

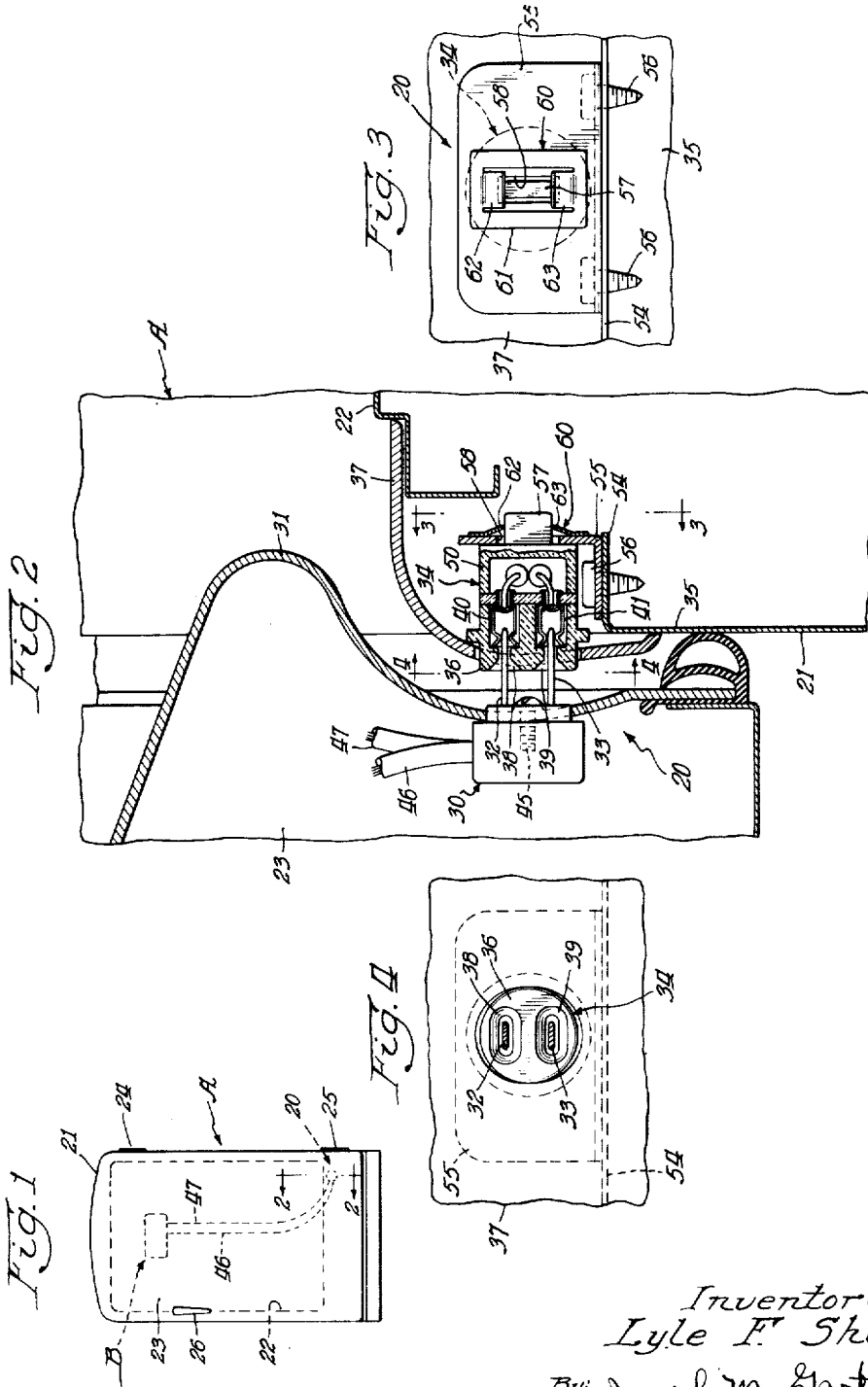
Oct. 15, 1957

L. F. SHAW

2,810,114

FLOATING ELECTRICAL CONNECTOR FOR A CABINET DOOR

Filed Dec. 31, 1953



Inventor:  
Lyle F. Shaw  
By Joseph M. Gartner

Att.

1

2,810,114

## FLOATING ELECTRICAL CONNECTOR FOR A CABINET DOOR

Lyle F. Shaw, Muskegon, Mich., assignor to Borg-Warner Corporation, Chicago, Ill., a corporation of Illinois

Application December 31, 1953, Serial No. 401,536

1 Claim. (Cl. 339—64)

This invention relates, in general, to electrical connectors particularly adaptable for advantageous employment for transmitting electrical energy between two movable objects such as, for example, between the cabinet and compartment door of a conventional refrigerator so as to supply electrical energy from the cabinet to an electrical device disposed on or in the compartment door.

Heretofore, the disposition of electrical devices on the compartment door of a refrigerator has been proven expensive and costly in service problems because no means were available to economically provide for transmission of electrical current from the cabinet to the door. Moreover, in the home appliance field particular problems presented themselves such as, for example, overcoming the proposition of short circuiting or deterioration of the wires which could be caused by bending or because of grease or normal vapors found in the kitchen.

The present improvements in electrical connectors are directed to simplify their construction and their mode of operation and also to provide an electrical connector which may readily and conveniently be employed universally to various appliances presently being commercially exploited, and particularly so where it is desired to transmit electrical current between two elements, one of which is movable with respect to the other. Moreover, the present device seeks to employ conventional parts wherever necessary and possible, thereby to effect a substantial reduction in the cost over the prevailing types of electrical transmission devices presently being employed for the same purpose.

Accordingly, an important object and accomplishment of the invention is to provide an electrical connector arranged for advantageous transmission of electrical energy between two elements, one of which is movable with respect to the other, said electrical connector being particularly and advantageously applicable for employment in a home appliance such as a refrigerator where it is desired to transmit electrical energy from the cabinet to an electrical device disposed in or on the compartment door, said electrical connector being particularly characterized in its simple but sturdy construction and in its convenient, fool-proof and safe operation.

Another object and accomplishment of the invention is to provide an electrical connector arranged for advantageous transmission of electrical energy from the cabinet of a refrigerator to the compartment door therefor to effect operation of various devices disposed in or on the compartment door such as, for example, an electric clock, radio or a butter softener employing electrical energy to control the viscosity of the butter.

A further object and accomplishment of the invention is to provide an improved electrical connector by co-relating and especially designing the various elements thereof, whereby there shall be such cooperation between said improved elements as will best serve the purpose of providing an efficient electrical connector capable of being

2

manufactured at low cost and yet giving maximum of satisfactory service in use.

Another object and accomplishment of the invention is to provide an electrical hinge particularly adaptable for application to refrigerators where it is desired to transmit electrical energy from the cabinet to an electrical device disposed on or in the compartment door, said electrical hinge having means providing complete enclosure of the electrical conductors and is fireproof and safe in its operation for the purposes intended.

A further object and accomplishment of the invention is to provide an electrical connector having appropriate means whereby the elements of the connector are in a floating arrangement so as to compensate for relative movement of the elements and to assure proper alignment of the elements each with respect to the other.

The invention seeks, as a further object and accomplishment, to provide an electrical connector as contemplated herein and particularly characterized by an arrangement of parts to more advantageously and satisfactorily perform the functions required of it and adapted to provide a compact unit which will successfully combine the factors of structural simplicity and durability, and yet be economical to manufacture.

Additional objects, features and advantages of the invention disclosed herein will be apparent to persons skilled in the art after the construction and operation are understood from the within description.

It is preferred to accomplish the various objects of this invention and to practice the same in substantially the manner as more fully described herein, and as more particularly pointed out in the appended claim.

Embodiments of the invention are illustrated in the accompanying drawings forming a part hereof and wherein:

Fig. 1 is a front elevational view of a refrigerator which may embody the features of the present invention;

Fig. 2 is a sectional view of a portion of the refrigerator depicted in Fig. 1, and illustrating the electrical connector embodying the features of the present invention, this view being taken substantially on the plane of the line 2—2 in Fig. 1;

Fig. 3 is an end elevational view of the electrical connector depicted in Fig. 2 and this view being taken substantially on the plane of the line 3—3 in Fig. 2; and

Fig. 4 is an end elevational view of the electrical connector depicted in Fig. 2, and this view being taken substantially on the plane of the line 4—4 in Fig. 2.

The drawings are to be understood to be more or less of a schematic character for the purpose of illustrating and disclosing a preferred form of the improvements contemplated herein and in the drawings like reference characters identify the same parts in the several views.

As a possible example of advantageous employment of the contemplated floating electrical connector, reference is made to the drawings, particularly Figs. 1 and 2, wherein there is illustrated the floating electrical connector with which the present invention is particularly concerned and being designated in its entirety by the numeral 20 and being operatively associated, for example, with a refrigerator designated in its entirety by the letter A.

The illustrated refrigerator A may comprise a cabinet 21 having a food compartment disposed therein and defined by the liner 22, a food compartment door 23 hinged as at 24 and 25 to the cabinet 21. The door 23 may be opened and closed by means of a handle grip 26.

The refrigerator cabinet is provided with the usual and conventional mechanical refrigerator apparatus (not shown) which may comprise a compressor, condenser and evaporator; the compressor may be of the hermetically sealed type with an electric motor.

It is notable that the door 23 of the refrigerator A may

3

have disposed in or mounted upon in any suitable manner an electrical device B such as, for example, an electric clock, radio or a butter softener employing electrical energy to control the viscosity of the butter.

Suffice it to say, since the invention is not particularly concerned with the precise construction of the illustrated refrigerator A and/or its associated parts, and the electrical device B, they will not be further described in detail, and it is deemed sufficient for all intentions and purposes herein contained to show only portions adjacent to and cooperating with the floating electrical connector contemplated herein. It is to be understood that details of construction of such refrigerator and/or its associated parts, and the electrical device B, may be modified to suit particular conditions or to satisfy the engineering genius of various manufacturers, and in some instances the contemplated floating electrical connector may be advantageously employed with other types of home appliances, and I do not wish to be limited to the construction of these elements as set forth except where such construction particularly concerns the invention contemplated herein.

Having thus described, by way of example, a possible adaptation of the floating electrical connector generally indicated as at 20 and as contemplated herein, and having described the general environment surrounding the adaptation, the specific construction and cooperative functions of the parts of said floating electrical connector with which the present invention is particularly concerned, will now be described in detail.

In the exemplary embodiment of the invention depicted in Figs. 2, 3 and 4 the floating electrical connector 20 contemplated by the present invention comprises, in general, a male plug member 30 carried by the inner panel 31 of the refrigerator door 23 and having a pair of projecting prongs 32 and 33, a female plug member 34 carried by a front panel portion 35 of the refrigerator cabinet 21 with end portions 36 projecting through a throat liner 37, said end projecting portions being provided with apertures 38 and 39 respectively disposed in alignment with and adapted to receive the projecting prongs 32 and 33 of the male plug 30, and said female plug member having disposed therein resilient contact prongs 40 and 41 adapted for intimate engagement with end portions of the projecting prongs 32 and 33 of the male plug member 30.

The male plug member 30 is fixedly secured to the inner panel 31 of the door 23 by means of the screws 45. Suitable electric wires 46 and 47 are provided to conduct electrical energy from the prongs 32 and 33 to the electrical device B (Fig. 1).

Attention is invited to Figs. 2, 3 and 4 wherein there is shown a female plug member 34 as comprising a housing 50 of generally circular form and adapted to accommodate the resilient prong members 40 and 41 as shown. It is notable that the apertures 38 and 39 disposed in the projecting end face portions of the body 50 are of a generally funnel shape in order to insure the proper alignment and subsequent insertion of the projecting prong members 32 and 33 into their proper association in the female plug member 34 for intimate contact with the resilient electrical connectors 40 and 41.

In order to further insure proper association of the parts hereinbefore described, attention is invited to Figs. 2 and 3, wherein the particular mounting of the female plug member 34 to the front panel 35 is clearly illustrated. It can be seen that the front panel 35 is provided with an integral bent flange 54 and that the housing 50 of the female plug member 34 is provided with a support bracket 55 adapted for intimate association with the bent flange 54 and is held securely thereto by virtue of the screw means 56. The housing 50 is provided with an axially extending substantially rectangular shaped stud 57 which projects through an aperture 58 of the support bracket 55. In order to maintain the housing 50 in its association with the bracket 55 as shown, there is pro-

4

vided a spring type locking device indicated in its entirety by the numeral 60 and which may comprise, in general, a flat plate rectangular-shaped body 61 having integral struck portions 62 and 63 adapted to wedgingly engage peripheral portions of the stud 57 thereby to prevent relative axial movement of the housing 50 with respect to the support bracket; however, it can be seen that slight movement of the housing 50 in a direction transversely of longitudinal axis of the female plug member 34 may be accommodated. This transverse movement provides a floating connection in order to accommodate slight misalignment between the male and female plug members. This slight transverse movement of the housing 50 moves the spring type locking device 60 transversely with respect to the support bracket 55 thereby providing a sliding engagement of the device 60 with the bracket 55.

The operation of the floating electrical connector 20 is as follows: Because the male member plug 30 is fixedly secured to the inner panel surface 31 of the door 23, it will move with the door responsive to opening of the door by manual force applied to the handle grip 26. Opening of the door 23 will cause the prongs 32 and 33 to withdraw from their normal operation position in the female plug member and break their intimate contact respectively with the resilient electrical prongs 40 and 41.

When the door 23 is closed, the prongs 32 and 33 will again assume their normal position in intimate engagement with the resilient electrical prongs 40 and 41 as shown in Fig. 2, thereby to provide an electrical connection between the female and male plug members respectively carried by the cabinet and food compartment door, which electrical connection will provide a through circuit facilitating conduction of electrical energy via wires 46 and 47 to an electrical device B disposed in or carried by the door 23.

Because of its simple construction, the floating electrical connector contemplated herein is economical to manufacture and is readily adaptable to mass production manufacturing methods.

From the foregoing disclosure, it may be observed that I have provided a floating electrical connector between a refrigerator cabinet and a food compartment door therefor which efficiently fulfills the objects as hereinbefore set forth and which provides numerous advantages which may be summarized as follows:

- (1) Structurally simple, efficient and durable;
- (2) Economical to manufacture and readily adaptable to mass production manufacturing principles; and

(3) The provision of an electrical connector arranged for advantageous transmission of electrical energy between two elements one of which is movable with respect to the other, said electrical connector being particularly and advantageously applicable for employment in a home appliance such as, for example, a refrigerator where it is desired to transmit electrical energy from the cabinet to an electrical device such as, for example, an electric clock, radio or a butter softener employing electrical energy to control the viscosity of the butter.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but wish to avail myself of all changes within the scope of the appended claim.

I claim:

An electrical connector for a cabinet having a swinging door, an electrical device disposed in said door, a separable two-part electrical connector adapted to provide a closed electrical circuit between said cabinet and said electrical device, said connector having a first part carried by said cabinet and a second part carried by said door, an apertured bracket secured to a structural plate of said cabinet and extending transverse to the axis of said cabinet-supported connector part, a stud of angular cross-section on said last-mentioned connector part and protrud-

5

ing through said bracket aperture, spring tongues on said bracket having free margins contacting flat surfaces of said stud whereby the connector part on said cabinet is restrained against movement longitudinally of its axis but is permitted limited movement transversely of its axis to accommodate misalignment between the respective parts of said connector.

5

6

## References Cited in the file of this patent

## UNITED STATES PATENTS

1,979,091	Alsaker, et al. -----	Oct. 30, 1934
2,289,027	Lyle -----	July 7, 1942
2,438,371	Marholz -----	Mar. 23, 1948
2,615,949	Hecking -----	Oct. 28, 1952

## FOREIGN PATENTS

381,187	Great Britain -----	Sept. 29, 1932
---------	---------------------	----------------