June 27, 1939. L. O'RUSSA 2,164,075

ELECTRICAL CONNECTOR

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Fig. 1

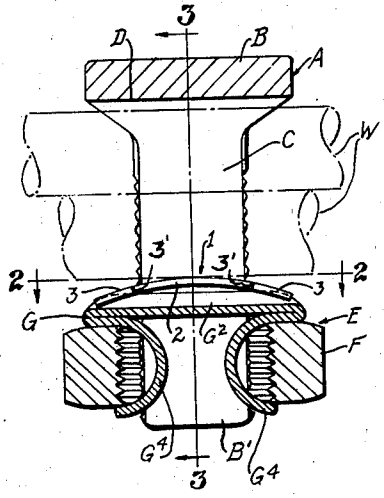


Fig. 2

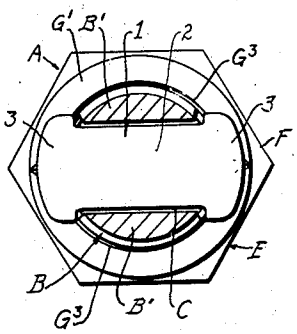


Fig. 3

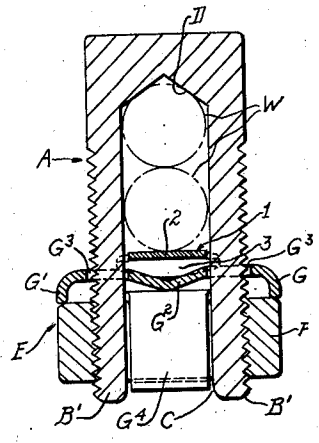


Fig. 5

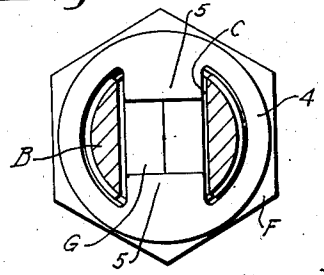


Fig. 4

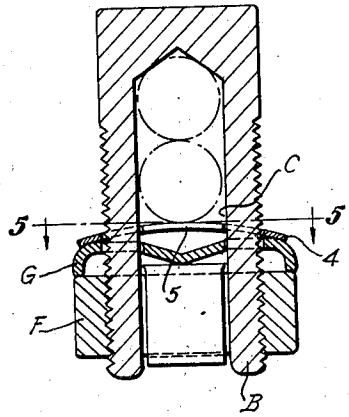


Fig. 6

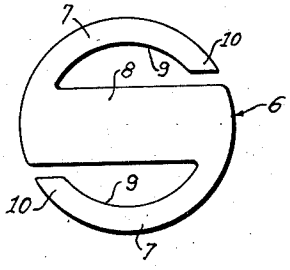
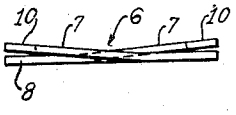


Fig. 7



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Fig. 8

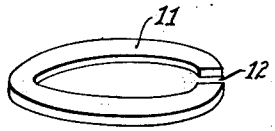


Fig. 9

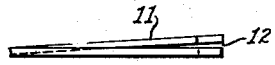


Fig. 10

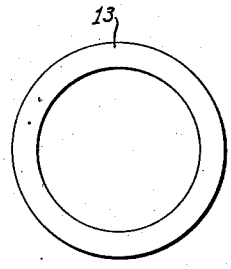


Fig. 11

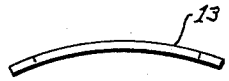


Fig. 12

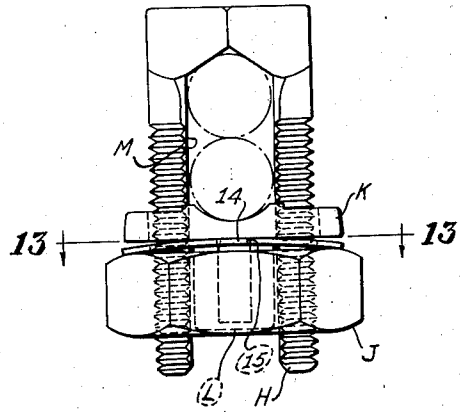


Fig. 13

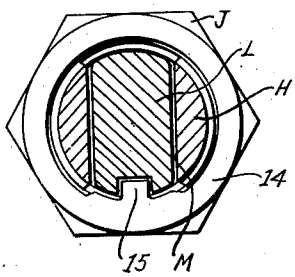


Fig. 14

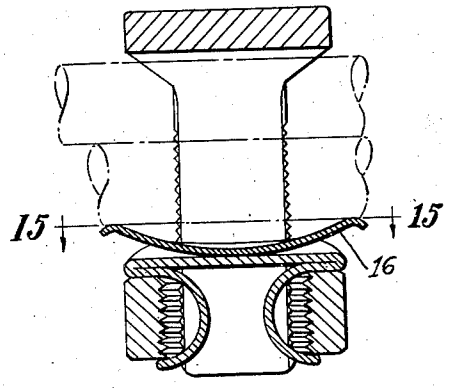
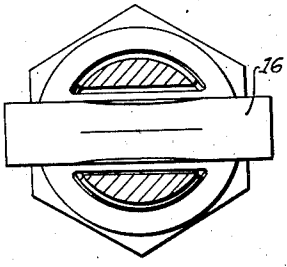


Fig. 15



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2,164,075

ELECTRICAL CONNECTOR

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Application July 22, 1937, Serial No. 154,947

2 Claims. (Cl. 24—243)

This invention relates generally to frictional wire connectors for electrically connecting conductors and other elements and adapted for use in the construction, extension, and repair of electrical systems of various kinds, such as telephone, telegraph, light, and power systems, and more specifically to that type of frictional connector which includes a split, or longitudinally slotted bolt-like member with which is cooperatively associated a nut and washer assembly movable screwthreadedly on said bolt so that wires or other elements may be electrically clamped between the washer of the nut and washer assembly and a portion of the bolt, the predominant object of the invention being to provide a wire connector of this type which includes resilient means adapted to insure application of sufficient pressure against the element or elements clamped by the connector to produce the desired perfect electrical contact between said element or elements being clamped and parts of the connector.

It has been found in the use of connectors of the general type to which this invention relates, that due to the softness of wires and other elements formed of copper which are clamped with the aid of such connectors, and because of vibration of suspended wires, the connectors frequently become loosened so that good electrical contact between the connected elements and parts of the connectors is not obtained. The purpose of this invention is to provide an improved connector which includes a resilient or spring element so incorporated in the connector assembly that it exerts positive tension pressure on the clamped elements at all times during use of the connector. Because of this arrangement positive electrical connection is naturally provided between elements connected by the connector when the nut assembly of the connector is drawn up tight, as the tightly drawn up nut insures this. Additionally positive electrical connection is provided between the clamped elements when the nut assembly becomes loosened for any reason, or is not properly drawn up on the bolt, by the resilient or spring element of the connector which in such situation forces the clamped elements together to provide positive electrical contact between said clamped elements in spite of the loose condition of the nut assembly.

Fig. 1 is a vertical section of a connector made and assembled in accordance with this invention.

Fig. 2 is a horizontal section taken on line 2—2 of Fig. 1.

Fig. 3 is a vertical section taken on line 3—3 of Fig. 1.

Fig. 4 is a vertical section of a connector which includes a slightly different type of resilient or spring element.

Fig. 5 is a horizontal section taken on line 5—5 of Fig. 4.

Fig. 6 is a plan view of another form of resilient or spring element.

Fig. 7 is an edge elevation of the resilient or spring element shown in Fig. 6.

Fig. 8 is a perspective of another form of resilient or spring element.

Fig. 9 is an edge elevation of the resilient or spring element shown in Fig. 8.

Figs. 10 and 11 illustrate still another form of the resilient or spring element, Fig. 10 being a plan view and Fig. 11 being an edge elevation.

Fig. 12 illustrates in elevation a connector having a resilient or spring element interposed between the washer and the nut of the connector instead of having the resilient or spring element interposed between the washer and the connected elements as shown in Figs. 1, 3, and 4.

Fig. 13 is a horizontal section taken on line 13—13 of Fig. 12.

Fig. 14 is a vertical section of a connector provided with yet another form of resilient or spring element.

Fig. 15 is a horizontal section taken on line 15—15 of Fig. 14.

In the drawings, wherein are shown for the purpose of illustration, merely, several embodiments of the invention, A designates in Figs. 1 to 3 inclusive the connector generally. The connector A of the views mentioned includes a bolt like element B which is provided with a slot C that extends longitudinally of the bolt, said slot being open at one end of the shank portion of the bolt and at its opposite end terminating in a wire seat D located at the inner portion of the head of the bolt. The spaced apart legs B' of the bolt B of the connector A are screwthreaded on their outer curved faces and mounted on said spaced apart legs is an assembly E that includes a nut F and a washer G.

The nut F and the washer G are permanently associated with each other in such manner that the nut may rotate relative to the washer. The washer comprises an annular portion G' which surrounds the spaced apart legs of the bolt B, the outer marginal portion of said annular portion providing a skirt portion which bears edgewise upon the upper face of the nut F. The washer includes also a bridge portion G^2 and

the presence of this bridge portion provides the washer with segmental openings G^3 through which the correspondingly shaped legs B' of the bolt B pass. The washer is provided with a pair of fingers G^4 which are extended from the skirt portion of the washer at points adjacent the opposite ends of the bridge portion, these fingers being extended initially inwardly and then downwardly through the bore of the nut. The free ends of the fingers G^4 are bent outwardly so that they underlie the lower face of the nut F and maintain the nut and washer in such assembled relation as to permit the nut to rotate about the screwthreaded bolt shank while the washer moves in a nonrotatable manner longitudinally of the bolt shank.

The resilient or spring element of the connector illustrated in Figs. 1, 2, and 3 is designated generally by the reference character 1 and it includes a relatively narrow, intermediate portion 2 which is disposed transversely of the slot C of the bolt as shown to the best advantage in Fig. 2. At the opposite ends of the narrow, intermediate portion 2 of the resilient or spring element 1 wider, integral portions 3 are provided, these wider portions being provided with shoulders 3' which overlap the legs of the bolt as shown in Fig. 2 so as to prevent movement of the resilient or spring element transversely relative to the slot C of the bolt. The opposite wider end portions of the resilient or spring element 1 contact with the top face of the washer G and said resilient or spring element is bowed upwardly as shown in Fig. 1.

In the use of the connector illustrated in Figs. 1, 2, and 3 the connector is arranged so that the wires W or other elements to be connected pass through the upper portion of the slot C of the bolt B. The nut and washer assembly E, with the resilient or spring element 1 associated therewith, is then screwed upwardly on the bolt to clamp the wires W between the wire seat D and the resilient or spring element 1. The nut and washer assembly is screwed upwardly on the bolt a sufficient distance to place the resilient or spring element under considerable tension and this will cause the wires W to be forced together with such pressure that positive electrical contact is obtained between the wires themselves and between the upper wire and the wire seat D and between the lower wire and the resilient or spring element 1. Also it is obvious, that in the use of the connector illustrated in Figs. 1, 2, and 3 the tendency of the connector to become loose due to vibration of the wires, or for any other reason, is eliminated as the tensioned resilient or spring element takes up any looseness that developes by continuing to force the wires W into close contact with each other and with the wire seat D.

In Figs. 4 and 5 a construction is shown which includes the same type connector as that illustrated in Figs. 1, 2, and 3, but the resilient or spring element 4 of Figs. 4 and 5 differs from the resilient element 1 of the preceding views. The resilient or spring element 4 is of circular washer form and has a bow formed therein, and said element 4 includes inwardly projected, integrally formed extensions 5 (Fig. 5) which extend from opposite directions into the slot C of the bolt B so that said element 4 is prevented from rotating about the bolt. The marginal edge portion of the element 4 contacts with the washer G and the upwardly bowed portion thereof contacts with the element being clamped, as does the element 1 of Figs. 1, 2, and 3, with like results of keeping the clamped elements in good electrical contact with each other and with parts of the connector even though the nut F may not be drawn up tight on the bolt.

The resilient or spring element 6 illustrated in Figs. 6 and 7 is made in substantially S-shaped formation when viewed in plan as shown in Fig. 6. The element 6 includes opposed curved portions 7 which are joined by an intermediate portion 8, segmental openings 9 being formed through the element between the intermediate portion 8 and the curved portions 7 through which the spaced apart legs of the bolt pass, and the intermediate portion 8 of said element being disposed in the slot of the bolt. One end portion of each curved portion 7 is free from the intermediate portion of the element 6 and these free end portions are curved upwardly as indicated at 10 to give the desired spring and resiliency to the element.

In use the element 6 is employed just as are the elements 1 and 4 previously described, the opposite end portions of the intermediate portion 8 of said element 6 contacting with the top face of the washer of the connector and the upwardly curved portions 10 contacting with the lowermost of the clamped elements.

The resilient or spring element 11 illustrated in Figs. 8 and 9 is in the form of a simple split washer, the portions of the element at the split 12 thereof being spread apart in the direction of the axis of the element to give to said element the desired spring and resiliency. The element 11 is employed as are the resilient or spring elements previously described herein, said element 11 embracing the bolt of an associated connector and being interposed between the washer of the connector and the lowermost of the elements clamped by said connector to exert spring pressure against said clamped elements.

The resilient or spring element 13 illustrated in Figs. 10 and 11 comprises a bowed or crowned washer of solid formation. This element 13 is used as are the previously described resilient or spring elements, said element being arranged in embracing relation with respect to the bolt of an associated connector and being interposed between the washer of the connector and the lowermost of the elements clamped by the connector so as to exert spring pressure against said clamped elements.

The connector illustrated in Figs. 12 and 13 is of slightly different construction and arrangement from the connector shown in Figs. 1 to 5, inclusive. The connector of Figs. 12 and 13 includes a split or longitudinally slotted bolt H on which is mounted a nut J and a washer K, said washer including a downwardly extended shank L that extends through the bore of the nut and is disposed in the slot M of the bolt of the connector. The washer K is capable of moving longitudinally of the bolt relative to the nut and a resilient or spring element 14 is interposed between the upper face of the nut and the lower face of the washer. The spring element 14 in formation resembles somewhat the spring element 4 of Figs. 4 and 5 previously described herein, being a bowed or crowned washer having an inwardly projected extension 15 which extends into a longitudinal slot formed in the shank L of the washer K to prevent said element from rotating about the bolt of the connector.

In use the spring element 14 forces the washer against the elements clamped by the connector

so as to apply to said clamped elements sufficient pressure to provide good electrical contact between the clamped elements themselves and between the clamped elements and the bolt and washer of the connector.

In Figs. 14 and 15 is illustrated a connector of the type illustrated in Figs. 1 to 5, inclusive, but the resilient or spring element 16 of Figs. 14 and 15 is in the form of a strip of material suitably secured to the washer G of the connector. The spring element 16 is secured at its center to the washer G and from said center thereof the strip forming the spring element is curved upwardly and outwardly in opposite directions, said curved portions serving to exert spring pressure against the elements clamped by the connector to provide good electrical contact between the clamped elements themselves and between the clamped elements and parts of the connector.

I claim:

1. A wire connector comprising a bolt having spaced apart shank portions screwthreaded at their outer faces, a nut and washer assembly mounted on said spaced apart shank portions of said bolt, the washer of said assembly being entirely of substantially non-yielding construction, said nut being arranged to move said washer longitudinally of said bolt in a straight-line non-rotatable manner as the nut is screwed longitudinally of the bolt so as to clamp one or more elements between said washer and a part of said bolt, and a resilient element independent of said washer for applying spring pressure to the element or elements clamped by the connector, said resilient element being bowed and including a portion which is disposed in the space between said spaced apart shank portions of the bolt.

2. A wire connector comprising a bolt having spaced apart shank portions screwthreaded at their outer faces, a nut and washer assembly mounted on said spaced apart shank portions of said bolt, the washer of said assembly being entirely of substantially non-yielding construction, said nut being arranged to move said washer longitudinally of said bolt in a straight-line non-rotatable manner as the nut is screwed longitudinally of the bolt so as to clamp one or more elements between said washer and a part of said bolt, and a resilient element independent of said washer for applying spring pressure to the element or elements clamped by the connector, said resilient element being arranged in embracing relation with respect to said bolt.

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