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Reed

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[54] **CABLE MOUNT FOR SPEAKER INSTALLATION**

[76] Inventor: **Samuel M. Reed**, 2121 Routt, Lakewood, Colo. 80215

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[52] **U.S. Cl.** ..... **174/65 R**; 339/105; 339/107

[51] **Int. Cl.** **H05k 5/00**

[58] **Field of Search** ..... 174/52 R, 65 R, 135; 339/105, 107

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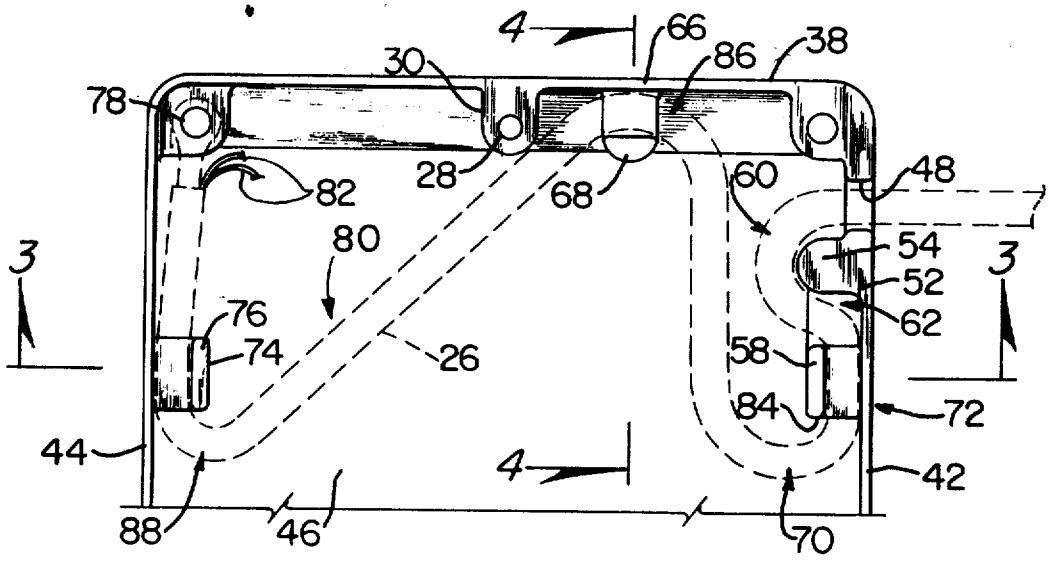
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Primary Examiner—J. V. Truhe
Assistant Examiner—David A. Tone

[57] **ABSTRACT**

A system for mechanically connecting a communication cable to a speaker so that the electrical connection of the cable to the speaker is not damaged or broken by pulling forces on the cable utilizes a plurality of spaced cable-retaining brackets within the housing to establish a succession of reverse bends in the cable whereby a pulling force on the cable is transmitted directly into and absorbed by the speaker housing and does not affect the electrical connection.

10 Claims, 4 Drawing Figures



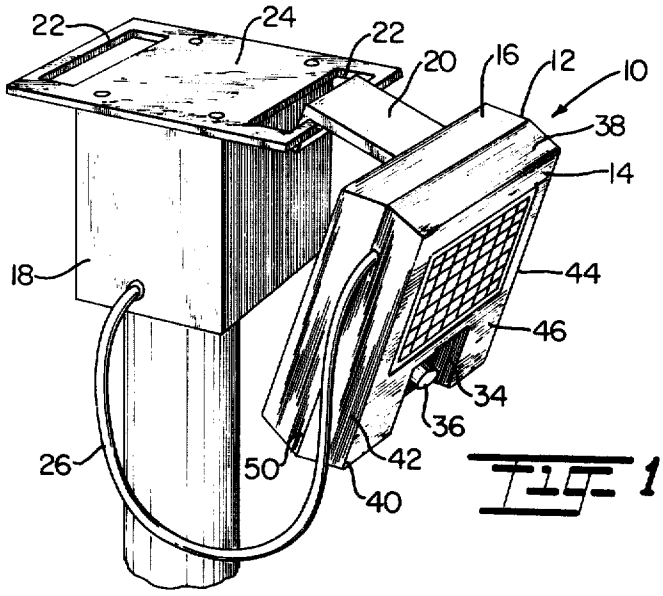


FIG. 1

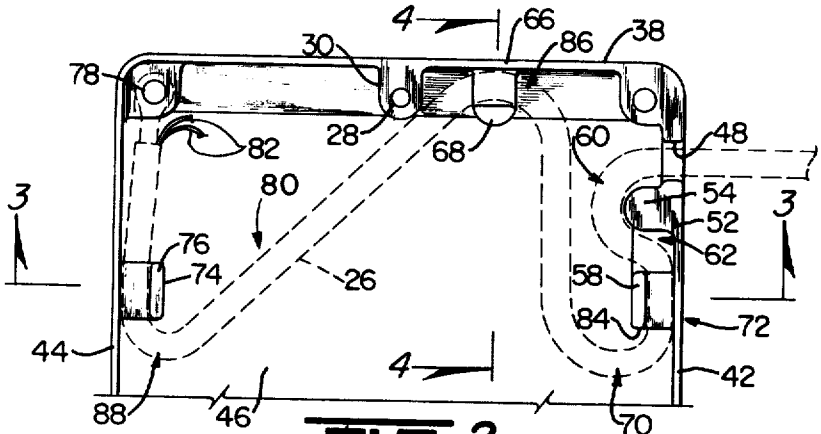


FIG. 2

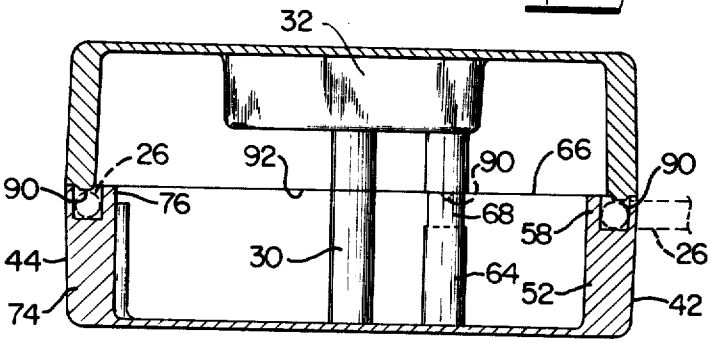


FIG. 3

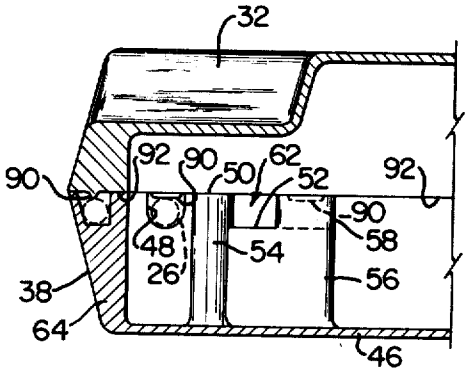


FIG. 4

CABLE MOUNT FOR SPEAKER INSTALLATION

The present invention generally relates to systems for connecting communication cables to speakers and more particularly relates to systems for mechanically connecting communication cables to loudspeakers of the type utilized in drive-in theaters.

Drive-in theaters have been popular entertainment centers for some time, but the proprietors of these theaters have constantly been plagued by accidental and/or intentional damage to the loudspeakers provided for each vehicle in the theater. Frequently, this damage, whether it be accidental or intentional, is caused by a pulling force applied to the communication cable physically interconnecting the speaker and a support post adjacent each vehicle. The pulling force tends to separate or break the electrical connection of the cable with the speaker thereby necessitating continual repairs. As an example, frequently theater patrons forget to remove the speaker from their car window before driving away from the support post so that the cable becomes stretched between the vehicle and the support post, and unless the cable is connected to the speaker in a suitable manner, it is yanked out of the speaker housing thereby breaking the electrical connection.

It is an object of the present invention to provide a new and improved system for mechanically connecting a communication cable to a speaker so that the electrical connection between the cable and the speaker is protected from pulling forces applied to the cable.

It is another object of the present invention to provide a system for connecting a communication cable to a speaker by establishing a succession of reversing bends in the cable which function to absorb pulling forces applied to the cable and thereby prevent the pulling forces from damaging the electrical connection of the cable to the speaker.

It is another object of the present invention to provide a system for connecting a communication cable to an outdoor speaker of the type used in drive-in theaters wherein the speaker is provided with a plurality of cable-retaining brackets adapted to establish reversing bends in the cable which cooperate with the brackets in absorbing pulling forces applied to the cable thereby protecting the electrical connection of the cable to the speaker.

These and other objects of the present invention are attained through use of a hollow speaker housing which includes a plurality of interior bracket means which retain the communication cable in place within the housing and establish reverse bends in the cable in such a way as to reliably absorb pulling forces applied to the cable. More particularly, a hollow speaker housing utilizing the connection system of the present invention has an opening through which the communication cable passes into the interior of the speaker housing and a bracket mounted in the housing on a first inner surface immediately adjacent to the opening which directs the cable around a retention post so as to undergo a reverse bend and then through a second, oppositely directed reverse bend forming a substantially S-shaped configuration of the cable. A second bracket on a second inner surface of the housing adjacent to the first inner surface cooperates with the first mentioned bracket in establishing and maintaining the S-shaped configuration. The reverse bends in the cable cooperate with the brackets to absorb or transmit pulling forces applied to the cable into the speaker housing so that the electrical connection of the cable with the transducer or speaker unit in the housing is not affected by the pulling force. In a preferred embodiment described in detail hereinafter, brackets or posts are stationed along the inner wall surfaces of the housing to establish a succession of reverse bends in the cable at right angles to one another which positively assure that no pulling force applied to the cable will affect the electrical connection of the cable to the speaker unit in the housing.

Other objects, advantages and features of the present invention will become more readily apparent when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of a speaker utilizing the cable connection means of the present invention.

FIG. 2 is a fragmentary rear view of the front portion of the housing of the speaker of FIG. 1 showing the mechanical relationship of the communication cable with the speaker.

FIG. 3 is a section taken along lines 3—3 of FIG. 2 and including the rear portion of the speaker housing not shown in FIG. 2; and

FIG. 4 is a fragmentary section taken along lines 4—4 of FIG. 2 and including the rear portion of the speaker housing not shown in FIG. 2.

Referring first to FIG. 1, a speaker **10** having a housing **12** comprised of front and rear sections **14** and **16** respectively connected in any suitable manner is suspended from a support post **18** by a rearwardly extending hook arm **20** adapted to be releasably received in an opening **22** in an upper plate portion **24** of the support post **18.** A communication cable **26** having a distal end electrically connected to a central communication center, not shown, passes out of the support post **18** and is connected in the housing **12** to a conventional transducer or speaker unit, not shown, which is operative to convert the electrical signals received from the central communication center to an audible audio signal. As will be appreciated, an arrangement of this type is traditionally used in drive-in theaters and is very susceptible to damage such as might be caused by a pulling force applied to the speaker housing yanking the communication cable **26** and possibly breaking the electrical connection of the cable with the speaker unit inside the speaker housing.

In order that a pulling force applied to the speaker housing **12** does not affect the electrical connection of the cable **26** with the speaker unit, a unique system for mechanically connecting the communication cable to the speaker housing is utilized and is shown most clearly in FIG. 2 to establish a series of reverse bends in the cable whereby a pulling force on the cable is absorbed or transmitted into the housing and does not affect the electrical connection of the cable **26** with the speaker unit. Before specifically describing the mechanical connection of the cable with the speaker housing **12,** it should be noted that the front and rear sections **14** and **16** respectively of the housing are comprised of inwardly opening rectangular shells which when attached in abutting relationship, define a closed compartment in which the speaker unit and other electrical components of the speaker are housed. The speaker unit as well as the other electrical components are mounted in the front section **14** of the housing, as shown in my co-pending application Ser. No. 234,609, but have not been illustrated in the present application

since they are conventional items and form no part of the present invention. The rear section **16** of the housing **12** assists in retaining the communication cable in the desired configuration within the housing and encloses the components mounted in the front section **14**. The rear section **16** is attached to the front section in a conventional manner by fasteners, not shown, which pass through the rear section and into threaded holes **28**, only one being shown, in bosses **30** provided at spaced locations around the perimeter of the front section. The rear section **16** of the housing has a recessed zone **32** centrally located at the top thereof where the hook-shaped arm **20** is attached. As can be seen in FIGS. **3** and **4**, the hook-shaped arm **20** has been removed merely for clarification purposes. Similarly, the front section **14** of the speaker housing has a centrally located recessed zone **34**, FIG. **1**, at the bottom thereof in which a volume control knob **36** is positioned.

Referring again to FIG. **2**, it will be seen that the front section **14** of the speaker housing **12** comprises a rectangular shell having a top wall **38**, a bottom wall **40**, and side walls **42** and **44** extending rearwardly from a front wall **46**. A notch or opening **48** is formed in the rear abutting edge **50** of the side wall **42** at a location spaced slightly from the top wall **38**. As best seen in FIGS. **2** and **4**, an integral bracket **52** is disposed on the inner surface of the side wall **42** on one side of the notch **48**. The bracket **52** includes a retention post portion **54** extending from the front wall **46** to the abutting edge **50** of the side wall **42** and a box-shaped portion **56** having an open U-shaped notch or clip portion **58** spaced from the retention post **54** along the abutting edge of the side wall **42**. As can be seen in FIG. **2**, the retention post portion **54** is substantially semi-cylindrical in shape so that it is adapted to guide the communication cable **26** in a smooth substantially 180° reverse bend **60** around the post. As best seen in FIG. **4**, after passing around the retention post, the cable **26** extends into a space **62** between the retention post and the clip and subsequently through the clip in a direction paralleling the side wall **42**. The clip **58** thereby maintains the substantially 180° reverse bend **60** in the cable around the retention post since the clip is immediately adjacent to the side wall **42**.

A second bracket **64** of substantially semi-cylindrical cross-section is integral with the inner surface of the top wall **38**, as is best seen in FIGS. **2** and **3**, and is therefore disposed on the opposite side of the notch **42** from the bracket **52**. The bracket **64** extends from the front wall **46** of the front section **14** to an abutting edge **66** of the top wall. The bracket **64** protrudes inwardly from the top wall and has an open U-shaped notch or clip portion **68** on its end through which the cable **26** passes in parallel relation to the top wall.

In this manner, the cable upon entering the front section is confined along a path which extends from the notch **48** in the side wall **42** through a reverse bend **60** around the retention post **54**, through the clip **58** in the bracket **52** on the side wall **42** and subsequently through a substantially 270° reverse bend **70** toward the clip **68** on the top wall **38** which re-directs the cable along a path parallel to the top wall. It will be appreciated that when the cable **26** is so confined within the housing **12**, it defines an initial substantially S-shaped curve **72** which, as will be explained more clearly hereinafter, absorbs or transmits into the housing, pulling forces which may be applied to the cable exteriorly of the housing.

A third bracket **74**, integral with the side wall **44** and best seen in FIGS. **2** and **3**, extends inwardly therefrom in opposing relationship with the bracket **52** on the side wall **42**. The bracket **74** is also notched on its end defining an open U-shaped clip **76** in which the cable **26** is passed parallel to the side wall **44** toward its ground connection **78** with the front section **14** of the speaker housing. It should be noted that the clip **76** is spaced along the side wall **44** from the top wall **38** so that the cable upon leaving the clip **68** on the top wall is forced to pass through an angle away from the top wall toward the side wall **44** thereby establishing a third reverse end **86** and then through a fourth reverse bend **88** as it passes around the bracket **74** and through the clip **76**.

As can be clearly seen in FIG. **2**, the brackets **52**, **74** and **64** on the side walls **42** and **44** and the top wall **38** respectively thereby retain the cable **26** within the housing **12** so that it passes through the hereinbefore mentioned S-shaped curve **72** and subsequently through a second enlarged S-shaped curve **80** which is normal to the S-shaped curve **72**. The path through which the cable is forced to pass by the brackets on the inner surfaces of the front section has been found to desirably position the cable so that in cooperation with the brackets, a pulling force applied to the cable exteriorly of the housing will be totally absorbed or transmitted into the housing so that there will be no axial force placed on the cable at the ground connection **78** or on the electrical wires **82**, shown in FIG. **2**, passing to the speaker unit, which as mentioned previously is not shown. In other words, as the cable **26** enters the front section of the housing through the notch **48** in the side wall **42**, it passes through a first 180° reverse turn **60** around the retention post **54** and then through a subsequent approximately 270° oppositely directed turn **70** toward the bracket **64** on the top wall **38** of the front section **14**. An axial pulling force applied to the cable exteriorly of the housing, as can best be appreciated in FIG. **2**, will draw the cable tightly against the retention post **54** whereby the majority of the pull is thereby transmitted directly into the retention post and hence into the housing. Any component of the pulling force which passed around the retention post rather than normally into the retention post would tend to draw the cable against the lower edge **84** of the clip **58** and be absorbed thereby. Accordingly, the initial S-shaped curve **72** of the cable established by the retention post **54** and the clips **58** and **68** on the side and top walls **42** and **38** respectively enables the cable to cooperate with the clips in absorbing substantially all of the pulling force applied to the cable exteriorly of the housing. Of course, the cable is retained by the clip **68** on the top wall and the clip **76** on the side wall **44** to pass through the third approximately 150° reverse bend **86** adjacent the top of the housing and subsequently through the fourth 150° reverse bend **88** adjacent the side wall **44** so that any pulling force which was not absorbed or transmitted into the housing in the S-shaped curve **72** would be absorbed and transmitted into the housing in the S-shaped curve **80**. Therefore, by utilizing a succession of reverse bends in the cable, it has been found possible to totally absorb pulling forces on the cable whereby the electrical connections of the cable to the speaker unit or other components within the housing are not detrimentally affected by the pulling force.

It will, therefore, be appreciated that a system for mechanically connecting a communication cable in a loudspeaker has been described wherein the cable is retained within the housing to pass from wall-to-wall through a succession of reverse bends and thereby effectively absorb or transmit into the housing pulling forces applied to the cable. It should also be noted that since the notch **48** in the front section **14** of the housing **12** as well as the clips **58, 68** and **76** utilized to retain the cable **26** within the housing open toward the abutting edges of the associated side walls which abut corresponding edges **92** of the rear section, the cable can be easily positioned within the housing to follow the desired path merely by separating the front and rear section **14** and **16** respectively of the housing, inserting the cable into the open notch and clips, and then reattaching the front and rear sections so that the rear section closes the open notch and clips as best seen in FIGS. **3** and **4**. Preferably, the open notch and clips in the front section of the speaker housing are slightly narrower than the width of the cable so that the cable is wedged into the notch and clips and thereby prevented from sliding axially therein. Also, protrusions **90**, FIGS. **3** and **4**, may be provided along the abutting edges **92** of the rear section **16** in alignment with the open notch and clips in the front section **14** so as to protrude into the associated notch and clips when the front and rear sections are attached to pinch the cable in the notch and clips.

Although the present invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made by way of example and that changes in details of structure may be made without departing from the spirit thereof.

What is claimed is:

1. In a speaker system wherein a communication cable is inserted through an opening into a hollow speaker housing and is connected at one end to a contact terminal on an interior wall of said housing opposite to the opening, the improvement comprising first retention means projecting inwardly from an inner wall surface of said speaker housing adjacent to the opening and adapted to form a first reverse bend in the cable as it enters the housing, second retention means spaced inwardly from the wall surface of said speaker housing in adjacent spaced relation to the first retention means and on a side of the first retention means opposite to the opening, said communication cable undergoing a first reverse bend around said first retention means as it enters the housing through the opening and undergoing a second reverse bend around said second retention means substantially at 180° to the direction of the first reverse bend, and third retention means on the inner wall surface of said speaker housing substantially at 90° to said first retention means adapted to retain the cable, said cable undergoing a third reverse bend around said third retention means substantially at 180° to the second bend in the cable, whereby pulling force applied to the cable will be absorbed by the housing to prevent said pulling force from separating the cable from its connection to said contact terminal.

2. In the speaker system of claim **1** wherein said first bend in the cable is greater than 90° but no greater than 180°, said second bend in the cable is greater than 180° but no greater than 270°, and said third bend in the cable is greater than a 90° bend.

3. In the speaker system of claim **2** wherein said third bend in the cable is not greater than a 180° bend.

4. In the speaker system of claim **1**, further including fourth retention means on an inner surface of said speaker housing adapted to retain the cable, said cable undergoing a fourth bend in the around said fourth retention means substantially at 180° to the third bend in the cable.

5. In the speaker system of claim **3** wherein said fourth bend in the cable is greater than a 90° bend.

6. In the speaker system of claim **5** wherein said fourth bend in the cable is not greater than a 180° bend.

7. In a system wherein an electrical cable is inserted through an opening in a hollow housing and is connected at its free end to a contact terminal on an inner wall of said housing, the improvement comprising a plurality of spaced cable retention means mounted on the inner surface of said housing including a pair of cable retention means in opposed facing relation to one another, each of said cable retention means having clip means for retaining said cable in place within the hollow housing, said cable undergoing a succession of reverse bends through said cable retention means defining two mutually perpendicular substantially S-shaped configurations between the opening and the contact terminal such that pulling forces applied to the cable will be absorbed by the housing to prevent the pulling forces from separating the cable from its connection to said contact terminal.

8. In a speaker system adapted for use in drive-in theatres wherein a communication cable inserted through an opening in a hollow speaker housing is connected at one end to an interior contact terminal, the improvement comprising:

a retention post substantially semi-cylindrical in shape, said retention post disposed on the inner surface of a first wall of said housing adjacent to said opening, said cable undergoing a first substantially 180° bend generally conforming to the semi-cylindrical surface of said retention post;

first cable retaining means on the inner surface of said first wall adjacent to and spaced from the said retention post on the side of said retention post opposite said opening, said cable disposed in tight-fitting engagement with said first retaining means and undergoing a second substantially 180° bend oppositely curved to said first bend;

second cable retaining means on the inner surface of a second wall in the housing perpendicular to said first wall, said second retaining means being spaced from said first retaining means and said cable disposed in tight-fitting engagement with said second retaining means and undergoing a third substantially 180° bend to form in relation with said second bend a generally S-shaped curve;

third cable retaining means on the inner surface of a third wall in the housing peripendicular to said second wall, and opposite said first wall, said third retaining means being disposed adjacent to said interior contact terminal, said cable disposed in tight-fitting engagement with said third retaining means and undergoing a fourth substantially 180° bend curving oppositely to said third bend; and

said first, second and third retaining means in cooperation with said retention post and said housing absorbing pulling forces applied to said cable from exteriorally of said housing to prevent said cable from being separated from said interior contact terminal.

9. In the cable mount apparatus of claim **8** wherein

said first, second and third cable retaining means are structurally cast into said first, second and third walls respectively.

10. In a speaker system adapted for use in drive-in theatres wherein a communication cable is inserted through an opening in a hollow speaker housing and is connected at one end to an interior contact terminal, the improvement comprising:

a first bracket integral with the inner surface of a first side wall adjacent to said opening, said bracket comprising a retention post substantially semi-cylindrical in shape extending outwardly from said inner surface and a box-shaped portion having an open U-shaped notch adjacent to and spaced from said retention post on the side of said retention post away from said opening;

said cable undergoing a first substantially 180° bend around said retention post generally conforming to the semi-cylindrical surface of said retention post and a second substantially 180° bend oppositely curved to said first bend in tight-fitting engagement with said U-shaped notch of said box-shaped portion;

a second bracket of substantially semi-cylindrical cross-section integral with the inner surface of a second wall in said housing perpendicular to said first wall, said second bracket protruding outwardly from and parallel to said second wall having an open U-shaped notch;

said cable undergoing a third substantially 180° bend in tight-fitting engagement with said U-shaped notch of said second bracket to form in relation with said second bend a generally S-shaped curve;

a third bracket substantially box-shaped integral with the inner surface of a third wall in the housing perpendicular to said second wall and opposite said first wall, said third bracket protruding outwardly from said third wall and having an open U-shaped notch on its end;

said cable undergoing a fourth substantially 180° bend in tight-fitting engagement with said U-shaped notch of said third bracket and curving oppositely to said third bend into positive connection with said contact terminal;

said first, second and third bracket means in cooperation with said cable forming two mutually perpendicular substantially S-shaped configurations in the cable such that pulling forces applied to the cable exteriorally of said housing will be absorbed by the housing to prevent the pulling forces from separating the cable from its connection to said contact terminal;

said housing comprising two releasable half sections split along a plane intersecting the top portion of said open notches of first, second and third brackets, said first half section containing said first, second and third brackets and said second half section having substantially thicker walls to generally cover said open U-shaped notches of said brackets thereby wedging said cable into said notches.

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