April 22, 1952 E. F. HUBACKER 2,594,023

INFRARED RAY BUTTER SOFTENER

Filed April 26, 1945

Fig. 1

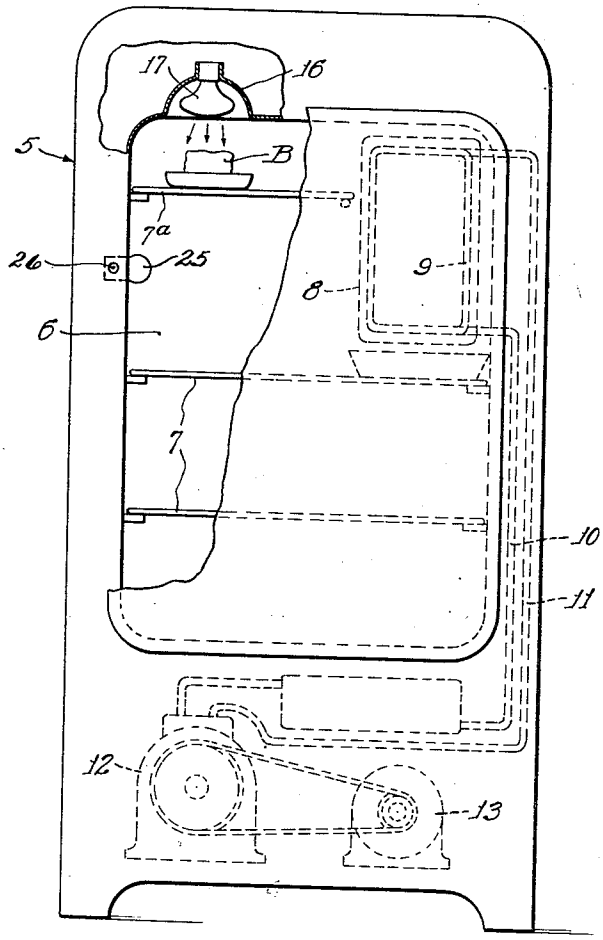


Fig. 2

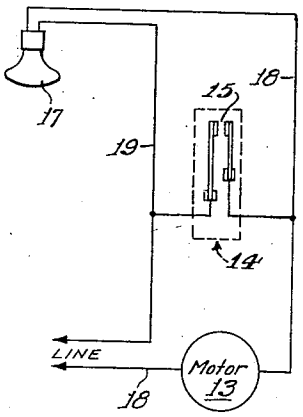
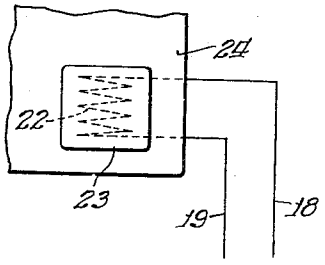


Fig. 3



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INFRARED RAY BUTTER SOFTENER

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5 Claims. (Cl. 62—4)

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The present invention relates to means for softening butter in an automatically operated refrigerator or other appliance. The improvements have particular reference to an arrangement in an electric refrigerator cabinet whereby the rays from a suitable lamp or the like are utilized to maintain the butter in a condition that permits it to be readily spread upon bread or other comestibles.

It is an object of this invention to provide an arrangement that is automatically operated to direct sufficient heat to the butter for raising the temperature thereof so that the butter will be softened. As is well known, when the food compartment of the refrigerator is at a low temperature the butter becomes too firm or solid for ordinary domestic uses. The present invention aims to automatically overcome this inherent condition.

Another object hereof is to provide a butter softener that is operated at a low cost, and which is simple in construction thereby adapting it for installation in a refrigerator cabinet without materially increasing the manufacturing cost of the refrigerator.

Still another object is to provide an arrangement of the character contemplated herein that embodies an infra-red lamp which is strong enough so that its rays will be directed to the butter to warm or soften it under predetermined temperature conditions. The rays from the infra-red lamp have a destructive effect upon germs and the like and therefore the use of such lamp produces a highly sanitary condition in the refrigerator cabinet especially in the coolant air in the vicinity of the butter thus tending to preserve its freshness.

The present improvements contemplate the use of electric conductors for the lamp that are connected across the contacts or switch elements in the electric motor circuit, such circuit being thermostatically controlled to regulate the temperature in the food compartment of a refrigerator cabinet. By reason of this arrangement it is not necessary to provide a special thermostat for the butter softener assembly since the temperature control thermostat performs this function.

Additional objects, aims and advantages of the invention contemplated herein will be apparent to persons skilled in the art after the construction and operation of the butter softener is understood from the within description. It is preferred to accomplish the numerous objects of this invention in substantially the manner hereinafter fully

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described and as more particularly pointed out in the claims. Reference is now made to the accompanying drawings that form a part of this specification, wherein:

Fig. 1 is a front elevation of an electrically operated refrigerator cabinet with the door broken away to show the present improvements in the food compartment; and

Fig. 2 is a diagram of the electric circuit and other instrumentalities of the improvements.

Fig. 3 is a plan of a modification.

The drawings are to be understood as being more or less of a schematic character for the purpose of disclosing typical or preferred embodiment of the improvements contemplated herein, and in these drawings like reference characters identify the same parts in the different views.

The refrigerator cabinet 5 comprises a food compartment 6 having shelves 7, and in the upper portion of this compartment there is a chamber 8 containing the refrigerating unit with coils 9 through which the refrigerant or coolant agent is circulated by pipes 10 and 11 leading from a compressor 12 in the bottom of the cabinet. An electric motor 13 drives the compressor 12 and the electric current through this motor is controlled by a thermostat 14 within the cabinet preferably in the food compartment. This thermostat, which by way of example may be of the bi-metallic type, is adjustable and is effective to open and close an electric switch 15 in the motor circuit whenever its indicator arm reaches the predetermined temperatures at which the thermostat has been set.

As shown, the refrigerant or coolant chamber 8 is at one side of the food compartment, thus providing a reduced region alongside said chamber for shelves 7*a*, of shorter width than those beneath the coolant chamber, for receiving small articles of food or dishes such as those containing butter, lard and the like. Above the upper shelf 7*a* the top wall or ceiling of the compartment is provided with a reveal or recess 16 to receive an electric lamp 17 preferably of the infra-red type. The lamp is arranged so that the rays thereof are directed down toward the upper shelf. The rays from this lamp are strong enough to raise the temperature of the butter 10° to 20° above the temperature within the food compartment and thus effect a softening of the butter. It is preferred, as seen in Fig. 1, to arrange the reveal and the lamp in such position that the butter or comestible (indicated as B) may be placed in the direct path of the rays emitted from the lamp.

In the diagram (Fig. 2), the conductors 18 and 19 comprising the electric circuit through the motor 13 are interrupted by the switch 15 that is opened and closed by means of a movable member of the thermostat 14 that is set for predetermining the limits of the temperature range within the food compartment. The circuit for the lamp 17 includes conductors 18 and 19 comprising a continuous electric circuit which has in it the thermostatically controlled switch 15. The lamp 17 or the like is thus connected directly across the thermostat contacts so that when the thermostat is opened the electric circuit is through the motor and then through the lamp. When thermostat 14 (indicated in dotted lines in the diagram) is closed the resistance through the contacts is so low that very little current passes through the softener device. Since the resistance of the lamp or the like is extremely high and the amount of current passing through it is very small this arrangement provides a very practical and satisfactory hook-up.

It is preferred to utilize the rays of a lamp for softening butter and like comestibles in a refrigerator. This function may be accomplished by other temperature raising means although a lamp of the infra-red type is preferable because of its germicidal properties. An example of such device may comprise an electric resistance coil 22 imbedded or molded in an insulating plate 23 of thermosetting material. This plate may be separate from a shelf member so that it may be placed wherever desired, or it may comprise a part of a special shelf member 24. In either instance the terminals of the resistance coil are electrically connected by conductors 18 and 19 through the thermostat 14 to be controlled thereby.

It will be seen that, during operation of the refrigerant unit 8 and the running of the motor and compressor, the heat radiating member of the softener is inactive and there is no heating effect upon the butter B until the food compartment has been lowered to the desired cooling temperature, whereupon the thermostat will operate to cut out the motor and cut in the butter softener. The advantage of this particular hook-up resides in the fact that heat is provided for softening the butter only during the period of low cabinet temperature or low running time. When the room temperature rises, the temperature in the cabinet rises and less heat is required during this period to warm the butter to a softening temperature. As the room temperature rises the running time of the motor and the compressor increases so that the infra-red lamp or heating element is on for a smaller percentage of the time. The arrangement described is therefore quite economical to operate and furthermore it eliminates the use of a second thermostat that would be especially designed separately adjusted to control the current for operating the butter softener device.

It is conceivable that a suitable electric illuminating lamp 25 may be introduced in the cabinet in conjunction with the infra-red lamp 17 or the electric coil 22. Such introduced lamp would effect an illumination of the food compartment 6 and would be controlled by switch means 26 operated by the opening and closing of the cabinet door.

While this invention has been described in detail in its present preferred form or embodiment, it will be apparent to persons skilled in the art, after understanding the improvements, that various changes and modifications may be made therein without departing from the spirit or scope thereof. It is aimed in the appended claims to cover all such changes and modifications.

I claim:

1. In a refrigerator cabinet having a cooling chamber supplied with coolant fluid from a motor-driven compressor, and having conductors forming an electric circuit through the motor, which circuit is controlled by a thermo-responsive switch within the cabinet, the improvement of a butter softener comprising an electrical lamp the rays from which are adapted to heat an object upon which they impinge, said lamp positioned in close proximity to a shelf in the cabinet; and electric conductors connected to the spaced points of the switch, the arrangement being such that the thermo-responsive switch controls the electric current to the motor-driven compressor and the butter softener lamp.

2. In a refrigerator cabinet provided with a cooling chamber that is supplied with coolant fluid by an electric motor driven compressor; a lamp in said cabinet adapted to emit heat rays; means for supplying electric current to the motor to drive said compressor; means for supplying electric current to said lamp; and a thermo-sensitive device coacting with both said means for rendering one means ineffective during the operation of the other means.

3. In a refrigerator cabinet provided with a chamber supplied with coolant fluid from a compressor driven by an electric motor; a food compartment in which said chamber is located; and a butter softener arrangement in said cabinet comprising a reveal in a wall of said compartment; an infra-red lamp in said reveal to emit its rays to impinge upon the butter, thereby warming the butter to a softened condition; means for supplying electric current to the motor and lamp; and a thermo-responsive switch controlling said means for predetermining the effective operation of said motor and lamp.

4. In a refrigerator comprising a cooling compartment having electrically operated means for cooling the same; and thermo-electric means including an electric motor circuit having a make-and-break device for controlling said cooling means, the improvement of an arrangement for softening butter and like substances in said cooling compartment, comprising an electric lamp adjacent the substance to be softened, the rays from said lamp being adapted to impinge upon the substance for raising the temperature thereof above the compartment temperature, said lamp characterized by its germicidal properties; and conductors for supplying electric current from said motor circuit to said lamp, said conductors being responsive to the make-and-break device actuated by said thermo-electric means for changing the amount of the electric current through said conductors and lamp, the arrangement being such that the lamp is ineffective when said electric motor circuit is closed and vice versa.

5. In a refrigerator cabinet having a food compartment supplied with coolant fluid by an electric motor driven compressor, and having a door closing an access opening to said compartment; an infra-red lamp in said compartment adapted to emit heat rays when electrically charged; means for supplying electric current to said infra-red lamp, and also to the motor to drive said compressor; a thermo-responsive device for rendering said infra-red lamp effective when said

motor is inactive; an electric illuminating lamp in said compartment; and means responsive to the opening and closing of the cabinet door for controlling said illuminating lamp.

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