March 10, 1936. M. LEE 2,033,199

INSULATED ELECTRICAL CONNECTER

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Fig. 1.

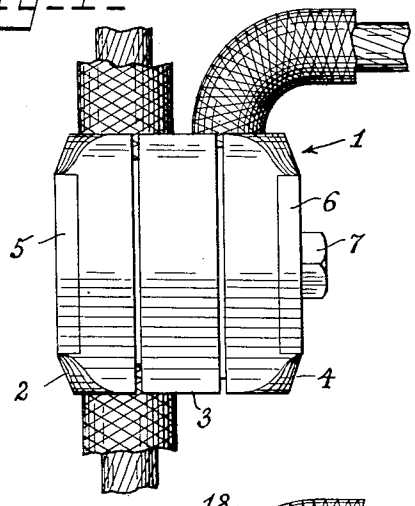
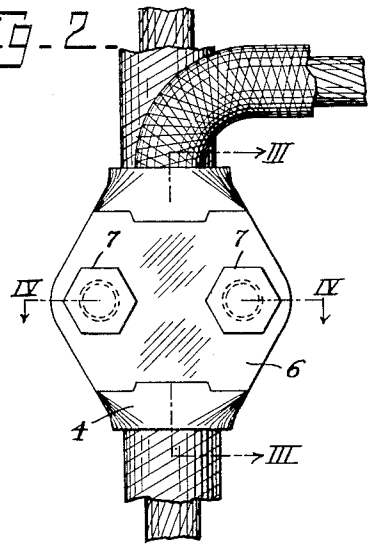


Fig. 2.



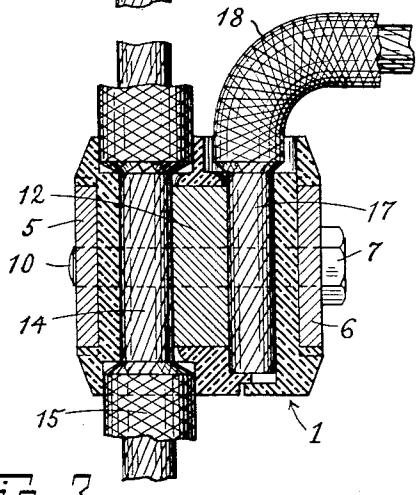


Fig. 3.

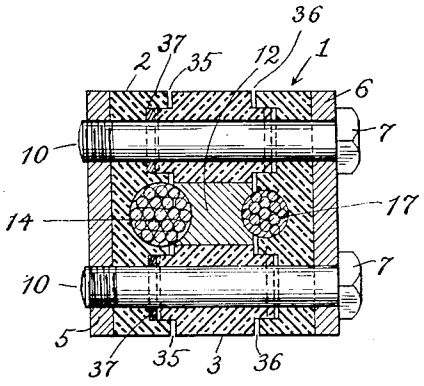


Fig. 4

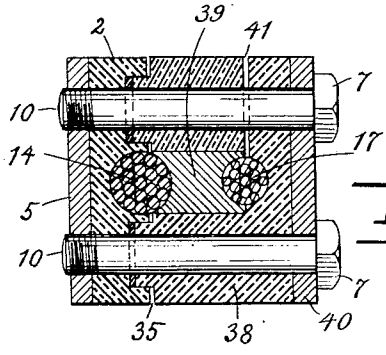


Fig. 10.

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Fig. 5.

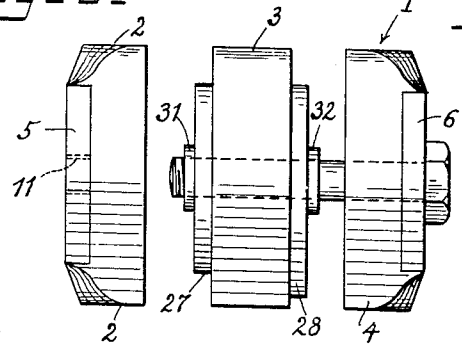


Fig. 11.

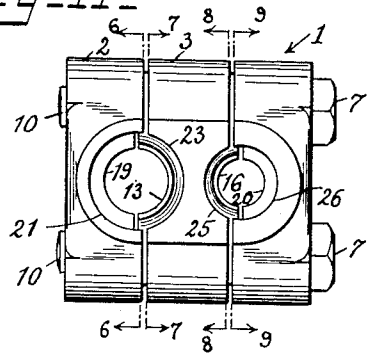


Fig. 6.

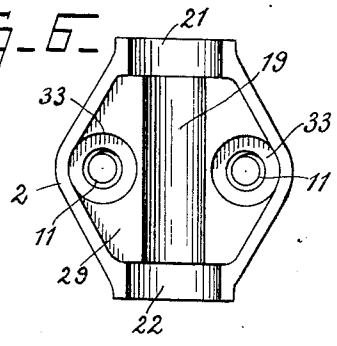


Fig. 7.

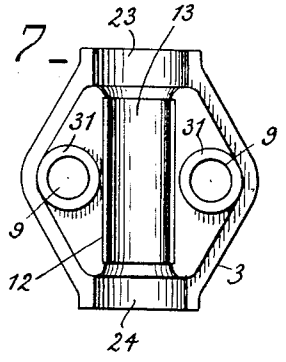


Fig. 8.

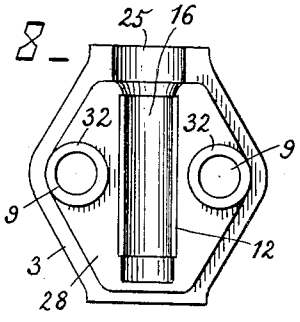
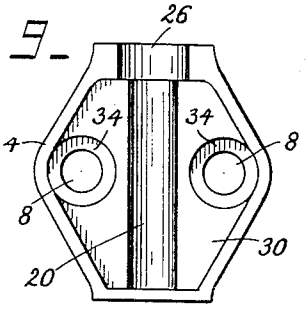


Fig. 9.



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UNITED STATES PATENT OFFICE

2,033,199

INSULATED ELECTRICAL CONNECTER

Marvin Lee, Rye, N. Y., assignor to Burndy Engineering Co., Inc., New York, N. Y., a corporation of New York

Application June 22, 1934, Serial No. 731,803

4 Claims. (Cl. 173—273)

The present invention relates to insulated electrical tap connecters of the clamp type which are particularly adapted for making branch line connections to a main conductor.

The main object of my invention is to make it possible to quickly and conveniently connect a branch line permanently to a main line conductor, without using tape or an insulating box to cover the connected metallic portions of the cable conductors involved, and without soldering said cables together.

It is therefore an important object of the invention to provide an improved electrical tap connecter of the type referred to, which, while avoiding the use of tape, is nevertheless fully insulated so that tape or any other form of insulation whatsoever is entirely unnecessary.

Another object is to provide such a connecter which makes an exceptionally good contact with the metallic portions of the cables by taking advantage of the best possible application of the clamp principle used in two or three part connecters.

A further object is to have the mentioned type of connecter which, although consisting of an assemblage of two or more main members, yet eliminates all danger of having an open seam between the members by including interlocking insulating portions thereon.

A still further object is to produce this type of insulated tap connecter which is exceedingly compact without in the least sacrificing its high efficiency so that it may be applied in cramped and very limited or awkward places.

It is also an object to produce such a connecter which is both strong and very durable, and also economical to make, and particularly economical to use by being an enormous time saver in installations wherein it is introduced.

Other objects and the many advantages inherent in the design, construction and use of my invention will appear more fully in detail as this specification proceeds.

Referring now to the accompanying drawings,

Figure 1 is a side view of an insulated electrical tap connecter made according to my invention and embodying the features thereof, portions of conducting cables being shown to indicate the relative positions thereof when connected.

Figure 2 is another view of the same as seen from the right in Figure 1.

Figure 3 is a vertical section of the connecter on line III—III of Figure 2.

Figure 4 is a transverse section on line IV—IV of Figure 2.

Figure 5 is a side view of the connecter when only partly assembled, without the cables.

Figure 6 is an inside view of the insulating cover or clamping member upon the left end of the assemblage of Figure 5.

Figure 7 is a view of one side of the intermediate insulated conducting member of Figure 5.

Figure 8 is a view of the opposite side of the same.

Figure 9 is an inside view of the insulating cover or clamping member upon the right end of the assemblage of Figure 5.

Figure 10 is a similar section to that of Figure 4, showing a modification.

Finally, Figure 11 is a top view of the connecter alone.

Throughout all of the views, the same reference numerals indicate the same or like parts.

In making tap connections to a main line, it has heretofore been customary to first solder and then tape the connection of the conductors, with an accompanying considerable amount of time and labor involved, not to mention that such a junction takes up considerable space and also requires some space for manipulation while being made. However, it is very often the case that only very limited space is available for connections in panel board gutters and junction boxes and the like, and a soldered and taped joint is both inconvenient to install therein and difficult to fit in place.

With the foregoing objects in view, and in order to wholly avoid the mentioned difficulties, it is now proposed to introduce a fully insulated, compact and convenient tap connecter of exceedingly efficient design.

Hence, in the practice of my invention, a tap connecter, generally indicated at 1 is preferably made of three main block members namely, a through insulating end block 2, an intermediate insulated connecting block 3, and a blind insulating end block 4. The ends blocks 2 and 4 have metal reinforcing plates similar to 5 and 6 respectively embedded in their outer end faces to take the strain of the clamping when the connecter is installed. In order to assemble said blocks, a pair of bolts 7—7 extend through holes 8—8 in end block 4, and holes 9—9 in intermediate block 3, while the threaded ends 10—10 of the bolts extend into holes 11—11 of end block 2 and are screwed into plate 5, and this form of assembly assures a good clamping effect between each two adjacent faces of said blocks.

In the intermediate or connecting block 3 is embedded a contact element or member 12 of

metal such as copper, the same extending right through the block from one side to the other. Upon the side intended to face end block 2, the contact element 12 has a groove 13 to generally conform to one half of the contour of the metal portion 14 of a main cable 15, while on the other side a groove 16 is intended to receive the metal portion 17 of a branch conductor 18. In correspondence with the remaining portion 14 of the main cable 15, the end block 2 has a groove 19 which is opposite and similar to groove 13 of the connecting or contact element 12, while the other end block 4 has a blind groove or channel 20 to enclose the metal portion 17 of branch conductor 18 when seated in groove 16 of said contact element. Obviously, when the blocks are assembled and the bolts screwed up tightly, the outer end blocks will firmly clamp the metal portions of the conductors seated in the grooves of the contact element so that they make rigid contact with the latter in said grooves. In addition, the arrangement of the blocks and the contact portions of the cables in a clamped series causes the whole pressure applied by the bolts to be directly exerted in full upon each of the contact portions and renders the contact very intimate and rigid in each case. This is quite important, as it lowers resistance, eliminates heating and current losses, as well as ensures durable connections.

When the present connecter is to be applied, it is only necessary to cut away a limited section of the insulation upon the main cable 15 so as to expose a length of bare metal 14 sufficient to match with the length of the contact element 12. This length is however not the same as the length of the end block or the intermediate block, but instead, the end block 2 has a pair of enlargements of groove 19 at 21 and 22 while the intermediate connecting block has similar enlargements of groove 13 at 23 and 24 to receive the insulation of cable 15 and wholly conceal the cut ends thereof within the connecter. In similar manner the insulation upon branch conductor 18 is cut away to expose a sufficient length of metal portion 17 to engage against contact element 12 and perhaps extend slightly past the same, while the upper enlargement 25 of groove 16 in intermediate block 3 and upper enlargement 26 of grove 20 in end block 4 are adapted to receive the end of the insulation of said cable 18 and wholly conceal the cut portion thereof from view.

Manifestly, when the blocks are assembled into an aggregate forming a connecter for the cables as particularly disclosed in Figures 1 to 4 inclusive, the main pressure is exerted upon the grooves in the blocks and the intermediate contact element as well as the metal portions of the cables, while there will of course be a slight opening between the edges of the adjacent blocks in each case as at 35 and 36. The present invention also includes means which completely eliminate any disadvantage which might be introduced by the presence of said openings, so that access from without to the conductors within the connecter will be completely blocked and the possibility of the ingress of metal dust or other undesirable matter eliminated or minimized. For this purpose, the intermediate connecting block 3 has a raised portion 27 upon one side and 28 upon the other side which project into spaces 29 and 30 of end blocks 2 and 4, respectively, so that the edges of the latter completely envelop said projecting or raised portions even when the blocks are not wholly clamped together and the edges thus not fully in contact. In addition to this, the holes 9—9 in the intermediate member 3 are provided with projecting portions 31 and 32 which are adapted to project into corresponding hollow portions 33 and 34 in the end blocks 2 and 4, respectively. Due to the projection of said portions 27, 28 as well as 31 and 32 about the bolts, it would not be possible to make contact with the bare metal 14 or 17 of conductors 15 and 18 or with the bolts 7—7 by inserting a knife or other object into the slight openings which appear between the blocks of the connecter even when fully assembled and clamped together as tightly as possible, for in each case parts 27 and 28 which are integral with the main frame of the intermediate block 3 would be encountered. The insulating end blocks 2 and 4 consist entirely of insulating material such as phenolic condensation product, ebonite, or any other suitable material, except for embedded plates 5 and 6 which reinforce these blocks, while the intermediate block, except for the contact element 12, is also formed of similar material such as phenolic condensation product, ebonite, etc., and in each case it is of course preferable to use insulating material which can be molded and thereafter accurately made so as to fit quite perfectly when the blocks are assembled.

The bolts are preferably of the rolled thread type, although others may be used, and insulating washers 37—37 of fibre, phenolic condensation product, or other material may be threaded or forced on the bolts past the threads and so tightly engage the bolt shanks as to readily retain by friction, the block 3 assembled with end block 4, when the bolts are unscrewed from end block 2. This facilitates handling of the connecter, as blocks 3 and 4 with the bolts in position may be conveniently handled as a unit.

It is possible to modify the connecter by having a block 38 of insulating material such as already mentioned having as before in the case of the intermediate block a contact element 39 similar to element 12 and reinforced by an end plate 40 while bolts 7—7 clamp the conductor 14 against said contact element 39. In this modification, however, block 38 replaces both the intermediate block and the right end block 4 as it is not subdivided into two blocks but merely has a slot or cut 41 extending down to the cable 17.

Other modifications are evidently possible without departing from the scope of my invention and parts may be used without others. Furthermore, I am not limited to the use of metal for the end plates 5 and 6 but may use other materials and may dispense with said plates altogether and make the end blocks wholly integral of insulating material other than those materials mentioned, while the contact elements 12 and 39 may be made of copper, silver, brass or any material whatsoever or in fact any conductive material which will serve the purpose such as carbon or graphite, etc. and said elements may also be made solid, hollow or of wire, etc.

The invention thus affords a ready means for making a quick, cheap and compact as well as durable connection between a main conductor and a branch conductor without solder or tape and without the loss of time or the expenditure of much effort.

Having now fully described my invention, I claim:—

1. An insulated electrical connecter comprising the combination of a pair of rigid clamping

end blocks of insulating material, each end block being grooved in parallel manner upon one side to receive and locate cables in the grooved portions thereof, an intermediate main block interposed between said end blocks and consisting of a compact metal contact member having all peripheral edges surrounded by an adhering outer wall of insulating material exposing free of insulation solely the two opposite sides of said contact member facing said end blocks, said main block being grooved in parallel manner upon both sides, including the two insulation-free opposite sides of said contact member to correspond with the grooved portions of said end blocks, and a pair of spaced, parallel clamping bolts passing through the two end blocks and the intermediate main block within the edges of said blocks out of contact with said contact member in positions wherein the contact member and the grooved portions of said blocks are disposed in the space between said bolts.

2. An insulated electrical connecter according to claim 1, wherein one grooved portion on one side of one end block and the corresponding grooved portion on one side of the intermediate block including the contact member is in each case open toward the exterior solely one end and terminates at the other end within the edges of said blocks to form a blind insulated end, while the other grooved portions are open at both ends, and wherein the intermediate block is recessed to form shoulders upon the edges thereof and the edges of the end blocks are correspondingly extended to project into said recesses toward said shoulders.

3. An insulated electrical connecter according to claim 1, wherein the end blocks are both provided with metal reinforcing plates embedded in the outer sides thereof and the bolts at one end pass through said reinforcing plates and have heads which engage exteriorly against one of said plates and at the other end have threaded portions screwed into the other of said plates.

4. In an insulated electrical connecter having a pair of clamping end blocks of insulating material and a pair of parallel spaced bolts passing through both blocks to retain the same in assembled relation, there being parallel grooves formed in the two facing sides of said end blocks between said bolts for receiving cables, an intermediate main block interposed between said end blocks comprising a compact metal contact member having the outer edges covered by a continuous attached wall of insulating material, the two opposite sides of said contact member being free from insulation and formed with parallel grooved portions corresponding with the grooves in the end blocks, and there being means reinforcing said end blocks to assist the same in withstanding clamping strains.

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