

993,293.

G. J. O. D. DIKKERS.
STEAM ACTUATED VALVE.
APPLICATION FILED AUG. 17, 1909.

Patented May 23, 1911.

2 SHEETS—SHEET 1.

Fig. 1

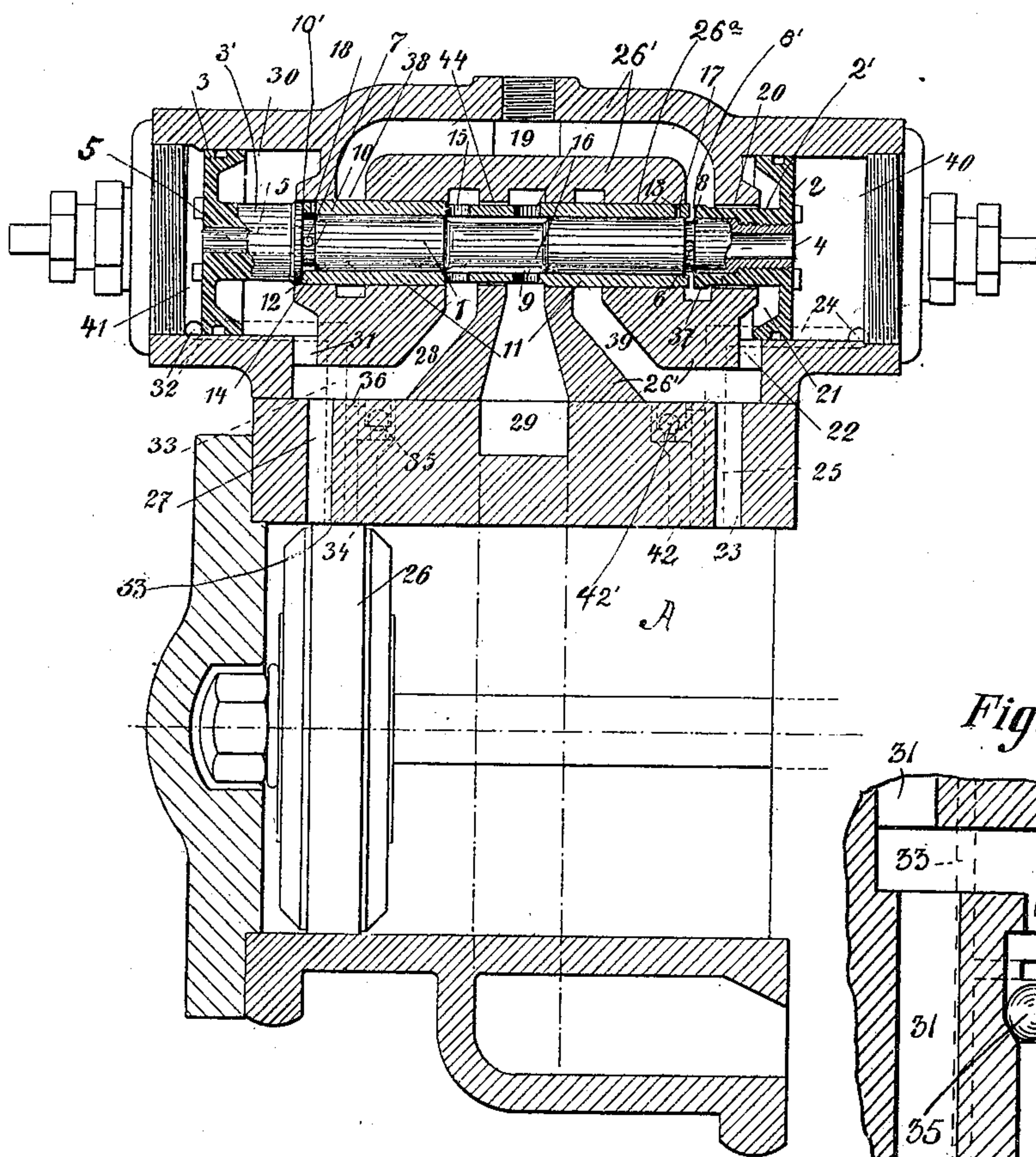
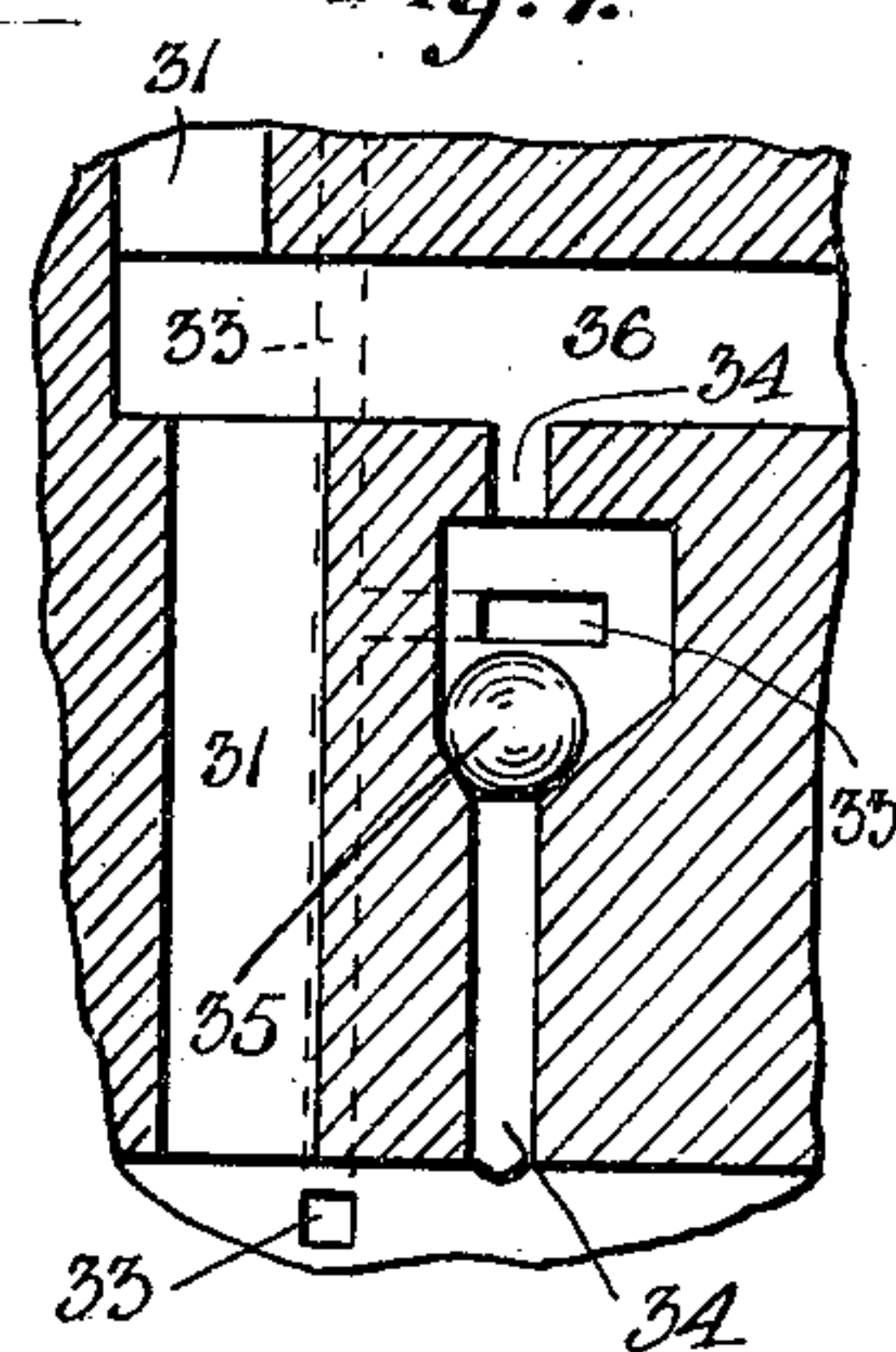


Fig. 7



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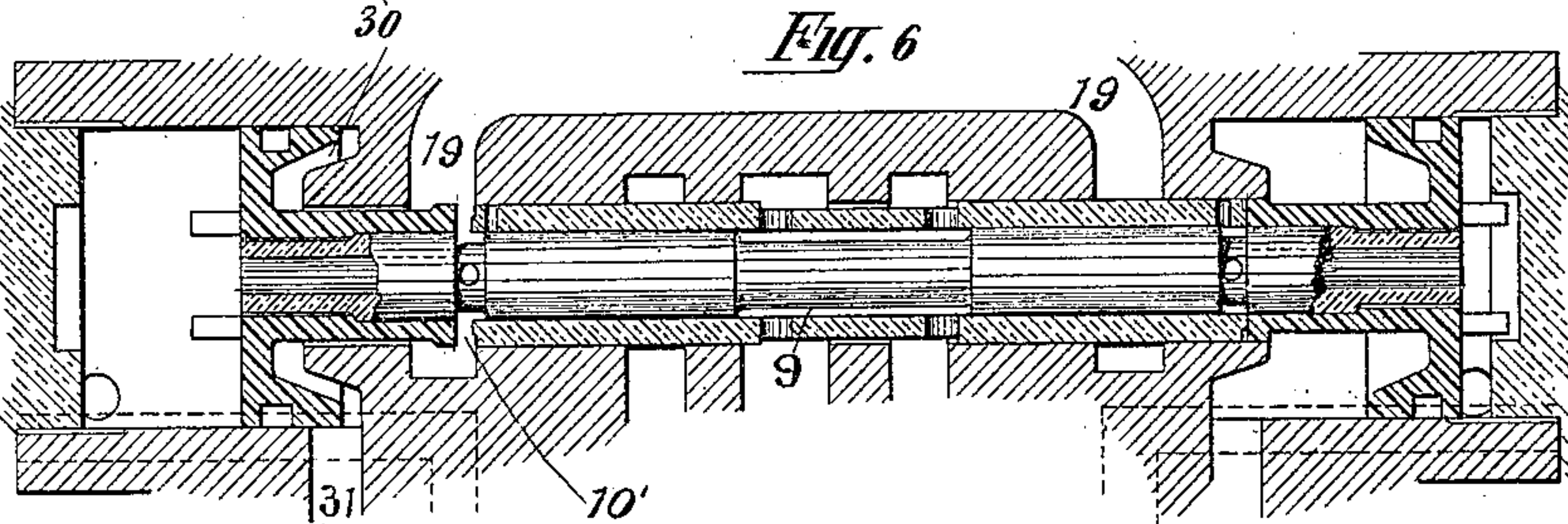
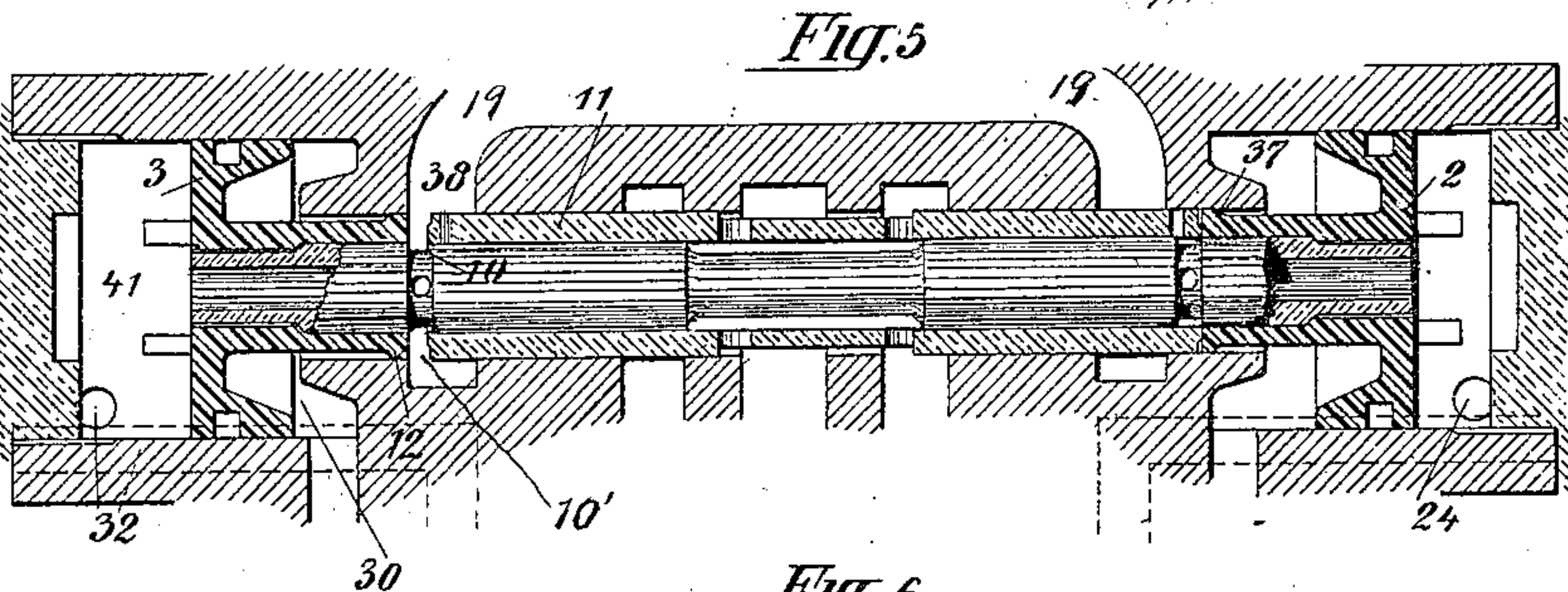
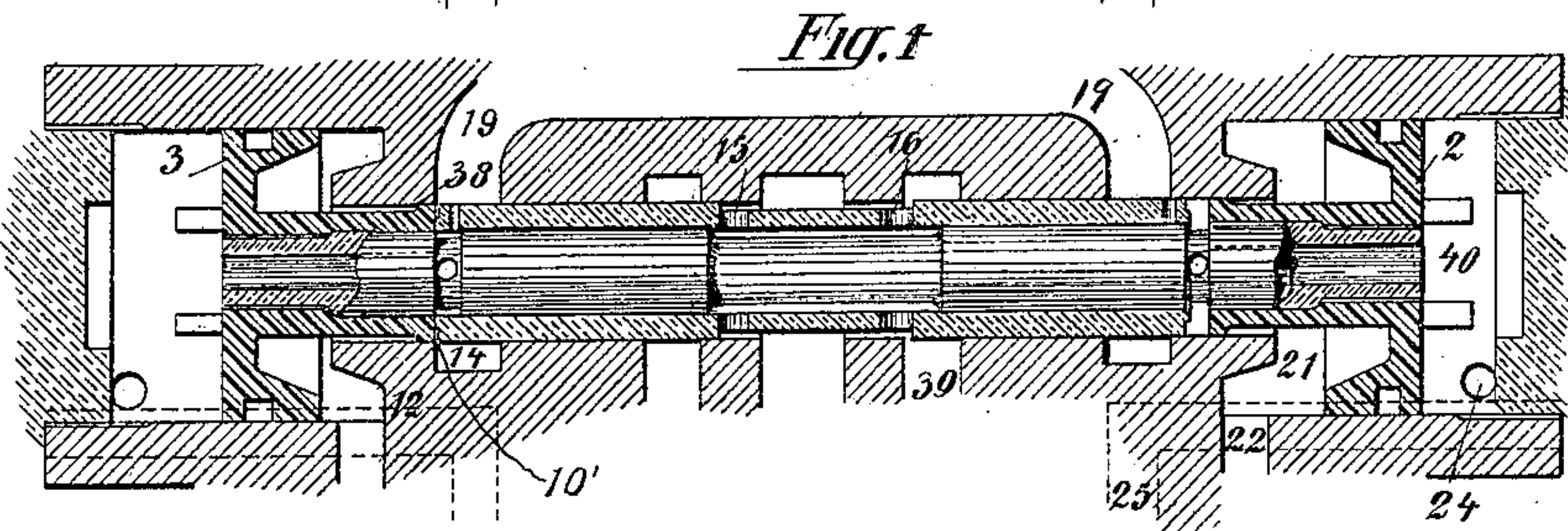
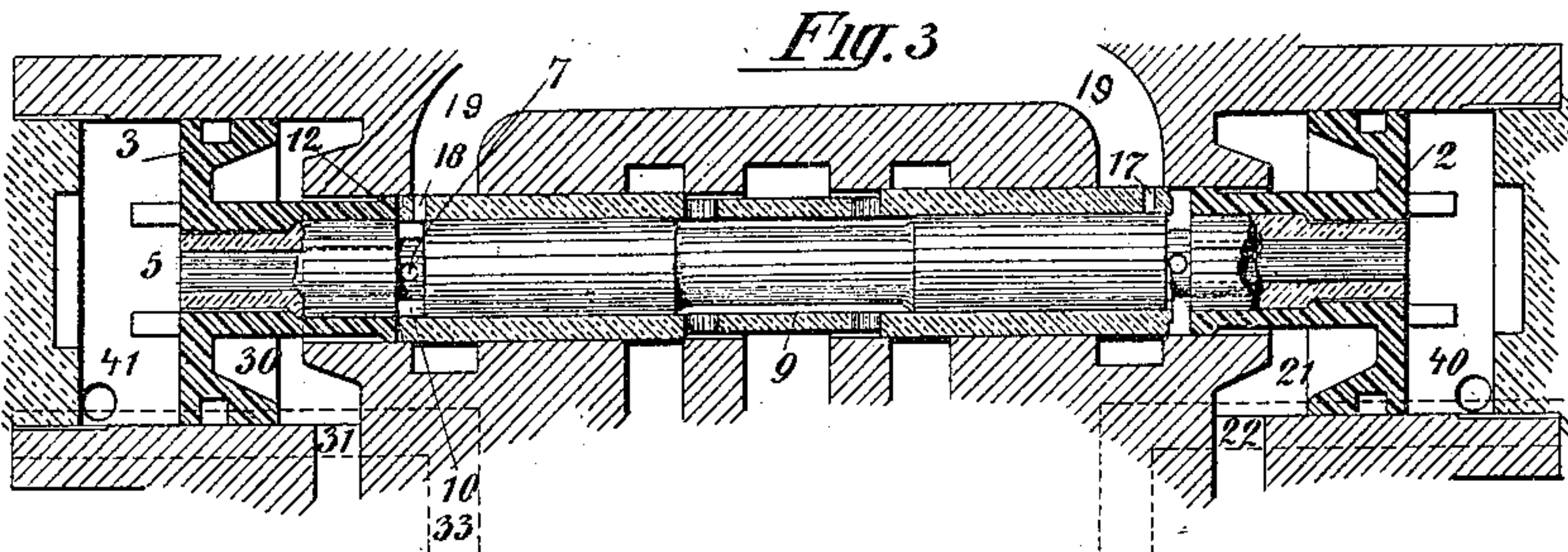
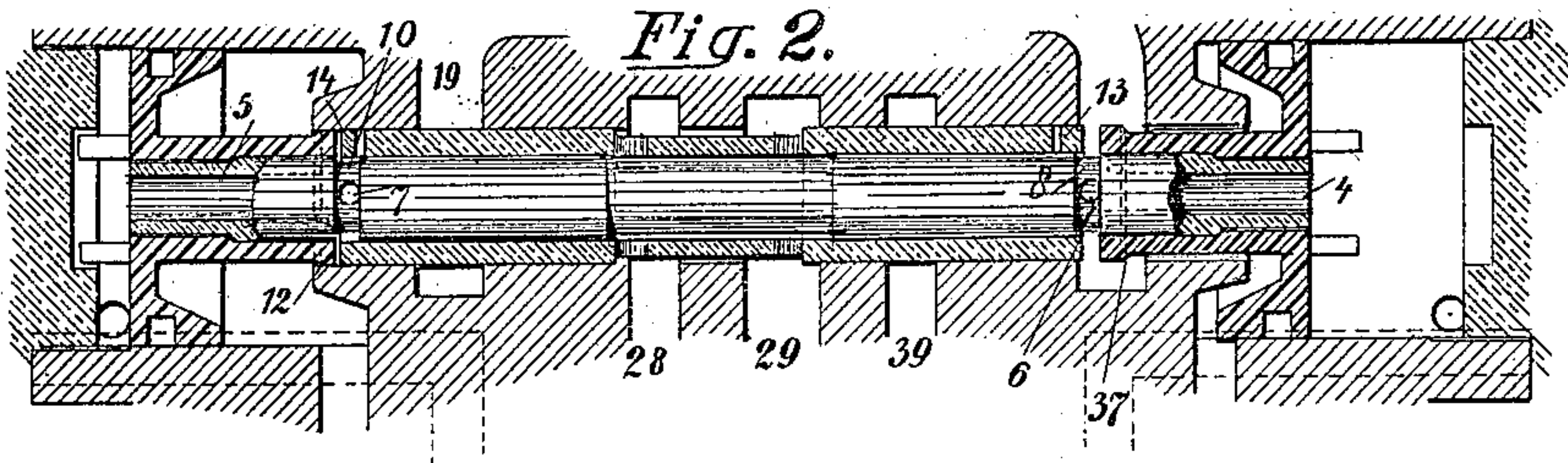
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

GERRIT JOAN OTTO DORIS DIKKERS, OF LONNEKER, NETHERLANDS.

STEAM-ACTUATED VALVE.

993,293.

Specification of Letters Patent.

Patented May 23, 1911.

Application filed August 17, 1909. Serial No. 513,346.

To all whom it may concern:

Be it known that I, GERRIT JOAN OTTO DORIS DIKKERS, a subject of the Queen of the Netherlands, and resident of Lonneker, Netherlands, have invented new and useful Improvements in Steam-Actuated Valves, of which the following is a specification.

This invention relates to steam pumps, and especially to steam actuated valves, and comprises a system of steam inlet and exhaust ports in conjunction with a valve mechanism of novel construction.

The prime object of the invention is to overcome certain disadvantages which exist in steam valves of usual types, namely, that the intake and exhaust of those types being governed in positive cyclic relation to each other, the live steam begins to enter before the exhaust ports are entirely open. This object, therefore, involves providing a steam actuated valve, especially applicable to steam pumps, although I do not limit the extent of its applicability.

A further object of the invention is to provide a steam actuated valve having no inoperative position, and that will continuously operate with regular and positive strokes so long as a supply of steam is continual and regular. This latter object is attained by the construction hereinafter described, whereby each exhaust port is opened before the opposite intake port is opened.

With the foregoing and other objects in view, the invention consists in the details of construction and in the arrangement and combination of parts to be hereinafter more fully set forth and claimed.

In describing the invention in detail, reference will be had to the accompanying drawings, forming a part of this application, wherein like characters denote corresponding parts in the several views, in which—

Figure 1 is a longitudinal section through the valve cylinders and main cylinder of an engine embodying the invention; and Figs. 2, 3, 4, 5 and 6 are longitudinal fragmental sections through the valve cylinders showing different positions of the valve mechanisms during a cycle of the engine. Fig. 7 is a detail sectional view showing the arrangement of the check valve and adjacent ports, etc.

Referring to Fig. 1, 26 designates the main piston of an engine and 26', the valve

casing, having a cylindrical bore 26^a there-through, in which is movably seated a cylindrical valve member 11. In opposite ends of said casing are steam cylinders 40 and 41, having pistons 2 and 3 fitted therein for axial movement. These pistons have threaded engagement with the ends of a cylindrical shaft 1, which is movably fitted within the cylindrical valve member 11. Bosses 2' and 3' on the pistons 2 and 3, extend into opposite ends of said bore 26^a. Said bosses have flanges 12 and 37 about their proximal peripheries which fit snugly, yet movably, in said bore, the remaining portion of said bosses being of slightly less diameter than the said bore, thereby providing an annular port 20, constituting steam ports between the primary steam port 19, and the cylinders 40 and 41. Other means of communication between ports 19 and cylinders 40 and 41, are provided through center bores 4 and 5 in the ends of the shaft 1, which communicate with said ports through apertures 6 and 7, in peripheral grooves 8 and 10, in the piston rod 1. The construction and relative adjustment of said bosses and the member 11, are such that peripheral spaces 8' exist therebetween allowing relative axial movement of said member and bosses, whereby said peripheral spaces are alternately closed and opened. A central peripheral portion of the piston rod is removed as at 9, thereby providing an annular recess communicating with apertures 15 and 16, in the member 11, which alternately communicates with interior communicating ports 28, 29, and with 29, 39, respectively.

The port 19 will hereinafter be known as the primary port, and the ports 28 and 39 as the intercommunicating ports, since they communicate with the main cylinder, the steam cylinders 30 and 40, and with the exhaust port 29. Ports 23, 27, will be known as the primary intake ports, and ports 24, 25 and 32, 33, as the secondary intake ports. Other ports, passages and elements will be hereinafter described and explained.

The operation of the valve is as follows:— Considering Fig. 1: the space 8' being open, live steam enters from the primary port 19, passes through the apertures 6 and 4, and enters the space to the right of the piston 2, while simultaneously, steam enters the space to the left of the steam piston through the

annular recess 20, and by these counteracting forces of steam on said piston the same is held in equilibrium.

From the left side of said piston, the steam enters the main cylinder A, through ports 21, 22 and 23, from the right side of said piston, through ports 24, 25, which are traceable in the drawing by broken lines.

During the entrance of live steam, as provided in the preceding paragraph, the main piston 26 is traveling toward the left, and the exhaust steam is escaping through the ports 27, 28, and through the apertures 15, 19 and 16, and out through 29. A portion of the exhaust, however, enters into the space to the right of the piston 3, and a portion of it enters through the ports 33, 32 into the space to the left of said piston 3, whereby the equilibrium of said piston is maintained until the ports 33, 34 become closed by the main piston 26, thereby cutting off the admission of steam to the left of piston 3; but the pressure continues on the right side thereof, and as the exhaust continues to escape through the ports 33, 33', 36 and 28, past the junction of port 34', 36 it causes a suction through said port 33 and relieves the pressure on the left hand surface of piston 3. In consequence of this unequal pressure the piston 3, is moved to the extreme left, thereby closing the space 8' and the ports 6 and 4; also closing the port 22, thus cutting off the entrance of live steam into the main cylinder A; but immediately the piston 26 completes its leftward stroke, and the exhaust is discontinued, while simultaneously with the discontinuation of the exhaust, a port 34 becomes uncovered by the removal of the piston 26 therefrom. Said port 34, has communication with the port 33, by a shunt port 36, shown in broken lines, and through these ports 34, 33, and 32, compressed steam from the cylinder A, enters to the left of the piston 3, while simultaneously, live steam is entering the space to the left of the piston 2, by the annular port 20. By these combined forces, the piston rod and its connections are carried with a quick, positive motion to the right, until the port 20 is entirely closed by the flange 37, and the space 8', is entirely closed by the cylindrical bore 26^a, as in Fig. 3. At this stage, the port 18, enters into communication with the primary port 19, and steam passes there-through via, ports 7 and 5, to the cylinder 30, and, (port 32 still being closed by piston 26), a renewed pressure is thereby exerted on piston 3, to remove it farther rightward until the space 10' communicates with the port 19 as in Fig. 4, whereupon said space is widened as in Fig. 5 by the steam pressure against the boss 3' and the end of piston rod 11. Thus far no steam has entered to the left of piston 26, and, therefore, port 32 is still closed, so that the pressure con-

tinues on the piston 3, until it has moved to the position shown in Fig. 6, whereupon steam enters around the boss 3', and passes to the main cylinder A, through the port 31, whereupon the piston 26 begins its rightward stroke, the piston 3 being held in equilibrium by means analogous to those described for piston 2, in the foregoing.

It will be observed that the arrangement and construction of parts and ports in the opposing halves of the valve casing are exactly alike; therefore, the foregoing description, as applied to the leftward movement and reversal of the piston 26, and to the co-action of the several parts and valve ports, is equally applicable in considering the rightward stroke and reversal thereof. Within the ports 34 and 42, are provided check valves of ordinary type 35 and 42, respectively, arranged to open upwardly so that steam can escape therethrough from the main cylinder, but no steam can enter the main cylinder therethrough.

It is obvious that with the mechanism shown and described, it is impossible for the valve to be reversed until the full stroke of the main piston is completed; thus assuring full efficiency, and obviating detrimental effects such as experienced in other steam pumps.

I claim—

1. In a steam actuated valve, the combination with a main cylinder, a main piston, and a valve casing having a cylindrical bore therein, of a cylindrical valve seated in said bore, said valve comprising an outer member and an inner member, said inner member having piston heads secured to its ends, steam cylinders containing said piston heads, said piston heads having axial extensions, flanges on said extensions for opening and closing annular ports, peripheral grooves in the inner valve member, ports in said grooves communicating with the steam cylinders, intake ports communicating with said steam cylinders and with the main cylinder, shunt ports having check valves therein communicating with said main cylinder, said shunt ports communicating with the intake ports.

2. In a steam actuated valve, the combination with a main cylinder, a main piston, and a valve casing having a cylindrical bore therein, of a cylindrical valve seated in said bore, said valve comprising an outer and an inner member, pistons on ends of said inner member, steam ports through the pistons, steam exhaust ports, steam cylinders containing the pistons, intercommunicating ports intervening the steam cylinders and the main cylinder, said ports communicating with the exhaust ports.

3. In a steam actuated valve, the combination with a main cylinder, a main piston, and a valve casing having a cylindrical bore

therein, of a cylindrical valve seated in said bore, said valve comprising an outer and an inner member, pistons on the ends of said inner member, steam ports communicating
5 with both sides of the pistons, steam cylinders containing the pistons, each of said cylinders communicating with the main cylinder through the medium of intercommunicating ports, said ports having communica-
10 tion with the exhaust ports, shunt ports having check valves therein, said shunt ports communicating with the said steam cylinders and with the main cylinder.

4. In a steam actuated valve, the combina-
15 tion with a main cylinder, a main piston, and a valve casing having a cylindrical bore therein, of a cylindrical valve seated in said bore, said valve comprising an outer member and an inner member, pistons adapted to ac-
20 tuate the valves, steam cylinders, steam ports communicating with the steam cylinders, in-

take ports, exhaust ports, intercommunicating ports intersecting the intake ports and communicating with said exhaust ports.

5. In a steam actuated valve, the combina- 25
tion with a main cylinder, a main piston, and a valve casing having a cylindrical bore therein, of a cylindrical valve seated in said bore, said valve comprising an outer mem-
ber and an inner member, piston heads se- 30
cured to said valve, steam ports communicating with said piston heads, said steam ports intersected by intermediately disposed ports, shunt ports, check valves in the shunt
ports, all substantially shown and specified. 35

In witness whereof, I subscribe my signature, in presence of two witnesses.

GERRIT JOAN OTTO DORIS DIKKERS.

Witnesses:

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A. HUIDEKOPER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."
