July 24, 1962 G. C. CROWLEY 3,046,513

DETACHABLE ELECTRICAL CONNECTOR

Filed Jan. 30, 1961

Fig. 1.

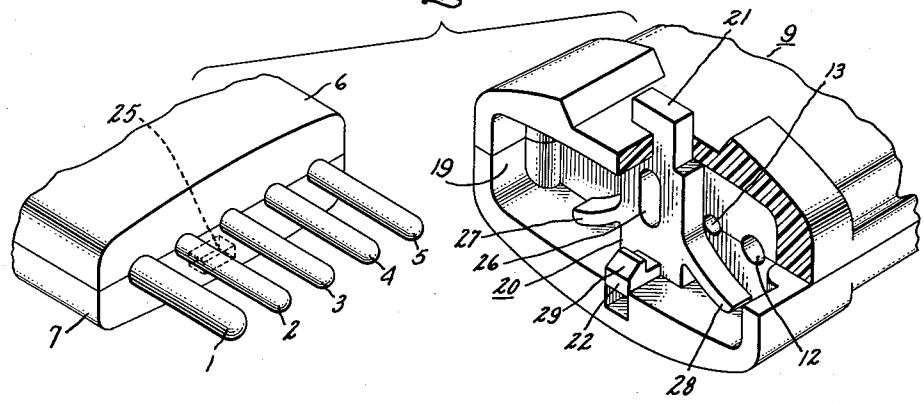


Fig. 2.

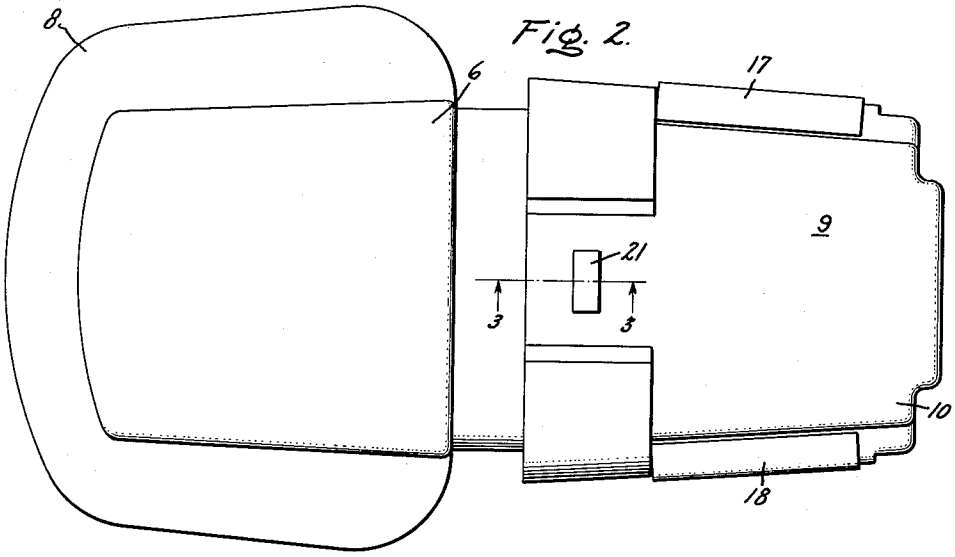


Fig. 3.

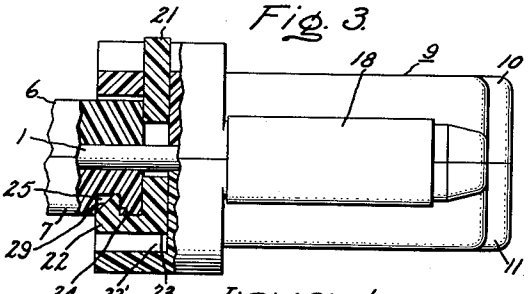
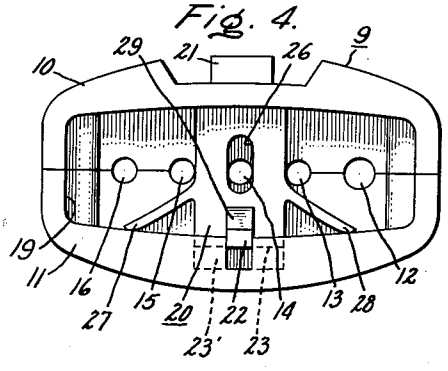


Fig. 4.



Inventor:
George C. Crowley,
by Laurence L. Kenyon
His Attorney.

United States Patent Office 3,046,513 Patented July 24, 1962

3,046,513

DETACHABLE ELECTRICAL CONNECTOR

George C. Crowley, Purley, England, assignor to General Electric Company, a corporation of New York

Filed Jan. 30, 1961, Ser. No. 85,874
3 Claims. (Cl. 339—91)

This invention relates to detachable electrical connectors, and more particularly to such a connector with releasable locking means to maintain the two parts thereof in assembled relation and prevent accidental separation.

While not necessarily so limited, the present invention finds particular application for electric bedcovers in which a wired electric blanket or the like is connected through a multiconductor cable to a bedside control and to a power source. It is obviously desirable with such electric bedcovers to provide a removable electrical connection between the body of the bedcover itself and the remaining electrical components. Ordinarily, such an electrical connector provides the means for establishing electrical connection not only to the heating wires, but to additional electrical connectors forming a part of the electrical control system. Typically, the connector is maintained at the foot of the blanket and involves from three to five separate electrical connections.

One of the requirements for the electrical connector is that it must occupy a minimum of space, since ordinarily this connector is located between the mattress and the foot of the bed. Thus, heretofore such connectors, in the interest of economy of space, have relied on frictional engagement to maintain the two parts of the connector assembled. However, such frictional engagement is not always sufficient in use and the blanket may become disconnected from its power supply, should the user, for example, tug or pull the blanket. Such forces tend to separate the electric power and control cord from the blanket. Thus, there is a need for some positive locking means to prevent the blanket from becoming disconnected during use.

The object of the present invention is to provide a compact detachable electrical connector, for electrically heated bedcovers or the like, with a self-locking latch.

A further object of this invention is to provide such a connector with the latch formed as a one-piece dielectric member for simplicity and for safety.

Another object of this invention is to provide such a detachable electrical connector with simplified locking means to prevent unintentional disconnection.

Briefly stated, in accordance with one aspect of this invention, a detachable electrical connector includes a male member of dielectric material with electrical conducting means secured therein and with a projecting portion adapted to be engaged in an open-ended recess of the female portion of the connector. The female member includes, of course, a body of dielectric material and a series of mating electrical conducting means. A one-piece movable locking member for the two portions of the connector is formed of a dielectric material, with the locking member extending across the open-ended recess of the female half of the connector. One end of the locking member is in the form of a push button extending through a wall of the open-ended recess of the female connector. This same locking member includes a detent engageable against a shoulder formed on the male connector. In addition, the locking member is formed with one or more integral resilient arms engaging the internal wall of the female connector to bias the locking member in a direction to secure the two halves of the connector in assembled relation.

The subject matter which I regard as my invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. My invention,

however, both as to organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing in which:

FIG. 1 is a partial perspective view of two halves of an electrical connector in accordance with the present invention in disassembled relation;

FIG. 2 is a plan view of the connector with the two parts thereof in assembled relation;

FIG. 3 is a partial sectional elevation taken on the line 3—3 of FIG. 2; and

FIG. 4 is an end elevation of the female portion of the electrical connector.

Referring now to the drawing, the present invention is illustrated by way of example in the form of an electrical connector particularly suitable for an electrically heated bedcover. The teaching of this invention, of course, is applicable to connectors of a similar type used for different applications. However, a connector for a bedcover must be relatively flat and compact while offering substantial safety from electrical short circuits or from accidental disconnection during use.

In the particular application herein disclosed, five separate electrical connections to the bedcover are contemplated. For that purpose, five electrical conducting pins, **1**, **2**, **3**, **4**, and **5**, are shown embedded in a two-piece dielectric connector member having a top half **6** and a bottom half **7**. Parts **6** and **7** may be, for example, of a thermosetting plastic molded in the proper configuration to receive the electrical conducting pins. This portion of the connector may comprise also a strain relief device adapted to be clamped to the fabric of the bedcover or blanket. As shown in FIG. 2, an enlarged flange **8** is provided for this purpose in order to increase the area of contact between the fabric material and the electrical connector. While the bedcover itself has not been shown in this application, it will be readily understood by those skilled in the art that the conducting pins **1** through **5** are connected to appropriate circuit elements in the blanket itself.

The male electrical connector shown at the left of FIG. 1 and described above is adapted to cooperate with a female electrical connector assembly **9** as shown on the drawings. This connector portion also may be molded in two parts, upper half **10** and lower half **11**. A series of apertures **12** through **16** (FIG. 4) are adapted to receive the conductor pins **1** through **5**. Although not shown in the present drawings, it will be understood that the female connector **9** includes electrical connecting clips of appropriate design to establish the desired electrical connections between the two halves of the connector. The upper and lower portions **10** and **11** of female connector **9** may also be secured together in any appropriate fashion, such as by the metal clips **17** and **18** shown in FIG. 2.

As best shown by FIG. 1, the male connector member includes an end of appropriate size and contour to be received in the open-ended recess **19** in the female connector. Such an arrangement provides a firm mechanical connection between the two parts when assembled as shown in FIG. 2, and the electrical conducting portions of the connector are completely sealed and protected by the dielectric material making up the body of each of the connector halves.

Connector assemblies as thus far described have been heretofore used in connection with electric blankets and the like. A similar connector is disclosed and claimed, for example, in Bliss et al. U.S. Patent 2,728,061, issued December 20, 1955, and assigned to the General Electric Company, assignee of the present invention. While such a connector construction will normally remain in engagement by friction after proper assembly, it has been

found in practice that occasionally the two halves of the connector will become separated during use. In accordance with the present invention, a simplified locking arrangement is provided which can, however, be released when desired.

As best shown in FIGS. 1 and 4 of the drawing, a one-piece locking member **20** of dielectric material is movably mounted in the female half of the connector assembly. As shown, this locking member **20** includes a push button portion **21** projecting through an aperture in the wall of female connector **9**. Locking member **20** extends across the open-ended recess in connector half **9** and includes on the side opposite the push button a detent or latch portion **22**. The locking member **20** is effectively anchored in position within the female connector, since the push button end **21** is engaged in an opening in the connector, while the opposite end **23** (FIG. 4) is receivable in a recess **23'** in the wall of the connector.

This locking member **20** cooperates with the male half of the connector to hold the two halves securely fastened together. For this purpose, the male half of the connector is provided with a shoulder **24** adapted to be engaged by the locking detent **22**. As a practical matter, shoulder **24** may provide part of a latch receiving recess **25** as shown by dotted lines in FIG. 1. In addition, the male connector half may provide guide means for the reciprocal movement of the locking member **20**. As shown in FIGS. 1 and 4, the locking member may include an elongated aperture **26** adapted to receive the projecting pin **3**. In addition, the side walls of the locking plate may be guided by conducting pins **2** and **4**. With this arrangement, there is little chance that the locking plate can become canted or jammed. The entire locking plate is, of course, made of a dielectric material such as nylon, and thus there is no danger of an electrical short circuit within the assembled connector.

While self-locking electrical connectors have been provided heretofore in the electrical art, it has been common practice to rely on the resiliency of one or more metal springs to bias the locking detent into engagement with the locking shoulder. However, with a locking arrangement as shown herein, any metal parts within the connector present a definite risk of electrical short circuit. Therefore, in accordance with the present invention, the locking member **20** of dielectric material is formed with integral resilient means to bias it into positive locking engagement. As shown herein, the resilient means comprises one or more flexible arms, two such arms **27** and **28** being shown in the illustrated embodiment. These resilient arms, as clearly shown in FIGS. 1 and 4, extend outwardly and engage the inside wall of the open-ended recess in the female connector. The configuration of these arms with relation to the connector is such that locking plate **20** is biased upwardly with respect to the position shown by the drawings; or, in other words, the locking detent **22** is biased into the locking recess **25** for securing the two halves of the connector in assembled relation.

As best shown in FIGS. 1 and 3, the outer surface of the locking detent is beveled as shown at **29** in FIG. 3. Thus, when the two connector halves are pressed together, the locking detent is automatically cammed downwardly against the resiliency provided by arms **27** and **28**. When the connector halves are fully assembled, the locking detent **22** snaps into recess **25**, and shoulder **24** on the male half of the connector thereafter prevents any accidental disengagement. The connector may, however, be disengaged at any time by depressing push button **21**, upon which the entire locking member **20** moves downwardly and the locking detent **22** then becomes clear of shoulder **24** and the connector halves can be separated.

A particular significance with respect to the present invention is the use of a one-piece member of dielectric material guided for motion within the body of the connector and operable to latch the two halves of the connector together. This integral member offers substantial economy in manufacture, and at the same time presents a structure offering a minimum risk of any electrical short circuit within the connector. By molding this one-piece or integral locking member from a resilient and flexible thermoplastic material such as nylon, the natural resiliency of the material allows it to function not only as a locking plate but also as its own spring.

While the present invention has been described by reference to a particular embodiment thereof, it is to be understood that various modifications may be made without departing from the invention. It is, therefore, the aim in the appended claims to cover all such equivalent variations as come within the true spirit and scope of the foregoing disclosure.

I claim:

1. A detachable electrical connector comprising a male member having a body of dielectric material and a plurality of conducting pins extending therefrom, the body of said male member also including walls defining a lock receiving recessed area, a female member having a body of dielectric material with a plurality of apertures to receive said conducting pins and walls defining an open-ended recess to receive an end portion of the male connector body, a one-piece locking member extending across the recess of said female member with at least one end thereof projecting through the wall of said female member to provide push button locking release means, a latch portion integral with said locking member within the end recess of said female member on a side opposite said push button to engage the locking recess in said male member, and flexible arms on said locking member engaging an internal wall of said female member biasing said locking member in a direction to engage said latch portion in said locking recess.

2. The combination of claim 1 in which said one-piece locking member is molded integrally of a resilient thermoplastic material.

3. In a detachable electrical connector, a male member of dielectric material having a plurality of electrical conducting pins secured therein and including a projecting portion, a lock engaging shoulder on the projecting portion of said male member, a female member of dielectric material with walls defining an open-ended recess to receive the projecting portion of said male member and having mating electrical conducting means therein, a one-piece movable locking member of dielectric material extending across said open-ended recess and anchored therein, said locking member having edges guided by sliding engagement with at least one of said pins, a push button forming part of said locking member extending thru the wall of said female member, at least one resilient arm integral with said locking member engaging the wall of said female member to bias said locking member in the locking direction and a locking detent forming part of said locking member engageable with said locking shoulder.

References Cited in the file of this patent

UNITED STATES PATENTS

1,648,518	Werner	Nov. 8, 1927
1,818,409	Leberman	Aug. 11, 1931
2,035,832	Parkin	Mar. 31, 1936
2,895,119	Montgomery	July 14, 1959

FOREIGN PATENTS

580,821	Great Britain	Sept. 20, 1946