

Nov. 21, 1950

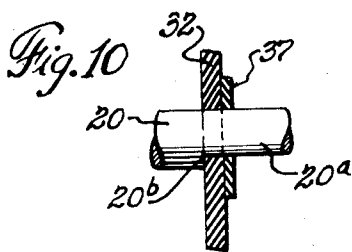
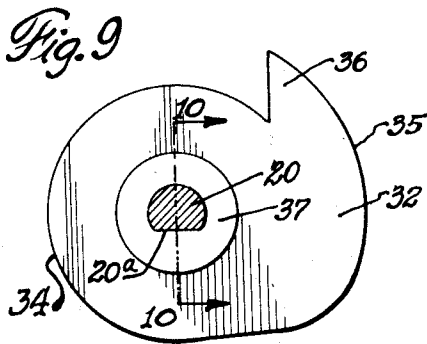
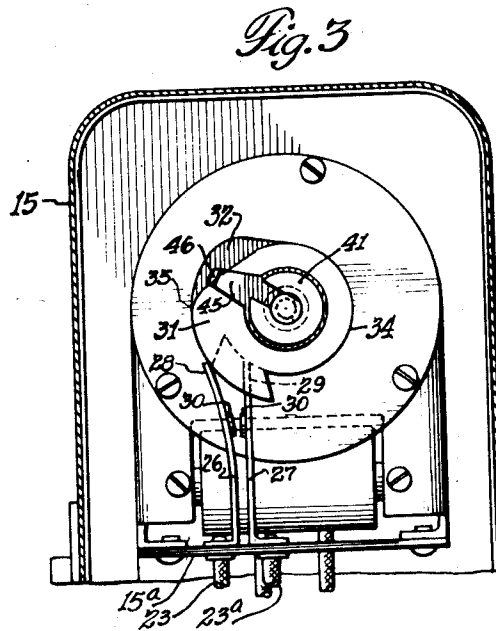
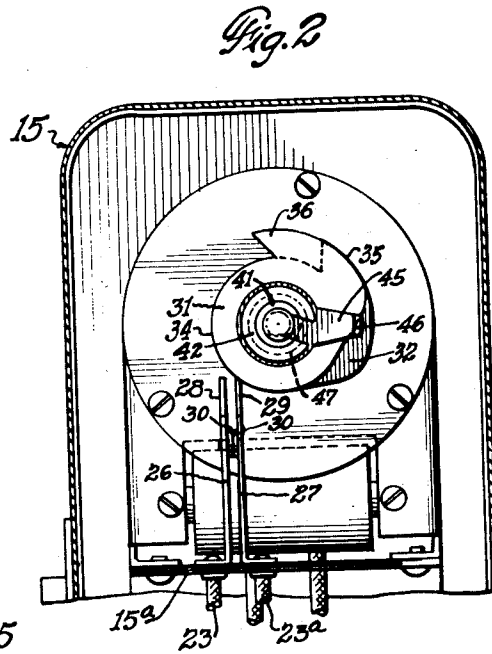
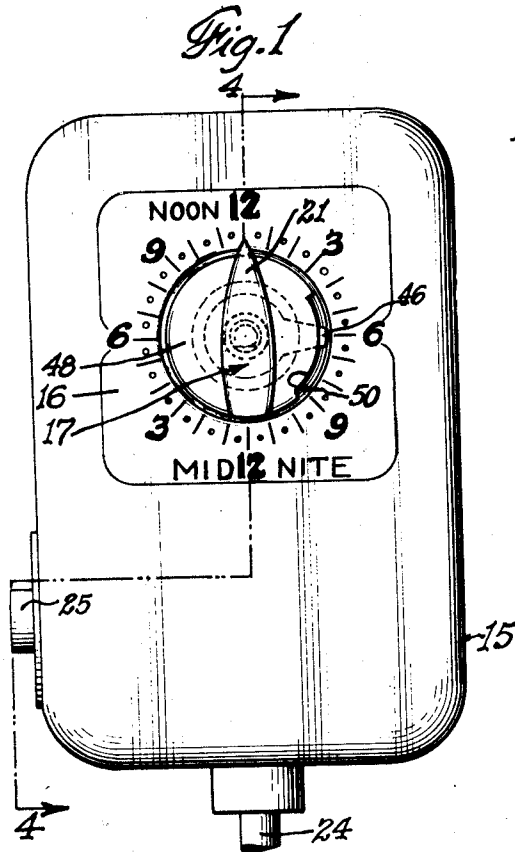
D. MORRISON

2,530,985

TIMER FOR AUTOMATICALLY DEFROSTING REFRIGERATORS

Filed Sept. 24, 1948

2 Sheets-Sheet 1



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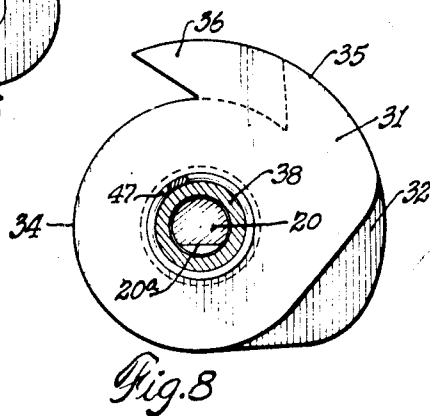
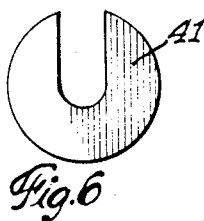
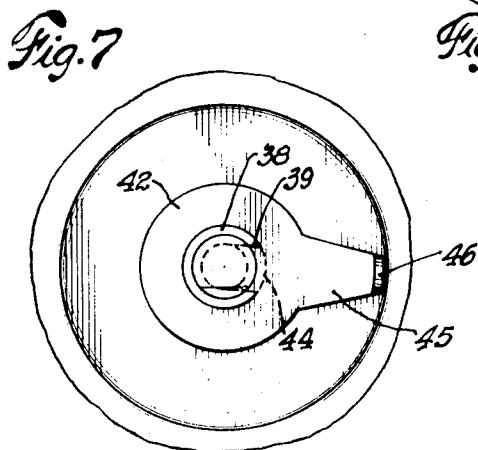
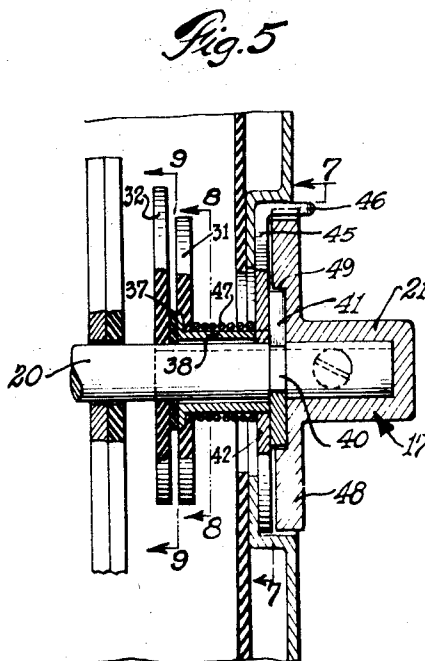
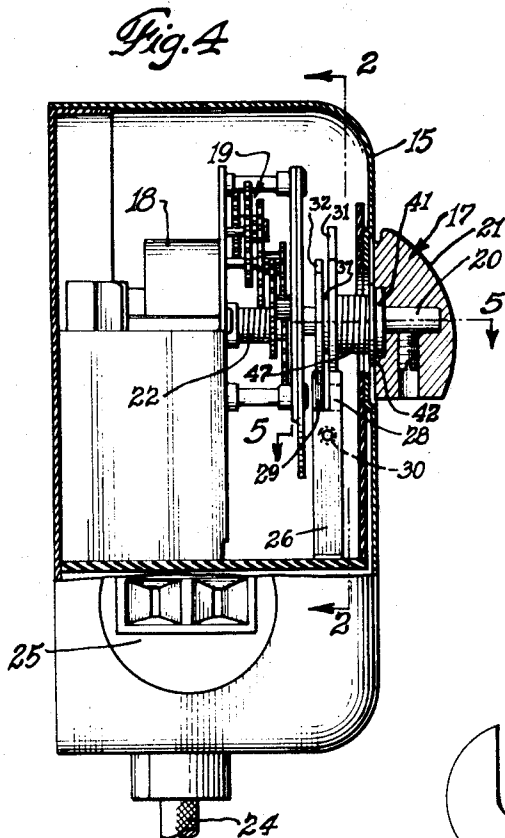
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TIMER FOR AUTOMATICALLY DEFROSTING REFRIGERATORS

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2 Sheets-Sheet 2



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TIMER FOR AUTOMATICALLY DEFROSTING REFRIGERATORS

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6 Claims. (Cl. 200—38)

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Refrigerators require defrosting from time to time, preferably often enough to prevent the accumulation of thick icy coatings; electric refrigerators being at the present time commonly provided with switches which the users open whenever it is desired to defrost, and which, in some devices, automatically close after a predetermined period of time has elapsed.

The object of the present invention is to make defrosting automatic at regular intervals so that the housewife or other person responsible for taking care of a refrigerator is relieved entirely of the duty of turning the current off and on.

Viewed in one aspect, my invention may be said to have for its object to create a simple, novel, and reliable timer for bringing about automatic defrosting of a refrigerator indefinitely, at regular time intervals.

Viewed in a specific aspect, the present invention may be said to have for its object the creation of a simple and novel timer provided with a continuously operating motor which shall be adapted automatically to open the electric circuit of a refrigerator at regular, predetermined times and to keep it open for a predetermined period, which shall be reliable in operation and require little or no attention, and which may be quickly and easily adjusted, both as to the length of the defrosting period and the times at which such period is to begin.

Viewed in still another aspect, my invention may be said to have for its object to produce a simple and novel switch mechanism capable of effecting quick openings and closings of a circuit and, in the preferred form, of varying the time interval between an opening and a closing operation.

The various features of novelty whereby the present invention is characterized will hereinafter be pointed out with particularity in the claims, but, for a full understanding of the invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is a front view of a timer embodying the present invention; Fig. 2 is a section on line 2—2 of Fig. 4, so far as the casing is concerned, whereas the mechanism within the casing is in elevation except for the pointer, which is omitted; Fig. 3 is a view similar to Fig. 2 showing the parts in positions occupied when the switch is open; Fig. 4 is a section on line 4—4 of Fig. 1, the lower part of the casing being in elevation; Fig. 5 is a section on a larger scale, on line 5—5

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of Fig. 4; Fig. 6 is a face view of a disc-like locking key used on the cam shaft; Figs. 7, 8 and 9 are sections taken, respectively, on lines 7—7, 8—8 and 9—9 of Fig. 5; and Fig. 10 is a section on line 10—10 of Fig. 9.

In the drawings, 15 represents a suitable casing having on the front side a dial 16 and a rotatable pointer 17 for cooperating with the dial. The dial is shown as suitably graduated for use with a pointer that makes one revolution in twenty-four hours; but it will of course be understood that an instrument may be made wherein the pointer turns more rapidly or more slowly, in which case the dial will be designed to fit the cycle chosen. For the sake of brevity the detailed description will be confined to the particular form shown.

A suitable electric motor 18 is mounted in the casing and, through a gear train 19, drives a shaft 20 that protrudes through the front wall of the casing. A pointer 17, that may be moved by hand, is firmly fastened to the protruding end of the shaft, preferably in a manner that permits it to be detached from the latter. The shaft is connected to the gear train in some conventional manner that permits it to be turned by the pointer while the gear train is stationary. For a reason that will hereafter become clear, the pointer should have the capacity to turn the shaft in one direction only, namely that in which the motor turns it when running. In the arrangement shown, I employ the common one-way clutch construction containing a coiled spring that tightens on and locks two coaxial shafts together when it is attempted to turn them relatively to each other in one direction, but allows free relative movements in the opposite direction; spring 22 being such a spring. The permissible movements of the pointer and the shaft 20, as viewed in Figs. 1, 2 and 3, are in the clockwise direction only, which is the direction in which the motor turns the shaft.

Current for both the motor 18 and an electric refrigerator is brought into the casing through a cable 24, the casing having a receptacle or outlet 25 into which a cable, not shown, leading to the refrigerator may be plugged. In the refrigerator circuit, of which wires 23 and 23^a form a part, is a switch that is mounted in the front part of the casing below the shaft 20. This switch comprises two like spring fingers 26 and 27, anchored at their lower ends to a transverse partition 15^a in the casing, and rising in spaced, parallel relation toward shaft 20 at some distance from a vertical plane containing the axis of this shaft;

the plane in which the fingers move during the opening and closing of the switch being at right angles to said axis.

The upper ends 28 and 29, respectively, of fingers 26 and 27 are narrowed so as to be spaced apart a little in the direction of the length of the shaft. The fingers are provided with contact pieces 30, below the narrowed sections, for engagement with each other. The parts are so proportioned that these contact pieces are firmly pressed together in closed-circuit position by the fingers when the fingers are left free to do so.

On the shaft are two disc-like electrically non-conductive cams 31 and 32 which preferably are duplicates of each other. Cam 31 is in a plane that intersects the narrow upper end 28 of finger 26, whereas cam 32 bears the same relation to the upper end 29 of finger 27. The low part 34 of each cam is an arc of a circle, somewhat greater than a semicircle, in the arrangement shown; the radius of this circle being such that the low part of each cam comes close to or barely touches the switch finger with which it cooperates. The high portion 35 of each cam is another, shorter arc of a larger circle, merged gradually at the leading end into the low part and terminating abruptly at the other end at the tip of an undercut nose-like section 36. Cam 32 is secured to the shaft so as to be compelled to rotate therewith. As best shown in Figs. 9 and 10, the shaft is flattened for some distance inwardly from its outer end, the flattened part 20^a meeting an abrupt shoulder 20^b at its inner end and the cam 32 is perforated with an opening having a configuration of the cross-section of the shaft portion 20^a so as to rotate with same. A washer 37, pressed onto the shaft portion 20^a, holds the cam 32 in place and serves as a spacer between the same and cam 31. As best shown in Fig. 5, cam 31 is fast on one end of a long flanged sleeve or bushing 38 that constitutes a hub therefor. In the forward end edge of this sleeve is a wide notch 39. The bushing, with the cam attached thereto, is rotatable in either direction on the shaft.

The shaft contains a circumferential groove 40 at the forward end of sleeve 38. When the washer-like key 41 shown in Fig. 6 is engaged in this groove it locks the cams against movement lengthwise of the shaft. Surrounding sleeve 38, just inwardly from key 41, is a washer-like cam-adjusting member 42 provided with a lug 44 that is set in notch 39, as best seen in Figs. 5 and 7. Formed as part of member 42 is a radial arm 45 the free end 46 of which is bent up to provide a manually operable finger piece. Surrounding sleeve or hub 38 is a stiff coil spring 47, under initial compression, and bearing at one end against cam 31 while its other end thrusts against cam-adjusting member 42. Thus member 42 is pressed firmly against key or abutment 41 while cam 31 is pressed against cam 32, or rather, the spacer 37 between the two cams. Therefore considerable frictional resistance must be overcome before cam 31 can be turned relatively to cam 32. However, the coil spring 47 is not influenced by this friction because the parts in contact with the ends of the spring turn in unison and carry the spring along with them.

Pointer portion 21 is a projecting rib or ledge on the front face or side of a thick disc 48. In the rear face of this disc is a recess 49 wherein the key or abutment 41 is nested. In the edge

of this disc is an arcuate notch 50 of considerable angular width; the notch being sufficiently deep to allow finger piece 46 to extend through and be freely movable within the same.

It will now be evident why the shaft must always turn in one direction only. The noses 36 on the cams would catch on the switch fingers and perhaps damage the same if the shaft were turned in the counterclockwise direction.

It is apparent that when the shaft turns in the clockwise direction, starting with the parts in the positions which they occupy in Fig. 2, the upper ends of the switch fingers are simply pressed toward the left by the high portions 35 of the cams 32 and 31, first finger 27 and then finger 26, so that the switch remains closed until one of the fingers, namely finger 27, is released and snaps back into its normal upright position while the other finger 26 is still riding on the high portion 35 of its cam 31, as in Fig. 3, for example; there being a quick breaking of the circuit. The parts are so proportioned that when the little finger piece 46 of the cam-adjusting member 42 is at the lower end of notch 50 as viewed in Fig. 1, the two cams 31 and 32 are in exact registration with each other, the tip of one nose 36 being aligned with the tip of the other. As the finger piece 46 of the cam-adjusting member 42 is shifted along the notch 50, the nose on cam 31 travels backward or in anti-clockwise rotation, moving the tips of the noses farther and farther apart; the angular width of the notch determining the greatest extent of such separation. With the cams registering; the switch remains closed during the whole twenty-four hours, for all practical purposes; that is because the contacts 30 of switch fingers are in engagement with each other, during the rotation of the cams, and at the instant that both drop off the high sections 35 of their respective cams and presumably remain so during and after the drop. When cam 31 is shifted so as to lag a little behind cam 32 then, once in every twenty-four hours, finger 27 drops off the high section of cam 32 while finger 26 is still riding on the high section of cam 31, thus opening the switch as in Fig. 3. The length of time that the switch remains open may therefore be anything from zero to a predetermined maximum. The switch again closes with a snap action when finger 26 snaps off of the tip of the nose of cam 31 and causes its contact 30 to sharply strike and engage the contact 30 on finger 27.

It is thus a very simple matter to achieve the most advantageous length of defrosting period in each individual case. The user needs only to make a tentative adjustment and vary the time a little one way or the other, from day to day, until the most satisfactory defrosting period is attained.

With the pointer 17 and cams 31 and 32 preset in their relative positions shown in Figs. 1 and 2, and with the pointer 17 and dial 16 synchronized with the time of day, the defrosting period will start after midnight at about 1:30 a. m. and will end when finger 26 is released from the high portion 35 of cam 31.

Although the primary purpose of my improved timer is for defrosting refrigerators, it is obvious that the principle thereof may be used wherever similar functions are to be carried out by a timer device.

While I have illustrated and described with particularity only a single preferred form of my

invention, I do not desire to be limited to the exact details thus illustrated and described, but intend to cover all forms and arrangements that come within the definitions of my invention constituting the appended claims.

I claim:

1. In a timer, a switch comprising two long spring fingers, anchored at one end, that contact each other whenever left free to do so, a rotatable shaft near said fingers and at right angles to the plane in which the fingers move as the switch opens and closes, a pointer on one end of the shaft, a pair of like cams on said shaft, each finger having at its free end a part that rides on one of the cams, each cam having a low section that leaves the corresponding finger free and a high section that presses that finger farther away from the shaft, the advance ends of the sections merging gradually into the low sections and the trailing ends of said high sections terminating abruptly, a motor for turning the shaft in one direction only, and a gear train, including a one-way clutch, connecting the motor to the shaft; whereby the clutch at all times allows the shaft to be turned in said direction by the pointer, independently of the motor, and at all times prevents the shaft from turning in the opposite direction relatively to the motor.

2. A timer as set forth in claim 1, wherein one cam is fixed to the shaft, means frictionally holding the second cam on the shaft, while allowing angular movement thereof relatively to the other said one cam when a predetermined turning force is applied, and wherein a finger piece is operatively connected to the second cam to transmit that turning force to the same.

3. In a timer, a switch comprising two long spring fingers, anchored at one end, that contact each other whenever left free to do so, a rotatable shaft near said fingers and at right angles to the plane in which the fingers move as the switch opens and closes, a pair of like cams on said shaft, one cam being fixed on the shaft and the second cam being frictionally held so as to yield under a predetermined turning force in either direction and move angularly relatively to the first cam, a manually operable part on the second cam for applying thereto such a turning force, a pointer on one end of the shaft, each finger having at its free end a part that rides on one of the cams, each cam having a low section that leaves the corresponding finger free and a high section that presses that finger farther away from the shaft, said high sections being of the same radius to cause the fingers to remain in contact with each other while engaged with the high sections of the cams, a motor adapted to run continuously in one direction, and a connection between the motor and the shaft to allow the shaft to be turned in said direction either by the motor, to open and

close the switch, or by the pointer, independently of the motor, to set the timer and determine the angular position of the shaft at which the switch opens.

4. In a timer, a shaft, a switch beside the shaft, two switch-operating cams on the shaft, one of the cams being fixed on the shaft and the second cam being loose, said shaft having an external removable abutment at some distance from the second cam, a hub on the second cam extending into the vicinity of said abutment, a compression spring surrounding said hub and bearing at its ends against the near side of the second cam and said abutment, respectively, to press the second cam into frictional engagement with the first cam, and a finger piece attached to the said hub for turning the second cam relatively to the other cam, a motor, a gear train, including a one-way clutch, that constantly maintains a connection between the motor and the shaft for driving the latter in one direction only, and a pointer on the shaft to turn it in said direction independently of the motor.

5. A timer as set forth in claim 4, wherein the hub has in its free end edge a notch and wherein the finger piece is part of and radiates from a washer-like piece provided with a lug that is entered in said notch in the hub.

6. In a timer, a shaft, a switch beside the shaft, two switch-operating cams on the shaft, one of the cams being fixed on the shaft and the second cam being loose, said shaft having an abutment thereon spaced from the second cam, a hub on the second cam extending into the vicinity of said abutment, a cam-adjusting member operatively connected with said hub, a compression spring surrounding said hub and bearing at its ends against said second cam and said cam-adjusting member, respectively, to press said second cam into frictional engagement with the first cam, and a finger piece attached to said cam-adjusting member for turning said second cam relatively to the first cam, a motor, a gear train, including a one-way clutch, that constantly maintains a connection between the motor and the shaft for driving the latter in one direction only, and a pointer on the shaft to turn it in said direction independently of the motor.

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