C. J. BASSLER.

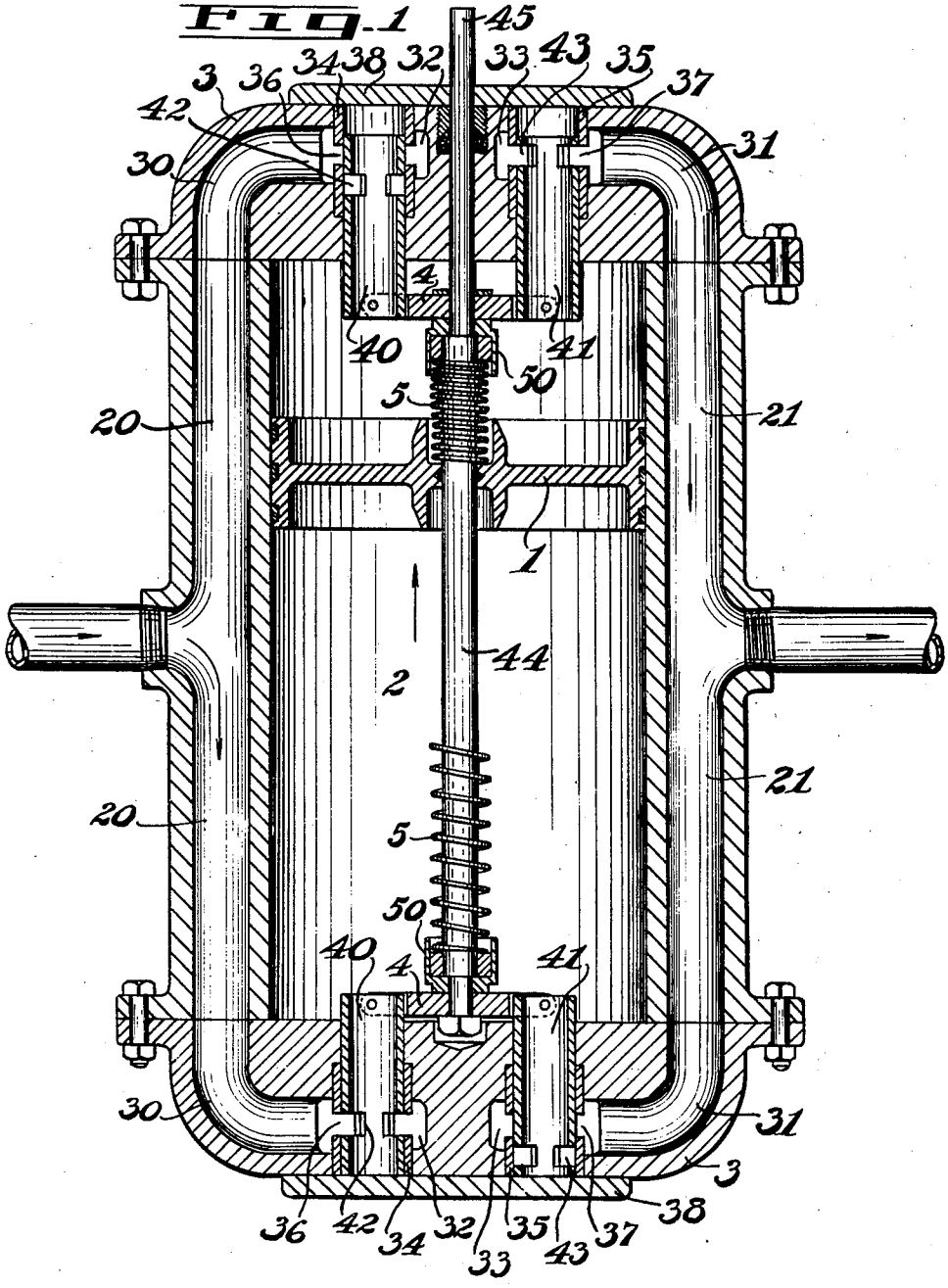
FLUID METERING DEVICE.

APPLICATION FILED MAR. 1, 1920.

1,355,208. Patented Oct. 12, 1920.

2 SHEETS—SHEET 1.

Fig. 1



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2 SHEETS—SHEET 2.

FIG. 2

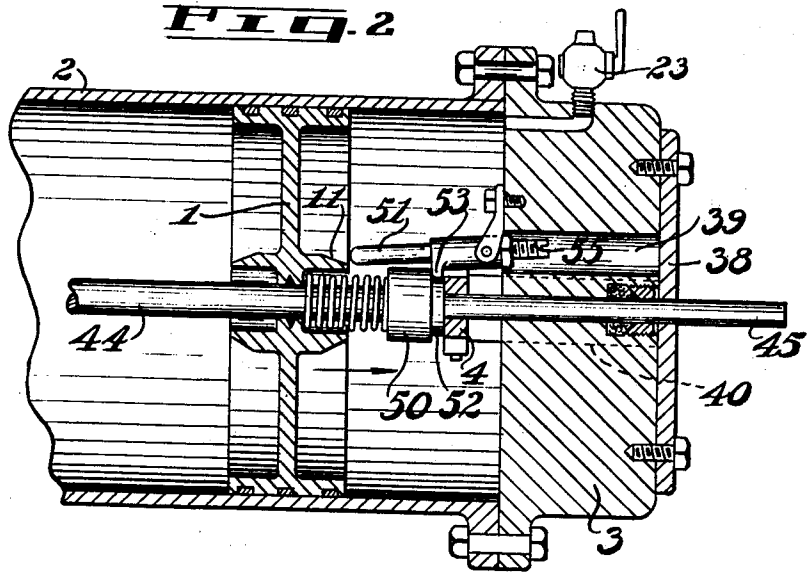
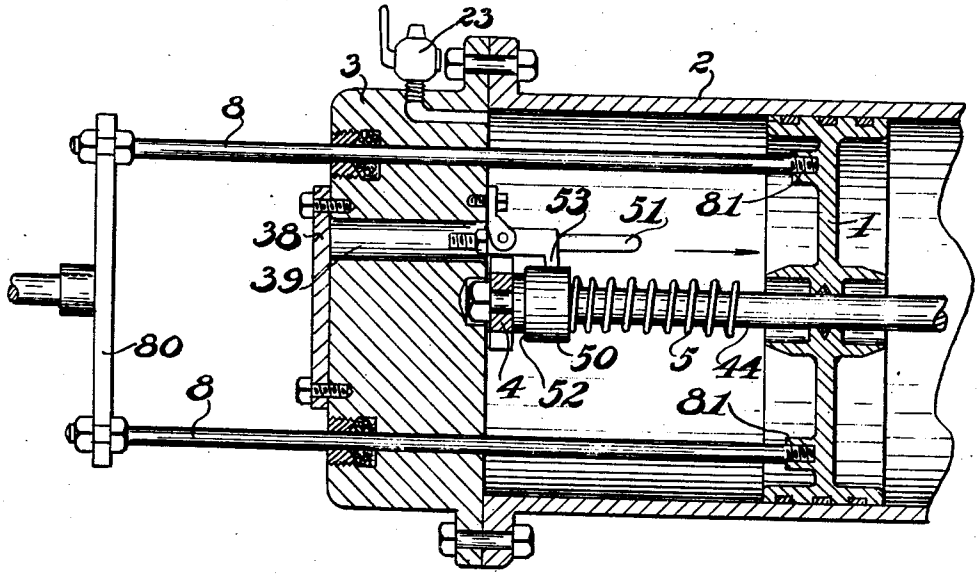


FIG. 3.



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UNITED STATES PATENT OFFICE.

CARLOS J. BASSLER, OF SEATTLE, WASHINGTON, ASSIGNOR, BY MESNE ASSIGNMENTS, TO AMERICAN LIQUID METER COMPANY, OF SEATTLE, WASHINGTON, A CORPORATION OF WASHINGTON.

FLUID-METERING DEVICE.

1,355,208. Specification of Letters Patent. Patented Oct. 12, 1920.

Application filed March 1, 1920. Serial No. 362,423.

To all whom it may concern:

Be it known that I, CARLOS J. BASSLER, a citizen of the United States, and resident of the city of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Fluid-Metering Devices, of which the following is a specification.

My invention comprises an improvement in fluid handling devices, and I have shown in the drawings which form a part of this specification several embodiments of my invention. One embodiment, that to which this specification is most particularly directed, is designed to be used as a fluid meter. Another embodiment which is shown in the drawings, and which will be later described, is particularly designed as a pump or compressor. This form may also be employed as a meter, if desired. It will be evident that the principles employed in my devices may be applied to other fluid handling devices, or to combinations of such devices with each other or with pumps or meters. I do not desire to limit myself either to the particular constructions or the particular uses described.

The object of my invention is to provide a fluid handling device which employs power imparted to a moving part, either through the pressure of the fluid or through an outside source, to operate a controlling valve at a predetermined time, or at a predetermined point in the travel of the moving part.

A further object is the provision of means, in such a device, of storing up power generated by the moving part, so that it may be released at the proper time positively to operate the controlling valve.

A further object is the provision in such a device of one or more valves controlling the inlet to and discharge from each end of a cylinder, said valves being connected to function oppositely at opposite ends of the cylinder, and being acted upon through reciprocation of the piston therein to be reversed in position and function automatically.

A further object is the provision in a meter employing a piston reciprocable within a cylinder, of means for reversing the direction of motion of the piston at predetermined points.

A still further object is the provision of means for regulating the position of the point where the reciprocable piston is reversed within the cylinder, at either or both ends of its travel.

My invention comprises those novel parts and combinations thereof which are shown in the accompanying drawings, described in the specification, and defined by the claims terminating the same.

In the accompanying drawings I have shown my invention in a form which is now preferred by me, together with several modified forms.

Figure 1 is a horizontal section through my preferred form, as designed for use as a meter.

Fig. 2 is a vertical section through an end of my device, taken at right angles to Fig. 1.

Fig. 3 is a section through one end of a further modified form, illustrating my invention adapted for use as a pump, compressor, or meter.

When used as a meter, my device may employ either a piston and rod to be operated by an outside power source, or a floating piston to be operated by the fluid pressure, reciprocating within a cylinder. Means are provided for controlling the inlet to and discharge from both ends of the cylinder, and other means are employed for limiting the stroke of the piston within the pump, to cause it to reverse or be reversed in direction. With the area of the cylinder and the length of stroke of the piston known, the volume of fluid passing through the device can be readily computed. I prefer that the means limiting the piston stroke be adjustable in order that variations due to differences in temperature, wearing of parts, and similar factors, may be compensated for.

Referring first to the form shown in Figs. 1 and 2, illustrating my preferred form of meter, the floating piston 1 is reciprocable within a cylinder 2 under the influence of a fluid under pressure supplied through suitable inlet passages 20. The fluid is discharged through similar outlet passages 21. The passages 20 and 21 may each communicate direct with the ends of the cylinder 2 if desired, but I have herein shown these passages as connecting with passages 30 and 31, respectively, formed in the opposite cylinder heads 3 of the cylinder. The passages 30 and 31, as herein shown, terminate in annular grooves 32 and 33, respectively, surrounding the sleeve bushings 34 and 35, respectively. The bushing 34 is provided with

inlet ports 36, registering with the annular groove 33. I prefer to use the bushings 34 and 35 in order to secure a more accurate timing of the closure of the valves, and in order that worn bushings or ports may be replaced with the minimum of expense and trouble, this not being possible without the use of similar devices.

The inlet and outlet valves and their ports may be positioned at any suitable place. Those shown herein are placed in opposite cylinder heads, in line with the piston. In the type shown in Fig. 1, the inlet valve 40 is formed separately from the outlet valve 41, each consisting of a sleeve reciprocable within its respective bushing 34 or 35, or the bores containing these bushings, and being provided with an inlet port 42 or an outlet port 43, as the case may be. The inlet and outlet ports are spaced axially, so that only one is open at a time, considering one end of the cylinder only. As shown herein, the outlet port 43 is the outermost. The two valve sleeves 40 and 41 in each end of the cylinder are connected to move together, as by the yoke 4 pivoted in each of them.

The pairs of valves at opposite ends of the cylinder are also connected to move together, as by the rod 44, to which each of the yokes 4 are secured. The valves in the pairs at opposite ends of the cylinder are oppositely set, so that when the inlet valve 42 is open at one end, the outlet valve 43 is open at the other end. When the valves are reversed in position at the one end, to close the outlet valve 43 and to open the inlet valve 42, by a means to be later described, the valves at the opposite end of the cylinder, being connected through the rod 44, are simultaneously reversed in position, to close the inlet valve 42 and to open the outlet valve 43. It is evident that this will cause the piston to reverse its motion. When it reaches the other end of its travel, the valves are again reversed in position, and the motion of the piston reversed accordingly.

Means must be provided to reverse the motion of the piston at each end of its stroke; preferably these means are actuated through the travel of the piston. Moreover, when using the device as a meter, with a known cylinder area and known length of piston travel, it is desirable that the reversal of the valves should take place rapidly, and just at the time the piston reaches the calculated end of its travel. The means which I have employed comprise a power storage mechanism, consisting of the spring 5 interposed between the piston 1 and a collar 50, which is connected to the valves 40 and 41 to move therewith, and which is provided with a shoulder 52, forming a locking dog, and a locking pawl 53 which is pivoted within the cylinder in position to engage the dog 52. A trip arm 51, forming a part of the pawl 53, is positioned to be engaged by a conical surface 11 upon the piston in its travel, to raise the pawl 53 from the shoulder 52. This arrangement causes the piston to compress one of the springs 5, that toward which it is moving, to store up energy. At the proper time, the conical surface 11 and trip arm 51 trip the power storage mechanism, the energy of the spring is released, and it is applied to the valves to reverse them. To vary the position of the piston in its path at the instant of reversal, the trip 51 may be adjustable longitudinally within the pawl 53, as by the threads 55. I prefer to mount the pawl 53 so that it may be reached from outside the cylinder for adjustment through a bore 39 in the head 3, the bore being closed by the cap plate 38.

The power storage device and trip which I have described constitute one embodiment which has been found effective, but I do not desire to limit myself to the exact construction described, as any suitable mechanism for the purpose may be employed.

In Fig. 3 my device is illustrated as it might be constructed for use as a compressor. Parallel piston rods 8 are connected outside of the cylinder by a yoke 80, and are reciprocated by any suitable source of power. These rods 8 pass through the cylinder head 3, and are secured in the piston 1, as at 81. By causing the piston 1 to reciprocate by applying power to the piston rods 8, the device will function as a compressor, and the valves will be given a quick cut-off and reversal at the end of each stroke, so that there will be no loss of pressure. If the time of reversal of the valves does not coincide with the reversal of the piston, this may be remedied by adjustment of the trip 51 in the pawl 53, as has been described. In Fig. 3 these latter parts are shown in the position they would assume after the pawl 53 had been tripped to open the inlet valve and to close the outlet valve at this end of the cylinder, and after the piston 1 had begun its travel toward the other end of the cylinder.

The rod 44 is shown herein as axially located within the cylinder 2, and as passing through the piston 1. This is the preferred position, as here the friction between the piston 1 and this rod is the least. The piston 1 may be permitted to turn without interfering with the rod 44. At one end the rod is shown as projecting, as at 45, from the cylinder head 3. This permits it to engage a suitable registering mechanism (not shown) to record the number of reciprocations made by the valves. From this may be calculated the amount of fluid passing through the meter. If desired, this feature may be omitted, and the rod 44 may be contained entirely within the cylinder. I have shown priming pet-cocks 23 at the upper side of each end of

the cylinder 1, to assist in starting the device, and to make sure that no air is being supplied instead of the desired fluid.

It is believed that a further description of the operation of my device is unnecessary, as this must be evident to those skilled in the art from the preceding description.

What I claim as my invention is:

1. In a fluid metering device, a cylinder, a piston mounted therein, fluid controlling valves, actuating elements for said valves and a detent for said actuating elements comprising a pivoted tubular member mounted to swing into and out of engagement with said actuating element and a trip-arm consisting of a straight rod having direct threaded connection in said tubular element for longitudinal adjustment therethrough.

2. In a fluid metering device the combination with a cylinder, of a head at each end of said cylinder, a piston mounted to reciprocate within said cylinder, a fluid inlet conduit leading to each end of the cylinder and a fluid outlet conduit leading from each end of the cylinder, a rod extending longitudinally through the cylinder and passing through said piston, said cylinder-head being longitudinally bored, entirely therethrough at each side of said rod with which bored portions said inlet and outlet conduits connect, an inlet and outlet valve at each end of the cylinder, said valves comprising tubular members which communicate longitudinally with the interior of the cylinder and are ported laterally for communication with the inlet and outlet conduits respectively, yokes extending transversely of the cylinder adjacent each end thereof to the outer ends of which yokes the said valves are pivotally connected, said yokes being secured to and movable with said rod, shouldered elements adjacent said yokes, springs surrounding said rod, adapted to be compressed between the piston and said shouldered elements, tubular elements pivoted adjacent said shouldered elements and movable upon their pivots into engagement therewith to restrain said elements against the action of said springs when said springs are being compressed, trip-arms threaded directly into said tubular elements, the outer ends of said trip-arms projecting into bores which extend entirely through the cylinder-heads and removable closure plates upon said cylinder-heads which, when removed, uncover the last named bores to render the trip-arms accessible for adjustment and uncover the bores in which the valves are disposed to permit access to said valves.

3. In a fluid metering device the combination with a cylinder, of a head at each end of said cylinder, a piston mounted to reciprocate within said cylinder, a fluid inlet conduit leading to each end of the cylinder and a fluid outlet conduit leading from each end of the cylinder, a rod extending longitudinally through the cylinder and passing through said piston, said cylinder-head being longitudinally bored, entirely therethrough at each side of said rod with which bored portions said inlet and outlet conduits connect, an inlet and outlet valve at each end of the cylinder, said valves comprising tubular members which communicate longitudinally with the interior of the cylinder and are ported laterally for communication with the inlet and outlet conduits respectively, yokes extending transversely of the cylinder adjacent each end thereof to the outer ends of which yokes the said valves are pivotally connected, said yokes being secured to and movable with said rod, shouldered elements adjacent said yokes, springs surrounding said rod, adapted to be compressed between the piston and said shouldered elements, tubular elements pivoted adjacent said shouldered elements and movable upon their pivots into engagement therewith to restrain said elements against the action of said springs when said springs are being compressed, trip-arms threaded directly into said tubular elements and removable closure plates upon said cylinder-heads which, when removed, uncover and render the trip-arms accessible for adjustment and uncover the bores in which the valves are disposed to permit access to said valves.

Signed at Seattle, King county, Washington, this 25th day of February, 1920.

CARLOS J. BASSLER.