C. P. HIGGINS.

MACHINE FOR FORMING SEAMLESS TUBES.

APPLICATION FILED SEPT. 21, 1906.

961,131. Patented June 14, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

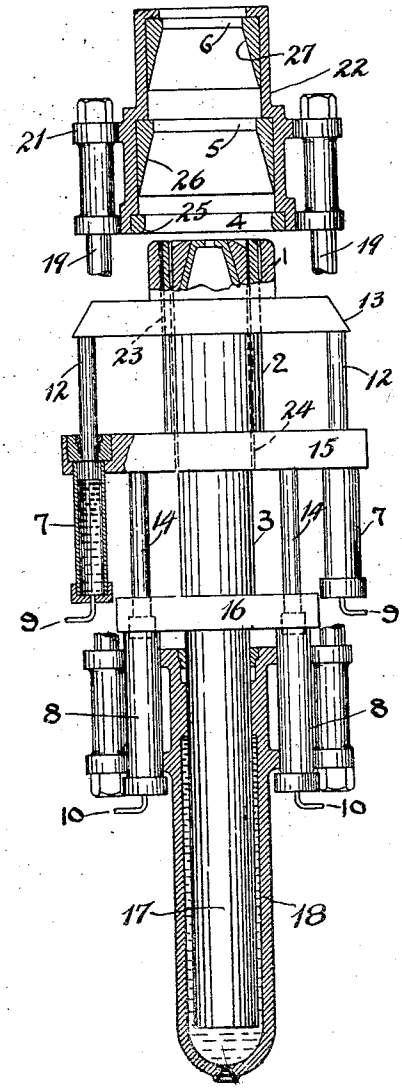

Fig. 2.

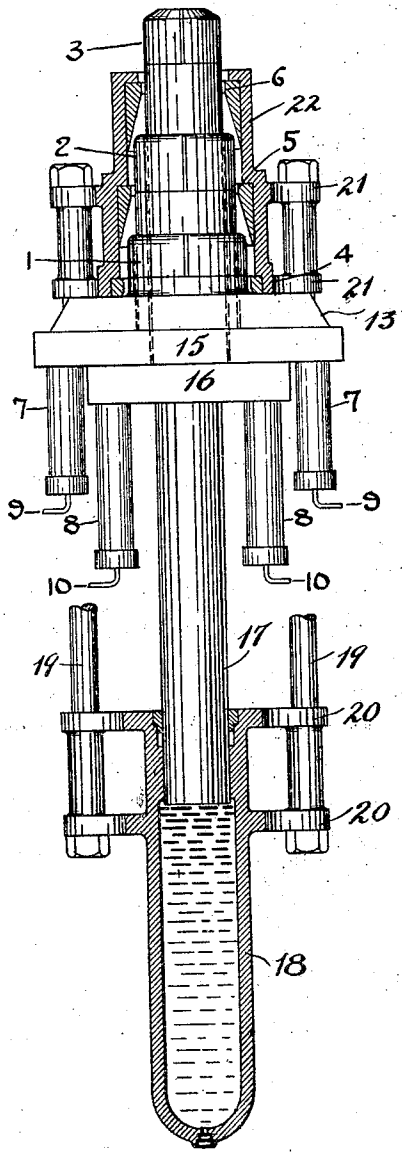

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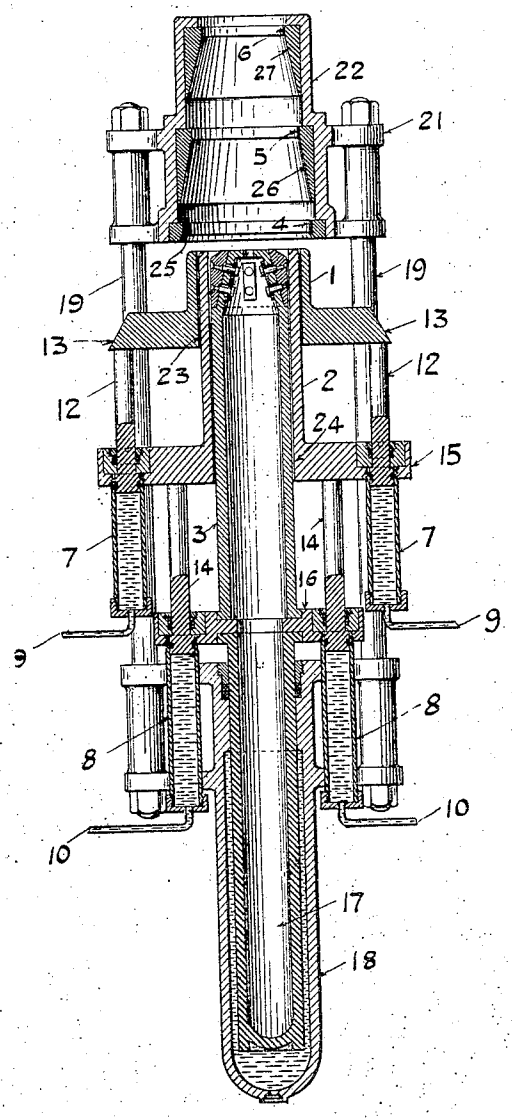
Fig. 3.



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UNITED STATES PATENT OFFICE.

CAMPBELL P. HIGGINS, OF ROSELLE, NEW JERSEY, ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR FORMING SEAMLESS TUBES.

961,131. Specification of Letters Patent. Patented June 14, 1910.

Application filed September 21, 1906. Serial No. 335,671.

To all whom it may concern:

Be it known that I, CAMPBELL P. HIGGINS, a citizen of the United States, residing at Roselle, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Machines for Forming Seamless Tubes, of which the following is a specification, reference being had therein to the accompanying drawing.

The present invention relates to a drawing process and has particular application to means for operating the male dies of a multiple press of the character shown and described in my co-pending application filed September 21, 1906, Serial No. 335,669.

The invention consists in the construction, combination and arrangement of parts set forth in and falling within the scope of the appended claims.

In the accompanying drawings forming a part of this specification a machine is illustrated which includes a series of male and female dies and other parts that make up the machine, in the relative arrangement similar to the machine of my aforesaid application.

Figure 1 is a view partly in elevation and partly in section of a machine shown in position to begin the drawing process on a metal plate. Fig. 2 is a view showing the relative position of the various parts after the drawing operation of a plate is completed. Fig. 3 is a vertical section of my machine.

Referring now especially to Fig. 1, wherein the machine is shown in position to begin the drawing process of a metal plate, which latter is introduced into the space between the end of the male die 1 and the female die 4. The male dies 1, 2 and 3 are supported by pressure in the cylinders 7 and 8 and are thereby all held in one plane at their upper or working ends and are compelled to advance together until the die 1 has passed through the female die 4 and drawn the plate onto the side die 1. As shown in the drawings, the cylinders 7 are provided with pistons having piston rods 12, and resting on said rods is a cross head 13 to which is secured the male die 1. In a similar manner the piston rods 14 of the cylinders 8 support a cross head 15 to which is secured the male die 2. The male die 3 is secured to a cross head 16 carried by a ram 17 of the cylinder 18. Tie rods 19 are secured to arms 20 of the cylinder 18, and 21 of the female die casing 22 to hold said cylinder and casing a fixed distance apart against the operating pressures. To permit the passage of die 2 through cross head 13, and die 3 through cross head 15, the said cross heads have central openings 23 and 24, respectively.

After the first drawing has been accomplished the pressure is exhausted from the cylinders 7 through the pipes 9, thus depriving the die 1 of its support and permitting the die 2 to advance after the die 1 has been stopped by the lower edge of the female die casing. The die 2 then advances through the opening 23 and die 1 carrying the plate which was drawn on the die 1 through the female die 5, thus reducing its diameter and lengthening its flange, after which the pressure is exhausted from the cylinders 8 through the pipes 10, thus depriving the male die 2 of the support afforded by said cylinders 8 and permitting the die 3 to pass on through opening 24 and die 2 after the cross head 15 of the die 2 has been stopped by the cross head 13 of the die 1, and until the said die 3 has passed on up through the female die 6, thus drawing the piece being operated upon to the size established by the dies 3 and 6. The cylinders are then brought into the same position as at the beginning of the operation by the introduction of pressure into the cylinders 7 and 8, through the pipes 9 and 10 until the pistons contained in said cylinders are brought up to the end of the stroke which is limited by the cross heads.

The female dies 4, 5 and 6 are graduated in diameter to correspond with the graduation of the male dies, and their interior faces are inclined inwardly at 25, 26 and 27, respectively, to effect the successive reductions in the diameter of the tube forced through by the male dies. By supporting the male dies on independently controlled pressure cylinders each male die may be stopped short of the point at which it will clamp or interfere with the removal of the piece being drawn.

What I claim and desire to secure by Letters Patent of the United States is:—

1. A multiple drawing machine comprising a series of female dies, a series of telescoping male dies, and independently controlled pressure cylinders for supporting the male dies.

2. A multiple drawing machine comprising a series of female dies graduated in size and having conical interior faces, a series of telescoping male dies graduated in size to correspond to the female dies, and independently controlled pressure cylinders for supporting the male dies.

3. A multiple drawing machine comprising a series of female dies, a series of telescoping male dies, independently controlled pressure cylinders for supporting the male dies below the female dies, and means for successively advancing the male dies and for withdrawing the support of a given male die after its drawing operation by releasing the pressure in the supporting cylinders.

4. A multiple drawing machine comprising a series of female dies, a series of telescoping male dies, independently controlled pressure cylinders for supporting the male dies below the female dies and with the upper ends of said male dies normally in the same plane, and means for successively advancing the male dies and for withdrawing the support of a given male die after its drawing operation.

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

CAMPBELL P. HIGGINS.

Witnesses:

AUGUSTE G. PRATT,

H. S. CHINNOCK, Jr.