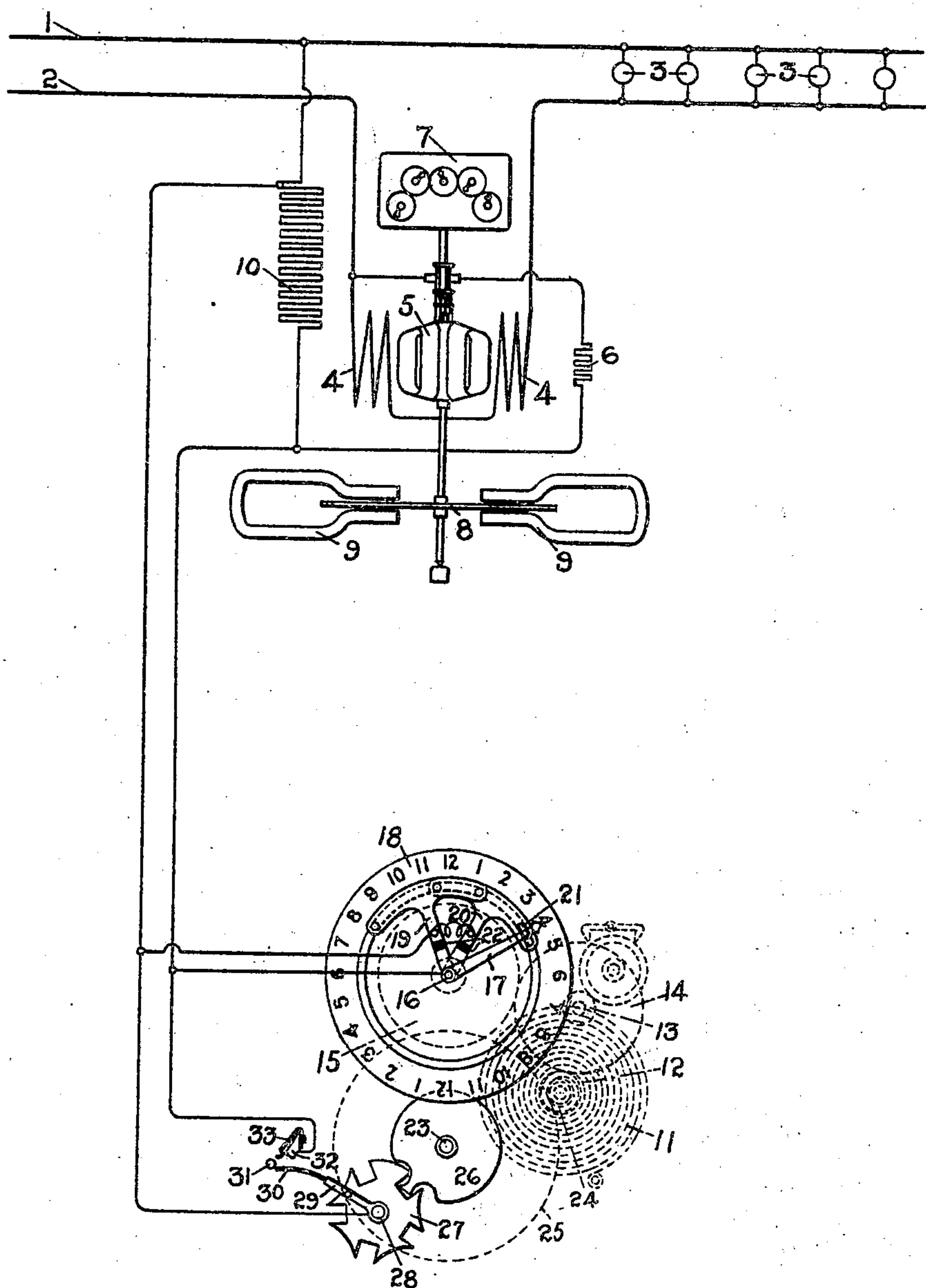


No. 808,279.

PATENTED DEC. 26, 1905.

W. C. FISH.  
MULTIRATE METER.

APPLICATION FILED JUNE 23, 1904.



WITNESSES:

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Att'y.



# UNITED STATES PATENT OFFICE.

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## MULTIRATE METER.

No. 808,279.

Specification of Letters Patent.

Patented Dec. 26, 1905.

Application filed June 23, 1904. Serial No. 213,779.

*To all whom it may concern:*

Be it known that I, WALTER C. FISH, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have  
5 invented certain new and useful Improvements in Multirate Meters, of which the following is a specification.

This invention relates to multirate meters; and its object is to provide an inexpensive  
10 durable device of a purely local character for effecting the change from one rate to another. I accomplish this by using a hand-wound clock mechanism to control the change of  
15 rate and so connecting it that it will effect a high-rate registration, and thereby penalize the customer in case he neglects to rewind the mechanism. I thereby dispense with  
20 auxiliary control-circuits and put the low rate within proper limits under the sole control of the customer, thus obviating any good reason for complaint.

It has been common heretofore to provide a multirate meter with a clock mechanism which at predetermined hours in the diurnal  
25 period changes the manner of metering electric energy by cutting a resistance into or out of series relation to the armature of the meter-motor or by disconnecting one registering-dial from and connecting another to the  
30 meter-shaft or by some other suitable means in order to induce customers to use the electric energy more freely during the period or periods when the load on the generating-station is relatively low. For this purpose it has  
35 been proposed to use hand-wound devices and delegate the rewinding to a station employee; but such a system has the objection of increasing operating expenses and in case of oversight in rewinding leads to complaints.  
40 To avoid this constant expense, multirate meters have been constructed having self-winding clock mechanisms, either within or close beside the casing of the meter, to effect the change from one rate to another. Self-winding  
45 clocks, however, are expensive, and as the mechanism is delicate and intricate they are exceedingly apt to break or get out of order, whereas hand-wound clocks are simple and their manufacture has been so  
50 perfected that they are comparatively inexpensive and can be used for considerable periods without attention.

In order to permit the use of a hand-wound clock in a multirate meter and to avoid the

expense of rewinding by an employee of the  
central station, I have provided means for in-  
ducing the customer to keep the clock mech-  
anism properly rewound. This may be con-  
veniently effected by arranging devices to  
impose a penalty on the customer in case he  
60 neglects to rewind the clock—as, for instance, by throwing the meter to the high-rate side when the mainspring of the clock has run  
down to a predetermined extent and main-  
taining it there until the spring is rewound. 65

My invention therefore comprises a multi-  
rate meter having a hand-wound clock mech-  
anism to effect the change from one rate to  
another and means for inducing the con-  
sumer to keep the mechanism properly  
70 wound by penalizing him on his failure to do so. In the accompanying drawing I have illustrated a means by which this may be accomplished; but it must be understood that the invention is in no way limited to any spe-  
75 cific method of accomplishing this result.

Referring to the drawing, 1 2 indicate supply-mains from a source of electric energy, feeding-lamps 3, or other translating devices. An electric meter is connected between the  
80 source of supply and the lamps, having its field-coils 4 4 in series in one of the service-mains and its armature 5 connected in a shunt across the lines, a resistance 6 being inserted in this shunt to cut down the current  
85 flowing therein. The moving element of the meter is geared to a registering-dial 7 and carries a drag-disk 8, with which the damping-magnets 9 9 cooperate to retard the rotation of the movable element, as is usual in  
90 meters of this type.

In the drawing the means illustrated for effecting the change from one rate to another is a resistance 10, connected in series with  
the armature 5, in addition to the resistance  
95 6, which is permanently in series therewith, and a time mechanism arranged to open and close a short circuit around this resistance 10 at predetermined intervals. It must be understood, however, that the invention is  
100 not limited to this type of multirate meter, as it is applicable generally to those types in which the clock mechanism operates clutches or energizes electromagnets to disconnect  
one registering-dial from the moving element  
105 of the meter and substitute another in its place when the change from one rate to another is to be made, as is well understood in



the art, or to meters in which other means are provided for this purpose.

The means for opening and closing the short circuit around the resistance 10 comprises a hand-wound clock mechanism, preferably an eight-day clock of ordinary construction, having a mainspring 11 driving a train of gears 12 13 14 15 so as to rotate a shaft 16 once in each twenty-four hours. Shaft 16 carries an arm 17, provided with an index on its end, which moves over an annular plate 18, marked with the hours of the day and night. Loosely mounted on shaft 16 are two arms 19 and 20, the ends of which are thin sheet-metal strips of good conductivity. Arm 17 carries a spring-metal brush 21, which is adapted to bear on the ends of the arms 19 and 20 and make electrical connection therewith. Arms 19 and 20 may be adjusted relatively, the thin strip of one arm passing under that of the other, and the two arms may be adjusted together about the shaft 16 in order to make the period during which the brush 21 is in contact with the arms begin and end at the desired hours. Pins may be provided on the under side of arms 19 and 20, extending into a groove in the base on which the annular plate 18 is mounted to hold the arms in any position to which they are moved. In each of the arms 19 and 20 is a section 22 of insulating material, and the outer ends of the arms are connected electrically together and to one side of the resistance 10. The other side of the resistance is connected, through shaft 16 and arm 17, to brush 21, so that while the brush is in contact with the arms 19 and 20 a path is closed around the resistance 10 for the armature-current of the meter-motor, and the meter records at the high rate. During the remainder of the cycle of brush 21 this path is open and the armature-current flows through the resistance 10, which cuts the current down and causes the meter to record at a lower rate. The mainspring 11 of the clock mechanism is also arranged to drive the shaft 23 through the train of gears 24 and 25, and mounted on this shaft is one member of an intermittent gear 26 of the Geneva type. The other member of this gear is a toothed wheel 27, mounted on a shaft 28, on which is also mounted an arm 29, carrying a flexible brush 30. The arrangement of this train of gears is such that the toothed wheel 27 makes less than one revolution while the spring of the clock is unwinding, and the end of one tooth of wheel 27 is made convex, as shown, so as to engage gear 26 and prevent further movement of the clock mechanism. Gears 26 and 27 are so positioned relatively that they arrive at the position illustrated when the spring 11 of the clock mechanism has almost run down, and in this position the brush 30 has engaged an insulating-stud 31 and been put under tension thereby. On fur-

ther movement of the trains of gears brush 30 moves by the stud 31 and snaps into engagement with the contact 32. Beyond this point, however, movement of the parts is prevented by the engagement of the convex tooth of gear 27 with the gear 26. Stud 32 is connected to one side of the resistance 10, and the other side of the resistance is connected, through shaft 28 and arm 29, to brush 30. It will be seen that a path is established around the resistance 10 by the engagement of brush 30 with contact 32 when the clock mechanism has almost run down, thus throwing the meter to the high-rate side, regardless of the position of brush 21 relative to the arms 19 and 20, and that this path around the resistance 10 can only be opened by rewinding the clock mechanism. When the mechanism is rewound, gear 26 rotates the gear 27 in the opposite direction, and a spring-latch 33, secured to the stud 32, again puts the flexible brush 30 under tension, so as to cause a snap-break of the short-circuit around the resistance 10. The purchaser of the energy measured by the meter while brush 30 is in contact with stud 32 is thus penalized for his failure to rewind the mechanism by having to pay for the energy at the high rate, regardless of the time when the energy is used.

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

1. A multirate meter having a clock mechanism to effect the change from one rate to another, and means for imposing a penalty on failure to rewind the mechanism.

2. A multirate meter having a clock mechanism for changing the manner of recording, and means for causing the meter to record at the high rate when the mechanism has run down a predetermined extent.

3. A multirate meter having a clock mechanism to effect the change from one rate to another, and means for causing the meter to operate at the high rate on failure to rewind the mechanism.

4. A multirate meter having a clock mechanism to effect the change from one rate to another, and means operated thereby for rendering the rate-changing devices inoperative after a predetermined operation of the clock mechanism without rewinding.

5. In a multirate meter, a resistance in the armature-circuit, a clock mechanism for closing and opening a short circuit around said resistance, and means for closing a circuit around the resistance on failure to rewind the clock.

6. A multirate meter having a resistance in one of the meter-circuits, a clock mechanism, devices operated thereby for closing and opening a short circuit around said resistance, and means operated after a predetermined movement of the clock mechanism without rewinding for closing a circuit around said re-



sistance regardless of the position of said opening and closing devices.

5 7. A multirate meter having a resistance in one of the meter-circuits, a clock mechanism, devices operated thereby for closing and opening a short circuit around said resistance, and means for rendering said circuit-opening devices ineffective when the clock mechanism has run down a predetermined extent.

10 8. A multirate meter having a resistance in one of the meter-circuits, a clock mechanism for closing and opening a short circuit around said resistance, and means for rendering said circuit-opening devices ineffective  
15 after a predetermined operation of the clock mechanism without rewinding.

9. In a multirate meter, a resistance in one of the meter-circuits, a clock mechanism for closing and opening a short circuit around  
20 said resistance, and means for effecting a quick closure of a circuit around the resist-

ance on failure to rewind the clock mechanism after a predetermined operation thereof.

10. A multirate meter having a resistance in one of the meter-circuits, a clock mechanism for closing and opening a short circuit  
25 around said resistance, means for closing a circuit around the resistance on failure to rewind the clock mechanism, and means for effecting a quick break of said circuit when  
30 the clock mechanism is rewound.

11. A multirate meter having a clock mechanism to effect the change from one rate to another, and means for effecting a penalizing record on failure to rewind the mechanism.  
35

In witness whereof I have hereunto set my hand this 21st day of June, 1904.

WALTER C. FISH.

Witnesses:

DUGALD McK. McKILLOP,  
HENRY O. WESTENDARP.