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3,345,601

QUICK-DISCONNECT BATTERY CABLE

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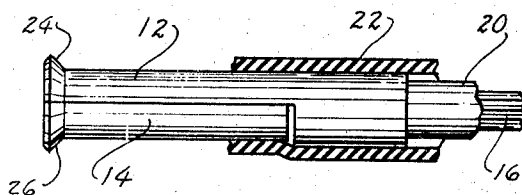


FIG. 4

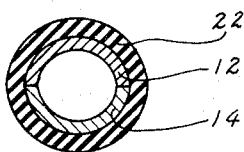


FIG. 3

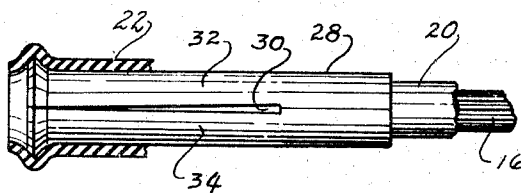


FIG. 5

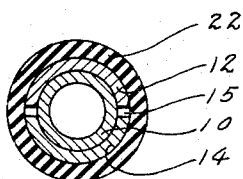


FIG. 2

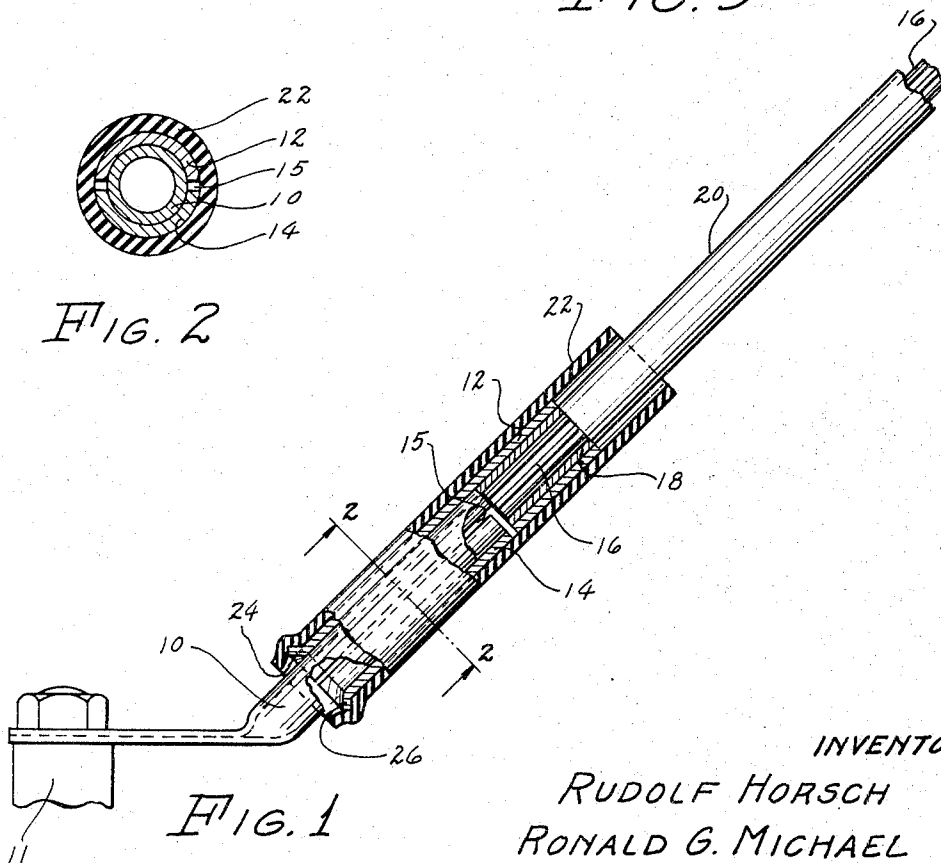


FIG. 1

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QUICK-DISCONNECT BATTERY CABLE

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ABSTRACT OF THE DISCLOSURE

A quick detachable cable connector having a conductive stem, a complementary element for slidably engaging with the stem, and insulating means tending to compress the element on the stem. The complementary element is mechanically and electrically connected to the cable and has portions urged inwardly by the insulating means but which portions are urged outwardly upon entrance of the stem. The insulating means encompasses the connector so that no conductive parts are exposed.

The present invention relates to a quick detachable electrical connection, and an object of the invention is to generally improve the construction and operation of devices of this class. In working with electricity and particularly with low voltage and high current apparatus, such for example as storage batteries, and particularly with such devices in connection with automotive equipment, tractors and the like, there is often occasion to make such connections, and it is desirable that they be firm mechanically, and of a character electrically, such that they will carry the usually relatively large volume of current which is common in such installations. In the past, these temporary connections have been made by what is known in the trade as "alligator clips" comprising a pair of jaws similar to those of an alligator, from whence comes the name. The jaws are to closed position and equipped with rows of sharp teeth. These clips have been generally satisfactory, but the teeth engaging "live" parts of the battery or other current source, offer little more than a plurality of point contacts having no substantial area for carrying the aforesaid heavy current. Furthermore, it is usual, in view of the character of the clips, that the metal parts are more or less exposed so that in working around a tractor or the like, if the clip happens to be "live" it may "short circuit" on any metal part which may be touched inadvertently, producing an intense electric spark, often causing scarring of the part—if not worse damage.

It is accordingly an object of the invention to provide a dependable electrical connection which is easily made and broken, which is mechanically secure, which provides a large contact area for conducting a heavy current, and in which the live parts of the coupling are entirely covered or shielded with insulation so that inadvertent contacts or shorting cannot occur.

A further object is to provide such a structure in which failure by reason of what is commonly known as metal fatigue is not a problem.

The manner in which these results are achieved is fully set forth in the following specification and illustrated in the drawings, in which:

FIGURE 1 is a longitudinal axial section of a device constructed according to the invention;

FIG. 2 is a cross section taken on the line 2-2 of FIG. 1;

FIG. 3 is a similar view showing the parts in a different position;

FIG. 4 is a view of a portion of FIG. 1 with the parts in a different position; and

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FIG. 5 is a similar view of a modification of the device embodying the invention.

In practice a flexible cable of known type may be provided at both ends with one of the terminals to be described, or it may be provided with such a terminal at one end while having at the other end some other kind of connection such for example as a battery terminal clamp of suitable or well known type not shown.

As seen in FIG. 1, a stem 10 formed in the present instance of a suitable section of metallic tubing is fixed in any suitable manner on an element 11 which may represent a battery terminal, or the current input of an electrical unit, switch, starting motor, or the like, it being understood that the assemblage may be utilized at either or both ends of an elongated conducting cable for making temporary or semi-permanent connections between any kind of electrical units. Stem 10 is permanently or semi-permanently installed on any of the current delivering or receiving portions of such units as may need to be so connected from time to time.

The flexible cable carries a sheath 12 in the form of a metallic tubular element substantially complementary to the external surface of stem 10 so as to slide thereon with a substantial area of contact. Preferably, tubular element 12 has one side cut out to form a loose segment 14, also substantially complementary to the exterior of stem 10 so that, between the remainder of sheath 12 and segment 14, stem 10 may be substantially entirely enclosed by metal. Sheath 12 and segment 14 are separated slightly by a clearance 15, corresponding to the kerf of a saw which separates segment 14 from sheath 12, and which clearance is maintained by the positioning of sheath 12 and segment 14 by contact with stem 10. Sheath 12 and segment 14 are pressed toward each other as will appear so that a large area of substantial frictional contact, as well as electrical contact, is accomplished between sheath 12 and stem 10.

Sheath 12 is electrically connected with a conductor or cable 16 in any suitable manner, in the present instance, a spacer or bushing 18 being engaged within sheath 12 axially spaced from segment 14, and in which cable 16 is securely engaged. Preferably bushing 18, sheath 12, and cable 16 are electrically bonded together, as for example by soldering. Cable 16 has the usual covering of insulating material 20 and may be extended to any reasonable length desired, and may have fixed thereto any suitable terminal or lug connector, not shown, for attaching to a battery post.

An elastic insulating shroud 22 is disposed about sheath 12 and segment 14 and extends somewhat beyond the ends of sheath 12 so as to overlap covering 20 and extend a distance beyond the opposite end of sheath 12, slightly smaller than the exterior of sheath 12 so that the shroud must be stretched to a certain extent when it is put in place outside of the sheath. By reason of its elasticity, shroud 22 continuously urges segment 14 inwardly of sheath 12, so that sheath 12 is in continuous yielding contact with stem 10 under the elastic urging of insulating shroud 22, and at such times as stem 10 is removed sheath 12 and segment 14 are pressed together as seen in FIGS. 3 and 4 and clearance 15 is eliminated.

Preferably, before forming segment 14, sheath 12 is flared at the end remote from cable 16 to provide two flared portions, 24 on sheath 12, and 26 on segment 14. Flared portions 24 and 26 engage the interior of shroud 22 and stretch the same substantially beyond the amount caused by the forcing of shroud 22 about sheath 12. This provides forceful engagement of shroud 22 with flared portions 24 and 26, and effectively prevents any inadvertent axial displacement of shroud 22 in relation to sheath 12. Also, engagement of shroud 22 with flared por-

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tion 26 in an analogous manner prevents axial displacement of segment 14. Furthermore, flared portions 24 and 26 being opposite each other define a funnel-like entrance portion to sheath 12 which effectively guides sheath 12 when it is being put in place on stem 10.

The operation of the device is thought to be clear from the foregoing, sufficient to say that an electrical unit which may need to be connected and disconnected from time to time, has stem 10 semi-permanently fixed thereon. When it is desired to make a connection, the device is grasped by using shroud 22 as a handle. It is then shoved bodily onto stem 10, sheath 12 sliding into place on the latter and being maintained in firm frictional contact by the contraction of shroud 22 against it and the loose segment 14. The flared configuration of portions 24 and 26 makes it easy to slide the parts together in this manner.

While segment 14 is preferably merely a section of sheath 12, which has been cut out and replaced and therefore may not be in electrical contact with sheath 12, it is to be observed that approximately half of the circumferential surface of stem 10 is positioned for contact with the interior of sheath 12, which makes for many times the area of electrical contact which is not possible in devices of the prior art. Furthermore, in this embodiment there is no flexing of the metal which might lead to failure, and displacement of segment 14.

Variations on the above construction will doubtless occur to those skilled in the art, for example segment 14 might be an entirely separately fabricated piece, and it might be electrically connected with sheath 12 or even an integral part thereof proportioned to flex inwardly under the urging of shroud 22 within the contemplation of the invention.

Such a construction is shown in FIG. 5, in which a sheath 28 is split lengthwise for a substantial part of its length by a saw-cut 30 resulting in two opposed portions 32 and 34 which correspond substantially to segment 14 and sheath 12 of FIGS. 1-4. In this embodiment portions 32 and 34 are pressed together by the compressing force of shroud 22 in a manner similar to the FIG. 1 embodiment, but it is necessary in the FIG. 5 arrangement for the metal to yield or "spring" slightly in order to grip stem 10. Nevertheless, certain of the advantages of the invention can be realized in this manner. Other variations are anticipated, and the invention is not intended to be taken as limited to the form shown and described, or in fact in any manner except as defined in the following claims.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A quick-disconnect assembly for connection to a battery, said assembly including a

flexible conductor adaptable for transmission of energy, socket means electrically and mechanically connected to said flexible conductor, said socket means having an elongated contact area, a separable contact portion and also having an enlarged portion at one end thereof,

stem means slidable in said socket means in position to engage with said contact area and with said contact portion, said stem means being attached in electrical contact therewith, and

resilient insulating means on said socket means and said flexible conductor in position to urge said socket means into contact with said stem means, and said enlarged portion of said socket means retaining said insulating means in one position on said socket means.

2. A quick-disconnect assembly for connection to a battery, said assembly including a flexible conductor, an insulating material on said conductor along a substantial length thereof, a spacer fixed on an end portion of said conductor, a cylindrical element positioned to engage with said spacer, said element having opposed segments with enlarged portions at one end thereof, said segments running along a substantial length of said element cover-

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ing means on said enlarged portions of said element, and extending beyond said spacer and, cooperating annular terminal means engaging with said element, said opposed segments being forced apart upon engagement, and said enlarged portions of said element being positioned to retain said covering means on said element, and to urge said opposed segments of said element into contact with said terminal means.

3. In a quick detachable electrical connection a rigidly supported electrically conductive stem, an electrically conductive sheath generally complementary to said stem, encasing said stem, an electrically conductive spacer engaged within said sheath, an electrically conductive cable engaged with said spacer and thereby in electrically conductive relation with said sheath, a segment contiguous to the wall of said sheath and engaged with said stem, said sheath providing an enlarged portion and said segment providing an enlarged portion, and an elastic insulating shroud disposed about said sheath, said segment and said enlarged portions, and of a size sufficiently smaller than said sheath and said segment to yieldingly press said sheath and said segment forcibly against said stem, and said shroud being retained in place on said sheath by engagement with the enlarged portion thereof, and retaining said segment in its axial position by engagement with the enlarged portion of said segment.

4. In a quick detachable electrical connection a rigidly supported electrically conductive stem, an electrically conductive sheath generally complementary to said stem at least partially encasing said stem, an electrically conductive spacer engaged within said sheath in electrically conductive relation therewith, an electrically conductive cable engaged with said spacer and thereby in electrically conductive relation with said sheath, a segment separate from said sheath contiguous with the wall of said sheath and engaged with said stem, said sheath providing a flared portion at the end thereof remote from said cable, and said segment providing a flared portion at the end adjacent the first-mentioned flared portion, said flared portions providing a funnel-like opening for easy entrance of said stem, and an elastic insulating shroud disposed about said sheath, said segment and said flared portions, and of a size sufficiently smaller than said sheath and said segment to yieldingly press said sheath and said segment forcibly against said stem, and said shroud being retained in place on said sheath by engagement with the flared portion thereof, and retaining said segment in its axial position by engagement with the flared portion of said segment.

5. A quick detachable means for connection to a battery, said means including a flexible cable connected for transmitting energy from said battery, a female portion connected to said flexible cable, said portion defining a tubular shape for a part of the length thereof, a tubular stem forming a mating part with said female portion, a segmented portion separate from said female portion and positioned to complete the tube of said female portion, said portions being flared at one end thereof, said tubular stem being slidably engaged in said female portion and in said segmented portion and a resilient covering on said female portion and on said segmental portion, retained by said flared ends positioned to urge said segmented portion in clamping relation with said tubular stem as said tubular stem is inserted in said female portion for completing an electrical circuit from said battery.

6. A temporary electrical coupling for connection to a battery, said coupling including a flexible cable connected for transmission of electrical energy, a socket element comprising a sheath segment connected to said flexible cable, said element having an enlarged portion at one end thereof, a separate segment positioned to complement said sheath segment and completing a tubular shaped female portion of said coupling, said separate segment also having an enlarged portion at one end thereof, stem

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means slidable in and engaged with said female portion, said stem means being in place for reception of said female portion, and resilient means on said socket element and said separate segment, said enlarged portion of said socket and separate segment being engaged with said resilient means to retain said resilient means in one position, and said resilient means urging said socket element and separate segment into clamping relationship with said stem means.

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