

[54] **FASTENING SUPPORT MEANS**

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[51] Int. Cl. .... **F16m 13/00**

[58] Field of Search .... **248/151, 188; 220/18, 69; 287/189.36 F**

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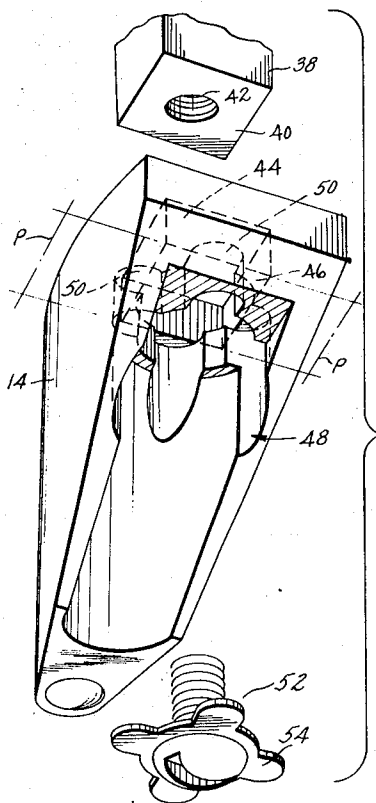
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## [57] **ABSTRACT**

The invention discloses a fastening support means such as may be used between metallic and plastic members such as support legs and terminal guards in an electric skillet or similar device. The invention is directed to the fastening means whereby dissimilar materials can be joined together for sole support on a common plane for independent expansion between the parts and no compression of either. This overcomes the tendency of skillet legs to loosen under constant use and provides a fastening means which remains permanently tight.

**12 Claims, 9 Drawing Figures**



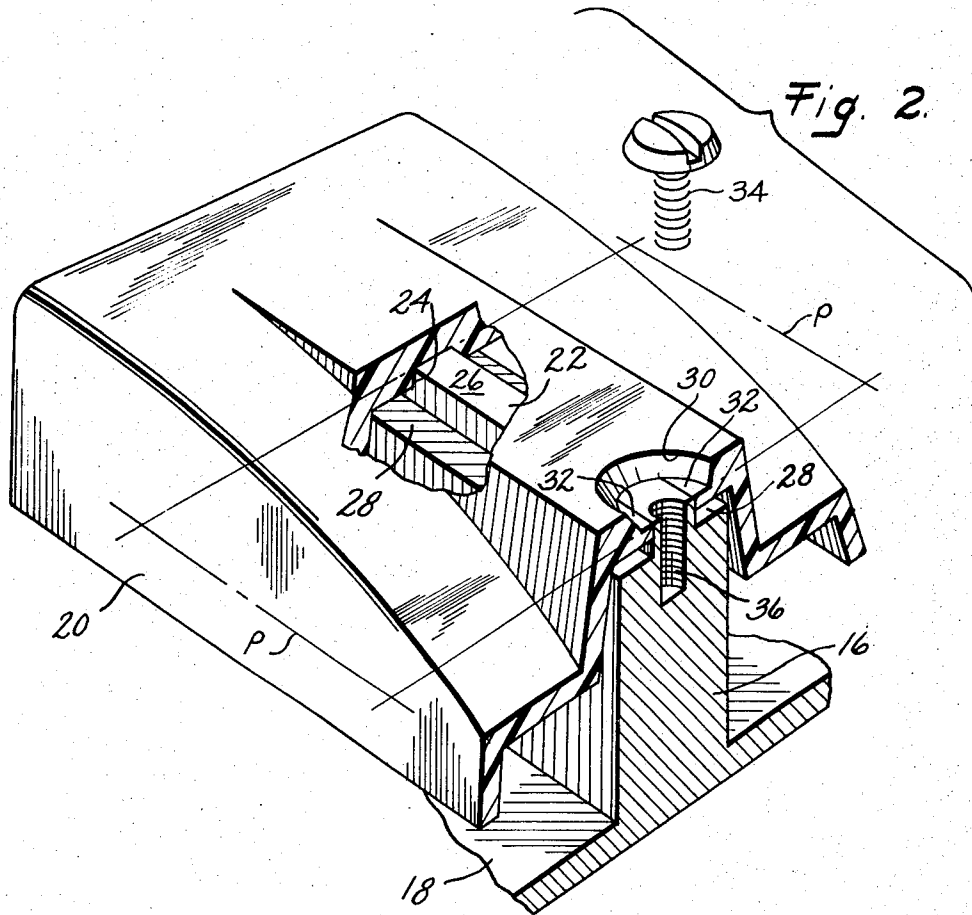
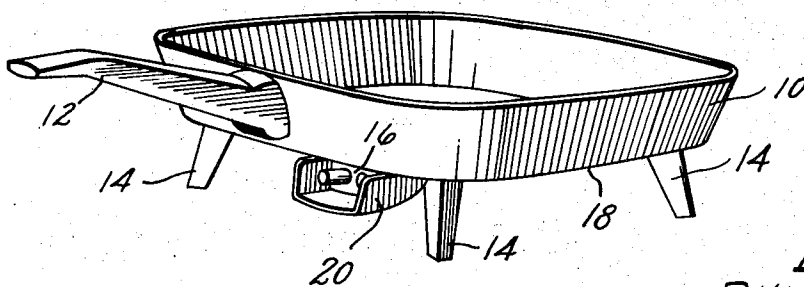


Fig. 1.



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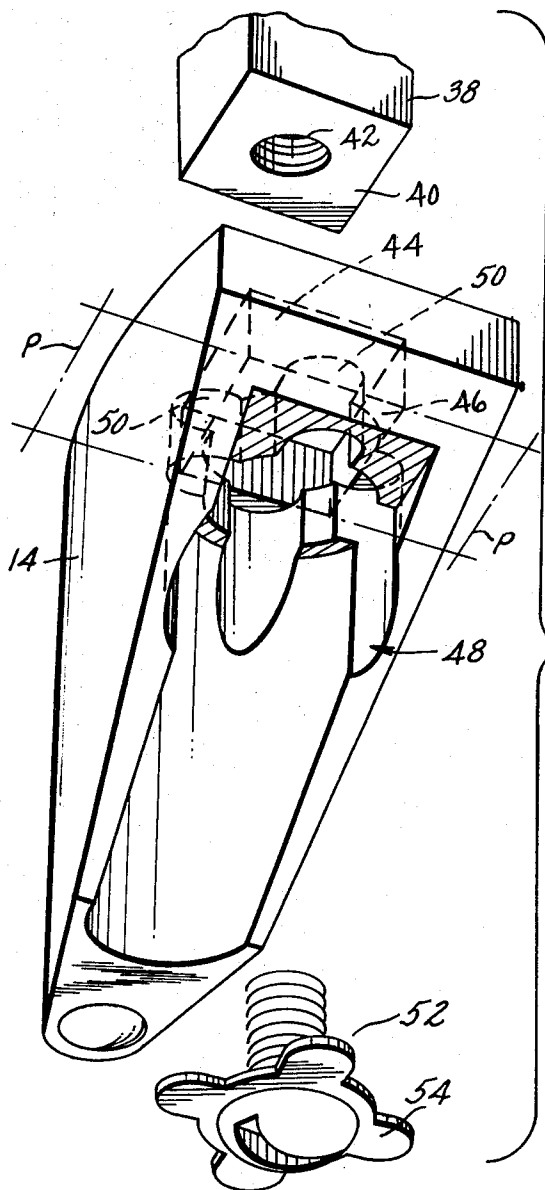


Fig. 3.

Fig. 6.

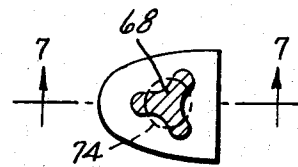


Fig. 7.

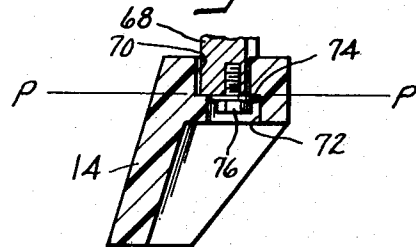


Fig. 8.

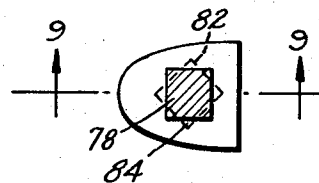


Fig. 9.

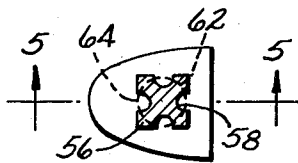
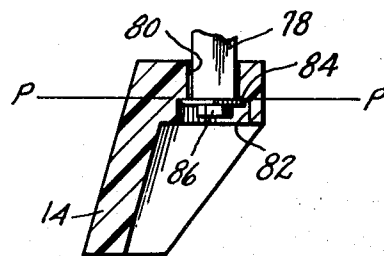


Fig. 4.

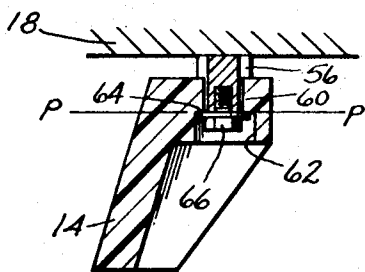


Fig. 5.

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## FASTENING SUPPORT MEANS

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

The invention is directed to a fastening support means primarily for use between dissimilar materials and, while not so limited, is described in connection with an electric skillet. It is directed to a connection that overcomes the tendency of the skillet legs to loosen and is achieved by a unique coplanar fastening means whereby continuous expansion and contraction can take place without any loosening of the legs.

## 2. Description of the Prior Art

Portable cooking vessels known as electric skillets or frypans are commonly provided with downwardly extending plastic legs for supporting the aluminum vessel on a countertop. Additionally, the skillets are probe-controlled in that a temperature setting probe is plugged into a metallic housing on the skillet and the temperature is controlled by thermostatic means within the probe all in a well-known manner. The area around the probe-skillet connection is protected by a plastic terminal guard to avoid any chance of electric shock.

One of the difficulties has always been the tendency of the plastic legs or other plastic parts, such as the terminal guard, to loosen because of the continuous expansion and contraction during use of the cooking vessel. Numerous schemes have been proposed to offset the different contraction rates of the materials such as the use of springs between the legs and cooking vessel to take up the slack or other more complex constructions have been proposed. Generally, these require more parts, are complex, and therefore more costly. The result is that the cooking vessel or skillets are generally built with the plastic legs screwed onto the bottom of the skillet and these, in due course because of heating and cooling, become loose as anyone who has used an electric skillet is aware. Tightening the screw holding the leg is no cure since the leg, after additional use, again loosens.

## SUMMARY OF THE INVENTION

Briefly described, the invention is directed to a fastening support means primarily, but not exclusively, for the legs of an electric probe-controlled skillet wherein the metallic skillet body uses plastic legs or other parts such as a terminal guard attached thereto. In a skillet application, there is provided a boss projecting from the skillet body and the boss is provided with a substantially flat load bearing lower surface thereon. In the skillet-leg combination, a plastic leg support is provided with a recess that has a bottom and the recess is formed in the upper part of the leg to receive the boss in nesting relation to provide the sole support of the load surface and therefore the skillet on the recessed bottom along a reference plane. The parts are of generally different materials, the skillet being of aluminum and the leg of a heat-resisting plastic. Securing of the leg to the skillet is obtained by providing the leg with an aperture means opposite the recess and extending the aperture down to the reference plane. The aperture is shaped differently from the recess or, if the same shape, it is differently oriented to provide spaced portions straddling the recess which spaced portions are coplanar with the load surface. The leg is then secured to the skillet by any suitable means such as a screw ex-

tending into the aperture whereby the screw head overlaps and bears on the spaced portions of the plastic leg and, at the same time, on the load surface. Simultaneously, the load surface bears on the bottom of the recess to limit upward movement. Consequently, both spaced portions and load surface are in the common reference plane or coplanar and securement of the leg to the boss and skillet is complete. This arrangement permits the two different materials to expand independently and neither material is ever in compression which is the cause of the loosening of the legs in an electric skillet. A similar construction is used in securing the plastic terminal guard to the aluminum skillet. Thus, the main object of the invention is to provide a unique fastening support means between materials which may be dissimilar and which support means uses no more parts than prior art structure but, by providing different orientations of the usual openings and recesses, the fastener ensures a structure that is permanently tight under repeated contraction and expansion at different rates because it allows independent expansion and contraction of the materials.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a general perspective view of an electric skillet illustrating a typical application of the invention;

FIG. 2 is a broken perspective, partially in section, showing the application of the invention to a terminal guard;

FIG. 3 is a exploded perspective of a plastic leg as used on an electric skillet;

FIG. 4 is a plan view looking down on the top of a modified leg;

FIG. 5 is a sectional elevation taken on the line 5—5 of FIG. 4; and

FIGS. 6-9 are views similar to FIGS. 4 and 5 of different modifications of leg structure.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention is described, for convenience, in connection with the well known electric skillet. However, it will be apparent that the unique fastening structure is applicable to any joining of similar or dissimilar materials which may be subjected to loosening for various reasons, such as the constant expansion and contraction as found in the repeated heating and cooling of electric skillets. The invention is also described as applied to a terminal guard on such a skillet.

Referring first to FIG. 1, there is shown a cooking vessel such as an electric skillet 10 which is generally of aluminum construction with a lifting means such as stick handle 12. The skillet is provided with a plurality of supporting legs 14 that are usually of heat resistant plastic. The temperature of the skillet is controlled by a thermostatic probe, not shown, which is inserted into a metallic housing 16 in the form of a boss-like extension bonded to the bottom wall 18 of the skillet. When the probe is in position, the user is insulated from electrical shocks by the use of a plastic terminal guard 20 that is secured to the housing 16 and prevents access to the electric terminals of the heating element. This structure is well-known and common to electric skillets.

Referring next to FIG. 2, the invention is shown as applied to the fastening of the terminal guard 20 to the

metallic housing 16. The housing 16 will normally expand at one rate and the terminal guard at another because of the different coefficients of thermal expansion of the dissimilar materials. FIG. 2 actually is a view looking up on the bottom of the skillet with the parts broken for illustration. In the usual skillet structure, the plastic terminal guard 20 is generally screwed directly to the skillet at metallic housing 16 as shown. Consequently, on heating and cooling and the differential expansion, it is impossible to maintain a tight fastening with the result that the terminal guard is constantly loose. The invention overcomes this defect as will now be apparent. In order to secure the terminal guard to the skillet, the usual metallic housing 16 is provided with a downwardly projecting load bearing surface 22 that projects away from the main part of housing 16. This may be in any form and, in the terminal guard application, is conveniently made as a longitudinally extending flat-surfaced rib 22 formed directly on the housing 16. To mesh with this, the plastic terminal guard 20 has a matching recess 24 on its inner surface in which the rib 22 rests. It will be seen that the load bearing surface 26 between the rib 22 and recess 24 is the sole support between the terminal guard 20 and housing 16. This sole support is ensured by providing clearance 28 so that the support occurs along surface 26 which, for convenience, is defined as a reference plane P meaning that the terminal guard is supported only in a plane P that contains surface 26 and inner surface of recess 24. To secure the terminal guard to the skillet, the other or outer side of the guard directly opposite the recess 24 is provided with an aperture means 30 in the form of a tubular opening that, for convenience, is simply a countersunk screw opening as seen in FIG. 2. For support in the manner proposed by the invention, it is important that the aperture 30 extends down to the reference plane P containing surface 26, and no farther within the manufacturing tolerances obtainable. By extending the aperture to the reference plane it ensures that there is an aperture and also that spaced portions 32 are formed straddling and coplanar with load surface 26. Any suitable tubular opening equivalent to aperture 30 may be used which has a diameter or cross section larger than the width of rib 22 and this then provides the spaced segment portions 32 straddling the rib. The terminal guard is then secured to housing 16 by any suitable means. Typically, this is conveniently done by a screw-like fastening means 34 which, when threaded at 36 into the housing 16 causes the wide screw head to overlap and bear on the spaced segment portions 32 as well as on load surface 26. As previously described in connection with FIG. 3, the spaced portions and load surface thus lie in the reference plane P and are therefore coplanar when screw 34 is tightened into housing 16. While it will be apparent that any projection and aperture construction may be used, it is convenient to make the rib 22 and recess 24 as longitudinally extending portions as shown in FIG. 2 whereby they also serve as a locating means between the terminal guard and metallic housing 16. This permits the use of a single screw 34 to attach the guard to the housing along common reference plane P. The operation of this structure in FIG. 2 shows that, upon expansion of housing 16, the terminal guard 20 is carried along with the expansion by reason of its sole

support along load surface 26 in reference plane P. This is ensured by the single flat surface 26 as the only load bearing surface and consequently there is no compression of the terminal guard. The term "compression" as used herein means that force in excess of the normal fastening force which excess force is induced by differential thermal expansion between two joined parts. Similarly, the terminal guard 20 may expand at its own rate and can expand into clearance 28 if appropriate while, at the same time, being carried in the opposite direction by the expansion of housing 16. Again, there is no compression of either housing 16 or guard 20 and each expands independently of the other while being secured together along a common reference plane P. The result is that the screw 34 may be tightened securely into threaded portion 36 and the terminal guard 20 does not loosen under constant expansion and contraction and whether of the same or different materials.

Referring next to FIG. 3, the same general concept of fastening different members along a common reference plane is shown as applied to the more troublesome plastic legs used on a skillet. The bottom wall 18 of the cooking vessel or skillet may be provided at each leg with a projecting load bearing surface in the form of a boss 38 that projects downwardly from the bottom wall of the skillet. A suitable load bearing surface such as a substantially flat lower surface 40 is provided with threaded portion 42 or its equivalent. To locate and nest on boss 38, leg support 14 is provided with a matching recess 44 which has a corresponding flat bottom surface 46 formed in the upper part of the leg and this recess receives boss 38 in nesting relation for sole support of surface 40 on bottom 46 along a reference plane P. As shown, the recess 44 and boss 38 are substantially square although any cross-sectional shape may be used and other different shapes are shown in FIGS. 5-9 that will be explained. In order to secure the leg 14 to the skillet, an aperture means, generally indicated at 48, is provided opposite recess 44 and the aperture means extends into the leg to reference plane P. In FIG. 3, this aperture 48 is shown as a substantially four fingered opening, this shape providing four spaced portions 50 that straddle or overlap the bottom wall 46 of recess 44 whereby the portions 50 lie in plane P and provide abutment to prevent any pass-through into recess 44. However, the central portion of aperture means 48 extends completely through and into recess 44 and it is only the straddling portions or ears 50 that stop at plane P. In order to secure the leg 14 to the boss 38, a suitable screw-like fastener 52 is provided. In this context, the term "screw-like fastener" is intended to cover any equivalent such as a rivet or the like even though the common machine screw as shown in FIG. 3 is generally used. For the particular shape just described, the screw head may be shaped by the use of an attached four-fingered washer 54 that is rotatable relative to the screw. The screw head and washer, in effect, then act as a wide screw head of particular shape. When the shank of screw 52 is inserted into threaded portion 42 the finger portions of the washer 54 line up in the matching slots of aperture means 48 and bear on spaced portions 50 as well as flat load surface 40 all in common reference plane P. Consequently, the screw 52 may be tightened completely into boss 38 and, with

suitable clearance between the leg and the bottom of the skillet, it will be apparent that the expansion of boss 38 carries the leg with it by bearing on recess bottom 46 while, at the same time, an expansion of leg 14 in the other direction may also take place. Thus, the fastening on common plane P provides for independent expansion of the boss and the leg while permitting no compression of the material of either member therebetween. A permanent tight fitting fastening means is the result regardless of the number of expansions and contractions.

While the operational concept should be clearly understood from FIG. 3, it will be apparent that almost any shape recess and aperture may be used wherein spaced portions, equivalent to portions 50, will occur. This can be by using different cross-sectional shapes or using the same shapes on the boss and recess and merely orienting the aperture differently to provide some kinds of straddling spaced portions. In FIG. 4 there is shown a square boss 56 with a cut-out 58 in each side to align the boss with rib 60 in the matching leg portion as shown in FIG. 5. In this configuration, the opposite aperture 62 may then be round to extend down to common plane P whereupon the overlapping or straddling portions 64 are provided for screw head 66 to bear against while also bearing against the bottom of boss 56 and both surfaces lie in common reference plane P. Again, the operation is identical to that described in FIG. 3, the boss and recess shapes being somewhat different. Referring to FIGS. 6 and 7, a rounded three-fingered boss 68 is used in a matching recess 70 in the leg portion and a round aperture 72 is used in the other side of the leg to provide the spaced portions 74 for cooperation with screw 76 along common plane P in the manner as previously described.

FIGS. 8 and 9 show another modification wherein the boss 78 is square to fit in a matching recess 80 in leg 14 and the opposite aperture 82 is also square but rotated 90 degrees or any other suitable amount to provide a different orientation and consequent spaced portions 84 for the coplanar bearing of screw head 86 along common reference plane P as previously described.

Similarly, any suitable other shapes will suffice providing that the common or coplanar limitation is maintained in the manner described whereby each member is free to expand independently and neither member is under any compression when the fastening occurs along the common reference plane P.

It should be noted that substantially no additional parts are required and merely different shaped openings suitably oriented are required to provide the permanent tight fastening between two similar or dissimilar members.

While there have been described preferred forms of the invention, obvious equivalent variations are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described, and the claims are intended to cover such equivalent variations.

I claim:

1. Fastening means comprising,  
a first member having a projecting load bearing surface thereon,

a second member with a recess on one side receiving said surface in sole support of said first member along a reference plane,

aperture means in the other side of said second member opposite said recess and extending to said plane,

said aperture being shaped to provide spaced portions straddling and coplanar with said load surface, and

means overlapping said spaced portions and load surface securing said members together along said plane to allow independent expansion and no compression therebetween of either member.

2. Apparatus as described in claim 1 wherein said members are of different materials having different coefficients of expansion.

3. Apparatus as described in claim 1 wherein said recess and aperture are of differently oriented cross sectional shapes to provide said spaced portions.

4. Apparatus as described in claim 1 wherein said projecting load surface is a flat-surface extension nesting in a matching recess in said second member,

said aperture being tubular-shaped to provide spaced segment portions and,

said overlapping means is a screw-like fastener in said first member with the screw head means bearing on said segment portions and said load surface in said reference plane.

5. In a cooking vessel having a bottom wall, the improvement in leg support structure comprising,

a boss projecting downwardly from said wall and having a substantially flat load bearing lower surface thereon,

a leg support with a recess having a bottom formed in the upper part of said leg for receiving said boss in nesting relation for sole support of the surface on said bottom along a reference plane,

aperture means in the leg opposite said recess and extending to said plane,

said aperture means being shaped to provide spaced portions straddling said recess and coplanar with said load surface, and

means extending into said aperture to overlap said spaced portions and load surface along said reference plane to secure said leg to the boss.

6. Apparatus as described in claim 5 wherein said vessel is metallic and said leg is a heat resistant plastic.

7. Apparatus as described in claim 5 wherein said recess and aperture are of differently oriented cross-sectional shapes to provide said spaced portions.

8. Apparatus as described in claim 7 wherein said vessel is metallic and said leg is a heat resistant plastic.

9. Apparatus as described in claim 8 wherein said securing means extending into said aperture is a screw-like fastener with its wide head bearing on said spaced portions of said leg and load surface and its shank threading into said boss.

10. In an electric probe-controlled metallic cooking vessel having a metallic housing bonded to the underside thereof to receive the probe and a plastic terminal guard fastened to said housing, the improvement in the housing-guard fastening comprising,

a downwardly projecting load bearing surface thereon,

a plastic terminal guard having a recess on its inner side receiving said surface in sole support therebetween along a reference plane, aperture means in the outer side of said guard opposite said recess and extending to said plane, said aperture being shaped to provide spaced portions straddling and coplanar with said load surface, and screw-like fastening means overlapping said spaced portions and load surface to secure said guard to said housing along said plane.

11. Apparatus as described in claim 10 wherein said load surface is a longitudinally extending locating and

supporting rib on said housing, said recess is a matching longitudinal recess, and said aperture is a tubular opening having a diameter larger than said rib width to provide spaced segment portions straddling said rib.

12. Apparatus as described in claim 11 wherein said securing means extends into said aperture and is a screw-like fastener with its wide head bearing on said spaced segment portions of said terminal guard and said load surface, and its shank threading into said housing rib.

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