United States Patent

Pfeifer

[15] **3,643,050**

[45] **Feb. 15, 1972**

[54] RESILIENT ELECTRICAL CONTACTS

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[22] Filed: **Mar. 27, 1970**

[21] Appl. No.: **23,121**

[52] **U.S. Cl.** ..... **200/166 BH**

[51] **Int. Cl.** **H01h 1/24**

[58] **Field of Search** ..... 200/166 C, 166 BH, 83 N, 8 R, 200/166 B, 168 G

[56] **References Cited**

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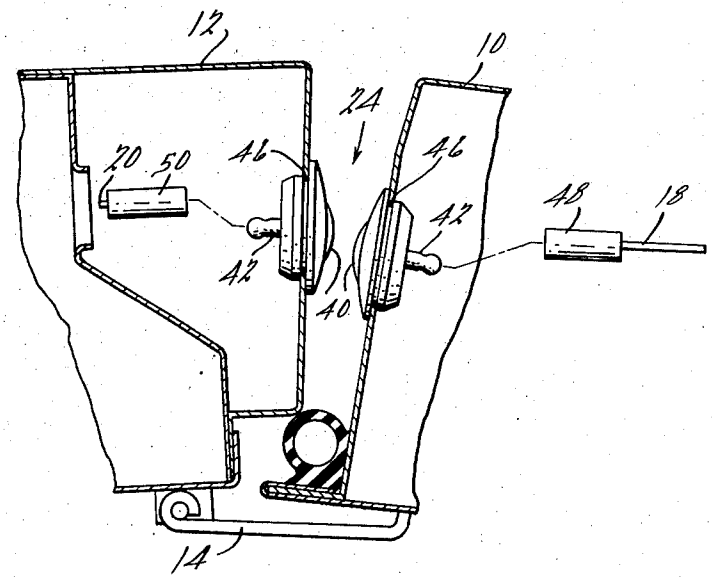
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[57] **ABSTRACT**

An electrical contact including a flexible rubbery support member adapted for mounting in a hole. The support member exteriorly supports an electrical contact button which is interiorly connected to an electrical wire. The contact is particularly adapted for use in mating contact pairs on door and doorframes or the like to provide a means of supplying power to electrical devices on the door when it is closed and the contacts are mated.

10 Claims, 6 Drawing Figures



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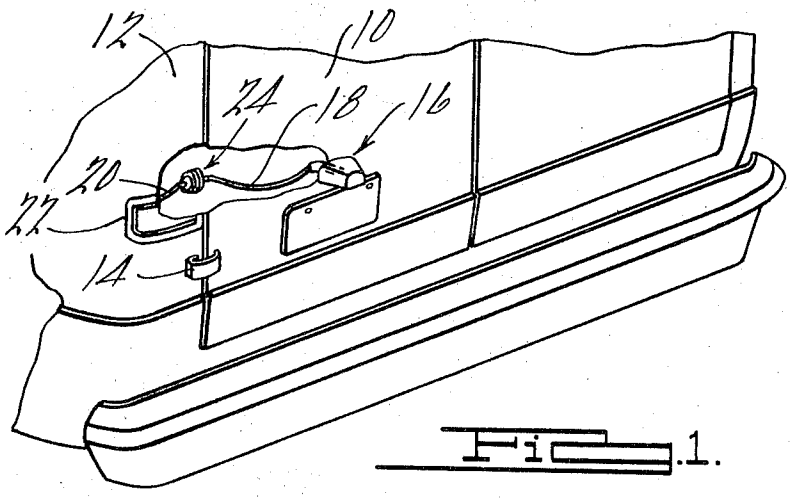


Fig. 1.

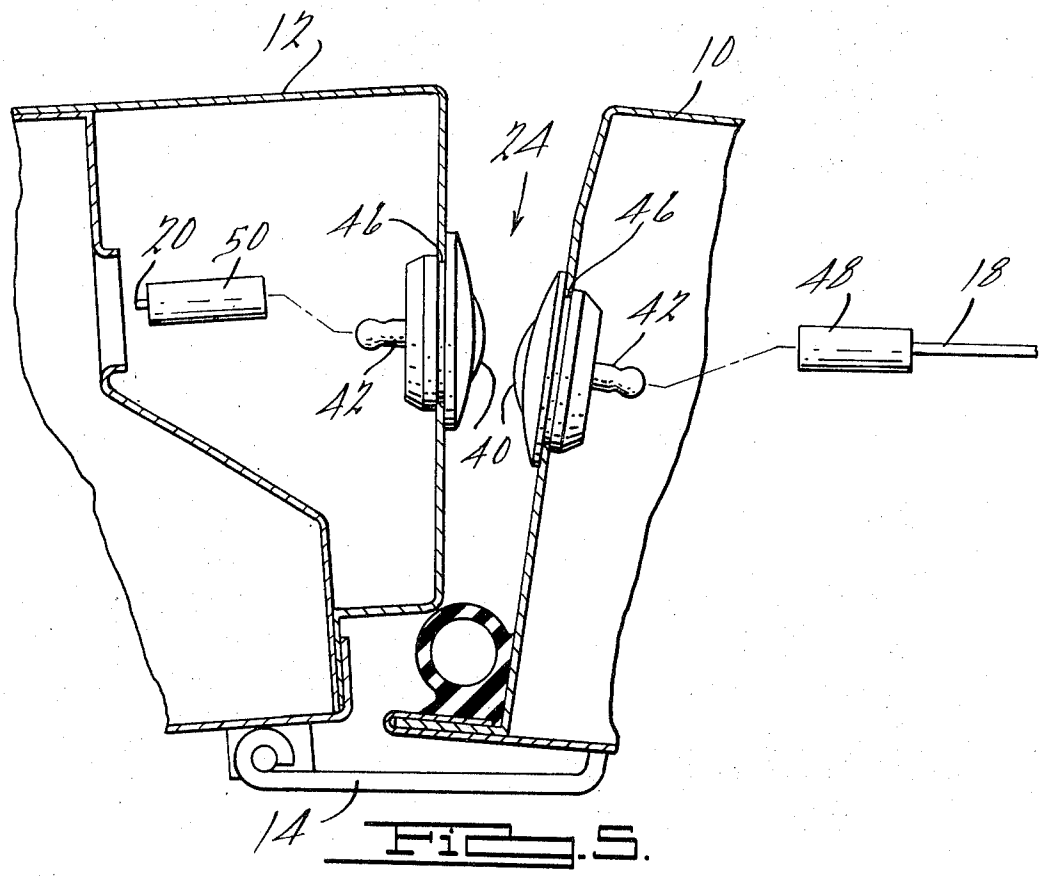


Fig. 5.

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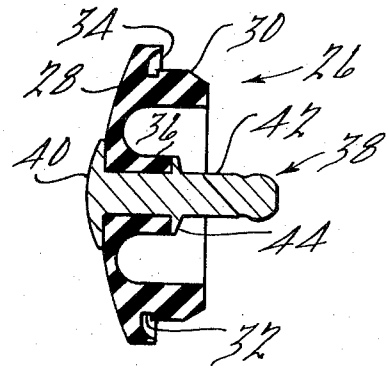


Fig. 4.

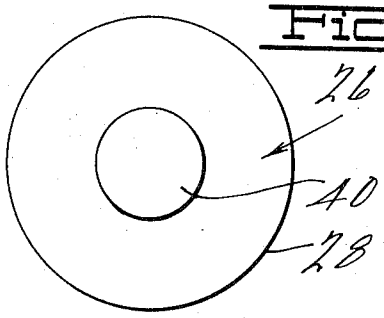


Fig. 2.

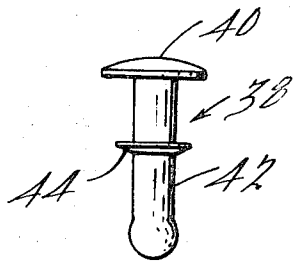


Fig. 3.

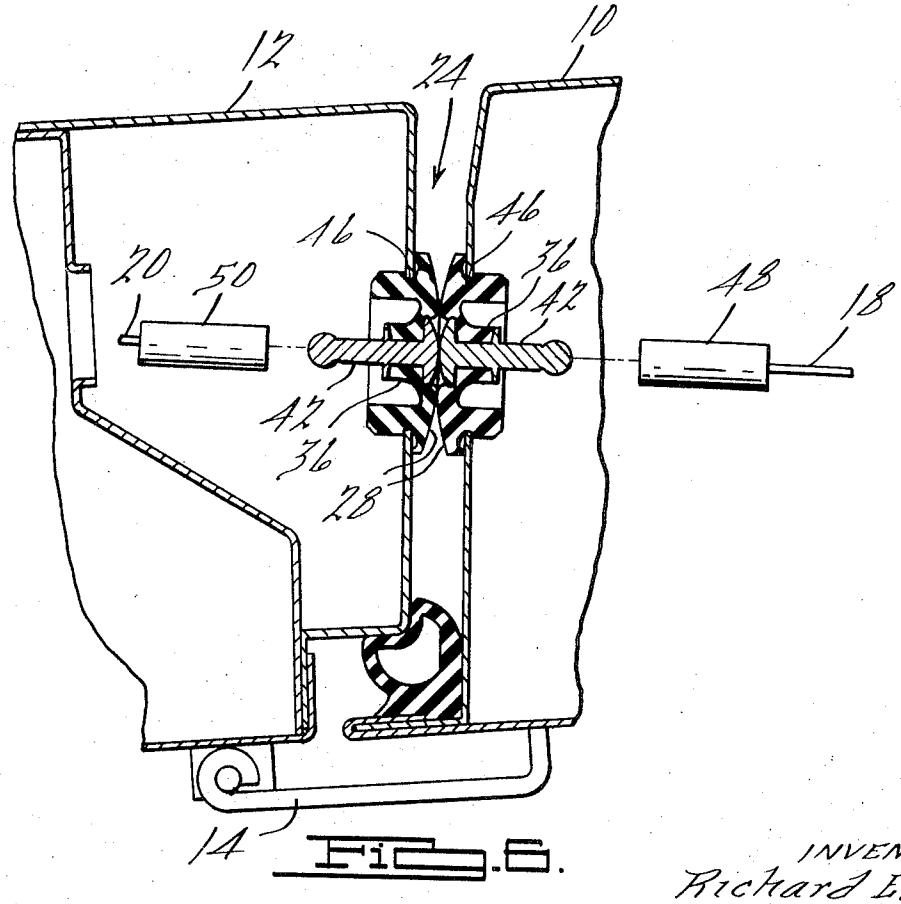


Fig. 6.

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RESILIENT ELECTRICAL CONTACTS

BACKGROUND

This invention relates to electrical contacts particularly those of the type which are carried on a door and doorframe respectively in a complementary pair and which are closed when the door is closed. The contacts of this invention find particular use in motor vehicles where they are to be used to supply electrical power from the vehicle to electrical devices carried on the vehicle door.

Power is usually supplied to motor vehicle doors by providing a length of flexible electrical wire between the door frame and the door, the length being long enough to bridge the gap between the frame and the door when the door is open. Upon closing the door this length of wire is accommodated between the frame and door.

SUMMARY OF THE INVENTION

This invention provides electrical contacts designed to provide good electrical connection upon the closing of such a door arrangement or other similar arrangement due to the elastic nature and shape of the contact support body. In its preferred form, the contact members are protected from dirt and moisture by the flexible contact support body because it deforms to form a seal when placed in abutment with a similar contact.

The unsightly wire running between the door and frame is thus avoided. Likewise, the possibility of catching the length of wire between the door and frame and damaging the wire is also avoided. The rubbery contact support body insulates the electrical contact members from the vehicle while its flexible body and the large area contacts compensate for dimensional variations in the door to frame fit and alignment.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be described in detail hereinbelow with reference to the drawings in which:

FIG. 1, is a fragmentary sketch illustrating the present invention as applied to the back door of a van type of motor vehicle.

FIG. 2, is a plan view of an electrical contact according to this invention.

FIG. 3, is a plan view of the preferred form of electrical conductor member to be used in the electrical contacts of this invention.

FIG. 4, is a vertical section through an electrical contact of the invention.

FIG. 5, is a fragmentary horizontal section through the open door and doorframe of FIG. 1 showing the installed electrical contacts of the invention.

FIG. 6, is a fragmentary section similar to FIG. 5 showing the door closed.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing, FIG. 1 shows the back door 10 of a van-type motor vehicle mounted for opening and closing with respect to frame 12 by means of hinge 14. Door 10 carries a license plate light assembly generally indicated at 16 which receives electrical power via wire 18. Electrical power is supplied to wire 18 from wire 20 which is connected into the taillight assembly 22 in this particular installation for convenience and ease of operation. Electrical connection is established between wires 18 and 20 when door 10 is closed by means of a pair of complementary electrical contacts, generally indicated at 24, carried on the inside edges of door 10 and frame 12 so as to be in mutual abutment for establishing electrical contact when the door is closed as shown in FIGS. 1 and 6.

The contact structure will be better understood with reference to FIGS. 2, 3 and 4 which show an electrical contact according to the invention which includes a support body 26 made of a resilient deformable elastic insulating material such as rubber, natural or synthetic, or a flexible plastic which may be readily molded into a shape similar to the one shown to include a convex domelike head portion or cap 28 and a shank portion 30 separated from head portion 28 by means of a peripheral notch 32. Head portion 28 includes a peripheral flange 34 which cooperates with notch 32 to mount the contact within an aperture as best shown in FIGS. 5 and 6. Centrally located in the body of support 26 is a cylindrical projection 36 which extends outwardly from the interior underside of head portion 28. Portion 36 has a central bore which receives an electrical conductor member such as pin 38 by a press fit. Pin 38 includes an exterior contact or button portion 40 carried on the raised central part of head portion 28. Exterior contact or button portion 40 is adapted for establishing electrical contact with another electrical member which is in most instances a complementary electrical contact of the same type as will be described in connection with FIGS. 5 and 6. Body 42 of pin 38 includes an intermediate flange 44 which is positioned the necessary distance from head 40 to provide a tight fit for the pin between head portion 28 and the projecting end of cylindrical portion 36.

FIGS. 5 and 6 show the electrical contacts in more detail with reference to their installation in a structure such as the aforementioned door and frame. FIG. 5 shows the door opened; FIG. 6 shows it closed. As can be seen, the contacts according to their preferred embodiment are adapted to be mounted in apertures 46 in the door frame and door. They are also formed to be electrically connected interiorly with wires 18 and 20 respectively by means of snap-on connectors 48 and 50 as indicated in the drawing and which are well known in the art and need not be described in detail here.

When the door is open as in FIG. 5 electrical contact is broken because the contact buttons are not in contact with each other. However, when the door is closed as in FIG. 6, corresponding buttons 40 are moved into abutment. In this position of mutual abutment, as can be seen in the Figure, a compressive force is generated by the closing of the door which causes the dome portions 28 to deform or compress inwardly. The resilient nature of the rubberlike material of the support body urges the two contacting buttons 40 against each other thus insuring good electrical contact therebetween. Also, the compression of the head portions of the support bodies allows surface portions of the domes surrounding the buttons to contact each other thereby forming a seal which protects the contacting buttons from dirt, water and the like.

It will be apparent that various changes and modifications may be made in the described construction without departing from the spirit and intent of the invention.

Having described the invention, what is claimed is:

1. An electrical contact comprising:

a support body adapted for mounting on a structure, the support body including an exterior convex head portion of a resiliently deformable elastic insulating material which flexes inwardly when force is applied against it, and

an electrical conductor member, carried centrally by the head portion and movable therewith upon deformation of the head portion, for making electrical contact with an electrical member brought against it, the conductor member including an exterior contact portion and an interior connector portion, the interior connector portion being adapted to be connected to an interior electrical circuit means within the structure whereby exterior electrical contact is maintained when a like electrical member is brought thereagainst as aforesaid by virtue of the fact that the head portion seeks to relieve its inwardly deformed condition by resiliently forcing the exterior contact portion outwardly against the like electrical member, the inwardly deformed head portion simultaneously forming a protective seal about the conductor member.

2. An electrical contact according to claim 1 wherein the head portion of the support body is domelike, and

the exterior contact portion of the electrical contact member is carried on the raised center portion of the dome.

3. An electrical contact according to claim 2 wherein

the support body includes a shank portion carrying the dome portion and is adapted for insertion into an aperture on a supporting structure by means of a peripheral notch which is included between the dome and shank portions for facilitating a tight fit in the aperture.

4. An electrical contact according to claim 3 wherein

the dome portion includes a peripheral flange.

5. An electrical contact according to claim 4 wherein

the electrical conductor member is a pin having an exterior contact portion and a body portion including a flange intermediate the exterior contact portion end of the body portion, and

the support body is hollow and includes an inner cylindrical projection extending outwardly from the underside of the dome portion with a central bore for receiving the pin, the length of the projection being the same as the length of the pin between the exterior contact portion and flange whereby the pin may be fixedly carried in the bore with the exterior contact portion on the dome.

6. In a door mounted on a frame, the door and frame including complementary electrical contacts, wherein the door is movable between open and closed positions relative to the frame to respectively open and close the contacts, the improvement wherein each of the electrical contacts comprise:

support bodies adapted for mounting on the door and frame respectively, each body including an exterior convex head portion of a resiliently deformable elastic insulating material which flexes inwardly when force is applied against it, and

an electrical conductor member, carried by the head portion and movable therewith upon deformation of the head portion, for making electrical contact with the complementary contact when brought against it, the conductor member including an exterior contact portion and an interior connector portion, the interior connector portion being adapted to be connected to an interior electrical circuit means within the door and frame respectively, whereby electrical contact is maintained between the contacts when the door is closed against the frame as aforesaid by virtue of the fact that the head portion seeks to relieve its deformed condition by resiliently forcing the exterior contact portions outwardly against the complementary contact, the inwardly deformed head portions simultaneously forming a protective seal about the conductor members.

7. The combination according to claim 6 wherein

the head portion of the support body is domelike, and

the exterior contact portion of the electrical conductor member is carried on the raised center portion of the dome.

8. The combination according to claim 7 wherein

the support body includes a shank portion carrying the dome portion and is adapted for insertion into an aperture on a supporting structure by means of a peripheral notch which is included between the dome and shank portions for facilitating a tight fit in the aperture.

9. The combination according to claim 8 wherein

the dome portion includes a peripheral flange.

10. The combination according to claim 9 wherein

the electrical conductor member is a pin having an exterior contact portion and a body portion including a flange intermediate the exterior contact portion and end of the body portion, and

the support body is hollow and includes an inner cylindrical projection extending outwardly from the underside of the dome portion with a central bore for receiving the pin, the length of the projection being the same as the length of the pin between the exterior contact portion and flange whereby the pin may be fixedly carried in the bore with the exterior contact portion on the dome.

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