A. R. HOLMÉN.

METER MOTOR.

APPLICATION FILED MAY 29, 1909.

997,500.

Patented July 11, 1911.

2 SHEETS—SHEET 1.

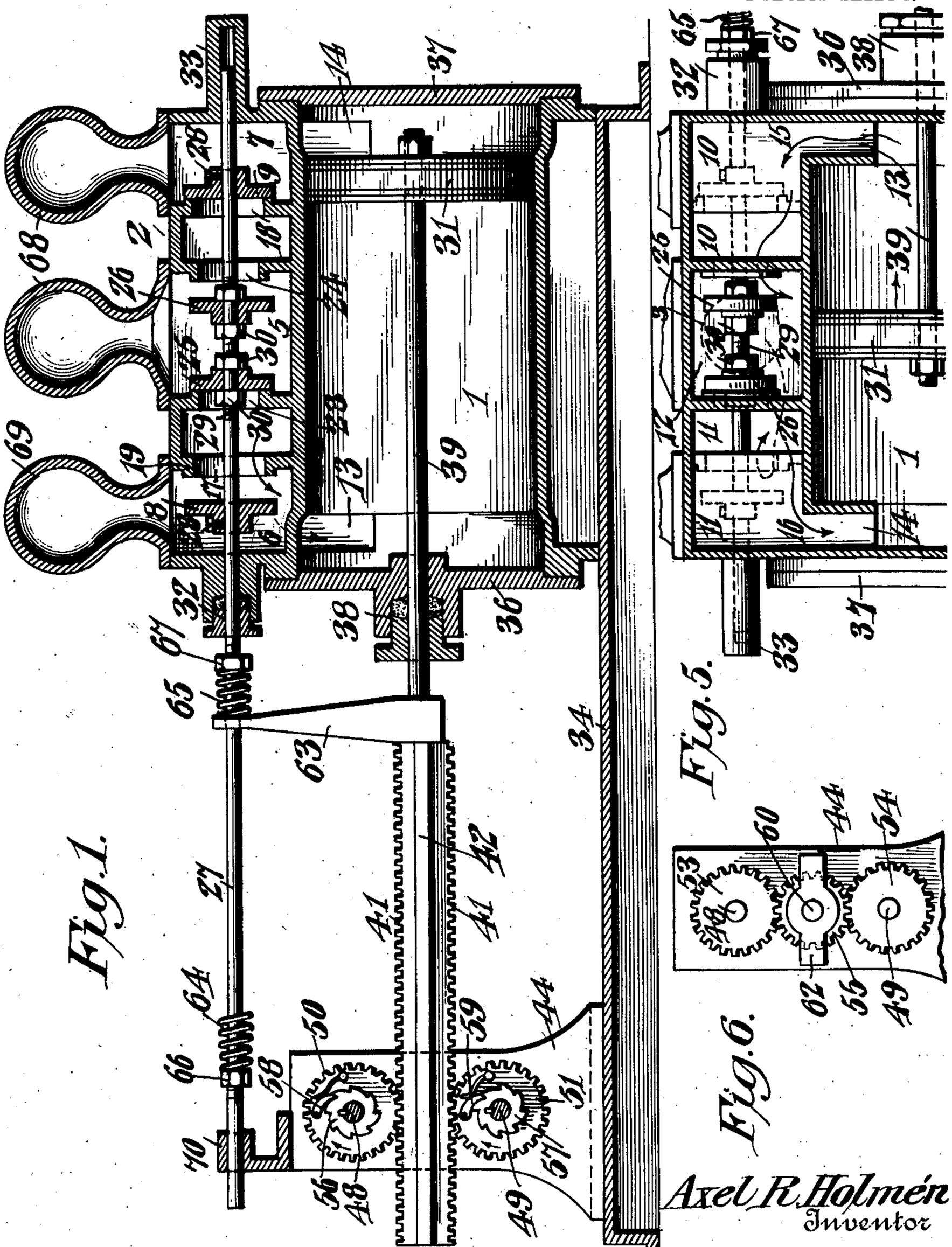

Fig. 1.

Fig. 5.

Fig. 6.

Witnesses

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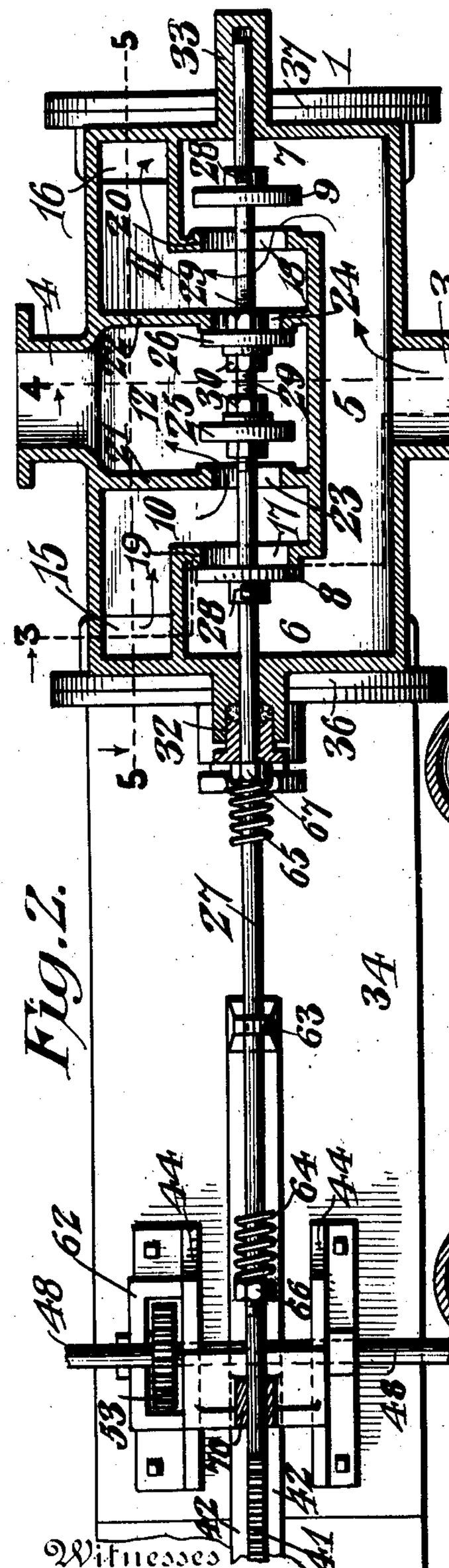

Fig. 2.

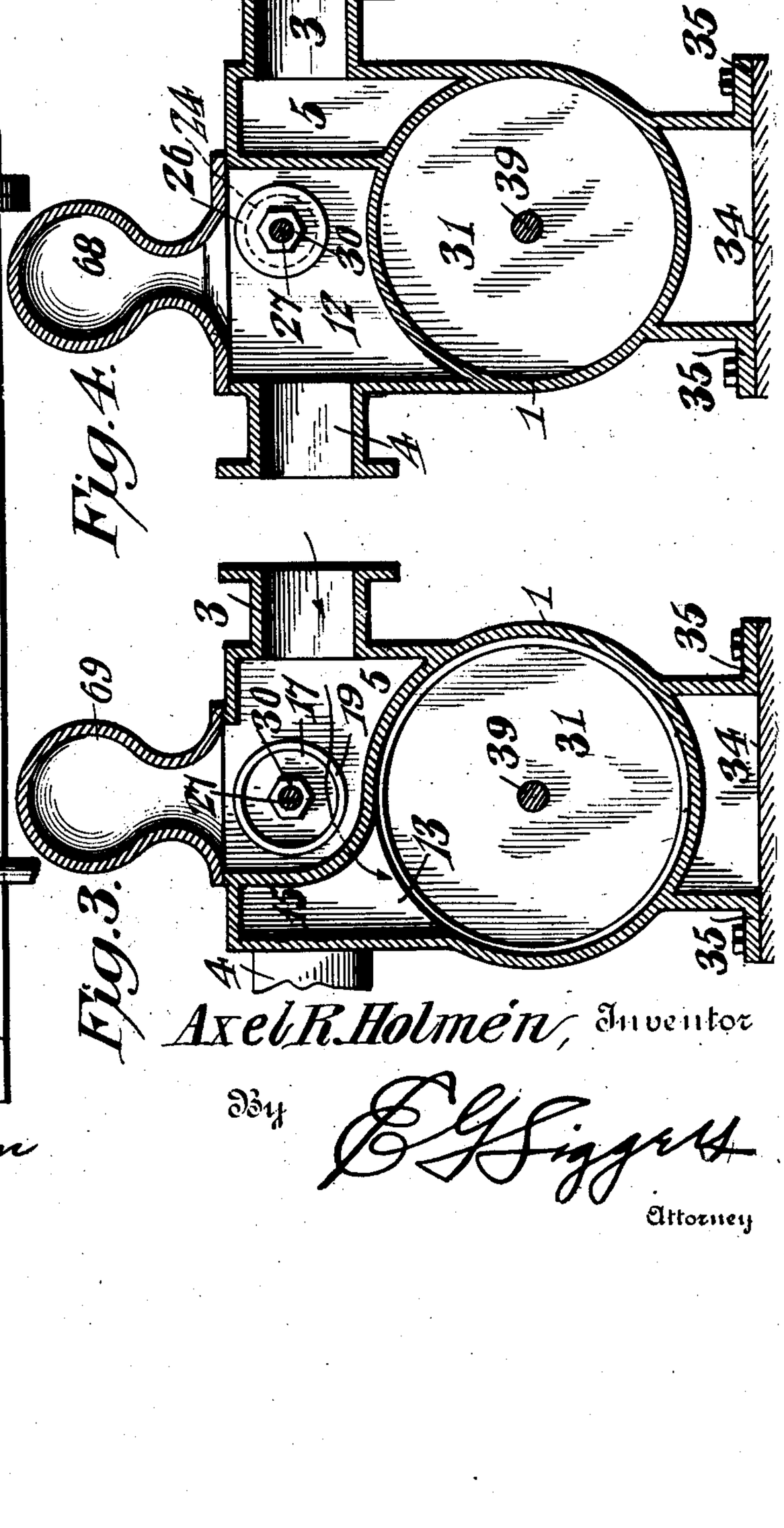

Fig. 3.

Fig. 4.

Fig. 1.

Witnesses

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UNITED STATES PATENT OFFICE.

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METER-MOTOR.

997,500. Specification of Letters Patent. Patented July 11, 1911.

Application filed May 29, 1909. Serial No. 499,124.

To all whom it may concern:

Be it known that I, AXEL R. HOLMÉN, a citizen of Sweden, residing at Columbus, in the county of Franklin and State of Ohio, have invented a new and useful Meter-Motor, of which the following is a specification.

The invention relates to a meter motor.

The object of the present invention is to improve the construction of meters and motors, and to provide a simple and efficient machine of comparatively inexpensive construction, adapted to use fluid under pressure as a motive power and also to enable the fluid passing through the machine to be measured.

Another object of the invention is to provide a machine of this character, equipped with means for converting reciprocatory motion into rotary motion.

With these and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claim hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction, within the scope of the claim, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:—Figure 1 is a central longitudinal sectional view of a meter motor, constructed in accordance with this invention. Fig. 2 is a horizontal sectional view of the same. Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 2. Fig. 4 is a similar view on the line 4—4 of Fig. 2. Fig. 5 is a vertical sectional view on the line 5—5 of Fig. 2. Fig. 6 is a detail view of the gear stands, illustrating the arrangement of the exterior gears. Fig. 7 is a transverse sectional view of the gear stand.

Like numerals of reference designate corresponding parts in all the figures of the drawings.

The meter motor comprises in its construction a cylinder 1 and a superimposed valve chest 2, provided at opposite sides with an inlet 3 and an outlet 4, located intermediate of the ends of the valve chest and preferably arranged horizontally. The inlet 3, which in practice will be connected with a suitable supply of fluid under pressure, communicates with an inlet chamber 5, extending the entire length of the valve chest at one side thereof and provided with terminal transversely disposed extensions 6 and 7, receiving front and rear admission valves 8 and 9 for controlling the passage of water or other fluid from the inlet chamber 5 to intermediate front and rear connecting chambers or passages 10 and 11, located in advance and in rear of a central exhaust chamber 12 and communicating with the cylinder 1 at the ends thereof through front and rear openings 13 and 14. The intermediate connecting chambers or passages are provided with transversely disposed branches, which are interposed between the extensions 6 and 7 of the inlet chamber and the exhaust chamber 12. The said intermediate chambers or passages are also connected by upright branches 15 and 16 with the front and rear openings 13 and 14 with the cylinder 1.

The front and rear admission valves 8 and 9 are adapted to alternately cover and uncover front and rear ports or openings 17 and 18 in the partitions 19 and 20, separating the inlet chamber from the intermediate connecting chambers or passages 10 and 11, and the said partitions 19 and 20 are provided around the ports or openings 17 and 18 with annular bosses or flanges, located within the transverse extensions 6 and 7 of the inlet chamber and forming seats for the front and rear admission valves 8 and 9. The longitudinal inlet chamber 5, which is located at one side of the valve chest, is separated from the opposite side by a longitudinal wall or partition, having the transverse portions 19 and 20, which are connected with the ends of the valve chest by terminal longitudinal portions. The partitions 21 and 22 extend from the intermediate longitudinal portion of the said longitudinal partition to the opposite side of the valve chest, as clearly shown in Fig. 2 of the drawings. The partitions 21 and 22 separating the intermediate connecting chambers or passages from the central exhaust chamber 12 are provided with front and rear exhaust ports or openings 23 and 24, and have annular bosses surrounding the ports or openings 23 and 24 and located within the exhaust chamber 12 to form seats for front and rear exhaust valves 25 and 26. The ports or openings 17 and 18 and 23 and 24, which are formed in the partitions or walls of the chambers of the valve chest, are arranged in alinement, and the front and rear admission

valves and the front and rear exhaust valves are mounted on a reciprocatory valve rod 27. The front and rear admission valves 8 and 9 are fixed to the valve rod by means of set screws 28, piercing hub portions of the said valves 8 and 9 and engaging the shaft, but any other suitable means may be employed for this purpose. The reciprocatory valve rod is provided with spaced threaded portions 29, receiving adjusting nuts 30, located in advance and in rear of the exhaust valves 25 and 26 and adjustably securing the same to the valve rod. When the valve rod is moved rearward to the position illustrated in Fig. 2 of the drawings, the front admission valve closes and covers the front admission opening or port 17, and the front exhaust valve opens the front exhaust port or opening 23. Simultaneous with this operation, the rear admission valve 9 is opened and the rear exhaust valve is carried to its seat covering the rear exhaust opening or port 24. As one admission valve and one exhaust valve are closed in each position of the valve rod, each will be subjected to the pressure of the motive fluid entering the valve chest, and in order to maintain the valves in their proper closed position, the admission valves 8 and 9 are constructed of greater area than the exhaust valves, so that they will be subjected to greater pressure and will operate to hold the exhaust valves in their closed position against the pressure of the motive fluid.

The movement of the valve rod rearward and the shifting of the valves to the position shown in Fig. 2 of the drawings causes the motive fluid to pass through the rear admission opening or port 18 into the rear intermediate connecting passage or chamber and through the same into the rear end of the cylinder 1 at the back of the piston 31, which will be moved forward, causing the water or other fluid contained in the cylinder to pass out through the front opening 13 into the front intermediate connecting chamber or passage and through the front exhaust opening or port 23 into the exhaust chamber 12. The fluid escapes from the exhaust chamber 12 through the outlet 4. In Fig. 1 of the drawings the valves are shown in the reverse position, the piston being near the limit of its rearward travel, the further rearward movement of the piston operating through the medium of the mechanism hereinafter described to shift the valves from the position illustrated in Fig. 1 to that shown in Fig. 2. The valve rod extends through a stuffing box 32 at the front end of the valve chest, and its rear end operates in a horizontal tubular guide 33, projecting rearward from the valve chest and preferably formed integral with the same.

The cylinder is preferably mounted upon a bed plate 34, being provided at the bottom with a suitable base having horizontal attaching flanges 35, bolted or otherwise secured to the bed plate. The cylinder is also equipped with front and rear cylinder heads 36 and 37, the front cylinder head being provided with a suitable stuffing box 38 for the piston rod 39.

The piston rod carries a rack bar 40, located at the outer end of the piston rod and forming a longitudinal extension thereof and provided with upper and lower teeth 41 and laterally extending flanges 42. The laterally extending flanges 42 slide in grooves 43 of opposite inwardly extending guides, projecting horizontally from the inner faces of vertical sides 44 of a gear stand. The sides 44, which are provided at their lower ends with attaching flanges 45 are bolted to the bed plate, and they are provided with upper and lower alined bearings 46 and 47 for upper and lower horizontal shafts 48 and 49, carrying upper and lower inner gears 50 and 51, which mesh with the upper and lower teeth of the rack bar 40. The upper and lower gears 50 and 51 are arranged between the sides of the gear case, and they are spaced from one of the sides by integral tubular extensions 52 of the bearings thereof. The upper and lower shafts also carry exterior upper and lower gears 53 and 54, meshing with an exterior intermediate gear 55 and located at the outer face of one of the sides of the gear stand. The upper and lower shafts are equipped with upper and lower reversely operable clutches, consisting of ratchet wheels 56 and 57 and pivoted spring actuated pawls 58 and 59. The pawls are mounted on the upper and lower inner gears 50 and 51, which are loose on the upper and lower shafts 48 and 49. The spring actuated pawls and the ratchet wheels alternately operate to rotate their respective shafts, and when the slidable rack bar is moved forwardly or outwardly by the piston, the upper gear wheel through its clutch mechanism rotates the upper shaft, and rotary motion is imparted to the intermediate outer gear 55, through the medium of the upper exterior gear wheel 53. When the direction of the piston is reversed by the means hereinafter described, and the slidable rack bar is moved inwardly or rearwardly, the lower gear wheel through its pawl actuates the lower ratchet wheel, and rotates the lower shaft and rotary motion is communicated to the intermediate outer gear, through the lower gear 54, which operates to continue the rotary motion of the intermediate gear in the same direction in which the intermediate gear is moved by the upper gear 53. The continuous reciprocatory motion of the piston is thus converted into a continuous rotary motion. The intermediate outer gear is mounted on a central hori-

zontal shaft 60, journaled in a central bearing 61 of the adjacent side of the gear stand and in a bearing bracket 62, secured to the gear stand at opposite sides of the intermediate gear. Any suitable means may be employed for connecting the central transverse shaft 60 with the machine or mechanism to be driven by the motor.

The valve rod is actuated to change the direction of the piston by means of an upwardly extending actuating arm 63, connected at its lower end with the piston rod 39 at the inner end of the rack bar and provided at its upper end with an opening through which the valve rod passes. The valve rod is equipped with front and rear springs 64 and 65, located in advance and in rear of the upwardly extending actuating arm 63, and adjustably positioned on the shaft by means of nuts 66 and 67, engaging threaded portions of the valve rod. The nuts are adapted to vary the tension of the springs, which are alternately engaged by the actuating arm to move the valve rod forwardly and rearwardly to shift the position of the valves. The valve chest is equipped with intermediate and end air domes 68 and 69, located above the exhaust and inlet chambers, and the gear stand supports a guide 70 for the front or outer end of the valve rod.

When it is desired to use the machine as a meter, a stroke counting device of any well known construction may be employed, and by multiplying the number and the length of the strokes with the area of the piston in inches and dividing by the number of cubic inches in a gallon, the quantity of fluid in gallons, that has passed through the machine, may be ascertained.

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

A machine of the class described comprising a cylinder, a piston operating in the cylinder, a valve chest provided at one side with an inlet opening and at the opposite side with an outlet or exhaust opening and including a longitudinal partition provided with intermediate and terminal longitudinal portions and transverse connecting portions, transverse partitions connecting the intermediate portion of the longitudinal partition with the wall of the valve chest at opposite sides of the outlet or exhaust opening and forming a centrally arranged exhaust chamber at one side of the valve chest, said longitudinal partition forming a continuous inlet chamber at the opposite side of the valve chest and the transverse and terminal portions of the longitudinal partition being spaced from the transverse partitions and forming intermediate chambers or passages and the said partitions having alined inlet and exhaust openings, and branch passages connecting the intermediate chambers or passages with the ends of the cylinder, a valve rod extending through the said openings, exhaust valves located within the exhaust chamber and mounted on the valve rod, and admission valves fixed to the valve rod and arranged within the end portions of the entrance chamber.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

AXEL R. HOLMÉN.

Witnesses:
C. E. JUSTIN,
H. C. WILL.