Jan. 30, 1934. F. J. TROLL 1,945,100

DEFROSTING INDICATOR FOR MECHANICAL REFRIGERATORS

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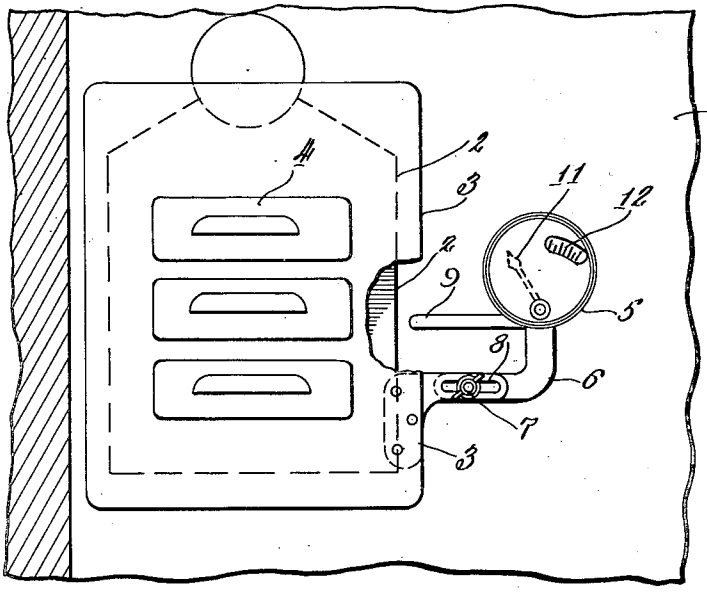


Fig. 1.

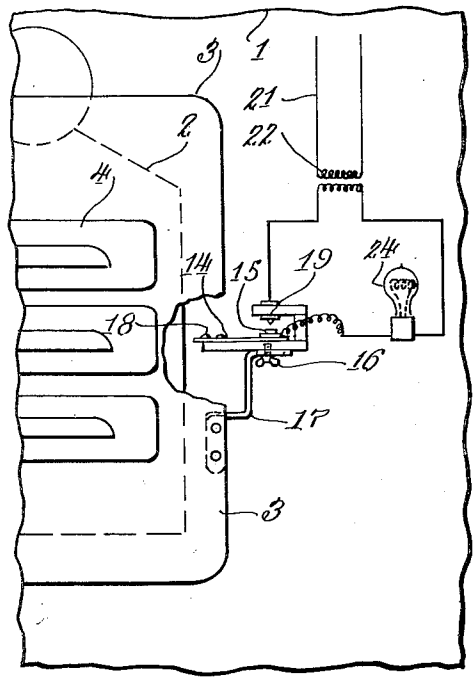


Fig. 2.

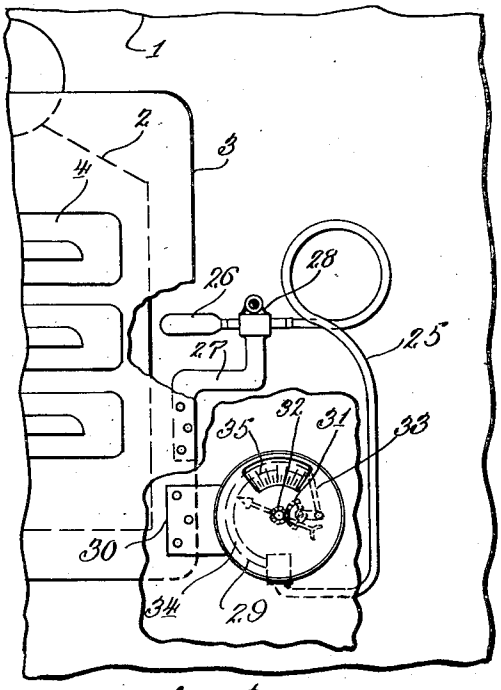


Fig. 3.

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DEFROSTING INDICATOR FOR MECHANICAL REFRIGERATORS

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4 Claims. (Cl. 177—311)

It is a well known fact to all those acquainted with the art of mechanical refrigeration that an accumulation of frost on the coils, whether they be evaporation coils or brine coils, which are placed in the cooling chamber to cool the food or other commodities stored in the refrigerator and to form ice cubes, has a marked tendency to decrease the efficiency of cooling or refrigeration and therefore to result in the consumption of an excess of current as compared to what is required when the accumulation of frost is restricted or limited to the minimum.

While all purchasers of electrical refrigerators for domestic use are informed either directly by the salesman or service man, or by printed instructions as to the necessity for defrosting at intervals which are sufficiently frequent to prevent what is regarded as undue accumulation of frost on the chilling or cooling unit, the fact is that there is no means for determining with any degree of accuracy when due regard to efficiency of operation requires that the defrosting operation should be performed. As a result of this condition the majority of domestic refrigerators are operated for a large portion of the time at a very low efficiency with a consequent unnecessarily large consumption of current.

The inventor in the present instance has discovered that when the bulb or other sensitive element of a thermometer is brought in direct contact with the frost, there is an immediate drop in the temperature indicated of about ten degrees below that resulting from contact of the sensitive element with the air in the immediate vicinity of the frost. The knowledge of this fact has been utilized in the construction of an instrument or indicator whereby the accumulation of frost on the chilling unit or cooling unit, whether it be brine coils or expansion coils, to a definite predetermined thickness, as indicated and announced instantaneously either by means of a signal or by an indicating pointer so that the housewife is relieved of all uncertainty as to the necessity for defrosting and immediately informed that it is time to defrost in order to maintain the normal efficiency of the refrigerating apparatus.

In the accompanying drawing I have illustrated an apparatus for indicating the accumulation of frost on the chilling unit and hence the necessity for defrosting in a refrigerating apparatus of the mechanical or electrical type.

In the drawing:

Figure 1 is an elevation of a chilling unit and the surrounding portion of a refrigerator to which an indicating device embodying the features of the invention has been applied.

Figure 2 is a similar illustration showing a different type of instrument for the same purpose similarly applied.

Figure 3 shows still another type of instrument.

All of the drawing is more or less of a diagrammatic nature, the refrigerator cabinet being shown fragmentarily, and the chilling unit with the trays for the ice cubes being shown in elevation.

Referring to the drawing by numerals, each of which is used to indicate the same or similar parts in the different figures, and having particular reference to the form shown in Figure 1, the fragmentary showing of the cabinet is indicated by reference character 1. This cabinet contains a cooling coil or chilling unit 2 which is enclosed in a casing 3 which serves as a support for the sliding trays 4 of familiar construction adapted to contain water or be frozen to form ice cubes.

In the form of the invention illustrated in Figure 1, a mechanically operated type of dial thermometer 5 is supported on a bracket 6 secured to the chilling unit casing or frost plate 3 in any suitable manner. This bracket is formed in two parts which are adjustably connected by a thumb screw 7 which fits in slots 8 formed in the respective parts of the bracket. The thermometer 5 has its temperature sensitive element 9 projecting laterally and spaced from the coil or chilling elements 2 by a distance which is determined by the manufacturer or by the service department as the case may be, or if preferred this may be adjusted by the owner of the refrigerator, it being understood that the adjustment may be made such as to call for frequent defrosting, giving a high degree of efficiency, or the frost may be permitted to accumulate to one eighth or even to one quarter inch if desired, so that defrosting will be less frequent.

The thermometer 5 includes an indicating hand 11 and calibrations 12 which calibrations correspond to the temperature at which time defrosting is necessary according to the predetermined thickness to which the frost is allowed to accumulate.

Figure 2 shows a similar fragment of a refrigerator 1 provided with cooling unit 2, and trays 4 for ice cubes. In this instance the indicating instrument consists of a bimetallic strip 14 carrying an electrical contact 15. The bimetallic strip and the electrical contact are supported by a screw slot adjustment 16 on a bracket 17. The

contact 15 which it will be understood is controlled as to its position by the strip 14 which is secured at one end at 18 to the bracket, the other end carrying the contact 15 being free, cooperates with a stationary contact 19. Both the contacts 15 and 19 are included in a secondary circuit 20 which is induced from a primary circuit 21 by means of induction coils 22, and includes a light 24 or other suitable indicator which it will be understood is energized by the closing of the circuit at 15, 19, when the strip 18 is brought in contact with the frost, when it accumulates to the predetermined thickness, causing the strip 14 to curl or bend to accomplish this result.

The parts are so arranged and proportioned as to place the points 15 and 19 in contact at the temperature of the strip 14 which corresponds to contact with the same at the end at 18 with the frost accumulated on the coil. In this way the accumulation of the frost to a predetermined thickness is indicated and the fact of this accumulation is communicated to the person in charge of the operation of the refrigerator.

Figure 3 shows an indicator comprising a copper or similar tube 25 having a bulb 26 at one end. The copper tube is supported on a bracket 27 having a thumb screw clamp or other suitable clamping means 28 through which the tube may be adjusted to determine the distance of the bulb 26 from the coil or chilling unit 2 and hence the thickness to which the frost may accumulate. The apparatus also includes a gauge 29 of the Borden tube type which may be supported as shown on the outside of the refrigerator by the bracket 30. The Borden tube 34 as shown operates a small arcuate gear 31 which engages a pinion 32 on an indicating hand 33. In the form of the invention shown the arcuate gear 31 is operated by a link 33 which is connected by its opposite end to the end of the Borden tube 34. The gauge includes calibrations 35 corresponding to the defrosting temperature of the indicator. It will be understood that the bulb 26 is adjusted by drawing the tube 25 through the clamp 28 when the latter is loosened so that it can be located at a suitable distance from the coil or chilling unit.

When the frost comes in contact with the bulb 26 it chills the air or other gas in the tube 25 communicating the resulting change of pressure to the Borden tube 34 which is correspondingly actuated in accordance with the well known Borden tube principle, moving the gauge hand to and over the calibrations 35 whereby the person in charge of the operation of the refrigerator is informed that the time for defrosting has arrived.

The operation of the various indicating instruments has been fully described in connection with the description of their construction, the principle involved in all these indicators being that by accumulation of the frost on the coil to a thickness corresponding to the adjustment of the indicator, the sensitive portion of the indicator comes in contact with the frost and the temperature of the indicator immediately drops through a range which it is believed corresponds to about ten degrees F. The chilling of the sensitive instrument is translated either by means of an indicating hand or a light or other signalling device whereby the operator is informed that the defrosting period has arrived, making it possible for the operator who may not be skilled or in any way otherwise informed as to the proper time for defrosting to operate the refrigerator with as high a degree of efficiency as it could be operated by an expert having the highest degree of skill and familiarity with the apparatus.

I have thus described specifically and in detail an apparatus embodying the preferred and other forms of the invention in order that the method of constructing, operating, applying and using the same may be fully understood, however, the descriptive terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a mechanical refrigerator a chilling element and means for indicating the accumulation of frost thereon to a predetermined thickness whereby the operator is advised of the need for defrosting.

2. In a mechanical refrigerator having a chilling element, an indicating instrument to announce the defrosting period, the same consisting of indicating means and a thermally sensitive element for operating said indicating means, the thermally sensitive element being so located relatively to the chilling element as to contact the frost coating on said chilling element and operate the indicating means on the accumulation of the frost on the chilling element to a predetermined thickness, which is permissible prior to defrosting.

3. In a mechanical refrigerator having a chilling element, an indicating instrument to announce the defrosting period, the same consisting of indicating means and a thermally sensitive element for operating said indicating means, the position of said thermally sensitive element being adjustable through a range relatively to the chilling element of the refrigerator, which range corresponds to the possible variation in thickness of the predetermined permissible accumulation of frost, the thermally sensitive element being so located relatively to the refrigerating element at all times during the operative period of the apparatus as to indicate the accumulation of the frost on the chilling element to a predetermined thickness, which is permissible prior to defrosting.

4. An indicating instrument for use in connection with a mechanical refrigerator having a chilling element, the same consisting of a thermally sensitive element, an indicating device connected thereto to be controlled thereby, the thermally sensitive element being located immediately adjacent the chilling element and spaced therefrom by an interval equal to the thickness to which the frost is to be permitted to accumulate, contact of the frost with the thermally sensitive element serving to operate the indicator, thereby to indicate the need for defrosting.

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