

[54] **ELECTRICAL CONNECTOR WITH AUTOMATIC THREAD LOCKING MECHANISM**

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[51] Int. Cl. .... **H01r 13/54**

[58] Field of Search ..... **339/89, 90, 91, 93, DIG. 2; 285/81, 82**

[56] **References Cited**

**UNITED STATES PATENTS**

3,351,886	11/1967	Zimmerman, Jr. ....	339/90 R
3,601,764	8/1971	Cameron .....	339/89 M

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[57] **ABSTRACT**

The electrical connector herein described includes a pair of separable connector halves or components equipped with interengaging contacts when the components are mated together. The mating is achieved by manually twisting in a clockwise direction a rotatable drive ring that encircles a coupling nut. The coupling nut has threaded engagement with one of the connector components and rotative sliding engagement with the other components together. Resiliently biased wedge blocks or pawls normally act to prevent inadvertent loosening of the nut, such as that caused by vibration, which loosening would permit the connector components to become unintentionally separated. However, intentional uncoupling of the component can be accomplished by rotating the drive ring in a counterclockwise direction, such reverse rotation causing shoe elements integrally carried on the drive ring to act against the wedge blocks so as to shift them and render them ineffectual when the connector components are to be deliberately unmated or separated.

**12 Claims, 9 Drawing Figures**

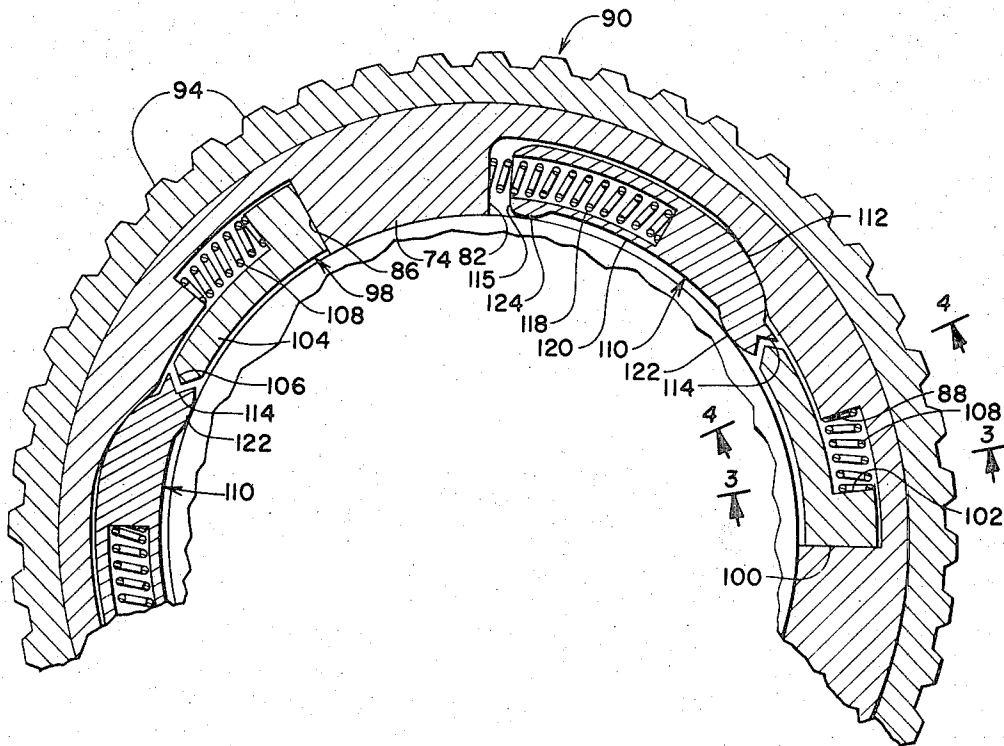




Fig. 3

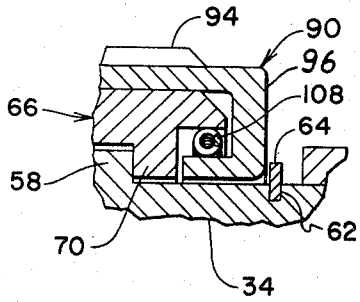


Fig. 4

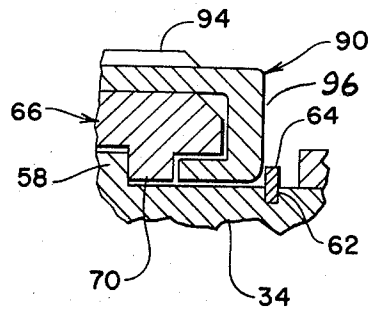


Fig. 7

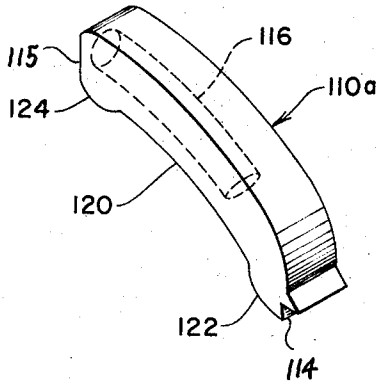


Fig. 8

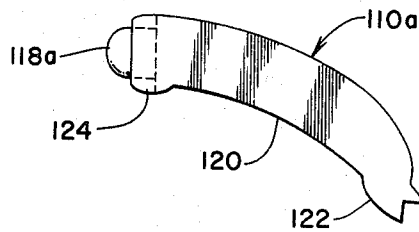
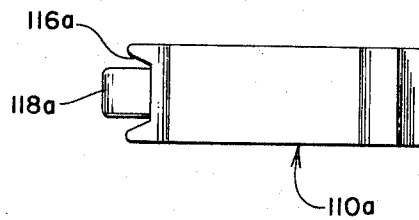


Fig. 9



SHEET 3 OF 3

Fig. 5

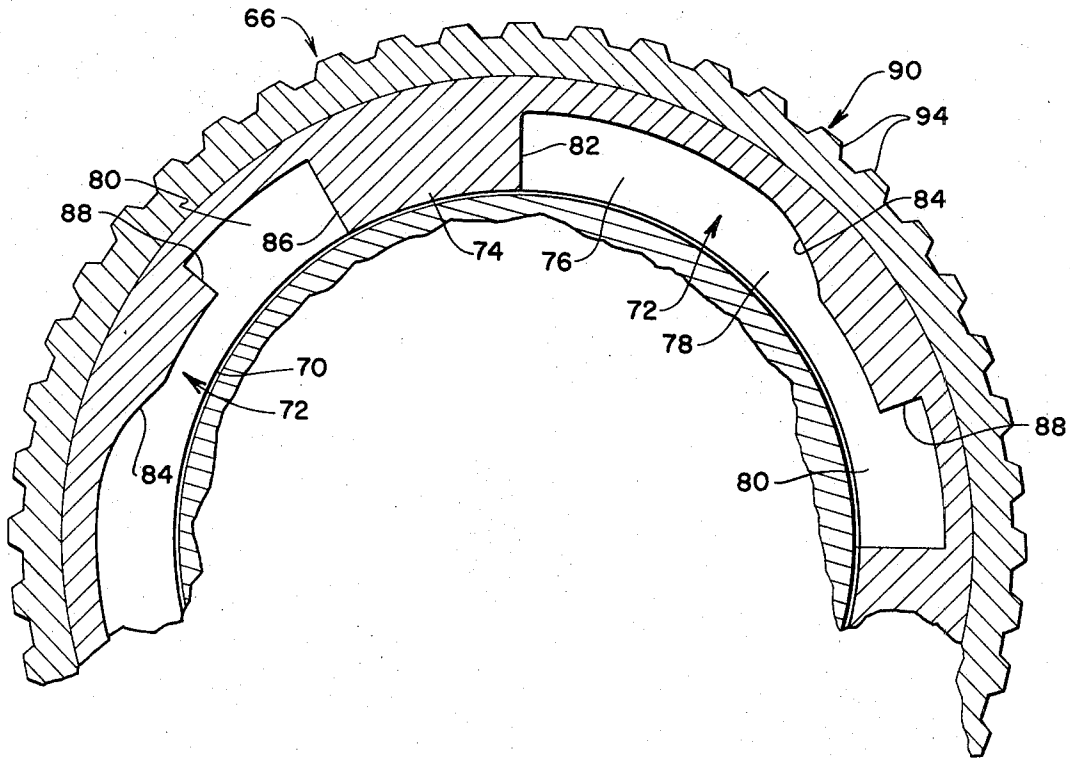
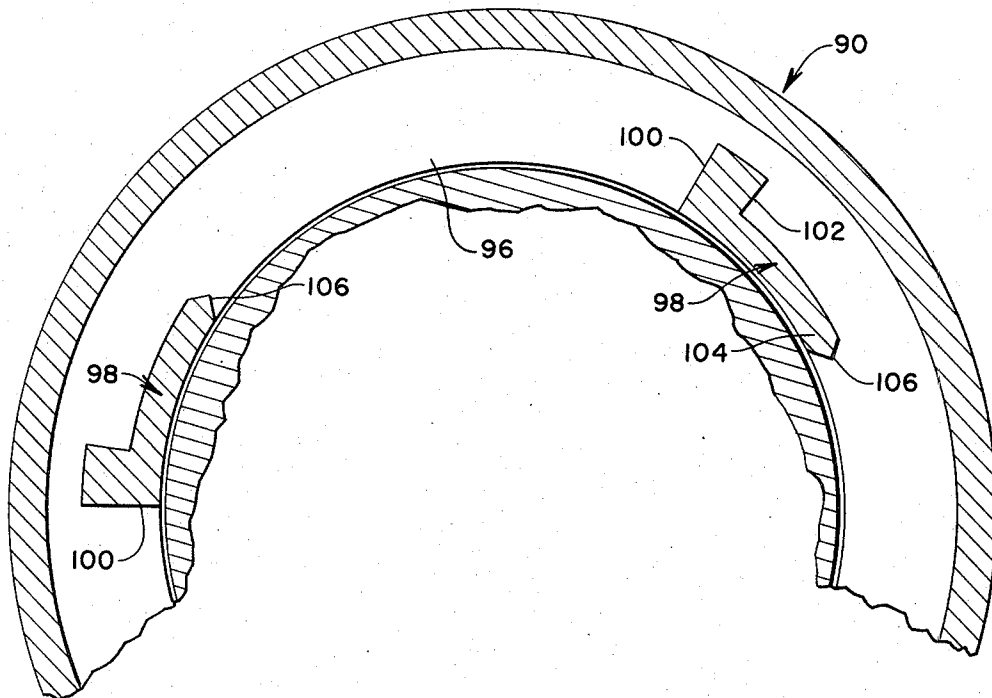


Fig. 6



# ELECTRICAL CONNECTOR WITH AUTOMATIC THREAD LOCKING MECHANISM

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

This invention relates generally to connectors composed of two separable halves or components, and pertains more particularly to an electrical connector in which inadvertent uncoupling or separation of the components is prevented.

### 2. Description of the Prior Art

Various detent mechanisms have been utilized in the past for preventing connectors from becoming accidentally uncoupled. Inasmuch as the purpose of such connectors is to minimize the chances of them becoming inadvertently uncoupled, they perform admirably well in this respect. However, inasmuch as they do resist uncoupling, the resistance must be overcome when the connector is to be deliberately uncoupled. Consequently, the amount of torque that must be manually applied is more than the designer would like to have. In other words, the detent-type of connector is relatively easy to couple, yet relatively difficult to uncouple. Owing to the assurance that the connector will remain coupled, such a shortcoming has been tolerated, particularly where circuit continuity through the connector must be maintained. Also, most detent types have no provision for a detent position to occur at any predetermined torque value. Still further, the detent action is usually initiated well before a complete "lock-up" is effected, thus increasing the likelihood of the connector components being only loosely coupled; this condition is very undesirable in electrical connectors, for it permits wear and early mechanical failure to occur in vibration-prone environments.

Other efforts have centered around the use of wedge elements. However, the effort involved is increased, usually during the coupling operation. Of course, the wedging action that takes place progressively increases as the wedge element is forced more tightly between two converging surfaces. Not only is there more coupling effort required, but the uncoupling effort is also increased due to the tight, tapered fit. One particular situation with which I am acquainted makes use of two mating connector components utilizing a plurality of indentations or holes which move over a plurality of balls as the two components are tightened, it becoming more difficult to move the indentations past the balls with the consequence that a locked condition is established. Here again, more effort is required, both when coupling and uncoupling the connector, than there should be, which is a decided drawback in the achieving of the desired goal.

## SUMMARY OF THE INVENTION

Accordingly, an important object of the present invention is to provide a connector composed of separable parts or components that will remain coupled or mated together until they are intended to be uncoupled. More specifically, an aim of the invention is to provide a connector that will not become inadvertently uncoupled due to vibration.

Another object is to eliminate the need for lock-wiring the connector. In the past, the coupling ring has been mechanically wired to holes in the mounting flange or to holes in one of the connector components. Obviously, the connector must be "unwired" before it

can be uncoupled, which is a nuisance, especially where the connector is installed in cramped quarters.

Another object of the invention is to provide a connector that can be both coupled and uncoupled with a minimum amount of manual effort. In this regard, a certain amount of torque is required in effecting the coupling of any connector utilizing rotative motion and also a certain amount of torque is required in effecting the uncoupling of such a connector, assuming that the uncoupling procedure is the reverse of the coupling procedure and not of the so-called "quick-release" variety. Consequently, an aim of the invention is to provide a mechanism that will not noticeably increase either the manual effort required to couple or noticeably increase the manual effort needed to uncouple the connector.

A further object is to provide a connector that affords adequate resistance to separation, doing so on a stand-by basis. Stated somewhat differently, the capability to resist any loosening, such as from vibration, remains latent until actually needed, and even then acting only to prevent undesired uncoupling while permitting facile desired uncoupling.

Still another object of the invention is to provide a connector composed of parts that are not apt to break readily. While my connector can be incorporated into a connector embodying the rather common bayonet and helical groove type of coupling action, it also can, even more readily, be employed in the threaded type which obviates the load or pressure imposed on the bayonets of the first-mentioned type. Thus, the load or pressure imposed on the connector parts when practicing the teachings of my invention is better distributed by reason of the greater surface provided by the threads. Hence, my invention enables the purchaser of connectors to select a threaded type of coupling without fearing that the connector will become separated when used in adverse environments, such as where high degrees of vibration are encountered.

Another object of the invention is to provide a connector possessing especial utility as an electrical connector, particularly of the pin and socket variety in which any inadvertent uncoupling is resisted even when the connector has not been fully coupled or mated. Thus, if the pin contacts are only partially inserted into the socket contacts, any tendency for the pin contacts to inadvertently retract from such a partially inserted relationship is effectively resisted in the same manner as when the components are fully mated. Consequently, a careless person might not fully couple the connector components together, yet do so to such a degree that the partially engaged contacts establish electrical continuity to instruments, signal systems, and the like, thereby presenting the appearance that everything is in order. Such a careless person would be apt to ignore any indicia that would denote a fully coupled condition. Hence, when utilizing the present invention, reliability in such partially coupled situations is not appreciably sacrificed, the partially mated condition not being able to progress into a fully unmated condition where electrical continuity would be lost. Instead, the partially mated condition can only progress in the direction of a more completely mated condition where vibration is encountered, this being an important safety attribute.

Yet another object of the invention is to provide a connector that is manipulated in the same manner as

other threaded connectors, thereby avoiding having to follow any special precautionary instructions.

Briefly, my invention comprises one electrical connector component that includes a shell threaded at one end thereof. A coupling nut is engaged with the threads on the shell of the first component. The end opposite the threaded portion of the nut, this being toward the rear, is specially configured. More specifically, there is an inwardly directed flange that slidably and rotatively abuts an outwardly directed flange on the shell of the second component that is to be mated with the first. The specially configured end portion of the coupling nut provides several angularly spaced recesses composed of one section or compartment that accommodates therein a wedge block, the interior of the coupling nut being tapered so as to provide a sloping cam surface against which the wedge block can act. There is a drive ring that encircles the coupling nut, the drive ring having a radial flange provided with shoe elements that extend into the second sections or compartments of the angularly spaced recesses. A compression spring, preferably a resilient rubber pad or perhaps a coil spring, biases each wedge block in the direction of the complementally configured sloping cam surface formed on the interior of the coupling nut. Another spring force, preferably a coil spring, acts against the shoes so as to normally bias the shoes in a rotative direction away from the particular wedge block that it will forcibly shift when the drive ring is reversely rotated in a direction to deliberately effect the uncoupling of the connector components.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of my electrical connector when the parts or components thereof are fully coupled together;

FIG. 2 is a sectional view taken in the direction of line 2—2 of FIG. 1;

FIG. 3 is a sectional detail taken in the direction of line 3—3 of FIG. 2;

FIG. 4 is a sectional detail taken in the direction of line 4—4 of FIG. 2;

FIG. 5 is a sectional view taken generally in the direction of line 5—5 of FIG. 1, the view showing the coupling nut devoid of any cooperable parts;

FIG. 6 is a sectional view taken generally in the direction of line 6—6 of FIG. 1, this view showing the drive ring devoid of cooperable parts;

FIG. 7 is a perspective view of one of the wedge blocks utilized when practicing the teachings of my invention, this embodiment employing a coil spring, as shown in FIG. 2;

FIG. 8 is an elevational view of a modified wedge block, this embodiment employing a resilient rubber button appearing at the left end thereof, and

FIG. 9 is a top plan view of the modified wedge block depicted in FIG. 8.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

Illustrating my invention is an electrical connector designated generally by the reference numeral 10 in FIG. 1. As is customary, an electrical connector is composed of two halves or components which have been labeled 12 and 14, respectively. The component 12 shown at the left in FIG. 1 includes a metallic shell 16 provided with a mounting flange 18 having holes 20

therein via which the connector 12 can be attached to an appropriate wall or the like. The shell 16 has an annular internal groove 22 which accommodates therein a resilient O-ring 24. Within the shell 16 is a rubber front insulator 25, a rigid plastic retention disc 26 and a rubber grommet 27 in which are held a number of socket contacts 28, only one of which is shown. The shell 16 has an internal shoulder at 29 which extends into a circumferential groove formed around the grommet 27. For a purpose presently to be explained, there is a longitudinal keyway 30 extending inwardly from the right end of the shell 16. Additionally, it will be observed that external threads 32 are provided throughout the end portion through which the keyway 30 extends.

Describing now the connector component 14, it will be perceived that it likewise includes a rigid shell 34. In this instance, the shell 34 is illustrated with a rubber front insulator 36, a rigid plastic retention disc 38 and a rubber grommet 40 therein, the rubber insulator being formed with a forwardly directed lip or rabbet 44, these members all being fixedly retained in the shell 34. The several members 36, 38 and 40 encompass and hold in place any preferred number of pin contacts 46, the precise number corresponding to the number of socket contacts 28 utilized in the component 12. It will be understood that my invention is also susceptible to use in connectors embodying hard face socket insulators and other types of coated retention mechanisms. Although not important to an understanding of the present invention, the shell 34 is formed with external threads at 48 for the attachment of a protective shroud or sleeve portion of a cable clamp 52. A key 56 extends radially from the shell 34 and is slidably received in the previously mentioned keyway 30. Also, it will be noted that the shell 34 has formed thereon an outwardly directed flange 58 which abuts the right end of the shell 16 when the components 12 and 14 are fully mated, there being a cylindrical surface portion 60 extending rearwardly from the flange 58. At the rear of the cylindrical surface portion 60 is an annular external groove 62 which receives therein a split ring 64 which performs a function presently to be referred to.

A coupling nut denoted in its entirety by the reference numeral 66 has internal threads 68 that engage the external threads 32 on the shell 16. Although shown and described as a one-piece construction, the coupling nut can be a composite construction, depending upon design considerations. At any rate, inset from the right end of the coupling nut 66 is an inwardly directed flange 70 intended to bear in a sliding fashion against the outwardly directed flange 58 so as to pull the shell 34 to the left in FIG. 1 when the coupling nut 66 is advanced helically to the left.

The inseting of the flange 70 from the right end provides space that is divided into several angularly spaced recesses 72, there being lugs or block portions 74 between the recesses 72 that extend into close proximity to the cylindrical surface 60 that has been previously mentioned. Actually, it is the cylindrical surface that forms the inner wall of each recess 72. It will help the ensuing description, it is believed, to consider each recess 72 as composed of three compartments or sections 76, 78 and 80. A radially directed shoulder 82 constitutes the end wall of the compartment 76. The intermediate compartment 78 has an inwardly sloping cam surface identified by the reference numeral 84. The re-

maining compartment, which has been given the reference numeral 80, has a shoulder 86 at the end thereof remote from the intermediate compartment 78. For a purpose soon to be explained, there is still another shoulder formed interiorly of the coupling nut 66, this shoulder being given the reference numeral 88. Thus, it is important to appreciate that each recess 72 has a larger compartment 76, an intermediate compartment 78 that provides the cam surface 84, and an additional compartment 80. The shoulders 82 and 86 that have been mentioned are really the walls of the lugs 74. While the word "compartment" has been used, the void formed could be termed a chamber or groove, being open at the right end of the coupling nut 66 as can be appreciated from FIG. 5.

Playing an important role in deriving the benefits from the present invention is a drive ring denoted generally by the reference numeral 90. The drive ring 90 loosely encircles the coupling nut 66, and as with the coupling nut can be of composite construction, if design considerations so dictate. Initially, the drive ring 90 has a cylindrical or cup-shaped configuration that permits it to be loosely fitted over the coupling nut 66. The rim or lip thereof is swaged as indicated at 92 so as to prevent the drive ring 90 from moving to the right as viewed in FIG. 1. Any number of flutes or ribs 94 can be disposed around the circumference of the drive ring so as to permit a twisting thereof for a purpose soon to be made manifest. As perhaps best understood from the sectional views shown in FIGS. 3 and 4, although reference can also be made to FIG. 6, there is an in-turned radial flange 96 engageable against the right end of the coupling nut 66 as can be discerned from FIG. 1. Thus, the swaged lip 92 prevents the drive ring 90 from moving to the right, and the flange 96 prevents the drive ring 90 from moving to the left. More importantly than preventing axial movement of the drive ring 90 with respect to the coupling nut 66 is the fact that the flange 96 supports angularly spaced shoes 98, the shoes 98 being movable with the drive ring 90 when it is rotated in either a clockwise or counterclockwise direction.

The ends of the shoes 98 labeled 100 abut against the previously mentioned internal shoulders 86 on the coupling nut 66. Hence, when the drive ring 90 is rotated in a clockwise direction, the ends 100 of the several shoes 98 abut against the shoulders 86 so as to forcibly rotate the coupling nut 66 in a clockwise direction, such rotation of the coupling nut 66 causing its axial advancement by reason of the internal threads 66 that are engaged with the external threads 32. The shoes 98 are notched as can be seen by an inspection of FIGS. 2 and 6. Thus, a shoulder is formed at 102 for a purpose soon to be described. This results in a reduced radial thickness 104 throughout the major portion of each shoe 98, the reduced section terminating in a tapered end 106. The convergence of the reduced section will be explained shortly. At this time, however, reference will be made to a coil spring 108 that is interposed between the internal shoulder 88 on the coupling nut 66 and the shoulder 102 on the particular shoe. The several coil springs 108 resiliently bias the shoes 98 in a clockwise direction as viewed in FIG. 2. However, the biasing action provided by the various coil springs 108 can easily be overcome when the drive ring 90 is rotated in a counterclockwise direction.

While the various shoes 98 are disposed within the compartments or chambers labeled 80, the larger compartments 76 have contained therein, there being one for each compartment, a plurality of wedge blocks or pawls 110. One form of wedge block 110 is shown in FIG. 7. Having mentioned the tapered cam surface 84 on the interior of the coupling nut 66, this being in the region of the intermediate compartment 78, it will be perceived that a complementary sloping or tapered cam surface 112 is formed adjacent one end of each of the wedge blocks 110. The end of the wedge block 110 nearer its shoe 98 is notched at 114. Thus, the end of the shoe 98 that is labeled 106 can extend into the notch 114 when the shoes 98 are to kick or shift the various wedge blocks 110 when the drive ring 90 is rotated in a counterclockwise direction.

Extending inwardly from the other end 115 of each wedge block 110 is a bore or passage 116 that contains therein a coil spring 118, the projecting end of the coil spring 118 abutting the shoulder 82 on the interior of the coupling nut 66. In other words, the various coil springs 118 bias their respective wedge blocks 110 in a clockwise direction as far as FIG. 2 is concerned, thereby tending to cause the tapered or cam surface 112 on each wedge block 110 to bear against the complementally configured cam surface 84 formed on the interior of the coupling nut 66. The shoes 98 can very easily overcome the biasing action of the individual coil springs 118 to cause the wedge blocks 110 to be forced in a counterclockwise direction so that the cam surface 112 thereon is moved away from the cam surface 84 on the coupling nut 66. To enable the wedge block 110 to be used for different sizes of connectors 10, that is, different diameters of the portion 66, the section thereof intermediate its ends 114, 115 is arced or concaved upwardly as indicated by the reference numeral 120. In this way, rounded portions 122, 124 are formed and these rounded portions are the only portions that contact or ride on the surface 60.

Although the illustrating of coil springs 118 lends itself nicely to pictorially explaining the biasing of the wedge blocks 110 in a clockwise direction as viewed in FIG. 2, the use of springs 118, especially the forming of the bores 116, is more costly. Therefore, the fabrication costs can be reduced by employing modified wedge blocks 110a, one of which is illustrated in FIGS. 8 and 9. Instead of the coil spring 118, a resilient rubber pad 118a is utilized, the end of the block 110a being slightly notched at 116a (see FIG. 9) to accommodate this resilient element. As with the coil spring 118, the pad 118a compresses to allow dislodgment.

The annular groove 62 formed around the shell 34 of the component 14 has already been alluded to. The purpose of this groove 62 is to receive therein the split ring 64 that projects radially therefrom to a sufficient degree so as to be engaged by the flange 96 on the drive ring 90 when the drive ring is rotated in a counterclockwise direction.

## OPERATION

Having presented the foregoing information, the manner in which my electrical connector 10 operates should be readily understood. Nonetheless, a recapitulation of what has been said, coupled with the procedures to be followed, will enable a better appreciation of the benefits that can be derived from a practicing of my invention. It must be borne in mind, though, that a

principal object of the invention is to prevent separation of the components 12 and 14 when installed in environments where a considerable amount of vibration is encountered.

Assuming now that the component 14 is to be mated or coupled with the component 12, it should be recognized that at this time the coupling nut 66 is completely separated from the shell 16 of the component 12. In other words, the component 14, the coupling nut 66 and the drive ring 90 all constitute a single unit. To effect a mating of the contacts 46, the operator merely aligns the key 56 with the keyway 30, moves the component 14 forward, and then starts to twist the drive ring 90 in a clockwise direction as viewed in FIG. 2.

By rotating the drive ring 90 in a clockwise direction, it will be understood that the several shoes 98, which are integral portions of the drive ring 90, move in unison in a clockwise direction, the ends labeled 100 of the shoes abutting the shoulders 86 of the coupling nut 66. This provides a metal-to-metal contact between the drive ring 90 and the coupling nut 66, the shoes 98 serving as intermediaries that transmit the rotational motion of the drive ring 90 to the coupling nut 66. With the internal threads 68 of the coupling nut 66 engaged with the external threads 32 of the shell 16 of the component 12, the coupling nut 66 is advanced axially along the shell 16 of the component 12, the key 56 simply moving longitudinally in the keyway 30 of the shell 16.

During this rotative step, the wedge blocks 110 are moved circumferentially around the cylindrical surface 60 of the shell 34 of the component 14. It will be recognized from FIG. 2 that the coupling nut 66 is being rotated in a clockwise direction, this causing the several shoulders 82 to be rotated clockwise also. Inasmuch as the projecting ends of the coil springs 118 bear against the shoulders 82 of the coupling nut 66, a gentle force is transmitted to the various wedge blocks 110 so as to move them along with the coupling nut 66 as it rotates. Of course, the sloping cam surface 84 on the coupling nut 66 is continually moving in a clockwise direction, always being spaced the same distance from the shoulders 82; the sloping cam surface 84 never under these circumstances interferes with the movement of the several wedge blocks 110.

Consequently, continued rotation of the drive ring 90 in a clockwise direction causes the axial advancement of the coupling nut 66 with respect to the component 12. As the coupling nut 66 is advanced, this being due to the helical configuration of the threads 68 and 32, the inwardly directed flange 70 on the coupling nut 66 rotatively and slidably bears against the outwardly directed flange 58 on the shell 34 of the component 14. In this way, the forward side of the flange 70 acts against the rear side of the flange 58, resulting in an advancing of the shell 34 progressively more into a fully telescoped relation with the shell 16. When a full coupling or mating is effected, then the flange 58 of the shell 34 abuts against the right end of the shell 16, FIG. 1 reflecting this condition. When this occurs, then the coupling nut 66 cannot be further advanced.

When the connector 10 is installed in an environment where a considerable amount of vibration is encountered, it can be expected that the coupling nut 66 will tend to vibrate in a counterclockwise direction. If not restrained or prevented, continued vibration would cause the coupling nut 66 to retract axially and ultimately

the component 14 will become completely separated from the component 12.

However, this cannot happen when utilizing the teachings of my invention, for as soon as any vibration tendency to rotate in a counterclockwise direction results, the cam surface 84 on the interior of the coupling nut 66 simply acts against the cam surface 112 on the wedge block 110, doing so with respect to all three wedge blocks 110. When this happens, the portions 122 and 124 of the various wedge blocks 110 are simply forced inwardly against the cylindrical surface 60. The greater the vibration, the tighter the wedging is. It must be taken into consideration that no rotative effort or torque is being applied to the drive ring 90 at this time. In other words, the connector 10 is unattended and simply performing its function as a connector, and under these circumstances the unmating of the components 12 and 14 simply cannot be tolerated.

The situation is quite different, though, when a deliberate uncoupling of the component 14 from the component 12 is desired. In this situation, the drive ring 90 is rotated counterclockwise as viewed in FIG. 2. Should vibration have occurred so as to cam the wedge blocks 110 against the cylindrical surface 60, then the rotation of the drive ring 90 immediately moves the various shoes 98 in a counterclockwise direction so as to cause the tapered ends 106 to engage in the notched ends 114 of the wedge blocks 110, the coil springs 118 compressing or yielding sufficiently so as to permit this. Continued rotation in a counterclockwise direction forcibly dislodges the various wedge blocks 110. Stated somewhat differently, the shoes 98 "kick" the blocks 110 in a counterclockwise direction, the coil springs 118 associated with these wedge blocks 110 yielding to permit the dislodgment to occur. Even if there has been no camming action which has resulted in a tight fit between the surfaces 84 and 112, rotation of the drive ring 90 in a counterclockwise direction will cause the shoes 98 to urge the various wedge blocks 110 in a counterclockwise direction with the consequence that the coil springs 118 associated therewith are compressed to the degree necessary to permit the ends 115 of the wedge blocks 112 to abut against the shoulders 82 of the coupling nut 66. Thus, there is a positive drive in a direction to uncouple the components 12, 14, for the wedge blocks 110 would transmit the rotative torque under these circumstances via the shoes 98 and the wedge blocks 110 to the coupling nut 66. Such action simply unscrews the coupling nut 66, the threads 68 traveling helically with respect to the threads 32. During this uncoupling procedure, the inturned flange 96 on the drive ring 90 bears against the radially projecting portions of the split ring 64. Consequently a pressural action is applied to the split ring 64 which is transmitted to the rigid shell 34, thereby forcing the rigid shell 34 to the right as viewed in FIG. 1, the key 56 traveling longitudinally to the right in the keyway 30. Sufficient rotation will completely detach the coupling nut 66 from the shell 16, this resulting when the contacts 46, 28 are completely disengaged.

While it is not planned that only a partial coupling of the components 12, 14 be consummated, such could occur if the operator is careless. From FIG. 1, it will be seen that the socket contacts 46 receive therein a considerable length of the pin contacts 28 when the components 12 and 14 are fully coupled together. However, if only a partial coupling of the components is re-

alized, then each pin contact 28 has, say, only its tip received in the socket contact 46 with which it is to be received. Where small currents are involved, this is not a serious disadvantage other than that one might expect the connector 10 to be more vulnerable to being completely uncoupled when subjected to vibrational conditions. However, the same wedging action takes place that transpires when the connector 10 is fully coupled, for any tendency for the coupling nut 66 to rotate in a counterclockwise direction when not actuated by the drive ring 90 causes the camming surfaces 84 to bear against the camming surfaces 112 on the wedge blocks 110. Therefore, it should be readily apparent that a fully mated relationship of the components 12 and 14 need not be attained in order for my invention to be effective. It should be understood that while an uncoupling is prevented under these operational circumstances, any tendency to tighten or to become more fully coupled can, and will, take place, this being very advantageous. Stated somewhat differently, there can never be an "inadvertent" uncoupling but there can be an "inadvertent" coupling which progresses in the direction of a fully mated condition of the components but not in the other direction.

It has been explained that the shoes 98 "kick" the blocks 110 in a counterclockwise direction and that the coil springs 118 yield to permit the blocks to be dislodged. When utilizing the modified blocks 110a (as shown in FIGS. 8 and 9), the rubber pads yield to permit such dislodgment.

I claim:

1. A connector comprising first and second components adapted to be mated together along a longitudinal axis, helical coupling means for causing mating and unmating of said components, drive means rotatable about said axis having means movable therewith for abutting against a portion of said coupling means to rotate said coupling means in one rotative direction to effect said mating when said drive means is rotated in said one rotative direction, and wedge means shiftable in a circular path about said axis relative to both said coupling means and said drive means, said coupling means having means thereon for shifting said wedge means in its said circular path in said one rotative direction when said coupling means is rotated in its said one rotative direction by said drive means and said wedge means resisting helical retraction of said coupling means in a reverse rotative direction opposite to said one rotative direction and hence unmating of said components, said abutting means on said drive means abutting said wedge means to render said wedge means ineffectual when said drive means is rotated in a reverse direction opposite to said one rotative direction.

2. A connector in accordance with claim 1 in which said wedge means includes a cam block having a tapered cam surface at the end thereof nearer said abutting means, said coupling means having a complementally configured tapered cam surface.

3. A connector comprising first and second components adapted to be axially mated together, helical coupling means for causing mating of said components, rotatable drive means for advancing said coupling means to effect said mating when said drive means is rotated in one direction, and wedge means including a tapered cam block for resisting helical retraction of said coupling means, said coupling means having a complementally configured tapered cam surface, and resilient

means for biasing said cam block in the direction of said cam surface, said drive means including means for rendering said wedge means ineffectual when said drive means is rotated in a reverse direction.

4. A connector in accordance with claim 3 in which said means for rendering said wedge means ineffectual includes a shoe element integral with said drive means for acting against said cam block to urge said block in a direction away from said cam surface when said drive means is rotated in said reverse direction.

5. A connector in accordance with claim 4 including resilient means for biasing said shoe element in a direction away from said cam block.

6. A connector comprising first and second connector components having portions of which longitudinally abut together when said components are mated, a coupling member having one end portion encircling a portion of said first component and its other end portion encircling a portion of said second component, said one portion of said coupling ring and the portion of said first component it encircles having interengaging helical means, and said other end portion of said coupling ring and the portion of said second component it encircles having interengaging flange means, whereby rotation of said coupling member in one direction causes advancement thereof along said first component with the result that said interengaging flange means produces an abutting of said first-mentioned portions when said components become fully mated, a wedge element having a sloping cam surface, said other end portion of said coupling member being recessed to form a first arcuate chamber for accommodating therein said wedge element, a second arcuate chamber of lesser diameter and an intermediate chamber between said first and second chambers, said intermediate chamber having a sloping surface complementing the sloping cam surface on said wedge element, a drive member encircling said coupling member having a portion thereof extending into said second arcuate chamber, first means biasing said wedge element relative said coupling member in said one direction of rotation to normally urge the sloping cam surface thereof against the sloping surface of said intermediate chamber to resist rotation of said coupling member in a reverse direction, and second means biasing said drive member relative said coupling member in said one rotative direction, the portion of said drive member received in said second arcuate chamber having a length such as to abut the end of said wedge element nearer thereto to shift said wedge element in said reverse rotative direction to overcome the action of said first biasing means and to move the sloping cam surface of said wedge element away from the sloping surface of said intermediate chamber to permit unmating of said components.

7. A connector comprising first and second components, a coupling nut threadedly engaged with said first component and having an inwardly directed flange, said second component having an outwardly directed flange forward of said inwardly directed flange and having a cylindrical surface extending rearwardly from said outwardly directed flange past said inwardly directed flange, the forward side of said inwardly directed flange bearing against the rear side of said outwardly directed flange when said coupling nut is rotated in one direction to effect mating of said components, said nut having a portion thereof encircling said cylindrical surface and providing an inwardly facing

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surface spaced radially outwardly of said cylindrical surface, said inwardly facing surface having a first section of one radius and a second section of a lesser radius with a sloping cam section intermediate said first and second sections, a wedge block disposed between said first surface section and said cylindrical surface having a sloping cam surface at one end thereof complementing that of said intermediate surface section, said nut having a radially directed shoulder at the end of said first surface section remote from said intermediate surface section, resilient means abutting said shoulder and the opposite end of said wedge block to normally urge said wedge block in said one rotative direction to cause its sloping cam surface to bear against said intermediate surface section, a drive ring encircling said coupling nut having release means extending into the space between said second surface section and said cylindrical surface so as to have one end thereof abut said one end of said wedge block to forcibly shift said wedge block in a direction opposite to said one rotative direction to overcome the action of said spring means when said drive ring is rotated in said opposite direction.

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8. A connector in accordance with claim 7 in which said nut has a second radially directed shoulder, and additional resilient means abutting said second shoulder and said release means to normally urge said release means in said one rotative direction away from said wedge block.

9. A connector in accordance with claim 8 in which said nut has a third radially directed shoulder at the end of said second surface section remote from said intermediate surface section, said release means abutting said third shoulder when said drive ring is rotated in said one direction.

10. A connector in accordance with claim 9 in which said second shoulder resides between said intermediate surface section and said third shoulder and is of lesser radial length than said third shoulder.

11. A connector in accordance with claim 8 in which said first resilient means constitutes a rubber pad.

12. A connector in accordance with claim 11 in which said second resilient means constitutes a coil spring.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,869,186 Dated March 4, 1975

Inventor(s) Ottomar H. Vetter

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

[57] Abstract, line 9, after "components" and before "together" insert --so as to pull the two components--.  
Column 10, Claim 6, line 37, "said" should be --said--.

Signed and sealed this 17th day of June 1975.

(SEAL)  
Attest:

RUTH C. MASON  
Attesting Officer

C. MARSHALL DANN  
Commissioner of Patents  
and Trademarks