

April 6, 1943.

R. F. MALLINA ET AL
ELECTRICAL CONNECTING DEVICE

2,315,720

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FIG. 1

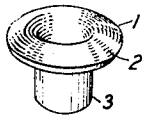


FIG. 2

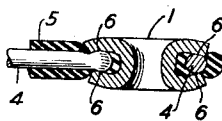


FIG. 3

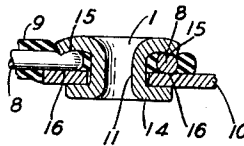


FIG. 4

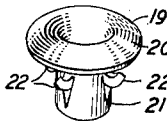


FIG. 5

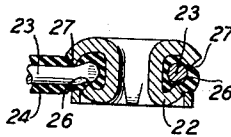


FIG. 6

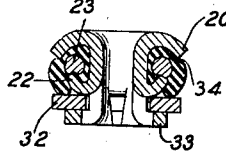


FIG. 7

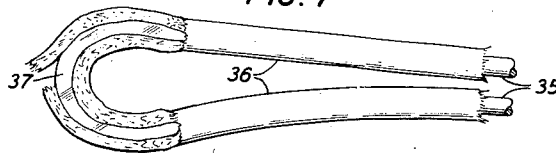
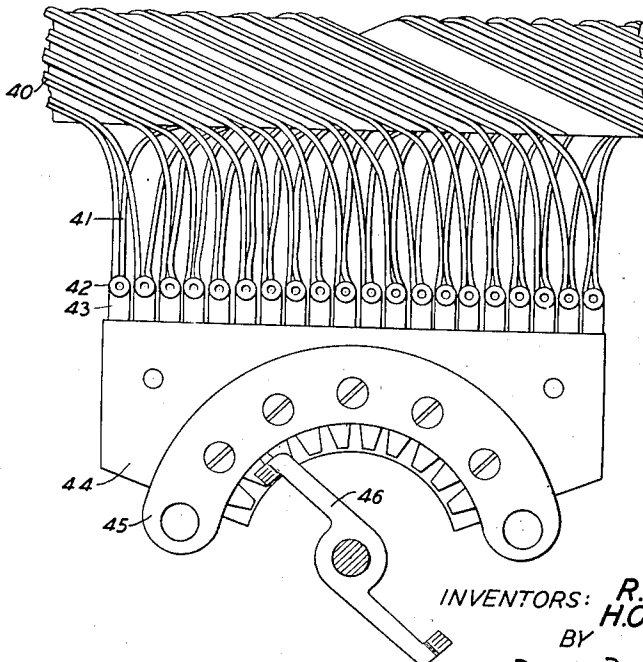


FIG. 8



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2,315,720

ELECTRICAL CONNECTING DEVICE

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6 Claims. (Cl. 173—324)

This invention relates to electrical connecting devices and particularly to connecting means for electrical conductors.

An object is to provide permanent and reliable electrical connections between conductors by simple and inexpensive means.

Heretofore connections have been made between insulated conductors and terminals and one method was to bare the end of a conductor and fold it over the insulated portion, to pierce a hole through the folded portion of the conductor and pass an eyelet through this hole and through a hole in the terminal and clamp the eyelet together over the conductor and the terminal to establish an electrical connection between the bare end of the conductor and the terminal. Other connecting means have been provided in which an eyelet is inserted through the insulation of a conductor, comprising a plurality of individual strands, and between the strands of the conductor at this point and then clamped or folded over the insulation so that the strands will make electrical connection with the eyelet.

It is a feature of the present invention to provide means for establishing an electrical connection between an insulated conductor and an eyelet, or similar riveting means, or between an insulated conductor and a terminal through such a riveting means in which the conductor is looped over the tubular portion of the eyelet and the eyelet is then clamped down to cause the insulation to be crushed away from the loop to establish electrical connection between these elements.

It is another feature of the invention to provide prongs cut out from the sides of the tubular portion of the eyelet so that when the eyelet is clamped down over the loop these prongs will crush or pierce the insulation away from the loop to establish electrical connections.

The invention has been illustrated in the accompanying drawing in which:

Fig. 1 shows an ordinary eyelet;

Fig. 2 is a cross-section showing an eyelet of the type shown in Fig. 1 formed to establish a connection with an insulated conductor;

Fig. 3 is a cross-section showing an eyelet of the type shown in Fig. 1 formed to establish a connection between an insulated conductor and a terminal;

Fig. 4 shows an eyelet having prongs cut out from the side of the tubular portion;

Fig. 5 is a cross-section showing an eyelet of the type shown in Fig. 4 formed to establish a connection with an insulated conductor;

Fig. 6 is a cross-section showing an eyelet of the type shown in Fig. 4 formed to establish a connection between an insulated conductor and terminal;

Fig. 7 shows a loop of insulated wire with the insulation separated from the conductor at the loop; and

Fig. 8 shows the application of this invention to an arrangement in which a plurality of insulated conductors of a multiple cable are connected to terminals of a switching bank employed in automatic telephone systems.

Referring now to the drawing, Fig. 1 shows an ordinary eyelet 1 having a cup-shaped flange 2 and a tubular portion 3. Fig. 2 shows this type of eyelet 1 clamped around a loop of an insulated conductor 4 having insulation 5. It will be noted that in this case the insulation is crushed away from the conductor 4 at the points 6 which takes place when the eyelet is clamped down over the loop, thus establishing a connection between the eyelet and the bared conductor at the points 6. In Fig. 3 the eyelet 1 is clamped over a conductor 8, having insulation 9 and a terminal 10, that is, the conductor is looped around the tubular portion 11 of the eyelet and the terminal 10 is inserted at the lower side of the loop of the insulated conductor 8 and the tubular portion 11 is then swaged or clamped over the outside lower side of the terminal 10 to form a flange 14. In this case the insulation 9 is crushed away from the loop at the points 15 so that a bared portion of the conductor will make electrical connection with the eyelet at these points and the insulation is also crushed away from the conductor 8 at the points 16 so that the bared conductor 8 will make electrical connection with the terminal 10 at these points.

In Fig. 4 an eyelet 19, such as shown in Fig. 1, has been illustrated having a flange 20 and a tubular portion 21 but the tubular portion is provided with cut-out prongs 22 at various points. This eyelet may be employed for establishing a connection between itself and an insulated conductor as shown in Fig. 5. In this figure, when the conductor 23 having insulation 24 is looped around the eyelet, between the upper flange 20 and the prongs 22 and the eyelet is then clamped over the loop, prongs 22 will pierce the insulation and make electrical contact with the bare conductor 23 at points 26. It is evident, of course, that the eyelet may be clamped still further so as to have the flange also pierce the insulation of the conductor at the points 27 if so desired. This type of eyelet as shown in Fig. 4 may also be

employed for establishing connections between a loop of the conductor 23 and a terminal 32 as shown in cross-section in Fig. 6. In this case the terminal is provided with a hole and inserted below the prongs 22 and the lower portion of the eyelet is then clamped over the terminals to form the flange 33. The prongs 22 will in this case pierce the insulation and establish electrical connection with the conductor. In this case, also, the eyelet may, if so desired, be clamped down further to cause the flange 20 of the eyelet to pierce the insulation and make electrical contact with the conductor 30 at the points 34.

It should be understood that while an eyelet having a cup-shaped flange has been disclosed and described as the connecting means, other riveting devices may be employed such as, for example, eyelets having flat flanges or a so-called hollow rivet, that is, a rivet having a flange and a stem, the latter being provided with a hole extending partially through the free end of the stem to permit this end to be clamped down, swaged or spun over the conductor or terminal to form a flange, for example, like 14 in Fig. 3.

In Fig. 7, the loop of a conductor 35 is provided with insulation 36 and it should be noted that at 37, the insulation 36 has been crushed away from a portion of the conductor which may be done by the methods described in connection with Figs. 1 to 6. Insulation 36 may be of such a nature that it will readily be crushed away from the conductor when clamped by an eyelet as described. Cellulose acetate insulation is suitable for that purpose, although the invention is not limited to the use of this particular material but conductors having other suitable insulating materials may be used.

Fig. 8 illustrates how connections may be made between insulated multiple cable conductors and terminals of a switching bank by means of eyelets as hereinbefore described. The insulated conductors may be arranged in a ribbon cable formation as shown at 40 and provided with loops such as 41 that are passed over eyelets. Such an eyelet 42 may be passed through a hole in a terminal such as 43 and then clamped down to crush the insulation to establish electrical connections between the loop 41 and the terminal 43 through the eyelet 42. Terminals like 43 may be arranged in a bank as shown at 44 in which several layers of terminals may be provided between insulation plates and clamped together with clamping plates 45. The terminals may be arranged in arcuate formations for selection by rotating brushes, such as brush 46, in a manner well known in the telephone art.

What is claimed is:

1. An electrical fastener comprising an eyelet having a shank and a flange formed on one end

thereof, an insulated conductor wrapped around the external surface of said shank, said eyelet also having formed on the other end of the shank by the application of pressure thereto, an opposing flange which serves to cover the wrapped portion of the conductor and to crush and displace the insulation away from said wrapped portion by said pressure to establish an electrical connection between the eyelet and the bared wrapped portion of the conductor.

2. In combination, an insulated conductor having a loop formed therein and an eyelet having prongs cut in the side of the tubular portion thereof and inserted in said loop with the tubular portion of the eyelet formed over the loop so that the prongs pierce the insulation of the loop to establish an electrical connection between the conductor and the eyelet.

3. In combination, an insulated conductor having a loop formed therein, a terminal having an aperture and an eyelet having prongs cut in its shank with the shank inserted in the loop and the aperture and swaged over the terminal so that the prongs pierce through the insulation of the loop to establish an electrical connection between the conductor and the terminal through the eyelet.

4. In combination, a single wire conductor covered with insulation and having a loop formed therein and an eyelet clamped over said loop to crush said insulation away from the loop in said single wire conductor to establish an electrical connection between the bared loop of said single wire conductor and the eyelet.

5. In combination, a single wire conductor covered with insulation and having a loop formed therein, an eyelet having prongs cut in the sides of the tubular portion thereof and inserted in said loop with the tubular portion of the eyelet formed over the loop so that the prongs will pierce the insulation on one side of the loop and so that the flange of the eyelet will crush the insulation away from the other side of the loop to establish an electrical connection between the prongs and loop on one side and between the flange and the loop on the opposite side.

6. In combination, a single wire conductor covered with insulation and having a loop formed therein, a terminal having an aperture and an eyelet having prongs cut in its shank with the shank inserted in the loop and the aperture and the shank swaged over the terminal so that the prongs will pierce through the insulation on one side of the loop and so that the flange of the eyelet crushes the insulation away from the other side of the loop to establish an electrical connection between the loop and the terminal and the eyelet.

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