(No Model.)

2 Sheets—Sheet 1.

C. W. BECK.

WATER METER.

No. 529,156. Patented Nov. 13, 1894.

FIG. 1.

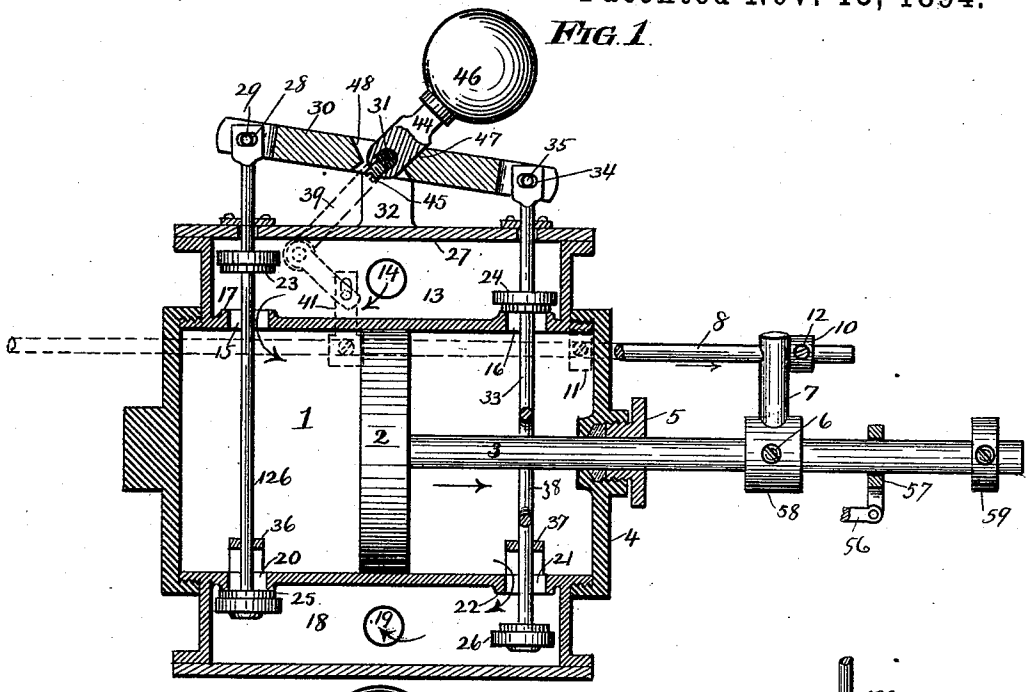

FIG. 2.

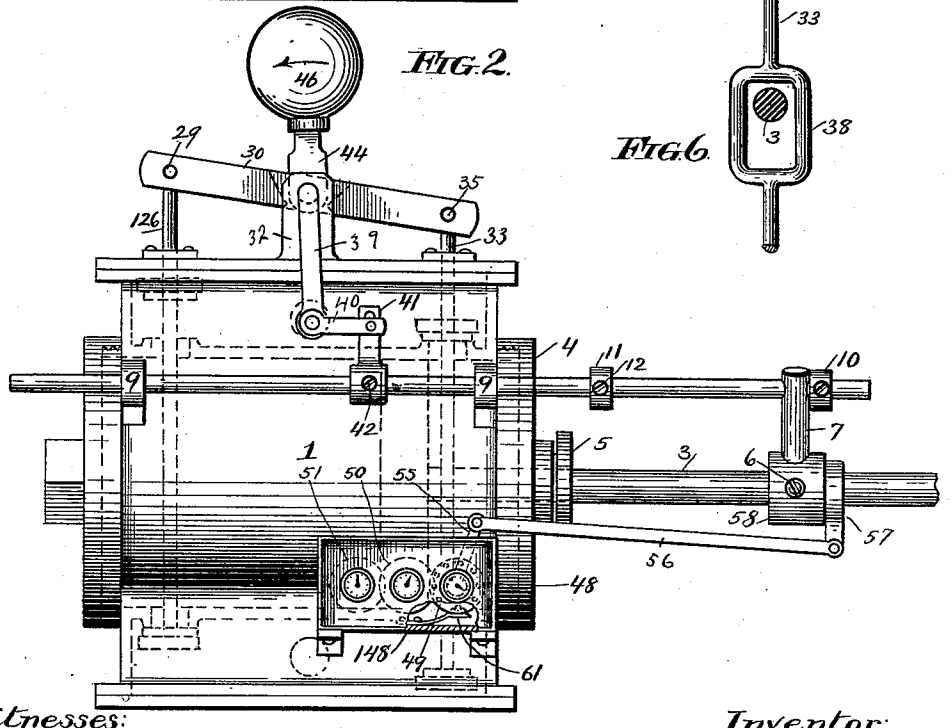

FIG. 6.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 3.

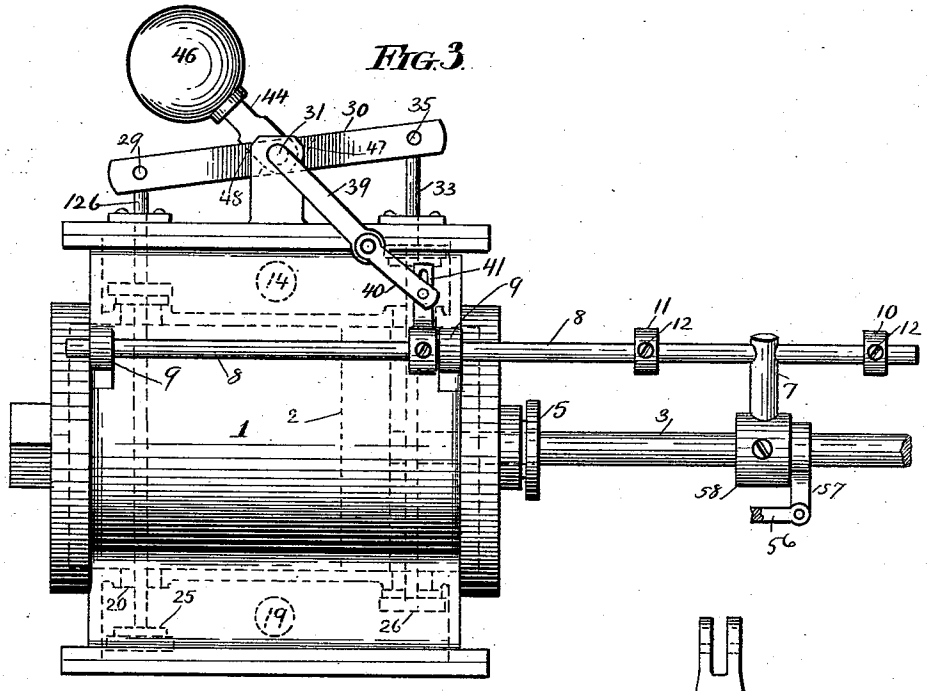


FIG. 7.

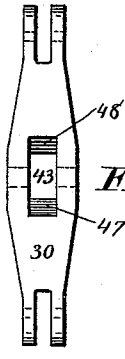


FIG. 4.

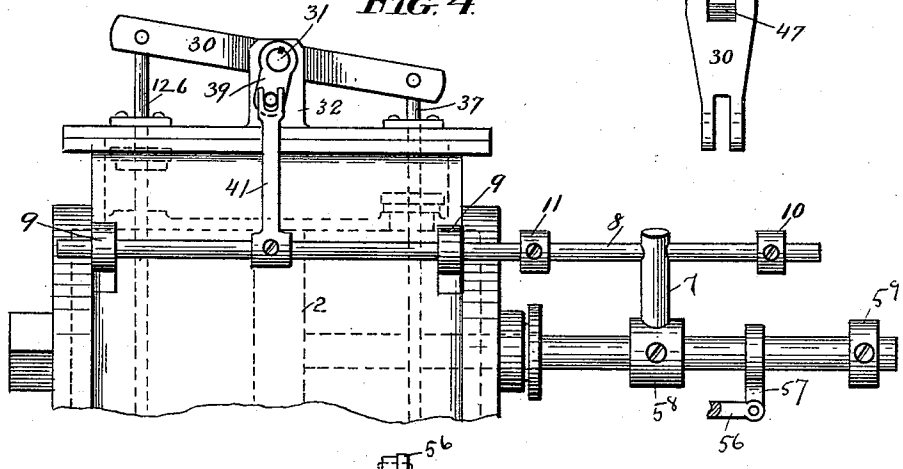
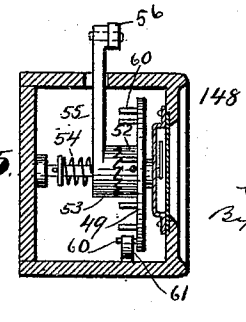


FIG. 5.



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UNITED STATES PATENT OFFICE.

CHARLES W. BECK, OF CHICAGO, ILLINOIS.

WATER-METER.

SPECIFICATION forming part of Letters Patent No. 529,156, dated November 13, 1894.

Application filed March 31, 1894. Serial No. 505,835. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. BECK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Water-Meters, of which the following is a specification, reference being had to the accompanying drawings, which are made a part hereof, and in which—

Figure 1 is a vertical axial section of a meter embodying the invention in its preferred form. Figs. 2 and 3 are side elevations thereof showing the parts in the different positions that they occupy at different stages in the operation of the machine. Fig. 4 is a side elevation of a portion of a meter embodying the invention under a slight modification. Fig. 5 is an elevation of the register with the front of the casing removed. Fig. 6 is an elevation of a portion of one of the valve stems. Fig. 7 is a plan view of the walking beam.

The object of the present invention is to provide an improved water meter, and the invention consists in the features of novelty that are particularly pointed out in the claims hereinafter.

In the drawings 1 represents the cylinder, 2 the piston arranged therein, and 3 the piston-rod extending through the cylinder head 4 and surrounded by a suitable stuffing box 5. Secured adjustably to the piston-rod by means of a set screw 6 is a tappet 7, which is preferably perforated for the passage of a rod 8 which is mounted so as to be capable of sliding endwise in suitable bearings 9, and which is intended to transmit movement from the piston-rod to the valve gear. To this end collars 10 and 11 are adjustably secured to it upon opposite sides of the tappet 7, by means of set screws 12, and it is connected with the valves through the medium of the gearing hereinafter described.

13 represents the induction chamber with which the supply pipe communicates through an opening 14, and which communicates with the opposite ends of the cylinder through ports 15 and 16, surrounding which are valve-seats 17.

18 is the eduction chamber with which the eduction pipe communicates through an opening 19, and which communicates with opposite ends of the cylinder through ports 20 and 21, surrounding which are valve-seats 22.

23 and 24 are valves located in the induction chamber and adapted to control the ports 15 and 16, respectively, and 25 and 26 are valves located in the eduction chamber and adapted to control the ports 20 and 21, respectively.

The valves 23 and 25 are coupled together by means of a stem 126 which passes out through an opening in the top plate 27 of the induction chamber and is provided with a laterally elongated slot 28 through which passes a pin 29 by which it is connected to one end of a walking beam 30 mounted to oscillate upon a shaft 31 journaled in standards 32 rising from the top plate 27.

The valves 24 and 26 are coupled together by a stem 33 which passes out through an opening in the top plate 27, and is provided with a laterally elongated slot 34 through which passes a pin 35 by which this stem is connected to the other end of the walking beam 30.

36 and 37 are brackets secured to the interior of the cylinder and provided with openings through which the stems 126 and 33 pass, respectively, whereby the lower ends of said stems are held against lateral movement, their upper ends being held by contact with the margins of the openings through the top plate 27. The valve-stem 33 is provided with a loop or eye 38 for the passage of the piston-rod 3.

39 is an arm which is rigid with the shaft 31, and may be either integral therewith or else formed of a separate piece of metal and attached thereto by any suitable means, these parts being shown in Figs. 2 and 3 as being integral, and in Fig. 4 as being of separate pieces keyed together. To the lower end of the arm 39 is pivotally connected one end of a link 40, the other end of which is pivotally connected to an arm 41 which is adjustably secured to the rod 8 by means of a set screw 42.

The walking beam is provided at its center with an opening 43 for receiving the lower end of a lever 44, which latter is provided with an opening for the passage of the shaft 31 to which it is secured, so as to be incapable of movement relatively thereto, by a set screw 45, or any other suitable device, and said lever carries at its upper end a weight 46.

47 and 48 are shoulders formed on the walking beam 30 at opposite ends of the opening

43 and adapted to be engaged by the lever 44, as hereinafter more fully described.

The operation of the device thus constructed is as follows: As shown in Fig. 1, the piston is at the center of its stroke to the right, or in the direction indicated by the arrow. When in this position the tappet 7 comes in contact with the collar 10, and during the remainder of the stroke of the piston the rod 8 partakes of the movement of the piston. At the instant the piston has completed its stroke, the parts are in the positions shown in Fig. 2, the center of gravity of the weight 46 having been shifted from one side of the vertical plane of its center of movement to the other. When the parts have arrived at the positions shown in Fig. 2 the weight moves by gravity in the direction of the arrow in said figure, and, operating through the shaft 31, arm 39, link 40 and arm 41, shifts the rod 8 from the position shown in Fig. 2 to the position shown in Fig. 3. This same movement of the weight also brings the lever 44 in contact with the shoulder 48 and shifts the walking beam from the position shown in Figs. 1 and 2 to the position shown in Fig. 3, and this movement of the walking beam in turn shifts the valves from the positions shown in Figs. 1 and 2 to the positions shown in Fig. 3. This shifting of the valves closes the ports 15 and 21 and opens the ports 16 and 20, thereby placing the left-hand end of the cylinder (as shown in the drawings) in communication with the eduction chamber 18, and the right-hand end in communication with the induction chamber 13. Water being thus admitted to the right-hand end of the cylinder, the reverse stroke of the piston takes place and discharges the water from the left-hand end into the eduction chamber and through the opening 19 into the eduction pipe. As soon as the piston arrives at the center of the return stroke the tappet 7 comes in contact with the collar 11, and during the remainder of said stroke moves the rod, which, in turn, operating through the arm 41, link 40, arm 39 and shaft 31, moves the weight from the position shown by full lines in Fig. 3 to the position indicated by dotted lines in said figure, thus shifting its center of gravity from one side of the vertical plane of its center of movement to the other. The weight then falls by gravity to the position shown in Fig. 1, and in so doing shifts the parts to the position shown in Fig. 1.

The capacity of the cylinder being known, in order to make this mechanism available as a water meter, it is simply necessary to apply to it a register having such connection with some of the moving parts that each stroke of the piston will be registered. To this end I have applied a register 148, which may be of any desired construction, but which is preferably constructed as shown. It has a train of registering disks 49, 50, 51, upon the first of which is an annular series of ratchet teeth 52 with which engages a pawl 53 having teeth meshing with said teeth 52, and held in engagement therewith by a spring 54 surrounding the stem upon which the pawl is adapted to oscillate. The arm 55 of this pawl extends out through an opening in the casing, and is connected by a link 56 with a collar 57 that is mounted loosely upon the piston-rod 3, between the collar 58 that carries the tappet 7 and a second adjustable collar 59. These collars 58 and 59 are so located that as the piston is nearing the completion of its stroke in one direction or the other, one or the other of them strikes the collar 57 and shifts the arm 55. Upon the first registering disk 49 are a number of pins 60, which are engaged successively by a spring actuated pawl 61 secured to the inside of the casing, whereby said disk is prevented from moving at random.

It is manifest, however, that while this machine is useful and primarily intended for measuring the quantity of water passing through it, it is at the same time equally as useful as a motor. In order to make it available for this latter purpose, it is simply necessary to make suitable connections between the piston-rod 3 and the device to which it is desired to apply the power. I have not shown these connections in the drawings, because they will vary with the nature of the machine to which the power is to be applied, and, furthermore, they will readily suggest themselves to any one skilled in the art.

The foregoing description contemplates a valve-operating mechanism which is conditioned to operate by the movement of the piston, but which is in fact operated by a force which is not derived immediately from the piston—that is to say, the movement of the piston simply lifts the weight to such position that it can fall by gravity and in so doing shift the valves through the medium of the described gearing, the arrangement being such that the valves are moved after the movement of the piston has ceased. This is preferable but not essential. If desired the valves may derive their movement from the piston immediately, through suitable gearing, such, for example, as shown in Fig. 4. In this figure the lever 44 and weight 46 are dispensed with, and the walking beam 30 is rigidly connected with the shaft 31 so that the former partakes of the movement of the latter. Here also the link 40 is dispensed with and the arm 41 engages the arm 39 directly, so that the latter partakes of the movement of the former. In other respects the machine shown in Fig. 4 is the same as that shown in the preceding figures, excepting that the collars 10 and 11 are located at such distance apart and in such relation to the tappet 7 that the latter comes in contact with one or the other of said collars an instant before the piston completes its movement in one direction or the other, as the case may be.

The parts are so proportioned that a very slight movement of the piston, say one-half

inch, will suffice to impart a quick movement to the valves which will shift them. It will be understood that unless the valves are moved quickly they may become balanced with all of the ports open and this, of course, would stop the operation of the machine.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a piston, a cylinder having at each end two oppositely located ports, one for the induction and the other for the eduction of the fluid, a valve for each of said ports, a pair of valve-stems one rigidly connecting the valves at one end of the cylinder and the other rigidly connecting the valves at the other end of the cylinder, a walking beam to which the valve stems are connected upon opposite sides of its center, and suitable connections between the piston and walking beam whereby the latter is operated, substantially as set forth.

2. The combination with a cylinder having suitable ports, a piston, and valves for controlling said ports, of a walking beam, means connecting said beam with the valves, a weight capable of a limited movement relatively to the beam and adapted to engage it during its falling movement, and connections between the weight and piston whereby movement is transmitted from the piston to the weight and said weight set in position to fall by gravity and operate upon the beam, substantially as set forth.

3. The combination of a cylinder, an induction chamber having two ports communicating with the cylinder, and an eduction chamber having two ports communicating with the cylinder, valves for controlling said ports, a pair of valve stems each extending directly from one induction valve to one eduction valve and connecting them, a walking beam to which said stems are connected, a lever capable of a limited movement independent of the beam, a weight on said lever, and means operated by the piston for moving said weight past the center of movement of the lever, the lever being adapted to engage the walking beam during the falling movement of the weight, substantially as set forth.

4. The combination of a cylinder, an induction chamber having two ports communicating directly with the cylinder, an eduction chamber having two ports communicating directly with the cylinder, the ports of the induction chamber being located opposite the ports of the eduction chamber, valves for controlling said ports, a pair of valve-stems passing through said ports and through the cylinder and each rigidly connecting one eduction valve with one induction valve, a walking beam to which said stems are connected, and connections between the piston and beam whereby the movement of the piston is transmitted to the beam, substantially as set forth.

5. The combination of a cylinder, an induction chamber having two ports communicating with opposite ends of the cylinder, an eduction chamber having two ports communicating with opposite ends of the cylinder, valves controlling said ports, a pair of valve-stems each rigidly connecting one induction with one eduction valve, a single walking beam to which said valve-stems are connected on opposite sides of its center of movement, and connections between the piston and beam whereby the movement of the piston is transmitted to the beam, the parts being so constructed and arranged that at each oscillation of the beam the induction port at one end of the cylinder and the eduction port at the other end of the cylinder are open, and the other ports closed, substantially as set forth.

6. The combination with a cylinder having suitable ports, a piston, and valves for controlling said ports, of a walking beam, a shaft upon which it is adapted to oscillate, a weighted lever secured to said shaft, shoulders formed upon the walking beam and adapted to be engaged by said lever, said shoulders being sufficient distance apart to permit a limited movement of the lever independently of the beam, and connections between said shaft and the piston, substantially as set forth.

7. The combination with a cylinder having suitable ports, a piston, and valves for controlling said ports, of a walking beam, a shaft upon which it is adapted to oscillate, a weighted lever secured to said shaft, shoulders formed upon the beam and adapted to be engaged by said lever, said shoulders being sufficient distance apart to permit a limited movement of the lever independently of the beam, an endwise movable rod, connections between said rod and shaft, and a tappet carried by the piston-rod and adapted to operate the endwise movable rod aforesaid, substantially as set forth.

8. The combination with a cylinder having suitable ports, a piston, and valves for controlling said ports, of a walking beam, connections between said beam and valves, a shaft upon which said beam is adapted to oscillate, a weighted lever fixed to said shaft, shoulders carried by the beam and adapted to be engaged by the lever, said shoulders being sufficient distance apart to permit a limited movement of the lever independently of the beam, an arm rigid with said shaft, an endwise movable rod, an arm carried thereby, a link pivotally connecting the two arms aforesaid, and a tappet carried by the piston-rod and adapted to engage and operate the endwise movable rod aforesaid, substantially as set forth.

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