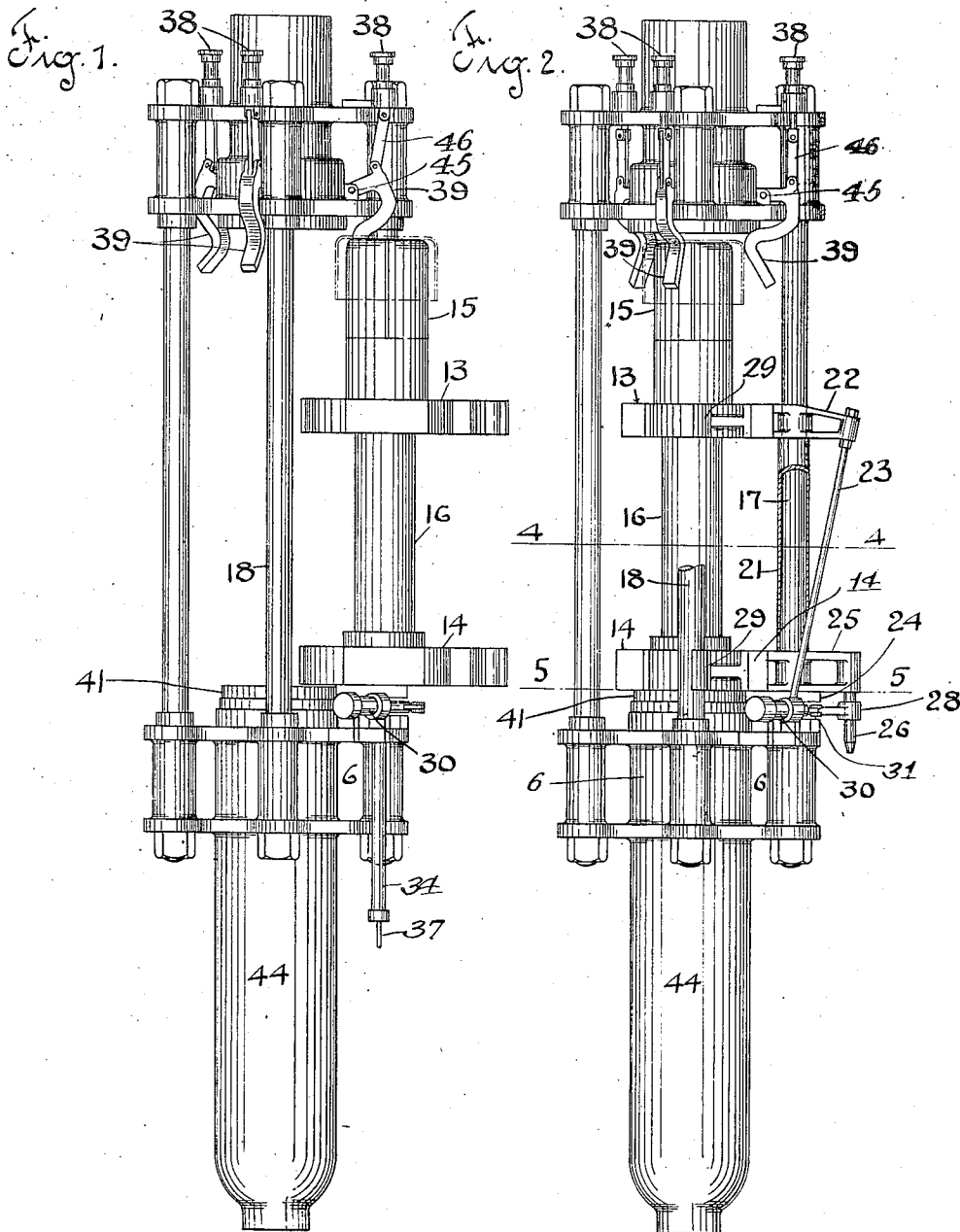


C. P. HIGGINS.
MACHINE FOR FORMING SEAMLESS TUBES.
APPLICATION FILED SEPT. 21, 1906.

961,133.

Patented June 14, 1910.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 3.

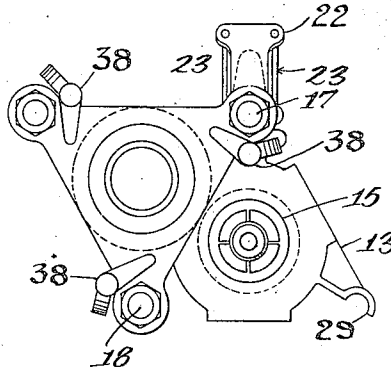


Fig. 4.

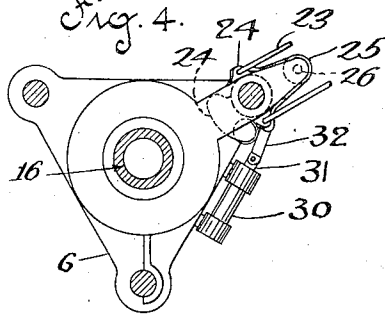
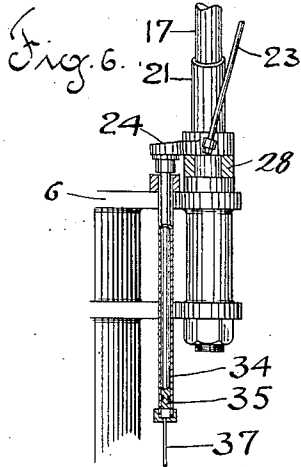
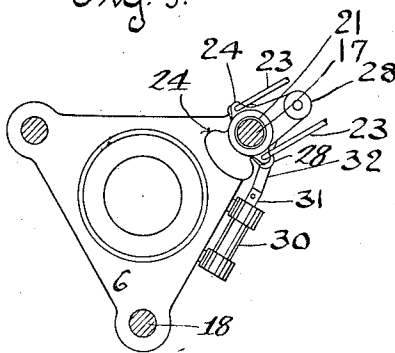


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 7

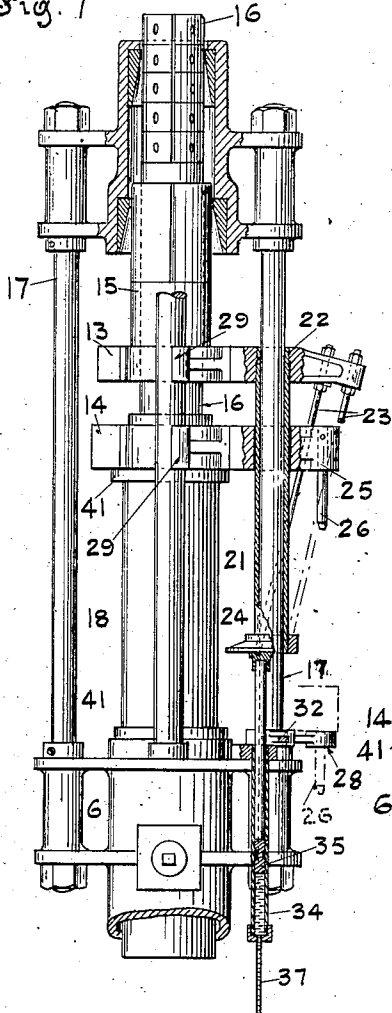


Fig. 9

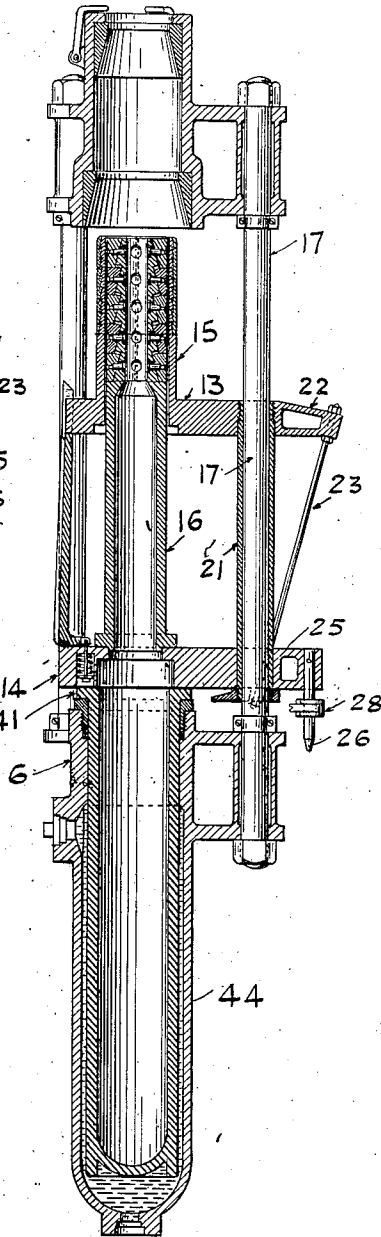
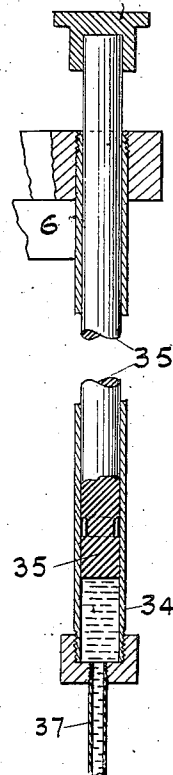


Fig. 8



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UNITED STATES PATENT OFFICE.

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MACHINE FOR FORMING SEAMLESS TUBES.

961,133.

Specification of Letters Patent. Patented June 14, 1910.

Application filed September 21, 1906. Serial No. 335,673.

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.

This invention relates to machines for forming seamless tubes from metal blanks progressively and in a continual pass by means of a series of movable male and stationary female dies.

The present invention comprises holders carrying the movable male dies adapted to swing upon the frame-work of the machine for the purpose of locating the blank to be operated upon, and an auxiliary means for sustaining the holder when the latter is swung to its outward position.

In the accompanying drawings forming a part of this specification, a machine is illustrated which includes the series of movable male dies and stationary female dies which are referred to in detail in my separate application filed September 21, 1906, Serial Number 335,669, and also the devices for centering the plate to be operated upon.

Figures 1 and 2 are front views in elevation of the machine showing the connection therewith of the swinging die holders. Fig. 3 a top view of the machine showing die swung out to receive piece to be operated upon. Fig. 4 a view on line 4-4, Fig. 2, showing the die holder swung into center. Fig. 5 a sectional plan through line 5-5, Fig. 2. Fig. 6 a detached portion showing supporting cylinder for dies. Fig. 7 a side elevation partly in section. Fig. 8 an enlarged sectional elevation of a plunger and cylinder forming part of the machine. Fig. 9 is a vertical section of the machine.

In the several views, like parts are identified by like numerals.

The male dies 15 and 16 are carried on upper and lower swinging holders 13 and 14, the larger die 15 being carried by the upper holder 13, and the smaller die 16 by the lower holder 14. The smaller die 16 is telescoped within the larger.

The die holders are mounted upon the side supporting standards 17 and 18 that connect the base of the machine with its top in which the stationary female dies are placed,

and are adapted to slide upon said standards and also to swing to one side, as shown in Fig. 6, sufficient to clear the frame-work of the machine and to place the blank upon the end of the male dies.

The male dies are shown in position for receiving the blank before the drawing operation in Fig. 1 of the drawing, and in central position in Fig. 2.

In the plan view Fig. 3 the male die holder 13 is shown swung to its outward position for receiving the blank, and in Figs. 4 and 5 the power devices for swinging the die holders 13 and 14 are shown.

The devices for connecting the swinging holders are shown in Figs. 2, 7 and 9.

The upper holder 13 carrying the large male die 15 is secured to the tubular bearing 21, which latter turns and also slides upon the standard 17, and is constructed with an arm 22 that projects outside the standard 17. As shown in Fig. 7, two parallel rods 23 are secured to the arm 22 which extend to and are rigidly secured to a bracket 24 placed upon the bearing tube 21 directly beneath the lower die holder 14, which bracket rises with the holder 13 in its sliding movement. The lower die holder 14 is also provided with a projecting arm 25 on its pivoted side in which a pin 26 is rigidly secured that depends therefrom and engages an aperture in an arm 28 projecting from and swinging on the standard 17.

The die holders 13 and 14 are made in triangular shape, as shown in the plan views, and provided with brackets and semi-circular clasps 29 to engage with a standard 18 opposite their pivotal connections on 17, as shown in Figs. 2 and 7, and in their respective open and centered positions in Figs. 3 and 4.

A hydraulic cylinder 30 is secured to the base block 6, Figs. 4 and 5, and provided with a piston rod 31 which imparts a swinging movement to the die holders 14 and 13 through link 32, swinging arm 28, pin 26, and arm 25.

In Figs. 6 and 7 an auxiliary hydraulic cylinder 34 and plunger 35 is shown secured to the base 6 of the machine. The upper end of the plunger 35 engages with the under side of the bracket 24, which is mounted upon the tubular bearing 21. As the lower die holder 14 approaches the upper die holder 13 the piston 35, acting through

bracket 24 and sleeve 21, forms a support for the die holder 13 when the latter is deprived of other support.

As shown in Figs. 1 and 2, arms 39 are pivoted to the top of the machine in which the stationary dies are placed. These arms are actuated by power cylinders 38 preferably hydraulic which are also secured to the top of the machine. When power is applied to the cylinders 38 the arms 39 close together simultaneously about the blank on the male die 15 to center it with the dies.

The complete operation of the machine is as follows:—Power is first applied to the hydraulic cylinder 30, which operates the swinging arms 22 and 25, which are operatively connected with the die holders by means of the fixed pin 26, extending through the aperture in the arm 28. The arm 28 forces the die holders out from the center of the machine to one side, as clearly shown in Fig. 3, in order to receive the blank to be operated upon. The flanged blank to be reduced in diameter and the flange lengthened, is placed on the end of the die 15, and the holder is swung back by a reverse pressure in the cylinder 30, thereby returning the dies to their normal position in the machine. Power is now applied to the hydraulic cylinders 38 operating the centering arms 39, and the blank is centered as clearly shown in Fig. 2. Pressure is now applied to the power cylinder 44, which raises the plunger 41 and die holders 13 and 14 until the larger die 15 has forced the plate through the lower female die. The smaller male die 16 is now passed on and strips the blank off the die 15, and presses it through the upper female die, which is of less diameter than the lower female die.

As shown in the drawings, the female dies are of progressively decreasing diameter.

The centering arms 39 are pivoted at 45 to the female die case or holder, and are connected by links 46 to the piston rods of cylinders 38.

What I claim herein and desire to secure by Letters Patent is:—

1. In a machine for forming a seamless tube progressively from a blank of metal in a continuous pass through a plurality of female dies of decreasing diameter, the combination with stationary female dies and

movable male dies, of holders carrying the male dies adapted to swing upon the frame-work of the machine to and from the line of coöperation of the dies and sufficiently clear of the frame-work to place the blank upon the dies.

2. In a machine for forming a seamless tube progressively from a blank of metal in a continuous pass through a plurality of female dies of decreasing diameter, the combination with stationary female dies and movable male dies, of holders carrying the male dies, and means for simultaneously swinging said holders clear of the frame of the machine to place the blank upon the dies.

3. In a machine for forming a seamless tube progressively from a blank of metal in a continuous pass the combination of a series of movable male dies and stationary female dies, swinging holders carrying the male dies for locating the blank to be operated upon, a pressure cylinder and means actuated thereby to control the position of the die holders.

4. In a machine for forming a seamless tube progressively from a blank of metal in a continuous pass through a plurality of vertical female dies of decreasing diameter, the combination with male and female dies of centering pawls or arms connected with a stationary die casing carrying the female dies and arranged to bring the blank into line with the center of the operating dies before the said dies start to reduce the said blank.

5. In a machine for forming a seamless tube progressively from a blank of metal in a continuous pass through a plurality of female dies of decreasing diameter, the combination of a plurality of stationary female dies, a plurality of corresponding movable male dies, means for advancing the male dies successively, and auxiliary means for supporting a given male die after it has completed its work and after the main pressure has been removed therefrom.

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

CAMPBELL P. HIGGINS.

Witnesses:

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H. S. CHINNOCK, Jr.