June 6, 1939. G. E. ANDRE 2,161,692

ELECTRICAL TERMINAL

Filed March 23, 1936

Fig. 1

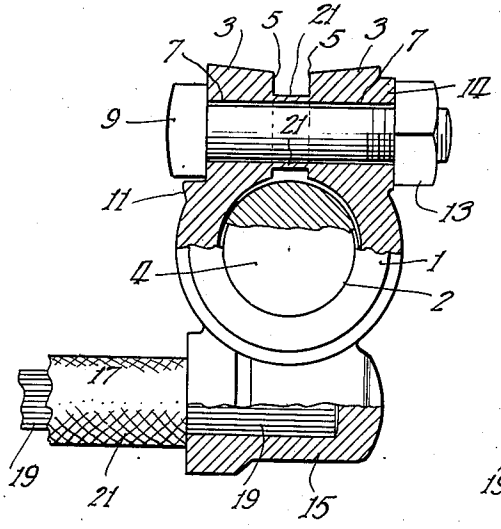
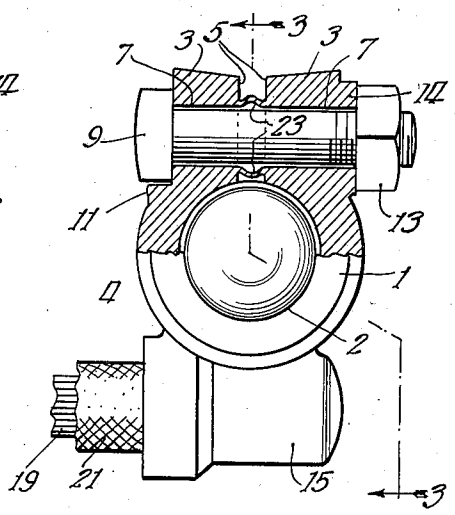


Fig. 2



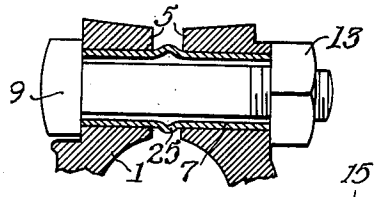
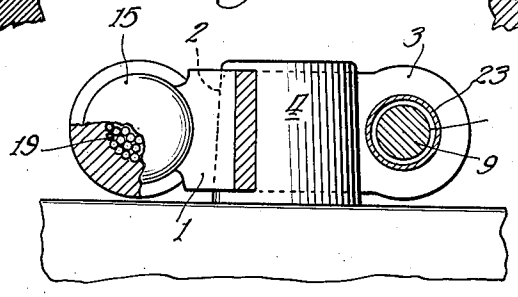


Fig. 6

Fig. 3



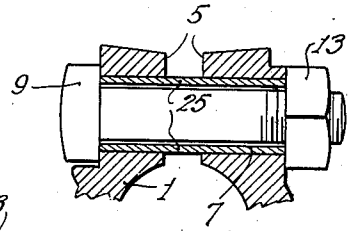
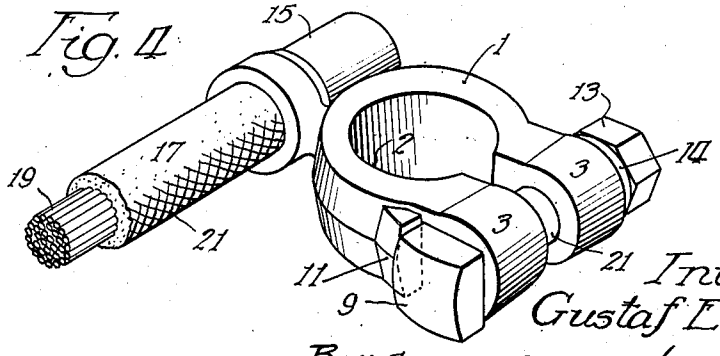


Fig. 5

Fig. 4



Inventor
Gustaf E. Andre
By: Fisher, Clapp, Adams & Powell Attys

Patented June 6, 1939 2,161,692

UNITED STATES PATENT OFFICE

2,161,692

ELECTRICAL TERMINAL

Gustaf E. Andre, Richmond, Ind., assignor to Belden Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application March 23, 1936, Serial No. 70,195

5 Claims. (Cl. 173—259)

My invention relates to electrical terminals and particularly to terminals for use in proximity to corrosive substances, as for example, the terminals used for connecting electric cables to storage batteries.

These terminals usually comprise a split, ring-like structure constituting a clamp, the same being formed of a suitable cast metal or alloy. A bolt or stud extends across the opening between the ends of the ring and through ears or lugs formed on the adjacent ends, for tightening the clamp about a co-operating battery lug or other means. To assure that the clamp shall fit the variety of battery terminals encountered, it is necessary that the ends of the clamp shall normally be separated a substantial distance. In the interests of economy and mechanical strength, it is generally necessary to use an iron or steel clamping bolt which is, however, subject to rapid corrosion by the usual battery acid and acid fumes. The end portions of the bolt can usually be protected from the corrosive action of the battery acids by a coating of grease or like acid-resistant material, but it is very difficult, as a practical matter, to apply a satisfactory coating of grease about the portion of the clamping bolt which extends between the open ends of the clamp. Hence, extreme corrosion of that portion of the clamping bolt may and usually does take place.

The principal object of the present invention, therefore, is to provide a terminal for a battery cable or the like which shall minimize, if not completely eliminate, the troublesome corrosion heretofore experienced as a result of escaping battery acid or acid fumes.

A more specific object of the present invention, therefore, consists in the provision of means for protecting from corrosion, the portion of the clamping bolt or stud intermediate the adjacent ends of the terminal.

A still further object of the invention is to provide an improved terminal of the type referred to, which may be manufactured economically and at a low cost. Other objects and advantages will be understood by reference to the following specification and accompanying drawing wherein there is illustrated a terminal embodying a selected form of the invention.

In the drawing:—

Fig. 1 is a sectional view partially in elevation, of a terminal constructed in accordance with the principles of my invention, which has been applied to a battery lug but which has not yet been tightened;

Fig. 2 is a view, similar to Fig. 1, showing the terminal tightened into position upon the co-operating battery lug;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2, the fragmentary sectional view of the conductor receiving end of the terminal is on the general line 4 of Fig. 2;

Fig. 4 is a perspective view of the terminal illustrated in the other figures of the drawing;

Fig. 5 is a fragmentary view showing a modified form of my invention, and

Fig. 6 is a view, similar to Fig. 5, showing the relation of parts with the terminal clamp tightened into position.

Referring particularly to the drawing, the terminal of my invention comprises a main body portion 1 having the general form of a split-ring or open-ended annulus. The central opening 2 within the body portion 1 is tapered as is shown in Fig. 3, in accordance with the usual practice in the art. A battery lug with which the terminal may be used is indicated at 4. Each of the ends of the body portion 1 terminates in an ear 3 having opposed, flat, inner surfaces 5 normally arranged in substantially parallel planes. A generally cylindrical passageway 7 extends through each of these ears for receiving the clamping bolt or stud 9. The ear 3 for receiving the head end of the clamping bolt is provided with a suitable flat-sided boss or projection 11, shown particularly in Fig. 4, for preventing the bolt from turning during the clamping operation. The nut 13 engages a flat bearing surface 14 formed in the other ear.

The entire terminal is preferably cast as a unit from lead or a non-corrosive alloy. The material is preferably one having considerable fluidity at casting temperatures. A suitable hollow cylindrical sleeve portion 15 for receiving the conductors 19 of the insulated cable 17 with which the terminal is used, is formed at a suitable location on the clamp or body portion 1 of the terminal. Preferably, the terminal is cast with the cable 17 in place. This assures that the insulated covering 20 for the cable shall extend very tightly against the terminal, and thereby provides a substantially sealed connection which prevents the battery acid or other corrosive materials from reaching the conductors 19 of the cable.

During the casting operation, a thin walled tube 21, which serves to connect the aligned passageways 7 formed in the two ear portions 3 for receiving the clamping bolt 9, is formed integrally with the ears 3 and the body portion 1. This tube

21 is illustrated particularly in Figs. 1, 3 and 4. Being formed with relatively thin walls, it is readily collapsible, and during the clamping operation it folds to form one or more accordion-like pleats 23, as is illustrated particularly in Fig. 2. Thus, the continuity of the walls of this tube are preserved at all times, and the entire bolt receiving, passage, the walls of which are defined by the ear portions 3 of the terminal and the tube 21, is kept completely closed at all times during the use of the terminal. Because of this, the portion of the clamping bolt 9 which extends through the open space normally separating the two ends of the clamp or body portion 1 of the terminal, is completely enclosed at all times, and since the tube 21 in common with the other portions of the terminal is formed of a corrosion-resistant material, this closure remains in existence throughout the entire operative life of the terminal.

It is possible, of course, that this enclosing tube for that portion of the clamping bolt which extends through the open end of the clamp portion of the terminal, might be formed separately from the other elements of the terminal. Such a structure is illustrated in Figs. 5 and 6, where the separate tube before and after collapse thereof is indicated at 25. The unitary cast structure is, however, the preferred method of construction.

From the foregoing, it will be seen that I have provided an improved clamp terminal intended particularly for use in proximity to corrosive substances which is provided with means for completely enclosing the portion of the clamping bolt which extends between the open ends of the clamp portion of the terminal within a sheath of corrosion-resistant material. This sheath, which in the preferred form of the invention, takes the form of a thin walled, collapsible tube, is capable of automatically accommodating itself to substantial relative movement of the opposed ends of the clamp portion of the terminal, which may take place when the terminal is being used. In addition, I have disclosed how this protective sleeve may be formed integrally with the body of the terminal during the casting of that member, thereby reducing the cost of terminals constructed in accordance with my invention to the minimum possible value.

Various modifications of my invention will be apparent to those skilled in the art, and it is my desire that the accompanying claims shall be construed as broadly as is possible consistent with the state of the art.

I claim as my invention:

1. In an electrical terminal, a one piece clamp member comprising a pair of spaced cooperating sections adapted to be clamped about a suitable cooperating contact, and a bolt or stud for moving said sections toward each other during the clamping operation, said cooperating sections having openings therein for receiving said bolt or stud, and that portion of said bolt or stud which extends between said sections being enclosed within a thin walled, collapsible tube formed integrally with said terminal.

2. In an electrical terminal particularly intended for use in proximity to corrosive substances, a one piece, cast clamp member of corrosion resistant metal having the general form of an open ended annulus, the two ends of said clamp member terminating in shoulder portions which are normally separated some distance from each other, a bolt or stud which extends through passageways formed within each of said shoulder portions to connect the two ends of said clamp member, and a thin walled, collapsible tube for connecting said passageways in order to enclose that portion of said bolt or stud which passes through the open end of said clamp member, said thin walled tube being cast integrally with said clamp member.

3. In a one piece, cast, electrical terminal particularly intended for use in proximity to corrosive substances, a clamp member having the general form of an open ended annulus, the two ends of said member terminating in shoulder portions which are normally separated some distance from each other, a bolt or stud which extends through suitable cylindrical passageways formed within each of said shoulder portions to connect the two ends of said clamp member, and a thin walled, substantially cylindrical, tube for connecting said passageways in order to enclose that portion of said bolt or stud which passes through the open end of said clamp member, said thin walled tube being cast integrally with said clamp member, and said clamp member being cast of a corrosion resistant metal of sufficient fluidity to form said thin walled tube during the casting operation.

4. In an electrical terminal particularly intended for use in proximity to corrosive substances, a clamp member having the general form of an open ended annulus, the two ends of said clamp member terminating in shoulder portions which are normally separated some distance from each other, a bolt or stud which extends through suitable aligned passageways formed within said shoulder portions to connect the two ends of said clamp member, and a thin walled, axially collapsible cylindrical tube of relatively soft corrosion resistant metal disposed within and connecting said aligned passageways, said tube having a sufficient length that the ends thereof will be engaged by the ends of said bolt or stud when said clamp is tightened in place upon the contact with which it is used, the portion of said tube which extends between said shoulder portions being adapted to be at least slightly collapsed during the tightening of said stud or bolt.

5. In an electrical terminal particularly intended for use in proximity to corrosive substances, a clamp member having the general form of an open ended annulus, the two ends of said clamp member terminating in shoulder portions which are normally separated some distance from each other, a bolt or stud which extends through suitable aligned passageways formed within said shoulder portions to connect the two ends of said clamp member, and a thin walled, axially collapsible cylindrical tube of relatively soft corrosion resistant metal extending between and connecting the inner ends of said aligned passageways, said tube cooperating with said shoulder portions and said aligned passageways formed therein to provide a single, substantially straight passageway, completely enclosed at all times, for receiving the shank portion of said bolt or stud, whereby corrosion of the shank portion of said bolt or stud shall be positively prevented regardless of the tightness or lack of tightness of said bolt or stud, said tube being adapted to be at least slightly collapsed during the tightening of said stud or bolt.

GUSTAF E. ANDRE.