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Patented Dec. 27, 1898.

C. SEARS.

METHOD OF AND MACHINE FOR MAKING MATRICES.

(Application filed Aug. 31, 1894.)

(No Model.)

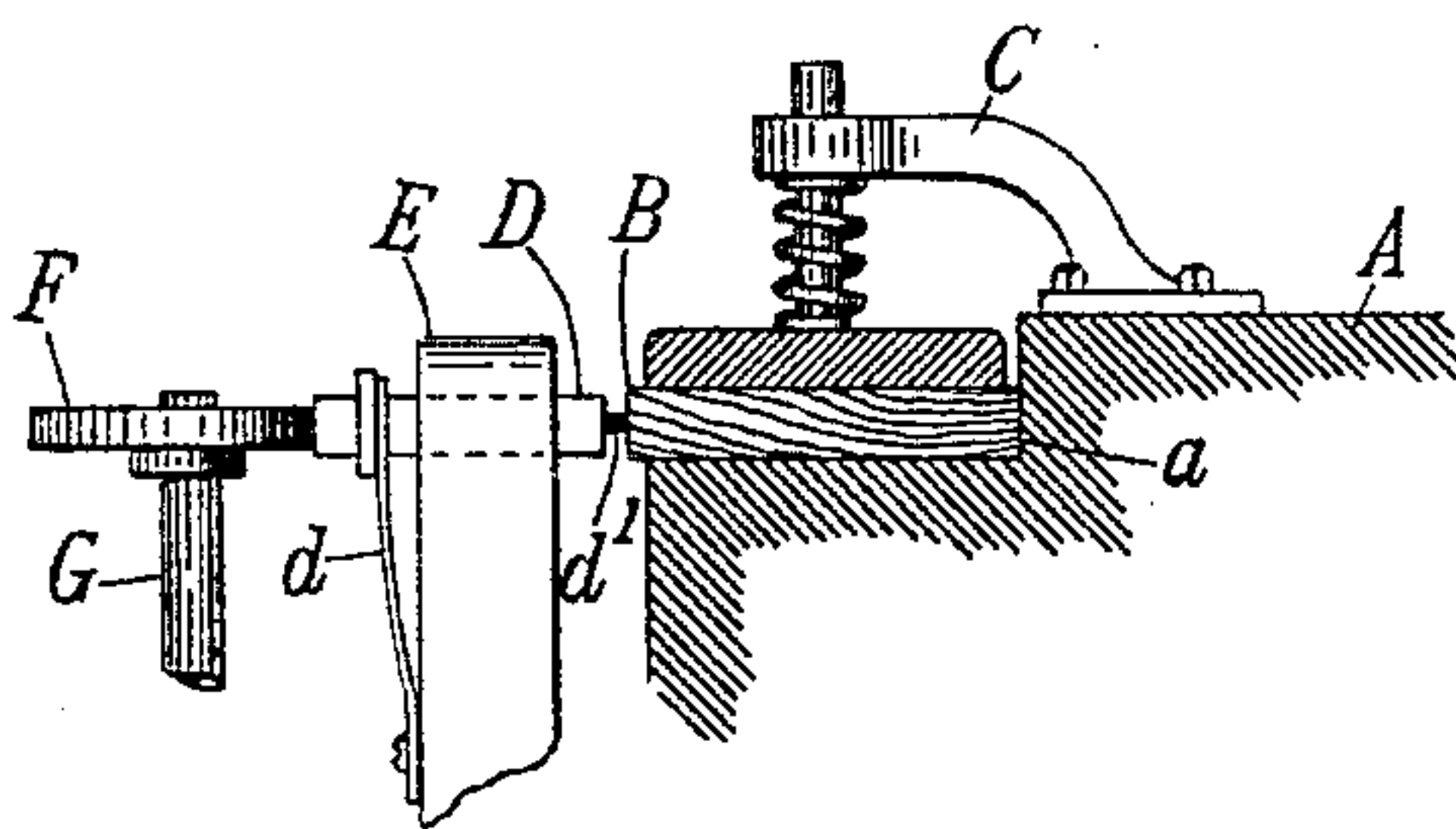


Fig. 1

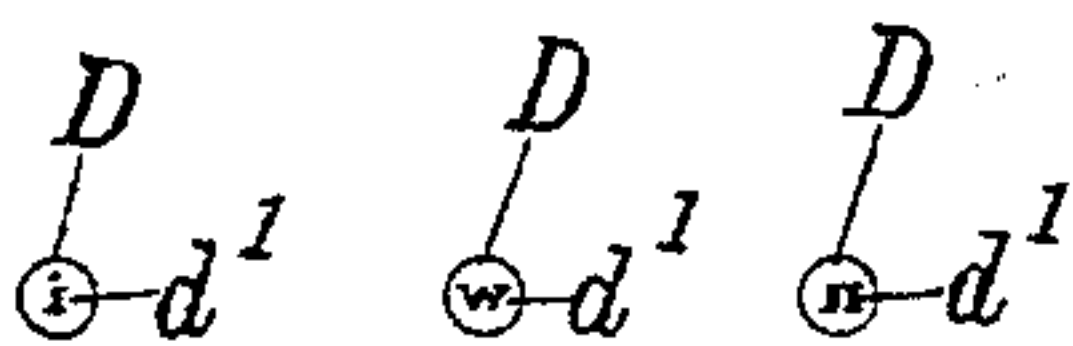


Fig. 2



Fig. 3



Fig. 4

Witnesses.

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# UNITED STATES PATENT OFFICE.

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## METHOD OF AND MACHINE FOR MAKING MATRICES.

SPECIFICATION forming part of Letters Patent No. 616,562, dated December 27, 1898.

Application filed August 31, 1894. Serial No. 521,801. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES SEARS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Methods of and Machines for Making Matrices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

For several years I have been engaged in perfecting, constructing, and using matrix-making machines which were especially constructed for the purpose of impressing the several letters one by one into the end fibers of a wood matrix-block. All of the machines which I have made and used for this purpose have contained mechanism by means of which all of the dies were forced forward the same distance into the wood, and I have supposed that when this was done the resulting depressions in the wood would be of equal depth, whereby when a type-bar was cast from any matrix so made the printing-faces on all of the letters would be in the same plane. I have long known, however, that on the type-bars so made there were slight variations in the height of the letters; but I have supposed in a general way that these inequalities were due to some slight imperfections in the machines employed, and since these inequalities were not so great as to affect the availability of said type-bars for use in a printing-press having a blanketed tympan I did not for a time give the matter any serious attention for the purpose of discovering the cause of such variations and a method of avoiding them; but when I began to make type-bars suitable for bookwork and other fine printing in a press having a hard tympan I was led to more closely examine the type-bars which had been produced. I found that there was uniformity in the variations in the height of the letters, that the smaller letters were higher than the large letters, and that the smaller the printing-face of the letters the greater distance said letters projected above those having larger printing-surfaces. Inasmuch as to make the matrix all of the dies were pressed forward the same distance by a force which was irresistible by the wood, I con-

cluded that the different depths of the resulting depressions were due to differences in the resiliency of the wood affected by the pressure of the different-sized dies.

The object of the present invention is to equalize the resiliency of the wood when compacted by the different dies, whereby a matrix may be formed in which all of the letter impressions shall be of equal depth, and consequently that all of the letters on the type-bar cast in said matrix shall have their printing-faces in the same plane.

The invention consists, broadly, in impressing the characters in all of the dies equal distances into the end fibers of the wood matrix-block and slightly compacting the wood which surrounds the letter impressions by direct pressure against the face of said matrix-block.

It also consists in a machine for practicing said process—to wit, a machine containing a series of longitudinally-movable dies of equal area on the end which faces the matrix-block, which dies have characters projecting equal distances from said ends, mechanism for holding a wood matrix-block immovable when the impressions are being thus made therein, and mechanism for forcing the several dies equal distances forward and such distances as will completely embed the characters in said matrix-block and will cause the ends of the dies to slightly compact the surface of said wood around the character impressions, all of which will be hereinafter explained, and pointed out definitely in the claims.

In the drawings, Figure 1 is a view in side elevation, partly in section, of mechanism adapted for the practice of my invention. Fig. 2 is an end view of several of the dies. Fig. 3 is a top view of a matrix formed by my improved process, and Fig. 4 is a vertical sectional view of one end of said matrix.

The apparatus shown is entirely suitable for the accomplishment of the result sought and is the best form of said apparatus now known to me. In practice, however, this mechanism or its equivalent will be incorporated as a part of a machine having other functions and capabilities—namely, a machine of substantially the character of the machine shown and described in Letters Patent Nos. 475,804, 475,805, and 475,806, granted to me May 30, 1892, or No. 537,905, granted



April 23, 1895, for a machine which is the joint invention of myself and Frank Miller.

Referring by letters to the parts shown in the drawings, A represents the carriage, having a recess in its front edge to receive the matrix-block B. A clamp C holds the block in fixed position upon the carriage, and the rear edge of said block rests against the shoulder *a*.

D represents a die; E, a guide which guides said die in a straight path as it is moved forward and backward.

*d* represents a spring which withdraws the die after the impression thereof has been made in the wood.

F represents a cam which is secured to the revoluble shaft G and which bears against the rear end of said die and forces it forward into the block B. It will be seen that this cam when it revolves must move all of the dies with which it engages forward equal distances.

The several dies D are all of equal length, and the letters on the front ends of the die-stems project from said ends equal distances, and I also make the front ends of all of the die-stems of equal size, because when so formed the sum of the area of the letter plus the area of the end of the die-stem not covered by said letter is the same with every die. Therefore when said dies are used in the described manner the surface which presses against and compacts the wood is the same on all the dies. I believe this is an important feature in securing the best results, although I have obtained very satisfactory results by compressing the wood block slightly in the direction of the fiber before any impressions are made therein. I therefore believe that the most important feature of the process is the slight compacting of the wood which surrounds the letter impressions and that this step is productive of greatly-improved results, whether said wood is compacted before or after the impressions are made.

As before stated, the most completely satisfactory results are obtained by employing a series of dies D, the ends of the stems of

which are of substantially the same area and the dies are of equal length. The letters *d'* project equal distances beyond the ends of the stems. All of these dies are moved forward equal distances by a cam F or other equivalent mechanism into the wood and until the ends of the die-stems press against and slightly compact the surface of the wood. In the matrices made in this manner all of the impressions are of equal depth when the dies are withdrawn and the printing-faces of all of the letters on the type-bars cast in said matrices are in the same plane.

Fig. 3 shows the appearance of the surface of a matrix formed in the manner last described, and Fig. 4 shows that the ends of the die-stems have compacted and slightly indented the wood.

Having described my invention, I claim—

1. The herein-described process of making a matrix, which consists in impressing the characters equal distances into the end fibers of the wood matrix-block, and slightly compacting the wood which surrounds the character depressions, by different pressure against the face of said matrix-block, substantially as and for the purpose specified.

2. In a machine for making matrices, the combination of a series of longitudinally-movable dies of equal area at the ends which face the matrix-block, which dies have their characters projecting equal distances from said ends, and mechanism for holding a wood matrix-block when the impressions are being made therein, with mechanism for forcing the several dies equal distances forward and such distances as will completely embed the characters thereon into the matrix-block and will cause the ends of the dies to slightly compact the surface of said wood around the character impressions, substantially as and for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES SEARS.

Witnesses:

E. L. THURSTON,  
THOS. C. BRINKLEY.