MANUFACTURE OF ENGLISH FILES.

The *Ironmonger* (London) contains an account of a visit to Sheffield, and a description of the manufacture of files, at the steel and hardware works of Messrs. Peace, Ward, & Co. The establishment is extensive, there being no less than 500 persons employed in it; and the proprietors make their own steel, for files, saws, edge tools, table cutlery, &c. In our American file manufactories, the steel is not made on the premises as in Sheffield; but the files are made in the same manner, as most of our file manufacturers are Englishmen. The following is condensed from the *Ironmonger*, commencing with a description of the mode of making the steel for the files:—

According to the several sorts of files required to be made, different qualities of steel are mixed together, in certain definite proportions determined by weight; a certain amount of scrap, broken into small bits, is added; also a given quantity of manganese, and the whole taken to the melting house or foundery.

The furnaces are simply holes in the floor of the casting-room; they are about three feet deep, and hold two melting-pots or crucibles each. The melting-pots are made of fire-clay, molded into shape, and placed for twenty-four hours in a drying-oven, after which they are held to be thoroughly annealed. Each will hold 28½ pounds of blistered steel. Hard coke is the fuel used for the fires. After the furnaces have been raised to an intense heat, the crucibles, covered with lids, are lowered into them. In about three hours the steel is in a state of white fluidity. The workman, armed with huge iron pincers, steps forth to the mouth of the furnace-hole, and looking into the sea of white fire at his feet, firmly grasps the crucible, draws it out of the fire, and carries it to the cast-iron molds, which are placed on the floor of the casting-room at a short distance from the furnace. The lid being removed, the crucible is tilted, and the molten metal flows into the mold; a workman carefully watches the brilliant stream which shoots out magnificent sparks in every direction, and removes with an iron rod any dark spots he happens to discern in the mass. The molds into which the steel intended for the manufacture of files is poured are long and square. The ingots thus formed are allowed to cool, and the empty crucibles refilled with blistered steel for another casting. The cold ingots of cast-steel, for fine files, and the bars of blistered steel, for coarser files, are next taken to the rolling-mill and tilting-shop. Tilting consists simply in heating the steel to a white heat, and then hammering it with steam hammers into bars. After this, the steel in bars is heated in immense furnaces, then passed between rollers, and pressed into flat, square, round, or half-round strips, and afterward cut into suitable lengths, which are then ready to be forged into file-blanks. To each file-forge two men are allowed, excepting for the smaller sizes. One is a striker, the other a forger; the anvil contains a cutting chisel, and dies to give the proper forms to the blanks, which are forged to the exact size and form with tangs, then taken to the annealing furnace, where about one tun weight of them at a time are gradually heated to a bright red heat. All access of air is then excluded from the furnace, and two days are allowed for cooling. The annealed blanks which are now sufficiently soft to bend, are straightened by hammering, then sent to the grinding-shop, where they are reduced to the exact size, and their surfaces rendered bright and smooth, when they are ready to be cut.

The cutter, seated on a board, before a flat-faced anvil, holds a hammer in his right, and a chisel in his left hand, with his right foot in a leather strap or stirrup, to keep the file in its place upon the anvil. According to the size and nature of the article, the hammer varies in weight from one to six pounds: the chisel is held fast between the finger and thumb. In striking, the hollow of the left hand, which holds the chisel, is turned toward the workman. The tooth, or indent, is turned down from left to right, and the chisel always moved close to every preceding tooth, until the whole of the surface is covered with regular indentations. This first row of teeth is called the over-cut. When completed, the *fash* is filed off, and the workmen then proceed to up-cut the file at right angles across the over-cut, slipping up the chisel, as before. When one side of the file is finished, the workman proceeds to cut the other side in the same manner. However, as direct contact of the cut side with the bare face of the anvil would be sure to spoil the entire cut, a flat piece made of an alloy of lead and tin is interposed between the toothed surface and the anvil.

The double cut must form most perfectly regular diamond teeth; the cutter must always know, not only how to adapt the strength of his blow to the nature of the steel he is operating on, but also how to regulate the fall of his chisel in harder and softer parts of the same file, so as to insure perfect uniformity and regularity of the teeth throughout. File-cutting machines have been introduced into Manchester; but although the teeth of the files are fully more regular than those cut by hand, they are said to want that peculiar angular burr that is produced by hand. When the files are cut, they are next hardened; the process of which is thus described:—

"The old system, which is still pursued in many file factories, but has been superseded by an entirely new method, consisted of brushing the files over with ale-ground and salts; drying them on an iron rack placed near the fire; then taking them up one by one with the tongs, held by the right hand—placing them on fires of very small coke,—blowing the bellows, held by the left hand, and heating to cherry redness, beginning at the heel, then moving the file about in the fire until it looked cherry red from the tang to the point; they were then set or straightened with a wood or lead hammer, and after this dipped into a cistern filled with brine. The new method which is pursued, is to cover the files over with a certain composition (a secret of the firm), which gradually dries on them; then to heat them to redness in a metallic bath, and dip them afterwards in brine. The tempering achieved by this new method is very superior to that of the old process, besides affording a considerable saving of time and labor. The files, which before the tempering were almost as soft as lead, are now quite hard."

The tempered files require thorough cleaning, which is effected with brushes and sand in water-tanks. After this operation, they are placed for twenty-four hours in a lime-bath, which serves, as it is technically termed, to *kill* the salt.

The files taken out of the lime-bath are dried, and after this oiled and brushed. The tangs are now put into a metallic bath to soften them, in order to prevent their breaking.

Every file is carefully examined and tested by the manager. First, a powerful magnifying-glass is used, to ascertain whether the teeth are quite regular throughout; then the file is rung on a large metal plate, and if it does not sound clear, it is rejected as *imperfect*. It is finally tried with the sharp edge of a prover, made of hard hammered cast-steel. After examination and approval, the files are handed to girls, who brush them over, and wrap them in paper parcels.

We gave a full description of the mode of manufacturing files in America, on page 22, Vol. XIV Scientific American (old series), which is more minute in some particulars than the above. For example, the composition for coating the files preparatory to tempering, is given, and the mode of using the lead bath for heating is the same which is said to be a new process in England. Our American file manufacturers may find it to their pecuniary advantage to adopt the Sheffield system, of making their own steel.

THE BEARD.

Nature has supplied the most of mankind with beards, and in very ancient times, the use of a razor upon it was unknown. In Greece, the first instance of shaving occurred in the reign of Alexander the Great. This warrior ordered the Macedonians to be shaved, lest the beards of his soldiers should afford handles to their enemies. The sarcastic Diogenes, when he once saw some one whose chin was smooth, said, "I am afraid you think you have great ground to accuse nature, for having made you a man and not a woman." In Cicero's time, the genuine beard was not worn by society. But the *barbula* (goatee) seems to have been affected by the young Roman "swells."

The beard began to revive again in the time of the Emperor Hadrian. But of all the emperors who wore that ornament, none creates so much interest in posterity as the Emperor Julian. His beard is the most famous beard in history. Speaking of it, he says:—"I commence with my countenance. It had nothing regular, or particularly agreeable about it; and out of humor and whimsicality, and just to punish it for not being handsome, I have made it ugly by carrying this long *and peopled beard*."

The Britons, like the ancient Gauls, allowed the hair to grow thick on the head; and, although they shaved their beards close on the chin, wore immense tangled mustaches, which sometimes reached to their breasts.

It may be presumed that the Northern nations felt the symbolic force of these appendages; we have a well-known passage in Tacitus about the Catti, who, he says, made a general custom of what among other German people was an affair of private daring—the letting the "crinem barbamque" grow till they had killed an enemy. The Normans, when they conquered England, were well shaven, on the back of the head as on the face: but the Saxons wore full beards.

In Edward II.'s reign, beards were worn apparently by persons in years, great officers of State, and knights templars, but not generally. Sir John Mandeville, the traveller (who died A. D. 1372), was called Sir John with the Beard (presumably from its size). In Edward III.'s time—the heyday of chivalry, of feudal ornament, of love-poetry, of heraldry—long beard and fine mustache were in honorable estimation. In Richard II.'s reign, the fashion continued. The beard was "forked," and "in all knightly effigies the mustache is long and drooping on each side of the mouth."

A sober and well-governed gentleman of Elizabeth's time, regulated his beard, as he did his dress, mind, manners, or conduct. It was an index of his status or profession; an emblem of his feelings and tastes—a symbol to be respected like his coat of arms. The Reformer, John Knox, cherished a large and profuse one, obviously from its patriarchal character, from the honor shown it in the Jewish days, from whose sentiment he drew his inspiration. The scholar, such as George Buchanan, wore it—sometimes as one who followed Knox and Calvin.

The hair, as we all know, played an important symbolic part in the Civil Wars of England; and the same rigor which the Puritan exercised on his head, he exercised on his chin, and trimmed his beard as closely as he trimmed his locks. The Vandyke beard is the typical one of this period. Peaked beards and mustaches were popular among the cavaliers; and were at least pretty generally worn.

Beards went out of fashion for more than two hundred years, among the Anglo-Saxons of Europe and America; but they have been revived again, and they are now cultivated and defended upon scientific considerations.

The mustache is approved because it is said to be a natural respirator; a defense to the lungs against the inhalation of dust; and the beard is defended as a protection for the throat against cold. It has been recommended that all preachers who are subject to throat diseases should allow their beards to grow. Travellers in sandy regions, millers, bakers, and all mechanics, should allow the beard free play.

A Nation of Pigmies.

In the Bay of Bengal, on the very high road of commerce, is a group of islands thickly covered with impenetrable jungle, and swarming with leeches in the rainy, and ticks in the dry season. Except a species of pig, until recently unknown to science, there are no wild animals that offer any molestation to man; but to make up for this deficiency, the human inhabitants are amongst the most savage and hostile that voyagers have ever encountered. They may truly be termed a nation of pigmies, being on an average only four feet five inches high, and weighing from seventy to seventy-five pounds; but they are well-proportioned, and display an agility and nimbleness truly wonderful. Their skin is dark, though not black as that of the negro, and their faces decidedly ugly. They go entirely naked, shave the hair off their head with pieces of bamboo or broken bottle, and further increase their unsightly appearance by daubing themselves all over with a mixture of red ochre and oil; or covering their persons towards nightfall with a thick coating of soft mud, to serve as a protection against the mosqui-

toes, with which, in addition to the leeches and ticks, they seem to be tormented the whole year round. They are excellent swimmers, taking to the water almost before they can walk ; and they rely upon the sea for the principal supply of their food—turtles, oysters, and fish.

Correspondence

American Guns.

MESSRS. EDITORS :—In an editorial article in your last issue, under the caption of "American guns," you quote from the Pittsburgh *Chronicle* an item in reference to the 15-inch guns, containing a grave misstatement and a very absurb suggestion. The 15-inch guns have *not* been condemned by the Department, as failing to realize the results anticipated from their use ; and the statement is founded on the most unreliable of sources—a Washington rumor. Some modification of the model is being made, but this would seem to prove that the guns have, in the main, proved satisfactory. In order to admit of their use in the monitor turrets, the first guns were made much shorter than the sea-coast 15-inch ; those hereafter made will be at least eighteen inches longer than those now in the turrets, and will be reduced at the muzzle to an exterior diameter of about twenty-one inches—three inches of metal, only. Such of the short guns as had not been forwarded have been turned down at the muzzle to conform to this modification, and one has been severely tested in Washington, proving that it has not been weakened by the reduction of the muzzle. I presume it is generally known that the monitor ports will be slightly enlarged, and the muzzles of the guns protruded, hereafter, in firing. These facts do not seem to indicate any design on the part of the Government to abandon the new 15-inch guns.

The brilliancy of proposing to increase the efficiency of a gun, objected to on the score of being already too weak, by rifling it, needs no comment. It is sufficiently striking and must commend itself to the Department. PITT.

Pittsburgh, Pa., Oct. 6, 1863.

Gas from Petroleum Tar and Hard Wood.

MESSRS. EDITORS :—It is generally supposed that the gas oils and residuum or tar distilled from petroleum are not adapted to gas making. To correct this impression I send you the following statement. The Aubin Gas Works are now arranged to make gas from the above tar and hard wood. From 40 gallons of the one and 1,800 lbs. of the other, they make (in ordinary operations as now used by many village gas companies), 12,000 feet of rich gas. Much of this great yield of course, comes from the wood ; but as the charcoal is worth what the wood costs, the entire yield is justly claimed from the tar. When I add that so exhaustive a process prevents clogging of either pipes or retorts, it is evident that whatever may be the objections to the use of petroleum and its distillates in coal and rosin gas-works, they apply to the works and not to the oils ; which when treated according to their conditions, are the richest and cheapest gas-making materials known.

H. Q. HAWLEY.

Albany, N. Y., Oct. 2, 1863.

How to Conquer Belligerent Bees.

A correspondent sends us the following remedy for pugnacious bees. It would seem to be effective :—

MESSRS. EDITORS :—In your issue of 26th September you copy an extract from the *American Stock Journal*, entitled "Bees," giving a remedy to stop them from robbing each other of their honey, all of which may be very good, in the absence of a better method. But having positive knowledge of a much quicker and simpler plan, I beg to lay it before your readers :—

When it is discovered that two swarms of bees are at war with each other, by turning up the hive containing the attacking bees, thrusting a stick up into the honey, and fracturing the comb, you will at once stop all further aggression, and set the bees repairing the damage done to their own empire, instead of trying to conquer another. G. B. TURRELL.

INVENTIONS AND DISCOVERIES ABROAD.

Purifying Gas With Animal Charcoal.—The following interesting extracts are from a communication to the *Journal of Gas Lighting* (London), by George Smedley, of the Sleaford Gas Works. He says :—"Being engaged (with the assistance of another person) in manufacturing manures from the refuse of the works, we made use of animal carbon as a vehicle, and, on one occasion I had some gas-liquor filtered through a small quantity of the same, when I discovered that, after filtration, the liquor was deprived of nearly the whole of its ammonia. I repeated the operation several times, and each time obtained the same result. Then came the thought—I have neither scrubber nor washer ; here is a material that has an affinity for ammonia in a liquid form ; why not in a gaseous one? Try it. I did so, by filling one tray in each purifier with the carbon. On the following days I applied the turmeric test ; and lo ! the old nuisance had vanished. I afterward made a small purifier, charged it with carbon, and, on testing the gas with the crude apparatus at my disposal, discovered it had the power of intercepting sulphuretted hydrogen as well as ammonia, but only a small per centage of carbonic acid. Further, I believe gas purified by animal carbon, retains a greater per centage of hydrocarbons than by either lime or oxide of iron. I must confess to you that I have not the means of satisfying myself on these points ; and shall only be too glad if any one in the gas world would solve these questions for me. My only idea at present is that it may be useful on small works where no means are provided of getting rid of the ammonia, by using it for that purpose, and afterward disposing of it at a profit. As the great question with us all is to have our gas as pure as possible, at the smallest cost, I submit this to you with the view that some one may take it up."

Transferring Photographic Pictures to Porcelain and Glass.—The *Photographic News* contains an interesting article on this subject, the inventor of the process being M. Grume, chemist, in Berlin, Prussia. The mode of conducting the operations is described as follows :—"The paper (resembling ordinary albumenized) is silvered as usual, but very much over-printed from the negative ; in fact, till the lights are quite gone, and the print appears lost. It is then washed, to free it from silver, and toned, and then rinsed. While rinsing, the print may be observed to be covered with blisters. These gradually increase in size until finally the delicate film of gelatine upon which the picture is splits off and floats into the water. It is then very carefully placed in hypo-sulphate of soda and then well washed—every washing appearing to render it more tough, till at last it may be handled with impunity. The glass, or porcelain, upon which it is to be placed is then passed under the film, and both lifted out of the water together. When dry it is trimmed and covered with transparent hard varnish. We have also received from Messrs. Harvey, Reynolds, & Fowler, a sample of paper for producing these pictures. The instructions they forward contain one or two additional hints. Excite the paper as for albumenized paper. Dry. Print *very* deeply, you can scarcely print too deep. Tone as albumenized paper ; more care will be required as the prints are over-printed, and the changes of tone are not so readily observed. Wash in water. A film now begins to leave the paper. Pass into the hypo-bath one part in five. The film now entirely separates from the paper, and the paper must be removed. Let the film remain in the hypo about ten minutes, and then carefully and thoroughly wash in water. The film is now very elastic. To transfer this film to any surface, clean the surface, and bring it under the film which is floating on pure water. Raise both out of the water together, pull the film into the desired position on the object, and let it dry. Then varnish with a clear varnish. If the film should not adhere as closely as desired on round surfaces, wash it (without removing it from the object) with a mixture of 1 part acetic acid 32°, and 6 of water. As soon as it becomes elastic, wash with water, and it will adhere well. As the manipulations thus described seem to present some difficulties, we were anxious, prior to bringing the process before our readers, to put it into practice. We have accordingly exposed half-a-dozen pictures and transferred them according to instructions. We have succeeded beyond our expectations, and have obtained, at the first attempt, some very pleasing transfers. The paper was excited on a sixty-grain bath, and a couple of pieces exposed under a portrait negative, until the highest lights were of a lavender tint. This we subsequently found was not quite deep enough. The prints were washed and toned as usual, reaching a deep purple in the gold bath, which was one made after Parkinson's formula. On being transferred to a dish of water, and washed well, we did not observe either blistering or entire separation of the film as expected. We then transferred them to the hypo bath, and allowed them to remain a quarter of an hour. A slight blistering was now apparent, which increased in the subsequent wash of water. But as the separation did not take place so speedily as we anticipated it, we added a trace of carbonate of soda to the water, and in a few minutes we saw the delicate transparent film separated from the paper, and floating in the water. After rinsing, we placed a piece of white enamel glass underneath the floating film, and by a little careful management lifted it from the water uninjured, and stretched flat upon the glass, where it dried, smooth, bright, and firm. We now exposed a couple more, and printed until the image was completely buried ; after which, before toning, we trimmed the print to the shape we desired, as we found it was a difficult thing to shape the film when once detached from the paper. We toned this time in a bath containing a little carbonate of soda, and we observed in the subsequent rinsing that the blisters began to rise ; these increased in the hypo bath, and in the course of the subsequent washings, the film readily separated and floated away from the paper. A subsequent couple were toned in the lime bath, washed, and fixed. These also separated in the subsequent washing without any trouble ; but a longer time was necessary, some hours elapsing before the film of albumen was quite detached. The attenuated film, as delicate as the wing of the smallest fly, at first sight seems quite unmanageable, curling, twisting, and folding itself with the slightest disturbance of the water ; and if the object on which it is to be placed be brought under it, and both lifted out of the water without proper precaution, it will probably be found to have run up together into a shapeless mass, apparently beyond remedy. If it be carefully returned to the water, the probability is that it will gradually float straight out again, and present itself quite uninjured. A little care and patience will be required. The variety of ornamental purposes for such transfers will readily suggest themselves. When transferred to plain white enamel glass, the pictures acquire not only a beauty as transparencies, but also as positives, which they did not possess before. The pure white and fine surface seems to impart a wondrous charm of delicacy and brilliancy altogether unexpected, which, for locket and brooch portraits, will possess especial value. It is probable that the film so transferred to ivory will be of value to the miniature painter. As ornaments for vases of opal glass, &c., many very beautiful effects may be produced. In the art of diaphanie, and as an adjunct to the now fashionable art of decalcomanie, it will probably be found useful ; and in a variety of ways which do not now occur to us. At present, the only protection is a hard varnish, but it is possible that by the use of an enamel powder fusing at a low temperature, a vitreous surface might be secured."

Paint for Coal Tar Colors.—A patent has been granted to B. Dupy and Antoine Vibert, of Lyons, France, for making pigments to be employed in oil painting from the colors of coal tar, which have hitherto been chiefly used for dyeing silk and woolen fabrics. For obtaining cakes of red, blue, and violet, 15 grammes of white soap are used, dissolved in 100 grammes of hot water, and there is then mixed with the solution 6 decigrammes of color, previously dissolved in methylitic alcohol, or other solvent. To this mixture is added 25 grammes of alumina, in a gelatinous state, and the mixture is then filtered and dried. These proportions may be varied at discretion ; for, instead of 6 decigrammes of color, a larger quantity may be used, in order to have a greater depth of color. Instead of white soap, glycerine and soaps made from oils or grease derived from animal matters may be employed ; and, instead of alumina, sulphate of barytes or other metallic or earthy oxide