

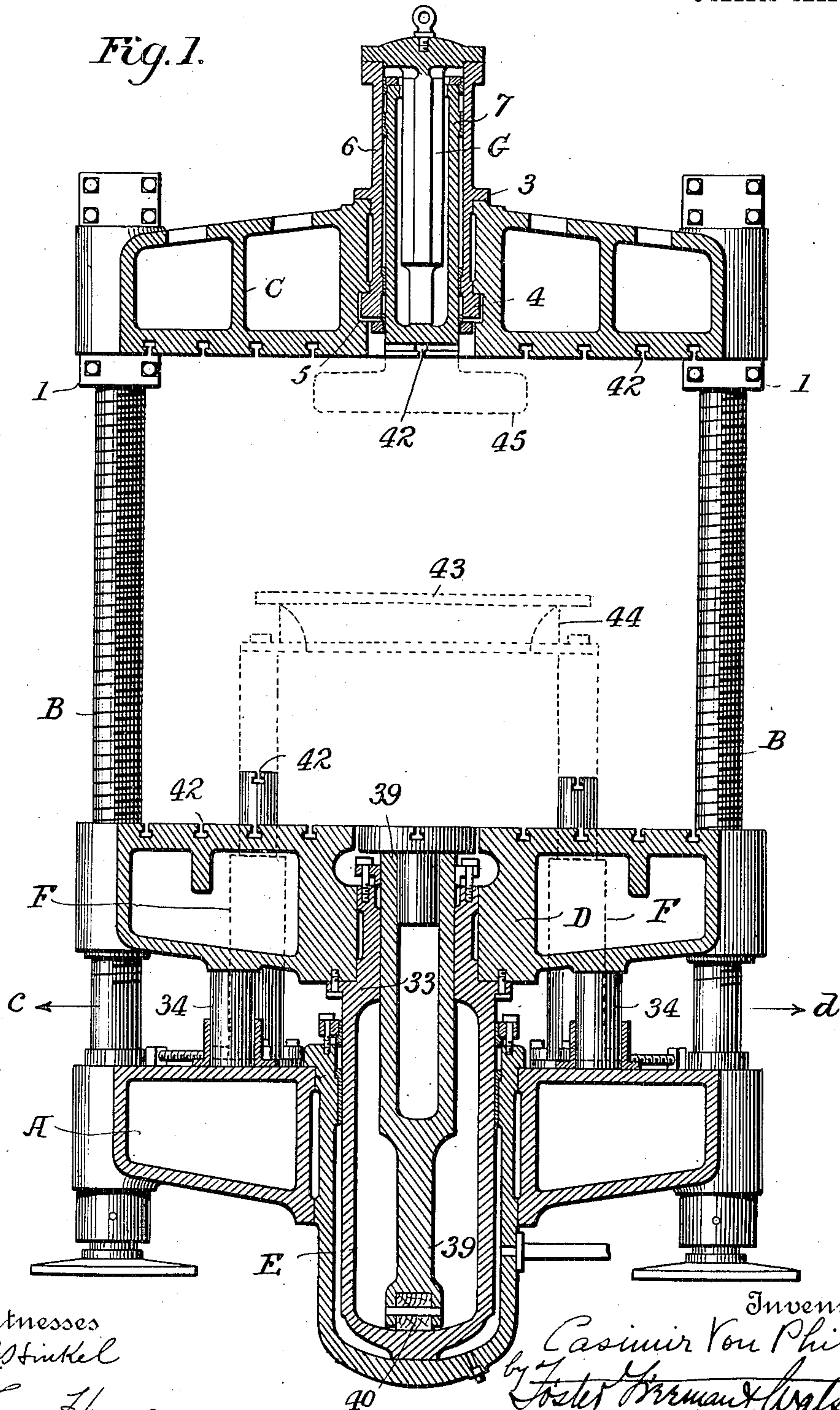
No. 812,228.

PATENTED FEB. 13, 1906.

C. VON PHILP.  
FLUID PRESSURE METAL WORKING MACHINE.

APPLICATION FILED AUG. 24, 1904.

3 SHEETS—SHEET 1.



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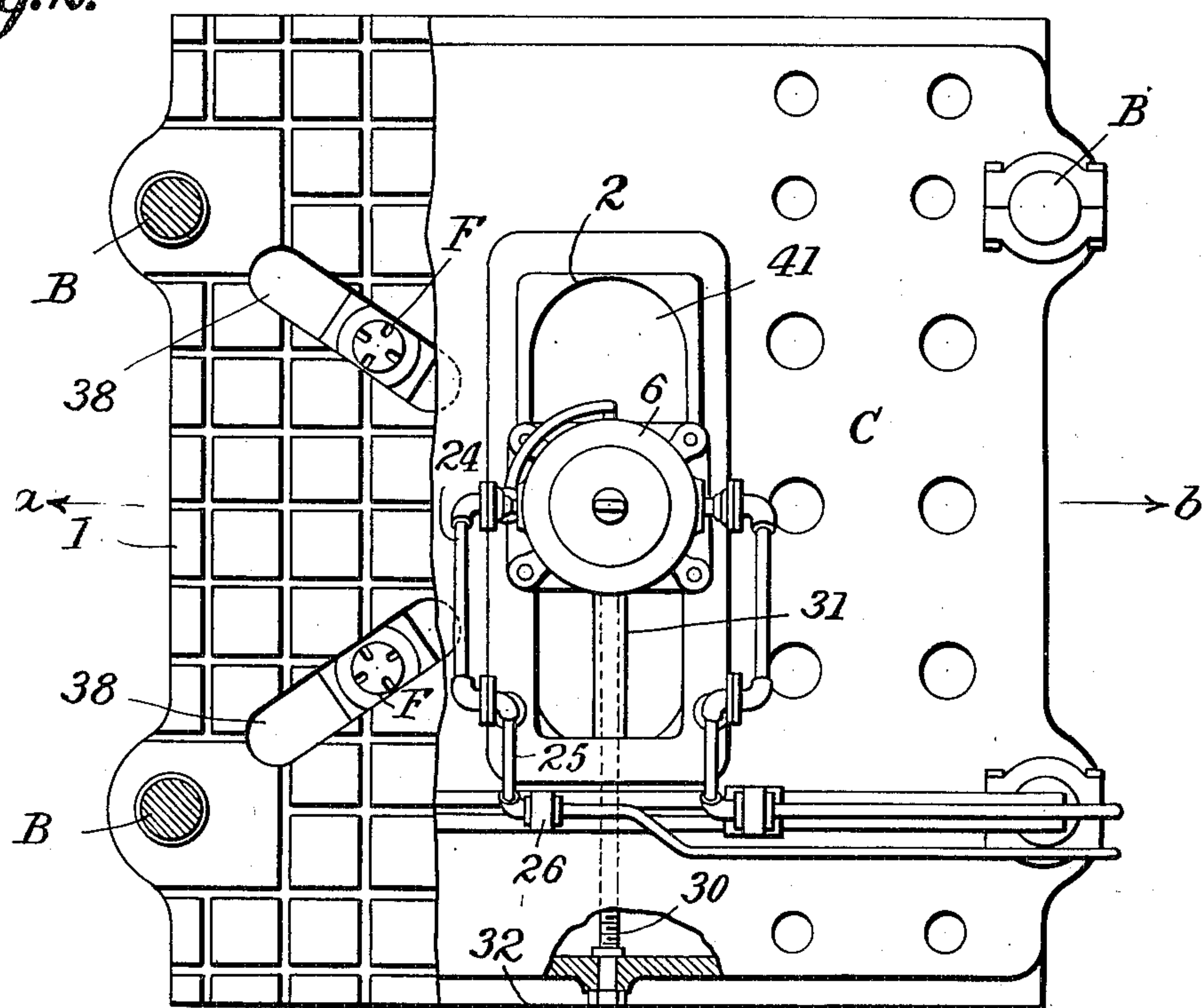
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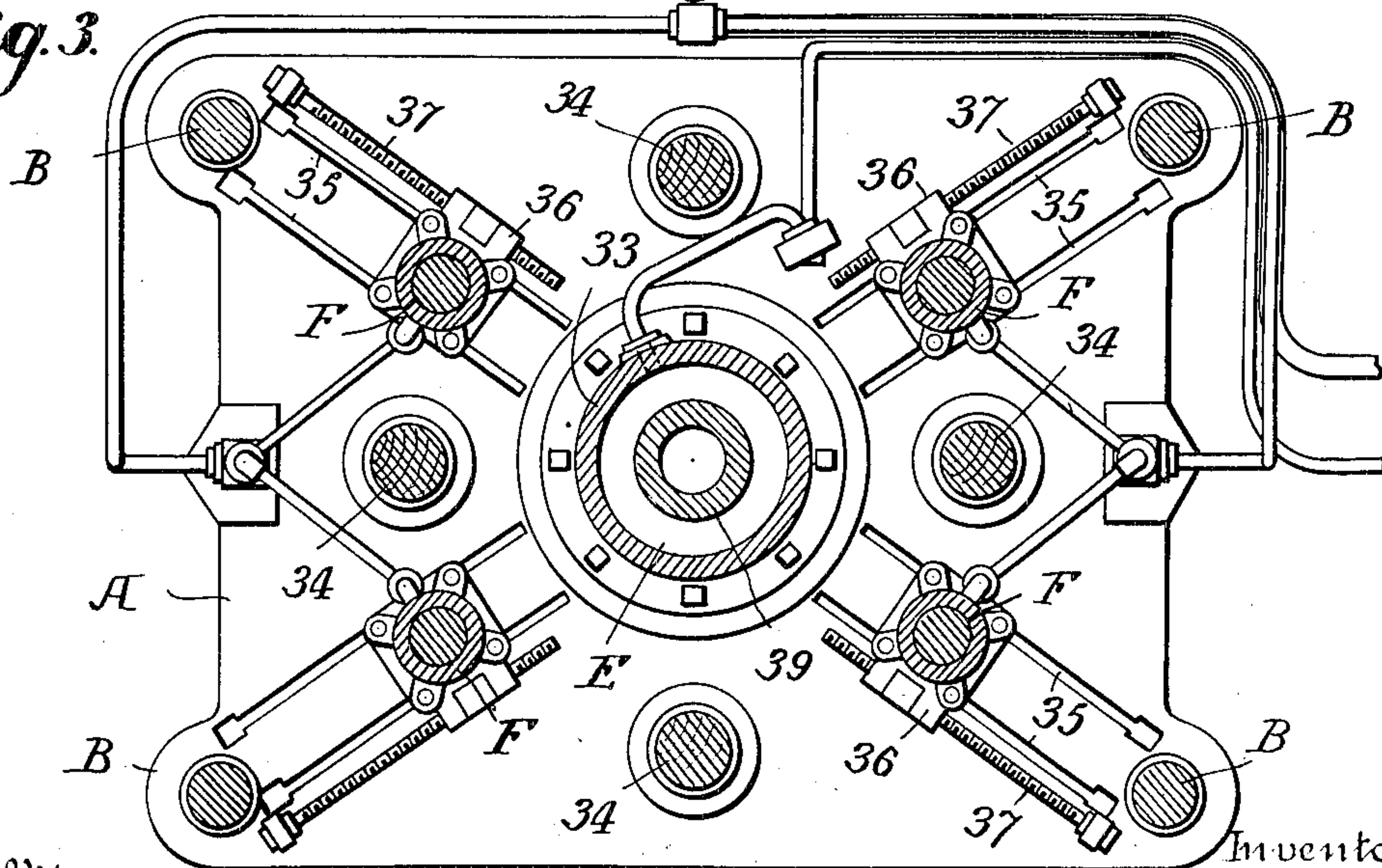
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3 SHEETS—SHEET 2.

*Fig. 2.*



*Fig. 3.*



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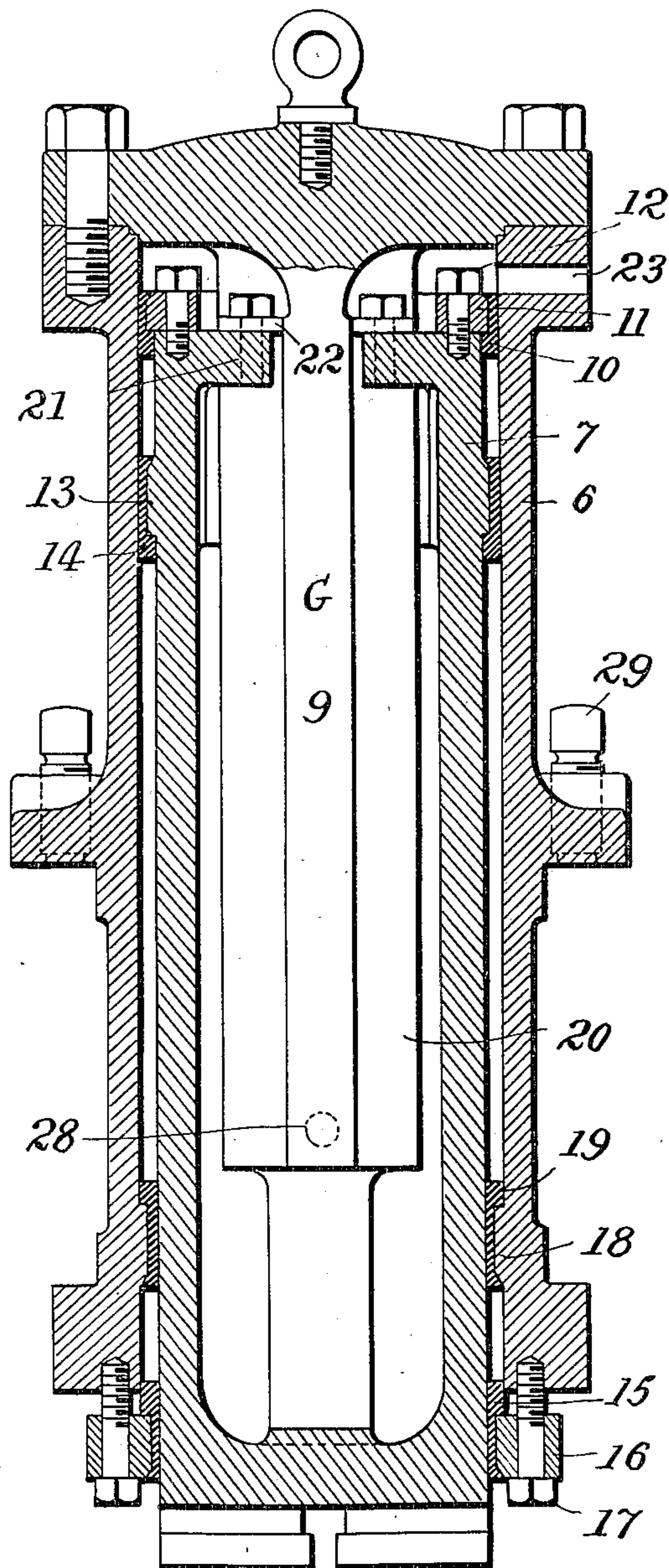
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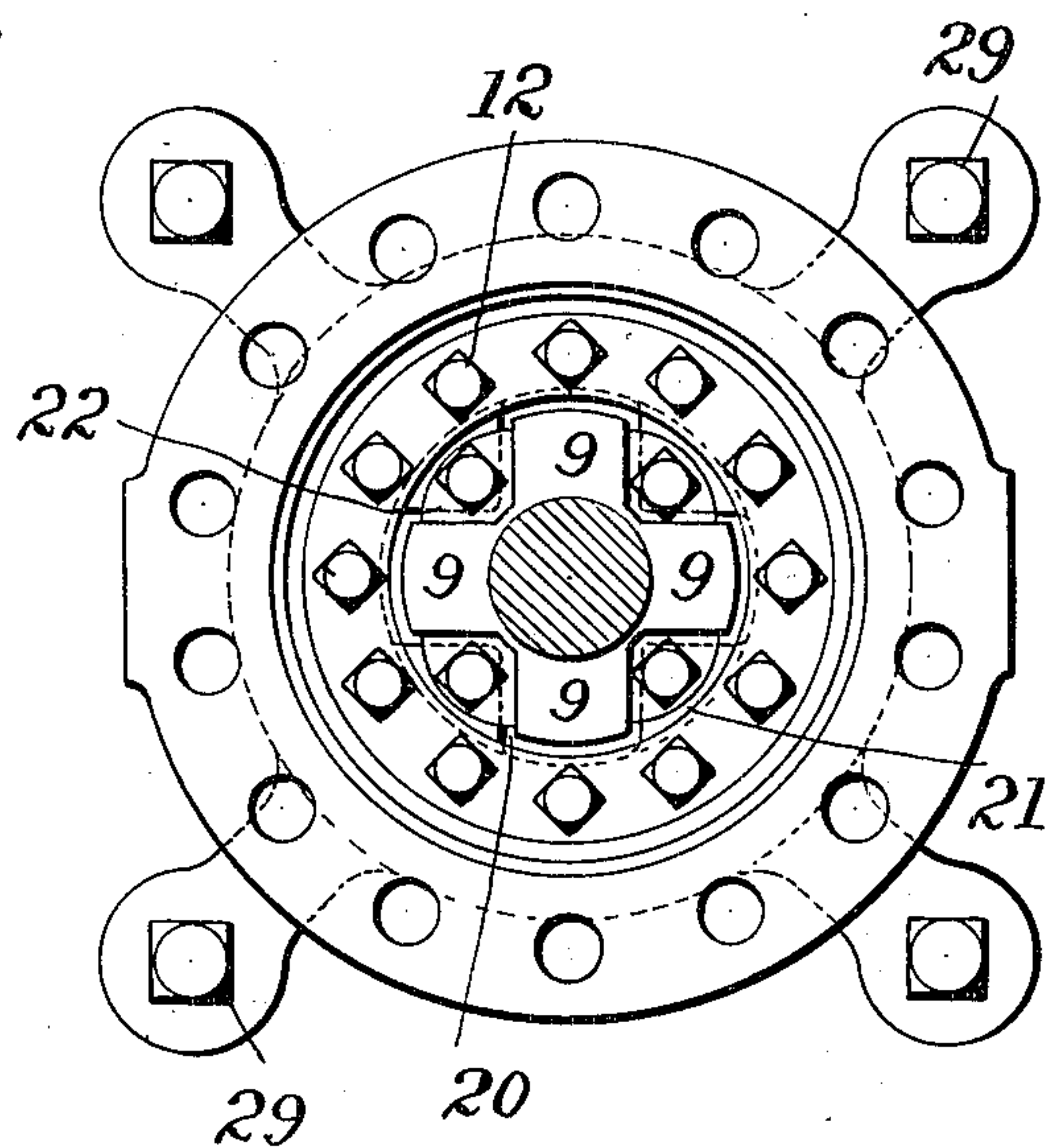
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3 SHEETS—SHEET 3.

*Fig. 4.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

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THE BETHLEHEM STEEL COMPANY, OF SOUTH BETHLEHEM, PENN-  
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## FLUID-PRESSURE METAL-WORKING MACHINE.

No. 812,228.

Specification of Letters Patent.

Patented Feb. 13, 1906.

Application filed August 24, 1904. Serial No. 222,014.

*To all whom it may concern:*

Be it known that I, CASIMIR VON PHILP, a citizen of the United States, and a resident of Bethlehem, Northampton county, State of Pennsylvania, have invented certain new and useful Improvements in Fluid-Pressure Metal-Working Machines, of which the following is a specification.

This invention comprises various improvements in fluid-pressure metal-working machines such as are employed for flanging or riveting metal plates and for other purposes.

The invention will be described in detail in connection with the accompanying drawings, in which—

Figure 1 is a vertical section on the line *a b* of Fig. 2 of an apparatus embodying my invention. Fig. 2 is a top plan view of the apparatus, the upper platen being broken away, so that the lower platen may be seen. Fig. 3 is a section on the line *c d* of Fig. 1. Fig. 4 is a vertical section of the working cylinder mounted on the upper platen; and Fig. 5 is a top plan view of the working cylinder with the head removed, showing the plunger and plunger-guide.

Referring to the accompanying drawings, the apparatus comprises a suitable foundation on which is mounted a bed-plate A, supporting uprights B. Upon the uprights are slidably mounted an upper platen C and a lower platen D. Fixed to the bed-plate A is a hydraulic device E for raising the lower platen D. The bed-plate A also supports hydraulic jack-cylinders F, the plungers of which may extend above the lower platen for supporting the work. Adjustably secured within the upper platen C is a hydraulic cylinder G, the plunger of which carries a tool or is otherwise suitably arranged and constructed to work upon the metal.

The upper platen C may be secured in any desired position upon the uprights B by means of lock-nuts 1, engaging with screw-threads upon the uprights. The upper platen has a slot 2, within which the cylinder G is slidably mounted. The cylinder G has lugs 3, which rest upon the top of the platen C, and also lugs 4, which extend into grooves 5, cut in the sides of the slot 2 and between the upper and lower faces of the platen C. By this construction ease of movement and security in position of the cylinder G is secured.

The interior of the outer cylinder 6 is of the usual cylindrical form, within which fits a hollow plunger 7. At the top of the plunger is secured a cylinder-ring 10 by a ring 11, fixed to the end of the plunger by bolts 12. Farther down the plunger is formed a lug 13, by means of which a second cylinder-ring 14 is secured to the plunger. At the bottom of the cylinder a similar cylinder-ring 15 is secured by a ring 16 and bolts 17 to the cylinder. A short distance from the bottom of the cylinder a lug 18 is formed upon its interior, which lug operates to secure another cylinder-ring 19. A guide 9, fixed to the head of the cylinder, has longitudinal grooves 20, into which extend lugs 21, fixed to the interior of the plunger. In order that the lugs may fit the grooves accurately, liners 22, machined to fit the grooves, may be secured to the lugs. The coöperation of the lugs and grooves prevents turning of the plunger within the cylinder, and therefore prevents twisting of a tool which may be carried by the cylinder with relation to the work. The space within the plunger may be connected with a source of fluid-pressure, as a head of water, by means of a pipe connected with an opening 23. This pipe preferably comprises sections 24 and 25, which are jointed to each other, so that they may turn. The other ends of the sections are jointed to the cylinder 6 and to a stationary pipe-head 26, secured to an upright B or other stationary portion of the apparatus. As will be noted, the pipe-sections 24 and 25 are of sufficient combined length to permit the cylinder G to move to the end of its travel, while the joints between the stationary pipe, the cylinder, and between the sections are such as to permit the flexure of the pipe-sections, so that the cylinder G may be moved along the slot 2. The opening 23 is also connected to an outlet-pipe which may be controlled by a valve in any suitable manner.

In the outer cylinder 6 is a hole 28, which connects with a source of pressure and also with an outlet in a manner similar to that noted in connection with the opening 23. The hole 28 opens into the outer cylinder between the cylinder-rings 14 and 19. If now the controlling devices be so turned that the space between the cylinder-rings 14 and 19 and between the plunger and the outer cyl-



inder is connected with the outlet through the opening 28, while the interior of the plunger is connected through the opening 23 with the source of pressure, the plunger will be forced downwardly. After the stroke of the plunger has been completed it is necessary that it be returned to its upper position. This may be accomplished by so manipulating the controlling devices governing the openings 23 and 28 that the former opening is connected with the outlet while the latter is connected with the source of pressure. The plunger will be then forced upwardly into position for another stroke.

As before stated, the cylinder G may be moved along the slot 2, and it may be held in any desired position by means of clamping-screws 29, carried by the lugs 3 and engaging with the top of the upper platen. The cylinder G may be moved along the slot 2 by a relatively movable screw 30 and sleeve 31, which are in engagement with each other, one being connected to the cylinder and the other to the platen. The relative movement may be effected by means of a squared end 32 upon the screw, to which a wrench may be applied.

The lower platen D is fixed to a plunger 33, fitted within the cylinder of the hydraulic device E, which is supported in the bed-plate A. The space within the cylinder between it and the plunger is connected in any suitable manner with a source of pressure and also has suitable means of exhaust. When the exhaust is closed and the pressure connection opened, the plunger 33 will be forced upwardly, carrying the platen with it, the distance to which the platen is moved being regulated by controlling the pressure connections. If it be desired to lower the platen, the pressure connections are closed, while the exhaust is opened, when the platen and plunger will fall by their own weight. Upon the bed-plate are mounted wooden buffers 34, against which the platen strikes on its return movement. The use of wood in this connection has been found peculiarly advantageous, as it secures the stoppage of the platen without undue shock.

The jack-cylinders F comprise an outer cylinder in which is mounted a plunger with means for admitting pressure to and releasing pressure from the space within the cylinder beneath the plunger in any suitable manner. Each jack is slidably mounted upon a radially-extending track 35, along which it may be moved by means of a relatively movable nut 36 and screw 37, which engage with each other and are connected one to the jack-cylinder and the other to the bed-plate, so that they may have relative movement, and thereby cause the cylinder to move along the track. In the present instance the nut is shown as fixed to the jack-cylinder, while the screw is rotatably secured to the bed-plate and extends

parallel to the track. Slots 38 in the lower platen permit the plungers of the jacks to extend above the said platen, and as the slots are parallel to the tracks movement of the jacks along the tracks is permitted. The jacks F are obviously limited in their approach toward the center of the platen, and therefore any work which is supported upon the plungers of the jacks is necessarily unsupported in the center. It may, however, be desirable under some circumstances that the center of the work be supported. To accomplish this, a second plunger 39 is mounted within the plunger 33 of the cylinder E. This plunger is adapted to be projected upwardly through the center of the lower platen D by means of pressure exerted between the interior of the plunger 33 and the exterior of the plunger 39. This pressure may be created and removed by means of suitable pressure and exhaust connections which it is thought unnecessary to further describe. Upon the exhaust of the pressure from the interior of the plunger 33 the plunger 39 will drop of its own weight. A buffer 40, preferably of wood, is fixed in the lower end of the plunger to lessen the shock when it strikes the bottom of the plunger 33.

The operation as a whole may now be described as follows: The platen C having been set at the proper distance above the bed-plate, the work may be placed upon the lower platen D. The platen D may then be raised, as before described, by means of the hydraulic or other pressure cylinder E to the desired height, or if it be desired to support the work upon the plungers of the jacks F the jacks are set to their proper radial positions, as before described. The plungers may then be raised by admitting pressure to the jack-cylinders. If it be desired to support the center of the work, the plunger 39 may be raised, as in the manner before described, or if such support is not necessary the latter plunger need not be called into operation. The work being properly adjusted and supported, as described, the cylinder G is moved along the slot 2 until it occupies a proper position with relation to the work. The plunger 9 is then driven downwardly toward the work and by means of the tool at its end performs riveting, flanging, or other operations upon the metal. After having performed its work the plunger is again raised, as before described, when the operation may be repeated. The adjustment of the position of the metal to be worked and its support may be changed at any time, while the adjustment of the cylinder G with relation to the work may also be accomplished at any stage of the proceedings. It will thus be obvious that the working plunger 9 may be caused to operate upon any portion of the work and to perform a variety of operations.

In order that the cylinder G may be re-



moved from the slot 2, the said slot has a widened part 41 to permit the passage of the lugs of the cylinder when withdrawal of the cylinder takes place.

5 The various plungers and the faces of the platens may have T-shaped slots 42 for securing the work.

The dotted lines in Fig. 1 show the machine arranged to operate as a flanging-press. The  
10 plate 43 to be flanged rests upon a die 44, supported by the projected plungers of the jacks, the flanging being performed by the head 45, secured to the plunger 7, which is projected against the plate in a manner before described.

15 It will be understood that the invention is not limited to apparatus operated hydraulically, but that steam, compressed air, or other suitable actuating fluid may be employed.

20 While I have illustrated my invention in what I consider to be one of its best applications, it is to be understood that it may have other embodiments, and I do not, therefore, wish to be limited to that shown.

25 What I claim is—

1. In a fluid-pressure metal-working machine, the combination with a platen, of a fluid-pressure cylinder and plunger mounted in said platen, a bed-plate, a plurality of jacks  
30 upon the bed-plate for supporting the work, and means for moving said jacks with relation to said platen, for the purpose set forth.

2. In a fluid-pressure metal-working machine, the combination with a platen, of a  
35 fluid-pressure cylinder mounted thereon, a bed-plate, tracks upon said bed-plate, jacks for supporting the work mounted upon said tracks, and means for moving said jacks along said tracks, for the purpose set forth.

40 3. In a fluid-pressure metal-working machine, the combination with a platen, of a fluid-pressure cylinder mounted thereon, a bed-plate, tracks upon said bed-plate, jacks for supporting the work mounted upon said  
45 tracks, and screw-and-nut connections between said bed-plate and said jacks, for the purpose set forth.

4. In a fluid-pressure metal-working machine, the combination with a platen, of a  
50 fluid-pressure cylinder mounted thereon, a bed-plate, radial tracks upon said bed-plate, jacks for supporting the work mounted upon said tracks, and means for moving said jacks along said tracks, for the purpose set forth.

55 5. In a fluid-pressure metal-working machine, the combination with a platen, of a fluid-pressure cylinder mounted thereon, a bed-plate, radial tracks upon said bed-plate, jacks for supporting the work mounted upon  
60 said tracks, and screw-and-nut connections between said bed-plate and said jacks, for the purpose set forth.

6. In a fluid-pressure metal-working machine, the combination with a platen, of a  
65 fluid-pressure cylinder mounted thereon, a

bed-plate, tracks upon said bed-plate, fluid-pressure jacks for supporting the work mounted upon said tracks, and means for moving said jacks along said tracks, for the purpose set forth.

7. In a fluid-pressure metal-working machine, the combination with a platen, of a fluid-pressure cylinder mounted thereon, a bed-plate, tracks upon said bed-plate, fluid-pressure jacks for supporting the work mounted upon said tracks, and screw-and-nut connections between said bed-plate and said jacks, for the purpose set forth. 70 75

8. In a fluid-pressure metal-working machine, the combination with a platen, of a  
80 fluid-pressure cylinder mounted thereon, a bed-plate, radial tracks upon said bed-plate, fluid-pressure jacks for supporting the work upon said tracks, and means for moving said jacks along said tracks, for the purpose set forth. 85

9. In a fluid-pressure metal-working machine, the combination with a platen, of a fluid-pressure cylinder mounted thereon, a bed-plate, radial tracks upon said bed-plate, fluid-pressure jacks for supporting the work mounted upon said tracks, and screw-and-nut connections between said bed-plate and said jacks, for the purpose set forth. 90

10. In a fluid-pressure metal-working machine, the combination with a bed-plate, of upper and lower platens supported thereon, a fluid-pressure working cylinder mounted in said upper platen, a central plunger for supporting the work, and means for raising said  
95 plunger, for the purpose set forth. 100

11. In a fluid-pressure metal-working machine, the combination with a bed-plate, of upper and lower platens supported thereon, a fluid-pressure cylinder mounted in the upper  
105 platen, jacks for supporting the work mounted at a distance from the center, and a central plunger, for the purpose set forth.

12. In a fluid-pressure metal-working machine, the combination with a bed-plate, of  
110 upper and lower platens supported thereon, a fluid-pressure cylinder having its plunger connected to said lower platen, said plunger being hollow, and a second plunger acting as a support for the work mounted within the first  
115 plunger, for the purpose set forth.

13. In a fluid-pressure metal-working machine, the combination with a bed-plate, of upper and lower platens supported thereon, a fluid-pressure cylinder having its plunger connected to said lower platen, said plunger being hollow, and a second plunger acting as a support for the work mounted within the first  
120 plunger and movable independently thereof, for the purpose set forth. 125

14. In a fluid-pressure metal-working machine, the combination with a bed-plate, of upper and lower platens mounted thereon, a fluid-pressure cylinder mounted in the upper  
130 platen, a fluid-pressure cylinder having its



4  
 plunger connected to the lower platen, said plunger being hollow, fluid-pressure jacks for supporting the work mounted upon said bed-plate and extending above the lower platen, 5 and a central plunger for supporting the work mounted within the aforesaid plunger, for the purpose set forth.

10 15. In a fluid-pressure metal-working machine, the combination with a bed-plate, of upper and lower platens supported thereon, a fluid-pressure working cylinder slidably mounted in a slot in said upper platen, said cylinder having lugs bearing upon the top of said platen, and other lugs entering grooves 15 in the sides of said slot, said grooves being located between the top and bottom of said upper platen, for the purpose set forth.

20 16. In a fluid-pressure metal-working machine, the combination with a bed-plate, of upper and lower platens supported thereon, a fluid-pressure working cylinder slidably mounted in a slot in said upper platen, said cylinder having lugs bearing upon the top of said platen, other lugs entering grooves in the 25 sides of said slot, said grooves being located between the top and bottom of said upper platen, and set-screws carried by the lugs bearing upon the top of the platen and adapted to engage with said platen, for the purpose 30 set forth.

17. In a fluid-pressure metal-working machine, the combination with a bed-plate, of

upper and lower platens supported thereby, a fluid-pressure working cylinder mounted in the upper platen, said cylinder comprising an 35 outer cylinder, a plunger therein, and a guide arranged within the plunger for preventing rotation of said plunger with relation to said outer cylinder, for the purpose set forth.

40 18. In a fluid-pressure metal-working machine, the combination with a bed-plate, of upper and lower platens supported thereby, and a fluid-pressure working cylinder mounted in the upper platen, said cylinder comprising an outer cylinder, a hollow plunger there- 45 in, a guide fixed to the head of said cylinder and extending within said plunger, said guide having longitudinal grooves, and lugs upon said plunger extending within said grooves, for the purpose set forth. 50

19. A fluid-pressure cylinder comprising an outer cylinder, a hollow plunger therein, a guide projecting from the cylinder-head within said plunger, said guide having longitudinal grooves, and lugs secured to said plun- 55 ger and projecting into said grooves, for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CASIMIR VON PHILP.

Witnesses:

HARRY WILBUR,  
 A. H. MOSES.