

(No Model.)

2 Sheets—Sheet 1.

A. S. CAPEHART.

MATRIX BAR AND METHOD OF MAKING SAME.

No. 529,440.

Patented Nov. 20, 1894.

Fig. 1.

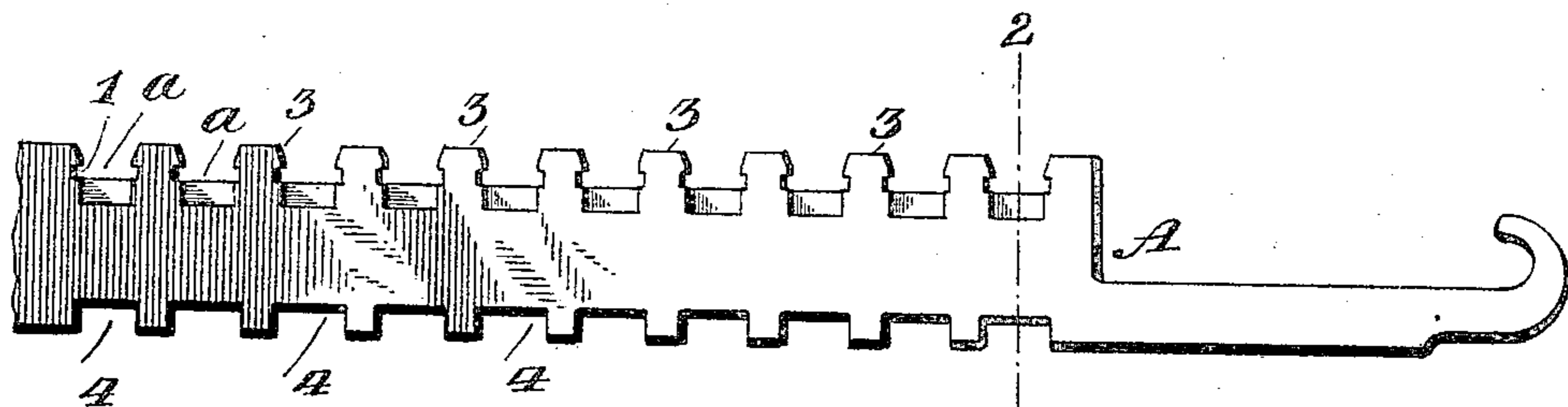


Fig. 2.

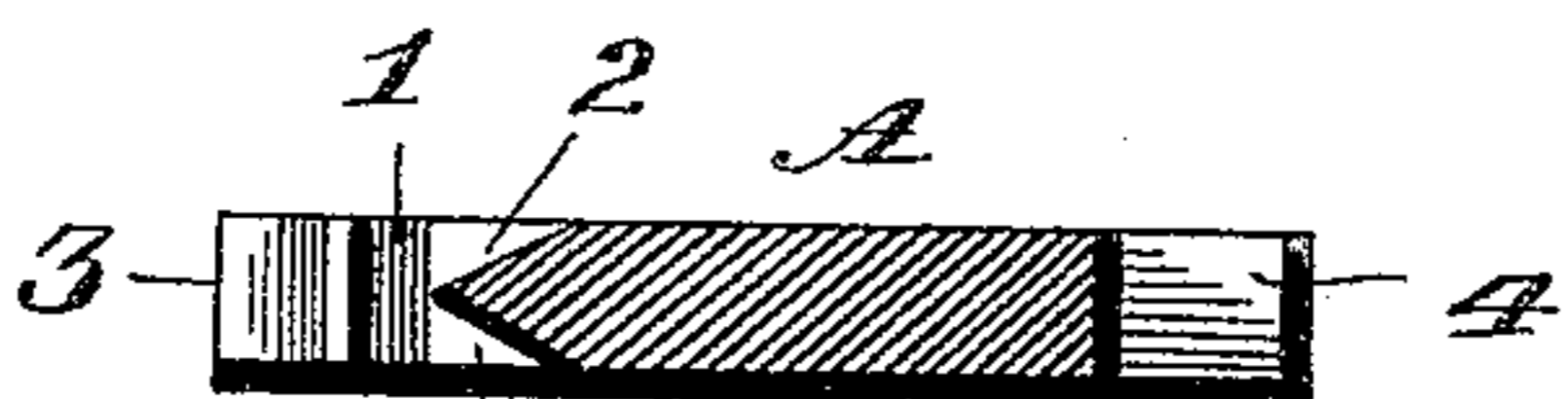


Fig. 7.

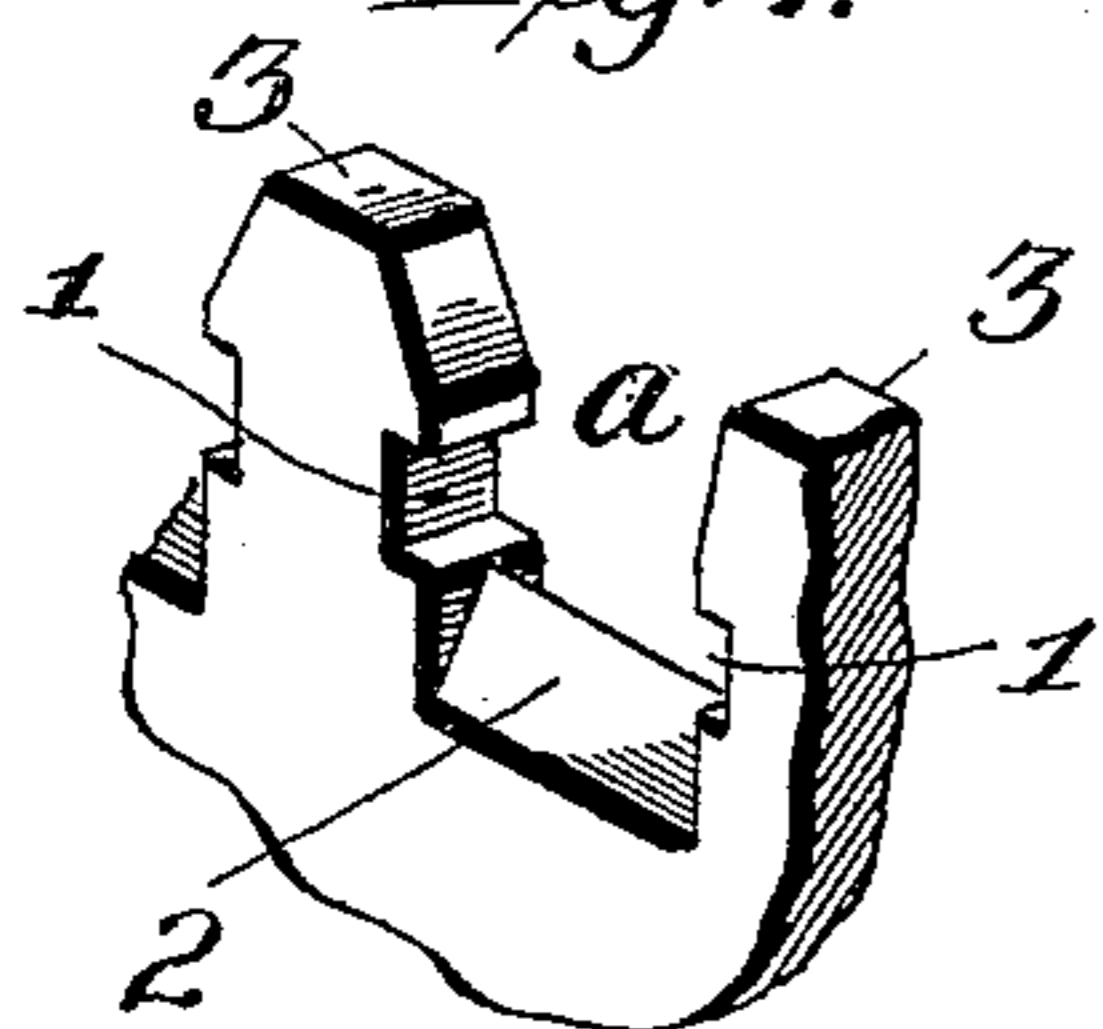


Fig. 3.

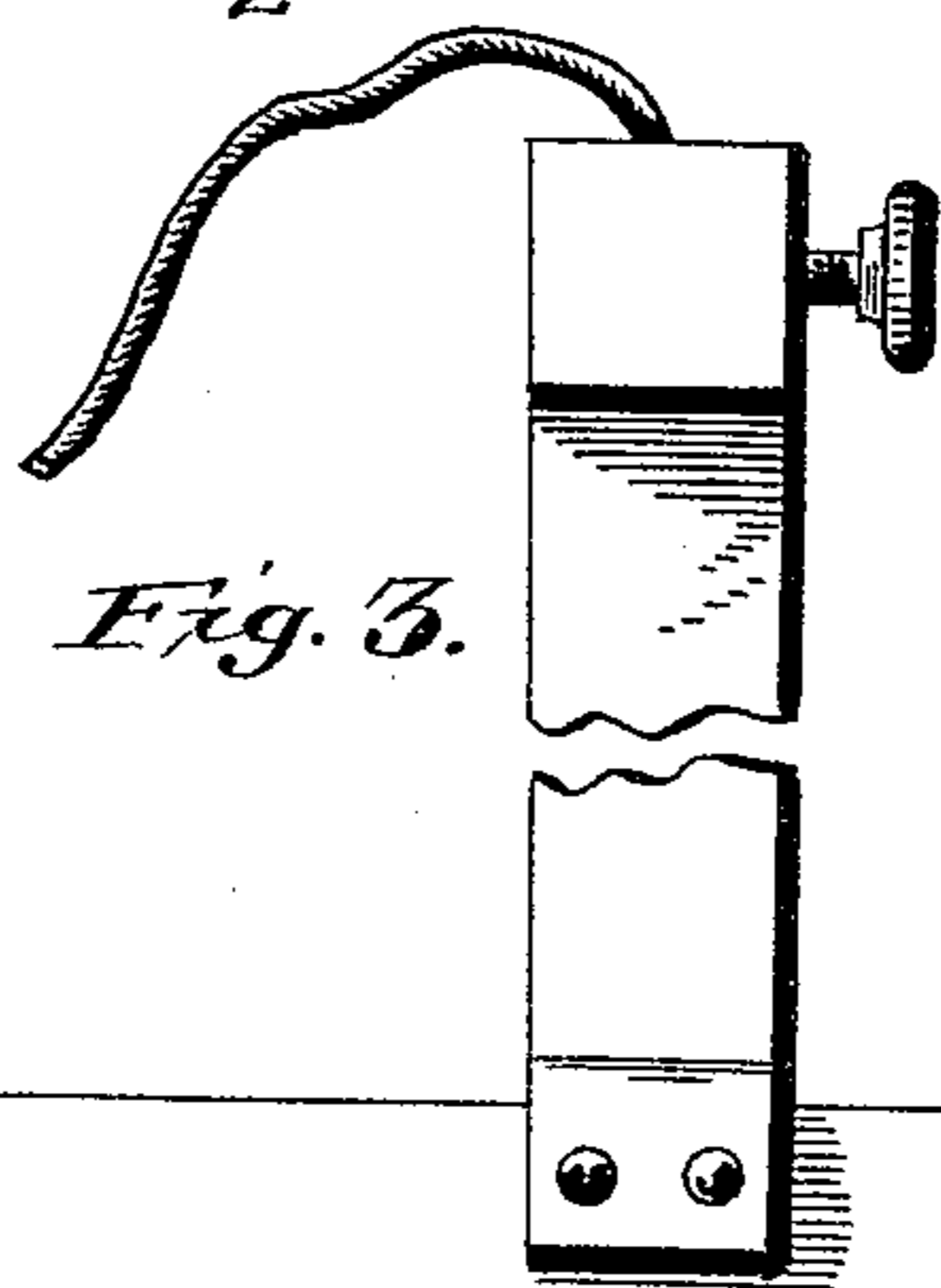
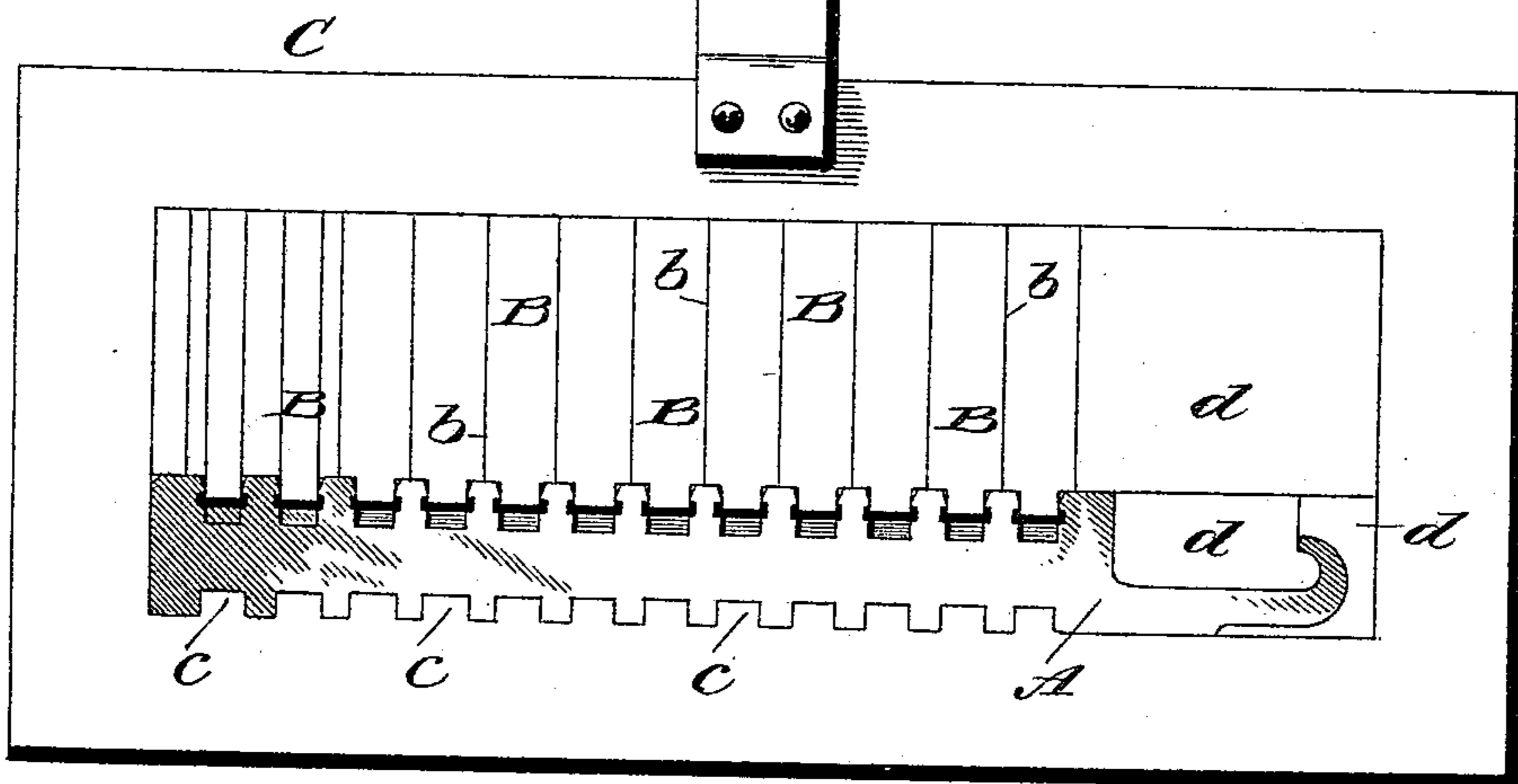
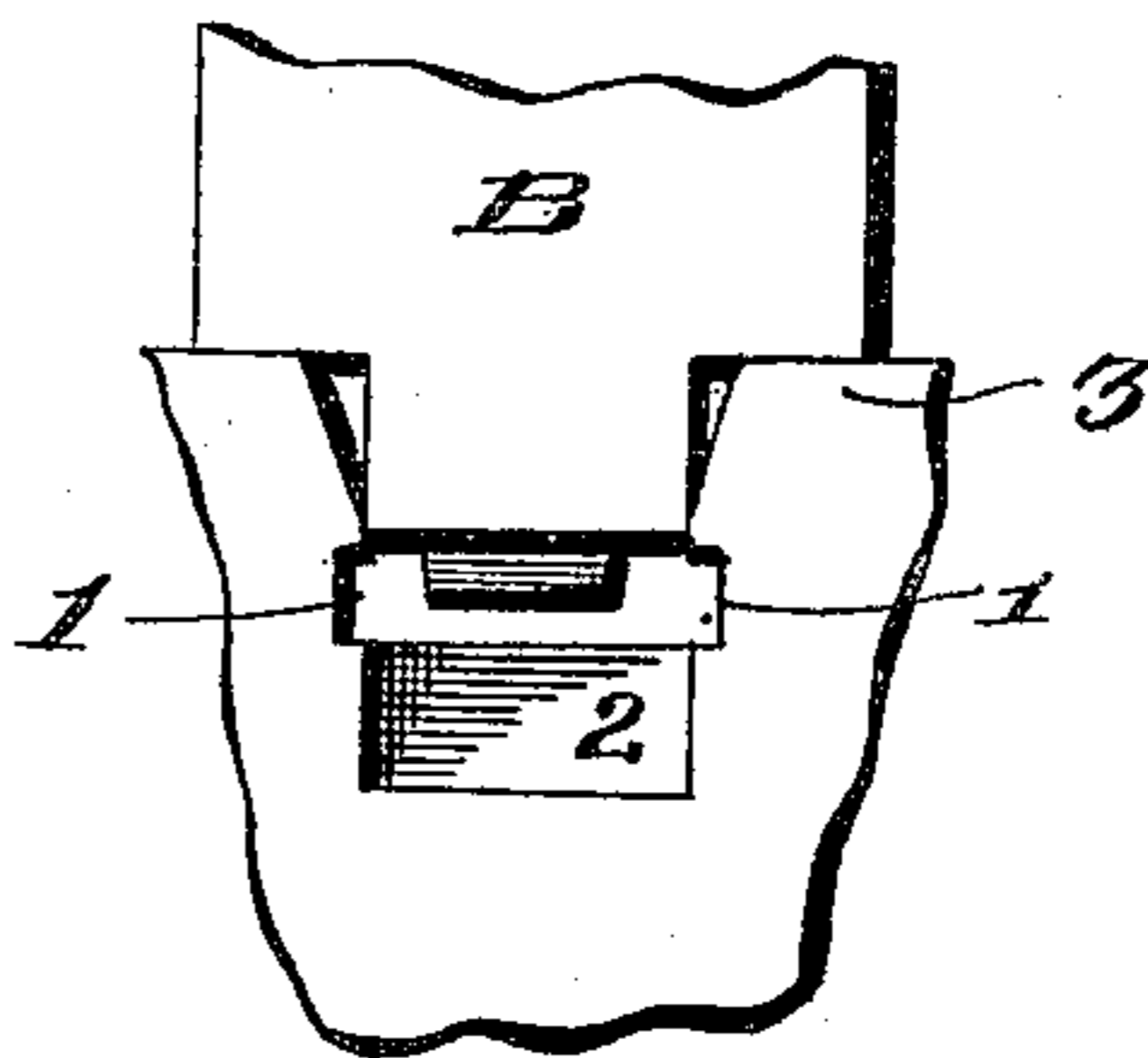


Fig. 8.



Witnesses
L. C. Hills.
E. W. A. Dick

Inventor
A. S. Capehart
by M. M. Bailey
Attorney

(No Model.)

2 Sheets—Sheet 2.

A. S. CAPEHART.
MATRIX BAR AND METHOD OF MAKING SAME.

No. 529,440.

Patented Nov. 20, 1894.

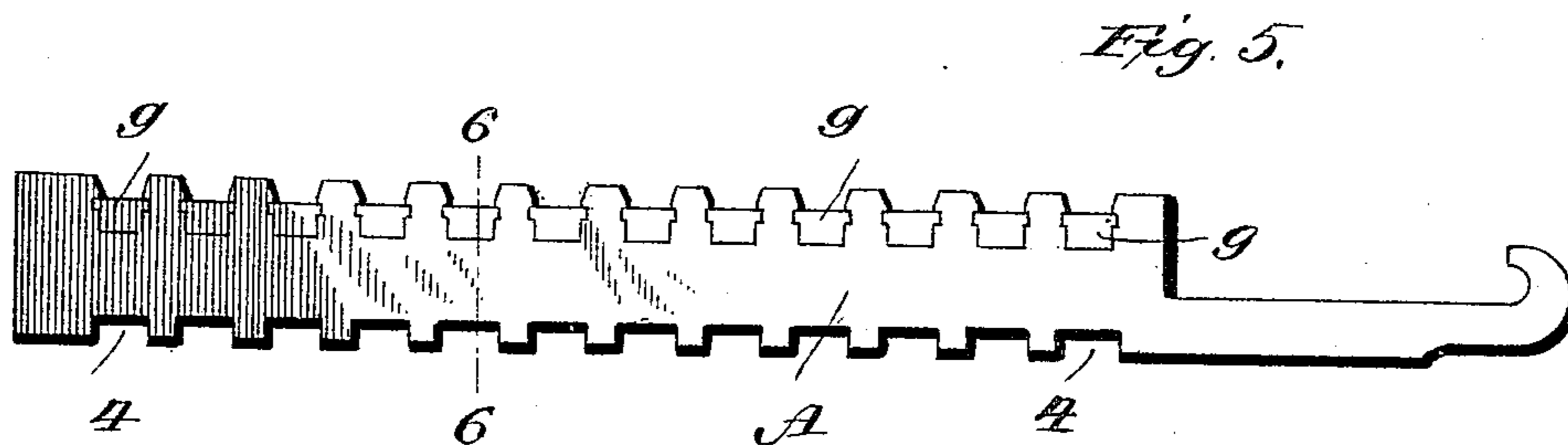
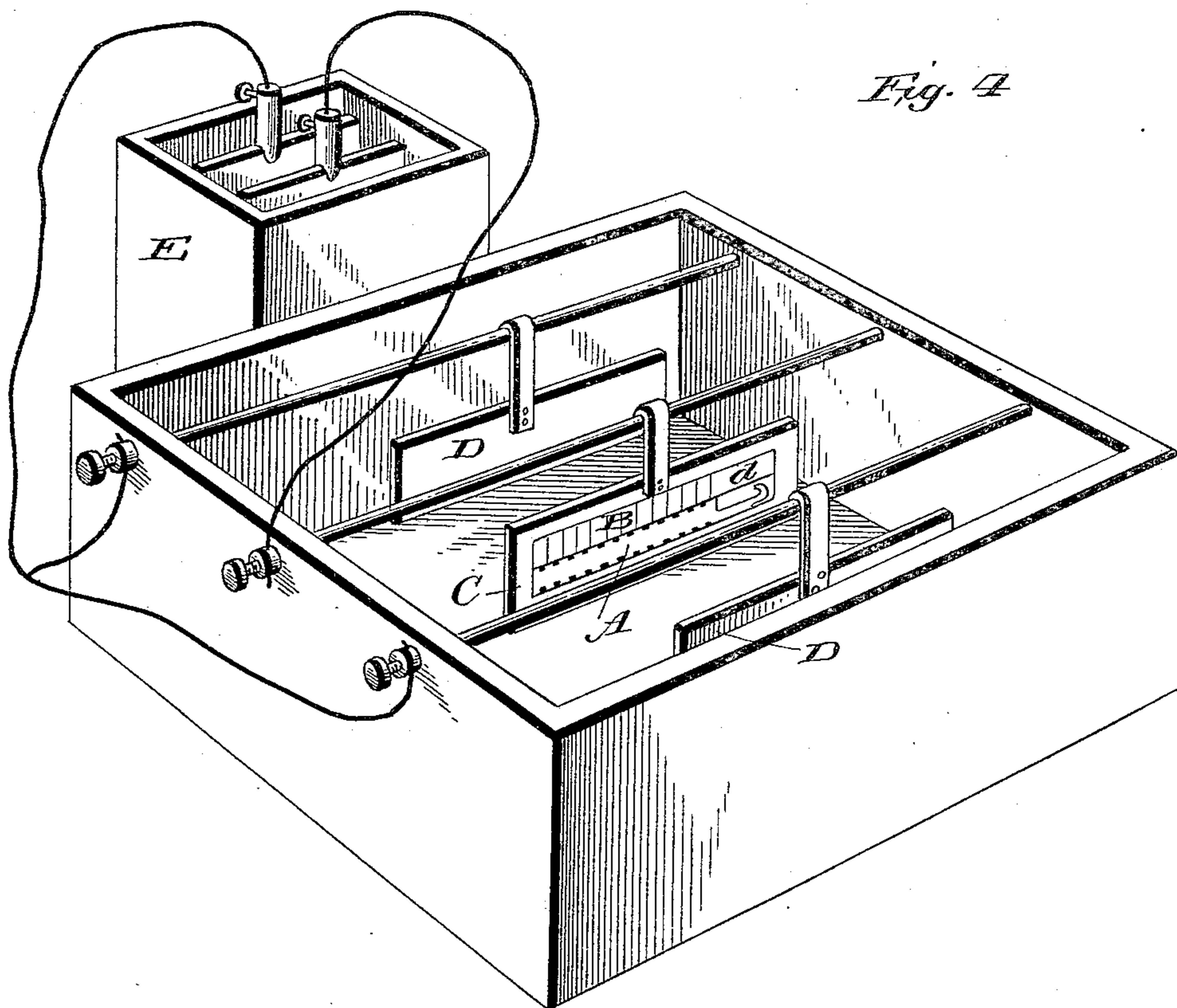
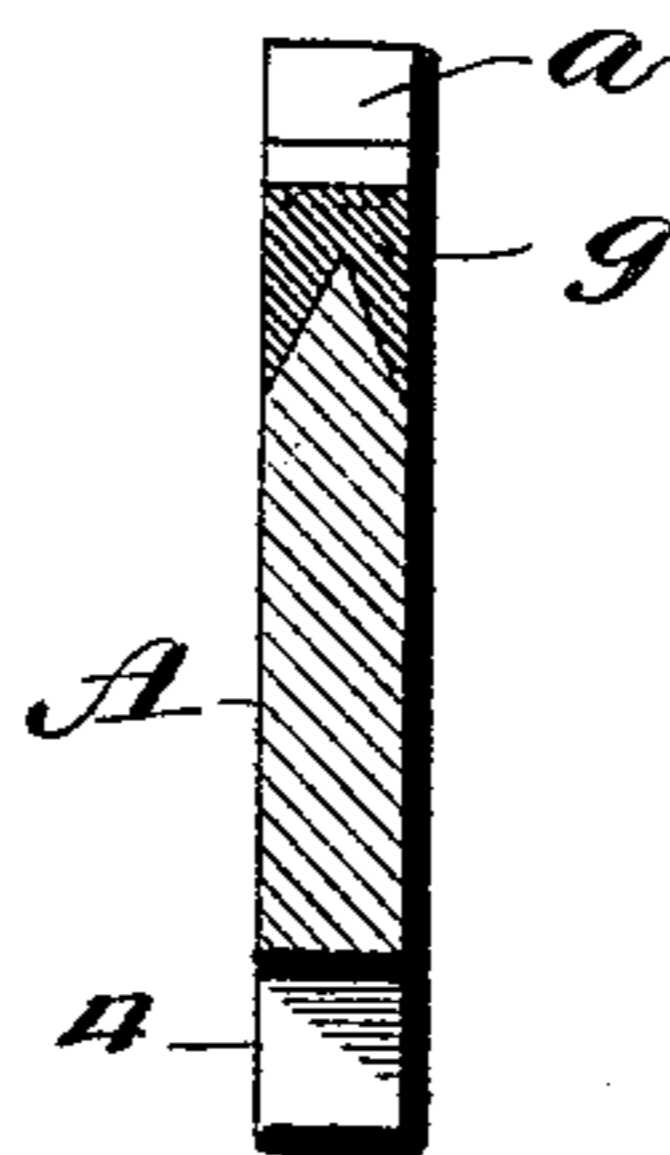


Fig. 6.



Witnesses
L. C. Mills
W. A. Dick

Inventor
A. S. Capehart
by *Marshall Daily*
his Attorney

UNITED STATES PATENT OFFICE.

ALEXANDER S. CAPEHART, OF BISMARCK, NORTH DAKOTA.

MATRIX-BAR AND METHOD OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 529,440, dated November 20, 1894.

Application filed March 9, 1894. Serial No. 503,023. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER S. CAPEHART, of Bismarck, in the State of North Dakota, temporarily residing in Washington city, in the District of Columbia, have invented certain new and useful Improvements in Type-Matrices or Matrix-Bars and in the Method of Making the Same, of which the following is a specification.

10 This invention has been designed with more particular reference to the production of type matrices or matrix bars such as are used in linotype or monoline machines for casting line bars, but it is applicable to the production of matrices of other forms. The intaglio, 15 made of copper, is produced by electro-deposition. This in a broad way is old; but the manner in which I carry out the process of electro-deposition, as well as the article which 20 is the product of that process I believe to be new with me. The article itself is a bar of brass or other suitable metal, the characteristic of which is that it is formed with one or more recesses which are open on three sides— 25 that is to say at the front and on the two side faces—and which contain the electro-deposit of copper forming the intaglio or intaglios. The copper is deposited in the recess or recesses, so as to fill the same and is there held, 30 each recess being undercut in such manner as to anchor the copper most firmly therein.

Taking for example a matrix bar such as used in the Scudder line casting machine illustrated in Letters Patent No. 506,198, of October 3, 1893, having in one edge a number of intaglio type, under my invention that bar 35 would be recessed in its edge at each point where a character should be placed, each recess being open at the front and on the two sides, and each recess would be filled by an electro-deposit of copper anchored in the recess with the side faces of the copper flush with the sides of the bar, and the intaglio character in the exposed front edge of the 45 copper. The intaglio would appear in a similar manner in single character matrices, such, for example, as those used in the Mergenthaler linotype machine, or in matrices or matrix bars each carrying the whole series of characters used, as in other kinds of line casting machines. To obtain this result the process I employ, generally speaking, consists 50

in inserting the male type or cameo into the recess in the matrix bar the proper distance with its type face opposite to, or confronting, 55 the closed or solid rear wall of the recess—said parts being held together in the desired fixed relation to each other in a frame which forms one electrode (the cathode) of a decomposing cell. This electrode thus formed and 60 arranged, and with all those parts of it coated and protected by insulating material save the parts where the deposit is to be made, is immersed in a suitable solution containing the opposite or copper electrode, preferably 65 consisting of two members placed one on each side of the cathode, and then, the circuit being closed between said electrodes and a battery or other suitable source of electrical energy (one pole of which is connected to the 70 central cathode and the other pole of which is connected in parallel to the two exterior copper anodes) the electro-deposit of copper is made from each side, filling the open portion of the recess or recesses in the bar, 75 around and upon the cameo end of the male type in each recess so far as the same is not protected by insulating material. As soon as the electro-deposit has been made the frame containing the type and bar is taken 80 from the bath, the type are withdrawn from the recesses in the bar and there remains in the mass of copper filling the perfect reproduction in intaglio of said type. The copper deposit itself is just about flush with the 85 sides of the bar and requires only a little rubbing on the stone to finish it up smooth and even.

To enable others skilled in the art to better understand my invention, I shall now proceed to describe with more particularity the manner in which the same is or may be carried into effect by reference to the accompanying drawings, in which—

Figure 1 is a view of a matrix bar having 95 in it a recess for the reception of the copper or other suitable metal to be electro-deposited therein—this matrix bar being one adapted to be used in the Scudder "monoline" machine hereinbefore referred to. Fig. 2 is a 100 cross section on line 2—2, Fig. 1. Fig. 3 is a plan of the bar and the male type co-operating therewith in the formation of the intaglio characters, mounted in a frame of conducting

material. Fig. 4 is a view of the decomposing cell in and by which the process of electro-deposition is effected. Fig. 5 is a view of the completed matrix bar. Fig. 6 is a section on line 6—6, Fig. 5. Figs. 7 and 8 are enlarged views of portions of the devices shown in Figs. 1 and 3 respectively.

The matrix bar A which usually is of brass has formed in it at the point where the intaglio characters are to appear recesses *a* of any suitable shape and dimensions. These recesses correspond in number to the characters which are to be borne by the matrix bar. They are formed in the front edge of the same as shown, extending through from side to side of the bar, and being open also at the front; and they are also undercut as at 1, and have at the rear a beveled edge 2, the bevel being from each side toward the middle, thus giving this rear face a wedge shaped cross section as seen in Fig. 2. By giving to the recess this or an analogous shape I insure the electro-deposited metal from displacement in any direction and interlock it most securely with the body of the bar. The beveled projections 3 on the bar between the points where the intaglio characters are to appear, are those usually provided on bars of this general kind for the entrance of the nozzle of the mold in which the casting is effected, and they form no part of my invention.

The bar thus prepared is placed in a brass or other suitable metallic rectangular frame C, Fig. 3, and the male type B are also mounted therein with their character ends entering the recesses *a* from the front and projecting a suitable distance therein, facing the solid rear walls of the recesses. The parts are conveniently thus assembled by placing the frame C flat upon a smooth and perfectly level steel or other bed, and, while the frame is in this position, first placing therein the male type separated accurately from each other by spaces or quads which correspond in thickness to the distance which intervenes between adjoining recesses in the bar. I also propose to form that edge of the frame C, which adjoins the rear edge of the matrix bar with projections *c* to accurately fit the aligning notches 4 in the rear edge of the matrix bar; and I also provide a filling piece *d*, made in one or more pieces, which accurately fits around the matrix bar and fills all that space included within the rectangular frame beyond the type B which is not filled by the matrix bar.

The type B are made conveniently of type metal although they may be made of any other suitable material; and the same is true of the filling piece *d*. The quads or spaces separating the type B from each other may be made separate from the type, but in order to avoid multiplying joints I prefer to form the same in one with the type as shown at *b*.

The type, and filling piece *d*, together with the projections *c* of the frame form in effect a mold to accurately fit around the matrix bar.

The front end of each type (the end on which the cameo face is formed) accurately fits and fills the mouth of the recess *a* to which it is applied and projects beyond that point into the recess the distance required.

When the parts are thus prepared and fitted together, we have a composite plate, in which the only openings are the yet unfilled portion of the recesses *a*, as seen in Fig. 3; and the copper deposit is to be made in these openings. To this end, all portions of the composite plate on both faces are waxed or covered with a film or coat of insulating material excepting those points where the deposit is to be made. The plate thus prepared is suspended in a bath as shown in Fig. 4, forming a cathode which is electrically connected to the appropriate pole or terminal of a battery E. To the other pole of the battery are connected the copper electrodes D, placed preferably one on each side of the electrode C and opposite to the openings or recesses *a* in the matrix bar, and connected in parallel to the battery. These electrodes are of course suspended in a suitable solution such as used in analogous electrolytic processes. Circuit being closed, electro-deposition commences from both sides and the copper deposit is gradually built up in the openings and around the cameo faces of the type as far as permitted by the insulating coating, until the recesses are solidly filled and the cameo faces of the type are reproduced in intaglio in the solid copper filling. As soon as this has been done, the plate or type form is taken out of the bath, the type and matrix bar are removed from the frame, and the type are withdrawn from the matrix bar. This in effect completes the operation. There need be little or no excess of copper deposit; and whatever slight excess there may be, amounting only to a mere spongy appearing fringe, can be quickly and readily removed by rubbing down the sides of the matrix upon the stone, or in any other suitable manner. I thus produce a finished bar such as shown in Figs. 5 and 6, with a solid copper deposit *g* filling and firmly anchored in each recess, and bearing in its front face the intaglio desired.

If desired the aligning notches 4 in the rear edge of the matrix bar need not be formed until after the electro-deposit of copper has been made, in which event of course the projections *c* of the frame C would be surplusage.

Having described my invention and the manner in which the same is or may be carried into effect, I state in conclusion that I do not limit myself to the special details hereinbefore set forth in illustration of my invention. Manifestly the same can be considerably varied by the skilled mechanic according to the kind of matrix or matrix bar to be produced.

The invention, as hereinbefore indicated, is applicable to the production of all kinds of

matrices, whether single character matrices, logotypes, or matrix bars carrying each a plurality of distinct and separate characters. I deem it however of peculiar value as applied to bars of the last mentioned kind. Heretofore so far as I am informed the characters have been produced in such bars by stamping them, and this operation, owing to the number of characters and their varying sizes and shapes, is very apt, even when conducted with the greatest care, to result in a distortion of the bar which is prejudicial to satisfactory and accurate results.

Under my invention all danger of distortion is prevented, the utmost accuracy is insured, and the cost of manufacture is largely reduced.

I here remark that I have named specifically copper as a filling for the recesses and for bearing the intaglio, for the reason that it is the metal which is most commonly employed in electro-typing processes, and most suitable for the uses herein contemplated. Still it is manifest that by varying in the decomposing cell the nature of the solution as well as of the electrodes in accordance with formulas well known in electro-metallurgy, the electro-deposit may consist of other metal than copper; and I desire to be understood as including any such obvious modification in my claims.

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

1. A matrix or matrix bar, the body of which is formed with a recess open at the front and on the two sides, and containing a filling of metal electro-deposited therein and having

in its front the desired intaglio character, as set forth.

2. A matrix or matrix bar, the body of which is formed with an undercut recess open at the front and on the two sides and containing a filling of metal electro-deposited therein and bearing on its front the desired intaglio character, as set forth.

3. A matrix bar the body of which has in one edge a plurality of separate and independent recesses, each open at the front and on the two sides of the bar and containing a filling of metal electro-deposited therein and having in its front the desired intaglio character, as set forth.

4. The method herein described of manufacturing matrices or matrix bars, which consists in forming in the body of the matrix or matrix bar a recess open at the front and on the two sides, inserting into the open mouth of the recess the male type or character so that its cameo face shall project a suitable distance into the recess and toward the rear wall thereof, protecting the type and bar by insulating material except at the points where the electro-deposit is to be made, and then electro-depositing a suitable metal so as to fill the recess and produce in intaglio the type character, substantially as and for the purposes hereinbefore set forth.

In testimony whereof I have hereunto set my hand, before two subscribing witnesses, this 8th day of March, 1894.

ALEXANDER S. CAPEHART.

Witnesses:

EWELL A. DICK,
ROBT. W. COX.