Dec. 14, 1954

R. C. PATTON

2,697,213

SOLDERLESS ELECTRIC TERMINAL

Filed May 31, 1952

Fig. 1.

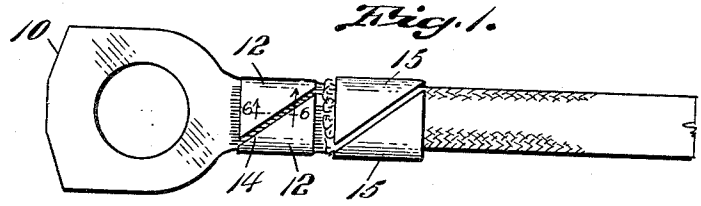


Fig. 2.

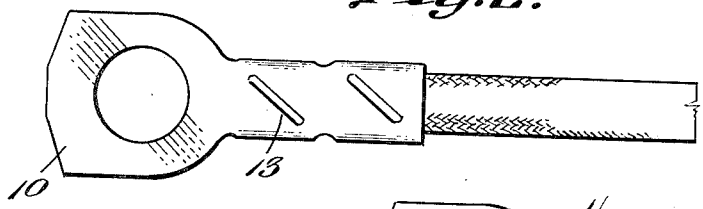


Fig. 3.

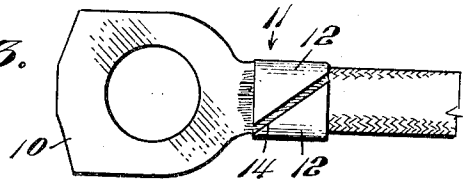


Fig. 4.

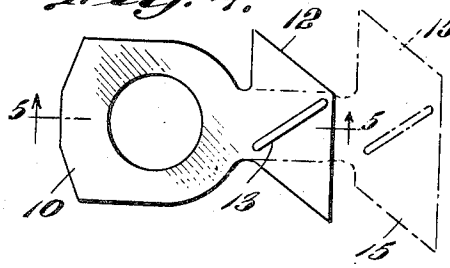


Fig. 5.



Fig. 6.

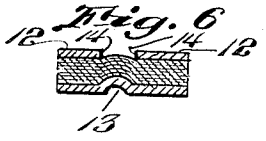


Fig. 7.

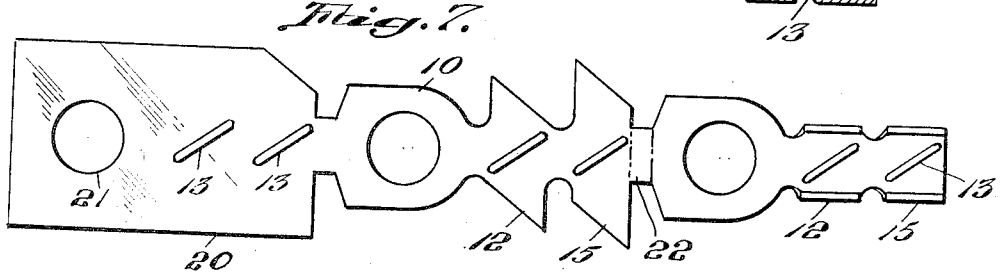
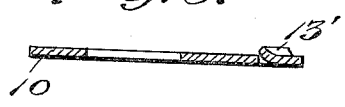


Fig. 8.



INVENTOR.
Ralph C. Patton
BY
Barlow & Barlow
ATTORNEYS.

United States Patent Office 2,697,213 Patented Dec. 14, 1954

2,697,213

SOLDERLESS ELECTRIC TERMINAL

Ralph C. Patton, Providence, R. I., assignor to Patton-MacGuyer Co., a corporation of Rhode Island

Application May 31, 1952, Serial No. 290,980

4 Claims. (Cl. 339—276)

This invention relates to a solderless electric terminal and more particularly to a terminal in which the crimping or holding means of the shank is formed prior to the insertion of the wire.

Solderless wire terminals in the past have employed various means of holding the wire conductor. These means have taken the form of ears which fold laterally over the end portion of the conductor and have used additional means such as detents pressed into the terminal after the ears have been folded or have employed ribs running laterally across the shank portion formed prior to the insertion of the wire to hold the wire securely.

One of the objects of this invention is to provide an improved solderless electrical connector.

A further object of this invention is to pre-form a solderless wire terminal which will tend to jam the wire against the arms of the shank portion.

Another object of this invention is to form the rib or holding portion of the shank prior to the insertion of the wire.

Another object of this invention is to form the terminals in strip form when so desired, but they may also be produced and applied as separate terminals.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a top plan view of the terminal affixed to the end of an insulated wire;

Figure 2 is a bottom plan view of the reverse side of the terminal affixed to the wire;

Figure 3 is a top plan view of a modified form terminal with a single pair of arms;

Figure 4 is a plan view of the terminal in flat sheet stock form;

Figure 5 is a sectional view taken on lines 5—5 of Figure 4;

Figure 6 is a sectional view taken on lines 6—6 of Figure 1;

Figure 7 is a plan view of the terminals in strip form showing the various stages of fabrication in one method of production; and

Figure 8 is a section view of a modified form of my terminal showing an alternate rib structure.

In proceeding with this invention, I provide a strip of sheet metal stock, cutting this stock by means of dies and bending it by forming tools to the shape desired for an electric terminal. During the die stamping process I form one or more ribs in the shank portion to co-operate with the arms that fold over the wire.

With reference to the drawings, **10** designates the lug or connector portion of the electric terminal, and **11** designates the shank portion of the terminal. The shank portion of the terminal is provided with arms **12** which are adapted to wrap around the wire as shown in Figures 1 and 3. In some cases it is also desirable to have additional arms **15** which may wrap around the insulation. Both pairs of arms have edges diagonal to the main axis of the shank portion **11**. Ribs **13** are formed between the extending arms **12** and **15**, which are also diagonal or oblique to the axis of the shank portion **11** in a direction to co-operate with the diagonal extent of the edges of the arms as will hereinafter appear. A preferable form of the rib **13** is shown in Figure 5 where the metal has been struck

with a blunt-edged punch to give a rounded form to the rib. It is also possible to form the rib such as at **13'** in Figure 8. In this form a shearing punch may be lightly struck against the sheet stock to partially shear the metal and raise it from the surrounding stock.

A solid or standard wire is attached to the shank portion by laying the wire over rib **13** and rolling and pressing arms **12** over and into engagement with the wire. Referring to Figures 1 and 2, it will be seen that the angle of the rib **13** and the edge **14** of arms **12** is substantially parallel when the arms are folded over the wire. When the wire is pulled sufficiently to cause it to move lengthwise through the arms **12**, the edge of the arms **14** and the rib **13** co-operate to urge the wire laterally thereby wedging it under one of the arms **12** which increases the frictional resistance between the wire and terminal and creates the effect of an extreme crimping force being applied by the terminal to the wire.

Referring more particularly to Figure 6, I show an enlarged view of the wire enclosed by arms **12** at the point of the rib **13**. It is apparent from this view that in the preferred form of this invention wherein the edges **14** of arms **12** do not meet, the wire is forced into the space between edges **14** by the action of rib **13**. The resulting configuration of the wire is such that when a lengthwise acting force is applied tending to disengage the wire from the terminal, the channeling effect created by the rib will tend to force the wire to the edge of the terminal underneath arms **12**. This effect will also be present when two pairs of arms are used, the second pair enclosing the insulation. Arms **15** will force part of the insulation between their open space and form an identical channeling action to that present with the wire. Thus, with insulated wire and a two pair arm terminal, the force required to disengage the wire is greatly increased.

While a more positive action of channeling occurs when the edges **14** of arms **12** do not meet, it has been found that when the edges do meet, as may occur when certain wire sizes are used, the action of rib **13** alone is sufficient to greatly increase the resistance of the wire to being disengaged from the terminal over other rib structures which lie lengthwise or transverse to the wire. With the crimps and indentations used in the prior art, the entire holding power has been determined by the force used in the crimping process and the area of the crimp. In the present structure, however, the amount of force used to bend the arms over the wire is not an important factor, as should the wire begin to slip, an additional lateral force is inherently applied over an increasingly greater area as the wire wedges against the inner wall of arms **12** and causes greater friction to be applied.

Referring particularly to Figure 7, I show a strip of metal **20** which has passed through the first stage of the die forming operation and has a terminal hole **21** and ribs **13** formed therein. Passing on to the second stage of the die-cutting operation, the arms **12** and **15** have been formed and a lug portion **10** has been shaped. The third stage of the forming operation bends the arms **12** and **15** upwardly at substantially a right angle to the plane of the lug portion. Severing occurs by removing the web **22**.

While I have described one method of producing this terminal, it is to be understood that various die-cutting operations may be substituted to provide a different sequence and that the terminal may take several shapes.

I claim:

1. A solderless electric terminal formed from sheet metal stock comprising a connector portion, a shank portion, arms on said shank portion extending in opposite directions transversely therefrom for folding about a wire, said arms when in the plane of said shanks having at least one edge extending diagonally to the axis of said shank and a rib in said shank portion extending on an opposite diagonal to the axis of the shank than the said edge of said arm, the said edge of said arm when in working position extending parallel to the rib so that a wire held between the folded arms and the shank portion will be deflected upwardly against

the said diagonal edge and securely gripped, axial movement of the wire wedging the deflected portion against one of the arms.

2. A solderless electric terminal as in claim 1 wherein both edges of said arms are parallel and extend on the same diagonal, said edges when in working position being spaced so that the wire will be deflected upwardly between said edges.

3. A solderless electric terminal formed from sheet metal stock comprising a lug portion, a shank portion, arms extending from the shank portion for folding about a wire, said arms having at least one edge that extends obliquely to the axis of the shank portion, a projection in said shank portion extending obliquely to the axis thereof, said edge of said arm being substantially parallel to the oblique projection when in working position so that a wire held between the folded arms and the shank portion will be deflected upwardly against the oblique edge and securely gripped, axial movement of the wire wedging the deflected portion against one of the arms.

4. A solderless electric terminal as in claim 3 wherein both edges of said arms are parallel and extend on the same diagonal, said edges when in working position being spaced so that the wire will be deflected upwardly between said edges.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
962,921	Schneider	June 28, 1910
1,262,155	Zimmerman	Apr. 9, 1918
1,789,951	Terrell et al.	Jan. 20, 1931
2,008,227	Reilly	July 16, 1935
2,288,918	Parker	July 7, 1942
2,483,424	Martines	Oct. 4, 1949

FOREIGN PATENTS

Number	Country	Date
271,613	Great Britain	June 2, 1927