July 5, 1960 W. J. LONDELL, JR 2,944,241

CONNECTOR

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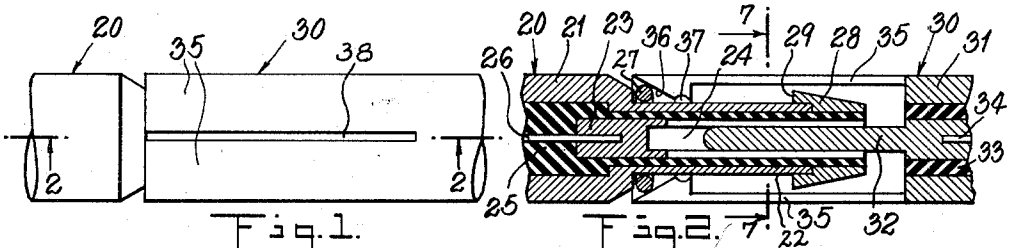

Fig. 1. Fig. 2.

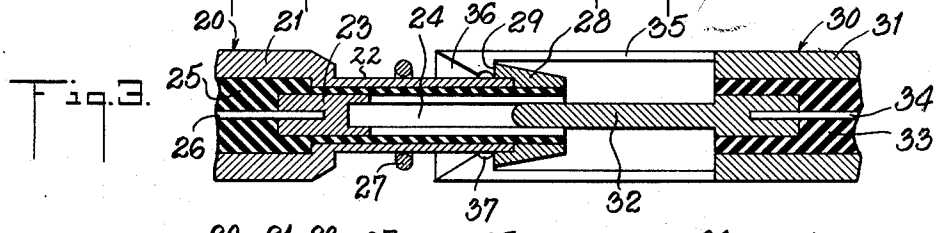

Fig. 3.

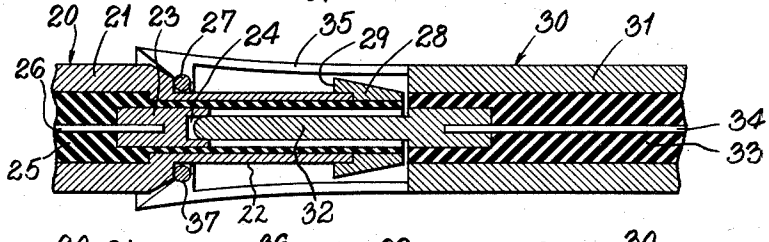

Fig. 4.

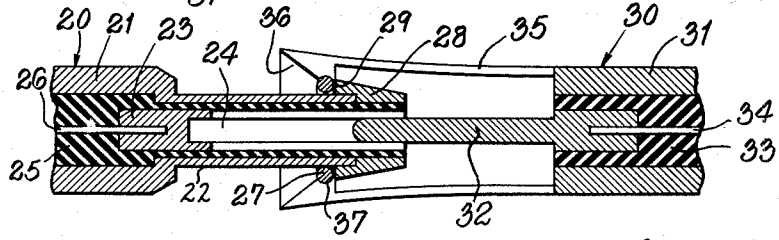

Fig. 5.

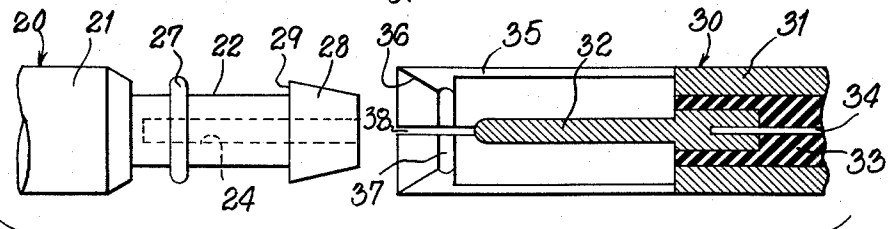

Fig. 6.

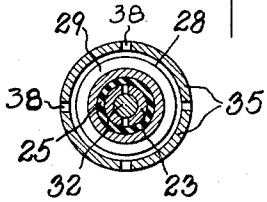

Fig. 7.

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CONNECTOR

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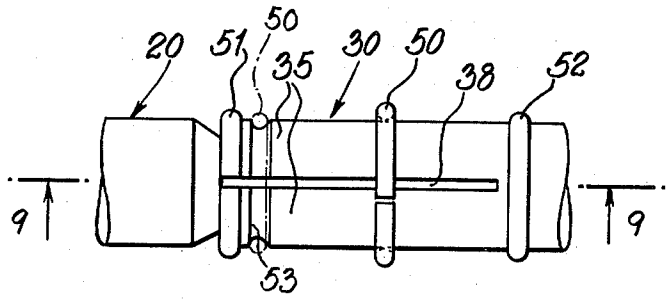

Fig. 8.

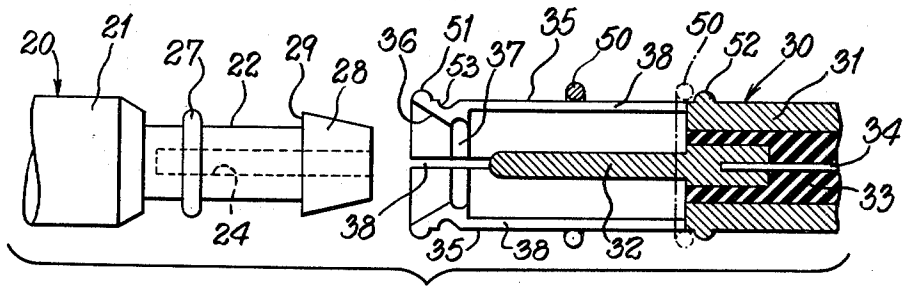

Fig. 9.

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United States Patent Office 2,944,241 Patented July 5, 1960

2,944,241

CONNECTOR

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Filed Dec. 9, 1957, Ser. No. 701,452

4 Claims. (Cl. 339—91)

My invention relates to electrical connectors and in particular to connectors possessing quick-connect and quick-disconnect features.

In the prior art, there have been many attempts to devise simple quick-connect, quick-disconnect connectors. None of these used elements are simple and easy to fabricate and assemble. Various types of release buttons, rotatable elements and other complex mechanisms have been employed to accomplish the desired results.

Accordingly, it is a principal object of my invention to provide a quick-connect, quick disconnect connector which does not require any push button releases, rotatable release mechanisms or other complex mechanisms.

It is a further object of my invention to provide such a connector wherein the mating elements use a simple mechanical locking device.

It is a still further object of my invention to provide such a connector wherein the mating elements may be disconnected simply and quickly.

It is a still further object of my invention to provide such a connector which can be manufactured easily and economically.

Other objects and advantages of my invention will be apparent during the course of the following description when taken in conjunction with the accompanying drawings wherein:

Figure 1 is a side elevational view of a preferred embodiment of my invention showing the male and female elements connected,

Figure 2 is a cross-sectional view along the line 2—2 of Figure 1,

Figure 3 is a cross-sectional view similar to that of Figure 2 showing the two elements in the locked position,

Figure 4 is a cross-sectional view similar to that of Figure 2 showing position 1 of the disconnect operation,

Figure 5 is a cross-sectional view similar to that of Figure 2 showing position 2 of the disconnect operation,

Figure 6 is a view of the embodiment of Figure 1 showing the units disconnected and in which the female element is shown in elevation and the male element is shown partly in cross-section,

Figure 7 is a cross-sectional view along the line 7—7 of Figure 2,

Figure 8 is a view similar to Figure 1 of a further embodiment of my invention, and

Figure 9 is a view similar to Figure 6 of the embodiment of Figure 8 in which the female element is shown in elevation and the male element is shown in cross-section along the line 9—9 of Figure 8.

In the drawings, wherein, for the purpose of illustration, are shown a preferred embodiment and a further embodiment of my invention, the numeral 20 designates the body of the female connector, generally and the numeral 30 designates the body of the male connector, generally. 20 comprises outer metallic shell 21 of silver-plated beryllium copper or similar material, inner metallic receptable 23 and release spring 27. 23 is preferably formed of

silver-plated beryllium copper or similar material and 27 is preferably made of spring steel or like material. Shell 21 is insulated from receptacle 23 by insulator 25 into which 23 is pressed and held firmly and which may be of rubber, plastic or similar material. 21 is made up of a large body portion which is essentially cylindrical in shape and which carries a forward bevel and tapers to smaller body portion 22 which is likewise cylindrical in shape in the region surrounding substantially most of 23. Adjacent the end of 20, 21 is enlarged in the shape of a truncated conical element 28 such that a sharp ledge 29 is formed at the point at which the shape of 21 changes from that of 22 to that of 28. I prefer to press fit 28 over 22 or silver solder it thereto but 22 and 28 may be formed from a single piece of material, if desired. 24 designates the opening in 23 which is designed to receive the connector element of the male plug. To insure firm connection to the male element it is best to slot 23 (slots not shown). Electrical connection is made to 23 by means of electrical wire 26 which is welded thereto.

Male connector body 30 comprises shell 31 formed of silver-plated brass or similar material, plug 32 which is designed to mate snugly in recess 24 of the female connector and which is formed of solid beryllium copper, silver-plated brass or similar material, and spring lock elements 35. Springs 35 are formed of silver-plated brass, beryllium copper or similar material. Insulator 33 of rubber, plastic or similar material is provided to insulate 31 from 32 and 34 which is used to carry electrical connection from 32 to outside circuitry (not shown). 34 is welded or soldered to 32 which is press fitted into 33. Spring lock elements 35 are separated from each other by openings 38. 35 at their outer extremities are shaped so that surfaces 36 will slide over the surface of 28 and then spring to the position shown in Figure 2 so that ledge 29 restrains the male plug from being disconnected from the female receptacle. Rounded surface 37 which is adjacent the end of 35 and just to the rear of surface 36 is shaped so that it will fit over and maintain intimate contact with ring 27 in positions 1 and 2 of the disconnect procedure.

In operation, connection is made between the two elements by inserting the male plug in the female receptacle and pushing them together in the direction of their axes. If an attempt is made to pull the units apart the spring elements 35 will lock against ledge 29 such that they cannot be separated by the application of any reasonable amount of force. To disconnect the two elements, 30 is pushed toward 20 so that lock elements 35 are pushed outward from the center by the forward shape of 21 and ring 27 so that rounded surfaces 37 are in contact with ring 27 as shown in Figure 4 (disconnect position 1). 30 is pulled away from 20 and spring elements 35 are held spread by ring 27 which remains in contact with 37. At the point shown in Figure 5 (disconnect position 2), 20 and 30 may be easily disconnected by continuing to apply force so that 30 is pulled away from 20 so that elements 35 will be pulled off ring 27 and the units will become separated as shown in Figure 6. After elements 20 and 30 are separated, elements 35 spring back into position.

Figures 8 and 9 illustrate a further embodiment of my invention in which locking ring 50 which is carried by 30, may be moved so as to fit into locking groove 53 cut into the outer surface of elements 35. The locking ring may be used in those applications in which it is necessary to restrain all movement of elements 35. When the locking ring is in place, elements 35 cannot assume the position illustrated in Figure 4 since they are restrained from expanding outwardly from the body of the unit. Stops 51 and 52 are provided to prevent locking ring 50 from

slipping off male connector **30** during operation. The operation of the embodiment of Figures 8 and 9 is similar to that for the embodiment of Figures 1 through 7 with the addition that locking ring **50** is slid into locking groove **53** after female connector **20** and male connector **30** are mated and locking ring **50** is slid out of locking groove **53** before attempting to disconnect the connectors. It is also within the contemplation of my invention to utilize a stop in lieu of the forward bevel of **21** which will also serve to spread elements **35** so that **37** and **27** will make contact with each other. My invention also contemplates its utilization with multicontact plugs and receptacles, both keyed and unkeyed, even though I have illustrated and described the principles of my invention in connection with single contact plugs and connectors.

While I have described my invention by means of specific examples and in specific embodiments, I do not wish to be limited thereto, for obvious modifications will occur to those skilled in the art without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A connector comprising in combination a male element, a female element cooperating therewith and means for making electrical connection to said male and said female element; said male element comprising a body portion and at least one conductive pin, said pin being insulated from and extending beyond one end of said body portion, at said end a plurality of resilient elements affixed to said body portion substantially at its outer perimeter, each said resilient element being parallel to said pin and extending beyond the end of said pin, the ends of said resilient elements being beveled so that each beveled surface forms an acute angle with the major surface of said element and so that said element is thinnest at its end, said beveled surface being carried from the end of said resilient element toward the end thereof which is affixed to said body portion, said beveled surface being shorter than the major surface of said resilient element, there being a surface substantially perpendicular to said pin connecting the end of said beveled surface furthest from the end of said resilient element with the major surface of said resilient element, said beveled surface carrying a groove at the end thereof furthest from the end of said resilient element; said female element comprising a body portion with a forward beveled surface forming an obtuse angle with the major surface of said body, a smaller surface of substantially the same shape as said body portion and smaller in radius than said body portion extending from said beveled surface toward the end of said female element, a beveled surface at the end of said smaller surface such that its small end forms the end of said female element and its larger end is nearer the body portion of said female element and is adjacent said smaller surface thereby forming a lip in the region at which they are contiguous, at least one conducting surface within said outer portions and insulated therefrom and carrying an opening therein, said opening being adapted to receive said pin of said male element and being greater in length than said pin, a ring slidably mounted on said smaller surface and shaped to fit in said recess carried by said resilient elements of said male element; the portions of said male and female elements beyond said body portions being of substantially the same length.

2. A male connector element comprising a body portion and at least one conductive pin, said pin being insulated from and extending beyond one end of said body portion, at said end a plurality of resilient elements affixed to said body portion substantially at its outer perimeter, each said resilient element being parallel to said pin and extending beyond the end of said pin, the ends of said resilient elements being beveled so that each beveled surface forms an acute angle with the major surface of said element and so that said element is thinnest at its end, said beveled surface being carried from the end of said resilient element toward the end thereof which is affixed to said body portion, said beveled surface being shorter than the major surface of said resilient element, there being a surface substantially perpendicular to said pin connecting the end of said beveled surface furthest from the end of said resilient element with the major surface of said resilient element, said beveled surface carrying a groove at the end thereof furthest from the end of said resilient element shaped to cooperate with a slidable ring carried by a female element which mates with said male element, and means for making electrical connection to said conductive pin.

3. A male connector element as described in claim 2 wherein the outer surfaces of said resilient elements carry a groove shaped to receive a ring which is slidably mounted on said resilient elements.

4. A female connector element comprising a body portion with a forward beveled surface forming an obtuse angle with the major surface of said body, a smaller surface of substantially the same shape as said body portion and smaller in radius than said body portion extending from said beveled surface toward the end of said connector element, a beveled surface at the end of said smaller surface such that its small end forms the end of said female connector element and its larger end is nearer the body portion of said female connector element and is adjacent said smaller surface thereby forming a lip in the region at which they are contiguous, at least one conducting surface within said outer portions and insulated therefrom and carrying an opening therein, a ring slidably mounted on said smaller surface and shaped to cooperate with a groove carried by a male element which mates with said female element, and means for making electrical connection to said conducting surface.

References Cited in the file of this patent

UNITED STATES PATENTS

1,667,485	MacDonald	Apr. 24, 1928
2,566,993	Parsons	Sept. 4, 1951