

F. W. HANKS.  
 COMBINED WASTE DETECTOR AND WATER METER.  
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1,063,255.

Patented June 3, 1913.

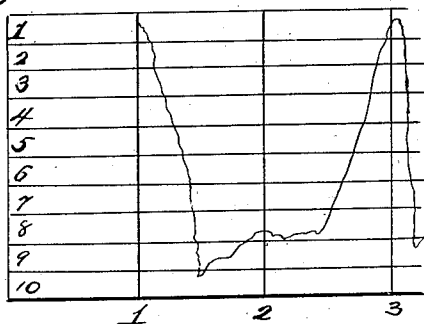


*Fig. 7*

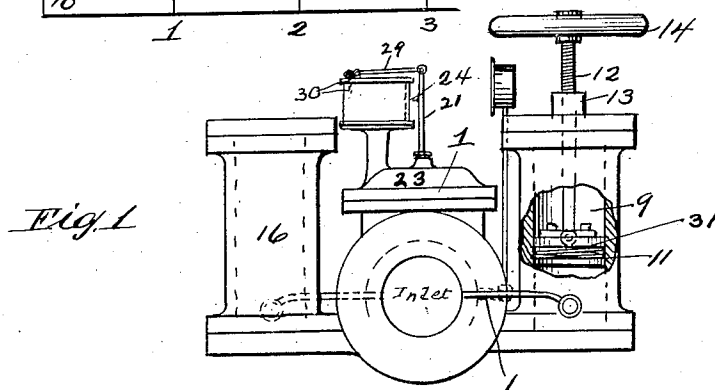


*Fig. 1*

*Fig. 6*

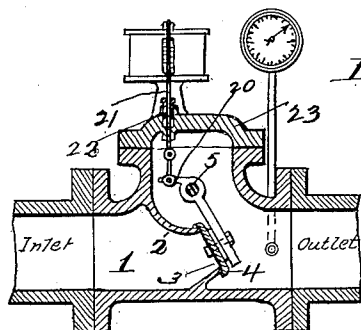
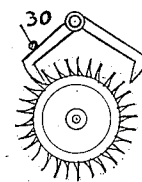


*Fig. 3*

*Fig. 4.*

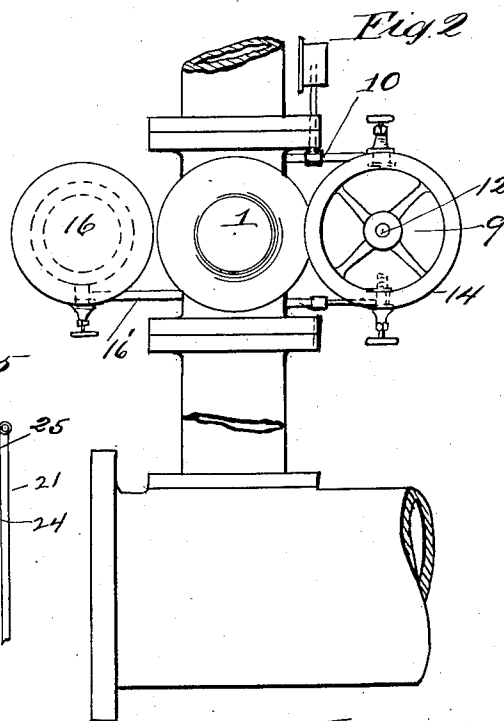
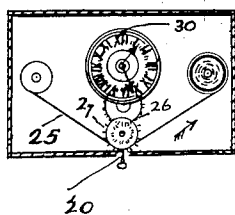
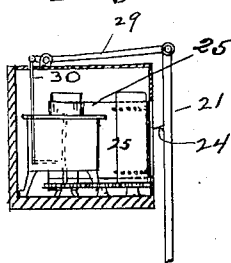


*Fig. 2*

*Fig. 5*



Witnesses  
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# UNITED STATES PATENT OFFICE.

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COMBINED WASTE-DETECTOR AND WATER-METER.

1,063,255.

Specification of Letters Patent.

Patented June 3, 1913.

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*To all whom it may concern:*

Be it known that I, FREDERICK W. HANKS, a citizen of the United States, and resident of Cleveland, county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Combined Waste-Detectors and Water-Meters, of which I hereby declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

The objects of the invention are primarily to provide means for detecting waste or unauthorized usage of water in water lines, such as fire lines or systems, which are intended for special usage only, and should not be drawn upon for general use.

Further uses are to provide means for recording the period of time during which the water line has been opened, the degree of opening in the line pipe, and also the number of times the line has been opened and water drawn therethrough, thus combining both the uses of a detector and meter.

A further object is to provide a metering and recording device which will oppose no resistance, or lessen the pressure in any way since a differential in pressure of 6% would exclude all meters from use in fire lines, on account of the objections raised thereto by fire insurance companies, and the interference with the free flow of water caused thereby. Again no meter is now in general use which will record accurately large volumes of water without a greater loss of head than a differential of 6%, and hence no meters now in use would be of any avail upon a fire line. In order therefore to satisfy both the fire insurance companies, and the water companies, it is essential that a device shall be provided which while it does not impede the free flow of the water shall give an accurate record of the duration of flow of water and the size of outlet opening, and the number of times the outlet is opened.

To accomplish these objects, the invention consists in a movable valve controlling an opening of known area, and located at any convenient point between the fire line and water main, and a recording device operatively connected with the valve, so that whenever the valve is opened in the slightest degree the amount of opening, the pe-

riod of time during which the valve is opened, and the number of times opened will be registered where the record can be readily seen.

The invention further consists in means for maintaining the valve tightly upon its seat, in spite of fluctuations in pressure in the main, such as might be derived from water hammer or other causes, and might disturb a perfectly equal pressure on both sides of the valve. This comprises means for producing a greater pressure on the outlet side of the valve than on the inlet side, and also comprises an air chamber on the inlet side whereby pressures in the main can be neutralized and sudden impulses will not effect an opening of the valve.

The invention further comprises the compression device, the recording device, the various forms of construction, and combination and arrangement of parts, as herein after described, shown in the accompanying drawings, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the device, showing main and fire service pipes, the air chamber valve chamber, compression chamber, and the recording mechanism; Fig. 2 is a plan view of the same; Fig. 3 is a vertical central section of the valve and chamber; Fig. 4 is an enlarged plan view of the time and recording mechanism; Fig. 5 is a vertical section through recording mechanism showing the recording roll or sheet, the recording finger and the device for starting and stopping the time mechanism; Fig. 6 is a plan of escapement device; Fig. 7 shows a portion of the record roll or sheet.

In the drawings 1 is a chamber on the branch line or system such as a fire line. This chamber is provided with the transverse partition 2 provided with an opening 3 on which is seated the valve 4, pivoted for freedom of movement at 5. This valve and seat are set at an angle so that the weight of the valve will close it when the pressure is equal on both sides thereof. The valve opens outwardly and upwardly and is of greater area on the outer side than within the opening in the partition, hence equal pressure on both sides, supposing that pressure to be constant as in a normal condition, would close the valve on its seat. Also as

soon as the pressure is removed from the outer or outlet side of the valve it would instantly open to the degree of the opening of the outlet. And the recording device arranged to operate in unison with the movements of the valve would show the number of times of opening, pressure, and degree of opening accurately and meet all the requirements. In practice, however, the valve is subjected to shocks of an irregular kind as from water hammer and other irregular pressures, and is liable to be forced open at irregular times, and hence a differential pressure which will retain the valve at all times in close engagement with its seat is necessary. This requirement is obtained by means of a pressure cylinder 9 communicating with the outlet end of the fire or other side line at 10. This chamber contains a piston 11 and screw threaded stem 12 which passes through the nut 13 in the cylinder head and by means of the hand wheel 14 the pressure can be brought up to a pitch which will prevent the valve from rising from its seat, no matter what abnormal pressures may be brought to bear upon it, and hence the recording instrument will not be affected unless the line is actually opened and the water permitted to flow. This compression chamber has the further advantage that it shows immediately if there is any leakage in the pipe line, since compression would be impossible if there were any leakage in the system. It is of course important that no spring or weight should affect the ability of the valve to open at once when the fluid commences to flow. Hence the means for closing the valve should not be connected with the valve in any way, or hamper or retard its movements. Hence it is of great importance in installing the system and recording device.

To cushion against shocks which would tend to give a greater pressure, or impulse to open the valve than could be sustained by the differential pressure just mentioned, and such as water hammer which might be caused by the sudden opening of large valves, or elevator valves, an air chamber 16 is provided upon the inlet pipe, or communicating therewith by means of pipe 16' which will have more compressibility than water and will absorb the shock.

Water being practically incompressible and the proportions of valve area and size of opening being determined the volume of water passing at any time can readily be computed, and to assist in determining these data, the machine is calibrated carefully before sending out, and the record is arranged to correspond to the known proportions of parts of the machine. A suitable recording device to accomplish these objects is shown in Figs. 1, 3, 4, and 5 where 20 is a finger projecting horizontally from the upper end

of the valve, 21 is a rod extending vertically through a stuffing box 22 in the cover 23, and is connected with the finger so as to move in unison therewith and in exact proportion to the movements of the valve. This rod is provided with a pencil or pen point 24 with which it makes a record of its vertical movements occasioned by the fluctuations of the valve below.

A record roll or sheet 25 against which the point 24 rests is set in movement at a predetermined rate, transversely to the movement of the rod and point, by means of suitable clock or spring actuated gear work at 26 and preferably sprocket or pin gears 27 engage the edge or edges of the roll, thus insuring absolute accuracy and steadiness of movement in the roll.

In order to record only the period of time during which the valve is open it is necessary that the escapement or some portion of the clock mechanism should be operatively controlled for starting and stopping by connection with the rod 21, and therefore controlled by the movements of the valve. This is exemplified in the drawings by means of a lever 29 and a stop rod 30 which when the rod 21 falls will rise and release the escapement, and when the rod rises, will fall and stop the movement of the geared mechanism or vice versa, thus making the movements of the recording roll and pencil coincident.

In Fig. 7 is shown a portion of the recording roll, showing horizontal lines indicating the number of gallons passing the valve and vertical lines denoting variations of time, hence the number of gallons during any period is graphically shown, and further the width of opening is indicated. For instance a certain width of opening will release 10 gallons per minute another width of opening will only release 5 gallons, the width for any number of gallons being predetermined and the record roll divided accordingly.

When in use upon a branch pipe line, the slightest use of water for other than legitimate purposes will be immediately recorded as well as the length of time opened, and the number of gallons used, and amount of opening of the water outlet to draw off the water will be recorded.

As soon as the outlet nozzle is opened of course all pressure is released from the pressure chamber, and to renew the differential pressure so as to obtain accuracy in the recording instrument the pressure cylinder must be filled again. For this reason this cylinder is connected with both the inlet and the outlet pipes of the system.

In addition to the plunger within the compression cylinder, a heavy steel or brass spring 31 may be secured between the plunger and the screw. The effect of which will be to provide a reserve pressure in the

spring to counteract any loss of the original pressure occasioned by a very small continuous leakage which in the course of time might amount to many cubic inches. This spring is shown in Fig. 1.

Having described the invention what I claim as new and desire to secure by Letters Patent is:

1. The combination with a water main and service pipe connected therewith, of means for detecting waste from the pipe consisting of a valve in the pipe arranged to rise and fall freely on its seat according to the water flow in the pipe, and having the greatest exposed area upon the outlet side, a record sheet or roll, a recording point adapted to be in contact with said roll, said point being operatively connected with said valve, a rod to which said point is attached, a lever pivoted to said rod, a stop rod operatively connected with said lever, and clock mechanism adapted to operate said roll, said clock mech-

anism having an escapement in accordance with the movements of said point.

2. In a recording device, the combination with a movable rod, and a recording point attached thereto, of a propelling roller, having points in its periphery adapted to engage and hold a record sheet, a holding roll, and a winding roll therefor, a friction device for the holding roll and a winding spring for the winding roll, clock mechanism for operating said propelling roller at a predetermined rate of speed, and a stop rod and lever adapted to stop and release the said clock mechanism and mechanically connected with said movable rod to which the said recording point is attached.

In testimony whereof I hereunto set my hand this 21st day of September 1905.

FREDERICK W. HANKS.

Witnesses:

WM. M. MONROE,  
GEO. S. COLE.