Sept. 4, 1962 J. ROGOFF 3,052,867

ELECTRICAL CONNECTOR

Filed Nov. 12, 1958

FIG. 1

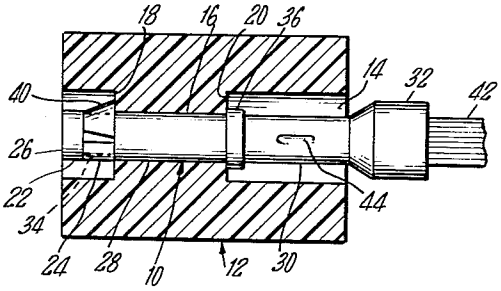


FIG. 3

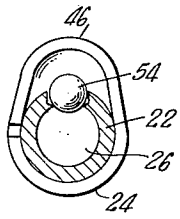


FIG. 2

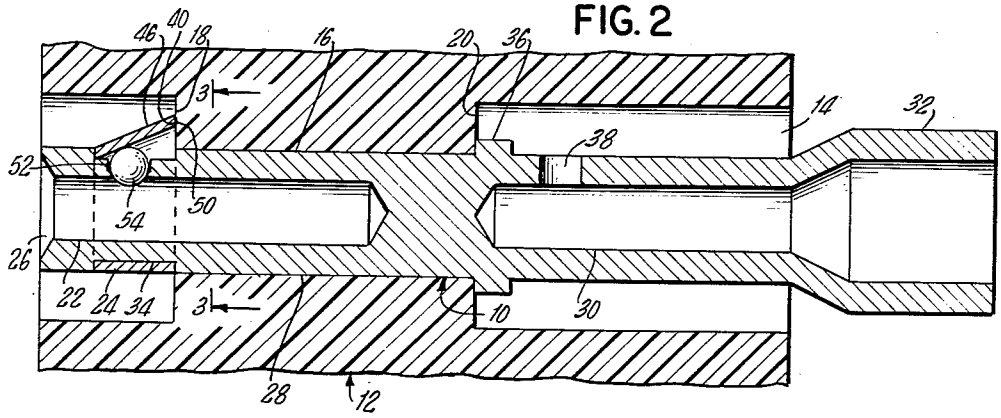


FIG. 4

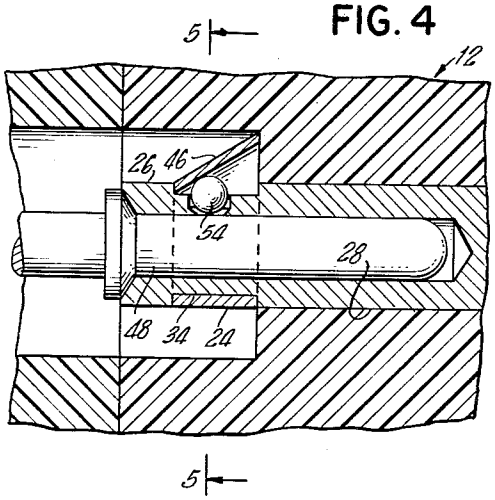
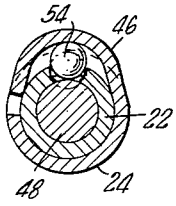


FIG. 5



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United States Patent Office 3,052,867 Patented Sept. 4, 1962

3,052,867

ELECTRICAL CONNECTOR

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Filed Nov. 12, 1958, Ser. No. 773,314
2 Claims. (Cl. 339—217)

This invention relates to electrical connectors of the mating plug and receptacle type having pin and socket connectors, and more particularly, to electrical connectors having multiple pin and socket contacts which are removable from mating plugs and receptacles.

The advantages of electrical connectors of a mating plug and receptacle type having multiple pin and socket contacts are obvious, but the prior art connectors have not been completely satisfactory because the known structures have often required a large number of different components to be manufactured by relatively expensive methods. The contacts, once assembled in the respective plugs and receptacles, could not be removed, nor could they be interchanged. Usually, these prior art contacts required a solder operation to be performed in a difficult location under poor conditions in order to join the electrical conductor to the contact. Moreover, it is desirable that the socket contacts have closed ends in order to prevent deformity of the socket during the insertion of the pin contact or to prevent the insertion of an oversize pin contact.

One of the objects of this invention is to provide a novel contact assembly structure for use in electrical connectors of the mating plug and receptacle type.

Another object of this invention is to provide a closed end socket contact assembly structure which is easy to insert and readily removable from the supporting plug or receptacle.

A further object of this invention is to provide a socket contact member removable from its supporting receptacle and capable of retaining the mating pin in the socket to ensure good electrical contact between the cooperating contact members.

Still another object of this invention is to provide an electrical contact structure which is removable from its insulated housing and capable of being readily and inexpensively manufactured from a minimum number of parts.

One of the features of this invention is the provision of a multiple contact plug and contact for a receptacle type electrical connector wherein the housing portions may be of identical design each having a plurality of bores therethrough into which are removably disposed mating pin and socket contacts. In one embodiment of my invention the socket contacts have a tubular body portion about which is disposed a retaining spring which locks the contact to the housing. The body of each socket contact has an opening therein in which is disposed a bearing member retained in position by the locking spring. The bearing member ensures good electrical connection to the mating pin contact inserted into the bore of the socket contact.

These and other features and objects of my invention will become more apparent by reference to the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a side view in cross section of an electrical connector disposed within a supporting receptacle in accordance with the principles of my invention;

FIG. 2 is an enlarged view in cross section of a socket contact of my invention;

FIG. 3 is a cross sectional view taken along the lines 3—3 of FIG. 2;

FIG. 4 is a partial cross section of the socket contact

of my invention shown with a mating pin contact inserted therein; and

FIG. 5 is a cross sectional view taken along the lines 5—5 of FIG. 4.

Referring to FIG. 1 of the drawing, an electrical contact in accordance with the principles of my invention mounted in a supporting receptacle is therein shown to comprise a socket contact **10** disposed within an insulating housing **12**. The insulating housing or receptacle **12** has a bore **14** therethrough. The bore **14** includes a portion of restricted diameter **16** forming front locking shoulder **18** and rear locking shoulder **20**. Contained within the bore **14** is the socket contact assembly **10**.

The socket contact assembly **10** includes the electrical socket contact portion **22**, and its associated retaining spring **24**. The electrical socket contact **22** has a mating contact receiving portion **26**, a barrel portion **28**, and wire receiving portion **30** and a wire insulation ferrule **32**. Toward the front of the barrel portion **28** is a circumferential slot or peripheral recess **34** in which is mounted the retaining spring **24**. A rear shoulder **36** is formed between the wire receiving portion **30** and the barrel portion **28**. The barrel portion **28** is of a diameter slightly less than the diameter of the restricted portion **16** of the bore **14** in order to provide the proper "float" for the electrical contact when properly seated in receptacle **12**. An inspection or peephole **38** is provided in the wire receiving portion **30** behind the shoulder **36**.

The spring retainer assembly **24** comprises a retaining spring of substantially tubular shape composed of a spring metal such as beryllium copper and disposed with the peripheral recess **34** on the barrel **28**. One end **40** of the tubular retaining spring **24** upstands from the barrel **28** to form a front locking shoulder **50** which cooperates with the front locking shoulder **18** of the receptacle **12**. Within the peripheral recess **34** of the socket contact **10** is an opening **52**. A bearing member **54** is located within the opening **52** and retained in place by the spring member **24** which is wrapped around the barrel **28** in the peripheral recess **34**.

In use, an insulated wire **42** has a portion of its conductor bared and received within the wire receiving portion **30** of the electrical contact **10**. To ensure proper insertion the peephole **38** is utilized to inspect this portion of the bared wire. A crimp or indentation **44** is then made to mechanically fasten electrical contact **10** to the bared wire. This crimp ensures both electrical and mechanical contact between the electrical contact **10** and the wire.

In a similar manner the insulation ferrule **32** may b indented or crimped to the insulation of the conductor After the socket contact **10** is assembled to the insulate wire, the contact and wire assembly is inserted into th receptacle housing **12**. During insertion, the cam su face **46** of the spring assembly is depressed during i movement through the restricted portion **16** of the bo **14**. As the spring assembly passes in front of the fro locking shoulder **18**, the upstanding end **40** of the spri assembly **24** is released and engages the front locki shoulder **18** of the bore **16** preventing the withdrawal the electrical contact assembly **10** from the receptacle.

In order to remove the socket **10** from the insulati housing **12**, a simple rod-like tool having a hollow p tion is utilized. The tool is slipped over the front of t socket contact **10**, and its edge is caused to ride up t camming surface **46** of the spring **24**. The inner dia eter of the tool is approximately equal to the diameter the restricted portion **16** of the bore **14** of the hous **12** and so causes the spring locking edge **50** to diseng shoulder **18**. When the spring is compressed thro the use of such a simple tool, a slight backward

on the conductor will cause the contact to be withdrawn through the restricted portion of the housing.

Prior to the insertion of the cooperating pin contact, the ball bearing member **54** extends through opening **52** into the contact receiving portion **26** of the electrical contact **10**. As shown in FIG. 5, when a cooperating pin contact member **48** is inserted, it forces the ball bearing up against the force of the retaining spring **24** and thus raises the locking portion of the retaining spring.

To join the mating contacts, the pin portion **48** is inserted within the socket member **10**. The diameter of the tubular portion **26** of the socket **10** is slightly larger than the diameter of the pin member of the pin contact **48**; however, the bearing **52** extends within the opening **54** to reduce this diameter. As the pin **48** is inserted into the bore **28**, the bearing **54** is forced upward against the force applied on the bearing by the spring **24**. This movement ensures positive locking of the spring **24** to the housing and ensures good electrical contact between the pin and socket contacts due to the pressure applied to the pin by the bearing forcing the lower end of the pin against the socket wall.

As will be readily recognized by those skilled in the art, the front end of the socket contact of my invention is a closed end preventing the insertion of an oversized pin contact. Moreover, the bearing may be made of a number of different materials, such as steel, glass or plastic, since the bearing member itself does not conduct electricity, but the electrical circuit path is from the socket to the pin contact. It will also be readily recognized by those skilled in the art that preferably the distances between the front shoulder **18** and the front of the housing may be varied.

I have thus described my invention, but I desire it understood that it does not confine to the particular form or usage shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of my invention and, therefore, I claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claims, and by means of which, objects of my invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to attain and accomplish these results.

I claim:

1. An electrical contact assembly for a housing of insulating material, the housing having a contact assembly receiving bore including a constricted portion providing an internal shoulder; comprising a metallic contact including a conductor receiving portion and a mating contact receiving tubular portion; a hole through the wall of said tubular portion; a spring means disposed on said tubular portion and adjacent said hole, said spring means including a radially projecting means for engagement with the housing bore shoulder; a member movably disposed in said hole; said member extending in part out of said hole against, and biased by, said radially projecting means, and in part out of said hole towards the center of said tube.

2. An electrical connector socket assembly comprising a housing of insulating material having a bore therein containing a constricted portion to provide an internal shoulder; a metallic contact socket including a conductor receiving portion and a hollow body portion adapted to receive a mating plug connector therein; said body portion further including a peripheral depression around the outside of said body portion wall; a bearing disposed at least in part in a hole through said wall; spring means disposed within said peripheral depression to retain said bearing in position in said hole; said spring means including radially projecting means adapted to engage said internal shoulder whereby the insertion of a plug connector in said socket urges said bearing against said spring causing said radially projecting means to engage said internal shoulder to prevent the withdrawal of said socket from said bore and said bearing urges said plug contact against the wall of said socket.

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