July 14, 1931. D. H. McGOGY 1,814,725

LIQUID METER

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Fig. 1.

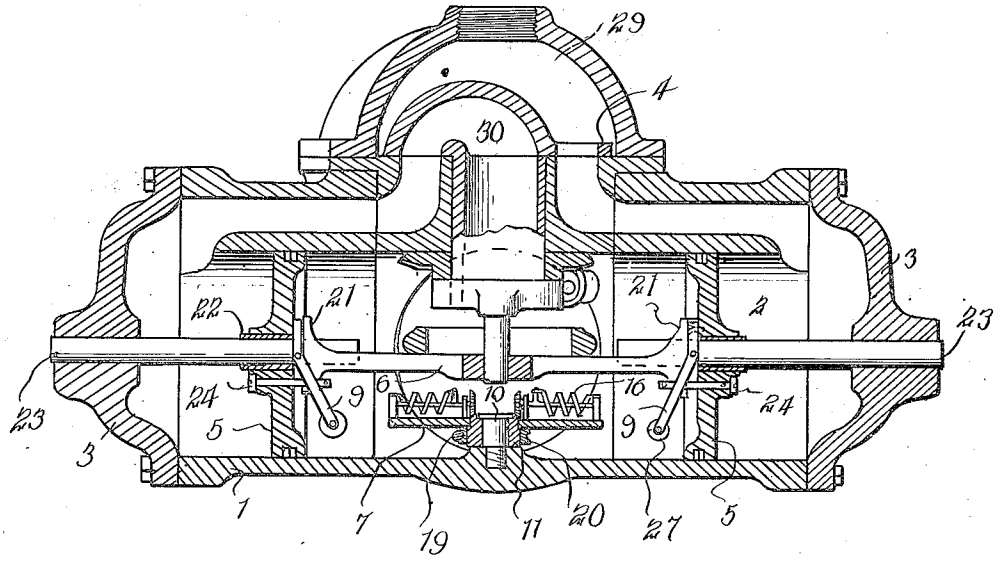
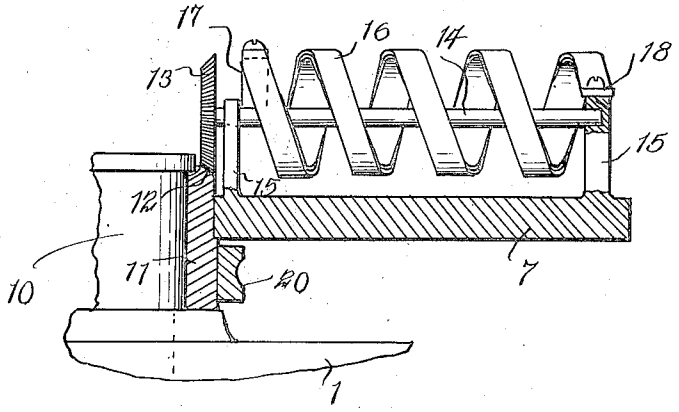


Fig. 2.



Inventor

D. H. McGogy

By Lacey & Lacey, Attorneys

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Fig. 3.

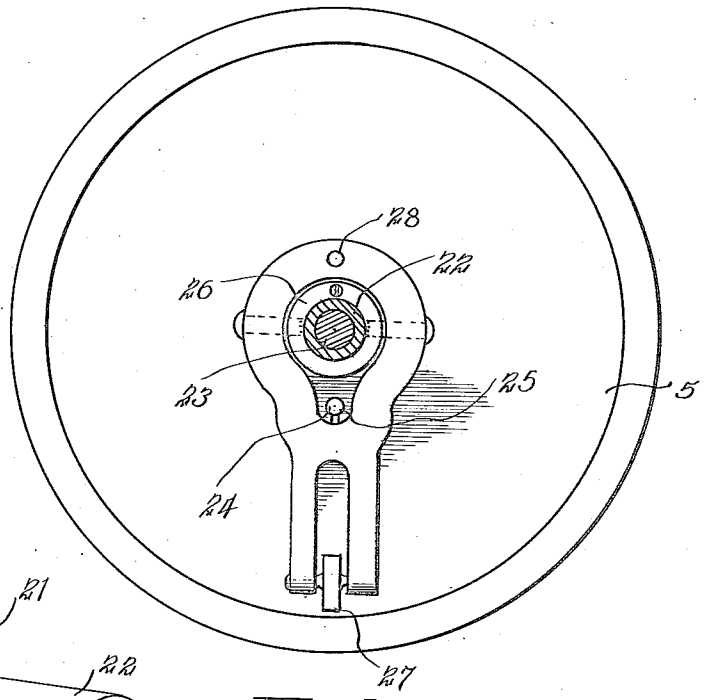


Fig. 5.

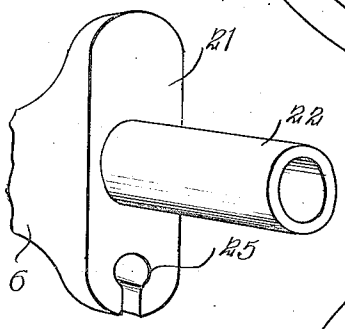
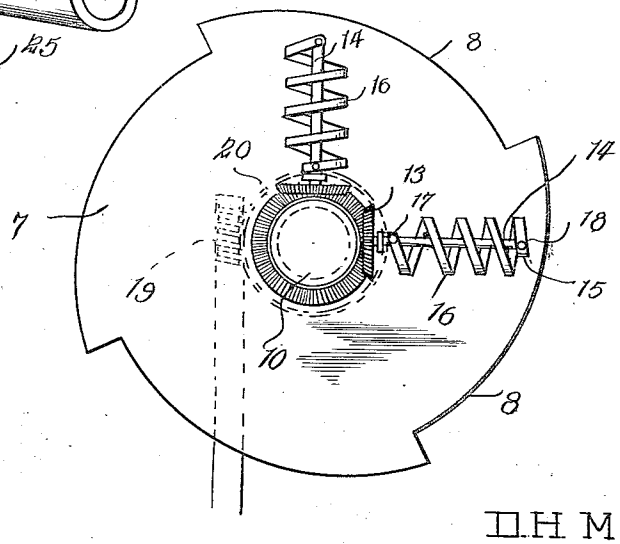


Fig. 4.



Inventor

D. H. McGogy

By Lacey & Lacey, Attorneys

Patented July 14, 1931 1,814,725

UNITED STATES PATENT OFFICE

DONALD H. McGOGY, OF McMINNVILLE, OREGON, ASSIGNOR TO McGOGY PUMP CO. INC., OF McMINNVILLE, OREGON, A CORPORATION OF OREGON

LIQUID METER

Application filed April 21, 1928. Serial No. 271,914.

This invention relates to meters for automatically measuring the amount of liquid flowing therethrough and is directed to the adjustable stop means for the meter disclosed in Letters Patent No. 1,694,747, granted to me February 11, 1928, whereby the pistons are gradually arrested in their inward movement, instead of being abruptly stopped.

The invention provides improved piston arresting mechanism and mountings associated therewith and with the casing, pistons and piston rods to maintain the pistons and check levers in fixed relative position.

While the drawings illustrates a preferred embodiment of the invention it is to be understood that in adapting the means to meet specific needs and requirements the design may be varied and changes in the minor details of construction may be resorted to within the scope of the invention as claimed, without departing from the spirit thereof.

For a full understanding of the invention and the merits thereof, reference is to be had to the following description and the drawings hereto attached, in which,—

Figure 1 is a longitudinal section of a liquid meter provided with piston arresting mechanism and mountings embodying the invention.

Figure 2 is a fragmentary view of a portion of the stop mechanism showing the parts on an enlarged scale.

Figure 3 is a front view of a piston and check lever associated therewith showing the associated guide rod and end of the piston rod in section.

Figure 4 is a top plan view of the cam plate and parts associated therewith.

Figure 5 is a detail perspective view of the outer end of a piston rod.

Corresponding and like parts are referred to in the following description and designated in the several views of the drawings by like reference characters,

The meter includes a casing 1, oppositely disposed cylinders 2 which are closed at their outer ends by means of cap plates 3, a rotary valve 4 for controlling the inflow and the outflow of the liquid through the meter, pistons 5 operable in the cylinders 2, piston rods 6 connecting oppositely disposed pistons and stop means for arresting the movement of the inwardly traveling pistons, the same including a cam plate 7. These parts are arranged in substantially the manner disclosed in the patent hereinbefore identified.

The cam plate 7 is formed at its outer edge with cam portions 8 which are disposed to be engaged by the check levers or buffers 9 associated with the respective pistons 5. A pin 10 secured in the bottom wall of the casing 1 supports the cam plate 7 and a collar 11 upon which the cam plate 7 is loosely mounted. The upper end of the collar 11 is formed with cog teeth 12 which mesh with the teeth of a bevel gear 13 which is fast to a shaft 14. Posts 15 rising from the cam plate 7 receive and support the shaft 14. A bimetallic helical thermostat 16 surrounds the shaft 14 and is connected at one end thereto, as indicated at 17, and at its opposite end to the outer post 15. By reason of the arrangement of the parts any change in temperature results in a rotation of the cam plate 7 about the collar 11. The collar 11 when adjusted remains relatively fixed, hence expansion or contraction of the helical theromstat 16 effects rotation of the shaft 14 forwardly or backwardly, and through the gearing 12 and 13 corresponding rotation of the cam plate 7 is produced, thereby bringing different portions of the cams 8 in position to be engaged by the respective check levers or buffers 9. Manual adjustment of the cam plate 7 is effected through a worm 19 and worm gear 20, the latter being fast to the collar 11 so as to rotate therewith. The worm 19 forms part of a shaft which is mounted in the casing 1 and projects to be manually operated from a point exterior thereto.

Each of the rods 6 is oppositely radially extended at its ends to provide a cross head 21 and is formed with a tubular extension 22 upon which a piston 5 is slidably mounted to have a limited independent movement. A guide rod 23 projects inwardly from each of the cap plates 3 and passes through the tubular extension 22 of the adjacent end of

one of the piston rods. A pin 24 on each piston 5 projects inwardly therefrom and passes through an opening 25 formed in an end portion of the cross head 21 and serves to limit the relative sliding movement of the piston on the end extension 22, as well as to prevent any turning of the piston upon the extension. A boss or collar 26 provided upon the inner side of each piston 5 pivotally supports the check lever coacting with the piston. The pin 24 passes through the check lever 9 and prevents turning thereof about the guide rod 23. The check lever 9 is bent intermediate its ends and is disposed so that its upper end comes between the piston and the upper end of the cross head 21, and with its lower portion inclined inwardly and downwardly and equipped with a roller or small wheel 27 to engage the cam portion of the plate 7. The upper end of the lever 9 is provided with a fulcrum 28 which preferably consists of a ball to minimize the friction between the lever and the upper end of the cross head 21.

In the operation of the meter the liquid enters the casing by way of the inlet 29 and passes out through the outlet 30 and is controlled by means of the valve 4 in the manner fully disclosed in the previously mentioned patent. Referring to Figure 1 of the drawings, the liquid passes into the cylinder at the right and leaves the cylinder at the left, thereby causing the pistons to travel from right to left. As the right hand piston nears the limit of its inward travel the lower end of the lever 9 comes in contact with the adjacent cam portion 8 of the plate 7, thereby arresting the inward travel of the lower end of the lever. This causes the lever 9 to turn upon its pivotal connection with the collar or boss 26, and as a result the inward travel of the piston is gradually arrested and an abrupt stopping thereof prevented, with the result that the action of the meter is smooth and free from vibration. Manipulation of the shaft provided with the worm 19 admits of manual adjustment of the cam plate 7. Automatic adjustment of the cam plate according to the temparture of the liquid flowing through the meter is effected by means of the thermostat 16. It is observed that there may be as many thermostats as desired to insure positive movement of the cam plate.

Having thus described the invention, I claim:

1. In a liquid meter of the character specified including a casing comprising a cylinder and a piston therein, an adjustable stop in the path of the piston within the casing, a piston rod loosely engaged in the piston, and a check lever pivotally mounted upon the piston and adapted to impinge against said stop to gradually arrest the movement of the piston when approaching the limit of its travel in one direction, and coacting means between the piston and piston rod to prevent relative turning of the piston within the cylinder.

2. In a liquid meter of the character specified comprising a casing including a cylinder, and a piston therein, a piston rod loosely engaged in the piston, a guide rigidly connected to the end of the cylinder and projecting inwardly and loosely engaging the piston and piston rod, means to prevent relative turning of the piston, an adjustable stop in the path of the piston, and a check lever pivotally mounted upon the piston and adapted to impinge against said stop and gradually arrest the inward movement of the piston when approaching the limit of its travel.

3. In a liquid meter of the character specified comprising a casing including a cylinder and piston therein, a piston rod loosely engaged in the piston, an adjustable stop in the path of a piston, a guide projecting inwardly from the end of the cylinder and loosely engaging the piston and piston rod, means coacting with the piston and piston rod to prevent turning of the piston and to limit relative sliding movement thereof, and a check lever pivotally mounted upon the piston and arranged to abut said stop to gradually arrest the inward movement of the piston when approaching the limit of its travel.

4. In a liquid meter of the character specified and in combination with the casing including a cylinder and a piston therein, a piston rod loosely engaged with the piston, means to prevent relative rotation of the piston, a cam plate, a pivot support for the cam plate, means for rotatably adjusting the pivot support, gearing between the cam plate and the pivot support, a thermostat mounted upon the cam plate and forming connecting means between the cam plate and said gearing to effect automatic adjustment of the cam plate according to the temperature of the liquid flowing through the meter, and a check lever pivotally mounted upon the piston and adapted to impinge upon the periphery of the cam plate for gradually arresting inward movement of the piston when approaching the limit of its travel.

5. In a liquid meter of the character specified and in combination with a casing including a cylinder and a piston therein, a piston rod having a crosshead adjacent the piston and a tubular extension fitting loosely in the piston, means engaged with the crosshead and the piston to prevent rotation of the piston and permit a limited relative sliding movement thereof, a stop in the path of the piston, and a bent check lever pivoted on the piston and having one end projecting from the piston to impinge against the stop and its opposite end dis-

posed between the piston and the crosshead on the piston rod.

6. In a liquid meter of the character specified including a cylinder, a piston rod having a definite movement, and a piston in the cylinder movable with the piston rod and having a limited sliding movement thereon and held against relative rotation, a stop in the path of the piston, and a lever pivoted on the piston and having a part in the path of said stop to be engaged thereby, and having a part in contact with the piston to gradually arrest its movement when the lever is rocked by contact with said stop.

7. In a liquid meter of the character specified including a cylinder, a piston rod having an extension and a lateral projection at the inner end of said extension, and a piston in the cylinder loosely mounted upon the extension of the piston rod and held against relative rotation, a stop in the path of the piston, and a lever pivoted on the piston and having an end portion disposed between the piston and the lateral projection of the piston rod, and having its opposite end portion in the path of the stop to be engaged thereby, whereby to rock the lever and gradually arrest the movement of the piston.

8. In a liquid meter of the character specified including a cylinder, a piston rod having a cross head and an extension, and a piston mounted loosely on said extension of the piston rod and held against relative rotation, a stop in the path of the piston, and a lever pivoted on the piston and having an end portion disposed between the cross head of the piston rod and the piston and having its opposite end portion inclined from the piston and disposed in the path of said stop to be engaged thereby, whereby to rock the lever and gradually arrest the movement of the piston.

In testimony whereof I affix my signature.

DONALD H. McGOGY. [L. S.]