Dec. 15, 1964 R. NEIDECKER 3,161,451

SELF-LOCKING ELECTRIC PLUG-AND-JACK CONNECTOR

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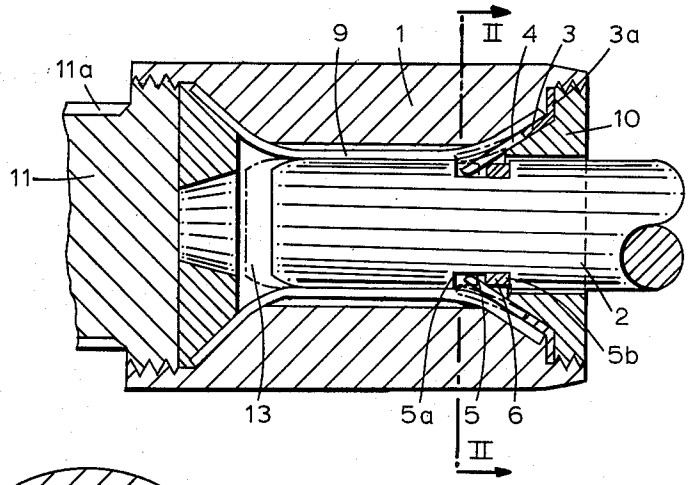

FIG. 1

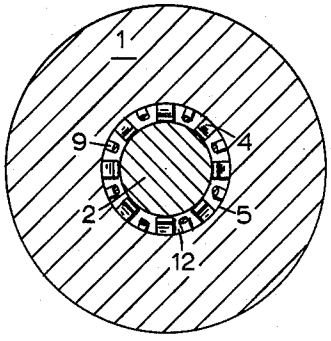

FIG. 2

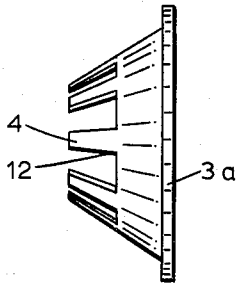

FIG. 3

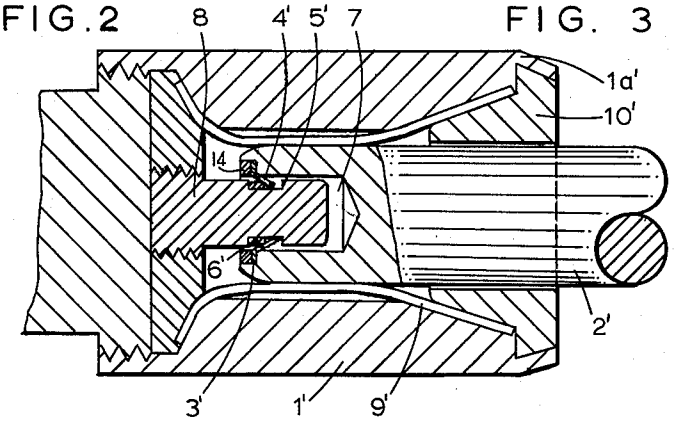

FIG. 4

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SELF-LOCKING ELECTRIC PLUG-AND-JACK CONNECTOR

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My present invention relates to a connector of the plug-and-jack type, used in an electric circuit for interconnecting two cables, wires or other conductors, in which the two mating coupling members are provided with means for releasably locking them in engaged position.

An important object of this invention is to provide a connector of this type in which the releasable locking is accomplished by simple means adapted to be accommodated by the coupling members with substantially no changes in their external dimensions.

Another object of the invention is to provide a connector of the character referred to in which the two coupling members are provided with means for automatically locking them against disengaging displacement in a position of interengagement and can be released from their locked position by a relative displacement in a non-disengaging sense, preferably by a linear motion in a direction opposite the sense of disengagement.

The foregoing objects are realized, in a connector according to the present invention, by the provision of one or more resilient barbs on one coupling member, these barbs in locking position bearing upon a transverse shoulder on the other member which they engage upon the introduction of the insertion end of the male member into the corresponding end of the female member. A blocking element, preferably a ring, is slidable on the member having the shoulder in such manner as to be normally spaced from the latter, thereby forming a gap into which the barbs of the other member snap in the position of interengagement of these members. When the insertion movement of the parts is continued beyond the interengagement position, the barbs are cammed out of the gap by the blocking element, which should have a height approaching or possibly exceeding that of the shoulder, and come to rest on the blocking element itself which is slidably entrained by them upon a subsequent disengaging displacement until it approaches the shoulder sufficiently to lift the barbs over it in the further course of such displacement whereby the coupling members can be separated from each other.

In an advantageous embodiment the barbs are formed as integral parts of a frustoconical ring which is longitudinally slitted at one end so as to terminate in an array of angularly spaced tongues resiliently connected with the unslitted body of this ring. When one (e.g. the female) connector part comprises a support, such as a sleeve, carrying an approximately cylindrical array of elongated resilient conductors serving as contact springs, the frustoconical barb ring may have a flange clamped in position by an element which also serves for the anchoring of one end of each contact spring.

Generally, either the jack or the plug may have the barbs mounted thereon; the complementary member carrying the blocking ring in, advantageously, a peripheral recess in which this ring is axially slidable. If the barbs are secured to the plug, they may be disposed in an axial bore thereof which in the interengagement position is penetrated by a stud axially projecting from the jack and carrying the blocking ring inside the bore.

The above and other objects, features and advantages of our invention will become more fully apparent from

the following detailed description of certain embodiments, reference being made to the accompanying drawing in which:

FIG. 1 is a longitudinal sectional view of a connector embodying the invention;

FIG. 2 is a cross-sectional view taken on the line II—II of FIG. 1;

FIG. 3 is a side-elevational view of a barb ring forming part of the connector of FIGS. 1 and 2; and

FIG. 4 is a view similar to FIG. 1 but showing a second embodiment.

The connector illustrated in FIGS. 1–3 comprises a female coupling member or jack composed of a sleeve 1, a set of contact springs 9 lining the inner periphery of sleeve 1 in a generally cylindrical array, and two clamping rings 10, 11 holding the springs 9 in place. This at least partly metallic jack is conductively joined to a circuit element, not shown, such as a cable whose strands may be received in grooves 11*a* of clamping ring 11. Both rings 10, 11 are shown to be in threaded engagement with the sleeve 1. Ring 10, which defines the insertion end of the jack, also engages a flange 3*a* of a frustoconical annular body 3 having its narrower end subdivided by a series of longitudinal slits into tongues 4 constituting an array of angularly spaced barbs resiliently connected with the body 3.

The complementary male coupling member of this connector is a plug 2 having a peripheral annular recess 5 which lies in a transverse plane and is bounded by two transverse annular shoulders 5*a*, 5*b*. The free ends of barbs 4 enter the gap formed between shoulder 5*a*, which is the one closer to the insertion end (i.e. the left-hand extremity in FIG. 1) of plug 2, and a blocking ring 6 which is axially slidable in the recess 5 and has a height almost equal to that of shoulder 5*a*. The latter shoulder, in the position illustrated in the drawing, prevents the separation of the two members 1, 2 by a disengaging displacement thereof. It should be noted, however, that sufficient clearance exists at 13 between the insertion end of plug 2 and the opposite end of the jack, i.e. the right-hand face of clamping ring 11 thereof, to enable a further engaging or penetrating displacement of the two members whereby the tips of the barbs 4 are cammed out of recess 5 and come to rest on the outer periphery of blocking ring 6. Thus, upon a subsequent reversal of the relative displacement of the two members, ring 6 is entrained to strike the shoulder 5*a*; in this manner, as indicated in dot-dash lines in FIG. 1, the barbs 4 are lifted to clear the shoulder 5*a* and to enable the substantially unhindered withdrawal of plug 2 from sleeve 1. It will be understood that, upon a reinsertion of the plug, ring 6 should be moved back toward shoulder 5*b* so as to restore the annular gap into which the barbs 4 may snap upon the return of the parts to the interengagement position shown in FIG. 1. The metallic plug 2 is, of course, also connected to a wire, cable or other external conductor not shown.

As best seen in FIG. 2, the barbs 4 formed as integral projections of body 3 are angularly staggered with respect to the contact springs 9 so as to be freely deflectable by the ring 6 toward the inner periphery of sleeve 1.

In FIG. 4 the sleeve 1 has its contact springs 9′ anchored to it by clamping rings 10′ and 11′ of which the former, instead of being threadedly connected with the sleeve as in the preceding embodiment, is shown held in place by a swaged lip 1*a*′ thereof and is used only for the retention of the springs. A stud 8 axially projects from ring 11′ within the sleeve 1′ and enters, with clearance, a bore 7 extending axially inwardly from the inser-

tion end of plug 2'. A frustoconical barb ring 3' is secured to this end of plug 2' by a clamping ring 14 and has its tongues 4' received in a recess 5' of stud 8 in which a blocking ring 6' is axially slidable. The operation of this connector is analogous with that of the system of FIGS. 1–3, sufficient space being again provided to the left of plug 2' and within bore 7 to enable a further penetration displacement of the parts beyond the illustrated locking position whereby the barbs 4' come to rest on the blocking ring 6' and entrain it toward shoulder 5*a*' upon a reversal of motion.

My invention is, of course, not limited to the specific embodiments described and shown. In particular, the barbs 4 or 4' need not be interconnected and their number and relative spacing may be varied. The general shape of the plug and jack members may also be modified; thus, for example, either of these members may be designed as a dual connector member of the type disclosed in copending application Ser. No. 816,548 filed May 28, 1959.

I claim:

1. An electric connector comprising an elongated plug member, a tubular jack member removably receiving said plug member, one of said members being provided with a transverse annular shoulder, the other of said members being provided with an annular shell having an array of resilient barbs bearing upon said shoulder in a position of interengagement and preventing a relative displacement of said members in a disengaging sense, and a blocking ring axially slidable on said one of said members adjacent said shoulder, said blocking ring having a height which at least approaches that of said shoulder and being entrainable by said barbs toward said shoulder upon an initial engaging displacement of said members beyond said position of interengagement and a subsequent reverse displacement thereof in said disengaging sense, thereby enabling said barbs to clear said shoulder and facilitating separation of said members from each other, said other of said members comprising a support and a generally cylindrical array of contact springs carried on said support, said support being provided at its insertion end with clamping means holding said contact springs in place and also anchoring said barbs to said other of said members.

2. An electric connector comprising an elongated plug member, a tubular jack member having an insertion end removably receiving a corresponding end of said plug member, one of said members being provided in a transverse plane with an annular recess bounded by an annular

shoulder on the side closer to the insertion end thereof, a blocking ring axially slidable in said recess in normally spaced relationship with said shoulder whereby an annular gap is formed between said ring and said shoulder, and an annular shell having a set of resilient barbs angularly spaced on the other of said members, said barbs having tips entering said gap and bearing axially upon said shoulder in a position of interengagement of said members for preventing a relative displacement thereof in a disengaging sense, said ring having a height which at least approaches that of said shoulder and being entrainable by said barbs toward said shoulder upon an initial engaging displacement of said members beyond said position of interengagement and a subsequent reverse displacement thereof in said disengaging sense, thereby enabling said barbs to clear said shoulder and facilitating separation of said members from each other, said other of said members comprising a support and a generally cylindrical array of contact springs carried on said support, said support being provided at its insertion end with clamping means holding said contact springs in place and also anchoring said barbs to said other of said members.

3. A connector according to claim 2 wherein said barbs are integrally combined into a frustoconical body formed with longitudinal slits.

4. A connector according to claim 2 wherein said barbs are integrally combined into a frustoconical body formed with longitudinal slits, said body having a flange engaged by said clamping means.

5. A connector according to claim 2 wherein said jack member comprises a sleeve and said generally cylindrical array of contact springs lines the inner periphery of said sleeve, said clamping means including a brushing threaded into said sleeve and having an opening passing said one of said members.

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