

E. D. CLAPP & F. VAN PATTEN.
Dies for Forging Carriage-Axles.

No. 151,959.

Patented June 16, 1874.

Fig. 1

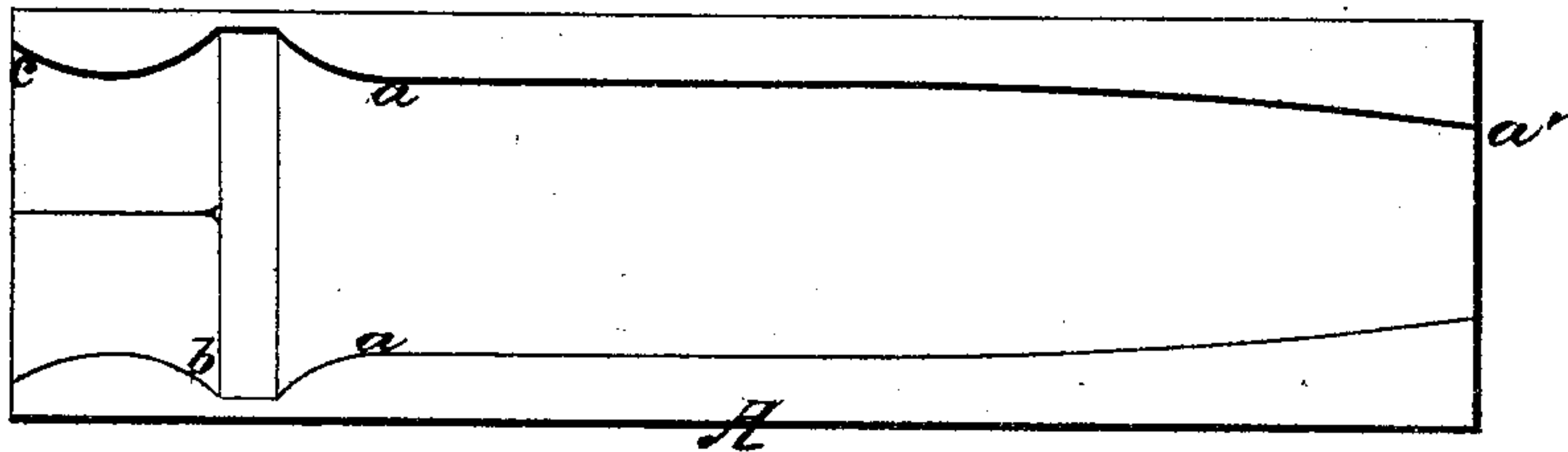


Fig. 2

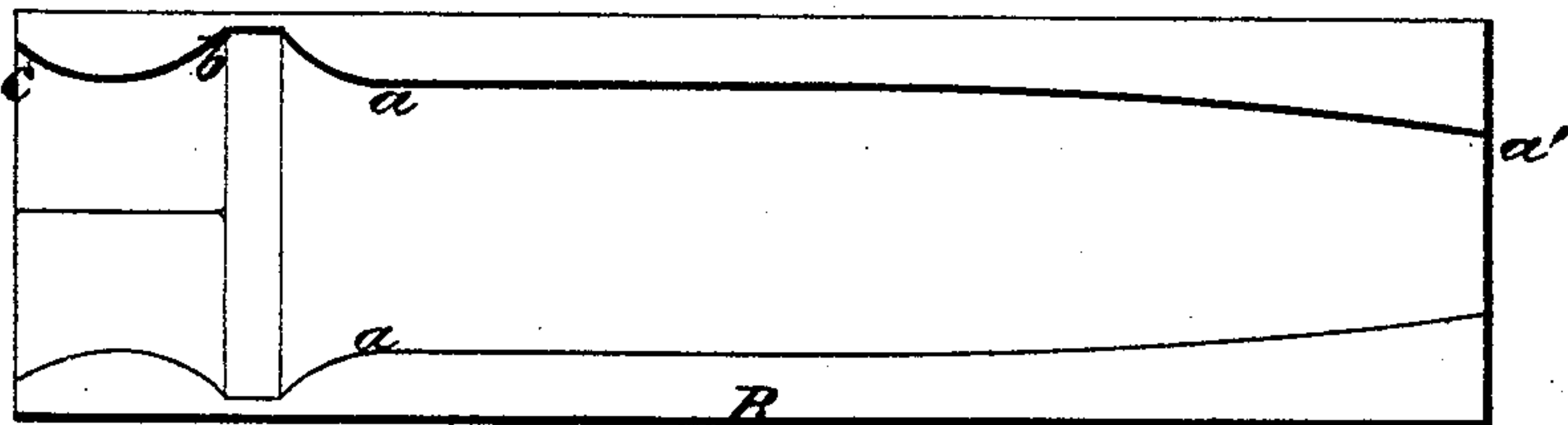


Fig. 3

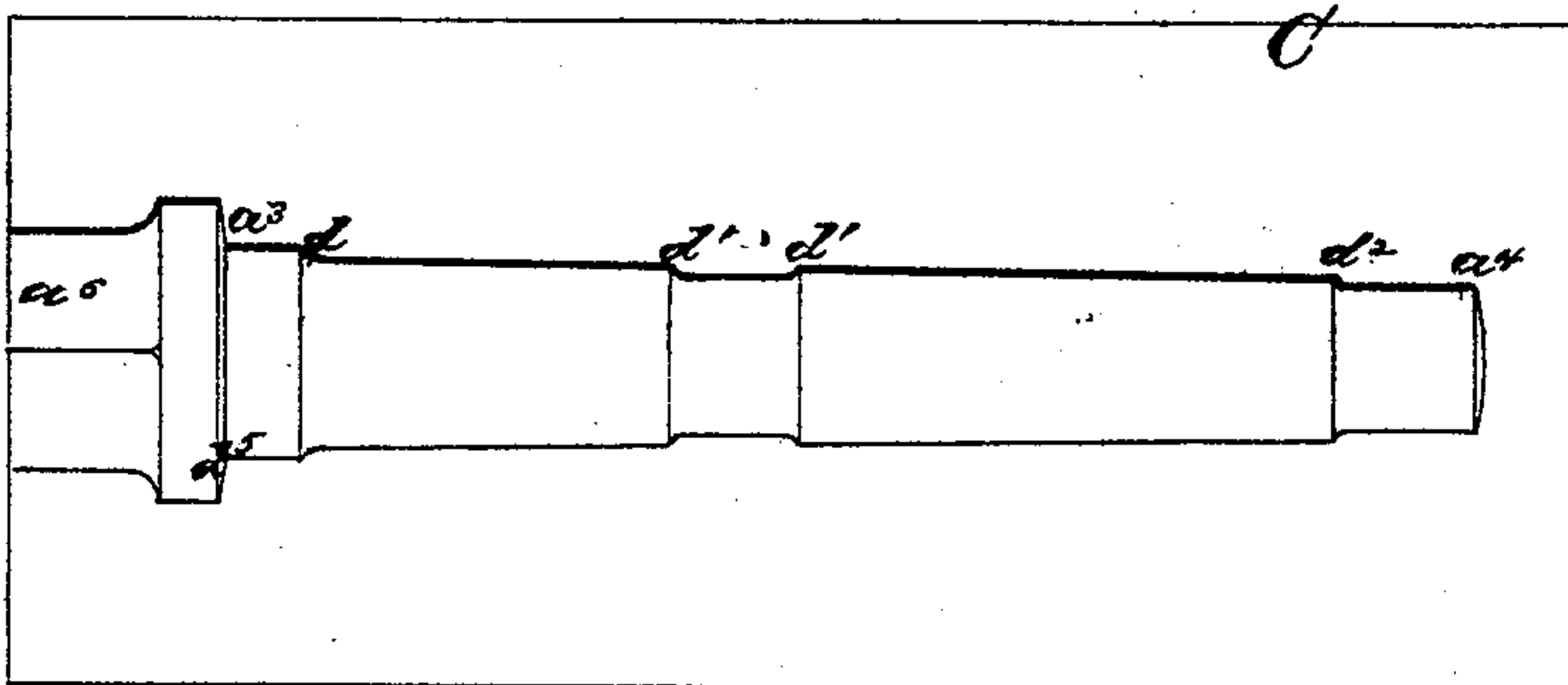
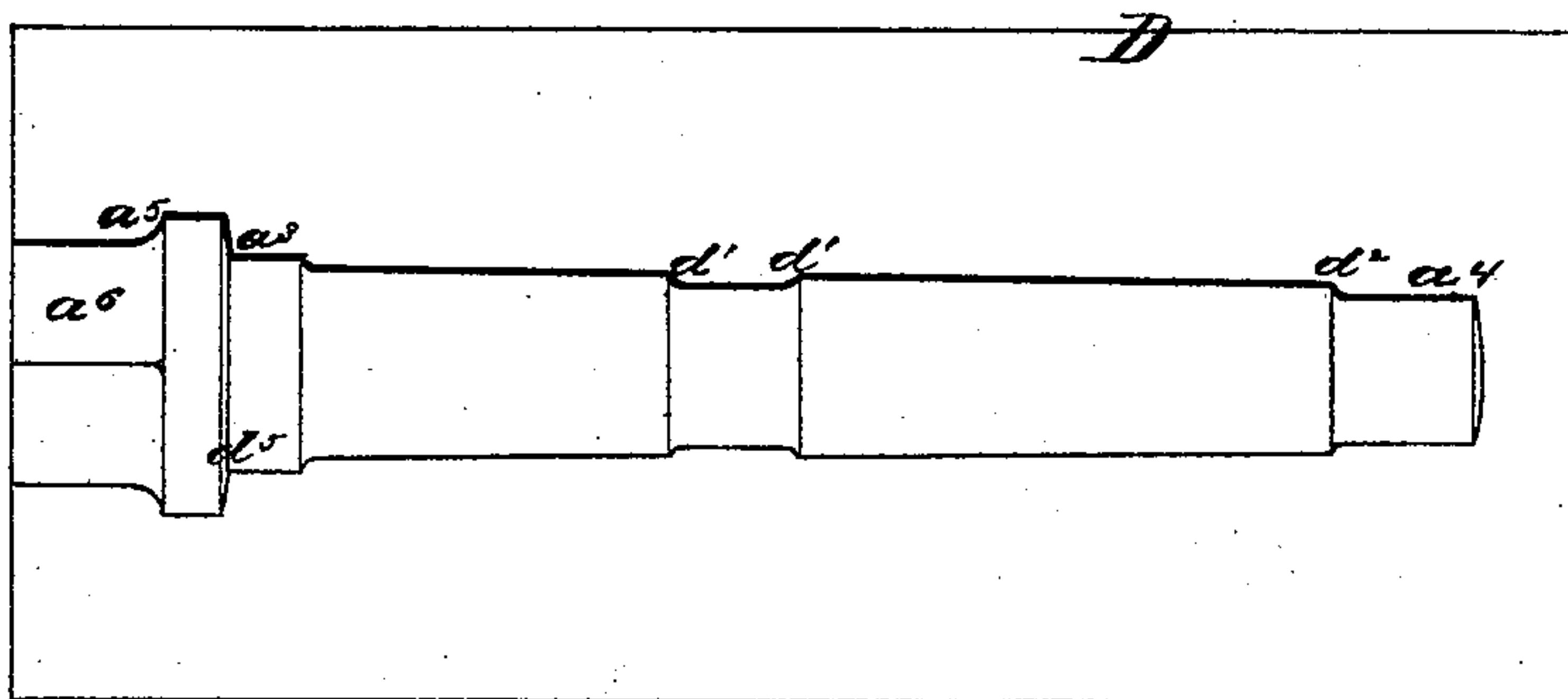


Fig. 4



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Fig. 5

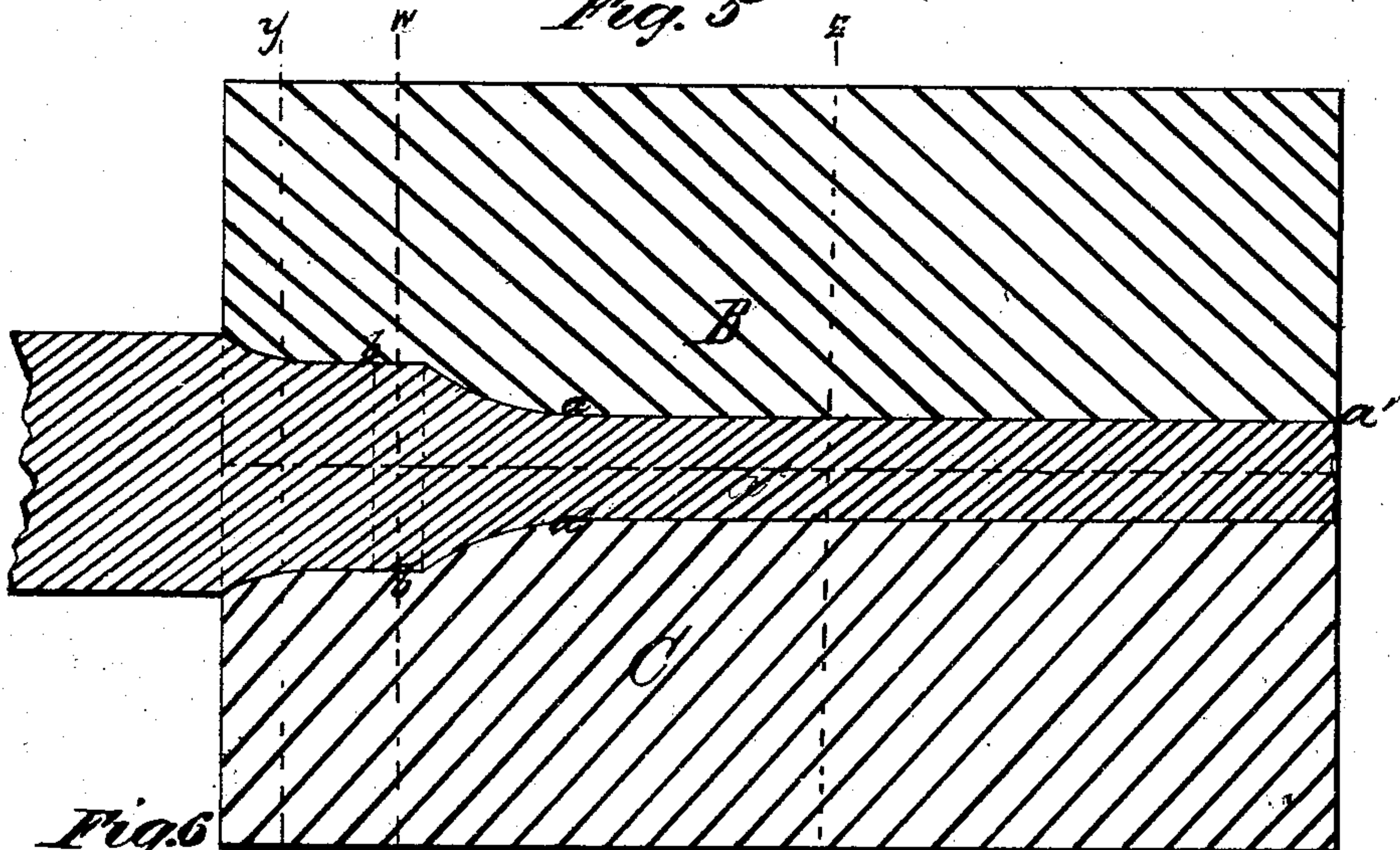


Fig. 6

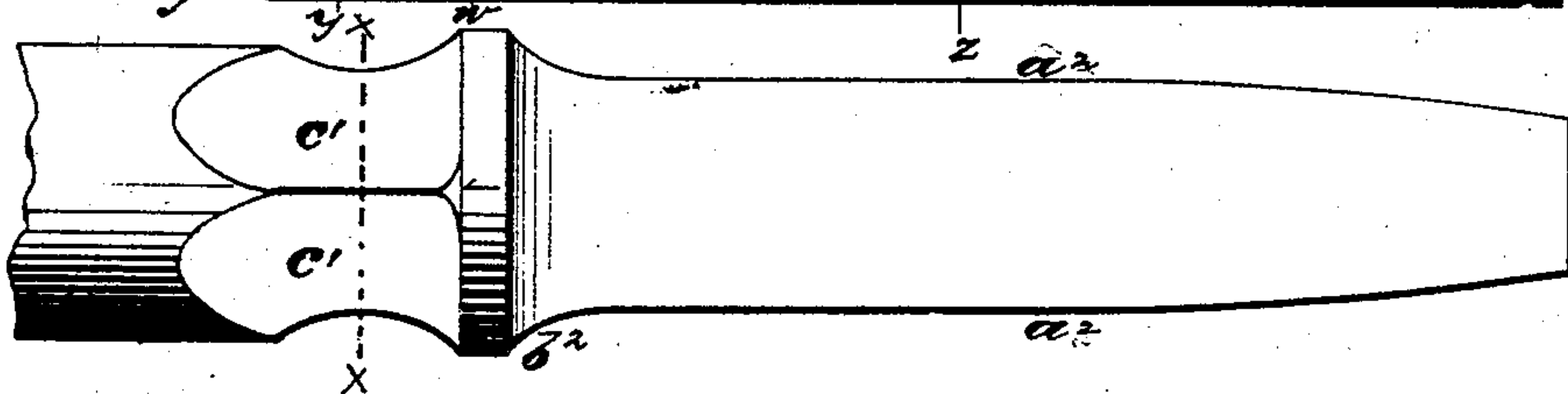


Fig. 9

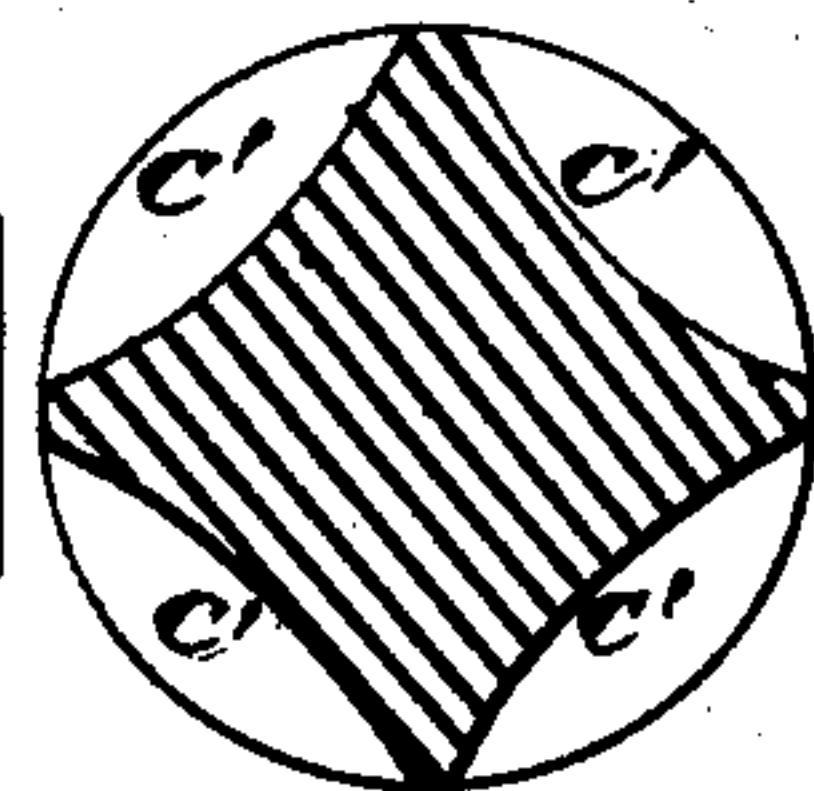


Fig. 7

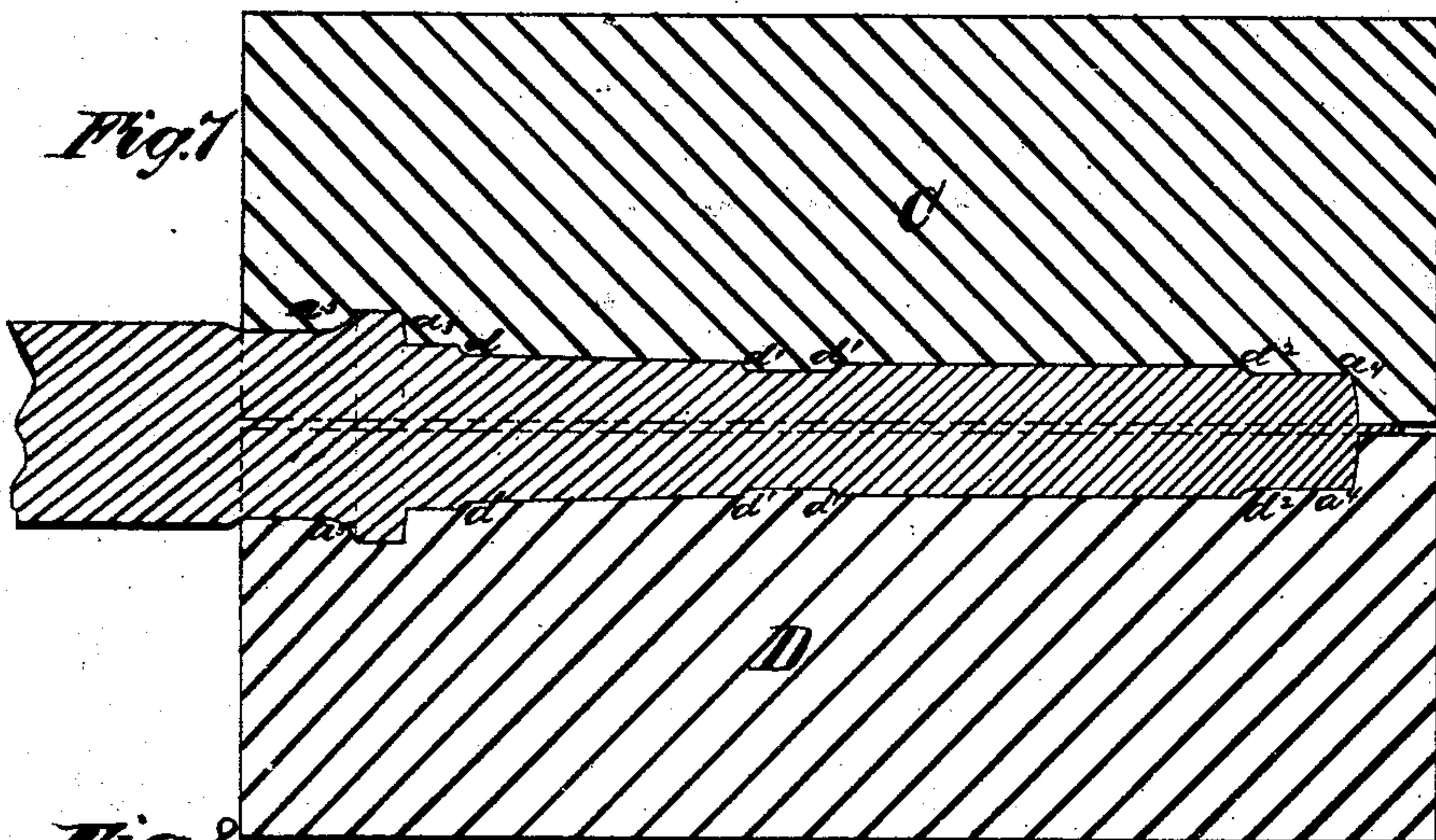
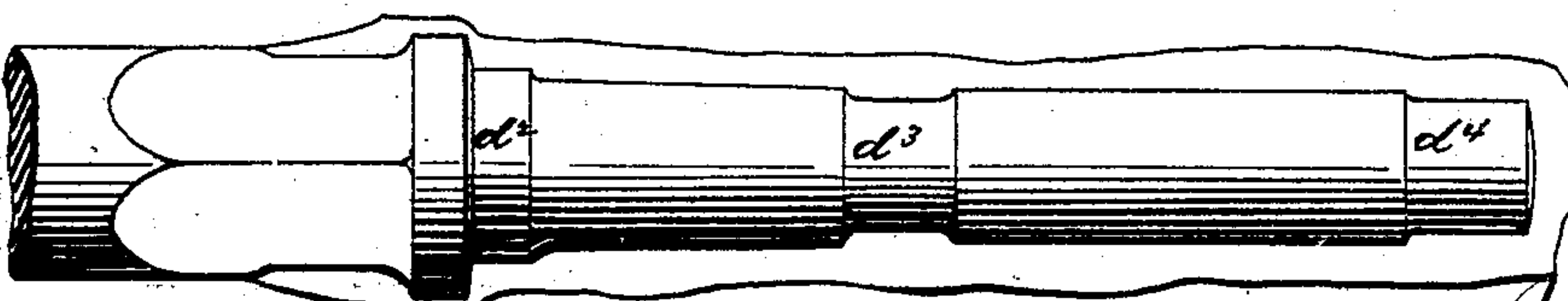
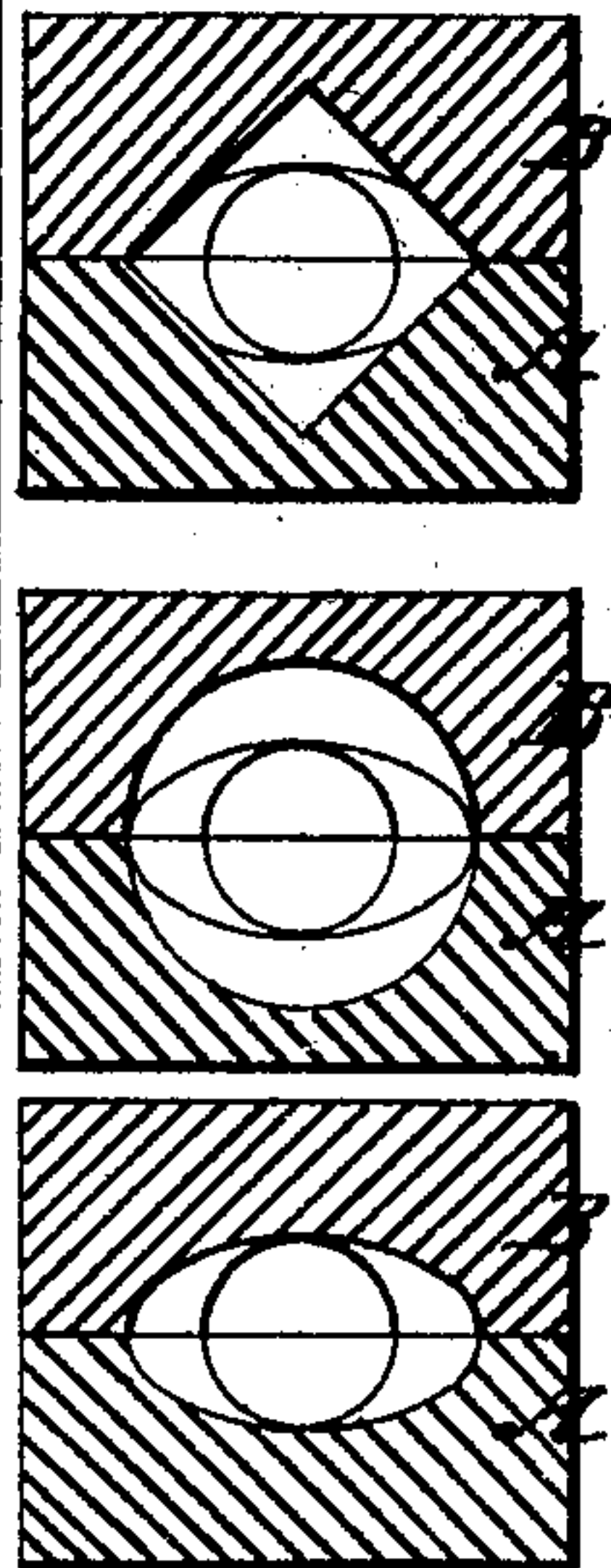


Fig. 8



Figs. 10, 11, 12



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UNITED STATES PATENT OFFICE.

EMEROUS D. CLAPP AND FREDERICK VAN PATTEN, OF AUBURN, NEW YORK.

IMPROVEMENT IN DIES FOR FORGING CARRIAGE-AXLES.

Specification forming part of Letters Patent No. **151,959**, dated June 16, 1874; application filed January 6, 1874.

To all whom it may concern:

Be it known that we, EMEROUS D. CLAPP and FREDERICK VAN PATTEN, of Auburn, in the county of Cayuga and State of New York, have invented a new and useful Improvement in Dies for Forging Carriage and Wagon Axles; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a top view of the lower half of the break-down die. Fig. 2 is an inverted view of the upper half of the said die. Fig. 3 is a top view of the lower half of the shaping and finishing die. Fig. 4 is an inverted view of the upper half of the said die. Fig. 5 is a vertical central section of the upper and lower halves of the break-down die brought together and operating upon a bar of metal. Fig. 6 is the bar of metal as shaped by the die shown in Fig. 5. Fig. 7 is a vertical section of the upper and lower halves of the finishing and shaping die brought together and operating upon the bar of metal shown in Fig. 6. Fig. 8 is a bar of metal shown in Fig. 6 as finished by the die shown in Fig. 7. Fig. 9 is a transverse section of the "break-down bar" in line $x x$, Fig. 6. Figs. 10, 11, and 12 are transverse sections of the break-down die in dotted lines $y y$, $w w$, and $z z$ of Fig. 5.

The nature of our invention consists, first, in a certain construction of the die for breaking down the metal of the bar, which forms a carriage or wagon axle, whereby the square form back of the collar can be produced, and the necessary metal to form the collar upon the axle is at the same time properly distributed to fill the collar-forming portion of the finishing-die when the break-down is subsequently brought under the operation of said die. It consists, second, in a certain construction of the finishing-die, whereby axles are forged with a square form back of the collar, and with the collar upon them at one heat of the forge, as will be explained.

In the accompanying drawings, A represents the lower, and B the upper, die-block of the break-down die. In each of these blocks is formed a cavity, a , a^1 , b , and c . That portion of the cavity which is between a a^1 is of a ta-

pering and outwardly-bulging form longitudinally, and of elliptical form transversely. From a to b the cavity is increased in diameter by cutting away the metal gradually on curved lines and terminating these curves in a straight line, which unites the two curves; and from b to c the cavity is made with an inwardly-bulging form, but without any taper, and in transverse section is of semi-diamond or a V-shaped form. The cavity in the break-down die-blocks gives a bar of metal, introduced between the blocks, the swelled taper form a^2 a^2 , and forms the shoulder b^2 and the flat concave surfaces c^1 , and thus prepares it for properly filling the different parts of the finishing-die, and especially for filling that portion which forms the collar on the axle-arm. The finishing die-blocks C D are each formed with a cavity, the cavity of one block corresponding exactly with that of the other. From a^3 to a^4 this cavity is of taper form, and at different parts of this portion of the cavity shoulders d d^1 d^2 are formed, so as to give the axle the form shown at d^2 d^3 d^4 . From a^3 to a^5 the cavity is increased in diameter, and is of a cylindric form between said points. The die-cavity at a^4 is made with a shoulder, or an abutment, or upsetting end, which may close upon the whole of the face end of the arm, as shown, or be perforated, if desired, with a small hole, in which the metal may be squeezed, in order to form a teat or end to facilitate centering the axle in a turning-lathe. This is done in order to determine the length of the arm, and also prevent the bulk of metal from passing along beyond this point, and thus the filling of the whole die-cavity with the metal is insured. The junction of the cylindrical portion with the taper portion is made by a flat-sided shoulder, d^5 . On the opposite side of this flat shoulder the cavity is made with a curved shoulder, which runs into a diamond or V-shaped termination, a^6 , of the cavity, as shown.

It will be apparent that the break-down produced from the die-blocks A and B will, when placed edgewise between the blocks C and D, present those portions of metal which have been thrown out at different parts of its length to those parts of the finishing-die cavity which are designed to receive them, and, therefore, when the upper die-block D is struck, in ordi-

nary manner of forging, those portions of metal which are to form the respective parts of the axle-arm will be made to fill the different parts of the cavity in the most perfect manner, while the surplus metal will take the form of a thin fin between the flat portions of the blocks outside of the margin of the cavity.

We find the diamond form for that portion of the die-cavity block of the collar-cavity to be very important, as it brings the fins on the corners of the square, at which points they can be trimmed off without showing that any fins were ever there. Further, in parting the dies to make a square, the diamond shape not only makes the "draw," which all dies require, to prevent the iron from sticking, but it also makes the article true.

With our break-down die, the metal is distributed in proper form to fill the finishing-die and ensure the proper forging of the axle-arm with the collar upon it at one heat.

We are aware that there are many different processes for forging axles with collars, but with all it is necessary to use much larger iron than with our process.

With our dies, after the piece of iron is broken down suitable for the finishing-die, the exact length of arm is secured by the first blow, according to the impressions in the dies, and after that the distributed metal is forced into the different parts of the cavity by each successive blow until the dies are filled and the axle-arm with the collar upon it properly formed.

We are not aware that axles with a square form back of the collar and with collars upon them have ever been forged by drop-dies alone, and from a bar of metal, which is held stationary until the collar portion of the cavity is filled and the square impression back of the collar has been made upon the bar.

A few of the advantages are, first, we form a given-sized collar with metal of very much

less diameter. Ordinarily one-inch axles are drawn from one and seven-eighths round iron. By our process the same axle can be forged from one and three-eighths round iron. Second, very much less expense is incurred in drawing out the bed portion of the axle from the back of the collar. Third, the circular part of the axle is formed with greater accuracy in size and length than can be done in rolling the blank, we being enabled to form the square and collar of exactly the length required at one heat. Fourth, one man alone can forge six hundred pieces in ten hours, while with the rolling process it is necessary, when drawing out, to have two men besides the heater to perform the work.

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

1. The break-down die, constructed as described and shown, with the longitudinally-bulging and transverse elliptical cavity for forming the arm, and the cavity for forming the collar, as described and shown.

2. The finishing-die, in which the arm or spindle of the axle and the collar thereof are formed simultaneously, constructed with a centering-cavity, a collar-cavity, and a spindle or arm cavity, and with an abutting or upsetting end at a^4 , which latter determines the length of the arm and insures the filling of the die-cavities with the metal, substantially as described and shown.

3. The upsetting or break-down die, constructed as described, in combination with the die which centers, determines the length, and finishes the square, the collar, and the arm of the axle, substantially as described.

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