

Aug. 26, 1941.

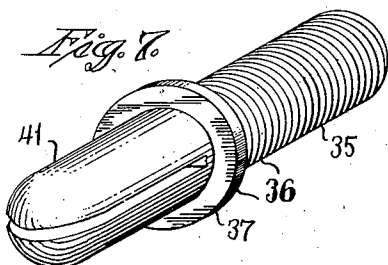
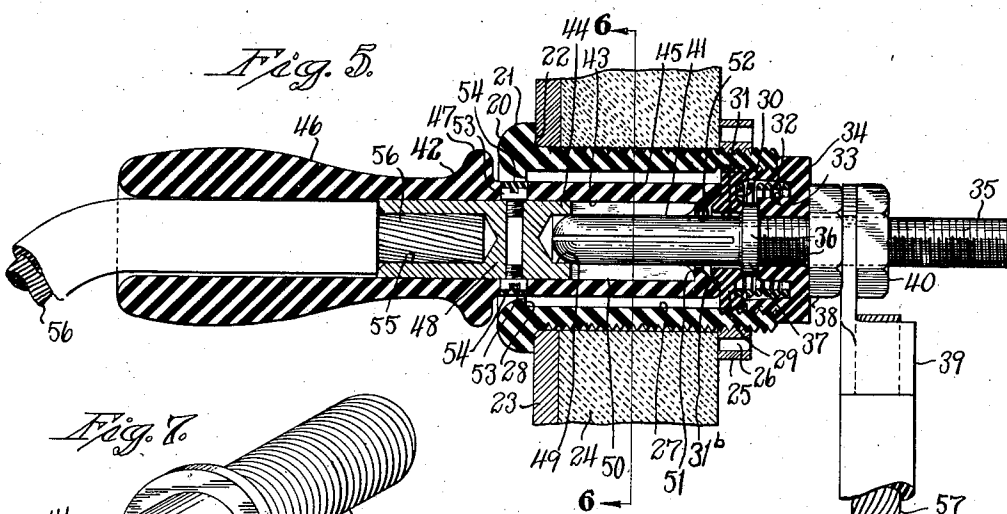
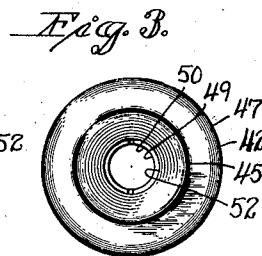
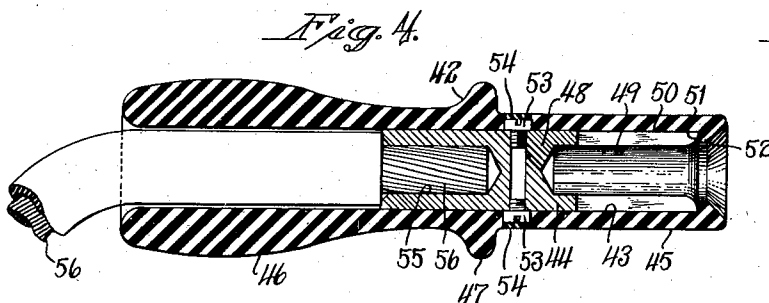
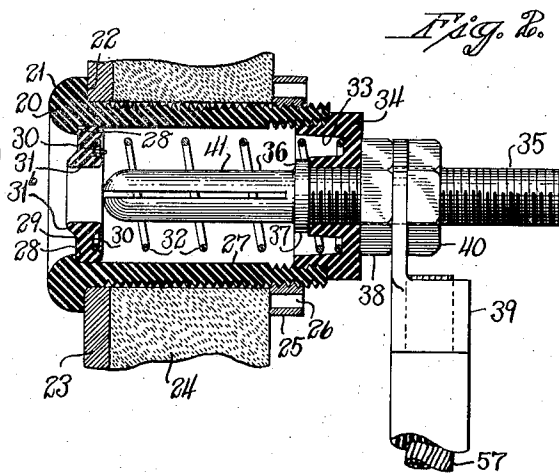
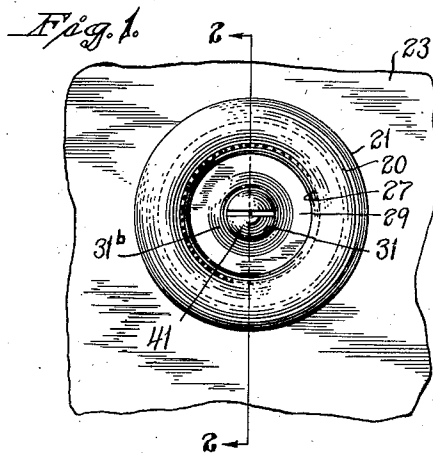
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2,253,593

SEPARABLE ELECTRIC CONNECTOR

Filed Oct. 17, 1939

2 Sheets-Sheet 1



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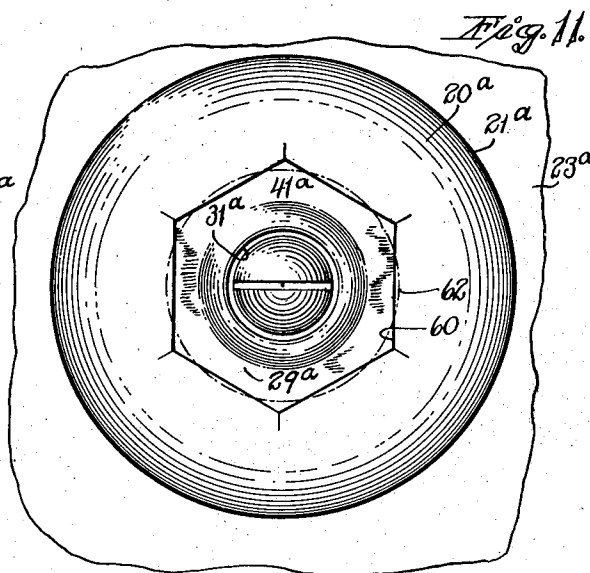
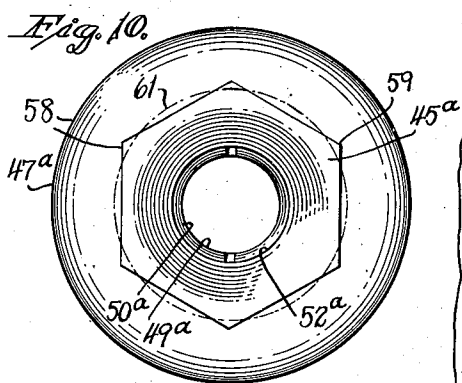
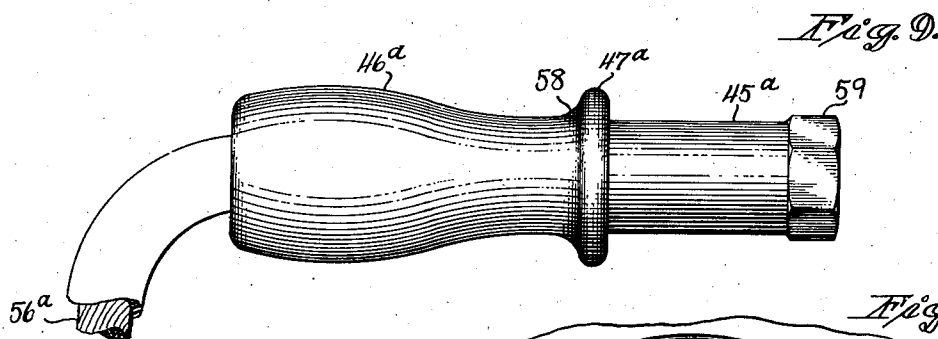
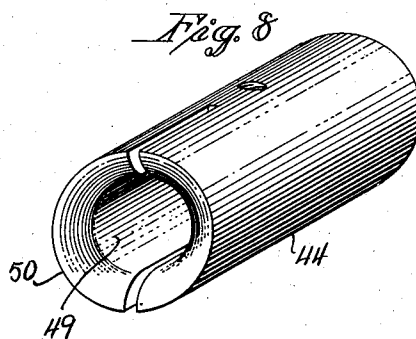
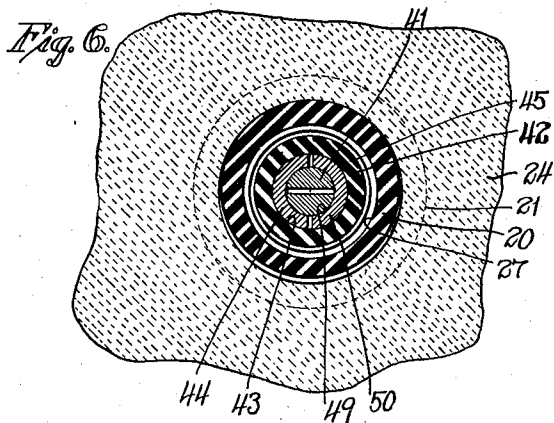
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,253,593

SEPARABLE ELECTRIC CONNECTOR

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3 Claims. (Cl. 173—363)

This invention relates to improvements in electric connectors, and more particularly to electric connectors in which readily separable interfitting male and female members are employed.

One of the objects of the present invention is to provide a superior separable electric connector in which both the male and female members or connectors are readily joinable and separable, and are so constructed and related when separated, as to be each guarded against accidental access to the live parts by the hands of the user or accidental short circuiting by contact with other connectors or members, grounded panels or the like.

Another object of the present invention is to provide a superior male connector which is guarded against accidental contact of its live parts with all but a female member of predetermined design.

A further object of the present invention is to provide a superior male connector or jack which is suitable for mounting in a panel in substantially the same manner as is customary with female connectors or jacks, but which is no more liable to have its live parts accidentally contacted by the hands of a person than is the usual female panel member of a separable connector.

Still another object of the present invention is to provide a superior male connector with a retractable guard-member which automatically moves into a position for guarding the live element of the connector when the male connector is separated from its complemental female connector, and which guard is automatically retractable by means of the said female connector to permit electrical engagement between the two said connectors.

With the above and other objects in view, as will appear to those skilled in the art from the present disclosure, this invention includes all features in the said disclosure which are novel over the prior art and which are not claimed in any separate application.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a fragmentary view in front elevation of a mounting-panel showing a male connector constructed in accordance with the present invention, mounted therein;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a view in end elevation of a female

connector suitable for use with the male connector of the preceding figures;

Fig. 4 is a view thereof in central-longitudinal section;

Fig. 5 is a view in central-longitudinal section showing the male connector and the female connector of the preceding figures interengaged for completing a circuit;

Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 5;

Fig. 7 is a perspective view of the contact-member of the male connector;

Fig. 8 is a perspective view of the contact-member of the female connector;

Fig. 9 is a view in side elevation of a modified form of female connector;

Fig. 10 is an end view thereof; and

Fig. 11 is a view in front elevation of a male connector suitable for use with the female connector of Figs. 9 and 10, and shown as mounted in a fragment of a mounting-panel.

The male connector shown separately in Figs. 1 and 2, comprises a tubular body-member 20 preferably formed of a moulded plastic insulating material, and which is externally threaded substantially throughout its length. The said body member is formed at its forward end with a flange-like head 21 of substantially-semi-circular form in cross section. The portion of the flange-like head 21 which projects radially outwardly, provides a rearwardly-facing annular stop-shoulder 22 adapted to be seated against the forward face of a mounting-panel 23. The said mounting-panel may be formed of sheet metal, and is preferably backed by a vibration-dampening backing 24 which may be conveniently formed of asbestos.

The body-member 20 extends through both the mounting-panel 23 and the backing 24, and is retained in place by a clamping-ring 25 threaded onto the externally-threaded periphery of the said body-member and bearing against the rear face of the backing 24. The said clamping-ring may be provided with two (more or less) wrench-receiving holes 26 extending in substantial parallelism with the axis of the ring, as is shown particularly well in Figs. 2 and 5.

The inner edge of the flange-like head 21 of the body-member 20 above referred to, overhangs the forward end of the cylindrical chamber 27 in the said body-member to provide a rearwardly-facing annular stop-shoulder 28 surrounding the otherwise-open front end of the body-member. The said stop-shoulder 28 is adapted to be engaged by the forward face of a

ring-like guard 29 adjacent the outer edge thereof. The said ring-like guard 29 is preferably formed of molded insulating material and is provided in its rear face with a shallow annular locating-groove 30, and with a central aperture 31 adjacent which the forward face of the said guard 29 is formed with a conical locating-rib 31b, all for the purpose as will more fully hereinafter appear.

Pressing against the bottom of the groove 30 in the rear face of the ring-like guard 29 and exerting a constant but yielding effort to seat the forward face thereof against the rearward-facing stop-shoulder 28, is the forward end of a helical guard-spring 32. The said guard-spring 32 is housed within the chamber 27 in the body-member 20, and at its rear end is seated against the bottom of an annular groove 33 formed in the forward face of an end-plate 34 threaded into the rear end of the cylindrical chamber 27 in the body-member 20.

Extending axially through the end-plate 34 is the externally-threaded shank 35 of a contact-member generally designated by the reference character 36, and formed about midway of its length with an integral annular locating-flange 37. The rear face of the said locating-flange 37 bears against the forward face of the adjacent portion of the end-plate 34, and is firmly held in place by means of a nut 38 threaded onto the shank 35 and bearing against the rear face of the said end-plate 34. Rigidly clamped against the rear face of the nut 38 just referred to is the tongue of a terminal-clip 39 which is, in turn, held in place by a binding-nut 40 threaded onto the shank 35 of the contact-member 36, as is shown particularly well in Figs. 2 and 5.

The contact-member 36 is preferably formed of brass, and is provided at its forward end with a bifurcated and therefore laterally-resilient contact-post 41. The bifurcated contact-post 41 constitutes the male contact of the assembly, and is preferably hemispherical at its forward end. The diameter of the contact-post 41 and the diameter of the aperture 31 in the ring-like guard 29 are such that the said guard may be retired rearwardly over the said contact-post from the position shown in Fig. 2 to the position shown in Fig. 5, and back again under the urge of the guard-spring 32.

For use in conjunction with the male connector above described is a female connector which is shown detached in Figs. 3 and 4. The said female connector includes a body-member preferably formed of moulded insulating material, and generally designated by the reference character 42. The said body-member is formed with an axial passage 43 extending therethrough from its outer to its inner end, and receiving in its interior a contact-member 44 formed of brass or other conducting material. The inner or terminal portion 45 of the body-member 42 is of cylindrical form while the outer portion 46 is shaped to provide a convenient handgrip, and is separated from the said terminal portion 45 by an annular limiting-flange 47.

The contact-member 44 is formed about midway of its length with an integral partition 48, the one face of which constitutes the end wall of a cylindrically-contoured socket 49 opening through the free end of the terminal portion 45, and formed in the interior of a bifurcated and therefore laterally-yielding contact-sleeve 50. The end of the contact-sleeve 50 lies adjacent

the free end of the terminal portion 45 of the body-member 42 and lies in substantial engagement with an annular stop-shoulder 51 constituting the inner face of an annular flange 52 inwardly projecting into the adjacent end of the passage 43 in the body-member 42.

Radially in line with the integral partition 48 in the contact-member 44 are two (more or less) oppositely-located locking-screws 53—53 radially threaded into the central portion of the contact-member 44 and having their respective heads located in suitable radial passages formed in the tubular terminal portion 45 of the body-member 42 adjacent the limiting-flange 47 thereof. Preferably, the outer faces of the heads of the locking-screws 53—53 are located below or inwardly of the periphery of the adjacent portion of the body-member, and for protective purposes are covered by plugs 54—54 formed of sealing-wax or other insulating material.

The outer end of the contact-member 44 is located mainly within the outer portion or handgrip 46, and is formed with an outwardly-opening cylindrically-contoured socket 55 in which may be soldered the adjacent end of a flexible cable 56 which, by means of the separable male and female connectors, may be placed in electrical communication with a cable 57 soldered or otherwise secured to the terminal-clip 39 clamped to the shank 35 of the contact-member 36 of the male connector.

When it is desired to electrically interconnect the cables 56 and 57, this may be accomplished by placing the tubular free end of the terminal portion 45 of the female connector over and around the conical locating-rib 31b on the outer face of the ring-like guard 29 of the male connector. Now by thrusting rearwardly, the ring-like guard 29 may be retired rearwardly in the chamber 27 of the body-member 20, against the tension of the guard-spring 32, and the contact-sleeve 50 of the bifurcated female connector sleeved-over the bifurcated contact-post 41 of the contact-member 36 of the male connector, until the parts assume the positions in which they are shown in Fig. 5.

When the parts have been forced into the positions in which they are shown in Fig. 5, the frictional engagement between the contact-sleeve 50 of the contact-member 44 of the female connector and the contact-post 41 of the contact-member 36 of the male connector, will be sufficient to prevent the axial separation of the two said elements by the tension of the now-compressed guard-spring 32.

An axial outward draft upon the handle-like outer-end portion of the body-member 42 of the female connector will separate the said female connector from the said male connector, during which operation the ring-like guard 29 will move outwardly until the two said connectors are entirely separated, whereupon the said guard will reassume the position in which it is shown in Fig. 2 and thereby guard the adjacent end of the contact-post 41 from accidental engagement by the hand of the operator.

The opening through the flange-like head 21 of the body-member 20 of the male connector is of circular form and has a diameter but slightly larger than the diameter of the cylindrically-contoured terminal portion 45 of the body-member 42 of the female connector. Under some conditions, it is desired to provide a female connector which will not interfit with the male connector of the type shown in Figs. 1 and 2 in par-

tical, and also to provide a male connector which will not interfit with the female connector of the type shown particularly well in Figs. 3 and 4. To carry out this purpose, a female connector of the type shown in Figs. 9 and 10 may be employed, and a male connector of the type shown in Fig. 11 may be employed.

The female connector of Figs. 9 and 10 is of the same interior construction as shown and described in connection with the female connector shown particularly well in Figs. 3 and 4, but the body-member 58 thereof is provided at the free end of its terminal portion 45a with a hexagonal or other non-circular flange 59 which is shaped and sized to conveniently pass through the hexagonal or other non-circular aperture 60 in the flange-like head 21a of the body-member 20a of the male connector shown in Fig. 11.

The internal construction of the male connector shown in Fig. 11 may be in all essential respects the same as the internal construction of the male connector, which is shown especially well in Figs. 1 and 2, and which has been described in detail. For purposes of brevity, the parts of the female connector of Figs. 9 and 10 will, where feasible, bear the same reference characters as those applied to the female connector of the preceding figures, save that each reference character will bear the additional designation a. Similarly, the parts of the male connector shown in Fig. 11 are marked with the same reference characters, where feasible, as are the parts of the male connector of the preceding figures, save that here, also, each reference character will bear the additional designation a.

In Fig. 10, the broken line 61 represents the size and shape of the aperture through the flange-like head 21 of the body-member 20 of the male connector of Figs. 1, 2, 5 and 6, in order to illustrate how the hexagonal head 59 of the female connector of Figs. 9 and 10 is prevented from entering or cooperating with the male connector just referred to.

The broken line 62 shown in Fig. 11 represents the size and shape of the terminal-end of the female connector of Figs. 3, 4 and 5, from which it will be seen that the said female connector cannot be introduced into the hexagonal aperture 60 in the male-connector structure of Fig. 11.

In this manner, female connectors may be provided which will not interfit with certain predetermined male connectors and, similarly, male connectors may be provided which will not interfit with certain predetermined female connectors. Thus, certain female connectors may be guarded against being coupled to a wrong male connector, and vice versa.

By providing a male connector with a retrievable guard, the said male connector is rendered safe against accidental contact with live parts by the fingers of an operator, to substantially the same degree as the safety ordinarily provided by enclosed contact-members of female connectors.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and

equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. A male electrical-connector construction including in combination: a mounting-panel structure having a hole therethrough; a hollow body-member secured in said hole and having stop-means at its forward end engaging the front of said mounting-panel structure; said body-member having an opening in its front end for entry of a female electrical-connector, and interior limit-means adjacent its front end; a contact-post secured inside and at the rear of said body-member and extending forwardly and having its front end located to the rear of the plane of the front face of said mounting-panel structure; a guard-member in said body-member yieldingly held against said interior limit-means and having an aperture permitting said guard-member to pass rearwardly over the said contact-post by the introduction of the terminal-end of a female connector through the opening in the front of the body-member.

2. A male electrical-connector construction including in combination: a mounting-panel structure having a hole therethrough; a hollow body-member in said hole and having a flange at the front of said mounting-panel structure and an exterior threaded portion at the rear of said mounting-panel structure, and a threaded member on said exterior threaded portion and clamping said mounting-panel structure between said flange and said threaded member; said body-member having an opening in its front end for entry of a female electrical-connector, and interior limit-means adjacent its front end; a contact-post secured inside and at the rear of said body-member and extending forwardly; a guard-member in said body-member yieldingly held against said interior limit-means and having an aperture permitting said guard-member to pass rearwardly over the said contact-post by the introduction of the terminal end of a female connector through the opening in the front of the body-member.

3. A male electrical-connector construction including in combination: a mounting-panel structure having a hole therethrough; a hollow body-member in said hole and having a flange at the front of said mounting-panel structure and an interiorly-threaded open rear end, and an exterior threaded portion at the rear of said mounting-panel structure, and a threaded member on said exterior threaded portion and clamping said mounting-panel structure between said flange and said threaded member; said body-member having an opening in its front end for entry of a female electrical-connector, and interior limit-means adjacent its front end; a contact-post support threadedly mounted in said threaded rear end of the body-member; a contact-post secured to said contact-post support and extending forwardly; a guard-member in said body-member yieldingly held against said interior limit-means and having an aperture permitting said guard-member to pass rearwardly over the said contact-post by the introduction of the terminal end of a female connector through the opening in the front of the body-member.

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