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PLUG AND JACK KEEPERS

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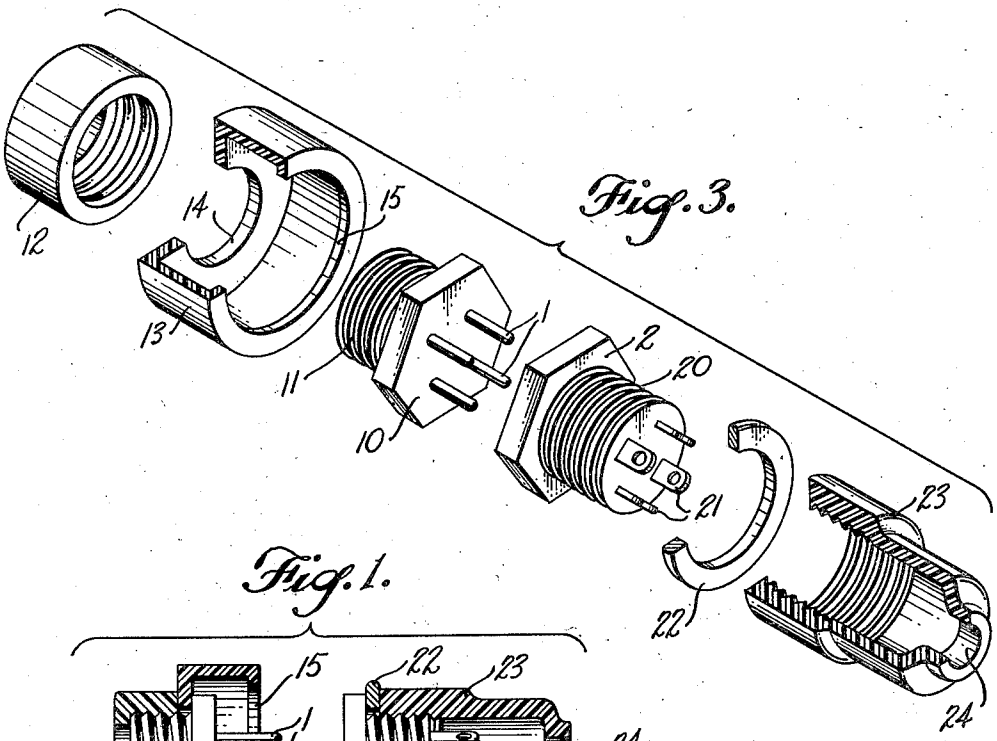
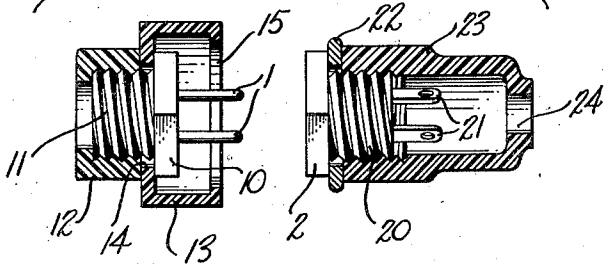


Fig. 3.

Fig. 1.



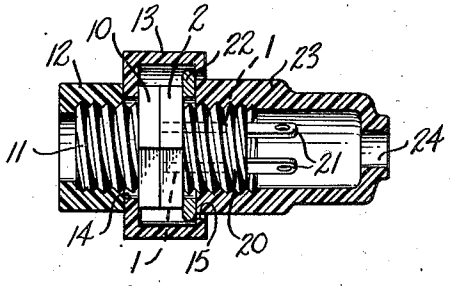


Fig. 2.

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PLUG AND JACK KEEPERS

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The present invention relates to keepers for retaining in engagement an electrical plug and jack or equivalent interfitting elements.

The particular object is to provide such a keeper which will automatically be engaged in holding position whenever the plug and jack are fully interengaged. An incidental object is to enable full engagement of a plug and jack to be detected readily by the resistance to their separation effected by the keeper, whereas such resistance is absent or much less noticeable if the plug and jack are not fully interfitted.

A further object is to provide such a keeper which is of simple and inexpensive construction, yet which is very effective.

An additional object is to make such a keeper of extremely durable, yet light construction and which can be adapted easily for use on plugs and jacks of different types.

Another object is to construct a plug and jack keeper so that it also will serve to shield partly or completely contact prongs of the plug.

An important object is to enable such a keeper to be rendered operative without requiring any manipulation other than simply the complete engagement of the plug and jack. Consequently, no lost motion or lost time is involved in engaging or disengaging the keeper. When engaged, however, the keeper will be effective to prevent any inadvertent separation of the plug and jack.

While the keeper construction may be of different types, the foregoing objects can be accomplished by providing on one of the plug and jack elements a cup having an inturned rim and on the other element an annular rib, the outer periphery of which is slightly larger than the inner periphery of the cup rim. The rib, or the rim, is made of material sufficiently pliant and resilient so that the rib and rim may be moved axially past each other to dispose the rib in holding position behind the cup rim while the rib or rim or both return to their undeflected relaxed positions to resist axial separating movement of the jack and plug.

A typical example of keeper construction employing the principles of the present invention is shown in the accompanying drawings and described in the following detailed description.

Figure 1 is a longitudinal sectional view through a plug and jack, parts being shown in elevation, and the plug and jack being shown in registering but separated condition.

Figure 2 is a corresponding longitudinal sectional view through the plug and jack shown in fully engaged relationship.

Figure 3 is an exploded view of the plug and jack parts in perspective with portions of certain parts being broken away.

The plug and jack to which the keeper of the present invention is applied may be of conventional construction. Thus the plug may include any number of prongs **1** embedded in and projecting from a base **10**. This base may include a boss **11** threaded to receive on it an internally threaded nut or cap **12**. A cup **13** of a size

to encompass the base **10** and root portions of the prongs **1** may be mounted, as shown in Figure 1, encircling the base and root portions of the prongs. This cup may have in its bottom an aperture **14** of a size to fit over the threaded boss **11**, but of insufficient size to pass the base **10**. The radial flange formed by such apertured bottom may be clamped between the base **10** and cap **12** by screwing the cap tightly onto the threaded boss **11** in the manner shown in Figure 1.

The jack also may incorporate a base **2** apertured in a pattern corresponding to the arrangement of the prongs **1** to receive such prongs as the bases **2** and **10** are moved axially toward each other. The base **2** also preferably has an externally threaded boss projecting from its side opposite that through which the jack sockets open. The sockets extend lengthwise through this boss and metal linings in them may be connected respectively to connecting wire soldering lugs **21** projecting from the end of the boss **20** opposite the base **2**.

The jack element has a radial projection **22** preferably in the form of a circumferential rib. In the type of construction illustrated in the drawings this projection or rib is located adjacent to the side of base **2** opposite that in which the jack sockets open and is formed by a washer having an aperture of a size to fit reasonably snugly over the external threads of boss **20**. This washer can be secured in place against the adjacent face of base **2** by a cap **23** having one end threaded internally to screw onto the threads of boss **20**. The opposite end of this cap has an aperture **24** for receiving wires connected to the soldering lug **21**.

The interior of cup **13** is of a size to receive the radial projection or rib **22** with reasonable clearance, but the rim of this cup encircling the prongs **1** is formed as an inwardly projecting flange **15** forming an opening slightly smaller than necessary to receive the projection or rib **22** without deformation of either the rim element or the projection element. To enable the projection **22** to be received within the cup **13**, therefore, as the plug and jack members are pushed into engagement it is necessary that either the cup member or the projection member, or both, be yieldable. It is further desirable that the material of which the yieldable member is made be sufficiently resilient so that when the plug and jack members have been moved into interfitting engagement as shown in Figure 2, the yieldable member will have returned substantially to its unstressed condition.

A convenient construction is to form the cup, or at least its inwardly projecting flanged rim, of a somewhat yieldable, tough plastic material such as the plastics sold under the names nylon, Teflon or polyethylene. Besides being resilient to a reasonable degree, these plastic materials are good electric insulators. Alternatively, rubber or synthetic rubber could be used of a type having slightly yielding characteristics. All of such materials may be designated as slightly resilient plastic material.

If the entire cup **13** and rim **15** are made of a slightly resilient plastic material, the diameter of the rib **22** should be from one-thousandth to fifteen-thousandths of an inch larger than the internal diameter of the rim **15**, depending upon the degree of resilience of the material of which the cup is made, and how tightly it is desired to have the parts held together. For ease of engagement and disengagement of the rib and rim, it is preferred that the periphery of the rib be somewhat rounded as shown best in Figure 1, although as an alternative or in addition the inner edge of the cup rim **15** could be roundted. Alternatively, either the rim or the rib could be slightly inclined to facilitate engagement of the rib with the rim without reducing the effort required to separate the plug and jack from the relationship of Figure 2.

While the cup member is shown as being mounted on the plug and the projection or rib provided on the jack, it will be evident that the cup and rib elements could be provided on the jack and plug members respectively. Particularly where the cup is formed as a separate part, as shown in Figure 3, and the rib is formed by the outer periphery of a separate washer, such as 22, shown in Figure 3, these parts may be designed to fit interchangeably on either the plug or the jack. Alternatively, however, the cup and projection or rib could be formed as integral parts of the plug and jack members.

Furthermore, while the keeper construction described above has been illustrated as applied to cooperating plug and jack members, keeper construction of this type could be utilized to retain in engagement cooperating members of other types, and the keeper elements could be engaged either by direct approach movement or by such movement accompanied by rotation. Members with which the keeper construction described could be used may be designated generally as members interengageable by approach movement whether or not rotation accompanies such approach movement.

I claim as my invention:

1. Keeper mechanism comprising members interengageable by approach movement and each having a base and a threaded boss projecting from said base, cup means having an aperture in its bottom received on one of said threaded bosses with the sides of said cup element encircling the base of said one boss, having an inwardly flanged rim and having threads screwed on such one boss securing said cup means thereto, means having an annular rib and an aperture received on the other of said threaded bosses, having an outer periphery of a size great enough so as not to pass the inwardly flanged rim of said cup means without deformation and having threads screwed on such other boss securing said annular rib means thereto, the depth of said cup means being sufficiently great so that its rim interferes with the circumference of said annular rib as the bases of said members are moved toward each other and prior to their abutment, and one of said means being sufficiently yieldable to enable said annular rib and the inwardly flanged rim of said cup means to pass in one direction during approach movement of said members into full engagement, and being sufficiently resilient to create substantial resistance to separation of said members which requires said annular rib and the rim of said cup means to pass in the opposite direction.

2. Keeper mechanism comprising members interengageable by approach movement and each having a base and a threaded boss projecting from said base, a cup element having an aperture in its bottom received on one of said threaded bosses with the sides of said cup element encircling the base of said one boss and having an inwardly flanged rim, a threaded cap screwed on such one boss and clamping said cup element, a washer element received on the other of said threaded bosses and having an outer periphery of a size great enough so as not to pass the inwardly flanged rim of said cup element without deformation, and a cap threaded on such other boss and operable to clamp said washer element, the depth of said cup element being sufficiently great so that its inwardly flanged rim interferes with the circumference of said washer element as the bases of said members are moved toward each other and prior to their abutment, and one of said elements being sufficiently yieldable to enable said washer element and the rim of said cup element to pass in one direction during approach movement of said members into full engagement, and being sufficiently resilient to create substantial resistance to separation of said members which requires said washer element and the inwardly flanged rim of said cup element to pass in the opposite direction.

3. Keeper mechanism comprising members interengageable by approach movement and each having a base and a threaded boss projecting from said base, a cup element having an aperture in its bottom received on one of said threaded bosses with the sides of said cup element of slightly resilient plastic material encircling the base of said one boss and having an inwardly flanged rim, a threaded cap screwed on such one boss and clamping said cup element, a washer element received on the other of said threaded bosses and having an outer periphery of a size great enough so as not to pass the inwardly flanged rim of said cup element without deformation of its rim, and a cap threaded on such other boss and operable to clamp said washer element, the depth of said cup element being sufficiently great so that its inwardly flanged rim interferes with the circumference of said washer element as the bases of said members are moved toward each other and prior to their abutment, and said cup element being sufficiently yieldable to enable said washer element and the rim of said cup element to pass in one direction during approach movement of said members into full engagement, and being sufficiently resilient to create substantial resistance to separation of said members which requires said washer element and the inwardly flanged rim of said cup element to pass in the opposite direction.

4. Keeper mechanism comprising a plug member having a threaded boss, a jack member having a threaded boss, a cup having an aperture in its bottom received on one of said threaded bosses and including an inwardly flanged rim, said cup being of slightly resilient plastic material, a threaded cap screwed on said cup-receiving boss and clamping said cup in place, a washer received on the other of said threaded bosses and having an outer periphery of a size great enough so as not to pass the inwardly flanged rim of said cup without deformation, and a cap threaded on said washer-receiving boss and operable to clamp said washer in place in a position to cause said washer to interfere with the inwardly flanged rim of said cup during approach movement of said plug and jack members into full interengagement, said cup being yieldable to pass the periphery of said washer during approach movement of said plug and jack members into full interengagement, and the resilience of said cup creating substantial resistance to separation of said plug and jack members during separation thereof which requires said cup and washer to pass in the opposite direction.

5. Keeper mechanism comprising a plug member including prongs and having a threaded boss, a jack member having a threaded boss, a cup having an aperture in its bottom received on the threaded boss of said plug member and including a side wall encircling said prongs and an inwardly flanged rim, said cup being of slightly resilient plastic material, a threaded cap screwed on said plug member boss and clamping said cup in place, a washer received on the threaded boss of said jack member and having an outer periphery of a size great enough so as not to pass the inwardly flanged rim of said cup without deformation, and a cap threaded on said jack member boss and operable to clamp said washer in place in a position to cause said washer to interfere with the inwardly flanged rim of said cup during approach movement of said plug and jack members into full interengagement, said cup being yieldable to pass the periphery of said washer during approach movement of said plug and jack members into full interengagement, and the resilience of said cup creating substantial resistance to separation of said plug and jack members during separation thereof which requires said cup and washer to pass in the opposite direction.

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