

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 foundry.

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 ton 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 *flash* 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 mesquit-