

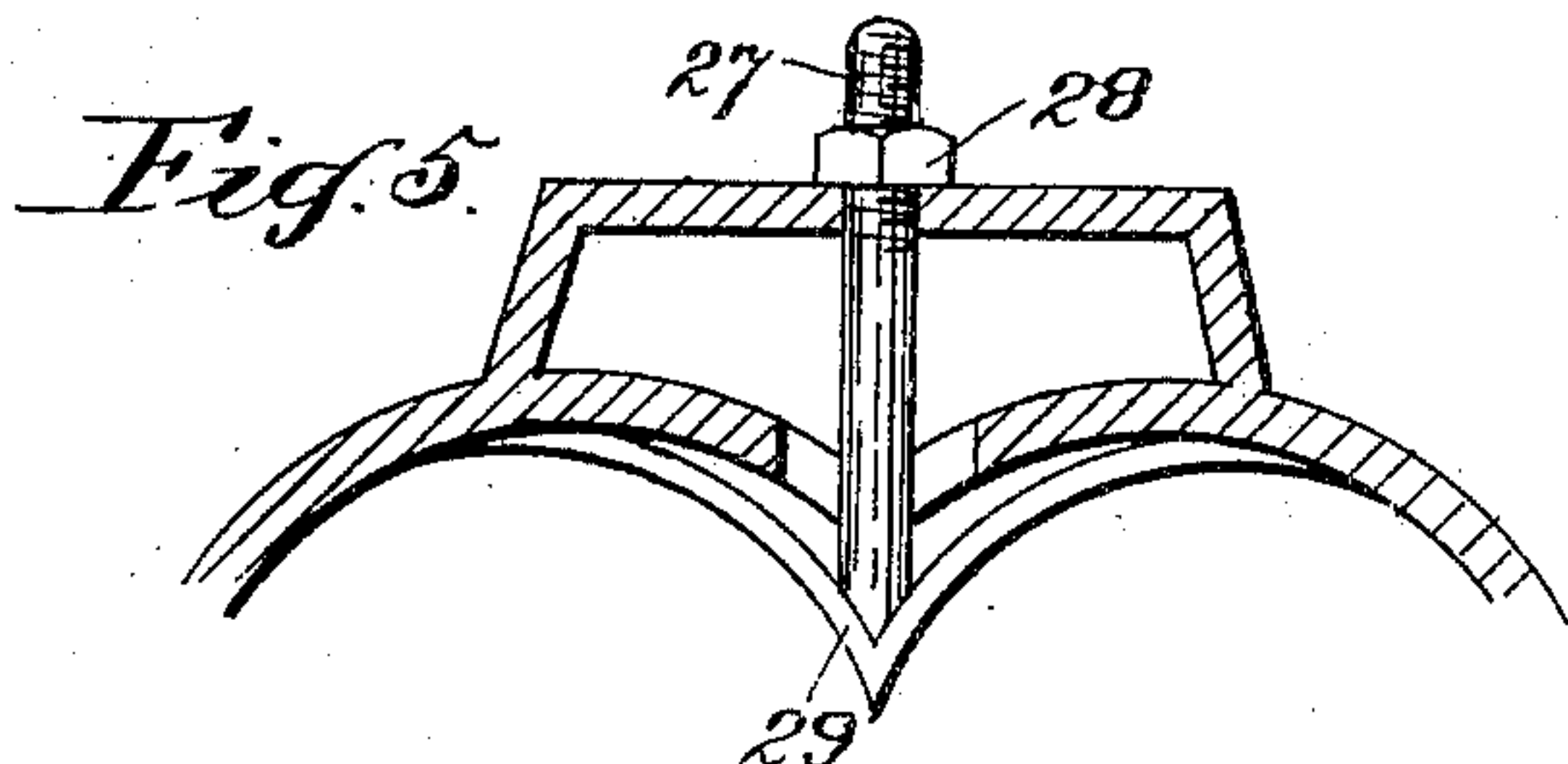
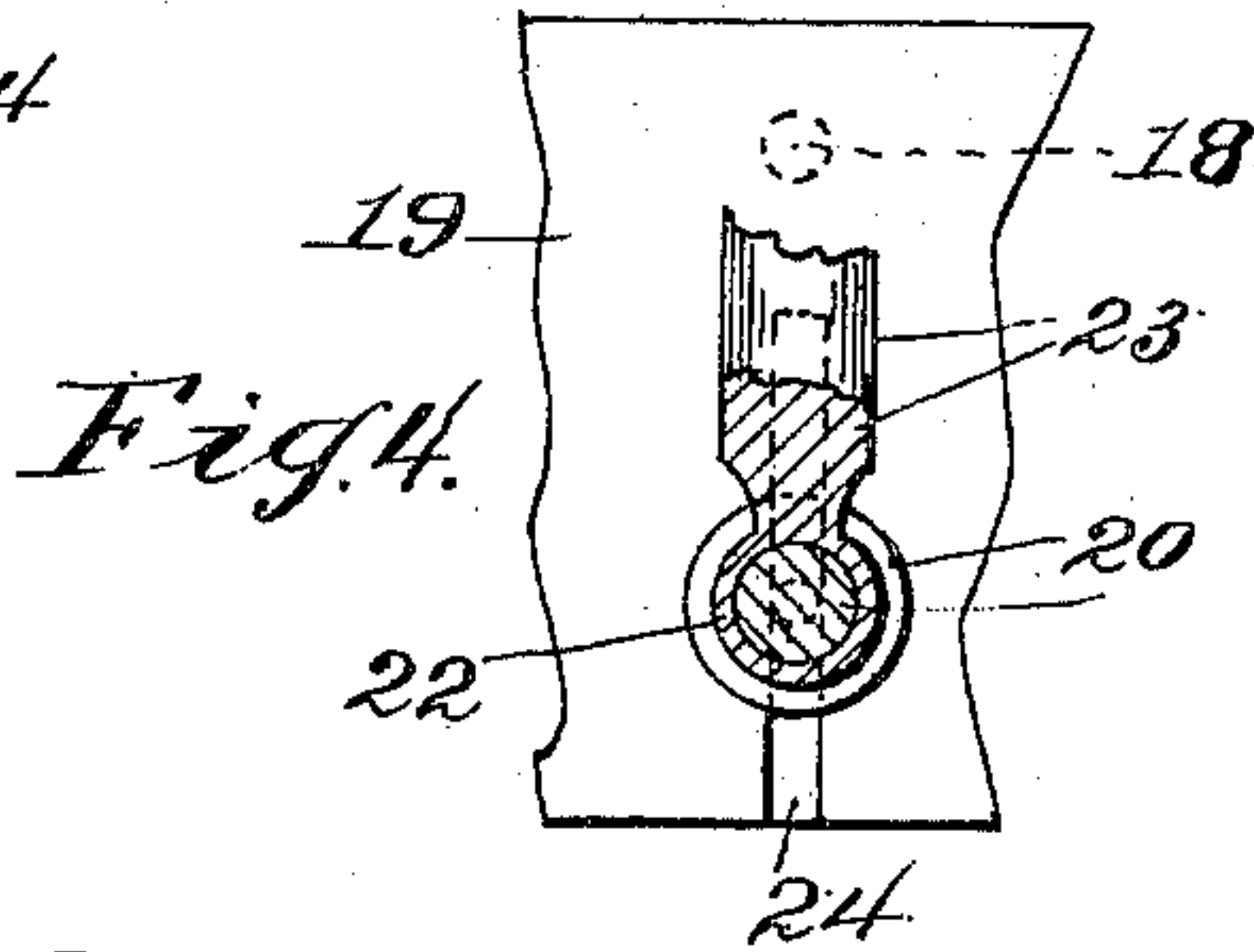
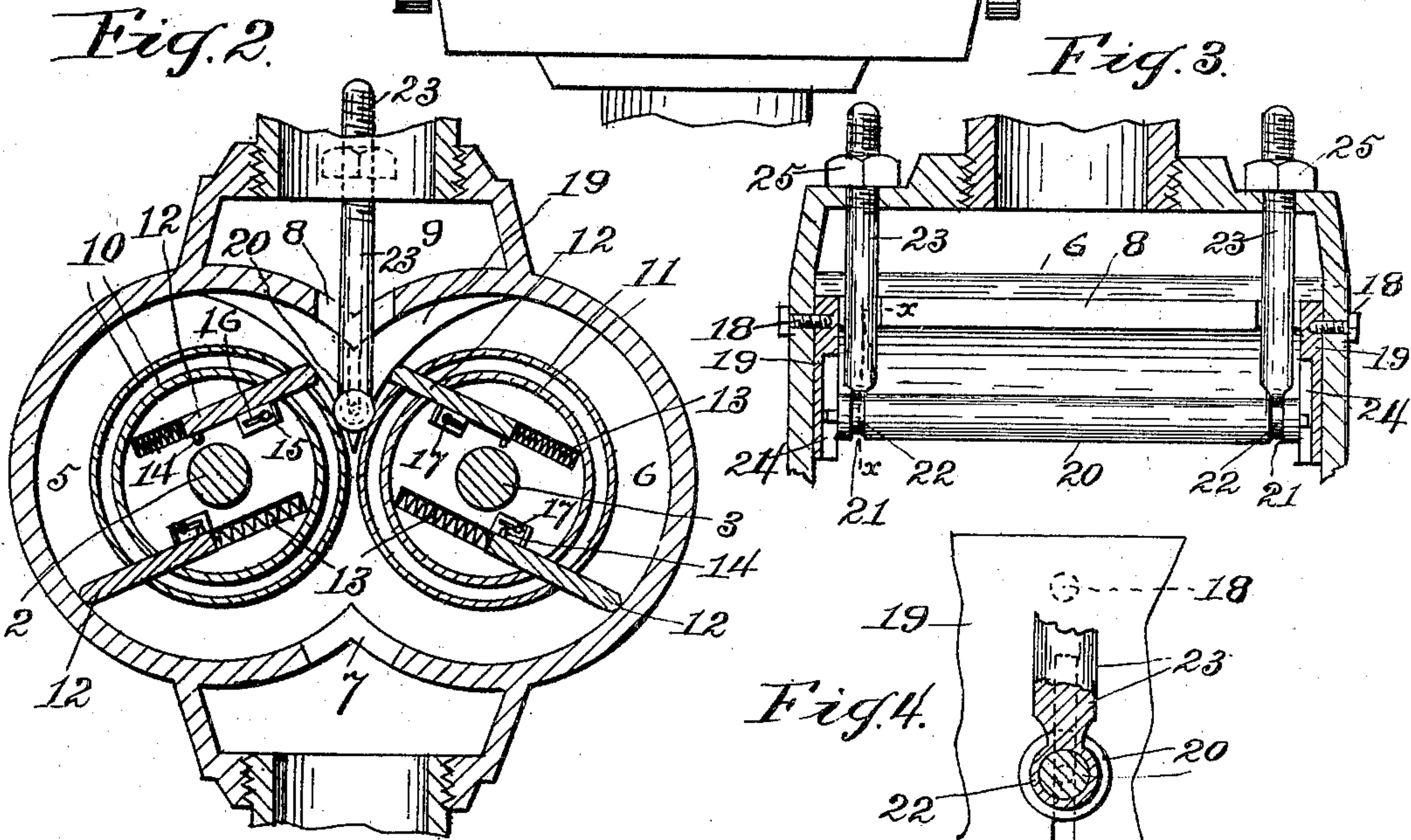
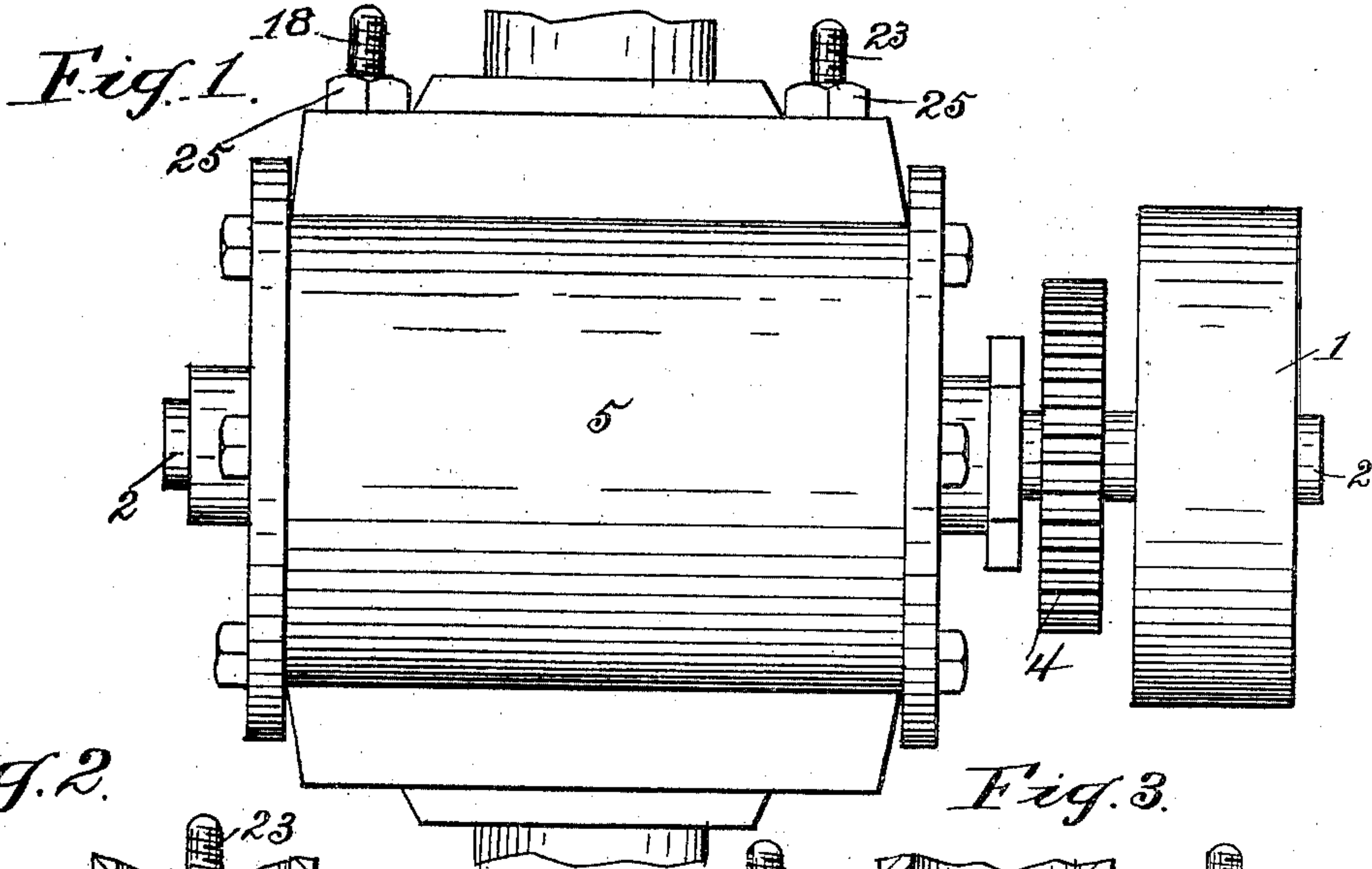
No. 709,597.

Patented Sept. 23, 1902.

S. M. FRANK.
ROTARY FORCE PUMP.

(Application filed Mar. 21, 1902.)

(No Model.)



Witnesses
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UNITED STATES PATENT OFFICE.

SAMUEL M. FRANK, OF SAN ANTONIO, TEXAS.

ROTARY FORCE-PUMP.

SPECIFICATION forming part of Letters Patent No. 709,597, dated September 23, 1902.

Application filed March 21, 1902. Serial No. 99,302. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL M. FRANK, a citizen of the United States, residing at San Antonio, in the county of Bexar and State of Texas, have invented certain new and useful Improvements in Rotary Force-Pumps, of which the following is a specification.

This invention relates to force-pumps, and particularly to a rotary force-pump or motor. The object of the invention is to provide a pump having double revolving pistons, with slidable spring-controlled valves working through the pistons not diametrically opposite each other in the usual way, but the valves of each piston work parallel to each other and through the cylinders at points diagonally opposite.

A further object of the invention is to provide the slide-valves with novel and peculiar guides and adjustable stops to control the outward movement of the valves under pressure of their springs.

A still further object of the invention is to provide an adjustable roller-valve journaled in the lower point of the valve-shoes and working between the pistons to prevent escape of air backward between the pistons during the starting of the pump.

Other objects, advantages, and improved results accruing from the special construction and arrangement of parts will be disclosed in the specification and claims to follow.

In the accompanying drawings, forming part of this application, Figure 1 is a side elevation. Fig. 2 is a central cross-section. Fig. 3 is a central longitudinal section of only the upper portion of the pump, showing the roller-valve and means for adjusting it in elevation. Fig. 4 is a detail section on the line *x x*, Fig. 3. Fig. 5 is a cross-section, partly broken away, of a modification.

The same numeral references denote the same parts throughout the several views of the drawings.

The pump is operated by a pulley 1 on the piston-shaft 2, and motion is imparted from the latter to the other piston-shaft 3 by suitable gearing 4. The pump-cylinders 5 and 6 have an induction-port 7 and an exhaust 8 to a water-chest 9. The pistons 10 and 11 are suitably fixed to their respective shafts 2 and

3, so as to revolve with the shafts central of the cylinders. Each piston is provided with a pair of slidable valves 12, working parallel with each other in pairs through the walls of the pistons at points diagonally opposite and are controlled by spiral springs 13. Each valve is provided with a projection or pin 14 to engage an angle stop-plate 15 for the purpose of limiting the outward movement of the valves under pressure of the springs. The stop-plates have a slot 16, and they may be adjusted to vary the travel of the valves by set-bolts 17 passed through said slots.

Upon the inner side of each end wall of the pump is attached, by set-bolts 18, a V-shaped valve-shoe 19, against which one of the valves 12 of each piston bears, while the other piston-valves bear against the pump-cylinders during the revolution of the pistons. Journaled in the valve-shoes and working between them and between the pistons at the lower point of the valve-shoes is a roller-valve 20, having grooves 21, in which collars 22 of adjusting screw-rods 23 are loosely secured. The valve-shoes have a groove 24 to permit the journals of the valve-roller to slide vertically, according to the movement of the rod-nuts 25, and the valve-roller is adjusted vertically, as desired, to vary its bearing on the pistons, or it is raised by the said rods clear of the pistons after the pump is started.

Referring to the modification shown in Fig. 5, the roller-valve is dispensed with and the valve-rod 27 is provided with a nut 28 for suspending the shoes 29.

In starting the pump the roller-valve is lowered in contact with the pistons to prevent escape of air backward between the pistons until a flow of water is effected through the pump, whereupon the roller-valve is raised. Then in the operation of the pump it is obvious that the shoes will force one of the valves of each piston inwardly, while the other two valves are projected, so as to have their bearing on the cylinders and force water through the exhaust, and when the first-mentioned valves have passed below the lower point of the valve-shoes—that is, when the pistons have carried said valves past each other—these valves are forced outwardly by the springs and take up the water, while the said projected valves are being retracted by

contact with the said shoes, thus forcing the water in a continuous stream through the pump.

It will be seen that the only friction in this pump is that between the shoes and the valves, and as their contact is of such short duration the friction is reduced to a minimum. The roller-valve cutting off all backward escape of air no time is lost in starting the pump, and thus producing an immediate flow of water therethrough. The valve-shoes being detachable, they are readily removed for repair or renewal, and the stop arrangement of the slidable valves prevents the valve-springs from exerting too great pressure on the valves, consequently relieving the valve-friction on the cylinders.

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

1. In a force-pump, the combination, with the cylinders, and the rotary pistons, of the slidable valves adapted to work through the walls of the pistons at points diagonally opposite, the valve-shoes, and the roller-valve operated between the pistons to check the backward escape of air between the pistons.

2. The combination, with the rotary pistons, the valve-shoes at each end of the pistons, and the spring-valves working against

the shoes and having a projection or pin and slidable through the piston-walls at points diagonally opposite, of the stop-plates adjustably secured upon the interior of the pistons and engaged by said projections or pins to control the outward movement of the valves.

3. The combination, with the removable valve-shoes having a groove, of the roller-valve journaled in the shoe-grooves, and the screw-rods having collars through which the roller-valve is revolved, and means to adjust the rods to vary the position of the said valve.

4. The combination, with the communicating cylinders, a shaft extending through each cylinder, a piston secured on each shaft and having valve-ways out of line with the shafts or the center of the pistons, a pair of valves slidable parallel with each other through the walls of the pistons, and the springs to project the valves, of the valve-shoes to retract the valves, the roller-valve operated between the pistons, and means to vary the bearing of the roller-valve on the pistons.

In witness whereof I hereunto set my hand in the presence of two witnesses.

SAMUEL M. FRANK.

Witnesses:

GRANVILLE A. WHEAT,
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