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REFRIGERATOR INCLUDING ILLUMINATED CABINET SHELF

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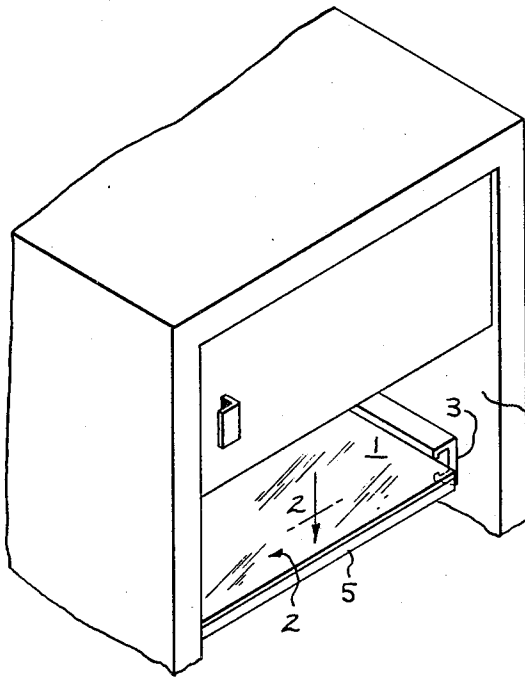


FIG. 1

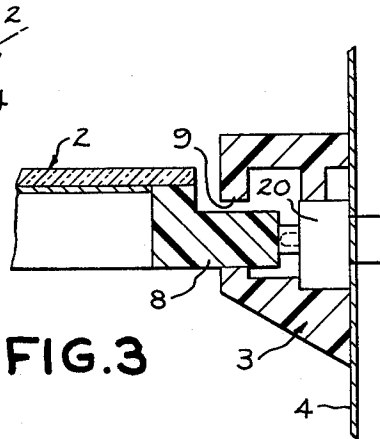


FIG. 3

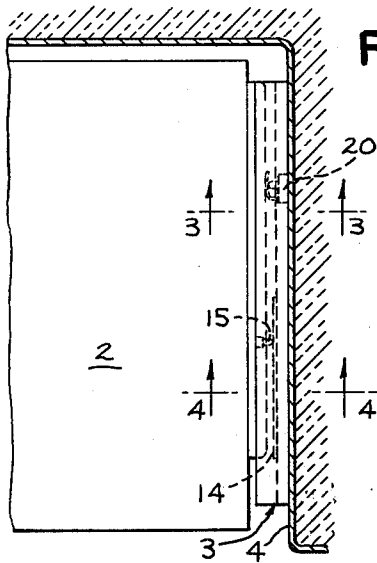


FIG. 2

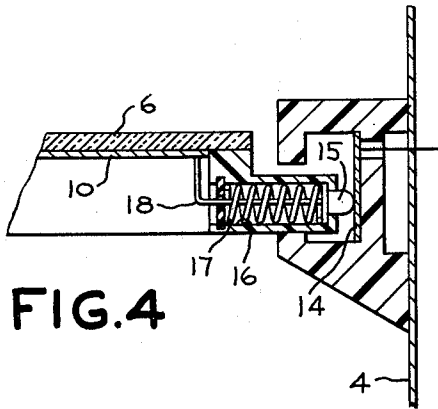


FIG. 4

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1

3,506,325

REFRIGERATOR INCLUDING ILLUMINATED CABINET SHELF

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7 Claims

ABSTRACT OF THE DISCLOSURE

A refrigerator comprising a storage compartment includes at least one shelf carrying an electroluminescent coating for illuminating the interior of the compartment.

BACKGROUND OF THE INVENTION

Household refrigerators normally include means for illuminating the storage compartment or compartments. To this end, one or more light bulbs have usually been mounted within the compartment. Since each light bulb forms only a point source of illumination, two or more bulbs are frequently required to provide a more uniform illumination of the entire interior of the storage compartment. Also to improve the appearance of the interior of the compartment and to prevent substantial blockage of illumination by foodstuffs stored adjacent any one light bulb, light diffusing shields have frequently been positioned in front of the bulbs. However, regardless of the placement of the light bulbs and light diffusing shields, a uniform pattern of illumination obtained for example in an empty compartment is substantially altered and diminished by the normal placement of articles stored in the compartment.

To provide a more effective illumination of the interior of a refrigerator cabinet, it has been proposed, as described in Patent No. 2,515,584—Benson, to employ one or more shelves composed of glass or clear plastic material and to provide a source of illumination adjacent one or more edges of the shelves whereby light rays will enter the edges of each shelf and travel through the shelves for distribution over a larger cabinet area. However, such means for distributing the illumination within the compartment can be employed only when the light transmitting shelves are stationary or in other words in a fixed position relative to light source.

SUMMARY OF THE INVENTION

The present invention has as its primary object the provision of a refrigerator cabinet including one or more shelves which are in themselves the primary sources of illumination for the interior of the refrigerator storage compartment. To this end, one or more of the storage shelves include a layer of electroluminescent material which, depending upon the remaining construction of the shelves, serves to illuminate the storage area above, below or both above and below the shelf. Preferably the electroluminescent material extends over substantially the entire horizontal area of the shelf thereby providing a relatively large source of illumination.

BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawing:

FIGURE 1 is a perspective view of a portion of a refrigerator cabinet incorporating the present invention; FIGURE 2 is a sectional view taken generally along lines 2—2 of FIGURE 1;

FIGURE 3 is an enlarged sectional view of a portion of the shelf and support structure taken along line 3—3 of FIGURE 2; and

2

FIGURE 4 is a similar sectional view taken along line 4—4 of FIGURE 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIGURE 1 of the accompanying drawing there is shown somewhat schematically a portion of a refrigerator cabinet including a storage compartment 1 containing one or more storage shelves 2 slidably supported in a horizontal position within the storage compartment 1 on slides 3 of electrically insulating material mounted on the outside wall 4 of the compartment 1.

In the illustrated embodiment of the invention, one or more of the shelves 2 comprise an open rectangular frame 5 of plastic or other electrically insulating material. This open frame 5 carries a sheet of glass 6 forming the article supporting surface of the shelf. At least the side portions of the frame 5 include outwardly extending flanges 8 adapted to be received in an open slot 9 in the shelf guides 3.

The source of illumination for the storage compartment 1 is in the form of a layer or layers of electroluminescent material 10 applied, for example, to the lower surface of the glass sheet 6 and extending substantially over the entire area thereof. The particular electroluminescent material employed and the matter of applying it to the shelf structure forms no part of the present invention. In other words any of a plurality of electroluminescent materials may be employed. Suitable materials are disclosed for example in Patents Nos. 3,030,542—Knochel et al.; 3,238,407—Jaffe; and 3,243,629—Leventan, and reference is made to these patents for a complete description of different types of electroluminescent materials or phosphors, the manner in which they may be applied to a supporting dielectric surface and the manner in which electrical connections therewith may be made.

In the accompanying drawing, the electrical connection to the electroluminescent layer 10 is illustrated rather schematically as comprising elongated bus bars 14 contained within at least the forward end portions of the slides 3 with the respective bus bars 14 being connected by suitable leads to a source of electrical potential or energy. The electrical connection between the electroluminescent layer 10 and the respective bus bars 14 includes terminals 15 mounted in slots or tubular openings 16 in the opposed edges 8 of the shelf frames and spring biased by means of springs 17 into engagement with the bars 14. Electrical leads 18 connect the terminals 15 directly or indirectly to the electroluminescent layer 10.

Thus when a shelf constructed in accordance with the present invention is properly positioned within its slides 3 the electroluminescent material 10 is connected across the bus bars 14 and the resultant luminescence of the layer 10 will illuminate the adjacent area of the storage compartment. The color of the light emitted by layer 10 will of course depend upon the nature of the electroluminescent material which may be selected to provide the desired interior color or hue. Alternately one or more of the shelves may be provided with one type of electroluminescent material while the remaining shelves are provided with a different type or color to provide a pleasing contrast or mixing of the color tones within the storage compartment.

In accordance with the usual practice of controlling the illumination of the interior of a refrigerator cabinet, the power supplied to the bus bars 14 is normally controlled by a door operated switch mechanism (not shown) designed to illuminate the compartment only when the door is open. Also to protect the user from the electrical

3

hazard of energized bus bars when the door is open and the shelf removed from its supporting slides, there may be provided a switch mechanism such as that generally indicated by the numeral 20 which is closed to complete the electrical circuit supplying power to the bus bars 14 only when the shelf is in its normal position within the slides 3.

It will be obvious of course that various modifications may be made without departing from the scope of the present invention. For example the shelf material may be an insulated metal sheet or a transparent or translucent plastic material or glass. Also the lighting effect, depending upon the particular structure of the shelf and of the luminescent coating may be provided either in an upward direction or in a downward direction from the shelf or both up and down. To provide illumination in both the upward and downward direction there can be used either two distinct layers of electroluminescent material, one on each face of the shelf, or a single coating of electroluminescent material on either surface of a transparent shelf of glass or a transparent polymer. Local highlighting of the interior of the storage compartment may be obtained by suitable selection of either an electroluminescent material providing a highlighting color of light or by judicious selection of the direction in which the lighting effect is provided.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A refrigerator comprising a liner forming a storage compartment having an access opening, a horizontal shelf and means supporting said shelf in said compartment; said shelf having a layer of electroluminescent material thereon for illuminating said compartment; and means supplying an operating electrical potential to said layer.

4

2. The refrigerator of claim 1 in which said shelf comprises an article-supporting sheet of light-transmitting material and said layer of electroluminescent material is applied to one surface of said sheet.

3. The refrigerator of claim 2 in which said sheet of light transmitting material is glass.

4. The refrigerator of claim 1 in which the opposed side edges of said shelves are slidably supported on said shelf supporting means and said potential supplying means comprises electrically conducting bus bars extending at least along the forward end portions of said supports and terminals on said shelf frame for maintaining sliding electrical contact with said bus bars.

5. The refrigerator of claim 4 in which said shelf comprises an open rectangular frame of plastic material and said supports include recesses in the shelf-supporting edges thereof for receiving said bus bars.

6. The refrigerator of claim 5 in which said shelf includes an article supporting glass sheet supported on said frame and having said layer of electroluminescent material on the lower surface thereof.

7. The refrigerator of claim 5 including switch means operable by said shelf for de-energizing said bus bars upon removal of said shelf from said shelf supporting means.

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