

(No Model.)

2 Sheets—Sheet 1.

F. H. SMITH.

APPARATUS FOR UPSETTING EYE BARS.

No. 387,822.

Patented Aug. 14, 1888.

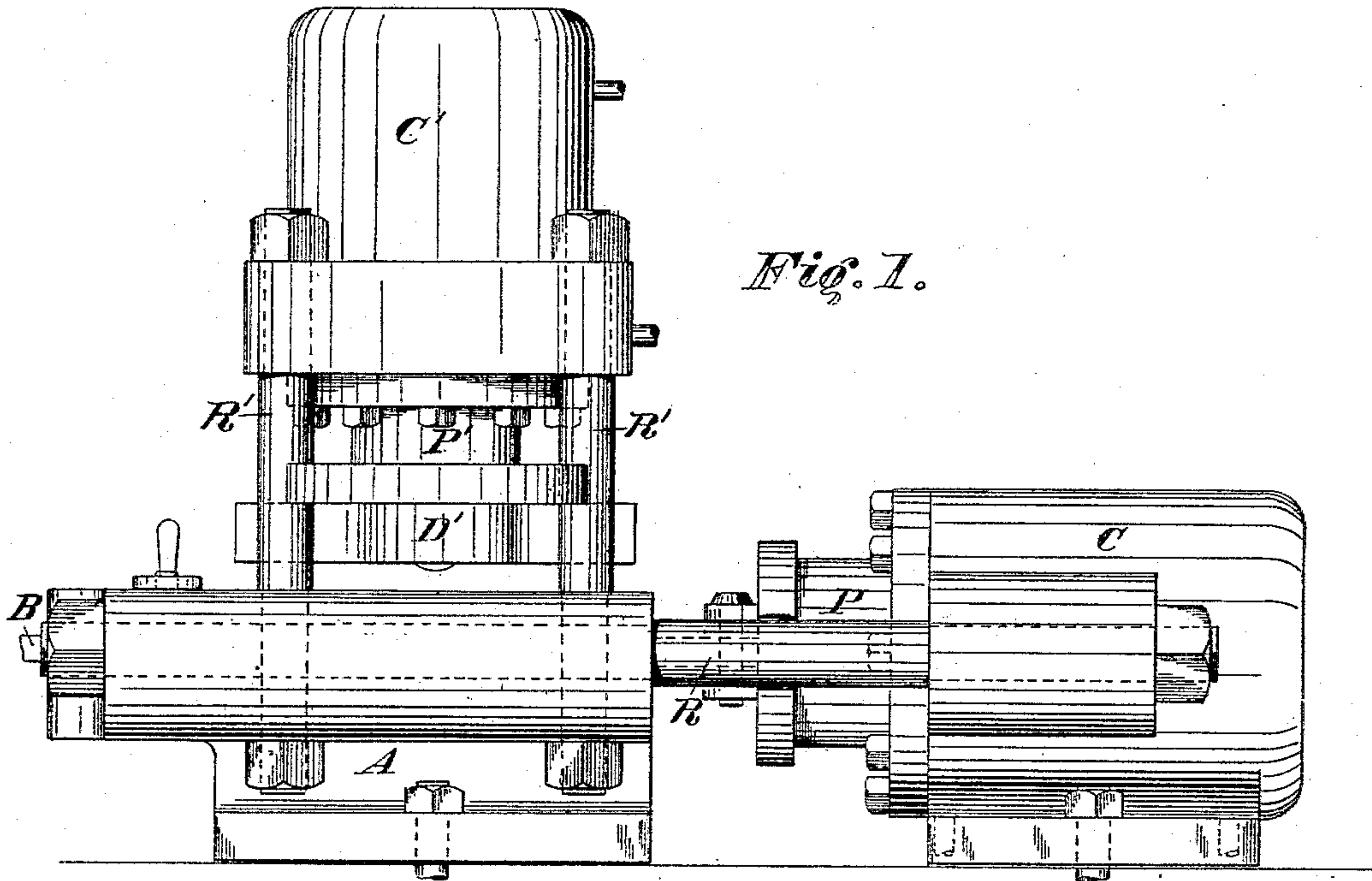


Fig. 1.

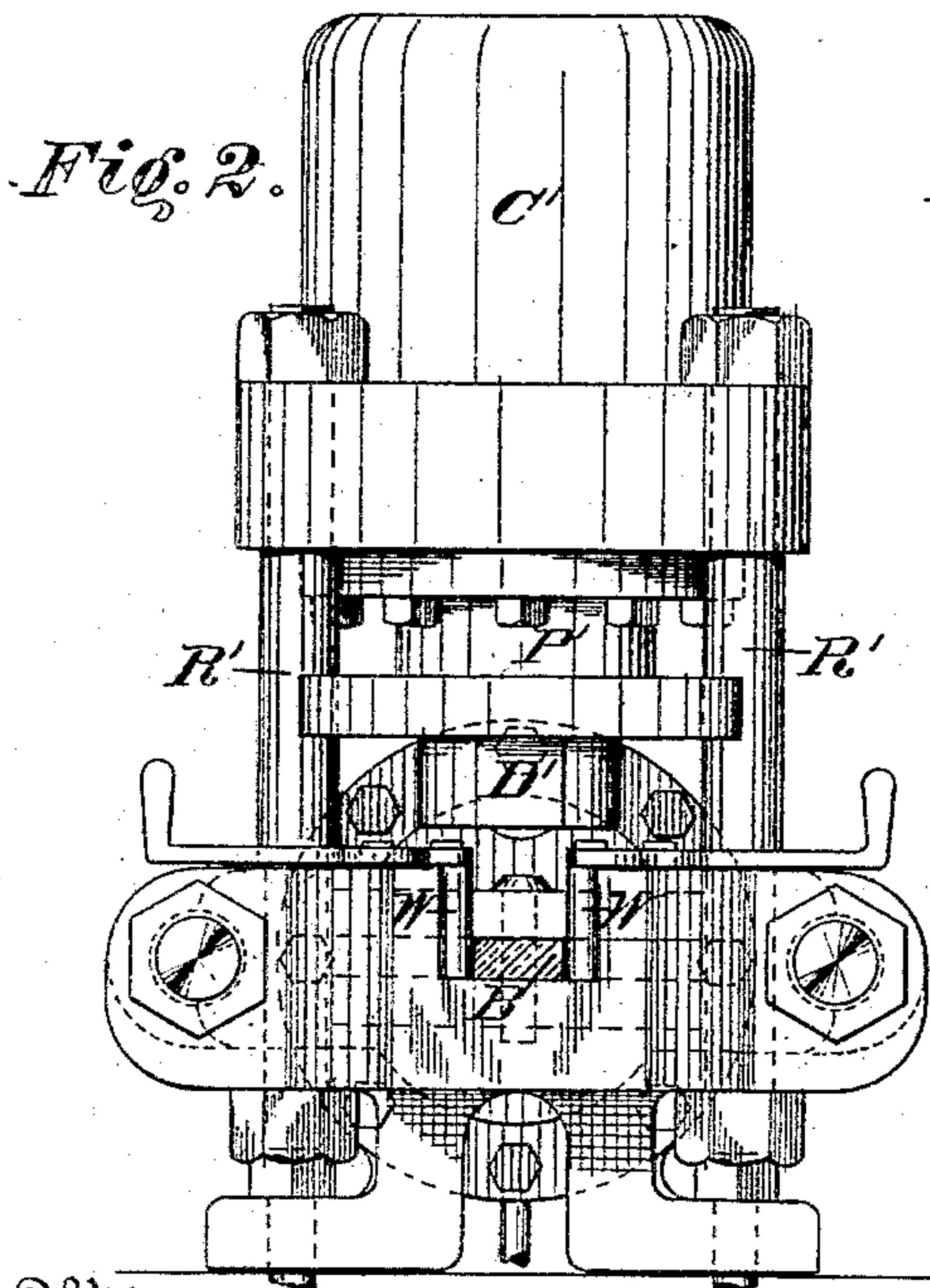


Fig. 2.

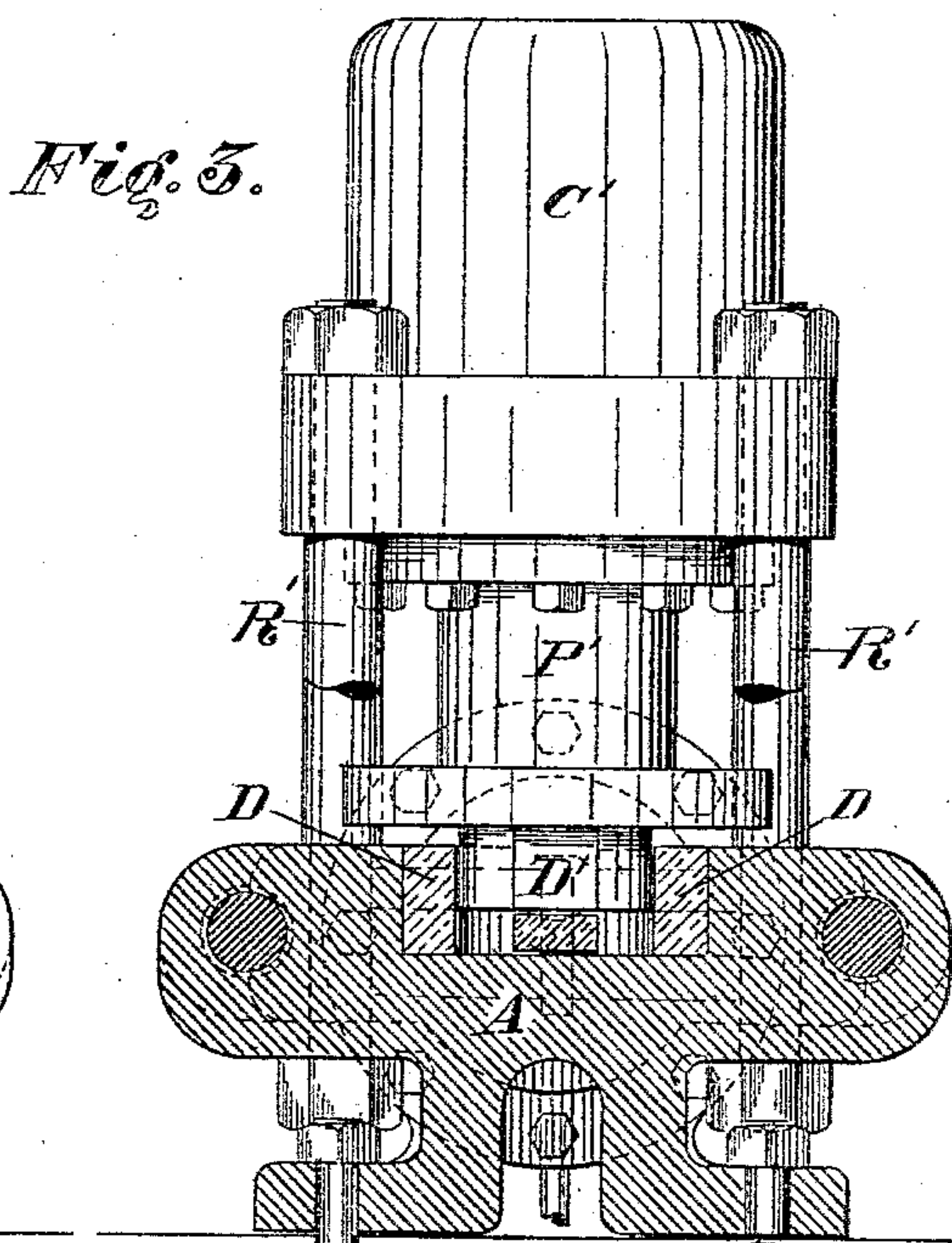


Fig. 3.

Witnesses

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Inventor.

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(No Model.)

2 Sheets—Sheet 2.

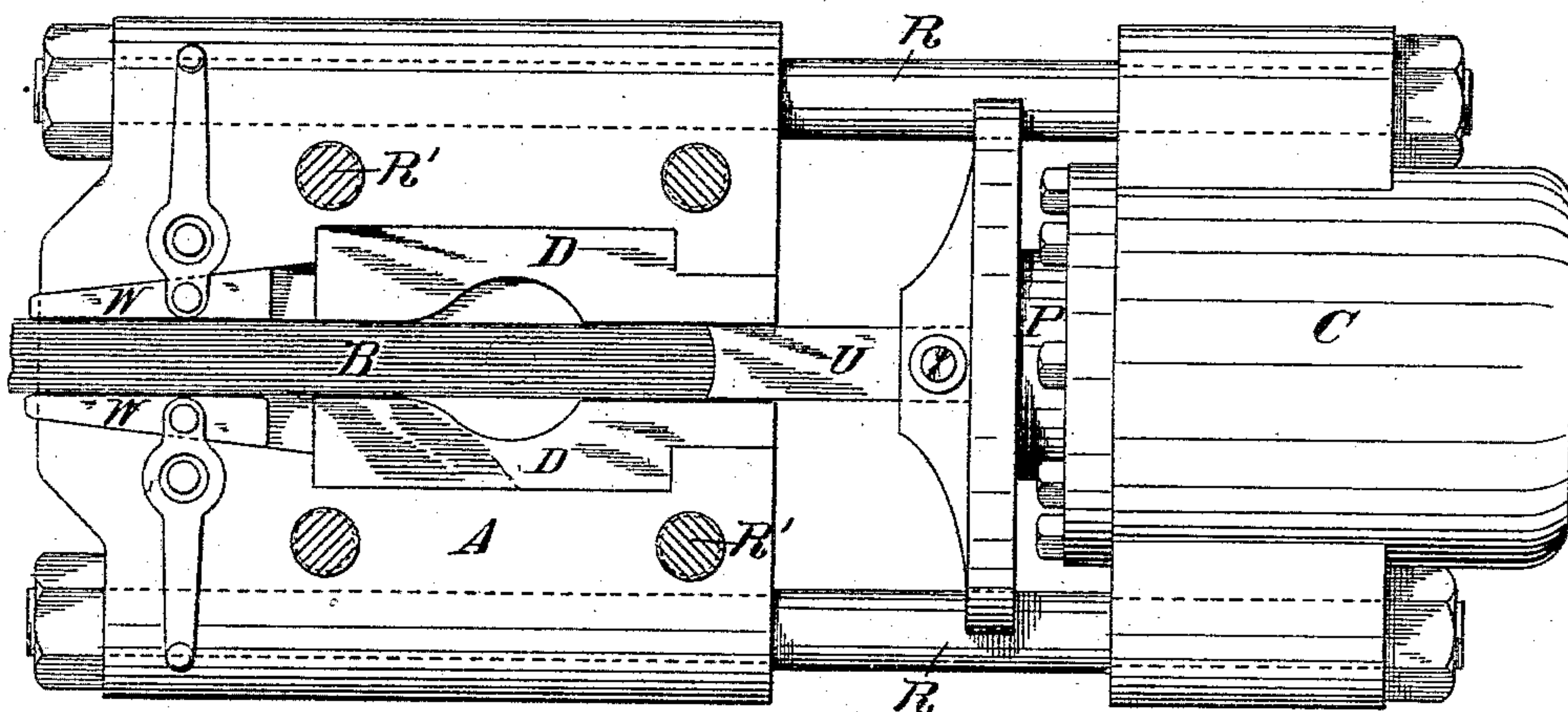
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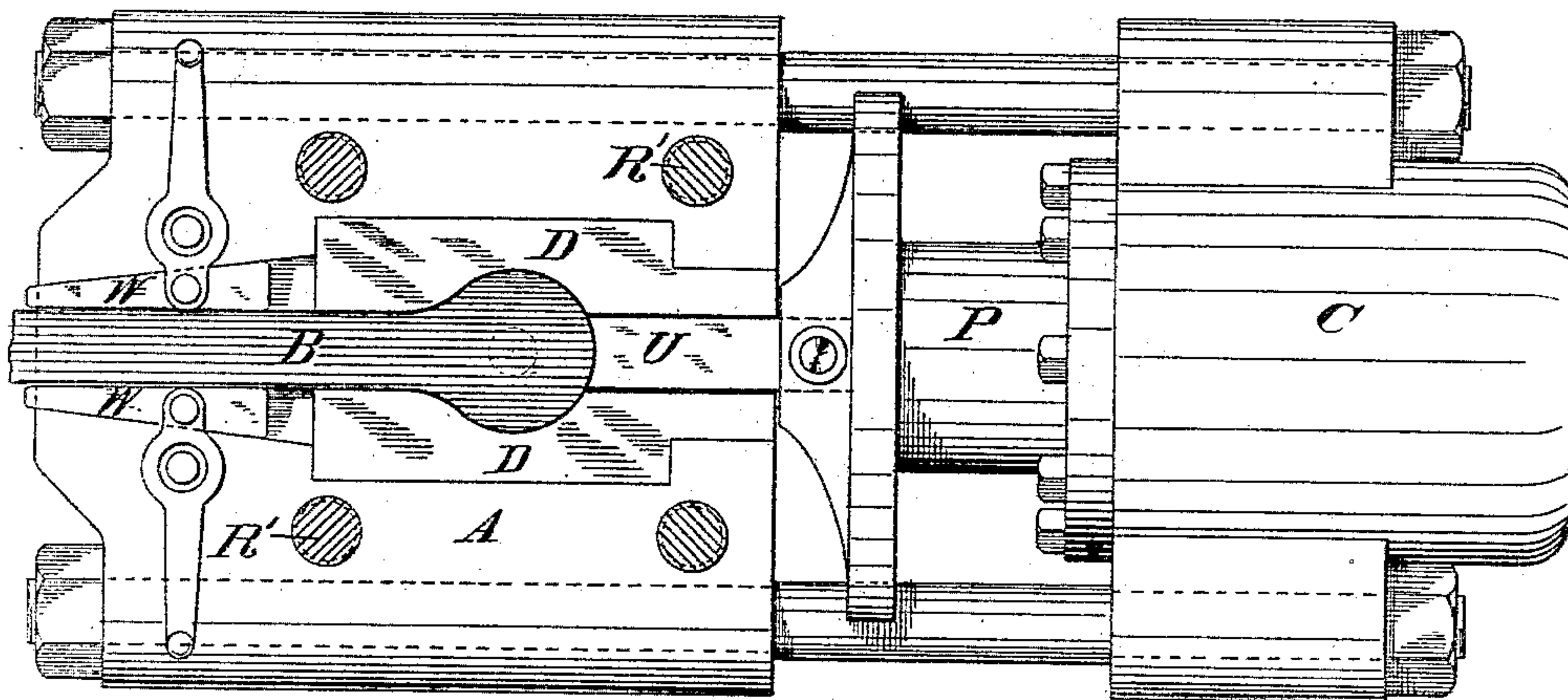
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*Fig. 4.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

FREDERICK H. SMITH, OF BALTIMORE, MARYLAND.

## APPARATUS FOR UPSETTING EYE-BARS.

SPECIFICATION forming part of Letters Patent No. 387,822, dated August 14, 1888.

Application filed December 2, 1887. Serial No. 256,803. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK H. SMITH, a citizen of the United States, residing in the city of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Upsetting and Die-Forging Enlarged Ends on Metallic Bars for Use as Eye-Bars and for other Purposes; and these improvements are explained in the following specification and shown in the accompanying drawings.

Figure 1 is a side view of my improved apparatus, showing the horizontal and vertical movements at about half-stroke. Fig. 2 is a front view of the same, showing the vertical movement at half-stroke. Fig. 3 is a front view of the same, showing the vertical movement on the full downward stroke, and in this figure the front portion of the anvil and of the female die is cut away in order the better to show how the compressing male die slides down vertically within the female die. Fig. 4 is a plan view of the bed of the anvil, showing the horizontal movement at the beginning of its stroke; and Fig. 5 is also a plan view, showing the horizontal movement at the end of its stroke; and in both these plan views the overhead portion of the apparatus is omitted in order the better to show the female die, the gripping appliances, and the upsetter and its action.

In all these figures similar letters refer to similar parts.

A is the anvil upon which the forging is to be done.

D is the female die within which the forging is to be done.

U is the ram which upsets the heat-softened end of the bar B back upon itself.

D' is the male die, which fits down within the female die and compresses the accumulating iron under it, and W W are the gripping-wedges which hold the body of the bar B while its heat-softened end is being upset and compressed into the required shape.

P is the horizontal piston, which actuates the upsetting-ram U, and C is the cylinder within which this piston moves.

R R are the rods connecting the cylinder C with the anvil.

P' is the overhead vertical piston, which actuates the compressing male die D', and C'

is the cylinder within which this vertical piston P' moves.

R' R' are the rods which connect the cylinder C' with the anvil.

In operation the bar to be forged is first properly heat-softened at its end, and is then placed on the anvil and gripped in position with its heated end extending through the front channel of the female die and through the shaping-chamber thereof and beyond this chamber to the required distance into the rear channel of the female die, and with its end resting against the end of the upsetting-ram, all as shown in Fig. 4. The compressing male die is then lowered down into the female die until it rests on the heated bar on the bottom thereof. The upsetting-ram is then driven forward, driving ahead of it the hot metal of the bar, and this motion is continued, either steadily or intermittently or reciprocally, in order to pick up any overflowing metal, until the heat-softened metal within the rear channel of the female die has all been driven backward and forced to accumulate and spread out in the shaping-chamber under the main body of the compressing male die and the upsetting-ram remains in the position shown in Fig. 5. The compressing male die is raised and lowered during or after the upsetting with rapidity and force suited to the metal under treatment, after which the forged bar is jarred and lifted out. The bar is prevented from bending laterally during the upsetting by the small bulbous protuberance shown in Figs. 1 and 2 projecting downward from the center of the vertical compressing male die D', which bulb will press into the hot metal bar at the point indicated by the dotted circle shown in Figs. 4 and 5, and thus steady the bar against lateral displacement without impeding the flow of the hot metal. Variations in the sizes or other peculiarities of the bars may require that this bulb or protuberance should vary in shape or should protrude from the bottom of the shaping-chamber instead of the top, or be used both at the top and bottom, or that it should be omitted altogether. The completion of the bar can be expedited by using the male compressing-die to drive a sledge-hammer into the center of the hot head while it is still in the female die, thus at once expanding it radially and also



half-punching the eye-hole ready for the drill-press. The power to be used in the cylinders to move the pistons may be hydraulic or air, gas, steam, or other, and one kind may be used  
5 in one cylinder and another kind in another, or alternately in the same cylinder if the work requires slow compression at one stage and rapid hammer-blows at another.

In many existing shops there are steam-hammers which can easily be used to actuate the vertical compressing male die of my apparatus, and thus dispense with a special cylinder therefor, as the anvil, together with the horizontal cylinder, can be placed under such  
15 steam-hammer and removed again. Screw or other power can also be used instead of cylinder-power for either or both the vertical and horizontal movements, and my first three claims admit this.

I am aware that other inventors have used or designed methods and apparatus for die-forging eye-bars in which the heated metal of the end of the bar has been driven backward into a shaping-chamber by an upsetting-ram  
25 under cover of a movable top plate; but in all cases known to me this combination is merely of chamber and cover-plate having a horizontal plane of separation, and not of female and male die. These chambers are formed by the  
30 opposition of concave edges of cheek-pieces, which require to be changed with every change in the thickness of the bar, and the cover-plate extends out over the tops of these cheek-pieces, and cannot be used as a hammer on account  
35 of the lateral overflow of metal on top of these cheek-pieces, which metal cools into thin sheets and checks the downward stroke of the cover, and makes it necessary to remove the upset but uncompressed head to another machine  
40 for trimming and reliable compression.

By the use of female and male dies, as shown and described in my improvement, I am enabled to dispense entirely with the changes of the cheek-pieces for different thicknesses of  
45 forged heads. The male die can be used as a hammer on the hot metal in the female die without the formation of lateral fins and without the removal of the bar to another machine.

In another application of even date I have shown and described another improvement, in which the heat-softened bar is gripped to a moving cross-head, and is thus driven endwise into the front of a female die and upset therein under a vertical compressing male die,  
55 which can be used as a hammer. That differs from this present improvement mainly in the fact that in this the bar is held stationary and a movable ram upsets it, while in that the bar itself is movable and is its own upsetting-ram.  
60

Having thus described my invention and

pointed out wherein it differs from others, I desire to claim the following as new and useful improvements in upsetting and die-forging enlarged ends on metallic bars for use as eye-  
65 bars and for other purposes:

1. In combination with an anvil, a horizontal receiving female die consisting of a shaping-chamber with front and rear channels, a vertical compressing male die fitted to slide  
70 up and down within the shaping-chamber and the front and rear channels, respectively, of the female die and a horizontal upsetting-ram fitted to slide endwise within the rear channel of the female die and under the male die. 75

2. In combination with an anvil, a horizontal receiving female die consisting of a shaping-chamber with front and rear channels, a vertical compressing male die fitted to slide  
80 down and up within the shaping-chamber and the front and rear channels, respectively, of the female die, a horizontal upsetting-ram fitted to slide endwise within the rear channel of the female die and under the male die, and a rear horizontal cylinder and piston fitted to  
85 actuate the horizontal upsetting-ram.

3. In combination with an anvil, a horizontal receiving female die consisting of a shaping-chamber with front and rear channels, a vertical compressing male die fitted to slide  
90 down and up within the shaping-chamber and the front and rear channels, respectively, of the female die, a horizontal upsetting-ram fitted to slide endwise within the rear channel of the female die and under the male die, and  
95 an overhead vertical cylinder and piston fitted to actuate the vertical compressing male die.

4. In combination with an anvil, a horizontal receiving female die consisting of a shaping-chamber with front and rear channels, a  
100 vertical compressing male die fitted to slide down and up within the shaping-chamber and the front and rear channels, respectively, of the female die, a horizontal upsetting-ram fitted to slide endwise within the rear channel  
105 of the female die and under the male die, a rear horizontal cylinder and piston fitted to actuate the horizontal upsetting-ram, and an overhead vertical cylinder and piston fitted to actuate the vertical compressing male die. 110

5. The combination of the dies which form the shaping-chamber, provided with a bulbous protuberance projecting from the top or bottom into said shaping-chamber at or about  
115 its center, and mechanism for driving the heat-softened end of a stationary metal bar backward and upsetting it into said chamber, for the purpose set forth.

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Witnesses:

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JNO. T. MADDOX.