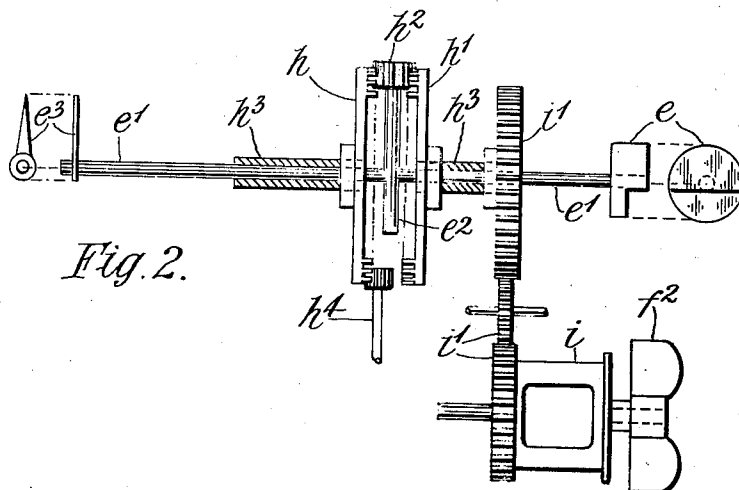
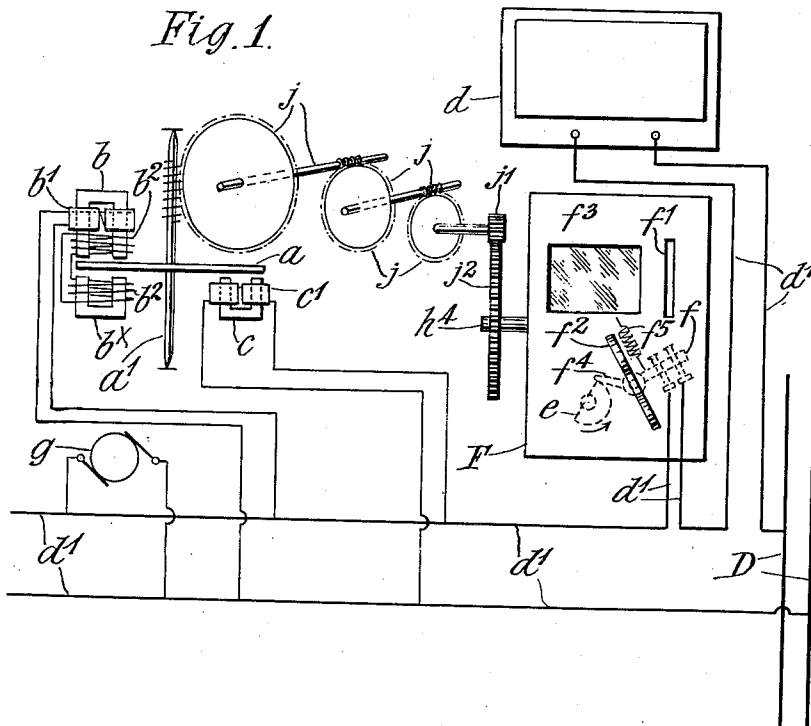


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ELECTRIC PREPAYMENT SUPPLY SYSTEM

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ELECTRIC PREPAYMENT SUPPLY SYSTEM

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This invention has reference to pre-payment electric supply systems, and to coin-slot apparatus for use in connection therewith.

One object of the invention is to provide a system which will, after the insertion of a coin, permit the supply of current only during a pre-determined time, and quite irrespective of the actual amount of current used.

10 Thus in a circuit where the wiring has been done on the hire-purchase system, or a vacuum cleaner, electric geyser or other appliance has been installed on similar terms, the arrangement will serve as a collecting box or
15 register for the weekly or other instalments, and if the hirer fails to keep up the payments by the insertion of the necessary coin or instalment periodically, then the circuit is interrupted automatically at the end of
20 the period last paid for, and remains broken until restored by the insertion of a fresh coin or coins. The actual consumption of energy is measured by a separate meter of any suitable kind, used in combination with the coin-
25 slot apparatus. The system works however, independently of the current used, and still operates to break the circuit at the end of the pre-paid period even if no current has actually been used.

30 In this way the use of the system provides an incentive to the user or hirer to keep up his payments regularly even if he should not be requiring to make use of the circuit, or the appliances hired, during the period covered
35 by the instalment. Moreover the apparatus will serve both as an instalment register and a collecting box, so that it will only be necessary for a collector to call, say, once a quarter to take out the coins, instead of having to call for them each week for instance.

According to the invention, the time-limit device or interrupter is so arranged that after a pre-determined time, a fresh coin must be inserted to obtain a supply whether any current has been used or not. For this purpose the apparatus comprises in combination, an ordinary energy meter and an automatic switch or interrupter provided with a timing device for opening it after a pre-determined period, say a week for instance, although in

some cases (such as when applied to a geyser) the period may be only a quarter of an hour for example. The timing device may comprise a constant-speed motor or a clock-work arrangement, and be coupled to the switch by mechanism which, after one run, is re-set for a further run simply by the insertion of another coin and the closing of the switch.

In order that the invention may be clearly 60 understood and readily carried into effect, reference will now be had by way of example to the accompanying diagrammatic drawings, in which:

Fig. 1 illustrates one arrangement of a system such as referred to, intended chiefly for collecting weekly instalments.

Fig. 2 illustrates in principle, the essential part of the coin-slot mechanism which is employed. 70

The left-hand portion of Fig. 1 represents the timing device or constant-speed motor. The right-hand portion shows the coin-slot mechanism which may be of any suitable known construction and contains the automatic interrupter or switch and its controlling cam. The middle portion represents the reducing gear which serves to connect the switch-control cam with the timing motor, and is so adjusted that the said motor will have to run say for a week in order to turn back or reverse the control cam by the same amount which it has been put forward (or wound up) on the insertion of the coin or coins. At the bottom is indicated an ordinary 85 consumer's circuit, the supply to which is to be pre-paid for a certain time.

The timing mechanism illustrated resembles in general arrangement, a disc motor such as used in electric meters. a is the disc; 90 b b' the actuating or driving magnets, and c the brake magnet, these magnets being laminated in the ordinary way.

d^1 d^2 are the consumer's mains. In these are included an ordinary meter d for meas- 95 uring the actual energy consumed, such energy being delivered by the supply mains D . e represents the automatic-control cam, which is driven slowly from the timing motor a and allows the switch f to spring open 100

after a pre-determined interval and interrupt the current to the apparatus to be controlled, such as a domestic motor *g* or a set of lamps.

5 In order that the speed of the disc motor *a* may keep practically constant and that it may be independent of ordinary working fluctuations in the supply voltage or potential, the magnets *b c* may have their exciting coils *b¹ c¹* connected in shunt across the consumer's mains *d¹*. Thus if the potential drops and slightly reduces the force of the actuating magnets, this is compensated for by the brake magnet *c* being correspondingly weakened at the same time, and hence the speed of
10 the disc *a* is not materially affected.

The magnets *b b^x* have (in the ordinary way) a closed-circuit winding *b²* which, like a transformer winding, is energized from the shunt winding *b¹* and sets up the necessary phase-reaction.
20

The coin-slot mechanism illustrated will now be briefly described for the sake of clearness, although its construction is not part of the invention. This mechanism is provided with a casing *F* having the usual coin slot *f¹*, the winding handle or key *f²*, and a window *f³* through which the counter or dial is read. Internally (as in Fig. 2) it comprises
25 an epicyclic or differential toothed gear *h h¹ h²* for working the switch-control cam *e*. This cam *e* is mounted at one end of a main spindle *e¹* from which extends a radial arm *e²* carrying the planet pinion *h²* of the differential gear. At the other end of the main spindle *e¹* is the pointer *e³* of the dial.
30

The two opposed discs or crown-wheels *h h¹* of the differential gear are carried by sleeves *h³* free to turn on the spindle *e¹*. The right-hand disc *h¹* is geared as shown by a suitable set of tooth wheels *i¹*, with the coin-receiver or "drum" *i*. When a coin is inserted into the latter through the slot *f¹*, and the key *f²* is turned in the usual way, the switch *f* closes and completes the circuit. At the same time the drum *i* imparts a partial turn to the disc *h¹*, which causes the planet pinion *h²* and arm *e²*, to travel forward with it, so turning the spindle *e¹* and putting the cam *e* into
35 the position for keeping the switch closed.

During this motion of the pinion *h²*, the other disc *h* remains stationary. Said disc *h* is however geared through a pinion *h⁴* and the reducing gear *j*, etc. (see middle of Fig. 1) to the timing arrangement *a*. Consequently when the control switch *f* is closed, the current starts the motor disc *a* and the latter very slowly turns the disc *h* in the opposite direction to that in which the disc *h¹* was
40 turned, so causing the planet pinion *h²* and the arm *e²* to travel back towards its original position.

In this movement the radial arm *e²* turns the spindle *e¹* and control-cam *e* back to the point where, after the lapse of the period of
45

time which has been paid for, the said cam *e* releases the tail or catch *f⁴* of the switch *f*, thus allowing the latter to be opened by a spring (such as *f⁵*) so interrupting the supply of current.

The reducing gear *j* which connects the disc *a* and its spindle *a¹* with the coin-slot mechanism does not call for special mention, beyond the fact that where the time period to be prepaid is a long one (such as a week) it is of a very high ratio, so that for instance after the motor disc *a* has run for a week, the cam *e* will only make a half turn. Between this gear and the coin-slot mechanism are interposed removable wheels or change-gears *j¹ j²* which can be changed when the rate of working is to be altered. This may be necessary when the meter is to be adjusted to take coins of a different value, or is intended to allow a different length of supply for the same kind of coin.
70 75 80 85

For direct-current working, the plain disc *a* may be replaced by one having a suitable winding of the known kind and a 3-part commutator, the operating current being that of a dry-cell for instance, or one derived at very low voltage by tapping a section of one of the mains on the potentiometer principle. In such a case the disc may rotate in the field of a permanent magnet, instead of the electro magnets *b b^x* of Fig. 1.
90 95

When the system is used for certain purposes, such as for controlling the supply to an electric geyser (as for instance in hotels to enable the guests to prepay for the use of a bath) the time interval required to be covered may only be relatively short, for instance a quarter of an hour. In these cases any convenient clock-work arrangement (such as that of an alarm clock) may be used in place of the motor or disc *a*. Also the switch *f* may be made correspondingly stout or heavy to take the rather large currents which have to be dealt with in a geyser or heater. The clock-work is made so that it may be re-wound by the opening of the switch or turning of the key *f²* and be started by the closing of the switch *f*.
100 105 110

In some cases the apparatus may be made to collect arrears of instalments. To this end the timing device may be arranged to still remain in circuit when the switch opens at the end of the pre-paid period. This may be provided for either by connecting the said device directly in shunt across the leads in advance of the switch, or by providing special contacts on the latter. With such an arrangement the planet pinion goes on turning backward beyond the position at which the switch normally opens. Consequently for resuming the supply two or more coins (representing the arrears) have to be inserted before the pinion regains that position, the handle or key being of course turned after the insertion of each coin.
115 120 125 130

Obviously the above arrangements may be modified in various ways according to circumstances in carrying out the invention, without departing from the general nature thereof.

5 We claim:

1. In an electric supply system, a consumer's circuit, an energy-meter for measuring the consumption in said circuit, a coin-controlled switch which both opens and closes
10 said circuit, a constant-speed motor having its windings constantly in shunt across the mains, and means actuated by said motor for causing said switch to open the consumer's
15 circuit after a predetermined time whether any current has been consumed or not, substantially as described.

2. In an electric supply system, a consumer's circuit provided with a meter, a coin-controlled switch for closing said circuit for
20 a predetermined time corresponding to the value of the coin but independent of the amount of current used, and a constant-speed electric motor to open said switch after such
25 predetermined time, said motor having its actuating and braking magnets in shunt across the consumer's mains, whereby the time that the switch remains closed is independent of fluctuations in the supply voltage as
30 well as of current consumption, substantially as described.

In testimony whereof we affix our signatures.

ROBERT HORNBY.

35 EDWARD HOWARD WRATTEN.