No. 667,138. Patented Jan. 29, 1901.

E. OXLEY.

PREPAYMENT METER.

(Application filed Oct. 28, 1899.)

(No Model.) 2 Sheets—Sheet 1.

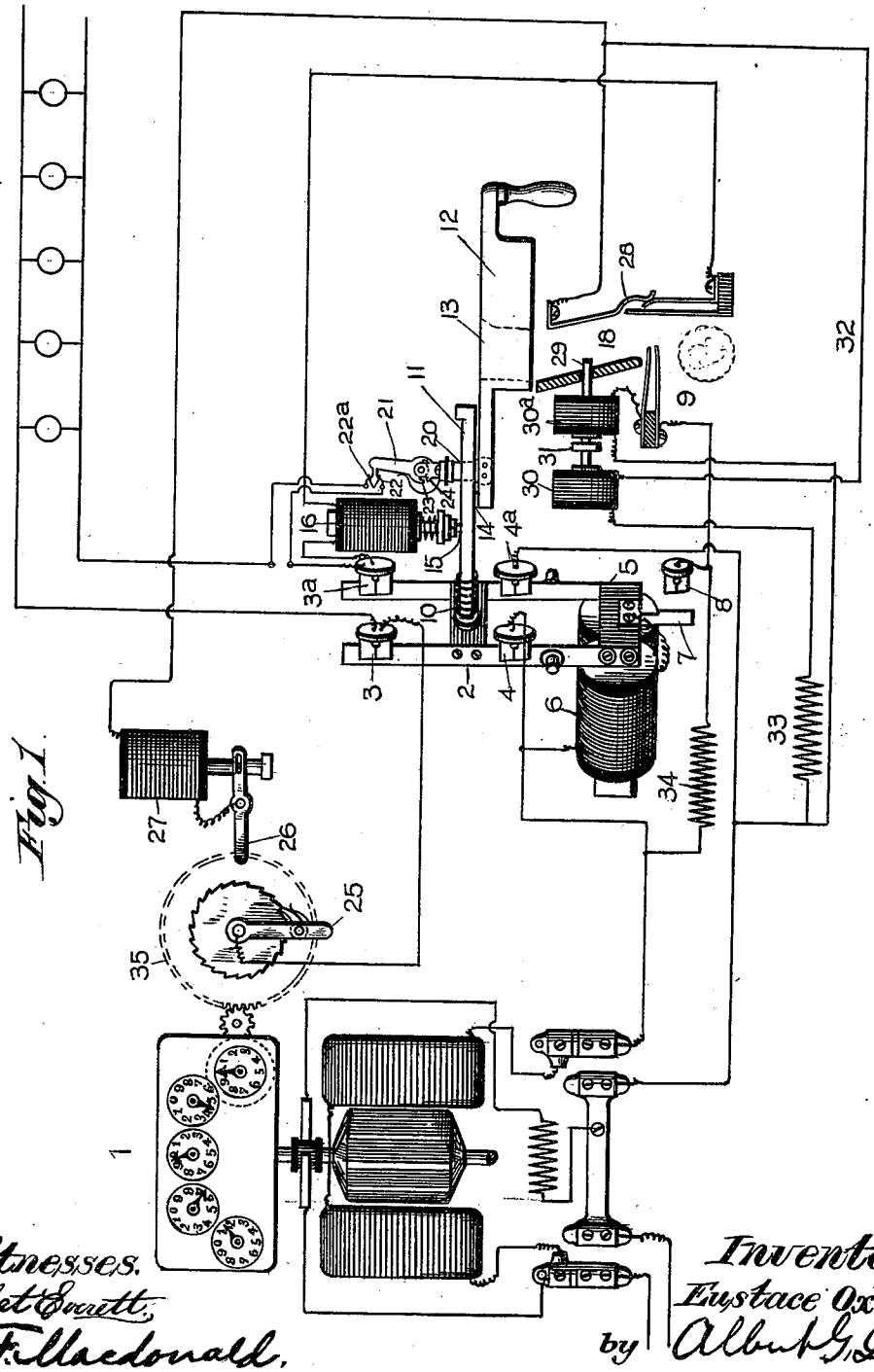

Fig. 1.

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Fig. 2.

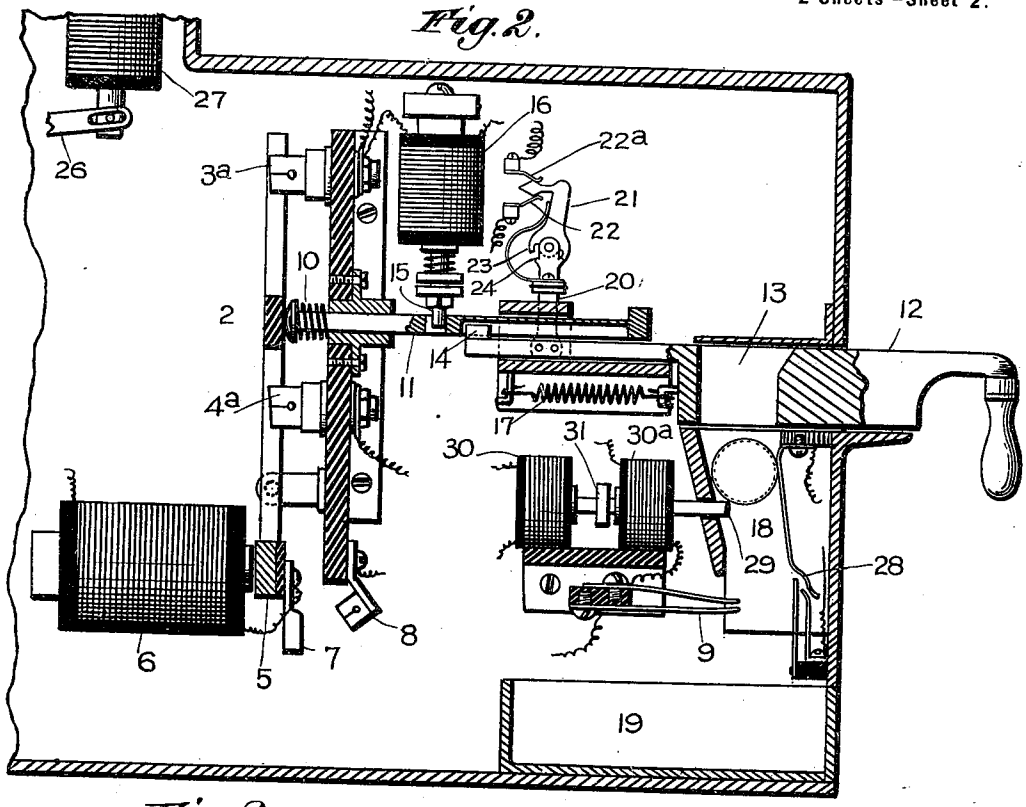


Fig. 3.

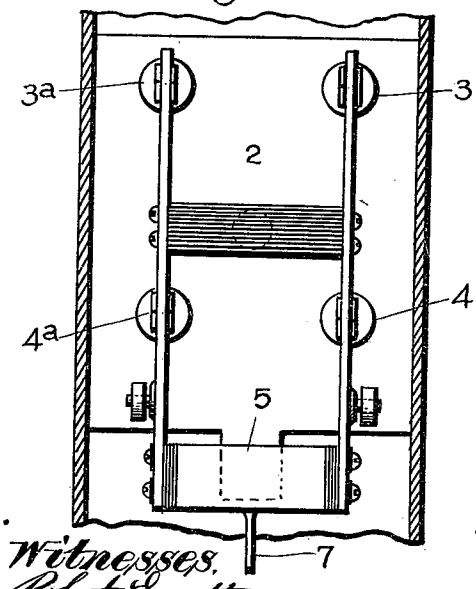


Fig. 4.

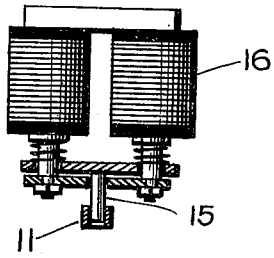
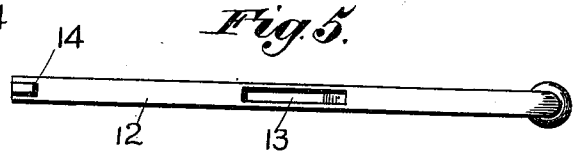


Fig. 5.



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UNITED STATES PATENT OFFICE.

EUSTACE OXLEY, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

PREPAYMENT-METER.

SPECIFICATION forming part of Letters Patent No. 667,138, dated January 29, 1901.

Application filed October 28, 1899. Serial No. 735,072. (No model.)

To all whom it may concern:

Be it known that I, EUSTACE OXLEY, a subject of the Queen of Great Britain, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Prepayment-Meters, (Case No. 973,) of which the following is a specification.

This invention relates to prepayment-meters in which by the deposit of a coin or token connection may be made between supply-mains and a consumer's translating devices for a determinate amount of current, after which the translating devices are automatically cut off from the source of supply. My invention has more particular reference to the type of such devices in which a magnetically-controlled switch is employed. Experiment has demonstrated that a magnet of comparatively moderate power may be relied upon to close the switch, since only the inertia of the parts must be overcome while the armature is farthest from the magnet-poles, and when the contact is effected the pull is sufficiently great by reason of the shortness of the air-gap in the magnetic field; but the magnet, unless of great power and large current-consuming proportions, is unreliable for opening the switch, since its maximum resistance is offered while the armature is farthest from the poles and the air-gap longest.

One of the objects of this invention is to provide a controlling device for the switch which may be operated by power stored by the operation of the consumer in inserting a coin and, further, an organization of the kind in which there is no tendency to throw the switch open after having been once closed by the insertion of a coin until the value of the coin in current shall have been delivered to the consumer.

A further object is to provide for a continuous supply of current so long as the consumer shall have paid for the same and to permit him to prepay, as it were, by inserting a coin before the value of the prior coin shall have been exhausted.

The several features of novelty of the invention will be more fully pointed out hereinafter and will be definitely indicated in the claims.

In the drawings which illustrate my invention, Figure 1 is a diagram of a system embodying my improvements. Fig. 2 is a sectional view of an apparatus embodying the construction of the prepayment device. Fig. 3 is an elevation of the switch. Fig. 4 is a detail view of the releasing-magnet for the switch, and Fig. 5 is a plan view of the operating-handle.

Referring first to Fig. 1, which shows the complete organization of a prepayment-meter embodying my improvements, 1 represents a meter, which may be of any desired type, by which a circuit-breaker may be operated after a determinate amount of electric energy has traversed it. The particular type shown is the Thomson recording-watt-meter, in which a pair of field-magnet coils are connected in series with the consumer's translating devices and an armature is connected in a high-resistance shunt across the mains. Between the series coil of the meter and the translating devices is a two-pole four-point break-switch 2, the blades of which cooperate with clips 3 3^a 4 4^a. The switch-blades carry an armature 5, coöperating with an electromagnet 6, one terminal of the coils of which connects with one side of the circuit and the other terminal with an insulated contact 7, which in the open position of the switch engages a clip 8, connected with the other side of the circuit through a circuit-closer 9, controlled by the coin. Thus it will be seen that in the normal condition of the parts the switch is open and the contacts 7 and 8 are in engagement, permitting the controlling-magnet to close the switch when a coin operates the circuit-closer 9. The opening of the circuit is directly effected by a coil-spring 10, compressed by the act of the consumer in feeding a coin to the apparatus. The mechanism for effecting this operation comprises a moving or sliding rod 11, into a slot in which extends a pin or lug connected with a sliding handle 12. The latter extends out through the side of the apparatus and is provided with a suitable knob or handle to permit it to be conveniently manipulated. When drawn out, a coin-slot 13 of a size to permit the insertion of a coin of the value for which the meter is constructed is exposed,

during which the pin or lug 14 engages the end wall of the slot in the rod 11, drawing the rod forward and compressing the spring 10. When drawn to its full limit, a spring-actuated pin 15, carried by the armature of a release-magnet 16, enters a hole or recess in the rod 11 and locks the spring in a state of compression. A spring 17, connecting the handle with a fixed portion of the casing, returns the latter to the normal position, with the coin-slot in line with a duct 18, leading to a cash-box 19. On a rod or stud 20, secured to the handle, is pivoted a switch-blade 21, the free end of which is adapted to enter and electrically bridge the two terminals 22 22^a. The bridge-piece which connects the terminals 22 22^a is electrically insulated from the handle.

On the pivoted end of the arm which carries the switch-blade is a projection 23, in the path of movement of which is a lug 24, mounted on the supporting-post. A spring, as shown, normally throws the projection away from the lug against a rear stop, the whole constituting a lost-motion connection between the switch and the handle. The object of this organization is to prevent an unscrupulous subscriber from defeating the opening of the circuit by propping the operating-handle in a distended position when the value of the deposited coin has about been exhausted. The device comprises, in effect, a snap-switch which operates every time the handle is drawn out, while the translating devices are drawing current to open the consumption-circuit, thus arresting the supply of current. In other words, the contact 21 is a necessary part of the main circuit, and unless it is in the position shown in Fig. 1 the supply of current to the consumer is interrupted. It is assumed, of course, that the proper coin or token has been deposited and the main switch 2 closed.

The operation of the meter or other device which limits the amount of energy furnished for a coin of definite value closes a circuit through the release-magnet 16 and withdraws the pin 15 from the spring-controlled rod, permitting the release of the spring and the opening of the switch. This device may be variously organized. The organization as shown comprises a circuit-closing arm 25, loosely journaled on the shaft of the gear-wheel 35, operated by the meter. This wheel may be geared to the counting-train. The arm 25 is connected with the wheel by a pawl and ratchet, as indicated, permitting it to move freely in one direction, but forcing it to partake of the movement of the wheel in the other direction. This arm is carried around by the wheel 35 until it passes a little beyond the vertical position, when it falls of its own weight and closes a circuit from the switch-clips 3 to the contact-lever 26, controlled by a solenoid 27, in circuit with which is the release-magnet 16. It will thus be seen that after a determinate amount of energy has been consumed the contacts 25 and 26 will actuate the release-magnet and free the spring 10, thus opening the switch.

In the release-circuit is included a light spring circuit-closer 28, which when a reserve coin is inserted in the slot opens the release-circuit and permits the supply of current to be uninterrupted. This circuit-closer cooperates with a coin-detaining pin 29, the position of which is controlled by two small magnets 30 30^a, the latter in series relation to the circuit-closer 9 and the former with the circuit-closer 26. Thus when a coin is inserted after the meter has been out of action the transit of a coin through the duct is uninterrupted; but when it strikes the circuit-closer 9 it not only energizes the switch-controlling magnet 6, but also energizes the magnet 30^a, drawing the pin 29 by the attraction on the armature 31 into the coin-duct and preventing the transit therethrough of another coin until the energy prepaid has been delivered. Thus a subsequent coin will be held back by the pin 29 and will hold open the light spring 28, thus interrupting the circuit of the release-magnet at a point independent of the circuit-closer 26. When, however, the energy has been delivered as paid for by the previous coin, the closure of the circuit at 26 energizes the magnet 30 over a branch 32, which includes a current-reducing resistance 33. The pin 29 will then be withdrawn from the coin-duct and permit the coin to drop, closing the circuit of the magnet 6, which, however, has its armature drawn to its poles, so that the condition of the supply-circuit remains uninterrupted and the apparatus will continue in the described condition until the arm 25 shall have been shifted once more through its range of movement to close the circuit at 26. When no further coin has been paid to the machine, the release-magnet 16 will draw the pin and permit the spring 10 to force open the switch.

A branch circuit to the circuit-closer 9 and the coin-releasing magnet 30^a, including a resistance 34, is provided around the magnet 6, so that the pin 29 may be withdrawn from the coin-slot on transit of a coin through the coin-duct while the consuming devices are drawing current.

While I have shown in the embodiment outlined in the drawings the meter as inclosed within the same casing as the prepayment device, it might obviously be in a separate inclosure, the wire connections between them being made at suitable terminals.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A prepayment electric meter comprising a coin-controlled circuit-closer between the source and the consumption-circuit, meter-controlled devices for opening the circuit after a definite current consumption, and connections for disabling the latter upon the insertion of a second coin until the value in current has been paid.

2. A prepayment electric meter comprising a coin-controlled circuit-closer between the source and consumption-circuits, meter-controlled devices for opening the circuit after a definite current consumption, a stop in the coin-duct for arresting the second coin, a counting-train, and means geared to the counting-train for withdrawing said stop after the value in current of the first coin has been paid.

3. A prepayment electric meter comprising a coin-duct within a casing, a magnet for closing a switch, a movable handle having a coin-pocket for leading a coin to the duct, a spring-actuated plunger which is independent of the switch, for opening said switch, and meter-controlled devices for regulating the said switch.

4. A prepayment electric meter comprising a coin-duct within a casing, a coin-pocket adapted to introduce a coin thereto, means for moving said coin-pocket to the outside of the casing, a barrier in the coin-duct, a circuit-controller below the same, an electromagnet operated by the meter through a lost-motion device for withdrawing said barrier when the value of the coin has been paid, contacts controlled by the passage of the coin, an electromagnet in circuit with the contacts, and a lost-motion device for completing the circuit of the last-mentioned electromagnet.

5. A prepayment device comprising a coin-duct, a barrier therein introduced by the insertion of a coin, a register-train, and means geared to the register-train of the meter for withdrawing the barrier when value has been paid.

6. A prepayment electric meter comprising a coin-duct, a barrier therein introduced by the insertion of a coin, a circuit-closing switch operated by the passage of a coin, a meter-operated device for opening the switch and withdrawing the barrier at a determinate current value, and independent devices for withdrawing the barrier independently of the switch when a second coin has been paid before the value of the first has been delivered.

7. A prepayment electric meter comprising a coin-operated switch for connecting the source with the consumption devices, a meter-released spring for opening the switch, a handle outside the machine for setting the spring, and an independent circuit-breaker operated by said handle when open.

8. In a prepayment mechanism, the combination of a normally open switch, a magnet for closing the switch, a contact included in the circuit of the magnet which is controlled by the switch, a second contact in the circuit of the magnet which is controlled by a deposited coin, an electrically-controlled barrier for holding back the coins in the chute, contacts for controlling the operation of the barrier, and a magnet for separating the contacts as soon as the circuit is completed.

9. In combination, a switch, a magnet for actuating the switch, the circuit of which is interrupted as soon as the switch moves a certain distance, a coin-controlled contact for completing the circuit of the magnet, a barrier, a magnet for actuating said barrier, a pair of contacts for completing the circuit of the barrier-actuating magnet, and a magnet for separating the contacts.

10. In combination, a switch, a magnet for actuating the switch, which is controlled by the switch itself, a handle for conveying coins into the chute, a barrier for holding back the coins in the chute, means for withdrawing the barrier from the path of the coin, and contacts so located with respect to the chute that coins in traversing the chute will complete the circuit of the magnet.

11. In a prepayment mechanism, the combination of a switch, a magnet for closing the switch, a spring-controlled actuator for opening the switch, which is capable of movement independent thereof, means for setting the actuator, and means for releasing the actuator so that it can open the switch.

12. The combination of a switch, a spring-operated actuator for opening the switch, which is capable of movement independent of the switch, and a coin-controlled device for tripping the actuator.

13. The combination of a switch, a spring-operated actuator for opening the switch, which is capable of movement independent of the switch and is set before the latter is closed, a locking device for holding the actuator against the strain of the spring, and a coin-controlled mechanism for withdrawing the lock.

14. In a prepayment mechanism, the combination of a casing, a sliding handle having a coin-receptacle, which is normally covered by the casing, but is exposed by moving the handle manually, a spring for returning the handle to its normal position and discharging the coin as soon as it is released, a switch, and a switch-opening device which is set in operative position by the handle.

15. In a coin-controlled apparatus, the combination of a casing, a handle having a coin-receptacle which is normally covered by the casing but is exposed by moving the handle manually, a spring for returning the handle and discharging the coin, a switch and a spring-actuator for moving the switch which is set by the handle.

16. In a coin-controlled apparatus, the combination of a switch for closing an electric circuit, coin-controlled means for actuating the switch, and a second switch included in the same circuit as the first, which is opened each time a coin is deposited in the apparatus.

17. In a coin-controlled apparatus, the combination of a switch for controlling an electric circuit, a second switch included in the same circuit with the first, and a coin-carrier which is mechanically connected to one of the switches and is arranged to open the circuit each time it is actuated.

18. In a coin-controlled apparatus, the combination of a switch for controlling an electric

circuit, a second switch included in the same circuit with the first, and a slidable coin-receiver mechanically connected to the second switch and arranged to open the circuit each time it is moved from its normal position.

19. In a prepayment mechanism capable of receiving one or a number of coins, the combination of a circuit, two switches included in the circuit, and means for opening one of the switches each time a coin is inserted in the apparatus, while the other remains closed until the prepaid amount of energy has been delivered.

20. In a prepayment mechanism capable of receiving one or a number of coins, the combination of a circuit, two sets of contacts included in said circuit, switches arranged to engage the sets of contacts, means connected with one of the switches by a lost-motion connection for separating it from the contacts each time a coin is deposited, while the other remains closed until the prepaid amount of energy has been delivered.

21. In a prepayment mechanism, the combination of a moving element controlled by a deposited coin, contacts arranged to complete a local circuit for the purpose of interrupting a second circuit, and a magnet for temporarily withdrawing one of the contacts.

22. In a prepayment mechanism, the combination of a moving element controlled by a deposited coin, a contact moved by the said element, a second contact in the path of the first, and a magnet for separating the two contacts.

23. In a prepayment-meter, the combination of a contact driven by the meter mechanism, a coin-controlled means for controlling the action of the meter, a second contact in the path of the first and assisting to close a releasing-circuit, and a magnet for separating the contacts the instant the circuit is completed.

24. In a coin-controlled mechanism, the combination of a coin-chute, a contact located in such manner that the first coin completes a circuit, and a second contact located in such manner that the second deposited coin holds a circuit open until the value of the first coin has been canceled.

25. In a coin-controlled apparatus, the combination of a moving element, a contact for closing a circuit so located that it is acted upon by a deposited coin, a releasing-circuit controlled by the moving element, and a contact included in the releasing-circuit, which is controlled by the second deposited coin so long as two coins remain on deposit in the apparatus.

26. In a coin-controlled apparatus, the combination of a coin-chute, means controlled by a deposited coin for setting the apparatus into operative condition, a barrier located in the coin-chute for holding the coins, a magnet for moving the barrier into operative relation, and a second magnet for moving the barrier into an inoperative position.

27. In a prepayment apparatus, the combination of a moving element, a coin-chute, a barrier, a contact controlled by the first deposited coin for causing the barrier to move into the chute, and a second contact controlled by the moving element for causing the barrier to be removed from the chute.

28. In a coin-controlled mechanism, the combination of a switch, a device operated by energy stored by the deposition of a coin, which device normally has no tendency to open the switch, and a coin-controlled means for releasing the said device so that it will engage with and force open the switch.

In witness whereof I have hereunto set my hand this 26th day of October, 1899.

EUSTACE OXLEY.

Witnesses:
DUGALD MCKILLOP,
JOHN MCMANUS.