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BATTERY CABLE CLAMP

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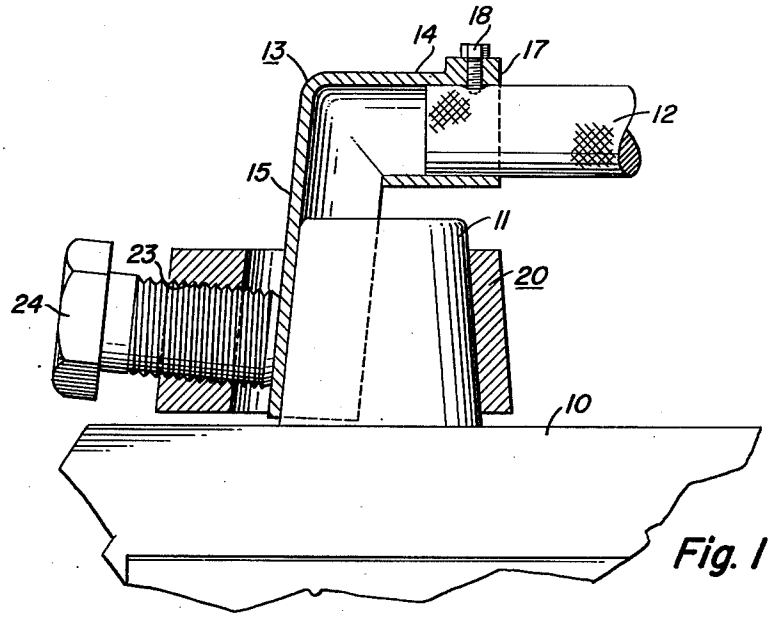


Fig. 1

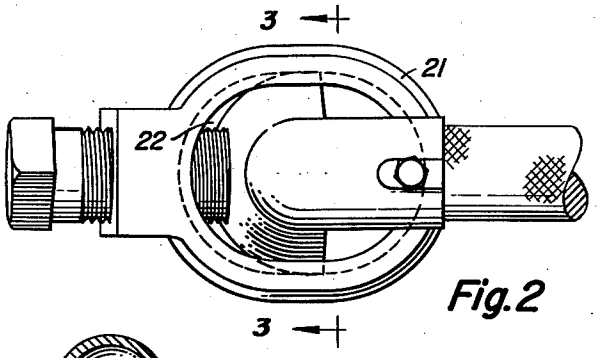


Fig. 2

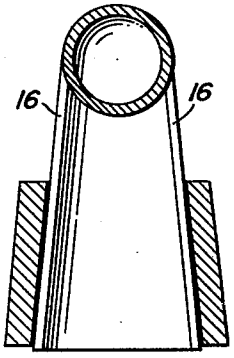


Fig. 3

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BATTERY CABLE CLAMP

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3 Claims. (Cl. 339—237)

This invention relates to electrical terminal devices in general, and relates more specifically to such device for use under extreme conditions of corrosion, such as automotive battery connectors.

Corrosion of storage battery terminal connection devices is a major problem, in that such corrosion often causes battery damage when removal of a cable terminal is attempted.

Another difficulty is that even normal oxidation and physical roughness of battery and cable terminals present poor electrical interconnections.

Furthermore, vibration will often shake a conventional vice type terminal clamp loose and produce a dangerous condition, or at least destroy electrical conductivity to the extent that large amperages cannot be carried for starter loads.

Therefore, an object of this invention is to provide a cable terminal having a shaped portion to closely fit the surface of a battery terminal and provide a separate clamp device to hold the skirt portion in good contact.

Another object of this invention is to provide a terminal device of separable parts particularly adapted to prevent disengagement by vibration, and to provide for disengagement of the parts when encrusted with corrosion with no danger of damage to the terminal post.

Still another object of this invention is to provide for maximum ease of installation and removal with conventional tools.

And yet another object of this invention is to provide for maximum flexibility in cable positioning with respect to a battery surface.

Other objects and a fuller understanding of this invention may be had by referring to the following specification and claims, taken in conjunction with the accompanying drawing, in which:

Figure 1 is a cross sectional view of the preferred embodiment of the connecting device;

Figure 2 is a top view of the connecting device; and,

Figure 3 is a sectional view taken along the line 3—3 of Figure 2.

Although the principles of the present invention may well be applied to attachment to other types of terminal posts, the drawing and the balance of this specification will be directed to the attachment of a cable to the terminal post of a conventional automotive type storage battery. In the drawing a portion of a battery **10** is illustrated as having a tapered lead battery post **11** extending from the top surface thereof. A cable **12** is attached to the post **11** by means of a terminal device embodying the principles of this invention. A cable terminal **13** is suitably attached to the cable **12**. In the illustrated embodiment of the cable terminal **13** there is provided an attachment portion **14** and a skirt portion **15**. The cable terminal **13** may be made quite readily by conventional stamping methods if desired. In the drawing a boss **17** carrying a bolt **18** threadably engaged therein is provided to mechanically engage the

cable **12** into the attachment portion **14**, although mechanical engagement is not a requisite. Solder sweating is generally employed regardless of whether or not the mechanical attachment is employed.

The skirt portion **15** is formed to partially circumscribe the surface of the battery post **11**, and therefore has a cross sectional configuration of generally C-shape. The size of the C-shaped cross sectional configuration increases progressively from the top near the attachment portion **14** to the bottom of the skirt.

Because of the C-form of the cross section of skirt **15**, the skirt ends in forward edges **16**. A decided improvement in electrical and mechanical interconnection of the cable terminal **13** has been found to accrue by making the C-shape cross sectional configuration with the distance across the edges **16** slightly undersized or even turned inwardly. Thus by forcing the skirt **15** into engagement with the post **11**, the edges **16** are caused to gouge through the normally oxidized dirty and rough surface found on battery terminals such as the terminal post **11**. This action effects a contact with clean, fresh metal and provides a measure of mechanical interconnection.

Prior devices have provided for somewhat cupped plates to contact battery terminals but such forms should not be confused with the present invention which provides a new and very unique function. One of the principle difficulties with prior art battery connecting devices is the problem of avoiding disengagement of the cable terminal by vibration and yet providing means for easily breaking the encrustration of corrosion formations without danger of damaging the relatively soft battery terminal post or its supporting structure. According to this invention a clamp **20** completely separate and independent from the cable terminal **13** is adapted to press the skirt **15** into engagement with the post **11**. The construction and operation of the clamp **20** provides holding forces opposing the normal vibration tendencies. Because of the separate nature of the cable terminal **13** and the clamp **20**, corrodable surfaces are divided and corrosion breaking forces may be applied most advantageously. The clamp **20**, in the illustrated embodiment, is essentially an annular wall **21** which defines an oblong and tapered opening **22** therethrough. Being an oblong opening, a major and a minor axis are provided. Reference to Figures 2 and 3 will at once illustrate the fact that the distance across the edges **16** of the skirt **15** at the bottom end thereof is considerably greater than the minor axis at the top of the opening **22** but less than the major axis at the top. Thus the skirt **15** must be inserted into the opening **22** with the maximum distance across the edges **16** extending along the major axis of the opening whereupon it may thereafter be turned to a locking position as illustrated in Figure 2. Such turning possibility is provided because of the tapered nature of the opening **22**. At the bottom of the opening **22** the minor axis is sufficiently large to accommodate the distance across the edges **16**, as illustrated best in Figure 3. In other words, the taper of the opening **22** is provided to correspond closely with the flair of the skirt **15**.

From the illustration in Figure 2 and foregoing description, it will be appreciated that the interlocking shape of the flaired skirt **15** and the tapered opening **22** will prevent vertical disengagement of the cable terminal **13** from the clamp **20**. Such formation together with the aid provided by gouging of the edges **16** into the material of the post **11** prevents disengagement by vibration.

As a further aid to the prevention of unintentional disengagement by vibration, a clamping bolt **24** is threadably engaged through a threaded opening **23** in the clamp **20**. Bolt **24** extends in the direction of the major axis of opening **22**, and therefore will press against the skirt **15**

and will force the skirt **15** against the surface of the post **11**. However, the threaded opening **23** extends in a downwardly direction with respect to the longitudinal axis of the opening **22**. The slope of the opening **23** is intended to correspond to the taper of the post **11**. Battery terminal posts are normally provided at a 3° angle. Accordingly, the slope of the opening **23** will normally be at 3°. Thus the bolt **24** will extend in a direction normal to the surface of the post **11** for the purpose of applying the best holding pressure on the skirt **15**. A greater degree of taper may be provided if desired, but a slope closely corresponding to the taper of the post is recommended.

The separate two-piece construction of the present invention provides for easy disengagement after corrosion has taken place. To produce such separation the bolt **24** is backed away from the skirit **15**. The tapered positioning of the bolt **24** provides an unexpected and desirable function for aiding in such backing off of the bolt. By such sloping provision the head of the bolt **24** is positioned a maximum distance away from the surface of the battery **10**. Thus a conventional wrench may be quite easily placed upon the head of the bolt. In conventional terminal construction the heads of such clamping bolts are usually placed such that an open end wrench is the only type of wrench that can be engaged with the clamping bolt.

After the bolt **24** has been backed away from the skirt **15**, a tapping blow on the head of the bolt **24** will place the corroded surfaces under a severe tensile shock strain. Since most materials, and particularly corrosive products, are weak in tensil, such tensil shock blow will break any corroded interconnection between the inner surface of the opening **22** and the contacting surface of the battery post **11**. Thus the clamp **20** is quite readily broken free from the battery post **11** in spite of heavy corrosion. It should be noted that the two-piece separate construction reduces the amount of surface contact between the clamp **20** and the post **11**, and therefore aids in such easy separation. Likewise, the two-piece construction reduces the amount of contact surface between the skirt **15** and the post **11**. After the clamp **20** has been broken loose the skirt **15** may be readily broken by a rotary or tipping force produced by lifting on the attachment portion **14**, such as by pulling upwardly on the cable **12**. It has been found that the skirt portion **15** will thus again produce tensil forces most conducive to separation of corroded surfaces and the most heavily corroded surfaces have been found to break free quite readily.

In summary, therefore, the advantages obtained by the present invention are that the edges of the skirt **15** dig into a battery post **11** to provide the best electrical and mechanical contact possible. The clamping screw of the clamp device is at an angle to position the head of the clamping screw or bolt off of the battery surface and also to allow the clamp to be positioned in any direction around the battery surface. Prior art devices with such bolts are limited to relatively few positions because of clearance problems. This terminal device fits all sizes of battery terminals without the use of shims for undersize posts. One wrench is all that is required for installing or disconnecting the terminal device, and the wrench may be a closed box wrench or a socket instead of an open end wrench. And finally, an outstanding advantage is the ease of breaking corroded surfaces as described because of the independent and separate two-piece construction.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

I claim:

1. A terminal connecting device for connecting a cable to a tapered battery post, comprising, a cable and terminal having a cable attachment portion and a skirt portion, said skirt portion having a tapered form of generally C-shape in cross sectional configuration to circumscribe a portion of the battery terminal, the tapered form thereby providing a greatest dimension across the skirt portion at the end thereof, a separate clamp means having an annular wall defining a central opening of elongated form having a major and a minor axis, said opening having a top and a bottom entrance, at said top entrance said major axis being greater than the greatest dimension of said skirt portion, said minor axis being greater than the smallest dimension of the skirt portion and smaller than the said greatest dimension, and screw means threadably carried by said clamp, said screw means extending into said central opening in the direction of said major axis to exert a clamping force against said skirt portion and terminal post.

2. A terminal connecting device for connecting a cable to a tapered battery post, comprising, a cable end terminal having a cable attachment portion and a skirt portion, said skirt portion having a tapered form of generally C-shape in cross sectional configuration to circumscribe a portion of the battery terminal, the tapered form thereby providing a greatest dimension across the skirt portion at the end thereof, a separate clamp means having an annular wall defining a central opening of elongated form having a major and a minor axis, said opening having a top and a bottom entrance, at said top entrance said major axis being greater than the greatest dimension of said skirt portion, said minor axis being greater than the smallest dimension of the skirt portion and smaller than the said greatest dimension, said opening being tapered from the top entrance to the bottom entrance, at said bottom entrance the minor axis being as great as the said greatest dimension of the skirt portion, and screw means threadably carried by said clamp, said screw means extending into said central opening in the direction of said major axis to exert a clamping force against said skirt portion and terminal post.

3. In combination, a battery post and a terminal connecting device attached thereto, said terminal connecting device comprising a cable end terminal and a clamp securing the cable end terminal to the post, said post being frusto conical in form, said terminal having a cable attachment portion and a skirt portion, said skirt portion circumscribing a portion of the terminal post, said clamp having an annular wall defining a central opening, said post and said skirt portion residing within said central opening with the skirt portion positioned upon the surface of the terminal post, said skirt portion having a concave inner surface shaped substantially to the form of the said battery post and ending in first and second lateral wall edges, at least a portion of said first and second wall edges being spaced a distance less than the corresponding dimension of the battery post, and screw means threadably carried by said clamp contacting the skirt portion and exerting a clamping force driving said first and second wall edges with a gouging action into the body of the battery terminal for good electrical contact and mechanical interconnection to resist loosening by vibration.

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