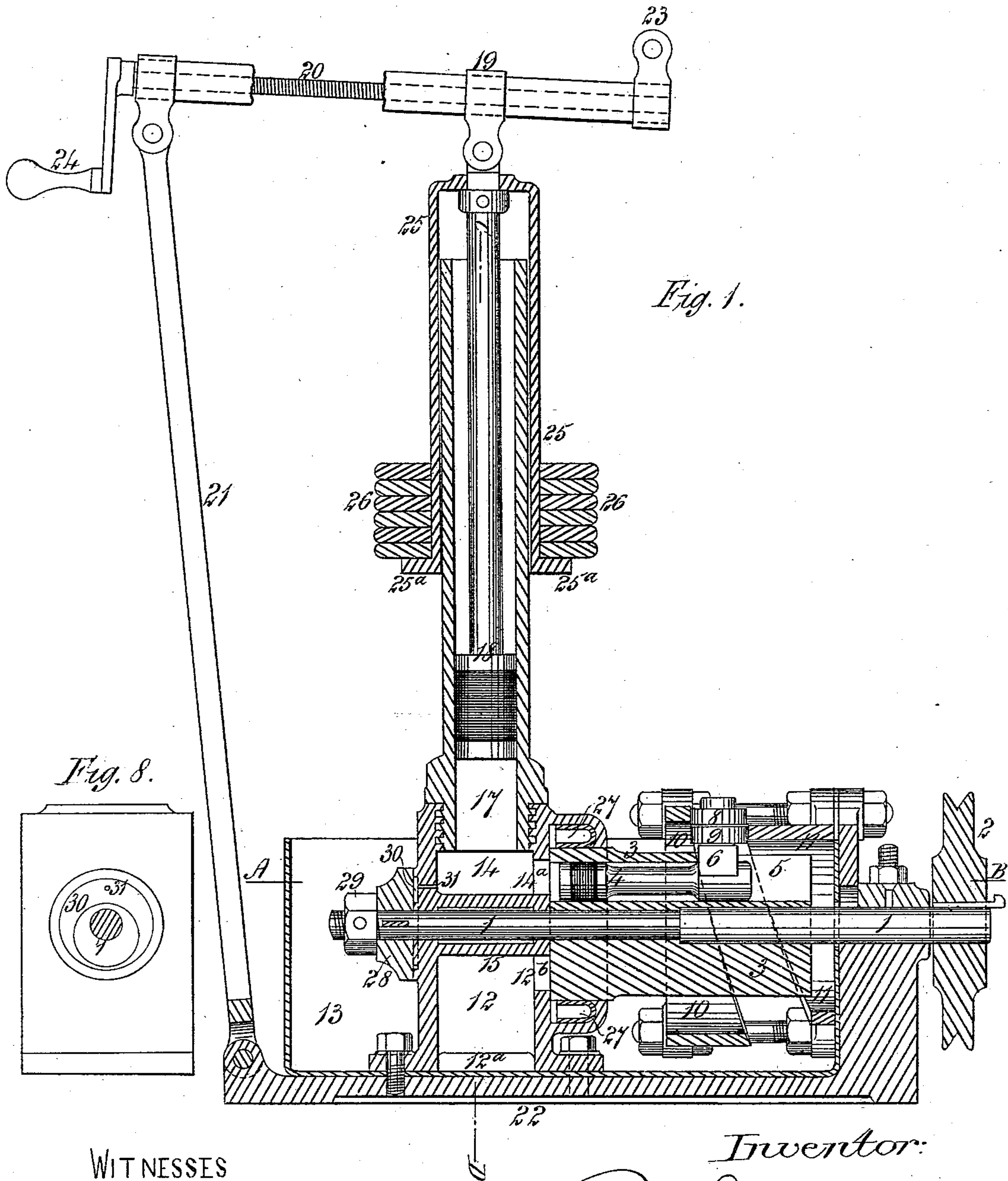


R. S. WEROTTE.
Governor.

No. 226,257.

Patented April 6, 1880.



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3 Sheets—Sheet 2.

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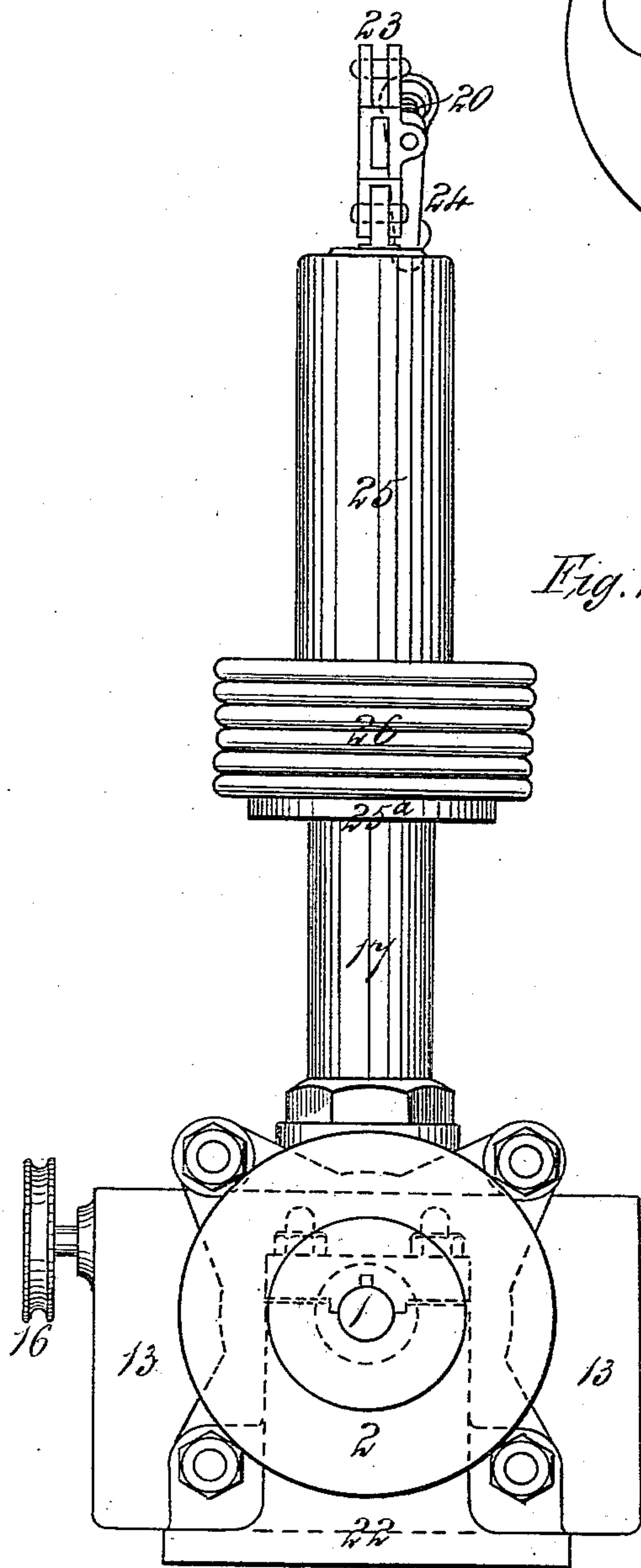


Fig. 2.

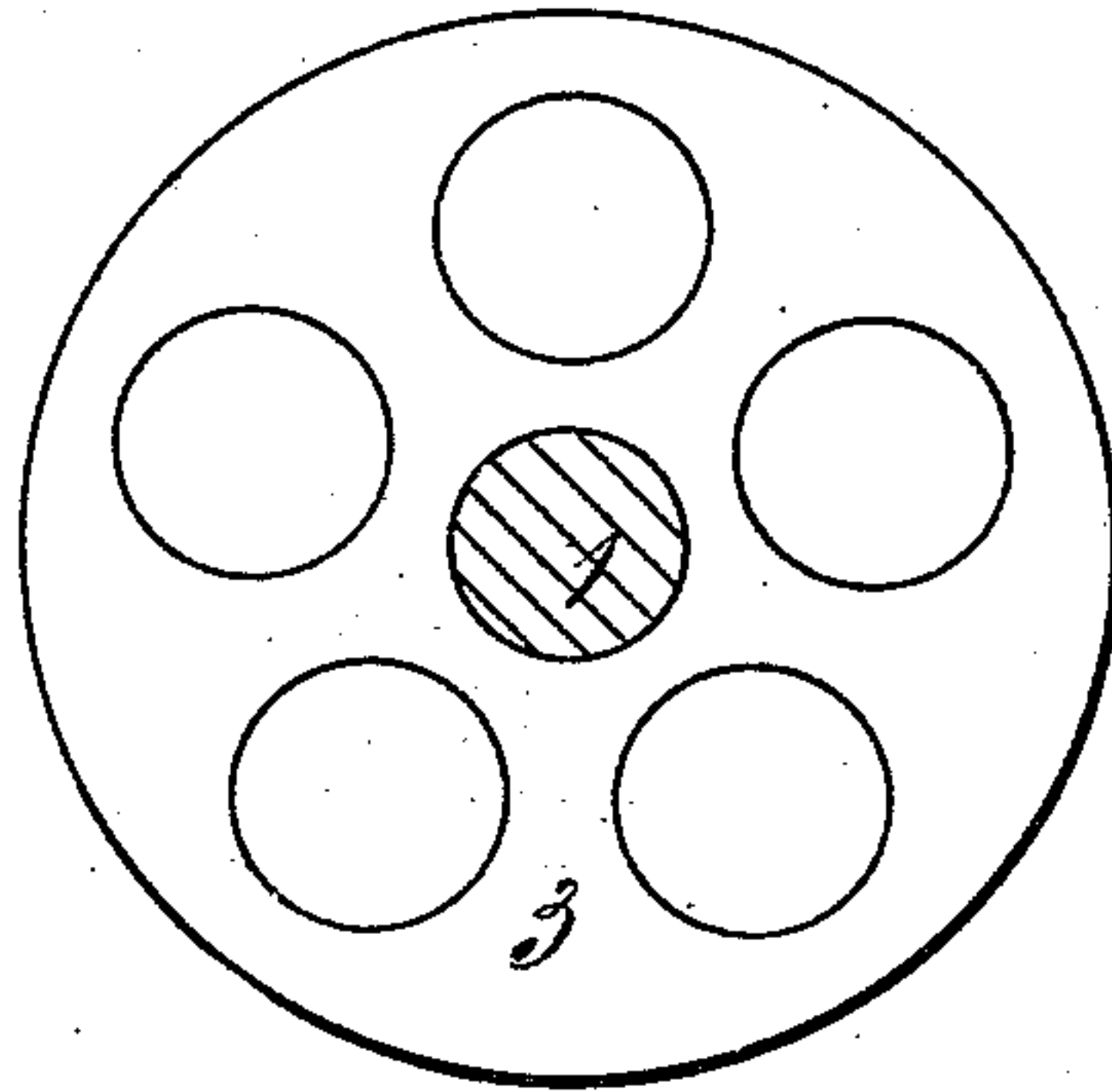


Fig. 4.

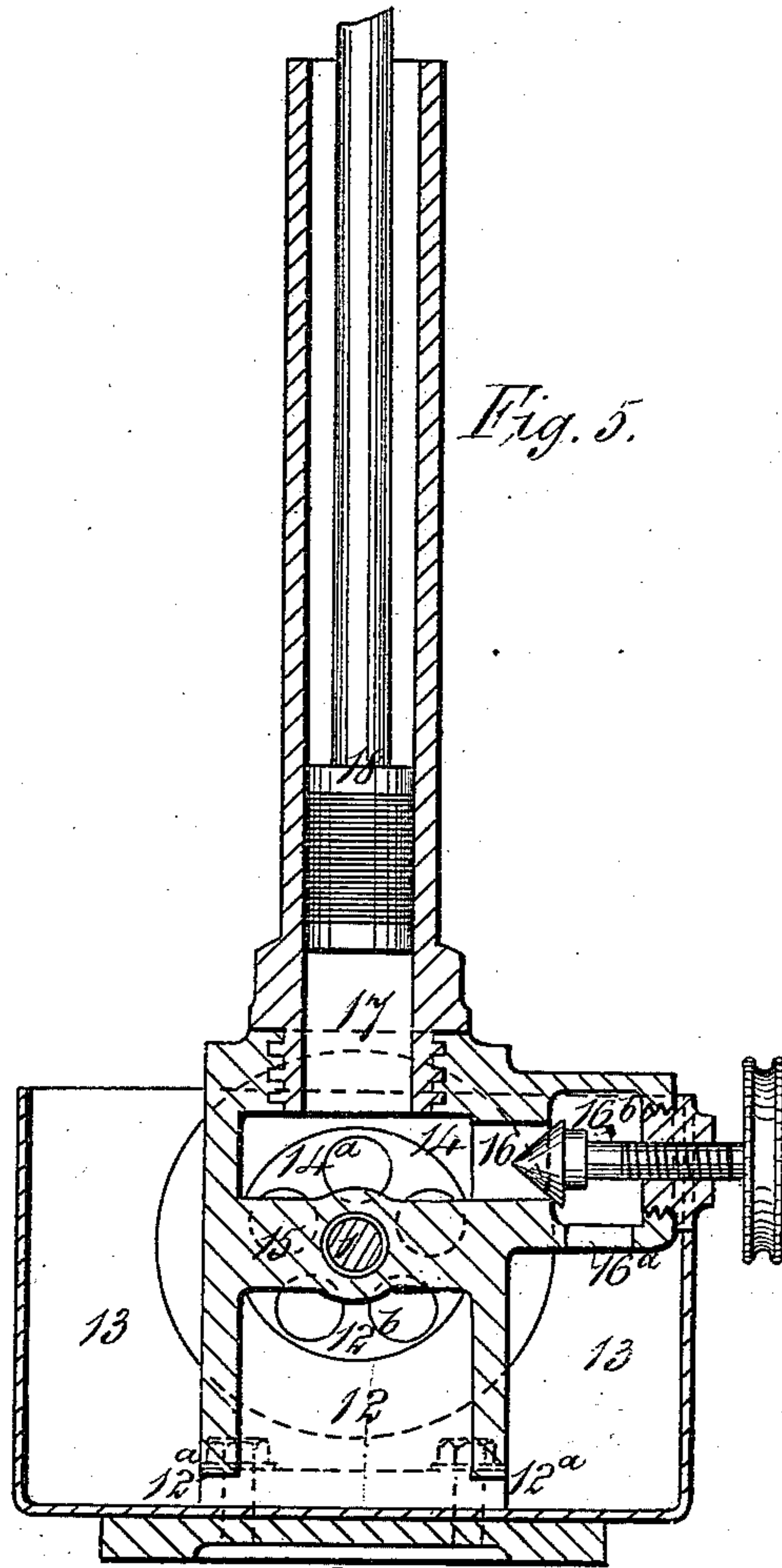


Fig. 5.

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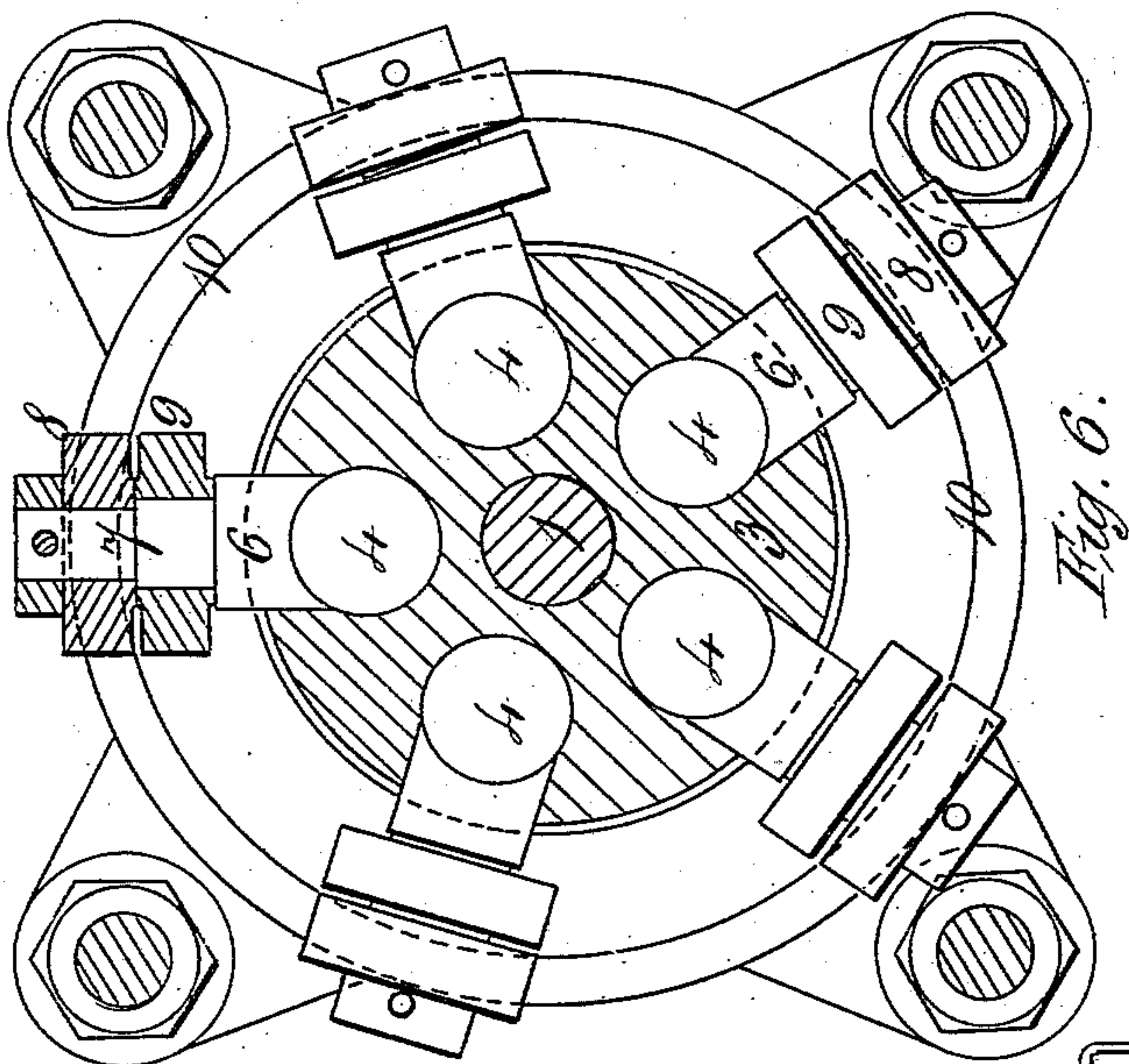


Fig. 6.

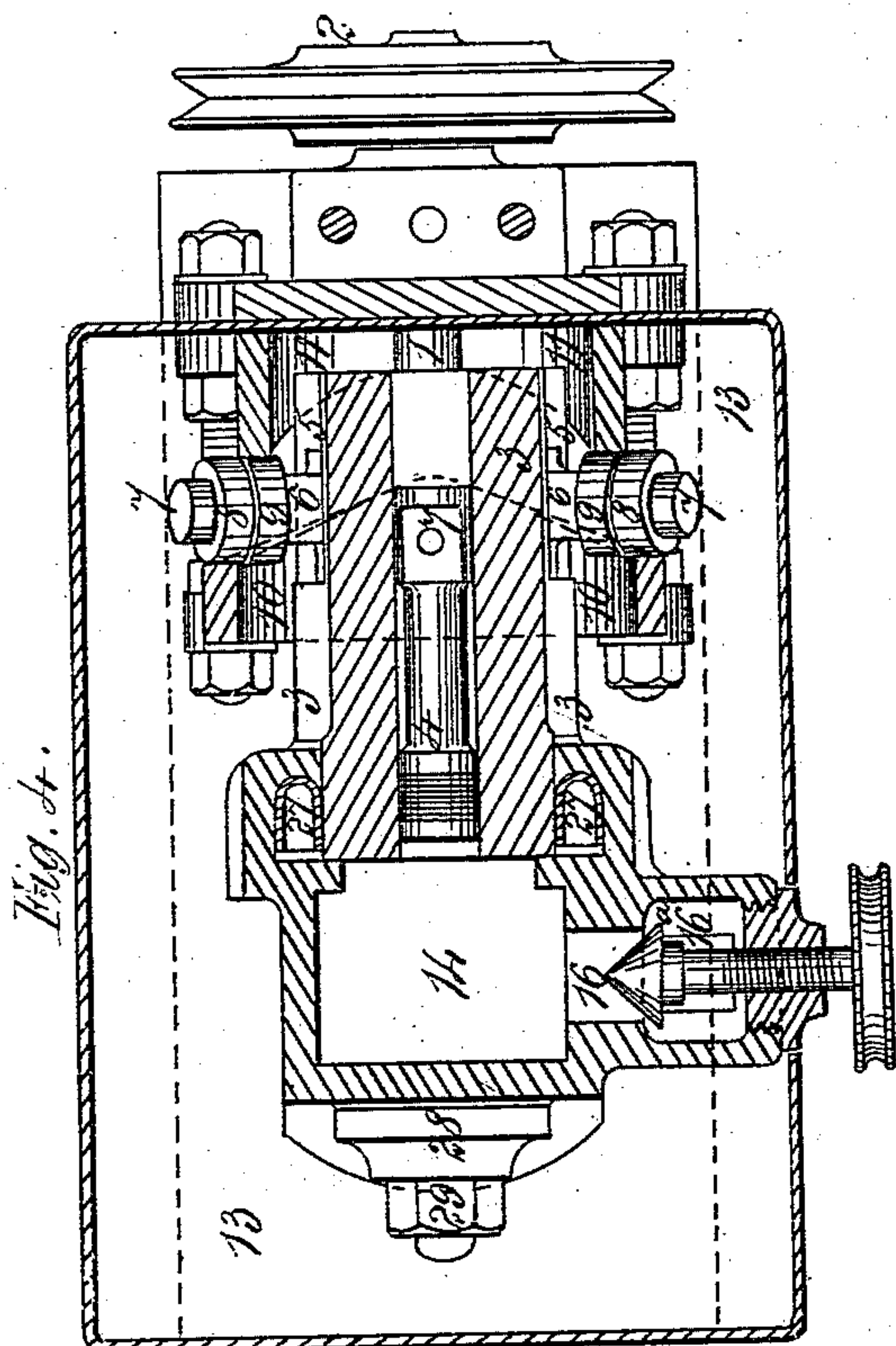


Fig. 4.

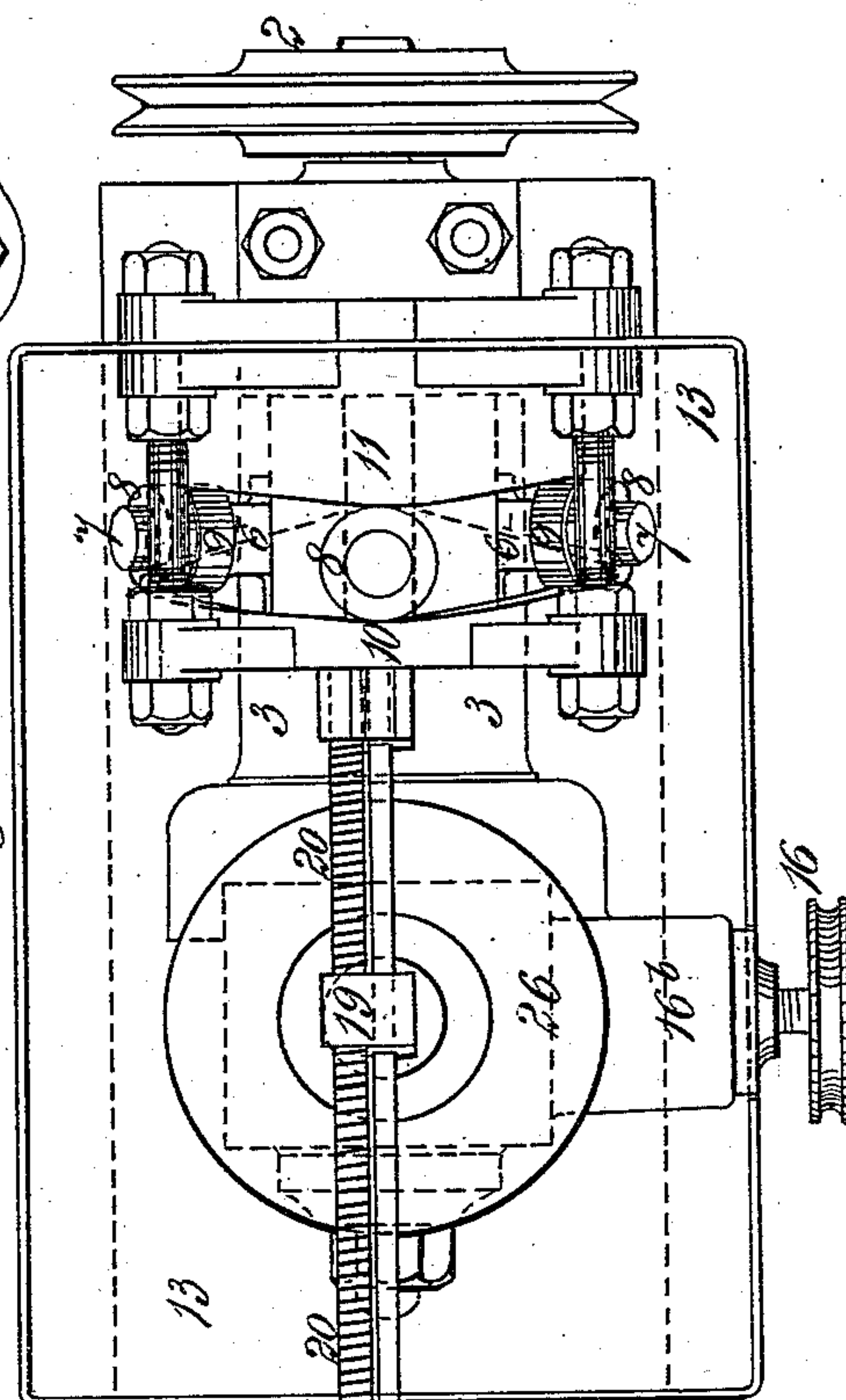


Fig. 3.

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UNITED STATES PATENT OFFICE.

RUDOLF SCHMITZ WEROTTE, OF WEST BROMPTON, GREAT BRITAIN.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 226,257, dated April 6, 1880.

Application filed December 10, 1879. Patented in England March 10, 1879.

To all whom it may concern:

Be it known that I, RUDOLF SCHMITZ WEROTTE, of West Brompton, in the county of Middlesex, Kingdom of Great Britain and Ireland, have invented new and useful Improvements in Governors for Steam and other Engines, and partly applicable for other purposes, of which the following is a specification.

My invention relates to an improved "cataract" governor, designed to afford a wide range of variation and adjustment in regard to the power given out by the instrument, its sensitiveness, and the increasing and decreasing the number of revolutions or movements of the prime mover, and to enable these adjustments to be readily effected while the prime mover is at work.

In my improved governor a principal feature is the use of an improved multiple force-pump driven from the prime mover to be controlled, and discharging liquid into a chamber which supplies a cataract, the variations in the supply of liquid to which chamber, by acting on a hydraulic ram through it, control the prime mover.

My improved governor is arranged as follows: On a suitable shaft driven from the prime mover to be governed is fixed a series of pump cylinders or chambers, each fitted with a piston. These chambers may conveniently be formed in a cylindrical piece of metal, which I will call the "pump-chamber cylinder or body." The piston-chambers are by the rotation of the governor-shaft caused to revolve about their common center or axis. Reciprocating motion is imparted to their pistons, (it may be by a suitable cam or other arrangement,) and thus each piston is caused to alternately draw liquid from a lower of two chambers, which is open, to a tank, and force such liquid into an upper chamber provided with an adjustable outlet or outlets and communicating with a cylinder fitted with a ram or piston, which can be more or less loaded by weights or springs, or by means of a hydro-pneumatic cylinder and adjustable reducing-valve arrangement. The upward extension or rod of the ram has jointed to it a nut or part, through which passes a sliding or screw bar. One end of this bar is connected to the bed-plate by a link. The other end is by a

link connected with the throttle-valve, expansion-gear, damper, fire-door, or other mechanism for checking the speed of the prime mover.

It will be evident multiple pumps of the improved construction hereinabove set forth may be employed for various purposes without the hydraulic cylinder and ram—as, for instance, for drawing and forcing or measuring water or other liquid or fluid.

Figure 1 of the drawings shows a longitudinal section of my improved cataract governor. Fig. 2 is an end view, and Fig. 3 a plan, of the same. Fig. 4 is a sectional plan taken in the line A B of Fig. 1. Fig. 5 is a cross-section in the line C D of Fig. 1. Fig. 6 is a cross-section, to a larger scale, of the pump-chamber cylinder or body, and shows, also, the anti-friction rollers and one of the tubular cams. Fig. 7 is an end view of the pump-chamber cylinder or body, and Fig. 8 is an end view of the water-chamber block with the nut and disk or washer removed.

On a shaft, 1, driven by a wheel, 2, from the prime mover to be governed, is fixed the pump-chamber cylinder or body 3, in which the pump cylinders or chambers (five of which are here shown) are formed, each fitted with a piston, 4. At one end of each of these cylinders or chambers is formed a slot, 5, which acts as a guide to a square piece, 6, formed on an extension of each of the pistons. From each of the pieces 6 projects a cylindrical part or axis, 7, upon which work anti-friction rollers 8 and 9.

10 and 11 are two tubular cams, connected together and to the bed-plate by bolts and nuts, as shown, between which cams the anti-friction rollers travel, as in an annular cam-path.

12 is a chamber, communicating at 12^a with a tank, 13, containing water. The chamber 12 and tank 13 are secured by bolts to the bed-plate 22.

14 is an upper chamber, (hereinafter called the "pressure" or "delivery" chamber,) separated from the chamber 12 by a partition, 15.

12^b and 14^a are two semicircular openings leading from the chambers 12 and 14, respectively, to the pump cylinders or chambers.

16 is an adjustable regulating-valve for regulating the flow of water out of the chamber 14.

17 is a cylinder communicating with the upper chamber, 14, and provided with a ram or piston, 18, the rod of which ram or piston has jointed to its upper end a nut or part, 19, 5 through which passes a screwed bar, 20.

21 is a link connecting one end of the screwed bar to the bed-plate 22. The other end of the screwed bar is connected by a link at 23 to the throttle-valve or other contrivance for check- 10 ing the speed of the prime mover.

24 is a handle for turning the screwed bar 20 to alter the distance between the center of the rod of the piston 18 and the center of the link at 23, thereby determining the length of 15 stroke of the piston 18 which shall effect the closing of the throttle-valve or other regulation.

25 is a flanged pipe fitting loosely around the cylinder 17, and carried by a collar on the 20 top of the piston-rod. The flange 25^a at the bottom of the pipe 25, carries weights 26 to increase the load, as required, on the piston 18; or springs or an adjustable hydropneumatic piston with adjustable pressure may be 25 used in lieu of weights.

27 is a cup-leather or packing fitting around the enlarged end of the pump-chamber cylinder or body 3, which revolves close up against the face of the chamber-block.

28 is a disk or washer keyed onto the shaft or spindle 1, and screwed up tight against the chamber-block by means of the nut 29, so as to keep the pump-chamber cylinder or body 3 well in contact with the face of the chamber- 35 block.

30 is a shallow eccentric groove at the back of the chamber-block, covered by the disk 28, and serving the double purpose, first, of lubricating the disk and the bearing of shaft 1 inside the block, and, second, of counteracting 40 and balancing the pressure with which the pump-chamber cylinder or body 3 is pressed away from the pressure or delivery chamber 14 at its semicircular opening 14^a. 31 is a small hole through the wall of the pressure or 45 delivery chamber, for the purpose of admitting fluid under pressure to the eccentric groove 30.

The operation of my improved governor is 50 as follows: As the shaft 1 is rotated by means of the wheel 2, driven from the prime mover to be governed, it carries round with it the pump-chamber cylinder or body 3, with its cylinders or chambers and their pistons 4, 55 which, by means of their anti-friction rollers 8 and 9, traveling round in the annular cam-path formed between the two fixed tubular cams 10 and 11, are caused to reciprocate and alternately to draw water from the tank 13 through 60 the lower or suction chamber, 12, and its semicircular opening 12^b and force it through the semicircular opening 14^a into the pressure or delivery chamber 14, where more or less pressure obtains, according to the load on the 65 piston 18. If, by an increase of speed, the pump delivers more liquid into the pressure

or delivery chamber 14 than can escape during the same time through the opening regulated by the adjustable valve 16, water accumulates under the piston 18 and forces it up, 70 thereby operating the throttle-valve or other contrivance for checking the speed of the prime mover. Similarly, when less liquid enters the chamber 14 than escapes in the same time past the valve 16, the volume of water 75 under the piston 18 decreases and the piston falls under its load.

16^a is an outlet for allowing the water to escape by the valve 16 back into the tank 13.

The adjustments are effected in the following way: Given the resistance offered by the 80 valve-gear or other regulating mechanism, (including friction of piston 18,) the load on the piston 18 must be slightly in excess of the total of such resistance. The area of opening 85 of the valve 16 is then adjusted so that the pressure under the piston 18 balances the total load. If more work is thrown on the governor, the opening of the valve 16 must be further reduced, so as to increase the pressure in 90 the chamber 14 according to requirement.

It will be obvious that multiple pumps constructed according to my invention may be employed in conjunction with suitable registering apparatus for measuring liquids and 95 without the registering apparatus for drawing and forcing liquids and fluids for various purposes, the cams being appropriately arranged and the shaft 1 suitably driven—for example, as indicated in Fig. 1. 100

What I claim is—

1. The combination, with a series of chambers, arranged concentrically and revolving about a common axis, of piston-rods provided with anti-friction rollers, and fixed cams for 105 imparting reciprocating motion to the piston, substantially as and for the purpose specified.

2. In a governor, the combination, with the revolving chambers, pistons provided with anti-friction rollers, and fixed cams, of a lower 110 or suction chamber with an opening to a tank (or liquid-reservoir) and another opening opposite the lower revolving chambers, and an upper or delivery chamber with an opening opposite the uppermost revolving chambers, 115 substantially as described.

3. In a governor, the combination, with the revolving chambers, pistons provided with anti-friction rollers, fixed cams, suction and delivery chambers, of a shallow eccentric 120 groove, 30, formed in the back of the chamber-block, with a small hole, 31, and a disk or washer, 28, and nut 29, substantially as described.

4. In a governor, the combination, with the revolving chambers, pistons provided with anti-friction rollers, fixed cams, suction and delivery chambers, eccentric groove, disk or washer, and nut, of a cylinder, 17, communicating with the delivery-chamber, and a weighted 130 or loaded piston, 18, substantially as described.

5. The combination, with the revolving

chambers, their pistons and upright cams, substantially as shown, and the delivery-chamber 14, of the chamber 16^b and communicating-passage valve 16, for regulating the liquid from the delivery-chamber 16^b, and the outlet 16^a, for escape of said liquid, all substantially as and for the purposes herein set forth.

6. In a governor, the combination of the revolving chambers, their pistons, suction and delivery chambers, cylinder 17, weighted or loaded piston 18, a nut or part, 19, connected to said piston 18, a screwed bar, 20, link 21, and handle 24, all arranged and operating substantially as described and shown, for the purpose specified.

7. The governor consisting of the revolving chamber-body 3, pistons 4, anti-friction rollers 8 9, fixed cams 10 11, suction-chamber 12, delivery-chamber 14, with hole 31, eccentric groove 30, disk or washer 28, nut 29, cylinder 17, piston 18, flanged tube 25, weights 26, or their equivalent, nut or part 19, screwed bar 20, link 21, handle 24, regulating-valve 16, chamber 16^b, and outlet 16^a, all substantially as described, for the purposes specified.

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