# United States Patent

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[54] **ELECTRICAL CONNECTOR WITH BREAKAWAY STUD**
**3 Claims, 2 Drawing Figs.**


[52] **U.S. Cl.** ..... **339/126 RS,** 339/263 R
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[50] **Field of Search** ..... 339/126, 214, 263, 31, 213, 218, 277; 174/152, 153



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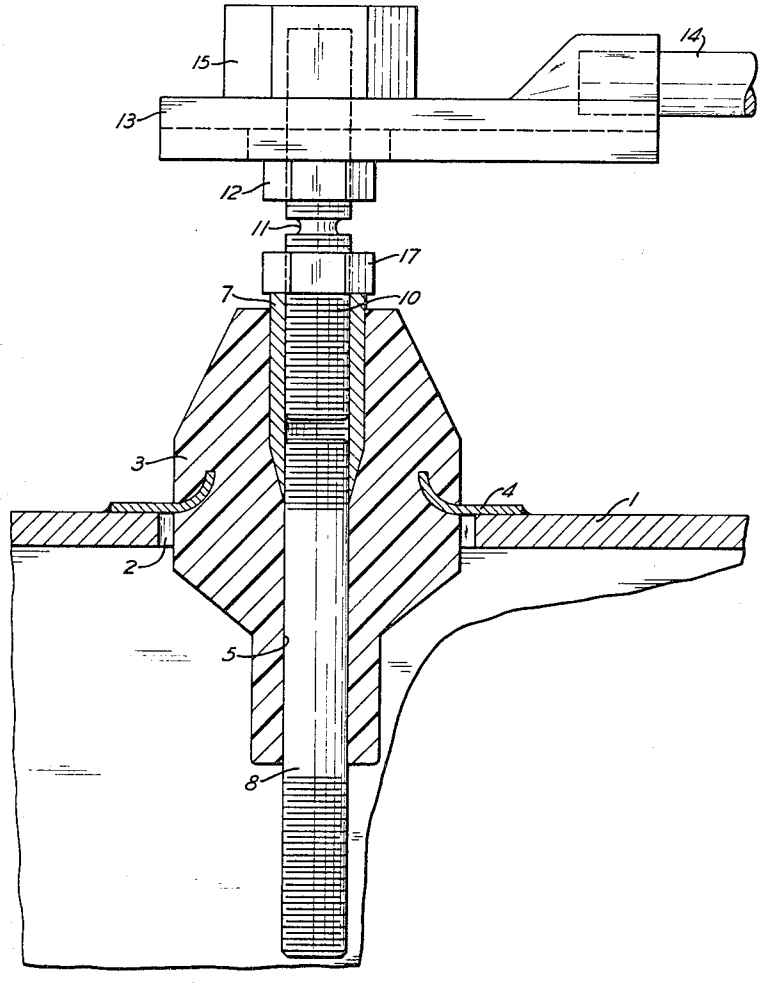
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**ABSTRACT:** An internally threaded metal sleeve is rigidly mounted in a passage through an insulating bushing and extends outwardly to an end of the passage or beyond it. The bushing is intended to be mounted in the wall of electrical apparatus, with the outer end of the sleeve outside. Screwed into the sleeve and projecting from its outer end is a threaded stud that carries a nut which presses tightly against the outer end of the sleeve. Outwardly of the nut the stud is provided with a groove that weakens it, and a pair of nuts mounted on the stud outwardly of the groove are for holding an electric cable terminal which, if enough tension is applied to it, will cause the stud to break at its weakening groove without damaging the sleeve or bushing.

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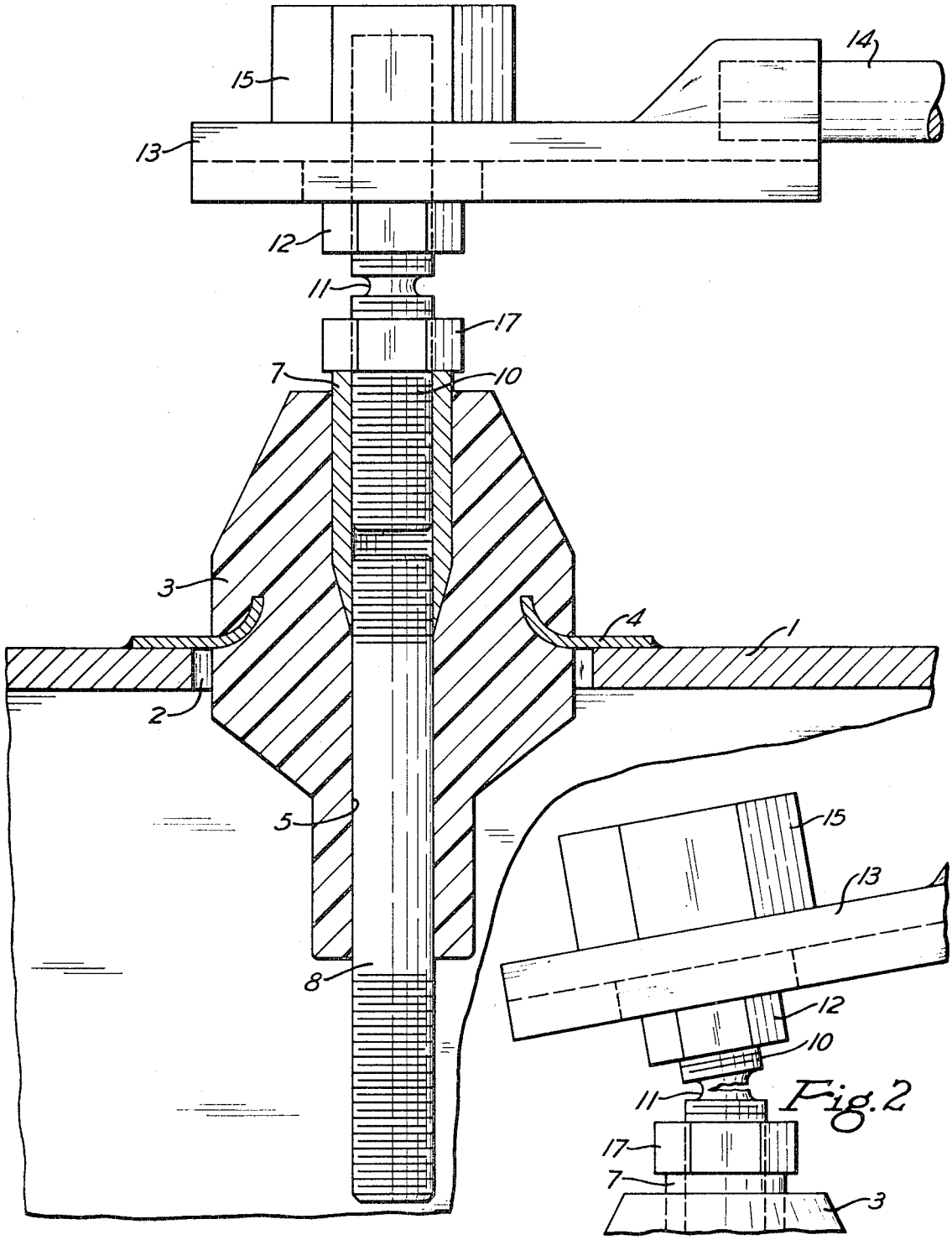



Fig. 1




Fig. 2

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# ELECTRICAL CONNECTOR WITH BREAKAWAY STUD

Electrical transformers are often mounted at ground level on concrete pads, or underground in concrete vaults. In either case the electric cables that extend away from the transformers are generally buried in the ground. The usual practice is to connect the cable terminals to threaded studs mounted in insulating bushings that in turn are rigidly mounted in the wall so the transformers. The studs are wired into the transformers. It has been found that, not infrequently, one of these buried cables is snagged by a digging machine or the like, with the result that the cable is pulled hard enough for it to break off the stud in the bushing at the transformer. This damages the bushing, so that the entire connector must be replaced. When this happens it becomes necessary to disconnect the transformer and take it to a shop where the damaged electrical connector is removed and new one put in its place. Of course, this is a rather expensive operation. The same misfortune can happen to other electrical apparatus where similar electrical connectors are used.

It is an object of this invention to provide an electrical connector for a transformer or other electrical apparatus, which can be repaired without moving the apparatus if tension on a cable breaks the connector stud.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. 1 is a fragmentary section through a transformer housing and electrical connector; and

FIG. 2 is a fragmentary side view of the connector with the stud shown breaking off.

Referring to FIG. 1 of the drawings, the wall 1 of electrical apparatus, such as a pad-mounted or underground mounted transformer, is provided with an opening 2 in which an electrical connector is mounted. The connector includes a rigid insulating bushings 3 made of a suitable insulating plastic that is encircled by a metal flange 4. The inner edge of the flange is embedded in the bushing. This flange is welded to the transformer wall around the opening. The bushing is provided with a central passage 5 extending through it from the inside of the transformer to the outside.

Molded into this passage is an internally threaded metal sleeve 7. The sleeve could extend the full length of the passage, but it is preferred that it be mounted in only about the outer half of the passage. A rod 8, with a threaded end screwed into the inner end of the sleeve, is molded into the bushing between its inner end and the sleeve. This rod projects from the bushing into the transformer and may be threaded for an electrical connection to it.

Screwed into the other end of the metal sleeve is a threaded stud 10 that projects from the sleeve, which extends at least to the outer end of the bushing. It is a feature of this invention that is short distance away from the sleeve the stud is provided with a circumferential groove 11 that reduces the cross section of the stud at that point and thereby makes it weaker there than at any other location along the exposed portion of the stud. A nut 12 is mounted on the stud outwardly beyond the groove, and a spade terminal 13 or the like of an electric cable 14 is clamped tightly against the nut by another nut 15 screwed onto the outer end of the stud. The cable is generally buried in the ground, but regardless of its location, if it is put



under enough tension, such as being caught by a mechanical digger, it will pull sideways on the stud and break the stud at the point where it is weakened by the circumferential groove 11, as shown in FIG. 2. Because the stud breaks instead of merely bending and breaking the plastic bushing or tearing out of the bushing, the bushing should not be damaged.

The weakening groove just described does not completely solve the problem, however, because lateral stress on the projecting portion of the stud before it breaks could cause it to mash the threads in one side of the metal sleeve. This would make it difficult or impossible to remove the broken stud, and even if it is removed a new stud could not be screwed into the damaged sleeve, so the transformer would have to be taken into the shop for repair.

It is a feature of this invention that is difficulty is overcome by applying a third nut 17 to the projecting portion of the stud. This nut is applied before the others and is located between groove 11 and the adjacent end of the sleeve, against which it is tightened as much as possible. With this construction, lateral stress on the stud, caused by tension on the cable connected to it, will be distributed through nut 17 more or less uniformly around the sleeve, at least to such an extent that the sideways pull on the stud will not damage the sleeve threads. Consequently, if the outer end of the stud is broken off, it is a simple matter to unscrew the rest of the stud from the sleeve and to insert a new stud. This operation takes the transformer out of service for only a short time and the expense of taking it to a shop, removing the entire connector and replacing it with a new one is avoided. It will be realized that the metal sleeve makes it possible to remove the broken stud and replace it with a new one, which could not be done if the stud were molded in the bushing as has been the practice heretofore.

To make sure that lateral pressure on the stud will not cause nut 17 to press against the end of the bushing at one side of the stud, it is desirable to extend the sleeve a short distance outwardly beyond the bushing. The nut then can never tough the plastic bushing.

I claim:

1. An electrical connector comprising an insulating bushing provided with a passage therethrough, an internally threaded metal sleeve rigidly mounted in said passage and extending outwardly at least to an end of it, means for rigidly mounting the bushing in the wall of electrical apparatus with said end of the passage outside, a threaded stud screwed into said sleeve and projecting from its outer end, a nut on the stud pressing tightly against the outer end of the sleeve, the stud outwardly of the nut being provided with a circumferential groove reducing the cross-sectional area of the stud to weaken it, a second nut on the stud outwardly of said groove, the outer end of the stud being adapted to receive a nut for holding an electric cable terminal on the stud against said second nut, and means for making an electrical connection to the opposite end of the stud.

2. An electrical connector according to claim 1, in which said last mentioned means is a second stud screwed into the inner end of said sleeve and projecting from the end of the passage opposite the outer end of the sleeve.

3. An electrical connector according to claim 1, in which the sleeve projects from said end of the passage.

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