(No Model.) 3 Sheets—Sheet 1.

G. KNIGHT & G. ELLIS.

COIN FREED ELECTRIC METER.

No. 584,879. Patented June 22, 1897

Fig. 1.

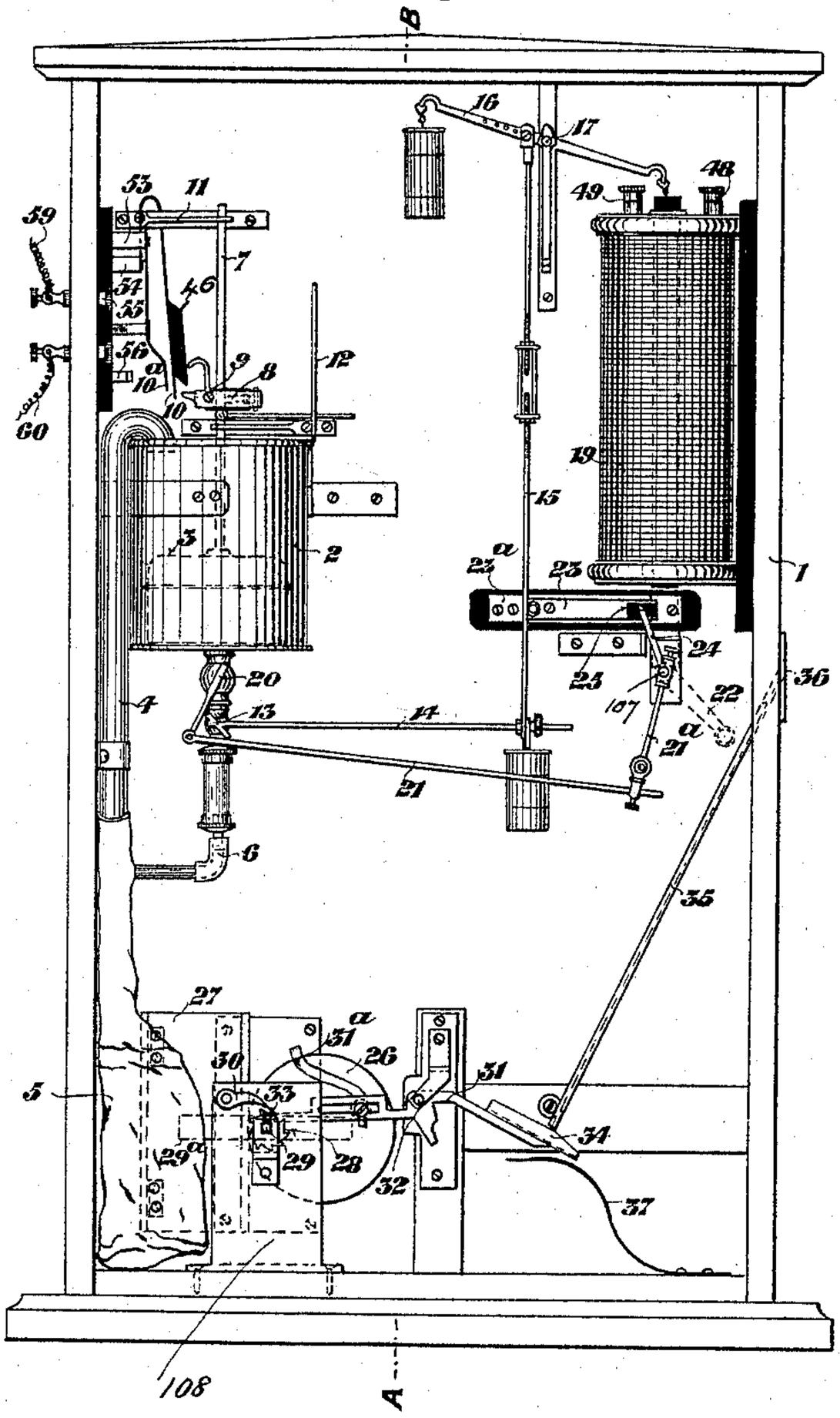
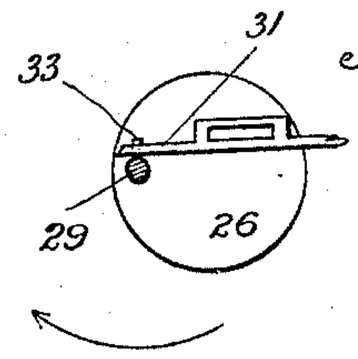


Fig. 1a.



Witnesses:-

Arthur Woodman.

William J. Thorn

Inventors.

George Knight

George Ellis

per

Sam E. O'Donnell

Attorney.

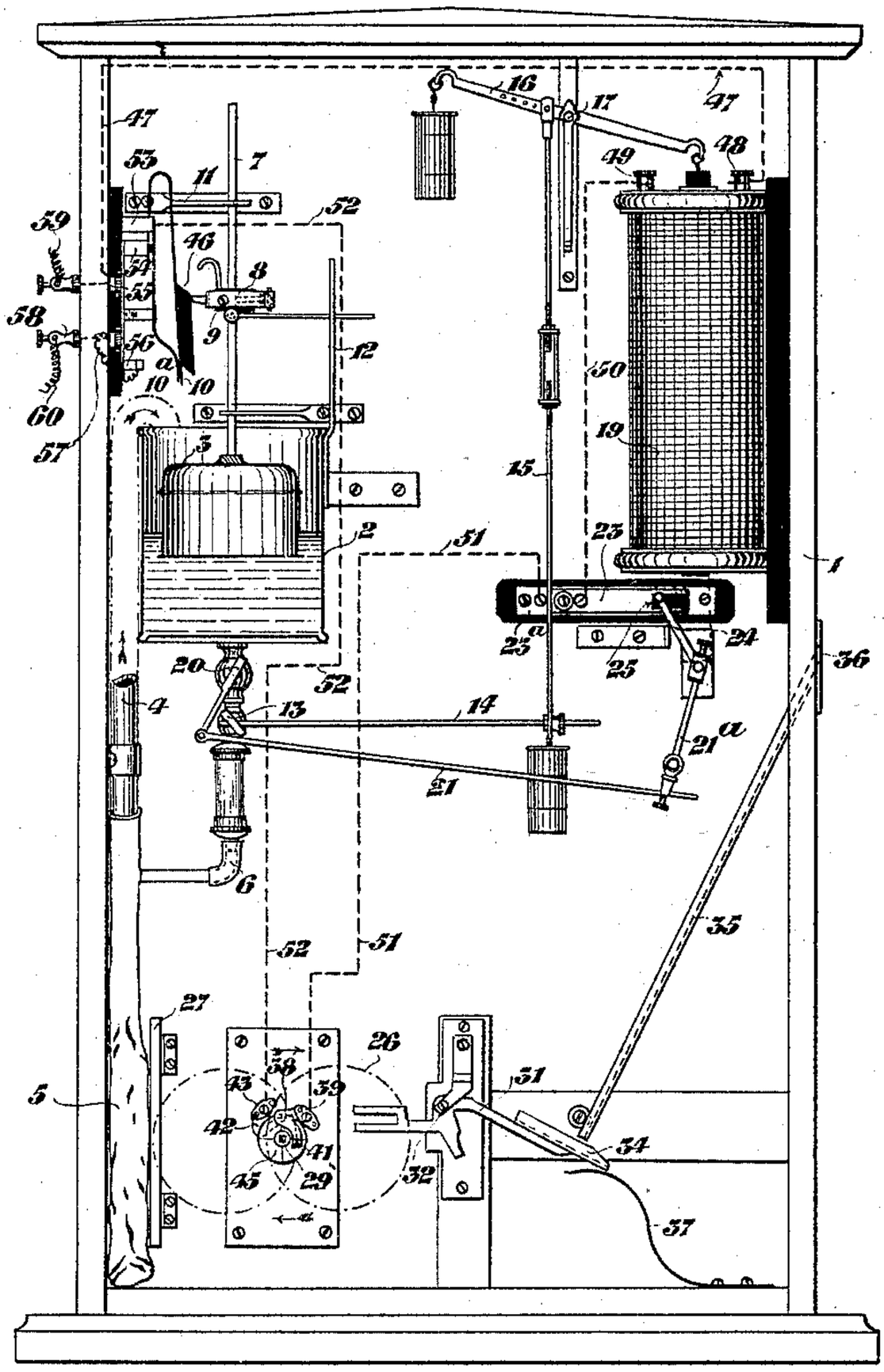
(No Model.) 3 Sheets—Sheet 2.

G. KNIGHT & G. ELLIS.

COIN FREED ELECTRIC METER.

No. 584,879. Patented June 22, 1897.

Fig. 2.



Inventors
George Knight
George Ellis

Witnesses:
Arthur Woodman
William J. Thorn

per John G. O'Donnell
Attorney.

(No Model.) 3 Sheets—Sheet 3.

G. KNIGHT & G. ELLIS.

COIN FREED ELECTRIC METER.

No. 584,879. Patented June 22, 1897.

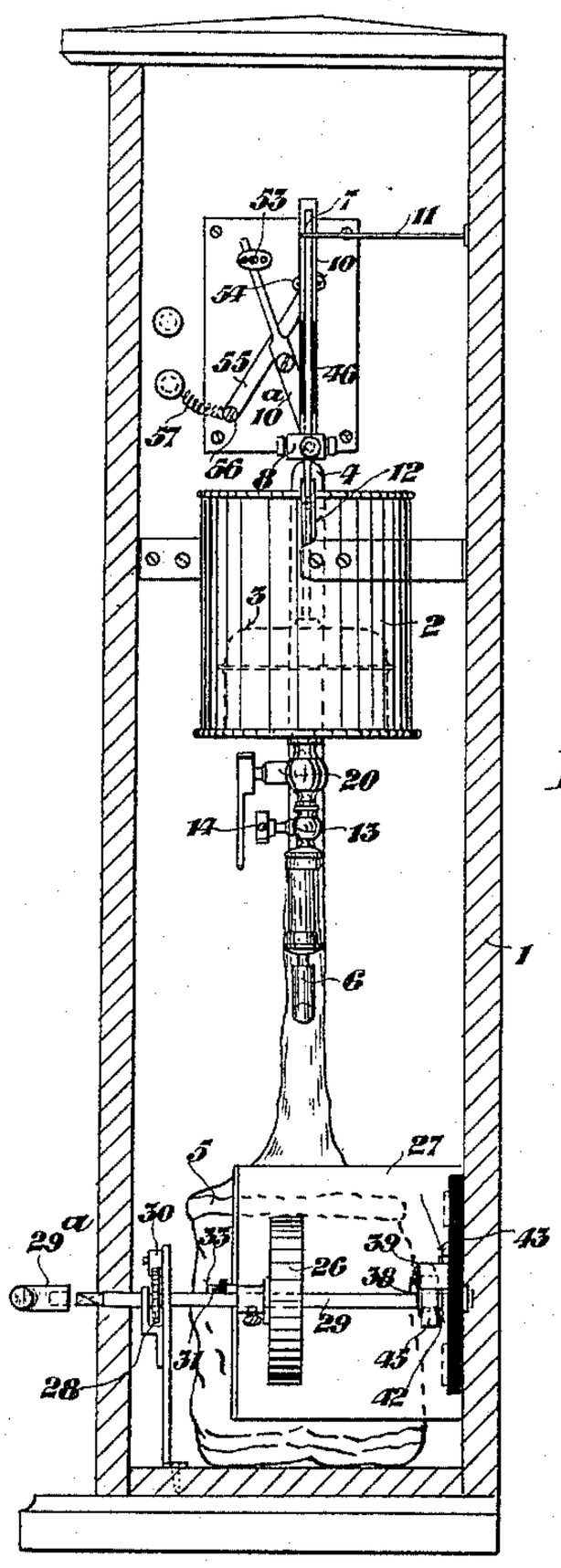


Fig. 3.

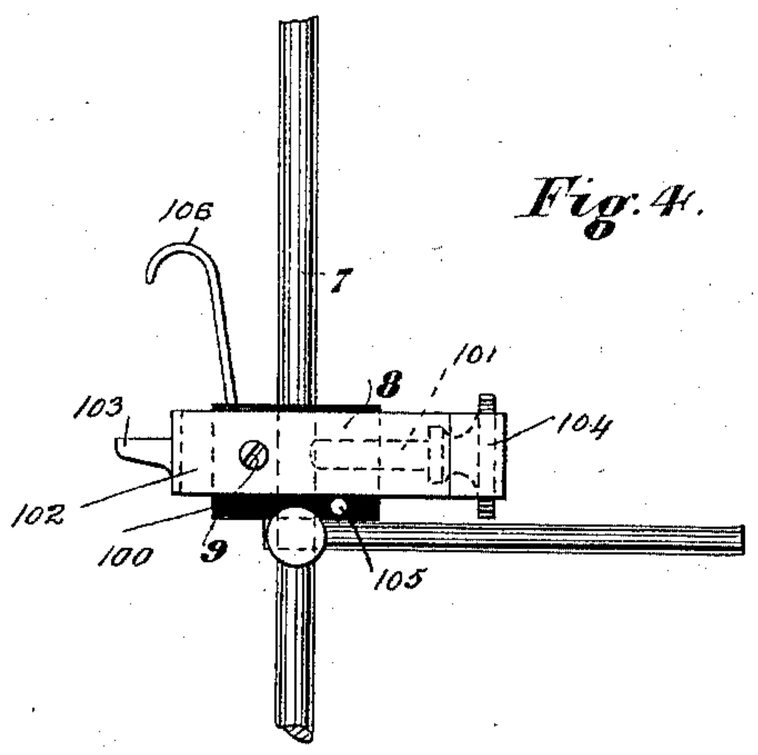


Fig. 4.

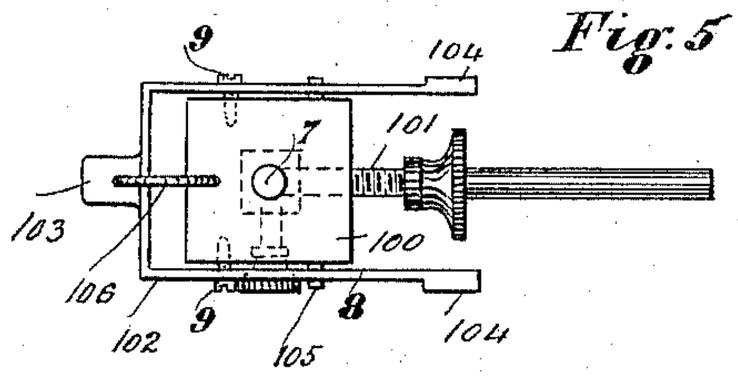


Fig. 5

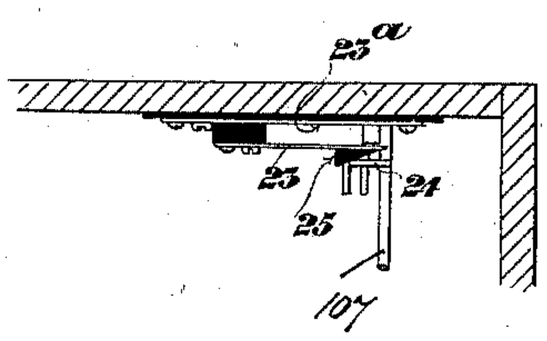


Fig. 6.

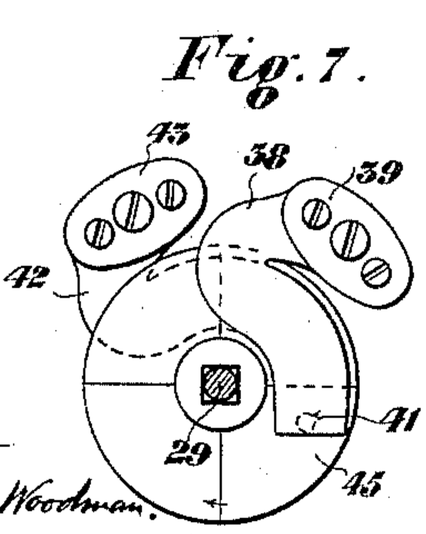


Fig. 7.

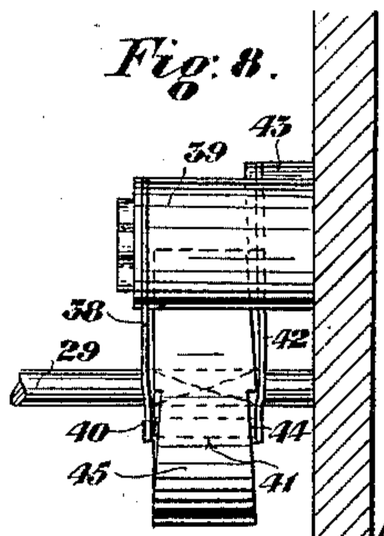


Fig. 8.

Witnesses:—
Arthur Woodman.
William J. Thorn

Inventors
George Knight
George Ellis
per John G. O'Donnell
Attorney.

UNITED STATES PATENT OFFICE.

GEORGE KNIGHT AND GEORGE ELLIS, OF SOUTHSEA, ENGLAND, ASSIGNORS OF ONE-HALF TO JACOB ATHERTON, OF HUYTON, ENGLAND.

COIN-FREED ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 584,879, dated June 22, 1897.

Application filed November 14, 1896. Serial No. 612,108. (No model.) Patented in Belgium November 26, 1896, No. 124,668, and in Canada December 12, 1896, No. 54,347.

To all whom it may concern:

Be it known that we, GEORGE KNIGHT, residing at 29 Middle Street, and GEORGE ELLIS, J. P., residing at 31 Granada Road, Southsea, in the county of Hants, England, subjects of the Queen of Great Britain and Ireland, have invented new and useful Improvements in Coin-Freed Electric Meters for the Measurement of Electricity, of which the following is a specification.

Patents for this invention have been obtained in Belgium, No. 124,668, dated November 26, 1896, and in Canada, No. 54,347, dated December 12, 1896.

This invention relates to improvements in coin-freed apparatus for supplying electric current for lighting and other purposes.

The way in which we carry out our invention is as follows: We provide a reservoir which may contain any suitable fluid or air or gas, under pressure or otherwise, the escape of which is capable of being controlled, and in this reservoir is a float which, as long as a certain quantity of the fluid remains in the reservoir, operates a switch to make electrical contact, such contact being automatically broken when the liquid has fallen below a certain level. Below this reservoir, or in any suitable position, is a flexible or collapsible vessel, which we will call a "receiver," into which the fluid escaping from the reservoir flows by means of a tube or pipe connecting the said reservoir with the receiver. In connection with the receiver we arrange apparatus for restoring to the reservoir a definite quantity of the fluid, such apparatus consisting of an eccentric mounted on an axle and capable of being rotated by means of a suitable handle. The said eccentric is normally held locked by means of a lever engaging either with the eccentric itself or its axle, and can only be released to enable it to be rotated by the insertion of a coin. The operation of this eccentric by means of its handle compresses the receiver and forces the fluid into the reservoir. In the outlet or escape pipe connecting the reservoir with the receiver are two taps, one of which is connected to a solenoid, the action of which automatically regulates the rate of discharge of the fluid from the reservoir according to the amount of current passing through the apparatus. The second tap is connected to the cut-off switch, hereinafter referred to. A switch or contact is arranged in connection with the eccentric or its axle, which operates in such a manner that the current can only pass through the apparatus when the eccentric has been rotated through a complete circle. Means, consisting of a ratchet-wheel or the like, are provided which compel the handle operating the eccentric to be always moved in one direction—that is to say, preventing a backward movement.

In order that our invention may be better understood and more readily carried into effect, we will describe the drawings hereunto annexed.

Figure 1 is an elevation of the box or case containing the apparatus comprising our invention with the front removed, showing the apparatus in its normal condition—that is to say, the reservoir empty, the float in its lowest position, and the eccentric locked. Fig. 1ª is a detail view showing the engagement of the free end of the lever 31 with the projection 33 on the shaft of the eccentric. Fig. 2 is an elevation of the box or case with the front removed, showing our invention during operation, the eccentric having been released by the insertion of a coin and the handle operated, thereby forcing the fluid from the receiver into the reservoir and raising the float. Fig. 3 is a cross-sectional elevation on line A B, Fig. 1. Fig. 4 is an enlarged side view of the contact-operating device attached to the float in the reservoir. Fig. 5 is a plan of Fig. 4. Fig. 6 is a plan of the cut-off switch connected to the upper or second tap (shown dotted on the drawings, Fig. 1) in the outlet-pipe connecting the reservoir with the receiver. Fig. 7 is an enlarged front view showing the contacts at the end of the eccentric-spindle. Fig. 8 is a side view of Fig. 7.

The same numbers refer to the same parts in the several figures of the drawings.

1 is the box or case containing the parts comprising our invention.

2 is the reservoir, in which is the float 3.

4 is the inlet-pipe of the reservoir through

which the water or other fluid is forced from the flexible vessel or receiver 5.

6 is the outlet-pipe of the reservoir through which the water flows back again into the receiver.

7 is an upright rod attached to the float 3 and carrying the contact-operating device 8, which is pivoted at 9. The contact-operating device is shown in detail in Figs. 4 and 5.

100 is a block of insulating material secured to the rod 7 by a screw 101.

102 is a forked lever pivoted on the pins 9, projecting from the block 100 and provided with a beak 103 at its front end. The rear end of the lever is provided with weights 104, which cause it to rest upon pins 105, projecting from the block 100.

106 is a spring which projects from the block 100 and bears against a block 46, of insulating material, carried by the front contact-spring 10, which is supported from the insulated block 54 on the case.

10ª is the rear contact-spring, supported from the insulated block 53 on the case behind the contact-spring 10. When the rod 7 rises, the lever 102 tips up until the beak 103 has been moved above the block 46. Directly the rod 7 commences to descend the beak 103 presses against the block 46 and moves the front contact-spring 10 into contact with the rear contact-spring and holds it in contact therewith until the rod 7 has descended and the beak passes under the block 46.

11 and 12 are guides for the rod 7.

13 is the tap connected by rods 14 and 15 (rod 15 being adjustable) and cross-bar 16 to the core of the solenoid 19. The cross-bar 16 is pivoted on a pin 17, projecting from the case. The solenoid is insulated and is secured to the case. The rods 14 and 15 are jointed together in any approved manner, so as to connect the lever 16 with the tap or valve 13.

20 is the second tap in the outlet-pipe 6, which is connected by rods 21 21ª to the switch-handle 22, (which is shown on the drawings dotted, as it is outside the case 1, and in Fig. 1 the front of the case is removed,) which operates the cut-off switch or contact 23 23ª, Fig. 6, by means of the projection 24 acting on the beveled block 25, of insulating material, on contact 23. The rods 21 21ª are jointed together in any approved manner, so as to connect the switch-handle 22 with the tap or valve 20. The projection 24 is on the shaft 107, which is journaled in the case and has the rod 21ª and the switch-handle 22 secured to it.

26 is the eccentric, and 27 a hinged flap or shutter, which compresses the flexible vessel or receiver 5, as hereinafter described. The flap 27 is pivoted to the side of the case in the path of the eccentric 26 and bears against or is otherwise operatively connected with the receiver 5.

28 is the ratchet-wheel on the spindle 29 of the eccentric, and 30 the pawl engaging in the teeth of said wheel, preventing a backward movement of eccentric and insuring that the handle 29ª (shown in Fig. 3) can be moved only in one direction.

31 is the lever, pivoted at 32, the end of said lever engaging with a projection 33 on the spindle or axle 29 of the eccentric.

34 is the end of the said lever which is acted upon by the coin.

35 is the coin-chute, and 36 the slot in the side of the box for the insertion of the coin.

37 is a spring insuring the return of the lever 31 to its normal position.

38, Figs. 2 and 7, is the contact-spring of the switch or contact device on end of spindle 29, connecting the terminal 39 with the front end 40 of the pin 41, Fig. 8, and 42 is the spring, connecting the terminal 43 with the back end 44 of the pin 41.

45 is an insulating disk keyed to the spindle 29, through which pin 41 projects.

The contact-springs 38 and 42 are secured by their terminals 39 and 43 to a stationary plate 108 inside the case and the pawl 30 is pivoted on a pin projecting from the said plate. The connecting-pin 41 is arranged transversely in a hole in the disk 45 and its ends bear against the two contact-springs 38 and 42 simultaneously.

The action of our invention is as follows: On the insertion of a coin into the apparatus at 36 it drops down the chute 35, striking the end 34 of the lever 31, depressing that end and raising the opposite end free of the projection 33 on the axle 29 of the eccentric, thus releasing it and allowing it to be rotated by means of its handle 29ª. On now revolving the eccentric by means of its handle 29ª (which handle projects outside the case containing the parts comprising our invention) it presses against the hinged flap or shutter 27, which compresses the receiver 5 and forces the fluid or gas contained therein up into the reservoir 2, lifting the float 3 and closing the switch or contact 10 10ª by means of the tilting contact-operator 8 coming in contact with the insulating-block 46. This switch or contact is kept closed until all the fluid or gas has escaped from the reservoir 2 back into the receiver 5, when the float 3, having fallen to its lowest position, as in Fig. 1, releases the switch and cuts off the current.

In the normal condition of the apparatus, although the current is laid onto it from the source of electricity through the wire 59, Figs. 1 and 2, (60 being the return-wire,) yet, owing to the float being at the bottom of the reservoir 2, as in Fig. 1, contact is broken at 10 10ª, and if it were possible to force the liquid into the reservoir 2 without revolving the eccentric 26 by means of handle 29ª, so that the float 3 were raised to make contact between 10 10ª, then the current would be flowing, but inasmuch as to force the liquid from the receiver 5 up into the reservoir 2 the handle, spindle, and eccentric have to be rotated, provision is made so that as soon as the handle 29ª is moved electrical contact is

broken down at the end of the spindle 29 by the connecting-pin 41, Figs. 2, 7, and 8, through the revolving of disk 45, to which it is connected, being moved out of contact with springs 38 and 42, thereby breaking down the circuit there. When the handle 29^a and the spindle 29 have moved one complete revolution, the pin 41 is again interposed between the two springs 38 and 42, Fig. 8, thus completing the circuit there, and the float 3 in the reservoir 2 now being forced up by the liquid entering said reservoir the contact-operator 8, pressing the insulating-piece 46, makes contact between the ends of the springs 10 10^a.

Assuming that the above-described action has taken place—that is to say, the coin inserted into the apparatus, the handle 29^a and eccentric 26 revolved through a complete revolution, thereby forcing the liquid from the receiver 5 up into reservoir 6, raising the float 3 and making contact between ends of springs 10 10^a—the current flows as follows, referring to Fig. 2: from wire 59 and its connecting terminal, along wire 47 to the terminal 48 of the solenoid 19, through the coils of the solenoid, out at terminal 49, along wire 50 to spring 23, Figs. 1, 2, and 6, through pin and plate 23^a, Fig. 6, along wire 51 to terminal 39, through spring 38 and pin 41 in disk 45, keyed to spindle 29 of eccentric 26, through spring 42, terminal 43, wire 52, through block 53 and fixed spring 10^a, from the end of spring 10^a to the end of spring 10, along spring 10 to block 54, along strip 55, Fig. 3, to terminal 56, along wire 57 to terminal 58, and along return-wire 60 back to the source of supply. The electric lamp or other apparatus for which the electricity is required can be connected to or inserted at any part of the external circuit above described. The current now flowing through the apparatus as above described, the core of the solenoid 19, which projects beyond the lower end of the solenoid, is moved upward, the connecting-rod 15, connected to the cross-bar 16, is thrust downward, rod 14 is moved downward, and the tap 13 moved more into the vertical position, allowing the water or other fluid to escape from the reservoir 2 down into the receiver 5. According to the strength of the current required, so the core of the solenoid will be moved more or less. If moved more, the downright rod 15 will be thrust farther downward and the tap 13 moved to increase the aperture in the pipe 6, allowing the liquid to flow from the reservoir to the receiver quicker. If the current required is less, the tap 13 will be moved so that the aperture is smaller and the flow of liquid is slower from the reservoir to the receiver. It consequently follows that the prepayment gives a specified quantity of electricity and is not gaged by time, unless the quantity of current required from an apparatus is always the same. Then the prepayment gives an average time for current flowing. When the water has all flowed from the reservoir 2 to the receiver 5, so that the float is at the bottom of the reservoir and disconnection has taken place at springs 10 10^a, the flow of electricity through the apparatus ceases. In the event of the full amount of electricity prepaid for not being required to be used on the occasion on which the prepayment has been made the remaining quantity can be used at a later occasion by switching off the current and at the same time closing the tap 20, thereby preventing the further flow of water from the reservoir to the receiver. The action of this portion of our invention is as follows: By moving the handle 22 from the dotted position, Fig. 1, toward the left the projecting piece 24, Fig. 6, operated by the handle 22, is moved to free the spring 23, breaking the connection between spring 23 and spring 23^a, thereby breaking down the circuit. This action of moving the handle 22 moves to the left the connecting-rods 21 and 21^a and operates the tap 20 to completely close the aperture and prevent the flow of the liquid from the reservoir 2 down the pipe 6 to the receiver 5, at the same cutting off the current from the lamp or other apparatus for which it is required. In this position contact is already made at the points 10 10^a, and the float 3 is kept in the position at which it is at the time the handle 22 is moved to the left. When the remaining portion of the current prepaid for is required to be used, the handle 22 is moved to its normal position, (dotted lines, Fig. 1,) rods 21 and 21^a and tap 20 are moved back into their normal position, and the flow of the liquid is allowed to continue down pipe 6 into the receiver 5 until the float reaches its lowest position in said reservoir and breaks contact at 10 10^a.

The reservoir 2 may be made of such a size that it will hold several charges of the fluid or gas, thus allowing it to be charged at one time with any quantity according to the number of times the charging apparatus is operated.

What we claim is—

1. In a coin-freed electric meter, the combination, with a coin-controlled receiver for fluid, of a reservoir connected to the said receiver and provided with a float which is raised when the fluid is forced out of the receiver into the reservoir, contact devices operating to close the circuit while the float is descending, a solenoid included in the said circuit, and a valve operatively connected with the said solenoid and controlling the passage of fluid from the reservoir back into the receiver, substantially as set forth.

2. In a coin-freed electric meter, the combination, with a receiver for fluid, of operating mechanism provided with a handle for forcing the fluid out of the said receiver, a coin-controlled locking device normally preventing the said handle from being operated, a reservoir connected to the said receiver and provided with a float, contact devices operated by the said float, a solenoid arranged in

circuit with the said contact devices, and a valve operatively connected with the said solenoid and controlling the passage of fluid from the reservoir back into the receiver, substantially as set forth.

3. In a coin-freed electric meter the combination of two connected vessels, (a reservoir and a receiver) of a cut-off switch for closing the connection between the vessels, preventing the flow of liquid from one to the other and breaking down the electric circuit at the same time, enabling the unused quantity of current for which prepayment had been made to be used, by reversing said switch to normal position, without further prepayment, substantially as described and illustrated in the accompanying drawings.

GEORGE KNIGHT.
GEORGE ELLIS.

Witnesses:
ALFRED W. DASHPER,
E. C. HEATH HORKEN.