, Chances and Hartley. During the 1850s R.W. Swinburne & Co. operated four sheet and crown houses; Chances and Pilkingtons had nine houses each, Hartley had six but was rapidly expanding. Swinburnes could not have hoped to catch the three leaders up without a massive programme of expansion which the company's directors evidently felt was either not possible or not worth the expense. With hindsight, the decision to abandon the manufacture of ordinary window glass was an unfortunate one. In the later years of the century plate glass became the type of flat glass most vulnerable to foreign competition and most firms which manufactured plate glass alone were not able to survive the 1890s. Pilkingtons, who took up the manufacture of plate glass in 1876 were only able to absorb the losses made in their plate glass department with the large profits made on their sheet glass.

A second possible cause of the firm's difficulties was the continued existence of the polishing department at Newcastle, quite separate from the casting works at Shields. This was self-evidently uneconomic (see page 452) and even before the new company reopened the works in 1868 it announced its intention of removing the polishing department to Shields.

The re-opening of the plate glass works in August 1868 by a company headed by Charles Mark Palmer illustrates again the attitude that saw glass manufacturing as a subsidiary activity. Like Hutt and Wood, Palmer was motivated by interests beyond the glass trade. Like Hutt and Wood, Palmer was also a partner in John Bowes and Partners, which continued to supply the works with coal, but his primary motive was not industrial but political. In July 1868 Palmer suddenly and unexpectedly declared himself as a rival Liberal candidate to the existing candidate, J.C. Stevenson, in the South Shields parliamentary election. His attempt to split the Liberal vote created an "immense sensation" as did his equally sudden purchase of the dormant glass works. Inevitably the glass works figured prominently in Palmer's election campaign: in July, for instance, he told an election meeting that "he hoped Shields would in future become as celebrated for plate glass connected with his name as Jarrow had been for shipbuilding."[13] When the works re-opened it did so decked out in Palmer's election colours to the sounds of cannons booming and bands playing. This, perhaps deservedly, gave rise to much cynical comment about Palmer in the Shields Gazette which was owned by J.C. Stevenson.

Palmer had certainly not taken on the glass works in entire ignorance of its real circumstances. He had taken advice from R.P. Philipson, who actively supported Palmer in his election campaign, and R.W. Swinburne. Both of these men evidently had faith in the basic soundness of the concern and, in later years, Palmer often referred to his "having got into the

concern from representations which have unfortunately not been realised."[14] The new company consisted of Palmer, holding 11/16th of the shares, John Irving Pascoe, holding 4/16th, and R.W. Swinburne, holding 1/16th. Swinburne left in 1872, selling his single share to Palmer for £2,500[15]. Pascoe quit the concern in 1879[16] leaving Palmer as the works' sole owner. Palmer's decision to take on the plate glass works was without any doubt the worst mistake of his career. Not only did it burden him with a heavy loss making the concern but it also jeopardised his other more successful ventures, most notable John Bowes and Partners. It is hardly surprising that the Tyne Plate Glass Company is conspicuous by its almost complete absence from contemporary accounts of Palmer's otherwise successful life: according to one writer "success has attended this remarkable son of Tyneside in all his multifarious undertakings",[17] but the Tyne Plate Glass Company was evidence to the contrary. Not only was the company a disastrous commercial failure but it also failed to persuade the voters of Shields to elect him in preference to J.C. Stevenson.

The most critical problems of the Tyne Plate Glass Company from 1868 until 1886 (when it was turned into a limited liability company) were financial: firstly because more often than not it was manufacturing at a loss, and secondly because it was weighed down by increasingly heavy liabilities in the form of mortgage and loan repayments. From 1876 to 1886 the company only managed to save itself from total collapse by seeking financial support from John Bowes & Partners which not only provided comparatively long term capital for improvements to the plant but also met the company's day to day trading losses. There is no doubt at all that without the support of the larger company the glass works would have closed many years before it actually did, which in many respects would have been preferable to its prolonged and costly decline. By putting off the

works' closure until 1891 Palmer extricated himself personally from the unfortunate concern but at great cost both to himself and to John Bowes & Partners.

The first approach to John Bowes & Partners was made in January 1876 when Palmer wrote to Hutt saying that the Tyne Plate Glass Company was compelled to look for another banker as the National Provincial Bank had treated their account in a hostile manner[18] (Palmer did not mention why but at the time the glass company's overdraft stood at £22,000). According to Palmer, Woods & Co. were willing to take on the glass company and to advance them £15,000 but they needed a guarantee which, Palmer hoped, John Bowes & Partners could provide. Neither Hutt nor Bowes had any objection and the guarantee was given. Palmer followed this up with a period of intensive capital raising. The previous year he had finally completed the purchase of the property from the heirs of Nicholas Wood (for £43,000) and in February 1876 he mortgaged it to the Standard Insurance Company of Edinburgh for £45,000.[19] In September 1876 the insurance company advanced a further £6,000 on the life policy of Palmer's son Alfred Molyneaux Palmer (who by this time was helping in the management of the glass works), and Palmer began to investigate the possibility of a second mortgage from John Bowes & Partners. This second mortgage, of £50,000, was completed in November 1876 and, in addition, John Bowes & Partners advanced a further £1,000 to the glass company as a temporary loan for "some pressing alterations".[20]

For the next few years Palmer continued to draw sums of money from John Bowes & Partners' in the Tyne Plate Glass Company's name. By June 1879 Palmer's personal account with the coal company stood at £93,931 and the Tyne Plate Glass Company's account stood at £78,711.[21] These advances were understood to be temporary, short term credits, made in order to

help the glass company over its temporary difficulties; in reality they were far more permanent. John Bowes should perhaps have become suspicious in November 1878 when Woods & Co. wrote to him complaining that the advance of £15,000, which was supposed to have been repaid by the glass company in instalments, had not been repaid.[22] As the guarantors John Bowes & Partners were forced to honour the debt. A full realisation of the situation and its consequences for the coal company did not, however, come about until May 1879 when J.V. Gregory (the manager of the coal company, on the request of Hutt who had become alarmed at the extent of Palmer's liability, went to the glass works to inspect its accounts, and talk with Palmer and George Warden (the manager of the works since the departure of Swinburne in 1872). Gregory's subsequent letter to Bowes outlined the unfortunate reality of the situation.[23] Firstly, the fact that the temporary loans to the glass works had reached a sum "beyond anything we could have anticipated." Secondly, that the glass works were manufacturing at a loss and showed no signs of making a profit in the forseeable future; largely because of "the enormous charges of interest payable to us and others". Thirdly, that although the withdrawal of their financial support would be easy it could have disastrous consequences, since not only were they themselves owed large sums of money but they had also bound themselves, as guarantors, to meet the glass works' debts to others. Gregory's conclusion was somewhat alarming: "It therefore appears to me that the suspension of the glass company might easily happen to involve that of John Bowes & Company".

Two days later Gregory consulted R.P. Philipson who came to the same conclusion: that the glass works were virtually the property of John Bowes & Partners and "the two must stand or fall together".[24] Both Gregory and Philipson did, however, take a cautiously optimistic view of the situation

and advised Bowes that continued support of the glass works would, in any case, be the most prudent course as the glass trade showed some signs of reviving and Palmer blamed much of the company's difficulties on the inefficiency of Warden whom he had recently replaced as manager.[25] Bowes had very little choice but to agree to continue the financial support of the glass works. Further advances were sanctioned and the interest due from the Tyne Plate Glass Company (£2,122 for the six months ending June 1879) was carried into a suspense account "until such time as such interest can be seen as profit". In addition a further mortgage of £7,000 was negotiated with Bowes' solicitors E. & J. Western. A summary of the glass company's account for the half year to June 1879 clearly shows how heavily the company was weighed down by interest charges on previous loans and how much money John Bowes & Partners were committing themselves to providing in order to sustain the company:[26]

Summary of the Tyne Plate Glass Company's account, January - June 1879

New advances	6,993	11	5
Paid off to Woods & Co.	1,500	-	-
" " " the National Provincial Bank	792	2	4
" " " S. Clarke & Co.	500	-	-
" " " Lambton & Co.	1,300	-	-
" " " Hyman	2,043	6	1
Coals etc.	471	6	33
	13,600	6	1
Interest in suspense account	2,122	9	10
	15,722	15	11

It is hardly surprising that by June 1882 the glass company's debt to the coal company should have increased to £140,576 16s 2d (excluding the interest).

The decision of May 1879 to continue the support of the glass company was to some extent forced on John Bowes by the existing situation, but there is no doubt that the risk to John Bowes & Partners, should the glass company have collapsed was a real one. John Bowes & Partners itself depended on an extensive system of credit rather than a large capital

An assessment of the firm, (which itself underwent a financial crisis from 1876 to 1886) made in 1885 found that "the firm has latterly been carrying on a gigantic business upon credit with insufficient capital and that this credit was largely given because of "the popular belief that Mr. Bowes was an exceedingly rich man and the known fact that Mr. Palmer was undoubtedly an able man of business".[27] A collapse on the scale of the Tyne Plate Glass Company would, almost certainly, have precipitated a withdrawal of credit from the coal company and certainly would have damaged Palmer's reputation on which the credit system in part depended. The decision of May 1879 did in some respects make the coal company's position worse. There is no doubt that the demands of the glass company were a major factor in the coal company's own financial crisis, and it was also the major cause of the animosity that developed between Hutt and Palmer, Hutt considered that the glass company was "wholly alien" to the interests of John Bowes & Partners and he made no secret of the fact that he blamed Palmer personally for both companies' difficulties. Interestingly, Hutt particularly blamed the glass company's lack of success on the fact that Palmer was not able to devote all of his time to it; other English plate glass manufacturers, according to Hutt, were successful because they superintended their works in person but Palmer "absents himself for weeks and months and hands the business over to others".[28]

The financial difficulties of the Tyne Plate Glass Company were, of course, a reflection of more fundamental problems, namely inefficient management and an uneconomic method of production. With the comparative security of John Bowes' promised continued support, and with a 15% advance in the selling price of glass from March 1880, Palmer began to turn his attention to these real problems. In April 1880 he travelled to Belgium to engage a new manager for the casting house, "which has always been

the weak place in the management", and returned with a German whom he was reported to be very pleased with. In October Palmer embarked on a programme of improvements which largely involved the replacement of the old coal fired furnaces with new gas furnaces. The benefit was two fold: firstly, the quality of glass was improved (the quality hitherto produced was said to be worse than any other English made plate glass), and secondly it was hoped that the cost of production would be lessened. By November 1880 Gregory was able to report to Bowes that the quality had been improved but the diminished cost was less certain:[29]

> It is certainly disappointing that you have not found the Tyne plate glass equal to that of foreign manufacture. There is no doubt however that a considerable improvement has recently been made in their glass, the quality was much worse previous to the alterations. The quality is now a fair, saleable quality in England. I feel more anxiety about the cost than about the quality. It was anticipated the alterations would cause a diminished cost of production. It is perhaps too soon to judge of this yet but the cost does not appear yet to be lessened.

By May 1881 it was clear that the cost had not in fact been lessened and that further advances would be necessary in order to make further experiments with gas furnaces. An added blow to the company was the departure of the new German manager who left because he did not like the locality. By this time even Bowes was beginning to protest at the escalation of the advances to the company and Gregory, who appears to have spent most of his time dealing with Palmer's finances, had a hard job in persuading him that further advances were in his own interests. For his part Palmer promised that this further trial of the gas furnaces would be his last chance "if they (the gas furnaces) do not succeed to our entire satisfaction it will then become a question of closing the works".[30] Fortunately the new experiments met with success and by July 1881 the cost of production was said to have been reduced by 2d per square foot:[31]

Estimated cost of plate glass, 1881: cost per square foot

	May	June	July
Rough plate	6.80d	6.00d	5.00d
Grinding	3.40	3.50	3.25
Smoothing	1.75	1.80	1.70
Polishing	2.40	2.50	2.25
Warehousing	.85	.85	.80
Discount & charges	1.30	1.30	1.30
	16.50	15.95	14.30
Interest to Bowes & Partners, Standard Ins. Co. etc.	3.00	3.00	3.00
	19.50	18.95	17.30

Some idea of the scale of the company's losses can be gained from the fact that the average selling price of plate glass throughout 1881 was 1s 3d per square foot; this was said to be the lowest price ever known.[32]

In October 1881 Gregory was able to make a comparatively optimistic report on the glass company to John Bowes & Partners.[33] The cost of production had been reduced and was expected to be further reduced with the building of new mixing houses and kilns "to remedy a want of economy which arises from the machinery departments being able to do more work than the producing departments". Gas heating was to be extended to the annealing kilns and there were hopes of a 20% increase in the selling price of glass. The only matter for concern was Palmer's lack of "a thoroughly first class; practical, technical manager" but in January 1882 Palmer appointed a new manager who immediately showed a marked ability to improve the works: "I believe" wrote Gregory to Bowes, "they have at last got the right man for the job".[34] A price rise did come into effect early in 1882 and, with slightly more favourable prospects for the immediate future, Palmer embarked on a further programme of improvements which increased the works' capacity from 22,500 square feet per week to 30,000. By the beginning of 1884 the worst was certainly over and, although the company's debt to John Bowes & Partners had not been substantially reduced, the company was able to operate on a more independent basis than before. The coal company continued

to protect the glass works and when the Standard Insurance Company's mortgage was due to be repaid in 1883, Bowes & Partners again agreed to act as guarantors for the interest repayments to the Friends Provident Institution, a Quaker society from Bradford to which the mortgage was transferred.

There is no doubt that Palmer's main aim in persevering with the glass company was to bring it to a point where it was sufficiently sound to enable its structure to be altered. The existing structure of the company whereby Palmer was its sole owner and capital was raised by repayable credit from outside sources was clearly highly unsuitable for the works' needs. The works could only be put on a more premanently safe basis by a massive injection of permanent capital both to reduce production costs even further and to avert the need to seek short term capital from outside sources. The most obvious way in which the structure of the company could be altered was by turning it into a limited liability company. Palmer had been contemplating this possibility since at least 1880 but at that time it was not a feasible course of action:[35]

> Mr. Palmer would only be too glad to turn the glass works into a limited company, which has more than once been thought of; but until it is brought round into being a paying concern it is not practicable as the public would not take shares.

A second possibility was to amalgamate the company with other English plate glass companies and in August 1885 Palmer opened negotiations with the directors of the Union Plate Glass Company at York.[36] The amalgamation would, Palmer told Bowes, be of great benefit to the Tyne works "as they have capital to carry on of which we are very deficient.". Despite a number of "satisfactory" meetings between the two companies in September 1885 the proposed amalgamation was not realised but Palmer, as we shall see, did no abanddn the idea.

The solution that was eventually settled on was the transformation of the firm into a limited liability company and the Tyne Plate Glass Works Ltd. was incorporated on 16 July 1886.[37] The benefit of incorporation was two fold: firstly it indemnified Palmer himself from liability for the firm's losses, and secondly, it provided a framework for raising new capital. In this particular case, however, only one of these benefits was realised. The incorporation automatically released Palmer from personal liability for the company's existing debts, and a carefully worded paragraph to this effect was inserted in the articles of incorporation, but it did not attract new capital to the glass works. The nominal capital of the company on its incorporation was £150,000 divided into 1,500 shares of £100 each. Seven subscribers put their names to the articles of incorporation and £85,000 of the nominal capital was "deemed to have been fully paid up." This £85,000 was the purchase price paid by the new company to Palmer as the vendor of the works and it was paid by the allotment of the first 850 shares to Palmer. Palmer, in turn, allotted the first six of these shares to the other six subscribers "as the nominees of the vendor". Thus, although £85,000 was "deemed to have been fully paid up" no actual capital had been advanced. The six other subscribers were all business associates of Palmer: his son Alfred Molyneaux, Edward Browne - the manager of the glass works, J.V. Gregory, Robert Watson Cooper - a Newcastle solicitor, John Price - the manager of Palmer's shipbuilding company, and James Hall - a partner with Palmer in the shipping company of Palmer & Hall. All were distinguished local men and the hope, one must assume, was that public money would be attracted to the glass works as a consequence of their association with it. This hope was not, however, realised. One month after the company's incorporation it was voted that the capital be increased by issuing 200 preference shares with the right to 5% above the profit paid

on the ordinary shares. None of the remaining ordinary shares were issued and in 1887 it was voted that the ordinary share capital be reduced to £85,000 by cancelling the 650 unissued ordinary shares. By December 1890 it was clear that the company was not attracting public money in anything like the quantities envisaged. In addition to the £85,000 worth of ordinary shares "deemed to have been fully paid up", only 40 of the preference shares had been issued yielding the comparatively meagre sum of £4,000.

The limited liability company was thus a mixed blessing for Palmer: it had extricated him from personal liability for the works' losses but it had committed the company to raising capital from a public that was evidently unwilling to invest in it. It was this that led Palmer to revive the idea of amalgamating with other English plate glass works; as he wrote to Richard Pilkington in 1889 "we who are under the limited liability act with shareholders must go to the public for additional capital, you have the advantage of dealing with it privately".[38] Pilkingtons had started to manufacture plate glass in 1876 and, typically, had invested large sums (£300,000) in the project, equipped the works with the latest machinery, rapidly overtaken their older British rivals and come to dominate the British industry; by 1888 their works were producing 70,900 square feet of polished plate per week, or more than double the capacity of the Tyne works.

From August to October 1885 Palmer corresponded with Richard Pilkington on the subject of amalgamation, but it is clear from these letters that Palmer's enthusiasm was not in the least shared by Pilkington. According to Palmer, all English glass works were equally vulnerable to foreign competition, "we must admit they manufacture cheaper than in England", partly because of the foreigners' modern works but partly because of their cheaper

labour. Pilkington did not share the view that English plate glass works were naturally at a disadvantage but, despite a distinct lack of encouragement, Palmer pressed on with plans for an amalgamation. He approached a M. Gerard Van de Linde to act as mediator between the four English glass companies and drew up a memorandum of points to be considered. The points raised in this memorandum make it quite clear that Palmer was acutely aware of the need to introduce new machinery to the works but lacked the capital to do so himself. He proposed that the English plate glass industry be rationalised "by apportioning the country off to the works most suitable for supply" and refitting these works with new machinery according to "the foreign system which enables them to produce glass at least 4d per foot below the cost of manufacture in this country". The capital for this would be raised by issuing preference shares . The particular piece of new foreign machinery that Palmer had in mind was the polishing machine invented by the Belgian, M. Malevez, and patented by him in 1888. Palmer's son had visited the Belgian and French glass works during the summer of 1889 and had returned convinced of the value of the Malevez machinery. Palmer opened negotiations with Malevez in August as, so he thought, a part of the amalgamation proposals and on behalf of all four English plate glass works. On October 9th he reported to Richard Pilkington that, "the inventor Mr. Malevez is withdrawing his proposals from us as he is filled up with work in his own country. We should not lose a moment in securing his patent for this country". What Palmer did not at this time realise was that the Pilkingtons had opened negotiations with Malevez on their own account and on October 14th Malevez returned to England to visit the St. Helen's works and discuss the purchase of his patent with them. When, two weeks later, Palmer learnt that the Pilkingtons had bought the patent without consulting him and, not only that, had done so for themselves

alone, he was, understandably, furious. In reply to a strongly worded letter from Palmer, Richard Pilkington protested that he had never encouraged the amalgamation plan and considered himself under no obligation at all to inform Palmer of his firm's intention.

Pilkington's purchase of the Malevez patent cemented their domination of the English plate glass industry. According to an American plate glass manufacturer who visited the works in 1893:[39]

> They have 12 Mallevez Machines (Polishers) running, each producing 4,000 sq. ft. per week, and are putting on eight more, which will give them 20 polishers and from which they expect to get 80,000 feet of glass per week.... Mr. P. seemed very anxious to sell us the sole right to the Mallevez patent in America, he claiming it to be the Key to the business in England, and whoever bought the American right would find it the same in America.

The smaller English factories all collapsed during the 1890s: the Union Plate Glass Company in 1891, the London and Manchester Company in 1893, and the Tyne Plate Glass Company in October 1891. A meeting of the shareholders held on the 3rd of October was told that the company "could not because of its liabilities continue in business ". The 280 hands were given notice to terminate and the newspapers were told that the closure was caused by "the unrenumerative prices now obtained for plate glass, foreign competition being exceedingly keen.".[40]

It is impossible not to sympathise with Palmer's almost heroic effort to resue the Tyne Plate Glass Company from the severe difficulties it found itself in by 1876. His strenuous effort must, however, be seen as too little too late. By 1876 neither he nor the firm was in a position to raise the massive amount of capital that was necessary to replace the out of date coal fired plant and increase the works' capacity to an economic level; the gap between the works' poor equipment and the demands of the glass trade for good quality, low priced glass was an impossibly large one. Indeed it

is arguable that by 1876 no amount of capital could have saved the works at all for, as a manufacturer of plate glass alone, it was doomed to failure. It is worth remembering that Pilkingtons' success with plate was in part due to their large profits on sheet glass with which the firm was able to sustain the losses made on plate. None of the English plate glass firms survived beyond 1905; the two longest lived - the British Plate Glass Company at Ravenhead and the London and Manchester Glass Company at Sutton Oak - were both acquired by Pilkingtons in 1901 and 1905 respectively. With this in mind it is quite possible to see the last thirty years of the Tyne Plate Glass Works' life as a protracted closure beginning in 1859 when the manufacture of sheet glass was abandoned. By 1876, when Palmer at last began to recognize that a glass works needed far more than a constant supply of cheap coal for success, it was already too late to avert the works' inevitable end.

2. The Sunderland sheet and rolled plate works

The manufacture of ordinary windowglass in the north-east during this period was dominated by one firm - James Hartley & Co. The reasons for the firm's closure in 1894 are broadly similar to those that caused the collapse of the Tyne Plate Glass Company in 1891, namely a failure to reduce the cost of production to a level that matched the low selling prices established by the cheap foreign imports. Hartley's collapse was different, however, in that it was more sudden and to some degree more unlikely. Whereas the plate glass works, even under R.W. Swinburne & Co. could never have laid claim to being a major English flat glass producer, James Hartley & Co. could. During the 1860s the English window glass industry was dominated by three firms - Pilkingtons, Chances and Hartleys. Between them these three produced 75% of English sheet glass and 100% of English rolled plate glass; they controlled prices by their domination of the manufacturers' association, they suppressed competition at home by collaborating in the purchase of smaller English factories in order to close them down. Given this domination of the home industry plus the increasingly severe competition from abroad, it is hardly surprising that many of the smaller English window glass firms found themselves unable to survive; according to William Moor, the managing director of the South Durham Glass Company, in 1893 "the low prices that have prevailed for imported glass have rendered it impossible for any but the largest of home manufacturers to successfully compete against foreign makers".[41] Hartley's collapse is, on the face of it, less easily explained but in fact Moor's comment is equally appropriate for by the 1890s Hartleys was no longer the large firm it had once been. From 1870 onwards, the firm experienced a real and relative decline as a manufacturer of both sheet and rolled plate; this is easily seen by a comparison between the development of the

firm and the developments of its two rivals, Chances and Pilkingtons.

During the 1860s Chances, Pilkingtons and Hartleys were more or less of equal size.[42] All three operated ten glass houses (in Hartley's case two were for rolled plate, eight for sheet) and employed roughly 600 - 700 men. During the 1870s none of the three extended the size of their works but whereas Chances and Pilkingtons consolidated their position by the introduction of improved methods of production, Hartleys did not. The first major technological development of the period was the regenerative gas furnace which was patented by the Siemens brothers in 1861. Chances started experimenting with gas furnaces almost immediately and they were soon followed by Pilkingtons. Hartleys, in contrast, lagged behind the others by over a decade and it was not until 1875, during a strike stoppage, that a first Siemens gas furnace was installed.[43] The second, and more important, technological development was the tank furnace. Pilkingtons installed their first tank furnance for sheet glass in 1873 and by 1877 were operating twelve. Hartleys again delayed and it was not until 1891, again using the opportunity of a strike stoppage, that a first tank furnace was erected. Chances also delayed the introduction of tank furnaces until the early 1890 s with almost equally disastrous consequences; Chances also fell seriously behind Pilkingtons in the production of sheet glass and by the 1890s were a far smaller firm than their rival. The Birmingham firm had, however, been making technical progress on another front with the development of a machine for a near-automatic production of rolled plate glass on which, along with their production of specialist optical and ornamental glass, the firm came increasingly to depend. Hartleys had no technical initiative to show in either the sheet or the rolled plate departments and faced the severe foreign competition in a far more vulnerable position than either its two rivals.

The degree to which Hartleys had fallen behind Pilkingtons by the 1890s is well illustrated by the claims made by the company formed in 1892 to take over the Sunderland works. The company's prospectus (see below) boasted of the works' 14 existing Siemens gas furnaces plus the two planned tank furnaces and it envisaged the works' production of sheet glass to be worth £59,084 per annum yielding a net profit of £7,780 per annum. These claims can be compared with Pilkingtons' real statistics for the previous year. In 1891 Pilkingtons had produced sheet glass to the value of £120,681 and the net profit on all their glass concerns had amounted to £136,530. They had had 16 tank furnaces in operation since 1886.

It is unfortunate that no records of Hartleys have survived but a reasonably complete picture of its development can be built up from its public activities which provides some basis from which to explore the question of why the firm did not maintain its earlier momentum. Before looking at the decline of the firm after 1870, something must be said about its more prosperous state during the 1850s and 1860s, and in particular the manufacture of rolled plate glass.

In James Hartley's obituary it was claimed that much of his prosperity was due to his invention of rolled plate glass which he patented in 1847. In many respects this claim was an accurate one. Not only was rolled plate glass a lucrative and marketable commodity in its own right but it also helped to strengthen Hartley's position in relation to his two rivals, Chances and Pilkingtons. In the early 1850s both Chances and Pilkingtons were larger and potentially more powerful concerns than Hartleys. Hartley's elevation into a position of equal power was to a very large extent a consequence of the agreement of 1854 which restricted the manu-

facture of rolled plate to the three firms alone. It is perhaps significant that Hartley had originally intended to license the manufacture to other firms but was persuaded not to by R.L. Chance and William Pilkington who clearly recognised the potential of the new glass.

Rolled plate glass was ideally suited to the market demands of the day. The Crystal Palace of 1851 provided a conspicuous example of the possibilities of light framed glass and iron structures, and rolled plate was uniquely suited to take advantage of this new trend in construction. Rolled plate was similar to rough, or unpolished, plate in that it admitted light without being transparent. It was different to rough plate in that it was lighter and therefore more practical; rough plate was ¼" to ½" thick and weighed up to 4 lbs per square foot, rolled plate could be manufactured as thin as 1/8th inch and weighed 2 lbs per square foot. Despite its thinness, rolled plate was said to be no less strong than rough plate and well able to withstand British weather. It also had the advantage of being the cheapest type of flat glass on the market and, in addition, it was decorative (rolled plate was usually manufactured with a fluted surface but could be impressed with a variety of decorative patterns). Rolled plate was, therefore practical, cheap and well suited to the demands of the day. Railway station roofing provided the most famous example of the use of rolled plate (Monkwearmouth station, built in 1848, is said to have been the first station to make use of rolled plate) but it was also employed in a variety of other popular Victorian structures such as conservatories, shopping arcades and glass houses.

From the manufacturer's point of view rolled plate glass was also ideally suited to the needs of the day in that it was cheap to manufacture. It was cheaper to manufacture than ordinary plate glass because less care was needed; in the manufacture of ordinary plate the metal had to be melted

in a number of separate small cuvettes the entire contents of which were thrown onto the casting table thereby avoiding air bubbles in the finished plate, rolled plate could be manufactured by ladling the metal out of a large melting pot onto the table as required, the resulting air bubbles being hidden by the glass's unpolished surface.[44] Rolled plate was also cheaper to manufacture than sheet glass because it only required unskilled, and therefore cheap, labour. The description of the plate glass workers as "unskilled"was not perhaps entirely true for, at least at Hartley's works, the plate glass department was manned by the old crown glass blowers who had been moved there as the demand for their original skill disappeared.

Despite the low selling price of rolled plate glass it was a profitable type of glass to manufacture. Before Hartley licensed the patent to Chances and Pilkingtons, he was said to have profited handsomly from his invention. Although all three firms concentrated their resources on the production of sheet glass, there is no doubt that rolled plate provided them with a steady and not inconsiderable return; not least because its cheap selling price immunised it against foreign competition. It is regrettable that Hartleys, as the original inventors of rough plate, did not maintain the lead in its production. In 1872 Pilkingtons erected a completely new rolled plate plant because demand for the glass was "excessive". Chance Bros. went even further with the development of a machine which produced rolled plate by nearly automatic means. By contrast the only development in Hartleys' rolled plate appears to have been a development for the worse; Sunderland rolled plate glass was said to have decreased in strength by the 1888s because of the greater use of sand, for cheapness, in the metal.[45]

There is no doubt that the invention of rolled plate encouraged the growth of the firm during the 1850s and 1860s, and it is regrettable that

James Hartley did not apply his considerable practical knowledge of glass making to any further inventions. Although Hartley did not die until 1886, he retired from a practical involvement in the firm's affairs in 1869. For some years previously he had been diverting his energies into non-business pursuits (in 1864 he had become Mayor of Sunderland, and in 1865, the town's Member of Parliament), and in 1869 he transferred the management of the works to his second son, John; his first son, James, had gone into the army. John Hartley was assisted in his duties by J.J. Kayll, the manager of the works whom Hartley had taken into partnership in 1848, but despite Kayll's assistance John Hartley was unable to maintain the firm's prosperity. He evidently possessed neither the entrepreneurial flair of his father nor his practical knowledge of glass making and must take much of the blame for the firm's lack of progress after 1870.

Despite the absence of records from the firm it seems fair to assume that from 1870 onwards the firm was increasingly beset by financial problems caused by high costs and low prices. Severe financial problems are certainly suggested by the firm's labour relations which grew increasingly troublesome from 1870 onwards. With the price of glass continually falling and the firm's failure to introduce low cost production techniques, the firm appears to have been obliged to pursue a policy of reducing production costs by reducing wages; a policy which inevitably provoked a hostile reaction from their employees.

Hartley's workforce was divided into two groups: the skilled sheet glass workers (the blowers, gatherers, flatteners and cutters), and the unskilled plate glass workers and labourers (the teazers, founders, cavemen and warehousemen). Although working side by side these two groups remained separate and distinct. They were paid on a different basis, the skilled

workers being paid by piece work, the unskilled by the week. They worked different hours and they traditionally made separate and uncoordinated demands on their employer; for instance, in 1874 the labourers struck for an increase of 6d per shift plus time and a half on Sunday, but the skilled workers sided with Hartley and the strike collapsed when foreign labourers were brought to the works to replace the striking men.[46]

The division between the skilled and the unskilled workers was at root historical and dated from the introduction of highly paid Continental sheet glass workers into England during the 1830s. The division was underlined in the second half of the century by the unionisation of the skilled glass workers long before the unskilled. A National Sheet Glass Workers' Association, including workers at Chances, Pilkingtons and Hartleys, emerged briefly during the 1870s to disappear by 1876. A more successful attempt at a national union was made in 1884 when the Knights of Labour, a powerful American organisation of workers, recruited the English sheet glass workers to their "Local Assembly No. 3,504" otherwise known as "The Window Glass Workers of England".[47] It was not until 1889 that the unskilled labourers and the rolled plate hands joined the National Labour Union. The emergence of the Knights of Labour at Sunderland, which became the centre of the Knights' activities in England, rather than at St. Helens, where the Knights failed to attract much support, was almost certainly no accident and must be seen as a reflection of the Sunderland workers' feeling of need for protection against their employer. This feeling is in part explained by the events of the previous decade and, in particular, the failure of the National Sheet Glass Workers' Association to support the Sunderland workers during their first serious strike in 1875.

The 1875 strike was generally agreed to have been "won" by the employers. The main result, as far as the men were concerned, was merely to demonstrate

the impotence of their union. In 1873, because an increase in the price of raw materials had forced the selling price of sheet glass up from 2d to 4d per foot, the men were given an advance of 15% in their wage rates; this was said to have been the first advance they had received for twenty years. Hartleys' men were not entirely satisfied with this because Chances' workers were to receive a 25% advance but they eventually accepted it.[48] In 1875 the selling price of glass was reduced to 3d per foot and Hartley announced that the 15% advance was to be deducted. Hartleys' men, plus the sheet glass workers at the Southwick works who were also affected, felt that this was unreasonable, particularly as Chances' men were only having 15% of their previous advance of 25% deducted. In June the men came out on strike and both works were temporarily closed. A deputation of men was immediately send to Chances' men, who were of course linked to the Sunderland men by the National Sheet Glass Workers Association, and returned with promises of support. Chances' men had not come out on strike and, despite their promises, appear to have done little to support their fellow workers in Sunderland. Hartley used the opportunity of the stoppage to erect new gas furnaces at the works and in July reopened it. It was soon clear that the strike was failing, not only was Hartley able to supply his customers by transferring orders to other sheet glass works but some of his men agreed to return to work at the reduction. A sympathiser wrote to the Sunderland Daily Echo advising the men to return to work even though their cause was just:[49]

> At present I cannot see how the men can win for they are meagrely supported by their brothers in the south, a portion of men have started at the reduction and the orders they cannot make are being supplied by other masters and foreign manufacturers. They are wasting the funds they have and are carrying on a struggle which may prove ruinous to both masters and men.

Ninety four men at Hartleys and seventy from the Southwick works remained out for twenty four weeks but in November were forced to submit on rather ignominious terms; not only did they agree to the reduction but Hartley

reserved the right to re-engage only a portion of the strikers, the rest were dismissed.

Perhaps understandably, nothing more was heard of the National Sheet Glass Workers' Association. From 1875 until 1884 the Sunderland workers do not appear to have maintained any formal links with workers in other parts of the country, and, even at Sunderland, disputes between employers and employees were settled on a factory basis by individual action. The disappearance of concerted union action did not however decrease the men's power to protect their interests, as is well illustrated by the troubles of the Southwick works in 1884.

The Southwick works had, since 1875, been carried on by a limited liability company which, despite being called the Wearmouth Crown Glass Company Ltd.,[50] also manufactured sheet glass. The company was dissolved in 1881 on the petition of its major creditor and major shareholder, Robert Preston, a Sunderland slate merchant. Preston continued to operate the works by himself and in January 1884 refused a demand from his sheet glass workers for an increase in wage rates.[51] The men stopped work and in February Preston offered them a slight increase. This was discussed and, after a vote of nine to seven, the blowers and gatherers agreed to return subject to the acceptance of the flatteners. Preparations were made for a return to work and eight pots of material were melted. When the blowers and gatherers returned however, they changed their minds and decided not to accept Preston's offer after all. The furnaces were put out and the melted material, £100 worth, was spoiled. An angry Preston immediately brought actions against all his workmen for damages, and when these failed (the magistrate decided that the seven who had originally voted against the return to work were not bound by the agreement to return, and neither were the remaining nine as the agreement was a conditional one) he decided to

abandon the manufacture of sheet glass altogether and dismissed his workmen. The 23 blowers, gatherers and flatteners immediately brought actions against him for wages in lieu of notice. The Southwick works continued to manufacture rolled plate glass until the end of 1884 but it had certainly closed by the end of 1885.

It was perhaps fortunate for the Knights of Labour that they should have made their first approaches to the Sunderland sheet glass workers so soon after these events, interpreted by some as a clear example of the tyranny of employers. In May 1884 Henry Burtt, the secretary of the Pittsburgh branch of the Knights of Labour, which in fact constituted a national union of window glass workers in America, came to Sunderland canvassing support for a proposed international union of window glass workers.[52] He was greeted with great enthusiasm at a large meeting of glass workers held in the town. The idea of an international union was welcomed and two of Hartley's men, Thomas Henzell and James Brown, were elected to go to Charleroi in Belgium where the first international congress of glass workers was to be held. Henzell and Brown returned in June and soon after their return the Sunderland men were given positive proof of the advantages to be gained from belonging to a large, powerful and wealthy union.

In August 1884 Hartley give notice that the men's present contracts were to be terminated and replaced with new ones at reduced rates. The men immediately struck, alleging - amongst other things, and no doubt as a result of their recent contact with Belgian workers - that they were working under worse conditions and at lower wages, considering the lower standing of living, than operatives in Belgium.[53] The strike lasted until November and throughout the Knights of Labour provided ample proof of strength. The workers received £1 a week strike pay. Some men emigrated to America at the

expense of the union. Henzell and Brown returned to Belgium at the expense of the union to investigate the possibility of introducing the Belgium system of working (this was found to be not possible). Delegates from America and Belgium were brought to Sunderland to help in the negotiations with Hartley. The eventual settlement saw the blowers and flatteners concede a reduction of 5% in return for a reduction in hours. The gatherers and cutters remained on the same rates as before. It was generally agreed to have had a successful outcome from the men's point of view.

One of the effects of the strike was to reinforce the distinction between the skilled and unskilled glass workers. During the strike the unskilled plate glass workers had received no strike pay at all and had, not surprisingly, returned to work two months before the sheet glass workers and at considerable reductions in pay of between 2s and 5s 6d per week. During the strike, the Sunderland Daily Echo published an account of the wages the workers at Hartley received which gives a useful picture of the differences between the various operatives (figure 27). As the paper itself pointed out, although the wages of the labourers such as the teazers and cavemen appeared to be high they worked exceptionally long hours and the work was extremely arduous; neither did they receive free firing. In 1889 the labourers struck for an increase of 2s per week and, again, time and a half for Sunday work claiming that they were working a 96 hour week.[54] The skilled workers, by comparison, worked a week that was frequently well below forty hours, and the sums mentioned by the paper were almost certainly beneath their true earnings. William Potts, a Sunderland sheet glass worker who had moved to Pilkingtons, included in a letter to the paper of November 1885 the comment that the men at Hartleys "must quit the idea of £4 a week for 32 hours work". In reply Joseph French, the secretary of the

Knights of Labour's Sunderland assembly, accused the wages at Pilkington's factory of being so poor that they "would only yield £2 for a full week's work". The men at Pilkington's were certainly paid on a less favourable basis in that, since 1870, they had been paid according to how many cylinders were safely delivered to the warehouse and they were paid on different scales according to their skill. The men at Hartleys deplored the lack of unionisation amongst Pilkingtons' men and blamed it on what they imagined to be the Pilkingtons' reign of terror over their workforce.[55]

The next major test of the Knights of Labour's strength occurred in 1891. By this time the American glass workers had withdrawn from the international association but still maintained a link with Local Assmebly no.3,504 at Sunderland. In March 1890 the men at Hartleys received a 10% advance in wage rates but in February 1891 notice was given that this was to be deducted because of the state of trade. The men felt that the state of trade did not warrant a reduction and the Knights of Labour agreed to co-operate with the National Labour Union (to which the unskilled workers now belonged) in a strike.[56] This strike lasted until December when the men agreed to return to work on the old terms whilst the matter was being settled by an independent arbitrator. The labourers had agreed to return in September for, although they were in a slightly less vulnerable position than they had previously been, they were still less prepared than the Knights of Labour to meet the cost of a long strike. The Sunderland workers continued to receive support from the American Knights of Labour; in June the secretary of the Sunderland men, James Brown, sailed to America to raise funds and by the time of his return in August the workers were said to be receiving £100 a week from America.

Although the 1891 strike had begun on the comparatively simple issue of wage reductions, a more complex issue soon emerged. In February Hartley

Figure 27: Glass workers employed at the Wear Glass Works, 1884.

Type of hand	Method and rate of wages	
I. In each sheet glass house		
10 blowers	piece work	c.40s - 45s.
10 gatherers	" "	c.30s - 34s.
1 founder	weekly wage	39s
1 manager	" "	39s
4 teazers	" "	31s
2 cavemen	" "	26s
13 boys	" "	12s
II. In each plate glass house		
16 plate hands	weekly wage	23s - 34s
1 founder	" "	39s
4 teazers	" "	31s
2 cavemen	" "	26s
2 boys	" "	8s
III. Others		
30 cutters	Piece work	?
20 flatteners	" "	?
2 pot makers	weekly wage	40s
15 mixers	" "	31s
20 bogie men	" "	19s
20 boys	" "	8s
12 cratemen	" "	?
20 mechanics	" "	?

(Taken from the Sunderland Daily Echo, 11 & 13 September, 1884)

had suddenly introduced a completely new demand; that the sheet glass workers be paid according to the footage of glass delivered to the warehouse instead of, as hitherto, the number of cylinders they produced. It was the question of footage that prolonged the strike to its eventual thirty-four weeks, Both sides remained absolutely adamant; the men, that they would never under any circumstances accept footage, Hartley, that he would not reopen the works without it. Eventually it was agreed to put the question to arbitration and two arbitrators were agreed on in November. The works were restarted but two weeks later came to an untimely halt once more when a serious fire destroyed most of the property.

The fire of December 1891 was undoubtedly a disaster. The company had been greatly weakened by the long stoppage and found itself unable even to attempt to rebuild the works; on January 5th 1892 a receiver was appointed. Although the firm was beyond rescue some hope for the works emerged in February when it was reported that a group of the firm's creditors was contemplating floating a new company to take over and reconstruct the works. This hope was realised and in November 1892 a prospectus was issued for a new limited liability company, James Hartley & Co. Ltd.[57] The directors of the new company were all local men[58] and the prospectus expressed great optimism about the works' future. The nominal capital of the company was to be £100,000 but only £15,000 was wanted immediately to purchase and reconstruct the works. The works had, in fact, been sold in August to a body called the Northern Trust Ltd. for £19,000 on mortgage. The new company was incorporated in November 1892 and by March 1893 had issued 1,891 preference and 1,882 ordinary shares. The Sunderland Daily Echo was soon reporting building activity at the works and the construction of two new continuous tanks was begun. In February 1893, at the request of the unemployed glass workers who had remained in the area and who were all in "dire poverty",

one of the old pot furnaces was relit and 150 men were put to work. In April the reconstruction was sufficiently complete to enable the first of the continuous tanks to be lit. 200 men were put to work and it was hoped that the full complement of 500 - 600 would soon follow. The works continued to operate until October 1894 when it was reported that the 200 employees had received one month's notice. It was hoped that the stoppage would be only temporary; the Sunderland Daily Echo described the event as "a precautionary measure owing to the accumulation of stock caused by an unparalleled depression in the glass trade",[59] and it was hoped that the stoppage would only last "until such time as the stock can be reduced to more manageable proportions". The works did not, however, reopen and was demolished in 1896.

The immediate cause of Hartleys' closure is, thus, easily explained: it was the consequence of three events which occurred in quick succession, a long strike, a fire and a severe depression in trade. The new company was certainly unfortunate in the timing of the reopening of the works. Pilkingtons' net profit fell from £116,131 in 1892 to £48,798 in 1893 and £21,510 in 1894.[60] Chance Bros. made overall losses of £80 in 1893 and £6,187 in 1894. Neither firm recovered its former profitability until 1896. Even if the new company had delayed the reopening until a more favourable time, it is still doubtful whether it would have been able to save the works. More fundamental causes were also to blame for the closure of the works and chief among these was the failure of its owners to introduce new productive techniques such as the continuous tank. Until 1892 the works remained under the ownership of the Hartley family and it seems impossible not to link this failure to the limitations of family ownership. That a family firm was not in itself a handicap to progress is amply demonstrated by the example of Pilkingtons; in the case of Hartleys, however, the family

failed to provide the necessary business talent to sustain the firm. John Hartley, who took over the management from his father in 1869, was evidently a poor judge of the changing conditions of the time. On his untimely death in 1886 the firm was carried on by his widow on behalf of their infant son; during this period the firm's debts increased substantially and the infant later sued his mother for the loss of his inheritance.[61] It was perhaps appropriate that the 1892 company, despite calling itself James Hartley & Co. Ltd., should have included no member of the Hartley family amongst its directors or shareholders. A previous attempt to incorporate the firm had been made in 1879 and it is perhaps unfortunate that this attempt was not successful;[62] had new directors and new capital been brought to the works at this date it is possible that the works' decline could have been halted. The works was demolished in 1896 but the department manufacturing coloured and ornamental glass for stained glass windows was transferred to a small glass works at Portobello in Monkwearmouth where the firm of Hartley & Wood continues to the present day.

The problems of the Wear Glass Works did not discourage the establishment of two new flat glass works in Sunderland during the last quarter of the century: the North East Glass Works of Sherwood & Co was established in 1879 and the Hendon Glass Company Ltd. was incorporated in 1883. Both glass works were called "plate glass works" but almost certainly only manufactured rolled plate (Hartley's patent had by this time expired) or rough plate for roofing. Rolled plate was a less demanding type of manufacture than either polished plate or sheet glass and both works were comparatively modest. The more successful of the two, the North East Glass Works, was begun in 1879 by Mr. Sherwood, an accountant, who was said to have had experience of the glass trade.[63] The works was converted from an old foundry next to Pallion station and began work in 1880. In October 1883

it was reported that the works was so successful that extensive additions were necessary and by 1884 it included two plate glass houses, both using a tank system, and employing 100 men. The works continued until c.1900 apart from a temporary stoppage in 1893 due to the depression in trade.

The Hendon Glass Company was a more ambitious but less successful venture. The company was incorporated in 1883 with a nominal capital of £25,000,[64] by October 1883 808 shares had been issued and the building of a completely new glass works next to Hendon station had begun. The seven original shareholders included Edwin Scott, an analytical chemist and the firm's managing director, and Walter Horn jr., a glass manufacturer, both of whom were connected with the Ayres Quay bottle manufacturing firm of Laing, Horn and Scott, (The other shareholders were W.H. Dixon, R. Millbanke Hudson, George W.L. Hudson and John Marshall, all of whom were ship owners, and Richard Foster a mining engineer.) The works were erected with a tank system which was only to be expected considering that tanks were already employed at the Ayres Quay bottle works; tank furnaces were particuarly suitable for the manufacture of poor quality glass such as bottles or rolled plate. The works began to manufacture in February 1884 but were soon encountering financial difficulties. In April 1885 a special meeting of the shareholders authorised the directors to borrow £3,000 on debenture and in June 1885 a further £1,000 was authorised this was to be used to redeem the mortgage on the works. In October 1885, following a court action against the company for non-payment of rates, a meeting decided that the company be voluntarily wound up because it was unable to meet its liabilities. The works appears to have been demolished soon afterwards.

CHAPTER EIGHT: THE BOTTLE INDUSTRY

The development of the north-east bottle industry during the last half of the nineteenth century contains something of a paradox. On the one hand, like other branches of the local industry, it appeared to suffer a dramatic decline. On the other, three of the most notably successful local glass firms were bottle manufacturers: these three firms - the Ayres Quay Bottle Company, John Candlish & Sons, and Alexander & Austin - all entered the twentieth century with revived hopes having all demonstrated to great effect that the difficulties of the period were not insurmountable. Whilst there can certainly be no doubt about the proficiency of these three firms, neither can there be any doubt that the local bottle industry as a whole experienced some sort of a decline during the last thirty years of the nineteenth century. A comparison between the bottle industry of 1872 and of 1891 produces clear evidence of the startling reduction in the number of furnaces and bottle hands employed in the industry in the north-east; a reduction that is underlined by the corresponding increase in other parts of the country (figure 28). It should be pointed out that the figures for furnaces are not so significant as they perhaps appear, in that the majority of furnaces in operation in 1872 were pot furnaces, the majority in 1891 were tank furnaces capable of producing a far greater quantity of molten glass. The number of bottle hands is a less ambiguous measure (the traditional method of producing bottles by hand survived until the development of the automatic bottle machine in the early twentieth century) and was also used by J.J. Candlish when, in his evidence to the Tariff Commission in 1907, he drew attention to the decline in the number of "gangs" at work in the north-east:[1]

> Bottle making in the North of England was originally confined to the making of "black bottles" for wine and for the exportation of beer. In 1872 there were 214 gangs engaged in this work; in 1882 we had only 125 gangs; in 1892, 86 gangs; in 1902, 70 gangs; and in 1904,

> 71 gangs, and only about half of these working in black glass ..... I take the number of gangs as the basis of comparison because furnaces would not be a true comparison, having altered so much in their capacity.

Candlish also provided the commission with a list of the firms and number of gangs that had disappeared from the north-east in the last half century (figure 29).

How can this dramatic decline in the north-east bottle industry be matched to the fact that three of the firms within the industry were manifestly successful? Candlish's mention of black bottles points towards the explanation. What the north-east industry experienced during this period was a double sided development. On the one hand the period saw the collapse of what might be called the traditional north-east bottle industry; that is an industry based on the production of cheap black bottles using small, coal fired pot furnaces. On the other side it saw the establishment of a more modern type of bottle industry, better suited to the market demands of the time, producing a variety of types of bottle, using gas-fired tank furnaces; it was this latter type of industry that the three leading firms in the area represented. Perhaps inevitably it was the least welcome side of this parallel development, the closure of established bottle firms and the demolition of bottle cones that had been a conspicuous part of the industrial landscape for over one hundred years, that tended to attract the most contemporary comment. But the more positive side of the industry's development during this period should not be underestimated; as J.J. Candlish told the Tariff Commission, "the actual output of the district is considerably greater than it was in the days before it was ruined".

The prime cause of the collapse of the traditional black bottle industry in the north-east was usually said to be the invasion of the English market by cheap foreign black bottles. With the advantage of low labour costs, foreign bottles had always posed a potential threat to the English

FIGURE 28: Table showing: a) number of glass bottle furnaces, and b) number of glass bottle hands, in Great Britain in 1872 and 1891

DISTRICT	a) FURNACES						b) HANDS					
	1872			1891			1872			1891		
	working	standing	total	working	standing	total	men	apprentices	total	men	apprentices	total
England:												
Sunderland	53	19	70	6	4	10	138	504	642	60	162	222
Seaham Harbour				5	2	7				35	85	120
Yorkshire	69	6	75				214	689	903			
Blaydon on Tyne	4	5	9				13	35	48			
Newport	-	-	-	66	28	94	-	-	-	377	1,365	1,744
London	-	-	-				-	-	-			
Lancashire	17	1	18	25	9	34	55	173	228	176	486	662
Bristol	2	0	2	2	1	3	11	37	48	13	47	60
Brierly Hill	1	0	1	1	1	2	5	11	16	15	21	36
Totals:	146	29	175	105	45	150	436	1,449	1,885	676	2,166	2,842
Scotland:												
Glasgow	17	5	22	10	2	12	55	173	228	15	151	166
Portobello	7	5	12	4	5	9	8	22	30	12	52	64
Leith	2	5	7	-	-	-	5	13	18	-	-	-
Alloa	2	0	2	2	1	3	7	18	25	15	50	65
Ireland:												
Dublin	5	0	5	5	3	8	12	78	90	21	129	150
Totals	34	15	49	21	11	32	91	318	409	63	382	445

Parlt. Papers 1893-4 (c.6894-IX) Vol. XXXIV: Royal Commission on Labour; minutes of evidence and appendices given before Group C, appendix LXXXII.

Figure 29:

The Tyne District	Houses	Gangs or Holes
Seaton Sluice	6	24
Bill Quay	4	16
Shields	4	16
Coulthards, St. Peter's Quay	2	12
Ridleys, St. Peter's Quay	2	8
Shields, Mill Dam	2	8
The Close	2	8
Ouse Bridge	1	4
Mushroom	1	4
	- 24	- 100
The Wear District		
Deptford	6	24
Diamond Hall	4	16
Kirks, Ayres Quay	4	16
The Panns	22	8
The Bridge	2	8
Hylton	2	8
Goldey's, Southwick	1	4
Deptford Quay, Parks	- 23	- 92
The Tees District		
Stockton	4	18
Hartlepool	2	8
Middlesbro'	1	4
	- 7	- 30
Totals	54	222

manufacturers' home market, but it was not until the late 1870s, and the adoption of the continuous tank process by many foreign manufacturers, that this threat became real. J.J. Candlish gave a rough chronology of the foreigners' advance to the Tariff Commission:

> In the late seventies the foreigners first invaded our market with black bottles. They drove us gradually out of that, our special trade; in the eighties they had practically captured our trade in the export beer bottles and now we have the extraordinary spectacle of ships discharging, within a few yards of a British bottle works, cargoes of bottles from abroad for a brewery in the same town. Fortunately a home trade in bottled beer sprang up which sustained our black bottle industry for some time ..... The foreigner has now attacked and largely captured the home beer bottle trade and we, having been driven out of both these trades to a large extent, have had to take to the Yorkshire pale glass trade and the foreigner is now commencing on that.

The British manufacturer's response to this foreign invasion was two-fold. Firstly, he could attempt to reduce his own manufacturing costs to match those of the foreign manufacturers; the indispensible element in this response was the introduction of continuous tank furnaces and it is worth recalling here the speech of Sir James Laing quoted in chapter six in which he attributed his own company's decision to install tanks to a visit made to the bottleworks in Gothenburg where they had seen the tank process in operation. Secondly, the British black bottle manufacturer could diversify his production and take up the manufacture of types of bottles which were not so vulnerable to foreign competition. This was a particularly crucial response for the north-east bottle manufacturers for it was the black bottle trade, in which they were traditionally strong, into which foreign bottles were making the greatest incursions. Something should perhaps be said here about the assortment of bottles being produced in Britain in the latter half of the century, and the various markets for which they were intended.

Broadly speaking, British bottles could be divided into three categories: cheap black bottles, pale bottles, and high class wine bottles. The cheap black bottle was the staple of the north-east industry and by the middle

of the century was firmly attached to the trade in bottled beer, ale and stout. Glass bottles had been used to package these comparatively cheap alcoholic drinks throughout the first half of the century, but the association had certainly been encouraged by the repeal of the glass duties. The connection between black bottle manufacturing and brewing was well illustrated in the north-east by a bottle manufacturer, such as Robert Fenwick, who was also a brewer; or by Laing, Horn & Scott of the Ayres Quay Bottle Company who were also ale and porter merchants. By the 1860s most brewers and drinks merchants had extensive bottling departments and the larger north-east bottle firms were said to have done most of their trade with large London firms: the Ayres Quay Company, for instance, had a contract with M.B. Foster & Sons, London bottlers of beer, for many years; John Candlish was said to have done business with some large brewing concerns who "took the bottles off him as fast as they could be moulded".[2] The market for bottled beer was greatly stimulated by the growth of colonial markets and John Candlish was fond of relating how, when visiting India as a part of the Parliamentary enquiry into the expense of the Abyssinian war, he had been served with one of his own bottles.

Pale bottles, or bottles manufactured in clear metal, supplied a quite different market. Pale bottles were used to package comparatively new types of commercial drinks: soda water, mineral water and artifical aerated drinks such as lemonade and cherryade. Pale bottle manufacturers also supplied the trade in druggists' and chemists' bottles which had previously been supplied by flint glass manufacturers. The manufacture of pale bottles was a relatively new branch of the bottle industry, dating from the second quarter of the nineteenth century when it had established itself in Yorkshire. Fortunately for the Yorkshire manufacturers, foreign competition was not nearly so intense in the pale bottle trade although, as William Bagley a

Yorkshire manufacturer, explained to the Royal Commission on Labour, there was increased competition from other British firms:[3]

> As a rule the foreign competition is in dark coloured bottles such as wine bottles and beer bottles, and the Lancashire manufacturers ceased to make these different types of bottles and commenced in the pale bottle trade which is chiefly Yorkshire trade. When I speak of the pale bottle trade I mean such bottles as soda water bottles, confectionery bottles, and druggists' bottles. That trade some twenty years ago was confined entirely to Yorkshire, but now these bottles are made in Lancashire, in Scotland, and in the north of England as well.

The manufacture of pale bottles was introduced into the north-east by the firm of Alexander, Austin & Poole which took over a bottleworks at Blaydon c. 1861. The major partner in the firm, Alfred Alexander, was already manufacturing pale bottles at the Hunslet glass works near Leeds and appears to have transplanted the Yorkshire methods complete to Blaydon. Blaydon's connection with the Yorkshire industry is underlined by the fact that the bottle workers at Blaydon belonged, not to the north of England bottle makers' union, but to the Yorkshire union.[4] Alexander & Austin (as the firm had become by 1865) was said to be one of the first firms to whom Hiram Codd licensed the manufacture of his patented mineral water bottle with a glass marble and a crimped neck. The Blaydon works also specialised in coloured druggists' bottles made in pale, amber, green or blue metal.[5] One of Alexander's partners, John Battle Austin, was a Sunderland shipbuilder and the firm soon expanded its operations by taking over a vacant bottle works at Southwick near Sunderland. The Southwick works, however, was intended for the manufacture of the traditional Sunderland black bottle and did not manufacture pale metal bottles until the late 1880s when, like the other Sunderland black bottle firms, the firm was forced to expand its range of products. At least one other north-east manufacturer pioneered the production of pale bottles in the area. This was J.S. Davison whose "Patent Bottle Works" at Blyth began production in 1868.[6] Although very little is known about Davison's operations at Blyth, his numerous patents for different

methods of stoppering bottles indicate that he was concerned with the problem of producing a bottle suitable for use when its contents were aerated and pressurised. In 1884 Davison moved to another bottle works at Low Fulwell near Sunderland. This venture was short lived but it is quite interesting that when the works was restarted in 1892, the manufacturer was a Yorkshire man, Richard Henry, who traded under the title "The Yorkshire Bottling Company".[7]

The third category of bottles was high class wine bottles. These bottles were manufactured from black or green glass but they differed from the cheap black bottle in that, being intended for a slightly more expensive trade, they required a better finish and a more attractive proportions. This branch of the bottle industry appears to have been introduced to the Sunderland firms in 1879 when the Sunderland Daily Echo reported that some of the local bottle firms had begun to manufacture a type of bottles called "Belgian clarets" which had hitherto been imported into the country.[8] This development was almost certainly connected with the relaxation of the excise regulations surrounding the bottling of wine in bond. Until 1879 importers of wine were compelled to sell wine in casks or have it bottled abroad. The relaxation of the regulations, which was said to have come about through the lobbying of north-east wine merchants aided by Newcastle's M.P. Joseph Cowen,[9] allowed them to bottle the wine themselves whilst it was in bond. This development created a new market for British bottle manufacturers and at least in the north-east, the new types of wine bottles were quickly added to their range alongside the beer quarts and pints. The wine bottles encountered some opposition from the men, largely because they had to be turned in the mould in order to give the exterior a smooth finish, but were eventually accepted when it was agreed that the blowers would receive four shillings extra per journey for turning the bottles.[10]

Candlish's bottle works at Seaham appears to have been particularly strong in the manufacture of these types of black bottles, as J.J. Candlish told the Royal Commission on Labour in 1892:[11]

> There are two classes of work; there is what we may call the high class trade, and there is a cheap trade. The high class trade is what my business consists of mostly, a trade with high class wine merchants who bottle expensive wines and spirits, and must have a very high class bottle and be sure that it will not lose its contents. There is also a cheap beer trade throughout the country that is supplied with a cheap article, a low priced article, which comes from the Continent.

Of the three categories of bottles it was the first, the cheap black beer bottles, that encountered the most severe foriegn competition; and it was the black bottle manufacturers of the north-east who found the need for a positive response to this competition most pressing. As suggested above this response was usually twofold and involved the reduction of production costs and the diversification of production. Both factors are clearly present in the histories of those firms - the Ayres Quay Bottle Company, Alexander & Austin, and Candlish & Sons - which survived into the twentieth century.

By the 1890s all three firms had continuous tanks in operation and all were manufacturing a far greater variety of bottles than they had done thirty years earlier. In the 1850s negotiations between the men and their employers on the rates of piece work had only concerned the traditional pint and quart bottles. By the 1890s agreement had to be reached on a far greater assortment: turned bottles, screwmouth bottles, burgundy clarets, champagne pints, pale and half pale bottles.

If the survival of these three firms rested simply on the matter of reducing costs and diversifying production, the question that immediately arises is why did not more of the north-east bottle firms respond in this positive way instead of abandoning the trade completely to the foreigner as so many of them did? One answer to this question can be found in comments made by the surviving manufacturers in 1891 at a meeting between

them and officials of the bottle makers' union.[12] When asked by the men to explain why so many other manufacturers had quit the trade, the manufacturers unanimously agreed that the fundamental cause was the low profits to be got from the bottle trade; particularly in the period following the strike of 1882-3 which, according to George Alexander, "drew all the profit out of the trade", and which, according to James Laing "killed the trade and let the foreigners into the market". It was, according to these manufacturers, simply the discouraging effect of the low profits that had caused their former colleagues to quit; as James Laing put it "Do you think property would be sacrificed if there was any possibility of carrying them on at a profit?" For their part, they only remained in the industry because of a stubborn hope that trade would eventually improve. Alfred Alexander provided a good illustration of the tenacity of the surviving employers when he told the meeting " I can give you my word I won't give up my Works even if I make very little out of it. For one or two years I have not even got my 5% interest on my capital". Even taking into account the fact that these comments were made by manufacturers, ever ready to protest that trade was poor, there seems no reason to doubt that poor profits did discourage investment and therefore contributed to the decline of the industry in the area.

A chronological account of the development of the bottle industry during this period is perhaps best based on the relationship between the bottlemakers and their employers. This is partly because most of the available source material directly concerns this relationship, but also because it was a central, indeed the dominant, issue of the period. The economic situation created a fundamental clash within the black bottle industry; a clash between aims of the manufacturers, namely lower production costs and diversification of production, and the aims of the bottlemakers, namely the protection of

their wages and the traditional customs of the industry, Before looking at this relationship, however, it will be useful to give some brief facts about the bottle firms in operation in the north-east during this period.

1. The Bottle Houses

i) The Tyne

The bottle houses previously associated with the Cookson family were among some of the oldest bottle houses on the river and most of them did not even survive the third quarter of the nineteenth century. The two Closegate houses were advertised to let in 1859 and appear to have been closed soon afterwards.[13] The Bill Quay bottle works, which by the 1850s consisted of four bottle houses, remained occupied until 1862 when its last occupants, Dobeson & Warren, moved to St. Lawrence (see below).[14] The four cones were still standing in 1872 but were demolished in 1883 to make way for the shipbuilding yard of Wood, Skinner & Co. The bottle works at Shields had a slightly longer lease of life and in 1859, after having been worked up to that date by Cookson & Cuthbert, the four cones were leased to the South Shields Bottle Company. The directors of this company included William Marshall, who acted as manager and who gave evidence to the Children's Employment Commission of 1865, and Nathaniel Grace Lambert, an ex-Mayor of Newcastle who took out a patent for smoke consumption and fuel economies in glass furnaces in 1870. Despite the patent, and despite the fact that the company installed tank furnaces at quite an early date, the works was said to have lost money during the late 1870s and was finally closed during the 1882-3 strike. According to the Newcastle Daily Chronicle, commenting on the auction of the property in 1883, the closure of the works was "premature" and due to the "the unfortunate and protracted bottle makers' strike".[15] Shortridge's old crown glass works at Shields was also turned into a bottle works for a brief time by its new owner, James Bowron of Stockton, who also worked four bottle houses at Stockton. Bowron took out a patent for moulding and blowing bottles in 1861 and, although the Stockton works continued in work until the late 1880s, the three cones at Shields

appear to have been demolished c. 1870.

All but one of the other long established bottle houses on the Tyne also closed before the main thrust of foreign competition was felt in the late 1870s. One of the works at St. Peters, the Byker Bottle Works, closed c. 1861 after having been taken over briefly by a Glasgow bottle manufacturer, Alexander Mein of the Clyde Bottle Company. The other works at St. Peters, the Albion Glass Works belonging to Alderman Thomas Ridley, closed c. 1879.[16] The bottle works at St. Lawrence, the St. Lawrence Bottle Works, was the exception in that it remained in operation until the 1890s at least. This house was taken over in 1862 by Dobeson & Warren who had moved there from the Bill Quay Works; the two had taken out a patent in 1861 for glass furnaces fired with the aid of a blowing apparatus. George Warren died in August 1879 but the house remained in operation and, interestingly, does not appear to have been affected by the 1882-3 strike; in May 1883 the Sunderland bottle manufacturers offered to pay their striking men "at the same rates and rules on which Mr. Warren's factory at Newcastle is working" but the offer was rejected.[17] The St. Lawrence works was almost certainly modest in size. In 1893 a new partnership was drawn up between members of the Warren family agreeing to carry on the works with a capital of £5,500, most of which was raised by a mortgage on the property.[18]

The only growth in the bottle industry on the Tyne occurred to the west of Gateshead, at Blaydon and Dunston. Following the repeal of the glass duties in 1845 a new glass house was erected at Blaydon and, although originally intended as a crown glass works, it was taken over by a bottle manufacturer, A. Thatcher, under the title The Durham Bottle Company.[19] In 1861 the Blaydon works was taken over by Alexander, Austin & Poole; the Poole being Henry Poole, the previous manager of the works. The Blaydon

bottle works, which in 1865 consisted of four cones, continued to be worked until the twentieth century and was joined in 1890 by a new bottle-works at Dunston owned by George Wardman & Sons; this bottleworks closed c. 1905. The glass works at Lemington was also worked as a bottle works during the 1860s by Thomas Harrison & Co.

(ii) The Wear and the Coast

The bottle industry on the Wear, in contrast to that on the Tyne, showed evidence of considerable health until the 1880s. In 1863, according to John Scott of the Ayres Quay Bottle Company,[20] 28 out of the 50 bottle houses in the north-east were situated on the Wear; and whereas most of the older houses on the Tyne had remained in the hands of small firms, those on the Wear tended to be worked by larger amd more prosperous firms and, on the whole, were to remain in production until the 1880s. The backbone of the bottle industry on the Wear continued to be the older firms, which, by the middle of the century, had already established themselves as large and reliable producers. The largest of these older firms was the Ayres Quay Bottle Company which, by the 1870s, worked two sites: one at Ayres Quay itself where six cones were in operation, the other (which was the works established by Hilkiah Hall above the Bridge) consisted of two cones.[21] The size of the Ayres Quay Company's operation was nearly matched by Featherstonhaugh's Wear Glass Bottle Works at Deptford where seven cones were worked. After these two firms came John W. Kirk's Ballast Hill Bottle Works which was also at Ayres Quay (it was Pemberton's old works) and consisted of five cones. The smallest of the old established firms was the Sunderland Bottle Works of Robert Fenwick which consisted of two cones below the Bridge.

Of these old established firms, only the Ayres Quay Company managed to survive into the twentieth century. The fundamental reason for the

eclipse of the others was, as suggested above, the severity of foreign competition, low profits and the damage done to the industry by the 1882-3 strike. The effect of the strike is underlined by the fact that most of the firms appeared to be in a reasonably healthy state up to the end of the 1870s; throughout 1879, for instance, the Sunderland Daily Echo's "Work in Sunderland" column reported that Kirk's five houses were all working a six journey week. The closure of Kirk's works is perhaps the most surprising closure of all, particularly in view of the fact that Kirk himself took the leading part in negotiations with the strikers throughout the 1882-3 strike, as if he had every intention of reopening his works once the matter was concluded. In fact the Ballast Hill works never reopened at all after the strike. One cone was lit at Featherstonhaugh's works in May 1883 but was soon extinguished. Fenwicks also returned to work in May but in October the works was closed because of "want of work". In September 1884 it was reported that there were plans for installing a continuous tank at the works but these plans never materialised and the works remained closed.[22] In contrast, the Ayres Quay Bottle Company succeeded in surviving the aftermath of the 1882-3 strike but not without, as we shall see, considerable sacrifices being made by both employers and employees. By 1890 the senior partners in the firm were John Scott and Walter Horn, both of whom acted as managing partners, and James Laing, who, although not taking an active part in the firm's management, remained deeply involved in the firm's affairs.

The suitability of Sunderland as a site for the bottle industry is underlined by the establishment of a number of new bottle works in or around Sunderland during this period. The most important of these was the Low Southwick bottle works built c.1850 by Henry Scott, a member of a family which had already established a successful earthenware manufactory at Southwick. From c. 1869 the works was occupied by Alexander & Austin as

a black bottle manufactory to complement their existing pale bottle works at Blaydon. S.P. Austin retired from the firm c. 1890 which then became Alfred Alexander & Co. and included, besides Alfred Alexander himself, his two sons George Alexander and Alfred Alexander jr.. George Alexander acted as manager of both the Southwick and the Blaydon works during the 1880s and was to go on to have a distinguished career in the bottle industry culminating in being the first Managing Director of United Glass Bottle Manufacturers Ltd. and the President of the Glass Manufacturers' Federation.[23]

Several less successful works were also established near Sunderland during this period. The Low Fulwell works of J.S. Davison has already been mentioned. Another bottleworks at Southwick, the High Bottle Works, closed during the 1882-3 strike as did another bottle works at Deptford after having been occupied by the firm of Harrison & Park. At Diamond Hall, to the south-east of Sunderland, a bottleworks was built c.1855. Its first proprietors were Snowdon & Watson but it soon passed to John Candlish of the Londonderry Bottle Works. The works suffered a severe fire in 1875 and appears to have been closed soon afterwards.[24] The glass works at Hendon, which until 1885 had been occupied by the Hendon Glass Company manufacturing rough plate glass was converted into a bottle works in 1888 by the Phoenix Glass Company[25] which continued to manufacture bottles there until the early years of the twentieth century.

After the Ayres Quay Bottle Company, the most important bottle works in the Sunderland district was undoubtedly the Londonderry Bottle Works established by John Candlish in 1853. Candlish was one of Sunderland's most celebrated public figures and a man who exemplified the Victorian ideal of self help. He began his working life as a common labourer in Pemberton's bottle works and, through his own efforts, rose to become the

Mayor of Sunderland, the town's M.P. and one of the largest bottle manufacturers in Europe.[26] The cornerstone of Candlish's fortune was the Londonderry Bottle Works which he erected at Seaham Harbour on land leased from the colliery-owning Marquis of Londonderry. The position of the Seaham Harbour works was in some respects similar to the position of the Delavals' eighteenth century bottle works at Hartley. Both were to a certain extent in a protected position, both enjoyed good shipping facilities from a small private harbour, and both were orignally intended as a complementary activity to coal mining - this is underlined in the Seaham case by Candlish's original lease which stipulated that he should purchase "small coals of the description ordinarily used in the manufacture of glass bottles" only from the Londonderry collieries.[27] Interestingly, when the lease was renegotiated in 1863 it was agreed that "it would be mutually advantageous to both parties if the existing regulations for the supply and purchase of coals could be relaxed". The initial lease granted Candlish 7,823 square yards of land at an annual rent of £650 on which to erect a bottle works of at least £1,000 in value. In addition he was granted the use of the cranes and railways at the harbour and permission to lay pipes to the sea to pump water to the works. By the time of his death in 1874 the works consisted of 6 cones and the works' customers included many of the larger London brewers.[28] By the time of the Royal Commission on Labour in 1892 the works employed over 500 people, 122 of whom were skilled bottlemakers, had a productive capacity of 60,000 bottles per day and was described by the leader of the Yorkshire bottle makers as a "model factory".

The two other bottle works on the north-east coast at Blyth and at Hartley, did not approach the Seaham Harbour works in importance. The six cones at Hartley were worked during the 1860s by the South Shields Bottle

Company until the silting of the harbour at Seaton made them uneconomic; the cones were standing in 1872 and were demolished c. 1875. The bottle works at Blyth was established in 1868 by J.S. Davision who departed c. 1883 to a new bottleworks at Low Fulwell. The Blyth works was eventually taken over by George Moore & Sons who occupied it throughout the 1890s.

2. The Bottle Makers

Two main aims emerge from the history of the north east bottle makers during this period: firstly, the protection of their earnings in the face of severe industrial difficulties, and secondly, the strengthening of their position by amalgamating with bottle makers in other parts of the country to create a financially strong and authoritative body. In neither of these areas could the north-east bottle makers be said to have been entirely successful; an amalgamation was never realised and, more importantly, the bottlemakers were not able to halt the relative decline in their earnings; as is suggested by figure 30 which summarises the change in the basic rate of the bottlemakers' earnings over this period. These basic rates were paid for the traditional "numbers" to be made in a single journey; 62 dozen quart bottles or an agreed equivalent amount for different sized bottles. Everything over the basic number was paid as overwork and the bottlemakers' earnings, therefore, were much higher than the mere basic rate. Figures for actual earnings are harder to discover but earnings usually appear to have been just under double the basic rate: for instance in 1856 the average wages paid at the Londonderry Bottle Works were finishers 56 shillings, blowers 45s 6d, and gatherers 41s 6d;[30] in 1882 the average earnings at Ayres Quay in the year preceding the strike were 43s 7½d and 40s 4½d for finishers and blowers respectively.[31] Even without a comprehensive set of figures for real earnings, it seems reasonable to assume that they did decline, not merely because of reductions in the basic rate but also because of a number of other reasons: reductions to the overwork rates, increases in the basic numbers, and the union's insistence that the available work should be shared and that no overwork should be worked until all the members had had the opportunity of working a basic journey.

Figure 30: Changes in the basic wages of the north-east bottle makers, 1850-1900

Date	Finisher	Blower	Gatherer
1850	24s	20s	16s
1853	28s	24s	20s
1872	30s 6d	26s 6d	23s 6d
1876	28s	24s	21s
1878	26s	22s	19s
1883 August	28s	24s	21s
1883 November	26s	22s	19s
1885	Various temporary reductions		
1888	26s	22s	19s
1891*	29s	25s	22s

*Until 1891 the basic wage consisted of a further 3s per week for house and firing (2s for rent and 1s for coals). The rise in 1891 is largely accounted for by the absorption of this traditional payment in kind into the money wage.

As the table indicates, the erosion of the bottle makers' wages was most intense during the 1870s and 1880s. This was reflected in the creation of a more formal trade society than had previously existed in the industry. The first formal union to which the north of England men belonged appears to have been the Glass Bottle Makers' Amalgamated Trade Association of Great Britain and Ireland which was established in 1877 with 335 members and which was dissolved in 1879 and re-established as the North of England Glass Bottle Makers' Society.[32] Collective action had certainly occurred in the industry before the appearance of this union, however, and had indeed been effective ; as, for instance, in 1856 when a strike by 240 bottle makers in 24 houses on the Wear had succeeded in getting their employers to withdraw a demand for a reduction of 4 shillings per journey off the basic rates.[33] This strike in 1856 is interesting as a precursor of more serious labour difficulties to come. Indeed it could almost be described as the

prototype of subsequent strikes, for the arguments advanced by both sides in 1856 were to be repeated many time before the end of the century. In 1856 the manufacturers insisted that the trade was desperately at risk from cheap foreign imports and that costs had to be reduced in order for them to survive. The men, on the other hand, insisted that, in order for them and their families to survive, they could not possibly suffer a reduction in their earnings, and they also accused the manufacturers of crying wolf over the foreign competition in that the current low prices for bottles were not they claimed caused by foreign imports but by the English manufacturers themselves; "it is only a determination on the part of the masters to drive the Belgian manufacturers out of the British market altogether that has led to the great reduction in the price of bottles". The men's case was somewhat strengthened by the fact that two of the Sunderland firms, Fenwicks, and Snowdon & Co. of Diamond Hall, were continuing to pay the old rates. However when the Sunderland Herald raised the matter with Robert Fenwick he insisted that this was not because trade was flourishing:

> Flourishing! I'll tell you the honest truth of the matter: we haven't been making 1% by our bottles for a long time past, and if it wasn't to keep on our customers, we wouldn't care although there wasn't a single bottle to be made about the place. With the wages we have to pay, and the high price of coals and materials, we cannot get our place in the market against the French and Belgian houses.

His reason for not supporting the other manufactures at the present time was merely that, three years previously, they had not supported him when he had stood out against the bottlemakers' demands for an increase and sent his men to jail for breaking their contracts. The outcome of the 1856 dispute appeared to vindicate the men's claims that the manufacturers were exaggerating the threat from abroad for the demands were withdrawn and the existing rates continued to be paid until 1872 without any apparent adverse consequences.

In 1872 the men received as advance of 2s 6d.[34] This was deducted, at the request of the manufacturers, in April 1876 without any protest but further reductions demanded in November 1878 proved more contentious. The manufacturers at first asked for a massive reduction of 7 shillings per man off the basic rates but soon reduced this demand to 5 shillings from the finishers' and blowers' wages and 2 shillings from the gatherers' wage. This was rejected by the men and the reduction was eventually agreed to be 2 shillings off all the hands' wages plus 2 d per gross off the overwork rate, plus a guarantee from the manufacturers that all the men who were out of work would be re-employed. This reduction, like its predecessors, was clearly understood by the men to be a temporary measure which was only adopted to help the industry through a difficult period. Four years later signs of a revival in trade were th o ught to be detected and in July 1882 the bottle makers sent a formal application to their employers for the restoration of the 2 shillings deducted in 1878. The employers declared that trade had not revived to any significant degree and that a rise in wages was impossible, and so, in August 1882, the 391 skilled bottlemakers in the north of England district came out on strike thus beginning what was to be the longest and most notorious strike in the history of the local bottle industry.

The year long strike of 1882-3 was, by any analysis, a disaster. It inflicted irreparable damage upon an already weakened industry, destroyed whole firms and many jobs, and left both sides of industry considerably worse off than they had been before. In August 1882, when the strike began, 31 out of the 54 bottle houses in the district were in operation. In August 1883 only seven were in work and in August 1885 an editorial in the Sunderland Daily Echo[35] described the local bottle industry as being "on its last legs" with the bottle houses on the Tyne "in crumbling ruins" and

only nine out of the remaining houses on the Wear and at Seaham in operation. The editorial laid the fundamental blame for this state of affairs with foreign competition - "it is a fact that Belgian bottles are supplied to the English market at lower prices than English bottles" - but there is no doubt that it was the strike which had accelerated the industry's decline to a startling degree.

Throughout the strike a vigorous public debate of the issues involved was kept up in the correspondence columns of the Newcastle Daily Chronicle: the main protagonists in this debate were John Joseph Good, the secretary to the union, and John W. Kirk, the secretary to the manufacturers' association.[36] Their letters reveal something of the flavour of both sides' attitudes. For their part, the manufacturers were deeply pessimistic about the future of the bottle trade but, in contrast, the men were determinedly optimistic both about the righteousness of their demands and the improved prospects for the trade. Both sides marshalled support for their respective positions. An "oppressed manufacturer" wrote from London confirming that what the local manufacturers said was true and that the black bottle industry in the north of England was in "serious jeopardy". Representatives from the bottle makers in Lancashire came to Sunderland to support the men and, at a public meeting, declared that the English bottle industry was well able to fight off the competition from abroad and that no bottle maker in England would work at the wages currently being offered in the north of England. With neither side able to make any impression on the convictions of the other, negotiations soon reached a state of deadlock.

In October, in an effort to break the deadlock, the employers put forward an entirely new proposal: that the existing wage system of basic rate plus overwork be replaced by a simpler system of payment by the gross. The rates they offered were no advance on the current rates, but they

undertook to guarantee a certain minimum wage per week even if no bottles were made at all. According to Kirk, the new system would guarantee the men a minimum wage per journey (5s 10d, 5s 2½d, 3s 11½d for the finishers, blowers and gatherers respectively), enable them to earn a fair amount (on average 9s, 8s and 6s), and was "the most favourable to the workmen that the present critical state of the bottle trade, owing to increased foreign competition, will justify". Unfortunately, the men rejected the new proposals as "all fudge" largely because they included a clause making earnings dependent on "good and merchantable bottles". Traditionally, the north-east bottlemakers were paid for all bottles that came out of the annealing arch, whether they were saleable or not, and this custom was one of their most jealously guarded practices, and one which they succeeded in retaining longer than any other bottlemaking district(see figure 31, p.552).

With the rejection of the new wage proposals, the strike continued and grew more bitter in December when the Stockton bottle works was re-opened and several Stockton bottle makers were imprisoned for assaulting black legs. By February 1883 the men were still firm and a vote taken at Sunderland in that month resulted in one vote to return to work and 153 to stay out (eight men were unable to attend this meeting and thirty five were said to have left the district in order to look for work). Votes taken at Stockton and Seaham Harbour also resulted in a vote to remain out. Throughout the strike the union was able to pay strike pay to its members but the non-unionised unskilled hands and labourers, 1,000 of whom were said to have been thrown out of employment by the strike, were not so fortunate.

In April a new round of negotiations began at a series of meetings chaired by an independent party, John Price of Jarrow. These meetings eventually resulted in the termination of the strike and an agreement on

wages that in effect gave total victory to the men. The manufacturers conceded the restoration of the 2 shillings, and the old system of wages, with all its traditions and customs, was retained. The strike was officially declared over in May but the union continued to pay strike pay until August, exactly one year after the commencement of the strike, to those members whose works had not re-opened. By the autumn of 1883 it was clear that the men had won a pyrrhic victory. Several of the larger works, notably Featherstonhaughs, Kirks, Fenwicks and Shields, were closing, and those works which intended to continue were clearly in a precarious state. As a result, a meeting of bottle makers held on November 22 voted, by 76 to 31, that "We go back to the old rates of wages and over work (viz. finishers, £1 6s; blowers, £1 2s; gatherers, 19s) and numbers on which we worked before the strike commenced, also, to allow our rent and coals as before". The men were in fact slightly worse off than they had been before in that the remaining manufacturers refused to recommence work unless the number for small bottles (under a reputed pint) was increased from 62 dozen to 70 dozen. This caused Good to accuse the manufacturers of gaining by strategem what they could not obtain by a fair fight, and he offered his union some advice on their future attitude towards their employers:

> The masters were aware of how far the men were prepared to go by the way they stood out for the 70 dozen. This is the evil of letting them know what is passed at our meetings. I would advise you to take an example from them, they don't let you know what they are doing; but I hope all will turn out for the best.

Perhaps the only beneficial consequence of the strike was that it seemed to breed a more sober and co-operative attitude in the survivors. In the aftermath of the strike, both employers and men appear to have re-doubled their efforts to work together for the survival of their industry. In January 1884 the Sunderland Daily Echo reported that the directors of the Ayres Quay Company had come to an arrangement with their work force which

had enabled them to tender for, and secure, a large contract which it was hoped would keep the firm in work throughout the coming year.[38] This arrangement in effect "stopped the count" or dispensed with the whole piece work system and when the bottle makers' union complained to the Company about this it was told that "the men were consenting parties".[39] In August 1885 the Ayres Quay Company again appealed to its workforce for help in securing a contract that could only be fulfilled if the Company was able to supply bottles at the Belgian prices. The Company paid for a deputation of men to go to London in order to see the bottle trade there at first hand and, as a result of this, the men consented to a further increase in the numbers, and reductions from both the basic wage and the over work rate.[40] Although this arrangement originated at the Ayres Quay Bottle Works, similar rates were soon adopted by the other surviving houses in the district.

The strike had also inflicted considerable damage on the bottle makers' union itself. The union, under the leadership of J.J. Good, had proved itself to be a poor judge of the interests of its members and it is hardly surprising that, in the aftermath of the strike, the men at the Ayres Quay works should have taken to negotiating directly with their employers. The men at Seaham Harbour were also critical of the union and particularly of the leadership of Good himself. Before the strike Good had been employed at Kirk's Ballast Hill Works but following the closure of his factory he had persuaded the union to take him on as an independent secretary on a yearly salary of £100. In June 1884 the Seaham Habour branch put forward two motions to the union meeting: first, that the society dispense with the services of the independent secretary, and second, that the society be officially registered. They also asked for an enquiry to be held into the working expenses of the society. Neither motion was passed

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and the following year the Seaham Harbour men broke away from the north of England union to form their own registered society; the Londonderry Glass Bottle Makers' Trade Society (see Figure 32 for membership figures). Later events were to justify their fears about Good's integrity.

In April 1884, in an effort perhaps to redeem the union's standing and restore some of its depleted finances, Good embarked on an attempt to form a national, amalgamated association of glass bottle makers. The idea of an amalgamated association was not new and this was, in fact, the third attempt to realise it. The first attempt had been made in June 1858 at a meeting of bottle makers of England and Scotland held at Carlisle and the architect of this scheme was said to have been an Ayres Quay bottle maker, William Graham.[41] The second attempt was the Glass Bottle Makers' Amalgamated Trade Association of Great Britain and Ireland which was officially registered in 1877[42] and which also appears to have been inspired by the north of England men in that it was replaced in 1880 by their own, unregistered, trade society. The 1884 attempt was marked by a series of conferences held at Glasgow and attended by delegates from all the major glass making areas, apart from Yorkshire, representing over 1,000 bottlemakers:[43]

Members represented at the conference

Lancashire	360
North of England	300
Glasgow	149
Portobello	50
Alloa	25
Bristol	48
Brierly Hill	23
Dublin	90

(The Yorkshire bottlemakers's union was by this time an established and strong body in its own right with, in 1884, 1,058 members.) The two main issues discussed at these conferences were: firstly, the form that the amalgamation should take, and in particular, where the funds, which were being held by the North of England society, should be held: and secondly,

the settlement of the current strike in the Scottish bottle houses.

It was the financial demands made by this strike that caused the amalgamation to break up in chaos in April 1885. Good, who had assumed the role of chairman throughout the conference, made an angry closing speech:

> In conclusion allow me to make one or two remarks in connection with the Amalgamation. This is the third one you have tried and it has been broken up, so the money had been really all spent, and so long as you carry on as you have done in paying money out of the funds to those who will never pay anything into them, you cannot succeed. Witness the last two strikes in Scotland where large numbers received strike pay having no claim on the trade. A society will never be successfully carried on until this class is cast off and not allowed to live out of the industry of others. It has been said by some Glasgow men that they would not support the north of England because they did not support them. Since 1882 up to the present strike the north of England sent Scotland £3,359 17s 5d and have received from them only £495 5s 5d, so this speaks for itself.

Good's leadership of the north-east bottle makers through this crucial period can perhaps partly be blamed for their failure to become as strong a force in the industry as their colleagues in Yorkshire. In his public statements Good tended to indulge in polemic and a misrepresentation of the manufacturers' position, and there is evidence of a similar rashness in his actions. At least one group of bottle makers, the Londonderry men, was not happy with his leadership and their fears about the financial position of the north of England society proved correct when, in 1891, Good was arrested on a charge of embezzling the society's funds.[44] Evidence given by other bottle makers revealed that since he had been appointed independent secretary in 1883 he had consistently resisted having a treasurer or auditor appointed and had also refused to have the society registered. The subscriptions he had collected from the men were supposed to have gone into the Society's bank account but Good had spent £150 as a deposit on the Skiff Inn in Trimdon Street, and a further £700 in speculative attempts to recover the money. Good was replaced as secretary by Paul Heptinstall, a blower at Southwick, and from 1891 the society was registered with the Board of Trade and operated on a more conventional basis.

The weakening of the union following the 1882-3 strike and the departure of the Seaham Harbour men was to affect the next round of negotiations in the industry. In 1891 the union decided that it was a reasonable time to ask for an advance in wages, a reduction in working hours, and a guarantee of half pay when a tank failed. The first hurdle that had to be overcome was to persuade the manufacturers to deal with them as a union and not to insist, as John Scott of the Ayres Quay Company did, that "we consider the matter one for our own employees and, this being so, we will be happy to meet a deputation of our own employees ".[45] As the "district" at this time only consisted of the men at Ayres Quay and Southwick, the union's argument that the matter should be treated as a "district question" was rather weak but, after a month of arguing the point, the manufacturers eventually agreed to treat it as a district question"sooner than disturb the good feeling that has existed between us for so many years". There is no doubt that the improvement in the trade during the late 1880s had brought with it a better relationship between the manufacturers and their men; in 1887, for instance, Paul Heptinstall had claimed that never before, in his forty years in the trade, had he known a better feeling between the work people and the employers.[46] This was certainly in part a consequence of the improvement in trade; in December 1887 trade was reported to be "brisk" with an average of 53,000 - 54,000 dozen bottles being sent from Sunderland to London every month;[47] in March 1888 the 280 employees of the Southwick bottle works were said to be all on overtime and the works' average weekly production was 2,000 dozen bottles.[48]

The 1891 negotiations were conducted on an altogether more civilised basis than the negotiations during the 1882-3 strike. Conferences were held and both sides proved willing to make some concessions in order to reach an agreement. In May the manufacturers conceded that half pay would be paid

or that the men would be found other work in the event of a tank failing, and, instead of the men's demand for a reduction in the hours of the two shifts, they offered three shifts of eight hours each. The men rejected this offer and the question of hours was shelved whilst wages were discussed. The men had demanded an increase in the wages paid for both black and pale bottles (which they now manufactured) and, after some discussion, the manufacturers agreed to increase the wages for pale bottles (which brought the north of England onto the same rates as Yorkshire) but not for black bottles for, as Walter Horn explained, the situation in the black bottle trade was still critical:

> In submitting these various concessions and alterations, the Manufacturers are anxious to more clearly lay before the men the real position of the Glass Bottle Trade in this district, having gathered from the remarks that have fallen from the men on the recent occasions we have met together, that the men have formed an erroneous idea of the actual state of affairs. This applies more particularly to the black and half-pale metal. The pale will now be equal to the highest paid district in the trade. Now in the black and half-pale matters are very different, the foreigners completely cutting the ground from beneath their feet, the condition of Wages abroad alone placing the English Manufacturers at a very great disadvantage, as is evidenced by the large quantities of bottles imported into London alone, which is now practically our only Market, in the first four months of this year the quantity being equal to the make of eight continuous Gas Tanks. From this you can gather the effect it has upon them. They cannot raise their prices or the foreigner steps in and takes one more of the many customers he has robbed us of in recent years. In the face of these facts they cannot see their way clear to meet the requests of the men to any greater extent than they herein offer; in fact to increase the cost of production further on the manufacture of black or half pale bottles would simply mean driving the trade from the district, and consequently closing the works.

Instead of the rise the men demanded, the manufacturers were prepared to offer 2 shillings more on the money wage for black bottles in lieu of the traditional supply of coals; which had traditionally been valued at 1 shilling per week and which, in 1888, had consisted of 15 cwt of small coals every three weeks in the winter months and every four weeks for the remainder of the year. The men did not like this new arrangement but the manufacturers declared that they were"determined to do away with this old custom at any cost"

and the men eventually conceded it. The new wage agreement signed in June 1891 was to remain in operation throughout the decade and, as a comparison with the wages in other parts of the country shows (figure 31), it restored some of the ground that the north-east had lost during the 1870s and 1880s. This agreement marked the beginning of an upward trend in the wages of the north-east bottle makers. A new agreement was made in 1910 and by 1916 wages had increased by 35% to bring the basic rate of a finisher to £2 8s 7½d for pale metal, and £2 4s 6d for dark metal.[49] By 1916 the society consisted of two branches: Ayres Quay where three out of the six furnances were working, and Southwick where two out of the three furnaces were in operation. The total number of members in the society was 292 and the state of trade was described as "good".

Figure 31: Weekly rate for a fixed number of bottles, 1894

	Finishers	Blowers	Gatherers
Seaham Harbour			
- pale metal shop	33s	31s	26s
- dark and turned bottles	32s	32s	25s
- dark and unturned bottles blown in the mould	29s	25s	22s
Southwick Sunderland	29s	25s	22s
Blaydon	33s	31s	26s
Blyth	29s	25s	22s
Yorkshire	33s	31s	26s
Lancashire	33s	29s	25s
Scotland	30-33s	27-31s	21-24s

(In the Lancashire and North of England districts (except Blaydon) a rate is guaranteed and paid by the employer whether bottles are made or not. In the North of England district (except Blaydon) all bottles drawn out of the arch are paid for, other districts pay only for those bottles that are saleable.)

Board of Trade (Labour Department), Report on Wages and Hours of Labour, Part II (1894), p.214

Figure 32: Membership of the North of England bottle makers' unions, 1887 - 1905.

	The North of England Society of Glass Bottle makers. (established 1877)	The Londonderry Glass Bottle Makers' Society (established 1885)
1887	259	- (figures not available
1888	241	-
1889	229	-
1890	220	-
1891	260	-
1892	288	122
1893	272	130
1894	341	130
1895	294	152
1896	255	186
1897	322	190
1898	337	200
1899	323	212
1900	331	229
1901	332	208
1902	277	218
1903	254	219
1904	255	219
1905	245	217

Board of Trade Labour Statistics.

CHAPTER NINE: THE FLINT GLASS INDUSTRY

Like all branches of the British glass industry the flint glass industry was considerably affected by the repeal of the glass duties. Under the conditions created by the tax British flint glass houses had developed a uniform character, all concentrating their resources on the production of comparatively expensive, ornamental table ware. By 1900 this homogeneity had disappeared to be replaced with an industry split into three almost unrelated branches. The biggest split in the industry was certainly that between blown and pressed glass; by the last quarter of the century blown flint and pressed glass shared few points in common, their workmen belonged to separate unions, the manufacturers had formed separate associations and the market pressures on the two trades were quite different. Blown flint glass was further subdivided between the houses manufacturing the traditional ornamental table ware, and those manufacturing purely utilitarian ware such as medicine bottles and light fittings.

These divisions within the British flint glass industry during the last half of the nineteenth century were underlined by an increasing degree of specialisation in the various glass manufacturing areas. The manufacture of ornamental table ware, for instance, became increasingly confined to Stourbridge; the manufacture of pressed glass was largely associated with the north-east, and later Manchester; the only type of manufacture that was spread comparatively evenly across the country was the manufacture of utilitarian blown glass which was frequently produced by small firms serving only a local market. The fortunes of the flint glass industry in each area were, therefore, heavily influenced by the type of flint glass it had come to concentrate on and in this respect the north-east was fortunate for pressed glass was, arguably, the branch of the flint glass industry which met the changing economic and commercial conditions of the last half of the nineteenth century with most success.

The repeal of the glass duties in 1845 was the principal catalyst of these changes. By reducing prices to a more realistic level repeal in effect multiplied the demand for flint glass and created a new market amongst the less well off classes of society. Broadly speaking, pressed glass, which was by nature better suited than blown glass to the demands of a mass market, assimilated these changes with comparative ease. Blown glass, and in particular blown glass table ware, did not and lost a considerable section of its market firstly to pressed glass and subsequently to foreign imports.

The decline of the blown table ware trade is to some extent confirmed by the membership figures of the Flint Glass Makers' Society for the last quarter of the century (Figure 33A)[1] which show that the only growth in blown flint glass occurred in areas, such as Yorkshire and the south-east, producing jam jars and bottles.[2] In the areas producing ornamental table ware, such as Stourbridge and Birmingham, numbers remained static. The figures clearly show the decline of blown flint in the north-east and a comparison with the membership figures of the North of England Pressed Glass Makers' Society (Figure 33B) indicates the extent to which pressed glass overshadowed blown flint glass in the north-east. The growth and success of the pressed glass industry is, therefore, the major development to be considered in the north-east during this period. The blown flint houses will be considered separately even though the practical extinction of the local blown flint industry was to some extent a consequence of the success of the pressed glass industry.

Figure 33A: Membership of the Flint Glass Makers' Society 1879 - 1897

Branch	August 1879	August 1887	February 1892	April 1897
Stourbridge	403	396	405	400
Manchester	350	300	260	205
Birmingham	346	339	337	305
Newcastle upon Tyne	104	89	55	45
York	86	83	90	83
Warrington	85	69	78	64
Glasgow	82	99	92	104
London	79	57	78	62
Hunslet	61	56	134	228
Edinburgh	54	88	86	100
Tutbury	54	36	34	31
Rotherham	48	59	71	74
Barnsley	36	62	131	109
St. Helens	31	31	45	45
Shelton	27	2	2	2
Dudley	26	25	57	57
Castleford	25	100	111	150
Longport	21	15	6	5
Bathgate	18	6	7	-
Dublin	18	3	3	3
Kilnhurst	14	40	39	-
Knottingley	14	-	-	-
Catcliffe	9	-	-	-
Bristol	5	2	-	-
Bolton	-	8	3	3
Canning Town	-	-	-	46
Mexborough	-	-	-	64
Round Oak	-	-	-	33
Thornhill Leas	-	-	-	36

Figure 33B: Membership of the Pressed Glass Makers' Friendly Society of Great Britain*(taken from Board of Trade Labour Statistics; figures for the period 1872-92 are not available)

1892	430	1899	550
1893	450	1900	526
1894	486	1901	506
1895	490	1902	519
1896	504	1903	511
1897	508	1904	511
1898	526	1905	490

*The title of the society on its foundation in 1872 was "The Pressed Glass Makers' Friendly Society of the North of England" but in August 1884 the Central Committee decided to extend the title to Great Britain as the society was the only society specifically for pressed glass makers. In actual fact the members only came from the Tyneside and Wearside factories with one exception, the Glasgow factory of Allan & Co. By 1905 the society had six branches: the two works at Gateshead, two at Sunderland, one at South Shields and one at Glasgow.

1. Blown Flint Glass

The declining fortunes of the local blown flint glass houses were described in 1863 by J. Collingwood Bruce:[3]

> Flint glass was, until recently, an article of luxury, found only in the dwellings of those in comparative affluence. It was produced formerly in small quantities comparatively by nine firms on the Tyne and, being elaborately cut and polished, was a very costly article. Some years ago, according to a leading manufacturer here, the workmen struck - several of the establishments were closed never to be re-opened, and the trade was transferred in a great part to Stourbridge, so that at present, the cut glass produced on the banks of the Tyne, where it had flourished probably for 230 years, is not equal to the make of one small work.

The closure of the major blown flint houses, as was described in the previous chapter on flint glass, had occurred during the 1840s when many of the leading flint glass manufacturers had retired. Their works had not, on the whole, been re-opened (the one exception was the Durham Glass Works which continued after Joseph Price's death in 1872 but only as a small manufacturer of light fittings, not cut glass table ware) and although a number of smaller blown flint glass houses had been established during the 1850s none were anything more than modest in size. By the time Collingwood Bruce was writing, the only significant firm producing blown glass table ware (which was exhibited at the 1862 Exhibition) was the Northumberland Glass Company whose manager and owner, Joseph Dodds, told the 1865 Children's Employment Commission "This is the oldest blown flint glass establishment here and there is none in this part of the country on a larger scale i.e. withmore than one furnace".[4]

Among the smaller blown flint glass manufacturers who established works during the 1850s were: Nicholas French (previously the manager of John Sowerby's blown glass house) who established a glass house in Harrison Street, Sunderland, in 1852; David Martin, W. & R. Ferry, Robert Gray, Thomas McDermott, and Henry Hudson, all of whom occupied small houses in Gateshead; Selby & Johnson, J. Swanston, and the Wright Brothers, who all

owned works in Newcastle.[5] These were all small manufacturers of a type described by R.L. Chance in 1861:[6]

> Most of these establishments are furnished in a very plain manner like many of our own common glass works, with little capital and few expenses. They buy their first materials already prepared in special factories devoted to this work only and to which the numerous small crystal works form an important class of customer. A master assembles several hands, sometimes he is his own chief workman. He constructs a furnace near some of the inexhaustible coal mines of Newcastle or Birmingham; the first materials he buys on credit; a few moulds are ordered if he intends to undertake moulding; and thus he makes the crystal in ordinary use with scarcely any other expense than the price of fuel, the first materials and labour.

The evidence given to the 1865 Children's Employment Commission by David Martin and William Ferry confirms the small scale of their operations; both Ferry and Martin were their own chief workmen and both had previously been employed in larger flint glass houses, Ferry's house consisted of two chairs only, Martin operated three chairs and also had a 2½ horse power engine to cut his own glass. These small works were in many ways the successors to the small illegal "cribs" of the excise years and none succeeded in developing beyond this state. Some of the firms were short lived; Johnson & Selby disappeared in 1853, Henry Hudson went bankrupt in 1857 (his successor Alexander Elliot went bankrupt in 1860), and Nicholas French sold his glass house in 1859.

Why did the smaller blown flint firms not develop and why were the dormant larger works not taken over by larger capitalists? One common explanation for the lack of success of the blown glass trade was that its workmen were particularly obstructive, and the point was put with most force by R.W. Swinburne in his address to the British Association:[7]

> A great impediment to the progress of glass manufacture in this district is the trades' union amonst the workmen. In the blown flint trade the union exercises a power which amounts to a domination over the employer. In one case at least a manufacturer permanently gave up his business from this cause, and in other cases large works have been for a time wholly suspended. At present the blown flint glass makers can only obtain a workman by taking the first on the union lists, and he must take the chance with him having the requisite qualifications, and must

receive him without a character ..... A respectable flint glass manufacturer makes the following statement:

> 'The glass makers' society decides upon the number of apprentices the master shall employ, and the rate of wages he must pay his men. It also orders the allowance of what is termed "drink money", which is daily spent in the purchase of intoxicating liquors. This induces unsteadiness in the men and in the majority results in habitual inebriation. The apprentices and boys are encouraged by precept and example to follow in the same course and so the evil is perpetuated ... The manufacturer is obliged to provide the men with a certain quantity of what is termed "metal", i.e. molten materials to make into goods; but if they cannot or will not work up all the metal the master has no redress; it must be ladled out of the crucibles as waste and the employer must give the men more drink for lading it.'
>
> Thus these infatuated men, many of them endowed with great ability in their craft, impair their own efficiency by their sensuality, violate the first principles of political economy, and inflict upon the employer a burden which hopelessly fetters him in the race of competition and improvement.

From the evidence given to the 1865 Children's Employment Commission there seems little doubt that the drunkenness and lack of diligence of their employees was a considerable problem for blown flint manufacturers, and it was true that there had been a protracted strike of flint glass makers in 1859 in which the north-east men appear to have joined;[8] however there was a far more convincing reason for the decline of blown glass in the north-east which was simply the competition provided by the quantity of cheap pressed glass being produced locally. David Martin admitted to the 1865 Commission that in respect of price blown glass was unable to compete with pressed glass; he and other blown flint manufacturers were only saved because of the superior quality of blown glass:[9]

> The pressed or machine made glass is so much cheaper than the blown that a man i.e. one who makes by blowing, could not stand against the machine at all were it not that the blown glass is so much better and stronger, e.g. ten pressed flint tumblers would crack for one blown tumbler.

William Ferry also admitted that the pressed firms now made a vast variety of goods that should have remained with the blown glass trade; he blamed the disorderliness of the men which had "driven" the pressed glass manufacturer into their trade. It seems scarcely possible that the amount of pressed glass being produced locally could not have had a damaging effect

on the local blown flint houses, particularly the smaller ones who were presumably specialising in cheap goods. The growth of the pressed glass industry at the expense of the blown is underlined by the fact that two of the small blown manufacturers - Thomas McDermott and the Wright brothers (see below) - turned to pressed glass during the 1860s.

The Northumberland Glass Company continued to manufacture blown flint table ware until 1872 when the then owner, Edward Dodds, decided to continue in business only as a glass merchant. Although this certainly marked the end of the manufacture of blown flint table ware in the north-east, the blown flint industry did continue in two forms. Firstly, a number of small firms of the "crib" type, continued to manufacture medicine, perfumery and hair oil bottles. Among these firms were those belonging to W. & R. Ferry, Robert Gray, and the Kendall Brothers of Gateshead; J.R. Mabane of South Shields whose "Hilda Flint Glass Works" operated from c. 1870 - 83; the various owners of the Hope Street glass works in Sunderland; and Joseph Thomas whose "Nil Desperandum Glass Works" was the Harrison Street works built by Nicholas French.[10] These firms were all modest and appear to have relied entirely on a local market.

The second form in which the blown flint industry continued in the north-east was more important in terms of size and capital: this was the manufacture of light fittings such as oil or gas lamp globes and chimneys, and electric light bulbs. The leading firm of this type was T.J. Liddle & Co. which occupied one of the old St. Lawrence sites from c. 1870. Trade was good enough to enable the company to be incorporated in 1874 as Liddle Henzell & Co; the original subscribers being the existing partners plus William Milburn Henzell, a wealthy grocer and tea dealer.[11] The initial capital of £3,000 was increased in 1889 to £5,500 (the extra shares being taken up immediately) and was further increased in 1898 to £8,000.

By this time the shares were mostly in the hands of J. Duncan Hodgson, a hardware merchant, and several of the original partners had left in order to start up companies on their own. In 1881 George Nicholson and William Henzell jr. raised a company to take over the glass works at Carr Hill which had been recently occupied by the pressed glass manufacturer Thomas Grey. The new company, the Lorraine Glass Company, was incorporated in July 1881 with a nominal capital of £10,000 and the intention of "making, refining, purifying and treating sulphates, alkalis and other chemicals used in making glass to make electric light, gas and oil lamps with their fittings and to carry on the manufacture of all types of glass".[12] Unfortunately the venture was not successful and the company was wound up in 1884. Thomas and John Liddle also moved to new glass works; firstly the Blackwell glass works in Gateshead, and finally the Eslington glass works at Teams which ceased production when it was burnt down in 1893.[13]

At Sunderland light fittings were manufactured by Duncan Park and John Thomas Todd who incorporated their company in 1885 as the Portobello Glass Works Ltd. with a nominal capital of £10,000.[14] Some indication of the way the work was organised can be found in the account of a strike at the Portobello works in 1887.[15] The work was organised into "shops" of three men and two boys who worked an eight hour "move" in which they were supposed to make 300 chimneys (this was said to be an increase from 1875 when the accepted amount for a move had been 200 chimneys). The manufacturer paid the shop 6s 5½d per move (the main workman received 2s 3d, the boys as little as 4½d) and the chimneys were sold in the shop at 2½d each. The Portobello company was wound up in 1891 and the works was taken over by Hartley and Wood.

It should perhaps be said that towards the end of the century several of the larger pressed glass firms did manufacture a small amount of blown goods: Sowerbys, for instance, attempted to market a range of blown glass

during the 1870s (see below) and by 1907 employed six glass blowers, three of whom were German and were employed for "large articles", presumably jars and bottles of an unsuitable size for pressing. Sowerby's manager, Adam Dodds, made it quite clear that the small amount of blown table ware the firm dealt in was entirely foreign manufacture:[16]

> A buyer often wants to buy an assorted parcel, not all pressed goods, but also a few blown. To meet him and prevent him enquiring elsewhere, we carry and sell some foreign blown manufacture, not advertising it as our own, but the travellers show it, not always knowing it to be foreign. We cannot possibly make it, in consequence of cheap labour abroad. To start making these goodsagain would be like starting a new trade, but we did make them, and could now if it paid.

2. Pressed Glass

Thanks to the low cost of its method of production, pressed glass was able to sell at an extremely low price and this proved an invaluable advantage in the market that developed following the repeal of the glass duties. Whilst the glass duties had maintained the price of flint glass at a high level, the price of pressed glass had been inappropriate to its distinctly poor quality. With repeal, its price was able to settle at a more realistic level, and one that found favour with a completely new class of consumer: in R.W. Swinburne's words, "the manufacture of pressed glass has cheapened flint glass articles to such an extent that almost the poorest of the population may be supplied with elegant articles of domestic use which a few years ago were far beyond their reach". The quality of pressed glass remained poor in comparison to the blown and cut glass which it sought to imitate; forming glass in an iron mould left a dullness on the surface and although this was slightly remedied by the technique of "fire polishing", or holding the article up to the furnace mouth to remelt the surface, it was never a wholly successful technique. To the class of consumer which was accustomed to traditional blown flint glass, pressed glass remained nothing more than a poor imitation, but for the majority of its purchasers, its cheapness more than compensated for its defects of quality.

The manufacturers of pressed glass in the north-east exploited the nature of their market with particular success by making use of a type of glass that did not contain the traditional but expensive ingredient, lead oxide. This tactic, according to Samud Timmins, enabled them to gain a share of the market at the expense of pressed glass manufacturers in other parts of the country who continued to make use of lead glass:[17]

> .... the practical question thenceforth became whether it was more profitable to manufacture comparatively dear goods with a maximum of brilliancy, or comparatively cheap goods with a minimum of lead. As a

> general rule the Stourbridge and Birmingham manufacturers have acted on the principle of commanding a high price by the superiority of their goods. Almost all of the best glass in the English market is manufactured in this district, although a considerable portion of it, afterwards cut or engraved in London, passes for London make. At Newcastle, on the other hand, the manufacturers generally have acted on the principle of commanding a market by the cheapness of their goods. Even in Birmingham the Newcastle glass finds an extensive sale ..... Those who could afford real cut glass never greatly favoured the imitation and those who purchased pressed glass on account of its cheapness were not scrupulously critical as to colour and brilliancy. If pressed glass was to be purchased at all the Newcastle glass was nearly as good in quality, quite as useful, and perceptibly cheaper. The consequence was inevitable. The Newcastle pressed glass business has steadily waxed while the Birmingham has waned. The manufacture still continues an important one in the town but there is no prospect of it again being one in which Birmingham will hold more than a secondary place. Other circumstances no doubt have influenced this result, but the main cause at work has been, and is, the comparative cheapness of the material when lead is more sparingly employed.

Although the original success of the north-east pressed glass manufacturers was, thus, based on the provision of a cheap rather than a fine quality product, the north-east manufacturers, and in particular J.G. Sowerby, can take much of the credit for an improvement in the quality of pressed glass produced during this period. This improvement, as we shall see, helped to consolidate the position of the north-east manufacturers at the head of the pressed glass trade by extending their market to those classes which were more particular about quality. It also had the less beneficial effect of loosening the north-east's hold on the cheaper end of the market and by the 1890s the north-east firms were facing competition in cheap goods from two sources: firstly from the Continent, and secondly from new factories in Manchester which specialised in the very cheap "unmelted" work.

In both cases the competition was purely in price and the cause was generally agreed to be low rates of wages:[18]

> We have not only the foreigner to contend against but we have the Manchester houses taking up the common class of work. I was informed they are making unmelted very low by the move, 400 articles for 1s 6d. This is just half what we are receiving in the North by the hundred.

This competition was certainly a cause of some, but not serious, concern.

Firstly because the competition from both Manchester and the Continent only

affected a small range of goods. With Manchester, only the very cheap "penny lines" were affected and the men proved willing to make concessions on wage rates in order to save them:

> The men in those factories making unmelted work were doing very little, in many cases not getting a turn a week, and the cause of it on enquiry (and found to be correct) was that it was through the trade leaving the North for Manchester, a manufacturer there having started an eight pot furnace for the class of work. A suggestion was made by Mr. Thos. Turnbull and Mr. Thos, Davidson to ask a small reduction on some cheap lines to try and recover the sale of these goods, the men agreed to take a penny less on some of these cheap penny lines as they are termed.

Foreign competition was less easily met but it was still confined to a small range of goods namely jam jars and cheap pub tumblers which competed against cheap blown tumblers imported from German and Belgium; as Sowerby's manager, Adam Dodds, admitted to the Tariff Commission, the bulk of the English manufacturers' production remained relatively unaffected by foreign goods:

> The glass imported mostly is light blown goods for which freights are low. The pressed glass is so much heavier than the blown, and with big articles such as dishes, bowls, etc. the freights interfere so much that the pressed-glass manufacturers in England can retain their trade.

Like all the glass manufacturers who gave evidence to the Tariff Commission, Dodds complained about foreign competition, but there seems no doubt that the competition experienced by pressed glass was nowhere near so severe as that experienced by blown glass. Dodds also admitted that, with regard to tumblers, the English manufacturer benefited from an unexpected degree of protection provided by the Weights and Measures Act of 1899 which enabled the local authority supervising the marking of glass vessels (by sand blasted stencil or engraving) to grant a rebate of the cost of marking. This protection was increased with the 1905 Act which, as Dodds explained, confined the rebate to glass manufacturers alone:

> The Weights and Measures Act stipulated that the cost of stamping measures should be 1 shilling per dozen. The local authorities in our neighbourhood for services rendered allowed us a rebate of 9d which makes the cost 3d per dozen. The London authorities charge 1

> shilling and foreign glass worth 10d per dozen has to pay 1 shilling for Government stamping which brings it to 1s 10d; and we have been selling our own make of this glass at 1s 8d. I can call it nothing else but protection and this protection has benefited us for the last two or three years. The new Weights and Measures Act came into force on the 1st January 1905. It provides that manufacturers alone are to be allowed rebates for services rendered ..... The tumblers referred to are beer tumblers mostly used by public houses and sometimes for jam.

The loss of the cheap lines was nevertheless of sufficient concern to encourage the Sowerby works to introduce new machinery for the purpose and fortunately the new steam press introduced in 1892 found favour with the men:[19]

> There has been a wonderful new invention tried at the Ellison (works), Gateshead. It is a wonderful piece of mechanism and if it is capable of doing what is claimed for it by the inventor it may secure a class of work to us that the foreigner and the Potteries have taken. It is a rotary steam press to employ two or more gatherers and one man to sit at the machine to cut the metal off. The work I think it might suit in particular is jams, marmalades, sweets, toilets, salts, small dishes and unmelted. The Central Committee got an invitation to inspect and examine the patent and see the articles made by it. They did so and asked all important questions. They then explained the whole thing to the District Meeting, and then the opinion of the meeting was taken and as a majority was decidedly in favour of it, when the Central Committee met they instructed me to write to say that they would try it.

Despite the smallness of the threat posed by foreign glass, the difference in manufacturing costs between England and the continent was thought by Sowerbys to be sufficiently significant to justify experimenting with producing goods abroad. In 1891 the firm sent a quantity of their moulds to Germany for glass to be manufactured and then reimported into England,[20] and this was followed up in 1896 with an apparently unsuccessful attempt to open a branch factory at Hoboken in Belgium.[21]

If pressed glass suffered less than blown glass from the effects of foreign competition, it also appears to have suffered less from bad labour relations. Although Dodds' evidence to the Tariff Commission stated that the pressed glass trade was "under greater disadvantages than any other" with regard to union interference, the evidence suggests that union authority did not operate to the industry's disadvantage. The pressed glass makers' union, founded in 1872, certainly did have a large degree of control over

various aspects of the manufacturing process, including areas which were traditionally the concern of the manufacturer alone. For instance, the final selling price of a particular article was to a large extent determined by the particular "price" or wage rate the union decided it should be manufactured for. When John Sowerby established his first pressed glass house in 1847 he attempted to introduce payment by the week, rather than by the piece, as a far more suitable system for renumerating men producing glass in large quantities with the aid of a machine. This system was rejected by the men and a system of piece work, payment by the hundred, was adopted instead. Under this system a different "price" was fixed for each particular article: thus a small tumbler was priced at 6d per hundred, a pen tray at 10d, a miner's lamp at 1s 4d, and a large centre stand at 4s 0d. At first these prices were fixed at the individual factories by the workmen themselves but in 1884 the union issued a guide catalogue of prices to ensure that prices paid at the individual factories were equitable; this catalogue consisted of a list of articles that were thought of as "standards". The union's influence extended further in 1889 when it established a "Pricing Committee" of representatives from each factory which would assess each new mould as it was introduced; the aim of the Pricing Committee was set out as "to regulate and by the comparison of new articles to bring all to one standard".[22]

The union thus had a direct say in the cost, and therefore the final selling price, of each article. There is no doubt that the union realised and accepted the responsibility of its position - that "the welfare of the trade is in the hands of the Pricing Committee" - and had generally always advised its members to be moderate in their pricing:[23]

> We trust that our members will not ask for exorbitant or unreasonable wages but justly price the various articles with a knowledge that looking a little after our employers' interest is furthering our own. We have no hesitation in saying that some of our masters have done all in their power to bring about a revival in trade.

Unfortunately on occasions the men's impressions of the state of trade could be rather shallow as, for instance, in 1888 when a general increase in prices was contemplated:[24]

> Never in the history of our trade was glass made in such large quantities at such low prices, but it is quite possible to overdo the thing and go down in price till the public will look contemptibly on some of the very cheap common articles and it is now admitted by some of the manufacturers that better prices could be obtained.

On this occasion the prices were increased but when the manufacturers in turn increased the selling prices of the articles the union reacted with indignation claiming that the size of the manufacturers' increase was not justified by their own:[25]

> We therefore say it is unfair and not correct to state to customers that the glass makers have got an advance in wages. We know our trade is like others, dependent on the supply and demand, and we are well aware that the foreigners have got a good footing in this country, and we are wishful to extend and increase our trade, not to cramp and curtail it for the benefit of foreign productions. The Pricing Committee are very careful in settling prices with this object in view.
>
> From the manufacturers' point of view their freedom to adjust prices of individual articles to the changing circumstances of the market was considerably curtailed. Manufacturers had, in effect, to apply to the Pricing Committee if they wanted to reduce the prices on a certain line. On some occasions, for instance the reduction on the penny lines which has already been mentioned, the union agreed but on other occasions they did not. For instance in May 1891 the employers asked for a reduction on plain tumblers to meet increased foreign competition:[26]
>
> I may say the Association of the Employers have, through their Secretary, Mr. Jobling, sent me several letters stating that they are very anxious for our Society to help them in this Tumbler Trade, I have put this to our Meetings and after taking the opinion of our members, they are against granting any concessions or reductions on Plain Tumblers.

Quite understandably the manufacturers were not happy with the system: the main complaint being that the Pricing Committee, on which they were not represented, did not price articles with reference to the state of the market.

The employers frequently suggested that they should be represented on the Pricing Committee but the union objected until 1890 when it was agreed that a joint committee of manufacturers and men should at least select the "standards" on which the price catalogue was based. A new standard price list was issued in 1890 and this continued in force until 1899; the 1899 list operated until 1910.[27]

The union also exerted a considerable degree of control over the actual production of the glass. By 1889 a body of "Factory Rules"[28] had been drawn up covering everything from the time the factories were to start on Monday morning to the amount of goods each workman should produce in a journey. This restriction of make was the rule that displeased the manufacturers most. The practice had existed since the union's establishment in 1872 and the first rule book had provided that no man should produce goods of a value greater than 7s 6d during an eight hour turn.[29] By 1907 the policy was still in operation despite, in Dodds' opinion, its manifest foolishness:

> An article is produced and men fix the price for making that article to bring in a return of 9s 6d or 9s per day. No matter what improvements in furnaces or patent machinery are introduced, the manufacturer will not get his numbers increased. It simply enables the men to get their day's work done quicker, but they have to remain on the spot until the time is up ..... We applied to our union recently, not for any reductions in wages, but for the men to make as many articles as they could, and we would pay them at the same rate, even if it came to 15s per day, the difference to us would be so great in getting the metal out of the furnaces quickly. They held meetings and decided not to agree to our request. We applied to them to increase the output from 8s 6d to 10s. That went to a vote, and came back with a refusal but they would make it to 9s 3d. To-day that is the maximum rate of wage we have to work to. No matter what facilities you grant a man he will not go beyond that 9s 3d because they think that some men earning 15s would reduce the number of men employed and others would be out of work.

The restriction of make was the major issue on which the manufacturers had objected to the formation of the union in 1872.[30] Several of the larger manufacturers, notably John Sowerby and Edward Moore, protested by locking the men out and although the men claimed that it was tyrannical to object to the formation of a society whose aim was "to help fellow workmen when out of employment and to keep the sick and infirm off the parish", Sowerby

and Moore pointed to rules such as the restriction of make as proof that the concerns of the society were not merely social. The lock out was lifted after 12 weeks but most of the rules drawn up in the first rule book remained.

Despite the manufacturers' origimal objection to the union the pressed glass trade appears to have avoided any major industrial disputes in the last quarter of the nineteenth century. The strikes that did occur were all confined to individual factories and concerned internal disputes: Greener's factory appears to have been particularly subject to strikes and there was a strike at Sowerbys in 1891.[31] Three reasons can perhaps be advanced for this comparatively harmonious state of labour relations. Firstly, there is no doubt that the union itself took a realistic view of the trade it was engaged in and was as anxious as the employers to keep its members in work, and hence off the union funds. There are many instances of the union using its influence to give positive help to the employers: for instance, following a complaint from the Cornhill glass works in Sunderland that too much glass was being broken during the sorting, a deputation visited the factory and rectified the fault"after an explanation of how it was sorted off the pans in other houses". On another occasion the Central Committee visited the Glasgow factory of Allan & Co. (which was the only branch of the union outside the north-east) where the men were only working three turns a week. They succeeded in persuading Allan to increase his make by arguing the sense of the policy followed by their own English manufacturers, namely "doing a large business on small profits and quick returns"; this policy they reasoned, was also better for the union as "we had better have the members paying as receiving unemployed money".

Secondly, there is evidence that the employers themselves were not entirely unhappy with the extent of the union's authority for it could be

used to their own advantage. In pricing for instance, the union's influence in regulating and standardizing the prices of the various goods produced by the individual factories reinforced the idea of a "trade price" which provided all manufacturers with some degree of protection against competition from their colleagues. Thus, in 1888, the Central Committee went to Greener's factory to ask the managing partner, Mr. Thompson, to raise the prices on some of his articles for which he was paying beneath the usual rates. Thompson replied that he would if the union would in turn compel other manufacturers to raise the wages on some other articles for which they were paying beneath the rates and selling beneath the trade price. The third reason for the success of the relationship between employers and union in the pressed glass trade is that there was evidently considerable communication between the two sides; new moulds were constantly being introduced and their prices discussed. The Central Committee of the union made regular visits to all the factories and was evidently well informed about the needs of the industry from the manufacturer's point of view. Indeed the union was not shy in offering the employers advice on commercial matters:[32]

> During the past quarter I am pleased to say our Trade has improved considerably in Gateshead and South Shields and the demand for new designs and well finished goods is very encouraging, and those firms who are not afraid to speculate on new moulds and make good metal can have no fear of securing orders, for the Ellison, Teams and South Shields have all more furnaces at work. I congratulate the districts named for the decided improvement during this past quarter. But I regret to say that Sunderland is not much brisker and the reason is not far to seek, the moulds are in many cases obsolete, and the goods made from them inferior.

On the manufacturers' side there appears to have been a realistic attitude towards their workforce and a willingness to trust them with a degree of responsibility. Although Dodds complained bitterly to the Tariff Commission about the restriction of make, his comments were on the whole sympathetic towards his men and he certainly did not subscribe to the view that the high wages paid to English workmen were the cause of the uncompetitiveness of the British glass industry. Dodds stated firmly that "we could never

expect our men to work for the wages the Belgians do: the work of glass making is very hard, particularly in the summer weather. The wages are high but our men are not over paid".

Altogether the pressed glass industry appears to have avoided the more severe difficulties experienced by the blown flint industry during this period. However it did not entirely escape the periodic depressions in trade. From 1879 to 1885 the pressed glass makers' Journal provides considerable evidence of a depression, with many hands being discharged, furnaces being put out and factories working half time. In November 1884 the Journal announced that two furnaces had been relit at the Ellison works and one at Moore's works where, in addition, hands had been engaged - "the circumstances being without precedent within our memory". By November 1885 trade had revived sufficiently to enable most of the factories to be working at full capacity.

i) The Sowerby firm

The Gateshead firm associated with the Sowerby family was unquestionably the most important of the local pressed glass firms. Not only was its works at Ellison Street unmatched in size, but the firm also pioneered several important technological developments and led the way in matters of quality and design. The credit for the firm's achievement must be shared between three men: John Sowerby, the founder of the Ellison works; his manager and eventual partner, Samuel Neville; and John George Sowerby, who took over the firm from his father during the 1870s. As we have seen in the previous chapter on flint glass, John Sowerby laid the foundation of the pressed glass industry in the north-east when he established in 1847 what was said to be the first glass house in England to be devoted entirely to pressed glass. Following the difficulties he encountered at his original house in Pipewellgate, Sowerby transferred his operations to the new

Ellison Glass Works c. 1850. This was a far more successful venture and, according to the evidence given by Samuel Neville to the 1865 Children's Employment Commission, the works - which by the 1860s consisted of eight ten pot furnaces and employed around 450 people - was the largest pressed glass factory in the Kingdom.[33] The eight hour shift system, in place of the traditional six hour shift worked in blown flint glass houses, had been introduced by the firm during the early 1850s according to Neville, and this meant that in later years the firm was well placed to take advantage of the tank system which permitted continuous working. By 1882 the works was operating continuously using three shifts working eight hour journeys around the clock and although the size of the works had not increased substantially the workforce had increased in size to 700 - 1,000;[34] nine furnaces were in operation in 1882 but one of these may have been used for stained glass rather than pressed glass. Production had also increased significantly from the 1860s when the works was said to have been producing thirty tons of glass a week;[35] by 1882 the weekly output had increased to 150 tons. The 1880s marked the end of the firm's expansion. Although the works remained the largest in the north-east, by the time of the Tariff Commission in 1907 only three out of the eight furnaces were in operation and part of the works was boarded up in order to save on the rates. The firm employed only 325 people (151 men, 61 women and 114 boys), but the full capacity, should the works be fully operational, was 750 to 800.

The firm was incorporated in 1882 as Sowerby's Ellison Glass Works Ltd. but until that date it had been a private company in the hands of the Sowerbys. In 1857 John Sowerby had taken his manager Samuel Neville into the business but the partnership was dissolved in August 1871 when Neville left to establish his own glass works (see below). John Sowerby did not die until 1879 but his son John George Sowerby appears to have had full control of the

management from at least the mid 1870s. J.G. Sowerby continued as managing director until 1897.

J.G. Sowerby's contribution to the firm was in some respects less impressive than his father's but was equally important. During the period of his directorship, which included periods of severe depression in the trade, the firm did not expand in size but J.G. Sowerby succeeded in consolidating the firm's position at the head of the pressed glass trade, largely by making considerable improvements to the quality of the glass it produced. Sowerby was well equipped to apply himself to the matter of quality; he was fortunate in possessing both a thorough technical knowledge of pressed glass plus an aesthetic sensibility and it was this combination that enabled the firm to meet the demands of the high Victorian market with more success than any of its rivals.

Sowerby's most important innovations were technological, namely his manypatents which made improvements to virtually all aspects of the manufacturing process. His first patent, taken out in 1871, was merely concerned with a method of ornamenting the glass but this was followed in 1874 with an improved form of press. Three patents, taken out in 1880, 1881 and 1883, were concerned with the actual pressing of the molten glass and dealt with regulating the flow of glass into the mould and avoiding "sucking"on the withdrawal of the plunger. Three later patents were all concerned with the finish or polish of the article (which had always been considered pressed glass's worst defect); in 1886 a patent was taken out for "heat polishing" using super heated steam; in 1887 Sowerby and an employee John Miller, patented a further form of heat polishing; in 1896 Sowerby and Henry Harley Pitt, who was to succeed him as manager of the works, patented a method of fire polishing in small steam furnaces known as "glowry holes". This was an important series of patents for an improved surface polish was

essential if pressed glass was to develop beyond being a mere poor imitation of cut glass. The progress made by the Sowerby firm is evident from the fact that by the 1890s it was able to market ranges of quite plain glass, identical in appearance to free blown glass, which would certainly not have been possible had the surface polish not been of a good standard.

Ironically, Sowerby's effort to improve the surface polish of his glass was probably helped rather than hindered by the use of a leadless metal. The "ordinary constituents" of Sowerby's metal, as described in a patent of 1878, were sand, soda, barium carbonate, nitrate of soda and manganese oxide. The significant item was barium carbonate which imparted to glass many of the same characteristics as lead, namely lustre and brilliancy, but produced a much harder metal which was particularly suitable for pressed glass; the quality of pressed glass depended in part on the crispness of the shape and moulded decoration being retained and one of the unsatisfactory aspects of fire polishing was that the technique tended to soften more than just the surface. A hard metal was always desirable for good pressed glass and Adam Dodds in his evidence to the Tariff Commission attributed the superior quality of American pressed glass to this fact above all:

> American pressed glass is the best pressed glass in the world. In consequence of their improved processes they are able to melt a much harder metal than ourselves. They have intense heat with their furnaces. When an article is pressed into shape in the mould it has to be re-heated to take off any little surplus in pressing and also to give it a good skin - a highly finished appearance. In consequence of the hard nature of the metal, when it comes to be re-heated the shape of the mould is retained. The heat does not remove the shape of it to the extent that it does with us, working with a softer metal. We are erecting at Gateshead a gas furnace which I hope will be able to produce the same great heat.

American glass was usually acknowledged to be superior in quality to English but an article in the Pottery Gazette of April 1878 suggests that Sowerby was eager to match the transatlantic standard. The magazine reminded its readers that a few months ago it had remarked on the exceptional lightness

of the tumblers being imported from America and therefore was now pleased to draw attention to some tumblers made by Sowerby in a new and beautiful metal formed by "instantaneous pressure" to make them even lighter than the American products; the magazine agreed with a Glasgow manufacturer who had declared Sowerby's new tumblers to be "the most marvellous pieces of work produced since the invention of pressed glass".

The second aspect of J.G. Sowerby's overall achievement was in the field of design. Although perhaps less important than his technological innovations, his activities in this field are equally interesting for being, arguably, one of the few successful attempts to marry the Aesthetic Movement of the 1870s and 1880s with manufacturing industry. Pressed glass was in every respect an unlikely vehicle for up to date ideas on art and design. Whatever its virtues in bringing glass to the poor at a cheap price, pressed glass had always been considered as lacking any artistic merit at all; it was poor quality, badly finished glass. Its low artistic standing sank even further during the 1850s when the authoritative voice of John Ruskin pronounced that cut glass, which pressed glass had always sought to imitate, was not only inartistic but barbaric.[36] Ruskin saw only two properties in glass, ductility and transparency, and where the glass blower failed to bring out these two properties, or they were disguised by cutting, the resulting glass, in Ruskin's opinion, failed as an artistic object. By Ruskin's standard pressed glass, however well designed and executed, was always vulgar: not only did it have a solid rather than a fluid appearance but, more damningly, it was formed by a machine rather than an artistic craftsman. Ruskin's idea about the properties of glass were perhaps undeservedly influential among theorists of design; typical of many was William Morris who stated "In speaking of glass work it is a matter of course that I am only thinking of that which is blown and worked by hand; moulded and cut glass may have commercial but

cannot have artistic value".[37] Fortunately more progressive ideas were also voiced by those who, although lacking the influence of Ruskin, were perhaps better qualified to pronounce on the properties of glass. For instance, in 1862 Sebastian Evans, the chief designer of stained glass for Chances, advanced the somewhat radical suggestion that of all types of glass it was pressed glass that promised the most from the application of artistic talent:[38]

> It has been assumed by critics of high standing that all glass except blown is essentially inartistic. That such an assumption is perfectly gratuitous can, we think, be easily shown. In the case of pressed glass cheapness of production is an element of primary importance and a perfectly mechanical similarity in all the wares from the same dies is unavoidable. The same however can be said of our coinage and other manufactures in which these conditions are by no means held to exclude even high artistic treatment. Pressed glass is further capable of producing effects quite distinct in kind from those productible in glass under other conditions or in any other material. There would thus appear to be a legitimate field for the artist even in this department of the manufacture, and although in all probability the taste of the general purchasers of such wares, who prefer bad imitations of more costly articles to wares good in themselves but manifestly uncostly, will for a long time retard its artistic development, there is no a priori reason why it should not hereafter produce really artistic shapes treated in a style peculiarly and legitimately its own. The vulgarity supposed to be inherent in pressed glass consists in fact almost entirely in the imitation of cut glass which has hitherto characterised it. Fire polish, though possessing a peculiar beauty of its own when properly applied, can never imitate and ought not to attempt to imitate the polish of the lapidary's wheel. That the invention is still comparatively speaking quite novel is its only apology for attempting to imitate the old and more widely accepted method of treating glass; and if in the whole range of glass manufacture there is one department more than any other which seems to promose a greater and more immediate result to the application of real artistic talent, it is that of pressed glass.

Evans' plea for pressed glass to be treated in a style "peculiarly and legitimately its own" was arguably not realised until Sowerby's series of "aesthetic" designs of the 1870s. Throughout the 1860s the designs of pressed glass certainly saw some departure from a slavish imitation of cut glass; pressed glass was found to be uniquely suited to the production of commemorative ware with low relief portraits, while low relief patterns using naturalistic or classical motifs were also patented by some manufacturers. However the designs patented by Sowerby from the mid seventies

onwards were a distinct departure from tradition and unquestionably in the most up to date artistic style. Not only did the low relief decoration feature distinctly "aesthetic" motifs such as sun-flowers, peacock feathers, Japanese fans or Kate Greenaway style children, Sowerby's square and triangular shapes were also original and the "aesthetic" inspiration was underlined by the fact that many of the goods were produced in favoured exotic colours such as turquoise, yellow and green. The glass Sowerby used was a coloured opaque glass which he patented in 1876 and called "vitro-porcelain". Something of the stir these first vitro-porcelain goods caused in 1876 was recalled by a writer in the Pottery Gazette in 1896:[39]

> Mr. J.G. Sowerby of Gateshead may claim credit for making the first opaque turquoise, opal and ivory glass in England, which came opaque from the pot and which enabled the article to be made direct from the molten metal which had previously been turned opaque by cooling and re-heating; this method gave the idea of pressing these opaque bodies and the furore of the flint turquoise goods by this process - with the beautiful forms and designs they produced - must be remembered by many who are still living. This was followed by the unique production of the variety known as malachite by the same (manufacturer).

Sowerby's influence in fact rested as much with his development of quite new types of coloured fancy glass as with the modern style of his decoration: these included malachite glass, which featured a swirling pattern of different coloured glass in the same body, Patent Queen's Ware which was an opaque ivory coloured glass patented by Sowerby in 1878, a milk white "blanc de lait" glass, jet black glass, glass interleaved with gold foil, tortoiseshell glass - introduced in 1882, and the most beautiful of all - opal glass which it was said had taken three years of experiment in order to bring it to a consistency suitable for pressing.[40] The success and influence of these new types of coloured glass is easily measured by the wave of imitations that followed them. Malachite glass was soon being manufactured by all the north-east houses and several firms developed their own particular coloured glasses: in 1886 Edward Moore patented an opaque green and an opaque fawn coloured glass; in 1889 J.G. Davidson patented

his own version of opal glass which was called "pearline". The general style of Sowerby's designs was also imitated but not with any great success. Imitations from abroad were a more serious problem for the firm which had had sufficient success with its "fancy glass" abroad to be able to open showrooms in Paris and Hamburg by the early 1880s.[41]

Although by the late 1870s many manufacturers had realised that giving their products an "artistic" dimension could be commercially advantageous, there is no doubt that Sowerby himself was genuinely inspired by the new spirit of "Aesthetic" taste. He was an artist and illustrator in his own right and exhibited at the Royal Academy from 1897 onwards. He was also a founder member of Newcastle Fine Arts Association and an illustrator of children's books in partnership with the Newcastle artist H.H. Emmerson and Walter Crane's brother Thomas; the two books produced with Thomas Crane have been described as "some of the most charming publications of the period".[42]

Sowerby's artistic zeal also expressed itself in the establishment in 1879 of a department for stained glass in partnership with the Yorkshire artist and designer T.R. Spence. Although Spence's association with the Gateshead Stained Glass Company, as it came to be known, only lasted a few years, the company executed all the glass work for one of Spence's few architectural commissions, St. George's church in Jesmond, whose wealth of rich decoration in an early Art Nouveau manner has been described as "very progressive in style for its date".[43] By 1882 the stained glass department was under the direction of the watercolourist A.H. Marshall who was said to have made particular use of a technique patented by Sowerby in 1880; this technique was designed to show patterns such as the folds of drapery by interleaving coloured glass between two layers of clear glass which was said to have had a "wonderfully soft yet brilliant effect".[44] The stained glass department was never large, by 1888 it consisted of 20 workmen under a manager, but

it was successful enough to enable it to be incorporated as a separate company in 1887. The original shareholders consisted of the leading workmen plus Richard Green, the manager of the Ellison works.[45] Despite its separate status, the stained glass company retained close links with the larger company; its premises were rented from the Ellison works and from the 1890s until the company's liquidation in 1926 the major shareholder was Adam Dodds. Much of the company's later work was designed by J. Eadie Reid, an artist from Whitley Bay.[46]

Despite the commercial success of Sowerby's aesthetic pressed glass, and despite the acclaim from within the trade, it never succeeded in attracting the wider critical praise that it certainly deserved. Prejudice against machine made glass remained firm and mainstream artistic theory continued to affirm that the only truly artistic style for glass was that approved by Ruskin and Morris, namely translucent, free blown glass in delicate limpid shapes, a style that was widely known as "Venetian". So strong was the prejudice against the machine that there is evidence of it in Sowerby himself, firstly in the establishment of a separate department for hand blown "Art Glass", and secondly in the introduction of a range of hand blown "Venetian" glass. Setting up a separate department or studio for the production of artistic products as distinct from the bulk of the commercial products, was the most typical response of manufacturers to the new aesthetic consciousness. In the same way that pottery firms such as Doultons and Wedgwood set up separate studios devoted to hand decorated "art pottery", so Sowerby in 1870 set up a separate department for "Art Glass" (He was also connected with the Gateshead Art Pottery which was listed in the 1883 directories at the Ellison works' address in East Street). Sowerby's "Art Glass" unquestionably fulfilled all the critical criteria: the vessels were the creation of the skill and imagination of the glass blower without aid of machine or pressure of commercial considerations:[47]

> Sowerby Art Glass is entirely hand made and no portions of it are pressed or moulded. Each piece represents the artistic capacity of the designer, whose drawing for it is intended never to be used again, and the judgement, experience and manipulative skill of the working glassman ..... At times the inventor and his skilled workmen have laboured over three hours at a single piece of glass, only to find it fly into pieces in the final manipulation. In one week the party spent twenty one hours at the work with the result of producing two completed objects only.

Sowerby succeeded in attracting some critical acclaim with this glass; a selection was shown at Christopher Dresser's Art Furnishers Alliance in 1880[48] and in 1882 200 specimens were exhibited at the Manchester Art and Industrial Exhibition. Sowerby's second venture into more conventional forms of artistic glass was the establishment of a range of hand blown "Venetian" glass, in plain elegant shapes. Like the "Art Glass" Sowerby's "Venetian Glass" appears to have been introduced in the early 1870s but its production does not appear to have lasted long.

The 1890s saw the eclipse of Sowerby's artistic productions and the firm appears increasingly to have concentrated on a basic range of saleable table ware in plain, clear glass sometimes decorated with engraving. J.G. Sowerby himself retired in 1897 in order to devote himself to landscape painting and his place as manager was taken by H.H. Pitt. Despite the departure of Sowerby at the relatively early age of 47 his activities certainly had a lasting effect, not just on the firm, but on the pressed glass trade as a whole. By raising the standards of quality and design, Sowerby had helped to make pressed glass more acceptable to classes which had hitherto scorned it. He had demonstrated that pressed glass need not confine itself merely to imitating cut glass and that, when treated in a style that suited its particular properties, it could be both pleasing and charming. Perhaps most importantly his technological innovations had helped to extend the range of possible effects pressed glass could reproduce.

ii) The other firms

The Sowerby firm was of central importance to the pressed glass industry in the north-east, not merely because of the lead it provided in so many matters but because many of the other firms in the area were established by men who gained their knowledge of the trade by working at Sowerby's. It has already been mentioned that Nicholas French, the manager of the blown glass department at Sowerby's during the 1840s, established his own glass works at Harrison St. in Sunderland in 1852. Following French's failure in 1859 the works was taken over and converted to a pressed glass works by James Angus and Henry Greener. Angus was a one time glass merchant who had recently occupied the flint glass house at Bill Quay, Greener, like French, was an ex-employee of Sowerby.[49] Angus and Greener continued at Harrison St. until Angus's death in 1869 when Greener moved his operations to a new glass works at Millfield in Sunderland. Following Greener's death in 1882 the firm was run for a while by his son, manager and accountant, but in 1884 the firm was taken over by James A. Jobling, a Newcastle chemical merchant who had an interest in the trade as he supplied chemicals to many of the local glass houses; the firm continued under the title Henry Greener & Co. until the firm was taken over by Cornings in the 1940s.[50] During the nineteenth century Greeners was one of the largest of Sowerby's rivals with works consisting of five ten-pot furnaces. Like all of the other north-east firms its designs did not approach Sowerbys in originality but it certainly produced a large range of goods and patented a number of production methods: a method of producing glass letters for shop windows was patented in 1874 and the manufacture of glasses with angular prisms for use as carriage roof lamps was patented in 1877.

Greeners spawned another company in turn when in 1893 Thomas Scurr and George Eunson, both of whom had previously been employed by the firm,[51]

set up a new works at the recently vacated bottle works at Low Fulwell. The works was said to be well equipped for the production of ornamental table ware and the pair had the added benefit of a patent taken out by George Eunson for lining moulds with a mixture of plumbago and tallow. The firm collapsed c. 1905.

Another firm that had a direct link to Sowerbys was the firm established by Samuel Neville following the dissolution of Sowerby and Neville in 1871. In 1870 Neville's name had appeared in the Sunderland Directories at Greener's old glass works in Harrison Street, but in 1872 he embarked on a more ambitious venture at Park Street in Gateshead, on land bought from the neighbouring chemical works, where he erected a new glass works with four furnaces. In 1874 the concern was turned into a limited liability company with an impressive nominal capital of £70,000 and some distinguished local industrialists as subscribers.[52] The company appears to have had a less successful life than might have been expected considering Neville's expertise; its products appear to have been generally unremarkable and according to Neville's obituary "Mr. Neville had at one time a large trade but in design and perfection he never reached the character and business of the best houses of the period". The Neville Glass Works came to an untimely end in January 1880 when a fire destroyed the whole premises. The works had in fact been idle for several months past but it was intended to restart it once trade improved for the fire had begun in the pot loft where a fire was always kept in to keep the pots dry. The company was wound up in May 1880 and Neville died abroad in 1883.

The third firm to trace its origins to Sowerbys was George Sowerby & Co. which took over the Lemington glass works, which had been dormant since 1877, in 1888. The company consisted of George Sowerby, who was

J.G. Sowerby's cousin and had most recently been employed at the Ellison works as the manager of the stained glass department, and H.H. Pitt who had also come from there. Pitt quit the new works in 1889 to return to the Ellison works but George Sowerby continued to the end of the century manufacturing goods that closely followed the Ellison products in design: according to a complaint in the pressed glass makers' journal, however, the Lemington works was notorious for producing bad sulphured metal which caused many of the best workmen to quit and seek employment elsewhere.

The remaining pressed glass firms in the area did not have so direct a link to the Ellison works, but they cannot fail to have been influenced by its conspicuous success. In terms of size, the largest works in the area, apart from the Ellison works,were those belonging to Greener, Edward Moore of South Shields and W.H. Heppell of Newcastle; all of these consisted of five ten pot furnaces. What was to become Heppell's works was erected c.1844 in Forth Street, Newcastle by the Wright Brothers. The major partner William Wright took out three patents in 1856-7 one of which was for moulding articles such as jugs in two pieces. The Wright brothers were successful enough to establish a smaller house in Pottery Lane further along Forth Banks and for a brief time they also occupied the small blown house in Oakes Place. On Wright's death in 1867 the main works passed into the hands of E.T. Reed, a glass merchant, and eventually to Heppell Garbutt & Co. which was dissolved in 1874 and replaced by W.H. Heppell & Co.[53] W.H. Heppell's interest in a pressed glass works was not surprising in view of his family connections to George Heppell & Co. who were iron founders specialising in the manufacture of iron moulds for pressed glass works. Indeed there could be said to be another connection to Sowerby here for William, John and George Heppell had first established their foundry in Pipewellgate in 1840 on land leased from Sowerby's New Stourbridge Glassworks.[54] The Heppell family's skill in the manufacture of moulds was well demonstrated by the patented designs

of W.H. Heppell which included jugs and basins in the shape of fish and shells. Following the firm's closure in 1884 the moulds were brought by George Davidson (see below). Other iron founders to specialise in the manufacture of glass house moulds during this period were W. Easton of Oakwellgate, Gateshead, S. Landells & Co. also of Gateshead (which claimed to be the largest manufacturer in England of moulds and presses), and Matthew Thompson of Sunderland.

Edward Moore's Tyne Flint Glass Works was established in 1860 on the site of Shortridge's old works at West Holborn in South Shields. By the time of the 1865 Children's Employment Commission, to which Edward Moore gave evidence, the works consisted of two furnaces with a third in the process of construction. Moore was the only exhibitor of pressed glass at the 1862 Crystal Palace exhibition and his goods were praised by Sebastian Evans as "marvellously cheap and technically excellent" but criticised for being mere imitations of cut glass. In 1891 a fire destroyed the works almost completely leaving only the five cones standing and making 400 hands idle. Despite the £45,000 damage done the works was reconstructed and restarted in May 1892. Moore himself died in May 1900 and the firm was continued by his son and widow. In June 1912 the company was incorporated as Edward Moore & Co. Ltd. with a small nominal capital of £7,500 subscribed by the works' previous owners who agreed to wind up the company in April 1913.[55]

Several of the smaller pressed glass companies proved more resilient than the larger firms. George Davidson & Co., for instance, whose Gateshead works consisted of four eight pot furnaces for most of the nineteenth century, survives to the present day as Bramah Glass. Matthew Turnbull's Cornhill works in Sunderland survived until 1954. George Davidson was a butcher from Low Fell who was said to have made a considerable capital from exporting food and goods to Australia.[56] In 1869 he invested in a small blown glass works for the

production of lamp globes and chimneys for the local trade. Exactly when Davidson decided to expand into pressed glass is not known but the company's first pressed glass designs were registered in 1878. By 1889 the works consisted of four eight pot furnaces and employed 300 - 400 people. The management was under Davidson's son Thomas who also designed many of the firm's goods; Davidson also made considerable use of old moulds bought from other factories, such as Nevilles, Heppells and Thomas Gray of Carr Hill, when they closed. Davidson's original patented designs were on the whole derivative of Sowerby's but lacked the delicacy that so distinguished the latter; the coloured glass, such as the green "vaseline" introduced during the 1880s, was also garish in comparison.

Matthew Turnbull's Cornhill Glass works at Southwick near Sunderland was established in 1859 and by the 1880s consisted of at least two furnaces, one of which produced blown glass lamp chimneys. Little is known about this works beyond the fact that in 1884 a workman was convicted for intimidating a fellow workman who refused to join the union.[57] The works continued in production until 1954 and the company was said to have had an extensive trade with Woolworths. Little is also known about the three remaining small pressed glass firms: McDermott Dave & Co., Thomas Gray & Co, and the Phoenix Glass Co. Thomas McDermott had started as a blown flint manufacturer during the 1840s but at some time during the 1860s turned to pressed glass. The company was incorporated in 1877 as the Albion Flint Glass Company Ltd. with a nominal capital of £10,000.[58] The size of the firm's operation at that time is illustrated by a schedule of the property attached to the incorporation papers. The works consisted of one furnace with one 12 horse power engine, the company owned 137 moulds all of which were for quite basic table ware including 57 moulds for tumblers. Most of the firm's business was almost certainly local although it was said in 1889 to have

a growing export trade.[59] The company was wound up in 1892. Thomas Gray occupied the glass works at Carr Hill from 1860, in which year he also took out a patent for moulding articles in a one piece mould and opening out the foot by hand, until 1880. Following the failure of Gray's successor, the Lorraine Glass Company, his moulds were brought by Davidsons. Finally there was the Phoenix Glass Company in South Shields which was established by Thomas Oates and taken over by T.J. Swinburne, R.W. Swinburne's brother, in 1875. The works was said to consist of one eight pot furnace and closed in 1882; the land was eventually sold to the Town Council to build a new Police Station on.

It is perhaps surprising that pressed glass should have emerged as the major branch of the north-east glass industry during this period; traditionally table ware had been the branch of the glass industry least suited to the conditions of the north-east and the manufacture of flint glass had been quite overshadowed by the manufacture of flat glass and bottles. The success of pressed glass owed much to its basic nature;it was cheap to produce and therefore well suited to the demands of a mass market. There is no doubt however that success was also due to the enterprise and foresight of the north-east manufacturers, particularly the Sowerbys, who exploited the potential of pressed glass to great effect. Significant improvements to the manufacturing process were also introduced and altogether the record of the north-east pressed glass manufacturers during this period was extremely creditable, particularly when compared to the less creditable record of some flat glass and bottle manufacturers. The success of north-east pressed glass continued into the twentieth century and the manufacture continues to the present day at Davidsons' works in Gateshead and Cornings' glass works in Sunderland.

CHAPTER TEN: CONCLUSION

This thesis has looked at the development of the three distinct branches of the glass industry in the north-east over quite a substantial period of time. Inevitably the time span involved, plus the host of dissimilarities between the separate developments of the three branches, makes the task of drawing broad conclusions, at first sight, not an easy one. Nevertheless generalisations can be made and broad conclusions can be drawn. First, some broad descriptive generalisations about the development of the industry and a restatement of the chronology of its expansion and depression in the region.

The 200 years under study can be divided into two contrasting periods. The first, which came to an end c.1830, was hallmarked by expansion, prosperity and the region's strength. This period saw a significant growth in all branches of the local glass industry, the consolidation of the region's leading position in the national glass industry, rising profits for manufacturers, and rising wages for skilled workers. Within this overall pattern of growth different patterns were experienced by the different branches of the industry: flat glass grew in disjointed spurts, c.1730 - 1740, 1790 - 1810 and c. 1825; the number of bottle firms in the region increased at a more uniform rate; growth in the flint glass industry was confined to one period, from 1805 to 1820. A few manufacturers, most notably in the flint glass industry, experienced failure but their numbers were not sufficiently significant to qualify the general description of the period as a prosperous and expansive one.

This period of expansion was followed by something of a hiatus during which, thanks to the prolonged uncertainty over the repeal of the glass duties, the expansion of the previous period was halted and the ensuing inevitable decline of several local firms postponed until the eventual

arrival of repeal in 1845. Repeal marked the beginning of the second period, which, in contrast to the first, was hallmarked by depression and decline. During this period of severe difficulties the local industry lost its traditional importance in the national industry, experienced falling profits, falling wages and eventually suffered a significant reduction in the number of firms and the numbers employed in it. Again, the developments of the different branches of the industry varied. Pressed glass alone succeeded in adapting to the new conditions ushered in by repeal and achieved some degree of growth. For both flat glass and bottles the pattern of decline was broadly similar. Both branches managed to adapt in the short term to the post-repeal conditions, but their weaknesses in methods and costs of production were dramatically exposed by the increasingly severe foreign competition of the last quarter of the century. As a consequence of the severity of this competition, and the failure of local manufacturers to respond in a positive way by introducing new technology both branches suffered a decline; in the case of flat glass, a decline to the point of extinction.

What are the broad conclusions that can be drawn from this broad history of steady expansion followed by a relatively sudden decline? Perhaps inevitably the broad conclusions concern those areas of development which affected all branches of the industry in common: firstly, and most obviously, the regional factors at work in the north-east, and secondly, the effect of excise taxation both during and after the 100 years of the tax's existence. Given that the process of industrial growth and decline is an infinitely complex one subject to a multiplicity of inter-related favourable or unfavourable factors, these are the two outstanding and critical factors peculiar to the development of this particular regional industry during this particular period.

To look first at the excise. The effects of the excise on the British glass industry as a whole have already been discussed in Chapter Five. Briefly, it exerted a conservative influence. The hundred years of the tax's existence were certainly years of considerable growth for the British glass industry but it was a growth that lacked some of the more vigorous characteristics usually associated with the process. The excise tended to work against the development of technological innovations or large scale production by limiting the opportunities for innovation and, to a lesser degree, preventing the extension of market demand which was a necessary concomitant of large scale production. It preserved traditional manufacturing processes and encouraged British glass manufacturers to concentrate their ingenuity merely on making improvements to these often costly and inefficient processes. These conclusions apply to the British glass industry as a whole. Can any conclusions specifically concerning the north-east industry be drawn? Again, there is no doubt that the excise period was also a period of considerable growth for the north-east industry but was this merely an unrelated coincidence?

It seems fair to conclude that the excise did exert a favourable influence on the north-east industry in particular, largely because the tax tended to work in the interests of the existing status quo; the established merchants and manufacturers who collaborated in controlling and stabilizing the trade. The excise established certain basic manufacturing conditions from which all manufacturers worked in "fair" competition, but inevitably this tended to favour those who were already well established and whose interests lay in a stable, undisturbed trade; the excise provided some measure of protection against new entrepreneurial initiatives in the trade and new technological innovations. Entrepreneurial initiative was not of course entirely unknown in the glass trade, witness the activities of Thomas Delaval who,

despite the excise, succeeded in introducing an element of maverick entrepreneurial activity to the bottle trade during the 1760s, but the reaction he provoked can perhaps be taken as evidence that such activities were somewhat exceptional.

By the middle of the eighteenth century the north-east manufacturers were well entrenched in both the bottle and the flat glass trades, and their position remained substantially unchanged until the 1830s. It would certainly not be right to suggest that the excise was a crucial factor in the north-east's commercial predominance during this period; the ability to supply a cheap product was clearly far more significant. The excise did however add some strength to the region's position and in this respect its role is not dissimilar to that of Mansell's seventeenth century patent of monopoly: both excise and monopoly were "artificial" components in the economic context which nevertheless reinforced the natural advantages of the north-east. Without the excise would the glass trade have been upset by any major technological innovation? Perhaps not, but even so it does seem fair to say that without the excise, the trade, in particular the London trade, would have been less stable, more competitive and therefore that the north-east manufacturers would have been required to make a greater effort to maintain their predominance; this would almost certainly have been true of the early years of the nineteenth century when improved inland transport made the London market equally accessible to other areas of low manufacturing costs such as the Midlands and Lancashire.

The second broad conclusion that can be drawn from this study is that the region itself exerted a fundamental and pervasive influence on the way the industry developed. To some extent this is self evident, particularly in respect of the growth of the industry which, as was discussed in chapter one, was clearly encouraged by the region's natural resources and related

economic activities. Less immediately evident is the influence of the region in the decline of the industry but it is clear that this decline stemmed in large part from the failure of local manufacturers to adapt to new conditions and this in turn can in part be explained by a complacency bred of the region's traditional strength. In flat glass, for instance, the closure of the two leading firms was certainly connected to their owners' blind faith in the potency of cheap coal and the consequent failure to introduce more efficient gas fired furnaces. Although self evident, the importance of regional factors still bears repeating. If any one factor was more critical than any other in shaping the development of the north-east glass industry, it was the region itself.

These then are the two main, broad conclusions of this particular study. Several minor conclusions can also be drawn: minor in the sense that they merely amplify or support several well established features of British industrial history. Amongst other things, the development of the glass industry in the north-east bears ample witness to: the pivotal role of the entrepreneur and his family (particularly well illustrated in this case by the outstandingly able Cookson family), the intimacy of the link between manufacturing and commerce during the eighteenth century, the lack of sharp division between landed gentry and manufacturers, and the role played by practical and empirical manufacturers in technological and chemical advance.

It should be said, finally, that much is still left unanswered about the British glass industry, and more particularly the British glass trade, as a whole during this period. This study has looked at one regional industry and has necessarily concentrated on its manufacturing side. It may well be that a further exploration of the commercial side of glass - the London glass trade, say, or a detailed analysis of market demand - during this period

would produce factors which prove as critical to the development of the British glass industry, and hence also the north-east glass industry, as the regional and industrial factors looked at here.

APPENDIX I: Excise returns for all English glass manufacturers, Year ending 5 January 1833.

DISTRICT	NAME OF PROPRIETORS	WHERE SITUATE	DUTY PAID £	
Bristol	Henry Ricketts & Co.	Bristol	4,714	F
	John Nicholas & Co.	"	2,653	
	Henry Ricketts & Co.	"	3,523	B
	Thomas Powell & Co.	"	3,792	B
	Coathupe & Co.	Nailsea	18,792	C
	" "	"	20,398	C
Durham	Isaac Cookson	South Shields	9,764	P
	"	"	11,848	C
	"	"	12,704	C
	"	"	13,602	C
	"	"	3,797	B
	"	"	1,464	B
	"	"	3,615	B
	Richard Shortridge	"	14,946	C
	"	"	7,432	F
	Charles Attwood	Southwick	17,680	C
	Addison Fenwick & Co.	Sunderland	9,507	C
	"	"	3,478	B
	Walter Featherstonehaugh	"	3,603	B
	"	"	5,095	B
	"	"	2,544	B
	William Booth & Co.	"	4,351	F
	John Hubbard	"	3,919	B
	"	"	3,841	B
Leeds	William Usherwood	Worshro' Dale	1,421	
	John Bower	Hunslet	1,547	
	"	"	2,222	
	"	"	2,866	
	"	"	10,106	C
	Noah Turner	Thornhill Lees	989	
Lichfield	Hannah Shakespeare	Birmingham	5,207	
	John Biddle	"	4,337	
	Rice Harris & Co.	"	7,259	F
	George Bacchus & Co.	"	11,015	F
	William Gammon & Co.	"	6,939	F
Liverpool	Abraham Akers & Co.	Newton	2,421	C
	Thomas Cockburn & Co.	Thatto Heath	15,924	P
	W.A.A. West & Co.	"	14,394	C
	John William Bell	Ravenhead	5,035	F
	Greenall & Pilkington	St. Helens	19,227	C
	Thomas Moore & Co.	Kendrick's Cross	3,158	
	James Holt & Co.	Liverpool	2,031	
	Thomas Choll & Co.	Old Swan	17,845	C
	William Foster & Co.	Vauxhall Rd.	2,690	F
Manchester	Thomas Molineux	Manchester	5,199	F
	Daniel Watson & Co.	"	188	
	William Robinson	"	2,426	
	William Maginnes & Co.	"	402	
	Frederick Fareham	"	6	

Appendix I (continued)

DISTRICT	NAME OF PROPRIETORS	WHERE SITUATE	DUTY PAID £	
London	Apsley Pellatt	Blackfriars	7,852	F
	William Christie	Stangate	3,523	F
	William Holmes	Whitefriars	3,746	F
Newcastle	Charles Attwood	Gateshead	20,241	C
	Joseph Price	"	6,808	F
	"	"	1,446	F
	George Sowerby	"	6,705	F
	George Stevenson	Carr Hill	568	F
	Joseph Price	Newcastle	4,894	F
	Joseph Lamb & Co.	Newcastle	5,688	F
	"	Lemington	9,091	C
	"	"	11,366	C
	"	"	3,796	C
	John Carr & Co	Hartley Pans	2,953	B
	"	"	3,527	B
	John Cookson & Co.	Bill Quay	3,919	B
	"	"	3,878	B
	Thomas Ridley & Co.	St. Peters	3,160	B
	William Richardson & Co.	"	17,230	C
	"	"	16,708	C
	Sir M.W. Ridley & Co.	Newcastle	2,839	Br
	"	"	18,275	C
	"	"	19,124	C
	Robert Todd & Co.	"	4,046	B
	Isaac Cookson & Co.	"	2,072	B
	"	"	2,637	B
Northwich	John Clare	Warrington	24,482	C
	John B. Faulkner & Co.	"	2,090	
	"	"	7,838	
	John Alderson	"	4,300	
	Thomas Robinson & Co.	"	2,015	
Salop	John Biddle & Co.	Moss	459	Br
	"	"	5,116	
Sheffield	Close and Clark	Rotherham	2,346	
	Thomas May	Catcliffe	868	
Stafford	John Davenport	Longport	4,211	F
Stourbridge	William Chance	Spon Lane	24,302	C
	"	"	4,644	C
	"	"	25,635	C
	Joseph Guest & Co.	Dudley	4,008	F
	Thomas Hawkes	"	5,593	F
	Joseph Stevens & Co.	Holyhall	2,938	F
	Thomas Badger & Co.	Dubley	4,870	F
	Thomas Davis & Co.	Dickinson's Green	3,460	
	Joseph Silvers	Moore Lane	2,438	
	Edward Westwood	"	1,380	
	William S. Wheely	Brettle Lane	3,667	
	Michael Grazebrook	Audnam	2,218	

Appendix I (Continued)

DISTRICT	NAME OF PROPRIETORS	WHERE SITUATE	DUTY PAID £	
	Thomas Littlewood	Holton End	3,645	F
	Richard B. Usell	Wordsley	1,758	
	Thomas Hill	Coalburn Brook	1,645	
	Thomas Webb & Co.	Wordsley	5,745	F
	John H. Pidcock & Co.	Platts	2,637	
	Philip Rufford	Stourbridge Heath	2,756	
	Sarah Ensell	Wordsley	2,254	
York	Jepson & Co.	Mear	1,196	
	Charles Priestly	York	2,230	

Key: Type of glasshouse where known :
B = Bottle
C = Crown
P = Plate
Br = Broad
F = Flint

Source: 13th Report Commissioners of Excise Inquiry (Glass)

APPENDIX 2: Richard Neve on Newcastle glass

From The City and Country Purchaser etc.(2nd Edition of 1726)pp 146-148

Newcastle glass

This sort of glass is of a kind of ash-colour; it is the glass that is most in use here in England, but 'tis subject to have Specks and Blemishes and Streaks in it, and it is very often warped and crooked. Of this glass Mr. Leybourn says there are 45 tables to the case but if I did not mistake, a London Glazier told me, That they had but 35 Tables to the case, and Mr. Laybourn also says, That each Table contained 5 superficial Feet, and by Consequence a Case will contain 225 Foot. The Glazier before mentioned said there was 6 foot in a Table and if but 35 Tables to the case, that would amount to but 210 foot. But I was informed by one who told me he had taken the dimensions of some tables of Newcastle glass and he found them to contain 7 foot at least for, saith he, they are of this form: The upper edge as they stand in the cases or frames is circular, about the 4th or 5th part of a Circle, the cord of which, saith he, was about 3½ foot; the lower side was straight, about 18 or 19 inches the perpendicular from the bottom to the top about 3 foot. From this observation a case of 35 tables would amount to 245 foot.

These tables of glass are brought in cases or slight frames of sticks fixed at some distance one from another into four corner pieces which are stouter. The ends of these frames are made tapering nearer one another at the bottom than they are at the top according to the form of the glass, but the sides are parallel. The glass is set on some straw which is laid on the bottom of the frame and there is some straw also put on the sides and top of each case, but none betwixt the tables. These cases are brought to London in the coal ships, they being set on end in the coals more than half its depth by which means they are kept steady from falling and being broke

by the motion and rowling of the ship.

Mr. Leybourn saith that a case of 45 tables 5 foot to a table, equal to 225 foot doth weigh about 200 lbs and by consequence 9 foot will weigh about 8 lbs.

He also saith the price of Newcastle glass is uncertain for when coals are plenty then glass is cheap and when the coals are dear in London then Newcastle glass is so likewise, not that they want coals at Newcastle but because they have no other conveyance for it to London. So that sometimes it is 30s per case and other times 40s. But I was informed by a London Glazier that the most constant price was 34s per case.

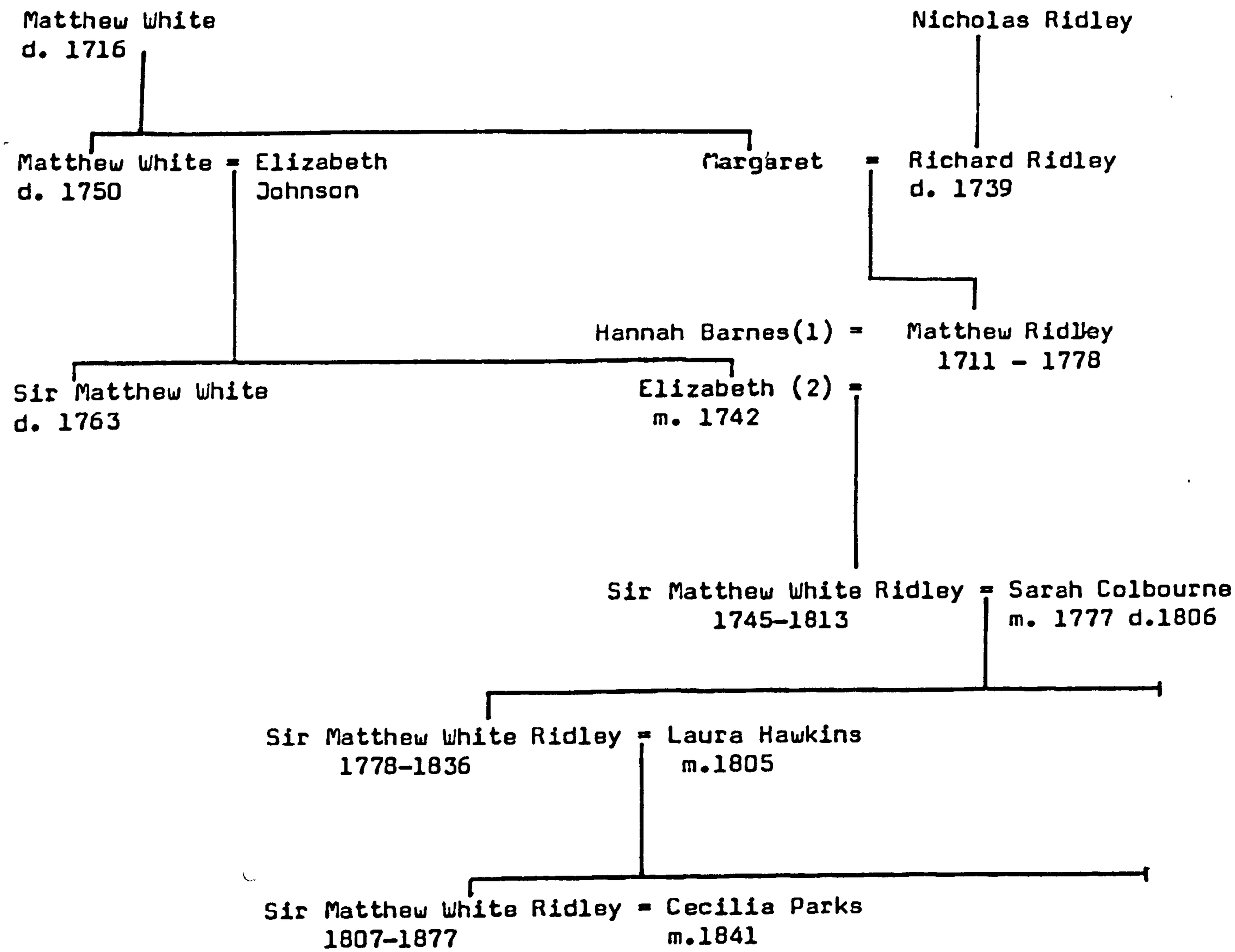
To cut a case of this glass into Quarries diamond-fashion (with halfs and quarters and three quarters of Quarries as the glass falls out) some say it isworth 6 or 7s but I did hear a glass-cutter say he would do it for 3s or 3s 6d.

Newcastle glass cut into large squares are sold for 22 to 25s per 100 foot according to their size. And small squares from 19 to 22s per 100 foot. And quarries of Newcastle glass for about 16s per 100 foot.

Glazing done with this Newcastle glass with quarries banding, soldering , pinning, the casements being included, the usual price is 5d or 6d per foot in London and thereabouts, but in several parts of the country they have 6d per foot and will be paid for pinning of the casements besides.

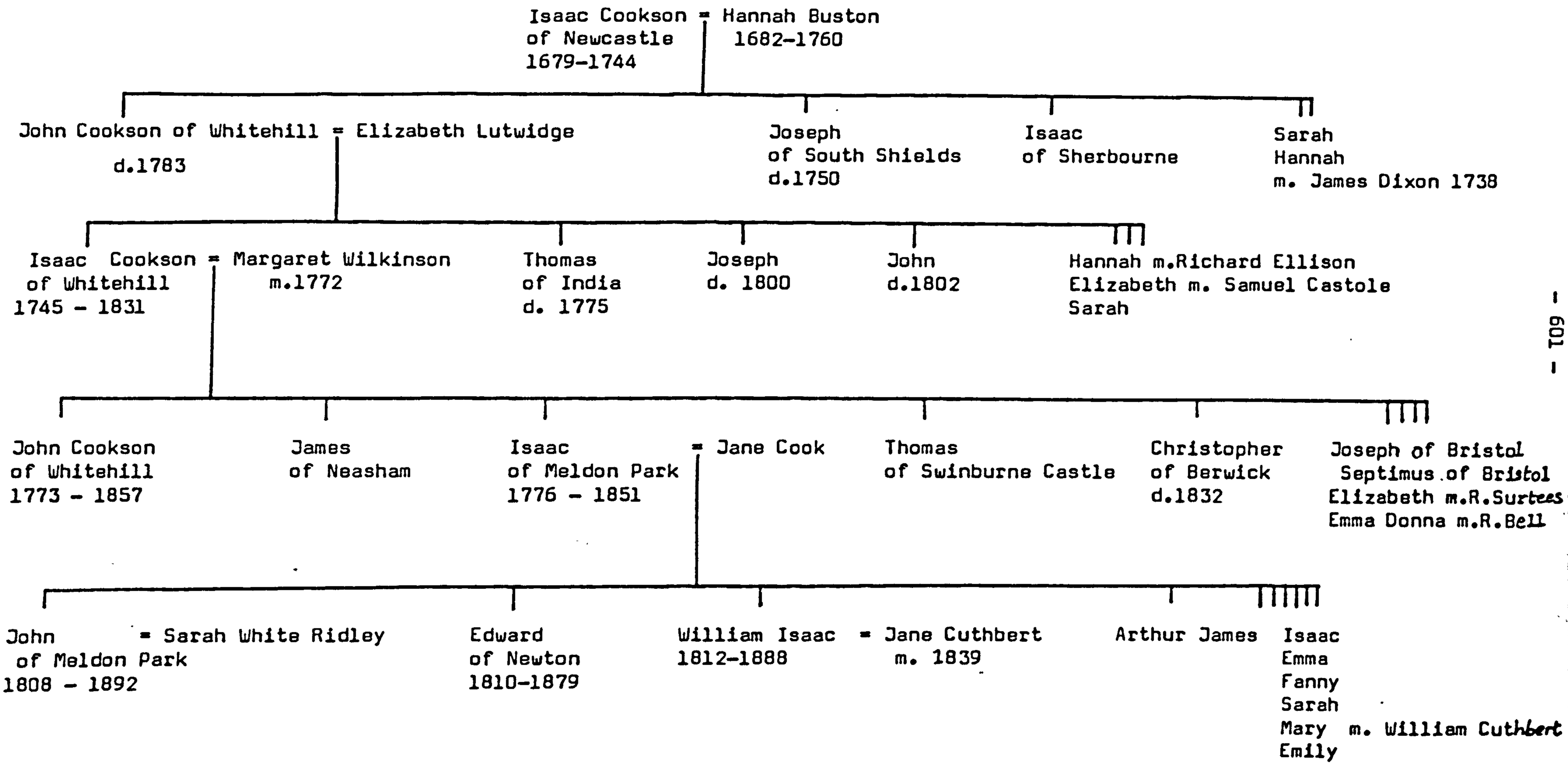
Glazing in some parts of the country, as in Rutland and other northern parts is done with Newcastle glass in quarries for 4½d or 5d per foot. And squares wrought into lead and set up for 6 d per foot. But then again in Sussex and Kent, the south parts of it they will not work so cheap because their glass is something dearer to them. In these southem parts they

commonly reckon 7d per foot for glazing with squares of Newcastle glass, besides which they will be paid for pinning of the casements.



Appendix 3a : Family tree of the Ridley and White families

Appendix 3b : Family tree of the Cookson family.



Appendix 3 c : Family tree of the Dagnia, Williams and Deer families

Onesiphorus Dagnia
of South Shields
d. 1712

John Dagnia = Mary Quincey
of South Shields
1680-1743

James, of Raby Castle, d.1755
John
Onesiphorus
Edward

Onesiphnorus
James
Jane
Sarah

Sarah = Evan Deer
m.1748 d.1793
d.1791

Jane Deer
d.1827

John Dagnia
of Newcastle
d. 1716/1717

John = Eleanor Barker
1687-1719

Christopher
1714-1778

John = Elizabeth Kelly
1717-1766

John = Elizabeth Clarke of Tynemouth
of Newburn d.1802
1745-1798

Joseph
William
Dorothy

Edward Dagnia (?)
d. 1711

Onesiphorus = Marjory Forster
1689-1724 m.1718, 1731
d.1755

John Williams
of Stourbridge
and Newcastle
1696-1763

John Charles Edward George

APPENDIX 4: A description of bottle manufacturing at the Closegate bottle house in 1799.

Taken from Dr. James Plumptre, 'Narrative of a Pedestrian Journey ... in the Summer of 1799', Cambridge University Library, Add. Ms. 5814/5/6, p.170(34)

Thursday 23 May

A little beyond it (the Mansion House), a glass house for the manufacture of green glass bottles attracted my notice and I went in to see the process. The glass is made of sea sand, soap ashes and kelp, sifted and dried. It is then put into large jars holding a ton each and stands in a furnace for some time; it is then melted in another furnace, and a portion of it is taken out at the end of a long iron tube. It is formed first upon stones, then blown a little, then rounded again, then put into a mould and blown to the size of it: it is then given to another man who cuts it from the iron tube with a wet iron: the hollow at bottom is made with a knob of iron: the mouth of the bottle is then formed and a rim put on, and all this while it is yet in a pliable state. It is then given to a boy who shakes it off, another puts it into the annealing furnace where it remains sixteen hours. I was desired to blow one, after it had been first formed into shape by one of the men, which I did and as they said I did it well I tried a second and of course had to pay footing (?); they told me I should have my bottles if I would wait till Saturday; but not being either able or willing to do that they have found some other owner.

Appendix 5 : Patents taken out by north-east glass manufacturers

a) 1700 - 1850

Name	Year	Number	Subject
Evan Deer	1764	815	Using alum slam for fluxing and making glass and soap
Thomas Delaval	1766	846	Making a flux for glass. Making gunpowder
" "	1767	870	Making and preparing kelp
James King	1780	1246	Making "British barilla"
Joseph Price	1814	3807	A method of making glass answer the purpose of ground glass
Charles Attwood	1817	4148	The method of manufacturing crown glass using carbonate of soda
" "	1819	4383	The manufacture of mineral and vegetable alkali
James and John Hartley	1834	6702	The manufacture of crown glass, dispensing with the bullion bar
R.W. Swinburne	1836	7257	The manufacture of small squares of plate glass
James Hartley	1838	7886	A method of manufacturing broad glass
" "	1843	9815	The manufacture of crown and sheet glass
" "	1847	11891	The manufacture of rolled plate glass

b) 1850 - 1900

i) Flat glass manufacturers

R.W. Swinburne	1855	2595	Heating glass furnaces
"	1861	129	Various improvements to the manufacture of plate glass
T.J. Swinburne	1855	2429	Annealing furnaces
"	1871	2808	Annealing kilns for plate glass
J. Hartley	1874	1768	Attaching glass linings to iron vats used for storing liquids
"	1874	3084	
J.J. Kayll	1878	4480	Cutting rolled rough plate glass
"	1898	4220	Ornamenting glass with coloured enamels

(cont.)

Appendix 5 (cont.)

ii) Bottle manufacturers

Name	Year	Number	Subject
A. Alexander & R. Park	1884	10679	Moulding bottles using an inner and an outer mould
J.J. Candlish & W. Hall	1889	20234	Using a piston to press mould bottles
J. Scott	1857	876	Moulding and shaping bottle necks in one operation
"	1886	804	Finishing bottles by rolling them using a steam winch
J.W. Kirk	1876	2364	Shaping bottles by rolling them between two pieces of wood
J. Bowron	1855	1031	Moulding glass tiles from sheets of glass
"	1861	354	Blowing and moulding glass bottles
W. Horn & R. Bell	1886	12496	Making bottle necks by using an opening plug
G. Warren & N. Dobeson	1861	197	Increasing the heat in furnaces by means of a blowing apparatus
J. Davison	1863	1760	A steam generator for furnaces
"	1867	3702	Smoke consumption in glass furnaces and kilns
J.S. Davison	1881	2338	Stoppers for bottles containing aerated liquids
"			(Thirteen further patents, 1882-1892, concerning various stoppers)
G.G. Eunson	1879	1494	Lining bottle moulds with plumbago and tallow which form a gas thus enabling the bottle to be rotated in the mould
N.G. Lambert & J. Dawson	1870	460	Smoke consumption and a method of economising fuel

iii) Pressed glass manufacturers

J. Wright	1856	37	Stoking furnaces, firebars and grates
W. Wright	1856	1431	Moulding bottles
"	1857	1605/6	Mechanical stoking. Annealing ovens
T. Gray	1860	242	Moulding footed articles in a one piece mould
S. Neville	1857	182	An annealing apparatus using a caterpillar track
"	1870	1773	Pressing plates or sheets
"	1872	813	Annealing lears heated by flues of gas jets
"	1872	3862	Ornamenting glass by means of dies on a rotating table
"	1876	126	Moulding cruet holders
"	1880	3538	Pressing articles by means of a cistern of glass beneath the press
S. Neville & J. Sowerby	1860	462	Using moulds with a central plug and an outer mould, thus dispensing with the upright hinges usually employed

(cont.)

Appendix 5 (cont.)

Name	Year	Number	Subject
J.G. Sowerby	1871	2433	Ornamenting glass by attaching ready moulded dies to the surface
"	1874	4065	Improvements to the pressing apparatus
"	1878	2156	Making an opaque ivory coloured glass
"	1880	522	Ornamenting glass
"	1880	1449	Regulating the flow of glass into the mould
"	1881	4505	Using a corrugated plunger to produce a pattern inside a vessel
"	1883	697	Tools for etching glass
"	1883	758	Avoiding sucking on the withdrawal of the plunger
"	1885	6463	Moulding jointed articles with a pattern on the underside
"	1885	6937	Moulding handled articles in a one piece mould
"	1886	4509	Steam polishing
Sowerby's Ellison Glassworks	1887	12001	Improvements to heat polishing
"	1889	17565	Moulding sheets of glass using a tubular mould
"	1889	20619	Electric powered cutting apparatus
"	1896	3056	Fire polishing in small steam furnaces
J. Davidson	1879	3424	Pressing tumblers over a shaped block
"	1890	20394	Moulding glass dishes
"	1892	11906	Moulding glasss dishes and baskets
"	1897	624	Moulding signal lamps for ships
T. Davidson	1889	2641	Making glass articles clear at the top and opaque at the base
"	1889	8049	Moulding dishes with a central partition and a handle
"	1889	8531	Moulding shades for gas burners
H. Greener	1873	3025	Moulding globular articles in a two piece mould
"	1874	268	Moulding letters and figures for shop windows
"	1877	4531	Moulding lamp glasses with angular prisms
E. Moore	1886	13132	Transferring annealed articles from one level to another
"	1887	3275	Moulding lamp glasses
"	1887	4821/2	Making opaque topaz and green glass
"	1889	2727	Marking measured vessels with a government stamp
"	1898		An improved spring punty
The Gateshead Stained Glass Company & J.E. Snee	1899	6194	Ornamenting glass and firing colours

Select list of sources

I: Unpublished

Cookson Mss. — Northumberland Record Office; University of Durham, Department of Paleography; Tyne and Wear County Archives.*

Delaval Mss. — Northumberland County Record Office.

Ridley Mss. — Northumberland County Record Office

Strathmore Mss. — Durham County Record Office.

Public Records

Excise correspondance, CUST 48
Customs and Excise trials, CUST 103
Treasury papers, T1 (particularly long bundles on glass, T1/3785, 3786).
Legal cases in C12, 13, DURH 8.
Records of dissolved companies, BT 31, 34, 41.

Records of the London Glaziers' Company, Guildhall Ms. 5737.

II: Published

1) Newspapers and periodicals

Local Newspapers, particularly the Newcastle Courant, the Newcastle Daily Chronicle, the Sunderland Daily Echo.

The Journal of the Society of Glass Technology

The Pottery Gazette

The Quarterly Report of the Glass Bottle Makers' Association, North of England District (in the Webb Colllection, British Library of Political and Economic Science).

The Flint Glass Makers' Magazine.

The Journal of the Pressed Glass Makers' Friendly Society (in the Webb Collection).

2) Parliamentary Papers

The 12th Report of the Commission of Inquiry into the Revenue; on the Excise from Scotland, 1825 (390)XIV.

The 13th Report of the Commission of Inquiry into the Excise; Glass, 1835 (15) XXXI.

Appendix to the Second Report of the Children's Employment Commission. 1842 XV

The Royal Commission on Labour, 1893-4 XXXIV.

3) Books and Articles

T.C. Barker, The Glassmakers (1977)

J. Collingwood Bruce, A Handbook to Newcastle upon Tyne (Newcastle, 1863).

W. Brockie, Sunderland Notables (Sunderland, 1894)

F. Buckley, 'Glass houses on the Tyne in the Eighteenth Century', The Journal of the Society of Glass Technology (1926), Vol. X, p.26-51.

Select list of sources (Continued)

F. Buckley, 'Glass houses on the Wear in the Eighteenth Century' Journal of the Society of Glass Technology (1925) Vol. IX, p.105-111.

Eleanor S. Godfrey, The Development of English glass making, 1560 - 1640 (1975)

George B. Hodgson, The Borough of South Shields (Newcastle, 1903).

Apsley Pellatt, Curiosities of Glass making (1844).

'A Day at a Glass Factory', The Penny Magazine, XIII, June 1844 pp. 249-256

(G.R. Porter), A Treatise on the Origin, Progressive Improvement and Present State of the Manufacture of Porcelain and glass (1832).

R.W. Swinburne, 'On the Manufacture of Glass', in R. Welford, ed. A History of the Trade and Manufactures of the Tyne, Wear and Tees (Newcastle, 1863).

The Report of the Tariff Commission (1907)

*At the time of writing certain business records from the Cooksons, the property of Associated Lead Manufacturers Ltd., are in the process of being deposited at Tyne and Wear County Council Archives.

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Notes to pages 1 to 9 .

The north-east as a location for the glass industry

1. All the figures for 1832 in this paragraph come from the Thirteenth Report of the Commisioners of Inquiry into the Excise Establishment; Glass, 1835, (15) XXXI, Appendices 1, 7 and 15.

2. A few isolated figures for the Newcastle collection are available. In 1800 the Newcastle collection was said to amount to £150,000 or 59.2% of the total for England (see J. Baillie, An Impartial History of the Town and County of Newcastle upon Tyne, Newcastle, 1801, p.535)
In 1810 the Newcastle collection was said to total £181,000 (made up of crown, £120,000; flint, £33,000; bottles, £28,000) or 39.8% of the English total (see E. Mackenzie, A Historical and Descriptive view of the Town and County of Newcastle upon Tyne, 1811, p.211)
In 1818 and 1819 the Newcastle collections amounted to £367,989 and £452,341 according to Sir Matthew White Ridley (ZRI 36/5 p.57), or 46.9% and 63.9% of the totals for England.

3. Both sets of figures are in 2DE 11/9 nos. 8,77.

4. DCRO NCB 1/JB/493, C. Fenwick to J. Buddle, 19 August 1815.

5. 2DE 4/4, John Crooks to Delaval, 3 May 1781.

6. 2DE 11/10, Isaac Cookson to Delaval, 15 May 1807.

7. ZRI 36/1, Stock accounts of the St. Lawrence and the High Bottle Houses, December 1780.

8. See page 262.

9. John Holland, The History and Description of Fossil Fuel, the Collieries and the Coal Trade of Great Britian (2nd Ed. 1841), p.421

10. 2DE 11/10/44, Delaval to Isaac Cookson, 7 May 1807.

11. Quoted in R. Smith, Sea Coal for London (1961), p. 113.

12. TWRO CLB, Cookson to anon, 24 March 1755.

13. PRO CUST 48/18 p. 68, report of I. Jackson, 10 May 1769.

14. 2DE 4/6 John Crooks to Delaval, 23 January 1793.

15. PRO T1 381/18.

16. A Glasshouse Clerk, The Plate Glass Book (1757) xxi.

17. S. Parkes, Chemical Essays (1815), Vol. III, p.425

18. see p.261 for references to Hilkiah Hall (a bottle manufacturer at Sunderland) and his "glass without alkali". Also see (G.R. Porter)

Notes to pages 10 to 16 .

A Treatise on the Origin Progressive Improvement and Present State of the Manufacture of Porcelain and Glass (1832), p. 190: "At Newcastle upon Tyne, where the manufacture of bottle glass is much encouraged by the excessive cheapness of small coal or slack, the manufacturers employ a mixture of lime and sea sand. This must be frequently wetted with sea water which on evaporating deposits its salt; the soda contained in this being the only alkali employed. When combined with silica and exposed to a high degree of heat, lime appears to be endowed with the property of decomposing salt; its presence is, therefore, essential to the success of this operation".

19. H.M. Matthews, the Development of the Synthetic Alkali Industry in Great Britain by 1823, Annales of Science, Vol. 33 (1976), p. 382.

20. R.C. Clapham, An Account of the Commencement of the Soda Manufacture on the Tyne (Newcastle, 1869), pp. 7-9.

21. British patent no. 815 of 1764.

22. British patent no. 846 of 1766.

23. British patent no. 1246 of 1780.

24. TWRO CLB, John Cookson to James Dixon, 14 June 1763.

25. TWRO CLB John Cookson to Thomas Farmer, 14 May 1764

26. 2DE 4/12/5, Joseph Oxley to Delaval, 15 April 1780

27. Journals of the House of Commons, XXXVII (1780), p. 916, petition of Isaac Cookson of Newcastle upon Tyne and Edward Wilson of South Shields.

28. 2DE 11/10/20, James King to Delaval, 7 April 1781.

29. The copperas works at Hartley had also been established by Thomas Delaväl. Unfortunately there is no indication of the inspiration behind Thomas Delaval's mineral alkali patent but in view of his activities in a variety of fields (he also constructed a new harbour at Seaton Sluice for the Hartley works and made improvements to the machinery in use at the coal mines) it seems reasonable to credit him with some degree of theoretical, scientific understanding. He would certainly have had access to contemporary scientific debate through his brother Edward Delaval, a distinguished scientist and Fellow of the Royal Society. He was, possibly, also aware of continental developments since he had spent some time in trade at Hamburg and indeed was said to have modelled his glass works on ones he had studied in Germany.

30. 2DE 11/3/5, William Allen to Delaval, 27 January 1778.

31. 2DE 4/6/25, John Crooks to Delaval, 15 September 1790.

32. 2DE 11/9/28.

33. 2DE 11/9/21.

Notes to pages 16 to 24 .

34. 2DE 4/23, John Bryers to Delaval, 30 September 1798.

35. Quoted in Charles Singer, The Earliest Chemical Industry (1947), p. 196.

36. ZCK 8/1, statement from C. Yorke, 4 January 1764.

37. 2DE 4/12/5, Joseph Oxley to Delaval, 15 April 1780.

38. ZRI 36/1, two letters from Joshua Henzell to Sir Matthew White Ridley in October 1781 mention the possibility of moving to Howden although Henzell was against the idea. In view of Delaval's earlier patent making use of copperas it is perhaps worth mentioning that King also erected a copperas works at St. Anthony's on the Tyne in 1773, one third of which was purchased by Aubone Surtees in 1776 (see Archaeologia Aeliana, third series, volume V (1908), pp. 88-9).

39. Quoted in T.C. Barker et al, "The Origins of the Synthetic Alkali Industry in Britain", Economica (May 1956), p. 168.

40. 2DE 4/9, George Douglas to Delaval, 10 March 1778.

41. Ibid. George Douglas to Delaval, 18 May 1779.

42. Ibid. George Douglas to Delaval, 8 July 1779.

43. TWRO CLB, John Cookson to Caleb Webster, 9 March 1768.

44. 2DE 4/14/34, Joseph Oxley to Delaval, 28 June 1782.

45. 22 G3 c. 39 section II "it shall and may be lawful to and for any glass maker or glass makers to have and take any rock salt or salt rock or brine or sea water for the purpose only of making a flux for glass at his or their own respective glass work or glass works and not elsewhere upon paying such and the like duty and obtaining such and the like licence as in the said Act mentioned etc."

46. 2DE 4/17/5, Joseph Oxley to Delaval, 3 February 1787.

47. S. Parkes, Chemical Essays (1815), Vol. III, pp. 451-2 and 465-6.

48. 53 G3 c. 97.

49. R.W. Swinburne, "On the Manufacture of Glass", in R. Welford (ed.) A History of the Trade and Manufactures of the Tyne, Wear and Tees (Newcastle upon Tyne, 1863), p. 182.

50. Quoted F. Buckley, "Glass houses on the Tyne in the Eighteenth Century", Transactions of the Society of Glass Technology, Vol. 10 (1926), p. 50.

51. See note 49.

Notes to pages 24 to 33 .

52. George B. Hodgson, The Borough of South Shields (Newcastle upon Tyne, 1903), p. 361. The following information on the Cooksons' alkali interests comes from this source.

53. See note 49. Dr. Edward Turner (1798-1837) was the first Professor of Chemistry at University College London. An article by H. Terreyon Turner (Annales of Science, vol. II no.2, 1937, pp. 137-52) makes no mention of these experiments.

54. This information comes from the firm's cash books (in TWRO) 1828-1832.

55. Quoted in W.E.S. Turner, "A notable British seventeenth century contribution to the literature of glass making", Glass Technology. Vol. 3 no. 6 (December 1962), p. 211.

56. Andrew Ure, A Dictionary of Arts, Manufacturing and Mines (1839), p.581.

57. Newcastle Courant, 10 March 1848, reports Featherstonhaugh v Hadland at the Durham Spring Assizes which concerned a dispute over stone from Cox Green sent to the Eccleston Crown Glass Works.

58. 2DE 4/23, John Bryers to Delaval, 14 October 1798.

59. TWRO CLB, John Cookson to James King of Ellenfoot, 14 February 1763.

60. John Crawford Hodgson, A History of Northumberland (1904), Vol. VII, pp. 318-9.

61. ZRI 36/1, various letters from Joshua Henzell to Sir Matthew White Ridley in December 1780 discuss the trials of Rivergreen clay. According to these letters previous attempts had been made c. 1747 when Matthew White had leased the seam and sent a quantity to the glass houses.

62. All the information concerning Stourbridge clay in this paragraph comes from 2DE 11/12, a bundle of letters concerning Stourbridge clay.

63. TWRO CLB, John Cookson to Messrs. Booker, 26 January 1768.

Flat glass 1700 - 1790

1. Quoted in R.T. Gunther (ed.), The Architecture of Sir Roger Pratt from his notebooks (1928), p.72.

2. P. Nicholson, The Builder's and Workman's New Director .... (1854), p.173. Since the section on glass refers to the excise duties "at present" levied on the article, it seems likely that the section was reprinted without amendment from an earlier edition: the book was first published in 1824 but the glass section does not appear in the first edition.

Notes to pages 36 to 54.

3. Eleanor S. Godfrey, The Development of English Glassmaking, 1560-1640 (Oxford 1975), from which most of the following account of the Mansell period is taken.

4. Richard Neve, The City and Country Purchaser's and Builder's Dictionary or the Complete Builder's Guide (2nd ed. 1726), pp. 150-154

5. John Houghton (ed.) A Collection of Letters for the Improvement of Husbandry and Trade, no. 198, 15 May 1696.

6. Journals of the House of Commons XI (7 January 1696), p.386.

7. Information in the following two paragraphs is taken from: D.H. Guttery, From Broad Glass to Cut Crystal; A History of the Stourbridge Glass Industry (1956); H.J. Haden, Notes on the Stourbridge Glass Trade (Dudley, 1977); W.H.B. Court, The Rise of Midland Industries, 1600 - 1838 (1938), chapters IV and V111.

8. The Postman, 5 November 1709, quoted F. Buckley, 'Glass houses on the Tyne in the Eighteenth Century', Transactions of the Society of Glass Technology, vol. 10 (1926), p. 41.

9. Neve, *op.cit.*, pp. 144-150

10. R. Campbell, The London Tradesman (1747), p.164.

11. The event is recounted in E. Hughes, North Country Life in the Eighteenth Century: the North East (Durham 1952), vol. 1, p.29

12. TWRO 940/4, Order and Minute Book of the Newcastle Company of Glaziers, Pewterers, and Plumbers, 24 September 1715. For other complaints concerning glass cut for the glass makers see 7 January 1716, 20 June 1717, 7 October 1717, 22 July 1723. September 1723, 12 August 1728.

13. CC Books, 28 September 1720, lease of the middle and eastern glass house to Jane Roddam, Mary Henzell, Joshua Middleton and Peregrine Henzell.

14. CC Books, 18 June 1724.

15. CC Books, 15 December 1726.

The Newcastle Company of Broad and Crown Glass Owners

16. ZRI 16/13/1, Mr. White's and Mrs. Tyzack's declaration of trust to the company and owners of the crown glass house.

17. ZRI 36/1, an account of Matthew White Ridley's profits on the western and middle broad glass houses, 1778 - 1781. There is only one year when the figures for the two houses do not correspond and this may reflect the cost of repairs, or rebuilding to one of the houses.

Notes to pages 56 to 62 .

18. For leases of the old (eastern and middle) glass houses to Harris and Haynes see CC Books, 19 December 1645, 20 February 1646, 10 September 1647, 10 April 1653 in which it is reported that Mr. Harris was "at present not in a capacity to pay arrears of rents and tolls".

19. CC Books, 4 June 1658, 20 June 1678.

20. CC Books, 3 February 1662, 21 September 1679.

21. CC Books, 7 April 1684, a copy exists in UDDP Shafto Mss. 203.

22. CC Books, 10 December 1687. Transfer of shares to Timothy Davison and, later Jonathan Roddam in UDDP Shafto Mss. 226 and 227.

23. CC Books 28 September 1720.

24. ZRI 16/13.

25. See manuscript notes by J.W. Corder on the history of Sunderland (Vol. IV, pp 317-358) for some details on the Suddick House. It appears to have been erected by a wealthy landowner Ralph Robinson and partly staffed by Henzells and Tyzacks, whose names appear in local church registers. The glass house is marked on a map of 1739 but no further referencesto it have been found, suggesting that it remained dormant for the greater part of the eighteenth century. When flat glass making was restarted at Southwick during the 1780s it was at a different site further up the river.

26. Henry Bourne, The History of Newcastle upon Tyne (Newcastle upon Tyne, 1736), p. 155.

27. John Brand, The History and Antiquities of the Town and County of the Town of Newcastle upon Tyne (1789), p.44, note (p).

28. For more detailed information about all the Quakers connected with the glass houses see J.W. Steel, A Historical Sketch of the Society of Friends in Newcastle and Gateshead, 1655-1898 (Newcastle upon Tyne, 1899), Chapter 1. Also see notes on Peregrine Tyzack snr. and Peregrine Tyzack jr. in the Library of the Society of Friends, Euston Road. London.

29. London Gazette, 25 June 1691, quoted in Buckley op. cit. and The Glass Trade in England in the Seventeenth Century (1914), in which he quotes further advertisements including one in which John Tyzack advertises his ability to conduct transactions concerning land or property in Pennsylvania.

30. Norwich Gazette. 29 April 1732, quoted in Buckley 'Glass houses on the Tyne in the Eighteenth Century', Transactions of the Society of Glass Technology, vol. 10 (1926), p. 41.

Notes to pages 62 to 68 .

31. CC BOOKs, 22 April 1735, Peregrine Tyzack, the apprentice of Jeremiah Hunter of the glass houses, petitioned the Council complaining that he had been stopped in guild but it was found that he "was not entitled to his freedom" and the Council ordered the stop to continue. Jermiah Hunter was a Quaker minister who was also concerned in the glass houses; the CC Books for 17 October 1734 note that Jeremiah Hunter's apprentice had resided in the eastern and mushroom (St. Lawrence) glass houses whilst his master had attended a meeting of the Broad Glass Owners on behalf of Ralph Davision from whom he had received a letter of attorney. Peregrine Tyzack's obituary (Newcastle Courant, 6 October 1770) paid tribute to his convictions and his piety; the latter is borne out by two letters from him to R. Gurney in 1770, see Gurney Mss. Library of the Society of Friends 4/48,49.

32. R. Surtees History and Antiquities of the County Palatinate of Durham (1840), Vol. 4. pt. ii, p.15 contains a pedigree of Hall of Durham and Glass.

33. UDDP Durham Wills, Jonathan Hall 1741, proved 1743.

34. CC Books, 15 June 1732.

35. CC Books, 20 January 1734.

36. Journals of the House of Commons XXXIV (1773) p. 149

37. Newcastle Courant, 19 June 1773. Also see Sykes' Local Records (Newcastle 1833), Vol. I, p. 293.

38. A list of the partners in 1780 is contained in PRO C12 642/13, Surtees v Lake. There is no contemporary record of the renewal of the partnership in 1767 but it was freqently mentioned in the discussions concerning the third renewal in 1812, see note 39.

39. ZRI 36/2, opinion of R. Hopper Williamson on the partnership, 1810.

40. A copy of Jane Tyzack's will is in ZRI 16/5.

41. CC Books, 15 December 1760, James King petitioned that he had recently purchased Nicholas Tyzack's shares in the St. Lawrence glass house and wished to have his name replace Tyzack's on the lease. King was a prominent Quaker whose name, and that of his brother Joseph, appeared as a trustee of the Quaker Meeting House in Pilgrim Street in 1760 and 1778 (see TWRO, deposit 20/6). Also see Gurney Mss. 2/460, a letter from King to R. and J. Gurney of Norwich of 1772 begging them to prevent Joshua Tyzack from returning to Newcastle "I do much fear the consequence of his coming to this place amongst his quondam fellow glass workers, a set of people who will delight to keep him in a continued scene of intoxication".

Notes to pages 69 to 79 .

42. ZRI 36/1 Since this "stock account for the Plate Glass Company" mentions "sums still to be advanced" from King and Henzell it seems probable that the company had not commenced manufacturing. It is also possible that the company represented an attempt to salvage the remains of Matthew Ridley's Howdon venture (Matthew White Ridley had inherited the estate of Matthew Ridley on his death in 1777) since the stock account also mentions materials such as white lead "on hand". It is not known where this plate glass company intended establishing its works but it seems not unlikely that it was to be at Howdon.

43. PRO C12 642/13, from which all the information in this paragraph is taken.

44. 2DE 35/15, Aubone Surtees to Delaval, ? August 1786.

45. M. Philips, A History of Banks, Bankers and Banking in Northumberland, Durham and North Yorkshire (1894), p. 35.

46. 2DE 4/16, Joseph Oxley to Delaval, 13 May 1786.

47. See various letters of 1780 from Luke Young, the Master of the Glaziers' Company, to Joshua Henzell in ZRI 36/1. The letters complain that he and the other glaziers had not been supplied with glass and it was provoking not to be able to buy from other suppliers and seeing other merchants taking their custom from them. Young suggested that he should be allowed to buy from other suppliers when the supply from Newcastle was short and argued that this would not harm the Newcastle glass makers since it would make no difference to them.

48. ZRI 36/1, Joshua Henzell to Matthew White Ridley, 18 December 1780.

49. CLB, John Cookson to James Dixon, 14 March 1763. Also see ? March 1764.

50. ZRI 36/1 Joshua Henzell to Matthew White Ridley, 18 December 1780.

51. CLB, John Cookson to James Dixon, 2 October 1762.

52. CLB, John Cookson to James Dixon, 23 December 1767.

Cookson and Jeffries

53. UDDP Cookson Mss. Box 1/8. The partnership agreements and deeds mentioned in this section are all taken from this box.

54. See W.P. Hedley and C.R. Huddlestone, Cookson of Penrith, Cumberland and Newcastle upon Tyne (Kendal 1966) for personal information on the Cooksons; also see appendix 3b.

55. R. Campbell, The London Tradesman (1747), pp 172-3

Notes to pages 80 to 91 .

56. (G.R. Porter), A Treatise on the Origin, Progressive Improvement and Present State of the Manufacture of Porcelain and Glass (1832) p. 188, pp. 212-5 contains a detailed description of the method by which blown plate is manufactured and points out the difference between it and broad glass.

57. CLB, John Cookson to James Dixon, 11 June 1763. In a letter of 3 November 1758 Cookson asks whether Dixon has managed to learn the mixture used at the Ratcliffe plate glass works.

58. PRO C12/1871/35, Also see UDDP Cookson Mss. Box 1/13. Jeffries v Cookson.

59. PRO DURH 8/9, Airey et al. v Cookson et al. Also see UDDP Cookson Mss. Box 1/14.

60. An undated (probably c. 1775) plan of two glass houses is in ZCK 16/22.

61. PRO C12/42/46, Joseph Cookson v Isaac Cookson et al.

The flat glass trade

62. Mr. Mortimer's Universal Director (1763).

63. Preston Pilbin, 'External relations of the Tyneside glass industry', Economic Geography, vol. 13 (1937), p. 302.

64. Guildhall Ms. 5735, The Court Minute Books of the Glaziers' Company, Vol. I, 25 April 1754, p. 185, also see p. 195, 30 September 1754.

65. CLB, John Cookson to Geo. Holman of Dublin, 26 January 1768.

66. Samuel Parkes, Chemical Essays (1815), Vol. III, p. 425.

67. The Builder's Price Book: Prices allowed by the Most Eminent Surveyors in London (1774), pp. 93-4.

68. Guildhall Ms. 5735: Vol. 3, 24 February 1803, 25 April 1805, 15 July 1812; Vol. 4, 22 December 1818, 7 April 1845.

69. A Glasshouse Clerk, The Plate Glass Book (2nd ed. 1757), pp. 162-5. The book does not mention the names of the glass houses from where the "Vauxhall" and "Blackfriars" plate glass came but it does not seem unreasonable to assume that the Blackfriars glass was from Cookson's warehouse at Blackfriars (in 1757 the warehouse moved to Fleet Street but it was at Blackfriars when the first edition of book came out in 1751). Three bills for plate glass sent to Dublin merchants in 1768 (CLB, John Cookson to James Jackson, Messers Booker, and J. Bibby, 26 January 1768) take almost identical form to the Blackfriars bill with only 40% being advanced for duty and this being deducted immediately after the discount for the quality. The basic prices for the plates are identical.

Notes to pages 92 to 110 .

70. CLB, John Cookson to David Nesbit, 18 March 1763.

71. CLB, John Cookson to John Orpin of Dublin, 6 September 1751.

72. CLB, John Cookson to Thomas Holmes of Dublin, 24 November 1761.

1790 - 1830

1. Bricks statistics from B.R. Mitchell and P. Deane, Abstract of British Historical Statistics (Cambridge, 1962), p. 235. Crown glass from Accounts and Papers, 1839 (419) XLIV.

2. J. Baillie, An Impartial History of the Town and County of Newcastle upon Tyne (Newcastle, 1801), p. 72, also see p. 515.

3. The Picture of Newcastle upon Tyne (Newcastle, 1807), p. 105. Also see E. Mackenzie A Descriptive and Historical Account of Northumberland (1811), Vol. I, p.211 in which he quotes the complimentary account of the Newcastle glassworks written by the French traveller St. Fond in 1802.

4. E. Mackenzie, op. cit. (1825 edition), vol. 2, p.382.

5. TWRO 80/259 A1.

6. See E. Lamb, Annals of the Lambs; a Border Family (privately printed, 1926) for all personal details about the Lamb family in this section.

7. TWRO 80/259 A5. Dyson was also obliged to deliver the "full and peaceable seizin" of the flint glass house in Newcastle by delivering a single glass decanter to each of the remaining partners.

8. E. Lamb, op. cit., p. 103.

9. This is mentioned in letters from John Head and William Lorraine to Matthew White Ridley in August 1818, ZRI 36/3.

10. DRO NCB 1/JB/1591, John Waldie to John Buddle, 9 April 1832.

11. The complicated partnership and legal history of the Tyne Plate Glass Company is best summed up in PRO C 13 281/17, Barber v Banner, 1822 on which most of the following account is based. But also see C12 483/4, 213/34, 470/23, 232/32, 222/28 for Banner v various parties 1795-8: and C13 234/31/43/53, and 272/40 for Barber v various parties 1812-28.

12. Guildhall Ms. 5735, Vol. 3, 21 September 1793.

13. This deed is quoted in part in Proceedings of the Society of Antiquaries of Newcastle upon Tyne, Third series, volume 7 (1915-6),p.36.

14. Newcastle Chronicle, 19 September and 26 September 1795, quoted in Buckley (1926).

Notes to pages 112 to 121 .

15. See J. Robinson, The Attwood Family (privately printed, 1903) for all personal details about the Attwoods in this section.

16. Newcastle Courant, 3 June 1809.

17. Ibid. 7 March, 15 December 1810.

18. Ibid. 6 November 1813.

19. J.S. Jeans, Pioneers of the Cleveland Iron Trade (Middlesborough 1875), p.5, also see pp. 6-8 from which following quotes are taken.

20. PRO B3/2204.

21. TWRO 573/11 is a notebook devoted to technical matters amongst which are detailed building specifications for new furnaces built March 1813.

22. British patent no. 4148 of 1817.

23. Attwood's mixture consisted of 8¼ cwt. of lixivated ashes ground and sifted, and 10½ cwt. of sand which was fritted with the addition of some cullet. Soda was then added to the fritted mixture to quicken the fusion and diminish the milkiness in the glass; Attwood did not specify an exact amount of soda but stated that it would rarely require more than 4 cwt. soda containing 20% alkali. Finally Attwood recommended the substitution of lime for some of the ashes but if this was done the quantity of soda should also be increased.

24. J.S. Jeans, op. cit. p.4.

25. Reprinted in Rees's Manufacturing Industry (1819 - 1820) (1972), vol. 3, p.85. The section on glass is said to have been written c. 1810. It thus seems that Attwood and Smith were experimenting with new processes long before they were actually patented.

26. Samuel Parkes, Chemical Essays (1815), vol. 3, p. 437, note.

27. PRO C13 281/17 lists all the partnership agreements.

28. TWRO 573/11.

29. R.W. Swinburne, 'On the Manufacture of Glass', in R.Welford (ed), A History of the Trade and Manufacture of the Tyne, Wear and Tees (Newcastle upon Tyne, 1863), p. 182.

The North Tyne Glass Company, The South Tyne Glass Company etc.

30. Newcastle Courant, 30 August 1823

31. ZRI 36/4 George Dunn to Matthew White Ridley, 31 April 1824. All Dunn's quotes in this section are taken from letters in this bundle.

Notes to pages 121 to 131 .

32. Newcastle Courant, 17 June 1826

33. John Barrass was a Gateshead merchant and headed a brewery company. Russell was a local man and probably a ship owner of South Shields.

34. Newcastle Courant, 21 September 1805.

35. 2DE 11/10/49.

36. Guildhall Ms. 11,937, Sun Fire Insurance Policies, vol. 94, no.855445.

37. See obituary of Richard Shortridge, Shields Gazette, 10 December 1884.

38. ZRI 36/4, George Dunn to Matthew White Ridley, 31 April 1824.

39. (G.R. Porter), A Treatise on the Origin, Progressive Improvement and Present State of the Manufacture of Porcelain and Glass (1832),p.186.

40. J.W. Corder's manuscript notes on the history of Sunderland (Vol. IV, p.335) in Sunderland Public Library mention a lease of 1788 to Thomas Kirkup, Joseph Kirkup and George Brumell of the Southwick Glass Company.

41. W. Brockie, Sunderland Notables (Sunderland, 1894), pp 60-62.

The Newcastle Broad and Crown Glass Company

42. TWRO 275/Box 379 contains a copy of the lease from the Corporation to the glass company of 29 March 1827 in which it is stated that the bottle house had been assigned to Todd in 1823 by the then owners of the middle and eastern glass houses: Matthew White Ridley, Thomas Shadforth, W. Orde of Nunnykirk, William Burell of Broome Park (executor of William Hargreaves), Robert Hedley and John Head. This lease also contains a small plan of the glass houses at the Ouseburn.

43. Newcastle Courant, 2 September 1842.

44. UDDP Baker Baker Ms. 20/71.

45. Compiled from figures in ZRI 47/24, 47/10,47/11, 47/13, 36/3(Letter of 16 August 1818) and UDDP Baker Baker Ms. 20/71.

46. ZRI 24/66.

47. TWRO 20/15/29 contains a copy of the will.

48. NRO/709, deeds concerning the Henzell family , particularly nos 7-9.

49. ZRI 36/2, opinion of R. Hopper Williamson on the partnership, 1810.

50. UDDP Baker Baker Ms. 20/71. A list of the partners, and their addresses in 1818 is in ZRI 36/3, 16 August 1818.

Notes to pages 132 to 147 .

51. See various letters from Lorraine and John Head to Matthew White Ridley in ZRI 36/3.

52. ZRI 36/4, George Dunn to Matthew White Ridley, 21 April 1824. The following account of the share purchases during 1824 and 1825 is taken entirely from letters and papers in this bundle.

53. UDDP Baker Baker Ms. 20/63, George Baker to F. Hall Staindish, 28 August 1820. Also see 20/61 in which Staindish asks Baker's opinion on selling the shares.

54. The Corporation Annual (Newcastle upon Tyne, 1836), p.59.

Isaac Cookson & Co.

55. Newcastle Courant, 28 August 1802.

56. Guildhall Ms. 11,937, Sun Fire Insurance Policies, volume 79, nos 815201/2.

57. For the Ravenhead company see especially J.R. Harris 'St Gobain and Ravenhead' in Barrie M. Ratcliffe (ed.), Great Britain and her World, 1750 - 1914 (Manchester 1975), pp. 27-71. It is interesting that the Cookson mss. at Northumberland Record Office contain a copy of the prospectus for establishing a cast plate manufactory in England on which the Ravenhead company was subsequently based. Harris mentions that the Duke of Northumberland had taken an interest in the plan and at one time it was a possibility that the works would be established on land owned by him which was said to be "the site in the whole of England which is most suitable in this enterprise". There is no evidence to suggest that John Cookson had any serious intention to begin casting plate at this time but both these points suggest that the possibility was considered by north-east glass manufacturers and capitalists. Whether the Northumberland Glass Company at Lemington was originally intended to manufacture cast plate as well as crown is not known. The Cookson mss. also contain a letter written to John Cookson from two French workmen at Ravenhead in 1777 offering their services to him. Their leaving Ravenhead would, they assured Cookson, cause the works to collapse "for the person who manages the same knows nothing of the nature of working the glass to perfection".

58. CCB, Volume 1 1816-1827, volume 2 1828-32, volume 3 1839-41. The following account is largely based on entries in the first volume.

59. Papers read to the 32nd Meeting of the British Association held at Newcastle upon Tyne in August and September 1863 (1864), pp. 293-4.

60. The Penny Magazine, June 1844, volume 13, pp. 243-256.

61. The Second Report of the Children's Employment Commission, 1843, XV, appendix part 2.

Notes to pages 149 to 167 .

62. M. Dobson, A Memoir of John Dobson (1881), contains an unreliable list of her father's work including a new glass works for Mr. Cookson at South Shields in 1817. The Cookson cash books contain occasional payments to Dobson for work done at the Westgate estate and Arthur's Hill on which Isaac Cookson erected new streets in the early 1830s.

63. Newcastle Courant, 17 June 1820, also see 14 April 1821, 29 March 1823.

64. The price list for 1830 is pasted into the inside cover of volume 2 of the cash books.

65. 12th Report of the Commission of Inquiry into the Revenue: Excise from Ireland and Scotland, 1825 (390) XIV.

66. PRO T1/1361/17599 (in which is no. 10589 of 1819 from which this account is taken)

67. ZCK 2/11

68. C. Babbage, On the Economy of Machinery and Manufacture (1835), pp. 149-50.

1830 - 1850

69. Newcastle Guardian, 7 April 1846.

70. See T.C. Barker, The Glassmakers (1977), pp. 58-60.

71. Barker, op. cit. Chapters one, two and three contain a full account of the development of the flat glass industry in Lancashire.

72. Barker, op. cit. Chapter three contains a discussion of the Association. Minutes of the Association's meetings during the 1820s and 1830s are in Pilkington Archives PB/165 and ZZ45/8.

73. Pilkington Archives PB 165/5.

74. Advertisements of the Dumbarton works appeared in the Newcastle Courant in 26 November 1836, March, April and July 1837, and March 1838.

75. Quoted in Barker, op.cit.p. 101, note 8.

76. Newcastle Courant, 17 November 1848. According to a writer in the Pottery Gazette, October 1888, pp. 914-5, the firm's wage book shows that the middle glass house closed in October 1847, another in January 1848, and the last pay at the eastern house was made in December 1848. The works was not sold immediately and on 27 March 1853 was advertised for sale in eight separate, smaller lots.

77. Barker, op. cit.,p. 81

78. Newcastle Courant, 27 December 1839, report of Attwood v Banks in the Rolls Court. The details in this paragraph are taken from this, a report of Potter v Attwood on 7 August 1840, and the sale notice of the Tyne Glass Works, 31 July, 30 October 1840.

Notes to pages 169 to 176 .

79. Return .... respecting the Effects produced by the Repeal of the Glass Duty on the Manufacture of Glass, 1846 (109) XLIV.

80. Newcastle Courant, 25 May, 22 June and 13 July 1855 reported cases of breach of contract brought against the firm by its workmen. On its closure, the firm's workmen were told to transfer to Hartley's works but many refused and brought cases against Bowron and partners for non payment of wages. One of the workmen, Mr. Boule, was a Frenchman earning £5 Os 6d a week which suggests the firm had introduced sheet glass before its closure. The works never appears to have been restarted.

James Hartley, Cookson & Cuthbert

81. The information in this paragraph, plus all subsequent personal details about Hartley is taken from W. Brockie, Sunderland Notables (Sunderland 1894), pp. 450-9, and obituaries in the Newcastle Daily Journal, 25 May 1886, and the Sunderland Daily Echo, 24 and 27 May 1886.

82. British patent no. 6702 of 1834.

83. For a more detailed account of Chance's introduction of sheet glass see Barker op. cit. Chapter 4 and J.F. Chance, A History of the Firm of Chance Brothers (privately printed, 1919)

84. W. Brockie, op. cit. p. 452

85. T1 3786, a bundle of 1836 contains all Chance's earlier petitions on the subject of sheet

86. 2 & 2 WIV c. 102, section 16.

87. P. Nicholson, The Builder's and Workman's New Director ..... (1854) p.70. See note 2 of the 1700 - 1790 section; mention of flattened crown glass would seem to date this to the 1836 edition.

88. Report from the Board of Excise to the Treasury, 1835 in T1 3786, see note 85.

89. Chance suggested this three times (p.134): "There seems to be no reason, therefore to restrict us from polishing crown glass and making it into plate unless it should appear that their duty which is by gauge is really a higher net duty than ours ..... Their duty is lower than yours? Yes, but as I mentioned above I cannot say that it may in fact be higher ..... the plate glass manufacturers would probably say that the regulations of the Excise and other things add to the amount of their duty so as to make the duty they pay more than the duty paid on crown or German sheet".

90. Newcastle Courant, 18 January 1839.

91. Ibid. 11 May 1838, Hartley was sued by a neighbouring market gardener for supposed damage done to his gooseberry bushes but it was found that the damage was only frost bite.

Notes to pages 178 to 185 .

92. Sykes' Local Records (Newcastle, 1833), Vol. II, p. 353.

93. M. Girouard, "Dobson's Northumbrian Houses," Country Life, 24 February 1966.

94. British patent no. 7257 of 1836.

95. George B. Hodgson, A History of South Shields (Newcastle 1903), p. 363.

96. Evidence of R.T. Shortridge and T. Salmon to the Royal Commission on Church Leases, 1837-8 IX.

97. Report of a lecture given at Sunderland by James Hartley, Journal of the Society of Arts, 17 February 1854.

98. Newcastle Courant, 2 April 1847.

99. Quoted in Brockie, op.cit. p. 452.

100. Newcastle Guardian, 7 April 1846

101. Quoted Barker, op.cit. p. 105

102. The following specifications are both taken from T.L. Donaldson, Handbook of Specifications (1856), Pt. II.

103. Swinburne, op.cit., p. 178.

104. J. Collingwood Bruce, A Handbook to Newcastle upon Tyne (1863), p.257.

Notes to pages 186 to 195 .

The Bottle Industry

1700 - 1800

1. Eleanor S. Godfrey, The Development of English Glassmaking, 1560-1640, (Oxford 1975), pp 225 - 232 contains a detailed account of the development of the English glass bottle and Sir Kenelm Digby's claim to its invention.

2. J. Houghton (ed), A Collection of Letters for the Improvement of Husbandry and trade (1696), Letter No. 198 15 May 1696

3. D. Dudley, Metallum Martis (1660), p. 16, quoted in H.M. Wood, 'The Dagnia Family,' Archeologia Aeliana 3rd series Vol. XVII (1920), pp. 224-234. Also see C.E. Adamson, 'John Dagnia of South Shields', glassmaker, Proceedings of the Society of Antiquaires Newcastle upon Tyne, New Series VI (1894), p.163.

4. Both Wood, op.cit., and Adamson, op. cit., state that the Dagnias actually erected their first glass house in the Closegate, and imply that they were the first to establish glass houses on this side of the town. However there is evidence that glass houses existed in the area earlier than the 1680s. In 1672 James Shafto willed his brother Mark "the close at the Forth called the Hospital close and the glass houses without the Closegate", see Archaeologia Aeliana, new series, vol. XVIII (1906), pp. 255-6 where the will is quoted. It is not known what connection, if any, these earlier glass houses had to the Dagnias' glass houses but it would seem possible that the Dagnias occupied them at some point.

5. Treasury Papers, 1697, xc, 112; xciv, 82.

6. PRO C 235/3 (Bridges), John Dagnia v Onesiphorus Dagnia.

7. Common Council Books, 15 June 1732 and 27 September 1742

8. Ibid. 30 June 1722.

9. PRO DURH 8/9, Airey et al. v Cookson et al. 1764.

10. CLB Cookson to David Nesbit, 23 August 1755.

11. Newcastle Journal, 28 February 1756. Quoted F. Buckley, 'Glasshouses on the Tyne in the Eighteenth Century', Trans. Soc. Glass Technology Vol. 10 (1926).

12. See Note 9.

13. All the information about the Glasgow bottle house comes from Cookson's letters: to James King, 24 Jan. 1758, 14 Feb. 1763, 30 Sept. 1763, 23 Oct. 1767; to George Murdoch, 12 Feb. 1765; to William Cunningham, 6 Feb. 1767.

14. The Brewery Company was probably the Anderston Brewery Company established in 1763. See Ian Donnachie, A History of the Brewing Industry in Scotland (1979), pp 64 -65.

15. CLB Cookson to William Cunningham., 6 February 1767. Further details about the export of seconds are contained in a letter of 20 April 1767.

16. J.C. Logan, 'The Dumbarton Glass Works', Business History (1973) contains information about James King's further activities.

17. Newcastle Journal, 18 May 1771. Quoted Buckley (1926).

18. The first mention of this company so far recorded appears in the Beilby Bewick Account Books. See M. Ellison, 'The Tyne Glass houses and the Beilby Bewick Workshop,' Archaeologia Aeliana, 5th series, Vol. 3. p. 143-193.

19. See Proceedings of the Society of Antiquaries of Newcastle upon Tyne, 3rd series, Vol. VII, pp. 207-211 for details about the Williams family. Also see Appendix 3c .

20. Proc. Soc. Antiquaries of Newcastle upon Tyne, 3rd series, Vol. III, p. 170.

21. Newcastle Courant, 26 March 1785. Quoted Buckley (1926).

The St. Lawrence Bottle House etc.

22. CC Books, 28 September 1720.

23. Ibid., 20 April 1721.

24. An enquiry into the history of the bottle house's ownership was made in 1806. Most of the following information comes from this, in ZRI 36/2.

25. ZRI 35/12 , Vol. II, 14 March 1753, Matthew Ridley to Jane Gomeldon.

26. Common Council Books, 26 January 1735. Subsequent leases 6 April 1752, 13 April 1775, 20 September 1795.

27. Newcastle Journal, 27 January 1753. Quoted Buckley (1926).

28. Quoted in Buckley (1926). The signatories, besides King, were: Matthew Ridley and partners, joint owners of the St. Lawrence bottle-house; Sir Matthew White & partners joint owners of the bottle house in the dock; John Cookson & partners, joint owners of the S. Shields bottle house; John Williams & partners, joint owners of the Closegate glass house; Joseph Airey & Partners, joint owners of the Bill Quay glass house.

29. ZRI 36/1 Henzell to Ridley 24 October 1781.

Sunderland

30. Most of the newspaper advertisements here referred to are quoted in full in F. Buckley, 'Glass houses on the Wear in the Eighteenth Century', Trans. Soc. Glass Technology, Vol. 9 (1925), pp.105-111.

31. CLB Cookson to Thomas Farmer, 5 June 1762.

32. 2DE 4/13 Joseph Oxley to Delaval, 12 January 1781.

33. PRO T1/732 no. 1835.

34. 2DE 4/6/numbers 53 & 54. Crooks reported to Delaval that Fenwick had been prosecuted and had had a hearing at the Moothall but was fined only 5 guineas.

35. PRO T1/746 no. 1140. The other signatories to the petition were Matthew White Ridley, Lord Delaval and Cookson, Deer and Blackett.

The Hartley Bottle Works

36. Sir John Delaval was given the trusteeship of the Delaval estates in 1756 following the near ruin of his elder brother Francis on whom the estates were settled and under whom they had deteriorated. From 1756 to 1771 Sir John was in the position more or less of a manager with the task of improving the estates and restoring them to their former profitability. The death of Francis Delaval, childless, in 1771 settled the estates on Sir John Delaval as the legal heir.

37. P.G.M. Dickson, The Sun Insurance Office 1710 - 1960 (1960), p.49.

38. 2DE 35/15 Aubone Surtees to Delaval, 29 September 1797.

39. 2DE 41/1 John Delaval to Thomas Delaval, January 1770 (?).

40. NRO 1765 contains a copy of the Act.

41. 2DE 11/9/10 Also see 2DE 41/1/20 for Thomas Delaval's original proposal.

42. 2DE 4/40/50 is a list of the fourteen salaried agents, and their salaries in 1802.

43. R.J. Charleston, 'Glass furnaces through the ages', Journal of Glass Studies, XX (1978), pp 9-34 argues this point. The article also includes a plan of a square bottle house at Gravel Lane, Southwark in 1770. This was the bottle house that until 1779 belonged to Benjamin Harrison, Delaval's London agent

44. 2DE 4/9 and NRO 650/G2 which contains Blacklock's estimate.

45. 2DE 4/4/61 John Crooks toDelaval 3 March 1782. Other information comes from other letters in this bundle.

46. 2DE 4/20/11 John Bryers to Delaval 11 March 1782 includes a small drawing and plan of Oxley's proposal.

Notes to pages 213 to 220 .

47. 2DE 4/20 Bryers to Delaval 5 July 1783. Also see letter of 7 February 1783.

48. 2DE 4/6 John Crooks' letters contain details of the construction.

49. 2DE 4/24 John Bryers to Delaval 21 June 1801.

50. 2DE 4/21 John Bryers to Delaval 25 April 1784. Also see M.J.T. Lewis, Early Wooden Railways (1970), p.197 which cites evidence that Bedlington Foundry was supplying Hartley colliery with iron wheels for coal wagons as early as 1772.

51. 2DE 11/3 William Allen to Delaval, 6 January 1788.

52. NRO 650/G no. 6.

53. 2DE 4/24 John Bryers to Delaval, 26 April 1801.

54. 2DG 11/9/78.

55. NRO 650/G2, estimate of value of the Seaton Sluice property.

56. 2DE 11/9.

57. 2DE 11/9.

58. NRO 1765/12.

59. The 1800 calculation is in 2DE 11/9 as is a note in 1803 that "Cookson told Bryers that their three houses at Shields cleared the last year near £4,000 being a profit of nearly 4½d per dozen".

60. The figures are taken from excise receipts in 2DE 11/8 and letters in 2DE 4/18 and 19. The receipts also include mineral alkali payments usually of about £12 to £15 per payment.

The Bottle Trade

61. London Evening Post, 5 June 1764. Quoted Buckley (1926).

62. CLB Cookson to John Webb 26 October 1753. Also see letter of 28 August. Cookson was anxious to make a good quality bottle for the London market and begged Webb to let him know of any faults. He also asked if he could find a good finisher in London; "I would be glad to have such a one to make champaignes for your market. One from London would cause an emulation and make the others strive not to be outdone".

63. CLB Cookson to James Dixon 3 February 1764. Also see letter of 2 March 1764.

64. CLB Cookson to John Webb 15 June 1759 instructing him to take out the insurance in the Union Office.

65. Mr. Mortimer's Universal Director (1763). The third bottle house was that of Jane Horsey in Little Bush Lane which was taken over c. 1780 by Mary Webb.

66. ZRI 36/1 Henzell to Ridley. Undated but probably 1781.

67. 2DE 41/1 Thomas Delaval to John Delaval 18 October 1771. Also see 2DE 11/11 for letters from Broughton.

68. 2DE 36/2 and 3. Correspondence with Delaval's lawyer. Also 2DE 11/11 correspondence with Broughton. Both contain bankruptcy details.

69. The contracts are all contained in 2DE 11/11, NRO 650 G2/2, and NRO 1765.

70. For details on Harrison see W.J. Cripps, A Pedigree of the Family of Harrison (privately printed 1881). The Dict. of Nat. Biog. also contains a biography of his son who, besides being the treasurer of Guy's Hospital and the Hartley bottle merchant, took over the works in 1813.

71. Among the marked bottles sent to Harrison were ones marked "Cox", "G.R.", "H.C.", "Hall", "Barlow".

72. CLB Cookson to Webb 2 June 1764. An identica letter was sent to Farmer.

73. CLB. Cookson to John Webb, 18 September 1764.

74. CLB Cookson to James Dixon, 23 May 1765.

75. 2DE 11/9/53, Dobson's report to Delaval of his meeting with the other manufacturers: the following paragraphs are based on this report.

76. 2DE 11/9/24. Also see no. 53 for Delaval's reply to Harrison's query on the matter.

77. 2DE 11/11/53 Benjamin Harrison to Delaval, 29 December 1778..

78. ZRI 36/1 Middleton Hewitson to Ridley, 30 November 1779.

79. ZRI 36/1 see various letters between glass cutters and Joshua Henzell, November to December 1780.

80. 2DE 11/11/101 Harrison to Delaval, 1797, notes Mr. Blackett's intention to open a warehouse in London to sell the produce of his manufactory.

81. ZRI 36/3 Hewitson to Ridley, 16 May 1811.

82. 2DE 11/3 contains an account of William Oxley's sojourn at Hartley. He arrived in December 1780 and was only paid ordinary wages and not bound until the experiment of the large hollow ware proved successful. In August 1783 he fell seriously ill with ague and was sent to Newcastle Infirmary. By June there was no prospect of him recovering his health so Delaval instructed that he and his family should be returned to London. By this time he had instructed other glass men in the making of hollow ware.

83. NRO 1765/13/4 - 16 contains the full argument over small bottles' price.

Notes to pages 233 to 246 .

84. 2DE4/35 Delaval to John Brotherick, 3 February 1793.

85. 2DE 4/18 Stephen Oxley to Delaval, 1 May 1796.

86. 2DE 4/38 Harrison to John Brotherick, 2 and 12 October 1798.

87. 2DE 11/10 28,29,30 Lucas Chance to Delaval. November and December 1799.

88. 2DE 11/7/18. Prices of bottles at London delivered to Hartley by Messrs Blackett and Carr, 27 March 1800.

89. 2DE 11/11 104. Harrison wrote on 25 October 1800 that Blackett and the other manufacturers intended to advance their prices from next Lady Day. Also see 2DE 11/9/79, table of prices commencing March 1801.

90. NRO 650/G2/6,B. and M. Harrison to John Brotherick, 4 June 1803.

91. 2DE 11/7/13 (1777 figures): 2DE 4/5/1 (1783 figures).

92. 2DE 4/3 Stephen Watson to Delaval June 1779.

93. 2DE 11/9/33 Delaval to Dobson 30 March 1773.

94. 2DE 4/8/6 - 10. Letters from George Douglas, March 1777. Sam Baker's orders were invoiced to Alderman Baker or William Row, both of Newcastle.

95. 2DE 11/7/7.

96. 2DE 4/8/16, George Douglas to Delaval 5 December 1775.

97. 2DE 4/12 and 13 contain all the letters from Oxley on his journey.

98. ZRI 36/1 Henzell to Ridley, 7 July 1781, also see letter of 26 September for the following quotes.

99. 2DE 4/13, 28 February 1783.

100. 2DE 8/5, Letters from John Wormwald contain all the following details.

101. 2DE4/4 and 5, letters from John Crooks contain details of Row's contract.

102. CLB Cookson to John Inglis, 20 November 1767.

103. ZRI 38/2, Ridley to John Inglis, 20 November 1767.

104. 2DE 4/13, 2 April 1781.

105. In 1751 Paul Failie was transferred one third of the glass house in the Closegate occupied by John Williams and his partners as a white glass house.

106. CLB Cookson to Stephen Van Os, 13 July 1753. Also see 21 July 1753, and Cookson to James Miller (the glass house manager), 4 September 1753, instructing him what type of bottles should be sent to the Dutch market.

Notes to pages 246 to 256 .

107. CLB Cookson to Alex. Baxter, 18 and 31 January 1763, 16 February and 16 December 1767.

108. Ibid. Cookson to Baxter, 2 January 1764.

1800 - 1850

1. Johnstone's Directory (1817).

2. Newcastle Courant, 28 August 1802 .

3. ZRI 36/2 Hewitson to Ridley 20 March 1803.

4. Newcastle Courant, 14 April 1804. Also see 30 August 1806 for notice of the amicable dissolution of Temple and Blackett, glass bottle manufacturers, and Blackett and Temple, common brewers. Also 14 September 1808 for notice of the sale of their glass house. It was bought by R.T. Shortridge.

5. Second Report of the Children's Employment Commission 1843 XX, Appendix, pt. 2

6. ZCK 17, notes by Joseph Cookson; ZCK 2/23 will of Joseph Cookson including schedule of deeds to St. Philip's glass house in Bristol.

7. 'Wesleyanism in Sunderland Pt. 2', Antiquities of Sunderland, Vol. 27, pp 1 - 56.

8. Newcastle Courant, 14 July 1848.

9. ZCK 5/3.

10. ZCK 1/6/2.

11. See Note 5.

12. ZRI 36/2, Hewitson to Ridley, 25 March 1809, the following quote is also taken from this.

13. Ibid. Ridley to Hewitson, dated 1811.

14. Newcastle Courant, 7 December 1811, 21 March 1812.

15. Cookson Cash Books records his yearly subscription to the trade, beginning in 1822 when the subscription was 1 guinea per house. It rose to five guineas in 1826.

16. Two bill headings from Robert Todd, one for the Closegate works, one for the North Shore bottle works, and both illustrating the works, are reproduced in N. McCord and D.J. Rowe, Northumberland and Durham, an Industrial Miscellany, (Newcastle, 1971), plates 49 and 65.

17. Newcastle Courant, 24 January 1835.

18. Ibid. 30 August 1839.

Notes to pages 256 to 261 .

19. Ibid. 15 March 1852.

20. PRO E/145 Bundle 4, nos. 4196 and 4197.

21. Newcastle Courant, 11 October 1826.

22. Sketches of Public Men of the North (Newcastle,1855), pp 109 - 112 contains a brief character sketch of Ridley, paying particular tribute to his "quiet industry".

23. Newcastle Courant, 13 October 1843.

Sunderland

24. The ownership of the two houses is outlined in a memorial from Addison Fenwick to theTreasury, PRO T1/ 1418 no. 14062.

25. PRO T1/1343 no 1396. A petition from Addison Fenwick argued that they should be recompensed for the time the warehouse stood empty, from December to April 1813, and should receive interest on the £3,000 purchase money for this period.

26. Newcastle Courant,28 July 1848.

27. DRO D/ma/12 Box 1.

28. Newcastle Courant,26 June 1824.

29. PP 1817 XV1 43 pp 646-650. Extents in aid issued on account of the glass duties in 1816. This records an extent of £1,452 3s Od issued to Marmaduke George Featherstonhaugh of County Durham.

30. Newcastle Courant,20 September 1828.

31. Newcastle Courant,13 July 1849.

32. Ibid. 17 March 1821.

33. Most of the following information about Hall's finances comes from N. Corder's unpublished notes on Sunderland Parish, Vol. IV, in Sunderland Public Library. Corder did not give his own sources.

34. PP 1826-7 XVII 241 - 326. Information filed in the Court of Exchequer for Breach of the Excise Laws plus sums for fine, penalty or compromise, 1821-6. Also PRO CUST 103/85 p. 343. Hilkiah Hall submits to a verdict for the crown, 1 June 1827.

35. PRO E 145 no. 103185. Extent issued to Hilkiah Hall for fines lately recovered in the Exchequer.

36. Newcastle Courant,3 May 1828.

37. Ibid. 29 September 1826.

Hartley

38. 2DE 11/10/27, 39-50 includes all correspondence with Cookson on the issue.

39. NRO 1765/20 contains the Harrisons' lease, the valuation and the later lease of the glass works to Carr and Jobling.

40. Also see PRO T1/1647 no. 15120, a petition to the Treasury from the Harrisons begging relief on the duty on 80 tons of rock salt shipped from Liverpool for use as a flux for glass. The officers claimed that only as mineral alkali, was salt duty free, in its natural state it had to pay duty. The Excise's report agreed with this; "The Revenue might be greatly injured were glass makers allowed to use rock salt in its native state as a flux and yet the memorialists appear to have obtained this on the erroneous supposition that it was so allowed". Under the circumstances they agreed to let the Harrison's have the particular shipment of salt duty free but it seems likely that in future they were told to use mineral alkali or pay the salt duty.

41. 51.GIII c.69 section 37. The fine for making small bottles was £50.

42. PRO T1/1233 no. 1687 of 1812.

43. ZRI 36/3 Hewitson to Ridley, 16 May 1811.

The Bottle Trade

45. ZRI 36/2 Middleton Hewitson to Matthew White Ridley, 3 September 1806. Also see letters of March 1809 for the following quotes.

46. Fifth Report of the Commissioners of Inquiry into the Excise: Stone Bottles and Sweets, 1834 (5) XXIV, Appendix 19.

47. Hansard 1825, XII, c. 1224.

48. 54 G3 c.96.

49. See P. Matthias, The Brewing Industry in England, 1700 - 1830 (Cambridge, 1959), pp. 191 - 4.

50. See note 52.

51. 2DE 11/8 Isaac Cookson to Lucas Chance, 3 February 1807.

52. PRO T1/1363 no. 17599. This includes the earlier petition from Bristol and an 1813 petition from the Scottish bottle manufacturers.

53. PRO T1/3786. Signatories to the Tyne petition were Isaac Cookson and Son, Clarke Plummer and Co., Cookson and Co., Robert Todd and Co., John Cookson and Co., and Jonathon Carr and Co. The Wear petition was signed by John Hubbard and Co., Walker Featherstonhaugh, Thomas Pemberton, and Hilkiah Hall.

54. PRO CUST 84/377 and 391, traders petitions to the Board

Notes to pages 273 to 280 .

55. CUST 84/377 p.61, petition of John Cookson and Co. 25 March 1817.

56. Ibid. p.58 Petition of Messers Row, 22 February 1817.

The Bottle Makers

57. CLB Cookson to Farmer, 24 September 1762. Also 2 October 1762.

58. NRO 650/G contains various indentures dating from 1763 to 1808.

59. CLB Cookson to Mr. French, 5 February 1766. This letter was written in connection with a glass maker, Richard Price, who had absconded to the London bottle house of Richard Russell. Price was bound to Cookson for seven years at 12 shillings per week with the possiblity of rise to 16 shillings, if placed as a blower, or 18 shillings as a broad glass maker: House and firing, or 40 shillings per year in lieu, to be provided. A writ was served on Price but he absconded to Stourbridge in 1768 and the case was dropped.

60. ZRI 36/1 Hewitson to Ridley 30 November 1779.

61. 2DE 11/9/62.

62. 2DE 11/9/45. Ashworth is included in the list of glass men who transferred their indentures from Thomas to John Delaval in 1771 (NRO 650/G8) He was a nephew of the manager Isaac Manchester but was dismissed in 1775 for being the ringleader of a stoppage (2DE 4/8).

63. There appears to have been a lot of movement of labour between Scotland and the north-east. Understandably it was the more skilled bottle workers, the finishers who were eligible to become managers, who appear to have been the most mobile. A good example of a mobile finisher is John Nealsham who left Cookson and Deer to become the manager at Dumbarton. When they were not prompt in paying his wages he returned to the north-east in 1777 and , after getting a good reference from Deer, was given a finishers place at Hartley. He was given 16 shillings a week, plus one room with the promise of two if his family joined him from Shields. He soon demanded a rise to 20 shillings which was given him because he was a good workman. Another example is John Sime who came to Hartley from Alloa, where he had been a manger, in 1790 when the Alloa house was put up for sale. He wanted to be employed as a manager but was only given a finisher's place. He left in 1795 and was judged to be no great loss.

64. NRO 1765 no. 17.

65. Newcastle Courant, 9 December 1853. The reference to the strike is to recent disputes in Lancashire which had been reported in the Courant.

66. ZAN M17/80

67. 2DE/4/20, 7 February 1783.

68. Ibid.

69. 2DE 11/9, memorial of 19 September 1807. Also see 2DE11/7/19, tables of manufactured bottles for one week, 16 - 23 September, showing amount of overwork.

70. NRO 650/G2 and D8.

The Flint Glass Houses

1. Francis Buckley, A History of Old English Glass (1925), p. 34 quotes a number of contemporary sources all crediting the introduction of glass cutting into England to German glass cutters, particularly Christopher Haedy who worked in London in the early part of the century.

2. There is evidence of glass enamellers working in a number of provincial centres - Bristol, Yarmouth, Newcastle and Leith - during the 1760s and 1770s. At Newcastle William and Ralph Beilby are of course well known thanks largely to their mention in Thomas Bewick's A Memoir. Also mentioned by Bewick, but for some reason quite overlooked, is Anthony Taylor who "had no opportunity of showing his talents in the Arts otherwise than in his painting and his enamelling on glass"(1979 edition, p.45), and who left Newcastle to go to the glassworks at Leith. There are no grounds at all for believing that these enamellers were anything more than skilled journeymen working for the glass houses; the polychrome armorial enamels executed by the Beilby brothers could perhaps be said to have transcended the basic cheap imitativeness of ordinary white enamelling and they may well have worked to commission.

3. The 1785 Committee on the Adjustment of Commercial Intercourse between Great Britain and Ireland (Irish Commons Journals,12 August 1785) took evidence from a number of London cut glass manufacturers on the emigration of glass cutters to Ireland. Among them was Samuel Parker (who was later to become a partner in the Tyne Glass Company) who clearly stated that cut glass manufactories were only established in London and its neighbourhood.

4. Thomas Alexander, glass cutter and engraver, the Close, is listed in the 1787 Directory.

5. Newcastle Chronicle, 1 April 1780 and 10 March 1781. Quoted Buckley(1925).

5a. R.J. Charleston,"George Ravenscroft: New Light on the Development of his 'christalline glasses'", Journal of Glass Studies Vol. X (1968), pp. 156-167.

6. Journals of the House of Commons XI (1969), 30 March. Petition of the London Flint Glass Makers against the war tax on glass

7. John Houghton Collections of letters for the improvement of husbandry and trade,15 May 1696.

8. This and other Dagnia deeds are quoted in R. Welford,"Local Muniments", Archaeologia Aeliana,2nd series,XXIV.

Notes to pages 285 to 291 .

9. CC books, 9 July 1733. Mary Pearson, administrix of Henry Pearson fuller, petitioned for a reduction of rent on her tenements and dyehouses in the Close because the proximity of several glass houses and smiths shops had reduced their value.

10. John Cookson's Day Book of 1744 - 1747 (Tyne and Wear County Archives) includes three shipments of flint glass abroad, two to North Bergen and one to Hambro'. One of these is marked "Dagnia & Co.". The articles include wormed wine glasses (priced at 10d per lb), plain wine glasses (8d per lb.), wormed and plain ale glasses (10d and 8d per lb.) quart and pint mugs (9d per lb.), three pint decanters (9d per lb.), candlesticks (3 shillings each), and a "pyramid" consisting of four salvers, a top branch, sweetmeat and jelly glasses, and priced at two guineas and four pence.

11. This claim originates from the Surtees Society edition of the Memoir of Ambrose Barnes (Surtees Society, 1866, Vol. 2) which points out that the Dissenters' Meeting House, which Airey, Cookson & Co. were to occupy later in the century, was advertised for sale in 1728.

12. John Cookson's letter Book 1747-1767 (Tyne and Wear County Archives) contains many letters about Fallowfield. The mines were leased from Sir Edward Blackett and the partners working them in April 1759 were John Cookson, Nicholas Roberts, Teasdale Mowbray and Sir Matthew Featherstonhaugh. In 1767 the partnership invested a further £4,800 capital in the enterprise.

13. Cookson's Letter Book. John Cookson to Alex Baxter, 18 Jan. 1763, 16 Feb. 1763.

14. Durham University Department of Palaeography, Cookson Mss. Box 1/15.

15. A. Brown, A History of Glasgow etc (Glasgow 1795), Vol.2, p.267: J.A.Fleming, Scottish and Jacobite Glass (Glasgow 1938), p.132.

16. Richardson's Table Books (Historical), Vol. 2 p.27.

17. Sykes' Local Records (1832), 24 January 1760: Newcastle Journal, 15 December 1764.

18. Newcastle Journal, 16 September 1769, quoted F. Buckley "Glass houses on the Wear in the Eighteenth Century", Trans. Society of Glass Technology Vol. 9 (1925), pp. 105-111.

19. Buckley (1925) suggests that Hopton came from the Whitefriars glass house which in 1763 was listed in Directories as being occupied by Hopton and Stafford but in 1765 by Stafford alone.

20. 2DE 4/8 George Douglas to Delaval, 19 May 1775.

21. 2DE 11/3 William Allen to John Delaval.

22. NC 8 January 1786. Also see CC books 20 September 1785.

23. NC 17 March 1787.

Notes to pages 291 to 297 .

24. NC 5 July 1786.

25. CC books 18 June 1807.

26. The history of the premises is outlined in deeds quoted by R. Welford, "Local Muniments" Archaeologia Aeliana 2nd Series XXIV.

27. CC books 18 June 1789.

1800 - 1850

28. See for instance NC 24 December 1813, an advertisement for an auction of rich London cut glass.

29. M. Ellison "The Tyne Glass houses and the Beilby Bewick Workshop", Archaeologia Aeliana, 5th series Vol. III, p.143-193, records many moulds for phials cut for the local glass houses

30. See for instance Poulett Thomson's speech, Hansard 2nd series, Vol. XXIII, 25 March 1830.

31. British Patent No. 3807, May 1814.

32. NC, July 1822.

33. NC, 28 May 1819 and 31 March 1821.

34. NC, 6 November 1819.

35. NC, April 1832.

36. PP 1843, XV, Appendix to the 2nd Report of the Children's Employment Commission.

37. NC, 17 May 1806. Also see other advertisement 2 May 1801.

38. E.L. Thornborrow, "Sunderland Engravers" South Shields Archaeological and Historical Society, Vol. 1, no. 7 (1959).

39. The Tyne Mercury, 16 September 1823 contains the most detailed report of the event.

40. J. Baillie An Impartial History of the Town and County of Newcastle upon Tyne (Newcastle, 1801), p.515.

41. NC, 30 April 1803, 21 May 1803, 1 September 1806. There is a plan of the glass house in 1802 in the Bell Collection no. 7/3 (Newcastle Central Library).

42. NC, 19 February 1820. Wilson's original partners included Francis and Thomas Hurry of Howdon Panns whose bankruptcy in 1805 caused two shares to be put up for sale (see NC 15 June 1805), and Richard Prime (see North Yorkshire Record Office, Burdon Mss., assignment of two shares from the estate of Richard Prime to Wilson and Hopper, 1807).

Notes to pages 297 to 303 .

43. NC, 13 April and 9 March 1811.

44. NC, 10 August 1821.

45. E. Lamb, Annals of the Lambs: a Border Family (privately printed 1926), p.105.

46. DRO NCB/1/JB/1862. The price list is undated but is probably c.1800.

47. See NC, 13 January 1810 for an advertisement by Dicey and Co., the manufacturers of Daffy's Elixir, threatening prosecution of glass makers manufacturing imitation Daffy's bottles. The Beilby Bewick records (see note 29) show that moulded Daffy bottles were also being manufactured by Price & Co. and Isaac Cookson & Son, presumably in bottle metal.

48. NC, 25 October 1817.

49. CC books 28 June 1831, 9 July 1835. Both times the partners were petitioning to extend their quay.

50. NC, 5 May 1810. William Richmond has been reported in other glass manufacturing areas in England and his activities appear to have become quite notorious.

51. PRO CUST 103/82, p. 567.

52. Ibid. p. 571.

53. NC, 22 February 1817.

54. CUST 103/82, 8 December 1815.

55. NC, 24 August 1816.

56. PP 1817 XVI pp 46-50. Extents issued by the Excise in 1816.

57. See NC, 24 March 1821, 13 April 1822, 20 March 1824, 10 July 1824 for advertisements of the sale.

58. The following account is based on papers of John White in the possession of Sunderland Museum.

59. NC, 2 March 1816.

60. NC, 30 July 1822.

61. NC, 6 November 1824 reports the Marquis's visit to the works.

62. NC, 5 October 1827.

63. NC, 29 May 1830.

64. NC, 20 September 1832.

Notes to pages 303 to 308 .

65. PRO T1 1281 no. 13080, also 1343 no. 12723.

66. TWRO 730/4 Andrew White's diary for 25 March 1836 records the celebration dinner.

67. NC, 6 October 1843. Also see further advertisement 4 June 1844. Also see 18 January 1839 for the fire.

68. NC, 8 January 1841.

69. NC, 26 January 1805.

70. Northumberland County History Vol. VI, Bywell, contains a pedigree of the Wailes family.

71. PRO CUST 103/75 p. 841.

72. NC, 1 July 1814.

73. NC, 1 November 1839.

74. NC, 13 February 1836.

75. See William Bell Scott Autobiographical Notes (1892) Vol. 1 p.189 "He (Wailes) had been in trade and unsuccessful; his reading was the London Journal, and his general knowledge of art nil. Yet he had the greatest delight in grand churches and had visited many in France. This was his inspiration; he got hold of Oliphant (Francis Oliphant, Wailes' chief designer), built a kiln in his back shop, introduced himself to Pugin and in a few years had 100 men busily at work with commissions more than he could manage".

76. See NC 15 August 1818, 14 February 1840, 20 May 1820, 13 March 1835. Also British Patents nos. 6766 (transporting railway carriages from one level to another) of 1835; and 7743 (boilers for steam vessels) of 1838 .

77. NC, 2 June 1810.

78. NC, 31 August 1811.

79. NC, 16 June 1820, Price advertised a sale of wine and spirits as he was declining the import business. He also appears in the Cookson cash books as a wholesale purchaser of bottles.

80. NC, 26 September 1818.

81. NC, 30 June 1821.

82. British patent no. 3807 of 1814.

83. PRO T1/3785 28 August 1835.

84. NC, 12 July 1822. On the occasion of his fiftieth birthday Price gave a dinner to his 130 workmen.

Notes to pages 308 to 312 .

85. NC, 20 February 1839, report of a speech by Mr. Brockett, Mayor of Gateshead, who claimed that the previous year 300 men had been at work at both Price's and Sowerby's works; now there were only 139 with Price and 87 with Sowerby.

86. NC, 30 March 1827.

87. Gateshead Observer April 1847. The bottle does not appear to have survived the demolition of the building in 1972.

88. NC, October 16 1846.

89. NC, 19 July 1850. The 50 foot high chimney had been built thirteen years previously and had been altered slightly the previous December when a new furance was built. Neither Price's foremen nor the builder, Richard Cail, could find the reason for its collapse.

90. Guildhall Mss. 11,937, Sun Fire Insurance Policies Vol. 80, no. 813742.

91. NC, 12 August 1809.

92. PRO CUST 103/71 pp 413 - 434.

93. NC, 12 January 1812.

94. PRO CUST 103/75 p. 1017.

95. PRO CUST 103/84 p. 867 Also PRO T1/1633 no. 11714.

96. CC books 29 September 1831. The Sowerbys and Phillips petitioned to erect geers at Poulter's Close as they had recently taken Waldrige Colliery on lease.

97. DRO D/PR/6/1 contains all the following details plus a map of the glass works on the land leased by Cuthbert Ellison to George Sowerby in December 1825.

98. It is possible that the Carr Hill glass works occupied the same site as the old pottery, which was owned by the Warburton family. In 1818 the Warburton pottery was advertised for sale; in the Directories for the 1820s George Stevenson's address is given as Warburton Place. A later pottery established at Carr Hill by Wallace and Co. was probably at a different site and had no connection with the Carr Hill glass works.

99. NC, 24 March 1821. Notice of the bankruptcy of John Coulson and Edward Leadbitter glass manufacturers of Gateshead.

100. NC, 3 June 1826.

101. NC, 30 March 1833.

102. NC, 18 March 1836.

103. NC, 11 October 1839.

Notes to pages 312 to 318 .

104. Gateshead Observer, 8 May 1847.

105. NC, 17 July 1846 (the works were advertised for sale 16 July 1845).

106. NC, 25 February 1848.

107. NC, 5 August 1853.

108. NC, 29 June 1849.

109. NC, 26 June 1846.

110. Gateshead Observer, 2 January 1847.

111. The following is taken from reports in the Gateshead Observer, 19 and 25 December 1846, 2, 9, 30 January 1847.

The Excise

1. CUST 48/16, p. 123, petition of 12 March 1760 from the glass makers of Warrington, Liverpool, Stourbridge, Dudley and Glasborough. A similar petition was sent from the glass makers of Bristol on 2 April 1760.

2. T1/340/84. The petition was signed by Matthew White, Thomas Henzell and Jane Roddam.

3. T1/381/17 and 18 contains all the discussions of 1758 on broad glass.

4. CUST 48/16, p.130, report of 11 April 1760 containing clauses laid before the Lords of the Treasury in 1756.

5. Hansard 1777, 1st series, vol. XIX, cc. 243-6.

6. It is not entirely clear why the manufacture of bottles should have lost more glass through moiles than the manufacture of any other type of glass but the determination of the bottle manufacturers not to accept the Excise's ruling on moiles must be taken as evidence of the truth of their claims and the real loss that they would suffer should they be forced to comply with the ruling.

7. ZCK 8/5, Board of Excise to John Cookson, 16 January 1765.

8. 2DE 11/8/4, R. Sayer to Delaval, 25 July 1777.

9. NRO 1765/10. The memorial was signed by Jane Gomeldon and Matthew Ridley (of the St. Lawrence house), Catherine Henzell and Ann Shafto (of the Ouseburn bottle house), John Cookson and Evan Deer (of South Shields), Charles Williams (of the Closegate house), William Russell (of Sunderland) and John Hussey Delaval.

10. 2DE 11/10/14, John Wilcox to George Douglas, 29 November 1777.

11. 2DE 11/11/15, Middleton Hewitson to Delaval, 31 December 1777.

12. 2DE 4/9, George Douglas to Delaval, 30 January 1778.

13. PRO 30/8 no. 301, f.160. Marmaduke Clark's report is contained in f.161.

14. The following account is largely based on Oliver Farrer's account to Lord Delaval for work done on behalf of himself and the other bottle house proprietors Farrer itemised each meeting he had attended and each petition he drew up and presented. NRO 650/G2/6.

15. T1/732 no.3251.

16. PRO 30/8 no. 125, Cookson to Pitt, 27 June 1794.

17. T1/732 no. 1835. Signed by Ridley and Hewitson, Cookson Deer and Blackett, Isaac Cookson, Lord Delaval, and W. Featherstonhaugh.

18. Information in this paragraph comes from 2DE 4/6 letters from John Crooks to Delaval, October 1794 to March 1795.

Notes to pages 347 to 371 .

19. PRO 30/8 no. 301, f.173.

20. 2DE 11/8/13, George Rose to Rowland Burdon, 21 March 1800.

21. 2DE 35/15, Rowland Burdon to John Cookson, ? April 1800.

22. ZRI 25/4 contains an unsigned draft of this petition "for redressing the grievances of the Act of Parliament passed the last session for granting several rates and duties on glass". It is not known if it was actually sent.

23. PRO 30/8 no. 301, f. 183.

24. Ibid., f. 178.

25. T1/982 no. 5894 contains the original petition plus the Excise's report of 1806.

26. T1/935 no. 342.

27. Case of the Flint Glass Manufacturers (1818), a copy of which is in ZRI 36/3.

28. T1/1140 no. 7203.

29. The following account is taken from CUST 48/42, pp. 336-353.

30. ZRI 36/2, John Head to Matthew White Ridley, 3 December 1808.

31. Ibid., John Head to Matthew White Ridley, 11 May 1809, Also see letter of 13 May for the following quote.

32. Hansard, 1812, 1st series, vol. XXIII, c.568.

33. B.R. Mitchell and P. Deane, An Abstract of British Historical Statistics (Cambridge, 1966), p.267.

34. PRO T1/1872 no. 23567, report of the Board of Excise on defects in the duties on glass with suggestions for their remedy, 21 April 1818.

35. Newcastle Courant, 5 December 1812, Also see 19 September 1812 in which Mr. Lignum gives notice that because of the new duty on glass he is obliged to advance the price of his antiscorbic drops from 4s 6d, for a small bottle, to 6 shillings; and from 11 shillings for a large bottle, to 14 shillings.

36. Fifth Report of the Commissioners of Excise Inquiry: Stone Bottles and Sweets, 1834 (5), XXIX, appendix 19.

37. See note 27.

38. T1/1444 no. 1563.

39. Countervailing duties on Irish manufactured glass had been imposed by the Act of Union in 1801. These were excise duties and were fixed at the same rate as the drawback payable on the various types of English glass. In addition Irish glass also had to pay a customs ad valorem duty on entering England or Scotland.

Notes to pages 371 to 397 .

40. J.S. Jeans, Pioneers of the Cleveland Iron Trade (Middlesborough, 1875), pp. 9-12.

41. Hansard, 1814, 1st series, vol. XXIX, c.230. Also see c.449 for a further debate on the Irish Glass Duties.

42. T1/1443 no. 1256. The petition was signed by John Head, Joseph Lamb, Isaac Cookson, John Brumell and Addison Fenwick.

43. ZRI 36/3, Lucas Chance to Isaac Cookson jr., 12 December 1814.

44. ZRI 36/3, see various letters of May 1818 between Cookson, Ridley and Robert Rough of 93, Upper Thames St. (Cookson's warehouse).

45. Accounts and Papers, 1839 (419) XLVI.

46. T1/1473 no. 9545. The petition was signed by Biddle Mountford and John Pidcock & Co., both of Stourbridge; the Newcastle Broad and Crown Glass Company did not sign it.

47. T1/1872 no. 23567, containing no. 3599 of 1818.

48. Ibid., containing no. 10589 of 1819, report of 26 May 1819 on the memorandum of Isaac Cookson & Co.

49. See note 27.

50. T1/1741 no. 14635. The petition was signed by William Wilson, Joseph Lamb, Shortridge Sawyer & Co., Lowery and Sowerby, Burell & Co., Joseph Price, and White Young & Co.,

51. T1/1872, containing no. 10421 of 1819, report of May 1819 relative to altering the duties and drawbacks on glass.

52. See various petitions in a bundle in T1/3786, particularly the petition of Ronayne & Co. of Cork whose glass was siezed on its way to the Cape of Good Hope, in 1830, on the grounds that itwas not worth 11d per lb. in the London market. The glass was eventually released after evidence was given from various glass merchants that it was worth 11d per lb. in Cork and Ronaynes' glass was usually of this low standard.

53. Twelfth Report of the Commissioners into the Revenue: the Excise in Scotland, 1825 (390) XIV.

54. This section is entirely based on letters from George Dunn to Matthew White Ridley in ZRI 36/4.

55. Hansard, 1817, 1st series, vol. XXXV, c. 1034.

56. J.R. McCulloch, Taxation and the Funding System (1845), p.245.

57. Hansard, 1830, 2nd series, vol. XXIII, c. 871.

58. The deputation later repeated their statements to the 1835 Commission from which the quotes are taken.

Notes to pages 398 to 430 .

59. Tl/3785 contains a bundle of petitions and reports on the subject of sheet glass.

60. Hansard, 1840, 3rd series, Vol. LIII, c. 249.

61. British patent no. 7886 of 1838.

62. Tl/3786 contains the memorial and Hartley's petition of January 1839 stating his case and appealing against the Board's ruling; the last quote in this section is taken from this.

63. Hansard, 1831, 3rd series, vol. II, 403-465 debate on the Budget, 11 February. Also see further debate of 14 February, 491-539.

64. Tl/3786 contains a bundle of these petitions; among them is a petition from the owners of kelp shores in Scotland stating that they too were affected badly by the uncertainty and depression in the glass trade.

65. Glass excise returns reprinted in J.R. McCulloch, op.cit., appendix 4; total excise returns taken from Mitchell and Deane, op.cit.,pp.392-3.

66. Hansard, 1832, 3rd series, vol. xi, 1281.

67. Hansard, 1838, 3rd series, vol. xii, 1199-1207.

68. Peel had agreed with Poulett Thomson that "it would have been better to take off the tax on glass than the house tax but it was said that greater pain was felt in paying the house tax".

69. Hansard, 1825, 2nd series, vol. XII, c. 1142.

70. Report of the Select Committee on Import duties, 1840 (601) V, evidence of J. McGregor.

71. Hansard, 3rd series, vol. LXXVII, 455-497.

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72. 2DE 4/15/53, Joseph Oxley to Delaval, 5 October 1783.

73. ZRI 25/40.

74. 19th Report of the Commissioners of Excise Inquiry: Licences, 1837 (83) XXX, Appendix 21; and Appendix 1 p.67 of the 1835 Report.

75. Tables of Revenue, Population and Commerce, 1835, XLIX p.227.

76. J.R. McCulloch, op.cit.

77. M. Ellison, 'The Tyne Glass Houses and the Beilby Bewick Workshop', Archaeologia Aeliana, 5th series, III, p. 143 notes several orders for notices such as "notice to open the pots".

78. Apsley Pellatt, Curiosities of Glass making (1849), p.93.

79. William Cuthbert's evidence stated this particularly clearly: "There are many regulations, or rather many restrictions, by the Act of Parliament, which, if carried rigidly into effect, would occasion very strong grievances; but they do not carry them into effect because they are impracticable, unless a man is a rogue; then they would have recourse to them ... but the honest trader does not suffer inconveniences from them".

80. 2DE 4/16/23, Joseph Oxley to John Delaval.

81. T1/1375 no. 1917.

82. Newcastle Courant, 6 November 1824, also see 7 June 1824 for an account of Pemberton's trial in the Exchequer.

83. An account of Bell's disputes with the Excise in 1828 is contained in T.C. Barker, The Glassmakers (1977), pp. 34-5. Although it is not absolutely certain, it is very possible that this was the same John William Bell who had established a flint glass house in Newcastle and who was prosecuted for blatent fraud in 1815 (see the flint glass chapter). Bell's disputes with the Excise, both in 1828 and in 1824 when he was fined £300 for having an insecure weighing room, were reported in the Newcastle papers.

84. CUST 103/78, p.79.

85. CUST 103/74 p.93.

86. CUST 103/84 p.367.

87. T1/1633 no. 11714, 31 January 1817.

88. CUST 103/75 p.841.

89. T1/3785.

90. See L.P. Williams, Michael Faraday, a Biography(1965), pp. 115-120. Also Proceedings of the Royal Society (1830), for Faraday's Bakerian Lecture on the results of these experiments. Also T1/3785 for Dolland's report to the Treasury of 1831 concerning the results of the experiments.

91. T1/2001 no. 7704, petition of William and Thomas Gilbert; a later report noted that their experiments had not been successful and were soon abandoned.

92. James Keir, A Dictonary of Chemistry (1789), p.4. Also see R.E. Schofield, The Lunar Society (Oxford 1963) pp. 172-4 for an account of Keir and Wedgewood's experiments.

93. T1/1949 no. 17669.

94. T1/3786 contains a bundle of all Price's petitions on this subject.

95. Apsley Pellatt, op.cit., p.45.

96. Seventh Report of the Commissioners of Excise Inquiry, 1834, VI, appendices 93, 98.

97. James Kenmore, 'Lighthouse Illumination and the Dioptric Apparatus', in S. Timmins (ed.), The Resources, Products of Birmingham etc. (1866).

98. Adam Smith, The Wealth of Nations, book 5, chapter 2, part 2.

99. P. Matthias, The Brewing Industry in England, 1700 - 1830 (Cambridge, 1959), p.339.

Notes to pages 450 to 463 .

Chapter six: the changing face of the north-east glass industry, 1850-1900

1. J. Collingwood Bruce, A Handbook to Newcastle upon Tyne (Newcastle upon Tyne, 1863), p.257

2. Excise figures reproduced in the Gateshead Observer, February 1841.

3. J. Guthrie, The River Tyne: Its History and Resources (Newcastle upon Tyne, 1880), pp 122-3.

4. Admiralty Enquiry into the State of the River Tyne (Newcastle upon Tyne, 1850), p. 187.

5. See articles in The Builder, Vol. 37, 12 April 1879, pp 393-4 and The Pottery Gazette, October 1888, pp. 914-5

6. W.E.S. Turner, "The British Glass Industry; Its development and outlook", in Journal of the Society of Glass Technology, Vol. 6, 1922, pp.108-46. (Tables on pp. 133,134)

7. DRO Strathmore/173: Report on the Tyne Plate Glass Company, 27 October 1881, also see letter from J.V. Gregory to John Bowes, 15 September 1881.

8. TWRO 741/1, Minutes of Sunderland Chamber of Commerce, 26 January 1887.

9. SDE, 1 October 1885.

10. Apsley Pellatt, Curiosities of Glassmaking (1849), p.47.

11. The Pottery Gazette, May 1897. Also see on article of December 1884, "Some reasons why we are undersold by foreign glass manufacturers".

12. See T.C. Barker, The Glassmakers (1977), Chapters 8 and 9 for an account of the Siemens' gas producers and tank furnaces.

13. Warren's patents of 1868 (nos. 682, 1480 and 3931) were all for regenerative gas furnaces and all acknowledged his debt to a patent taken out by A. Pocheron in 1866 (no. 1279). By 1872 the Glasgow firm of Carson & Warren was operating four tank furnaces and John Carrington was operating eight through various partnerships in the South Lancashire district.

14. See note 6.

15. T.C. Barker, "The Glass Industry" in The Development of British Industry and Foreign Competition 1875-1915, ed. D.H. Aldcroft (1968), Chapter 10, pp 307-326.

16. Reprinted In A History of the Trade and Manufactures of the Tyne, Wear and Tees, ed. R. Welford (Newcastle 1863), p.181.

17. SDE, 12 November 1885.

18. The Gateshead Observer, 11 May 1850

19. SDE, 18 November 1885. Much of this editorial was taken up with an attack on Mr. S.P. Austin, The Tory candidate in the forthcoming election and a bottle manufacturer, who had been dallying with protectionist arguments. The paper (which was owned by the Liberal candidate Alderman Storey) challenged Austin to declare his true views on free trade.

20. SDE, 21 April 1886. This was prompted by a report that Sunderland bottle makers had refused to manufacture a new, improved beer bottle developed in Sweden on the grounds that the old Sunderland bottle was stronger and more reliable. As a result, it was reported, several Swedish bottle makers had been imported into Sunderland to manufacture them but this was later (29 April) denied by the bottle makers.

21. Both quotes are taken from The Free Trader, 7 July 1905, p.55.

22. 4th Report of the Children's Employment Commission, 1865 (8357) XX. Minutes of Evidence. The two following paragraphs are based on this source.

23. Newcastle Daily Chronicle, 21 October 1882.

24. The secretary of the Yorkshire Bottle workers' Association, Alfred Greenwood, described in detail the hazards of working at a tank furnace - which he likened to Dante's Inferno - to the Royal Commission on Labour. See note 27, questions 29,928 - 39.

25. SDE, 3 May 1879.

26. The Glass Bottle Makers' Association, North of England District: Report (Sunderland 1891) pp.20 - 47, Report of the Correspondence and Conference with the Employers on the Question of Shorter Hours and an Advance in Wages.

27. Royal Commission on Labour, 1893-4 XXXIV. Minutes of Evidence, Vol.3, Group C. Q.30,058.

28. Ibid., Q.30,165-8 p.388.

29. SDE, 28 October 1893.

30. NDC, 18 August 1882, letter from W. Hall the foreman of the Londonderry Bottle Works.

31. See comments in the SDE, 18 November 1885, 21 April 1886 and 11 January 1888.

32. SDE, 22 November 1879.

33. SDE, 17 September 1885.

34. NDC, 22 June 1886.

35. SDE, 2 April 1891.

Notes to pages 472 to 479 .

36. TWRO, 741/1, Sunderland Chamber of Commerce, minutes, 29 January 1897.

37. Royal Commission on Labour, 1893-4, Vol 33, Appendix LXXX1.

38. Figures taken from the bottlemakers' quarterly report.

39. SDE, 18 August 1884.

40. NDC, 22 June 1886.

41. Royal Commission on Labour, 1893-4, Vol. 33, qs. 30,289-90.

42. See SDE 3 January 1884, 3 January 1885, Also 7 May 1894 for a report of the opening of the Candlish Memorial Hall built by subscriptions from the workforce.

43. SDE, 19 August 1885.

44. Report of the Tariff Commission, Vol. V1 (1907), witness no 284.

Chapter Seven: the flat glass industry

1. See C. Tomlinson (ed.), Cyclopaedia of Useful Arts and Manufactures (1866), Volume 1, p.777-8. "At the Exhibition of 1851, plates of enormous dimensions were exhibited, but in quality they were not equal to the French .... The excellence of the plate glass of St. Gobain is said to be due to the fact that it is a true chemical compound, consisting of one atom of the trisilicate of soda and one atom of the trisilicate of lime, with a small percentage of alumina. The English plate glass, on the contrary, consists of a mixture of two glasses of different densities.". Tomlinson went on to point out that the difference in quality was in part due to the uses to which the glass was put. The French never used plate glass for glazing whereas a very large portion of the English plate glass was used for glazing and it was this fact that prevented the English manufacturers from adopting the French mixture; the French glass attracted moisture from the atmosphere and thus would have decayed if exposed to the weather for any period. The difference in quality between English and French glass was still apparent later in the century; according toJ.V. Gregory, writing to John Bowes in November 1880 (DRO Strathmore/173), "it is generally understood that no English made plate glass is equal in whiteness of colour to the French.

2. According to George B. Hodgson, The Borough of South Shields (Newcastle 1903), p.365, in March 1858 the six plate glass firms in England came together in a syndicate called "The Imperial Glass Company Ltd." with a capital of one million pounds and R.W. Swinburne as the Managing Director. No trace of such a company can be found in the registers of limited liability companies, nor is there any trace of the "London, Birmingham and Newcastle Plate Glass Company" under which the Newcastle works is listed in the 1857 and 1858 directories. It seems probable therefore that the association of the companies was a more informal one, similar to a manufacturers' association. R.W. Swinburne was certainly the head of the Plate Glass Manufacturers' Association in 1862 when he was presented with a piece of silver plate at a meeting in Birmingham in recognition of his services to the association.

3. DRO Strathmore/161, William Hutt to John Bowes, 21 January 1843.

4. DRO Strathmore/160, William Hutt to John Bowes, 20 September 1844.

5. The Report of the Committee of Investigation of the Affairs of the Brandling Junction Railway Company (Newcastle 1843), pp 15 - 19,24. Appendices 27 - 81

6. DRO Strathmore/155, William Hutt to John Bowes, 9 December 1843, Also see letters of 10,18 and 31 January 1844.

7. DRO Strathmore/160, William Hutt to John Bowes, 19 December 1844.

8. Northumberland County Record Office, ZCK/8.

9. Gateshead Observer, 27 April 1850.

10. Newcastle Courant, 1 August 1851, quotes an article about Swinburne's exhibits in the Westminster Review. The writer of the article enthused about the possible uses of Swinburne's ornamental glass as a building

material or for making doors and furniture; the use of this "artificial marble would, he claimed, create an age of Aladdin's palaces. Speculation about the extended use of glass was typical of the period that followed the repeal of the glass duties; besides glass furniture and buildings, there was talk of glass paving stones, window sills, water pipes, railway sleepers and printing cylinders.

11. Newcastle Daily Chronicle, 8 August 1868.

12. Newcastle Courant, 15 May, 1859. In September Swinburne attempted to sell part of Cookson's Quay plus part of the fire damaged crown glass houses to the Town Council to be made into municipal wash houses. His price for the property was £43,000 which was immediately refused.

13. The Shields Gazette, 22 July 1868.

14. D RO/151, C.M. Palmer to William Hutt, 27 January 1876.

15. DRO NCB/1/D/4 no. 3, Abstract of land belonging to the Tyne Plate Glass Company, Swinburne left the north-east two years later in 1874, to become the managing director of the Thames Plate Glass Company (1874) Ltd. which was formed to take over the Thames Plate Glass Works at Blackwell. The new company began with a nominal capital of £100,000 (see PRO BT 31/1934 no. 8021) but was not successful and was voluntarily wound up in August 1876. R.W. Swinburne died in April 1886 at Hawkshurst in Kent.

16. University of Durham, Department of Paleography, BRA 1069 contains deeds between Palmer and Pascoe dissolving the partnership and indemnifying Pascoe for the works' debts.

17. E.R. Jones, Heroes of Industry (Newcastle 1886), p.235.

18. DRO Strathmore/151, C.M. Palmer to William Hutt, 27 January 1876.

19. DRO NCB/1/D/4 no. 3, Abstract of land belonging to the Tyne Plate Glass Company. This contains details of all transactions relating to the land from 1760 to 1896.

20. DRO Strathmore/151, C.M. Palmer to John Bowes, 13 September 1876. In this letter Palmer admits that the works was losing money and was causing him great anxiety. He had considered abandoning it altogether but, on the advice of R.P. Philipson who had insisted that the only course was that "the concern must be carried through", had decided to persevere with it.

21. D.RO Strathmore/160, Report on Supplementary Accounts, 13 September 1879.

22. DRO. Strathmore/151, Woods & Company to John Bowes, 20 November 1878.

23. DRO Strathmore/173, J.V. Gregory to John Bowes, 16 May 1879.

24. DRO Strathmore/173, J.V. Gregory to John Bowes, 17 May 1879, also see letter of 22 May.

25. Palmer was expressing his dissatisfaction with Warden as early as 1875 when he told Bowes that Warden had "sadly misled" him about his capabilities. In 1876 he sent his son Alfred Molyneaux to the glass

works to assist Warden in the management but Warden so irritated Alfred that, according to Palmer, "Alfred begs me to give him something else to do". Palmer continued to complain about Warden and in 1879 attempted to replace him with "a gentleman practically acquainted with plate glass making in England and the continent".

26. DRO Strathmore/160, Report on Supplementary Accounts, 13 September, 1879.

27. Quoted in C.E. Mountford, The History of John Bowes and Partners up to 1914, M.A. thesis, Durham University, 1957, p.148.

28. DRO. Strathmore/173, William Hutt to John Bowes, 25 August 1880, Also see letter of 21 July 1880 in which Hutt argues that John Bowes & Partners would have withstood the depression well without Palmer's glass speculation.

29. DRO Strathmore/173, J.V. Gregory to John Bowes, 16 November 1880.

30. DRO Strathmore/173, C.M. Palmer to John Bowes, 30 May 1881. Also see letter of 27 May 1881 in which Palmer pleads his case at length. He takes particular care to remind Bowes of the value of the glass works' consumption of small coal,"latterly much has been (sic) the small coal from the steam collieries which were almost unsaleable and were in danger of being all burnt at the pit head ".

31. DRO Strathmore/173, C.M. Palmer to John Bowes, 7 July 1881.

32. DRO Strathmore/173, J.V. Gregory to John Bowes, 15 September 1881.

33. DRO Strathmore/173, Report to Partners concerning the Tyne Plate Glass Company, 27 October 1881.

34. DRO Strathmore/152, J.V. Gregory to John Bowes, 26 January 1882.

35. DRO Strathmore/173, J.V. Gregroy to John Bowes, 23 June 1880.

36. DRO Strathmore/173, C.M. Palmer to John Bowes, 17 August 1885, also 22 September.

37. PRO BT 31/386 no. 22913. All the following information about the incorporated company comes from this source.

38. Tyne and Wear Archives, accession no. 1211/1. This source contains all the correspondence from Palmer to Pilkington on the subject of amalgamation.

39. Quoted in T.C. Barker The Glassmakers (1977), p.159.

40. The Sunderland Daily Echo, 29 September 1891.

41. PRO BT 31/5156 no. 34834. The South Durham Glass Company was incorporated on 21 September with a nominal capital of £10,000. Its managing Director was William Moor of Sunderland, an engineer, who may have been previously connected with the Wearmouth crown and sheet works. The works closed in April 1893 and Moor's quote is from a letter written to the Registrar of Joint Stock Companys explaining the closure.

Notes to Pages505 to 515 .

42. All the following information about Pilkingtons and Chances comes from chapters 7,8 and 9 of T.C. Barker The Glassmakers (1977).

43. The Sunderland Daily Echo, 12 July 1875.

44. W.G. Armstrong (ed.) The Industrial Resources of the Tyne, Wear and Tees (1864) p. 209. The section on glass written by R.W. Swinburne contains an appendix describing the manufacture of Hartley's rolled plate glass. Swinburne contrasted it with the method of manufacture of polished plate and attributed rolled plate's comparative economy of manufactured to two points; firstly the use of a large crucible instead of a number of smaller ones, and secondly the fact that the plates were made small enough to be stacked vertically in the annealing kiln instead of being laid horizontally.

45. J. Gwilt, An Encyclopadia of Architecture (1891), p.547.

46. The Shields Gazette , 29 April 1874.

47. See H. Pelling, 'The Knights of Labour in Britain, 1880-1901', Economic History Review Vol. 1X no. 2 (December 1956), 313-331 for the background to the Knights approach to the Sunderland glassworkers.

48. The account of the 1875 strike istaken entirely from reports and letters in the Sunderland Daily Echo, see in particular, 15 June 8,9 July, 12,14,28 August, 6,27 November.

49. The Sunderland Daily Echo, 12 August, 1875.

50. PRO BT 31/2138 no. 9840. The Wearmouth Crown Glass Company Ltd. was incorporated on 9 September 1875 with a nominal capital of £30,000. The original shareholders were all local men, Joseph Fawcett, Thomas Gibson, Richard Lewis (all ship owners), William Moore (gentleman), J.W. Matteson, T.G. Matteson (both glass manufacturers and the existing owners of the works). They were soon joined by Robert Preston, a slate merchant. The company was wound up on 22 August 1881.

51. The Sunderland Daily Echo,24 April 1884 contains an account of the circumstances leading to the various legal cases between Preston and his workmen.

52. The Sunderland Daily Echo, 20 May 1884.

53. The account of the 1884 strike comes entirely from reports and letters in the Sunderland Daily Echo; see in particular 14 August, 11, 12, 13 September, 4,8,16,18 October.

54. The labourers struck from 30 June to 5 July 1889 on a demand of an extra 2s per week but resumed work on their original rates with the promise that their grievances would be looked into.

55. The Sunderland Daily Echo, 21 November 1885 contains a letter from Joseph French, a glass cutter and a prominent member of the Knights of Labour, accusing Pilkingtons of dismissing any man who belonged to their union, and of employing a "Bible Reader" who would come and visit the men in their homes in order to spy on them for the employers. Pelling (see note 46) also quotes a letter from James Brown, the

secretary of the union at Sunderland, in which he attributes the Knights' lack of success at Pilkingtons in part to "the Tyrannical disposition of the capitalist".

56. For the 1891 strike see the Sunderland Daily Echo, 2 February, 2 March, 11, 17, 18 July, 23 September, 5, 26 October.

57. The prospectus was printed in the Sunderland Daily Echo, 9 November 1892.

58. PRO BT 31/15264 no. 37461, the original shareholders and directors were John Barwick, James Marr, Arthur Robson, J. Sanderson (all ship owners), Benjamin Noble (a bank manager), W. Mills Roche (a solicitor), and J. Weidner (a merchant).

59. The Sunderland Daily Echo, 1 and 2 October 1894. The company was not wound up until 1904 by which time the major shareholder was Arthur John Dorman the Middlesborough steel manufacturer.

60. T.C. Barker, The Glassmakers (1977), pp. 160-161.

61. PRO DURH 27/132, Hartley v Hartley, 1894.

62. Barker (1977) pp. 142-4 mentions a prospectus drawn up in 1879 for floating the business as a public company. No trace of this scheme can be found in any of the Sunderland sources so it presumably was abandoned prematurely.

63. The Sunderland Daily Echo,11 November 1879, 17 October 1883, 13 December 1884, 5 December 1887 and 17 November 1893 provides all the known information about the Pallion plate glass works.

64. PRO BT 31/3168 no. 18370 is the source of all the following information.

1. Report of the Tariff Commission (1907), Vol. VI, evidence of J.J. Candlish, witness no. 284. The two following quotes are taken from Candlish's evidence.

2. W.Brockie, Sunderland Notables (Sunderland, 1894), p.330.

3. Parlt. Papers 1893-4 XXXIV: Royal Commission on Labour; Minutes of evidence given before Group C, Vol. III, p.384. q.30,090.

4. Ibid., p.378, q.29,953. When Alfred Greenwood, the leader of the Yorkshire bottle makers, was asked whether his society included the entire Yorkshire trade, he replied "Yes, but it includes Blaydon on Tyne where there is a factory which works under similar conditions; another factory at Newport in Monmouthshire, South Wales and another small factory in Canning Town, London. We have about 150 men, say, employed at those factories". In 1893 when the Blaydon works came out on strike with the Yorkshire union there were 94 skilled bottlemakers employed there.

5. A trade card in Sunderland Museum lists Alexander & Austin's wholesale products for druggists.

6. Newcastle Courant, 18 September 1868, reported the opening of the new bottle works at Cowpen Quay, Blyth by Messers Davison, the proprietors and the patentee.

7. Sunderland Daily Echo, 16 June 1893, reported the restarting of the Low Fulwell works. Two holes were lit and twenty men and boys were employed; it was hoped that 100 men would eventually be employed but in 1894 (Sunderland Daily Echo, 2 February) Henry went bankrupt.

8. Sunderland Daily Echo, 8 February 1879 and 1 April 1879 when it was reported that Fenwicks had received a large order for this type of bottle.

9. F. Gosman, Past Events: an everyday register of events .... which occurred during the year 1880 (Newcastle, 1881), p.85-6, 20 July 1880, described the commencement of the new practice of bottling wine in bond by Messers Anderson & Son of Newcastle who had been instrumental in bringing about the change; the change had occurred during the previous year by means of an excise order but it was not confirmed by Act of Parliament until 1880.

10. Newcastle Daily Chronicle, 19 August 1882, letter from W. Hall, a bottle maker of Seaham Harbour who described how the turned bottles were hard and slow to make but were accepted by the men because they realised it was an effective way of competing with the foreigner.

11. Parlt. Papers 1893-4, XXXIV: Royal Commission on Labour; minutes of evidence given before Group C, Vol. III, p.391, q.30,238.

12. Glass Bottle Makers' Association, North of England District: Report, December 1890 to June 1891 (Sunderland, 1891), pp.26-33, An Abstract Report of the Conference held April 25th, 1891, at the Fawcett Street Cafe between the Employers and a Deputation of the North of England Glass Bottle Makers' Society.

13. Newcastle Courant, 4 February 1859. The works was described as consisting of two cones capable of producing 200,000 dozen bottles a year, and with an extensive river frontage which made the works well able to be adapted to a timber yard or any other trade requiring shipping facilities. Until 1859 the works had been occupied by Robert Todd.

14. The Bill Quay Works was advertised to let in 1848 (Newcastle Courant, 23 April) at which time it consisted of two large bottle houses and one flint glass house. The flint glass apparatus was bought by James Angus and the works continued as a bottle works under James Richards and, from c. 1855, Mary Richards. Dobeson and Warren occupied it briefly c. 1861 - 1862.

15. Newcastle Daily Chronicle, 27 February 1883. Also see April 23 for a description of the demolition of the three cones; the largest weighed 400 tons and contained 130,000 bricks.

16. The Pottery Gazette, October 1888, p.915 reported that Newcastle Corporation had recently purchased "the howling wilderness at St. Peter's known as Alderman Thomas Ridley's bottle works where bottles ceased to be made eight or nine years ago".

17. Glass Bottle Makers' Association, North of England District; Report December 1881 to December 1883 (Sunderland, 1884), report of a meeting held on 16 April, 1883.

18. Tyne and Wear Archives, accession no. 412, papers concerning St. Lawrence bottle works.

19. In the Londonderry papers (Durham County Record Office, D/Lo/E/194) there is an unexecuted lease dated 1857 between Lord Londonderry and A. Thatcher of Hemel Hempstead, glass bottle manufacturer for the Durham Bottle Company, for land at Seaham Habour on which to erect a glass bottle manufactory. Nothing further is known of this attempt to erect a second bottle works at Seaham Harbour; Candlish's bottle works were by this time in operation.

20. Parlt. Papers 1865, XX: Fourth Report of the Children's Employment Commission, evidence of John Scott of the Ayres Quay Bottle Works,p.246.

21. The two cones above the bridge were demolished in 1879 to make way for the new railway bridge across the Wear.

22. Sunderland Daily Echo, 13 September 1884.

23. Edward Meigh, The development of the automatic glass bottle machine. A story of some pioneers (The Glass Manufacturers' Federation, 1960), p. 10 contains a brief resumé of Alexander's career.

24. Sunderland Daily Echo, 4 November 1875. Also see 31 May 1879 when it was reported that the Diamond Hall bottle works "long out of use" were rumoured to be about to be converted to a plate glass works.

25. Sunderland Daily Echo, 17 February 1888 reported that the Phoenix glass company were ready to commence work at the Hendon glass works in Commercial Rd; this was the works vacated by the Hendon plate glass company in 1885. The Phoenix glass company appears to have survived until c. 1905.

26. See note 2 for a work which provides a good account of Candlish's life (pp. 321-333) Also see T. Fordyce, Local Records (Newcastle,1876), Vol.II, p.295 for an obituary of Candlish. Candlish's business career included a great variety of ventures; after being apprenticed to a draper he became a commercial traveller, a draper, a newspaper proprietor, a ship broker, secretary to the Sunderland Gas Company and, eventually, a bottle manufacturer. In later life he was said to have lost considerable sums in further speculative ventures, notably an iron ship building company based at Middlesborough and a colliery owning firm.

27. Durham County Record Office, D/Lo/E/193, Abstract of John Candlish's lease, 1855. Also see D/Lo/B/346 no. 7 for a copy of the renegotiated 1863 lease.

28. The letter heading of the Londonderry Bottle Works included a royal coat of arms and the claim that they were manufacturers by appointment to Her Majesty's government.

30. Sunderland Herald, 11 April 1856, letter from John Candlish. Another indication of the real earnings of bottle makers comes from the same paper which, on 11 July, reported the case of a bottle maker at Featherstonhaughs who had been charged with refusing to maintain his ninety-five year old mother. It was said in evidence against him that he earned a basic rate of 24 shillings a week and, besides his allowance of £5 per year for rent, could earn 15 shillings a week more for overwork.

31. Newcastle Daily Chronicle,21 December 1883, letter from John Scott.

32. Board of Trade, Labour Statistics: Statistical tables and report on trade unions (fourth report, 1891), p.454,lists this society as a dissolved society (with 335 members in 1877, 437 in 1878, 440 in 1879) which was dissolved in 1879 and reestablished as the North of England Bottlemakers' Society.

33. The account of the 1856 strike is based on reports in the Sunderland Herald, April 4, 11,25 and March 28.

34. This paragraph is based on a letter from William Hall, a Seaham Harbour bottlemaker, in the Newcastle Daily Chronicle, 19 August 1882.

35. Sunderland Daily Echo, 19th August 1885.

36. This account of the 1882-3 strike is based on letters and articles in the Newcastle Daily Chronicle, see in particular August 12 -22; September 28, 31; November 1,3,7,9; December 1,5,15,16,21,22: January 6,23; February 6. Plus Glass Bottle Makers' Association, North of England District, Report, December 1881 to December 1883 (Sunderland,1884), which also contains all the following information about the immediate aftermath of the strike.

38. Sunderland Daily Echo, 3 January 1884.

39. Glass Bottle Makers' Association, North of England District: Report January 1884 to June 1884 (Sunderland 1884), report of meeting held on 24 May.

40. Sunderland Daily Echo, 20 August 1885 reported that an arrangement had been made which had enabled the Company to secure a contract which would keep five of their houses in full employment. On 21 September it reported that the men had agreed to an increase in the basic numbers - from 62 to 70 dozen for quart bottles, and 70 to 76 dozen for smaller bottles. On 8 October it was reported that the men had agreed to a reduction of 7½d per gross off overwork rates; and on 16 October, that they had agreed to a reduction in the basic wage.

41. The only information about this attempt at amalgamation comes from a speech made in Sunderland at a bottle makers' conference by Alfred Greenwood (see Sunderland Daily Echo, 18 May 1891). Greenwood spoke of five abortive attempts at amalgamation since 1850 and attributed their failure to the ignorance of the bottle makers.

42. See note 32.

43. All the following information comes from An Abstract Report of the Three Conferences, held at Neilson's Temperance and Commercial Hotel, Glasgow, of the Amalgamated Glass Bottle Makers' Trade Association (Sunderland, Tweedie & Gibbs, 1885).

44. Sunderland Daily Echo, 12 February 1891 contains an account of Good's trial.

45. Letter from the Ayres Quay Bottle Company to Paul Heptinstall, 10 April 1891, quoted in Glass Bottle Makers' Association, North of England District Report December 1890 - June 1891 (Sunderland, 1891), pp.20-47, report of the correspondance and conferences with the employers on the question of shorter hours and advance of wages.

46. Sunderland Daily Echo, 19 Fabruary 1887. This comment was made at a tea and entertainment held at the Southwick works to celebrate the marriage of the manager, Robert Parks. On the same occasion George Alexander spoke of how greatly encouraged he was by the existence of the "triple union for mutual benefit" between the directors, the managers and the men.

47. Sunderland Daily Echo, 20 December 1887. This small item on the revival of the bottle trade also drew attention to the large quantity of bottles shipped to Jersey during the last year and the erection of a third continuous tank at Ayres Quay.

48. Sunderland Daily Echo, 3 March 1888.

49. North of England Glass Bottle Makers' Society: Report (Sunderland, 1916).

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Chapter nine: the flint glass industry

1. Figures taken from The Flint Glass Makers' Magazine and, for pressed glass from Board of Trade Labour Statistics:figures for the period 1872-92 are not available.

2. The common ground between the blown flint glass makers producing jam jars and the Yorkshire pale bottle makers was formally recognized in February 1892 when proposals for a federation of flint bottle makers, and Yorkshire bottle makers was approved by both sides. See The Flint Glass Makers' Magazine No. 18, Vol. 5, February 1892.

3. J. Collingwood Bruce, A Handbook to Newcastle upon Tyne (1863), pp 259-260.

4. PP 1865 (3458) Vol. XX. Fourth Report of the Children's Employment Commission; *evidence of witnesses*, p.239.

5. McDermott's Albion Glass House and Robert Gray's house were both in Pipewellgate, David Martin's house was at New Chatham, the Ferrys' Hillgate Glass Works was at Bank Road, Henry Hudson's Falcon Glass Works was in Oakwellgate. Selby & Johnson's house was at New Mills near Fenham Barracks, Swanston occupied one of the old St. Lawrence works, the Wright brothers erected the Newcastle Flint Glass Works in Forth Street and also occupied for a time a smaller house at Oakes Place.

6. Chance's evidence to the French inquiry of 1861 into the treaty of Commerce with England, quoted in A. Sauzay, Marvels of Glassmaking in All Ages (1870), p.34. Chance estimated that there were 80 flint glass firms in Great Britain at the time, comprising 120 furnaces and producing flint glass to the annual value of £1,600,000.

7. R. Welford (ed.), A History of the Trade and Manufactures of the Tyne, Wear and Tees (Newcastle 1863), p.181. The "respectable flint glass maker" Swinburne quotes was almost certainly Joseph Dodds who said more or less the same thing in his evidence to the Children's Employment Commission of 1865. William Ferry's evidence to the Commission also highlighted the problem of drunkeness among workmen.

8. See G. Lushington, "An account of the strike of the flint glass makers in 1858-9", pp 105-114 of Trades Societies and Strikes: Report of the Committee on Trade Societies appointed by the National Association for the Promotion of Social Sciences (1860). The strike had begun in Stourbridge but had been made general in November 1858; delegates from Newcastle had attended the meetings of the United Flint Glass Makers Society which had been founded in 1844 as a national union with its head quarters at Stourbridge.

9. PP 1865 (3458) Vol. XX, evidence of witnesses p. 241.

10. All these firms advertised themselves as manufacturers of either flint and green bottles or druggists' and perfumery bottles. Robert Gray survived until 1882, the Ferrys until 1877 when their works was taken over by the Kendal brothers who went out of business a year later. The Hope Street glass works was occupied from c.1870 to c.1900 by Candlish & Young, T.L. Turnbull, Smith & Robson and T.L. Johnson. Joseph Thomas sold his glass works in 1878.

11. PRO BT 31/31755/12972. The original subscribers were Thomas and John Liddle (glass manufacturers), John Stephenson Henzell (grocer), Joseph Nicholson (glass manufacturer) George Nicholson (agent), William Millburn Henzell (grocer and tea dealer).

12. PRO BT 31/2842/15625. The original subscribers were George Nicholson (glass manufacturer), F.J. Ellison, H.J. Vasey (merchants), William Henzell, R.B. Preston of Stockton, William Bryers (agents), William Bunting (accountant).

13. SDE, 14 June 1893. The works was completely destroyed and 15 - 20 hands thrown out of work.

14. PRO BT 31/3455/20894. The subscribers were Duncan Park, John Taylor Todd (glass manufacturers), G.W. Bain (agent), Robert Davison (tea dealer), James Armitage (builder), Thomas Armstrong (builder), Nicholas Coxon (butcher). Park and Todd had previously been partners in Cassidy Park & Co. who had manufactured light fittings at the Blackwell glass works at South Shore, Gateshead, until 1872.

15. SDE, 16 & 17 February 1887.

16. Report of the Tariff Commission (1907), Vol. VI, section III, witness no. 282. All the following quotes from Adam Dodds come from this source.

17. S. Timmins (ed.) The Resources, Products and Industrial History of Birmingham and the Midland Hardware District (1866), pp. 528-9.

18. The Pressed Glass Makers' Friendly Society of Great Britain: Quarterly Report, no. 66, 28 February 1891, p.4. The following quote comes from no. 63, 31 May 1890, p.5. (This source known henceforth as PGMFS of GB.)

19. Op. cit., no. 71, 28 May 1892, p.4. The inventor was H.H. Pitt.

20. Op. cit., no. 66, 28 February 1891, p. 1 reports the annoyance of both the men and the other employers at Sowerbys' action.

21. Sowerby is said to have opened the factory at the beginning of 1896 and closed it in 1897 following severe damage done by gales. Nothing further has been discovered about the Belgian factory.

22. Op. cit., no. 60 31 August 1889.

23. Op. cit., no. 41, 29 November 1884.

24. Op. cit., no. 56, 25 August 1888.

25. Op. cit., no. 61, 30 November 1889.

26. Op. cit., no. 67, 30 May 1891, p.1.

27. Board of Trade (Labour Department), Report on Collective Agreements between Employers and Workpeople in the United Kingdom (1910), p. 377. A copy of the 1890 Price Catalogue is in the Webb Collection in the British Library of Political and Economic Science.

28. PGMFS of GB: Rules and Regulations (Sunderland, 1889).

29. PGMFS of GB: Rules and Regulations (Gateshead, 1872).

30. NDC 21,22 March & 4 June 1872. The factories involved in the lock out were Sowerbys, Moores, Carr Hill and Greeners.

31. For strikes or disturbances at Greeners see SDE 3 September 1874, 27 June 1884 and 18 February 1887. For the 1891 strike at Sowerbys see SDE 10 February 1891, plus the Quarterly Report of the union.

32. PGMFS of GB: Quarterly Report, no. 67, 30 May 1891, p.1

33. PP 1865 (3458) Vol. XX. Fourth Report of the Children's Employment Commission; evidence of witnesses, p. 239.

34. NDC 21 October 1882. This article on Sowerby paints a glowing picture of the flourishing state of "the largest pressed glass manufactory in the world", but it must be balanced with the union's quarterly report for November 1882 which reported a growing depression in the trade and the temporary closure of three furnace at the Ellison works; two furnace at Moores and one at Davidsons had also been put out.

35. J. Collingwood Bruce, A Handbook to Newcastle upon Tyne (1863), p.260.

36. John Ruskin, The Stones of Venice (1852), Volume II, Appendix 12.

37. W. Morris, Architecture, Industry and Wealth (1902), p.53.

38. S. Evans, 'Glass manufactures' in R. Mallett (ed.) The Practical Mechanics' Journal: Scientific Record of the late Exhibition of 1862 (1862) pp.407-8

39. The Pottery Gazette, March 1896. Also see November 1877 for an enthusiastic response to Sowerby's vitro-porcelain.

40. The article of October 1882 (see note 34) included a lot of information on the composition of Sowerby's coloured glasses: opal glass was manufactured using cryolite spar from Iceland, golden glass used calcined oats, ivory glass was manufactured from a metal containing china clay and uranium, oxide of cobalt and zaffre was also employed for the blue and purplish hues.

41. Throughout the 1880s the firm was constantly threatening prosecutions for infringements of their design patents. The firm's trade mark which appeared on most of their pressed goods was a peacock's head but it was said that foreign firms even copyed the trademark.

42. Elizabeth Aslin, The Aesthetic Movement (1981) p. 163, plate 99, also see p. 164 and plates 80, 81 for Sowerby's glass. Also see Marc Girouard, Sweetness and Light; the Queen Anne Movement, 1860 - 1900 (1977), pp. 150-1, plates 143, 212 for further comment on Sowerby's illustrated books.

43. N. Pevsner and A. Richmond, The Buildings of England: Northumberland (1957), p. 255.

44. Tyneside Industries (Historical Publishing Company, 1889), p.171 from which most of the information in this paragraph comes.

45. PRO BT 31/14883/25007. The original subscribers, besides Richard Green, were: H.G. Drummond (draftsman), Thomas Frost Sadler (draftsman), Fraser Aitchison Mein (glass painter), Robert Redford Hymers (lead glazier), George Russell Drummond (book keeper), and James Neville Green (agent).

46. Christ Church in Gateshead contains several windows signed either by J. Eadie Reid or the Gateshead Stained Glass Company. Little of the Company's other work is known, apart from the commissions mentioned in Tyneside Industries, namely the London Law Courts, Mount Stuart for the Marquis of Bute, the Royal and Imperial Hotels in Bournemouth and "important works in Manchester and some abroad".

47. NDC 21 October 1882. Also see the Gateshead Observer, 13 January 1883 for a description of the exhibition of Art Glass in Gateshead

48. The link with Dresser is quite interesting in that in the late 1880s Dresser himself designed a range of glass for the Glasgow manufacturer, James Couper, ... some of which is quite similar in appearance to the few specimens of Sowerby Art Glass that are known.

49. Greener was the son of a Sunderland glass engraver and had previously been employed by both John Sowerby and Joseph Price.

50. In 1922 the firm acquired, from the American firm Cornings Ltd., the sole right to manufacture borosilicate glass, or "Pyrex", in this country, which foresighted move ensured the survival of the works to the present day.

51. The Pottery Gazette, February and March 1896 contains short descriptions of the new works.

52. PRO BT 31/1956/8250. The original subscribers were Samuel and Alexander Neville (glass manufacturers), William Cochrane (mining engineer), Alfred S. Palmer (mining engineer), Hilton Philipson (coal owner), A.A. Potts (wine merchant), James Morrison (iron manufacturer), George Armstrong (Solicitor). By August 1874 the company had over 20 share-holders including various other members of the Cochrane family and Emerson Bainbridge, a colliery owner. The manager was F.J. Cullen.

53. The partnership between W.H. Heppell, Thomas Garbutt and Joseph Simpson Armison was dissolved in March 1872.

54. Durham County Record Office D/Pr/6/1, lease of 1 December 1840.

55. PRO BT 31/13915/122524

56. The following is taken from Claude L. Fraser, Pressed Glass: A short History of George Davidson & Co. Ltd. (Gateshead, 1946). Also see Tyneside Industries (Historical Publishing Company, 1889), p.169.

57. SDE 17 January 1884.

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58. PRO BT 31/2313/11204. The original subscribers were Thomas McDermott and T.R. Dove (glass manufacturers), Joseph Scott (engineer), John Jameson (engineer), John Lucas (fire brick manufacturer), Thomas Arnott (solicitor), William Weightman (Warehouseman), Easton Robson Kirkley (engineer).

59. Tyneside Industries (Historical Publishing Company, 1889), p.159.