Dec. 30, 1958 W. R. POSTELL 2,866,958

QUICK CIRCUIT CONNECTOR

Filed Feb. 12, 1957

2 Sheets-Sheet 1

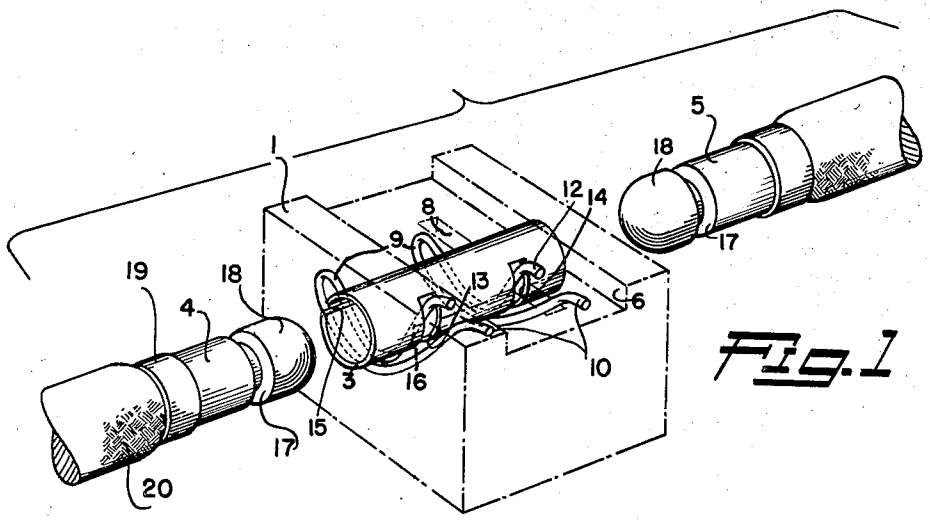


Fig. 1

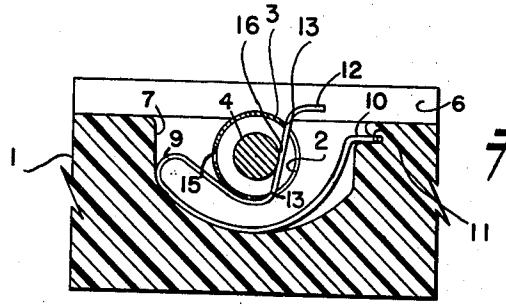


Fig. 2

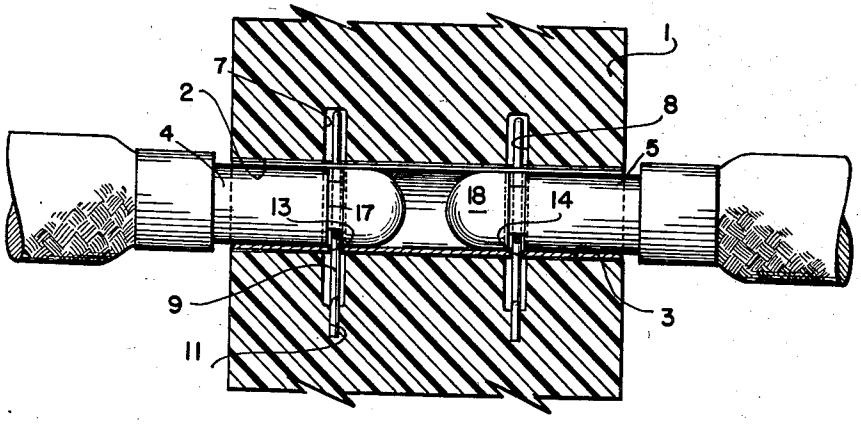


Fig. 3

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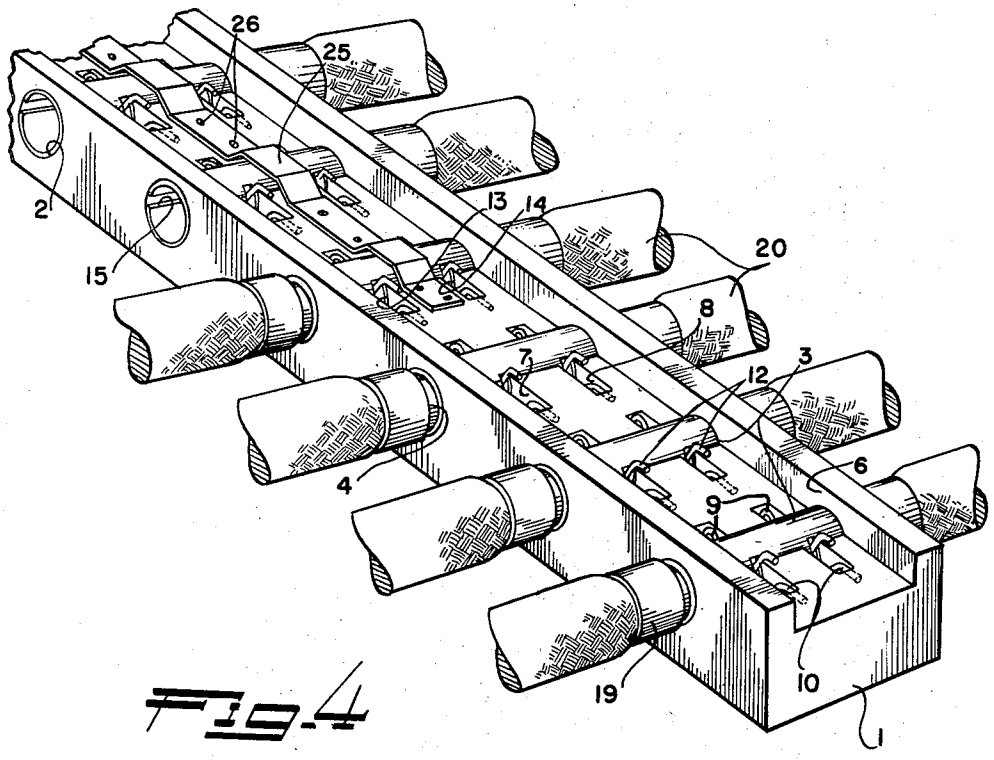


FIG. 4

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QUICK CIRCUIT CONNECTOR

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13 Claims. (Cl. 339—198)

This invention relates generally to electrical wiring systems and more particularly to an electrical connector for completing a circuit between a plurality of wires.

There are a great many applications in the packaging of electronic equipment wherein space limitations are critical and the use of miniaturized electronic components such as connectors are required. Beacuse of this requirement, much work has been done in the recent past to make such components smaller. In the connector art, the main effort has been directed towards reducing the size of the conventional designs now commercially available. However, because of the construction of standard sized, commercially available connectors they have in the main been found unsuitable for miniaturization.

Aside from the difficulties in miniaturizing standard electrical connectors there is a recognized need for a better electrical connector compatible with modern electronic packaging techniques which is suitable for use under rugged environmental conditions and which will permit coupling and decoupling of the wires without special tools.

An object of this invention is to provide an electrical connector the construction of which is highly suitable for miniaturization.

Another object of this invention is to provide an electrical connector having its parts secured together as an assembly by the same retainer springs used to lock the wires in place. Coupling of the wires is effected by simply sliding connector pins into a sleeve. Uncoupling of the wires is effected by depressing the retainer springs and pulling on the wires. Coupling and uncoupling of the wires may be repeated as often as necessary without damaging the connector.

Another object of this invention is to provide an electrical connector capable of maintaining good electrical contact with its associated wiring under widely varying temperature and vibration environmental conditions.

Another object of this invention is to provide an electrical connector well suited to high speed manufacturing methods for low cost production.

Still another object of this invention is to provide an electrical connector having a minimum of parts all of which are noncritical in dimensions and easy to assemble.

Further and other objects will become apparent from a reading of the following description especially when considered in combination with the accompanying drawing wherein like numerals refer to like parts.

In the drawing:

Figure 1 is an exploded view in perspective showing the construction details of the electrical connector;

Figure 2 is a sectional end view of the electrical connector;

Figure 3 is a sectional plan view of the electrical connector; and

Figure 4 is a perspective view showing a typical arrangement employing a plurality of the electrical connectors.

Referring to the drawing, with particular reference to Figures 1, 2 and 3, the connector includes a block 1 of

electrical insulating material such as hard rubber or a synthetic resin. A bore 2 is formed in block 1 which extends therethrough for loosely receiving a metal sleeve 3. The metal sleeve is split at 15 axially throughout its length and is preferably somewhat elastic or springy for squeezing the associated connector pins 4 and 5 which are received one within either end of sleeve 3.

A shallow channel groove 6 is formed in one side of block 1 transversely of bore 2 exposing the bore and an intermediate section of sleeve 3. Also a pair of deep grooves 7 and 8 are formed in block 1 transversely of bore 2, opening into channel 6 and forming cavities around the outer periphery of the sleeve for receiving retainer springs 9. Grooves 7 and 8 are spaced apart and generally symmetrically located with respect to channel groove 6. One end 10 of each retainer spring 9 may be suitably secured to block 1 such as by inserting the same into a recess 11 formed in the wall of the groove. The retainer springs are formed to a generally curved U-shape, conforming approximately to the shape of the grooves and curving around to press against the underside of sleeve 3 remote from the split. This urges the sleeve to squeeze connector pins 4 and 5 for maintaining good electrical contact. The free end 12 of each retainer spring projects upwardly into the channel groove 6 to provide a simple means with which to retract the spring in uncoupling wires and disassembling the connector.

A pair of transverse slots 13 and 14 are formed in sleeve 3 which mate with grooves 7 and 8 when sleeve 3 is properly positioned with respect to block 1. Slots 13 and 14 are preferably made in sleeve 3 remote from the split at 15. When slots 13 and 14 in sleeve 3 are aligned with grooves 7 and 8, substantially straight intermediate segments 16 of retainer springs 9 are received within the slots, locking the sleeve in position with respect to the block.

Transverse slots 13 and 14 in sleeve 3 are purposely made sufficiently deep that segment 16 of each retainer spring 9 projects well into the passage through the sleeve. This allows the retainer spring to also engage circumferential grooves 17 formed in each connector pin 4 and 5 when the circumferential grooves are aligned with the slots in the sleeve as shown in Figures 2 and 3.

The diameter of connector pins 4 and 5 are such that when inserted in split sleeve 3, the sleeve will be caused to expand slightly and firmly grip the pin. The front end or nose 18 of each connector pin is rounded to serve as a cam to automatically effect retraction of retainer spring 9 to permit entry of the pin into the sleeve for aligning grooves 17 with the associated slots 13 and 14. The aft end 19 of pins 4 and 5 are adapted to receive the connecting wires 20 which may be secured to the pin by any suitable means such as by swaging.

To complete an electrical circuit through the connector it is only necessary to press connector pins 4 and 5 into the opposite ends of sleeve 3. By employing circumferential grooves 17 which are generally rectangular in cross-sectional shape in the connector pins, positive locking action is obtained by simply aligning the grooves with the slots to permit entry of the retainer springs. Only by pressing on the free end 12 of the retainer spring so as to disengage the retainer spring from the circumferential groove in the connector pin may the pin be removed.

The connector may be readily assembled by sliding the loose fitting sleeve into the bore of the block and inserting the retainer springs into grooves 7 and 8. The retainer springs press against the sleeve and project into slots 13 and 14 locking the pins and restraining both axial and rotational movement of the sleeve relative to the block. The pressure applied to the sleeve by the retainer springs produces a squeezing action on the connector pins to

maintain good electrical contact under extreme environmental conditions.

The connector construction is desirable not only because a relatively few parts are employed, but also because none of the parts dimensions are critical.

The electrical connector herein described is primarily intended for use as illustrated in Figure 4 wherein block 1 carries a plurality of the individual connectors. It is often desirable to combine signals or to provide several output leads from a single input lead in various combinations, and this may be accomplished in the Figure 4 configuration by simply securing a strap of conductive material 25 to block 1 within channel 6 by means such as screws 26 so that electrical contact is made between the strap and the sleeves of the several connectors to be joined. The connector block may employ as many connectors as is necessary for a particular application and the cross-coupling straps may be used to join any two or more of the connectors. It should also be understood that connector block 1 may be made in any desired configuration and is not limited to a linear arrangement of connectors as is shown.

While the invention has been described in its preferred embodiment it should be understood that certain alterations, modifications and substitutions may be made to the instant disclosure without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. A connector for electrical circuits comprising, an electrical insulating block, said block having a generally cylindrical bore formed therethrough, a conductive sleeve loosely received within said bore, a pair of conductive connector pins slidably received one within each end of said sleeve; said block, sleeve and pins having slots cut therein transversely of said bore and in alignment at a predetermined axial position of said pins and sleeve relative to said block, and a pair of retainer springs carried by said block and engaging said slots when in alignment for securing said sleeve and pins to said block, said sleeve being split longitudinally for squeezing the connector pins to insure good electrical contact, said pins having a rounded nose for deflecting said sleeve and retainer springs to effect entry into the sleeve.

2. A connector for electrical circuits comprising, an electrical insulating block, said block having a generally cylindrical opening formed therethrough, said block having a pair of spaced grooves formed therein transversely of said opening, a metal sleeve loosely carried within said cylindrical opening and communicating with said grooves, said sleeve being split longitudinally and having a pair of transverse slots cut therein for alignment with said grooves, a pair of retaining springs carried within said grooves and engaging said slots securing said sleeve within said bore and projecting into the passage through the sleeve, a pair of connector pins each slidably received within opposite ends of said sleeve, said pins having a rounded nose for deflecting said retaining springs to effect entry into the sleeve, said pins each having a circumferential groove formed therein intermediate of the ends thereof and arranged to receive the associated retaining spring when aligned with one of said slots in said sleeve.

3. A connector for electrical circuits comprising, an electrical insulating block, said block having a bore formed therethrough, a longitudinally split metal sleeve loosely carried within said bore, a pair of spaced slots formed transversely in said sleeve and generally opposite the split, said block having a pair of spaced grooves formed therein transversely of said bore and aligned with said slots, said grooves each extending substantially completely around said sleeve, a generally U-shaped retainer spring carried within each said groove and engaging said sleeve throughout at least a portion of its peripheral surface remote from the split to oppose expansion of the sleeve, said spring having an intermediate segment thereof projecting into the passage through the sleeve at the aligned slot to restrain axial and rotational movement of the sleeve relative to the block, and a pair of connector pins each slidably received within opposite ends of said sleeve and being slightly larger in diameter than the passage through the sleeve whereby a squeezing force is exerted on the pins for good electrical contact, said pins each having a circumferential groove formed therein to receive the spring segment projecting into the passage through the sleeve slot.

4. The connector of claim 3 wherein one end of each retainer spring lockingly engages the block and the other end thereof projects beyond the groove for actuation to release the connector pin.

5. The connector of claim 3 wherein the nose of the pins are rounded to form a cam for automatically retracting the retainer springs to permit entry of the pins into the sleeve.

6. The connector of claim 4 wherein the nose of the pins are rounded to form a cam for automatically retracting the retainer springs to permit entry of the pins into the sleeve.

7. A connector for electrical circuits comprising, a block of electrical insulator material, said block having a plurality of noninterconnecting bores formed therein and a channel groove exposing an intermediate segment of each bore, a longitudinally split metal sleeve loosely carried within each said bore, a slot formed transversely in each said sleeve, said block having a groove formed thereon transversely of each said bore and aligned with the slot in the associated sleeve, said groove extending substantially completely around said sleeve and opening into the channel groove, a retainer spring carried within said groove and engaging said sleeve throughout at least a portion of its peripheral surface remote from the split to oppose expansion of the sleeve, said spring having an intermediate segment thereof projecting into the passage through the sleeve at the aligned slot to restrain axial and rotational movement of the sleeve relative to the block, and a connector pin slidably received within said sleeve and being slightly larger in diameter than the passage through the sleeve whereby a squeezing action is exerted by the sleeve for good electrical contact, said pin having a circumferential groove formed therein to receive the spring segment projecting into the passage through the sleeve slot.

8. The connector of claim 7 wherein one end of the retainer spring lockingly engages the block and the other end thereof projects into the channel groove for actuation to release the connector pin.

9. The connector of claim 7 wherein the nose of the pin is rounded to form a cam for automatically retracting the retainer spring to permit entry of the pin into the sleeve.

10. The connector of claim 7 wherein a metal strap is carried within said channel groove electrically coupling a plurality of the sleeves.

11. A connector for electrical circuits comprising, a block of electrical insulator material, said block having a bore formed therein, a longitudinally split metal sleeve loosely carried within said bore, a slot formed transversely in said sleeve, said block having a groove formed therein transversely of said bore and aligned with said slot, said groove extending substantially completely around said sleeve and terminating exteriorly of said block, a retainer spring extending into said groove and engaging said sleeve throughout at least a portion of its peripheral surface remote from the split to oppose expansion of the sleeve, said spring having an intermediate segment thereof projecting into the passage through the sleeve at the aligned slot to restrain axial and rotational movement of the sleeve relative to the block, and a connector pin slidably received within said sleeve and being slightly larger in diameter than the passage through the sleeve whereby a squeezing action is exerted by the sleeve

for good electrical contact, said pin having a circumferential groove formed therein to receive the spring segment projecting into the passage through the sleeve slot.

12. A connector for electrical circuits comprising, a block of electrical insulator material, said block having a bore formed therein, a longitudinally split metal sleeve loosely carried within said bore, a slot formed transversely in said sleeve, said block having a groove formed therein transversely of said bore and aligned with said slot, said groove extending substantially completely around said sleeve and terminating exteriorly of said block, a retainer spring carried within said groove and engaging said sleeve throughout at least a portion of its peripheral surface to oppose expansion of the sleeve, said spring having an intermediate segment thereof projecting into the passage through the sleeve at the aligned slot to restrain axial and rotational movement of the sleeve relative to the block, and a connector pin slidably received within said sleeve, said pin having a circumferential groove formed therein to receive the spring segment projecting into the passage through the sleeve slot.

13. The connector of claim 12 wherein the nose of the pin is rounded to form a cam for automatically retracting the retainer spring to permit entry of the pin into the sleeve.

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