

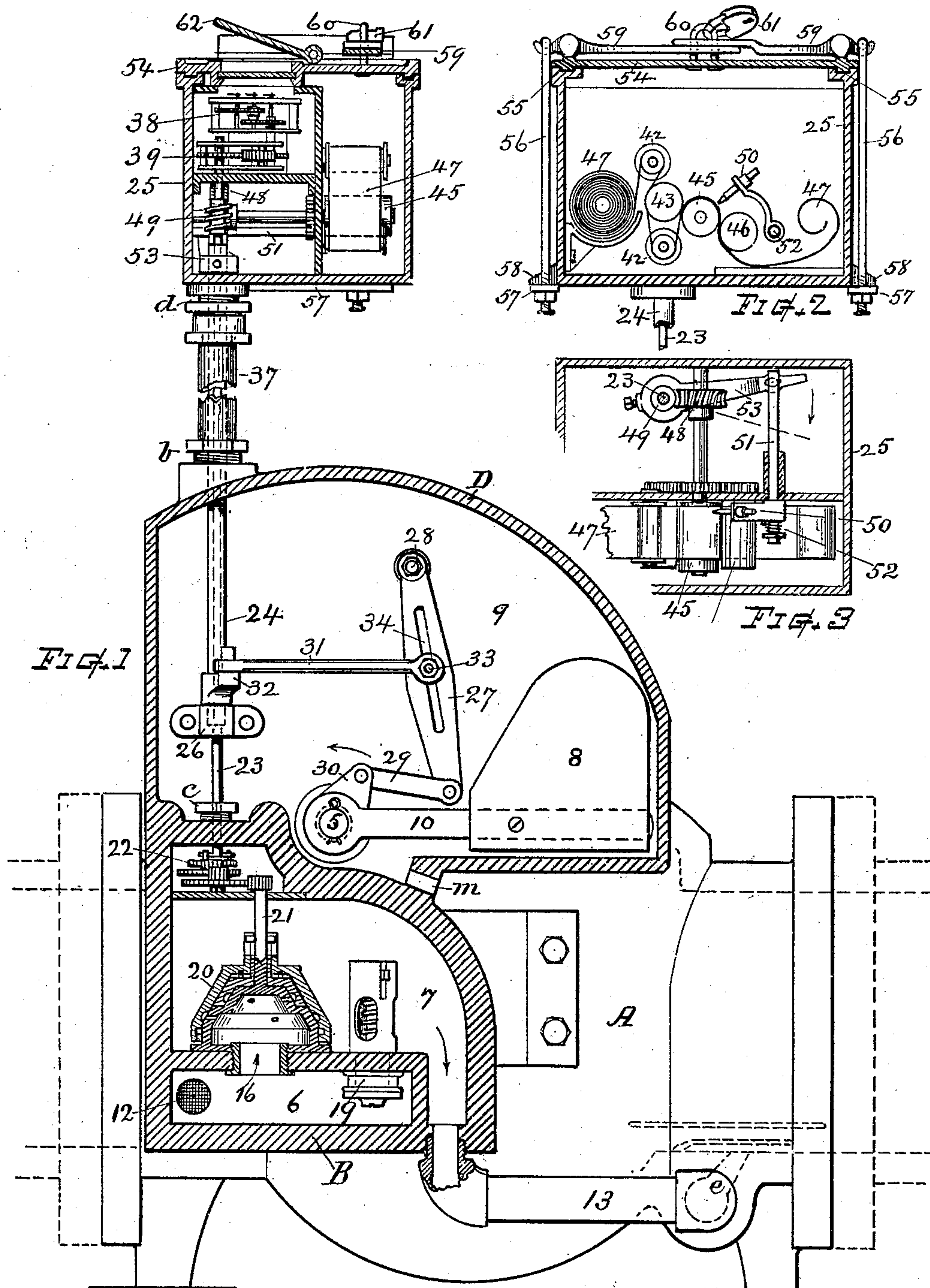
No. 842,947.

PATENTED FEB. 5, 1907.

H. A. DESPER.
LEAK DETECTOR AND METERING MECHANISM.

APPLICATION FILED OCT. 12, 1904.

2 SHEETS—SHEET 1.



Witnesses.

Charles S. Bacon
Fred N. Flynn

Inventor.

Henry A. Desper
By Charles S. Bacon
Attorney

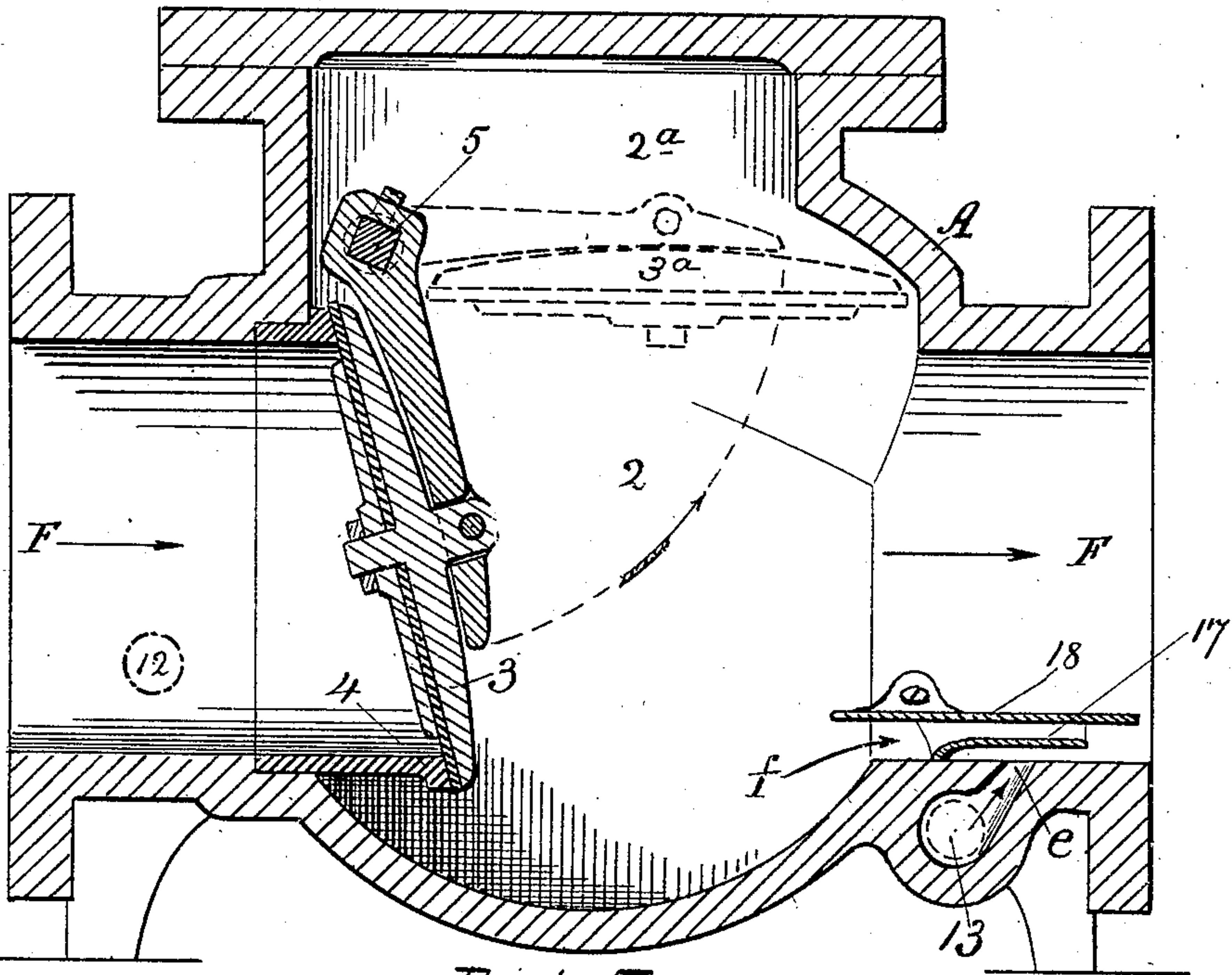
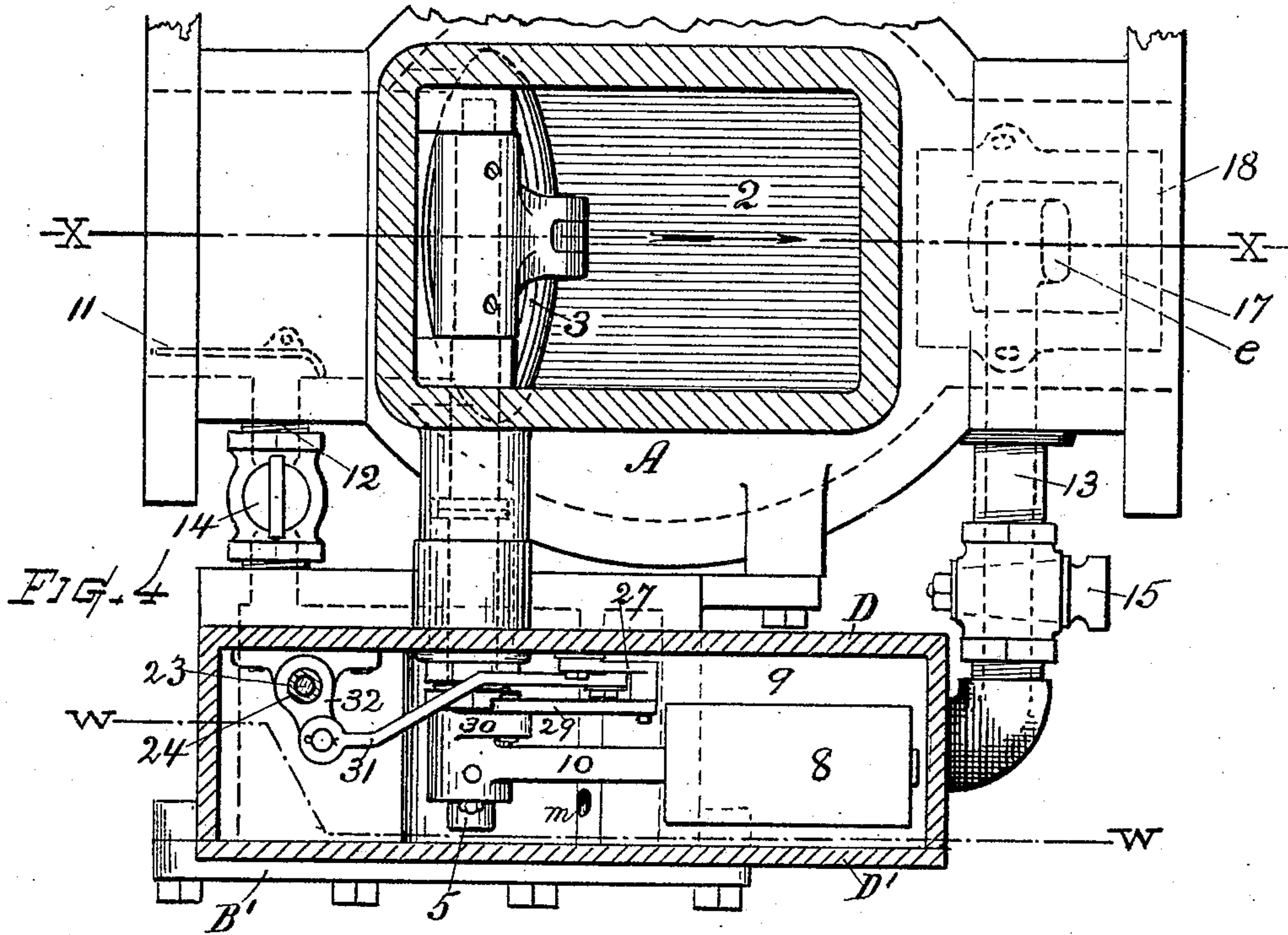
No. 842,947.

PATENTED FEB. 5, 1907.

H. A. DESPER.
LEAK DETECTOR AND METERING MECHANISM.

APPLICATION FILED OCT. 12, 1904.

2 SHEETS—SHEET 2.



WITNESSES.
Charles A. Bacon
Fred N. Flinn

FIG. 5.

INVENTOR.
Henry A. Desper
By Charles H. Burleigh
Attorney

UNITED STATES PATENT OFFICE.

HENRY A. DESPER, OF WORCESTER, MASSACHUSETTS.

LEAK-DETECTOR AND METERING MECHANISM.

No. 842,947.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed October 12, 1904. Serial No. 228,119.

To all whom it may concern:

Be it known that I, HENRY A. DESPER, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Leak - Detector and Metering Mechanism, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

The prime object of this invention is to provide a practically efficient means for detecting and indicating any consumption of flow of water, due to leakage or otherwise, that may occur in a fire service-pipe employed in a building or situation where it is intended or stipulated that such pipe is to be used for fire service only, also to afford means for the purpose named that will approximately indicate and record the flow through the service-pipe without obstructing the free flowage to the full capacity of the pipe in case of fire demands. I attain these objects by mechanism the nature and operation of which is illustrated in the accompanying two sheets of drawings, the particular features of invention and subject-matter claimed being hereinafter definitely set forth.

In the drawings, Figure 1 represents a sectional elevation view of mechanism embodying my invention. The section is taken approximately at the position of line W W on Fig. 4. Fig. 2 represents a longitudinal vertical section of the register - case, showing an arrangement of register and recording mechanisms and means for closure of the casing. Fig. 3 is a sectional plan view illustrating devices for actuating the record-strip and marker. Fig. 4 represents a plan view of the body-casing partly in section, the automatic valve, its counterweight, and accompanying mechanism as connected for use; and Fig. 5 is a vertical longitudinal section of the body-casting, including the main waterway, valve-chamber, and valve at line X X on Fig. 4 with dotted lines indicating the position of the valve when fully opened.

Referring to the drawings, A indicates a shell or body casting containing the valve-chamber 2, forming a part of the main waterway F F of the service-pipe and having suitable hubs or flanges for connection with the line of piping.

3 indicates a swinging valve arranged within the chamber 2 and hingedly supported by a rockable shaft 5 to close down upon an inclined seat 4 and to swing up into the upper extension 2^a of the chamber, as indicated at 3^a on Fig. 5. The valve opens automatically in the direction of the flow, which is indicated by arrows on Figs. 4 and 5. When resting against its seat 4, the valve 3 completely closes the main waterway F F or fire-service-pipe passage. Combined with this body-section I provide a by-pass casing B, containing an inclosed water-space comprising inlet and outlet compartments 6 and 7, separated by a partition having an opening therethrough. The front plate B' of said casing is removable for access to the interior mechanism. The casing is surmounted by a housing D, inclosing a dry compartment 9, into which the end of the rockable valve-shaft 5 extends. Suitable bearings and stuffing-box devices are provided for said shaft where it passes from the valve-chamber 2 into the dry chamber 9. Attached to the shaft 5 there is an arm 10, carrying a weight 8, that serves to yieldably close the valve 3 against its seat. The arm is preferably disposed to stand about horizontal when the valve is closed and to swing upward as the valve opens. The greater mass of the weight is best disposed above the horizontal alinement, so that as the arm moves upward toward the vertical the effective counteraction of the weight in respect to the valve will decrease, the greatest efficiency of the weight and leverage being exerted when the valve is at or near its closed position.

The supplemental water-chamber is connected with the main waterway or body A by a conduit 12 from the inflow end to the inlet-compartment 6 and by a second conduit 13 from the outlet-compartment 7 to the outflow end, thus forming a by-pass for a current of water around the valve 3 and through the inclosed water-space. These conduits are preferably provided with stop-cocks 14 and 15, but may be employed without such cocks, if in any instance so desired.

Within the by-pass chamber is arranged a turbine, motor, or whirler 20, disposed over an opening 16 in the horizontal partition that separates the inlet-compartment from the outlet-compartment. The spindle 21 of said turbine connects, by a suitable train of

speed-reducing gearing at 22, with a shaft 23, that extends to and actuates the registering mechanism, which is hereinafter described.

The turbine in the present instance comprises a rotatable internally-bucketed conoid overlying a stationary conoidal shell, into and through small openings in which the water is directed to impinge against the interior of said rotatable conoid and finding exit beneath the lower edge thereof.

The turbine 20 is rotated only by forward flow through the by-pass. Any backward flowage causes the turbine to depress against its conical seat, and thereby resist rotative action.

Other suitable form of turbine or motor may be used in lieu of the special form herein shown as an element of the combination when desired.

Within the by-pass chamber and controlling an opening in the dividing-partition I preferably provide an automatic backwardly-yieldable check or relief valve 19, the purpose of which is to relieve, in case of reverse flow or water-hammer, any excessive pressure or effect upon the turbine 20. In some instances such check-valve may be omitted.

Within the main waterway F, adjacent to the entrance of the conduit 12, there is preferably provided a deflector or thin plate 11, extending over its mouth or inlet-opening and adapted for diverting a portion of the flow from the main service into said conduit. This is best arranged at the side of the main waterway to avoid catching any sand or heavy sediment that might trail along the bottom of the service-pipe.

The exit of the conduit 13 into the main service is preferably arranged as indicated by dotted lines on Fig. 4 and full lines in Fig. 5. A directing-plate 17 extends over the exit-opening *e* adjacent thereto, but with a space which is closed at its upper end. A second plate 18, overlying and of longer dimension, is disposed at a short distance from the first and serves to direct a portion of any water-current which may flow along the bottom of the main channel at *f*, causing it to pass the edge of the directing-plate 17 in a manner for inducing an ejective flow from the conduit-exit, thus rendering the action effective with but a slight flowage through the main valve-opening, which naturally delivers the current along the bottom of the chamber.

The register driving shaft 23 is surrounded by a tubular shaft 24, that extends from within the weight-housing chamber 9 to the register-box 25. Said tubular shaft is supported at its lower end by a suitable bearing 26, and means is provided for partially rotating the tube with the movement of the valve-shaft and weight. For this purpose there is shown in the present instance a

swinging lever 27, fulcrumed at its upper end to the housing at 28 and having its lower end connected by a link 29 with a crank member 30, attached to the hub of the arm 10 or working with the valve-shaft. A connecting-rod 31 is pivoted at one end to the intermediate part of the swing-lever and has its other end jointed to an arm 32, fixed on the tubular shaft 24. The pivoting-joint at 33 may be at a fixed position on the lever or it may be made adjustable along the lever, as by a slot or guide 34 with the pivot-stud movable therein, so that the extent of movement of the connection can be varied as desired.

The opening where the shaft passes through the casing at *c* is provided with a suitable stuffing-box or packing to make a water-tight joint, and suitable bearings for the support of the shafts are provided at *b* and *d*.

The register-box 25 comprises a closable casing having a removable cover and means whereby the casing is secured to a tube or standard 37, that incloses the operating-shafts and supports the register-casing in connection with the housing B. The standard and shafts may be of any desired length to suit the situation where the apparatus is used, so that the register mechanism will be convenient for access, while the valve connections and apparatus may be disposed within a pit or well. Within the casing there is a register mechanism 38, which may be of any well-known kind, such as employed for meters. Said register is operated by the shaft 23 and a suitable train of connecting-gearing at 39. There is also provided a series of feed-rolls 43, 45, and 46, adapted for supporting and advancing a ribbon or strip of paper 47. Said feed-rolls are operated by means of a worm-gear 48 and a worm-screw 49, mounted on the register-driving shaft 23. (See Figs. 1 and 3.)

A flanged guide roll or rolls 42 serves to keep the paper in proper alinement as it runs over the feed-rolls. A pencil device or marker 50, connected to reciprocating rod 51, is arranged to act in conjunction with the face of one of the rolls 45 and provided with a spring or means 52 for pressing its point against the paper passing over said roll. An arm or member 53, attached to the upper end of the tubular shaft 24, connects with or engages the marker-rod in a manner to move the marker in accord with the movement of the tubular shaft, which is moved by the valve 3 and intermediate connecting parts.

The cover 54 of the register-case is seated upon a packing-gasket 55, fitted in a groove at the top edge of the walls. For securing said cover in place I provide yokes 56, having spring foot-bars 57, that engage with lugs 58 on the exterior of the case. Combined with these yokes are hooked levers 59, that ful-

crum upon the top of the cover and have inwardly-extended slotted arms which are brought down over a loop or staple 60, fixed in the cover, and are there secured by a key 61 or padlock passed through the staple above the levers, thus affording a tight and secure closure for the casing. A hinged lid 62 over a glazed opening is provided for viewing the dial of the register without unlocking the main cover, but the recording devices are best inclosed within their compartment inaccessible without removing the main cover, being thus protected by the locking devices so that they cannot be tampered with by unauthorized persons.

In practice this apparatus is connected with the fire service-pipe at any desired location and may be placed in the ground and protected from frost in suitable manner, the register mechanism in its water-tight case being disposed just below the surface of the ground or at a position readily accessible.

The operation is as follows: So long as there is no draft from the service-pipe the valve 3 remains closed and the operative mechanism stands idle; but in case of a leakage or the drawing of water from the service-pipe then the flow of water through the by-pass way effects rotation of the turbine and the operation of the register mechanism. So long as the draft-pressure is so small as to be within the resistance of the weight the valve 3 remains closed and the flow is wholly through the turbine and simply operates the register and record-strip, the marker showing a straight line on the edge of the paper. When the draft is sufficient to cause the valve 3 to open, the weight is lifted and the connections from the shaft 5 cause a movement of the tubular shaft 24 and its arm 32, causing the marker 50 to travel across the paper to a greater or less extent, according to the degree to which the valve opens, thereby in addition to the register showing a record of the amount to which the valve is opened and the approximate limit of any period during which such action occurs, thus affording a ready detector for any leakage or surreptitious taking of water from the fire service-pipe. The register indicates the number of cubic feet or other predetermined units of water passing through the turbine, while the position of the mark on the record-strip indicates the relative proportion which such cubic foot or unit bears to the entire volume of water passing through the service-pipe at any period, the longitudinal dimension of the mark indicating the duration of the period that the valve is open or the flowage occurring.

In the event of fire demands the valve readily swings up, as per dotted lines, Fig. 5, and allows the full capacity of the pipes to flow through without any obstruction to its free passage.

This apparatus is not designed to meter water accurately, but to show within a fair degree the nature and extent of any flowage through the service-pipe, whether in a very small stream or, as in case of a fire-supply, to the full capacity of the pipe to which it is attached. It obviates the objection to the use of a regular water-meter on a fire service-pipe, inasmuch as it is not liable to break down when extra duty is put on the service, and it offers no obstruction to the flow, even though the registering mechanism should fail to operate.

What I claim as of my invention, and desire to secure by Letters Patent, is—

1. In combination with a service-pipe, a stop-valve closing in opposition to the flow, a shaft for said valve, a counterweight connected therewith for normally closing said valve, a supplemental chamber with inlet and outlet conduits connected as a by-pass around the valve, a turbine or whirler arranged in said chamber, registering mechanism and paper-feeding mechanism operated by said turbine, a marker cooperating with the paper-feed mechanism, and means for moving said marker actuated from the valve-shaft.

2. In combination, the body-casting having an interior valve-chamber forming a part of the service-pipe, a valve-seat and swinging valve within said chamber, a rockable shaft carrying said valve, a supplemental casing comprising water-pressure chambers and a weight-housing, inlet and outlet conduits for said water-pressure chamber, a turbine or whirler therein, register mechanism comprising a unit-indicating train, a record-strip feed and a recording-marker, dual shafts for operating said register-train and record-marker, connecting-gearing from the turbine-spindle to said register-operating shaft, and means connected with the valve-shaft for actuating the record-marker shaft.

3. In a detector and meter mechanism for fire service-pipes, the combination with the service-pipe, of means for automatically yieldably resisting the flow or current of water therethrough, a by-pass way, a register-operating motor therein, means for registering units of water passing said motor, a record-strip and record-strip-feed devices operated in conjunction with the unit-registering means, a record-marker, and means for actuating said marker deriving motion from said current-resisting means.

4. In apparatus of the character described, the combination, with the main waterway, the valve arranged therein, the by-pass comprising a partition-divided chamber with inflow and outflow compartments, and a turbine-motor arranged in said chamber; of a backwardly-yieldable relief-valve disposed between said compartments, for the purpose set forth.

5. In combination, with unit-registering mechanism, its driving-gearing, operating-shaft and motor therefor; of a series of feed-rolls adapted for advancing a ribbon or strip of paper, a worm-screw carried upon the register-operating shaft, gearing for operating said feed-rolls therefrom, an independently-actuated marker device, its point impinging against one of the feed-rolls, a tubular shaft provided with means for reciprocating said marker, and an inclosing case for said registering and paper-feeding mechanisms, provided with a water-tight closure.

6. In apparatus of the character described, the combination, with the main waterway, a main valve therefor, means tending to close said valve; a registering mechanism, suitable driving-gearing and an operating-shaft therefor, and a motor for rotating said register-operating shaft, of a separately-actuated means in conjunction with said registering mechanism for indicating the position and movements of said main valve.

7. In an apparatus for the purpose specified, in combination with the main service waterway, the supplemental by-pass chamber, the register-actuating turbine therein, and the outlet-conduit therefrom; a guard-plate disposed within said main waterway over the exit-opening of said conduit, and a second guard or directing plate of larger dimension disposed near to and overlying said first guard-plate, substantially as and for the purpose set forth.

8. In apparatus for the purpose specified, the combination with the main waterway, its backwardly-closing main valve, a position-recording marker controlled from said main valve, the by-pass waterway, a registering mechanism operating in connection therewith, and a record-strip carrier coacting with said registering mechanism and marker; of a forwardly-operative backwardly non-operative motor arranged in a chamber on the by-pass and having means for transmitting motion from said motor to the drive-shaft of said registering mechanism.

9. In apparatus for the purpose specified,

in combination, a main waterway, a main valve therein, means for automatically closing said main valve, means actuated by said main valve for indicating the position or movement of said valve, a by-pass for a portion of current diverted from the main waterway, a meter-registering mechanism arranged in conjunction with said position-indicating means, and a motor disposed in the by-pass for operating said meter-registering mechanism by the diverted current, said motor comprising a movable member elevatable from the inlet-port seat, for action of the motor by the forward flow therethrough, and depressible onto said seat rendering the motor self-locking or resistant to action by reverse flow of water in the by-pass way.

10. An apparatus of the character described, comprising a body-casing having therethrough a direct main waterway with an enlarged removably-capped interior chamber, to accommodate a valve openable out of line from the direct course of the waterway, an inward-projecting valve-seat coincident with said waterway at the inlet side, a valve-hinging shaft across said chamber, a main valve supported by said shaft and closable on said valve-seat, means for automatically resisting opening pressure against said valve, a supplementary waterway for diverting a portion of the current from the main waterway, a position-indicating means connected with the valve-hinging shaft and controlled by movement of the main valve, meter-registering mechanism coacting with said position-indicating means, a meter-operating motor disposed in said supplementary waterway and controlled by a current diverted from the main waterway, and suitable connections for actuating the meter-registering mechanism from said motor.

Witness my hand this 10th day of October, 1904.

HENRY A. DESPER.

Witnesses:

CHAS. H. BURLEIGH,
ELLA P. BLENUS.