Aug. 2, 1927. 1,637,606

I. S. DEMENT

REGISTERING DEVICE

Filed Feb. 24, 1923

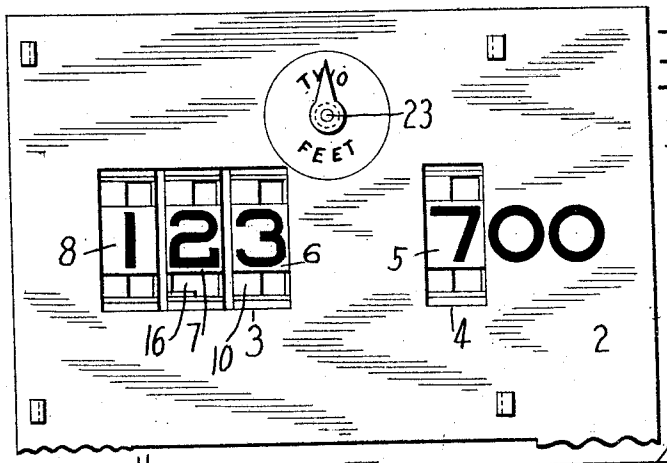


Fig. 1.

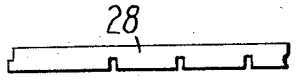


Fig. 6.

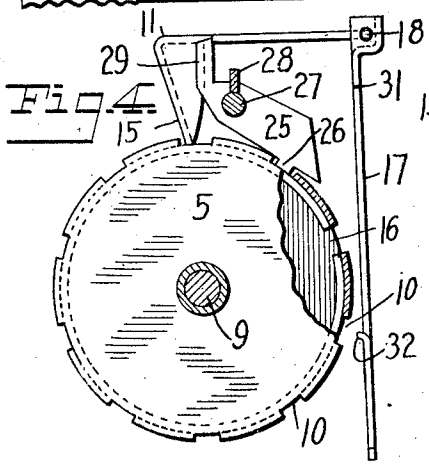


Fig. 4.

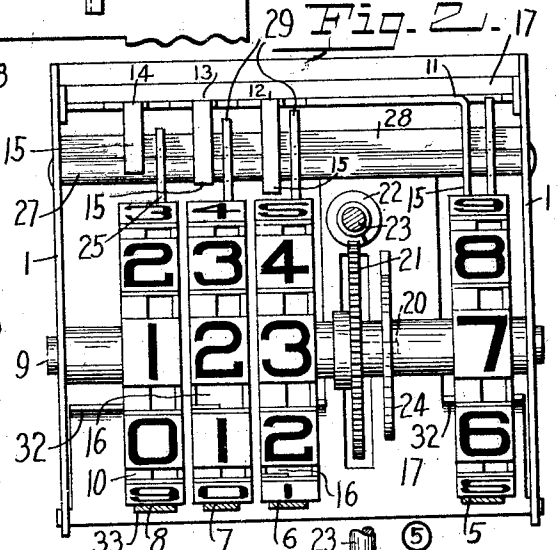


Fig. 2.

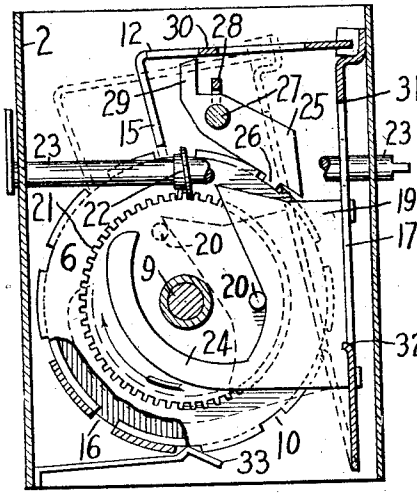


Fig. 5.

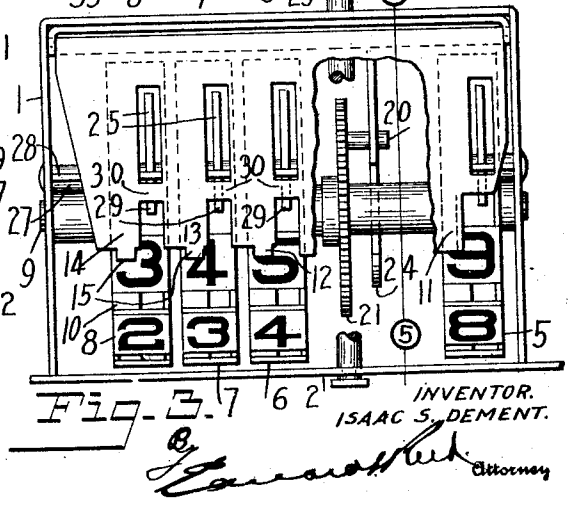


Fig. 3.

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Patented Aug. 2, 1927. 1,637,606

UNITED STATES PATENT OFFICE.

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REGISTERING DEVICE.

Application filed February 24, 1923. Serial No. 620,914.

This invention relates to a registering device and is in the nature of an improvement on the device shown and described in the application for patent filed by me November 13, 1922, Serial No. 600,553.

One object of the invention is to provide a simple efficient registering device which will operate without the use of springs.

A further object of the invention is to provide a registering device having gravity operated means for quickly advancing the registering elements upon the completion of each cycle of operation of the driving mechanism.

A further object of the invention is to provide a registering device with a gravity pawl which will be controlled by the actuating device for the register.

A further object of the invention is to provide such a registering device which will be simple in its construction, positive in its operation and which can be produced at a low cost.

Other objects of the invention will appear as the device is described in detail.

In the accompanying drawings Fig. 1 is a front elevation of a registering device embodying my invention; Fig. 2 is a front elevation of such a device with the front plate removed; Fig. 3 is a plan view of such a device, partly broken away, and with the casing in section; Fig. 4 is a transverse section taken just inside the casing at the right hand end of Fig. 3 and partly broken away; Fig. 5 is a section taken on the line 5—5 of Fig. 3; and Fig. 6 is a detail of a portion of the spacing bar.

In these drawings I have illustrated one embodiment of my invention and have shown the same as designed primarily for use with a gas meter, but it will be understood that this particular embodiment has been chosen for the purposes of illustration only and that the device may take various forms without departing from the spirit of the invention.

In that form of the device here shown it comprises a casing 1 adapted to be mounted in a meter casing and having a front plate 2 provided with sight openings 3 and 4. Mounted within the casing and in line with the respective sight openings are a plurality of counterwheels, 5, 6, 7, and 8. These counterwheels are preferably loosely mounted on a shaft 9 so that they are free to rotate thereon relatively both to the shaft and to one another. Any suitable means may be provided for actuating the counterwheels to effect the registration thereon but I prefer to employ a pawl and ratchet mechanism and have therefore associated with each counterwheel a plurality of ratchet teeth, there being one ratchet tooth for each indicating number on the counterwheel. In the present instance, the counterwheels are ten point wheels and bear on the peripheries thereof the numerals 0 to 9 inclusive. The ratchet teeth may be associated with the counterwheels in any suitable manner but, in the present instance, I have formed the teeth in the counterwheels themselves. In this construction each counterwheel has in the periphery thereof a series of recesses 10 which divide the periphery of the counterwheel into ten sections or projections, on each of which is placed one of the indicating numerals. As a result of this construction the projections which carry the indications constitute teeth which may be engaged by a pawl to actuate counterwheels.

The pawls for actuating the respective counterwheels may be of any suitable character and may be mounted in any suitable manner but each pawl is of such a character that it will actuate its own counterwheel only and the several pawls are so arranged that each successive counterwheel will be advanced one step when the next preceding counterwheel completes a single rotation. The several pawls, which are here indicated by the reference numerals 11, 12, 13, and 14, are, in the present instance, formed from a single plate of metal so that they are rigidly connected one to the other. Each pawl is provided at its forward end with a downturned portion or nose 15 which is adapted to enter one of the recesses in the periphery of the corresponding counterwheel and, when operative movement is imparted to the pawl structure, to advance that counterwheel. The downwardly extending projections or noses of the several pawls are of different lengths. The nose of the pawl 11 being of the greatest length and the noses of each succeeding pawl being of slightly less length than the nose of the next preceding pawl. Consequently when the nose of the pawl 11 is resting in one of the recesses of the counterwheel 5, of lowest denomination, the noses of the other pawls

will be held out of engagement with their respective counterwheels and the movement of the pawl structure will actuate only the first counterwheel, 5. Each counterwheel except the last has one of its recesses of greater depth than the others, as shown at 16 in Fig. 5. In the present instance the peripheral wall of the counterwheel is formed of two thicknesses of metal and the recesses 10 are formed by openings in the outer layer of metal and the recess 16 is formed by openings in both layers of metal. The deep recesses 16 are so arranged that they will be in line with the respective pawls when the indication "9" is opposite the sight opening. When the pawl enters the deep recess of the first counterwheel it will permit the whole pawl structure to move downwardly until the nose of the pawl 12 engages the second counterwheel 6 thus causing both counterwheels to be actuated by the forward movement of the pawl structure. When the second counterwheel has completed one rotation the pawl will engage the third counterwheel and when the third ratchet wheel has completed one rotation the pawl will engage the last ratchet wheel, thus causing all four ratchet wheels to be advanced simultaneously.

The pawl structure or plate may be mounted in any suitable manner but it is preferably carried by a supporting structure or frame which is so arranged that it will move forwardly by gravity. As here shown a pawl supporting frame 17 is mounted in the rear of the counterwheels and is pivotally supported in the end walls of the casing near the bottom thereof on an axis parallel with the shaft 9. This frame is provided at its upper end with lugs 18 having bearing openings to receive pintles on the ends of the pawl structure or plate so that the pawls will move about the axis of these pintles relative to the supporting frame and will move with the frame when the latter moves about its axis. The pawl supporting frame is so arranged that when in its normal or retracted position it will occupy a substantially vertical position but the manner of mounting the pawls thereon throws the center of gravity somewhat in front of the axis of the frame and consequently when unrestrained the pawl structure and the supporting frame as a whole will move forwardly with sufficient force to rotate the counterwheel or counterwheels with which the pawl structure is in engagement. It will be noted that the pawl supporting frame has portions cut away to permit it to move forwardly past the rear edges of the counterwheels. Suitable means are provided for periodically moving the pawl supporting frame to its initial or upright position and then releasing it to permit it to advance the pawls. In the present construction the frame has a forwardly extending projection or plate 19 the forward edge of which constitutes a cam and is arranged in the path of a pin 20 carried by a worm gear 21 mounted on the shaft 9. This worm gear meshes with a worm 22 on a shaft 23 mounted in the front and rear walls of the casing and adapted to be connected in any suitable manner with the meter mechanism so that the worm gear 21 will rotate continuously when the meter is in operation. The rotation is normally in the direction of the arrow in Fig. 5 and it will be apparent that when the pawl frame is in its forward position the pin 20 will engage the edge of the cam plate 19 and force the frame rearwardly into its upright position and as it passes out of engagement with the cam plate the frame will be released and the frame and the pawls will be permitted to move forward by gravity. To insure the positive operation of the pawls in the event that for any reason they should fail to operate by gravity, I have provided the frame with a forwardly extending and upwardly curved arm 24 which, when the pawl frame is in its upright position, will lie in the path of the pin 20 after the latter has passed out of engagement with the cam plate 19. The engagement of the pin with the cam arm 24 will force the latter forwardly and downwardly, thus carrying the pawl frame and pawls forwardly. It will be apparent therefore that the first counterwheel will be advanced one step upon each complete rotation of the worm gear 21. The center of gravity of the pawl carrier or frame 19 may be so arranged that the pawl carrier will move forward by gravity as soon as released by the pin 20, or, as in the present instance, it may be so arranged that the pawl carrier will be retained in an upright position until positively actuated by the contact of the pin with the cam arm 24. After initial movement has been positively imparted to the pawl carrier it will quickly complete its operative movement by gravity. In the present construction the cam plate 19 and the cam arm 24 are so shaped and arranged that they will be operatively engaged by the pin 20 when the worm wheel 21 is rotated in either direction, thus causing the registering devices to be actuated even though the driving mechanism is operated in a reverse direction.

It is desirable that some means should be provided for holding the loosely mounted counterwheels against movement and I prefer to utilize gravity pawls for this purpose. I have here shown each counterwheel as provided with a gravity pawl 25 having a projection or nose 26 adapted to enter the recess in the periphery of the counterwheel and hold the latter against movement in either direction. The detent pawls 25 are

loosely mounted on the shaft 27 and are held in properly spaced relation thereon by a spacing bar 28 having notches to receive the edges of the hub portions of the respective pawls, the supporting bar being secured at its ends to the end walls of the casing. The detent pawls are of such weight that they will move by gravity into engagement with the respective counterwheels and will normally lock these wheels against movement. The detent pawls are preferably moved into inoperative positions by the actuating device for the counterwheels and, in the present instance, each pawl has on the forward side of its axis an upwardly extending finger 29 lying just in front of a cross bar or lateral projection 30 carried by the pawl which actuates the corresponding counterwheel. The fingers 29 of the several detent pawls are of different lengths. The finger of the detent for the first counterwheel being of the greatest length and the fingers of the succeeding pawls decreasing in length. The finger 29 of the first detent pawl lies always in the path of the lateral projection 30 of the pawl 11 and consequently each forward movement of the pawl structure will move this detent into its inoperative position and release the counterwheel. The noses 15 of the several pawls are so arranged that they will enter the recesses 10 at points spaced short distances from the next preceding tooth of the respective counterwheels, thus allowing the pawls to move forward a short distance before they operatively engage the counterwheels, thereby allowing time for the operation of the detents before force is applied to the counterwheels. When the pawl of the preceding counterwheel enters the deep recess 16 of that counterwheel the pawl structure will drop down far enough to permit the finger 29 of the detent of the next succeeding pawl to be engaged thereby. In this manner each counterwheel is locked against movement at all times except when that counterwheel is to be operated.

I have also provided means for locking the detents in engagement with the respective counterwheels so as to hold the latter against displacement. As here shown the pawl supporting frame 17 is provided with a transverse portion or locking edge 31 which extends transversely to the several detents and is so arranged that when the pawl structure moves forward this locking edge will overlie the several detents. The upper edges of the detents are cut away or inclined so that the locking edge 31 of the frame will clear the rear edges thereof even when one of the detents is in an elevated position, that is, resting upon one of the projections between the recesses of its counterwheel. As the pawl structure completes its forward movement the detent which has been elevated will drop into the next succeeding recess and at this time the locking edge 31 of the frame will lie close to the inclined upper edges of the several detents and will prevent these detents from being accidentally displaced or withdrawn from their respective recesses. This locking device is only operative when the pawl structure is in its foremost position but inasmuch as the pawl structure is held in its foremost position by gravity when unrestrained it will be apparent that the counterwheels may be set to predetermined positions, preferably the zero position, and that they will be retained in that position during shipment or handling, thus avoiding the necessity of setting the counterwheels upon each installation. If desired, detents 33 may be provided to hold the respective counterwheels against accidental displacement, as, for example, in the event the meter should be turned on its back when the pawl supporting frame is in its rearmost position and out of locking contact with the detents.

The overthrow of the counterwheels is positively prevented by means of projections or stops 32 extending forwardly from the frame or pawl carrier 17 and so arranged with relation to the respective counterwheels that as the pawl carrier moves forwardly these projections or stops will enter recesses 10 in the respective counterwheels and check the forward movement thereof. The arrangement of the stops with relation to the counterwheels is such that when the counterwheel is moved by its pawl the stop will not be brought into engagement therewith until the counterwheel is advanced far enough to permit the stop to enter the next succeeding recess. Consequently the normal operation of the counterwheel is not interfered with but the stop will positively prevent the counterwheel from being advanced more than one space.

The construction described is a very simple one and is very efficient and entirely accurate in its operation and its operaton is positive. It is of such a construction that it can be built at a very low cost and can be quickly and easily installed in a meter.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention what I claim as new and desire to secure by Letters Patent, is:

1. In a registering device for a meter or the like, a counterwheel, a pawl to actuate said counterwheel, a pivoted carrier for said pawl mounted for movement by gravity in a direction to cause said pawl to actuate said counterwheel, driving mechanism, and means operated by said driving mechanism to move said carrier to its initial position and then release the same, said carrier and

said pawl being so arranged that the major portion of the weight thereof will be supported at the axis of said carrier and will not be imposed upon said means for moving said carrier to its initial position.

2. In a registering device for meters and the like, a counterwheel, a pawl carrier pivotally supported near its lower end and arranged normally in an upright position with its center of gravity on the forward side of its axis, a pawl carried by the upper portion of said carrier to actuate said counterwheel upon the forward movement of said pawl carrier, driving mechanism, and means operated by said driving mechanism to move said pawl carrier to a normal position and then release the same.

3. In a mechanism of the character described, a counterwheel, a pawl to actuate said counterwheel, a pawl supporting frame pivotally mounted in the rear of said counterwheel and movable by gravity in a forward direction, a cam carried by said frame, a rotatable part arranged to engage said cam to move said frame to its initial position and then release the same, a cam arm carried by said frame and arranged to be engaged by said rotatable part after the latter has passed said cam and to positively move said arm forwardly, and driving mechanism to actuate said rotatable part.

4. In a mechanism of the character described, a casing, a plurality of counterwheels mounted in said casing for rotation relative one to the other, a plurality of pawls rigidly connected one to the other and arranged to actuate said counterwheels, a pawl supporting frame pivotally mounted on said casing in the rear of said counterwheels and arranged normally in an upright position but having its center of gravity on the forward side of its axis, driving mechanism, and means actuated by said driving mechanism to move said frame to its upright position and then release the same.

5. In a mechanism of the character described, a casing, a plurality of counterwheels mounted in said casing for rotation relative one to the other, a plurality of pawls rigidly connected one to the other and arranged to actuate said counterwheels, a pawl supporting frame pivotally mounted on said casing in the rear of said counterwheels and arranged normally in an upright position but having its center of gravity on the forward side of its axis, a cam secured to said frame, a worm wheel rotatably mounted on the axis of said counterwheels, a part carried by said worm wheel and arranged to engage said cam and move said frame to an upright position, a shaft mounted in said casing, and a worm secured to said shaft and meshing with said worm wheel.

6. In a mechanism of the character described, a counterwheel, an upright pawl carrying frame pivotally mounted at its lower end for movement by gravity in one direction, a pawl carried by the upper portion of said frame to actuate said counterwheel, driving mechanism, and a device operated by said driving mechanism to control the movement of said pawl carrying frame, said pawl carrying frame having separated parts arranged to be successively engaged by the device operated by said driving mechanism to first move said frame to its initial position and release the same and to subsequently impart forward movement to said frame.

7. In a mechanism of the character described, a counterwheel, driving mechanism, a pawl for actuating said counterwheel, means controlled by said driving mechanism to actuate said pawl, a gravity detent for said counterwheel, and a finger connected with said detent and arranged in the path of a part of said pawl, whereby the first movement of said pawl will move said detent into an inoperative position.

8. In a mechanism of the character described, a plurality of counterwheels having teeth adapted to be engaged by pawls for actuating the counterwheels, each of said counterwheels having a deep recess in the rear of one of said teeth, a plurality of pawls to operate the respective counterwheels, said pawls being rigidly connected one to the other and being of different lengths, driving mechanism, means controlled by said driving mechanism for actuating said pawls, a gravity detent for each counterwheel, each detent having an upwardly extending finger, the fingers of the several detents being of different lengths, and parts carried by said pawls to engage the respective fingers and move said detents into inoperative positions.

9. In a mechanism of the character described, a counterwheel, driving mechanism, a pawl for actuating said counterwheel, means controlled by said driving mechanism to actuate said pawl, a detent for said counterwheel, and a finger connected with said detent and arranged in the path of a part of said pawl, whereby the first movement of said pawl will move said detent into an inoperative position.

10. In a mechanism of the character described, a counterwheel, driving mechanism, a pawl for actuating said counterwheel, means controlled by said driving mechanism to actuate said pawl, a detent for said counterwheel, a finger connected with said detent and arranged in the path of a part of said pawl, whereby the first movement of said pawl will move said detent into an inoperative position, and means controlled by the operative movement of said pawl to lock said detent in engagement with said counterwheel.

11. In a mechanism of the character de-

scribed, a plurality of counterwheels, pawls to actuate the respective counterwheels, a supporting frame for said pawls, driving mechanism, means controlled by said driving mechanism for actuating said frame and said pawls, a detent for each counterwheel, each of said detents having a part arranged to be actuated by the respective pawls on the forward movement of the latter, and a part carried by said frame for locking said detents in engagement with the respective counterwheels when said frame is in its foremost position.

12. In a mechanism of the character described, a plurality of counterwheels, a pawl supporting frame, a plurality of pawls carried by said frame to actuate the respective counterwheels, said frame and said pawls being so mounted that when unrestrained they will move forward by gravity, a gravity detent for each counterwheel, each of said detents having an inclined upper edge, means actuated by said pawls for moving said detents into inoperative positions, and a part carried by said frame and arranged to be moved into locking relation to said detents when said pawls and said frame are in their forward positions.

13. In a mechanism of the character described, a counterwheel, a pawl to actuate said counterwheel, a pivoted frame to support said pawl, said frame being mounted for movement by gravity in a direction to cause said pawl to actuate said counterwheel, means operated by said driving mechanism to move said frame to its initial position and then release the same, and a stop carried by said frame to prevent the overthrow of said counterwheel.

14. In a mechanism of the character described, a plurality of counterwheels, pawls to actuate the respective counterwheels, a supporting frame for said pawls, driving mechanism, means controlled by said driving mechanism for actuating said frame and said pawls, a detent for each counterwheel, each of said detents having a part arranged to be actuated by the respective pawls on the forward movement of the latter, a part carried by said frame for locking said detents in engagement with the respective counterwheels when said frame is in its foremost position, and stops carried by said supporting frame to engage the respective counterwheels after they have been partially actuated by said pawls to prevent the overthrow thereof.

15. In a mechanism of the character described, a counterwheel, a pawl to actuate said counterwheel, a pawl supporting frame pivotally mounted adjacent to said counterwheel and movable by gravity to cause said pawl to actuate said counterwheel, a cam connected with said frame, a rotatable part arranged to engage said cam and move said frame to its initial position and then release the same, said cam being so shaped that it will be operatively engaged by said rotatable part when the latter is moved in either direction, a driving mechanism to actuate said rotatable part.

16. In a mechanism of the character described, a counterwheel, a pawl to actuate said counterwheel, a pawl supporting frame pivotally mounted adjacent to said counterwheel and movable by gravity to cause said pawl to actuate said counterwheel, a cam connected with said frame, a rotatable part arranged to engage said cam and move the same to its initial position and then release the same, a cam arm carried by said frame and arranged to be engaged by said rotatable part after the latter has passed out of engagement with said cam to impart forward movement to said frame, said cam and said cam arm being so shaped and arranged that they will be operatively engaged by said rotatable part when the latter is moved in either direction, and driving mechanism to actuate said rotatable part.

17. In a registering mechanism for a motor or the like, a driving shaft rotatable in either direction, a registering element, an actuating device for said registering element comprising a part having a cam surface, and a rotatable member connected with said driving shaft and arranged to engage said cam surface and cause said actuating device to move said registering element in the same direction when said shaft is rotated in either direction.

In testimony whereof, I affix my signature hereto.

ISAAC S. DEMENT.