

Oct. 1, 1968

A. OBEISSART

3,404,365

CONNECTORS, IN PARTICULAR FOR ELECTRIC CIRCUITS

Filed June 9, 1966

2 Sheets-Sheet 1

Fig. 1.

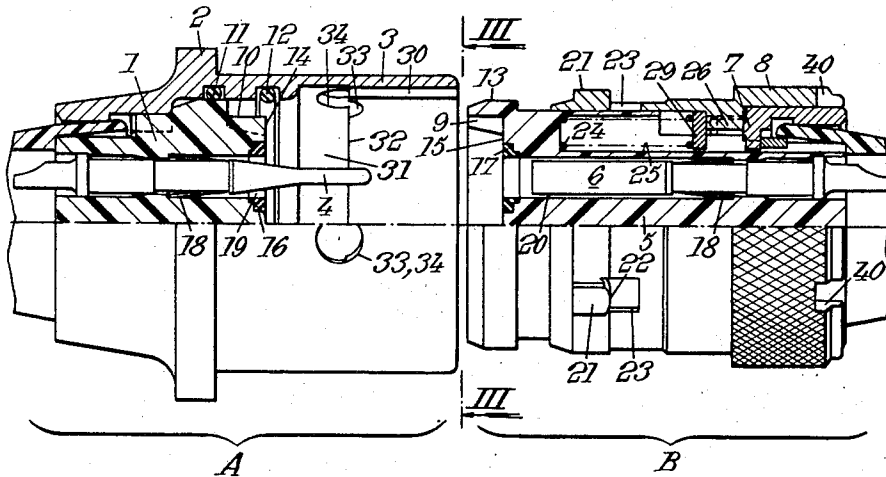
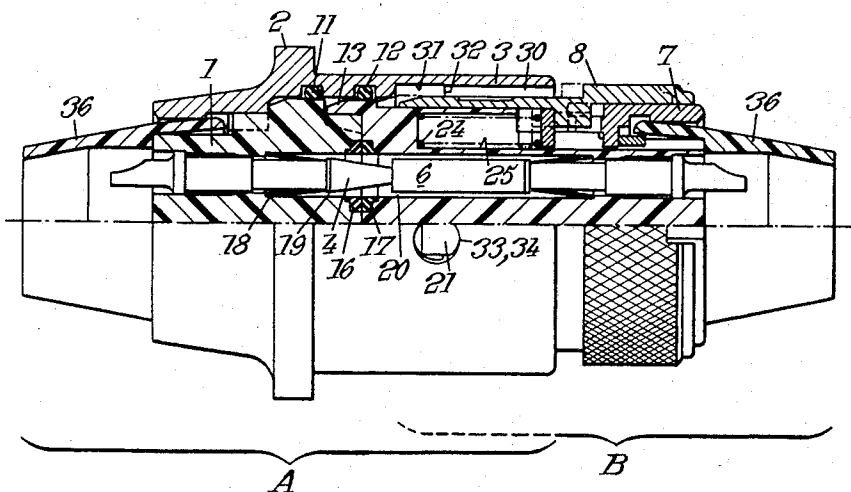


Fig. 2.



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2 Sheets-Sheet 2

Fig. 3.

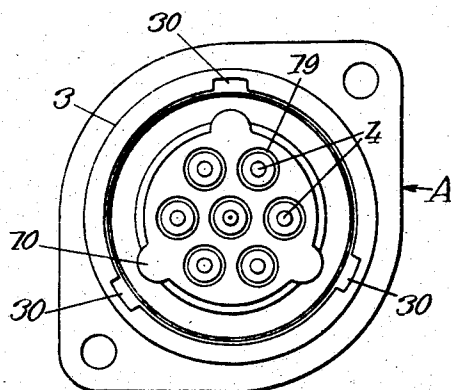


Fig. 4.

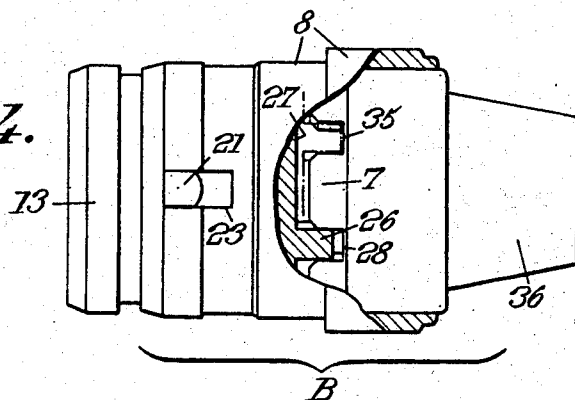
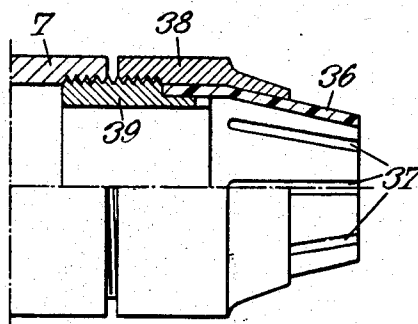


Fig. 5.



1

2

CONNECTORS, IN PARTICULAR FOR ELECTRIC CIRCUITS

Albert Obeissart, Boulogne-sur-Seine, France, assignor to
Societe Souriau & Cie, Billancourt, France

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6 Claims. (Cl. 339—90)

ABSTRACT OF THE DISCLOSURE

A connector constituted by two axially engageable bodies, a first of which externally carries a slidable and rotatable ring and the second of which carries a socket, the first body together with the ring being insertable into the socket to couple together electrical connectors carried by the bodies after which the ring is slidably moved forwardly against the action of a spring and rotated to be locked in said socket whereafter the spring returns the ring to its rearward position in which it is locked against rotation to the first body.

The present invention relates to connectors, and especially miniature connectors, in particular for electric circuits, comprising two parts, a male one and a female one, adapted to fit in each other, in combination with locking means operable by a ring mounted on one of the parts, said ring being capable of axial and rotation movements with respect to said part.

The chief object of the present invention is to reduce the overall dimensions of the connector without reducing the space reserved to the fixation of the contacts, while simplifying the fabrication of the connector.

The invention consists chiefly in arranging such connectors in such manner that the part supporting the locking ring can be engaged and guided with respect to the other part, in particular in it, and that said ring can, at the end of engagement, be pushed against the action of resilient means, then turned about its axis through an angle, thus making it possible to lock, under the action of said means, lugs or the like carried by said ring in recesses provided in the corresponding part, the whole being possibly completed by other locking means for blocking in rotation said ring in the locked position thereof.

Preferred embodiments of the present invention will be hereinafter described with reference to the appended drawings, given merely by way of example, and in which:

FIG. 1 shows on an enlarged scale, half in axial cross section and half in elevation, a miniature electric connector comprising two parts adapted to be assembled together the whole being shown in a position where the movable part is located opposite, but at a distance from, the fixed part;

FIG. 2 similarly shows the connector having its parts engaged and secured in each other;

FIG. 3 is a front view of the fixed part of the connector seen in the direction of the arrow III—III of FIG. 1;

FIG. 4 shows, in plan view, the movable part of the connector, with portions cut away;

FIG. 5 separately shows, half in elevational and half in sectional view, a wire tightening device different from that of FIGS. 1 and 2.

It will first be reminded that there are many connectors, consisting generally of two cylindrical parts adapted to engage in each other and provided with locking means generally carried by the external cylindrical piece and comprising several rings. These prior connectors have the drawback of including a relatively important number

of pieces, which involves difficulties in the machining and mounting of said pieces in the case of connectors of very small dimension, i.e. of the miniature type.

According to the present invention, locking is ensured by means of a ring carried by the part of the connector which is intended to engage into the other part. In particular the connector is such that said ring can, at the end of the engagement of the connector parts in each other, be pushed against the action of resilient means and then turned through an angle making it possible to lock, under the action of said resilient means, lugs or the like carried by this ring in recesses provided in the inner cylindrical wall of the connector part of greater diameter.

Such a connector is extremely simple, since it comprises only one locking ring the external diameter of which is equal to or smaller than the external diameter of the part comprising the recesses.

However, it should be well understood that the above mentioned locking device, comprising a single ring provided with lugs and movable first with a translatory motion then with a rotary motion, might apply also in the case where it is carried by the connector part of greater diameter, the lugs then cooperating with recesses provided in the cylindrical external surface of the connector part of smaller diameter.

But the first arrangement is preferable, due to its smaller overall dimensions and its greater simplicity.

Advantageously, supplementary locking means are provided to oppose further rotation of the ring when the locking thereof has been obtained, whereby disengagement requires first another axial thrust exerted on the ring to release said supplementary locking means.

The embodiment of this invention which will now be described in detail with reference to the drawings relates to the case where the locking means are carried by the movable part B of smaller external dimension intended to engage into the connector part A of greater diameter and supposed to be fixed (FIGS. 1 and 2).

The fixed connector part, or receptacle, A essentially comprises a block 1 of an insulating material secured in an external shell 2, for instance of metal, including a cylindrical portion 3 adapted to accommodate the movable connector part, or plug B. Block 1 carries contact pins 4.

Plug B comprises a block 5 of an insulating material carrying contact sockets adapted to cooperate with contact pins 4. Block 5 is rigid with a first metal ring 7, which supports locking ring 8, movable thereon.

The respective faces of insulating blocks 1 and 5, which come into contact with each other in the connecting position, are provided with cooperating projections and recesses 9 and 10 arranged to prevent any relative rotation of said blocks 1 and 5 in said connecting position.

Furthermore, packing means are provided. On the one hand shell 2 carries, in grooves thereof, toroidal packing rings 11, 12, the ring 12 being adapted to cooperate with the end 13 of block 5. On the other hand, the respective adjoining edges 14 and 15 of blocks 1 and 5 carry rings 16 and 17 of rubber or rubber-like material adapted to be applied against each other as shown by FIG. 2.

Pins 4 and sockets 6 are mounted in removable manner by means of clips 18 which may be reached by a tool introduced into free spaces 19, 20.

The locking means include, on plug B, ring 8 provided with locking lugs 21 (three in number). The rear walls 22 of said lugs 21 are of rounded shape, to cooperate with recesses in receptacle A (as will hereinafter be described). 23 is a hole intended to facilitate the machining of said face 22.

Locking ring 8 is slidable axially with respect to in-

3

insulating block 5 together with ring 7 (rigidly assembled therewith) against the action of springs 24 located in recesses 25 of block 5. Said locking ring 8 is normally prevented from rotating with respect to unit 5-7 by at least one projection 26 (FIG. 4) carried by the rear edge 27 of said ring 8 and engaged, in the unconnected position of the plug (FIG. 1), in a corresponding notch 28 of ring 7.

Thus, in order to rotate locking ring 8 about the axis of plug B, this ring must first be pushed against the action of springs 24 so as to clear projection 26 of locking ring 8 from the notch 28 of ring 7.

A friction ring 29 is interposed between springs 24 and a shoulder of locking ring 8. It tends to brake the rotation of said locking ring 8 when said rotation has been made possible by the axial sliding displacement of locking ring 8 toward the left of FIG. 2.

The inner wall of the cylindrical portion 3 of receptacle A is provided with three longitudinal grooves 30 adapted to cooperate with the lugs 21 of the plug locking ring 8.

In view of the fact that, when plug B is being engaged in receptacle A, grooves 30 guide the lugs 21 of ring 8 which, at this time is angularly fixed with respect to said plug B (owing to the projections 26 of said ring 8 being engaged in notches 28 of plug B), plug B is correctly introduced in receptacle A so that pins 4 engage sockets 6. Locking ring 8 thus performs by itself the correct relative angular positioning of the parts and permits avoiding the necessity of particular positioning means for this purpose.

Longitudinal grooves 30 open into an annular groove 31 wherein lugs 21 can move once said lugs 21 have reached the ends of longitudinal grooves 30 and locking rings 8 is rotated above its axis.

It is in this annular groove 31, along the edge 32 thereof, that are provided the above mentioned recesses which cooperate with the rounded rear walls 22 of the locking lugs 21 of ring 8. Said recesses are designated by reference numerals 33. They are obtained by drilling holes 34 through cylindrical portion 3.

Concerning the supplementary locking means above referred to, they consist of a second notch 35 (FIG. 4) into which projection 26 can penetrate at the end of the rotation of the parts with respect to each other. The angular distance between notches 28 and 35 is therefore the same as the annular distance between grooves 30 and recesses 33. This angular distance is for instance equal to 30°.

The connector above described works as follows:

In the position of plug B shown by FIG. 1, ring 8 is urged against ring 7 under the action of springs 24 and projection 26 is engaged in notch 28, so that ring 8 is angularly fixed with respect to plug B.

Plug B is then engaged into receptacle A, lugs 21 being located opposite longitudinal groove 30. This corresponds to the correct relative positioning of the two connector parts so that pins 4 engage into sockets 6.

At the end of the engagement, the end 13 of plug B engages packing 12, projections and recesses 9-10 coming into mutual engagement, and rings 16 and 17 come into contact with each other.

Lugs 21 are then advanced in longitudinal grooves 30 to enter annular groove 31. Plug B is then rotated through 30° so that lugs 21 come opposite recesses 33. The plug is then released and spring 24 pushes back ring 8, which ensures a double locking, respectively at 33 and at 35. This is the position illustrated by FIG. 2.

In FIG. 2 the extreme position of ring 8 toward the left has been shown in dotted lines. In FIG. 4 the position of projection 26 at the end of the locking operation is also shown in dotted lines.

Springs 24 act in such manner as to apply the plug and the receptacle against each other.

In order to separate the plug from the receptacle, ring

4

8 must again be pushed toward the left, after which it is rotated in the rearward direction until lugs 21 are again opposite grooves 30.

It should be noted that marking means may advantageously be provided at the rear of rings 7 and 8, for instance notches such as 40 provided in ring 8 and adapted to cooperate with marks (not visible on the drawing), carried by the other ring 7, which permits of ascertaining at any time the relative annular positions of rings 7 and 8.

Such a connector is particularly simple to manufacture since it comprises only a minimum of pieces, of small dimensions.

It should be noted that wire holders such as shown at 36 in FIGS. 2 and 5 are provided at the corresponding ends of plug B and receptacle A.

FIG. 5 shows an advantageous construction.

Wire holders 36 consist of frusto-conical elements, of rubber or nylon, provided with slots 37 and adapted to be tightened against the electric wires (not shown) by a frusto-conical tightening ring 38.

The whole may be advantageously fixed to the rear of an element such as ring 7 by means of a screw threaded coupling 39.

In a general manner while the above description discloses what are deemed to be practical and efficient embodiments of the present invention, said invention is not limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the invention as comprehended within the scope of the appended claims.

What I claim is:

1. An electrical connector comprising first and second insulating bodies having respective internal bores, male and female connector elements in respective of said bores, an external socket fixed on the first body, a ring slidably and rotatably mounted on the second body and, said ring positioned on said body to penetrate therewith inside said socket, spring means acting on said ring to urge the same rearwardly on said second body away from the first body, locking lugs at the forward part of the ring for penetrating into grooves provided in the interior of said socket, said socket having an annular recess at the terminal ends of the grooves and retaining notches at the edge of said recess for receiving said lugs, said notches being angularly positioned relative to said grooves such that the notches can be engaged by the lugs, after insertion of the ring into said socket, by rotating the ring, and the lugs therewith, until the lugs engage the notches, said ring having a rear edge facing away from said first body, an abutment integral with said second body and facing said rear edge of the ring, and locking means at said rear edge of the ring cooperating with said abutment for locking the ring against rotation relative to said second body in two angular positions corresponding respectively to a first position in which the bodies are axially engageable and disengageable, and a second position in which the bodies are locked together with said lugs engaged in said notches.

2. A connector as claimed in claim 1 wherein said locking means comprises a rearward projection on said rear edge of the ring, said projection cooperating with said abutment to prevent relative rotation between said ring and second body in both of said angular positions.

3. A connector as claimed in claim 2 wherein said spring means urges the ring rearwardly such that the projection engages said abutment on one side thereof and the ring is angularly locked with the second body.

4. A connector as claimed in claim 3 wherein said ring is pushed forwardly against the action of the spring means to allow the ring to turn and said lugs to be engaged in said notches, the spring means returning the ring to its rearward position after release of the ring at which time the projection is engaged with the abutment at the other side thereof.

5

5. A connector as claimed in claim 4 comprising a plate member secured to said body, the abutment being on said plate member, the latter having notches on either side of the abutment for receiving said projection.

6. A connector as claimed in claim 1 further comprising a friction ring interposed between said spring means and said ring for braking movements of rotation of said ring with respect to said second body.

6

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MARVIN A. CHAMPION, *Primary Examiner.*

J. H. McGLYNN, *Assistant Examiner.*