Dec. 6, 1938. H. R. SMITH 2,139,523

COIN CONTROLLED REFRIGERATING MECHANISM

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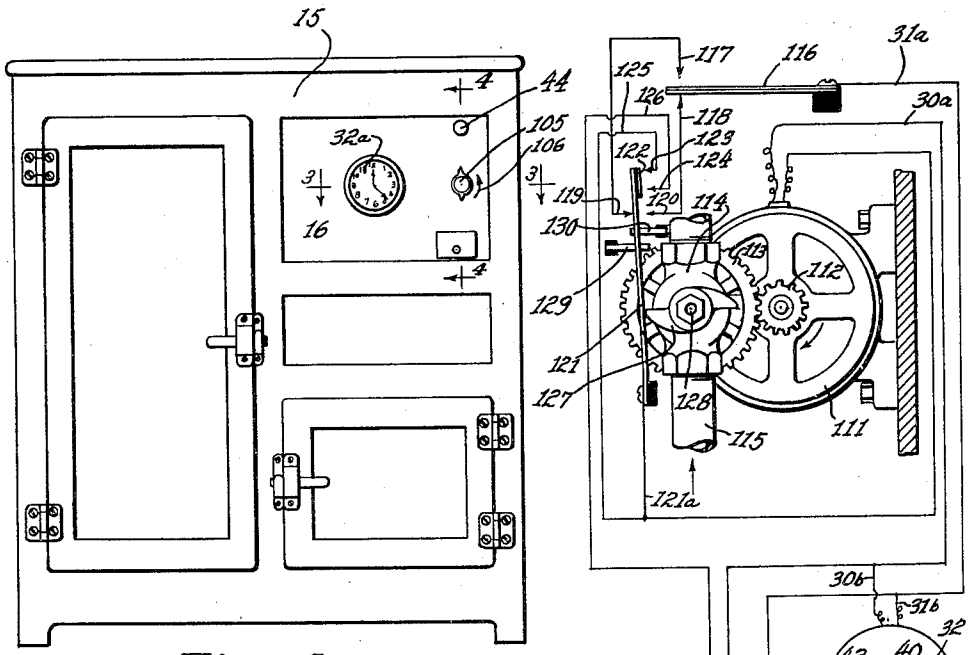



Fig. 1.

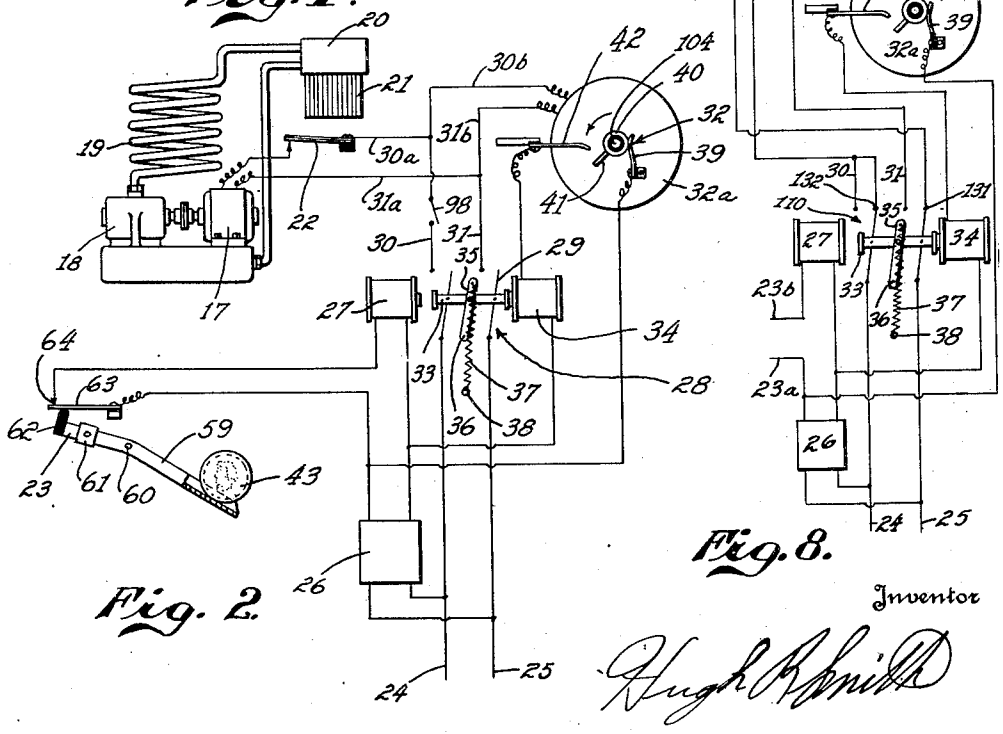



Fig. 2.

Fig. 8.

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COIN CONTROLLED REFRIGERATING MECHANISM

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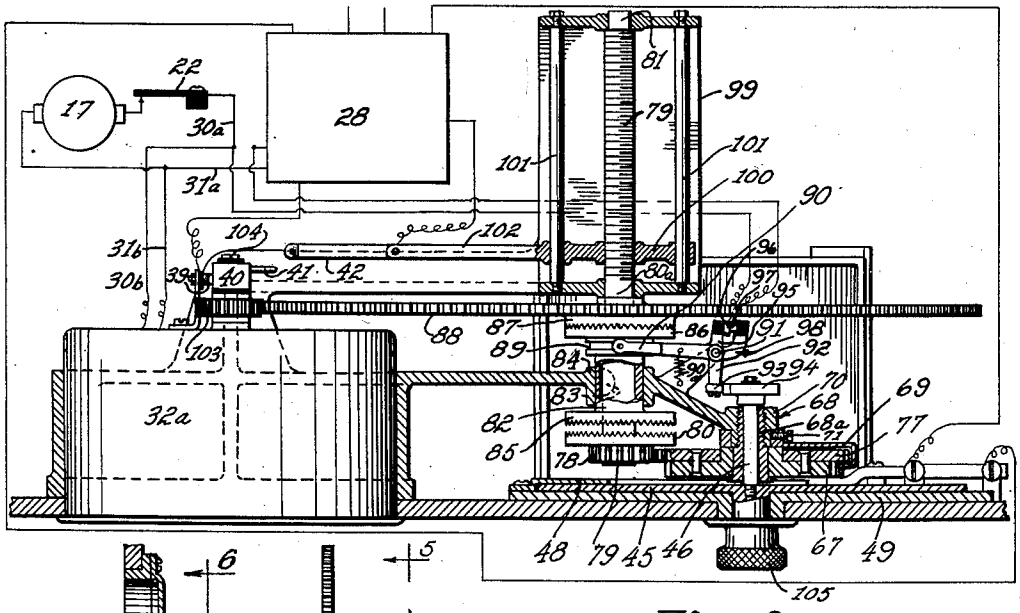



Fig. 3.

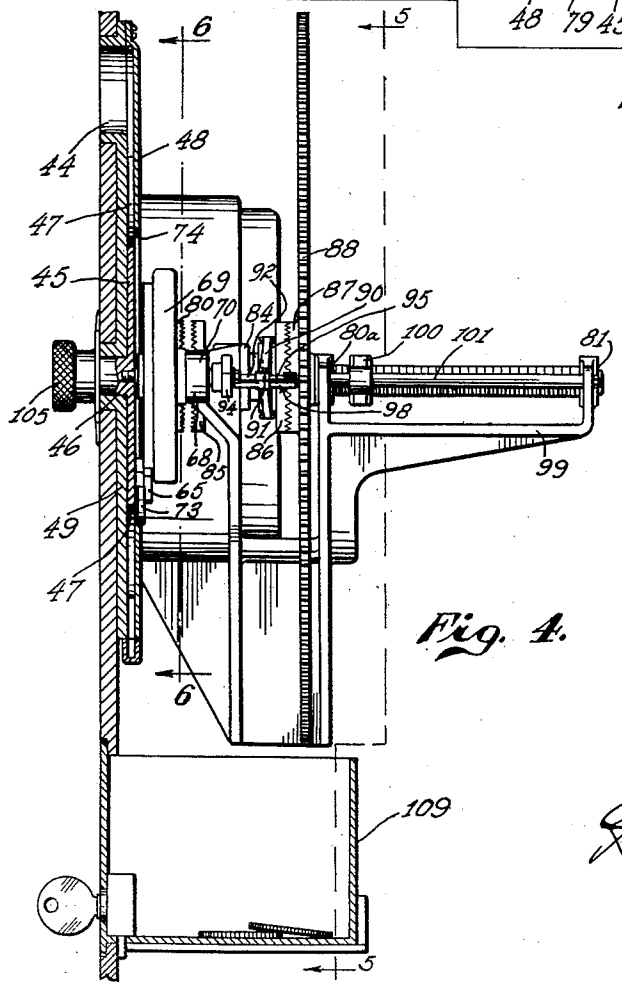



Fig. 4.

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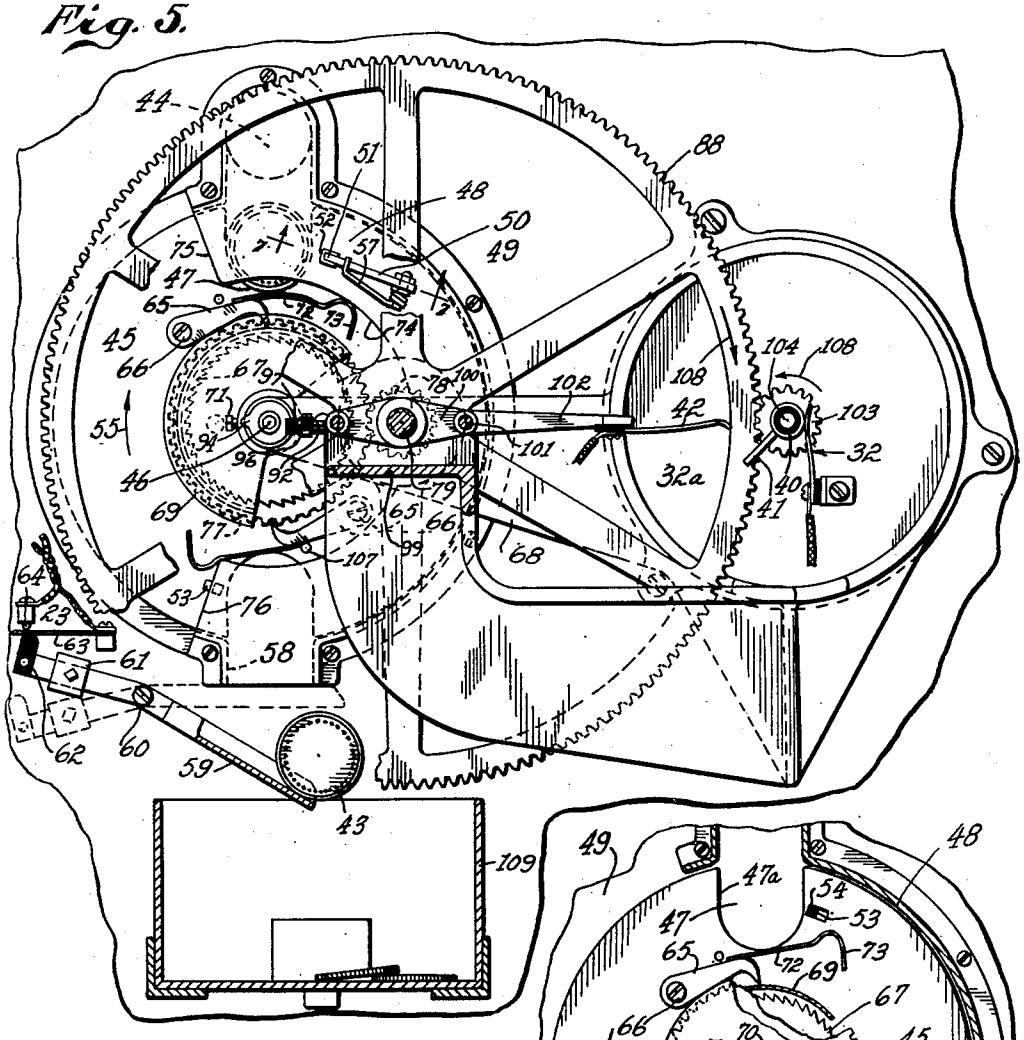
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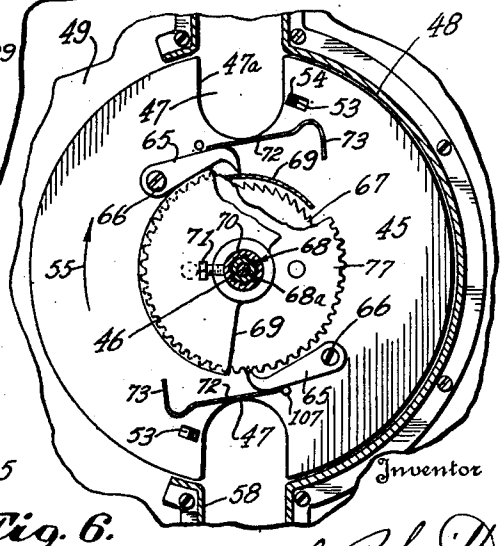
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COIN CONTROLLED REFRIGERATING MECHANISM

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Fig. 5.



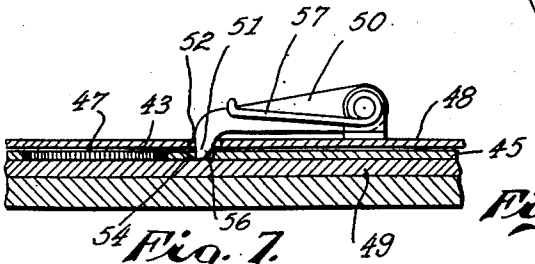




Fig. 7.

Fig. 6.

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Patented Dec. 6, 1938 2,139,523

# UNITED STATES PATENT OFFICE

2,139,523

## COIN CONTROLLED REFRIGERATING MECHANISM

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Application August 2, 1930, Serial No. 472,699

20 Claims. (Cl. 194—9)

This invention relates to automatic control means for refrigerators and has for its particular object the provision of a coin operated mechanism which will control a refrigerator in an efficient and reliable manner for home use.

It also has for its object the provision for such a mechanism which may be loaded with a number of coins and will operate automatically in accordance with the natural requirements of refrigeration for the duration of time which the coins deposited represent.

It has for a further object the provision of such a mechanism which will permit a variation in running time for a given coin deposited in accordance with the operating expense and capacity of the refrigerator and which will operate reliably and continuously over a long period of time.

The provision of a coin device which is particularly adaptable to the needs of such service is another feature of my invention.

As a further object, it provides for such a mechanism as will be fool-proof, serviceable and incapable of unauthorized adjustment. With this and other objects in view the invention consists in the combination, correlation and construction of parts, members and features which will be described in the specification and will be finally pointed out in the claims.

Referring to the drawings:

Figure 1 is an illustration of a refrigerator in which my invention has been embodied. Figure 2 is a diagrammatic view of the basic operating elements of a portion of my invention. Figure 3 is a fragmentary section on line 3—3, Figure 1 with diagrammatic showing of other parts of the invention. Figure 4 is a fragmentary section on line 4—4 of Figure 1. Figure 5 is a section on line 5—5 of Figure 4, parts being broken away for clearness of illustrations.

Figure 6 is a section on line 6—6 of Figure 4. Figure 7 is a section on line 7—7 of Figure 5. Figure 8 is a detailed diagrammatic view of the application of my invention to a gas operated refrigerator.

Referring to Figures 1 to 8 inclusive:

15 illustrates a refrigerator case a section 16 of which is adapted to house the power and refrigerating unit and the automatic control mechanism. The former may consist of prime mover 17, a compressor 18, a cooling coil 19, expansion chamber 20 and refrigerating coils 21 connected in the usual manner. In the drawings the prime mover 17 is an electric motor controlled by a thermostatic switch 22, sensitive to the variations in the temperature within the refrigerator, controlling the supply of electric current to it in accordance with the requirements thereof.

A coin controlled switch 23 connects the feed wires 24 and 25 through a transformer 26 to a magnet 27, comprising a portion of a relay 28. The relay 28 comprises a two pole switch 29 connected to the feed wires 24 and 25 and adapted to connect these wires with wires 30 and 31 respectively, leading through wires 30*a* and 31*a* to the prime mover and through wires 30*b* and 31*b* to a timing device or clock 32*a* adapted to operate the switch 32. The clock 32*a* is thus connected in parallel with the prime mover, 17.

The thermostatic switch 22 is interposed in either one of the lines 30*a* or 31*a*. The armature 33 of the relay 28 is adapted to be operated by the magnet 27 and an opposed magnet 34 and is linked to a bar 35 pivoted at 36 which is retained in either of its extreme positions by a spring 37 fastened at a point 38 located on the bisector of the angle of throw of the bar 35 beyond the pivot at 36.

The magnet 34 is connected in series with the clock-operated switch 32 and in parallel with the magnet 27. The clock operated switch 32 comprises a brush 39 operating upon a slip-ring 40 with which is connected a contact arm 41 which intermittently is adapted to make contact with contact strip 42.

The general operating scheme of this portion of the mechanism may be described as follows:

A coin 43 dropped through an appropriate mechanism actuates the switch 23 to energize the magnet 27 from the feed wires 24 and 25. The armature 33 is thus pulled towards the magnet 27 closing the switch and thus connecting the wires 24 and 25 with the wires 30 and 31 respectively, energizing the prime mover 17 through the thermostatic switch 22 and likewise the clock 32*a* which serves to actuate the clock operated switch 32. After a predetermined period of operation rotation of the contact arm 41 brings it in contact with the contact strip 42 to close a circuit from the feed wires 24 and 25 and the transformer 26 through the magnet 34 to pull the armature 33 in a direction to break the switch 28, breaking the contact between the feed wires 24 and 25, and the prime mover 17 of the refrigerating unit.

Means for delivering a coin to the coin controlled switch 23 is interconnected with the clock actuated switch 32 in a manner not illustrated in Figure 2, but which is shown in the details of the other figures and which will now be described:

An opening is provided at 44 in the refrigerator

casing for the reception of a coin of preselected denomination. Below this opening a coin delivery and carrier disc 45, mounted upon a rotatably mounted shaft 46, is provided with a pair of coin receiving recesses 47, at 180 degree positions. One of these recesses is normally positioned just below the opening 44, the other just above the coin operated switch 23. The coin drops into the first recess by gravity and discharges from it also by gravity upon reaching its opposite position. A shield 48 mounted upon the frame 49 retains the coin in the carrier disc until it reaches the switch 23.

Upon the shield is mounted a spring detent 50, the point 51 of which passes through an opening 52 in the shield 48 and is adapted to enter depressions 53 on the face of the carrier disc 45 when the disc is in coin receiving position. The entering face 54 of the depression 53 is tapered outward so that the disc may be turned in the direction shown by the arrow 55. The slanted rear face 56 of the detent permits reverse motion of the disc. The detent is held toward the disc by a spring 57 and acts to assure accurate positioning of the carrier disc.

Suitable safety and protective devices may be introduced to insure against fraudulent operation of the coin device. The shield 48 is provided with a discharge chute 58 at the bottom, to which the coin is delivered and through which it drops by gravity to the switch 23. Intermediate the chute 58 and the switch 23 may be interposed devices for testing the coin in various ways: by weight, magnetically; by contour, by elasticity, by size, thickness and diameter, as well as by devices to eject spurious coins and other unauthorized coins or material, to the end, that none but the proper type and denomination of coin will reach the switch 23 for the operation thereof.

These devices in themselves are well known in the art and are illustrated only in general by the provision of a weight testing device forming a part of the switch 23. The coin drops from the chute 58 into one end of a troughed lever 59 pivoted at 60 to the frame. The opposite end of this lever carries a weight 61 for partially balancing the coin and a contactor 62. If the coin is sufficiently heavy it will overbalance the weight 61, tilt the troughed end of the lever downward, and thus raise the contactor 62 to force the switch spring 63 against the contact 64 and close the circuit through the magnet 27.

To set the clock operated switch 32 the coin carrier disc 45 carries two pawls 65 pivoted thereto as at 66 at 180 degrees apart. These pawls co-operate with a ratchet 67 rotatably mounted concentric with the disc 45 on a bushing 68a through which the shaft 46 passes. The bushing is carried in an extension 68 of the frame 49. A portion of the teeth on the periphery of the ratchet is protected by a shield 69 adjustably mounted concentric with the ratchet on the hub 70 of the extension 68 to which it is locked with a set screw 71. Each of the pawls 65 is provided with a spring 72 fastened thereto and provided with an end 73 adapted to co-operate with the inside face 74 of the shield 48, and the ends 75 and 76 thereof which serve as cams to urge the pawls 65 resiliently through the springs 72 toward the shield 69 and the ratchet 67, during a portion of the revolution of the coin carrier disc, and to release them respectively.

Fastened to the ratchet 67 is a gear 77 which meshes with another gear 78 mounted for free rotation upon a screw shaft 79. One member 80 of a toothed clutch is attached to the gear 78 and is rotatable therewith. The screw shaft 79 extends through bearings 80a and 81 and through a clutch sleeve 82 to which it is slidingly keyed by key 83. The clutch sleeve 82 is journaled at 84 in the frame extension 68 and carries a toothed clutch member 85 for co-operation with the member 80. At the other end sleeve 82 is provided with a similar toothed member 86, for co-operation with a toothed clutch member 87 which is attached to a gear 88 and also mounted with the gear for free rotation upon the screw shaft 79. Intermediate the clutch members 85 and 86 the clutch sleeve 82 is provided with a pair of spaced opposed collars 89 for the reception of a shifter yoke 90. The yoke is pivoted at 91 on the frame extension 68 and is of the form of a bell crank having an arm 92 carrying a roller 93 for co-operation with a cam 94 on the shaft 46. Another arm 95 carries a switch contact 96 to contact with a stationary contact 97 on the frame and comprising the switch 98. A tension spring 90a holds the roller always against the cam.

The bearings 80a and 81 are portions of a bracket extension 99 of the frame 49. Between them the screw-shaft 79 is threaded for the reception of a nut 100. This nut is guided and prevented from rotating by guide rods 101 affixed to the frame and passing through bores in the nut. The nut carries a contact arm 102 which carries the contact strip 42.

The timing device or clock 32a has a gear 103 attached to its drive-shaft 104, which meshes with the gear 88. The slip-ring 40 is also attached to the clock shaft 104 and is energized by the brush 39 and connected to the rotating contact arm 41.

Operation is as follows: A coin of the proper denomination is inserted at the opening 44 and the knob 105, attached to the carrier disc 45 and shaft 46 (Fig. 3), is rotated as shown by the arrow 106 (Fig. 1). This rotates the disc 45 and the pawls pivoted thereto as shown by the arrow 55 (Figs. 5 and 6). The shield 69 is so adjusted that a certain period of lost motion takes place prior to the upper pawl 65 striking the ratchet 67, as illustrated in Fig. 6. This lost motion may be adjusted to give variable travel to the ratchet 67 corresponding to the prescribed motion of the coin carrier disc 45.

During this lost motion period the cam 94 also rotates and the spring 90a pulls the clutch yoke 90 downward as viewed in Fig. 3 meshing clutch members 80 and 85 and releasing members 86 and 87, thus clutching gear 78 to the screw-shaft 79 and releasing gear 88 therefrom. This movement of the yoke 90 pulls the contacts 96 and 97 apart, opening the switch 98 and disconnecting the power from the motor 17, thus stopping the refrigeration during the operation of inserting a coin. This is to prevent the holding of the clutch open between the gear 88 and screw-shaft 79 by a partial rotation of the knob and consequent operation of the refrigerator without corresponding operation of the clock-operated switch driven by gear 88.

After the pawl 65 drops over the shield 69 and meshes with the ratchet 67, the ratchet 67, gears 77 and 78 and the screw-shaft 79 are all connected and continued rotation will therefore carry the nut 100 along the shaft. The threads are left-handed to carry the nut upward as viewed in Fig. 3.

Continued rotation of the knob brings the coin opposite the chute 58. At this position, the

spring 72 on the pawl 65 which has been driving the ratchet drops off the end 76 of the shield 48, releasing the pressure on the pawl and permits it to drop by gravity against the pin 107. At the same point the detent 50 drops into the depression 53. At this point also the cam 94 again forces roller 93 to the left as viewed in Fig. 3, disengaging clutch members 80 and 85 and engaging members 86 and 87 to connect gear 88 to the screw-shaft 79. The switch 98 is also closed by the yoke movement so that the coin, when it drops through the chute and trips the switch 23, is effective to start the operation of the refrigerator and timing device as described previously.

As gear 88 is now connected to the shaft 79 and the rotation of the clock-drive shaft 104 and gear 103 are as shown by the arrows 108 in Fig. 5 the screw-shaft 79 is turned in the opposite direction to that of its motion due to the turning of the knob 105 and the nut is moved downward in Fig. 3 so that contact 42 approaches the path of rotating contact 41. On contact of 41 and 42 the refrigerating mechanism is stopped by breaking the circuit to the motor through relay 28, as previously described.

It will be seen that coins may be inserted at any time whether the machine is operating or not and that each coin inserted will cause the nut 100 and contact 42 to be moved a definite distance further along the screw-shaft 79 up to the limit of its length, and that a correspondingly lengthened time period will elapse before the motor is shut off.

It will further be noticed that the last coin passing through any testing devices interposed between the chute 58 and the switch 23 finally starts the motor. Suitable devices well known in the art may be interposed whereby spurious coins will lock the mechanism against operation, such as a spurious coin operated relay similar to the combination of switch 23 and relay 28 operating a main switch.

After passing through the switch 23 the coins may be received in any suitable lock box, such as 109.

In case a coin is not inserted the detent 50 will drop into the open coin recess 47 and strike the side 47a thereof stopping further rotation of the disc 45. This will likewise be the case if the coin is too thin or of too small diameter. The face 56 permits return of the disc for the correct insertion. The amount of motion thus allowed is not sufficient to carry the pawls 65 beyond the shield 69 so no motion of the gearing occurs.

The spring pressure on the pawls is sufficient to carry the ratchet both backwards and forwards so that it is impossible to ratchet the turning device forward by oscillating the knob 105 with a coin in place at a point beyond the shield.

In Fig. 8 is shown another application of my invention to a gas operated refrigerator. In this case an exactly similar coin mechanism is used. The coin switch is connected to the wires 23a and 23b in the same manner as shown and described for Fig. 2. Magnets 27 and 34 operate armature 33 to effect operation of switch 110 which is similar to switch 28 with the exception that it is a double throw switch.

One side makes connections between wires 24 and 30 and 25 and 31. These wires serve the same type of circuit as before described, supplying power to the timing mechanism 32 and motor 111. This motor has a pinion 112 to drive a gear 113 for operation of a rotary valve 114 controlling flow of the gas, which in this case is the source of power, through the supply pipe 115. The thermostatic switch 116 for automatic control is connected in the line 31a and operates between contacts 117 and 118 connected to contacts 119 and 120 respectively. A switch bar 121 operates between the contacts 119 and 120. It likewise carries a bar 122 insulated from it for connecting two contacts 123 and 124 feeding lines 125 and 126 respectively. Bar 121 is energized by a wire 121a connecting it to line 125 which forms part of the circuit through the motor 111. A cam 127 is mounted on the control shaft 128 of the valve 114 and actuates the switch bar 121. This bar is of spring construction and is resiliently detained in its two positions by detents 129 and 130 to give it a "snap-over" action. Line 126 forms one point of the other side of switch 110 at contact 131 and the other point 132 is connected to line 30.

Operation is as follows: The switch is shown in the stopped position. Coin insertion energizes the magnet 27, throws switch 110 to the left energizing lines 30 and 31, 30a and 31a and 30b and 31b and starts the timing device 32a. Lines 125 through the motor and the line 121a and switch bar 121 are also energized. In the position of the bar 121 shown, the contact 119 becomes live and 117 connected therewith. As the refrigerator warms up switch 116 will contact at 117 completing the circuit and starting the motor 111 which through its gearing actuates the valve 114. After a quarter revolution which opens the valve the pressure of the cam 127 is sufficiently relieved to allow the spring of the bar 121 to overcome detent 129 and snap over energizing contacts 120 and connecting 123 and 124. Operation of thermostatic switch 116 will then alternately open and close the valve 114 by controlling the circuit through the motor 111 until the timing device energizes the magnet 34 as previously described. Then if switch 116 is down (as shown) no action takes place. If it is raised against contact 117 in response to temperature rise in the refrigerator, the circuit is complete through contacts 131 and lines 30, 125 and 126 to 132 through the motor 111 which will operate until the valve is closed.

Having thus described my invention I claim:

1. In combination with an electrically operated mechanism and a source of current supply, controlling mechanism therefor including: a timing device, a switch member rotated by said timing device, a second switch member adapted to be moved into and away from operative relation with said first switch member, means for positioning said second switch member, connecting mechanism associated with said timing device and said second switch member adapted to move said second switch member into operative relation with said first switch member, electrical contacts controlled by said switch member, a connection to the electrically operated mechanism and the source of current supply, whereby closing of said contacts will control said mechanism, and coin actuated mechanism initiating the operation of said controlling mechanism responsive to the depositing of a coin therein.

2. A device as described in claim 1 in which the positioning means includes a rotatable member, and means for translating rotary motion of said member to linear motion of one of said switch members.

3. An automatic operating device for a power operated refrigeration mechanism including a coin actuated switch, means for delivering a coin

to said switch, a source of power, means for controlling said source of power connected to said switch, a timing device, a pair of secondary switch members adapted to control said source of power and actuated by said timing device, and a clutch mechanism cooperative with said coin delivery means whereby one of the secondary switch members is connected to said coin delivery means and adapted to be positioned by operation thereof.

4. Coin control means including a source of power, a motor, a coin delivering means, a switch operable by a coin delivered by the delivering means, a timing device, a second switch, mechanism operated by said coin delivery means for setting said second switch, means operable by said timing device for closing said second switch, and electrical connections between said switches, the source of power and the motor.

5. A coin control means as described in claim 4 including a clutch interposed between said timing device and said coin delivery means, and means cooperative with said coin delivery means to actuate said clutch.

6. A coin control means as described in claim 4 including a ratchet device interposed between said setting mechanism and said coin delivery means, a clutch interposed between said timing device and said coin delivery means, and means cooperative with said coin delivery means to actuate said clutch and ratchet device.

7. A coin controlled refrigeration mechanism including a source of energy, energy transforming means adapted to utilize such energy, coin operated means, master control means actuated thereby for controlling said energy supply, a time operated mechanism, means connecting the master control means therewith whereby said energy supply is shut off at a predetermined time period, means for varying said time period, and said last-named means, including a setting mechanism adapted to set said time operated mechanism for varying the shutting off of said energy supply by predetermined time intervals operable upon each deposit of a coin for delivery to said coin operated means.

8. A device as described in claim 7 in which said setting mechanism includes a rotary member and a switch contact positioned thereby.

9. A coin control refrigeration mechanism including a source of energy, energy transforming means adapted to utilize such energy, coin operated means, master control means actuated thereby for controlling said energy supply, said master control means including two co-operative mechanisms, a time operated mechanism, means connected with said time operated mechanism for actuating one of said cooperative mechanisms at a predetermined time, a setting device operatively connected with the other of said co-operative mechanisms for setting thereby to vary such time of actuation of said first mechanism whereby the time of operation of said control means is dependent upon the relation of said time operated time mechanism with said setting device.

10. In combination, a power operated mechanism provided with an electric motor, and a source of power, coin operated controlling mechanism governing the supply of energy from said source of power to said motor, including a switch, a timing device, coin actuated means for closing said switch, means for automatically opening said switch comprising a rotatable member connected with said timing device for regulation thereby, an auxiliary switch actuated by said rotatable member, electromagnetic means controlled by said auxiliary switch to actuate said opening means, and setting mechanism associated with said coin actuated means and said automatic opening means, operable to vary the time of opening of said switch by said opening means upon the depositing of additional coins in said coin actuated means.

11. In combination, a power operated mechanism provided with an electric motor, and a source of power, coin operated controlling mechanism governing the supply of energy from said source of power to said motor, including a switch, an electrically operating timing device controlled by said switch, coin actuated means for closing said switch, means for automatically opening said switch, connected with said timing device for regulation thereby, and setting mechanism associated with said coin actuated means and said automatic opening means, operable to vary the time of opening of said switch by said opening means upon the depositing of additional coins in said coin actuated means.

12. A coin operated device including a main switch, a solenoid for moving the switch in one direction, a coin controlled switch means for controlling the energization of the solenoid, a second solenoid for moving the main switch in an opposite direction, and a time controlled switch means for energizing the second solenoid including a set of switch contacts, means responsive to the delivery of a coin for moving one of the contacts away from the other contact, and means responsive to the passage of time for moving one of the contacts toward the other.

13. A coin operated device including a main switch, electromagnetic means for opening and closing the main switch, a time controlled switch means for controlling the energization of the electromagnetic means to open the main switch, said time controlled switch means including a set of switch contacts, coin controlled means for moving one of the contacts away from the other and for controlling the energization of the electromagnet means to close the main switch, and time controlled means for moving the switch contacts closer together.

14. In electrical refrigeration apparatus, the combination, with a compressor motor, of a timing motor, means automatically actuated by insertion of a coin for conditioning the circuit for starting both motors at the same time, means for shutting off both motors at the same time after a predetermined period of time has elapsed, and means for shutting off the compressor motor before the end of such period without shutting off the timing motor.

15. In electrical refrigeration apparatus, an electric circuit, a compressor motor in the circuit, a timing motor in the circuit in parallel with the compressor motor, a main switch in the circuit in series with both motors, a solenoid in the circuit in parallel with the main switch, means for causing the timing motor to open the main switch after a predetermined period of time has elapsed, means for causing the solenoid to close the main switch when energized, and a coin-controlled switch in the circuit in series with the solenoid for energizing the latter to close the main switch and place the apparatus in operation.

16. In electrical refrigeration apparatus, an electric circuit, a compressor motor in the circuit, a timing motor in the circuit in parallel

with the compressor motor, a main switch in the circuit which is adapted to be opened by the timing motor after a predetermined period of time has elapsed, which switch is connected in series with both motors, a solenoid which is adapted to close the main switch, and a coin-operated switch which is adapted to close the circuit of the solenoid when operated.

17. In electrical refrigeration apparatus, an electrical energy supply circuit, a compressor motor energized from the supply circuit, timing means including a constant speed electric motor for controlling the time period of operation of the apparatus, coin-actuated means variably controlling the operating period of the timing means in accordance with the number of coins successively employed, and a main switch operatively connected with the timing means for simultaneously controlling operation of the compressor and timing motors.

18. In electrical refrigerating apparatus, an electrical energy supply circuit, timing means automatically actuated by insertion of a coin and including a constant speed electric motor energized from said circuit for controlling the time period of operation of the apparatus, a compressor motor energized from said circuit, a main switch associated with the timing means for controlling simultaneously the electrical energy supply to the compressor and timing motors, and a separate switch for automatically controlling in response to refrigeration requirements operation of the compressor motor independently of the timing means.

19. In a coin operated device adapted for immediate successive reception of a plurality of coins, a constant speed motor, a switch for controlling an electric circuit, switch operating means comprising a member movable in opposite directions into positions respectively effective for causing opening of said switch and enabling closing of said switch and maintaining it closed, a shaft rotatable in opposite directions and having driving connection to said member effective for moving the latter in opposite directions, drive means normally providing driving connection between said motor and said shaft for continuously driving the latter in one direction for moving said member toward switch opening position, and means supplementary to said drive means comprising pawl and ratchet setting means actuated responsive to insertion of a coin and having operative connection to said drive means for momentarily disabling said driving connection and rotating said shaft in the opposite direction a predetermined distance for each successively inserted coin.

20. In a coin operated device adapted for immediate successive reception of a plurality of coins, a constant speed motor, a switch for controlling an electric circuit, switch operating means comprising a member movable in opposite directions into positions respectively effective for causing opening of said switch and enabling closing of said switch and maintaining it closed, a shaft rotatable in opposite directions and having driving connection to said member effective for moving the latter in opposite directions, drive means normally providing driving connection between said motor and said shaft for continuously driving the latter in one direction for moving said member toward switch opening position, and setting means supplementary to said drive means actuated responsive to insertion of a coin and having operative connection to said drive means for momentarily disabling said driving connection and rotating said shaft in the opposite direction a predetermined distance for each successively inserted coin.

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