

[54] **PRODUCT DEPLETION INDICATOR FOR REFRIGERATORS**

1,019,554 3/1912 Taylor200/85
2,474,157 6/1949 Needlman340/280

[72] Inventor: **Anthony P. Cotter**, 13218 Lowell, Grandview, Mo. 64030

Primary Examiner—John W. Caldwell
Assistant Examiner—Scott F. Partridge
Attorney—D. A. N. Chase

[22] Filed: **Feb. 24, 1971**

[21] Appl. No.: **118,383**

[52] U.S. Cl.**340/272, 200/85, 340/280**

[51] Int. Cl.**G08b 21/00**

[58] Field of Search340/272, 280; 221/6; 200/85; 62/129, 131; 222/23; 312/234

[57] **ABSTRACT**

A refrigerator in which each of a plurality of shelves is adapted to receive a number of consumable products of a particular type. The shelves are mounted for limited up-and-down movement under the weight of products thereon, each shelf in its upper position being in a depleted condition and effecting actuation of a switch that controls the energization of an indicator light on the exterior of the cabinet. The lights are of different colors to identify a particular depleted shelf and signal the depleted condition without the need to open the refrigerator door and inspect the shelves.

[56] **References Cited**

UNITED STATES PATENTS

350,450	10/1886	Tucker	340/280
3,078,682	2/1963	Gould	200/85 X
3,130,395	4/1964	Simjian	340/280
1,765,223	6/1930	Ferris	340/280 X
3,259,894	7/1966	Ciccarone	340/272
2,142,599	1/1939	Binder	200/85

5 Claims, 7 Drawing Figures

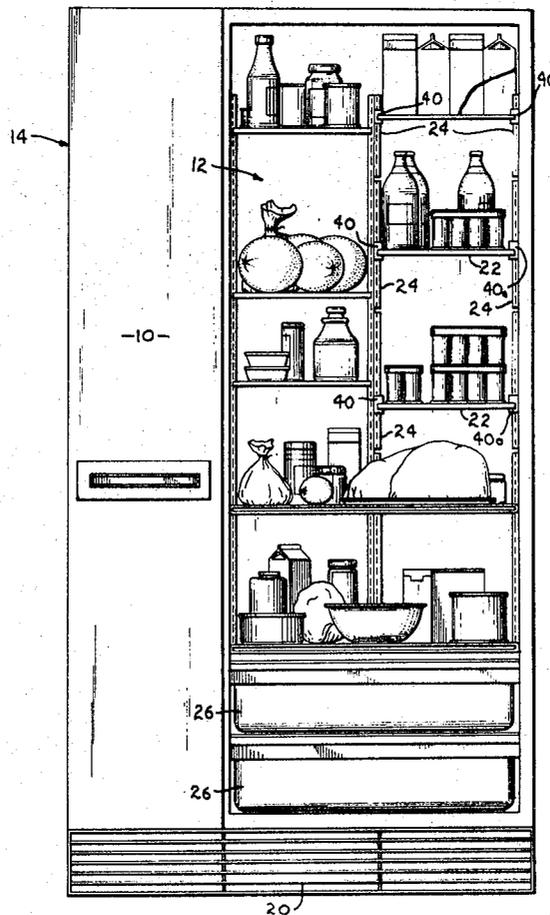


Fig. 1.

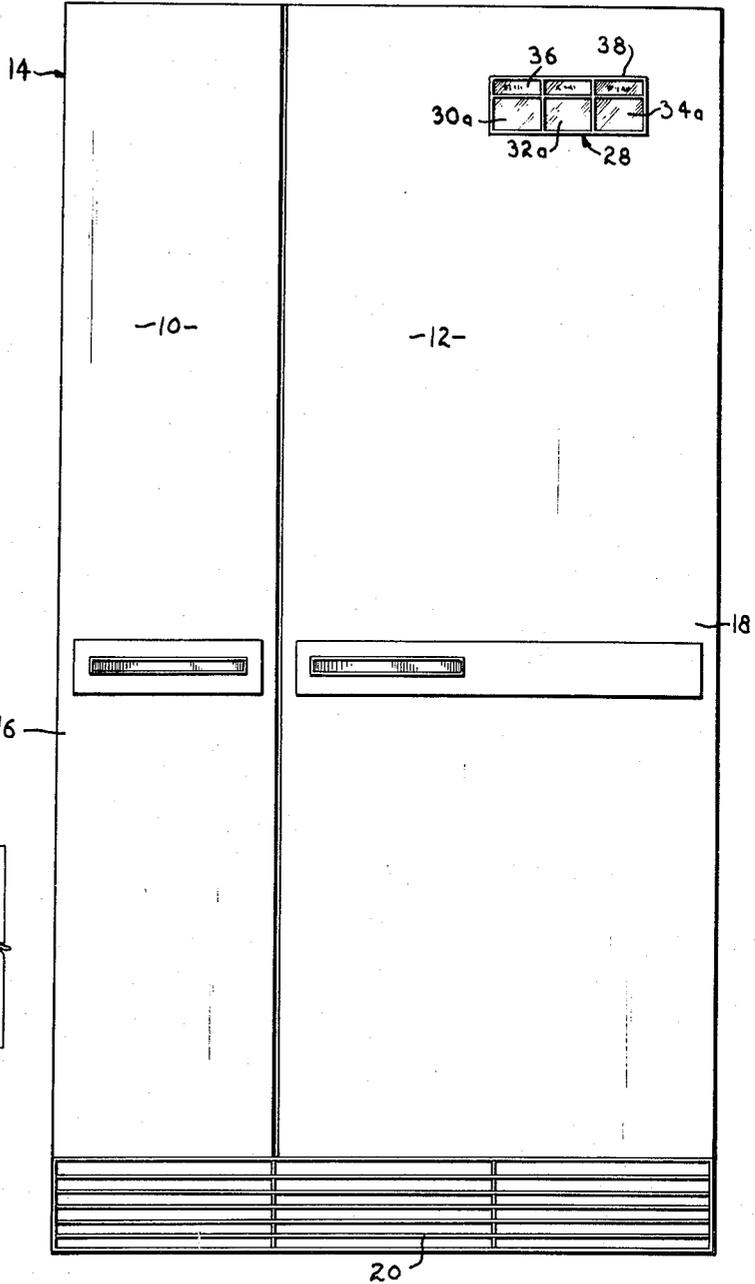


Fig. 3.

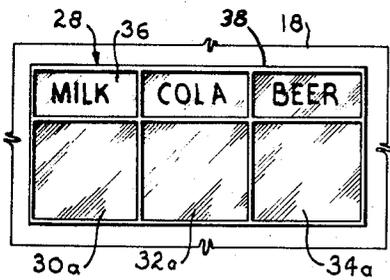
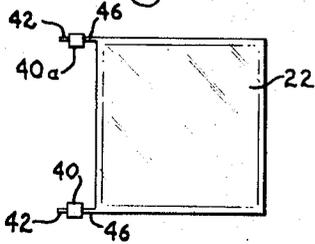


Fig. 6.

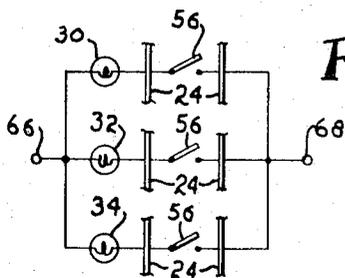


Fig. 7.

INVENTOR
Anthony P. Cotter

BY
D. A. N. Chase
Attorney

Fig. 2.

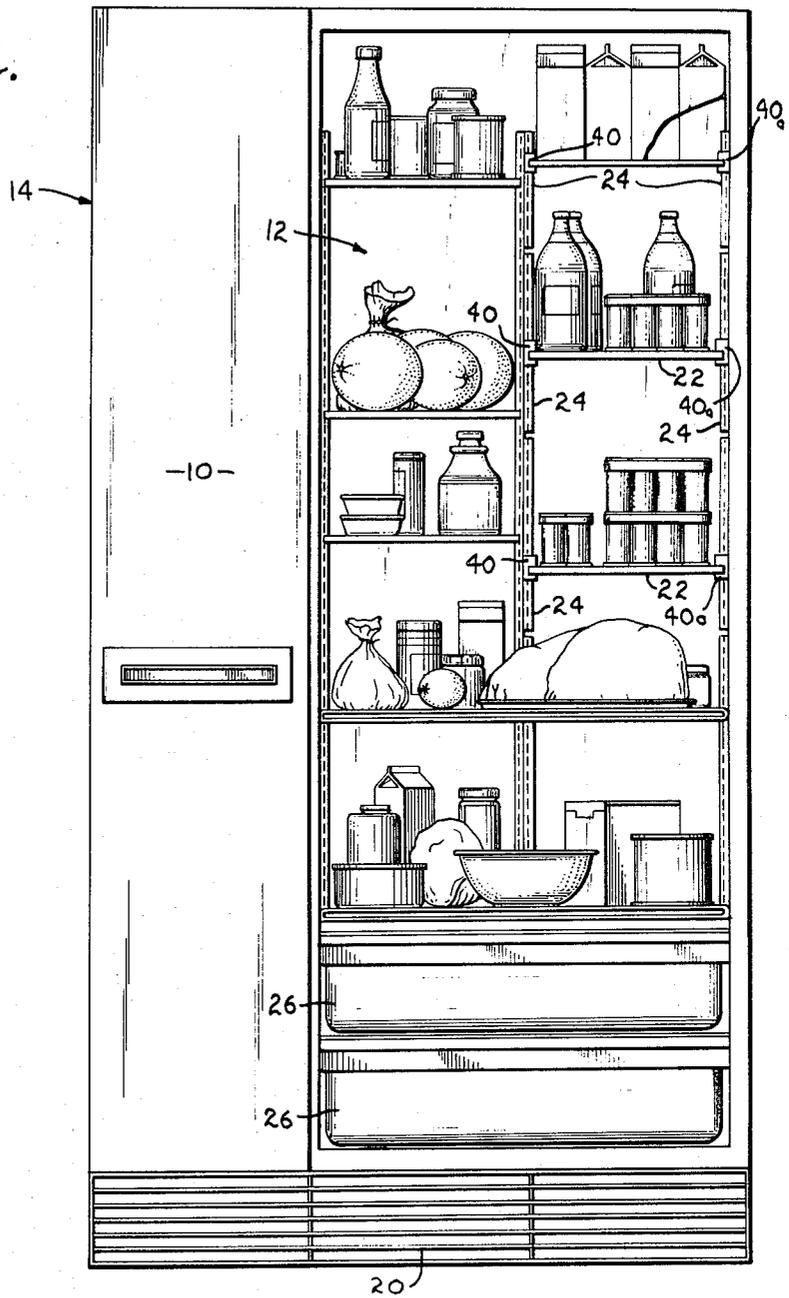


Fig. 4.

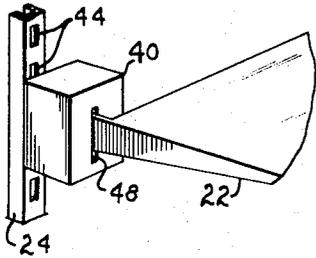
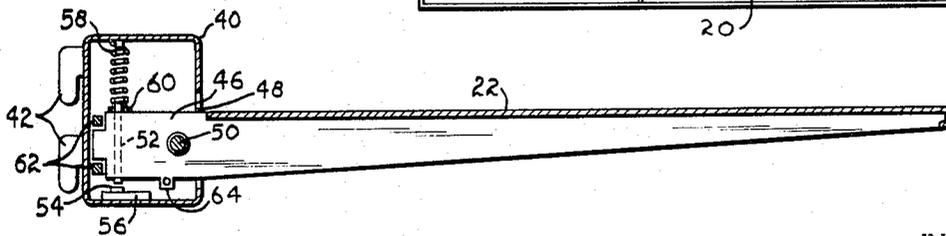


Fig. 5.



INVENTOR
Anthony P. Cotter
BY
D. A. N. Chase
Attorney

PRODUCT DEPLETION INDICATOR FOR REFRIGERATORS

This invention relates to apparatus for indicating the depleted condition of a shelf used for the storage of a plurality of articles and, in particular, to a refrigerator provided with indicator lights on the exterior of its cabinet for signaling the depleted condition of individual, preselected shelves within the refrigerated storage compartment.

Large capacity refrigerators for home use are commonly provided with half-width shelves in the refrigerator compartment that are especially positioned and spaced to receive consumable products such as beverages packaged in individual containers. These beverages include milk, cola and other soft drinks, and beer or other types of malt beverages. Manifestly, refrigerators of this type find widest use in homes with large families where milk and the other beverages are rapidly consumed. Not infrequently, the housewife will neglect to check the supply of such consumables before doing her routine grocery shopping, thus she may be inconvenienced by failure to restock depleted beverage shelves.

Accordingly, it is the primary object of this invention to provide a means of indicating the depleted condition of a shelf used for storage purposes, without the necessity of opening a cabinet door or otherwise gaining access to the storage space for the purpose of visually inspecting the shelf.

As a corollary to the foregoing object, it is an important aim of this invention to provide a refrigerator with the aforesaid apparatus, wherein such refrigerator is equipped with lights on its cabinet exterior for the purpose of indicating the depleted condition of one or more interior shelves.

Furthermore, it is an important object of this invention to provide multi-colored light indicators to signal the viewer, thereby providing quick visual identification of the particular product shelf that is depleted.

Additionally, it is another important object of this invention to provide such signaling apparatus without interfering with the normal functioning of the storage shelves, including adjustment as may be required to accommodate particular container sizes.

In the drawings:

FIG. 1 is a front elevational view of a refrigerator equipped with the signaling apparatus of the present invention;

FIG. 2 is a view similar to FIG. 1, except that the door of the refrigerator compartment is removed;

FIG. 3 is an enlarged, top plan view of one of the shelves;

FIG. 4 is a perspective, detail view showing the mounting of one of the shelves on a track element therefor;

FIG. 5 is an enlarged, end view of one of the shelves, the housing and certain other parts of the special shelf mounting being broken away and revealed in cross section;

FIG. 6 is a detail view of the signaling assembly; and

FIG. 7 is an electrical schematic diagram showing the power circuits to the indicator lamps.

Referring initially to FIGS. 1 and 2, a large capacity refrigerator is illustrated of the type commonly used in the home, such refrigerator having side-by-side freezer and refrigerator compartments 10 and 12. The com-

partments are part of the usual insulated cabinet 14, the freezer compartment 10 being normally closed by a door 16 while the refrigerator compartment 12 is normally closed by a door 18. Both of the doors 16 and 18 are hinged at the sides of the cabinet 14 (the hinges are recessed and therefore are not visible), thus the doors open from the middle to provide ready access to the respective compartment interiors. A grill 20 at the bottom front of the cabinet 14 provides the exhaust opening for the condenser of the refrigeration system.

In FIG. 2 the door 18 is removed to reveal the interior storage space of the compartment 12. As may be seen, various adjustable shelves are provided in the compartment 12 including three vertically spaced shelves 22 which, from top to bottom, are used to store milk (illustrated in half gallon cartons), cola or other soft drinks (illustrated in quart bottles and six-packs), and beer or other malt beverages (shown in six-pack cartons). These three shelves 22 are of the half-width type and snap into place on tracks formed by three pairs of electrically conductive, upright, slotted track elements 24 secured to the rear wall of the compartment. Other half-width and full-width shelves are also provided as may be appreciated from viewing FIG. 2, these shelves being utilized to receive and store other perishables as illustrated. Vegetable and meat bins 26 are provided beneath the shelf section as is customary in refrigerator design.

In FIGS. 1 and 6 a signaling assembly 28 is shown mounted on the door 18 of the refrigerator compartment 12, flush with the front surface of the door 18. The assembly 28 includes three electric lamps 30, 32 and 34 shown schematically in FIG. 7, such lamps being disposed behind light transmitting lenses 30a, 32a and 34a respectively. The lenses 30a, 32a and 34a are red, amber and green in color respectively and correspond to "milk", "cola", and "beer" as indicated in FIG. 6. The product-identifying indicia may conventionally appear on an identification strip 36 inserted in a frame 38 above the colored lenses.

One of the shelves 22 is shown in detail in FIGS. 3-5. Metal housings 40 and 40a are located adjacent the two rear corners of the shelf 22 and each is provided with a pair of lugs 42 which are received in corresponding slots 44 in the track elements 24. (As is clear in FIG. 4, the track elements 24 are channel shaped to provide a clearance opening behind the slots 44 into which the lugs 42 extend.) The shelf 22 is of aluminum construction and is provided with a rearwardly extending arm 46 at each of its rear corners. Each arm 46 extends through a clearance slot 48 in the front of a corresponding housing 40 or 40a and serves as a means of mounting the shelf 22 for limited up-and-down movement as will now be discussed.

A pivot pin 50 is carried by each of the housings 40 and 40a and extends through the respective arm 46 to mount the shelf 22 for pivotal movement about a horizontal axis which is permitted by the slot 48, it being appreciated that the pins 50 in the two housings 40 and 40a at the rear corners of the shelf 22 are in axial alignment. In housing 40, a cross pin 52 extends through the arm 46 with its upper and lower ends projecting therefrom, the lower end of the pin 52 being engageable with the actuator button 54 of a microswitch 56 located at the bottom of the housing 40. A coil

spring 58 fits over the upper end of the cross pin 52 and engages a washer 60, the spring 58 being compressed between the washer 60 (on arm 46) and the top of the housing 40. A pair of vertically spaced crossbars 62 present stops which limit the extent of pivotal movement of the shelf 22. The microswitch 56 is connected in series between a terminal 64 formed on arm 46 and the housing itself, the lugs 42 being of metal construction along with the housing 40 to present an electrically conductive component that, as will be explained, is electrically isolated from the shelf 22 when the switch 56 is open.

The pivot pin 50, cross pin 52, washer 60, and stops 62 in housing 40 are composed of a structurally strong, insulating material such as nylon. Accordingly, electrical continuity is established between the metal shelf 22 and the metal housing 40 and lugs 42 only upon closure of the microswitch 56, which occurs when the lower end of the cross pin 52 depresses the actuator button 54. It should be understood, however, that at least some of the parts in housing 40 composed of insulating material are replaced with metallic parts in the housing 40a associated with the other rear corner of the shelf 22, and that no switch 56 is provided in housing 40a. For this reason, it is necessary that the other rear corner of the shelf be at all times electrically as well as mechanically connected to the corresponding lugs 42 of housing 40a as will be appreciated in the discussion of operation to follow.

As schematically illustrated in FIG. 7, three independent, parallel power circuits are connected to the indicator lamps 30, 32 and 34. Low voltage power is supplied at the terminals 66 and 68. In each circuit, connections are made to the two track elements 24 as illustrated, and the circuit is open until such time that the switch 56 associated with the respective shelf 22 is closed. Accordingly, it may be appreciated that energization of a particular lamp 30, 32 or 34 is controlled by the corresponding switch 56 which, when closed, establishes electrical circuitry between the two track elements 24 to which the shelf is attached. As may be seen in FIG. 2, the three pairs of track elements 24, though vertically aligned end-to-end, are spaced apart a short distance at their ends to provide electrical isolation between the three pairs of elements.

All three of the shelves 22 and their associated indicator lamps operate in the same manner. Referring to the uppermost shelf 22, for example, this shelf is utilized to store milk within the refrigerator compartment 12 and, accordingly, is attached to its track elements 24 at a height permitting sufficient clearance for the half gallon cartons. The lugs 42 are downturned and fit into the slots 44 such that the slotted frontal strip portions of the elements 24 are captured between the lugs 42 and the rear surfaces of the housings 40 and 40a. Therefore, besides providing a solid mechanical connection, electrical contact is made between each of the housings 40 and 40a and the corresponding track element 24.

The springs 58 in the housings 40 and 40a bias the shelf 22 in a counterclockwise direction about the pivot pins 50 as viewed in FIG. 5. When the shelf is unloaded, it assumes an upper position in which the rearwardly projecting ends of the arms 46 are in engagement with the lower stops 62, and the cross pin 52 in housing 40 is

in engagement with the actuator button 54 thereby closing the switch 56 to energize the lamp 30. It may be appreciated, therefore, that one viewing the exterior of the refrigerator cabinet 14 will see a red light emanating from the lens 30a, and thus will be made aware that the uppermost shelf 22 is depleted. This signal indicates to the viewer that milk needs to be purchased in order to restock the shelf. If desired, the springs 58 may be sized such that the shelf 22 is returned to its upper position prior to complete depletion so that, for example, the red signal will appear when only one carton of milk remains. Manifestly, the signal disappears as soon as the shelf is resupplied since the bias of the springs 58 is overcome by the weight of the products, thereby shifting the arms 46 into engagement with the upper stops 62 and releasing the actuator button 54 of the switch 56.

It may be noted that conduction of electric current between the track elements 24 (shelf in depleted condition) is through the metal body of the shelf itself, but the use of low voltage at the power terminals 66 and 68 assures that no hazard is presented. If a higher operating voltage is desired, the switches 56 may be employed to operate relays (not shown) in the respective power circuits to control the lamps 30-34.

The vertically spaced stops 62 permit the travel necessary to open and close the switch 56, but the shelf 22 is limited in its up-and-down movement so that it does not acquire an objectionable forward or rearward tilt in either of its extreme positions. Other means of mounting the shelves 22 for limited up-and-down movement may also be employed, but the preferred mounting arrangement disclosed herein has the advantage of being readily adaptable to an adjustable shelf construction utilized in refrigerators that are commercially available at the present time.

Since each of the shelves 22 is reserved for products of one particular type or class, the viewer becomes quickly accustomed to associating a particular colored signal with the depletion of a particular product, such as milk, cola or beer. For purposes of initial familiarization, the identification strip is provided and may be changed as required depending upon the beverages which a particular consumer may desire to stock on the shelves 22. Accordingly, the signaling apparatus of the present invention has ultimate versatility since it may be customized to suit the tastes of a purchasing consumer.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In an article storage structure provided with a normally closed cabinet having an interior space which is hidden from view when the cabinet is closed, the improvement comprising:

- a pair of electrically conductive, upright, horizontally spaced track elements in said cabinet;
- a vertically adjustable article storage unit supported by said track elements at a selected height, said unit including a shelf for receiving a plurality of articles for storage in said cabinet, means mounting said shelf for limited movement from an upper position, in which the shelf is in an essentially unloaded, depleted condition, to a lower position under the weight of said articles thereon, and means coupled with said shelf for returning the

latter to its upper position when a sufficient number of said articles are removed therefrom to place the shelf in said depleted condition; an electrically operated signaling device for indicating that the shelf is in said depleted condition without opening the cabinet; and an operating circuit connected with said track elements and said device,

said mounting means of said unit being provided with a pair of electrically conductive components engaging corresponding track elements at the selected height, and said track elements and said components having mating parts permitting selective vertical positioning of the unit on said track elements,

said unit further including an electrical switch coupled with said components for establishing electrical continuity between said track elements when the switch is actuated, and means responsive to movement of said shelf for actuating the switch as the shelf shifts to its upper position under the action of said returning means, whereby the unit is mechanically and electrically independent of said track elements to permit vertical adjustment of the shelf, yet electrical connections to said switch are established through the track elements irrespective of the shelf height selected.

2. The improvement as claimed in claim 1, wherein said shelf is electrically conductive and has a pair of rearwardly extending arms at rear corners thereof, and wherein said mounting means of the unit includes a pair of aligned pivot pins adjacent said rear corners and carried by corresponding components for supporting said arms for pivotal movement of the shelf between said positions thereof, said switch being mounted on one of said components and electrically connected with said one component and the associated arm, the other of said arms being electrically connected with the other of said components.

3. In a refrigerator:

a normally closed cabinet having a refrigerated interior space which is hidden from view when the cabinet is closed;

a plurality of product storage units;

a plurality of electrically conductive support structures in said cabinet, each providing a number of heights at which a corresponding unit may be supported within the cabinet and supporting said unit at a selected height,

each of said units including a shelf for receiving a

number of consumable products of a particular type for storage in said cabinet, means mounting said shelf for limited movement from an upper position, in which the shelf is in an essentially unloaded, depleted condition, to a lower position under the weight of said products thereon, and means coupled with said shelf for returning the latter to its upper position when a sufficient quantity of said products are removed therefrom to place the shelf in said depleted condition;

a plurality of electrically operated signaling devices on the exterior of said cabinet, each operable to indicate that a corresponding shelf is in said depleted condition without opening the cabinet and inspecting the shelf; and

a plurality of independent operating circuits, each connected with a corresponding support structure and a corresponding device,

said mounting means of each unit being provided with a pair of electrically conductive components engaging the corresponding support structure at the selected height, and the support structure and the components having mating parts permitting selective vertical positioning of the unit on the support structure at the heights provided,

each unit further including an electrical switch coupled with the components thereof for establishing electrical continuity between the switch and the associated support structure when the switch is actuated, and means responsive to movement of the shelf for actuating the switch as the shelf shifts to its upper position under the action of said returning means, whereby the units are mechanically and electrically independent of the support structures therefor to permit vertical adjustment of the shelves, yet electrical connections to the switches are established through the support structures irrespective of the shelf heights selected so that the depleted condition of a particular shelf will be indicated.

4. In the refrigerator as claimed in claim 3, wherein each of said devices, upon operation thereof, emits visible light of a different color to thereby provide said devices with different recognizable characteristics.

5. In the refrigerator as claimed in claim 4, further provided with indicia-bearing means on said cabinet exterior proximal to said devices for identifying the product stored on each shelf and, accordingly, represented by each device.

* * * * *

55

60

65