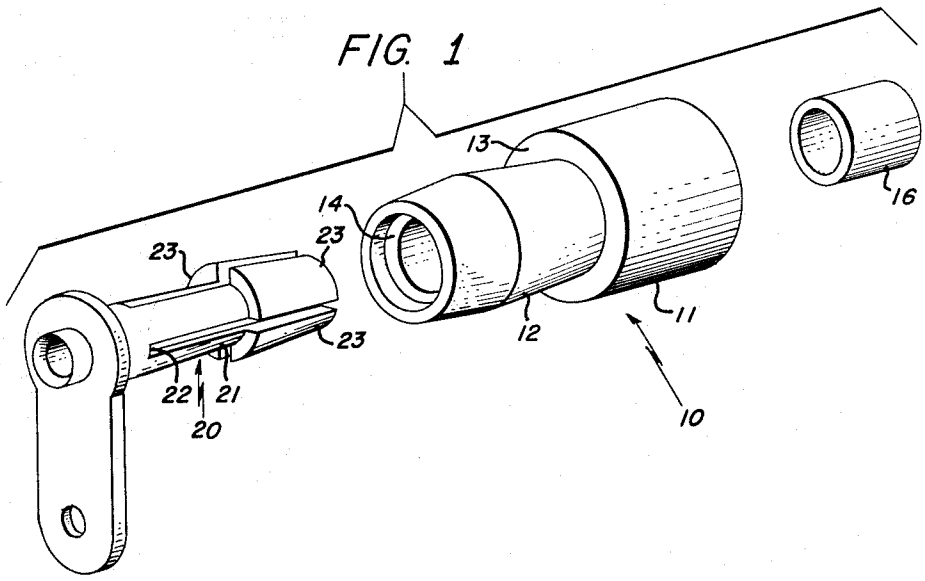
Oct. 10, 1961 N. F. DAMON 3,004,238

DETACHABLE ELECTRICAL CONNECTORS AND ATTACHING MEANS THEREFOR

Original Filed Feb. 17, 1956

FIG. 1



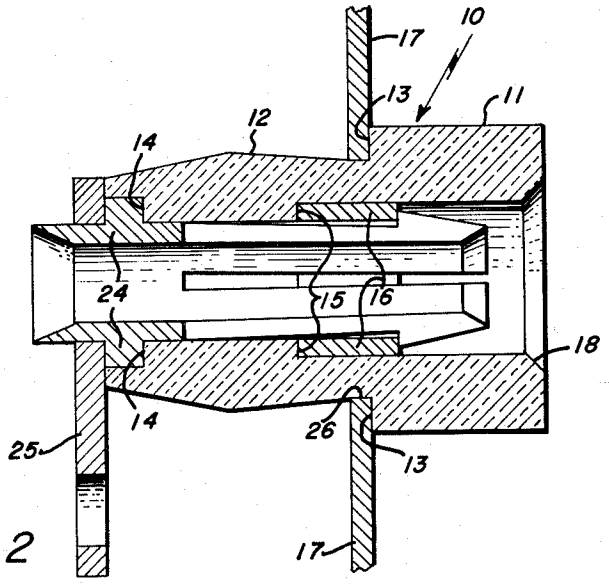


FIG. 2

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DETACHABLE ELECTRICAL CONNECTORS AND ATTACHING MEANS THEREFOR

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Continuation of application Ser. No. 566,292, Feb. 17, 1956. This application Jan. 27, 1961, Ser. No. 85,436
3 Claims. (Cl. 339—217)

This is a continuation of my copending application, Serial No. 566,292, filed February 17, 1956, now abandoned.

This invention relates to detachable electrical connectors, particularly those of the smallest size adapted to receive a standard 0.080" probe, and, more particularly, to means for fastening such connectors in a hole in a panel.

The connector and fastening means of this invention constitute an improvement of the connector forming the subject matter of my Patent Number 2,685,073.

The connector of the above-mentioned patent comprises a tubular insulating bushing formed with an interior shoulder and a conductive tubular member with tapered resilient fingers, having latches formed at one end that slip past the shoulder on the inside of the bushing when the conductive part is inserted, and which spring outward to retain the conductive part within the bushing after insertion. The improvement of this invention consists in forming the shoulder further into the bushing and in setting a metallic sleeve against this shoulder on its outer side in the region where the inserted bushing makes contact with the opening in the panel. The result is to expand the portion of the bushing within the panel to hold the connector firmly in place. The sleeve accomplishes this result without adding to the external dimensions of the connector. Thus, a connector of this construction lends itself to use in miniatured equipment.

Other and further advantages of this invention will become apparent as the description thereof progresses, reference being had to the accompanying drawings wherein:

FIG. 1 is an exploded isometric view of a preferred embodiment of the connector; and

FIG. 2 is a longitudinal section of the embodiment of FIG. 1 when the connector is assembled and mounted in an opening in a panel.

In FIGS. 1 and 2, the reference numeral **10** designates a bushing of insulating material made in tubular form with an enlarged portion **11** at one end, a tapered restricted portion **12** at the other, with a shoulder **13** formed between them. This shoulder **13** forms a support when the bushing is panel-mounted. A recess **14** is formed on the inside of the restricted portion **12** of the bushing **10**. The inside diameter of the enlarged section **11** is larger than that of the restricted section **12**. Another shoulder **15** is formed on the inside of the bushing **10** where these two sections meet. A metallic sleeve **16** is inserted in the enlarged section **11**. This sleeve has a length longer than the thickness of the panel **17**, into which the connector is to be mounted, and an outside diameter slightly greater than the inside diameter of the section of the bushing **10** of greatest diameter, and of an inside diameter at least as great as that of the section **12** of the bushing of least inside diameter. The opening at the enlarged end **11** of the bushing **10** is formed with a taper **18** to receive a probe (not shown). The conductive part **20** of the connector is tubular in shape with one end formed into tapered fingers **21** separated by slots **22**. Latches **23** are formed on one end of at least one, and preferably all, of these fingers **21**. An annular flange **24** is formed near the end of the conductive piece **20** opposite to the fingers **21**. A lug **25** is fitted over the same end of the conductive piece **20** against the flange **24** and fastened to it by any convenient methods, such as staking and soldering, to form a means for connecting one or more conductors to the conductive piece **20**.

In use, one of the conductors to be connected or a point to which a voltage is to be measured is connected to the lug **25**, and the bushing **10** is inserted into an opening **26** in the panel **17** until stopped by the shoulder **13**. The slightly oversize sleeve **16** is inserted into the outer end of the bushing **10** until it rests against the inner shoulder **15**. In forcing this sleeve into the bushing, the material between the sleeve and the opening **26** in the panel **17** is compressed. This compression is compensated for by a swelling of the material on the inside of the panel, forming a bulge which retains the bushing firmly in the opening in the panel. The conductive piece **20** of the connector is then inserted in the bushing **10** from the inner end **12**, as seen in FIGS. 1 and 2. When the conductive piece **20** is inserted into the interior of the bushing **10**, the fingers **21** are compressed together in passing through the restricted portion **12** of the bushing until the latches **23** pass the outer end of the sleeve **16**, at which point they expand to latch the conductive piece **20** into the bushing **10**. At the same time, the flange **24** contacts the recess **14** to prevent further penetration by the conductive piece **20**. The conductive piece **20** is firmly held within the bushing **10** by the latches **23** on the fingers **21** and the contact of the flange **24** with the shoulder **14**. The conductive piece **20** can easily be removed from the bushing **10** by pressing inward on the fingers **21** sufficiently to release the latches **23** to permit the conductive piece **20** to pass out through the sleeve **16** and the restricted portion **12** of the bushing **10**.

If desired, the conductive piece can be formed with an integral, turret-type terminal, such as that shown in FIG. 3 of the cited patent. While the portion **12** of the bushing **10** of restricted diameter is shown tapered, this is merely for ease in insertion into the opening **26** in the panel **17**, and is not necessary to the operation of the invention.

This invention is not limited to the particular details of construction, materials and processes described, as many equivalents will suggest themselves to those skilled in the art. It is accordingly desired that the appended claims be given a broad interpretation commensurate with the scope of the invention within the art.

What is claimed is:

1. A detachable electrical connector adapted to be mounted in an aperture in a mounting panel, comprising a resilient tubular insulating support member having a transverse internal shoulder separating said support member into two portions of different internal cross-sectional areas and a transverse external shoulder separating said support member into two portions of different external cross-sectional areas, said external shoulder being adapted to abut the periphery of a mounting-panel aperture, said internal and external shoulders being relatively displaced longitudinally of said tubular support member with the surfaces thereof being disposed in opposed facing relationship to define therebetween a longitudinal mounting portion of said support member wherein the portion of smaller external cross-sectional area overlaps the portion of larger internal cross-sectional area, a substantially rigid tubular member of a length at least equal to the length of said longitudinal mounting portion and of an external cross-sectional area greater than the internal cross-sectional area of said mounting portion of said support member, said rigid tubular member being adapted to be positioned within said mounting portion with one end thereof abutting said internal shoulder to provide a rigid second internal shoulder within said support member and to urge said mounting portion outwardly into firm gripping relationship with the periphery of such mounting-panel aperture,

and a conductive tubular member adapted to be inserted within said support member in contact with said rigid tubular member at said second shoulder, said conductive tubular member having a plurality of resilient fingers at one end thereof extending through said rigid tubular member, at least one of said fingers having a latch comprising an enlarged end of said finger tapering to the end of the finger and forming a shoulder located by and latched with said second shoulder, and a flange near the remaining end of said conductive tubular member adapted to bear against a portion of said support member to retain said conductive tubular member therein in cooperation with such latch finger.

2. A detachable electrical connector adapted to be mounted in an aperture in a mounting panel, comprising a resilient tubular insulating support member having a transverse internal shoulder separating said support member into two portions of different internal cross-sectional areas and a transverse external shoulder separating said support member into two portions of different external cross-sectional areas, said external shoulder being adapted to abut the periphery of a mounting-panel aperture, said internal and external shoulders being relatively displaced longitudinally of said tubular support member with the surfaces thereof being disposed in opposed facing relationship to define therebetween a longitudinal mounting portion of said support member wherein the portion of smaller external cross-sectional area overlaps the portion of larger internal cross-sectional area, a substantially rigid tubular member of a length at least equal to the length of said longitudinal mounting portion, the external cross-sectional area of said rigid tubular member being greater than the internal cross-sectional area of said mounting portion of said support member and the internal cross-sectional area of said rigid tubular member being at least as great as the smaller of the two internal cross-sectional areas of said support member, said rigid tubular member being adapted to be positioned within said mounting portion with one end thereof abutting said internal shoulder to provide a rigid second internal shoulder within said support member and to urge said mounting portion outwardly into firm gripping relationship with the periphery of such mounting-panel aperture, and a conductive tubular member adapted to be inserted within said support member in contact with said rigid tubular member at said second shoulder, said conductive tubular member having a plurality of resilient fingers at one end thereof extending through said rigid tubular member, at least one of said fingers having a latch comprising an enlarged end of said finger tapering to the end of the finger and forming a shoulder located by and latched with said second shoulder, and a flange near the remaining end of said conductive tubular member adapted to bear against a portion of said support member to retain said conductive tubular member therein in cooperation with such latch finger.

3. A detachable electrical connector adapted to be mounted in an aperture in a mounting panel, comprising a resilient tubular insulating support member having a transverse internal shoulder separating said support member into two portions of different internal cross-sectional areas and a transverse external shoulder separating said support member into two portions of different external cross-sectional areas, said external shoulder being adapted to abut the periphery of a mounting-panel aperture, said internal and external shoulders being relatively displaced longitudinally of said tubular support member with the surfaces thereof being disposed in opposed facing relationship to define therebetween a longitudinal mounting portion of said support member wherein the portion of smaller external cross-sectional area overlaps the portion of larger internal cross-sectional area, a substantially rigid tubular member having first and second oppositely oriented abutments thereon adapted to be positioned within said support member with said first abutment in contact with said internal shoulder, said rigid tubular member extending in the direction of said external shoulder at least as far as a position in substantial alignment with the plane of a mounting panel into which said support member is inserted, the external cross-sectional area of said rigid tubular member extending from said first abutment to said position being greater than the internal cross-sectional area of said mounting portion to urge said mounting portion outwardly into firm gripping relationship with the periphery of such mounting-panel aperture, and a conductive tubular member adapted to be inserted within said support member in contact with said rigid tubular member at said second abutment, said conductive tubular member having a plurality of resilient fingers at one end thereof extending through said rigid tubular member, at least one of said fingers having a latch comprising an enlarged end of said finger tapering to the end of the finger and forming a shoulder located by and latched with said second abutment.

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