Aug. 15, 1967 L. L. McCORMICK ETAL 3,336,562

LOW SEPARATION FORCE ELECTRICAL CONNECTOR

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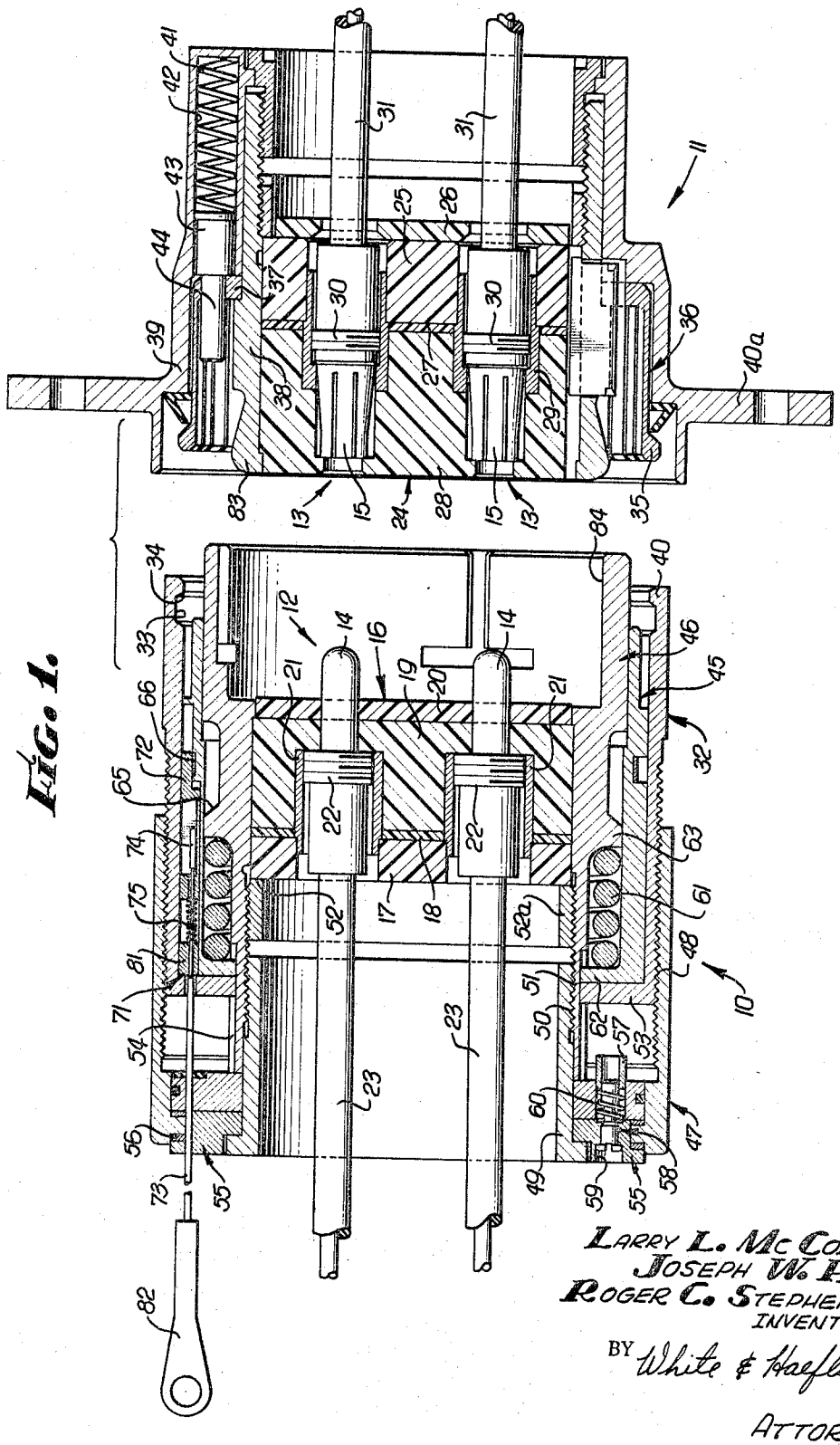


FIG. 1.

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LOW SEPARATION FORCE ELECTRICAL CONNECTOR

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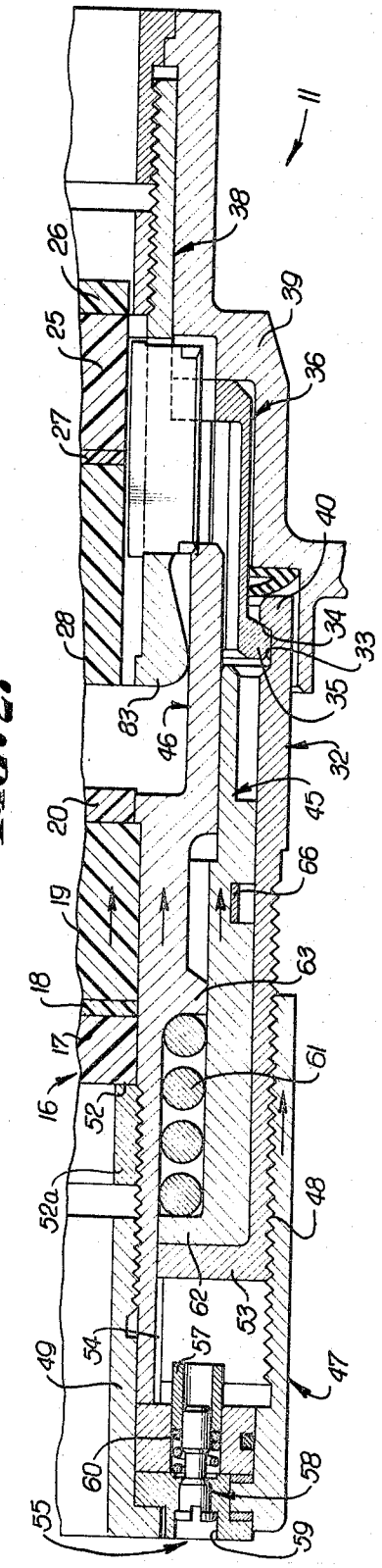


FIG. 2.

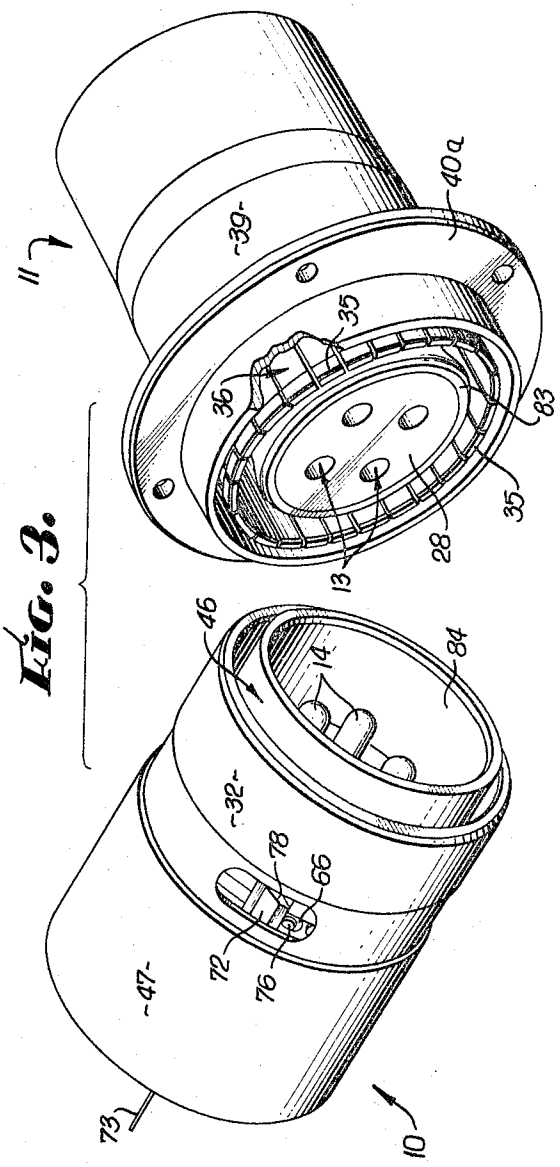


FIG. 3.

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LOW SEPARATION FORCE ELECTRICAL CONNECTOR

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FIG. 4.

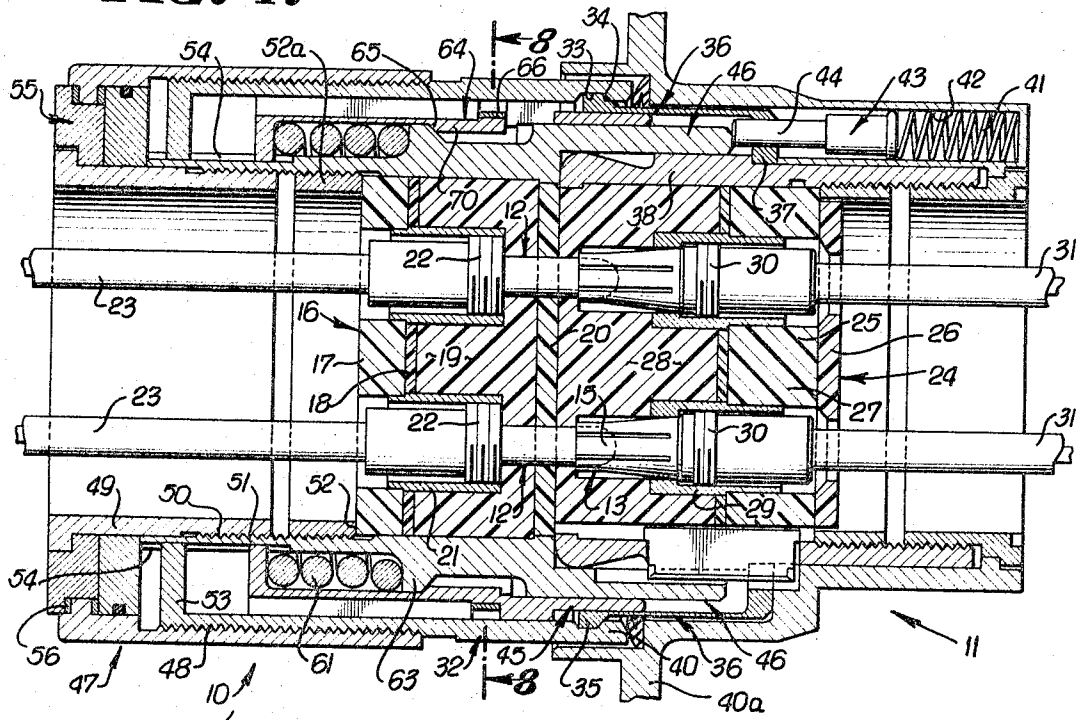
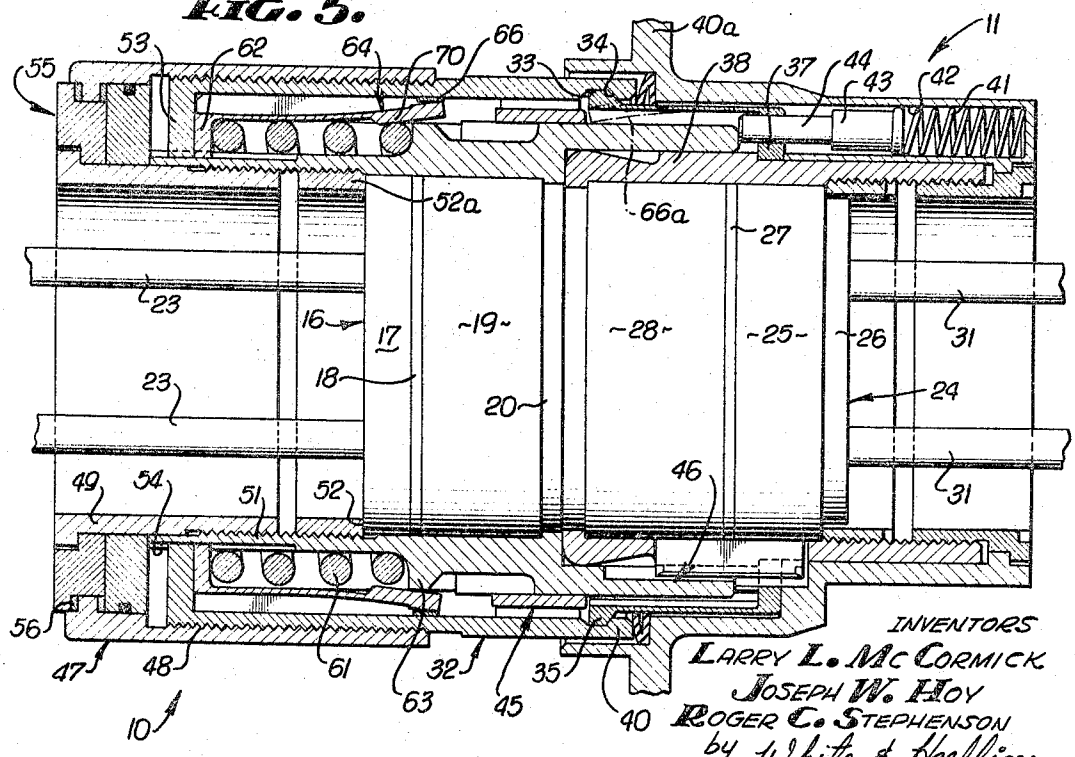


FIG. 5.



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FIG. 6.

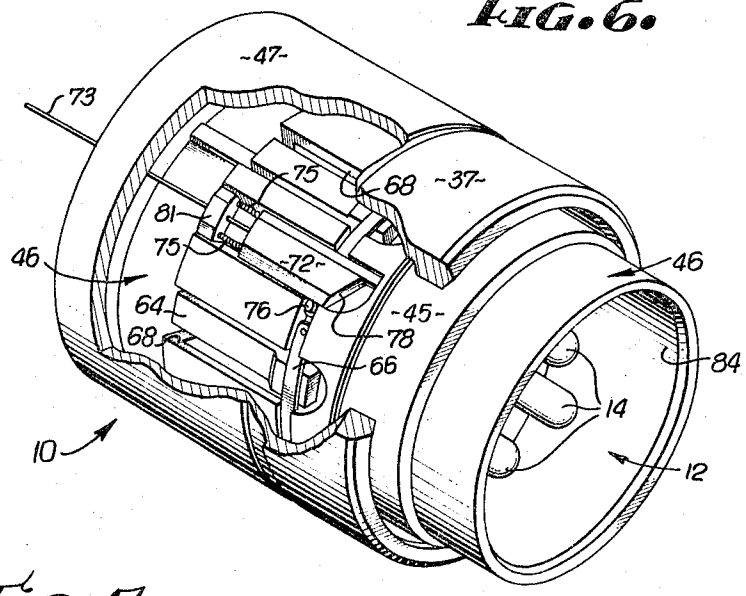
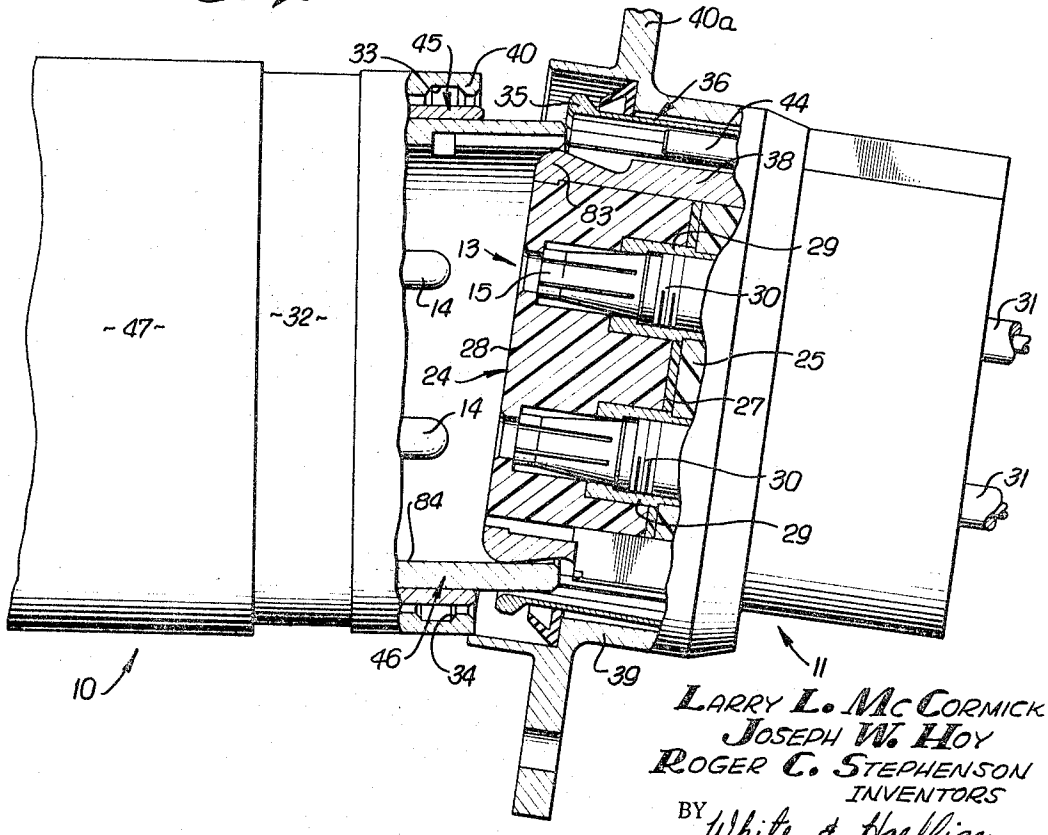


FIG. 7.



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FIG. 8.

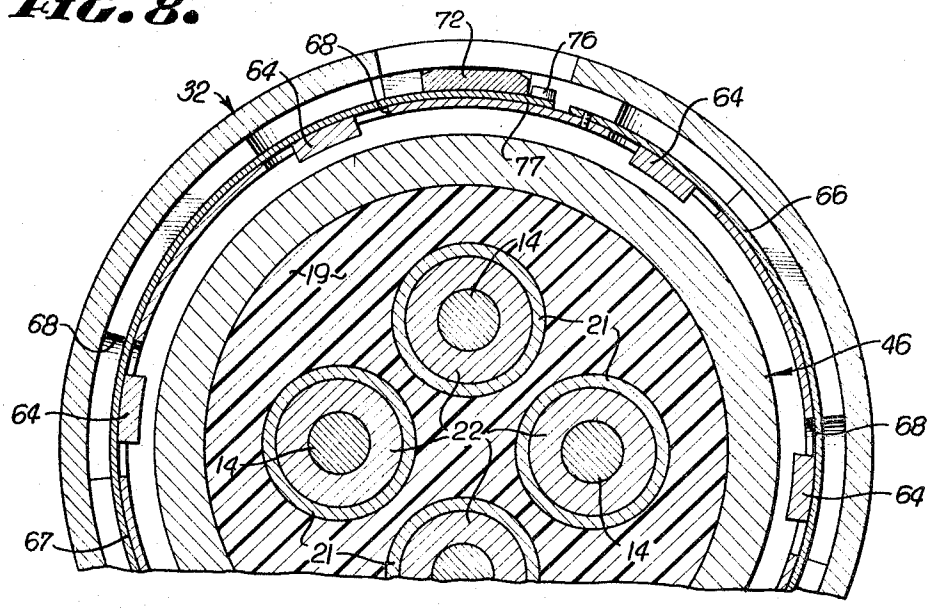
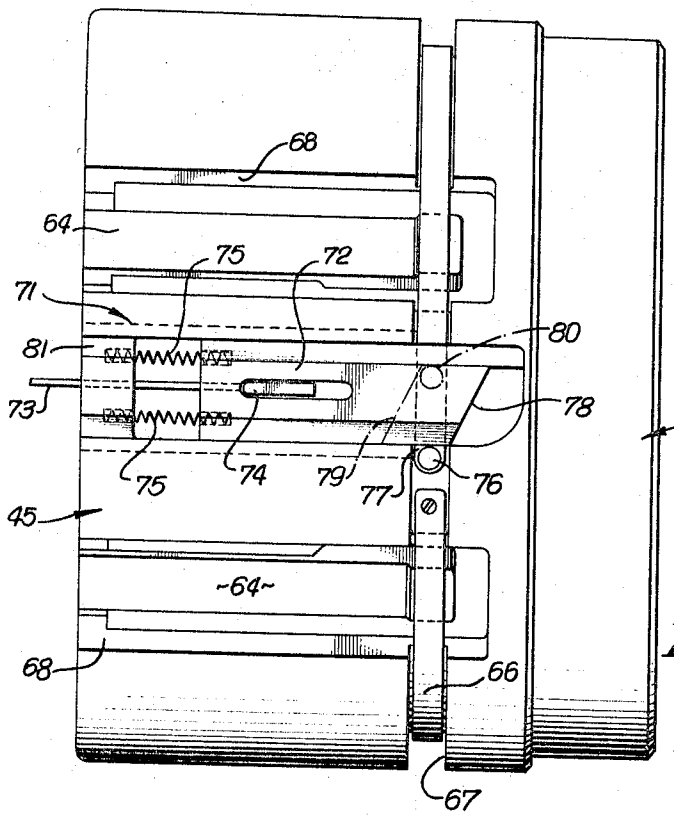


FIG. 9.



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3,336,562

LOW SEPARATION FORCE ELECTRICAL CONNECTOR

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Filed July 27, 1964, Ser. No. 385,108
13 Claims. (Cl. 339—45)

ABSTRACT OF THE DISCLOSURE

The present invention relates to umbilical electrical connectors which are separable with a minimum amount of externally applied force. The inventor includes a quick release mechanism containing a spring for separating the connectors and a double latching arrangement for restraining the spring. The initial latch includes an annular array of detent fingers encompassed by an encircling band. Releasing the band simultaneously releases all of the fingers and allows the secondary latch to release the spring and separate the connector. In addition the invention includes means for guiding the connectors during the mating and separating thereof so as to eliminate possible binding. The guide means includes a rounded end surface and a clearance recess whereby the connectors will not bind or jamb even though they are out of alignment during mating and/or separating.

This invention relates generally to umbilical type electrical connectors, and more particularly concerns improvements in the release of such connectors whereby multiple frictionally interengaged electrical terminals may be suddenly separated in response to application of very low separation initiating force.

Apparatus with which the invention is concerned generally includes plug and receptacle assemblies having multiple electrical terminals adapted to interfit when the assemblies are in fully axially interengaged position. Serious problems have existed in the past as respects how to obtain sudden release of the assembly terminals without exerting considerable external force, the latter tending in certain system applications to load the system undesirably. Also, jamming or cocking of the terminal carriers in the plug and receptacle assemblies and during separation movement of the terminals presents serious problems leading to malfunctioning of the system through failure of the terminals to separate.

It is a major object of the present invention to provide a novel and unusual solution to the above problems as well as others associated with the deficiencies of prior umbilical type electrical connectors. Considered in its broader aspects, the plug and receptacle assemblies of the present invention have what may be called a partially interconnected position in which the assemblies releasably hold one another against relative separation in response to the exertion of separation force below a predetermined level. Also, the assemblies include means to block their separation in said position, to bring their terminals into full interengagement and to create axial loading operable when released to suddenly axially separate the assemblies disengaging the terminals, the assemblies including other means for effecting the loading release when desired. More specifically, yieldable means carried by one of the assemblies provides axial loading when deflected, and actuator means is carried by the other assembly for movement first to block relative separation of the assemblies from partially interconnected position, and thereafter to effect completion of the loading deflection of the yieldable means.

It is another object of the invention to provide a novel structural combination, the "chain reaction" mode of operation of which offers certain novel and unusual advantages and results including the release of a relatively high separation force in response to the exertion of a relatively very low release force. As will be brought out in greater detail, the above mentioned actuator may take the form of multiple parts one of which is movable relative to another to unblock the release of primary latching shoulders holding plug and receptacle body members in partially interconnected position, and while another of the actuator parts transmits separation spring loading in order to effect the desired separation. Also, the actuator structure may itself include secondary latching mechanism for holding the actuator parts against relative movement, and an actuator spring for effecting relative movement of the actuator parts when the secondary latching mechanism is released, in order to assure unblocking of the primary latching shoulders while the primary separation spring is still exerting force sufficient to separate the plug and receptacle assemblies including the electrical terminals. In this regard, the secondary latching mechanism is typically held against such release as initiates release of the primary latching shoulders, by a metallic band extending about a cantilever finger on one actuator part, so as to retain the finger against flexing and disengagement from another actuator part. The band is suddenly expansible in response to slight force application thereto, thereby to release said finger and release the chain of events culminating in assured separation of the plug and receptacle assemblies and terminals.

These and other objects and advantages of the invention, as well as the details of an illustrative embodiment, will be more fully understood from the following detailed description of the drawings, in which:

FIGURE 1 is a side elevation taken in section showing the plug and receptacle assemblies prior to interconnection;

FIGURE 2 is a fragmentary side elevation taken in section showing the plug and receptacle assemblies in partially interconnected position;

FIGURE 3 is a perspective view of the terminal ends of the plug and receptacle assemblies;

FIGURE 4 is a side elevation taken in section showing the plug and receptacle assemblies in fully interconnected position;

FIGURE 5 is a view like FIGURE 4, but showing the assemblies at a time during the "chain release" of the assembly elements;

FIGURE 6 is a perspective view of the plug assembly partially broken away to show the interior construction thereof;

FIGURE 7 is a side elevation showing the plug and receptacle assemblies as they near physical separation, and broken away to show the structure giving the assemblies ability to misalign without jamming, during separation;

FIGURE 8 is a section taken on line 8—8 of FIGURE 4; and

FIGURE 9 is a side elevation of actuator structure showing the means for releasing the secondary latching mechanism.

Referring first to FIG. 1, the coaxial plug and receptacle assemblies are respectively shown at **10** and **11** with electrical terminals **12** carried by the plug and terminals **13** carried by the receptacle. The terminals **12** include pins projecting at **14** toward the receptac'e terminals **13** into which they are received, as better seen in FIG. 4, when the assemblies and terminals are brought into full interengagement as by frictional penetration of the pins **14** into the split sockets **15**, spreading the latter. Additional structure associated with the plug terminals **12** includes the insert **16** made up on non-conductive back-up plate **17**,

seal 18, and body and seal members 19 and 20. The insert carries the nuts 21 into which the contact pins are threaded at 22, the conductors from the pins extending at 23 as shown. In similar manner, the receptacle assembly includes an insert structure 24 carrying the contact sockets 15, and including back-up plate 25, seals 26 and 27, and plate 28. The insert 24, like the insert 16, is insulative, and carries the nuts 29 into which the sockets 15 are threaded at 30, conductors extending at 31 and from the end of the receptacle assembly opposite the sockets 15.

Extending the description to FIG. 2, the latter shows the assemblies 10 and 11 in partially interconnected position in which the assemblies releasably hold one another against relative separation in response to the exertion of separation force below a predetermined level. As illustrated, the plug assembly 10 includes a tubular body or engaging screw 32 internally grooved at 33 to form a primary latching shoulder 34. The latter is annular and releasably engaged by a series of circularly spaced latch fingers 35 projecting generally axially on the collet 36. As seen in FIG. 1, the end portion 37 of the collet is retained in position by the receptacle body members 38 and 39 which are integral with one another. As is also clear from FIG. 1, the receptacle body member 39 is flanged at 40*a* for suitable connection to a mounting structure not shown. It will, therefore, be understood that the retaining shoulder 34 and the latch fingers 35 comprise one form of primary latching mechanism holding the plug body member 32 against relative separation from the receptacle body members 38 and 39 in response to the exertion of primary separation force below a predetermined level. Conversely, the plug and socket assemblies 10 and 11 may be brought into their partially interconnected position as shown in FIG. 2 by pushing them axially together whereby the fingers 35 will deflect inwardly over the inwardly flanged forward portion 40 of the body member 32, the fingers thereafter snapping outwardly to engage the shoulder 34, as seen in FIG. 2. At this time, the electrical terminals 12 carried by the plug are not in complete engagement with the electrical terminals 13 carried by the receptacle assembly.

Further, in accordance with the invention, the assemblies 10 and 11 include means to block their relative separation (as by disengagement of the fingers 35 from the shoulder 34), to bring the terminals 12 and 13 into full interengagement, and to create axial loading operable when released to suddenly axially separate the assemblies and disengage the terminals 12 and 13. One form of such means is shown in the drawings to include what may be characterized as blocking and pushing actuator structure movable telescopically to advance relative to the body members 32, 39 and 38, blocking inward flexure of the collet fingers 35 and transmitting pushing force effecting deflection of springs or yieldable means 41 seen in FIG. 1. The latter are carried within bores 42 of the receptacle assembly and spaced about the axis thereof to be compressed axially in response to forward displacement of the plungers 43 projecting leftwardly at 44 between the inner and outer body members 38 and 39, and inwardly of the fingers 35. Before proceeding further, it may be stated that the function of the springs 41 is to store released loading energy which, upon release, is operable to suddenly separate the assemblies 10 and 11 and the terminals 12 and 13.

More particularly, the above referred to actuator structure may take the form of multiple parts one of which, such as release sleeve 45, is movable relative to another part, such as pilot sleeve 46. One function of the part 45 is to block release or inward flexure of the collet fingers 35 prior to deflection of the springs 41 in response to forward advancement of the pilot sleeve 46 against the members 44. Thus, FIG. 4 shows the release sleeve 45 projecting axially within the space between the collet fingers and the pilot sleeve 46, the latter pushing against the members 44 to compress the springs 41. It will be understood in this regard that the actuator parts 45 and 46 advance together and rightwardly into the position shown in FIG. 4 to complete the intercoupling of the plug and receptacle assemblies and the electrical terminals 12 and 13. Such forward advancement relative to the plug body 32 is brought about by rotation of a third actuator part such as the engaging nut 47 threaded at 48 on the body 32 to advance rightwardly when turned clockwise. The nut carries an inner sleeve portion 49 which has threaded connection at 50 to a rearward extension 51 of the part 46, whereby the nut 47, and the actuator parts 45 and 46 advance together relative to the body 32. At the same time, the insert structure 16 associated with the plug and carrying the terminals 12 advance with the actuator parts since the insert is retained at 52 by the nut sleeve 52*a*. Referring back to FIG. 2, the body 32 relative to which the actuator parts move axially is turned inwardly at 53 for reception in a spline 54 holding the body and the actuator member 46 against relative rotation, while allowing relative axial movement. When the actuator parts referred to above have advanced to the right to fully intercouple the plug and receptacle assemblies, the inturned portion of the body 32 (or engaging screw) is in the position shown in FIG. 4, i.e., spaced closely forwardly of the thrust bearing assembly 55. The latter does not rotate with the nut 47 (although it moves axially therewith) in view of its connection to the sleeve 49, and the part 46, having spline connection at 54 to the non-rotating body 32; however, a suitable bearing is provided at 56 to allow rotation of the nut 47. The structure 55 houses an indicator, better seen in FIG. 2, to include a plunger 57 engageable by the inturned portion 53 of the body to push the indicator screw 58 rearwardly in the observable bore 59 when the elements are as seen in FIG. 4. A spring 60 opposes such rearward deflection of the indicator and repositions it as seen in FIG. 2 when the plug and receptacle assemblies are separated from complete intercoupling.

The actuator structure also includes what may be referred to as secondary latching mechanism for holding the parts 45 and 46 against relative axial movement until such time as separation release of the plug and receptacle assemblies is desired. In addition, the actuator structure includes a spring for effecting the relative movement of the parts 45 and 46 when the secondary latching mechanism is released, the spring 61 serving this function in the embodiment shown. As illustrated, the spring 61 is axially compressed in FIG. 4 between the inturned portions 62 of the part 45 and the outwardly turned flange 63 of the actuator part 46. The spring is shown in released condition in FIG. 5.

The secondary latching mechanism typically includes generally axially extending cantilever fingers 64 on the part 45 and a holding shoulder 65 on the flange 63 of the part 46, the inturned portions of the fingers 64 being retained in engagement with the annular shoulder 65 and against outward flexure in a direction tending to release the secondary latching mechanisms, such outward flexure being better seen in FIGURE 5. Accordingly, in the views 1, 2, 3, 4 and 6, the secondary latching mechanism is not released, whereas in FIG. 5 it has just been released to allow the spring 61 to retract the actuator part 45 from blocking engagement with the primary latching fingers 35. The latter are then deflectable inwardly to the broken line position seen at 66*a*, allowing loading energy stored in the ejection springs 41 to be released for separating the plug and receptacle assemblies.

Outward flexure of the secondary latching fingers 64 to the positions shown in FIG. 5 is prevented until such time as general release of the plug and receptacle assemblies is desired, by what may be characterized as other means for effecting said release. Said other means typically includes a metallic band shown at 66 in FIG. 4 as extending in a hoop-like path about the common axis of the packaged assembly, and in confining relation to the

secondary latching fingers 64. Such confinement holds the inwardly turned ends of the latching fingers in engagement with the annular shoulder 65 on the flange 63 of the part 46. Reference to FIG. 9 will show the band 66 as retained within a groove 67 in the actuator part 45, the latter containing multiple splits 68 within which extend the secondary latching fingers 64. In particular, the fingers extend rightwardly in the splits 68 from the left end base portion 69 of the part 45, allowing the latch fingers to flex outwardly when their inturned end portions 70 ride over the flange 63 in response to expansion of the spring 61 subsequent to expansion of the band 66. The latter is held against hoop-like expansion by the lanyard pull responsive release generally indicated at 71, FIG. 9, and including a spring-urged element in the form of a slide carrier 72 blocking expansion of the band. Thus, the carrier 72 is movable axially leftwardly by the lanyard 73 to which it is connected at 74, and against the compression springs 75, thereby to unblock a lug 76 carried by the band portion 77. When the face 78 of the carrier has moved to the position shown at 79 in broken lines, the lug 76 may travel to the position shown at 80 in broken lines, under which conditions the band becomes expanded as desired. The lanyard 73 extends to the left as shown in FIG. 1 through the base 81 of the release, the inturned portions 62 of the body 32, and through the structure 55 which does not rotate with the outer portion of the nut 47. Accordingly, the lanyard handle 82 may be pulled to the left when general release is desired, for effecting same.

During separation of the plug and receptacle assemblies in response to ejection expansion of the springs 41, the assemblies are capable of separating without jamming due to misalignment, such capability being made possible by reducing a portion of the diameter of the inner assembly, which telescopically interfits in piloting relation when brought together with the other assembly to the position shown in FIG. 2. For example, the receptacle assembly 11 has a rounded nose portion 83 on the body element 38, the rounded nose fitting into the bore 84 of the actuator part 46 of the plug assembly. Upon release, the assemblies may become misaligned, as seen in FIG. 7, but without such misalignment preventing separation of the assemblies, in view of the rocking ability of the receptacle relation to the plug, made possible by the rounded nose taper at the portion 83.

As may be seen from FIGURE 3, the mating portions of the plug and receptacle are circular cylinders. However, it is to be understood that the terms "cylinder" and "cylindrical" are used herein in their broad sense and refer generically to the class of surfaces generated by a straight line moving parallel to another line and following a curve.

Summarizing the connection and disconnection of the plug and receptacle assemblies, to prepare the plug 10 for engagement, the actuator part or nut 47 is turned counterclockwise in FIG. 1 causing the spring 61 to become compressed and bringing the secondary latching fingers into the position for holding engagement with the shoulder 65, as seen in FIG. 4. At this point, as seen in FIGS. 3, 6 and 9, the band 66 may be tightened about the secondary latching fingers 64 by adjustment of the lanyard release structure 71, and to the condition shown in FIG. 9. By this adjustment, spring 75 drives carrier 72 forward, camming lug 76 from broken line position 80 to full line position 76, and blocking return of the band 66, thus locking fingers 64.

The plug assembly 10 may then be aligned with and started into the receptacle assembly 11 until the assemblies are brought into the condition shown in FIG. 2, i.e., the partial interconnected position in which the assemblies releasably hold one another against relative separation in response to the exertion of separation force below a predetermined level. The actuator nut 47 is then turned clockwise to complete the full interengagement of

the plug and receptacle assemblies, as seen in FIG. 4. The ejection springs 41 are then compressed by the plungers 43 in response to the advancement of the actuator part 46. Also, the primary latching fingers 36 have been blocked against inward flexure by the actuator part 45.

When the lanyard handle 82 is pulled, the holding band 66 may then expand due to outward force exerted by the secondary latching fingers 64. The latter then ride over the flange 63 in response to expansion of the spring 61, whereby the actuator part 45 is suddenly retracted to unblock the primary latching fingers 36. The loading of the ejection springs 41 is then sufficient when exerted against the actuator part 46, to overcome the interengagement of the latching fingers 35 with the shoulder 34, and the assemblies suddenly separate.

We claim:

1. In a device of the class described the combination of a first member, a second member adapted to mate with the first member, a passage extending axially into one of said members and having a substantially cylindrical surface, a barrel on the other of said members having a substantially cylindrical surface adapted to fit into the passage when said members are mated, said barrel having an outside diameter slightly less than the inside diameter of the passage to provide a small clearance space between the cylindrical surfaces whereby the barrel is freely slidable within said passage only as long as the axis of the barrel is within a predetermined range of alignment with the axis of the passage, a guide on the first member including a rounded surface and a clearance recess, said rounded surface being disposed adjacent the end of said first member and having a diameter substantially the same as the cylindrical surface on the first member, said rounded surface being adapted to slidably engage the cylindrical surface on the second member when the barrel is initially moving into the passage or is finally moving out of said passage whereby said rounded surface guides said barrel during such initial or final movement, said clearance recess being disposed between the rounded surface and the cylindrical surface on said first member to form a clearance space for the end of the second member as the end of the barrel moves into and out of the passage oblique to the axis thereof, the axial length of said recess being sufficiently long whereby the barrel is always aligned within said predetermined range of said passage whenever the end of the second member has passed beyond the recess and engaged the cylindrical surface on the first member.

2. In a device of the class described the combination of a first member having a passage with a cylindrical surface extending axially inwardly from one end thereof, a second member having a barrel with a cylindrical surface adapted to slidably fit into said cylindrical passage whereby said barrel is free to move into and out of said passage, a guide on one of said members adjacent the end thereof, said guide forming a rounded surface adapted to slidably engage the cylindrical surface on the other of said members when the barrel is moving into and out of said passage, and a recessed clearance on said member disposed between said rounded surface and the cylindrical surface on said member, said clearance forming a space through which the end of said other member may pass as the barrel enters and leaves the passage until the axis of the barrel is substantially aligned with the axis of the passage.

3. In a device of the class described the combination of a first member having a cylindrical passage extending axially inwardly from one end thereof, a second member having a barrel with a cylindrical exterior surface adapted to slidably engage the cylindrical surface of said passage whereby said barrel is free to move into and out of said passage, a guide on the end of said barrel, said guide including a toroidal surface effective to slidably engage the cylindrical passage as the barrel moves into and out of the passage even though the barrel may

be oblique to the passage, and an annular recess in said barrel disposed between the toroidal surface and the cylindrical surface, said recess forming a clearance space for the end of the first member as the barrel moves into and out of the passage oblique to the axis of the passage.

4. In an electrical connector of the class described the combination of a receptacle member having a passage with a cylindrical inner surface extending axially inwardly from one end thereof, a plug member having a cylindrical outer surface effective to slide within said passage when said members are mated, a first set of electrical contacts on the receptacle member, a second set of electrical contacts on said plug member adapted to electrically engage the contacts in the first set only when the plug and receptacle members are substantially fully mated, a rounded guide surface on one of said members adapted to slidably engage the cylindrical surface on the other of said members as the plug member moves into and out of said passage, and a clearance recess on said one member between the guide surface and the cylindrical surface, said recess being positioned to provide a clearance space for the end of the plug member as it enters and leaves the passage oblique to the axis thereof.

5. In an electrical connector of the class described the combination of a receptacle member having a passage with a cylindrical inner surface extending axially inwardly from one end thereof, a plug member having a cylindrical outer surface effective to slide within said passage only when the axis of said plug member is aligned within a predetermined range of the axis of said passage, a first set of electrical contacts on the receptacle member, a second set of electrical contacts on said plug member adapted to electrically engage the contacts in the first set only when the plug and receptacle members are substantially fully mated, an annular toroidal guide surface on the end of one of said members adapted to engage the cylindrical surface on the other of said members when said plug member is partially in said passage, said guide surface being effective to slide on the cylindrical surface of the other member even though the axis of the plug member is mis-aligned with the receptable member beyond said range, and an annular recess on said one member between the toroidal guide surface and the cylindrical surface on said recess, said recess being effective to provide a clearance space for the end of the other member when said members are partially mated and oblique to each other, said recess being axially long enough to insure said member being aligned within said range when said cylindrical surfaces are in engagement with each other, said recess being axially short enough to insure said cylindrical surfaces being in engagement before the contacts in said sets engage.

6. The electrical connector of claim 5 wherein the contacts in one set are sockets and the contacts in the other set are pins that fit into said sockets to establish electrical engagement therebetween, said pins and sockets being disposed parallel to the axis of said members and effective to engage and disengage by moving in the axial directions parallel to each other only when the two cylindrical surfaces are in engagement with each other.

7. In an electrical connector of the class described the combination of a receptacle member having a passage with a cylindrical inner surface extending axially inwardly from one end thereof, a plug member adapted to mate with said receptacle member, a cylindrical barrel on said plug member adapted to slidably fit into said cylindrical passage whereby said barrel is free to move within said passage when said barrel is aligned with said passage within a predetermined range, a first set of electrical contacts on the receptacle member, a second set of electrical contacts on said plug member, the contacts of said sets being adapted to electrically engage with each other only when the plug and receptacle members are substantially fully mated, a rounded toroidal guide surface on the end of said barrel adapted to slidably engage the cylindrical surface of said passage as the barrel is moving into and out of said passage, and a recessed clearance on said barrel between the guide surface and the cylindrical surface of said barrel, said clearance forming a space through which the end of the receptacle member may pass as the barrel enters and leaves the passage, said recessed clearance being axially long enough to insure the barrel being axially aligned with the passage when the end of the passage engages the cylindrical passage of the barrel.

8. The electrical connector of claim 7 wherein the contacts in one set are sockets and the contacts in the other set are pins, said pins and sockets being disposed parallel to the axes of said members and effective to engage and disengage by moving in the axial directions paralllel to each other, said pins being disposed inside of said sockets only when the barrel is in engagement with the passage.

9. An electrical connector of the class described including the combination of a plug member, a receptacle member adapted to releasably mate with the plug member sets of electrical contacts on said members adapted to be electrically interconnected when said members are mated, first spring means coupled to said members and effective to force said members to completely separate from each other, first latch means having locked and unlocked positions for respectively retaining said spring means loaded and said members mated and releasing said spring means and said member whereby said first spring means forces said members completely apart from each other, second spring means coupled to the first latch means and effective when released to bias the latch means into the unlocked position, second latch means including a plurality of resilient fingers disposed in a cylindrical array and a band surrounding said fingers and compressing the fingers radially inwardly whereby the first latch means is retained in the locked position, said fingers being effective to expand radially outwardly and release the first latch means, and means for releasing the band whereby said fingers allow the first latch means to move into the unlocked position and release the first spring whereby the members are separated by the first spring means.

10. In an umbilical connector package, coaxial plug and receptacle assemblies having electrical terminals adapted to interfit when the assemblies are in fully axially interengaged position, said assemblies including the combination of

body members carrying primary latching mechanism and having a partially interconnected position in which latching shoulders are releasably interengaged to hold the assemblies against relative separation in response to the exertion of separation force below a predetermined level,

yieldable means deflectable to store release loading energy,

actuator structure moveable relative to said body members first to block release of said latching shoulders and thereafter to effect completion of said deflection and completion of full terminal interengagement, other means for effecting said loading energy release,

multiple parts in said actuator structure, one of said multiple parts being moveable relative to another to unblock the release of said latching shoulders while said other part transmits the loading of said yieldable means to effect said separation,

secondary latching mechanism in said actuator structure for holding said parts against said relative movement and a spring for effecting said parts relative movement when said secondary latching mechanism is released, and

a generally axially extending cantilever finger in said secondary releasably latching mechanism on one of said parts and a holding shoulder on the other of said parts engaged by said finger, said other means retaining said finger in engagement with said holding shoulder and against flexure in a direction tend-

ing to release said secondary latching mechanism, said other means includes a metallic band extending about said axis in confining relation to said finger, the band being expansible to allow said finger to flex outwardly away from said axis.

11. In an umbilical connector package, coaxially extending plug and receptacle assemblies including

electrical terminals adapted to interfit endwise when the assemblies are in fully axially interengaged position, said assemblies including tubular body members carrying primary latching mechanism,

said mechanism including a series of latch fingers spaced about said axis to project generally axially and a retaining shoulder releasably engaged by said latch fingers to hold said members against relative separation in response to the exertion of primary separation force sufficient to disengage said fingers from said shoulder,

one of said assemblies including a series of body mounted primary compression springs spaced about said axis to receive movement transmitted generally axially and deflecting the springs to store release loading energy,

said other assembly including body mounted blocking and pushing actuator structure moveable telescopically to advance relative to said body members blocking flexure of said fingers in disengaging relation with said shoulder and transmitting pushing force effecting said spring deflection,

said other assembly also including body mounted rotary actuator structure rotatable about said axis and relative to said body members to effect said telescopic advancing movement of said blocking and pushing actuator structure, the electrical terminals included in said other assembly being carried by said actuator structure to fully interengage the electrical terminals included in said one assembly in response to said actuator relative movement, and other means for effecting said loading energy release causing retraction of said blocking and pushing actuator structure,

said blocking and pushing actuator structure includes outer and inner tubular parts, the outer part moveable telescopically relative to the inner part to unblock inward flexure of said fingers in disengaging relation with said shoulder while the inner part transmits the loading of said springs to effect said separation,

said other assembly includes secondary latching mechanism having a series of latch fingers carried by

said outer part and spaced about said axis to project generally axially,

a retaining shoulder carried by the inner part and releasably engaged by said latch fingers to hold said parts against relative separation in response to the exertion of secondary separation force sufficient to disengage said fingers from said shoulder,

a spring for exerting said secondary separation force to effect said parts separation when said secondary latching mechanism is released,

said other means includes a metallic band extending in a hoop-like path about said axis in confining relation to said secondary fingers, said band being expansible to allow flexing of said fingers out of engagement with said shoulders in response to the exertion of said secondary separation force, said outer part then being retracted out of blocking relation to said primary latching fingers,

said primary latching fingers then being flexed out of engagement with said primary latching shoulder in response to the exertion of said primary separation force,

said assemblies then being separated in response to expansion of said primary compression springs.

12. The combination of claim **11** including a lanyard pull responsive release for holding said band against expansion until the exertion of sufficient lanyard pull against said release.

13. The combination of claim **12** in which said pull responsive release includes a spring urged element blocking expansion of said band, the element being movable in response to lanyard pull to unblock expansion of said band.

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