July 17, 1956 L. A. CLOUTIER 2,755,453

ELECTRICAL TERMINAL

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Fig. 1.

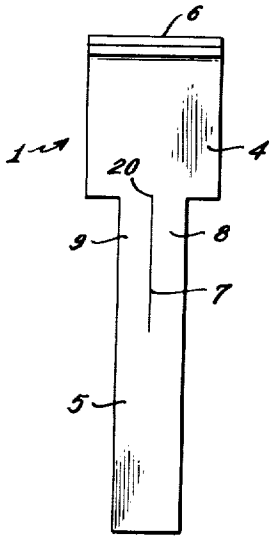


Fig. 2.

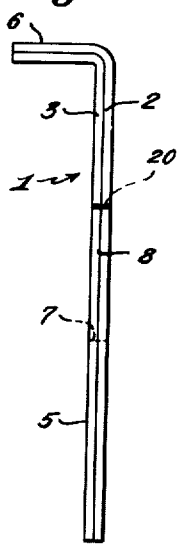


Fig. 3.

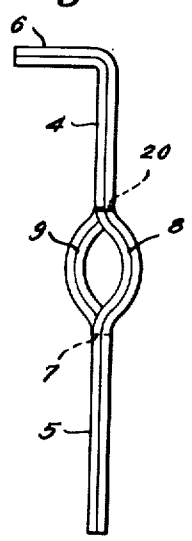


Fig. 4.

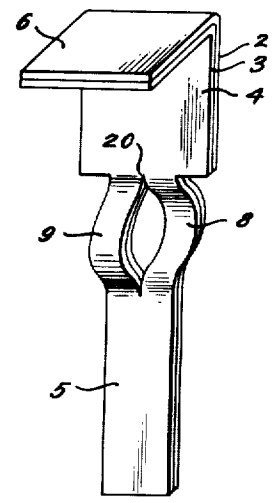


Fig. 5.

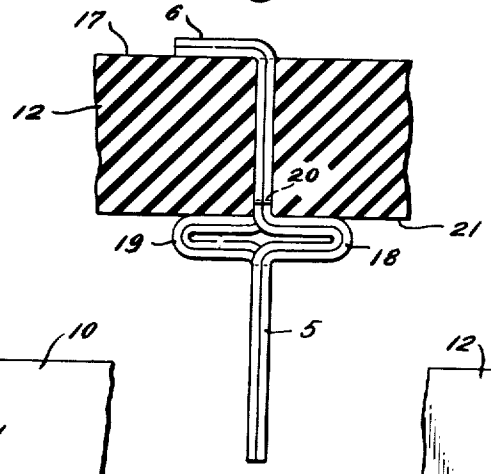


Fig. 6.

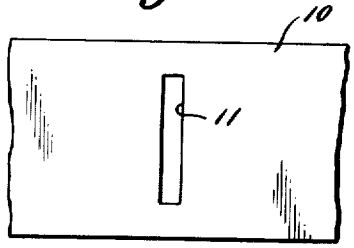
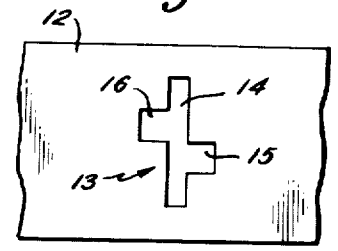


Fig. 7.



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Fig. 8.

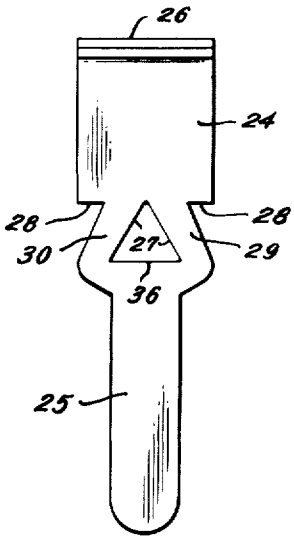


Fig. 9.

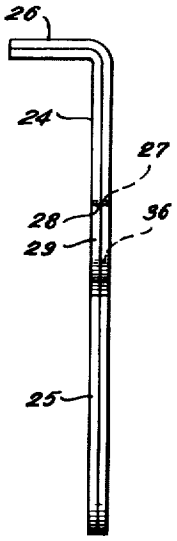


Fig. 10.

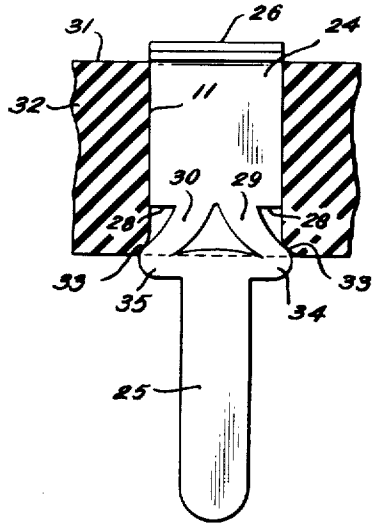


Fig. 11.

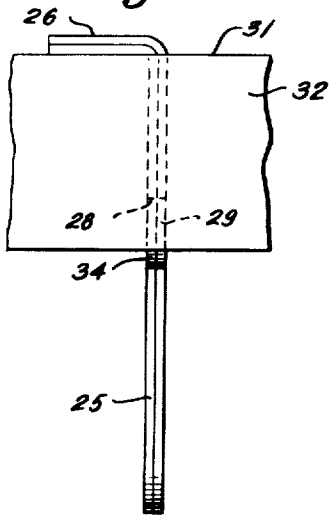


Fig. 12.

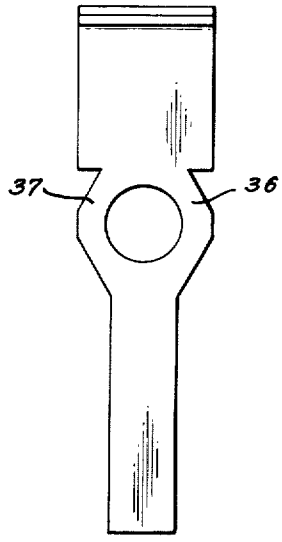
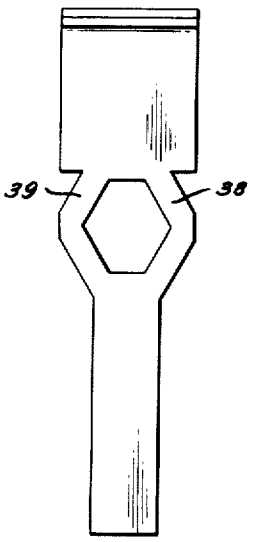


Fig. 13.



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2,755,453

ELECTRICAL TERMINAL

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Application August 6, 1952, Serial No. 302,940

5 Claims. (Cl. 339—220)

This invention relates to electrical terminals, and in particular to electrical terminals which are crimped into a base of insulating material.

Among the several objects of the invention are to be noted the provision of an electrical terminal of novel form made from sheet stock; the provision of a terminal of the class described which is economical of material; the provision of a terminal of the class described which may be manufactured on high speed machinery by means of simple punching and forming dies; the provision of a terminal of the class described which can be firmly fastened into a terminal block by means of a simple and novel crimping operation; the provision of a terminal of the class described which, after being crimped into a terminal block resiliently retains its tightness therein; and the provision of an electrical terminal having expansible portions therein for fastening purposes. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which several of various possible embodiments of the invention are illustrated:

Fig. 1 is an elevation of one embodiment of this invention;

Fig. 2 is a side view of Fig. 1;

Fig. 3 is a view of the Fig. 2 device, but showing the terminal after another operation has been performed on it to make a second embodiment of this invention;

Fig. 4 is an isometric view of the terminal of Fig. 3;

Fig. 5 is a cross sectional view of the Fig. 4 terminal shown mounted in a terminal block;

Figs. 6 and 7 are plan views of sections of terminal blocks illustrating shapes of mounting holes therein for the Figs. 2 and 3 terminals;

Fig. 8 is an elevation of another embodiment of the invention;

Fig. 9 is a side view of the Fig. 8 embodiment;

Fig. 10 is an elevation, partly in section, showing the Fig. 8 terminal mounted in a terminal block;

Fig. 11 is a side view of the mounting of Fig. 10;

Fig. 11 is a side view of the mounting of Fig. 10; and

Figs. 12 and 13 are plan views showing alternative embodiments of this invention.

In the manufacture of electrical switches, for example, use is often times made of terminals or electrical contact structures which are mounted in an insulating terminal block or some other part of the switch structure, by means of the terminal or contact structure being inserted in a hole through the terminal block and thereafter being crimped to hold the device securely in place. (Hereinafter, the word "terminal" will be used to denote terminals per se, or contact structures, or combination terminal and contacts.) Due to manufacturing tolerances, it is relatively expensive to have the hole (into which the terminal is

to be inserted) the exact size and shape of the terminal, with the result that the strength of the crimps formed by the crimping operation is relied upon to keep the terminal from having free play in the hole. With many switches, this problem of tightness of the terminal is not serious because in those cases the terminal merely acts as a device to which electric wires, etc. are to be soldered. However, in other types of electrical switches, and particularly in switches of the kind shown in the Bolesky Patent No. 2,199,387 free play (or looseness) of the terminal is objectionable. This is because of the fact that in such a construction, any loose play of the terminal may result in a change in the calibration of the thermostatic element, since the face of the terminal acts as a stationary electrical contact.

It is the general purpose, therefore, of this invention to provide a terminal which may be mounted in a hole in the terminal block in a firm and secure way with a minimum of loose play, and which uses a minimum of expensive contact material.

Referring now to the drawings, there is shown in Figs. 1 and 2, elevation and side views, respectively, of one embodiment of this invention. In this instance, indicated generally by numeral **1**, is a terminal made of a layer of silver **2** bonded to a base metal layer **3**. As shown, the terminal consists of a broad shank portion **4**, a narrow shank portion **5**, and a bent-over head **6**, the head to act as an electrical contact. Terminal **1** is preferably blanked from sheet stock, the sheet stock itself comprising a layer of silver bonded to a layer of base metal, by conventional blanking dies.

Indicated by numeral **7** is a slit (or narrow slot) sheared or pierced completely through the narrow shank portion **5** and positioned entirely within the shank as shown. The terminal of Figs. 1 and 2 may be used in this form, if desired, but there will now be described a second embodiment (Fig. 3) which results from another operation being performed on the Fig. 1 terminal. The Fig. 3 device is preferred over the Fig. 1 device for reasons which will be given below.

In Fig. 3 is shown the Fig. 1 terminal with an additional operation performed on it, to bend outwardly and away from each other, as shown, the legs **8** and **9** produced by the slit **7**. In this instance the bend shown is elliptical, but it could be circular or parabolic, etc., or it could be in the form of a triangular bend.

Fig. 4 shows an isometric view of the Fig. 3 terminal illustrating in greater detail the respective arrangement of parts.

The terminals shown in Figs. 1, 2 and 3 can be manufactured by simple blanking and forming operations from the sheet stock referred to above, using progressive dies on high speed blanking and forming machinery. This leads to economy of manufacture.

As to the method of using the Figs. 1, 2 and 3 terminals, there are shown in Figs. 6 and 7 plan views of sections of terminal blocks having mounting holes provided therein. Referring first to Fig. 6, the terminal block **10** has provided therein a rectangularly shaped mounting hole **11** which extends through the terminal block. This hole is for use with the terminal shown in Figs. 1 and 2, and the shape and dimensions of hole **11** are such as to contain the broad shank portion **4** with as snug a fit as manufacturing tolerances allow.

Referring now to Fig. 7, the terminal block **12** has therein the mounting hole **13** which is shown as having a rectangular center section **14** and the two end sections **15** and **16**, these end sections being approximately of the same size. Hole **13** is to be used with the Fig. 3 terminal, and end sections **15** and **16** are provided to permit the curved legs **8** and **9**, respectively, to pass through the terminal block.

Referring now to Fig. 5, there is shown the terminal block **12** with the Fig. 3 terminal mounted therein. The terminal is mounted in this way: First the terminal is inserted in hole **13** so that the bent-over contact head **6** rests snugly against the surface **17** of terminal block **12**. Then while head **6** is held against surface **17**, the narrow shank portion **5** is pushed toward head **6**. Because of the pre-curvature of legs **8** and **9**, these legs will bend further outwardly with the result that the curved-out legs (now indicated by numerals **18** and **19**) become crimped bent portions which hold the terminal securely in the terminal block **12**. Also, if the end **20** of slot **7** nearest head **6** is so positioned that it lies within the block, then the outwardly bending legs **8** and **9** will fulcrum against the edge of the hole in surface **21** of the terminal block to tend to draw the terminal tightly into the hole.

The terminal shown in Figs. 1 and 2 is to be used with the hole **11** shown in Fig. 6. In this case, there is no need of the side extensions **15** and **16**, because legs **8** and **9** of the terminal are not pre-formed as in Fig. 3. After terminal **1** is inserted in hole **11**, then it will be necessary to bend legs **8** and **9** sideways away from each other to start the crimping operation. This sideways motion may be continued to impart the complete crimp shown in Fig. 5, but it is preferable to combine the initial sideways bending with lengthwise pressure on the end of narrow shank portion **5** to assist in the crimping.

Referring now to Fig. 8, there is shown another embodiment of this invention, wherein the shank of the terminal again is formed with two integral legs which will be expanded outwardly in order to fasten the terminal into its terminal block. In this instance, the terminal again has the wide shank portion **24**, the narrow shank portion **25**, and the bent-over head **26**. It will be noticed again that the terminal in this instance is made of laminated material, as was the terminal shown in Figs. 1, 2 and 3. (It is obvious, of course, that instead of being made of laminated material, this terminal as well as the prior terminals can be made of non-laminated electrical contact material such as silver, gold, platinum, or copper, etc.) In this instance, a triangularly shaped hole **27** is pierced through the shank of the terminal, and the shank is notched as indicated at **28** to provide the leg portions **29** and **30**.

Referring to Figs. 10 and 11, there is shown a cross sectional view of the terminal of Fig. 8 mounted in a terminal block. In this case, after the terminal has been inserted in a hole such as that shown by numeral **11** in Fig. 6, the head **26** again is held firmly against the surface **31** of the terminal block **32**, and while being held, force is exerted against the end of narrow section 25 to push it toward the head **26**. This bends the legs **29** and **30** outwardly away from each other as shown in Fig. 10. In this case, the bottom of the hole **11** is provided with the rounded shoulders **33**, the purpose of which is to act as fulcrum points against which the legs **29** and **30** may bear. It is seen that the bending force applied to arms **29** and **30** is applied approximately at the bending points **34** and **35** and that there is a component thereof perpendicular to the surface of the terminal block. This component is on one side of the fulcrum points 33, and the resisting force is the force that the head **26** is exerting against surface **31** through the medium of the wide shank portion **24**. The results, therefore, of this fulcrum action is to draw and maintain head 26 firmly against surface **31**.

Shown in Figs. 12 and 13 are further modifications of the Fig. 8 terminal, the legs **36** and **37** of the Fig. 12 embodiment being formed by piercing a circular hole in the narrow section of the shank; and the legs **38** and **39** of the Fig. 13 embodiment being formed by piercing a hexagonal hole in the narrow section of the shank.

Other forms of piercing a leg shape will suggest themselves to one reading this disclosure. However, it will be noted that in all the embodiments shown herein, the basic principle is that of providing two or more leg sections integrally formed from the shank of the terminal, these leg portions being expanded outwardly to act as fastening portions to hold the terminal in the terminal block, by forcing the narrow portion of the terminal toward the head to cause this outward bending. (For example, three legs can be provided in the Fig. 1 or 3 types, with the center leg being bent in one direction and the other two being bent away from the center leg.) In speaking thus of forcing the narrow section of the terminal toward the head to cause the bending, it is contemplated that in some instances the force may be applied sidewise against the legs to cause that sidewise bending, with the result that the narrow section of the terminal shank moves toward the head. However, it is preferable for ease and economy of insertion, to cause the crimping action by applying the force to the end of the narrow shank to cause the sidewise bending and crimping.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings, shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A terminal for an electric device, comprising a flat sheet metal shank and a flat sheet metal head integrally attached to said shank; said shank being provided with at least one hole therein to provide inner walls; said shank having its outer edges notched, the boundary of said notches defining, together with said inner walls, a pair of legs integral with said shank, attached thereto at both ends, and inclined at an angle to the length thereof; at least a portion of said legs being adapted to be bent away from each other.

2. A terminal for an electric device, comprising a head and a shank; said shank having for part of its length a wide portion and for the rest of its length a narrow portion; the narrow portion of said shank being parted at approximately its center to provide two legs; each of said legs lying in the plane of the shank and being joined at one end to said wide portion and at the other end to said narrow portion; and said legs being outwardly inclined at an angle to the length of the shank whereby said legs are adapted to be bent further apart by motion of the narrow portion of the shank toward the wide part of the shank.

3. A terminal for an electric device, comprising a flat sheet metal shank and a flat sheet metal head integrally attached to the shank, said shank having two leg portions, said leg portions being integral with said shank and each of said leg portions being joined at both of its ends to said shank; said leg portions extending outwardly away from each other in opposite directions in the plane of the face of said shank, and at least a portion of each of said legs being adapted to be bent outwardly away from the other.

4. A terminal for an electric device, comprising a flat sheet metal shank and a flat sheet metal head integrally attached to the shank, said shank being provided with a polygonal shaped hole therein, to form legs integral with said shank and attached thereto at both ends, said legs being initially at an angle to each other in the plane of said shank, and at least a portion of each of said legs being thus adapted to be bent outwardly away from each other by forcing the ends of said shank towards each other.

5. In combination, a terminal block and a terminal, said terminal including two surfaces and providing a hole therein extending from one of said surfaces to the other, said terminal comprising a head and a shank, said shank being formed of sheet metal and comprising a flat por-

tion, two legs and another portion, said flat portion being snugly received in said hole, one end of said flat portion being integral with one end of each of said legs, the opposite end of each of said legs being integral with said other portion of said shank, said head being disposed against one of said surfaces of the terminal block and each of said legs extending outwardly away from the other and lying tightly against the other surface of said terminal block to maintain said head firmly against said one surface.

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