Nov. 12, 1957 F. KLUMPP, JR 2,813,258

CONDUCTOR TERMINALS

Filed May 9, 1956

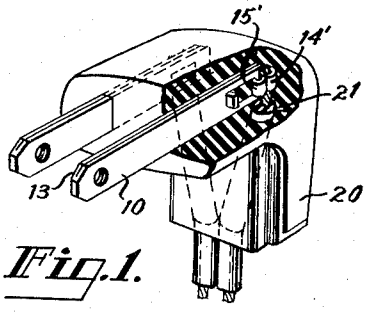


Fig. 1.

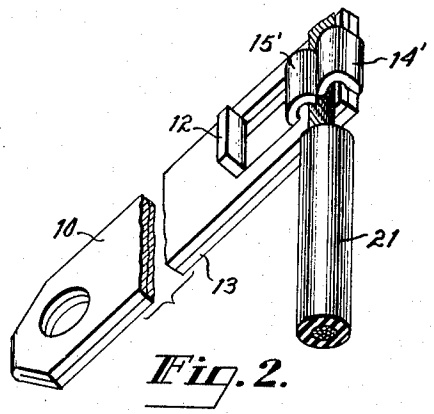


Fig. 2.

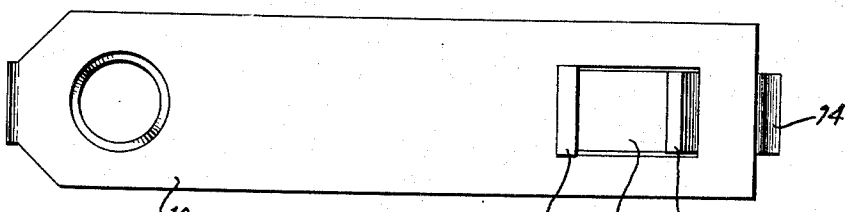


Fig. 3.

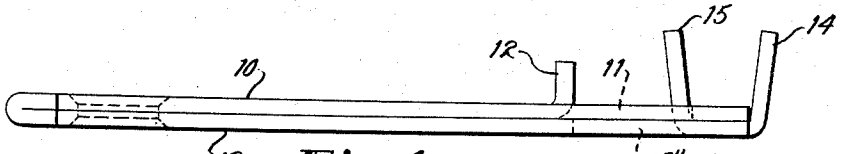


Fig. 4.

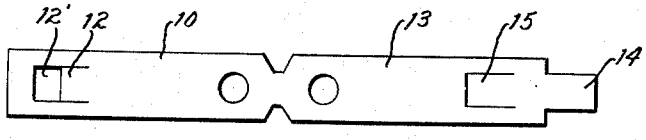


Fig. 5.

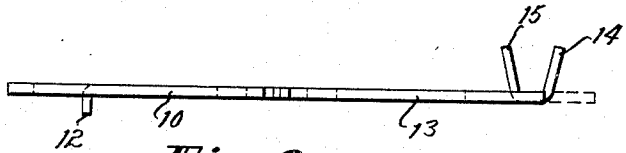


Fig. 6.

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CONDUCTOR TERMINALS

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10 Claims. (Cl. 339—276)

My invention relates to conductor terminals useful in connectors such as electric cord plugs and the like and more particularly to such terminals of the blade type, formed from flat stock.

In connectors in which the body of the plug or cap, for example, is molded around the conductor terminals or blades, it is desirable in some cases that the terminals be constructed to facilitate use of the terminal and the conductor secured thereto in constructions in which the terminal and the conductor emerge at an angle to each other from the body of the molded plug.

Pressure exerted on conventional blades during molding operations causes the blades to break at those portions of the terminal between the conductor receiving sleeve and the remainder of the blade, since these portions, because of the way the blades are formed, are the narrowest and hence the weakest part of the terminal. Furthermore, because this is the thinnest part and is only of single thickness, the terminal blade is limited in the amount of current that it can carry.

It is also desirable to provide a construction of conductor terminal which is simple in construction and which facilitates formation of the terminal from the raw stock. Another desirable objective is to reduce the scrap during forming, thus making more metal available for the terminal for increasing its strength and its current-carrying capacity.

Where heavy conductors for carrying large currents are used, it is desirable to have strong and heavy conductor-engaging elements to securely fasten the conductor to the terminal and to have an optimum transverse section to increase current-carrying capacity.

Another desirable feature of terminals of the folded variety is to provide a construction in which the folded portions are securely locked together with the conductor attached prior to molding into the finished connector.

It is therefore an object of my invention to provide an improved conductor terminal which facilitates use in connectors of the angle variety although not limited thereto.

A further object of my invention is to provide a terminal which is not subject to rupture during molding operation.

A still further object of my invention is to provide an improved terminal which is simple in construction and which facilitates formation of the finished terminal while, at the same time, reducing scrap and increasing the strength of the terminal and its current-carrying capacity.

A further object of my invention is to provide a terminal having improved conductor-engaging means which also act as a locking means for folded type terminals.

Other objects of the invention will appear in the following description.

Briefly, in accordance with my invention, the conductor terminal is first stamped or punched out as an elongated blank comprising two members which are folded over in registry to form the terminal blade. One of the elongated members is provided at its end with a conductor-engaging finger or tongue. The other member has punched and formed from its body adjacent one end a tongue or stop member extending normally of the member. The one member has punched and formed from the body adjacent the conductor-engaging finger or tongue extending from the end thereof a second conductor-engaging tongue, both tongues being formed to extend at an angle from the one member and oppositely to the stop member or tongue. The two members are then folded together so that one of the conductor-engaging tongues extends through the aperture from which the stop member was formed. The two conductor-engaging tongues are then formed into loops and pressed against a conductor received between the tongues to lock the conductor to the terminal blade and to lock the two portions of the blade together. A pair of such terminal blades may be connected to pairs of conductors and then molded into a cap or plug.

In the drawing:

Fig. 1 is a perspective partially in section showing terminals made according to my invention utilized in a molded connector or plug of the angle type;

Fig. 2 is a perspective of a terminal blade made according to my invention fastened to a conductor prior to molding in;

Fig. 3 is a plan view of a terminal made according to my invention;

Fig. 4 is a side elevation of the terminal shown in Fig. 2;

Fig. 5 is a blank showing a step in forming a terminal made according to my invention; and

Fig. 6 is a side elevation showing a later step in the formation of a terminal made according to my invention.

A terminal made according to my invention as best shown in Figs. 2, 3, and 4, includes an elongated member **10** having adjacent one end thereof a rectangularly-shaped aperture **11**, partially formed by blanking or punching out a part and forming a stop member or tongue element **12** from the metal. The stop element **12** extends normally of the member **10** at the periphery of the aperture.

A second elongated member **13**, which can be formed by a folded-over portion of an elongated blank, is provided with a conductor-engaging tongue **14** at one end thereof adjacent the apertured end of the first elongated member **10**. It is folded up against the end of member **10** to overlie the end of member **10**. A second tongue **15** formed from the body of the elongated member **13** is formed to extend through the aperture **11**. Thus, the tongues **14** and **15** are oppositely disposed and as shown in Figs. 1 and 2 are folded over into loops **14'**, **15'** to engage the conductor **21** and secure it firmly against the terminal at the same time locking the two folded-over portions **10** and **13** against each other prior to being molded into the plug **20**.

Steps in the formation of a blade terminal made in accordance with my invention are illustrated in Figs. 5 and 6. As shown, the terminal may be formed from flat stock with the portions **10** and **13** extending oppositely from each other with the portion **13** provided with the tongue **14** extending from one end thereof. The other tongue **15** is formed by a punch and die as is the stop member **12**, the material **12'** being removed as scrap. The two portions **10** and **13** are then subjected to the action of the dies which position the tongues and stop member as indicated in Fig. 6 after which a folding operation takes place to provide the terminal shown in Figs. 3 and 4.

The conductors are then secured to the terminal members by forming the tongues **14** and **15** over and against the conductor to securely fasten the conductor without the use of solder to the terminal member after which the

terminals may be molded into a plug to provide the connector **20** as shown in Fig. 1.

As illustrated in Figs. 1 and 2, the terminal blades and the conductors secured thereto are at 90° to each other. If a straight through arrangement is desired, the conductor may be given a 90° turn so that it extends parallel to the blade and along one edge and oppositely to the terminal. It is of course apparent that angles other than 90° may be employed.

It will be observed that little scrap results from the construction employed leaving more metal to provide a strong and rugged terminal and to provide a larger cross-section of metal for carrying heavy currents. The tongues **14** and **15** can be varied in width and length to engage various sizes of conductors of the solid type or of the strand type. It is obvious that the construction facilitates so-called right angle assembly for plugs or connectors in which the conductors emerge from the connector at an angle to the terminals.

Since the two members **10** and **13** are both electrically connected to the tongues **14** and **15**, they are available for carrying current and hence since a double thickness of metal is provided along the entire length of the terminal, which is not the usual practice, much heavier currents can be carried by the terminal. It is of course obvious that, if desired, one or the other of the members **10** or **13** could be formed with a slight bulge or bow to provide a spring action.

Furthermore, since there are no thinned-out portions such as a single thickness between the terminal and the sleeve which normally receives the conductor, fracture of the terminal during molding is substantially completely eliminated. The tongues **14** and **15**, in addition to providing a firm, rigid contact of large area for the conductor, also serve to lock the two portions of the conductor terminal together, thus further insuring no deformation or rupturing during molding operations.

The structure is simple and reduces the number of steps in formation to a minimum requiring merely punching, folding and bending without the necessity of forming sleeves with a twisting action of the conductor-engaging parts as required in other types of terminals, thus preventing weakening of the conductor-engaging portions.

If desired, the stop member **12** could employ all of the metal from which the aperture **11** is formed. This would result in a longer tongue. Likewise, it could be formed to extend from the same side as tongues **14** and **15** as shown in Fig. 5 and when folded over against the part **13**, extend downwardly through the aperture **15''** which results from the punching out and forming of the tongue **15** from the metal body of member **13**.

I claim:

1. A conductor terminal including a first elongated member having an aperture adjacent one end thereof and a tongue extending at an angle to said member at the periphery of said aperture, a second elongated member registering with said first elongated member and in contact therewith, said second elongated member having a first conductor-engaging tongue at an angle thereto adjacent the apertured end of said first member and overlying the end of said first elongated member, said second elongated member having a second conductor-engaging tongue formed from the body of said second elongated member and extending at an angle thereto and through said aperture at the periphery thereof and oppositely disposed to said first conductor-engaging tongue, said conductor-engaging tongues being adapted to be formed into loops to engage a conductor and force it into contact with said elongated members.

2. A conductor terminal including a first elongated member having an aperture adjacent one end thereof and a stop member extending at an angle to said member at the periphery of said aperture, a second elongated member registering with said first elongated member and in contact therewith, said second member having a first conductor-engaging tongue extending from the end thereof and at an angle thereto adjacent the apertured end of said first member, said second member having a second conductor-engaging tongue extending at an angle thereto and through said aperture and oppositely disposed to said first tongue, said tongues being adapted to be formed into loops to engage a conductor and force it into contact with said first elongated member.

3. A conductor terminal formed from flat stock and including a pair of elongated elements secured together at one end and registering with and in contact with each other, one of said elements having an aperture adjacent one end thereof, the other of said elements including a pair of tongue members adjacent the apertured end of said one element, said tongue members being positioned at an angle to said elements, one of said tongue members extending from the end of said other element and overlying the end of said one element and the other of said tongue members extending through the aperture of said one element, said tongue members being adapted to be formed into oppositely disposed loops engaging a conductor and the apertured end of the first element to maintain said conductor and said elements in locked relationship.

4. A conductor terminal including a pair of elongated elements registering with and in contact with each other, one of said elements having an aperture adjacent one end thereof, a stop member extending from said apertured member and at an angle thereto at the periphery of said aperture, the other of said elements including a pair of tongue members adjacent the apertured end of said one element, said tongue members being positioned at an angle to said elements, one of said tongue members extending beyond the ends of said elements and the other of said tongue members extending through the aperture of said one element, said tongue members adapted to be formed into oppositely disposed loops for engaging a conductor.

5. A conductor terminal including an elongated member having an aperture adjacent one end thereof and a stop member extending at an angle to said member at the periphery of said aperture, a second elongated member registering with said first elongated member and in contact therewith, said second elongated member having a first conductor-engaging tongue at an angle thereto adjacent the apertured end of said first member, said second elongated member having a second tongue extending at an angle thereto and through said aperture and oppositely disposed to said first tongue, said tongues being adapted to be formed into loops to engage a conductor.

6. A conductor terminal including a first elongated element having a rectangular aperture adjacent one end thereof, the longer axis of said aperture lying along the longitudinal axis of said element, a tongue formed from part of the material removed to form said aperture and extending from the periphery of the aperture at an angle to said element to provide a stop member, a second elongated element in contact with the first elongated element and having a first tongue element extending from an end thereof at an angle thereto and overlying the end adjacent said aperture of said first element, and a second tongue element extending through said aperture and opposite to said stop member and at an angle to said first element, said tongue elements being oppositely disposed and adapted to be folded toward each other into oppositely disposed loops for firmly engaging a conductor extending transversely of said elongated elements and to lock said elongated elements together.

7. A conductor terminal including a first elongated element having a rectangular aperture adjacent one end thereof, the longer axis of said aperture lying along the longitudinal axis of said element, a second elongated element in contact with and in registry with the first elongated element and having a tongue member extending

from one end thereof at an angle thereto and overlying the end adjacent said aperture of said first element, and a second tongue member extending through said aperture adjacent the periphery thereof at an angle to said first elongated element, said tongue members being oppositely disposed and adapted to be folded toward each other into oppositely disposed loops for firmly engaging a conductor extending transversely of said elements and to lock said elements together.

8. A connector including a molded plug of angular shape, a plurality of conductor terminals and conductors connected thereto molded within said connector, each of said conductor terminals including a first elongated element having a rectangular aperture adjacent one end thereof, the longer axis of said aperture lying along the longitudinal axis of said element, a tongue formed from a part of the material removed to form said aperture and extending from the periphery of the aperture at an angle to said element to provide a stop member, a second elongated element in contact with the first elongated element and having a tongue element extending from the end thereof at an angle thereto and overlying the end adjacent said aperture of said first element, and a second tongue element extending through said aperture and opposite to said stop member and at an angle to said first element, said tongue elements being oppositely disposed and folded toward each other into oppositely disposed loops and firmly engaging the conductor extending transversely of said element and locking said elements together, said conductor terminals and said conductors extending from the body of said connector at an angle to each other.

9. A connector including a molded plug of angular shape, a plurality of conductor terminals and conductors connected thereto molded within said connector, each of said conductor terminals including a first elongated element having an aperture adjacent one end thereof, a tongue formed from a part of the material removed to form said aperture and extending from the periphery of the aperture at an angle to said first element to provide a stop member, a second elongated element in contact with the first elongated element and having a tongue element extending from the end thereof at an angle thereto and overlying the end adjacent said aperture of said first element, and a second tongue element extending through said aperture adjacent the periphery thereof and at an angle to said first element, said tongue elements being oppositely disposed and folded toward each other into oppositely disposed loops and firmly engaging the conductor extending transversely of said element and locking said elements together, said conductor terminals and said conductors extending from the body of said connector at an angle to each other.

10. A connector including a molded plug, a plurality of conductor terminals and conductors connected thereto molded within said connector, said conductor terminals being formed of flat stock, each of said conductor terminals including a first elongated element having a rectangular aperture adjacent one end thereof, the longer axis of said aperture lying along the longitudinal axis of said element, a tongue formed from a part of the material removed to form said aperture and extending from the periphery of the aperture at one end thereof and at an angle to said element to provide a stop member, a second elongated element registering with and in contact with the first elongated element and having a tongue element extending from the end thereof at an angle thereto and overlying the end adjacent said aperture of said first element, and a second tongue element extending through said aperture adjacent the periphery thereof and opposite to said stop member and at an angle to said first element, said tongue elements being oppositely disposed and folded toward each other into oppositely disposed loops and firmly engaging the conductor extending transversely of said element and locking said elements together, said conductor terminals and said conductors extending from the body of said connector.

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