

No. 646,936.

Patented Apr. 10, 1900.

W. G. ALGEO, JR.
METAL DRAWING MACHINE.

(Application filed June 15, 1899.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

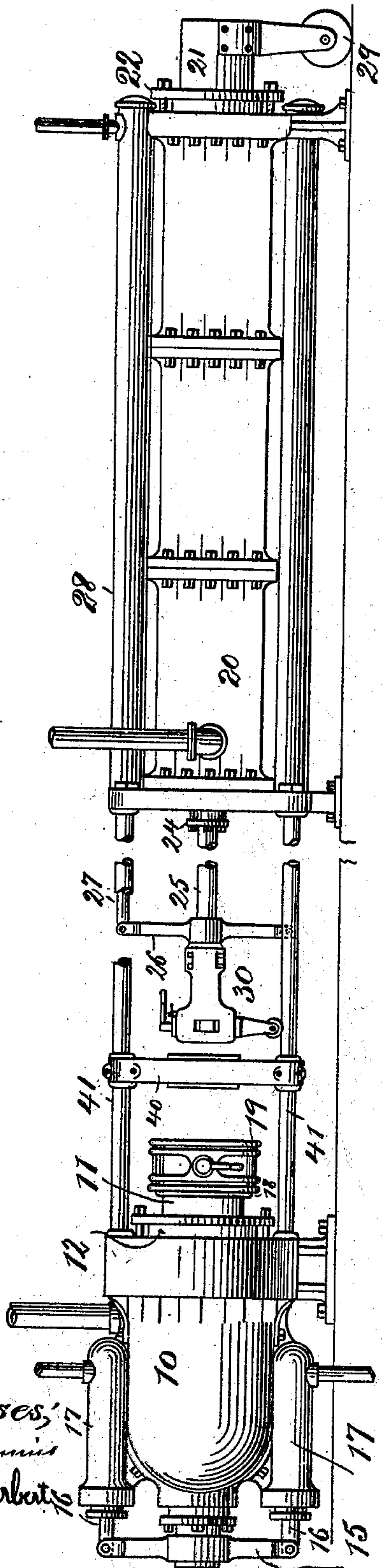


Fig. 3.

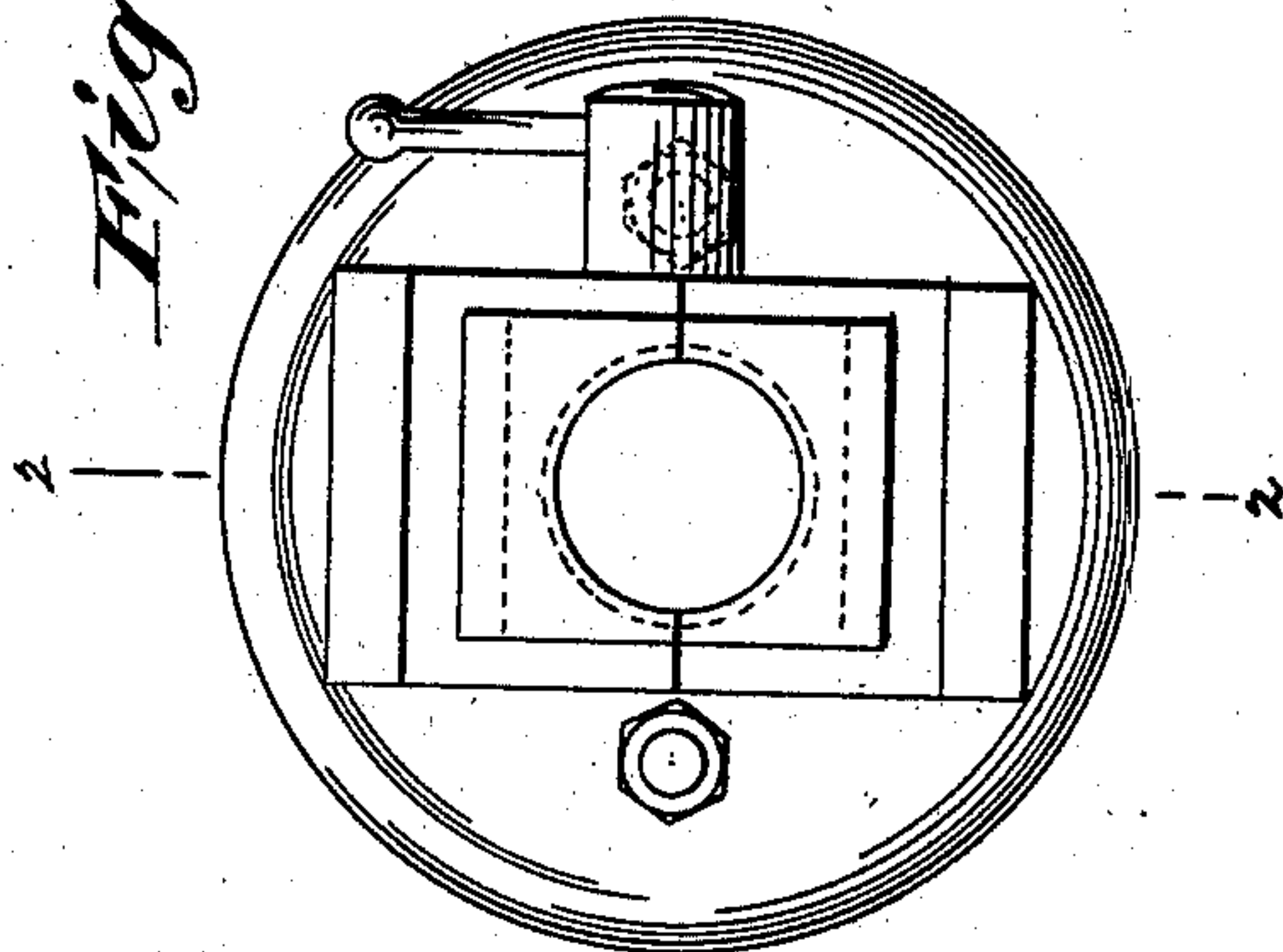
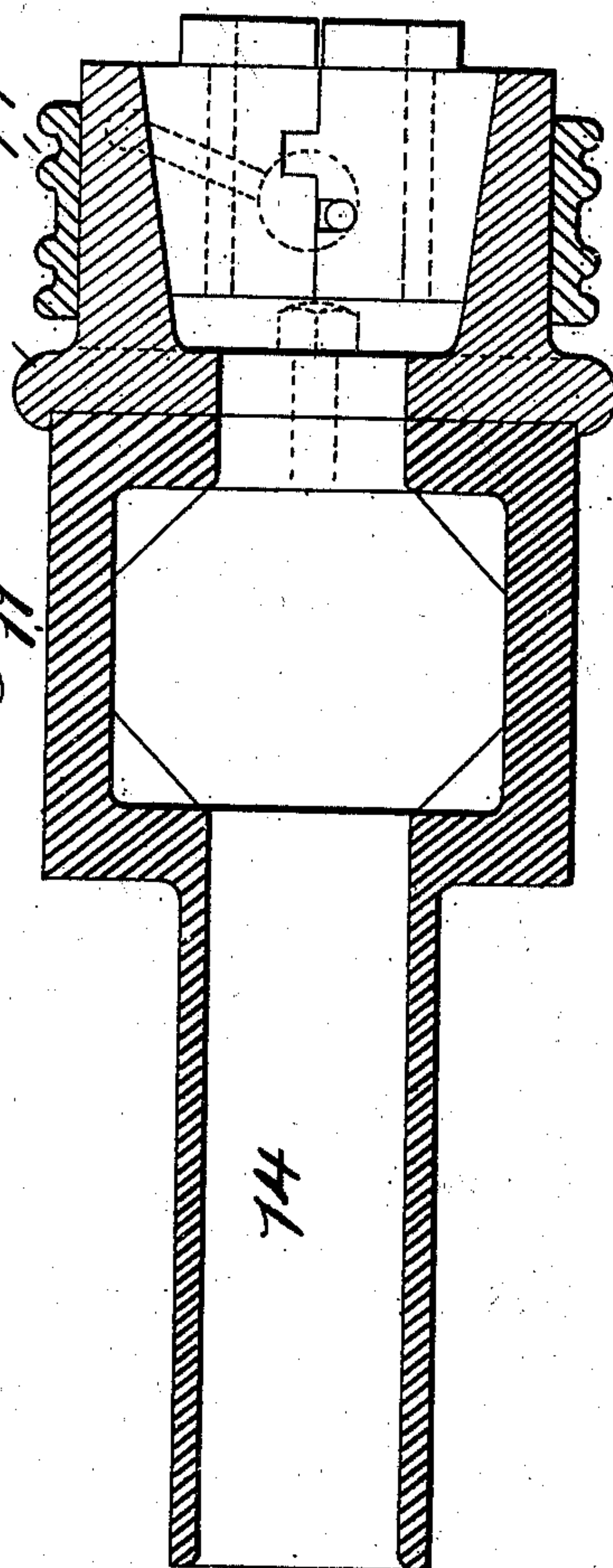


Fig. 2.



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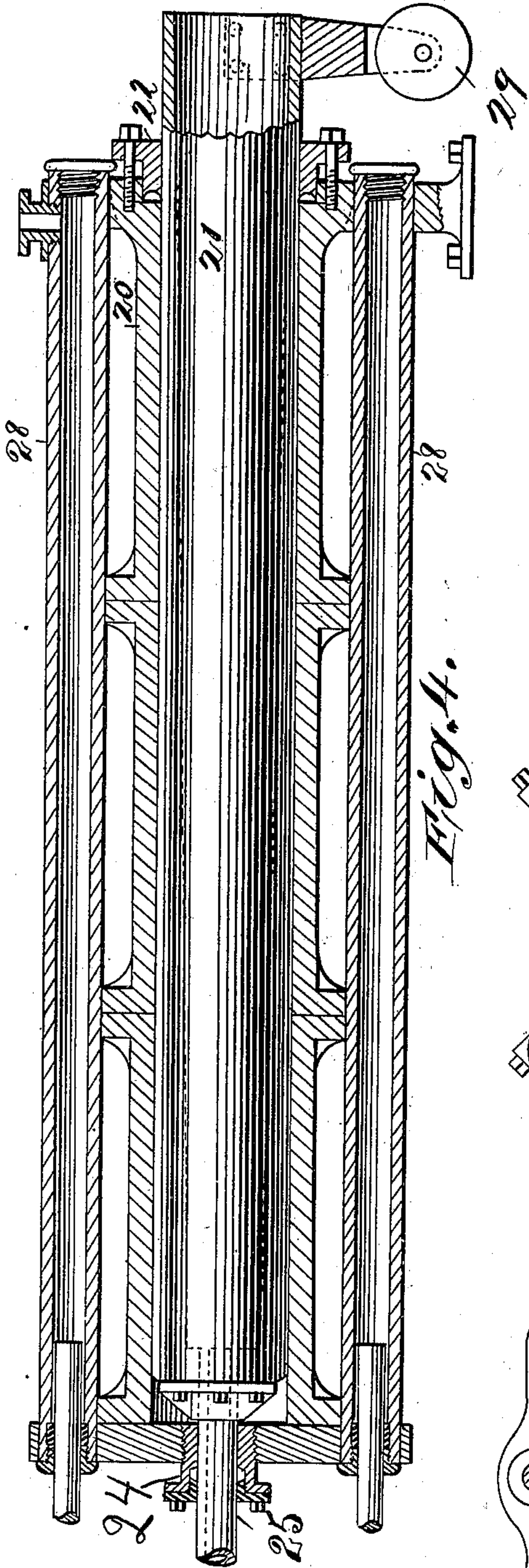


Fig. 4.

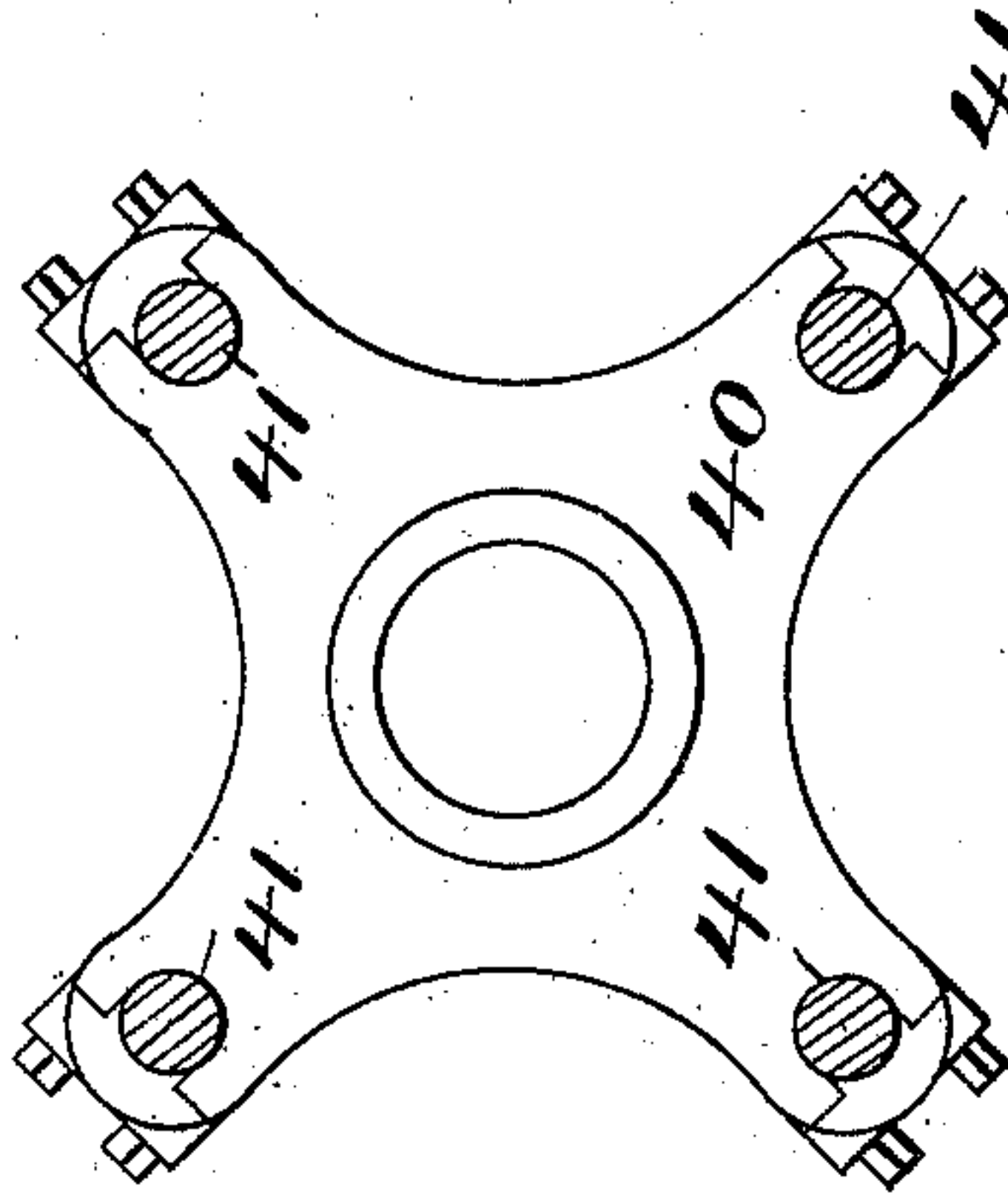


Fig. 5.

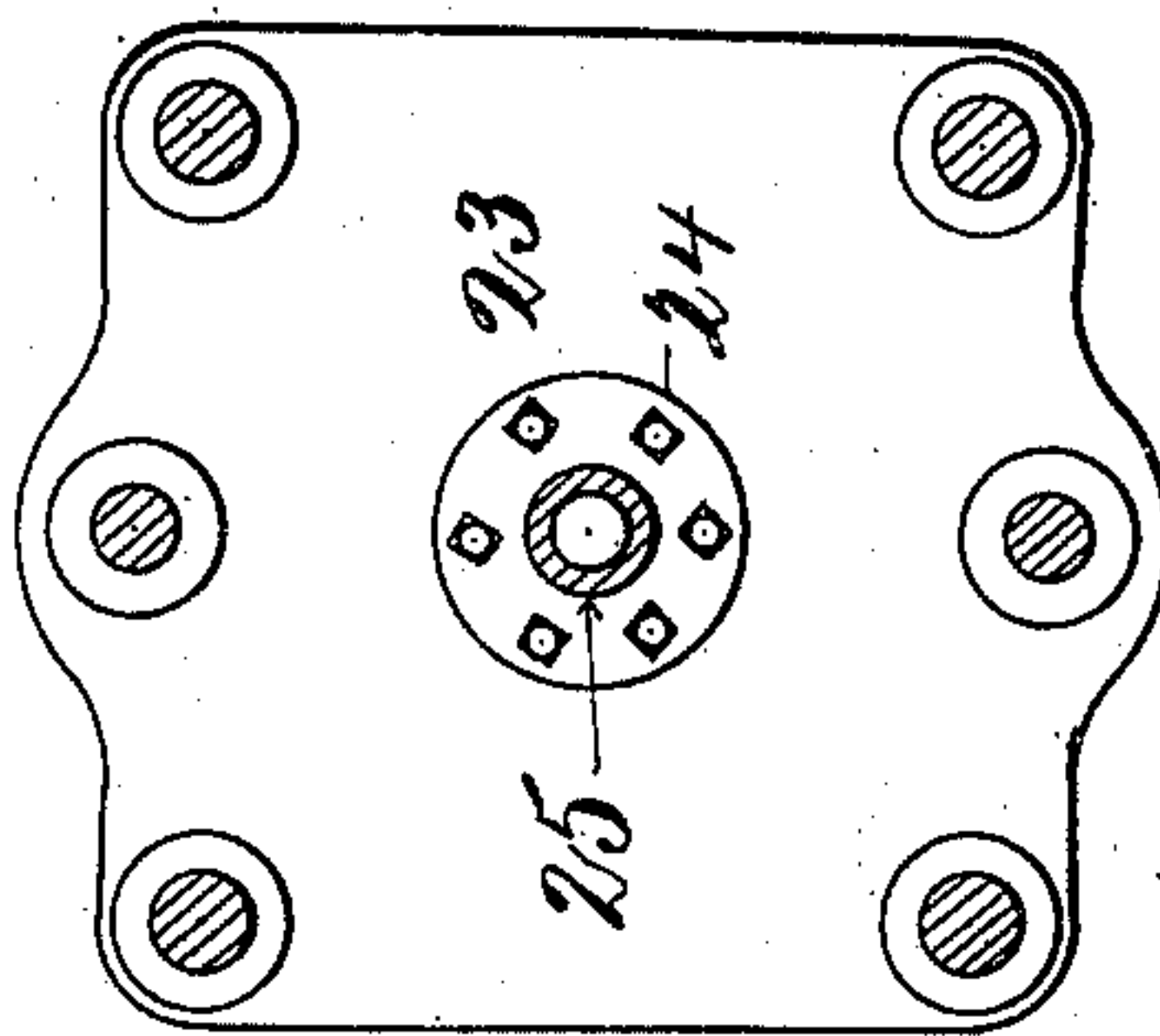


Fig. 6.

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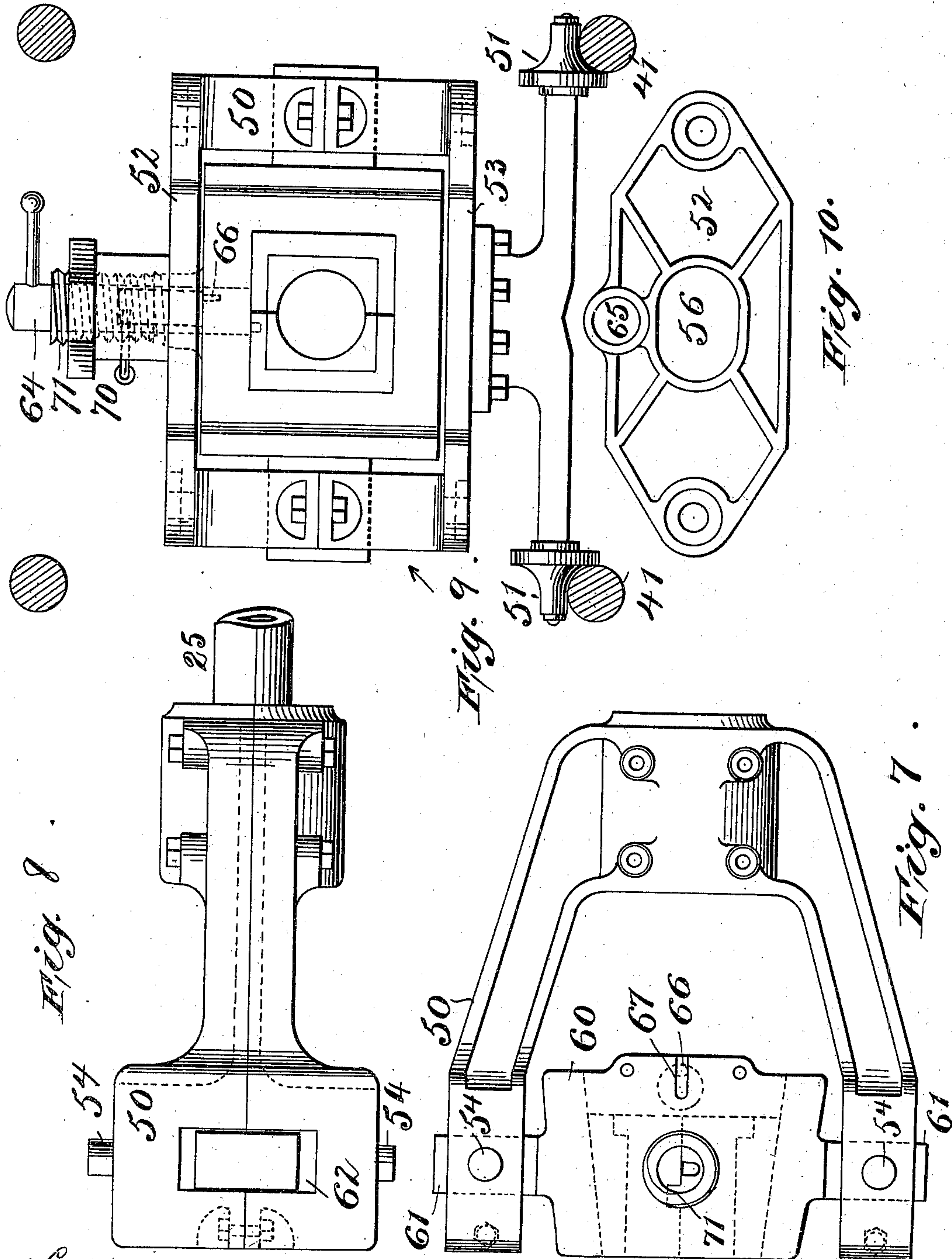
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

WILLIAM GIBSON ALGEO, JR., OF BEAVER FALLS, PENNSYLVANIA.

METAL-DRAWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 646,936, dated April 10, 1900.

Application filed June 15, 1899. Serial No. 720,598. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GIBSON ALGEO, Jr., of Beaver Falls, Pennsylvania, have invented certain new and useful Improvements in Metal-Drawing Machines, of which the following is a description, referring to the accompanying drawings, which form part of this specification.

The invention relates particularly to machines for drawing metal in great lengths as compared with present practice in respect to drawing rods and other straight bodies.

The embodiment of the invention illustrated in the drawings is designed to draw twenty-five feet at one pull, after which the pulling-gripper may be set back to draw a second twenty-five feet.

The object of the invention is to improve drawing-machines, making them more efficient, more readily handled, more durable, and better in every way, and while the improvements are specially adaptable to drawing straight bodies in long lengths the invention is not of course limited to such use.

The novel features will be best understood by a description of the accompanying drawings, which illustrate a preferred form of the invention.

Figure 1 is a side elevation of the apparatus. Fig. 2 is a cross-section of the pushing-plunger and gripper. Fig. 3 is an end view of the same looking from the forward end. Fig. 4 is a vertical central section through the pulling-cylinder, &c. Fig. 5 is an end view of the die-head. Fig. 6 is a view of the pulling-cylinder head which is toward the die-head. Fig. 7 is a plan view of the draw-head and drawing-gripper. Fig. 8 is a side elevation of the same. Fig. 9 is an end view of the same, showing also the roller-supports and brace-rods of the machine; and Fig. 10 is a plan view of a brace for the drawing-yoke.

Throughout the drawings like numerals of reference indicate like parts.

The machine embodies a pushing-cylinder, which has a hollow plunger and gripping mechanism, with a short stroke as compared with the pulling-cylinder; also, a pulling-cylinder, which has a hollow plunger and hollow piston-rod or drawing-rod connected to the drawing-head; also, tie-rods or brace-rods which connect the two cylinders together

and a die-head which is secured to the brace-rod. Preferably the pulling and pushing cylinders are powerful single-acting cylinders, and four (or two) cylinders of small diameter are employed for retracting the plungers and grippers to their initial position. The metal to be drawn is introduced axially through the hollow plunger of the pushing-cylinder, gripped in the gripper, and then forced forward by the cylinder until the end of the metal is protruded through the die far enough to enable the pulling-gripper to take hold. The metal is then drawn by the pulling-gripper progressively in successive steps, the gripper being released and set back when it reaches the limit of movement of the pulling-cylinder and gripped onto the metal again farther back, near the die-head. When the pulling-gripper is set back with the hollow piston or plunger of the pulling-cylinder, the metal that has already been drawn runs through the open center of the pulling-plunger or pulling-piston and protrudes at the end, where it may be suitably supported and guided to prevent its bending.

Considering now each of the mechanisms of the machine illustrated in the drawings, the pushing-cylinder is indicated by 10, the pulling-cylinder by 20, the drawing-head by 30, and the die-head by 40. The pushing-cylinder is a relatively short strong cylinder in which the pushing-plunger, preferably of the form shown in Fig. 2, is fitted. The larger portion of the plunger 11 projects through the end of the cylinder toward the die-head 40 and is surrounded by the packing-box 12. Through the other end of the cylinder and surrounded by the packing-box 13 the tubular projection 14 of the plunger extends and is secured to the cross-head 15, which is actuated by the plungers 16 of the retracting-cylinders 17. The large cylinder 10 is used to force the pushing-plunger 11 toward the die-head, Fig. 1, while the small cylinders 17, operating with less power and at a higher speed, retract the plunger from the die-head. The grippers or gripping-jaws of the pushing-cylinder may be preferably of the type shown, which is a type common in testing-machines, and they are mounted in the casting 18 on the end of the ram or plunger 11, as shown in Fig. 2. A strap 19, preferably placed around the cast-

ing 18, reinforces the latter against the strain produced by the wedge-like form of the gripper when the plunger is forced forward. As will be seen by Figs. 2 and 3, the metal billet or bar to be drawn may be introduced axially through the central opening in the plunger and gripped near its forward ends between the jaws of the gripper. This central opening is of course in line with the die-opening in the die-head 40. The die-head 40 is bolted to the tie-rods or brace-rods 41, which are secured at each end to the cylinders 10 and 20. The details of the die-head are shown in Fig. 5.

The pulling-cylinder 20 may consist of several lengths of cylindrical casing, bolted together and provided with a cylinder-head and packing-box 22, surrounding the hollow plunger 21. At the other end the cylinder-head 23 is provided with a smaller packing-box 24, which surrounds the tubular piston-rod or plunger-rod 25, which connects the plunger 21 to the draw-head 30. This rod 25 carries a cross-head 26, connected with plungers 27 of the small retracting-cylinders 28, which are adapted to force the draw-head 30 rapidly to the left, Fig. 1, to return it toward the die-head to its initial position when it has made its stroke to the right. The projecting end of the hollow plunger 21 is preferably provided with friction-reducing supports—such, for instance, as one or more rollers 29. This provision is especially important where the length of the plunger 21 is from twenty-five to thirty feet or more.

In order to allow for some eccentricity of the end of the metal as it is first thrust through the die ready to be gripped by the pulling-gripper, the pulling-gripper has a sliding adjustment in a yoke upon the end of the rod 25, which yoke 50 is supported upon a pair of rollers or wheels 51, which run upon the tie-rods or brace-rods 41. These details are shown in Figs. 7, 8, 9, and 10. This yoke 50 is bolted directly onto the end of the pulling-rod 25 and is provided with cross braces or yokes 52 53, secured to the studs 54, as shown in Figs. 7, 8, and 9. The yoke 52 has an elongated central opening 56, through which the grip-operating shaft extends, the form of the opening allowing the movement of the gripper laterally without interference from the brace 52. The gripper, which may be of a type already mentioned, is carried in a sliding head 60, which has two tongues or slides 61, that fit and move freely within slots 62 in the yoke 50, permitting both horizontal and vertical adjustment. The horizontal adjustment is effected by means of a vertical shaft 64, which runs through the opening 65 in the cross-brace 52 and is provided with an eccentric-pin 66, which runs in the slot 67 of the cross-head 60. Turning the shaft 64 will result, therefore, in shifting the cross-head 60 laterally. Vertically the adjustment is effected by a nut 70, screw-threaded onto the screw-stud 71 of the cross-head 60 and resting upon the brace 52.

By adjusting the nut 70 the level of the gripper may be accurately adjusted, and then the gripper may be set toward the right or the left by means of the adjusting-shaft 64 previously to being gripped onto the end of the metal to be drawn.

The operation of the machine will now be understood from the description of the several parts and their coöperation and objects, as already set forth. It will of course be understood that the pistons may be used as equivalents of plungers, though it is less practical to accurately bore out the cylinder to receive the piston and to provide the piston with packing than to true up the cylindrical exterior of the plunger and provide a packing-box in the head of the cylinder. So, also, other obvious equivalents will readily suggest themselves, and I will not attempt to enumerate them.

Having now fully explained my invention and described its preferred embodiment, I claim as the characteristic features of the invention the following:

1. In combination in a drawing-machine, a die-head, a gripper for the metal, and a cylinder, plunger or piston, and rod, for relatively moving the gripper and die-head, the said rod fitting one end or head of the cylinder and the said plunger or piston also fitting the cylinder, and there being an axial opening through the plunger or piston and the rod from end to end, substantially as set forth.

2. In combination in a drawing-machine, a die-head, a pulling-gripper, a cylinder, a tubular plunger or piston packed in said cylinder, a tubular rod running through and packed in the head of the cylinder and connected to the gripper, a pushing-gripper in line with the said die-head, a pushing-cylinder, a tubular plunger or piston therefor connected to said gripper, and a rearwardly-extending tubular projection from the said plunger or piston packed in the rear end of the said cylinder, substantially as set forth.

3. In combination in a drawing-machine, and with the pulling-gripper thereof, a cylinder, a tubular plunger running through and packed in one head of the said cylinder, and a tubular rod running through and packed in the other head of the cylinder and connected with the gripper, substantially as set forth.

4. In combination in a drawing-machine, and with the pulling-gripper thereof, a cylinder, a tubular plunger running through and packed in one head of the said cylinder, and a tubular rod running through and packed in the other head of the cylinder and connected with the gripper, and friction-reducing supports for the projecting end of the said plunger, substantially as set forth.

5. In combination in a drawing-machine, a gripper, a cylinder, a piston or plunger, and rod, connected to actuate the gripper, a movable connecting device between the gripper and the said rod allowing lateral and vertical

adjustment of the gripper; and positive means for so adjusting the gripper vertically, substantially as set forth.

6. In combination in a drawing-machine, a gripper, a cylinder, a piston or plunger, and rod, connected to actuate the gripper, and a movable connecting device between the gripper and the said rod allowing lateral and vertical adjustment of the gripper, the said connecting device combining a slotted yoke and a cross-piece sliding in the said slotted yoke, substantially as set forth.

7. In combination in a drawing-machine, a gripper, a cylinder, a piston or plunger, and rod, connected to actuate the gripper, and a movable connecting device between the gripper and the said rod allowing lateral and vertical adjustment of the gripper, the said connecting device combining a yoke secured to the said rod and provided with supporting guide-rollers, and a cross-piece carrying the said gripper, and sliding transversely in the said yoke, substantially as set forth.

8. In combination in a drawing-machine, and with the pushing-gripper thereof, a cylinder, a tubular plunger running through and packed in one head of the cylinder and carrying the said gripper on its projecting portion, and a tubular continuation of the said plunger of smaller diameter running through and

packed in the other head of said cylinder, substantially as set forth.

9. In a drawing-machine, a pushing-cylinder set in line with the draw-die, a hollow piston or plunger therefor carrying a gripper at one end and having a tubular projection at the other end extending through and packed in the head of said cylinder, whereby the metal may be introduced axially through the said plunger or piston, and one or more retracting cylinders and plungers or pistons, connected to the said tubular projection, substantially as set forth.

10. In combination in a drawing-machine, a pulling cylinder and piston or plunger, a pushing cylinder and piston or plunger, brace-rods connecting the said cylinders, a die-head secured to the said brace-rods between the said cylinders, and a gripper connected to be actuated by the said pulling-cylinder, the said pistons or plungers being tubular and affording an uninterrupted axial opening from one end of the machine to the other, substantially as set forth.

Signed this 9th day of June, 1899, at Beaver Falls, Pennsylvania.

WILLIAM GIBSON ALGEO, JR.

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