

WATER METER.

1,001,578.

3 SHEETS-SHEET 1.

Fig. 2.

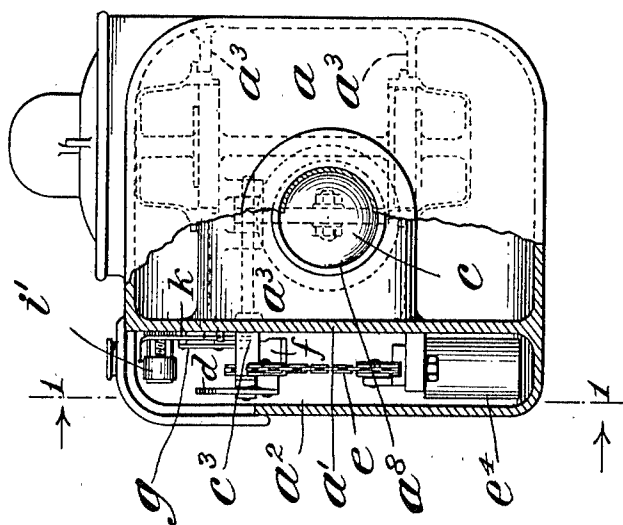
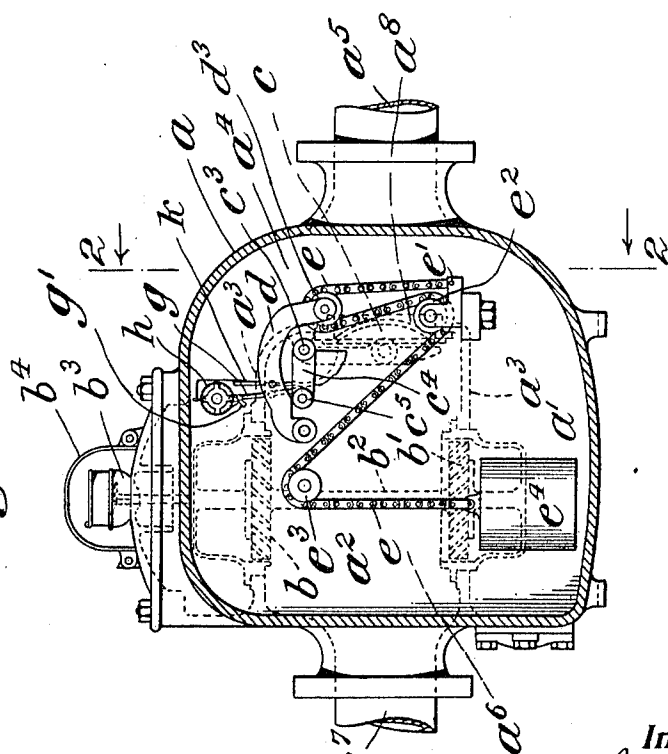


Fig. 1.



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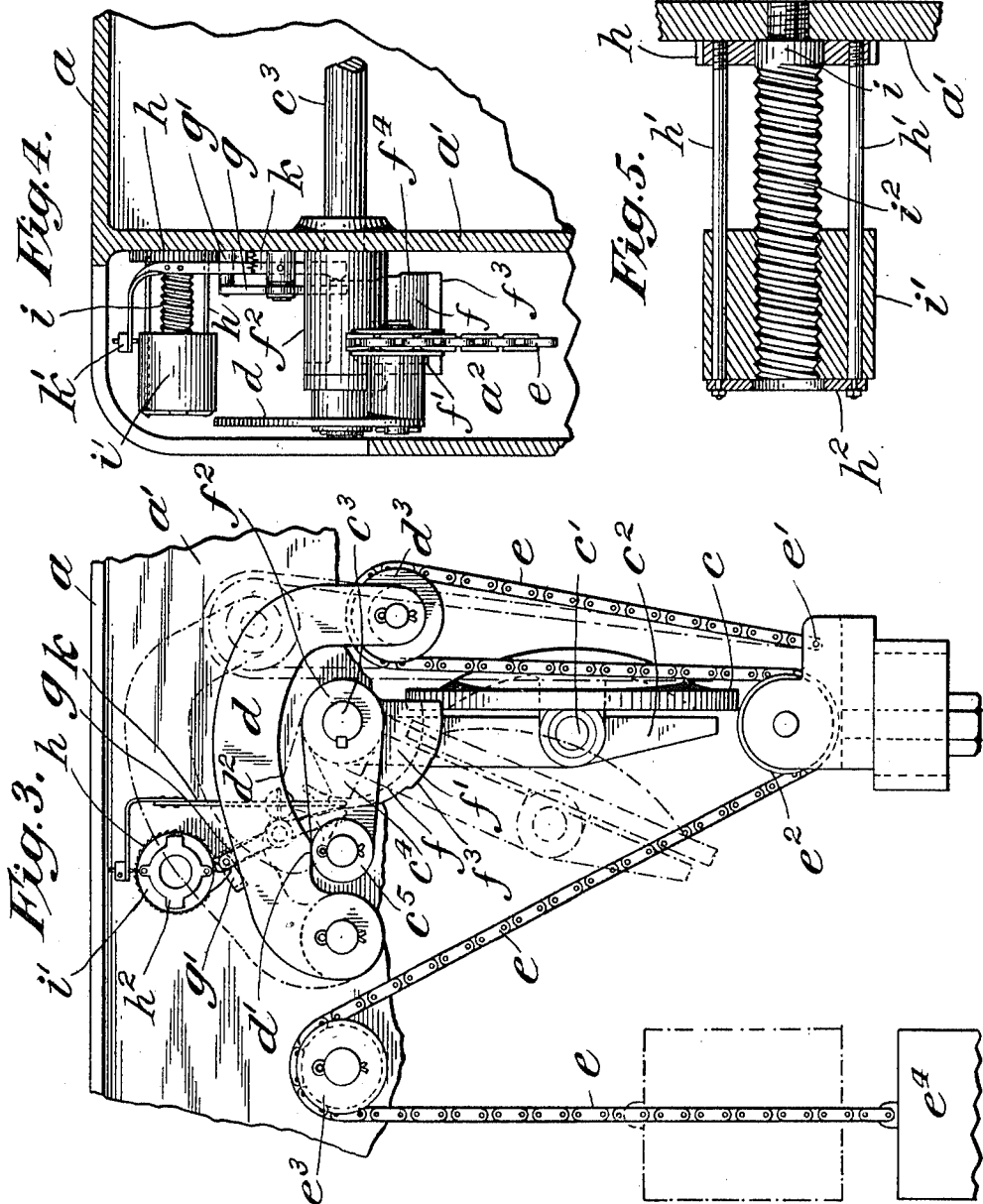
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WATER METER.
APPLICATION FILED MAR. 11, 1910.

1,001,578.

Patented Aug. 22, 1911.

3 SHEETS—SHEET 2.



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3 SHEETS-SHEET 3.

Fig. 6.

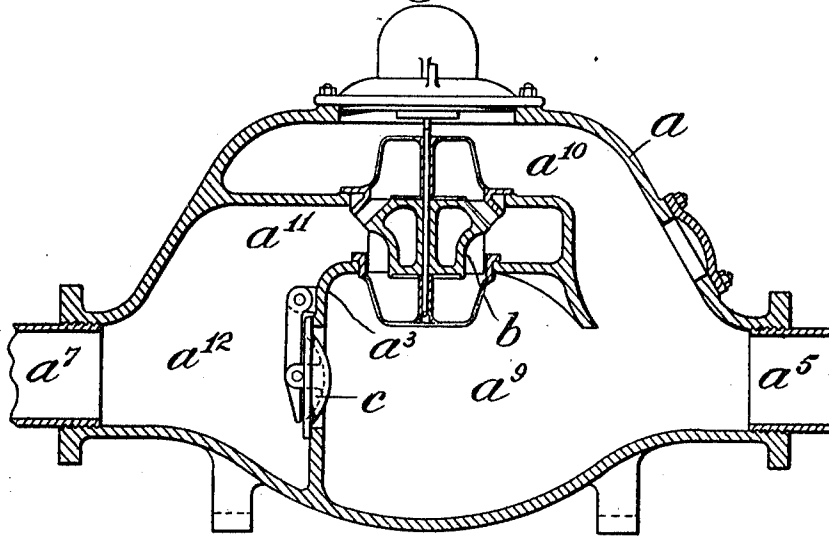
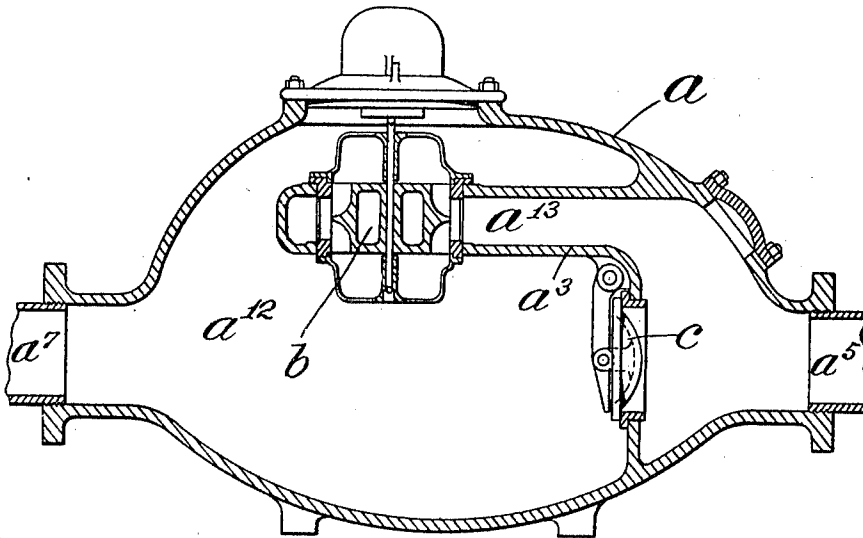


Fig. 7.



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UNITED STATES PATENT OFFICE.

JAMES M. BURTON, OF LONG ISLAND CITY, NEW YORK, ASSIGNOR TO NEPTUNE METER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

WATER-METER.

1,001,578.

Specification of Letters Patent. Patented Aug. 22, 1911.

Application filed March 11, 1910. Serial No. 548,524.

To all whom it may concern:

Be it known that I, JAMES M. BURTON, a citizen of the United States, residing in Long Island City, in the borough of Queens of the city of New York, in the State of New York, have invented certain new and useful Improvements in Water-Meters, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to the construction of meters designed especially for use where the ordinary flow for consumption is to be metered while an extraordinary flow, as when the water is used for fire purposes, is permitted automatically without metering and without loss of head. Such metering devices are provided ordinarily with multiple conduits, in one of which is placed the measuring device through which the normal flow of water takes place, while the other conduit is normally closed but opens automatically to permit a free flow of water in case of an extraordinary demand, as for fire service. Meters of this character have been criticized by water department officials because of the frequency with which, under practical conditions of use, more or less flow through the fire service conduit takes place without any indication thereof, and by fire underwriters because of the frequency with which, also under practical conditions of use, the conduit for fire service becomes clogged or obstructed so that there is abnormal loss of head, while in all of such devices, so far as known, there has been hitherto some loss of head due to certain features of construction. Not only have devices of this character, as heretofore offered to the public, suffered from the faults of construction above alluded to by which there is at best more or less diminution of head when the fire conduit is open, and by which there is introduced an element of uncertainty as to the indication of the opening of the fire service conduit, but the construction has been highly complicated, involving many joints and a corresponding number of gaskets and bolts, and there has been formed invariably a dead end in which sand and other foreign matter accumulates to such an extent as sometimes to obstruct seriously the fire conduit when it should permit a free flow, while the existence of such dead end and therefore the existence of a body of still water favors ac-

cumulation and the growth of barnacles or similar subaqueous growth, which always brings about a serious loss of head, while sometimes it prevents the proper opening of the fire service valve.

It is the object of this invention to produce a meter or metering device of the character referred to which shall be free from the defects above alluded to, and especially shall be very compact and easily capable of embodiment in a single structure, that is, within a single shell or casing, shall consist of a minimum number of parts avoiding a multiplicity of joints and a corresponding multiplicity of gaskets and bolts, shall have no dead end for the accumulation of sand and other foreign matter, shall permit a straight and unobstructed flow when the fire valve is open without any loss of head, and shall indicate with certainty both the number of openings of the fire service valve and the extent of each opening.

The invention will be more fully explained hereinafter with reference to the accompanying drawings in which it is illustrated and in which—

Figure 1 is a view partly in elevation and partly in vertical section through the mechanism chamber on the plane indicated by the line 1—1 of Fig. 2, looking in the direction of the arrows. Fig. 2 is a view partly in elevation and partly broken out and in section on the plane indicated by the line 2—2 of Fig. 1. Fig. 3 is a detail view in side elevation of parts of the mechanism shown in Fig. 1 but on a larger scale. Fig. 4 is a detail view in elevation of some of the parts shown in Fig. 3. Fig. 5 is a detail view on a still larger scale of the means for supporting and effecting the movement of the recording drum. Figs. 6 and 7 are views in longitudinal section illustrating modifications in the arrangement of the fire valve with respect to the metering device.

Referring first to the construction illustrated in Figs. 1—5, it will be seen that the shell or casing *a*, which receives and supports all of the working parts, is divided by a vertical partition *a'* to form at one side thereof a chamber *a''* in which are located the mechanical devices directly concerned with the movement of the fire valve and with the recording of such movement, the compartment on the other side of the partition *a'* being further divided by a wall *a'''* to form an inlet

compartment a^4 which communicates with the inlet a^3 , and an outlet compartment a^6 which communicates with the outlet a^7 . In the vertical part of the wall a^3 and in line with the inlet a^5 and the outlet a^7 is formed a fire port a^8 , the area of which is at least equal to the area in cross section of the inlet a^5 and of the outlet a^7 , so that when the fire port is open there is no loss of head through restriction of the conduit through which the water then flows.

In the horizontal parts of the wall a^3 are located the register meter wheels, preferably turbine wheels b and b' rotated by the passage of the water and mounted upon a vertical shaft b^2 which is operatively connected at its upper end with the usual register mechanism b^3 . The latter may be mounted on the top of the shell or casing a and provided with a removable cover b^4 , as usual. The fire port a^8 being normally closed, all of the ordinary flow passes through the metering device and the volume thereof is registered as usual by the register b^3 .

It will be observed that there is in advance of the fire port a^8 no dead end or chamber in which sand or other foreign matter may accumulate or in which the water may remain quiet so as to favor corrosion or subaqueous growth. The fire port, moreover, is elevated above the bottom of the shell or casing a , so that such foreign matter as may be brought into the shell or casing immediately drops below the line of the fireport a^8 and across the face of the nary flow through the metering devices there is a constant movement of water across the fireport a^8 and across the face of the valve, which closes it, so that there is no possibility of clogging or restricting the fire port through accumulation of foreign matter or attachment of forms of subaqueous growth. All such foreign matter as may be introduced into the shell or casing falls, as stated, into the lower part of the shell or casing, where it is out of the way and cannot in any manner interfere with the free flow of water through the fire port.

The fireport a^8 is closed normally by a valve c , which is preferably swiveled, as at c' , upon its supporting arm c^2 , so that it shall seat itself tightly against the edge of the port a^8 when it closes. The supporting arm c^2 is fixed upon a shaft c^3 which is mounted in suitable bearings and within the compartment a^2 is provided with an arm c^4 which carries at its extremity a roller c^5 . Also pivotally mounted in the compartment a^2 is a cam arm or lever d having on its underside a short dwell d' which is at right angles to the initial line of movement of the roller c^5 , with which it coöperates, and a long curved cam surface d^2 with which the roller c^5 coöperates after its movement has started.

In the free end of the arm d is a sheave d^3 . A chain e , having one end secured to a fixed point, as at e' , passes over the sheave d^3 on the end of the arm d , thence under a sheave e^3 mounted on a fixed axis preferably below the line of the lower edge or limb of the fire port a^8 , and thence over a sheave e^3 mounted on a fixed axis preferably above the line of the upper edge or limb of the fire port a^8 , the chain having attached at its free end a weight e^4 . It will be observed that when the valve c is in its closed position, as shown by full lines in Fig. 3, the weight e^4 acts through the chain e and the lever arm d with its maximum power to hold the valve closed, the short dwell e' on the underside of the cam arm or lever d then resting upon the roller c^5 just above its center. It will also be seen that just as soon as the valve c has opened slightly, under an increased pressure differential brought about by a greater demand on the outlet a^7 , the roller c^5 passes beyond the point which separates the dwell d' from the curved or inclined cam surface d^2 , as shown by dotted lines in Fig. 3, so that the effective resistance offered by the weight e^4 to the continued movement of the valve c is greatly reduced. Therefore, the weight itself being selected with reference to the initial pressure differential which is required to open the fire valve, the valve will be held securely closed until such pressure differential is developed and will then open quickly and freely.

Recording devices are provided whereby a record is made each time that the fire valve opens and the extent of each opening is also recorded. The recording mechanism will now be described. On the shaft c^3 , in the compartment a^2 , is mounted a double cam f , consisting of a flange secured to the shaft through the medium of a web f' and a hub f^2 , the outer surface f^3 of the flange having a cam formation while the edge or end f^4 also has a cam formation.

The cam f^3 coöperates with a cam lever g which carries at its free end a pawl g' . The weight of the pawl g' sufficiently overbalances the lever g so that its lower end always presses against the cam f^3 and so that the pawl end swings back after it has been swung forward and released. The pawl g' engages a ratchet wheel h which is mounted for rotation on a stud i mounted in the wall a^1 . The ratchet wheel h has fixed therein studs h' , the outer ends of which are held in proper relative position by a plate h^2 . On the studs h' is mounted a recording drum i' which is adapted to move freely, in a longitudinal direction, on the studs h' , and is threaded internally to engage the threaded portion i^2 of the stud i . By this means, as will be understood, the recording drum i' is rotated and at the same

time receives a slow longitudinal movement. The edge cam f^4 coöperates with a spring pressed lever k which carries at its upper end a stylus k' , adapted to coöperate with the drum i' or with the record sheet temporarily secured thereto.

As will be understood, the longitudinal displacement, with respect to the axis of the drum i' , of the mark made by the stylus k' corresponds to the extent of movement of the cam f^4 and therefore to the degree of opening of the fire valve c . The drum itself receives both a rotary and a longitudinal movement at each opening of the fire valve, so that a fresh surface is presented to the stylus at each opening. Therefore, the drum, which will be readily observable through the top of the casing a , when the cover plate is removed, shows instantly and positively both the number of times the fire valve has opened since the last inspection and the extent of each opening.

It will be understood, of course, that various changes in details of construction and arrangement, not only with regard to the recording mechanism, but with regard to other features of the invention might be made to meet the requirements of different conditions of use without departing from the spirit of the invention. Figs. 6 and 7 of the drawings, illustrate, for example, changes which may be made in the relative arrangement of the fire valve, metering device, the main conduit in which is located the fire valve and the by-pass conduit in which is located the metering device. In each of these figures the shell a is shown as of a shape suited to the internal arrangements. In both figures the fire valve c is shown as in line between the inlet a^5 and the outlet a^7 and as having an area equal to that of the inlet or of the outlet. It is also shown as located in a vertical part of the wall a^3 and at some distance above the bottom of the shell a so that there is formed on each side of the fire valve a pocket to receive whatever sand or other foreign matter may be brought into the shell, without permitting it in any manner to interfere with the opening of the fire valve. In both figures, as will also be seen, the face of the fire valve and the vertical wall in which it is located is constantly washed by the inflowing water and there is no dead end in which the water is permitted to rest, to favor either the accumulation of foreign matter or the formation of subaqueous growths or corrosion of the metal. In Fig. 6 the fire valve is shown as nearer the outlet a^7 while the metering device b is shown as adapted to receive water from below through the main inlet chamber a^9 and from above through a conduit a^{10} and to discharge the same through a conduit a^{11} and the outlet chamber a^{12} . In Fig. 7 the metering device b is shown as adapted

to receive the water through a conduit a^{13} and to discharge the same above and below into the outlet chamber a^{12} . In both cases, as well as in the construction shown in Fig. 1, the face of the fire valve and the vertical wall in which it is located is constantly washed by the water which flows from the inlet to the metering device. Various other changes will readily suggest themselves.

So far as the construction shown and described herein is capable of being claimed only as a flow recorder as distinct from a meter, in accordance with the Patent Office classification of subject matter of invention, no claim therefor is made herein, but the right to make claims therefor in a separate application is reserved to the applicant.

I claim as my invention:

1. The combination of a shell or casing, a vertical wall dividing the interior of the shell or casing into an inlet chamber and an outlet chamber and having a port therein, a pivoted valve normally closing the port and adapted to be opened by an increase in the pressure differential, a by-pass conduit around the valve, a metering device in said conduit, recording mechanism and means whereby the recording mechanism is operated by the movement of the valve.
2. The combination of a shell or casing, a wall dividing the interior of the shell or casing into an inlet chamber and an outlet chamber and having a port therein, a valve normally closing the port and adapted to be opened by an increase in the pressure differential, a by-pass conduit around the valve, a metering device in said conduit, recording mechanism and means whereby the recording mechanism is operated by the movement of the valve, such recording mechanism comprising means whereby each opening of the valve is recorded and means whereby the extent of each opening of the valve is recorded.
3. A water meter comprising a plurality of conduits, a pivoted valve normally closing the main conduit and adapted to be opened by an increase in the pressure differential, a metering device located in the other conduit and recording mechanism operated by the opening of the valve in the main conduit, such recording mechanism comprising means whereby each opening of the valve is recorded and means whereby the extent of each opening of the valve is recorded.
4. A water meter comprising a shell or casing, a wall dividing the interior of the shell or casing into an inlet chamber and an outlet chamber and having a port therein, a valve normally closing said port and adapted to be opened by an increase in the pressure differential, a shaft supporting said valve, bearings for the shaft, a cam carried by said shaft, a support for a recording sur-

face, a stylus and means operated by said cam to shift the stylus to an extent corresponding to the extent of movement of the valve.

5 5. A water meter comprising a shell or casing, a wall dividing the interior of the shell or casing into an inlet chamber and an outlet chamber and having a port therein, a valve normally closing said port and adapted to
10 be opened by an increase in the pressure differential, a support for a movable recording surface, a movable stylus to cooperate therewith, means operated by the opening of the valve to shift the recording
15 surface and means operated by the opening of the valve to shift the stylus.

6. A water meter comprising a shell or casing, a wall dividing the interior of the shell or casing into an inlet chamber and
20 an outlet chamber and having a port therein, a valve normally closing said port and adapted to be opened by an increase in the pressure differential, a shaft supporting said valve, a support for a movable recording
25 surface, a movable stylus, a cam on said shaft and connections whereby the recording surface is moved at each opening of the valve and a second cam on said shaft and connections whereby the stylus is shifted
30 at each opening of the valve to an extent corresponding to the extent of opening of the valve.

7. The combination of a valve, a shaft supporting the valve, a recording drum, a
35 ratchet wheel, means operatively connecting

the same with the drum, a pawl lever, a cam on said shaft for operating said pawl lever, a stylus, a lever carrying the same, and a second cam on said shaft for operating the stylus lever.

8. The combination of a valve, a shaft supporting the same, a screw threaded stud, a recording drum mounted on said stud to rotate and to move longitudinally thereon, a ratchet wheel mounted loosely on said stud
40 and means operatively connecting the same with the recording drum to rotate the same and to permit longitudinal movement thereof, a pawl lever to cooperate with said ratchet wheel and a cam on said shaft to
45 operate said pawl lever.

9. The combination of a valve, a shaft supporting the same, a screw threaded stud, a recording drum mounted on said stud to rotate and to move longitudinally thereon, a ratchet wheel mounted loosely on said
50 stud and connected with the recording drum to rotate the same and to permit longitudinal movement thereof, a ratchet lever, to cooperate with said ratchet wheel, a cam
55 on said shaft to operate said ratchet lever, a stylus, a lever carrying the same, and a second cam on said shaft to operate the stylus lever.

This specification signed and witnessed this 10th day of March, A. D., 1910.

JAMES M. BURTON.

Signed in the presence of—

ELLA J. KRUGER,

AMBROSE L. O'SHEA.