

# United States Patent [19]

Hayward et al.

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[54] **TAMPER-RESISTANT CABLE TERMINATOR**

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[51] Int. Cl. .... **H01r 13/54**  
[58] Field of Search .... **339/36, 39, 85, 147; 333/22 R; 70/404**

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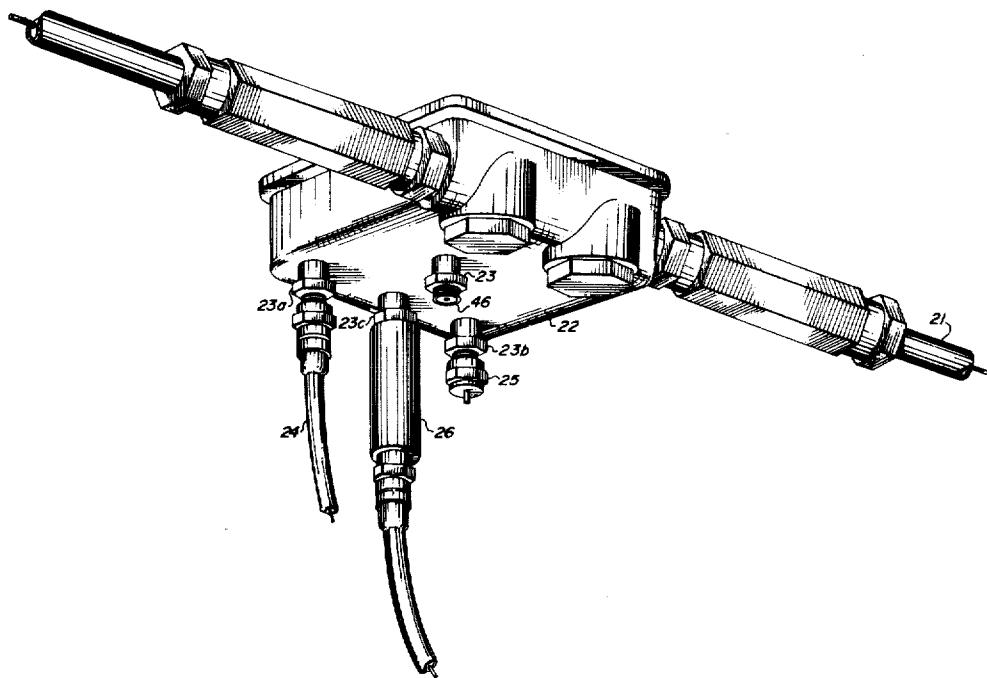
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[57] **ABSTRACT**

A tamper-resistant cable terminator assembly especially adapted for use in a CATV cable transmission system. The assembly consists of an outer barrel member which encloses a female connector having an integral terminal resistor. A snap ring retains the female connector inside the barrel member. The female connector is engaged with the male threads on a fixed cable terminal by means of a special tool inserted through an aperture in the barrel member. When the female connector is rotationally engaged with the male threads on the fixed cable terminal, the barrel member is free to rotate around the male-female connector assembly and the terminator assembly cannot be removed from the terminal without using the special locking tool.

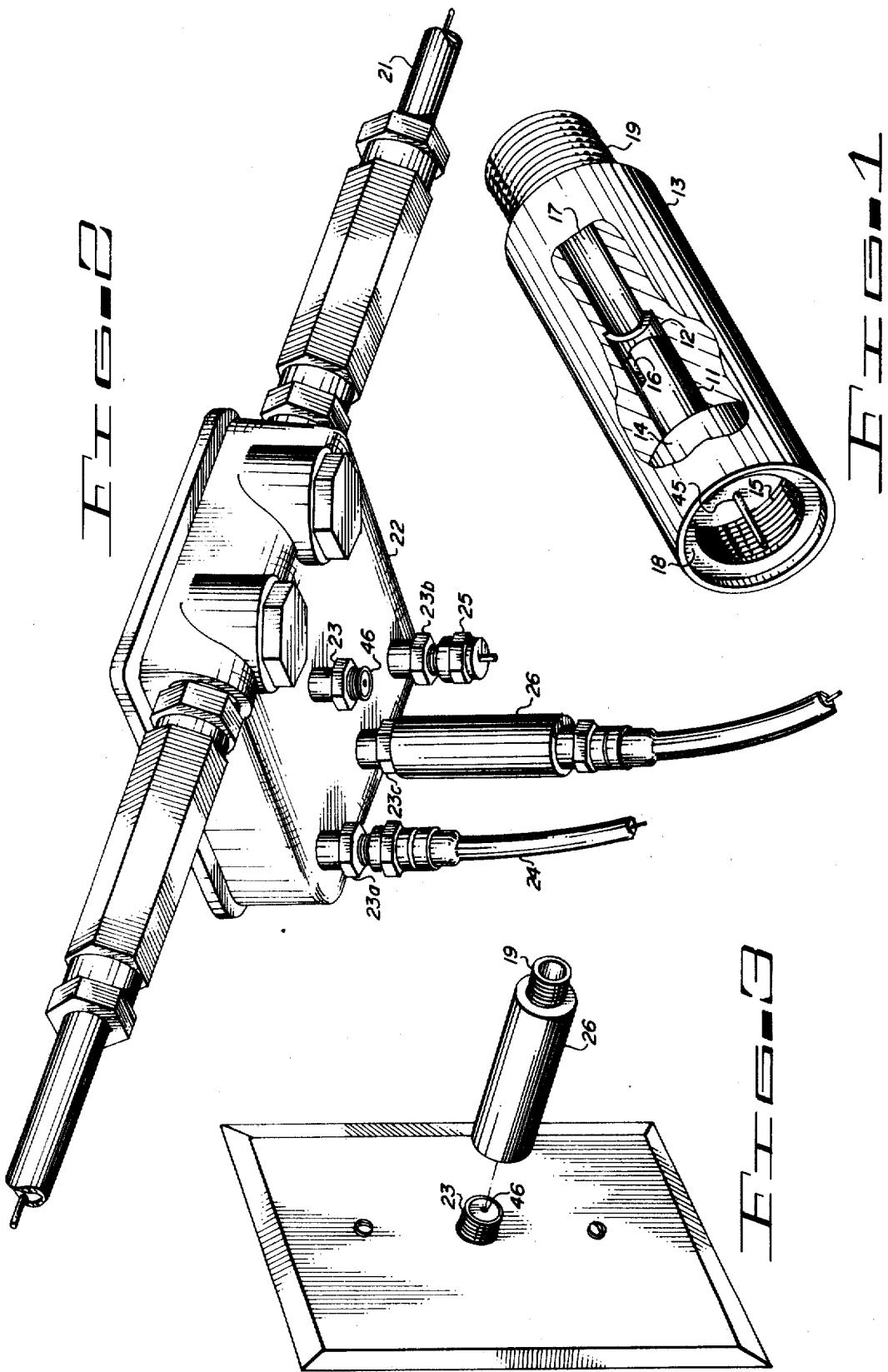
**1 Claim, 8 Drawing Figures**



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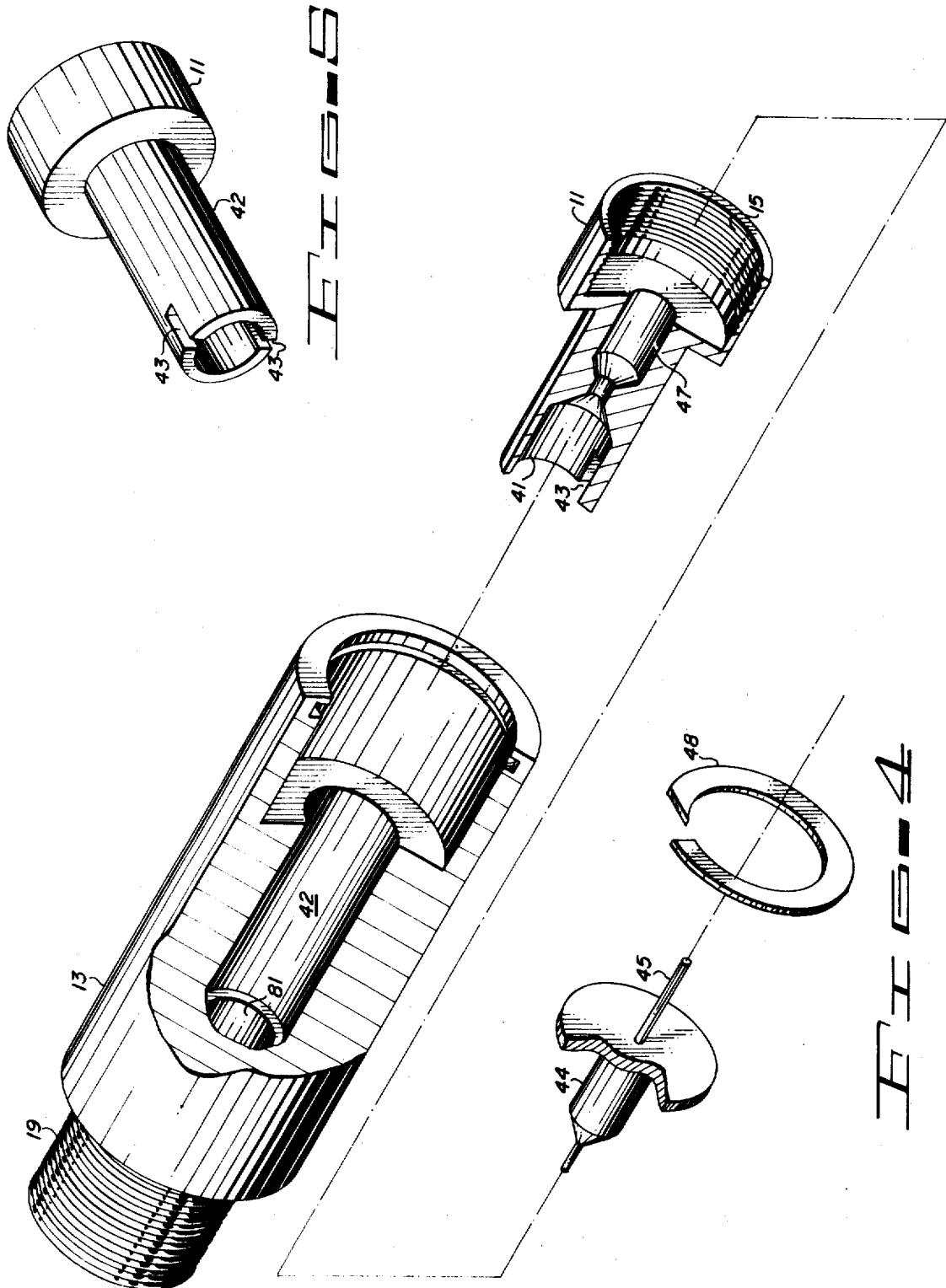
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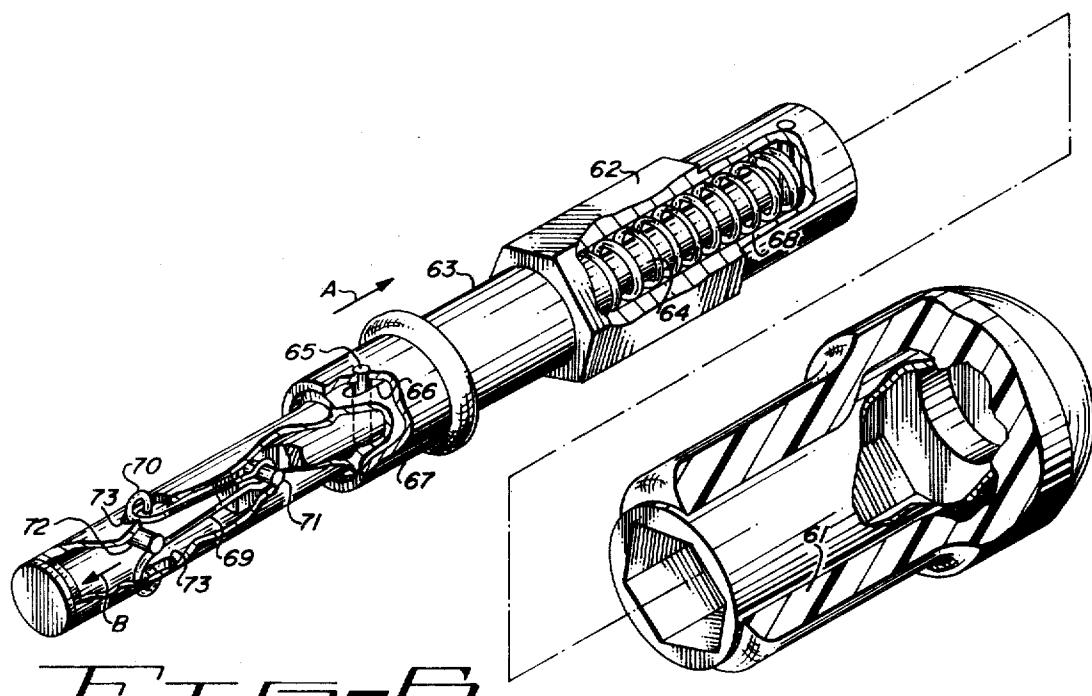
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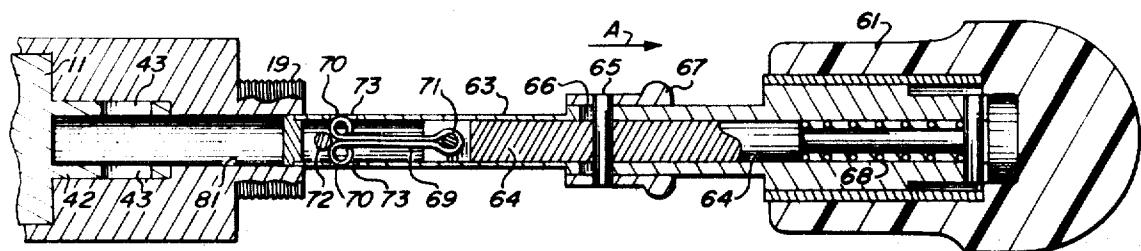
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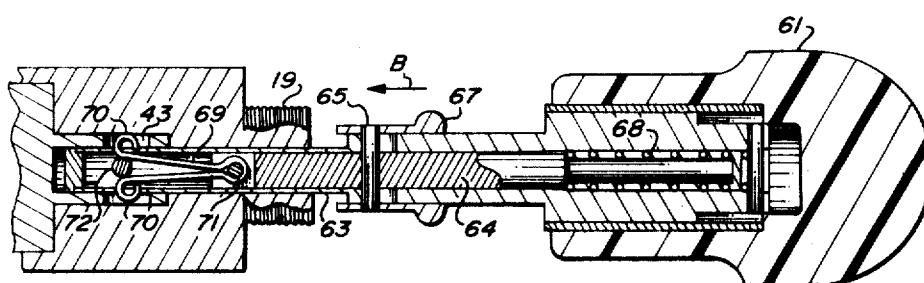
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*FIG. 6*



*FIG. 7*



*FIG. 8*

**TAMPER-RESISTANT CABLE TERMINATOR**

This invention relates to a cable terminator assembly.

More particularly, the invention relates to a cable terminator assembly especially adapted for use in a CATV cable transmission system.

In a further and more specific respect, the invention concerns a cable terminator assembly which can be readily installed and removed from a CATV cable terminal to prevent unauthorized use of the CATV facilities. Installation and removal of the terminator assembly must be accomplished by means of a special locking tool not readily available to the general public.

In still another, further and more specific respect, the invention concerns a special locking tool for use with a CATV cable terminator assembly.

In a cable antenna television (CATV) system, a central antenna is situated in a remote location selected for proper reception of line-of-sight television signals. The signals are then transmitted to television receivers located in a plurality of residences, business establishments, etc., by means of a permanently installed coaxial cable. A fee is charged for the right to connect a television set to the coaxial cable.

The connection to the coaxial cable is usually made at one of two general locations, i.e., at a multiple-terminal junction box located at a central point in a residential or commercial neighborhood to provide service for a plurality of subscribers or at single terminal junction boxes located on the walls in various rooms of apartment buildings or the like.

Because the multiple or single terminal junction boxes are usually readily accessible to the general public, it is possible for a moderately skilled person to connect his television receiver to the coaxial cable, using conventional, readily available hand-tools, without paying the required subscription fee. It would be highly desirable to effectively prevent such unauthorized use of CATV facilities by unauthorized persons, with consequent loss of subscription revenues.

Accordingly, it is an object of the present invention to provide a tamper-resistant cable terminator assembly.

Another object of the invention is to provide a tamper-resistant terminator assembly for use in a CATV cable transmission system.

Still another object of the invention is to provide a tamper-resistant cable terminator which can only be installed and removed from a CATV cable terminal by means of a special locking tool which is not generally available to the public.

Still another and further object of the invention is to provide a locking tool especially adapted for use with a shielded cable terminator assembly, which tool is capable of rotating connector members within the tamper shield into locking engagement with sufficient torque to prevent disengagement of the connector members with conventional tools.

These and other, further and more specific objects of the invention will be apparent to those skilled in the art from the following detailed description thereof taken in conjunction with the drawings, in which:

FIG. 1 is a partially cut-away perspective view of a cable terminator assembly constituting the preferred embodiment of the invention;

FIG. 2 is a perspective view showing the conventional manner of connecting the antenna cable of a television receiver to a CATV cable terminal on a multiple-terminal junction box, showing a conventional cable terminator assembly and showing the cable terminator of FIG. 1 installed in operative position;

FIG. 3 illustrates the method of installation of the cable terminator assembly of FIG. 1 on a single terminal CATV cable junction box such as might be located on the interior wall of an apartment dwelling;

FIG. 4 is a partially cut-away exploded perspective view of the cable terminator assembly of FIG. 1;

FIG. 5 is a perspective view of the special internal female connector member of the assembly of FIGS. 1-4;

FIG. 6 is a cut-away, partially exploded perspective view of a novel locking tool especially adapted for use with the cable terminator assembly of FIGS. 1-4; and

FIGS. 7 and 8 are sectional views illustrating the mode of operation and use of the tool of FIG. 6 and the terminator assembly of FIGS. 1-4.

Briefly, in accordance with the invention, we provide a tamper-resistant cable terminator assembly especially adapted for use in a CATV cable transmission system, which system includes a cable for transmitting electrical signals and a fixed cable terminal comprising a first connector member of a rotationally engageable male-female connector member pair. The terminator assembly comprises the second connector member of said pair which is provided with means for engaging an elongate locking tool to rotate said connector pair into locking engagement. The second connector member is received and enclosed within an outer shield member, the shield member being provided with a recess shaped and sized to permit the shield member to freely rotate coaxially about the connector pair. The assembly also includes means inaccessible from outside the shield when the connector pair is lockingly engaged for retaining the second connector member inside the recess. Finally, the terminator assembly also includes means defining a locking tool access port in the shield member, the port being fixed and shaped to temporarily receive the elongate barrel of said tool therethrough to rotate the second connector member and lock and unlock the second connector member from the first connector member.

The locking tool comprises a hollow handle portion having an elongate hollow barrel portion extending from the handle portion, the barrel portion having at least one aperture formed in the wall thereof adjacent the terminal end thereof. The tool also includes an operating shaft member slidably received in the hollow barrel portion and means for limiting the movement of the operating shaft within the barrel between a retracted position and an extended position. Finally, the tool includes connector member engaging means which are operatively linked to the shaft within the barrel member. The engaging means are adapted to extend outwardly through the barrel member aperture and engage the connector member for rotation thereof when the operating shaft is in the extended position and is further adapted to retract inwardly of the barrel member out of engagement with the connector member when the operating shaft is in the retracted position.

Turning now to the drawings, which illustrate the presently preferred embodiment of the invention but

which are not to be construed as limiting the scope of the invention to the embodiment shown and described therein, FIG. 1 illustrates the assembled terminator assembly consisting of a female connector member 11 received within the recess 12 of the shield member 13. The lower skirt 14 of the connector member 11 is provided with internal threads 15. The upper portion of the female connector member 11 is hollow and is provided with slots 16 which engage a locking tool which can be inserted through the bore 17. The connector member 11 is retained within the shield 13 by a retainer ring 18 received in a groove in the lower end of the shield 13. The upper portion of the shield may be provided with a male threaded portion 19, the purpose of which will become apparent from the following description.

FIG. 2 illustrates a typical multi-terminal junction box in a CATV cable transmission system. Signals from the central CATV antenna are transmitted via a coaxial cable 21 to various junction boxes located throughout the area served by the CATV system. The junction box 22, as shown in FIG. 2, is provided with a plurality of terminals 23 for connecting individual subscribers' television receivers to the main cable 21. The terminal 23 is neither connected to a subscriber's line nor terminated. The terminal 23a is shown connected to a typical subscriber's line 24. The terminal 23b is shown connected to a typical prior art cable terminator 25. The terminal 23c carries the cable terminator assembly 26 of FIG. 1. The threaded portion 19 of the device of FIG. 1 provides a convenient place to attach the subscriber's cable 24a when the terminal 23c is out of service.

As shown in FIG. 3, the terminator assembly 26 of FIG. 1 is similarly useful in terminating a single CATV cable terminal 23 mounted on the wall of the interior of a house, apartment or place of business.

FIGS. 4 and 5 illustrate in greater detail the assembly of FIG. 1. The shield member 13 is provided with a recess 41 which receives and encloses the female connector member 11, the lower portion of which is provided with internal female threads 15. The upper portion 42 of the connector 11 is hollow and is received in the reduced-diameter portion 42 of the shield member 13. The upper end of the connector 11 is provided with slots 43 which engage with a special locking tool, as will be described below. A resistor 44 is connected to a conductor 45. When the cable is terminated, the conductor 45 is received in the central socket 46 (FIGS. 2-3) of a male terminal to provide the necessary terminal impedance. The resistor 44 is secured within a reduced-diameter portion 47 of the female connector 11. The connector member 11 is retained within the recess 41 of the shield 13 by a retaining ring 48 seated in a groove 49 in the lower end of the shield member 13.

FIG. 6 illustrates the assembly of the special locking tool. A hollow handle member 61 receives the upper portion 62 of a hollow barrel 63. An operating shaft 64 is slidably received within the barrel 63. The movement of the shaft 64 within the barrel 63 is limited by a pin 65 in a slot 66 formed in the operating shaft 64. The pin 65 also locates a retractor sleeve 67 slidably received on the barrel 63. Movement of the retractor sleeve 67 in the direction of the arrow A causes the operating shaft 64 to slide rearwardly within the barrel 63 against the action of the spring 68. A generally V-shaped spring member 69 having laterally extending lugs 70

formed in the ends of each leg is linked to the operating shaft 64 by means of a pin 71 extending through a loop formed at the apex of the V-shaped spring member 69. In the preferred embodiment shown in the drawings, the legs of the spring member 69 are normally urged together. As the shaft 64 moves in the direction of the arrow B, the legs are spread apart by a pin 72, forcing the lugs 70 outwardly through apertures 73 formed adjacent the lower end of the barrel 63.

The mode of operation of the tool and terminator assembly is illustrated in FIGS. 7-8. FIG. 7 shows the tool with the shaft 64 partially inserted into a bore 81 formed in the upper end of the shield member 13. Finger pressure in the direction of the arrow A moves the retractor sleeve 67 toward the handle 61. The retractor sleeve 67 is mechanically linked by means of the pin 65 to the operating shaft 64, which also moves in the direction of the arrow A against the action of the spring 68. The movement of the shaft in the direction of the arrow A allows the spring member 69 to move out of contact with the spreading pin 72 such that the lugs 70 retract within the barrel 63. The barrel 63 can now be inserted further into the bore 81, as shown in FIG. 8, until the apertures 73 register with the slots 43 formed in the upper end of the female connector member 11. At this point, the lugs 70 can move outwardly and the shaft 64 is urged away from the handle portion 61 by the spring 68. The lugs of the V-shaped spring 69 are spread apart by the pin 72, forcing the lugs 70 outwardly into engagement in the slots 43 of the female connector member 11. In the position shown in FIG. 8, rotation of the handle 61 causes the female connector member 11 to rotate such that it can be threaded with the male threads of a CATV terminal 23 (FIGS. 2-3). When the connector members 11 and 23 have been rotationally engaged, the retractor slide 67 is moved toward the handle, causing the lugs 70 to retract within the barrel 63 and permitting the tool to be withdrawn from the bore 81.

Having described the invention in such full, clear and concise terms as to enable those skilled in the art to understand and practice it, and having identified the presently preferred embodiment of the invention, we claim:

1. In a tamper-resistant cable terminator assembly specially adapted for use in a CATV cable transmission system, said system including
  - a cable for transmitting electrical signals, and
  - a fixed cable terminal comprising a first connector member of a rotationally engageable male-female connector member pair, said cable terminator assembly including
    - a second connector member of said pair having means for engaging a locking tool adapted to rotate said pair into locking engagement,
    - an outer shield member coaxially rotatable about said connector pair member, shaped and dimensioned to receive and enclose said connector pair therewithin when lockingly engaged, and
    - means for retaining said second connector member inside said outer shield member,
  - the improvement whereby the tamper-resistance of said terminator assembly is increased, said improvement comprising:
    - a means carried by said second connector member forming a cylindrical extension thereof and having at least one locking-tool-engaging recess formed in

the inner wall thereof and extending radially outwardly; and  
b. means defining a locking tool access port in said outer shield member communicating with the interior of the cylindrical extension of said second con-

nection member, the diameter of said port being no larger than the inside diameter of said cylindrical extension.

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