

Jan. 29, 1963

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3,076,171

ELECTRIC TERMINAL MEANS

Filed April 28, 1960

2 Sheets-Sheet 1

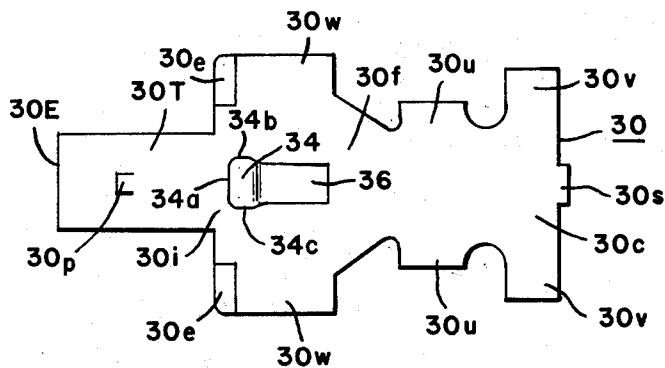


Fig. 2

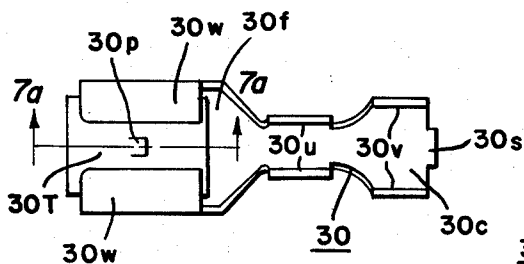


Fig. 3

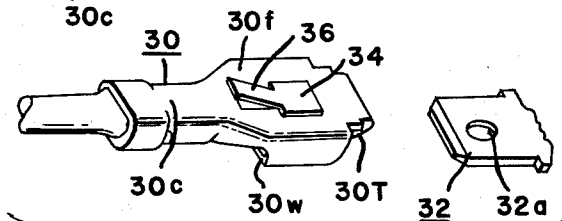


Fig. 1

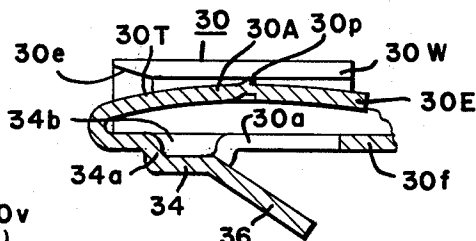


Fig. 4

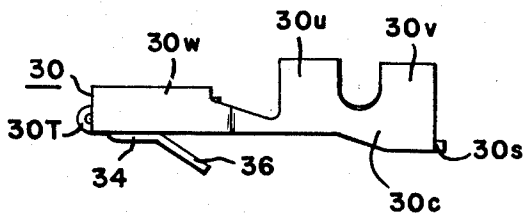


Fig. 5

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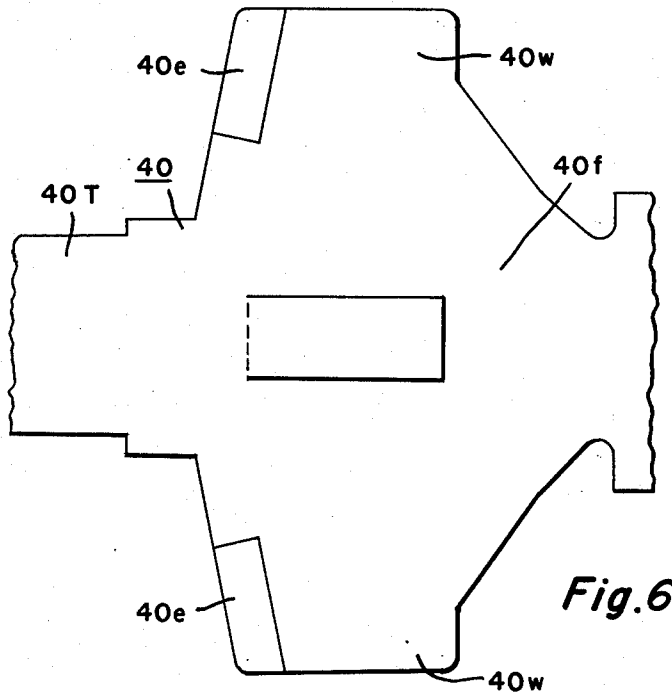


Fig. 6

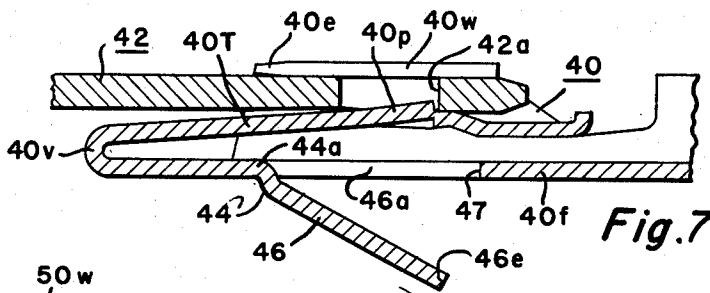


Fig. 7

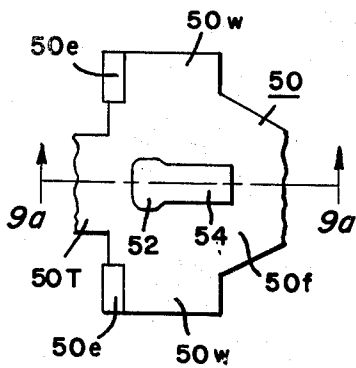


Fig. 8

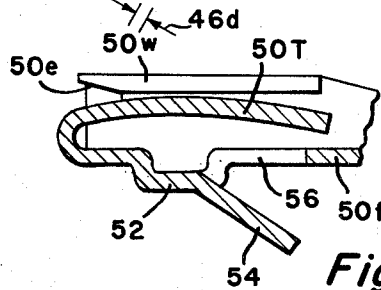


Fig. 9

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3,076,171

ELECTRIC TERMINAL MEANS

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3 Claims. (Cl. 339-258)

This invention relates to electric terminal means and particularly to an improved terminal adapted to be mounted in a connector provided for connecting together ends of wires in making electrical circuit for electrically operated devices.

This is a continuation-in-part of application Serial No. 744,705 to Hopkins, filed June 26, 1958, now Patent No. 3,037,183, issued May 29, 1962.

An object of this invention is to provide an improved electric terminal means adapted to be assembled and disassembled in a connector body.

Another object of this invention is to provide a female terminal means including a metal body having a conductor engaging portion and floor integral therewith and extending longitudinally relative to each other with a pair of side wings each having one end integral with the metal body in a location laterally adjacent to the floor and having opposite ends extending toward each other over the floor, which has a tongue portion longitudinally integral at one end with the floor, and having a spring-like arcuate contact section that has a normal location between the floor and opposite ends of wings extending toward each other such that distance between the spring-like arcuate contact section and wing ends is substantially less than thickness of sheet metal used for terminal means while an embossed portion is formed downwardly from the floor strengthened thereby in a location longitudinally in alignment with an opening in the floor left by formation of a tang integral at one end with the embossed portion and projecting downwardly away from both the floor and tongue portion in a direction toward the conductor engaging portion though the tang has increased resiliency due to connection thereof directly to the embossed portion which assures against binding as well as hindrance to movement of the tang along peripheral edges of the floor opening left thereby because the downward embossed portion forms a shield-like abutment to deter return of the tang into the opening and to allow miniaturization of the female terminal means as to decrease in distance between the floor and ends of wings extending towards each other where the spring-like arcuate contact section is maintained free of interference for engagement with male blade terminal means adapted to mate therewith.

Another object of this invention is to provide an electric terminal means having a spring locking tang for locking connector terminals into insulator bodies and adapted to deflect easily while being pushed into a connector body yet adapted to spring to a locking position unrestricted by all remaining terminal means metal from which the tang is sheared.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

FIGURE 1 is a perspective view of terminal means in accordance with the present invention.

FIGURE 2 is a blank view of the terminal means of FIGURE 1.

FIGURE 3 is a plan view of the terminal means made from the blank of FIGURE 2.

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FIGURE 4 is a fragmentary cross-sectional elevational view taken along line A—A in FIGURE 3.

FIGURE 5 is a side view of the terminal in FIGURE 3.

FIGURE 6 is a fragmentary blank view of female terminal means also in accordance with the present invention.

FIGURE 7 is a fragmentary cross-sectional view of mating terminal means including the female terminal means of FIGURE 6.

FIGURE 8 is a fragmentary blank view of terminal means similar to what is shown by FIGURE 2.

FIGURE 9 is a fragmentary cross-sectional view taken longitudinally along one end of terminal means formed from the blank of FIGURE 8.

In FIGURE 1 there can be seen a perspective view of further female terminal means generally indicated by numeral 30 and having a sheet metal body portion including a base or floor portion 30f integral longitudinally with a conductor engaging portion 30c. The blank view of FIGURE 2 illustrates the shape of integral parts of the sheet metal body used to form the female terminal means such as 30. FIGURES 3 and 5 illustrate plan and side views of the terminal means made from the blank sheet metal body of FIGURE 2. The conductor engaging portion 30c includes a first pair of tabs 30u adapted to be crimped or bent into engagement electrically relative to an insulated conductor the outer periphery of which is encompassed by slightly longer tabs 30z extending in pairs on opposite sides of a central and longitudinally extending integral stop member 30s. Provision of this stop member 30s is optional. A pair of side wing portions 30w are integral at one end thereof with the base or floor portion 30f and extend laterally thereof with opposite free ends of each of the wing portions being bent toward each other above the base or floor portion 30f as best seen in views of FIGURES 3 and 4. Each of the side wing portions 30w has an inner surface and edge thereof coined or cut away as indicated by reference numeral 30e such that a male blade means or male terminal generally indicated by numeral 32 in FIGURE 1 can be inserted between the free ends of the side wing portions 30w at a location to one side of each of the side wings and electrically in engagement with a tongue portion 30T having a free end bent back in a continuous arc terminating at an end 30E while an opposite end of the tongue portion 30T is integral as indicated by 30i adjacent to the floor portion 30f. In a central location relative to the tongue portion 30T there is a projection or pimple 30p visible in views of FIGURES 2, 3 and 4. This pimple 30p is adapted to lock relative to an aperture 32a of the male blade 32 visible in FIGURE 1. Such engagement of the pimple relative to a male blade can be seen in FIGURE 7 of the drawings.

As best seen in the view of FIGURE 4, the tongue portion 30T has a generally arcuate upper surface 30A which is normally spaced a distance below the surface of the pair of free ends of the side wing portions 30w less than thickness of sheet metal used for the body portion of the female terminal means or male terminal means. For purposes of miniaturizing the overall height of the wing portion 30w relative to the floor portion 30f and tongue portion 30T integral therewith the female terminal means 30 include an embossed portion 34 integral with the floor portion 30f and deformed below the floor portion 30f as shown in views of FIGURES 1, 4 and 5. Since the embossed portion 34 extends below the floor portion 30f the height of the wing portions 30w above the floor portion need not be greater but rather can be decreased while providing additional freedom for resilient movement of the tongue portion 30T. The embossed por-

tion 34 is integrally joined along three sides by segments 34a, 34b and 34c made of sheet metal integral with the floor portion 30f. The fourth side of the embossed portion 34 is integral with one end of a tang 36 also bent downwardly or below the floor portion 30f wherein there is left an aperture 39a where sheet metal of the body of the terminal means is removed to form the tang 36. The tang 36 is integral at one end directly with the embossed portion 34 which is longitudinally substantially in alignment therewith rather than having the tang integral directly with the floor portion. It is to be understood that a free end of the tang 36 can engage a shoulder of an insulating housing having a terminal mounting passage therein as can be seen in FIGURE 4 of Patent 3,037,183 noted earlier. As best seen in FIGURES 1 and 2, the tang 36 and embossed portion 34 together have a T-shape below the floor portion 30f. During insertion of female terminal means such as 30 relative to an insulating body, the embossed portion 34 provides a shield located in a plane substantially parallel to the plane of the floor portion 30f and the tang 36 can be resiliently deflected also to be co-planar with the embossed portion 34 yet the tang 36 cannot bind or engage any peripheral edge defining the opening or aperture 30a in the floor portion 30f because the embossed portion 34 is deformed below the floor portion 30f for at least a distance equal to substantially once the thickness of the sheet metal body material used to form the female or male terminal means. It is apparent that the embossed portions 20 and 34 are located entirely in planes either above or below yet substantially parallel relative to floor portions of the terminal means. The embossed portion 34 further provides a protective shield to deter against return of the tang into the opening or aperture 30a as the female terminal means is inserted longitudinally relative to an insulating housing. Normal spacing of the arcuate surface 39A away from a bottom surface of side wing portions 30w is less than thickness of sheet metal used to form the terminal means.

FIGURE 6 is a fragmentary blank view of a sheet metal body for another female terminal means generally indicated by numeral 40 and having features in accordance with the present invention. The fragmentary cross sectional elevational view at FIGURE 7 illustrates this female terminal means 40 having a floor portion 40f as well as a pair of side wing portions 40w extending laterally and integrally from the floor portion 40f. Each of the side wing portions 40w includes a coined edge 40e and the side wing portions are bent toward each other above the floor portion 40f. A tongue portion 40T extends longitudinally and integrally from the floor portion 40f which also has a pimple or projection 40p adapted to engage an aperture 42a of a male blade terminal means generally indicated by numeral 42. The tongue portion 40T is joined to the floor portion 40f by a substantially longer V-shaped end portion 40v to enhance resilience of the free end of the tongue portion 40T while the height between floor portion 40f and the side wing portions 40w where they are bent toward each other can be miniaturized and decreased appreciably. A transversely embossed portion 44 is bent below the floor portion 40f and away from the side wing portions 40w as well as the tongue portion 40T. This embossed portion 44 is substantially elbow shaped and is joined to the floor portion by a bend or section 44a which though transverse relative to the longitudinally extending floor portion and tongue portion is located in a position substantially longitudinally in alignment with a downwardly bent tang 46. As best seen in FIGURE 7, the tang 46 is formed of metal taken from the floor portion 40f leaving an aperture 46a in the floor portion and the elbow shaped embossed portion 44 permits deflection of the tang 46 into a position substantially parallel to the floor portion but not co-planar therewith. The embossed portion 44 as bent below the floor portion 40f assures that the tang 46 even when parallel to the floor portion 40f is located

to one side of any peripheral edges defining the opening or aperture 46a. Also, the provision of the elbow shaped embossed portion 44 is such that arcuate deflection of the tang 46 with respect to the free end 46e of the tang will never result in having the free end of the tang bind relative to an edge 47 of the opening or aperture 46a in view of the offset for a distance 46d indicated by the arrows in FIGURE 7.

FIGURE 8 illustrates a fragmentary blank view of another terminal means 50 having side wing portions 50w and coined edge 50e. The side wing portions 50w are laterally integral with a floor portion 50f over which a tongue portion 50T is bent back and extends to have an arcuate shape of top surface area which is spaced a predetermined distance below the side wing portions 50w such that this distance is normally less than thickness of a male blade means such as 42 and the like adapted to be mated therewith. The tongue portion 50T differs from that shown in figures previously noted in that the pimple or projection such as 30p or 40p is eliminated and not needed. The free end of the tongue portion 50T can be deflected toward the floor portion 50f against which this free end abuts as a limit stop. Integral with the floor portion 50f there is a deformed embossed portion 52 bent below the floor portion 50f. A locking tang 54 is integral at one end directly with respect to one side of the embossed portion 52 and the embossed portion serves to offset this tang 54 at least once the thickness of sheet metal used for the terminal means 50 or a male blade adapted to mate therewith. The embossed portion 52 also serves to shield the tang 54 against possible binding of the latter relative to peripheral edges of an aperture 56 left in the floor portion 50f as the embossed portion 52 and tang 54 are formed therefrom. As is best seen in the view on FIGURE 8, the embossed portion 52 and tang 54 together have a substantially T-shaped configuration.

It is to be understood that each of the embossed portions serves to strengthen the floor portion of each of the female terminals and when bent below the surface of the floor portion permits miniaturizing of the height or distance between the floor portion and integral side wing portions.

While the embodiments of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. Female terminal means comprising, a metal body including a conductor engaging portion and a floor integral therewith and extending longitudinally relative to each other, a pair of side wings each having one end integral with said metal body in a location laterally adjacent to said floor and having opposite ends extending toward each other over said floor, a tongue portion integral at one end with said floor in a location remote from said conductor engaging portion and bent back arcuately over said floor such that minimum height between said side wings and tongue portion is less than thickness of metal for male terminal means to mate therein, said arcuately bent tongue portion having a free end as a termination of the arcuate shape such that this free end can engage said floor when male terminal means fit between said arcuate tongue portion and free ends of said side wings, an embossed portion deformed below said floor in a location substantially centrally thereof and spaced laterally inwardly away from opposite sides and integral therewith longitudinally in alignment in a location immediately below said tongue portion and remote from said conductor engaging portion, and a tang having one end integral with said embossed portion in a location completely below said floor and having a free end projecting toward said conductor engaging portion and further below even said embossed portion so as to have resilience of said tang enhanced due to location thereof with said embossed portion below said floor and on a side of said

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floor remote from the side thereof where said arcuately extending tongue portion extends and requires less height between said free ends of the side wings and said floor.

2. Female terminal means adapted to fit longitudinally into a hollow interior of a housing of insulating material including abutment means integrally provided along inner surface means forming the hollow interior and comprising, a metal body including a conductor engaging portion and a floor integral therewith so as to extend longitudinally relative to each other, a pair of side wings each having one end integral with said metal body in a location laterally adjacent to said floor and having opposite ends extending toward each other over said floor, a tongue portion having an arcuate spring-like contact section that terminates directly in a free end engageable with said floor and that is integral with a C-shaped section to join said arcuate spring-like section to one end of said floor, said arcuate spring-like contact section having a normal location below ends of said side wings extending toward each other and above said floor such that distance between said arcuate spring-like contact section and ends of said side wings extending toward each other is normally less than thickness of metal for said body as well as for male blade means adapted to mate therewith and the like, said side wings each having a tapered leading edge located laterally outwardly from juncture of said arcuate spring-like contact section and said C-shaped section, said tapered edges in conjunction with said arcuate spring-like contact section forming an insertion guide to permit resilient wedge grip of any male blade means metal firmly between said side wings and said arcuate spring-like contact section of said tongue portion, an embossed portion deformed below said floor in a location substantially centrally thereof and spaced laterally inwardly away from opposite sides and away from said tongue portion which thus has freedom to move back and forth resiliently relative to said floor though distance between side wings and said floor is minimized, and a tang integral at only one end with said metal body and joined specifically at said embossed portion so that said tang projects below said floor and is adapted to engage abutment means of the insulating housing for prevention of movement in one direction while said side wings engage further abutment means of the housing for prevention of movement in an opposite direction, said embossed portion having a purpose to strengthen said floor as well as to enhance resilience and clear-

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ance for both said tang and said tongue portion respectively.

3. On a female electrical terminal means including a metal body including a conductor engaging portion and an integral floor extending longitudinally relative to each other as well as having a pair of side wings each having one end integral with said metal body in a location laterally adjacent to said floor though opposite free ends thereof extend toward each other into a location adjacent to a tongue portion integral at one end with said floor in a location remote from said conductor engaging portion and bent back arcuately over said floor such that minimum height between said side wings and tongue portion is less than thickness of metal for male terminal means to mate therein, the specific improvement in combination therewith which comprises a thinned embossed portion including downward edges that merge into a box-like swaged deformation extending substantially parallel though below said floor in a location substantially centrally thereof and spaced laterally inwardly away from opposite sides remote therefrom though over-all width of said thinned embossed portion with said box-like deformation is slightly greater than width of a slot-like opening left in said floor by displacement of a tang struck therefrom to have one end thereof integral with said box-like deformation of said embossed portion in a location completely below said floor and having a free end projecting toward said conductor engaging portion and further below even said embossed portion to assure enhanced resilience of said tang free of possible edge binding interference with the slot-like opening when said tang is temporarily deflected toward said floor that is strengthened against possible lateral-transverse displacement centrally in a location specifically longitudinally in alignment with the slot-like opening and simultaneously having said embossed portion on a side of said floor remote from the side thereof where said arcuately extending tongue portion extends and requires less height between said free ends of the side wings and said floor.

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