

UNITED STATES PATENT OFFICE.

MARTIN A. HOWELL, JR., OF CHICAGO, ILLINOIS.

MANUFACTURE OF FILES.

SPECIFICATION forming part of Letters Patent No. 258,301, dated May 23, 1882.

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To all whom it may concern:

Be it known that I, MARTIN A. HOWELL, Jr., a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Manufacture of Files; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to
10 which it appertains to make and use the same.

Heretofore files have been made from bar-steel from steel cast in crucibles and forged into bars, in order to give greater tenacity to the metal, and to give a greater regularity to
15 the combined carbon in the metal; but, in consequence of the repeated forgings, heating, and reheating, much of the carbon is lost by the process, and the surface which should contain the carbon intact, in order to give the greatest
20 hardness to the teeth, is rendered really the weakest, while the excess of labor attendant upon this process of forging of the blanks, and the waste of material and of fuel enhance the value to the consumer.

25 The nature of my invention relates to the employment or use of "decarburized cast-iron blanks" in the manufacture of files, in cutting and finishing the same while the metal is in the soft decarburized condition, and in recarburizing the blanks after surfacing and cutting, in
30 order that no carbon shall be lost by the process, but retained intact where its presence is most essential for the purposes intended. By this means the original natural or granular
35 character of the metal is preserved, the particles are not crushed by any process of forging, the affinity for carbon is greater when heated to the proper degree, and a hardness is secured which can only be given by carbon unimpaired,
40 thus enabling me not only to produce a much cheaper file, but one of far greater durability and regularity.

I take a medium grade of white or refined iron, charcoal-iron being preferred, more particularly Lake Superior iron. I proceed to produce my castings in the usual way from patterns in sand or flasks of refractory materials. When the castings are completed they are
45 cleaned from any adhering sand or dirt in a rattle-barrel, when the blanks are placed in
50 flasks or saggars, interlaid with oxides of iron, iron scale, or any material having an affinity

for carbon, kept at a red heat until the blanks are properly annealed, when, after gradual cooling, they are taken out, cleaned, and surfaced upon a grindstone, in order to prepare
55 them for the process of cutting the teeth, which is done in the usual way. The blanks are then placed in air-tight boxes, or boxes which can be kept air-tight by proper luting, interlaid
60 with sifted carbon, animal or vegetable, or in a mixture of carbon and salts, all of which is well known, and varied to suit the taste of the operator or the character of the work intended to be produced, when they are kept at a red
65 heat for a time corresponding to the depth of the carbon required, or the depth of the decarburized surface of the soft blank previous to cutting, when they are immediately taken from the cases and hardened in cold water, or cold
70 water containing one of the forms of soda, in order to hold the contact of the water to the surface of the red-hot blank while immersed.

An uncertain degree of superficial hardness can be secured, without the use of the cementation process of embedding the blanks in carbon in cases, by heating the blanks to a red heat and coating the surface with the ferrocyanide or prussiate of potash, salts of ammonia, &c., and plunging the file in water or other liquids, all of which is well known; but I prefer the cementation process, as it gives a solid character to the work, and a durability absolutely requisite in the abrasion of hard
85 metals.

It will be readily seen by any person versed in manufacture that the greater expense of refined bar-steel as compared with the cast-iron, the saving of fuel, of waste, and largely of labor enables me to produce my blanks at
90 a far cheaper rate than where produced by the well-known processes in use, while the superiority of the work in tenacity and durability is overwhelmingly in favor of this process.

I am aware that files have been made of wrought or bar iron by the same process as in
95 common use in the making of steel files, save that they were hardened in a way somewhat analogous to mine, but of a very inferior character, being equally expensive as to fuel, labor, and material, save a trifling difference in the
100 latter, but rendered generally unsalable from the inferior and uncertain character of the hardness, and the liability of all such closely-

forged metals to blister when subjected to the cementation process—a difficulty not encountered in the use of decarburized cast-iron. It is well known, also, that steel files, having lost
5 a portion of their carbon in heating and forging, are liable to this same objection of blistering if subjected to the process above named, and when the carbon is once lost the result is a poor and unreliable product, as the various
10 qualities now on sale demonstrate.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In the manufacture of files, the process

which combines the decarburization of cast- 15 iron blanks for the purpose of softening and cutting, with the subsequent recarburization for the purpose of hardening and tempering, substantially as set forth.

2. In the manufacture of files, the combined 20 process of surfacing, cutting, recarburizing, and hardening of decarburized cast-iron blanks, substantially as and for the purposes set forth.

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Witnesses :

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