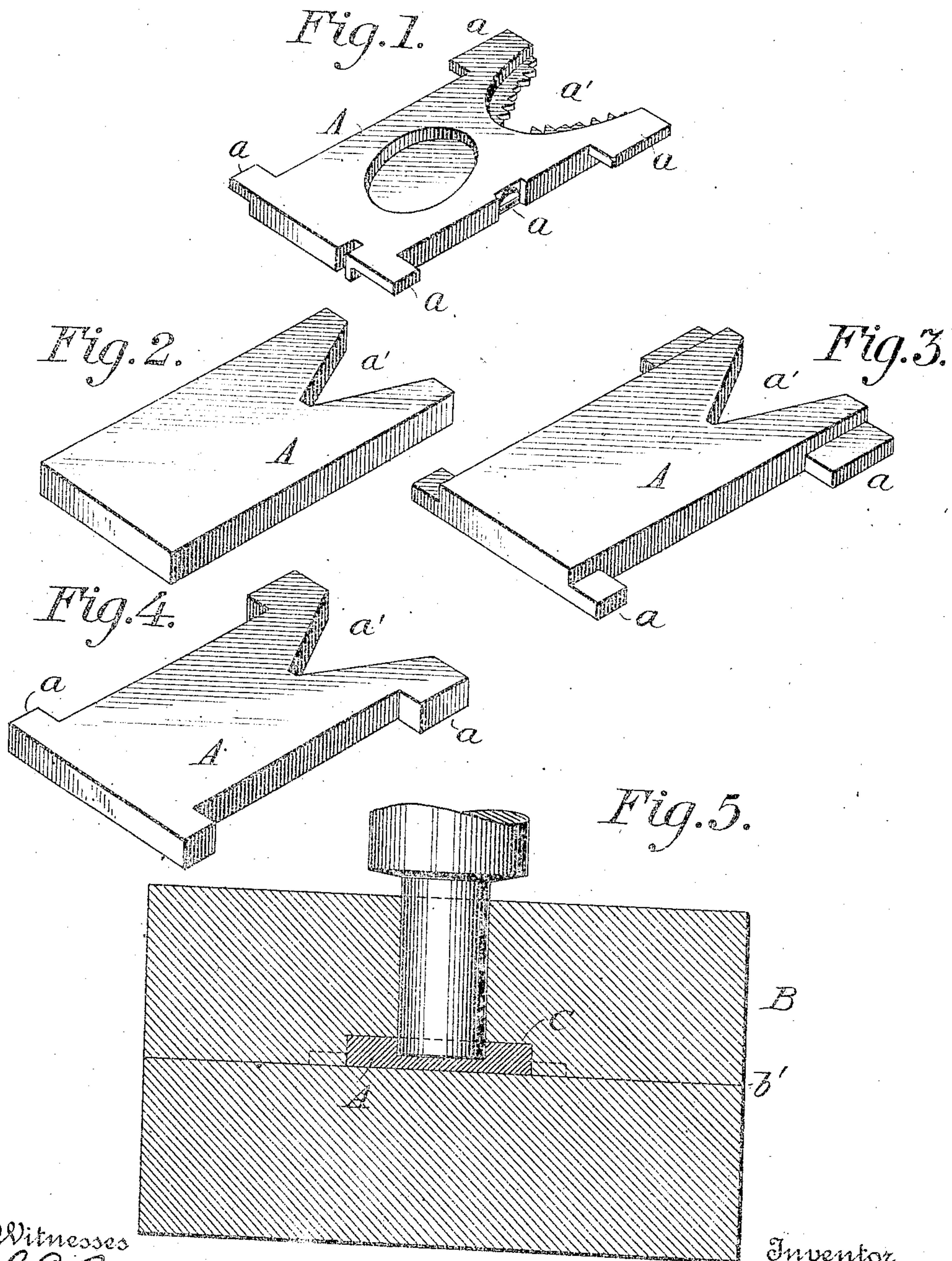


939,988.

P. T. DODGE.  
METHOD OF PRODUCING MATRICES.  
APPLICATION FILED JULY 25, 1907.

Patented Nov. 16, 1909.



Inventor  
Philip T. Dodge  
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# UNITED STATES PATENT OFFICE.

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## METHOD OF PRODUCING MATRICES.

939,988.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed July 25, 1907. Serial No. 385,567.

*To all whom it may concern:*

Be it known that I, PHILIP T. DODGE, of Washington, in the District of Columbia, have invented a new and useful Method of Producing Matrices, of which the following is a specification.

My invention has reference more especially to the manufacture of matrices for linotype machines such as are fully described in Letters Patent of the United States No. 436,532. These matrices, which consist each of a thin brass plate having a matrix character on one edge, as shown in Figure 1 of the accompanying drawings, are required to be made with extreme precision in certain of their dimensions, the variation of the small fraction of a thousandth of an inch prohibiting their successful use. Heretofore it has been the practice to produce these matrices from sheet brass by the use of machine tools performing from 50 to 60 distinct operations.

The aim of my invention is to greatly reduce the number of operations required and at the same time to produce a matrix having smooth, condensed surfaces as distinguished from the soft and granular surfaces left by the ordinary cutting tools after the removal of the outer skin or surface. To this end I form my matrices by confining blanks in an inclosed die of suitable form, then applying pressure by a plunger, or its equivalent, to the side face of the blank, or to some other portion of its surface which does not require precision in form or size, in such manner as to flow the metal within the die and enlarge the blank in the directions in which accuracy is required until it tightly fills the corresponding portions of the die.

By the employment of a die which is tightly closed at all essential points before the pressure begins, and by the application of sufficient pressure, I displace the metal in the central or unimportant part of the blank and cause the latter to tightly fill the die, so that it acquires the exact form and size required and presents a hardened or condensed surface of perfect smoothness, without fins or projections thereon.

In some cases I propose to complete the matrices by one operation in the die; in other cases, for special matrices, it may be necessary to perform one, two, or more additional finishing operations, such for ex-

ample as the cutting of the teeth to give the proper distributing combination.

Referring to the drawings, Fig. 1 represents a perspective view of a completed matrix. Figs. 2, 3 and 4 represent perspective views of the blanks of different forms which may be employed. Fig. 5 represents a vertical section through a die such as I propose to employ.

Referring to Fig. 1, A represents the body of the matrix, provided with ears, *a*, at the respective corners, with a notch, *a'*, at the upper end containing distributing teeth as usual, and with the intaglio character or matrix proper, *a''*, on one edge.

In carrying out my invention I punch or otherwise form from sheet brass, or other suitable material, a blank of the approximate form of the final matrix, such for instance as the blanks shown in Figs. 2, 3 and 4. I next provide, of hardened steel or other suitable material, a strong and massive die, B, containing a cavity, C, of the exact form and size of the required matrix. This die may be made in two parts joined on line *b'*, or otherwise formed, provided only that its parts are adapted to be joined or locked rigidly together in such manner that the internal cavity or chamber will present no joints or seams between the moving parts.

Through one side of the die I make an opening to receive the end of a tightly fitting plunger which will be actuated by the head of an ordinary punching press, or by any other suitable means.

The inner end of the plunger is of a size less than that of the matrix, and is preferably arranged as shown to enter the side of the chamber, to form by pressure an indentation in the side of the blank wholly within its margin. The blank being inserted and the two parts of the die joined and rigidly secured together, the plunger is forced inward in such manner as to displace the metal from the center of the blank and cause it to flow outward in all directions and to tightly fill the interior of the mold.

It is to be noted that the body portions of the mold have no movement in relation to each other and that consequently there is no wear between them, and no possibility of the metal flowing between them in such manner as to produce a fin or bur on the matrix. In other words, the matrices delivered from



the die will present a perfectly smooth and finished surface at the edges—a matter which is of the utmost importance in order to insure their proper action in a linotype machine.

Having described my invention, I claim and desire to secure by Letters Patent:—

The method of forming a linotype matrix and producing thereon hardened and condensed surfaces of predetermined dimensions without fins or projections, which consists in providing a blank of approximately the form of the required matrix, inclosing said blank in a tightly-closed die cavity of the exact form and dimensions of the required matrix, and applying pressure to the side of

the blank at a point wholly within the marginal limits or the effective surfaces of the blank; whereby the displacement of the metal in said limited area will cause the material of the blank to flow outward and fill the tightly-closed die cavity, thereby hardening and condensing the surface of the matrix and giving it the exact form and dimensions required.

In testimony whereof I hereunto set my hand this twenty-second day of July, 1907, in the presence of two attesting witnesses.

PHILIP T. DODGE.

Witnesses:

F. M. EGGLESTON,  
WALTER MOBLARD.