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ELECTRICAL CONTACT CLIP AND COVER THEREFOR

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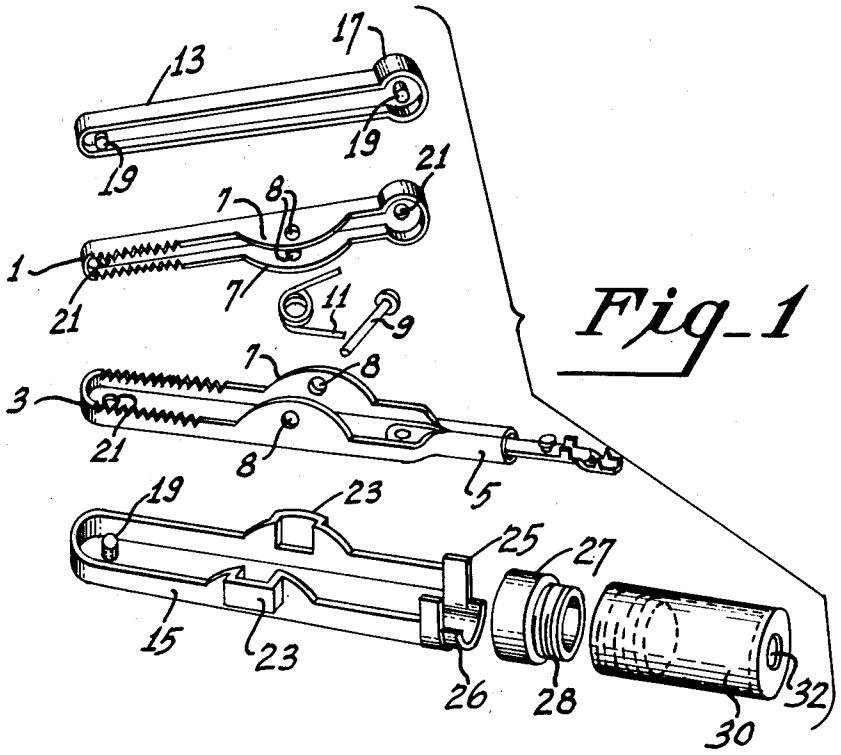


Fig_1

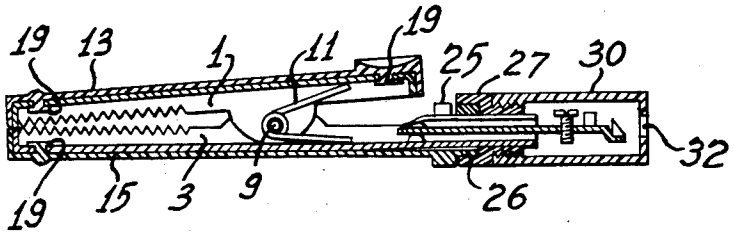


Fig_2

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ELECTRICAL CONTACT CLIP AND COVER THEREFOR

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4 Claims. (Cl. 339—200)

The present invention relates to an electrical contact clip and insulating cover therefor.

An object of the invention is to provide an improved easily manufactured and inexpensive plastic insulating cover which can be quickly and simply attached to the main parts of an electrical contact clip with a minimum of effort.

Another object is to provide an easily assembled and inexpensively manufactured insulated electrical contact clip having spring actuated hinged jaws for clampingly engaging a terminal member or wire carrying electrical current.

Briefly stated, the invention comprises an electrical contact clip of the type having fixed and movable metallic jaws hingedly joined together, the fixed jaw having a stem or holding portion to which the electrical wire is connected for carrying electrical current. Individual tapered and thin insulating covers of molded plastic material are provided for both jaws. The shape of each insulating cover is such that it fits snugly over the particular jaw which it is designed to cover. Both plastic covers have flange-like edges which enclose almost entirely the sides of the metallic jaws. The cover for the movable jaw has a finger receiving indented portion at the wide end and two spaced small plastic studs on the inside thereof for entry into correspondingly positioned holes in the movable jaw. The cover for the fixed jaw has a wide central part to enable the hinged portion of the jaw to fit snugly therein. One end of this last cover is provided with a small plastic stud on the inside for entry into a correspondingly positioned hole in the associated fixed jaw while the other end of this cover has a semi-cylindrical strip integral therewith for grasping the stem of the jaw. An important feature of the invention lies in the fact that the covers are securely attached to the jaws of the metallic clip by spreading the ends of the plastic studs after they have passed through the holes in the jaws. This is done by the application of heat to the studs. In this way, the heated and spread plastic studs act as rivets to hold firmly the covers to the metallic jaws of the contact clip.

The plastic insulating covers of the present invention are characterized by their cheapness and simplicity of manufacture, their ease of assembly on the contact clip, and their effectiveness in substantially completely enclosing and insulating all exposed metallic portions of the electrical contact clip.

A better understanding of the invention may be had from a reading of the following description taken in conjunction with the accompanying drawings, wherein:

Fig. 1 illustrates an exploded view of an embodiment of the insulated electrical contact clip of the invention, showing the different parts of the clip disassembled and exaggerated in size; and

Fig. 2 is a longitudinal vertical section taken through the assembled insulated electrical contact clip of Fig. 1.

Throughout the figures of the drawing, the same parts are designated by the same reference characters.

Referring to the drawings in more detail, the electrical

contact clip of the invention includes a movable jaw 1 and a fixed jaw 3 made from highly electrically conducting material, such as copper, aluminum, tin or steel. These jaws are channel-shaped and tapered throughout their length from a wide rear portion to a narrower front portion and have overlapping ears 7, in turn, provided with aligned holes 8 through which a hinge pin 9 extends to hingedly connect the jaws intermediate their ends. A coiled spring 11 securely held between the ears by the hinge pin 9 serves to urge the narrow front end portions of the jaws together for mutual clamping engagement upon an electrical current carrying element. The lower fixed jaw 3 is provided with a metallic stem 5 for enabling attachment of a wire adapted to carry electrical current.

Channel-shaped insulating covers 13 and 15 are made from a thermoplastic resin material and cover the outer and lateral sides of the jaws. The upper cover 13 has flange-like edges which extend downwardly over the movable jaw 1 and enclose this jaw almost entirely. This cover 13 has a finger receiving indented portion 17 at the wide rear end and is provided with spaced studs 19 of plastic material, integral with the cover, for entry into correspondingly positioned holes 21 in the jaw 1. The lower cover 15 also has flange-like edges which extend upwardly over the fixed jaw 3 and enclose this jaw almost entirely. This cover 15 has a stud 19 of plastic material near the front end, integral with the cover, for entry into a correspondingly positioned hole 21 in the jaw 3, and is also provided with wider internally recessed portions 23 intermediate its ends for accommodating the projecting ends of the hinge pin 9 when assembling the clip and covers. The ends of the pin 9 are riveted and extend slightly outside the ears 7 when the parts of the clip are assembled. Lower cover 15 is provided at its rear wider end with a semi-circular shaped plastic portion 25 integral with the cover 15 for grasping the stem 5 of the clip when the cover is slipped over the jaw 3. Plastic cover 15 also has a small cut-out or shoulder 26 adjacent the semi-circular portion 25. Studs 19 and portions 23 and 25 are made of the same thermoplastic resinous material as the main body of the cover and formed in the same molding operation.

A relatively short cylindrical insulating sleeve 27 extends around that portion of stem 5 nearest the plastic cover 15. One end of sleeve 27 is provided with a threaded end 28. The other end of sleeve 27 nearest jaw 3 has a short internal recess to enable the sleeve to slide over the shoulder 26. Threadedly engaging end 28 is another but longer insulating sleeve 30 having an internally threaded opening at the end nearest sleeve 27 and at its other end a narrower opening 32 for accommodating a current carrying wire. The two sleeves 27 and 30 may in some form of clips be replaced by a single sleeve which is adapted to slide over the stem to form a tight fit.

In assembling the insulated contact clip of the invention, the metallic parts including jaws 1 and 3, spring 11 and hinge pin 9 are put together in known manner. The channel-shaped thermoplastic insulating covers 13 and 15 are placed over their respective channel-shaped jaws 1 and 3 so that the studs 19 extend through the correspondingly positioned holes 21 in the jaws. In this position, the flange-like edges of the covers will enclose the sides of the jaws, and semi-circular portion 25 will snugly enclose the stem 5. To securely attach the plastic covers 13 and 15 to the jaws of the contact clip, the ends of the thermoplastic studs 19 which project into the interior of the jaws are heated by momentary contact with a probe, not shown, so as to spread the ends of the studs to cover the openings 21, in the manner of a rivet. Fig. 2 shows the shape of the ends of the thermoplastic studs 19 after the application of heat thereto. The sleeves 27 and 30 slide over the free end of stem 5 and make a tight fit.

The internal recess in sleeve **27** produces a snug fit with shoulder **26** of cover **15**. The insulated contact clip of the invention is characterized by the complete absence of screws or other time consuming and troublesome means for attaching the plastic covers and sleeves to the jaws and stem of the clip. The thinness of the covers reduces to a minimum the space occupied by the clip, so that the assembled clip and covers occupy substantially the same space as occupied by the clip without the covers. The thermoplastic studs constitute a simple, fast and positive means for securing the covers to the clip in permanent manner with a minimum operation on the part of the assembler. The covers are cheap and easy to manufacture, while the permanent attachment of the insulating covers to the clip prevents any maintenance trouble and possible danger inherent in the use of screws which may become loose and fall out.

Insulated contact clips in accordance with the invention have proven to be highly satisfactory for use in connection with the testing of radio apparatus. The clips which have been built and successfully used have jaws which are about 1½ inches long and taper from ⅜ inch at the wide end to 3/16 inch at the narrow end. The stem may vary in length from approximately ½ inch to 1¼ inches depending on the particular design of the clip. The insulating covers used and preferred were molded of nylon and had unusually excellent insulating and strength properties. These special properties enabled the use of very thin sections of the insulating material, thus making the novel construction possible. The thinness of the plastic covers and the snug fit enables these small insulated clips to be used easily in compact spaces where the wires of equipment are very close to one another. The plastic covers have a thickness appreciably less than 1/32 inch except for the semi-circular portion **25** of the lower cover **15** which has a thickness of approximately 1/16 inch.

What is claimed is:

1. An insulated electrical contact clip comprising a pair of opposed metallic channel-shaped jawes hingedly connected together, a spring between the jaws urging them together at one end for mutual clamping engagement upon an electrical current carrying conductor, a thin thermoplastic insulating channel-shaped cover covering each of said jaws and having flange-like edges which extend over the sides of said jaws, the width of the channel of each cover as measured between the flange-like edges being substantially the width of the jaw which it accommodates, each of said covers having an internally projecting stud of thermoplastic material integral with the cover and passing through a correspondingly positioned hole in the associated jaw, the free end of each of said studs being wider than the hole in the jaw through which it has passed as a result of heat treatment after the cover has been positioned on the jaw, for securing the insulating covers to said jaws.

2. An insulated electrical contact clip comprising a fixed metallic jaw and a movable metallic jaw hingedly connected together, means for urging the front ends of said jaws together, a stem at the rear end of said fixed jaw for connection to a current carrying conductor, a thin thermoplastic channel-shaped insulating cover covering each of said jaws and having flange-like edges which extend over the sides of said jaws, the width of the channel of each cover as measured between the flange-like edges being substantially the width of the jaw which it accommodates, the cover which insulates said movable jaw having spaced internally projecting studs of thermoplastic material integral with said cover and passing through correspondingly positioned holes in said movable jaw, the cover which insulates said fixed jaw having a single internally projecting stud of thermoplastic material near the front and integral with said cover and passing through a correspondingly positioned hole in said fixed jaw, the free ends of said studs being wider than the aforesaid holes in said jaws and acting as rivets to attach said covers to said jaws as a result of heat treatment after the cover has been positioned on the jaw, the rear end of that insulating cover which covers said fixed jaw having a semi-circular shaped grasping surface for engaging said stem.

3. An insulated electrical contact clip as defined in claim 2, characterized in this, that the jaws and covers correspondingly taper from the rear to the front ends, the rear end of the cover which insulates said movable jaw having a finger receiving indented portion and an insulating sleeve slidably mounted on said stem and abutting the rear end of the insulating cover for said fixed jaw.

4. An insulated electrical contact clip comprising a fixed metallic jaw and a movable metallic jaw hingedly connected together, means for urging the front ends of said jaws together, a stem at the rear end of said fixed jaw for connection to a current carrying conductor, thin molded nylon channel-shaped insulating covers covering said jaws and having flange-like edges which extend over the sides of said jaws, the width of the channel of each cover as measured between the flange-like edges being substantially the width of the jaw which it accommodates, the cover which insulates said movable jaw having spaced internally projecting studs of molded nylon material integral with said cover and passing through correspondingly positioned holes in said movable jaw, the cover which insulates said fixed jaw having a single internally projecting stud of molded nylon material near the front and integral with said cover and passing through a correspondingly positioned hole in said fixed jaw, the free ends of said studs being wider than the aforesaid holes in said jaws and acting as rivets to attach said covers to said jaws, as a result of heat treatment after the cover has been positioned on the jaw, the rear end of that insulating cover which covers said fixed jaw having a semi-circular shaped grasping surface for engaging said stem.

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