The trades of Sheffield as influencing life and health, more particularly file cutters and grinders : read before the National Association for the Promotion of Social Science, October 5th, 1865 / by Dr. J.C. Hall.

THE

TRADES OF SHEFFIELD

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MORE PARTICULARLY

FILE CUTTERS AND GRINDERS.

READ BEFORE THE

National Association for the Promotion of Social Science,

OCTOBER 5th, 1865,

BY

DR. J. C. HALL,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, EDINBURGH.
SENIOR PHYSICIAN TO THE SHEFFIELD PUBLIC HOSPITAL AND DISPENSARY.
AUTHOR OF REMARKS ON THE "PREVENTION AND TREATMENT OF THE SHEFFIELD GRINDERS' DISEASE." "THE PATHOLOGY, DIAGNOSIS, PREVENTION, AND TREATMENT OF CONSUMPTION," &c., &c.

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THE TRADES OF SHEFFIELD.

THE EFFECTS OF CERTAIN SHEFFIELD TRADES ON LIFE AND HEALTH.

May it please you, Mr. President, Ladies, and Gentlemen ;—

In obedience to the request of the Council, I have to address you this morning, on one of the most interesting and important questions that can come before the National Association for the promotion of Social Science, during its visit to Sheffield, viz.—*The Trades carried on in this town, and the effects of these trades on the health and lives of our industrious artisans.* It is a question in which thousands of my fellow-countrymen are concerned ; —a question that addresses itself to every inhabitant of Sheffield ; that is alike momentous to capital and labour—to the wealthy manufacturer and the humblest workman in his employ. Our enquiry will I think be facilitated by first directing your attention to

The Borough of Sheffield and the Manufactures carried on in it.

Sheffield is the principal seat of the cutlery and other hardware manufacture, and the capital of the parish which bears its name. Where now, says the historian of Hallamshire, " is collected a numerous and active population, was anciently a deep solitude, the silence of which was broken only by our rivers pouring their waters in natural cascades through the woodland scenery. Who was the first to raise the axe amongst the forests of Hallamshire, or who first established himself and his family in one of its romantic vallies it is now vain to attempt to recover."—*The Rev. J. Hunter, F.R.S.*

The parish of Sheffield is of considerable extent. It is about ten miles in length ; its average breadth three miles, with an area of rather more than 22,000 acres. At the last census the population was 185,157, being an increase in ten years of 49,874. The present population of Sheffield is more than 200,000. The number of houses at present, I am informed by Mr. Bagshaw, is 43,563, and of these 39,664 are inhabited and 3,900 uninhabited. The last return made to the Town Clerk showed the rateable value of the property in the Borough to be £498,641 7s. 4d.

In the ten years ending 1860, the death rate was 28 in a 1000—in 1863, 34 in a 1000—in 1864, 34 in a 1000, and for the first six months of the present year we find it after the rate of 32 in a 1000, and even ad-

mitting a slight error in this return of the Registrar General, based as it is on our population at the last census, nevertheless the death rate of Sheffield must still strike with alarm everyone who gives the subject his consideration.

Sheffield has very rapidly increased in size and importance; for, in 1615 the population was only 2,207. In 1736 the township of Sheffield consisted of 2,152 houses, with a population of 9,695. Many of our local trades can be carried on with a very small amount of capital, and hence the very large number of what are called little masters. The wages of many of the artisans are also much higher than in other towns. I mention these circumstances as I think we shall presently see that they have an important bearing on the subject under consideration.

The neighbourhood of Sheffield abounds in the three mineral productions which are most important to man—COAL, IRON, and STONE. The iron ore is found in many parts of the district at a depth of from 50 to 60 feet; and although it was unquestionably the raw material which first led the inhabitants of the town of Sheffield to manufactures of iron, these mines are in this our day comparatively of little importance to the staple branches of the trade—steel is what is principally required, and the native iron of the district is not adapted for conversion into steel like the iron of other countries. A large quantity of English iron is doubtless used in Sheffield in the manufacture of cast metal goods; but a hundred furnaces at the least are constantly at work for converting the iron of Sweden and Russia into steel, from which our finest razors, scissors, knives, and files are made.

Below the iron lies the bed of coal, one principal seam of which runs under a portion of the town. The mean depth of the coal is about 120 yards, and the thickness of the bed from 3 to 5 feet. This bed supplies, and has supplied for many years the fuel required by the manufacturers; but the existence of railways of late years has of course extended the sources whence the supply is obtained. Previous to the employment of coke, charcoal was used in the smelting of the iron ore, and doubtless led to the destruction of many of our ancient forests. Evelyn has remarked that, "Nature has thought fit to produce this wasting ore more abundantly in woodlands, than in any other ground, and to enrich our forests to their own destruction."

In the early years of its History the only extensive concerns connected with the trades of Sheffield were the Furnaces and Forges in which the iron was prepared for the Manufacturer, and the beautiful Park of Sheffield, in the midst of which stood the prison which so long held the Scottish Queen, was within the memory of man, dotted with iron-stone pitt-hills. Sheffield did not enjoy in those times that almost entire monopoly which she posseses at the present of that staple article of her manufacture—the Knife. This country had an import trade in knives till the reign of Queen Elizabeth; and in the articles enumerated in the Custom House Books of the reign of Henry VIII. are *Knives of Almayne, Knyves of France and Knyves of Colloyne.* Stowe informs us that in the fifth year of her reign, Queen Elizabeth laid some restrictions on this import trade in order to encourage the London Manufacturers, London being at that time the principal mart for the finer species of Cutlery.—Now, it is notorious that a very large portion of what is sold as fine London

Cutlery in the metropolis,—both scissors, knives and razors—are

"Sheffield made,
Both haft and blade."

The town of Sheffield is supplied with water by a company, the principal reservoirs of which are placed at an elevation of 1,200 feet above the level of the sea, and are filled from springs, and from the surface drainage of the land. The quantity of rain water at such an elevation is as a matter of course at all times considerable. The water is brought along an open stone conduit to the other reservoirs of the company, which are placed about a mile from the town, and they are placed at an elevation of 460 feet above the lower streets; so that the water which is conveyed in iron pipes to the town, can be easily taken to the upper rooms of the house of any inhabitant who may require it.

The water is very pure. An imperial gallon does not contain more than 4 grains of mineral and organic matter. About a grain of these is in a state of suspension, and can easily be separated by filtration; and about 3 grains of saline, earthy, and organic matter are held in solution. The taste is agreeable, and few towns have more pure and better water than Sheffield.

The supply of all the necessaries of life is abundant and generally reasonable in price. Milk is brought into the town by the small Derbyshire farmers around Sheffield.

Homes in which the Artisans Reside.

Having taken a general and rapid survey of the town of Sheffield, it may be well to direct attention to the homes of its artisans. Most of them have a house of their own, and those who live in the suburbs have frequently a garden. In times of good trade it is not usual to find two families under the same roof, and I do not think we have an inhabited cellar in the whole town. The average number of inmates to each house is rather more than five, and many of these dwellings either front the street or open into moderately sized yards. At certain periods, however, numerous houses are returned as uninhabited. This is easily accounted for. When trade is good, there is a great demand for cottage houses, and speculators are induced to run them up as slightly and rapidly as possible, in the hope of obtaining for a time at least an enormous per centage; hence when trade becomes bad, a reaction takes place, and the speculative builders who have paid but little attention to what are really the legitimate wants of a population, find to their cost, that the cottage accommodation that has been created is far beyond what is required. The recent adoption of the "Local Government Act" by the Corporation of Sheffield will have a most beneficial effect so far as the erection of houses for our artisans is concerned. There is probably less of the confined alley and narrow *cul-de-sac* in Sheffield than in many other manufacturing towns. A good deal has been done of late years to the sewers and surface drains of the town, but still much requires to be done, to improve the sanitary condition of the inhabitants. The working classes appear but little aware that they have a duty to perform as well as the authorities; and that all measures for effecting improvements in the drainage of the streets, the supply of water, and in ventilation, may be rendered nearly inoperative, for removing the causes which increase the bills of mortality and seriously affect the health of towns—those causes which

add to the burdens of the rate-payers by producing widowhood and orphanage, arising from preventible diseases, and preventible deaths. I say, do what the authorities may, their efforts will be far from successful if a nidus of morbific effluvia be permitted to remain in almost every part of the confined courts in which the houses of some of our artisans are placed, and who on opening their windows with the forlorn hope of purifying their small habitations with the breezes of summer, get instead a mixture of gases from dunghills, ashpits, and night-soil—or what is even worse, because more insidious, from earth which has become impregnated with organic matter imbibed long before, and which now, though comparatively clean and dry, emits a poisonous vapour.

Manufactures of the Town of Sheffield.

The Manufactures of Sheffield are Cutlery—*Knives, Scissors, Razors, Files, Edge-Tools, Joiners' Tools, Engineers' Tools, Scythes, Sickles, Shears, Saws, Circular Saws, Steel, Railway Springs and Rails, Buffers, Anvils, Vices, Steam Hammers, Boilers, Engines, Stove Grates, Fenders, Fire Irons, Silver, Silver-plated, Britannia Metal Goods, &c., &c., &c.* To which must be added the more recently introduced manufacture of *Armour Plates, Guns, and Steel Shot.*

Effects of the Sheffield Trades on Life and Health.

In considering the effects of the Sheffield Trades on life and health, with a view of showing how their injurious effects may to a very considerable extent be removed, it will be quite impossible for me within reasonable limits to direct attention to all of them. Such for example as ivory and bone cutters, cutlers, hair-seating weavers, &c.* I shall therefore confine my remarks to the manufacture of files and to the Grinding Trades of Sheffield, with a passing allusion to the men employed in the Lead Works of this town, because they suffer from a disease arising from the same poisoning of the system as File Cutters.

The Sheffield Lead Works.

The Lead Works of Sheffield were established in 1758, and now employ about 40 men and 20 women. Although as old as any works in England, no better precautions are taken to preserve the health of the workmen at any of the more modern establishments. Plenty of air and strict cleanliness are deemed of the utmost importance in preventing the attacks of lead poisoning. The latter is enforced as much as possible by the foreman and managers. A pint of ale is allowed daily, and in the event of sickness medical attendance is supplied and sick pay granted to the sufferers. I am indebted to my friend Wm. Baker, Esq., F.C.S., the chemical superintendent of these mills, for the fact that the workmen who have to do with metalic lead only, suffer

* Many years ago, Mr. Thackrah pointed out the effect of arts, trades, and professions on life and longevity. Stone] masons, quarrymen, cotton batters, miners, leather dressers, needle pointers, machine filers, bone scale cutters, ivory cutters and hair seating weavers, suffer more or less from the effects of dust. A singular affection is produced on the men who haft knives with cocoa wood and ebony; the dust from both of which woods causes in some instances constriction of the chest—running from the eyes and nose, and symptoms which resemble those present in hay-asthma. It also produces when the skin is at all tender, a peculiar kind of erythema on the hands, face, and other parts of the body.

very little; nor do the red lead workpeople appear to be so liable to the attacks as those employed in the white lead departments. "These latter often are taken," says Mr. Baker, "in three or four months from the time they first commence working." Some constitutions, however, appear to resist lead poisoning better than others, and men are now working who have been employed at the Sheffield Lead Mills 6, 8, 12, 13, 14, and in two cases, 30 years.

The Manufacture of Files.

The forging, grinding, cutting, and hardening of files forms one of the most important branches of our local trades, and one in which the workmen suffer most severely, at any rate in one part of the manufacture of a file. This is one of the trades which is "*in Union*," and consequently one, the numbers employed in which can more readily be ascertained. At the present time there are engaged in the File Trade:—

Forgers and Cutters	3,500
File Grinders	250
Hardeners	200
Females	300
Boys	1,000
Dressers, Strippers, and Coke Riddlers	300
Managers	200
	5,750

If to this number we add the Manufacturers, and those not connected with the Union, it will be seen that more than 6,000 of the inhabitants of Sheffield and its vicinity are engaged in the manufacture of files. The Filesmiths' Union is one of the most powerful in Sheffield. From 1854 to 1865 it has paid to its members when out of work, £51,044 17s. 2½d. From 1860 to the end of 1864, (five years,) this Union paid for 312 deaths, viz. 297 men and women and 15 boys, £1,156 6s. 0d. The wages of the better class of double-handed forgers will average about 40s. a week; single-handed forgers, 25s. to 30s. a week; cutters of a superior class of work, 30s.; boys, 6s. to 18s.; female cutters, 6s. to 18s. a week; scourers, &c., 9s. to 12s. a week.

Manufacture of a File.

In speaking of the wages of File forgers, single and double-handed forgers were mentioned. Small Files—say all under ten inches are made single-handed: the larger files require a striker who using a very heavy double-headed hammer aids the skilled forger in moulding the steel into the requisite shape. The history of a file is simply this—as a rule horse rasps are forged from bar steel; other files from cast steel. When forged the file is sent to be annealed or softened in a furnace or baking oven, it then goes to the grinder, who placing it upon the wet stone grinds it until he makes it perfectly white and marked only by the grain of the stone. The best smooth files are then stripped and filed from heel to point; in which condition they are sent to the Cutter* who uses a hammer which varies in weight according to

* A file with a thousand cuts on each side is made with a hammer and chisel, the hammer weighing 7½lbs.; it has 300 cuts on the edge, for which a 3lbs hammer is used. A man working 10 hours can cut about 20 such files in a day. Mr. J. E. White has calculated that a man to do this must lift about 140 tons in weight during a day. Files are not cut by the machine in Sheffield; machine-cut files being considered very inferior to files cut by hand.

the size of the file—also a leather stirrup which is for the purpose of holding the file upon an anvil enclosed in a stone stock*

The file while being cut, rests upon a bed of lead, and where many are cutting in the same shop, fine particles of lead dust abound in considerable quantity. In cutting files it is the custom of the men to wet the thumb and finger of the left hand by putting them to the mouth and so moistening them with their saliva. At every shifting, and when the file has to be turned, the lead is handled and thus in a variety of ways it is absorbed into the system. The next process the file undergoes is hardening, and were it not for the practice of some Houses of hardening files in lead it would not be necessary for my present purpose further to describe the manufacture of a file. I say the practice of some Houses to harden in lead, for out of 200 Firms manufacturing files I find as yet only about 15 that have adopted this system. After the file is cut it has to be hardened.

Hardening Files in a Coke Fire.

If the old process of hardening in a coke fire be adopted the file is brushed over with ale grounds and salt, a covering which protects it from the effects of the coke fire, in which it is thoroughly heated without being burnt; it is then set and straightened either with a hammer of wood or of lead. It is then dipped into salt and water, and afterwards taken out and "strained" by the hardener to the requisite form. The files are then scoured with water and fine sand and plunged into lime water, which imparts that peculiar grey colour which renders the Sheffield Files as beautiful to look at, as they are confessedly valuable to use. The *Tang* of the file is tempered in hot lead, after which the file is brushed, oiled, and wrapped up for market.

Hardening Files in Lead.

The file is covered with a composition of 1 part of wheaten flour, 2 parts of fine charcoal dust, and 3 parts of common salt. A small pan containing the lead, about ten inches in diameter, is surrounded by a coke fire, and stands in the centre of the furnace which presents a surface, more or less heated, of about four feet square. The lead is kept, or perhaps rather ought I to say, should be kept, covered with fine coke dust, or what is better still, with finely ground old steel pots, for this material is found to lie closer than any other to the surface and to prevent what the File Hardeners call waste *i.e.* oxidation of the lead. The metal is kept at a good red heat, but certainly below the temperature at which lead volatilizes.

Diseases of the Sheffield File Cutters.

What is the File Cutters' Disease? Poisoning by lead. I have already stated that the file rests on a bed of lead during the process of cutting, and that fine lead dust may be seen to rise every time the chisel is struck by the hammer. The men have a foolish habit of wetting the finger and thumb with which the chisel is held, by licking them—they frequently eat their meals without washing their hands—

* Those who may wish to understand thoroughly this beautiful process of File Manufacture in all its branches, cannot do better than consult the very able pamphlet of Mr. Henry Turner.

and often take dinner in the work-shop where the files are cut. As though fine lead dust, handling the lead at each shifting, and licking the fingers were not sufficiently poisonous. I saw in one of the file cutters' shops during the last few weeks a man, whose wife had just brought him his dinner, eating it with unwashed hands, and dipping his fingers blackened and covered with fine lead dust into a paper which contained the salt for seasoning his beef. I went this day (Sep. 25, 1865,) to a file shop in which several men were at work, cutting. These men all take their dinners in the shop—they never wash their hands until they get home at night—"sometimes not then." They do not change their clothes when they get home. One man made this statement. "*I have known a thousand file cutters, but I only know one who takes the trouble to wash his hands before he gets his dinner, he works at Cammells'. I never think of washing mine.*" With regard to the symptoms of lead poisoning I need not dwell on them at any length here. Lead as a poison first appears to act on the peripheral nerves of the body, and afterwards, on the nervous centres; its chief manifestations being on the nerves of the intestines, producing colic—and on those of the arms, producing paralysis. I know not why this substance should exert a special influence on these parts. The File Cutters after repeated attacks, have a peculiar dirty-white and sallow appearance; the dropped wrist is common, and the blue line round the teeth arising from the deposition of a sulphuret of lead very marked. The deposit of sulphuret of lead is due either to the sulphur furnished from animal matters received into the tartar on the teeth; or to the sulpho-cyanic acid in the saliva. The lead is from the salt of that metal which has entered the circulation. A boy was admitted into the Sheffield Public Hospital a few weeks ago. He had all the symptoms of lead poisoning exept the blue line; being a file cutter no doubt existed as to the nature of the disease. Iodide of Potassium was given to him, and in a week the blue line appeared. If formed, it is difficult to say when it will disappear. I once had a File Cutter under my care who had suffered in early life from lead colic; *he had not however cut files for eighteen years before I saw him, nor had he been in any way exposed to the influence of lead. The blue line was still present.*

With respect to hardening files in lead producing the File Cutters' disease. The men who work at it say, "that sometimes they feel ill," and they consider it injurious to health. My own experience leads me to say that it most certainly is not nearly so injurious as file-cutting. At the Sheffield Public Hospital and Dispensary, where we have had the last two years, 56,858 in and out patients, and to which the File-smiths' Union annually subscribes £52 10s., to have the privilege of sending the poorer brethren of the trade, when sick, I do not remember to have seen the last ten years, a file hardener suffering from lead colic. I saw one with the blue line, but he had only hardened in lead for a short time, but he had been a cutter previously for many years, and had often been a sufferer from the file-cutters' disease. If this process prove a valuable one, and if it be found not open to the objection urged so strongly against it, "that it makes soft and dumb files," a moment's consideration of the process already described, will convince any one, that with very ordinary precautions, the operation may be rendered quite harmless to the workmen. But unfortunately, it is just those

ordinary precautions which are so frequently omitted through ignorance or carelessness in many departments of life. If the workmen suffer at all from hardening files in lead, how does the lead affect them? Clearly from the fine particles of oxide of lead (dust) which are carried upwards by the current of air rising from so large an extent of heated surface. This takes place more especially when the file is plunged into the pan, and the covering of coke dust and dross of oxide of lead is disturbed. Nothing can be more simple and easy than to place a hood over the pan leading up to an opening in the chimney of the furnace. The current of air would then pass in a direction away from the person of the hardener. Mr. Baker, whose great practical experience as a chemist connected with our lead works, all will admit, was kind enough to visit some of these places with me. He fully confirms my opinion, that the prevalent idea that any vapour containing lead is given off is altogether erroneous. Even supposing any chloride of lead were formed from the salt in the composition used in covering the files, its vapour would be visible, if the temperature were high enough to render it volatile. We saw no such vapour.

Prevention of the File Cutters' Disease.

a. Children should not begin to cut files at so early an age as at present. It tends to make them feeble in body, and deprives them of the possibility of being properly educated.

b. Without the greatest care lead will enter the system through the skin. Common sense will therefore, point out the importance of washing the hands, arms, and face many times a day—of frequently combing and brushing the hair, and of having one set of clothes for the shop and another when out of it. The mouth ought also to be frequently rinsed with water.

c. The meals ought not to be taken in the workshop, and never taken without first washing the hands, arms, face, and lips, and changing the working jacket, or the poison will enter the system with the food.

d. On no account lick the fingers when at work.

e. An orinasal respirator worn when working would keep out much of the fine lead dust, and consequently keep the poison from entering the air passages.

f. The dress should be of coarse linen—a cap of the same material would keep the lead dust from the hair.

g. The working dress and shirt should be put on when entering the shop, and both should be changed for the ordinary dress before going home.

h. On no pretence neglect the use of the hot and cold bath.

i. Attached to every large manufactory where files are cut, there ought to be a large room, supplied with hot and cold water, where the men could wash themselves, and change their dress.

Treatment of the File Cutters' Disease.

The treatment of lead poisoning admits only of the passing remark, that purgatives, an enema, opium, and hot baths are among the most

useful remedies, and that the dropped wrist requires to be supported on a splint; counter irritation and galvanism, will be required. M. Duchenne has pointed out the importance of applying galvanism, not generally to the arm but more especially to the muscles affected; which, in these cases, are most commonly the extensores digitorum, and not the lumbricales nor interossei; hence, why the first phalanges only cannot be extended, whilst when these are supported, the second and third phalanges can be voluntarily raised without difficulty.

I hope most sincerely that thousands of my fellow-townsmen when these remarks are made public by the press, will seriously consider what I have stated, and what I am certain every physician and surgeon of experience will confirm. The means of prevention may be considered too simple, or trifling; but by these, and a free use of soap and water, how much of pain, of sorrow, and of wretchedness to themselves and to their families, might the File Cutters of Sheffield avoid.

The Causes and Prevention of the Sheffield Grinders' Disease.

Grinders are divided into three classes:—1. *Dry Grinders, using only the dry stone.* 2. *Mixed, or those who partly grind on the wet, and partly on the dry stone.* 3. *Wet Grinders.* The Grinder carries on his work in a building called a wheel. The first steam-grinding wheel was erected in 1786, when grinding became a separate branch of trade.

Wheels and Hulls.

At the present time there are about 164 Wheels in and near Sheffield. Of these 132 are steam and 32 water wheels. There are 8 water wheels on the Sheaf, 2 on the Don, 7 on the Porter, 6 on the Loxley, 8 on the Rivelin and 1 at Whirlow.* In each wheel are a number of rooms which vary in size and the number of grindstones they contain. In these the Grinders work. As a general rule wet grinding, and the heavier branches of the trade are carried on down stairs; and the lighter branches in the rooms on the upper stories. There are however many exceptions to this rule, and it is no uncommon circumstance to see wet and dry grinders working in the same room. The heavier branches of grinding include saws, scythes, table knives machine knives, edge tools, files, &c., &c. The lighter branches are spring knives, (pen and pocket knives,) razors, scissors, forks, spindles, needles, &c., &c. Needle grinding is principally carried on at Hathersage, a village some few miles from Sheffield. A considerable number of men are employed in grinding glass.

The rooms in which the grinders work in the various wheels are called "*hulls*," the literal meaning of which is a *stye*. A visit to many of these places would convince you, Sir, and every member of the National Association for the Promotion of Social Science, that a more happy or appropriate appellation could not possibly be selected. In

* This may not, possibly include every wheel—as many old houses have of late years been devoted to this purpose. It is hardly necessary to state that in sanitary and other requisite requirements many of such places are totally unfitted for grinding.

each room are placed a number of "*trows*" (troughs), more or less in proportion to its length. Some rooms will have ten, some not more than two or three. The trough, which is made of cast metal, is received into the floor of the room and contains the water in which the grinding stone revolves. When the stone is run dry, the water is removed from the trough. Each trough has several divisions—one for the stone, one for the glazer, the lap, and the polisher.

The *Glazer* is a wooden wheel, which varies in size from four inches to four feet in diameter: it is covered with leather. This is "dressed" over with glue and emery, and when this application hast set the surface is rubbed with emery-cake, which is a composition of emery, suet, and bees'-wax.

The *Lap* is a wooden tool faced with lead, on which the sides of pen-knives, the sides of razors, and the flat sides of the better finished scissors are rubbed to give them a flat surface. The effect of this will at once be evident to any one who has a first-class Sheffield knife, on comparing the pen with the pocket blade, or a razor with a table knife.

The *Polisher* is placed at the back part of the hull. It is smaller in size than the wooden wheel already described. It is covered with leather, and made to revolve much more slowly than either the grinding stone or the glazer. If it revolved rapidly the blades either of the knives or the razors that were undergoing the process of polishing, would become heated, and the fine temper of the steel destroyed. Although the glazer revolves with no little rapidity the paste with which it is covered prevents this effect. A dry powder, called by the workmen "*crocus*" (an oxide of iron), is used for polishing. Boys, who are apprenticed but too frequently to the lighter branches of the grinding trade at from nine to twelve years of age, are first put to polishing the different articles. *I found a boy at work in a wheel last week, engaged in polishing, aged only seven.* In my visits to wheels, I have frequently met with young boys with coughs, shortness of breath, and lungs extensively diseased, *who have never ground*, but who have been injured by this process of polishing, about which I shall presently have some remarks to make.

The *Drum*. In the back part of each room is a drum or wheel of large dimensions, which is set in motion by the steam-engine, and to it the grinding stones, glazers, and polishers are attached by the "wheel-bands," which are broad leather straps. The connection between the different wheels and the drum can be effected or discontinued in a moment with the utmost facility by putting the bands on or off. Every drum ought to be protected by a rail.

Grinding Stones.—A large portion of the grinding stones are brought from the neighbourhood of Wickersley and Dalton, a few miles from Sheffield. The whitening stones, used for smoothing articles before glazing, are brought from the Brincliffe-edge quarries, about a mile from the town. In grinding a razor both the dry and wet stones are employed. I will therefore, describe the process of making a razor, in order to show the effect this trade has on the health and lives of those employed.

Making a Razor.

The razor is first forged out of a bar of steel. It is then sent whilst in the soft state to the grinder, who shapes it *on the dry stone* into the

required pattern. After the razor has been "*shaped*," it is returned to the forge to be "file cut" and "marked;" the mark stamped upon it is very frequently that of some distant firm, it may be in Glasgow, London, or some other town. The razor next undergoes the process of hardening and tempering, after which it is once more brought to the wheel and ground to an edge on a wet stone. It is then "lapped," on a tool the exact size of the stone on which it has been ground. The back and end of the tang is glazed. The whole blade is then wiped very clean, and highly polished with crocus. It is now sent to the hafter who places it in the scales (*handle*). The razor is then made ready for use by being "set" or sharpened.

In order to find out the exact quantity of steel dust of necessity created in the first process a razor undergoes on the dry stone, Mr. John Wilson, (a very well-educated and most intelligent pen-blade grinder—and for whom I have personally the highest respect,)—in himself a living example of what a grinder ought to be, and what he might be if he would, and who has worked for many years for the celebrated firm of J. Rodgers and Sons, Cutlers to Her Majesty, made, at my request, the following experiment, the result of which is shown in the annexed table.

Table showing the Weight of a Dozen Razors in the different stages of their Manufacture.

Shape of Razor.—Quill Backs.	Weight. lbs.	oz.	*Shape of Razor—Swaged Backs.*	Weight. lbs.	oz.
12 Razor Blades forged in the rough	2	4	12 Razor Blades, forged in the rough	2	0
12 Razor Blades, shaped.....	1	15	12 Razor Blades, shaped	1	15
12 Razor Blades, finished.....	1	10	12 Razor Blades, finished.....	1	8
Loss in shaping 5 ounces per dozen, principally on the dry stone.			Loss in shaping, 6 ounces per dozen (dry.)		
Loss in grinding on the wet stone, 5 ounces per dozen.			Loss in grinding, 2 ounces per doz. (wet).		

In shaping a dozen large razors on a stone seven inches in diameter, the stone would be reduced nearly one inch.

To grind a razor to the proper shape great friction is required; razor backs are for the most part round and the pressure during the shaping is so great that no wet stone could sustain the rolling friction; the stone would soon become uneven like a hammer-stone, and so pulverised, that after shaping four or five blades, the workman would be unable to hold the blade on the stone. *Forks, razors, table knife-bolsters, scissors, shanks, and needles,* undergo the rolling process and consequently, require the dry stone. Spring knives five and twenty years ago were ground on a dry stone.

This process has been superseded, and these knives are now I am happy to say, all ground on the wet stone, which is made to revolve with great rapidity. In shaping razor blades on the dry stone, a number of red hot particles of steel fly about in all directions. From these "*Motes*," as they are called by the grinders, the eyes were at one time constantly injured, and in some instances permanently lost. This danger is now obviated by wearing large spectacles of ordinary window glass. The protection they afford is obvious, for on examination after they have been a short time in use, the glasses are found spotted all over by the sparks of heated steel. But even this precaution is not taken by all—a razor grinder told me only last week, he did not use the "specs" because his eyes were so good.

Dry Grinding, Hanging, and Racing Stones.

It is in dry grinding that the workmen are exposed to by far the greatest danger. The dust which is created by the stone and steel fills the room in considerable quantities, and when grinding scissors or forks two or three deep without a fan, those who sit behind throw a large quantity of dust on those who sit in the front. But it is not only in grinding that dust ascends. Much of the evil resulting from the trade of a grinder, and this remark applies alike to dry and wet grinding, proceeds from "hanging" and "racing" the stones. The stones are received at the wheel from the quarry in a rough state.

The grinder first drills a hole through the centre, and fixing it on the axle places it in the trough. It is then made to revolve slowly in order that the steel which is used in the process of racing may bite.

With this bar of steel the asperities of the stones are removed and their surface rendered level and smooth. During the operation, which frequently lasts half an hour, the rooms are unavoidably filled with dust; the dust also arises in dense clouds when the sides of the "trow" are swept after the process of racing is over. It is easy to protect the nose and mouth with a light handkerchief during this process; but the precaution is seldom taken. On my asking a file grinder at the Union Wheel a week or two ago, when collecting materials for this paper, and who I found racing a stone and covered with dust, why he was thus exposing himself to causes certain to induce a disease that would quickly bring him to a miserable death, he replied, "*we know all about it Doctor, but we never give it a thought.*" Much dust also, arises in glazing and polishing; the amount will depend in some measure on the nature of the glaze used. The glazing of forks is the most injurious. Almost all the grinding stones are now fitted with plates and screws, instead of as formerly, only with wedges: the number of accidents from the breaking of the grinding stones are, at present, much less frequent than when the old plan was in operation. The saw grinders at one time were often very seriously injured from the breaking of the stones when they were at work. The large size of the stones, and the weight and length of many of the saws they have to grind, will easily account for this branch of the trade, being more dangerous from the breaking of the stones, than when the articles are smaller and lighter.

Different Classes of Grinders.

It has been intimated already that grinders may be divided into dry, wet, and mixed. Forks, needles, brace bits, and spindles are ground entirely on the dry stone, and in addition, table knife bolsters, shanks, shaping razors, "humping" scissors, &c., &c., all require the dry stone to be employed. Some trades never use the dry stone: for example, saws, files, sickles, table knife blades, edge tools, scythes, &c., are only ground and glazed. There is also a numerous class of grinders who work for the most part on the wet stone, and who are employed in grinding engineers' tools, engravers' steel plates, hammers, fenders, fire irons, stove grates, busks for stays, candlestick-bottoms, nippers, garden-shears, hoops, &c.

Fork Grinders work on a dry stone, and their calling is perhaps more destructive than any of the grinding trades. The present number of men employed is about 150. Personal inquiries at the various wheels

induce me to conclude the present condition of these men is no better than when a fork grinder told me, some years ago, "I shall be 36 next month, and you know that is getting an old man at our trade;" and when I found the average age of the men only 28. Individual instances may be found of fork grinders much older than this man, but it is nevertheless an undoubted fact that many fork grinders miserably perish before the age of 30. Take for example a boy of *ten*, (and at that early age many of them go into the wheel,) at the age of 21 his expectation of life, supposing he continue to work at his trade without a fan, would certainly not exceed 14 years. Now at 21 the probable expectation of life is 39 years; so we see, that these unfortunate men are exposed to influences which rob them of 25 years of existence—to that extent deprive their wives and families of the benefit of their labour, and fill the union poors'-houses with widows and fatherless children. There is no more melancholy object than a fork grinder, looking prematurely old and dying from the dust inhaled in his trade—no object more deserving of our pity, as we see him often crawling to his hull to labour when altogether unfitted by the grinders' disease for his calling—"his poverty and not his will consents." In this condition, a day or two in a week, he grinds for a few hours; inhales additional dust, and in order to obtain bread, increases the disease which already is rapidly destroying him.

Razor Grinders.—From the statements published a few weeks ago by the Committee of the Razor Grinders' Union, it appears there are 290 workmen employed in grinding razors, and 81 boys under 21.

Ages.	*Persons.*	*Ages.*	*Persons.*
21 to 25	83	50 to 55	9
25 to 30	57	55 to 60	8
30 to 35	36	60 to 65	3
35 to 40	35	65 to 75	1
40 to 45	29		
45 to 50	29		290

The above table may be left without a word of comment, to tell its own tale.

Scissors Grinders.—These men work partly on a wet and partly on a dry stone. The most destructive part of the work of a scissors grinder is when giving the rounded form to the blade, and which is called humping.

There are at the present time about 250 men employed in this calling. Some years ago, I found the average age of all then living to be 32. A few weeks ago I visited 86 scissor grinders when at work in the different hulls. I took down the age of each man at work, and found the average to be only 31 years. I took the same day the average age of 40 razor grinders and found it only 31 years and six months. These men were at work on the dry stone, and a majority of them either had no fan or a fan that was almost useless. Others had a fan, and were working with dry grinders who had no fan. One man with a good fan was humping scissors, but received the dust from a grinder on either side of him who was shaping razors.

File Grinders use only the wet stone. 250 men are at present employed.

Saw grinders employ the wet stone. There are at present 220 men and 60 boys.

Table Blade Grinders are not so numerous as a few years ago. Many have gone to America, and from the low prices obtained few boys have been apprenticed. At present there are 660 men and 170 boys.

**Spring Knives*, 650 men and 200 boys have been returned to me by the Secretary of the Union, as the number at present engaged in this branch of grinding.

Saw Grinders (wet), 220 men, 60 boys.

Scythes (wet), men and boys 60.

Sickles (wet), 72 men, 30 boys.

Edge Tools and Wool Shears, 230 men and boys.

If to these we add the grinders of surgeons' instruments, engineers' tools, jobbing grinders, needle grinders, &c., it will be found that in and out of the different unions there are 3,090 men, and 1,073 boys—total, 4163 men and boys employed in grinding, dry, wet, and mixed. I have tested the accuracy of my former return sufficiently to say that still the average ages of all the fork grinders living does not exceed 29. Scissors grinders, 32 ; edge tool and wool shear grinders, 33 ; table knife grinders, 35. The ages of all the razor grinders have already been given. I regret to be obliged to say that there is but too much truth in the remark once made to me by a young man aged 26, a fork grinder,—"*he reckoned in about two more years at his trade he might begin to think of dropping off the perch*," adding "*you know a fork grinder is an old cock at thirty*." On taking down the ages of all the grinders, wet, mixed, and dry, at one of our largest wheels, I found the average 34; boys under 21 were excluded from this calculation. There can be no difference now ; all the same adverse influences are still in operation, and sickness and premature deaths will continue until the causes producing them are removed. Taking the returns of the ages of the grinders who had died at some of the wheels, from their club books, I found it to be 43, 40, 40, 41, 38½. Taking the deaths at the wheel of the Messrs. J. Rodgers & Sons, for some years past (1850 to 1865, wet and dry grinders,) the average age was 49—of the dry grinders only 43. At the Union Wheel, from 1859 to 1864, the return including both wet and dry grinders, shows the average age at death to be only 46. But even these death rates may mislead us, if we do not remember that both these wheels are *first-class*, and that as a rule it is only the more prudent and better class of grinders who belong to such provident societies.

Men who work in the country, as a rule, are more healthy than those who grind at the wheels in the town ; and as a body they are more temperate. One of the most healthy branches is saw grinding. Many saws are ground at the water wheels on the picturesque streams around Sheffield ; and, as a rule, the men have not to work so many hours a day as at some of the other branches. Again, the trade is too heavy to admit of boys coming into it at a very early age. No boy is recognised by the Saw Grinders' Union under the age of 14. The men

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* When my book was published in 1857, on the Grinders' Disease. I returned 685 men and 600 Boys, under Spring Knife Grinders. Mr. Broomhead the Secretary to the Union informs me that of late years only Grinders' Sons have been allowed to enter the trade, hence the diminution. The same remark will apply to others of the grinding trades.

stand at their work, and consequently the lungs are not so compressed as when the grinder, sitting on his horsing, bends forward for many hours each day, in other branches of the trade about to be described.

The Causes which Produce the Grinders' disease.

The cause of this disease is first, the irritation produced by the metallic and gritty partices inhaled in grinding and also in "hanging" and "racing" the grinding stones; and next, the constrained position in which they labour, and which is unfavourable to the free action of the respiratory organs; to this must be added, the working for many hours in a badly ventilated room. When at work the grinder mounts what he calls his "horsing." This is a low narrow wooden seat. His elbows rest upon his knees, and his head, particularly when employed on very small articles, is bent over the stone. This position is a very injurious one, and when long continued is calculated, unquestionably, to induce pulmonary congestion. In many of the branches—table knife grinding for example, the men often work in the coldest weather very thinly clad—their handkerchiefs off; their shirts open and their chests fully exposed; and this too, in a room every bit of glass from the windows of which has been removed, that the light may not be obstructed by the splashing of the dirty water from the grinding stones. The floors of such hulls are generally of mud, and always wet, dirty and uncomfortable. The men perspire freely at their work and in this condition often leave the hull, and without putting on additional clothing, lounge about the yard in the open air, even when the weather is very cold. Inflammation of the lungs, pleurisy, rheumatic fever, and diseases of the heart are not unfrequent among them. I have seen many young boys suffering from grinders' disease arising from the dust inhaled in polishing; and in dry grinders very often before the age of twenty, evidence is present of the existence of this fearful affection. I had a patient at the Public Hospital last week, a grinder aged 22—on enquiring what was matter with him he said "I grind razors and have got what I shall never get *shut on*" (rid of).

He began to work at 11 and never had used a fan. Both lungs were affected by the grinders' disease, but not nearly to the extent I have seen them, even in younger men than this poor fellow. At the commencement of the disease the breathing is difficult—more particularly when walking up a hill, going up stairs, or ascending the steps leading to the upper hulls in which they work. At this early stage, the shoulders are often elevated, in order to relieve the distress occasioned by shortness of breath. The disease quickly increases; and day by day, makes certain progress in all dry grinders, working without the protection of the fan. The digestive organs become impaired, the breathing is more and more short and oppressed—the face has a dirty white aspect—the countenance is indicative of much suffering—he stops to cough in the street as he crawls to his work—supporting himself against the walls. They all complain of a dry sensation in the throat and tell you "they feel screwed up" and that something is so tight across their chests they cannot breathe. The cough is at first dry but after a time there is a good deal of expectoration which at first is frothy, and indicative of irritation. If asked by my medical friends to give them a brief *resumé* of the physical signs of the Sheffield

Grinders' disease—I would say—those of bronchitis and dilated bronchi in some cases—in others, of emphysema or of consolidation, and, lastly of excavation. I have had several photographs prepared by Mr. Caloe of some sections of the lungs of those who have died from Grinders' disease. Also some drawings of the sputa in wet and dry grinders under my care, as seen with the microscope, and which Mr. Tuffin West has made for me. (Some beautiful illustrations were here handed round for the inspection of those present.) And now, I come lastly to consider how this terrible disease may be prevented.

Prevention of the Sheffield Grinders' Disease.

This Disease was formerly almost unknown, and for this reason. Until the year 1786, when the first steam wheel was erected, grinding wheels were built upon the banks of rivers in and near Sheffield; and water being the power employed, it will at once be obvious that the grinder would have many interruptions to his trade and that to grind day after day as the grinders now do, was then impossible, and many of them were makers as well as grinders of Cutlery. Nor was this all. By the old regulations of the Cutlers' Company, passed in the reign of Elizabeth, it was provided, "*that no person engaged in the said manufacture, either as a master, servant, or apprentice, shall perform any work appertaining to the said science or mystery of Cutlers for eight and twenty days next ensuing the 8th day of August in each year; nor from Christmas to the 23rd day of January, upon pain and forfeiture, for every offence found and presented by twelve men of the said fellowship of the sum of Twenty Shillings. No person occupying any wheel for the grinding of knives to allow of any work being done during the holiday months: penalty as before.*" When grinding became a separate branch of trade, the hours were no longer limited, and then, it would appear, that the fearful effects, on the animal economy, of constantly inhaling particles of steel and grit day after day, began to develope themselves. This then leads me to a first practical suggestion for alleviating the condition of the Grinders, viz., to *diminish the hours of labour*; and the most effectual way to do this is to abolish "Saint days," as the first days of the week are called by these men, and which are spent by but too many of them in drunkenness and intemperance. What is the result? They crowd into three or four days the labour that ought to be distributed over the whole week, and many soon find, to their cost, the folly of such proceeding. It is a notion in some of the hulls that a drunken grinder often lives the longest. This is a very great mistake. Intemperance has hurried hundreds of these men into their graves. I almost invariably find that, so soon as the liver becomes affected, the chest symptoms are aggravated: and that when the liver fails to discharge its functions, a comparatively slight amount of disease in the lungs of the grinder, will cause far more distress and difficulty in breathing, than even in lungs more extensively diseased, when this organ acts properly. By limiting the hours of labour, time would be afforded for out of doors pursuits, for exercises which would bring the different muscles of the body into play, and prevent, especially in the young, some of the effects which result from bending over the wheel when at work. I have had to day in my study, Mr. Samuel

Sharpe, a razor grinder, at the union wheel: he is now 48, strong and healthy, he has never suffered from the grinders' disease, he began to work at eleven, and he justly expressed the opinion that "*grinding takes most hold of young boys.*" Mr. Sharpe has always used a fan, and will not work in a hull with dry grinders who are not so protected. He does not believe in "Saint days," and works on an average about 38 hours a week. It would be well therefore, 1, *to limit the hours of labour both in boys and men.* 2, *wet and dry grinders ought on no pretence to be allowed to work in the same hull.* After what I have already said, the reason for this will be too obvious to require additional remark. 3, *to oblige the owners of all wheels to provide a fan for every dry grinder, and to see that this fan is always kept in proper working order.* On this point I wish to make a few observations, to which I invite the serious attention of all who may hear or read what I have to say in support of this—to my mind, absolutely necessary requirement. I propose that the *owner of the wheel and not the grinder*, should provide the fan and see that it works properly. If the grinders are left to provide it for themselves, so reckless of life, so careless and indifferent are many of the fork, scissors, and razor grinders, that I am certain they will never provide it for themselves. Let me give some evidence in proof of this. In one hull I found a man shaping razors with a first class fan. There was much dust—the fan was not working, he had not taken the trouble to affix the band, and that necessary act would have taken perhaps half a minute. In another hull, a scissors grinder had a good fan, and spoke to me of its "wonderful advantages"—"if they cost a hundred times as much as they do, they are worth it—no dry grinder can live without them"—and yet this man permitted razor grinders to work without a fan on his right hand and on his left, and to cover him with their dust. In another hull, in which five dry grinders were at work the fans had not been used for three weeks—the wheel band was wrong—and yet these men went on destroying themselves, rather than do to the wheel band a quarter of an hour's work—all that was requisite to set the fan in motion. A most intelligent scissors grinder, Mr. Wreaks, who has now left the trade, at which he began to work when only *nine*, told me "he always used a fan." He once offered to five scissors grinders who worked in the same hull with him, to put up a fan at his own cost, and to take the price of it from each by instalments of one shilling a week. They one and all refused his kind offer. I found hull after hull, in which scissors, razor, and fork grinders, are now working (September, 1865) without fans,—some are working in a very confined space without them, two and three deep. One man, a scissors grinder, told me, "it was not worth while to get one for the bit of time he should have to live." I only found one fan in all the hulls I visited attached to the polishing machinery. I think that where polishing is carried on, a fan ought always to be in use. I visited one hull in which an intelligent man at one end had put up a fan for each "trow," and for which he charged each fellow-workman a penny a week; the man working next to him had paid his penny for the fan, but having been too idle to fix a box, it was useless. Others I found with a fan fixed but not at work, because *they did not like the noise;*" and I have many times been told by dry grinders "the trade was full enough as it was, and that if the men

lived longer it would be so full there would be no getting a living at it." What can I say to such men?—to dry grinders working without a fan—why this—if ever there was a trade more poisonous than the fabled valley of the upas—more slow in its effects it is true, but equally deadly with the inhaling of the atmosphere of the celebrated Grotto del Cani, it is that of a fork, a razor, or a scissors grinder, who works without employing the effectual means for his preservation which the fan affords; if bent on destroying yourselves thus recklessly, have the honesty to prevent others, the poor little boys, many of them your own sons, from entering the trade without a warning—write therefore, over the doorway leading to your infernal hulls

"ALL HOPE ABANDON YE WHO ENTER HERE;"

we do not use the fan, and without this protection your destruction after a few years misery and suffering is certain. The entrance to a dry grinders' hull, without a fan, I say emphatically is unmistakably the gate that leads to certain death!

A good fan will cost from £1 10s. to £3, or £5, but after what I have stated, I think all present will agree with me, that the *owner* of the wheel must be by law compelled to provide a fan as an absolutely necessary portion of the machinery of a wheel where dry grinding is carried on; and that he *must be held responsible* for having this fan always at work and in proper order. A small additional sum could be added to the weekly rent of the hull; which would not exceed one penny.

The fan is on the principle of a winnowing machine, and with a flue properly constructed, leading from each of the different stones in each room, the dust can most effectually be driven out of it, and both the particles of grit and metal which arise in grinding, and the dust created in glazing and polishing removed. I went last week into one of the rooms used for razor grinding at the wheel of Messrs. J. Rodgers and Sons, where many men were at work shaping razors; there was no dust, nor was I inconvenienced in the slightest degree, during the half hour I remained. Had the fan not been at work, I know by experience that I should soon have felt most uncomfortable. One of the men told me the wheel had been "lame" for three weeks, (*i.e.* not at work,) and he had been working at another place without a fannie, and felt so bad at his chest that he was glad to get back to his own "trow" again. He never felt bad there.* At the Soho Wheel, and at the Union Wheel also, and I may add, at many other wheels, I have seen the fan at work with the happiest effects, and in the next room I have seen a set of reckless fools destroying themselves because they would not use it. Many years ago, the late Mr. Trickett, at the Union Wheel, showed me how the different processes could be gone through without injury to the grinder from the dust, and at the Soho wheel, I saw that shaping razors and even racing a stone, by adding a properly contrived box could be rendered perfectly innocuous by the use of the fan; almost all the dust being driven off by the fan, up a shaft on the outside of the building. The particles of dust and steel not carried away by the fan, in "racing" a stone, may be prevented from entering the air passages by tying, as all intelligent grinders do, when performing this work, a light handkerchief over their nose and mouth. That these fans, or

* The Messrs. Rodgers provide the fans free of charge, and will not permit dry grinders to work without them.

"Fannies," answer perfectly well, I have convinced myself by repeated experiments, and by the testimony of every dry-grinder who uses them.

To prevent the Grinders, disease I am therefore of opinion, 1st. That the hours of labour should be reduced, 2nd. That wet and dry grinders should on no pretence be allowed to work in the same room. 3rd. That the owners of wheels should be compelled to provide a fan for all dry grinders. 4th. That all wheels should be placed under proper inspection—properly * Ventilated and kept clean—the rooms built of a sufficient height with enough space for each man, and every wheel properly provided with conveniences, the want of which at present—or the substitutes for which, at many wheels are a disgrace to the civilization of the 19th Century, and in a sanitary point of view a great evil. No floor should be of mud. Where wet grinding is carried on the floor should be flagged with a sufficient incline to let the water run off.

LASTLY.—CHILDREN SHOULD BE PREVENTED FROM ENTERING THE WHEELS AT AN EARLY AGE.

Sir,—May I read what I wrote in 1857. *To send a boy at eight or nine years of age into a grinding hull is an act of refined cruelty which the powerful arm of the law ought to restrain. The application of the Factory act to the grinding trades of Sheffield would in my opinion be most wise and salutary. These helpless children I would indeed commend to the protection of the State; and glad indeed shall I be if these remarks attract the eye of any member of the House of Commons, and induce him to bring the question before Parliament; or, if the evils, religous, moral, and physical, under which these poor boys are suffering, lead the inhabitants of Sheffield to petition the legislature to cast around them that protection which they have not at present.* Such was the opinion I published in my work on "The causes, prevention, and treatment of the Sheffield Grinders' Disease," eight years ago. I repeat that opinion now, and right glad am I to see it in every respect confirmed by the evidence collected by Mr. White, and by the recommendation made to Her Majesty by the Childrens' Employment Commission. The early age at which these boys are sent into the grinding hulls, by parents who seem only to regard their children as machines to add to their weekly income, by making them work as soon as possible, enfeebles them in mind, and renders them dwarfed, decrepid, and often deformed in body. Prematurely used up—their spring of life exhausted, too often they never arrive at manhood's summer. It is impossible, under such circumstances, to give these children that general education which they require,—that general training and religious instruction which it is the duty of the state to see extended to all classes in a Christian land. And so we go on in Sheffield, "like clings to like, the whole creation thro'" one generation passes away—ground off in the wheels—but another comes, like in ignorance, like in intemperance and folly—the children of to-day are the types of the fathers of yesterday; they have come into the world without God's blessing, in the

* *Ventilation of the Wheels.*—The hulls cannot be constructed with windows before and behind the grinder as has been suggested. The light at his back would interfere with his work. Ventilation, however, could be provided by gratings at the back of the hull. The fan also, when at work, powerfully assists ventilation. Too commonly the grinders regard the hull as "only a place to work in," and take every care that it shall remain, as its name implies, a stye.

homes where but-too often their parents have left it without a hope. Without education, without moral or religious training, these children are compelled at ten or eleven years of age to work in the hulls—and there we see them—rocked by the cradle into a maturity of vice, and their education completed by the conversation of older boys and men, whose every breath is an offensive expression, or an oath; and who appear to be suckled in sin, cradled in profligacy, and catechised in blasphemy. Are not these children worthy our consideration—children who but too often never hear a father's loving voice, and but too often never know a mother's tender solicitude.

"Where shall their hope find rest—no Mother's care,
Protects their infant-innocence by prayer;
No Father's guardian hand their youth maintains,
Calls forth to virtue, and from vice restrains."

Surely these facts have been unknown to our philanthropists, otherwise we should long ago have heard of the mission to the grinding wheels, and of sermons and collections for the preachers at the hulls. "*Is it nothing to you,—all ye that pass by?*" These evils are at any rate known now, and until steps are taken to remove them I trust in future no Sheffield guinea will be diverted from its proper course. Even the grinders themselves are becoming aware of these enormous evils. The Saw Grinders' Union does not now recognize boys under the age of 14; and at the next general meeting of the spring knife grinders, the secretary of that union informs me, the question will be considered of preventing boys from coming into the hulls at an early age. To my fellow townsmen, the file cutters' of Sheffield, who neglect those sanitary regulations so requisite for health—who eat their dinners without washing their hands—who dip their dirty lead-begrimed fingers into the salt—and who wear the same clothes in the workshop and out of it—to the dry grinders who work without the protection of a fan—and also to all artisans who lead intemperate lives, I say, "turn ye, turn ye, why will ye die." I can only hope that the preventing boys from entering the grinding wheels at the early age, now so common, and the better education the coming generation must receive, will make men understand more fully their duty to themselves, their neighbours, and their God; and lead them to realize that whatever may be our station in life, we have each and all of us a duty to perform. I ask them carefully to consider the advice I have ventured thus plainly to give them, satisfied that if they adopt it, they will one and all of them be convinced, in the language of the immortal dramatist—

"I am not an imposter, that proclaim
Myself against the level of mine aim;
But know I think, and think I know most sure,
My art is not past power, nor you past cure."
[*All's well that ends well.*]

Surrey House, Sheffield, November 11th, 1865.

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