

Feb. 18, 1947.

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2,416,113

INSULATOR FOR CONNECTING CLIPS

Filed Nov. 12, 1942

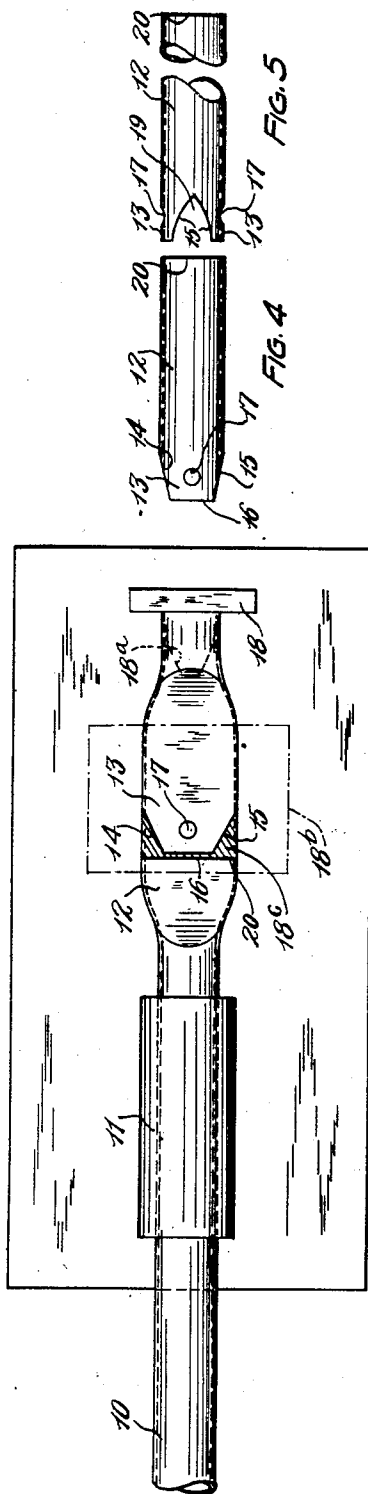


FIG. 1

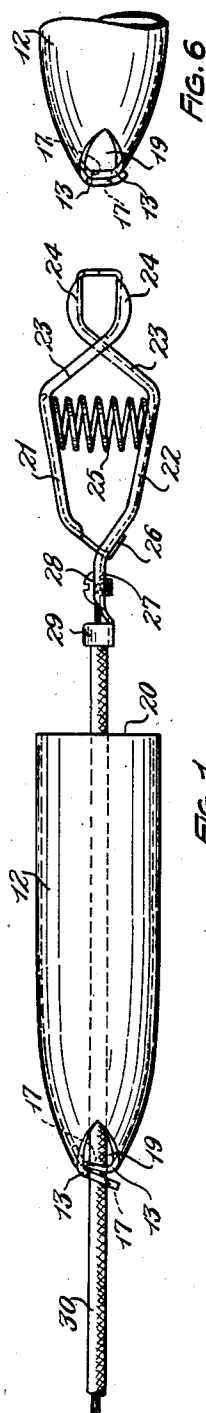


FIG. 2

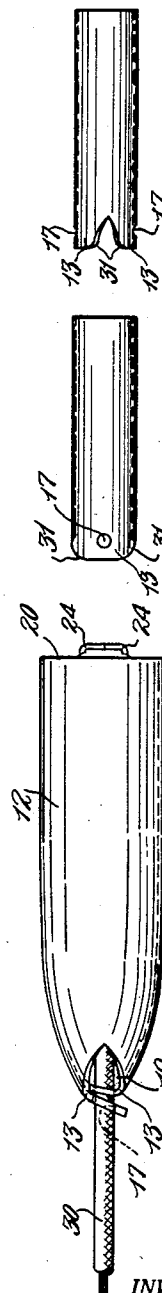


FIG. 3

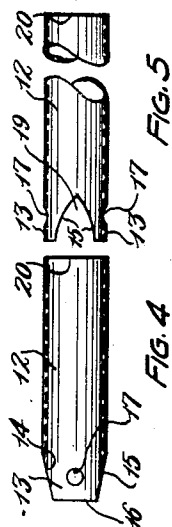


FIG. 4



FIG. 5

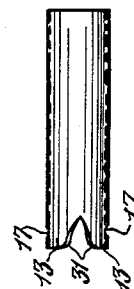


FIG. 6



FIG. 7

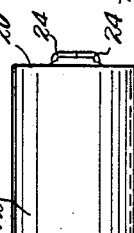


FIG. 8

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2,416,113

INSULATOR FOR CONNECTING CLIPS

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Application November 12, 1942, Serial No. 465,303

1 Claim. (Cl. 174—138)

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This invention relates to an insulator and more particularly to an insulator for an electrical connecting clip such as is used to connect an electrical conductor to a terminal.

An object of the invention is to provide an insulator for an electrical connecting clip which is simple in construction and can be readily and inexpensively manufactured and which can be applied to the connecting clip with facility.

Another object is to provide an insulator for an electrical connecting clip and which insulator is not produced by molding operations but is formed of flexible tubing cut and trimmed in a predetermined manner to the desired shape.

Another object is to provide an insulator for an electrical connecting clip and which insulator is formed from flexible tubing and is so constructed that it will adequately cover up and insulate the entire clip including the tail end of the latter and also will exert an inherent gripping action on the electrical conduit or conductor connected to the clip, thus preventing the insulator from slipping along the conduit or conductor and away from the clip.

Another object of the invention is to provide an insulator for an electrical connecting clip and which insulator may be formed of extruded plastic tubing by means of simple and inexpensive manufacturing operations.

Additional and further objects of the invention will become apparent hereinafter during the detailed description that is to follow of embodiments of the invention.

Referring to the accompanying drawing illustrating said embodiments of the invention,

Fig. 1 is an elevational view of an insulator embodying the invention with the insulator depicted as mounted on the conduit or conductor that is attached to the connecting clip but with the insulator not yet pushed up over the clip.

Fig. 2 is a view similar to Fig. 1 but showing the insulator pushed up over the clip until the nose of the latter projects slightly from the insulator.

Fig. 3 illustrates diagrammatically and on substantially one-half of the scale of Figs. 1 and 2, the manner in which the insulator may be formed from extruded plastic tubing.

Fig. 4 is a top plan view of the finished insulator shown in Fig. 3.

Fig. 5 is a side elevational view of the insulator shown in Fig. 3.

Fig. 6 is a fragmentary view of the tail end of the insulator shown in Fig. 1 and on the same

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scale, with the tail flaps of the insulator cemented together, and

Figs. 7 and 8 are views similar to Figs. 4 and 5, respectively, but illustrate a slightly different form of insulator in that the tail flaps have rounded or curved edges as distinguished from the angularly disposed substantially straight edges of the insulator shown in Figs. 4 and 5.

In making insulators for connecting clips and similar devices it has been customary to mold the insulators from rubber stock. This practice requires, of course, the use of molding dies and the employment of rubber stock and which, at the present time at least, is not readily available or plentiful for such purpose. Also insulators formed of rubber stock have a relatively high incidence of deterioration when subjected to heat, oil and other deleterious conditions.

Insulators constructed in accordance with the present invention need not be formed of molded rubber stock but can be constructed more economically, simply and expeditiously from suitable flexible tubing as, for example, synthetic plastic flexible tubing. The insulators embodying the present invention may be constructed from extruded flexible tubing by means of simple cutting, punching and trimming operations, which can be carried out rapidly and cheaply in existing machines as, for example, a punch press, by utilizing in such machines a simple form of cutting, punching and trimming die. The insulators formed of flexible tubing such as plastic tubing will have a high dielectric strength thus making the insulators suitable for insulating purposes, and also such insulators will possess high resistance to heat, oil and other deteriorating factors, thereby increasing the effective life of the insulators.

Referring first to Figs. 3, 4 and 5 the manner in which the insulator of the present invention may be formed and the character of its construction will now be explained. A suitable length of flexible tubing 10, and which tubing may be extruded and formed of plastic or other suitable material can be fed through a cylindrical guiding element 11 until its right hand end, as viewed in Fig. 3, contacts a fixed positioning abutment 18 which has a conical centering projection 18a extending into the tube. The cylindrical guide member 11 and the positioning abutment 18 may be arranged on a suitable machine as, for example, a punch press. This machine may have a movable die member 18b functioning on one downward stroke of the member to flatten that portion of the length of tubing

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10 which is below the die member and then to cut off the left hand end of said portion of the tubing to the desired shape to provide the tail flaps of the insulator and to punch the aligned holes in said flaps while at the same time the die member will trim off the right hand end of the remaining length of tubing to give a plane or straight edge configuration thereto.

Referring to Fig. 3 the portion of the length of tubing 10 which lies beneath the die member and is first flattened by the operative movement of said member is indicated at 12. The die member after it has flattened the portion 12 acts by means of the male die member 18c to sever the flattened portion adjacent its left hand end to form the tail flaps 13 of the insulator. These flaps 13 each have convergent side edges 14 and 15 with the edges of each flap at their inner ends merging into the inner ends of the corresponding edges of the other flap. The edges 14 and 15 at their outer ends join the end edge 16 of each flap. The die member in addition to cutting the tail flaps from the flattened portion of the tubing also punches in said flaps the aligned openings 17. In addition, the die member trims the right hand end of the remaining length of tubing to a straight edge. The die member having completed the cutting, punching and finishing or trimming operations just referred to now moves away from the insulator on its return stroke and the finished insulator is removed from the machine in some suitable manner as, for example, it may be ejected therefrom by directing a jet of compressed air against it.

From the foregoing it will be noted that the insulators may be quickly and easily produced from a length of flexible tubing fed into operative position by predetermined increments and that each operative stroke of the movable die will produce a separate insulator from the length of tubing. As soon as the die releases its pressure upon the cut, punched and trimmed length of tubing 12 the latter, due to the inherent resilience of the flexible tubing, will revert to its normal cylindrical configuration, at which time the tail flaps 13 will have a general arcuate shape transversely of the insulator while substantially V-shaped openings 19 will separate said tail flaps as clearly indicated in Fig. 5. The right hand end of the finished insulator, as shown in Figs. 4 and 5, will have a substantially circular plane end edge 20.

The insulator may be used with various forms of electrical connecting clips of the spring or hinged jaw type. A good illustration of this type of clip is to be found in my Patent No. 1,779,442, granted October 28, 1930, and therefore a clip corresponding to that shown in said patent will be shown and described herein by way of illustration.

The clip as illustrated comprises two members 21 and 22 having crossed portions 23 which are provided at their free ends with jaws 24. The jaws 24 are normally pressed together or held closed by a coil spring 25 interposed between the members 21 and 22. The members 21 and 22 are pivotally connected together by providing on the member 21 spaced tongues 26 which extend through slots in the member 22 (only one tongue and one slot being shown herein). The members 21 and 22 are flanged inwardly or channeled, with the member 22 extending rearwardly beyond the point on its pivotal connection to the member 21 and thus providing a flanged extension 27. A terminal screw 28 is threaded through

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a tapped opening formed on the center line of the flanged extension 27, while the rear end of said extension is provided with a reduced portion having along its opposite edges ears 29.

In applying the insulator to a connecting clip one of the tail flaps 13 of the insulator is bent downwardly, while the other tail flap is bent upwardly in overlapping relationship and until the openings 17 register with each other. Then the skinned end of an electrical conductor 30 is threaded through the openings 17 and said conductor pushed on through the openings and the insulator 12 and out of the open end of the latter. Then the skinned end of the conductor is clamped under the terminal screw 28 of the clip, after which the ears 29 of the clip are bent down into clamping engagement with the conductor. The insulator may now be moved along the conductor 30 to envelope the connecting clip and insulate the same. If desired, the connecting clip may be entirely enclosed within the insulator 12 or the nose of the clip composed of the jaws 24 may be fully exposed from the open end of the insulator or partially exposed, as indicated in Fig. 2. In any event the insulator will adequately envelope and protect the clip, and particularly the tail end of the latter which is completely enclosed due to the bending of the tail flaps 13 of the insulator. In this connection it should be noted that when said tail flaps 13 are bent to bring the openings 17 into registry, the V-shaped spaces 19 between the flaps are materially reduced in size and only relatively small openings between the flaps remain so that no part of the tail of the clip is exposed sufficiently to contact with elements which might short-circuit the clip. In connection with the size of the openings 19, as shown in Figs. 1, 2 and 6, it will be recalled that these views are on a scale twice that of Figs. 4, 5 and 8.

The tail flaps 13 of the insulator when the latter is enveloping the connecting clip tend to return to their original condition due to the inherent resilience of the material of which the insulator is formed. This tendency of the flaps 13 to return to their original condition or position throws the openings 17 slightly out of alignment with each other, with the result that the edges of the openings 17 of the flaps tenaciously grip the conductor 30 and hold the insulator in position and against slipping backwardly on the conductor and exposing the connecting clip.

It will be understood that the insulators are made in varying sizes for use with different size connecting clips and also that the openings 17 will be formed of such size as to snugly fit the size of conductor which should be used with a particular size of connecting clip.

If desired, the tail flaps 13 could be bent into overlapping engagement, with the openings 17 in alignment with each other and said flaps cemented in that position prior to the application of the insulator to the connecting clip. This arrangement is disclosed in Fig. 6 and possesses the advantage of somewhat greater convenience to the user as it is capable of more ready application to the connector clip, since the conductor can be threaded through the openings 17 in the flaps without the user being required to bend the flaps into position. Of course if this is done the flaps are not free to tend to return to their original position because of the inherent resilience of the material and therefore the edges of the openings 17 will not have any gripping action on the conductor

except insofar as is produced by the snug fit of the conductors in the openings.

In Figs. 7 and 8 the side and end edges of the flaps 13 instead of being straight edges angularly disposed with respect to each other are shown as curved, particularly at those portions of the edges where they merge with each other. In other words, the side edges of the flaps and the end edge thereof are interconnected with gradually curved portions indicated in Figs. 7 and 8 at 31. This arrangement imparts to the insulator a more finished, pleasing and symmetrical appearance.

From the foregoing description it will be seen that insulators can be efficiently, economically and easily manufactured from flexible tubing which may be extruded tubing and may be formed from plastic or other suitable flexible tubing.

Instead of requiring molding dies for the production of the insulators, a simple form of flattening, cutting, punching and trimming die may be used, and such die can be mounted in a simple machine, such as a punch press, and each operative stroke of the machine will produce an insulator.

Since the insulators may be formed of plastic tubing they will have a high dielectric strength and will resist heat, oil and other deleterious conditions.

The insulators can be easily applied to the connecting clips and adequately protect and insulate the latter.

Although preferred embodiments of the invention have been illustrated and described herein, it will be understood that the invention is susceptible of various modifications and adaptations within the scope of the appended claim.

Having thus described my invention, I claim:
An insulator for an electrical connecting clip

of the spring or hinged jaw type adapted to have an electrical conductor connected to one end thereof; said insulator comprising a piece of flexible tubing of electrical insulating material having substantially constant wall thickness from end to end, said tubing being considerably greater in diameter than the diameter of the conductor but such as to snugly telescope over the clip, said piece of tubing being of sufficient length to receive the clip and a portion of the conductor, one end of said piece of tubing being open to provide access to the clip jaws while the other end thereof is provided with flaps having openings therein of predetermined diameter, said flaps when overlapped substantially closing said other end of the piece of tubing and placing said openings in alignment with each other whereby the conductor may be passed through the openings and gripped by the flaps.

RALPH S. MUELLER.

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