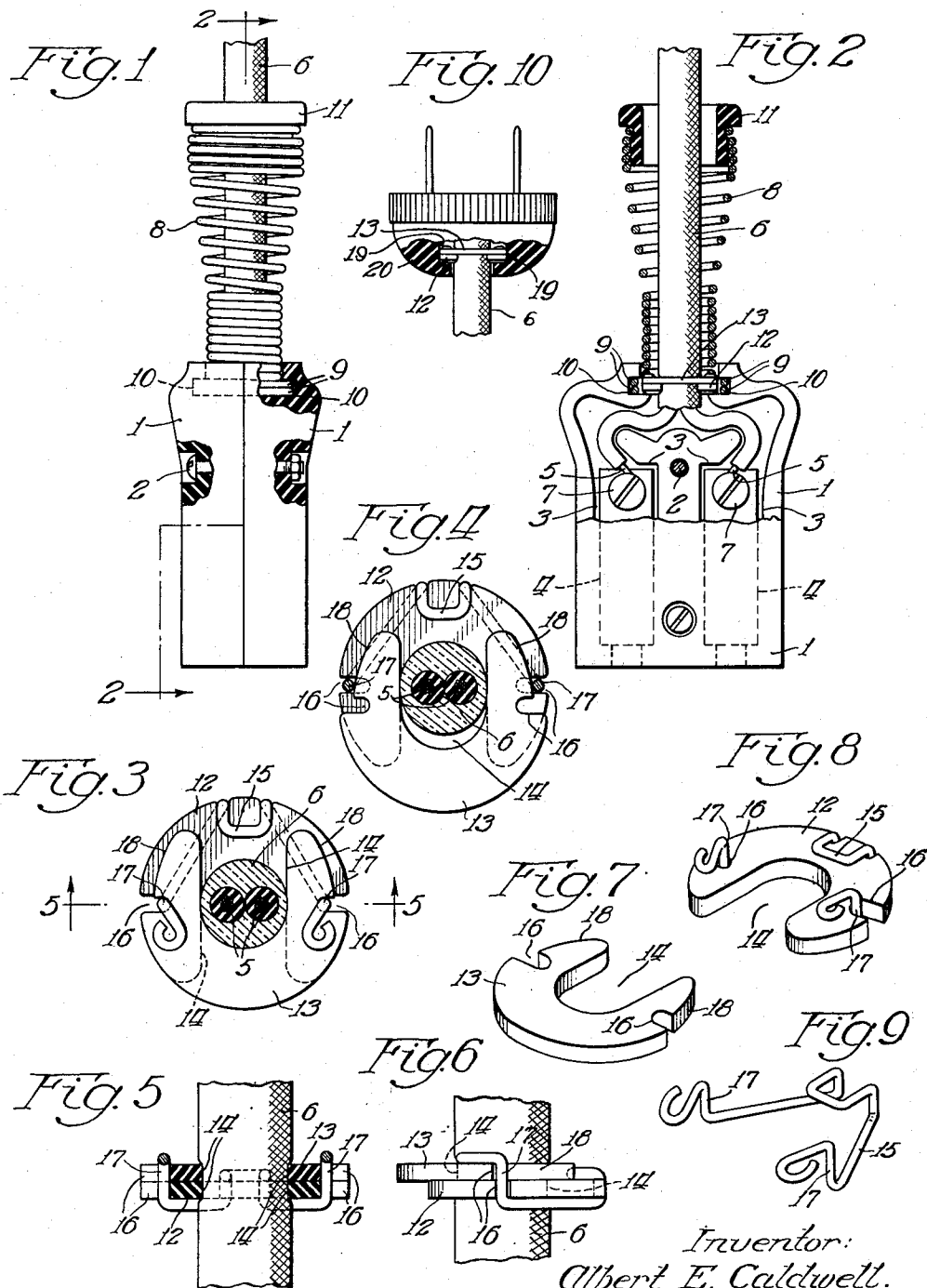


Feb. 27, 1940.

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ELECTRICAL CONNECTOR

2,192,165

Filed Aug. 31, 1936



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UNITED STATES PATENT OFFICE

2,192,165

ELECTRICAL CONNECTOR

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Application August 31, 1936, Serial No. 98,661

2 Claims. (Cl. 173—322)

My invention relates to electrical terminals and particularly to plug connectors such as are used for connecting conductor cords to electrical outlets and to electrical appliances.

Devices of this type usually comprise a body portion of insulating material having mounted therein or thereon a plurality of socket or pin type contacts. The conductors of the electrical cord with which the connector is used are connected to the contacts by suitable screws or the like.

During the use of appliance cords and similar devices, it is common practice to effect the disconnection of the cord from the associated outlet or appliance by a pulling or jerking action, and to assure reasonably satisfactory operation of the cord and connector over a substantial period of time, it is necessary to provide some means, in the nature of a strain relief, for preventing the stresses induced by such pulling or jerking from being transmitted to the connection between the cord conductors and the connector contacts. In fact, this matter is of such a serious nature, both from the viewpoint of assuring satisfactory long operative life of the connector and a minimization of fire hazard, that the insurance underwriters have recently required that an approved connector of the above described type must be capable of sustaining a weight of twenty pounds applied across the contacts thereof and the associated cord for a period of five minutes without permitting separation of the cord and the contacts, when the screws for fastening the cord conductors to the contacts have been backed off one-half turn.

The principal object of the present invention is to provide an improved strain relief of simple design which shall mechanically interconnect the cord proper with the body portion of the connector so as to prevent the stresses induced during use of the connector from being transmitted to the electrical connection between the cord conductors and the connector contacts.

Other objects of the invention are to provide an improved strain relief which may be embodied into existing connector plug structures without any modification thereof; to provide an improved strain relief which may be applied laterally to the cord with which it is used; to provide an improved strain relief of the subject type which shall utilize a minimum of parts and which shall be inexpensive to manufacture and to install; and generally, to provide an improved strain relief for use in conjunction with

connectors and connector plugs of the subject type.

An illustrative embodiment of the invention is shown in the accompanying drawing, wherein:

Figure 1 is a side elevational view partially broken away of an appliance type connector plug utilizing a strain relief in accordance with the present invention;

Figure 2 is a sectional view, partially in elevation, taken on the general line 2—2 of Figure 1;

Figure 3 is an enlarged plan view of the strain relief of the present invention as applied to the conductor cord with which it is used;

Figure 4 is a sectional view similar to Figure 3 showing an intermediate position in the applying of the strain relief to the cord with which it is used;

Figure 5 is a sectional view on the general line 5—5 of Figure 3;

Figure 6 is a side elevational view of the strain relief applied to the conductor cord with which it is used;

Figures 7 and 8 are perspective views of the strain relief in the disassembled position;

Figure 9 is a perspective view of the locking spring forming a part of the strain relief; and

Figure 10 is an elevational view, partially in section, of a connector cap, such as is commonly utilized at the outlet end of an appliance cord, embodying a strain relief in accordance with the present invention.

Referring to the drawing, the appliance type connector therein illustrated includes a suitable body or grip portion comprising two complementary members 1 which may be of molded insulating material and which are releasably secured together, as by a screw 2 or other suitable means. Suitable recesses 3 are formed in the inner faces of the body forming members 1 for receiving a pair of socket type contacts 4 which are adapted to releasably engage the contact pins forming a part of the appliance with which the connector is used. The conductors 5 of the cord 6 are connected to the upper ends of these contact elements 4 by suitable screws 7 or similar means.

To minimize bending and kinking of the cord adjacent the connector, the connector includes an axially flexible protector spring 8, the lower coils 9 of which engage an annular recess 10 formed in the cooperating members 1 making up the body portion of the connector. If desired, the upper end of the protector spring 8 may be provided with a ferrule 11 of insulating material for engaging the cord proper.

The strain relief according to the present invention comprises a pair of slotted, generally U-shaped, washer-like members 12 and 13, each of which is provided with a centrally located slot 14, in order that the members may be applied laterally to the cord conductor with which the strain relief is used. The members 12 and 13 are preferably punched from sheet insulating material such as hard fiber. The slot 14 in each of the members 12 and 13 is of somewhat less width than the normal diameter of the conductor cord, in order that the strain relief shall at least slightly compress and very tightly engage the conductor cord when in position thereon, as is illustrated in Figure 5. The member 12 has a latching spring 15 permanently supported thereon, as is illustrated particularly in Figures 3 and 8, the spring itself being illustrated particularly in Figure 9. Both of the members 12 and 13 are provided with two, diametrically opposed slots 16 which are adapted to align with each other when the strain relief is in the normal assembled position. The latching spring 15 has upright portions 17 normally disposed in the slots 16 formed in the spring supporting member 12, and these portions are of a sufficient length that they will engage the corresponding slots 16 in the other member 13 when the strain relief is in the assembled or cord gripping position.

The manner of attaching the strain relief is illustrated particularly in Figures 3 and 4. Either of the two washer-like members 12 and 13 is applied laterally to the conductor cord at the desired location thereon, and the other member, in opposed relation thereto, is likewise applied laterally to the cord and then moved into cooperating position therewith. An intermediate step in the assembling of the members 12 and 13 is illustrated in Figure 4, and it will be seen that the outer edges 18 of the non-spring bearing member 12 are so formed that during the assembling movement they will not disengage the latching portions 17 of the spring 15 from the slots 16 in the spring bearing member 13. When the two washer-like members 12 and 13 have been moved from the position shown in Figure 4 to the position shown in Figure 3, the upstanding side portions 17 of the latching springs will automatically engage the slots 16 in the non-spring bearing member 13, as is shown particularly in Figures 3 and 6, and will serve to securely latch the two members into gripping position upon the cord.

The proportions of the slots 14 in the two washer-like members 12 and 13 are, as mentioned previously, so proportioned that when those members are in the assembled position they very tightly grip the conductor cord with which the strain relief is used, and by virtue of the fact that all of the stresses induced in the upstanding portions 17 of the spring 15 which serve to latch the two members 12 and 13 together are of a shearing nature, there is no tendency for the various elements of the strain relief to become disengaged during use thereof.

If the strain relief is used in conjunction with an appliance type connector, such as that illustrated in the drawing, the outer dimensions of the strain relief are preferably so proportioned that the strain relief may be fitted within the lowermost coils 9 of the protective spring 8 which prevents excessive bending of the conductor cord 6. When in that position the strain relief will abuttingly engage the adjacent upper coils of that spring and will mechanically connect the

conductor cord 6 to the body portion of the connector plug with a resilient connection. Thus, none of the stresses which may be induced in the cord 6 during use of the connector will be transmitted to the electrical connection between the cord conductors 5 and the socket terminals 3 of the connector. Further, the inherent resilience of the mechanical connection will help to minimize the stresses induced in the cord.

When the strain relief is used in conjunction with other types of connectors, such as plug caps and the like, the proportions of the two washer-like members 12 and 13 may be conveniently correlated with the dimensions of such other connectors to accomplish the desired mechanical interconnection of the cord and the connector. A particularly suitable arrangement is illustrated in Figure 10, the strain relief in this device abuttingly engaging a suitable annular recess 19 formed in the body portion 20 of the plug cap.

From the foregoing, it will be seen that I have provided an improved strain relief of novel design which may be readily applied to various types of existing connector structures without any material modification thereof. My improved strain relief is very simple in design, and it is easy and inexpensive to manufacture. My improved strain relief is particularly easy to install, for the reason that the two elements thereof need not be slipped over the end of the conductor with which the device is used, but may be applied laterally to the cord at any desired point, either before or after the cord conductors have been connected to the terminals with which they are used. The ability of being laterally applicable to the cord is of the greatest importance in minimizing assembling costs, and in making possible many of the most desirable features of the invention.

Although but one specific embodiment of the invention has been herein shown and described, it will be understood that details of the construction shown may be altered without departing from the spirit of my invention as defined by the following claims.

I claim the following as my invention:

1. In a strain relief for use in conjunction with conductor cords and the like, a pair of cooperating, washer-shaped members having generally U-shaped cutout portions for gripping the cord with which the strain relief is used, said members being disposed in overlying opposed relation when in the gripping position, being so formed that they may be applied laterally to said cord, and having generally oppositely arranged peripheral slots formed in the edges thereof which align in a direction axially of said members when said members are in gripping position upon said cord, and a spring member carried by one of said members and having portions adapted to extend through said aligned slots and resiliently retained therein when said members are in gripping position upon said cord for locking said members in that position.

2. In a strain relief for use in conjunction with conductor cords and the like, a pair of cooperating, washer-shaped members having generally U-shaped cutout portions for gripping the cord with which the strain relief is used, said members being disposed in overlying opposed relation when in the gripping position, being so formed that they may be applied laterally to said cord, and having generally oppositely arranged slots formed in the sides thereof which align when said members are in gripping position upon said cord, and a member formed of spring wire carried by

one of said members and having portions extending through said slots formed in that member in a direction generally normal to the plane thereof, said portions being engaged and moved outwardly by the sides of the cooperating member when said cooperating members are being placed in gripping position upon said cord, and said portions automatically engaging the cooperating slots in both of said members when those members are in gripping position upon said cord

thereby locking said members in that position, the surfaces of the member cooperating with the spring carrying member being so formed that the locking portions of said spring remain at least partially within the slots in the spring carrying member when said cooperating member is being moved into gripping position upon said cord.

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