

UNITED STATES PATENT OFFICE.

JOSEPHUS HOOPER, OF LOUISVILLE, KENTUCKY, AND THOMAS CLARK, OF
NEW ALBANY, INDIANA.

MODE OF CONVERTING CAST-IRON INTO STEEL.

SPECIFICATION forming part of Letters Patent No. 390,969, dated October 9, 1888.

Application filed January 18, 1888. Serial No. 261,150. (No specimens.)

To all whom it may concern:

Be it known that we, JOSEPHUS HOOPER, of Louisville, Jefferson county, Kentucky, and THOMAS CLARK, of New Albany, Floyd county, Indiana, have invented certain new and useful Improvements in the Method of Manufacturing Edge-Tools from Cast-Iron; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates particularly to the manufacture of edged or cutting tools having cutting-faces of steel of appropriate temper from ordinary hard castings, poured either from the blast-furnace direct or from a cupola or other furnace wherein pig-iron is remelted.

In the practice of our invention we first produce a cast-iron blank of a shape approximating that of the article when finished, but of considerable and uniform thickness at that portion which is subsequently to form the steel cutting edge or edges. Thus in casting a hoe-blade or a hatchet-blank in this preliminary step of our process we have found it advantageous to have its outer edge of a uniform thickness of from three-sixteenths to one-quarter of an inch. The hard casting or blank is then packed in iron scale, hematite ore, or other oxidizing agent, (as in the ordinary annealing process for converting cast-iron into malleable iron,) and inserted in an annealing-oven, where it is subjected to the usual temperature incident to the process of annealing. The annealing process thus begun is, however, interrupted at about two-thirds of the ordinary period which would be required to convert the article treated into malleable iron, (which of course will differ according to the character of the cast-iron composing it,) and the casting is removed. The casting will then be found to be partially decarbonized and in a uniform manner along its outer edges, which retain from one and a half to two per cent. of

carbon. These edges, however, have still the coarse grain or structure of the original cast-iron, and are therefore unsuitable to be sharpened and tempered at once. We therefore, after removing the blanks from the annealing-ovens, heat them to a cherry-red heat and condense the grain at the edges by blows of a hammer, at the same time working the blank out into the shape of the finished article by bringing the edges to the cutting-point, the final cutting-edge being formed, if need be, by grinding. The blanks are thereupon reheated to the required temperature, depending upon the thickness of the cutting-edge and the amount of carbon retained, and the edges are tempered by being immersed in the heated condition in water, oil, or other tempering-liquid, thereby effecting the desired molecular change and distribution of the carbon essential to a cutting-edge.

Having thus described our invention, what we claim is—

The method of making tools with steel cutting-edges from cast-iron, which consists in first casting a blank or hard casting of a form approximating that of the finished article, but of greater and uniform thickness at that portion intended for the cutting-edges, then partially decarbonizing said blank, then working the partially decarbonized blank at its cutting-edges until it assumes the shape of the finished article, at the same time condensing the grain at said edges, and finally tempering said edges, substantially as described.

In testimony that we claim the foregoing we have hereunto set our hands.

JOSEPHUS HOOPER.
THOMAS CLARK.

In presence of—

PHEBE CLARK,
S. P. SMITH.