

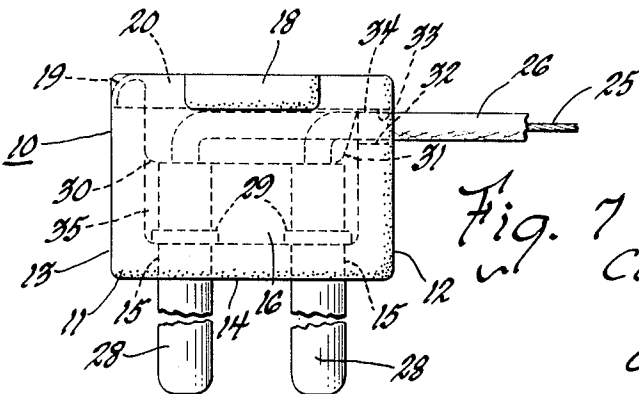
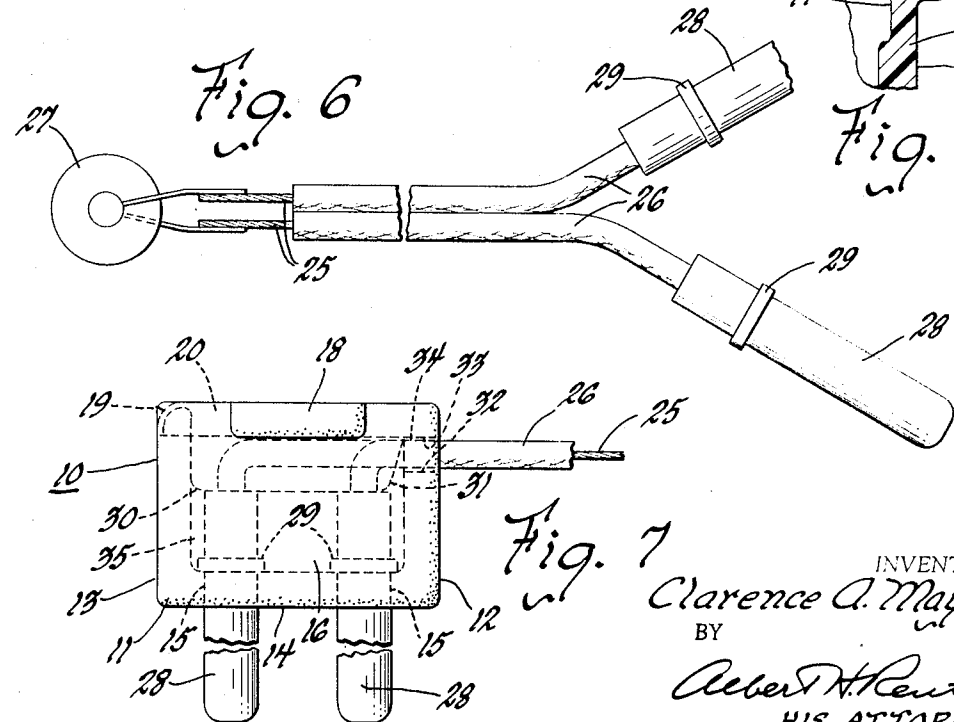
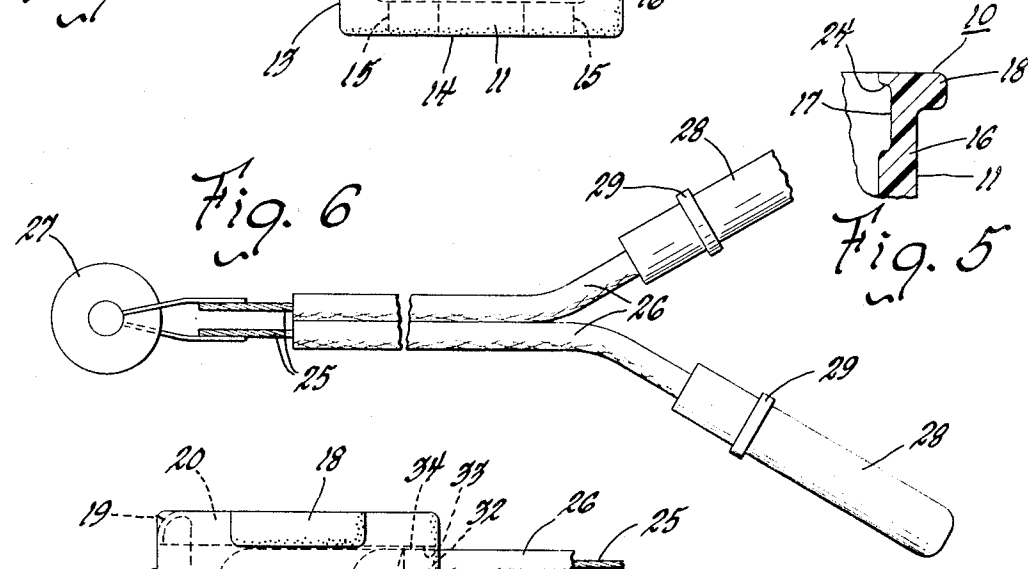
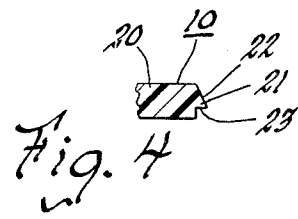
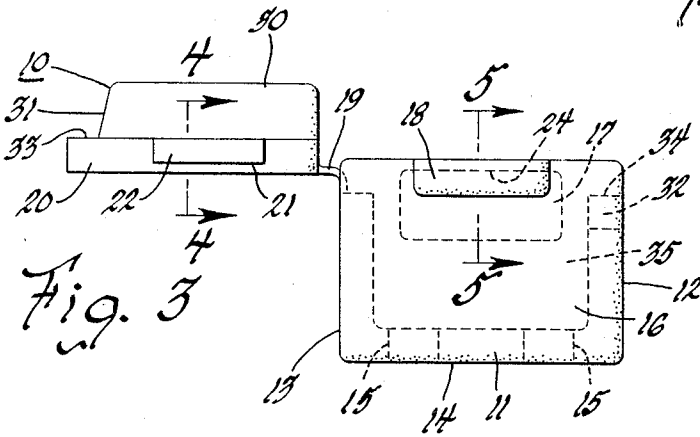
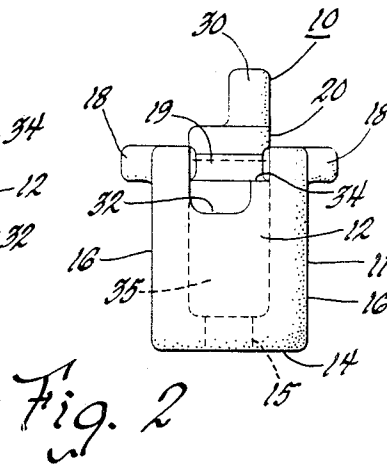
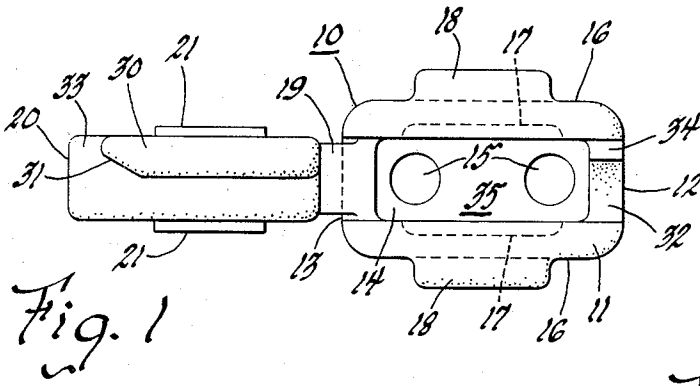
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3,293,591

SUB-MINIATURE ELECTRICAL PLUG

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1

3,293,591

SUB-MINIATURE ELECTRICAL PLUG

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5 Claims. (Cl. 339-107)

This invention relates to electrical connections and, more particularly, to miniaturized insulating plug body features with multiple functions and advantages though having unitary structure throughout.

On certain appliances there is limited space for wiring connections which nevertheless must be protected against damage though being kept accessible for servicing. Problems of production and servicing previously required plug replacement with costly labor and material expenditure due to need for scrapping an entire plug assembly including pins or connectors secured to wiring. Accordingly, an object of the present invention is to provide a new and improved insulating plug body readily replaceable as a unit with minimum cost for labor and material.

Another object of this invention is to provide a sub-miniature electrical plug structure having prong means readily insertable by only close fit to hold in proper orientation along peripheral surfacing of aperturing in a base of a box-shaped main body portion entirely of moldable insulating material integral with opposite side walls each internally undercut for a tab lock grooving in locations parallel to external flanging extending laterally outwardly for removal of plug structure from socket installation, each undercut being complementary to outward locking tab projections of a lid portion for the box-shaped main body portion and a reduced thickness hinge portion of moldable insulating material integrally interconnecting the lid portion and box-shaped main body portion thereby to eliminate handling of more than one piece free of danger of loss during separation though maintaining alignment for engagement of the locking tab projections as to wall grooving.

A further object of this invention is to provide a sub-miniature electrical plug structure having prong means readily insertable by only close fit to hold in proper orientation along peripheral surfacing of aperturing in a base of a box-shaped main body portion entirely of moldable insulating material integral with opposite side walls each internally undercut for a tab lock grooving in locations parallel to external flanging extending outwardly for removal of plug structure from socket installation, each undercut being oversized to permit overtravel of locking tabs thereto though complementary to outward locking tab projections of a lid portion for the box-shaped main body portion and a reduced thickness transverse hinge portion of moldable insulating material integrally interconnecting the lid portion and box-shaped main body portion thereby to eliminate handling of more than one piece free of danger of loss during separation though maintaining alignment for engagement of the locking tab projections as to wall grooving, the external flanging during engagement for plug removal enhancing interfit and positive engagement of the locking tab projections with wall grooving.

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 plan view of sub-miniature electrical plug body structure of insulating material having features in accordance with the present invention.

2

FIGURE 2 is an end view of the structure of FIGURE 1.

FIGURE 3 is a side view of the structure of FIGURES 1-2.

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

FIGURE 5 is a fragmentary cross-sectional view taken along line 5-5 in FIGURE 3.

FIGURE 6 is a view showing a pair of wiring-connected prong means for assembly with the plug body structure of the foregoing illustrations.

FIGURE 7 is an elevational view to show assembled and closed relationship of the wiring-connected prong means of FIGURE 6 with the plug body structure having features in accordance with the present invention.

In FIGURES 1, 2 and 3 there can be seen miniaturized insulating plug body means generally indicated by numeral 10 and having features in accordance with the present invention. The same plug body means generally indicated by numeral 10 is shown also in FIGURE 7. The plug means 10 includes a substantially box-shaped main body portion 11 including opposite end walls 12 and 13 as well as a base or bottom portion 14 having a pair of substantially parallel apertures 15 therethrough. Also, the box-shaped main body portion 11 includes a pair of substantially identical side walls 16 each internally undercut or recessed as indicated by numeral 17 in views of FIGURES 1, 3 and 5. Integral with each of the side walls 16 there is external flanging 18 substantially parallel to the undercut or recessing 17. This flanging 18 can be engaged externally by fingers of an individual for removal of plug structure which integrally also includes a transverse hinge portion 19 that can be seen in views of FIGURES 1-3 and 7. A lid or cover portion 20 integrally joined to the transverse hinge portion 19 has a pair of laterally opposite and outward locking tab projections 21 adapted to mate with the undercuts or recessing 17 during closing of the lid portion as to the box-like body portion. The undercuts or recessing 17 are purposely oversized to permit overtravel of locking tab portions 21 and interengagement of these tab projections 21 with the recessing 17 of the side walls 16 is enhanced and positively maintained during engagement of the flanging 18 on opposite side walls 16 during pulling or removal of the plug body means. The view of FIGURE 4 illustrates in further detail the locking tab projections integral with the cover portion 20 such that an inclined or ramp surface 22 and a lateral locking shoulder 23 are provided. The shoulder 23 illustrated in FIGURE 4 engages a complementary lateral surface or abutment 24 along an upper portion of recessing 17 as shown in FIGURES 3 and 5.

FIGURE 6 illustrates wiring means or a pair of conductors 25 suitably insulated with a covering 26 of plastic material. One end of the wiring or conductor means 25 can be secured by soldering to terminals of thermistor means generally indicated by numeral 27 as illustrated in FIGURE 6. For further disclosure as to function and purpose of such thermistor means 27 reference can be made to a copending application Serial Number 232,355, Beck et al. filed October 23, 1962, now Patent 3,217,508 issued November 16, 1965, on an ice-making appliance representing one example of a location where features of the present invention can be used. This copending application belongs to the assignee of the present invention. FIGURE 6 further illustrates a pair of prongs or base pin means 28 each having an outwardly flared shoulder or abutment 29. The prong or pin means 28 have a close fit as to the inner surfacing of the apertures 15 in the base 14 of the box-shaped body portion 11. Assembly of the prong or pin means 28 and abutment of the portions 29 thereof as to the base or floor portion 14 can be seen in the view of FIGURE 7.

Another feature in accordance with the present invention is the provision of a pressure foot portion 30 integrally on one side of the cover or lid portion 20 as illustrated in views of FIGURES 1-3 and 7. This pressure-foot portion 30 extends substantially parallel to the cover or lid portion 20 for a distance less than full length thereof terminating in an inclined ending 31 at one end and adjacent to the transverse hinge portion 19 at an opposite end. The end wall 12 has a cutout 32 through which wiring can be fitted subject to closure of the cover or lid portion 20 to have a free end 33 thereof adjacent to the inclined portion 31 fit against a stop portion or abutment 34 of the end wall 12. The stop or abutment 34 can be seen in views of FIGURES 1-3 and 7. The pressure foot portion 30 assures that wiring is pushed to one side by insulating material to avoid shorting against an adjacent pin or prong means in assembled relationship as illustrated in FIGURE 7. The wiring can be suitably soldered or crimped to the pin or prong means subject to installation and removal from the insulating body means having features in accordance with the present invention to permit frictional or close-fit engagement or disengagement therebetween upon access to internal space 35 of the box-shaped body portion 11. Once the wire and pin or prong means has been installed in the plug body portion and the integral hinged lid portion is snapped in place the wiring extending externally therefrom through the opening 32 there is a snug interfit for strain relief by holding of the wiring to one side due to engagement of the pressure foot portion 30 thereagainst. Wire movement is mainly limited to a location laterally and longitudinally to one side of juncture of the wiring with the pin or prong means and thus sufficient thickness of wiring and insulation thereon is present to result in less wire movement and therefore less wire damage due to flexing. Features of the present invention permit bringing the wiring out of the side of the plug structure which is particularly advantageous when insufficient space or room is available to bring the wiring out of the back or cover end such as is usually done on conventional lamp or appliance plug means.

Additional advantages indicated previously include provision of the pressure foot portion on the lid or cover portion to keep wiring from shorting out against an adjacent pin or prong means of the plug structure. Also the lid portion is positively locked in place by allowing overtravel of the lid tab projections in the locking groove or undercut of the sidewalls. Disengagement of the tab projections can be facilitated by pressing down and laterally outwardly in opposite directions on the flanging 13 so as to spread the side walls 16 temporarily away from each other while simultaneously lifting upwardly on the free end 33 of the cover portion 20. This free end 33 can be engaged from an underside due to location of the opening 32. Also the flanging 13 enhances maintenance of the interlock of the hinged cover portion 20 during interengagement of the tab projections 21 with the undercut or recessing 17 when the flanging 13 is engaged along an underside thereof and is used for lifting or disengaging the plug means from a suitable socket structure not illus-

trated per se though having socket portions or female terminal means adapted to mate with the pins or prong means 23. Since the plug structure has a body means including integral hinge means 19 of reduced thickness between the lid portion and box-shaped body portion, it is unnecessary to handle separately two pieces which could be easily lost or misplaced due to sub-miniature size thereof. The apertures 15 are oriented substantially parallel to each other and the prong means with wiring as well as the insulating body structure per se can be readily replaced individually in the event of damage without scrapping and replacement of an entire plug assembly during original production or servicing.

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

What is claimed is as follows:

1. An electrical plug structure having prong means readily insertable and replaceable, comprising, a box-shaped main body portion entirely of moldable insulating material integral with opposite sidewalls each internally undercut for a tab lock grooving in locations parallel to external flanging extending laterally outwardly for removal of plug structure from mating socket installation, a lid portion having opposite outward locking tab projections mating with said grooving, a reduced thickness hinge portion integral between said lid portion and said box-shaped main body portion, and a pressure foot means carried integrally along one side of said lid portion for wire engagement and lateral displacement thereof to insure against short circuit between adjacent prong means and to permit wire strain relief laterally thereof.

2. The structure of claim 1 wherein said box-shaped main body portion has a base with a pair of substantially parallel apertures therethrough for close fit of mating prong means.

3. The structure of claim 1 wherein said box-shaped main body portion has a deepened cutout for wiring passage in one end thereof adjacent to an abutment for limiting engagement of said lid portion in a location remote from said integral hinge portion.

4. The structure of claim 1 wherein said undercut grooving is oversized to permit overtravel of said locking tab projections of said integral lid portion.

5. The structure of claim 1 wherein said pressure foot means has a laterally offset location on an underside of said lid portion as closed positively to displace a wire laterally to one side to insure against short circuit between adjacent prong means.

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