Jan. 15, 1957 J. R. MILLS 2,778,000

CONDUCTIVE HINGE FOR REFRIGERATOR DOOR

Filed June 14, 1952

FIG. 1.

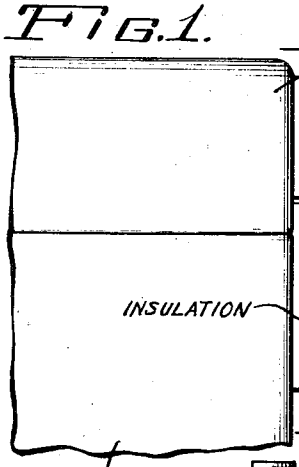


FIG. 4.

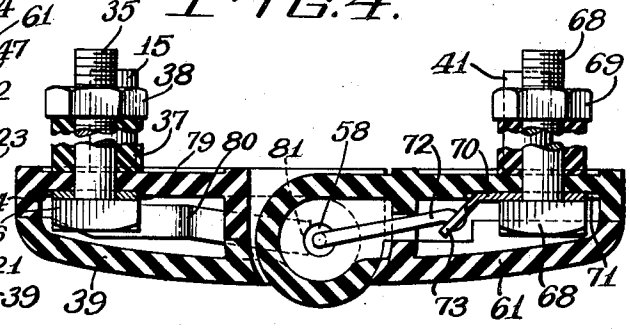


FIG. 3.

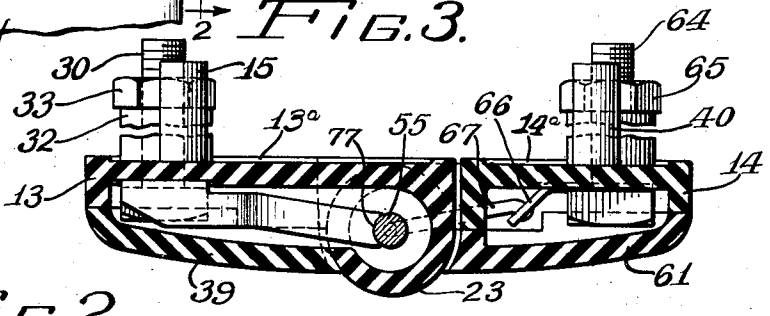
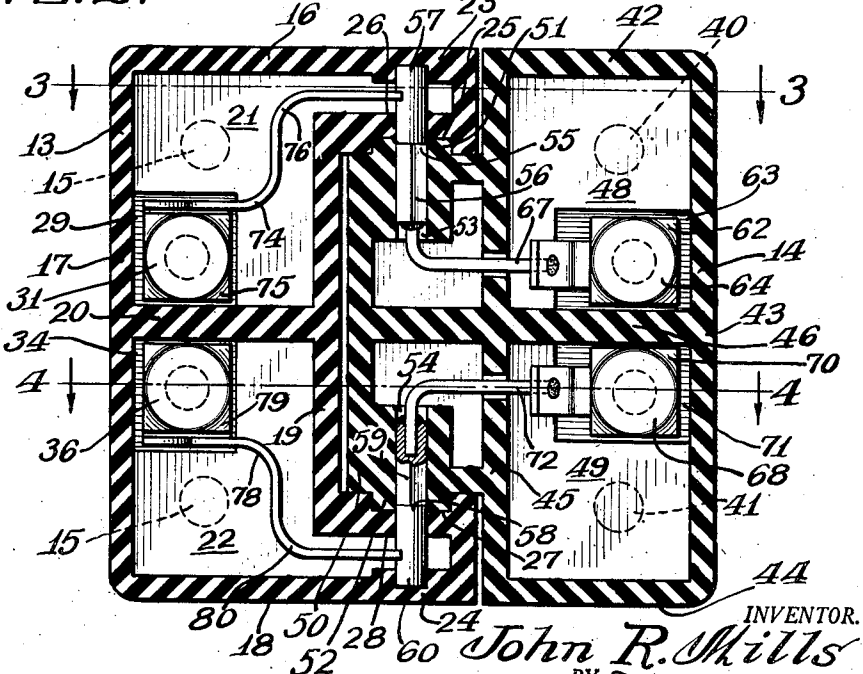


FIG. 2.



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CONDUCTIVE HINGE FOR REFRIGERATOR DOOR

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2 Claims. (Cl. 339—4)

This invention relates generally to a hinge structure and more particularly to a hinge which is adapted to convey an electrical current from a stationary object to a movable object.

Many modern refrigerators are equipped with means for maintaining butter at a higher temperature than the regular food storage compartment so that it will be in a relatively soft condition and will be adaptable for immediate use upon removal from the refrigerator. One common means of accomplishing this is to provide a butter keeper compartment mounted on the inner panel of the refrigerator door with a heating element positioned in heat exchange relation with the butter keeper. The heating element is generally an electrical unit having automatic means for controlling the flow of electric current thereto so that the butter keeper compartment will be maintained at a proper temperature. Many refrigerated cabinets are cooled by an electrically operated refrigeration system whereby there is a readily accessible supply of electrical current for the heating system. In order to provide a refrigerator cabinet which is neat in appearance, it is advantageous to supply the hinges of the compartment door with means for conveying an electrical current from the cabinet to the door.

It is one object of the present invention to provide a hinge which will conduct an electric current from a cabinet to a door.

Another object of the invention is to provide a hinge comprising a hinge butt and hinge leaf connected by a pin having one end fixedly connected to the hinge leaf and the other end rotatively connected to the hinge butt.

Another object of the invention is to provide an electrical conductor which is fastened to the hinge butt with one end biased against the pin whereby an electrical current will be conducted between the pin and the electrical conductor.

Another object of the invention is to provide an electric current conducting hinge which is simple in structure and can be easily assembled and disassembled.

Another object of the invention is to provide an electric current conducting hinge which is neat in appearance and economical to manufacture.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

Fig. 1 is a top elevational view of a portion of a refrigerated cabinet showing a door hinge attached thereto.

Fig. 2 is a cross sectional view of the hinge taken substantially along line 2—2 of Fig. 1.

Fig. 3 is a cross sectional view of the hinge taken substantially along line 3—3 of Fig. 2.

Fig. 4 is a cross sectional view of the hinge taken substantially along line 4—4 of Fig. 2.

Referring to the drawings for a more detailed description of the invention, a portion of a refrigerated cabinet 10 is shown with a door 11 rotatively secured thereto by hinge 12. The hinge 12 comprises a hinge butt 13 and a

hinge leaf 14. As can be seen in Figs. 3 and 4 the hinge butt 13 is provided with a flat surface 13*a* having two cylindrical shaped projections 15 extending therefrom. The opposite side of the hinge butt 13 is provided with an upper wall 16, side wall 17, bottom wall 18, inner wall 19, and an intermediate wall 20. The upper wall 16, intermediate wall 20 and lower wall 18 are each provided with a stepped or raised portion 21. The inner wall 19 is the same height as these raised portions. The inner wall 19 divides the space enclosed by the other four walls into an upper chamber 21 and a lower chamber 22.

As best seen in Fig. 2, the hinge butt 13 is provided with an upper overhanging cylindrical shaped hollow projection 23 and a similarly shaped lower projection 24 spaced therebelow. The upper projection 23 is provided with a circular shaped depression 25 and a circular shaped opening 26 extending upwardly along the center line of the depression 25. The lower projection 24 is provided with a circular shaped depression 27 and a circular shaped opening 28 which extends downwardly through the center of the depression 27. A rectangular shaped recess 29 is formed in a lower corner of the upper chamber 21 and an electrical current conducting bolt 30 extends through the hinge butt 13 with the head 31 thereof adjacent the recess 29. An insulating block 32 fits over the bolt 30 and is secured in place by a nut 33 which is threaded to the bolt 30. The lower chamber 22 is provided with a rectangular shaped recess 34 and a bolt 35 which extends through the hinge butt 13 with the head 36 thereof located adjacent the recess 34. An insulating block 37 fits over the bolt 35 and is held against the hinge butt 13 by a nut 38 which is threaded on the bolt 35. An outer cover 39 fits over the hinge butt 13 with the edges thereof being secured to the walls 16, 17, 18 and 19 in sealed relationship in any suitable manner so that moisture will be prevented from entering the chambers 21 and 22.

The hinge leaf 14 is provided with a flat portion 14*a* from which two spaced apart cylindrical projections 40 and 41 extend. Top wall 42, side shoulder 43, lower shoulder 44, inner wall 45 and intermediate shoulder 46 extend from the opposite side of the flat portion 14*a*. The walls 42, 46 and 44 are each provided with a stepped portion 47. Intermediate wall 46 divides the space enclosed by the other walls into an upper chamber 48 and a lower chamber 49. The inner edge of the hinge leaf 14 is provided with a cylindrical shaped sleeve 50 having a circular shaped projection 51 which is rotatively secured within depression 25. The lower end of the sleeve 50 is also provided with a circular shaped projection 52 which is rotatively secured within depression 27. A square opening 53 extends through the center of projection 51 and a second square opening 54 extends through projection 52 in alignment with opening 53. A pin 55 having a square portion 56 and a circular portion 57 is positioned with the square end 56 fixedly secured in the square opening 53 and the circular portion 57 rotatively secured in the circular opening 26. A second pin 58 has a square end 59 fixedly secured within the square opening 54 and a circular end 60 rotatively secured within the circular opening 28. An outer cover 61 fits over the hinge leaf 14 with the edges thereof being secured to the walls 42, 43, 44 and 45 in sealed relationship by any suitable means so that moisture will be prevented from entering the chambers 48 and 49.

A flat clip 62 is positioned within a recess 63 of hinge leaf 14 and secured therein by bolt 64 and nut 65 with an upturned edge 66 extending outwardly therefrom. An electric conductor 67 has one end secured to the upturned edge 66 of the clip 62 and the opposite end secured to pin 55. A bolt 68 and nut 69 secures a second clip 70 in a recess 71 and an electric conductor 72 has one end connected to an upturned edge 73 of the clip 70.

The opposite end is secured to the square end 59 of the pin 58.

A resilient member 74 is positioned within the upper chamber 21 of the hinge butt 13 with a flat portion 75 secured within recess 29 by bolt 30. The resilient member 74 has a curved arm 76 which extends upwardly from the flat portion 75 into contact with the pin 55. The end of the arm 76 is provided with a curved surface 77 which contacts the circular portion 57 of the pin 55 with the member 74 in assembled position as shown in the drawings, the arm 76 is deflected from its free position so that the curved end 77 is held in intimate contact with the pin 55. A second resilient member 78 has a flat portion 79 secured in recess 34 by bolt 35. An arm 80 extends from the lower edge of the flat portion 79 and curves into contact with the pin 58. The end of the arm 80 is provided with a curved surface 81 which bears against the pin 58. Arm 80 is deflected from its free position so that curved end 81 is held in contact with pin 58 at all times.

The hinge butt 13, cover 39, hinge leaf 14 and cover 61 are constructed from an electrical insulating material. The hinge 12 is positioned with hinge butt 13 adjacent the cabinet 10 and the hinge leaf 14 adjacent the door 11. The pins 15 extend through the outer wall of the cabinet 10 are secured thereto by suitable means. The pins 41 and 42 of the hinge leaf 14 extend through the outer wall of the door 11 and are secured thereto in any suitable manner. Bolts 30 and 35 of the hinge butt 13 act as terminals and may be attached to a suitable supply source. It is contemplated that the bolts 64 and 68 of the hinge leaf 14 be electrically connected to a heating element of a butter keeper (not shown) which may be fastened to the door 11. An electric current will be conveyed to the pins 55 and 58 by the conductors 67 and 72, then to the bolts 30 and 35 by the resilient members 74 and 78. The ends of the resilient members 74 and 78 will be held in contact with the pins 55 and 58 during opening of the door 11 whereby the circuit through the hinge will be completed at all times. As the door is opened, the projections 51 and 52 of the hinge leaf 14 will rotate within the depressions 25 and 27 of the hinge butt 13. It is contemplated that two hinges be supplied so that the door 11 will be solidly supported.

From the foregoing it is apparent that an attractive electrical conducting hinge is provided. The outer covers 39 and 61 seal the interior of the hinge and prevent moisture from interfering with the operation of the hinge. The hinge is simple in structure and economical to manufacture.

While the invention has been shown in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof. It is desired that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What is claimed is:

1. In a hinge structure, a hinge butt comprising a substantially flat body portion having walls extending thereabout to form two compartments, portions of one of said walls being formed to have a cylindrical shape, two bearings, each of said bearings formed in one of said portions of said one wall, said bearings positioned longitudinally therein in a spaced apart relationship along a common axis, a pair of passageways, each of said passageways formed through one of said portions, each of said passageways positioned in one of said portions between one of said bearings and one of said compartments, a hinge leaf comprising a substantially flat body portion having walls extending thereabout to form two compartments, one of said walls of said hinge leaf being formed to have a cylindrical shape, a pair of openings formed through said one wall of said hinge leaf and positioned longitudinally therein in a spaced apart relationship along a common axis, each of said openings further positioned to open into one of said compartments of said hinge leaf, a pair of pins, each of said pins fixedly mounted in one of said openings and pivotally mounted in one of said bearings, said hinge butt and said hinge leaf further formed of a material which is a relatively poor conductor of electricity, four terminal bolts, each of said terminal bolts mounted in one of said compartments of said hinge butt and said hinge leaf, a pair of electrical conductors, each one of said pair of electrical conductors connected between one of said terminal bolts mounted within one of said compartments of said hinge leaf and the portion of one of said pins which is fixedly mounted in one of said openings, a pair of resilient conductors, each one of said pair of resilient conductors mounted to one of said terminal bolts mounted in one of the compartments of said hinge butt, each one of said resilient conductors being positioned to extend through one of said passageways and to abut the portion of one of said pins pivotally mounted in one of said bearings.

2. In a hinge structure, a hinge butt comprising a substantially flat body portion having walls extending thereabout to form two compartments, portions of one of said walls being formed to have a cylindrical shape, two bearings, each of said bearings formed in one of said portions of said one wall, said bearings positioned longitudinally therein in a spaced apart relationship along a common axis, a pair of passageways, each of said passageways formed through one of said portions, each of said passageways positioned in said portions between one of said bearings and one of said compartments, a hinge leaf comprising a substantially flat body portion having walls extending thereabout to form two compartments, one of said walls of said hinge leaf being formed to have a cylindrical shape, a pair of openings formed through said one wall of said hinge leaf and positioned longitudinally therein in a spaced apart relationship along a common axis, each of said openings further positioned to open into one of said compartments of said hinge leaf, a pair of pins, each of said pins fixedly mounted in one of said openings and pivotally mounted in one of said bearings, said hinge butt and said hinge leaf further formed of a material which is a relatively poor conductor of electricity, a pair of covers, one of said covers mounted to abut said portions and to extend over the other walls of said hinge butt, the other of said covers mounted to abut said one wall of said hinge leaf and to extend over the other walls of said hinge leaf, electrical conductor means mounted in each of said compartments, said means being positioned and cooperating with said pins so that an electrical circuit is completed from one of said compartments of said hinge butt, through one of said pair of passageways, through one of said pins, to one of said compartments of said hinge leaf, and another electrical circuit is completed between the other compartment of said hinge butt, the other passageway of said pair of passageways, the other of said pins, to the other of said compartments of said hinge leaf, and mounting means extending from said flat body portion of said hinge butt and said hinge leaf for mounting said hinge structure to a cabinet and door.

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