

(No Model.)

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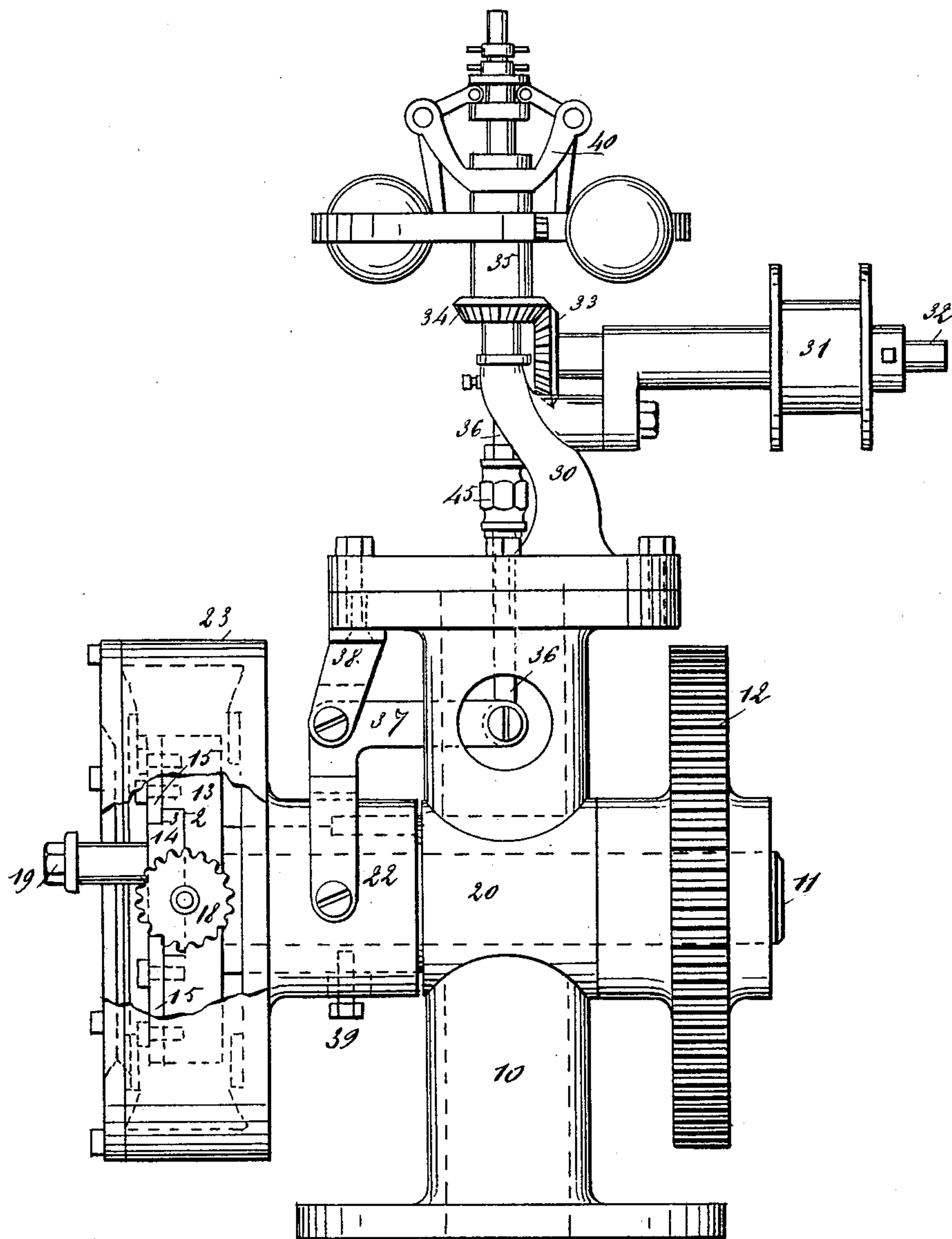
J. W. HAYES.

AUTOMATIC CUT-OFF VALVE GEAR.

No. 366,480.

Patented July 12, 1887.

*Fig. 1*



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(No Model.)

2 Sheets—Sheet 2.

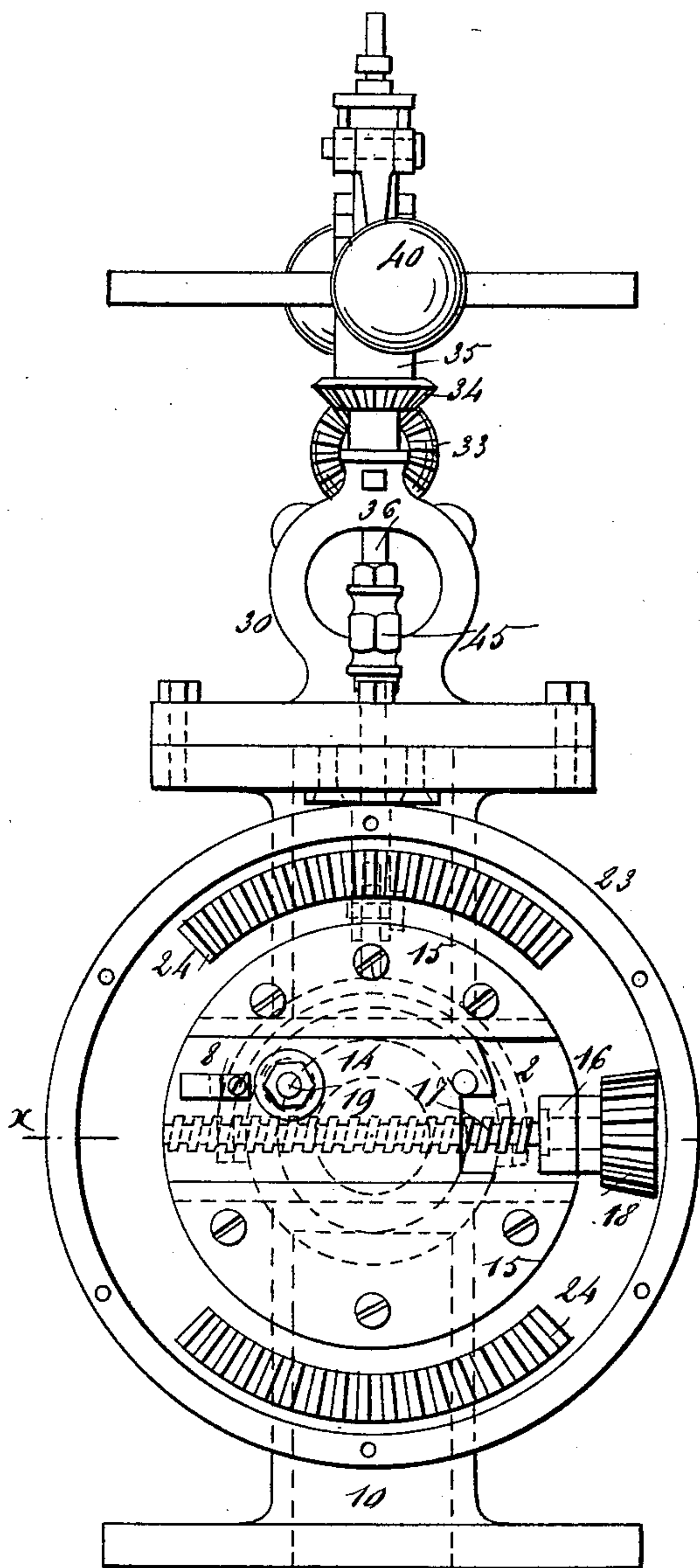
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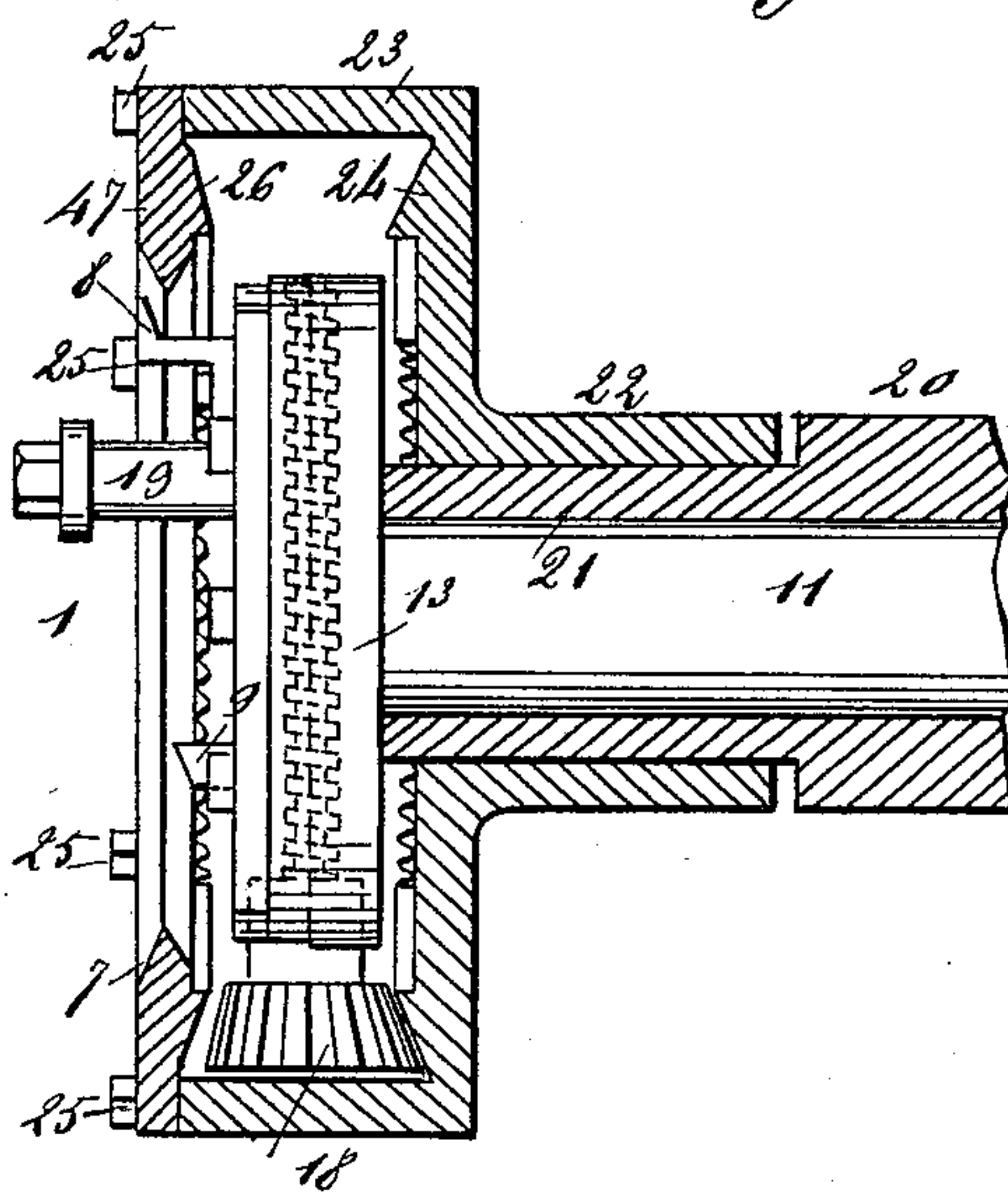
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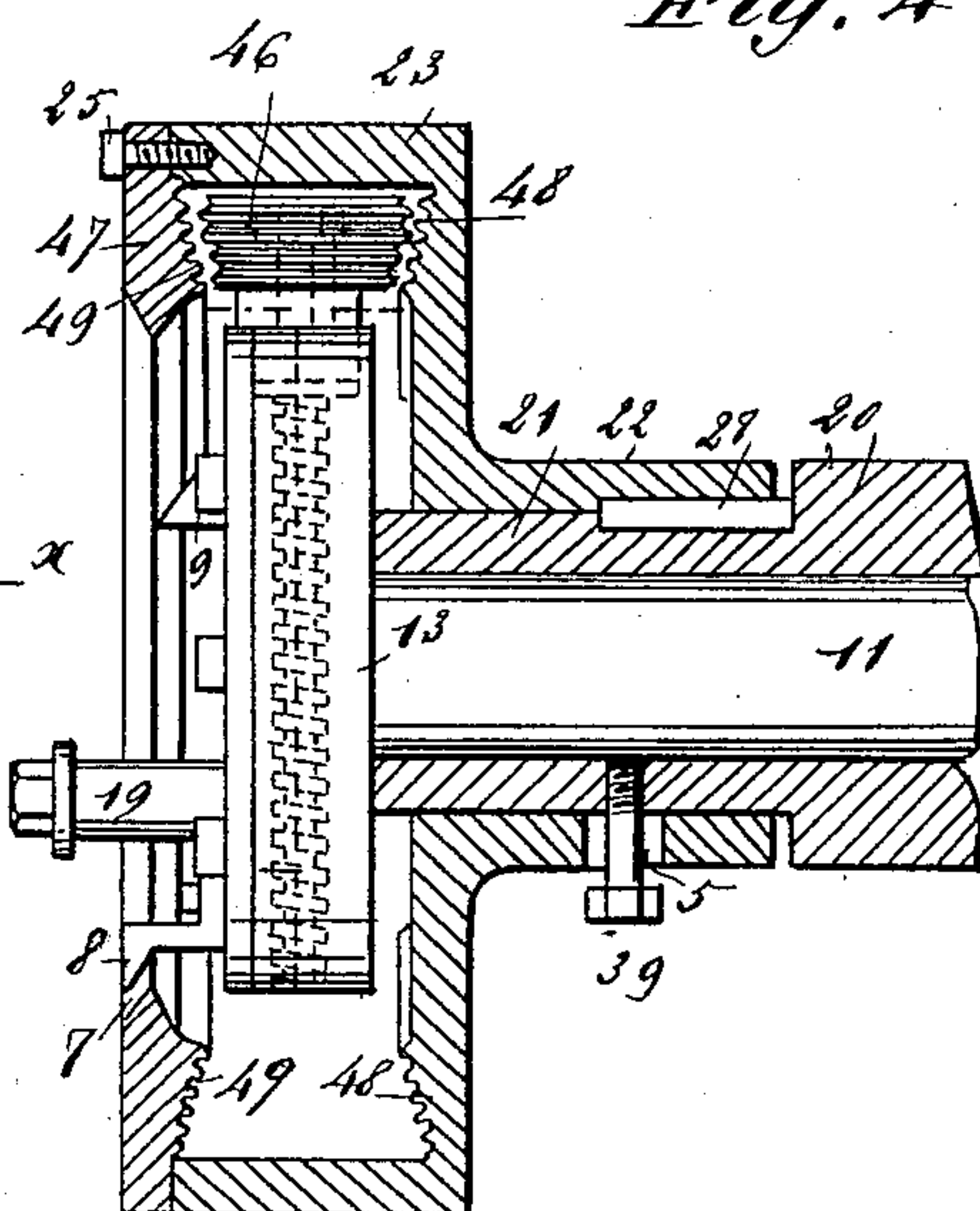
*Fig. 2*



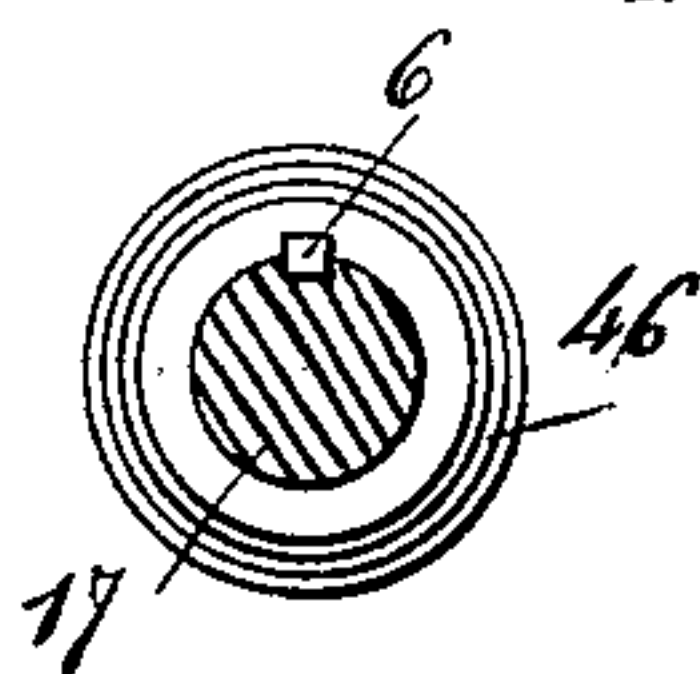
*Fig. 3*



*Fig. 4*



*Fig. 5*



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# UNITED STATES PATENT OFFICE.

JOHN WESLEY HAYES, OF PORTSMOUTH, NEW HAMPSHIRE.

## AUTOMATIC CUT-OFF-VALVE GEAR.

SPECIFICATION forming part of Letters Patent No. 366,480, dated July 12, 1887.

Application filed December 1, 1886. Serial No. 220,375. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN WESLEY HAYES, of Portsmouth, in the county of Rockingham and State of New Hampshire, have invented  
5 a new and Improved Automatic Cut-Off for Slide-Valves and other Engines, of which the following is a full, clear, and exact description.

This invention relates to a novel form of automatic cut-off for slide-valves; and the invention consists, essentially, of a revoluble head  
10 carrying a slide, to which the crank-pin for the valve-rod is connected, a means for regulating the slide being provided, as will be hereinafter described, and specifically pointed  
15 out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

20 Figure 1 is a side view of my improved automatic cut-off, a portion of the case being broken away to disclose the interior construction. Fig. 2 is a face view of the cut-off, the front plate being removed. Fig. 3 is a sectional view of the case, the view being taken  
25 on line *x x* of Fig. 2; the mechanism within the case, however, being shown in full lines. Fig. 4 is a similar view of a modified construction, and Fig. 5 is a detail view of the friction-  
30 wheel illustrated in Fig. 4.

In the drawings above referred to, 10 represents a vertical standard, which serves as the bearing or support for a horizontal shaft, 11, upon one end of which there is secured a  
35 gear, 12, that is arranged to be engaged by a corresponding gear that is connected to the main crank-shaft of the engine.

Upon the opposite end of the shaft 11 there is secured a head-block, 13, that is formed  
40 with a transverse groove or recess, 2, in which there is arranged a slide, 14, said slide being held to the head-block by plates 15, which project beyond the side walls of the recess 2 and into rabbets 3, that are formed in the slide.

45 In one end of the recess 2 there is a lug or projection, 16, which serves as the support for a screw, 17, said screw being held against longitudinal displacement by collars that are arranged upon either side of the lug 16, the position of such collars being shown in Fig. 2.  
50 This screw 17 engages with a correspondingly-

threaded aperture that is formed in the slide 14, and upon the extending end of the screw there is secured a bevel-pinion, 18.

The crank-pin, to which the connecting-rod 55 of the slide-valve is to be secured, is carried by the slide 14, and this pin is shown at 19.

That end of the shaft 11 to which the head 13 is secured extends outward through a sleeve, 20, that is made integral with or rigidly connected to the standard 10, the outer portion, 60 21, of the sleeve 20 being smaller than the inner portion; and upon this smaller portion 21 there is mounted a sleeve, 22, which carries a case, 23, said case being formed with beveled  
65 racks 24, while the outer facing-plate, 47, of the case, which is held thereto by bolts 25, is formed with racks 26, the pinion 18 riding in the annular space between the racks, as best shown in Fig. 3. The case 23 is held against  
70 any rotary movement by means of a feather, 27, which is fitted between the sleeves 22 and 20, as best shown in Fig. 4.

A governor-stand, 30, is secured to the upper end of the standard 10, the governor being  
75 of any of the well-known forms—such, for instance, as the one illustrated at 40—and this governor is driven by means of a belt which runs in engagement with a pulley, 31, that is carried by a horizontal shaft, 32, the inner  
80 end of said shaft being provided with a bevel-gear, 33, that engages with a corresponding gear, 34, that is carried by the lower end of a sleeve, 35, to which the operating mechanism of the governor is connected.  
85

As the governor-balls are thrown outward, they act to depress a connecting-rod, 36, which is secured to one arm of a bell-crank lever, 37, said lever being pivotally mounted upon a  
downwardly-extending bracket, 38, that is  
90 carried by the standard 10, the other arm of the lever 37 being connected to the sleeve 22, so that said sleeve, and consequently the case 23, moves toward or from the standard 10 in accordance with the position of the governor,  
95 this sliding movement being regulated by means of a set screw or bolt, 39, which passes through an elongated slot, 5, that is formed in the sleeve 32, the inner end of the said set screw or bolt engaging with the contracted portion 21 of  
100 the sleeve 20.

Such being the general construction of my



improved form of automatic cut-off, the operation is as follows: When the speed of the engine is unduly increased, the rod 36 will be depressed, and the case 23 will be consequently thrown outward, so as to bring one of the racks 24 into engagement with the pinion 18, and as the pinion so engages with the racks it will turn upon its bearings and the slide 14 will be moved so as to bring the crank-pin 19 closer to the axis of the shaft 11, which movement of the crank-pin will operate to cut off or decrease the stroke of the valve in connection with which it is arranged. On the other hand, when the speed of the engine is too slow, the governor-balls will drop inward and the rod 36 will move upward, thereby bringing one of the racks 26 into engagement with the pinion 18, which pinion will be turned in a contrary direction, and, so turning, will have a contrary effect upon the valve to the one just described.

In order that the engine may be driven at any required rate of speed, I form the rod 36 in two sections that are united by a coupling-piece, 45, which said coupling-piece is formed with internal right and left hand threaded sockets, into which the correspondingly-threaded approaching ends of the two sections of the rod fit, the arrangement being such that the rod may be shortened or lengthened so as to regulate the operation of the cut-off.

As clearly shown in the drawings, the facing-plate 47 is formed with a large central aperture, through which the crank-pin 19 extends, and within which said pin revolves, the defining edge of the said central aperture being V-shaped, as shown at 7.

The slide 14 carries two outwardly extending dogs, 8 and 9, the dog 9 being formed with a beveled end adapted to bear against the inner beveled face of the edge 7, while the dog 8 overhangs the edge and is provided with a beveled face that bears against the outer beveled face of the edge 7, the arrangement being such that the segmental racks are prevented from carrying the crank-pin too far in either direction, as at the allowable limit of movement of the slide one of the dogs will be brought against the face against which it is intended to bear and a further engagement of the pinion prevented. The racks are made segmental to prevent a too rapid movement of the valve as a cut-off.

In Fig. 4 I illustrate a construction wherein I employ a friction-wheel, 46, instead of a pinion, 18, and wherein the casing 23 and its cover are formed with friction bearing-surfaces 48 and 49, the friction-wheel being formed with a corrugated peripheral face, while the friction-surfaces 48 and 49 are also corrugated; and in order that the corrugation of the wheel may fit within the corrugations of the bearing-surfaces 48 and 49, I mount the wheel 46 upon

the screw 17 by means of a feather, 6, which feather permits of a longitudinal movement of the wheel 46 upon its bearings, but prevents any rotation of the wheel upon said bearings. This friction-wheel and its bearing-surfaces are of course to be considered as the mechanical equivalent of the pinion and its racks.

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

1. In an automatic cut-off, the combination, with a governor, of a revoluble head, a slide carried thereby and provided with a crank-pin, a screw arranged in connection with the slide and provided with a pinion, a circular rack, and connections between the rack and the governor, substantially as described.

2. In an automatic cut-off, the combination, with a governor, of a revoluble head, a slide carried thereby and provided with a crank-pin, a screw arranged in connection with the slide and provided with a pinion, a circular rack, attachments to regulate the throw of the rack, and connections between the rack and the governor, substantially as described.

3. In an automatic cut-off, the combination, with a revoluble head, of a slide carried thereby, a crank-pin carried by the slide, a screw carried by the head and engaging with the slide, a pinion carried by the screw, a sliding case provided with opposed racks, a governor, and connections between the case and the governor, substantially as described.

4. In an automatic cut-off, the combination, with a revoluble head, of a slide carried thereby, a crank-pin carried by the slide, a screw carried by the head and arranged to engage with the slide, a pinion carried by the screw, a sliding case provided with opposed racks, a governor, a bell crank-lever, a connecting-rod arranged between the governor and the lever, and a means for adjusting the length of said rod, the bell-crank lever being connected to the sliding case, substantially as described.

5. In an automatic cut-off, the combination, with a revoluble shaft, of a head carried thereby, a slide mounted in a recess formed in said head, a crank-pin carried by the slide, a screw provided with a pinion and mounted upon the head and arranged to engage with the slide, a case formed with racks, a facing-plate also formed with racks and with a central opening having a V-shaped defining edge, dogs carried by the slide and arranged to bear against the inclined faces of the V-shaped edge of the facing-plate, a governor, and connections between the slide-case and the governor, substantially as described.

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Witnesses:

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