

March 4, 1958

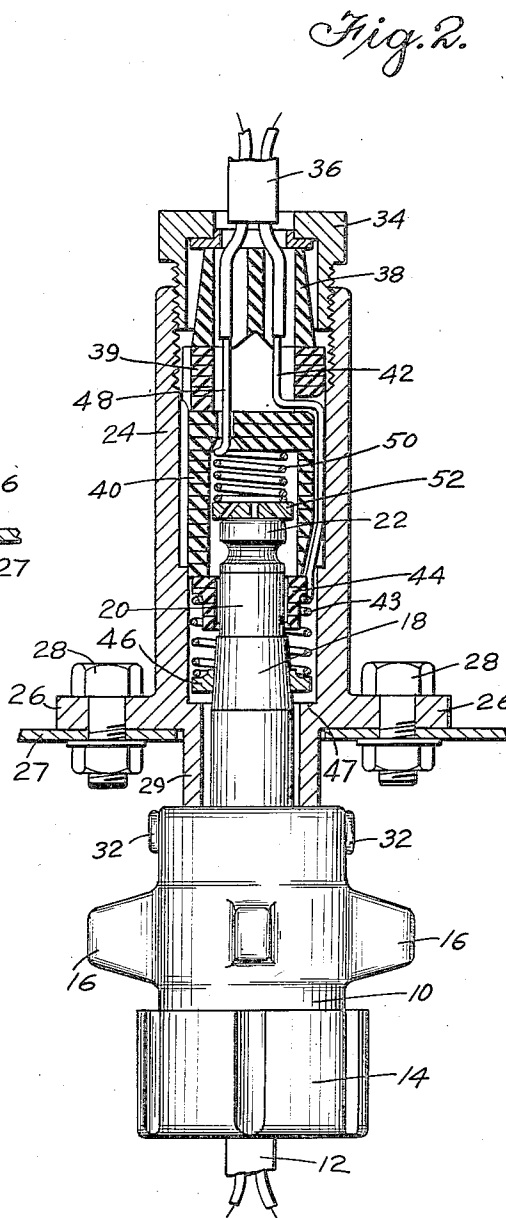
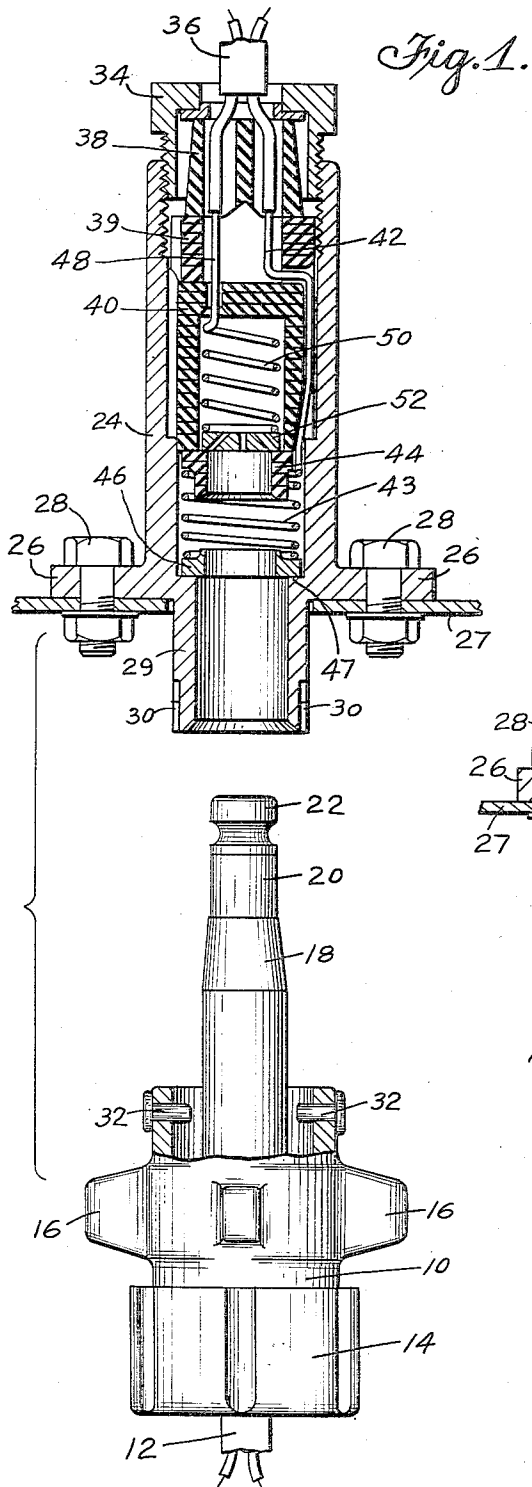
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ELECTRICAL CONNECTING DEVICE

Filed Sept. 15, 1954

2 Sheets-Sheet 1



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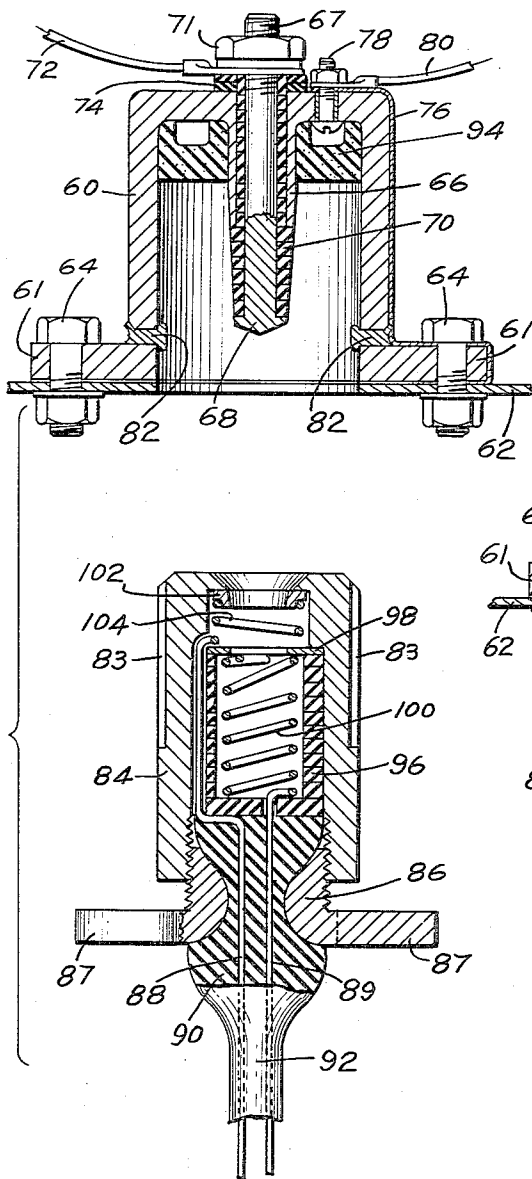


Fig. 3.

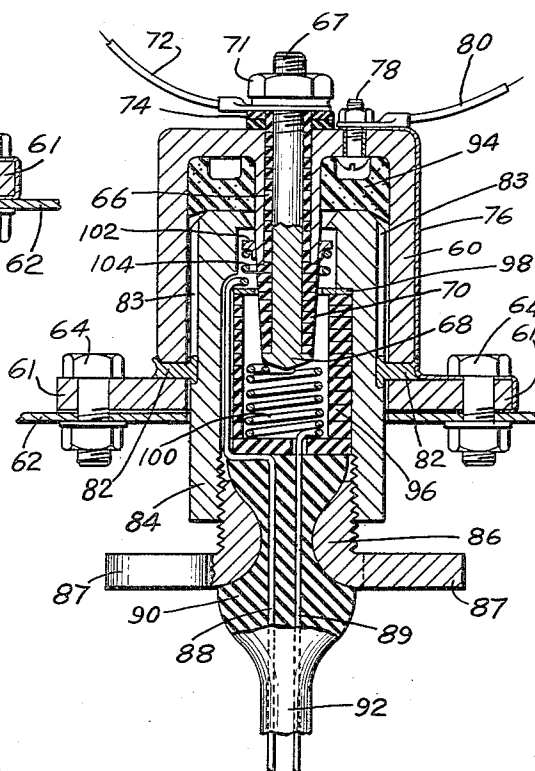


Fig. 4.

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1

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ELECTRICAL CONNECTING DEVICE

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2 Claims. (Cl. 339—183)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to an electrical connecting device of the springjack receptacle type, and more particularly to a device designed for use under conditions of considerable vibration, and wherein extreme reliability is desirable.

In the firing of rockets from an airplane under service conditions, it is desirable that the electrical circuitry be dependable, yet the vibration developed by the plane tends to open circuits at any point where there are separable parts, as at a switch or other connecting device.

The present invention aims to provide an electrical coupling to serve with standard phono-jack plugs which will maintain its connection despite severe vibrations, and which can if desired be made to give notice, by way of a short circuit, if the connection is accidentally broken.

A further object of the invention is to provide a coupling which will work equally well with any of several known types of phono-jack.

Other objects and many of the attendant advantages of the invention will be readily appreciated as the same becomes better understood by reference to the following description.

Fig. 1 is a view in longitudinal section of a connecting device embodying the invention, the plug and its receptacle being shown in separated position;

Fig. 2 is a view similar to Fig. 1, but showing the plug and receptacle connected in circuit-closing position;

Fig. 3 is a view similar to Fig. 1, but showing a modified form of the invention; and

Fig. 4 is a similar view of the modified form, but showing the elements connected in circuit-closing position.

The form of apparatus shown in Figs. 1 and 2 includes a male member in the form of a jack plug comprising a body 10 having connected thereto electrical wiring 12 which, in the example above referred to, will connect with the rocket. The jack plug may be of known commercial construction, and as shown is provided with a base 14 and bosses 16 to facilitate handling. The plug has a tapered shank body 18 which is separated by insulation 20 from a tip 22, as known in the art.

The receptacle includes a generally cylindrical body 24 formed with a longitudinal bore and having flanges 26 drilled to permit the receptacle to be bolted to the airplane body, indicated at 27, by bolts 28. A cylindrical portion 29 on said body is designed to receive the plug and is formed with bayonet slots 30 to receive corresponding pins 32 on the male member, to secure the two members together in usual manner.

The body member 24 is closed by a threaded cap 34 through which extends an electrical cord 36 connected to electrical control apparatus in the airplane. Within

2

the body member are stationary insulating members indicated at 38, 39, 40, shaped as indicated to accommodate the wiring and other elements to be described. One of the conductors, 42, of cord 36 extends through members 38, 39 and along the outside of member 40, whence it extends in the form of a coil spring 43 the upper end of which is seated against a stationary retaining ring 44 while its lower end is seated against a movable contact ring 46, urging it into contact with a shoulder 47 in the interior of the body. The other conductor, 48, extends through members 38 and 39 and through the upper surface of member 40, whence it extends in the form of a coil spring 50 the lower end of which is seated against a movable button contact 52.

In the operation of the device shown in Figs. 1 and 2, the receptacle is mounted at some suitable location on the plane and the male member, electrically connected to a rocket by cord 12, is inserted in the receptacle and rotated to cause pins 32 to engage the bayonet slots 30. The parts are then in the positions shown in Fig. 2, wherein tip 22 has made contact with button 52 and shank 18 has raised ring 46 out of contact with shoulder 47. Upon the closing of the circuit by means of control apparatus in the plane, not shown, current will flow through conductor 48, spring 50, button contact 52, tip 22 and cord 12 to a fuze or other initiating device, returning through cord 12, shank 18, ring 46, spring 43, and conductor 42 back to the control apparatus.

If now the locking apparatus 30, 32 fails to hold the male member in place, due to vibration or other cause, the spring 50 will force the plug outwardly of the receptacle until the ring 46 seats upon and makes contact with the shoulder 47 of the body 18, and if said body is grounded by being connected to the airplane body a ground circuit will result which can be detected and indicated by any suitable type of instrumentation in the cockpit, so that the situation may be corrected.

In the form of the invention shown in Figs. 3 and 4, the stationary receptacle has a cup-shaped metallic body 60 formed with flanges 61 and secured to a mounting surface 62 of the airplane by bolts 64. Said body is formed with a reentrant plug comprising a sleeve 66 formed integral with the body 60, a bolt 67 having a contact tip 68, and an insulating bushing 70 therebetween. A contact wire 72 supplies current to the tip 68, being secured thereto by an annular nut 71 and insulated from the body 60 by shouldered insulating washers 74.

A ground jumper strip 76 may be secured to the body by a bolt 78, which also retains the terminal of a wire 80 for ground return in case added grounding is required. The strip 76 extends downwardly and around flange 61, being held in contact with surface 62 by the bolt 64.

The body 60 of the receptacle is provided with pins 82 which engage in bayonet slots 83 on the movable member now to be described. Said movable member comprises a hollow cylindrical body 84 having threaded therein a closure member 86 having flanges 87 for rotating the assembly to cause the pins 82 to seat in slots 83. Conductors 88, 89 pass through member 86, being embedded in insulation 90 and extending through a cord 92 to the rocket, not shown. A live rubber pad 94, at the upper end of the cavity in body 60, is compressed by and frictionally engages the upper end of body 84 when the movable member is secured as indicated.

A cup-shaped insulating member 96 is fixedly mounted within body 84, its upper end being closed by a metal retaining ring 98. A coil spring 100, formed by an extension of conductor 89, has its upper end formed to

3

seat against and be compressed by ring 98 and also to engage the contact tip 68 when the movable member is in place as indicated in Fig. 4. A contact ring 102 is normally held in contact with the upper end of body 84 by a coil spring 104 formed as a continuation of conductor 88, but is moved downwardly by sleeve 66 when the movable member is moved into its connecting position.

With the parts in the positions shown in Fig. 4, current entering through wire 72 will pass through tip 68, spring 100 and lead 89 to the fuze, not shown, and thence through conductor 88, spring 104, ring 102 and sleeve 66 to surface 62, which is grounded by wire 80. But if the movable member should slip out of its socket the spring 100 will move into contact with the ring 98, which will ground the conductor 89 and prevent the passage of current to the fuze.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. An electrical connector for use in an airplane or the like, comprising a receptacle formed with a longitudinal bore and a shoulder in said bore electrically connected to the body of the airplane, a plug movable into and out of said bore and having a tapered conducting shank, a contact ring shaped to receive said shank and movable longitudinally of said bore, resilient conducting means normally retaining said ring in contact

4

with said shoulder but yielding to permit said shank to move said ring out of contact with said shoulder, a conducting tip on said plug insulated from said shank, a contact in said bore in alignment with said tip to be contacted thereby, an electrical circuit leading from the interior of the airplane body to said contact and thence through said tip to a point outside said airplane body, and a second electrical circuit leading from the interior of said airplane body to said resilient conducting means and thence through said ring and said shank to a point outside said airplane body.

2. An electrical connector for use in a vehicle, comprising a receptacle formed with a bore and a shoulder in said bore electrically connected to the body of the vehicle, a plug movable into and out of said bore and having a tapered conducting shank, a contact ring constructed and arranged to receive said shank and movable thereby longitudinally of said bore, resilient conducting means normally retaining said ring in contact with said shoulder but yielding to permit said shank to move said ring out of contact with said shoulder, and an electrical circuit leading from the interior of the vehicle body through said resilient conducting means and said ring and said shank to a point outside the vehicle body.

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