2 Sheets—Sheet 1.

G. W. CASILEAR.

HARD-METAL TYPES.

No. 193,805. Patented Aug. 7, 1877.

Fig. 1

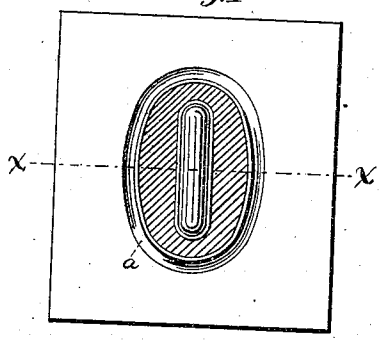


Fig. 2



Fig. 3.

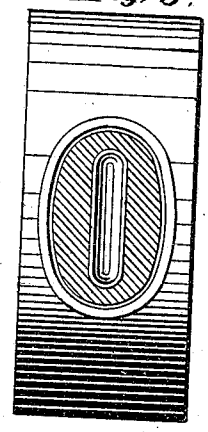


Fig. 4.

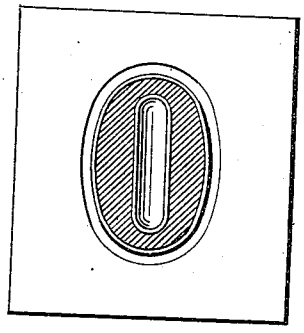
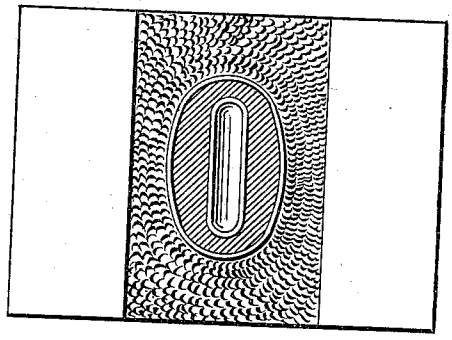


Fig. 5.



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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

GEORGE W. CASILEAR, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN HARD-METAL TYPES.

Specification forming part of Letters Patent No. **193,805**, dated August 7, 1877; application filed December 16, 1876.

To all whom it may concern:

Be it known that I, GEORGE W. CASILEAR, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Movable Hard-Metal Type; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making a part of this specification.

My invention relates to novel improvements in hard-metal movable type and the process of manufacturing the same, as will be hereinafter more fully set forth.

Previous to my invention it has not been customary to manufacture movable type from hard metal, owing to the many difficulties attending the same and the great expense incident thereto, and, consequently, the nearest approach to the objects sought by my present invention has been the electrotype. The advantages of a hard-metal movable type over the ordinary electrotype are obvious and well known, and I have discovered by practical use of type made by my process that I am enabled to produce work to all intents and purposes as good as steel-plate engraving, and at greatly-reduced cost and expenditure of time.

With these ends and objects in view, my invention consists—

First, in the process of producing movable type in hard metal—that is to say, by first engraving the design upon steel, then taking up the same upon the perimeter of a decarbonized roller, subsequently hardening the same and rolling the design into a suitable plate or strip of hard metal, then routing out the raised metal surrounding the design and leaving the design in relief.

Secondly, my invention consists of a hard-metal movable type having the characteristics hereinafter described and resulting from the process herein set forth, as a new article of manufacture.

To enable those skilled in the art to more fully understand the nature and advantages of my invention, I will proceed to describe the same more fully and in detail, referring to the accompanying drawings, in which—

Sheet 1 shows the various steps necessary for the production of the type, and Sheet 2 illustrates the character of work done by type made by my improved process. In Sheet 1 of the drawings, Figure 1 represents a steel plate upon which is cut or engraved, in intaglio, a type of any design of letter or figure, and Fig. 2 is a section at *x x* of Fig. 1.

The design so cut or engraved, as shown at Fig. 1, is then taken up on a soft or decarbonized roller, as seen at Fig. 3, by aid of the well-known transfer-press. The roll is then hardened, and the design in relief on its perimeter is then transferred or rolled into a steel, brass, or other hard-metal plate or strip, as shown at Fig. 4, thus reproducing what is shown at Fig. 1, and in this condition it would be incapable of use in surface-printing. In order to render it capable of such use I now subject the plate or strip to the action of a routing-machine, and cut the metal away from and down below the surface of the design, thus presenting a relief-surface capable of surface-printing, as shown at Fig. 5.

In order to facilitate the operation of routing, and avoid the necessity of any trimming by hand of any burr, I cut the outside or surrounding line of the design a little wider than ordinarily, as shown at *a*, so that the routing-tool may cut directly into said space, and thus leave the next inner line clear and well defined, and without any burr or feather projecting upward or in the plane of the printing-surface. This final plate, as shown at Fig. 5, may be of any thickness, varying from the minimum thickness necessary to impress and rout, to the ordinary type-metal thickness. When the metal used is less in thickness than the height of a type it may be mounted in any suitable manner upon type-blocks.

When reproduced upon the final plate the metal between the type or designs is routed out, and the plate subsequently and readily cut up by suitable saws into type of equal and exact size, having reference to spacing, &c.

What I claim as new, and desire to secure by Letters Patent, is—

1. The process herein described of making hard-metal movable type, consisting of engraving the design upon a plate, taking up in

relief upon a roll, then rolling into a second plate, routing out the surrounding metal, and subsequent separation, as set forth.

2. As a new article of manufacture, a hard-metal movable type for surface-printing, having the design in relief, with the surface surrounding the same routed out, as shown and described.

Witness my hand to the foregoing specification this 29th day of November, A. D. 1876.

GEO. W. CASILEAR.

Witnesses:
WM. C. MCINTIRE,
F. A. CASILEAR.