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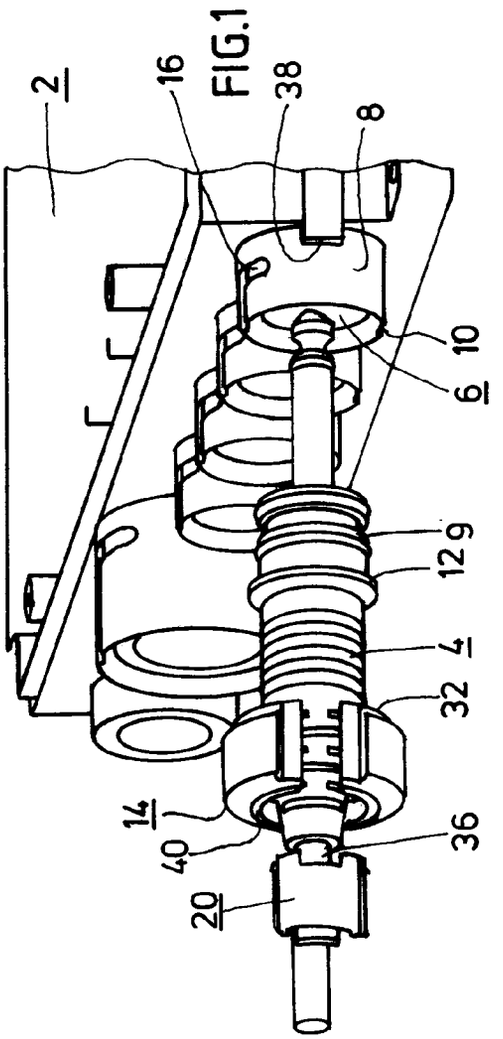
(54) An electrical connector.

(57) The present invention intends to provide an electrical plug-and-socket connection of in particular jack and DIN types in connection with a socket in a cabinet in which the connection is secured against unintended disconnection due to pulling apart. This is obtained by a union nut (14), preferably of the bayonet type, which surrounds and retains the plug (4), and where the union nut is secured against unintended removal by means of a longitudinally displaceable locking element (29) in conjunction with the side wall of the union nut. The locking element may be displaced between an inoperable position and a locking position where the element directly or indirectly engages with the cabinet. The plug may hence only be removed by disengaging the locking element and subsequently loosen the union nut.

FIG.1



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The present invention relates to an electrical connector, in particular of the Jack and DIN types in conjunction with a socket in a cabinet.

Plugs of the Jack and DIN types are widely used in conjunction with low voltage equipment and installations and are so well-known that they do not require more detailed description. The plugs are only retained by compression forces in the socket and are easily removable and there is a risk that they may be inadvertently disconnected. In certain cases it is desirable and sometimes required that this cannot take place. As an example may be mentioned hospital beds where the mattress support may be adjusted by means of a system of electric linear actuators. The beds are washed and disinfected when the patients are discharged, typically in automatic washing plants. In this situation it would be unfortunate if a plug were not in its proper place because water and disinfectant might enter the socket and thereby disturb or in the worst case hurt the electronics inside. Disinfectants are aggressive compounds which may attack electronic parts.

It is the purpose of the invention to provide a simple solution to the described problem.

The electrical connection, in particular of the Jack and DIN types in conjunction with a socket in a cabinet is particular in that it comprises a union nut which surrounds and retains the plug and where the union nut is secured against undesired removal by an axially displaceable locking element in conjunction with the side wall of the union nut which may be displaced between an inoperative position and a locking position where the element engages the cabinet directly or in-directly.

The construction becomes particularly simple and user friendly by letting the axially displaceable element form part of the side wall of the union nut, preferably as a section of the union nut. In the active locking position the union nut will look like a standard union nut.

The locking element is preferably retained by a tongue-and-groove joint to the union nut. With two pairs of connections, one on the side edges of the element and one in a radius of the union nut, the union nut with the element appears as a solid whole. In case the tongue-and-groove is slightly slanted towards the centre of the union nut, the ring is furthermore tightened by the insertion of the element. Additionally the union nut with a springforce might squeeze around the element.

The locking element advantageously locks in that the end facing the cabinet has a cut-out designed for engaging a projection in the cabinet. Alternatively the end of the locking element may grip into an under-cut in the cabinet.

In the former embodiment the union nut is preferably shaped with an outside recess, and the locking protrusion is fitted at some distance from the socket and has a height such that the recess may pass between the protrusion and the socket, and furthermore that the wall element has a length and thickness so that the cut-out engages the locking protrusion.

In case several plugs are disposed in a row the locking protrusions are advantageously disposed such that neighbouring plugs share a locking protrusion.

According to the invention the plug is preferably made with a bayonet lock. An alternative embodiment has a thread.

The sockets are preferably fitted into a cylindrical piece on the outside of the cabinet as against a countersunk fitting.

A connection which is fluid tight may be obtained by means of o-rings in which case it is preferable to mount a single o-ring in a groove on the outside of the body of the plug. Alternatively the o-rings could be fitted in the sockets.

The invention will be explained in detail in the following in conjunction with a discussion of the embodiment shown in the drawing which relates to a cabinet for an actuator system for hospital beds. In the drawing is shown:

Fig. 1, a part of a cabinet with a number of sockets, in connection with the rightmost of which is shown a jack plug during its introduction into the socket and with a union nut for locking the plug in place,

Fig. 2, the jack plug fitted in the socket and held by the union nut, and

Fig. 3, the union nut seen in perspective drawing from behind and

Fig. 4, a further embodiment of the union nut.

In Fig. 1 of the drawing there is schematically shown a section of a cabinet 2 with six sockets, with a jack plug 4 being inserted into the nearer socket 6. The socket 6 comprises a short cylindrical part 8 which projects from the cabinet. In a circular groove 9 at the front of the jack plug 4 there is fitted an o-ring which is not shown for obtaining fluid tightness when the plug is fitted into the socket. In the entrance to the socket there is placed a recess 10 which cooperates with a collar 12 on the plug in forming a stop for further movement of the jack into the socket.

Locking of the inserted jack plug in the socket is obtained by means of a union nut which cooperates with the socket 8, in that the union nut and the socket are formed like a bayonet socket with diametrically opposite bayonet grooves 16 in the outside of the socket cooperating with two corresponding bayonet pins 18. As is usual with bayonet sockets the nut is fitted over the socket and turned, whereby the nut is retained against axial pulling out.

The union nut may, however, be completely locked by means of a locking element which is in the form of an axially displaceable wall element 20 in the union nut, cf. Fig. 3. To a large measure the geometry

of the wall element corresponds to that of the union nut. The wall element is provided with a tongue 22 on the side edges which cooperate with corresponding grooves 24 in the sides in the opening in the union nut. In the opening there are two wings 26 as a continuation of the inside surface of the union nut wall. In each of these wings 26 there is a groove which is close to the other two grooves and which cooperate with the axially disposed tongue 20 on the wall element. The first set of tongue-and-groove joints retain the wall element in the in the ring-shape of the union nut while the second set holds the nut and wall element together. On the outside of the union nut, at the end facing the cabinet, there is a recess 32. In a further embodiment as shown in Fig. 4 the tongues 22 on the side edges of the wall element end at the bottom in a leg 34 with a hook which, when the element is fitted, catches the recess 32 and further prevents the wall element from being unintentionally extracted. The thickness of the side parts of the wall element is balanced in order that the full wall thickness of the union nut is obtained in cooperation with the wings in the opening, while the central part already has this thickness. The wall element has the full height of the union nut, i.e. it has no terminating recess at the inner end. In the central part, however, there is a cut-out 36 which cooperates with a projection 38 on the cabinet when the wall element is fitted, said projection being positioned at a distance from the socket corresponding to the remaining wall thickness at the recess and extending to the edge of the recess. This brings about that the union nut may be fitted unhampered over the socket and turned, as the recess 32 descends behind the locking protrusion 38. The wall element is subsequently pushed into the opening in the union nut where in its bottom position it catches the projection 38 on the cabinet with its cut-out 36. Thus the union nut is secured against unintentional removal.

The union nut retains the jack plug by having a collar 40 at its front end which cooperates with the stop collar 12 on the plug. The plug projects with its rear end through the union nut, as the hole corresponds to the thickness of the rear end.

Claims

1. An electrical connector, in particular of the Jack and DIN types (14) in connection with a socket or aperture in a cabinet, characterized in that it comprises a union nut (14) which surrounds and retains the plug (4) and where the union nut is secured against unintentional removal by an axially displaceable locking element (20) in conjunction with the side wall of the union nut which element may be displaced between an inoperative position and a locking position where the element engages the cabinet (2) directly or indirectly.

2. An electrical connector according to claim 1, characterized in that the axially displaceable locking element (20) forms part of the side wall of the union nut (2), preferably as a section of the union nut.

3. An electrical connector according to claim 2, characterized in that the locking element (20) is retained by a tongue-and-groove joint (22, 24; 30, 28) to the union nut.

4. An electrical connector according to any of the preceding claims, characterized in that the locking element (20) locks in that the end facing the cabinet has a cut out (36) for engaging a projection (38) in the cabinet (2).

5. An electrical connector according to claim 4, characterized in that the union nut is shaped with an external recess (32), and the locking protrusion (38) is placed at some distance from the socket (6) and has a height such that the recess (32) may pass between the protrusion and the socket, and that the wall element (20) has a length and thickness such that the cut-out (36) engages the locking protrusion (38).

6. An electrical connector according to claims 4 or 5, characterized in that in case several plugs are disposed in a row locking protrusions are disposed such that neighbouring plugs share a locking protrusion (38).

7. An electrical connector according to claim 1, characterized in that it takes the form of a bayonet connection.

8. An electrical connector according to any of the preceding claims, characterized in that the socket (6) is formed as a cylindrical piece projecting from the cabinet (2).

9. An electrical connector according to claim 1, characterized in that it is provided with a sealing o-ring fitted in a circular groove on the outside of the plug (4).

FIG.4

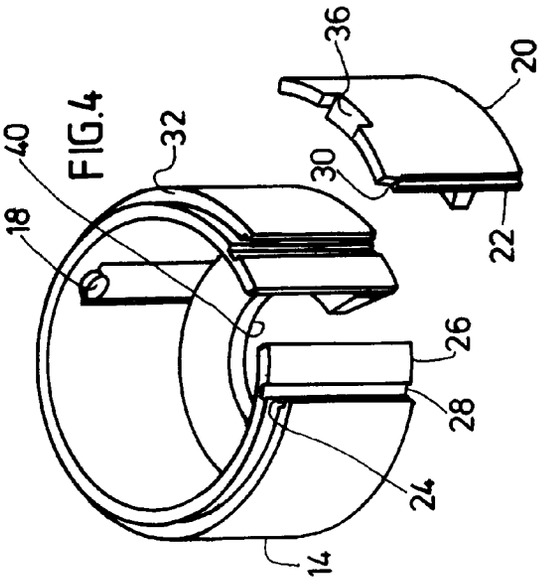

FIG.3

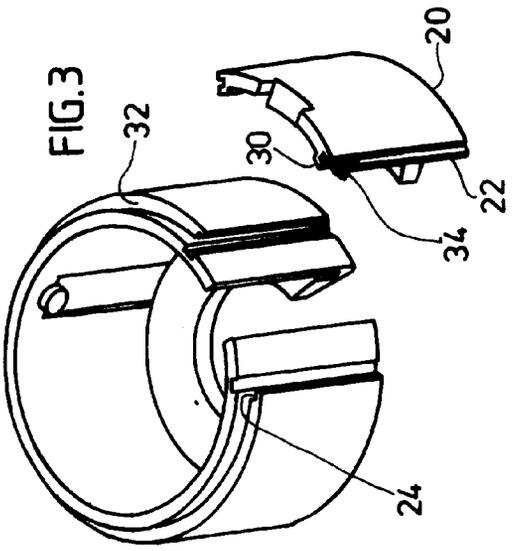

FIG.1

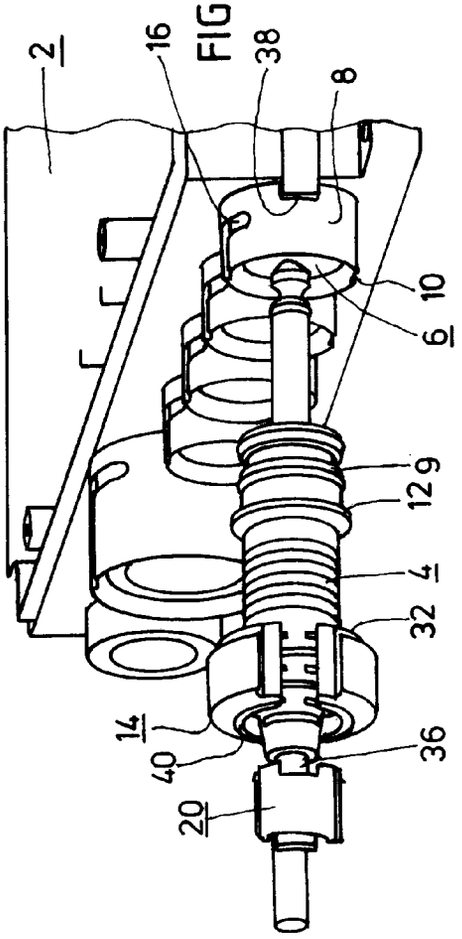

FIG.2