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(54) Terminal and terminal assembly for a shielded coaxial cable

(57) A termination assembly (10) is disclosed for terminating a shield (12) of a shielded insulated cable (14). The cable includes a conductor core (20) with a dielectric sheath (22) therearound, and an outer insulating jacket (24) with the shield disposed between the dielectric sheath and the insulating jacket. The assembly includes a dielectric housing (16) having a terminal receptacle (38). A terminal (18) is received in the receptacle of the housing and includes a pair of teeth (68,70) movable toward each other in a direction (B) generally tangentially of the dielectric sheath (22) to displace the outer insulating jacket (24) and to clamp a portion (80) of the shield (12) between the teeth (68,70) without substantially disturbing the dielectric sheath (22).

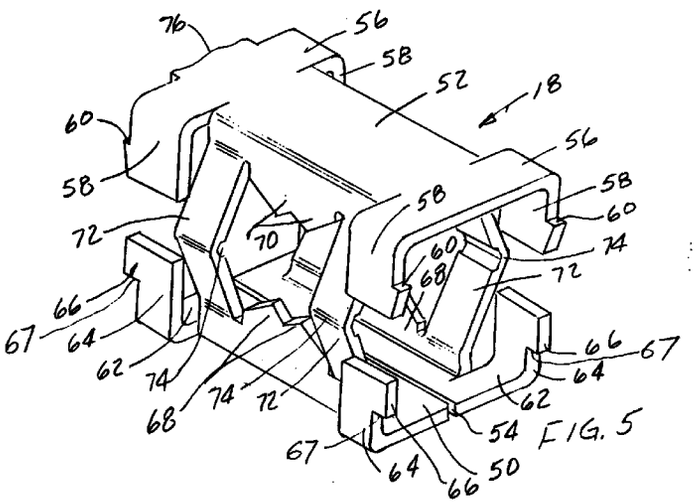

FIG. 5

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Description

Field of the Invention

This invention generally relates to the art of connectors or terminals and, particularly, to a terminal and terminal assembly for terminating the shield of an insulated coaxial cable.

Background of the Invention

A typical shielded coaxial cable includes a center conductor core with a dielectric sheath therearound. An outer insulating jacket is provided, with the shield disposed between the dielectric sheath and the insulating jacket. Typically, the shield is tubular and of a conductive braided material.

Terminals or terminal assemblies often are used to terminate the conductive shield of the coaxial cable. Typically, this is accomplished by a terminal with some form of crimp barrel or other means having teeth which pierce the outer insulating jacket and contact the strands of the braided shield. Many such teeth are required to provide an adequate contacting interface. The pressure against the braid by such teeth is quite random, and the combination affects the dielectric properties of the cable. Specifically, the cable impedance can be affected by such terminals, because the terminals often result in considerable deformation of the dielectric sheath about the center conductor.

In some applications, particularly in some radio frequency applications, such as automobile antenna cables, the shield is terminated to ground and stringent limits are imposed on any disturbance of the cable impedance. In such applications, there is a need to terminate the shield without interrupting the center conductor and without substantially interrupting the dielectric shield surrounding the conductor. The present invention is directed to solving these problems and satisfying such a need.

Summary of the Invention

An object, therefore, of the invention is to provide a new and improved terminal and terminal assembly for terminating a shield of a shielded insulated cable.

As is known, a shielded cable typically includes a conductor core with a dielectric sheath therearound. An outer insulating jacket is provided, with the shield disposed between the dielectric sheath and the insulating jacket.

In the exemplary embodiment of the invention, a terminal generally includes a pair of teeth movable toward each other in a direction generally tangentially of the dielectric sheath. The teeth displace the outer insulating jacket and clamp a portion of the shield between the teeth without substantially disturbing the dielectric sheath. The terminal is disclosed herein in a termination assembly which includes a dielectric housing having a receptacle for receiving the terminal.

In the specific embodiment of the invention herein, the terminal includes two pairs of relatively movable teeth, with one pair on each opposite diametral side of the cable. The terminal is fabricated of sheet metal material and includes a base portion in abutment with a fixed wall of the receptacle of the housing and a pressure portion movable toward the base portion. One of the teeth in each pair thereof is on each of the base portion and the pressure portion of the terminal. One or more deformable arms integrally join the base portion and the pressure portion of the terminal.

Another feature of the invention is the provision of complementary interengaging latch means between the housing and the movable pressure portion of the terminal to hold the pressure portion in an actuated position. This holds the teeth in their clamping positions to clamp a portion of the shield therebetween.

Other objects, features and advantages of the invention will be apparent from the following detailed description taken in connection with the accompanying drawings.

Brief Description of the Drawings

The features of this invention which are believed to be novel are set forth with particularity in the appended claims. The invention, together with its objects and the advantages thereof, may be best understood by reference to the following description taken in conjunction with the accompanying drawings, in which like reference numerals identify like elements in the figures and in which:

FIGURE 1 is a perspective view of a termination assembly incorporating the concepts of the invention, with the terminal in open position for receiving the coaxial cable;

FIGURE 2 is a perspective view similar to that of Figure 1, with the terminal in its termination position;

FIGURE 3 is a perspective view of the housing of the assembly, with the terminal and cable removed;

FIGURE 4 is a perspective view similar to that of Figure 3, with one of the side walls of the housing broken away;

FIGURE 5 is a perspective view of the terminal in its open position;

FIGURE 6 is a vertical section taken generally along line 6-6 of Figure 1; and

FIGURE 7 is a vertical section taken generally along line 7-7 of Figure 2.

Detailed Description of the Preferred Embodiment

Referring to the drawings in greater detail, and first to Figure 1, the invention is embodied in a termination assembly, generally designated 10, for terminating a shield 12 of a shielded insulated cable, such as a coax-

ial cable generally designated 14. The termination assembly includes two components, namely a dielectric housing, generally designated 16, and a terminal, generally designated 18, received in the housing.

Before proceeding with a description of termination assembly 10, it should be understood that coaxial cable 14 is of a conventional structure and includes a center conductor core 20 with a dielectric sheath 22 thereabout. An outer insulating jacket 24 is provided, with shield 12 disposed between dielectric sheath 22 and insulating jacket 24. Shield 12 is shown as a typical braided shield of conductive metal material.

Referring to Figure 2 in conjunction with Figure 1, terminal 18 is shown in Figure 1 in an open position projecting from the top of housing 16. In this open position, cable 14 can be inserted into an opening 26 in housing 16 in the direction of arrow "A" (Fig. 1). In order to terminate shield 12 of cable 14, pressure is applied to the terminal in the direction of arrow "B" (Fig. 2) which effectively collapses the terminal and terminates the shield, as will be described in greater detail hereinafter.

Referring to Figures 3 and 4 in conjunction with Figures 1 and 2, housing 16 includes a front wall 28, a rear wall 30, a bottom wall 32, a top wall 34 and a pair of side walls 36, all of which combine to form a generally rectangular receptacle, generally designated 38. Opening 26 for receiving cable 14 is formed in front wall 28. Access to receptacle 38 is provided by an opening 40 in top wall 34 and through which terminal 18 is mounted in the receptacle. A pair of holes 42 are formed through each side wall 36, for purposes to be described hereinafter. A saddle 44 is formed in the top of rear wall 30 and through which a connecting portion (not shown) of terminal 18 can extend. Lastly, a pair of guide grooves 46 are formed on the inside of each of rear wall 30 and top wall 34 adjacent side walls 36, for purposes described hereinafter. Figure 4 shows shoulders 48 at the bottom of guide grooves 46 in rear wall 30. The entire housing 16 is a unitary or one-piece structure molded of dielectric material such as plastic or the like.

Referring to Figure 5 in conjunction with Figures 1 and 2, terminal 18 includes a generally planar base portion 50 and a generally planar top or pressure portion 52 parallel to the base portion. The entire terminal is stamped and formed of sheet metal material. Therefore, base portion 50 is interrupted lengthwise of the terminal by a seam 54 which would have formed the extreme outer edges of a metal blank from which the terminal is stamped and formed. A bridge 56 is formed at the front and at the rear of pressure portion 52, with each bridge defining a pair of downwardly depending flanges 58 having forwardly and rearwardly directed teeth 60. Somewhat similarly, bridges 62 are formed at the front and at the rear of base portion 50. The bridges define upwardly projecting flanges 64 which have forwardly and rearwardly projecting guide bosses 66 which have downwardly facing shoulders 67. Upwardly projecting teeth 58 are formed on each opposite side of base portion 50, and teeth 70 are formed on each opposite side of pressure portion 52. In essence, teeth 68 and 70 are located to define two pairs of opposing teeth, with one opposing pair of teeth 68,70 being located on each opposite side of base portion 50 and pressure portion 52. Lastly, a pair of deformable arms 72 join base portion 50 and pressure portion 52 on each opposite side thereof. The deformable arms have weakened or thin areas 74 defining an intermediate hinge area of the arms, as will be described hereinafter. Lastly, as stated above, the terminal has a connecting portion which is not shown in the drawings but is broken away, as at 76. This connecting portion can take a wide variety of configurations for connecting the terminal and, thus, shield 12 of cable 14 to an appropriate ground.

Figures 6 and 7 correspond to Figures 1 and 2, respectively, and show the operation of terminal assembly 10 and, particularly, terminal 18 in terminating shield 12 of cable 14. More particularly, as stated above, Figures 1 and 6 show terminal 18 positioned within receptacle 38 of housing 16 in an open condition so that cable 14 can be inserted through opening 26 in front wall 28 of the housing and into the open terminal. When the terminal 18 is mounted in the housing 38, guide bosses 66 on flanges 64 enter guide groove 46 of the housing. The terminal 18 moves into the housing until shoulders 67 on the guide bosses engage shoulders 48 of the guide grooves 46 leaving some clearance between the bottom wall 32 of the housing 38 and base portion 50 of the terminal. The clearance is required for energy storage.

Figures 2 and 7 show that a force has been applied in the direction of arrow "B" to the top or pressure portion 52 of terminal 18. This drives teeth 70 of the pressure portion downwardly in the direction of arrow "B" toward teeth 68 of base portion 50. When pressure portion 52 is driven downwardly toward base portion 50, deformable arms 72 deform about hinge areas 74 and move outwardly into holes 42 in housing 16.

It can be seen in Figure 7 that upper teeth 70 of pressure portion 52 move downwardly on opposite sides of cable 14 toward lower teeth 68 of base portion 50 in a direction generally tangentially of dielectric sheath 22 of the cable. The teeth displace outer insulating jacket 24 of the cable and clamp portions 80 of shield 12 between the opposing pairs of teeth on opposite diametral sides of the cable. It can be seen that this is accomplished without substantially disturbing dielectric sheath 22.

When terminal 18 is mounted through opening 40 into receptacle 38 of housing 16, guide bosses 66 on flanges 64 of bridges 62 for base portion 50 are guided into guide grooves 46 in the housing. Teeth 60 projecting forwardly and rearwardly of flanges 58 of bridges 56 for pressure portion 52 also enter guide grooves 46. It can be seen in Figure 5 that teeth 60 are sharp or pointed. When pressure portion 52 is driven downwardly in the direction of arrow "B" to close the terminal and clamp teeth 68 and 70 into terminating position with the shield of the cable, teeth 60 bite into the walls of guide grooves 46 and thereby provide a complementary

interengaging latch means between the housing and movable pressure portion 52 of the terminal to hold the pressure portion in its actuated position and, thereby, to hold teeth 68 and 70 in their shield-clamping position.

Lastly, it should be noted in Figure 7 that a slight clearance 82 is left between the bottom of flanges 58 of top pressure portion 52 and flanges 64 of base portion 50. This clearance allows the terminal to store energy due to the elasticity inherently created in piercing the outer jacket and deforming the shield of the cable.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or central characteristics thereof. The present examples and embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein.

Claims

1. A termination assembly (10) for terminating a shield (12) of a shielded insulated cable (14) having a conductor core (20) with a dielectric sheath (22) thereabout, and an outer insulating jacket (24) with the shield disposed between the dielectric sheath and the insulating jacket, comprising:

   a dielectric housing (16) having a terminal receptacle (38); and
   a terminal (18) received in the receptacle of the housing and including a pair of teeth (68,70) movable toward each other in a direction (B) generally tangentially of the dielectric sheath (22) to displace the outer insulating jacket (24) and to clamp a portion (80) of the shield (12) between the teeth (68,70) without substantially disturbing the dielectric sheath (22).

2. The termination assembly of claim 1 wherein the terminal (18) includes two pairs of said teeth (68,70), with one pair on each opposite diametral side of the cable (14).

3. The termination assembly of claim 1 wherein the terminal (18) includes a deformable arm (72) integrally joining the teeth in said pair thereof.

4. The termination assembly of claim 3 wherein the terminal (18) is fabricated of sheet metal material.

5. The termination assembly of claim 1 wherein the terminal (18) includes a base portion (50) positioned a predetermined distance above a fixed wall (32) of the receptacle of the housing and a pressure portion (52) movable toward the base portion, with one of the teeth (68,70) in said pair thereof being on each of the base portion (50) and the pressure portion (52) of the terminal.

6. The termination assembly of claim 5 wherein the terminal (18) includes a deformable arm (72) integrally joining the base portion (50) and the pressure portion (52) of the terminal.

7. The termination assembly of claim 6 wherein the terminal (18) is fabricated of sheet metal material.

8. The termination assembly of claim 5, including complementary interengaging latch means (46,60) between the housing (16) and the movable pressure portion (52) of the terminal (18) to hold the pressure portion in an actuated position and, thereby, to hold the teeth (68,70) in clamping position.

9. A termination assembly (10) for terminating a shield (12) of a shielded insulated cable (14) having a conductor core (20) with a dielectric sheath (22) thereabout, and an outer insulating jacket (24) with the shield disposed between the dielectric sheath and the insulating jacket, comprising:

   a dielectric housing (16) having a terminal receptacle (38) with an access opening (40) through a wall (34) of the housing to the receptacle; and
   a terminal (18) received in the receptacle (38) of the housing, the terminal being fabricated of stamped and formed sheet metal material and including a base portion (50) positioned a predetermined distance above a fixed wall (32) of the receptacle of the housing and a pressure portion (52) movable toward the base portion, a pair of teeth (68,70) at each opposite side of the receptacle with one of the teeth in each pair thereof being on each of the base portion (50) and the pressure portion (52) of the terminal (18), the pairs of teeth (68,70) being located for relative movement toward each other in a direction (B) generally tangentially of the dielectric sheath (22) on each opposite diametral side of the cable (14) to displace the outer insulating jacket (24) and to clamp a portion (80) of the shield (12) between the teeth without substantially disturbing the dielectric sheath (22).

10. The termination assembly of claim 9, including complementary interengaging latch means (46,60) between the housing (16) and the movable pressure portion (52) of the terminal (18) to hold the pressure portion in an actuated position and, thereby, to hold the teeth (68,70) in clamping position.

11. The termination assembly of claim 9 wherein the terminal (18) includes at least one deformable arm (72) integrally joining the base portion (50) and the pressure portion (52) of the terminal.

12. The termination assembly of claim 11 wherein the housing includes a hole (42) into which the deformable arm (72) projects when the pressure portion (52) of the terminal (18) is moved toward the base portion (50) of the terminal.

13. A terminal (18) for terminating a shield (12) of a shielded insulated cable (14) having a conductor core (20) with a dielectric sheath (22) therearound, and an outer insulating jacket (24) with the shield disposed between the dielectric sheath and the insulating jacket, comprising a pair of teeth (68,70) movable toward each other in a direction (B) generally tangentially of the dielectric sheath (22) to displace the outer insulating jacket (24) and to clamp a portion (80) of the shield (12) between the teeth (68,70) without substantially disturbing the dielectric sheath (22).

14. The terminal of claim 13, including two pairs of said teeth (68,70), with one pair on each opposite diametral side of the cable (14).

15. The terminal of claim 13, including a deformable arm (72) integrally joining the teeth in said pair thereof.

16. The terminal of claim 15 wherein the terminal (18) is fabricated of sheet metal material.

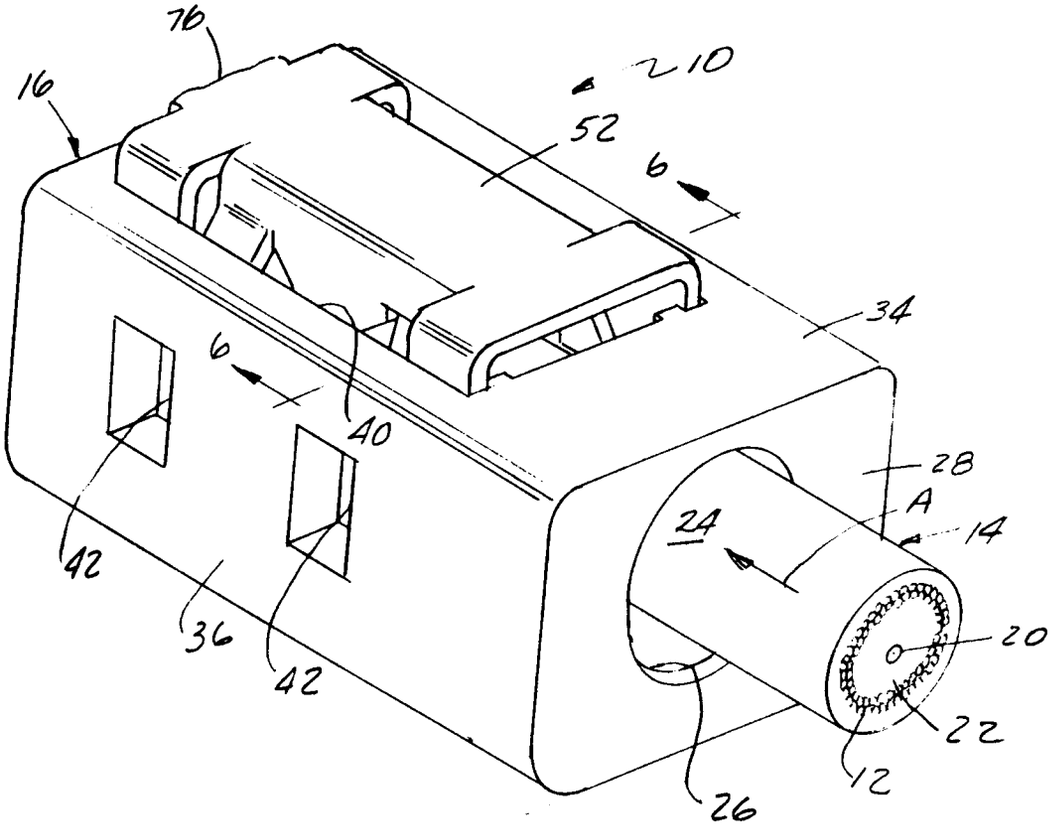
17. The terminal of claim 13, including a base portion (50) and a pressure portion (52) movable toward the base portion, with one of the teeth (68,70) on said pair thereof being on each of the base portion (50) and the pressure portion (52).

18. The terminal of claim 17, including a deformable arm (72) integrally joining the base portion (50) and the pressure portion (52).

19. The terminal of claim 18 wherein the terminal (18) is fabricated of sheet metal material.

20. A terminal (18) for terminating a shield (12) of a shielded insulated cable (14) having a conductor core (20) with a dielectric sheath (22) therearound, and an outer insulating jacket (24) with the shield disposed between the dielectric sheath and the insulating jacket, comprising:

    a terminal (18) stamped and formed of sheet metal material and including a base portion (50) and a pressure portion (52) movable toward the base portion, a pair of teeth (68,70) at each opposite side of the cable with one of the teeth in each pair thereof being on each of the base portion (50) and the pressure portion (52) of the terminal, the pairs of teeth (68,70) being located for relatively movement toward each other in a direction (B) generally tangentially of the dielectric sheath (22) on each opposite diametral side of the cable (14) to displace the outer insulating jacket (24) and to clamp a portion (80) of the shield (12) between the teeth without substantially disturbing the dielectric sheath (22).


76
16
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A
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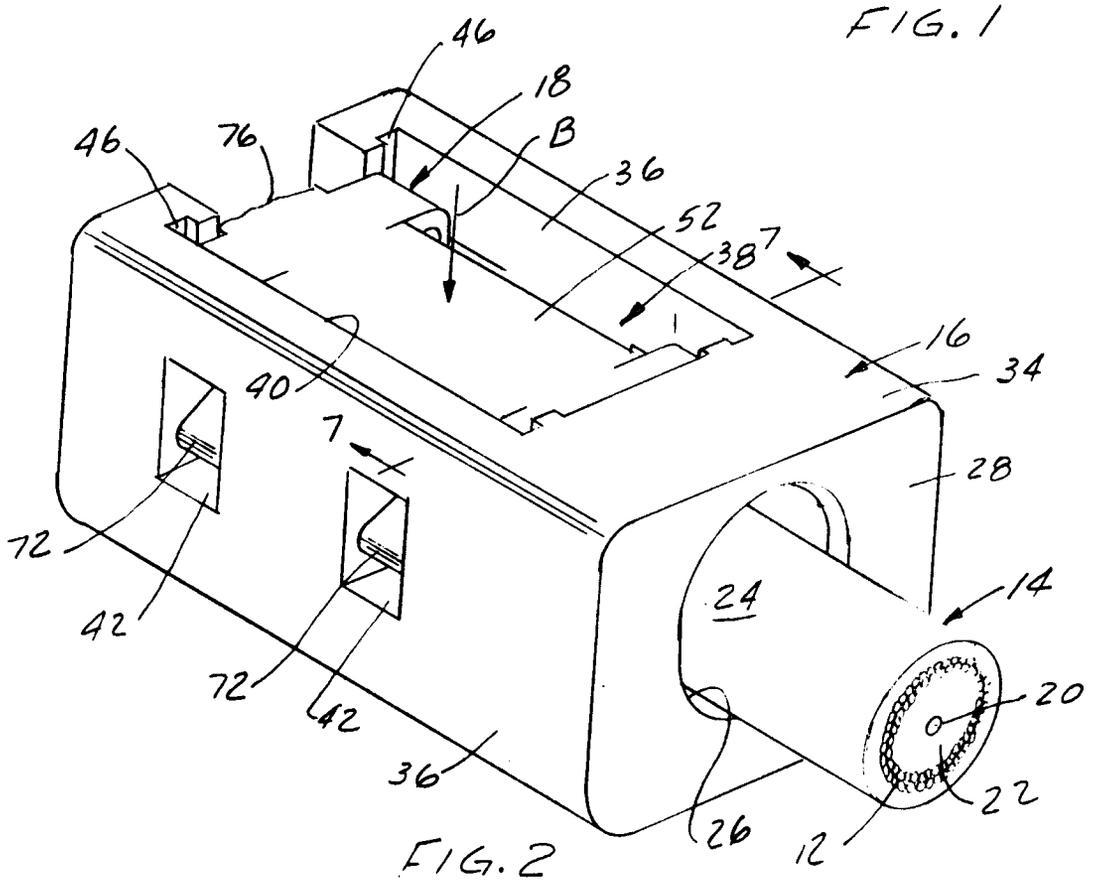
FIG. 1


46
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76
B
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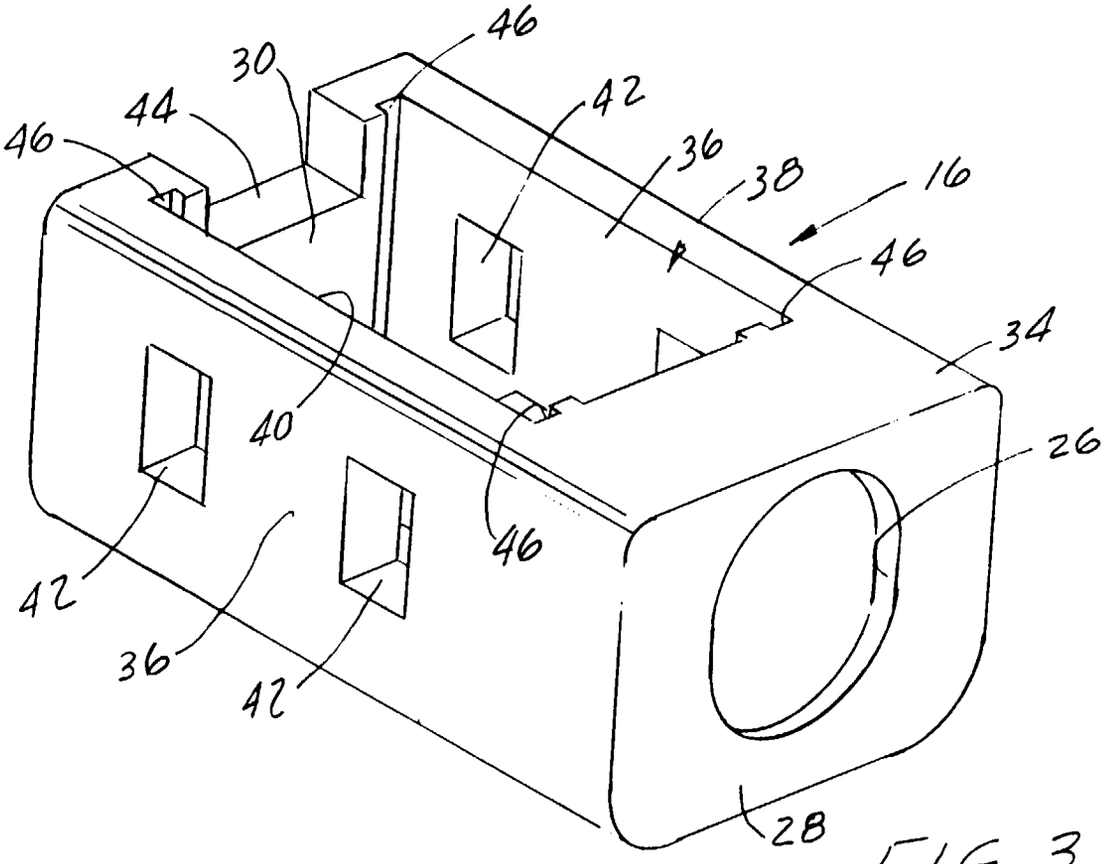
26
12

FIG. 2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42
28

FIG. 3

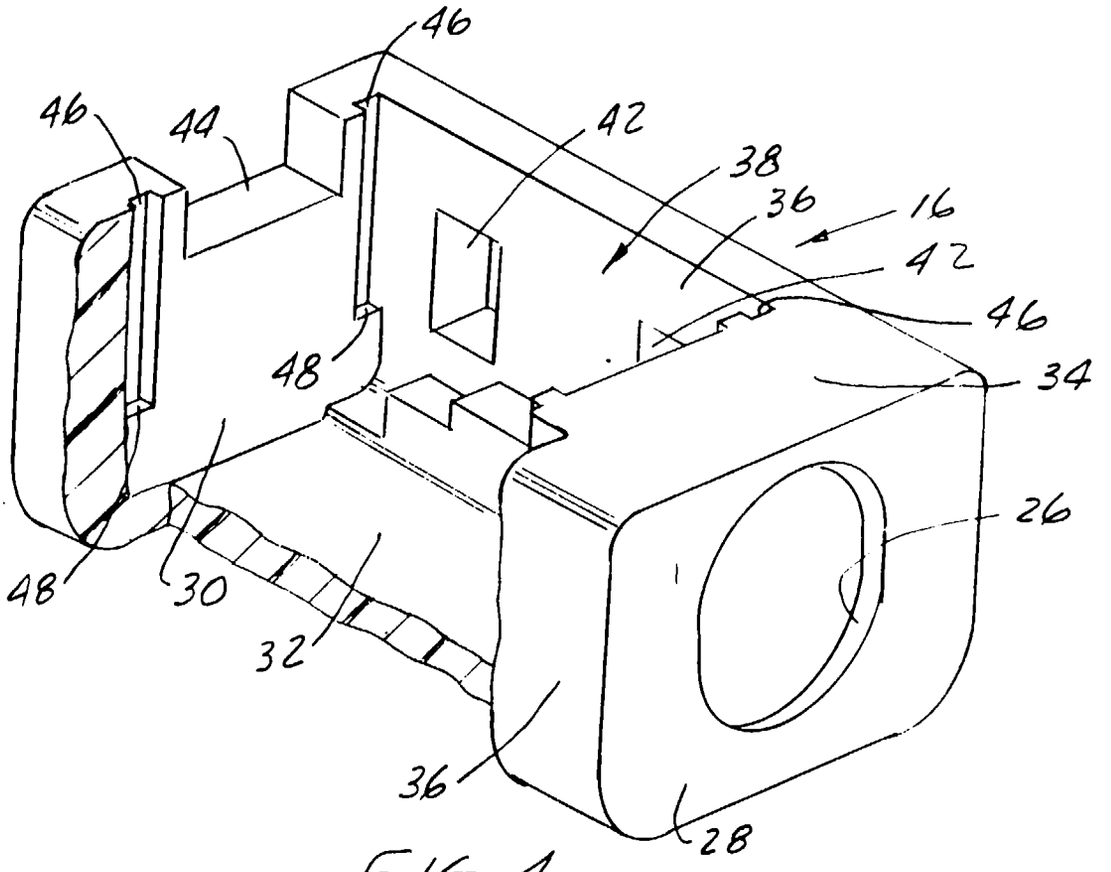
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FIG. 4

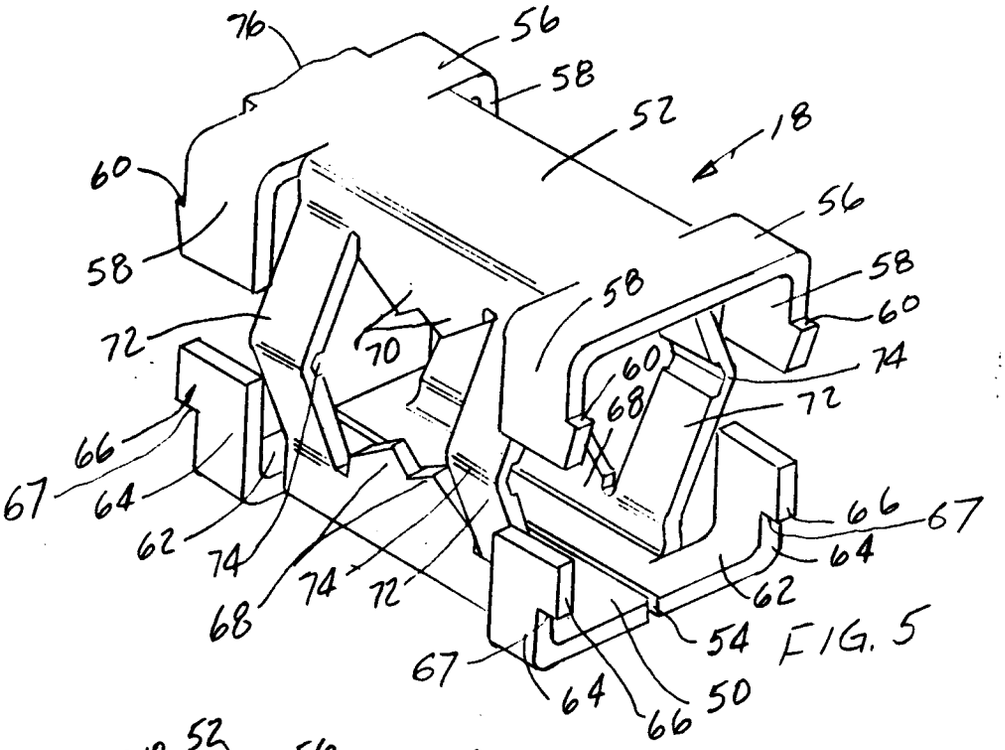

FIG. 5

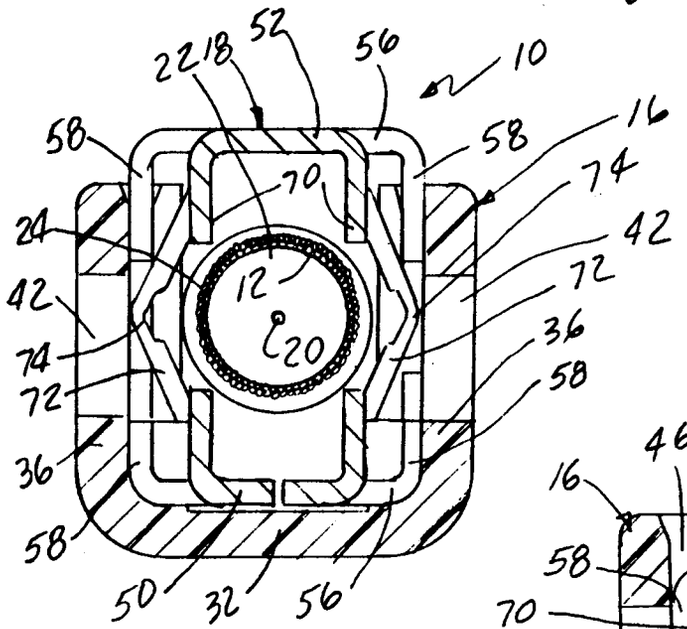

FIG. 6

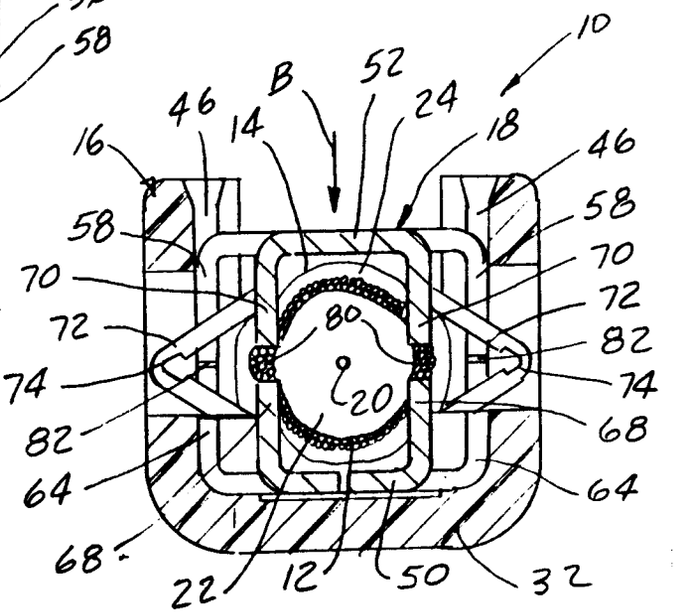

FIG. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 10 9865

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB-A-2 124 041 (MOLEX INCORPORATED) 8 February 1984 * page 4, line 27-90; figures 8,9 *	1-4, 13-16	H02G1/00 H01R9/05
X	US-A-5 362 251 (BIELAK) 8 November 1994 * abstract; figures 2-5 *	1,2,13, 14	
X A	US-A-5 066 248 (GAVER, JR. ET AL.) 19 November 1991 * abstract; figures 1,3 *	1,2,13, 14	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

H01R
H02G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25 November 1996	Waern, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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