

(No Model.)

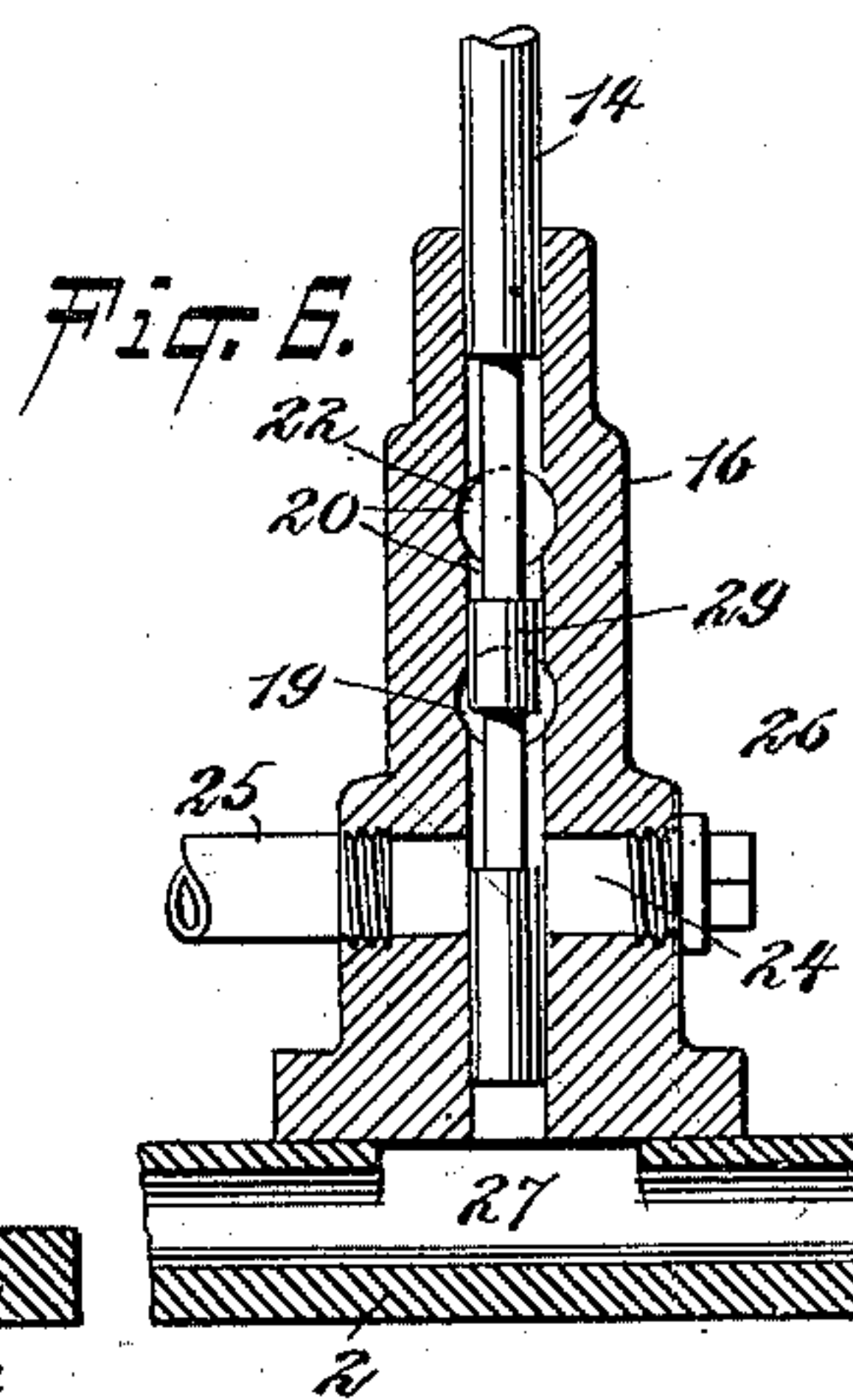
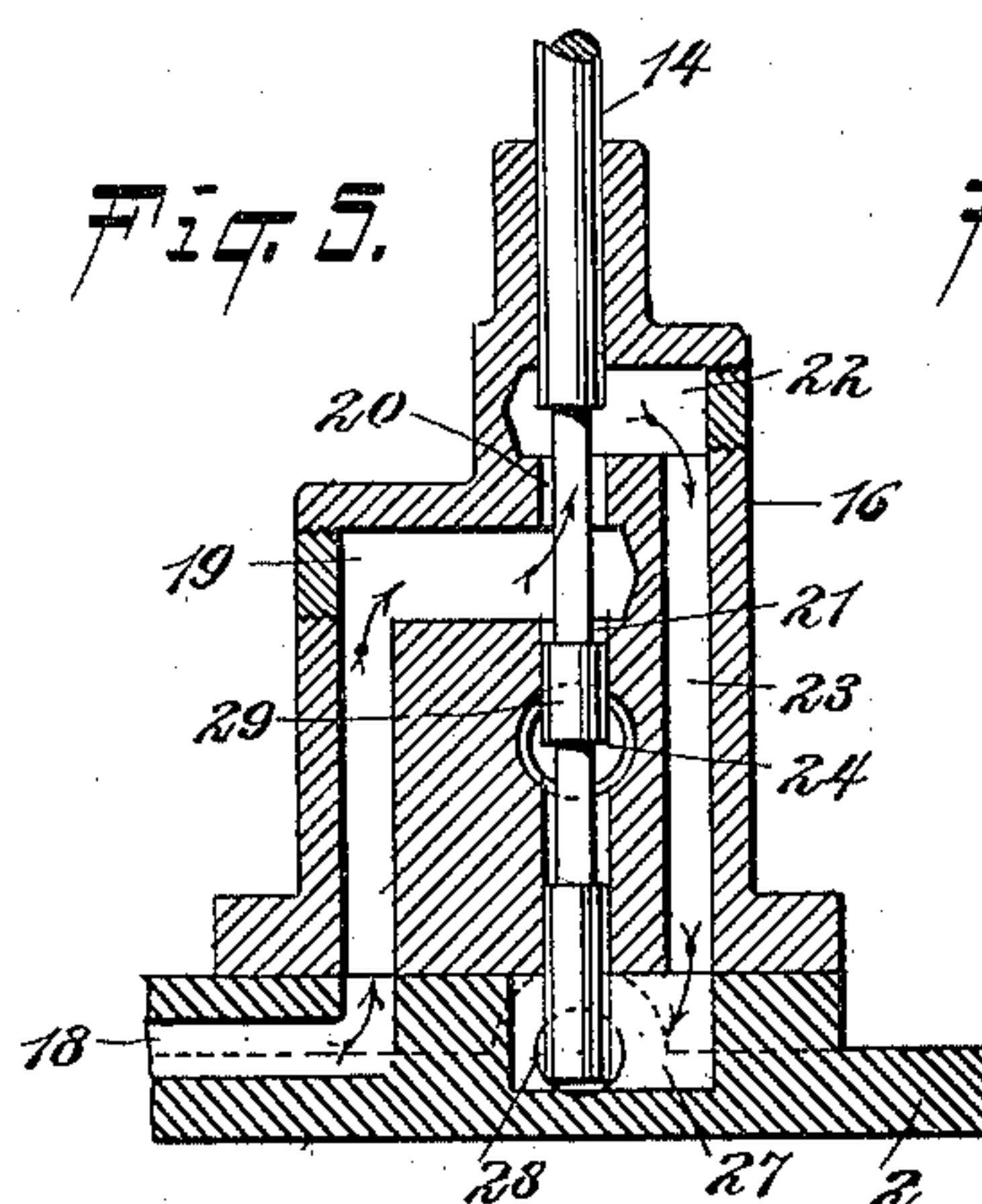
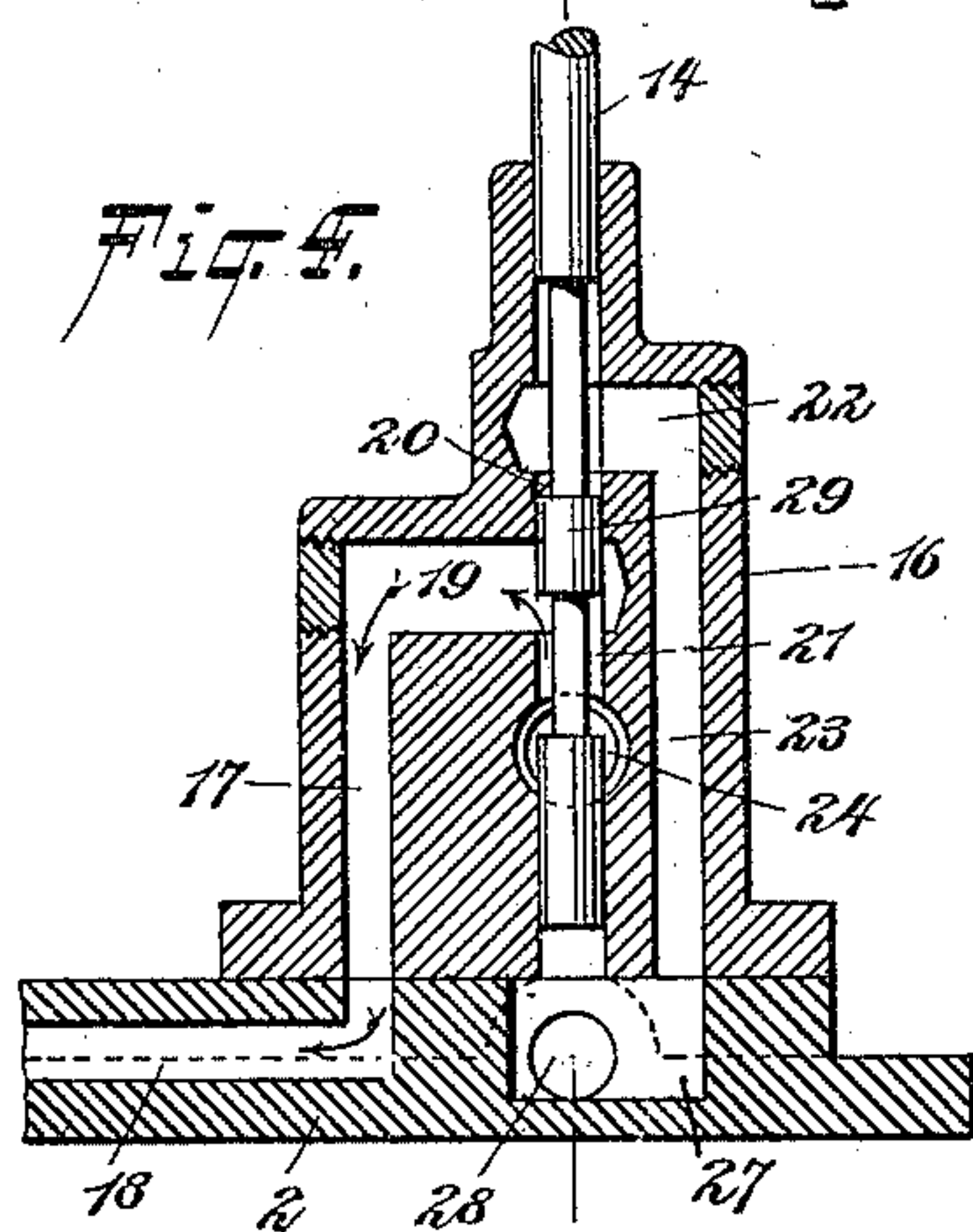
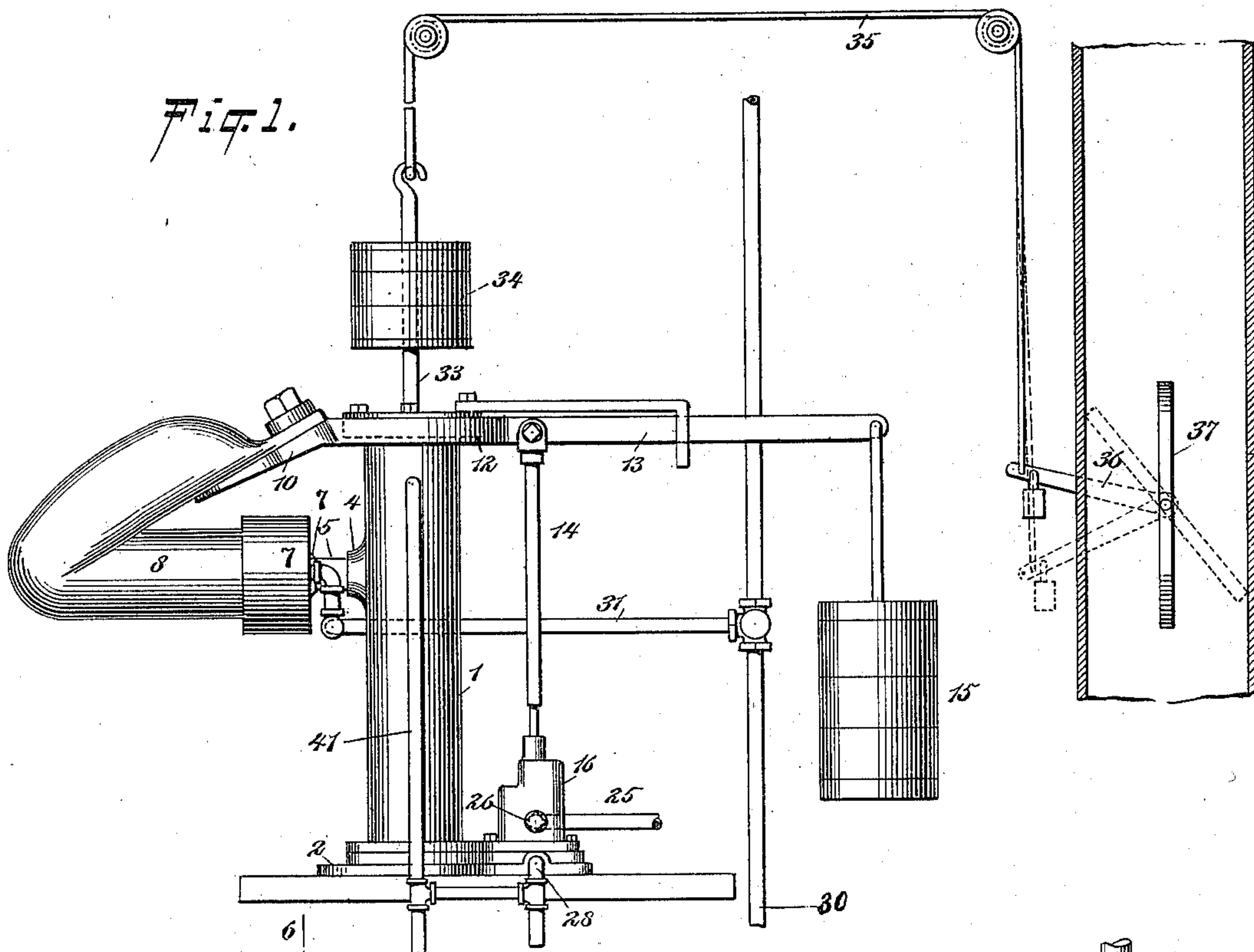
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F. T. MUELLER.

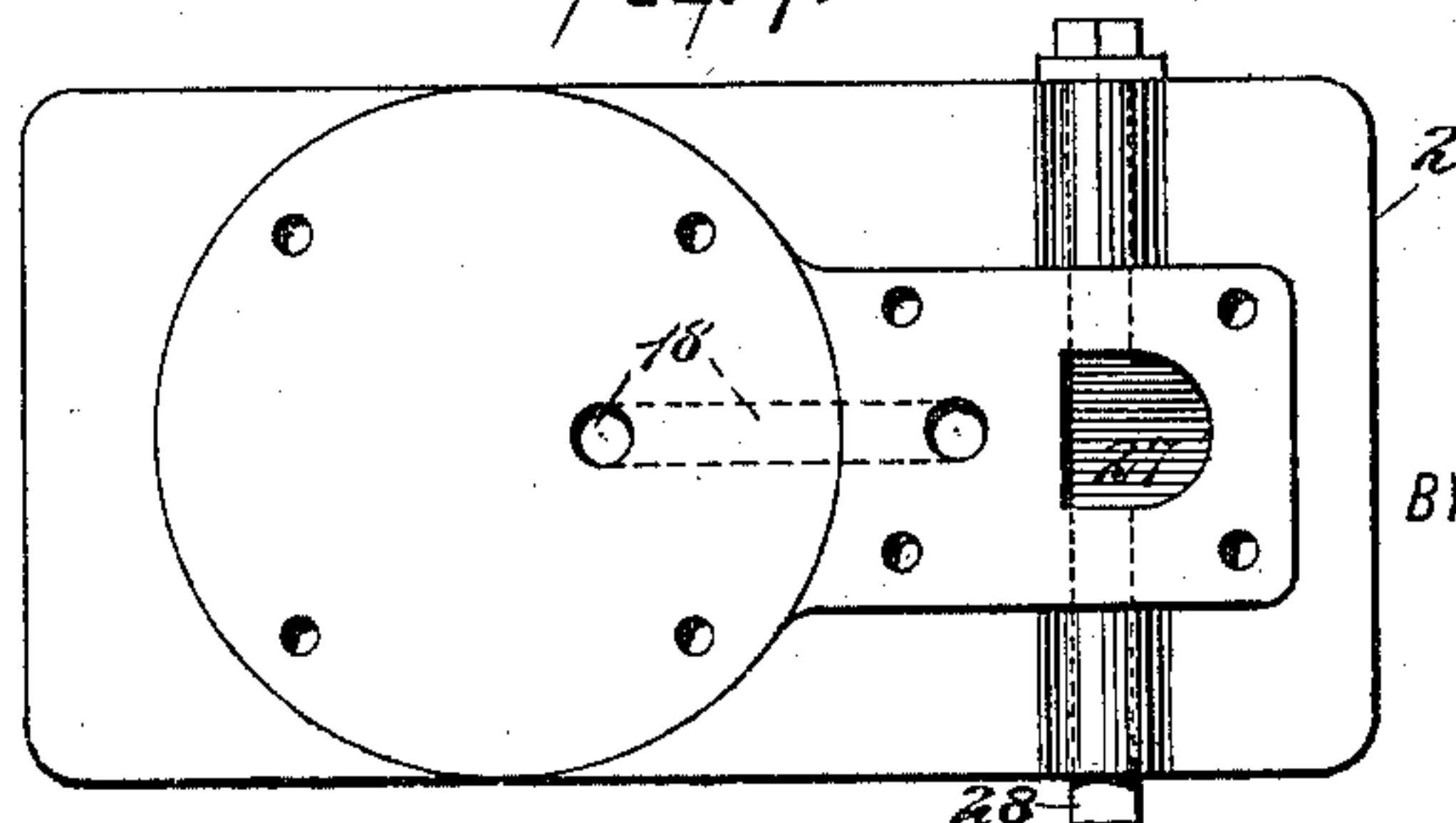
VALVE CONTROLLING APPARATUS.

No. 598,571.

Patented Feb. 8, 1898.



*Fig. 7.*



WITNESSES:

*William P. Goebel.*  
*M. Van Nortwick.*

INVENTOR

*Frederick J. Mueller*

BY

*George Cook.*

ATTORNEY.

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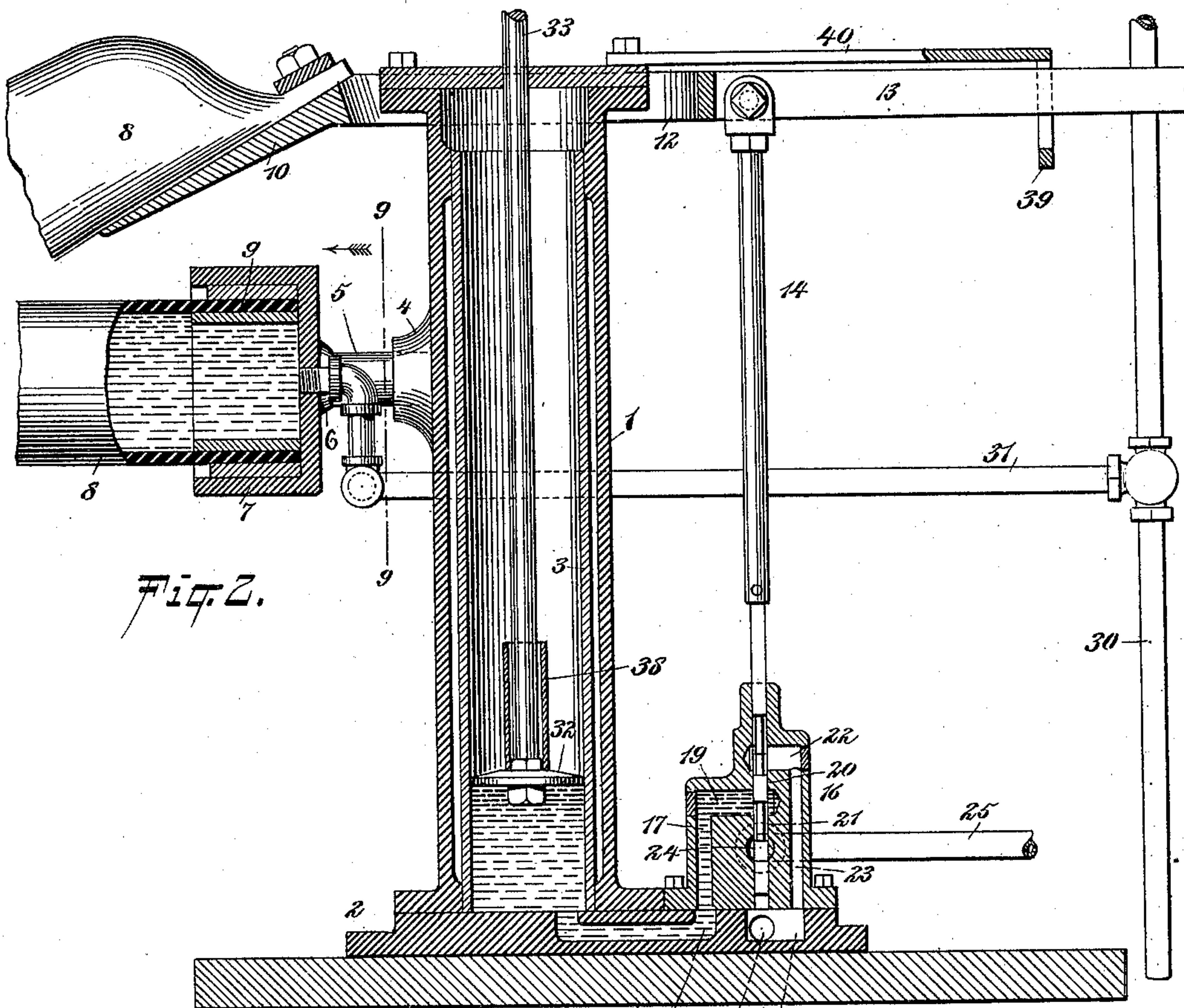


Fig. 2.

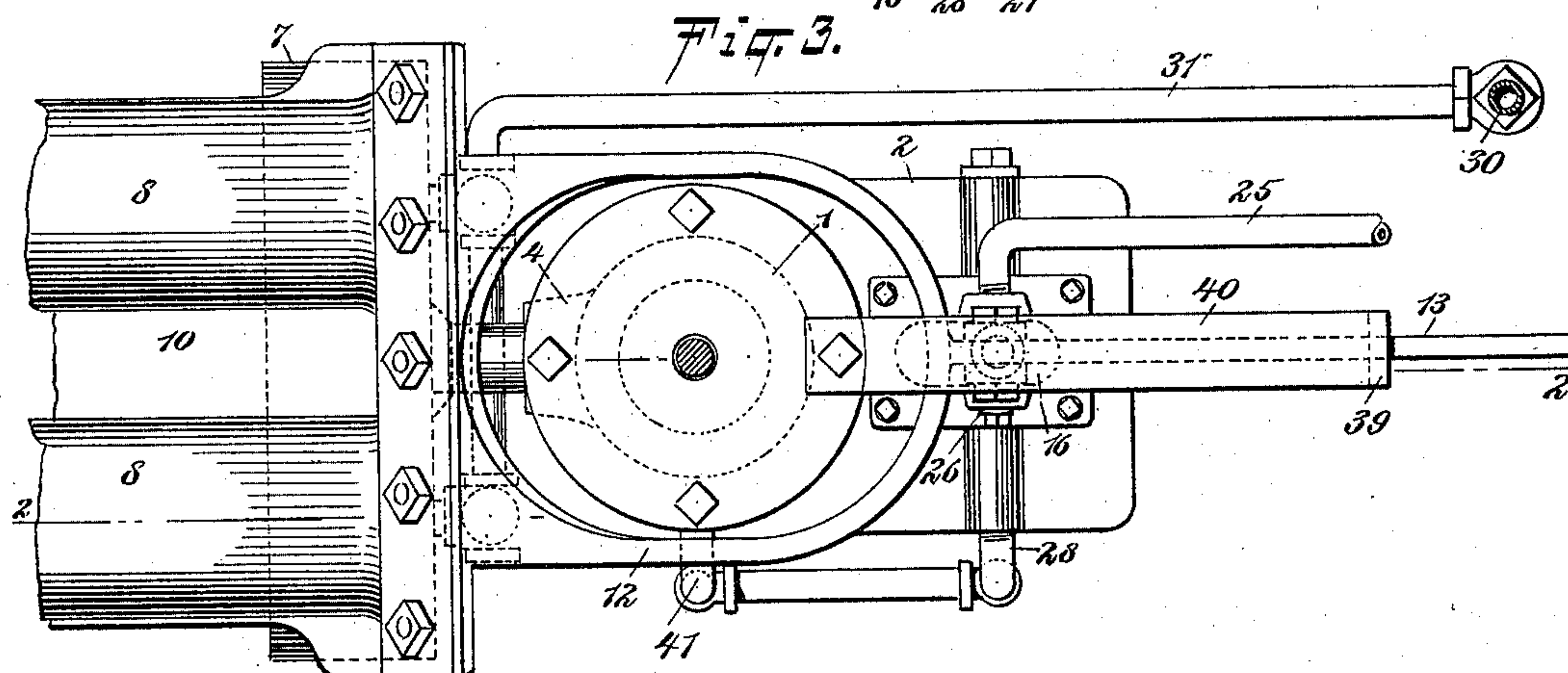


Fig. 3.

WITNESSES:

William P. Goebel.  
M. Van Nortwick.

INVENTOR  
Frederick T. Mueller  
BY  
Gerard Cook  
ATTORNEY.



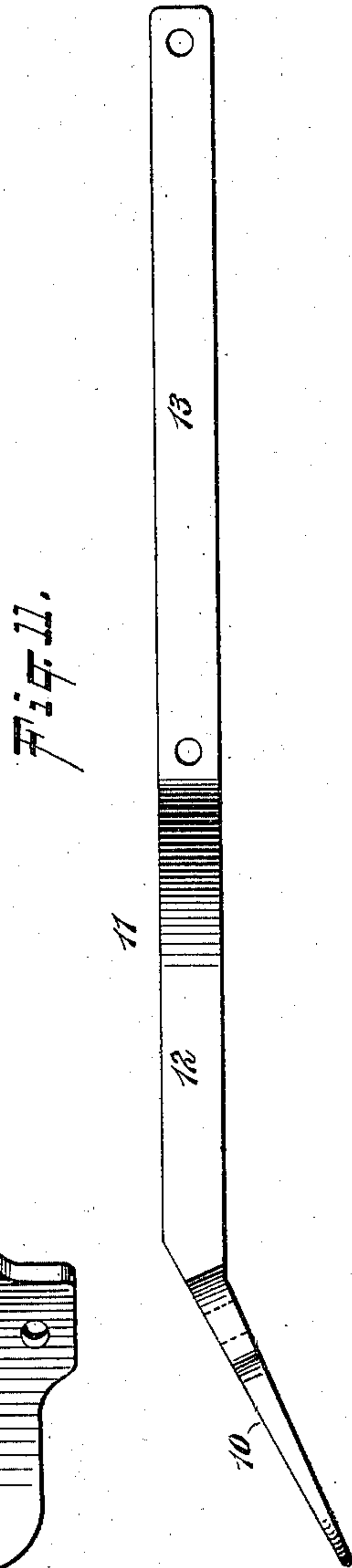
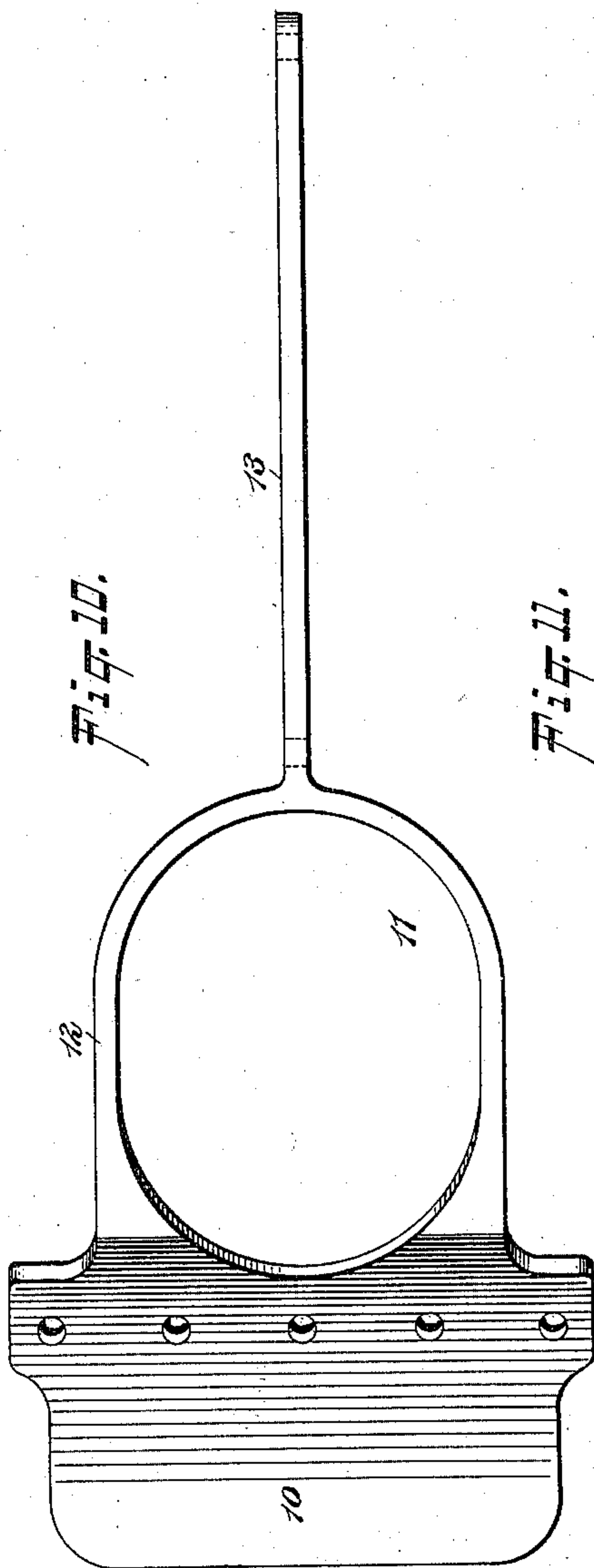
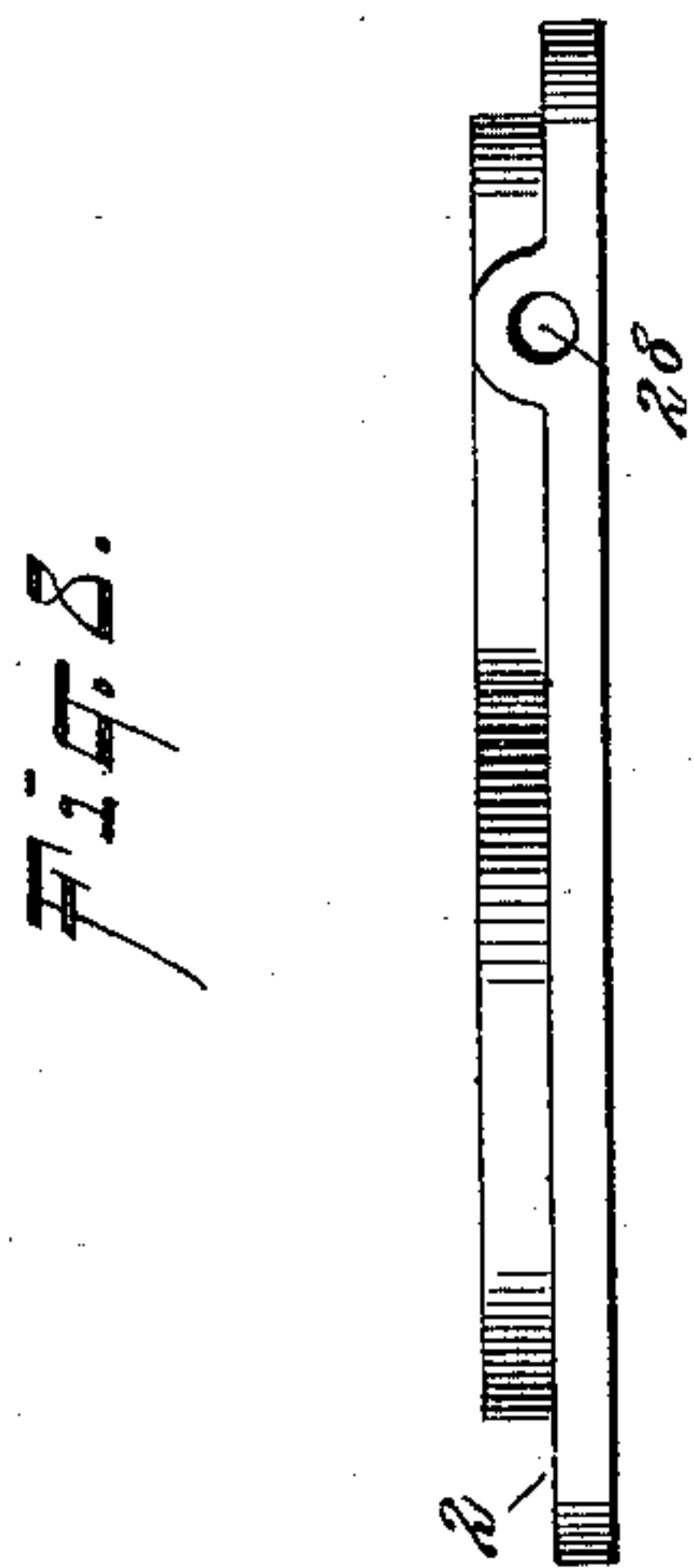
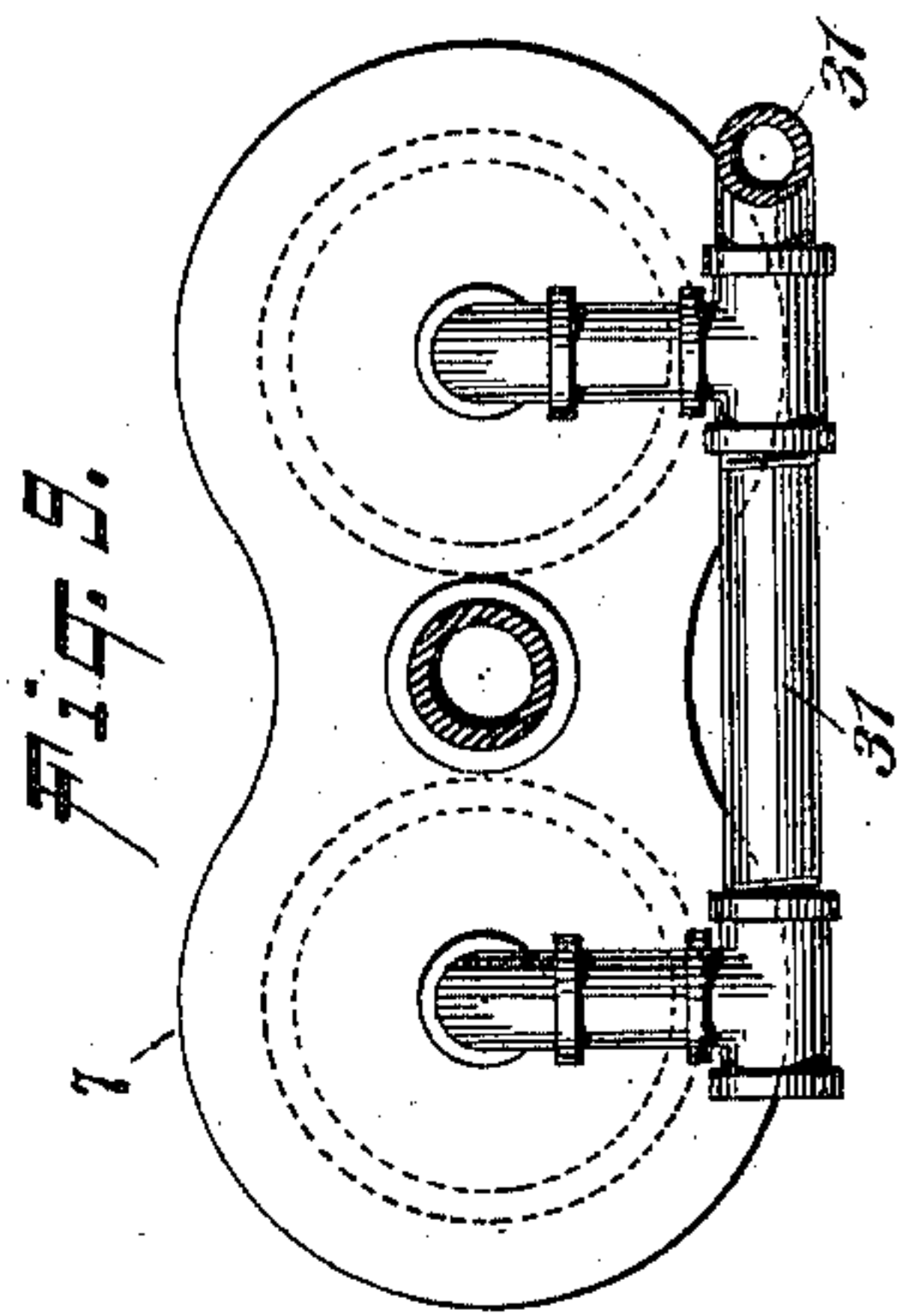
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William P. Goebel.  
M. Van Nortwick.

INVENTOR

Frederick T. Mueller

BY

George L. Cook.  
ATTORNEY.



# UNITED STATES PATENT OFFICE.

FREDERICK T. MUELLER, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF  
TO TIMOTHY J. KIELEY, OF SAME PLACE.

## VALVE-CONTROLLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 598,571, dated February 8, 1898.

Application filed March 24, 1897. Serial No. 629,026. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK T. MUELLER, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Valve-Controlling Apparatus, of which the following is a specification.

My invention relates to an improved device for controlling the operation of valves, and is based upon the inherent tendency of a flexible tube when folded over upon itself to straighten out when pressure is exerted upon its contents. If such a tube or pipe—as, for instance, a section of hose-pipe of suitable diameter folded over upon itself and partially filled with gas or liquid—has one of its ends held stationary, any pressure applied to its contents will cause the opposite closed and folded-over end to rise, and in my invention this motion or lifting of said closed end is utilized to open or close a valve.

In order that it may be more clearly and fully comprehended, I will describe my invention as applied to a damper, the object being to construct and arrange the several parts so that an even pressure may be maintained in the boiler and the damper opened or closed when such pressure decreases or increases, as the case may be.

In the accompanying drawings, Figure 1 is a side view of my improved device, showing the same arranged to open and close the damper. Fig. 2 is a sectional view thereof, the damper being omitted. Fig. 3 is a plan view of the same. Figs. 4 and 5 are sectional views of the valve-chamber, showing the valve in different positions. Fig. 6 is a similar view taken on the line 6 6 of Fig. 4. Fig. 7 is a plan view of the detached bed-plate. Fig. 8 is a side view of the same. Fig. 9 is a sectional view taken on the line 9 9 of Fig. 2. Fig. 10 is a plan view of the lever for operating the valve-rod. Fig. 11 is a side view of the same.

Referring to the drawings, 1 represents a cylinder of any suitable size and dimensions, preferably constructed of cast-iron, and having its upper end closed and its lower end resting upon and secured to a bed-plate 2. Within this cylinder 1 is tightly fitted an inner

cylinder or lining 3, preferably formed of brass and provided for the purpose of presenting a smooth and finished inner surface to a piston working therein. The cylinder 1 has formed thereon or secured thereto a stud 4, in which is threaded one end of the arm 5, the opposite end being secured in the stud 6, formed on the box or bracket 7, the latter being supported thereby. In the box 7 are tightly fitted the open ends of the flexible pipes 8, suitable packing-rings 9 surrounding said open ends for preventing the escape of water therefrom, with which said tubes are filled, as will be hereinafter described. These tubes or pipes 8 are made of waterproof material, such as rubber, sections of hose-pipe fully answering all the requirements, and are bent or folded back upon themselves, so that the material of the upper folded-over portions will come in contact with the material of the lower straight portions at the fold or bend, the purpose of this arrangement being to cause a lifting of the upper portions when pressure is exerted on the contents of the pipes by reason of the swelling or expansion of the pipes at the contact-point, the upper closed and folded-over ends being tightly secured to the plate 10, forming a part of the lever 11. (Shown in Figs. 10 and 11 of the drawings.) This lever practically forms a continuation of the upper folded-over portion of the pipe 8 and is preferably formed of the shape shown—that is, with the plate 10 on a slant to correspond with the slant of the upper arms or portions of the tubes 8, the ring 12 for encircling the upper end of the cylinder 1, and the arm 13, with which is connected a valve-rod 14, the outer end of said arm being provided with weights 15 for lowering said rod 14 at the proper time. To the bed-plate 2 is also secured a valve-chamber 16, provided with the vertical port 17, registering or connecting with a port 18, formed in the bed-plate 2 and leading into the lower end of the cylinder 1 and at its upper end leading into the horizontal port 19, which latter in turn communicates with the port 20 and with the port 21, the port 20 communicating with ports 22 and 23 and the port 21 communicating with the port 24, into which latter is threaded the end of an inlet-pipe 25,



the other end of the latter being connected to the city water-main, an elevated water-tank, or other suitable water-supply under pressure. The opposite end of port 24 is closed by means of a plug 26, as shown in Fig. 6 of the drawings.

The lower end of the vertical port 23 leads into the chamber 27, formed in the bed-plate 2, from which chamber leads an exhaust or outlet pipe 28 to carry away the water from the cylinder 1, as hereinafter described.

On the valve-rod 14, connected, as before described, with the arm 13 of the lever 11, is formed the valve 29, which when the valve-rod is raised closes the port 20 and opens the port 21, and when the valve-rod is lowered opens the port 20 and closes port 21.

From the boiler (not shown) and below the water-line therein leads a pipe 30, which connects with the pipe 31, leading into the ends of the flexible pipes 8 through the bracket 7, said pipes being filled with water.

Within the lining 3 of the cylinder 1 is fitted a piston 32, secured to the lower end of the piston-rod 33, passing through the cover or top of the cylinder, on which rod and above the cylinder is secured a weight 34, the upper end of said piston-rod being connected in any convenient way, as by a rope or chain 35, to a lever 36, formed on or secured to the damper 37.

In order to prevent the piston from rising too high in the cylinder, I secure to the piston a sleeve 38, fitting around the rod 33, and which, striking the top or cover of the cylinder, limits the upward movement of said rod and piston.

Having described the construction and arrangement of the several parts, I will now describe the operation of the device.

By reference to Fig. 1 it will be seen that the damper is in a vertical or open position. Should steam be formed too fast in the boiler, the increase in pressure therein will be transmitted through the water with which the pipes 30 and 31 are filled to the water in the flexible pipes 8, the effect being to cause the upper folded-over portions thereof to rise or separate from the lower portions, the tendency of a flexible tube under such conditions being to straighten out, and as the lower ends in the present instance are held stationary by the bracket 7 the upper closed ends secured to the lever 11 will lift, thereby raising said lever 11, which is guided in its movements by the downwardly-bent ends 39 of the plate 40, secured to the top of the cylinder 1. As the lever 11 rises, it lifts or raises the piston-rod 14, bringing the valve 29 into the position shown in Figs. 4 and 6, the result being that the water under pressure in the inlet-pipe 25 will flow through the ports 24 21 19 17 18 and into the lower ends of the cylinder, and exerting its pressure on the piston 32 will raise the same with its piston-rod 33, thereby dropping the weighted lever 36 and closing the damper 37. Again, should the

pressure in the boiler decrease the pressure on the pipes 31 and 30 will decrease, thereby relieving the pressure on the water in the flexible pipes 8 and allowing the upper portions of the latter with the weighted lever 11 to descend. The valve-rod 14 will thus be lowered, bringing the valve 29 into the adjustment, as shown in Fig. 5, the result being that the weighted piston-rod 33 will descend, causing the piston 32 to force the water from out the cylinder through the ports 18 17 19 20 22 23 and into the chamber 27, out of which it flows through the exhaust-pipe 28. As the piston-rod 33 descends it will of course raise the lever 36, thereby opening the damper 37.

In case any water should leak past the piston it will be carried up thereby until it reaches the outlet-pipe 41, leading from the upper portion of the cylinder and connecting with the discharge or exhaust pipe 28.

As before stated, although I have described my invention as applied to a damper for opening or closing the same, it will be evident that it is applicable to other devices, as the raising or lowering of the piston-rod 33 may be employed to perform other work, the amount depending upon the pressure behind the piston.

Again, it will be understood that instead of using water in the pipes 30 and 31 and in the flexible pipes 8 they may be filled with air or gas under pressure.

Again, it will be evident that instead of using two flexible pipes 8 one only may be used, practical devices which I have constructed and operated showing such to be the fact. I have found in practice, however, that when two are employed the device acts with more sensitiveness than when one only is utilized.

Further, it will be evident that many unimportant changes in the detail, construction, and arrangement of the parts might be made without departing from the spirit and scope of my invention, and hence I do not limit my claims to that shown and described.

I am aware of the fact that flexible pipes bent in the form of an arc of a circle and made of metal have been used for various purposes, such being generally known and referred to as the "Bourdon spring," and hence I make no claim to such, the gist of this invention lying in the use of a pipe made of flexible material, such as rubber or fabric, in contradistinction to metal and bent or folded back upon itself, thereby utilizing the expansion of the pipe at the point of bending or folding where the surfaces of the rubber or fabric come in contact to assist in the separation of the two portions and straightening out of the pipe.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a valve-regulator, the combination of a motor consisting of a pipe made of flexible material folded back upon itself, and a valve



connected with and operated by said motor, substantially as described.

2. In a valve-regulator, the combination with a motor comprising a pipe of flexible material folded upon itself, one end of the pipe being held stationary and the other adapted to move, and a valve connected to the movable end of the pipe, substantially as described.

3. In a valve-regulator the combination with a pipe made of flexible material and containing liquid under varying pressure, said pipe being folded over upon itself and having one end movable, of a valve and valve-rod, the latter being connected with and operated by the movable end of said pipe, substantially as described.

4. In a device of the character described, the combination with a cylinder having a piston working therein, of a flexible pipe folded over upon itself and containing a liquid under varying pressure, and a lever secured to said flexible pipe, for operating a valve controlling the supply and discharge of water to said cylinder behind said piston, substantially as described.

Signed at New York, in the county of New York and State of New York, this 22d day of March, A. D. 1897.

FREDERICK T. MUELLER.

Witnesses:

THOS. MEEHAN,

TIMOTHY J. KIELEY.