May 6, 1930. H. A. WOOFTER 1,757,822

ELECTRICAL LEAD

Filed May 24, 1926

Fig. 2.

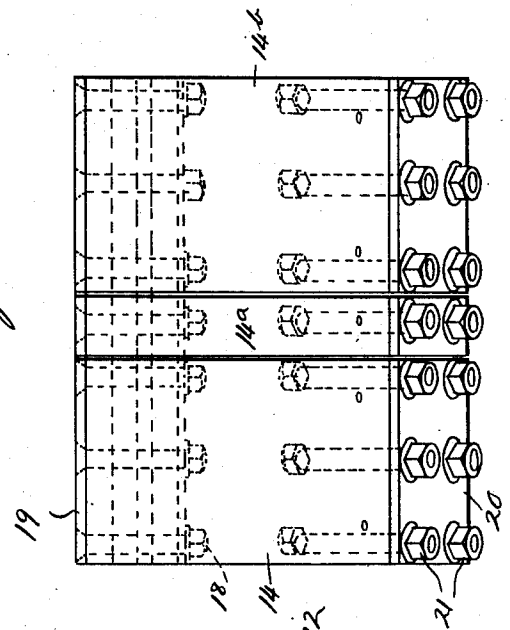
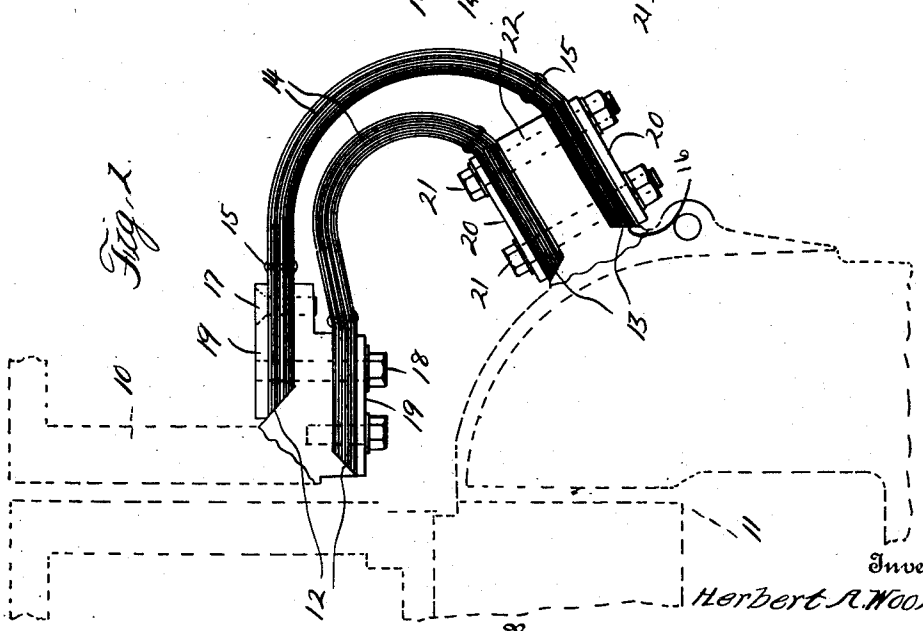


Fig. 1.



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UNITED STATES PATENT OFFICE

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ELECTRICAL LEAD

Application filed May 24, 1926. Serial No. 111,403.

The invention relates to electric leads and more particularly to an improved construction of electrical lead or conductor.

While the invention need not necessarily be so limited, it contemplates, in the illustrative embodiment herein shown and described, a laminated or multi-ply lead having the ends thereof formed with inclined surfaces, as, for instance, by bevelling the same, which end portions are adapted to have an abutting engagement with the elements adapted to be connected electrically. Such a construction involves several noteworthy advantages, one of the most important of which is that of obtaining a more efficient and satisfactory electrical contact between the ends of the lead and the elements connected thereto. With the present construction the current passing through the laminæ flows therefrom through the ends directly into the element to which the lead is connected and eliminates the necessity of the current from the outer laminæ passing through the inner laminæ, to the element such as is the case where the ordinary surface contact is effected. Thus, a more efficient and satisfactory electrical connection may be provided with the use of a lead of the character taught by this invention.

The advantages of this invention result, to a great extent, from the construction of the ends of the lead which are bevelled or inclined to increase the cross sectional area of each strip and to consequently provide a greater contact area. Then by providing screws or bolts together with clamping plates the inclined ends of the lead may be drawn or forced into contact with the element to which it is to be connected. Obviously with such a construction the pressure with which the bevelled surfaces engage will be increased by tightening the bolts or screws together with the clamping plates to thus increase the efficiency of the electrical contact.

While obviously the invention is capable of efficient use in practically every instance where two parts are to be connected electrically, nevertheless the invention is herein illustrated, and has been found to function with particular effectiveness, in connection with welding apparatus wherein currents of high amperage are used.

The several other objects and advantages and numerous novel details of the construction of the invention will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawing wherein

Figure 1 is a fragmentary side elevation of certain parts of a welding apparatus showing the application of this invention and

Figure 2 is a front elevational view of the structure illustrated in Figure 1.

Referring now particularly to the drawings wherein like reference characters indicate like parts, it will be noted that for the purpose of showing one application of the present invention I have illustrated fragmentarily certain parts of a welding apparatus which includes a terminal block 10 and a secondary casting 11 which for the above purposes, will be designated as the elements adapted to be connected electrically. The element 10 is shown as provided with two inclined surfaces 12 while the element 11 is also provided with a pair of inclined surfaces 13.

Each of the electrical leads or conductors 14 is illustrated as of a laminated or multi-ply construction formed of a plurality of longitudinally flexible sheets of material united at one or more points by fastening means 15. Each lead 14 has one or both of its ends bevelled or inclined as indicated at 16 which bevelled end or ends is adapted to be secured to either of the elements 10 or 11 or both, in abutting relation to the inclined surfaces 12 or 13 thereof.

In the illustrative embodiment of the invention shown in the drawings, one end of each of the substantially parallel leads 14 are shown as secured to the terminal block 10 by means of bolts 17 and a bolt 18 common to both of the leads. All of the securing elements just referred to not only pass through the ends of the leads and through the adjacent portion of the terminal block 10, but also through clamping plates or elements 19 arranged in substantially parallel relation with the ends of the leads 14. The

other ends of the leads 14 have associated therewith clamping plates 20 which together with bolts 21 cooperate to secure these ends of the leads to the projecting portion 22 of the secondary casting.

In practice the ends of the leads 14 will be carefully machined to a certain definite slope, so that the cross sectional area is thereby greatly increased, giving a contact area greatly in excess of a direct right angle cross section. These inclined or bevelled ends will be caused to engage the inclined surfaces aforedescribed formed on the terminal block or secondary casting, then by means of the clamping plates these inclined ends are drawn tightly into engagement with the corresponding inclined surfaces.

From an examination of Figure 2 it will be noted that in addition to the pair of leads 14 shown in edge elevation in Figure 1, two other sets of leads 14^a and 14^b are also employed, the construction of these leads however, being identical with the ones just described. The three sets of leads are shown as including two sets of relatively wide leads and one set of relatively narrow leads. Obviously the particular dimensions of the leads as well as the number thereof and their arrangement and association have no particular bearing upon the scope of this invention because as mentioned hereinbefore, the invention for illustrative purposes, is herein shown as applied to a welding machine and the present use of the leads is peculiar to this character of welding machine.

The herein described construction and arrangement of leads finds special utility in connection with welding apparatus because by arranging the leads in a plurality of rows of sections in parallel the inductive reaction of the transformer is reduced thereby securing a much higher power factor than it has been possible to obtain before in a resistance welding machine.

Furthermore with the leads bowed or curved into a substantial U-shape when the terminal block 10 is moved a travelling or rolling motion of the leads results.

With the construction as just described, it will be noted that electric current passing from one of the elements to the other through the leads 14 may enter and pass out of the ends thereof because these ends are secured in abutting relation with the elements to be connected electrically. When, as was heretofore practiced, connection between the lead and the elements to be connected was effected merely by clamping the face or side of the end of the lead to the element, the current from the plies of the lead most remote from the point of contact was forced to pass laterally through the remaining plies to the element so that a relative inefficiency in the conduction of the current resulted. However, with the present invention, the amount of current conducted by each layer or ply of the lead may flow therefrom through the end directly to the element with which connection is made. In the embodiment of the invention herein illustrated, this abutting end contact between the elements and the lead is in addition to the usual surface contact as practiced with electrical leads of this character heretofore.

Inasmuch as the invention is capable of application and use in numerous other ways, reservation is made to make such changes and rearrangements as may be necessary and expedient without departing from the spirit and scope of this invention and as may come within the purview of the accompanying claims.

What I claim as my invention is:

1. The combination with an element having an inclined surface formed on its side, of an electrical lead having a bevelled end, and means for clamping said electrical lead to the side of said element with the bevelled end of said lead in wedging engagement with the inclined surface on the element.

2. The combination with an element having an inclined surface formed on its side, of an electrical lead having a bevelled end, and means for clamping said electrical lead to the side of said element with the bevelled end of said lead in wedging engagement with the inclined surface on the element, said means including a plate engageable with the outer face of said lead, and securing members passing through said plate and said lead and engaging said element.

3. The combination with an element having a portion of its surface inclined, of a multi-ply electrical lead having a beveled end, and means for clamping said multi-ply electrical lead to the said element with the beveled end of said lead in abutting wedging engagement with the inclined surface on the element.

4. The combination with an element, of a multi-ply electrical lead having a beveled end, and means for wedging and permanently securing the beveled end of said multi-ply lead in engagement with the said element.

In testimony whereof I affix my signature.

HERBERT A. WOOFTER.