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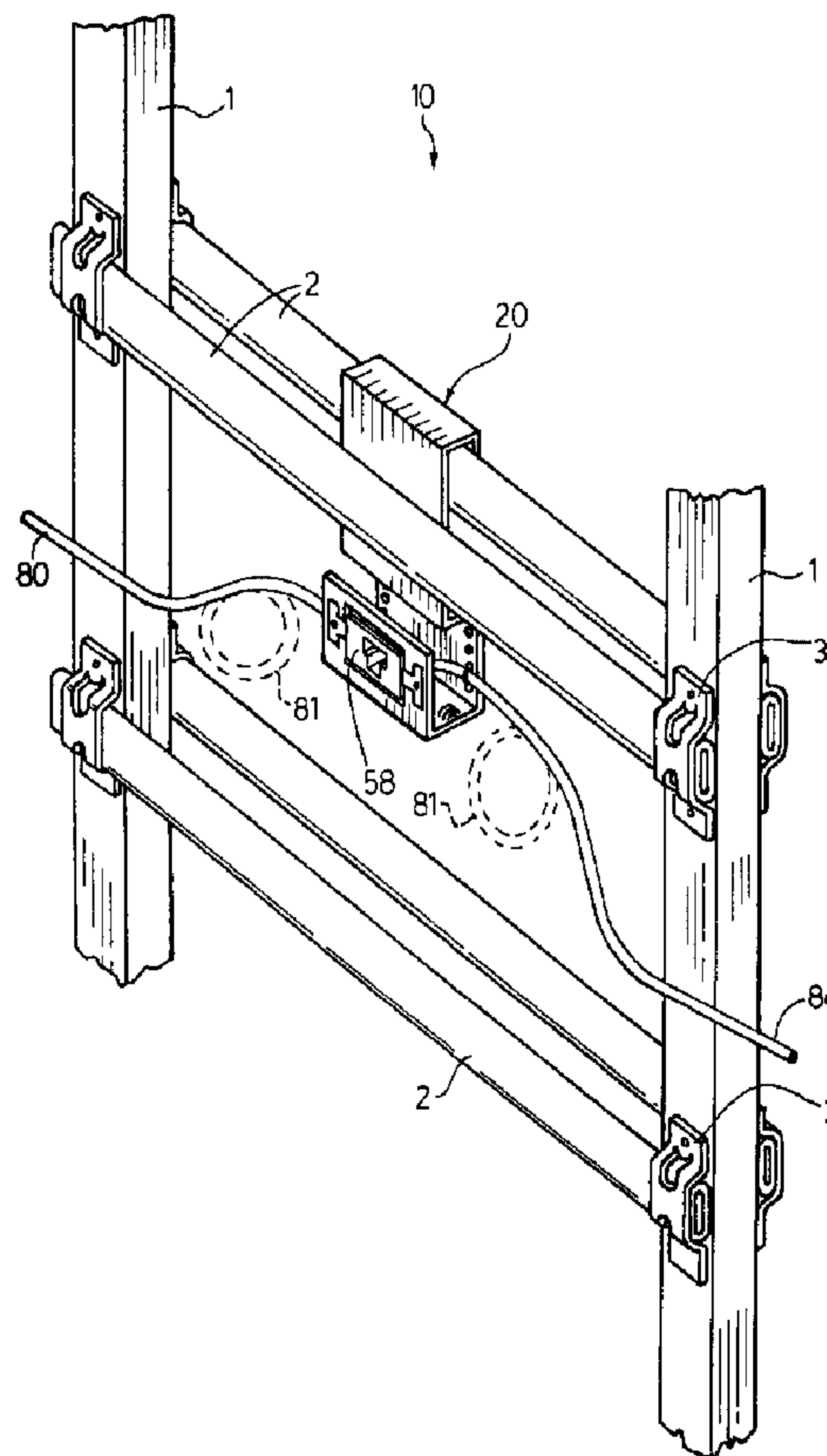
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(54) Titre : CONNECTEUR DE CONDUIT DE COMMUNICATIONS

(54) Title: COMMUNICATIONS CONDUIT CONNECTOR



(57) Abrégé/Abstract:

A communications conduit connector mounting device comprising a support member having a forwardly directed front surface and a rearwardly directed rear surface spaced from the front surface, the support member having a thickness defined between the front

(57) **Abrégé(suite)/Abstract(continued):**

surface and the rear surface, an aperture extending transversely through the support member throughout the thickness of the support member opening through both the front surface and the rear surface, a slotway extending transversely through the support member throughout the thickness of the support member open through both the front surface and the rear surface laterally from the aperture to a side of the support member. Preferably, the mounting device includes a hook member coupled to the support member for suspending the support member.

ABSTRACT

A communications conduit connector mounting device comprising a support member having a forwardly directed front surface and a rearwardly directed rear surface spaced from the front surface, the support member having a thickness defined between the front surface and the rear surface, an aperture extending transversely through the support member throughout the thickness of the support member opening through both the front surface and the rear surface, a slotway extending transversely through the support member throughout the thickness of the support member open through both the front surface and the rear surface laterally from the aperture to a side of the support member. Preferably, the mounting device includes a hook member coupled to the support member for suspending the support member.

Title

Mounting Device For Communications Conduit Connector

This application is a division of Canadian Patent Application Serial No. 2,232,335, filed March 17, 1998.

Field of the Invention

This invention relates to a mounting device for communications conduit connectors and, more particularly, to a device for mounting communications conduit connectors to modular office furniture systems.

Background on the Invention

Modular office furniture systems utilizing modular partitions are well known for the advantages of increased efficiency in the use of space and the ability to adapt and make changes to any particular configuration selected.

Many different forms of partitions are known which comprise a panel assembly consisting of a rectangular frame including vertical and horizontal frame members and with covers removably mounted to the frame on at least one side of the frame such that the panel assembly provides an interior space within the frame accessible by removal of the removable cover. A preferred panel assembly is taught by the present applicant's U. S. patent 5,406,760 to Edwards issued April 18, 1995. Other known panel assemblies include those taught by U.S. patent 4,685,225 to Kelly issued August 11, 1987 and U.S. patent 5,209,035 to Hodges et al issued May 11, 1993.

An important feature of such office panel systems is the ability to lay-in, customize and modify communications conduit such as wiring and optical cable used to connect and

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transmit signals between electronic equipment such as telephones, facsimile machines, computers including peripherals such as servers, printers, modems, speakers and the like. Known panel assemblies provide convenient access openings throughout the length of the panel assemblies for ease of exit and egress of communication conduit as for example to permit communication conduit to exit from or enter into the interior space defined by the panel assembly at different positions along the length of the panel as to permit easy placement of telephones, computers and the like at varying different locations as may be desired by a user and adjusted from time to time.

Known panel assemblies, however, suffer the disadvantage that there is not a convenient mechanism for the easily securing within the panel connectors for interconnecting two or more communications conduit as is typically necessary as for example to couple a telephone with a telephone communication conduit.

Background of the Invention

Accordingly, to at least partially overcome these disadvantages of previously known devices the present invention provides a communications conduit connector mounting device providing a support member to receive a communications conduit connector to join together the ends of two communications conduit, and with the support member depending from a hanger mechanism adapted for engaging the interior structure of the panel assembly.

An object of the present invention is to provide a communications connector mounting device providing a support plate for attachment of a communications conduit connector and depending from a suspension mechanism to engage the interior structure of a panel assembly.

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Another object is to provide a communications conduit connector mounting device which is adapted to engage a horizontal member of a panel assembly to be movable to a plurality of positions along the length of the horizontal member, preferably to be slidably movable along the length of the horizontal member.

Another object is to provide a communications conduit connector mounting device comprising an outlet-box forming portion which is open at both ends and preferably at one of its top, bottom, interior or exterior sides so as to provide a shielded cavity for at least a portion of a communications conduit connector, however having an open side to permit easy exit and entrance of communications conduit.

Another object is to provide a communications conduit connector mounting device which is readily removable from or engagable onto an interior structure of a panel assembly for ease of removal and access when a removable cover mounted to the panel assembly may be removed.

Another object is to provide a simple communications conduit connector mounting device which is adapted to be located at a plurality of positions within the interior space of a panel assembly.

Accordingly, the present invention in one aspect provides a communications conduit connector mounting device comprising a support member adapted to carry a communications conduit connector for joining together ends of at least two communication conduit for transmission of signals therebetween, which support member depends from an engagement member adapted for engaging an interior structure of a panel system for supporting the support member within the interior of the panel system. Preferably the engagement member

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may comprise a hook mechanism removably engaging a horizontal member attached to a frame forming the panel assembly which frame has covers removably mounted to at least one side of the frame. The hook mechanism engages the horizontal member such that the bracket carrying the connector locates the connector within the internal space disposed for ready access of the removable cover. Preferably the hook mechanism is capable of being moved to a plurality of positions along the length of the horizontal member in which in each position the support member locates the connector within the interior space exposed for easy access on removal of the removable cover. More preferably the hook mechanism is slidably movable along the length of the horizontal member.

The support bracket member may comprise an outlet-box forming portion comprising a first elongate U-shaped channel member extending parallel the horizontal member open along its length on one side and at both ends. The hook mechanism may comprise a second elongate U-shape channel member extending parallel the horizontal member also open along its length on one side and at both ends. With such configurations, preferred versions of the invention can permit the device to have a substantially constant cross-section profile in cross-section normal the horizontal member and preferably with profiles selected from S-shapes and C-shapes. The hook mechanism is preferably configured so as to engage the horizontal member in a manner to fixedly secure the device thereto against pivoting relative the horizontal member, preferably with at least one side of the support bracket member to receive the connector disposed vertically. This can be accomplished by having the hook mechanism engage the horizontal member at locations spaced longitudinally along the frame member sufficient to prevent pivoting of the apparatus about any horizontal axis normal the

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horizontal member and by having the hook member engage the horizontal member on each lateral side of the horizontal member to prevent pivoting of the device about any axis parallel the horizontal member.

The support bracket may comprise a simple planar member. The support bracket preferably has an aperture extending through the planar member for mounting of a connector therein. Preferably, a slotway is provided from one side of the simple planar member extending into the aperture to permit a connector to which conduit has been coupled to be secured in the aperture without disconnection of the conduit by means of the conduit gaining access to the aperture by passing through the slotway.

While the support bracket member may comprise a simple planar member, it is preferred that the bracket member include a planar shield portion extending generally parallel a mount portion of the bracket member carrying the connector spaced therefrom to provide a partially protected space between the mount portion and the shield portion for connections between the connector and at least some of the conduits. Preferably the bracket member also includes an upwardly directed trough open upwardly and at its ends and extending parallel the horizontal member to assist in receiving at least one of the communication conduit. A channel member preferably also carries securement devices to assist in securing of conduit thereto.

Brief Description of the Drawings

Further aspects and advantages of the invention will become apparent having regard to the following description taken together with the accompanying drawings in which:

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Figure 1 shows a frontal prospective elevation view of an assembled modular office furniture partition wall including a number of panel assemblies in accordance with U.S. patent 5, 406,760;

Figure 2 is a frontal prospective view of the partition wall of Figure 1 with some of the cladding covers removed to reveal the internal partition frames;

Figure 3 is an exploded schematic view showing a communications conduit connector mounting device in accordance with a first preferred embodiment of the present invention together with a preferred connector, a telephone jack and a conduit to connect to the connector;

Figure 4 is a schematic pictorial view illustrating the mounting device and connector shown in Figure 3 located on a section on a rectangular frame of a panel assembly of the same construction as that shown in Figures 1 and 2;

Figure 5 is a cross-sectional end view through a middle portion of the panel assembly of Figure 1 along section line V-V¹ in Figure 1;

Figure 6 is an enlarged view of central portions of Figure 5;

Figure 7 is a view similar to Figure 6 but showing a mounting device in accordance with a second embodiment of the invention;

Figures 8 to 13 comprise cross-sectional end views of mounting devices in accordance with third to eighth embodiments of the present invention, respectively;

Figure 14 shows a schematic end view of a ninth embodiment of the present invention in which the mounting device is secured to a U-shaped trough member;

Figure 15 is a schematic cross-sectional end view of a mounting device in accordance with a tenth embodiment of the present invention secured to a horizontally extending flange member;

Figure 16 is a pictorial view of a mounting device in accordance with an eleventh embodiment of the present invention;

Figure 17 comprises a pictorial view of a twelfth embodiment of the present invention;

Figure 18 comprises a schematic exploded pictorial view of a thirteenth embodiment of the present invention together with a connector;

Figures 19 to 24 comprise pictorial views of mounting devices in accordance with respective fourteenth to nineteenth embodiments of the present invention;

Figure 25 is a view similar to Figure 6 but showing a mounting device in accordance with the embodiment of Figure 21; and

Figure 26 is a schematic pictorial view of a clip member for engaging a conduit.

Detailed Description of the Drawings

Each of Figures 1, 2, 4, 5 and 6 illustrate a panel assembly in accordance with U.S. patent 5,406,760. The partition wall illustrated comprises a plurality of rectangular panel assemblies generally indicated 10 shown to be arranged end to end for convenience. Each panel assembly comprises a generally rectangular frame including vertical frame members or post 1 and horizontal frame members or beams 2. The beams 2 are preferably arranged in parallel pairs on both sides

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of each post 1. The beams 2 are connected to the outward opposing front and rear faces of each post 1 in an overlapping moment resisting connection. Both the posts 1 and the beams 2 are shown as tubular in cross-section. The post 1 and beams 2 are connected with brackets 3 having a saddle portion of internal profile mating with the external profile of the beams 2. The brackets 3 include flange portions above and below the saddle portion which overlie and are connected to the outward, forward or rearward face of the associated post 1 as by screws, rivets, welding and the like. The posts 1 of adjacent panel assemblies are connected as shown in Figure 2 in line with the posts 1 of adjacent panels as by connectors generally indicated as 25.

Cladding covers indicated generally as 5 but also specifically as 5a or 5b are removably coupled to the frame as best seen in Figures 2, 5 and 6 laterally outward of the beams 2. As best seen in Figure 6, due to the thickness of the brackets 3, a vertical space is present between the beams 2 and inward portions of the covers 5 other than where the brackets are present. Mechanisms are provided for mounting the covers 5 to the frame however such mounting mechanisms are not illustrated for the purpose of simplicity. The mounting mechanism preferably comprise resilient clips to engage portions of each covers 5 with the clips preferably secured between adjacent beams 2 or to the post 1. Each cover 5 preferably comprises a skin of sheet metal generally indicated 12 and having at each end a plastic end plug 14 which assists in maintaining the sheet metal in its desired form. The end plug 14 provides a means for engagement of the mounting mechanisms so as to realisable couple each cover 5 to the frame. As shown each panel 5 preferably spans between adjacent parallel vertically spaced pairs of beams 2 however in a middle portion of

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the panel assembly there are shown cover 5a and 5b which do not span between adjacent beams 2 but rather are removably coupled to each frame and generally span half the distance between two adjacent beams 2.

The panel assembly illustrated is to be appreciated as formed with an open gridwork of posts 1 and beams 2 with the result that the panel assembly has an open interior cavity which advantageously permits the passage of wires and cables therein. This interior cavity is made up of a vertically extending central post space 39 together with horizontally extending raceways 41 adjacent and open to the central post space 39. The central post space 39 is defined between the posts 1, that is between a forward plane including the forward face of each post 1 and a rearward plane including a rearward face of each post 1. The central post space 39 extends vertically between the spaced, parallel forward and rearward planes and between interior faces of the post 1. The central post space 39 extends continuously vertically throughout the height of the partition open upwardly to above the top of the partition and open downwardly to below the lowest beam of the partition.

A plurality of raceways 41 extend horizontally between the beams 2 outward of the respective of the forward or rearward planes. The raceways 41 extend a full width of each partition and are open at each end to beyond the exterior end faces of the posts. The raceways 41 are defined inward of the covers 5 and extend forwardly and rearwardly from the respective forward and rearward planes the combined thicknesses of the beams 2 and the saddle portion of the brackets 3. In addition, the raceways 41 also include an interior space within the cover 5, that is, a space between the ends 14 of each cover which is in

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communication with the raceway 41 and thus extends the raceway 41 laterally outwardly to the metal sheet 12 forming the cover.

The raceways 41 are open on their interior sides to the central post space 39 over the entire distance between the posts 1. Whereas the central post space 39 ends at the interior end faces of the post 1, the raceways 41 provide for passageway for conduit horizontally past the posts outward of the posts inward of the covers. Similarly the central post space 39 provides a passageway for conduit vertically past the beams 2 inward of the beams and inward of the covers. The raceways 41, central post space 39 and covers 5 define an interior cavity in the panel assembly which permits conduit to be routed vertically throughout the partition between the post 1 inside the beams and horizontally across the partition and between adjacent partitions in the raceways outside the post 1, between the beams 2 and inside the covers 5.

Figures 1, 2 and 5 show a recessed panel 7 adapted to carry horizontally extending electrical cables. The panel 7 preferably comprises sheet metal removably coupled to the frame by a coupling mechanism not shown and carrying an internal electrical outlet-box 16 carrying electrical power outlets 8 accessible on either side of the panel assembly through openings in the recessed panel 7. Such recessed panel 7 may optionally be closed from view by a half cover 5a as shown in Figures 1 and 2.

The recessed panel 7 has its upper end 18 recessed inwardly from the cover 5b and thus provides a vertically extending space or gap 99 therebetween particularly advantageous for passage of communication conduit.

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Reference is now made to Figure 3 to 6 which show a preferred embodiment of a communications conduit connector mounting device generally indicated 20. The device includes a hanger mechanism generally indicated 22 and a connector support member generally indicated 24. The hanger mechanism 22 is adapted to engage the horizontal frame member comprising beam 2 so as to support the connector support member 24 in a position within the interior cavity of the panel assembly. The hanger mechanism 24 shown as comprising an elongate U-shaped hook channel member which has two parallel side walls 26 and 28 joined by a bridging side wall 30 to form an elongate hook forming cavity 32 therebetween open along its length at one open side indicated 34 and at both ends 36 and 38.

The connector support member 24 comprises an outlet-box forming portion which is in the form an elongate U-shaped box channel member with two parallel side walls 40 and 42 joined by a bridging side wall 44 to define an elongate generally rectilinear cavity 48 therebetween. The channel member and its cavity is open along its length at one open side 50 between the two opposed side walls 40 and 42 and opposite the bridging side wall 44. The channel member and its cavity are also open at open ends 52 and 54.

The box channel member of the connector support member 24 extends parallel the hook channel member of the hanger mechanism 22.

The side wall 40 of the connector support member 24 carries a major aperture 56 therethrough adapted to receive a conduit connector 58. The conduit connector is schematically illustrated as a commercially known type such as for example sold under the trademark Leviton. As is known the connector 58 is provided with a connector tabs 60 and

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62 at either end each carrying a hole by which screws 64 and 66 may secure the connector 58 within the aperture 56 by engaging in threaded holes 68 and 70 in the side wall 40.

The connector 58 carries a female socket 59 of the type known for use with telephone connections and adapted to receive in a quick connect snap connection, a male plug 74 connected to a first conduit 76. The connector 58 also include at its rear as generally indicated 78 a connection mechanism for connection of the end of one or more other conduit in known manner. As shown in Figure 3 a second conduit 80 is shown whose end is adapted to be engaged to the rear end 78 of the connector 58.

The side wall 42 is shown as being provided with a number of holes 82 which as described later may be used to assist in securing a conduit to the connector support member 24.

Reference is now made to Figure 4 which shows the mounting device 20 of Figure 3 mounted in the interior cavity of a panel assembly having a construction substantially the same as that shown in Figures 1 and 2 and with the covers removed therefrom. As seen, the hanger mechanism 22 and its hook channel member forms a hook member with the side walls 26 and 28 forming arms of the hook and the bridging side wall 30 forming the bight. The hook member closely engages about the right hand most beam 2 with the side walls 26 and 28 engaging the inward and outward surfaces of the beam, respectively, and the bridging side wall 30 engaging the top of the beam such that the device 20 is suspended from the beam with the connector support member 24 disposed therebelow and located with the side wall 40 being disposed vertically and facing towards the left hand side of the partition as shown. With the hook channel member extending parallel the horizontal beam 2, is to be

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appreciated that the hook mechanism can be placed on the right hand beam 2 at a plurality positions along the length of the beam, that is at an infinite number of sequential positions spaced along the beam between the posts 1. Preferably the hook channel member is sized to frictionally engage the beam 2 however to permit longitudinal sliding of the hanger mechanism 22 along the beam 2.

As seen in Figure 4, communications conduit indicated as the second conduit 80 and a third conduit 84 are connected to the rear of the connector 58 with each conduit extending from the connector 58 horizontally through the cavity 48 of the connector support member 24 out one of the opens ends 52 and 54 of the cavity and subsequently through the interior cavity of the panel assembly and out of the panel assembly horizontally through the raceways 41 outward of the posts 1. The third conduit 84 is secured to the side wall 42 of the connector support member 24 by a plastic strap which extends through two adjacent of the holes 82 and about the conduit 84. This plastic strap can comprise known strap forming devices with an eyelet at one end through which the other end of the strap is drawn and which eyelet frictionally engages the strap to resist withdrawal.

Reference is now made to Figures 5 and 6 which illustrates the device 20 as suspended from the right hand beam 2 as in Figure 4 however in these specific context of the panel assembly illustrated in Figures 1 and 2 and disposed behind covers 5b mounted above recessed panels 7. As shown, the device 20 has its hanger mechanism 22 disposed such that the side wall 28 extends vertically downwardly in a vertically extending lateral space defined between the beam 2 and the covers 5 and 5b. This lateral space is provided between the covers and the beam the thickness of the bracket 3 and with the side wall 28

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having a width not greater, and preferably less than the bracket 3, the side wall 28 may readily extend vertically through the lateral space.

Referring to Figure 6, with only the left hand side cover 5b removed, a person can reach into the interior cavity of the partition and remove or engage the mounting device 20 on the right hand beam 2, by merely vertically sliding the mounting device 20 to slide the side wall 28 between the right hand beam 2 and the right hand covers 5 and 5b. Neither the left hand cover 5 nor the right hand covers 5 and 5b need to be removed to permit installation, removal or relocation of the mounting device 20. In removal, once side wall 28 is above the right hand beam 2, the mounting device can be moved horizontally to between the horizontal pair of beams 2 and then vertically downwardly in the central post space 39 to below the beams from which it may be moved horizontally to the left between the left hand beam 2 and the top 18 of the recessed panel 7. In order to permit the mounting device 20 to be removed from the beam 2 by movement vertically and then horizontally, the distance between the lower end of the side wall 28 and the flange 90 must be greater than the vertical height of the beam 2 at least in the context of a hanger as shown in which the flange 90 and/or the connector support member 24 extends vertically under the beam 2.

It is to be appreciated that by merely removing the removable left hand cover 5b access is readily provided to the device 20 and its connector 58 for connection of the conduit to the connector, for plugging or unplugging of the plug 74 and for relocation of the device 20 at varying locations spaced longitudinally along the beam 2 between the posts. Preferably when initially coupling the second and third conduit 80 and 84 to the connector 58, additional lengths of the conduit may be provided in a coil for each of the second and third

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conduits such that there is sufficient extra length of each conduit to permit location of the device 20 at any location on the beam between the posts without the need to connect or reconnect the conduits 80 or 84. Such coils of additional conduit are schematically shown in Figure 4 as in dashed lines as coils 81. The first conduit 76 is shown to extend from the connector 58 downwardly across central post space 39 and through the left hand side raceway 41 and out under the bottom of the left hand cover 5b in the space between the left hand cover 5b and the left hand recessed panel 7.

Figures 5 and 6 show the mounting device 20 with its hook member secured over the right hand beam 2 with the side wall 40 facing towards the left hand side. It is to be appreciated that the mounting device 20 could be removed and reversed to assume a mirror image position with the hook member over the left hand beam 2 and with the side wall 40 facing towards the right hand side.

As seen in Figure 6, the cavity 48 of the connector support member 24 opens upwardly and towards the left hand side. This is achieved by having the device 20 having a generally S-shaped profile in side view normal the horizontal frame member as best seen in Figure 6. In this regard the side wall 26 which forms an arm of the hook member closest the left hand cover 5b extends inwardly of the right hand beam 2 between the two beams 2 and downwardly to a horizontal flange 90 which connects to the side wall 42 of the support member 24. The flange 90 is vertically spaced from the upper most end of the side wall 40 of the support member 24 such that the cavity 48 of the support member 24 not only is open upwardly between the side walls 40 and 42 but access to its open end 50 is provided laterally to the cavity 48 throughout the length of the device 20. This construction is believed

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advantageous to permit easy lay-in of communication conduit into the cavity 48 from the left hand side of the device 20 when the left hand cover 5b is removed.

Preferably, when initially installing the connector 58, a workman will remove the device 20 from the right hand beam 2 and work on the device with the device held laterally to the left hand side of the partition. A workman may feed the second and third conduits 80 and 84 through the cavity 48 and out the aperture 56 connecting these conduits to the connector 58 and then securing the connector 58 within the aperture 56 on the side wall 40.

Next the workman may secure the connector in the aperture 56 and then hang the device 20 on right hand beam 2. As an alternate embodiment to that of Figure 3, the aperture 56 may be modified such that the portion of the wall 50 indicated in Figure 3 as 92 is removed where by the aperture 56 comprises an upwardly opening slot such as shown in the embodiment of Figure 17. With this configuration, it is not necessary to initially pass the second and third conduits 80 and 84 through the aperture 56, rather, the conduits may be connected to the connector 58 separate from the device 20 and then as the connector is moved horizontally into the aperture 56, the conduits 80 and 82 are merely passed vertically downwardly into the cavity 48 via the upwardly opening aperture 56.

The connector support member 24 in the first preferred embodiment illustrated in Figure 4 is shown with its side wall 42 providing a shield wall to assist in protecting any of the connections between the second and third conduits 80 and 84 at the rear of the connector 58. As well, the side walls 40 and 42 together with the bridging side wall 44 in effect provide a U-shaped upwardly opening trough to assist in retaining conduit therein.

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In Figures 4, 5 and 6, the connector 58 is located in the aperture 56 provided in the side wall 40 which faces towards the left hand side cover 5b. As an alternative, a similar aperture could also be provided in side wall 42 to receive the connector to face outwardly to the right into the interior space of the right hand cover 5b and with a conduit such as conduit 76 to extend between the side wall 42 and the skin 12 of the right hand cover 5b in the interior space of the right hand cover 5b downward to exit via the gap 99 between the right hand cover 5b and the right hand recessed panel 7. In the context of such an arrangement, the device 20 could be removed and/or engaged merely by removal of right hand cover 5b. The alternate aperture in side wall 42 could be provided as a knockout panel indicated as 91 in Figure 3 and delineated by dashed lines.

The device 20 as illustrated in Figures 5 and 6 shows the connector support member 24 as located in right hand side raceway 41 and extending partially inwardly to the left into the central post space 39 but not extending outwardly to the right into the interior space of the right hand cover 5b.

The mounting device 20 may be configured as may be desired for different needs to control the extent to which the device 20 and/or its support member 24 locate within one or more of the central post space 39, raceway 41 and the interior space within the covers. In this regard, reference is made to Figure 7 which shows a side view of a partition similar to that of Figure 6 but showing a mounting device 20 in accordance with a second embodiment of the invention and in which similar elements are referred to with similar reference numbers. The hanger mechanism 22 has its side walls 26, bridging wall 30 and side wall 28 formed in the shape of a smoothly curving hook conforming to the profile of the upper

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end of the beam 2. The flange 90 which connects side wall 26 to side wall 40 extends diagonally. With the side wall 28 of a shorter vertical length than that of the first embodiment, the side wall 26 can be of lesser length yet permit removal without the flange 90 preventing the side wall 28 from clearing the top of the beam 2.

In Figure 7, the connector support member 24 is located to extend partially into the interior space of the right hand cover 5b and partially into the central post space 39. In Figure 7, the connector 58 is shown disposed vertically and comprising two connection mechanisms 78 for connection of conduit.

Reference is made to Figures 8, 9 and 10 which show schematic cross-sectional side views of third, fourth and fifth embodiments of mounting devices 20 in accordance with the present invention and similar in many respects to the first embodiment of the mounting device 20 shown in Figure 3 in having a profile of generally S-shape in cross-section. Each of the members shown is illustrated with a hanger mechanism 22 of substantially identical shape and profile to that of the hanger mechanism in the first embodiment of Figure 3.

The third embodiment of Figure 8 has been provided such that the channel support member 24 comprises a U-shaped channel member which does not extend laterally beyond the hanger mechanism 22 and thus the sides wall 40 and 42 of the connector support member 24 do not extend laterally beyond the side walls 26 and 28 of the hook mechanism. When utilized in the identical manner to that in Figure 6, the embodiment of Figure 8 would be located substantially only in the right hand side raceway 41 leaving the central post space 39 and the interior space within the right hand cover substantially clear.

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In Figure 8, two apertures 56 are shown, one in each of side walls 40 and 42. It may be possible with the hanger mechanism 22 disposed about a right hand beam 2 shown in dotted lines in Figure 8 to have the connector 58 received either in side wall 40 to be directed towards the left or in side walls 42 to be directed towards the right.

In the fourth embodiment of Figure 9, the side wall 40 on the left side does not extend to the left beyond the side wall 26 of the hook mechanism 22 however the side wall 42 of the support member 24 in a lower part of the S-shape extends to the right substantially beyond the side wall 28 of the hanger mechanism 22. When utilized in the identical manner to that in Figure 6 with the hanger mechanism disposed about a right hand beam 2 shown in dotted lines in Figure 9, the embodiment of Figure 9 would be located in the raceway 41 and in the interior space within the right hand cover leaving the central post space 39 substantially clear. In Figure 9, only one aperture 56 is shown in the side wall 40, as when used in the preferred manner as in Figure 6, there would not be expected to be room for a conduit to extend between the side wall 42 and the skin of the right hand cover.

In the fifth embodiment illustrated in Figure 10, the side wall 42 of the support member 24 is a vertical extension of the side wall 26 of the hook mechanism 22 and thus the support member 24 is located entirely to the left of the hanger mechanism 22. The embodiment of Figure 10 provides a return flange 98 on the upper end of the side wall 40 of the support member 24 as may be advantageous to provide additional support to the side wall 40 and to assist in further enclosing the cavity 48.

When utilized in the identical manner to that in Figure 6 with the hanger mechanism disposed about a right hand beam 2 shown in dotted lines in Figure 10, the embodiment of

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Figure 10 would have its support member 24 located merely within the central post space 39 leaving both the raceways 41 and the interior spaces within the cover is clear. In Figure 10, three apertures 56 are shown one in each of side walls 40 and 42 and one in bridging wall 44. With the support member 24 mounted in the central post space 39, connectors could readily be used in either side walls 40 or 42 so as to be directed towards either the left side or the right side. As well, in some circumstance, it might be advantageous to have a connector directed downwardly as by locating it in the aperture 56 in the bridging wall 44.

Reference is now made to the sixth, seventh and eighth embodiments illustrated in end cross-sectional views in Figures 11, 12 and 13 which illustrate mounting devices 20 similar in many respects to the mounting device of the first embodiment however adopting a generally C-shape in profile. In each the hanger mechanism 22 is substantially identical to that shown in the first embodiment and the connector support member 24 is also substantially the same however the connector support member 24 opens to the same lateral side as the hanger mechanism 22. As seen in each of Figures 11, 12 and 13 the connector support member 24 has side walls 40 and 42, and bridging side wall 44 defining cavity 48 with an open side and open ends.

The embodiment of Figure 11 has its connector support member 24 below the hanger mechanism 22 so as to locate substantially within a raceway 41 in a comparable manner to that described with the embodiment of Figure 8.

The embodiment of Figure 12 has its connector support member 24 arranged so as to locate substantially within a raceway 41 and the interior space of a cover in a comparable manner to that described with the embodiment of Figure 9.

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The embodiment of Figure 13 has its connector support member 24 arranged so as to locate substantially only within the central post space 39 in a comparable manner to that described with the embodiment of Figure 10. As in Figure 10, the embodiment of Figure 13 includes reinforcing flange 98.

The embodiment of Figures 8, 10, 11 and 13 are illustrated as having more than one apertures 56 one in the side walls 40 and 42 and the bridging side wall 44. Such apertures are each sized so as to receive a connector 58 therein. Having apertures for the connectors 58 in the different walls provides increase flexibility in use of the mounting device 20 having regard to the desired usage and space configurations in the interior of the panel assembly and the like. The apertures 56 may advantageously be pre-formed. It is also advantageous that all or some of the apertures 56 be provided as knockout areas which can be removed by the application of forces as in known with outlet-boxes generally. Insofar as all the apertures 56 are pre-punched, the walls which are not to receive a connector 58 still continue to serve some shielding and/or supporting function. It is to be appreciated that having the aperture 56 in bridging side wall 44 with the plug 74 to be disposed downwardly could be convenient in some installations.

In the context of a partition system as illustrated in Figures 1, 2, 4, 5 and 6, as best shown in Figures 5 and 6, it is advantageous that the embodiments of the mounting devices 20 illustrated in Figures 3 and 7 to 13 be utilized in an orientation that the side wall 28 forming the distal end of the hook be received on the outside of the beam 2 about which the hanger device 20 is received, that is with the side wall 28 locating in the space between the beam 2 and the covers 5 and 5b. One advantage is that the mounting devices may be

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engaged into or removed from the beam merely by removing one of the covers 5b. As an alternate orientation which is not illustrated in the drawings, the mounting devices 20 at least of the embodiments shown in Figures 8, 9, 11 and 12 could be utilized with the side wall 26 on the inside of the beam 2 about which the hanger device is received, that is, with the side wall 26 located in the space between the beam 2 and the covers 5 and 5b on one side. This has the disadvantage that both covers 5 and 5b on that side must be removed in order that the mounting device may be engaged onto or removed from the beam.

Mounting devices in accordance with the present invention are not limited merely for use with partitions as illustrated in Figures 1, 2, 4, 5 and 6. In the context of other partition systems, the hanger mechanism 22 may be useful in different orientations and the nature of the particular partition system, and any removable covers may dictate preferred usages and orientations.

In this regard, reference is made to Figure 14, Figure 14 shows a trough 112 formed of sheet metal which extends as a horizontal member coupled to a frame within a panel assembly of a construction is taught for example in U.S. patent 5,209,035 to Hodges et al. Figure 14 shows a device 20 in accordance with the ninth embodiment of the invention which has its hanger mechanism 22 adapted as a hook with a suitable spacing in between the side walls 26 and 28 to engage upon one arm of the U-shaped trough 112. The device 20 illustrated in Figure 14, is similar to that in Figure 13 with the connector support member 24 laterally outside of the side wall 28 and this permits the device 20 in Figure 14 to be removed merely by vertically upward movement. While not shown, a removable cover would be provided to the left of the device 20.

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Reference is made to Figure 15 which show a tenth embodiment of the invention accordance with the present invention which is adapted to being engaged upon a horizontal flange 114 comprising a portion of a panel assembly in accordance U.S. patent 4,685,255 to Kelly. In Figure 15 the hook mechanism 22 is adapted so as to provide its side arms 26 and 28 disposed horizontally to engage on the flange 114 and support the device 20 therefrom, slidably horizontally therealong. A removable cover not shown would be provided to the left of the device 20.

Reference is made to Figure 16 which shows a simplified eleventh embodiment of the mounting device 20 in which the hanger mechanism 22 comprises two longitudinally spaced hook members 22 and the connector support member 24 merely comprises a flat planer plate 40 on which aperture 56 is provided as a knockout which if removed provides an aperture 56 as a U-shaped opening open downwardly. Figure 16 shows two conduit support hooks 120 each stamped from wall 40 and having a base 122 and leg 124. The hooks are adapted to permit conduit to be laid therein as a manner of securing conduit connected to a connector mounted to wall 40. Other embodiments show the use of pairs of holes 82 to assist in securing conduit. Many other mechanisms may be utilized to assist in securing conduit to the connector support mechanism.

The embodiments illustrated in Figures 3 and 7 to 16 are all adapted for manufacture, preferably by forming by bending a sheet of material of relatively uniform thickness, as for example by bending sheet of thin metal as from which appropriate apertures openings and slots may have been previously stamped. Of course, each of the embodiments

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of Figures 3 and 7 to 16 could also be formed as by extrusion from plastic or metal and subsequently punching or handling as to form appropriate aperture slots, holes and the like.

Reference is made to Figures 17 and 18 which show twelfth and thirteenth embodiments more adapted to manufacture by extension as from plastic and aluminum. Each is adapted such that the hanger mechanism 22 engages about a beam 2 and supports the connector support member 24 thereabove. In the embodiment of Figure 17, the two U-shaped channels are substantially of the same size with the side wall 40 being an extension of side wall 26 and the side wall 42 being an extension of side wall 28 and with the bridging walls 30 and 44 being common. Figure 17 shows an aperture 56 as a U-shaped opening upwardly as is advantageous to assist in laying in conduit connected to the rear of a connector 58.

Figure 18 shows an embodiment in which the connector support member 24 is spaced upwardly from the hook member 22 by a vertical extension flange 90 and with one side wall 42 having a horizontal extension flange 98 to assist in closing the cavity. In Figure 18 three locations are shown for aperture 56 with one in each of walls 40, 42 and flange 90, preferably as removable knockouts. Figure 18 shows the connector support member 24 as having two longitudinally extending bosses 100 and 102 each providing a bore 104 and 106 which are spaced apart a distance such that a connector 58 may be secured in each open end 52 and 54 of the connector support member 24 as shown. Such configuration may be advantageous for certain panel assembly configurations. With the connector 58 not completely enclosing either end, the connector support member 24 can continue to permit conduit to pass out the ends.

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The first embodiment of Figure 3 is also adapted to receive a connector 58 across its end in a manner as shown in Figure 18. In the embodiment of Figure 3, a U-shaped strip 108 bridging wall 44 is shown as punched upwardly from wall 44 to provide an opening 110 between strip 108 and the wall 44 into which a screw may be engaged extending parallel the longitudinal of the channel member. Similar such strips 108 are provided on flange 90 such that with the wall 44 and flange 90 suitably spaced the connector 58 can be engaged in the end of the connector support member 24 with screws received in the openings 110.

The invention has been described illustrating a preferred connector 58 as illustrated in Figure 3 and as is adapted for location within an aperture in the connector support member 24 sized to similar proportion as for example found in typical outlet-boxes used in the construction industry. Various other connector devices may be used including those which are used for example in telephone industry for surface mounting of a telephone connection. One such connector includes a substantially rectangular box-like member having an open top and provided with an adhesive on its rear surface covered with a release sheet such that when the release sheet is removed the connector may be secured to flat surface. This connector also includes a removable box like top cap with an open bottom. The connector presents one or more female sockets in its side walls thereof accessible through openings in the side walls of the top for coupling of male plugs such as plug 74 in Figure 4. Such an adhesive backed connector may readily be applied to a flat surface of a mounting device 20 such is shown in particular in the simple embodiment in Figure 17.

While all of the preferred embodiments of Figures 3 to 18 show the apertures 56 adapted for mounting connectors disposed in a plane which is vertical parallel that covers 5

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or horizontal normal that covers 5. It is to be appreciated that mounting devices could be provided with connectors disposed at any angle whatsoever.

Reference is made to Figure 19 which shows a fourteenth embodiment in accordance with the present invention. The embodiment shown in Figure 19 is substantially the same as that shown in Figure 3, however, with some differences. Firstly, in the embodiment of Figure 19, the connector support member 24 is supported by the hook mechanism 22 such that the side walls 40 and 42 are disposed at an angle to the vertical, preferably, in the range of about 30° to 60° to a vertical and, more preferably, about 45° to a vertical as shown.

Secondly, a pathway 130 is provided through that portion of the wall 40 indicated as 92. This pathway 130 is advantageous such that a connector such as connector 58 shown in Figure 3 to which conduits such as conduits 80 and 84 as shown in Figure 4 have already been attached, may be secured in the aperture 56 without removing the conduits from the connector. Portions of the conduit intermediate its ends may be passed via the pathway 130 into the aperture 56 such that the conduits may extend out the open ends 52 and 54 of the cavity 48 as well as upwardly through the aperture 56 to the connector. Subsequently, the connector may be secured in the aperture. Similarly, the connector may be removed from the device 20 without disconnecting its conduits.

Thirdly, Figure 19 shows removable tabs 132 and 134 comprising an extension of the wall 42 and which may be removed as by severing along the dashed line indicated in respect of tab 132 as 136. The tab 132 is shown as carrying additional holes 82 to assist in securing conduit to the connector support member 24. The holes 82 on the tab 132 are advantageous in that they do not underlie the upper, front wall 40 and, thus, are more readily accessible.

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Openings 82 on the rear wall 42 may also be made more accessible as by removing knockout portions 138 and 140 delineated on the front wall 40 by severing the same as along a dashed line indicated regarding knockout 138 as 142. Preferably, only one of the tabs 132, 134 or the knockouts 138, 140 would be provided.

Fourthly, Figure 19 indicates a central portion of rear wall 42 as knockout portion 144 which may be provided to be severed along the dashed line 146 so as to provide an aperture through the rear wall 42 in alignment with the aperture 56. This may be advantageous so as, for example, to permit a connector to extend rearwardly through both the forward wall 40 and the rear wall 42 or to provide access to the rear of a connector received within the aperture 56.

Reference is now made to Figure 20 which shows a fifteenth embodiment of a mounting device 20 in accordance with the present invention. The embodiment of Figure 20 has similarities to the embodiment of Figure 16 insofar as the connector support member 20 comprises a single forward wall 40 carrying the aperture 56. As was the case with Figure 19, the wall 40 is disposed at an angle of about 45° to a vertical. In replacement of the openings 82, pairs of slots 156 are provided at each end of the wall 40. A touch fastener securing strap generally indicated 148 is to be received in each pair of slots 156. The touch fastener strap 148 is of a known construction such as that sold under the trade mark VELCRO and has a plurality of loops on an area 154 at one end and a plurality of hooks over an area 152 of the other end adapted such that the hooks engage in the loops. In the context of Figure 20 with the strap passed through the openings 156 such that the loop area 154 extends downwardly from one opening 156 and the hook area 152 extends downwardly

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from the other slot 156, conduit can be secured within the loop formed by the strap 148.

The wall 40 in Figure 20 has an upper surface 158 and a lower surface 160. In a preferred use, the connectors such as shown in Figure 3 may be mounted with its face plate on the upper surface 158 with its female socket, such as that shown as 59 in Figure 2, being directed upwardly and with conduit engaged in the rear of the connector to be disposed rearwardly underneath the rear surface 160 and held, preferably, in a strain relief manner, underneath the wall 140 engaged on the rear surface 160 by the bands 148.

Alternatively, the connector could be mounted to face downwardly, that is, with the connector face plate overlying the rear surface 160, the female socket to face downwardly, and the connector to extend upwardly through the aperture 56 providing its conduit to be secured above the wall 40 on the upper surface 158 by the bands 148 which would be inverted. Arranging the connector to extend downwardly from the wall 40 could be advantageous as, for example, when the device 20 is mounted at a height above a user.

Reference is made to Figure 21 which shows a sixteenth embodiment of a mounting device 20 in accordance with the present invention. The embodiment of Figure 20 is similar in use to that of Figure 20, however, provides in addition to upper front wall 40, a side wall 44 a rear wall 42 and a return flange 98. Notably, the wall 42 has an aperture 57 therethrough sized identically to that of aperture 56. The apertures 56 and 57 are disposed in alignment and may be seen to extend transversely through the support member 24 through an entire thickness of the support member between an upper front surface 158 of the wall 40 and a lower rear surface 168 of the wall 42. The slotway 131 is seen to extend transversely through the entire thickness of the support member 24 extending laterally from the apertures 56 and 57 to and

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through wall 44. Slotted openings 156 are provided on the wall 42 adapted for receipt of bands such as 148 shown in Figure 20. As well, openings 82 are provided on wall 42 which can be used together or in conjunction with the slots 156 for securing conduit with straps and the like. Reference is now made to Figure 25 which shows the mounting device 20 of Figure 21 mounted in an assembly substantially the same as that shown in Figure 6. As clearly seen in Figure 25, the walls 40 and 42 are mounted at an angle of about 45° to a vertical. Connector 58 is mounted so as to present its female socket 59 disposed upwardly on top of the forward surface 158 of the wall 40 to receive a conduit 76. The connector 58 is shown to have conduits 80 and 84 connected at its rear and to extend rearwardly through the aperture 57 in wall 42 rearwardly of the rear surface 168 of the wall 42. As illustrated, both the conduits 80 and 84 are shown to extend to the same side and be received under the wall 42 engaged on the surface 168 by the touch fastener band 148.

The embodiment shown in Figure 21 is adapted for mounting of a connector with the face plate to be on the wall 40 disposed upwardly as shown in Figure 25. It is to be appreciated, however, that a mounting device as illustrated in Figure 21 could also be adapted for mounting with the connector 58 to have its face plate extend downwardly from the surface 168 of the wall 42 as, for example, by providing openings such as 68 and 70 in the wall 42 and openings such as 156 and 82 in the wall 42. Of course, by providing all of these openings in both of the wall 40 and wall 42, the device 20 would be adapted for either upward or downward mounting of the connector.

Figure 25 illustrates the conduits 80 and 84 being secured to the rear surface 168 of the wall 42 as is convenient in the device of Figure 21 and which would, therefore, permit

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the connector 58 with its conduits 80 and 84 to be coupled to and removed from the device 20 without disengagement of the conduits 80 and 84 from the connector 58. With the conduits 80 and 84 connected to the connector, the conduits can be passed through the slotway 131 and the connector then dropped into the aperture 56. The conduits 80 and 84 which are now below the wall 42 can be connected to the surface 168 of the wall 142. It is to be appreciated, however, that a connector 58 such as that shown in Figure 6 in which the conduits extend from the sides of the connector could be used with a device 20 as shown in Figure 21 for connection in the manner shown in Figure 6 with the conduit to pass in the cavity 48 between the walls 40, 42 and 44.

In Figure 21, the hanger mechanism 22 is mounted via the extension flange 90 to the wall 40. The sheet member forming the device 20 effectively ends as flange 98 at the end of wall 42 opposite from where the wall 42 merges with the bight-like wall 44.

Reference is now made to Figure 22 which shows a seventeenth embodiment of a mounting device in accordance with the present invention. The device of Figure 22 is substantially the same in function and construction to the device of Figure 21, however, in Figure 22, the extension flange 90 connects to the wall 42 and the sheet member ends at a side edge of wall 40 opposite from where wall 40 merges with the wall 44.

Reference is now made to Figure 23 which shows a eighteenth embodiment of a mounting device 20 in accordance with the present invention and which is identical to the device of Figure 21 with the exception that a pathway 130 is provided opening into the aperture 57 through the wall 42 and its associated support flange 98. The device of Figure 23 is advantageous for coupling of a connector such as 58 shown in Figure 4 in which it is

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desired that the conduits 80 and 84 connected to the connector 58 pass between the walls 40 and 42. In use, a connector with its conduits attached to its sides may have the conduits between their lengths pass through slotway 131 such that they extend through the central opening formed by both apertures 56 and 57 through both walls 40 and 42 and thus entirely through the support member 24. Subsequently, the conduits 80 and 82 which are below the wall 42 may be passed through the pathway 130 so as to now be disposed between the walls 40 and 42 for securing to the surface 170 of the wall 42 as by use of the openings 82 and a strap or other mechanism.

Reference is now made to Figure 24 which shows a nineteenth embodiment of a mounting device 20 in accordance with the present invention and which is identical to the mounting device 20 of Figure 22, however, includes a pathway 130 which is identical to the pathway 130 shown in Figure 19. The device of Figure 24 can be used either in a manner such as the device of Figure 19 or in a manner such as the device shown in Figure 21.

Reference is now made to Figure 26 which shows a conduit support hook 120 stamped from wall 42 such that the support hook 120 has a base 122 and a leg 124. As shown, the support hook 120 is removed from the wall 42 so as to provide an opening 180 in the wall yet leave portions of the wall 182 and 184 on either side of the hook. Figure 26 is intended to show the under surface 168 of the wall 42 of a device as shown in Figure 21 in which the support hook 120 has been provided in substitution for the holes 156 and 82. The hook 120 would extend upwardly away from the wall 44 towards the extension flange 98 on the underside of wall 42 as shown in Figure 21. The leg 124 of the hook member 120 is provided with an upturned terminal end 186 to assist the user on sliding the conduit 172

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between the leg 124 and the surface 168 of the wall 42. Preferably, the extent to which the leg 124 is spaced from the surface 168 may be selected having regard to the diameter of the conduit 172 such that the leg 124 may frictionally engage the conduit 172 onto the surface 168. A support hook 120 as shown in Figure 26 could, of course, be provided in conjunction with other securing means such as holes 82 or slots 156 and the like.

In the context of the embodiment of Figure 21 when utilized as shown in Figure 25 with the conduits 80 and 84 secured to the rear surface 168 of wall 42, it is to be appreciated that the connector support member 24 need not have open ends such as 52 and 54 as shown. Rather, the ends 52 and 54 could be closed. Similarly, the sides 44 and the side opposite side 44 could be either open or closed. With the alternatives that the ends and sides may be open or closed, many other configurations arise for construction of the device 20 as by forming from sheet metal or other materials.

While the invention has been described with reference to preferred embodiments, many modifications or variations will now occur to a person skilled in the art. For definition of the invention, reference is made to the appended claims.

WE CLAIM:

1. In a panel assembly comprising a rectangular frame including elongate vertical and horizontal frame members and a cover removably mounted on at least one side of said frame, the improvement comprising a separate, removable cable management apparatus mounted within an internal space defined by said frame and cover,

the apparatus comprising:

a hook mechanism;

a connector support bracket member carried by the hook mechanism,

a communications conduit connector for joining together ends of at least two communication conduits for transmission of signals therebetween,

the connector carried by the bracket member,

the hook mechanism removably engaging one of the horizontal frame members such that the bracket carrying the connector locates the connector within the internal space disposed for access on removal of the removable cover,

the bracket member comprises a flat planar mount portion to which the connector is secured,

the hook member engages the horizontal frame member to dispose the planar portion in a plane parallel the horizontal frame members and disposed at an angle of between about 30° and 60° to a vertical.

2. A panel assembly as claimed in claim 1 wherein the mount portion is disposed in a plane at an angle of about 45° to a vertical.

3. A panel assembly as claimed in claim 1 wherein the bracket member having a forwardly directed front surface on the planar portion and a rearwardly directed rear surface spaced from the front surface,

the bracket member having a thickness defined between the front surface and the rear surface,

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an aperture extending transversely through the bracket member throughout the thickness of the bracket member opening through both the front surface and the rear surface,
a slotway extending transversely through the bracket member throughout the thickness of the bracket member open through both the front surface and the rear surface laterally from the aperture to a side of the bracket member.

4. A panel assembly as claimed in claim 3 including conduit engagement means carried on the rear surface for securing a length of conduit thereto intermediate ends of the conduit.

5. A panel assembly as claimed in claim 4 wherein the front surface comprises one face of a first thin sheet member and the rear surface comprises one face of a second thin sheet member spaced from the first sheet member to define a cavity therebetween.

6. A panel assembly as claimed in any one of claims 2 to 5 wherein the hook mechanism is movable to a plurality of positions along the length of the horizontal frame member in which in each position the bracket carrying the connector locates the connector within the internal space disposed for access on removal of the removable cover.

7. A panel assembly as claimed in claim 1 wherein the hook mechanism is movable to a plurality of positions along the length of the horizontal frame member in which in each position the bracket carrying the connector locates the connector within the internal space disposed for access on removal of the removable cover.

8. A panel assembly as claimed in claim 7 wherein
the hook mechanism is slidably movable along the length of the horizontal frame member.

9. A panel assembly as claimed in claim 7 where the hook mechanism has a bight and two arm portions extending from opposite sides of the bight,
the bight engaging over an upwardly directed surface of the horizontal frame member with the arm portions extending downwardly on either side of the horizontal frame member.

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10. A panel assembly as claimed in claim 9 wherein
the hook mechanism is slidably movable along the length of the horizontal frame member.
11. A panel assembly as claimed in claim 9 wherein the bracket member comprises a flat planar mount portion to which the connector is secured, wherein when the hook mechanism engages the horizontal frame member the planar mount portion is disposed in a vertical plane parallel a longitudinal axis of the horizontal frame member.
12. A panel assembly as claimed in claim 11 wherein the bracket member includes an upwardly directed trough open upwardly and at each of its ends and extending parallel the horizontal frame member and receiving at least one communication cable therein.
13. A panel assembly as claimed in claim 11 wherein the bracket member includes a planar shield portion extending generally parallel the mount portion, spaced laterally therefrom to provide a partially protected space between the mount portion and shield portion for connections between the connector and at least one of the cables.
14. A panel assembly as claimed in claim 10 wherein
a vertically extending lateral space exists between the horizontal frame member and the removable cover,
a first of the arm portions of the hook mechanism extending downwardly between the horizontal frame member and the removable cover in such lateral space,
the support bracket member depending from said first arm portion located therebelow,
the support bracket member comprising an elongate U-shaped channel member extending parallel the horizontal frame member and having two parallel laterally spaced side walls joined by a bridging bottom wall to define an elongate cable receiving cavity therebetween open at both ends and open upwardly along its length as an upward opening,
a first of the side walls of the channel member extending upwardly to engage the first arm portion of the hook mechanism such that access to the upward opening of the cavity is

provided laterally between the first arm portion of the hook mechanism and a second side wall of the channel members along the entire length of the channel member.

15. A panel assembly as claimed in claim 7 wherein said apparatus permits removal and engagement of the apparatus from the internal space with cable connected to the connector, by disengagement and engagement respectively, of the hook mechanism from the horizontal frame member.

16. A panel assembly as claimed in claim 7 wherein with the said cover removed said apparatus permits removal from the internal space with cable connected to the connector by disengagement of the hook mechanism from the horizontal frame member by mere relative vertical movement of the apparatus upwardly and subsequently horizontally laterally.

17. A panel assembly as claimed in claim 8 wherein a vertically extending lateral space exists between the horizontal frame member and the removable cover laterally to one side of the horizontal frame member and inwardly of the cover,

a first arm of the hook mechanism extends between the horizontal frame member and the removable cover in such lateral space,

the support bracket member supported below the hook mechanism by a second arm of the hook mechanism.

18. A panel assembly as claimed in claim 9 wherein the support bracket member comprises an outlet-box framing portion comprising a first elongate U-shaped channel member extending parallel the horizontal frame member open along its length on one side and at both ends.

19. A panel assembly as claimed in claim 18 wherein the hook mechanism comprises a second elongate U-shaped channel member extending parallel the horizontal frame member open along its length on a downward side and at both ends.

20. A panel assembly as claimed in claim 9 wherein the hook mechanism comprises a U-shaped hook channel member extending parallel the horizontal frame member, the hook channel member having two parallel side walls joined by a bridging top wall to define an elongate cavity therebetween open on a downward side and at both ends and to receive the frame member longitudinally slidable therein.

21. A panel assembly as claimed in claim 20 wherein the support bracket member comprises a downward opening extension of one of said side walls of the hook channel member.

22. A panel assembly as claimed in claim 20 wherein the support bracket member comprises a U-shaped box channel member extending parallel the hook channel member, the box channel having two parallel laterally spaced vertical side walls joined by a bridging bottom wall to define an elongate cavity therebetween open at an upper side and at both ends, the connector secured to the sidewall closest the removable cover.

23. A panel assembly as claimed in claim 22 wherein the apparatus has a substantially constant cross-sectional profile in cross section normal the horizontal frame member.

24. A panel assembly as claimed in claim 23 where the apparatus has a profile selected from one of an S-shape and C-shape.

25. A panel assembly as claimed in claim 8 wherein the hook mechanism in engaging the horizontal frame member in any one position engages the horizontal frame member at locations spaced horizontally along the horizontal frame member sufficient to prevent pivoting of the apparatus about any horizontal axis normal the horizontal frame member.

26. A panel assembly as claimed in claim 9 wherein the hook mechanism engages the horizontal frame member on each lateral side thereof to prevent pivoting of the apparatus about any axis parallel the horizontal frame member.

27. A panel assembly as claimed in claim 8 wherein the hook mechanism engages the horizontal frame member to fixedly secure the apparatus thereto against pivoting relative the horizontal frame member.

28. A panel assembly as claimed in claim 14 wherein said connector is mounted in an aperture in the second side walls of the channel member,

the second wall of the channel member having an outer surface directed toward said cover and an inner surface directed away from said cover,

the connector presenting outwardly of the outer surface a receptacle for connection with a male or female end plug of one cable,

the connector presenting inwardly of the inner surface connection means for connection of the end of at least one other cable.

29. A panel assembly as claimed in any of claims 7 to 28 wherein the cable comprises an element selected from the group consisting of a wire, a plurality of wires, an optical fibre and a plurality of optical fibres.

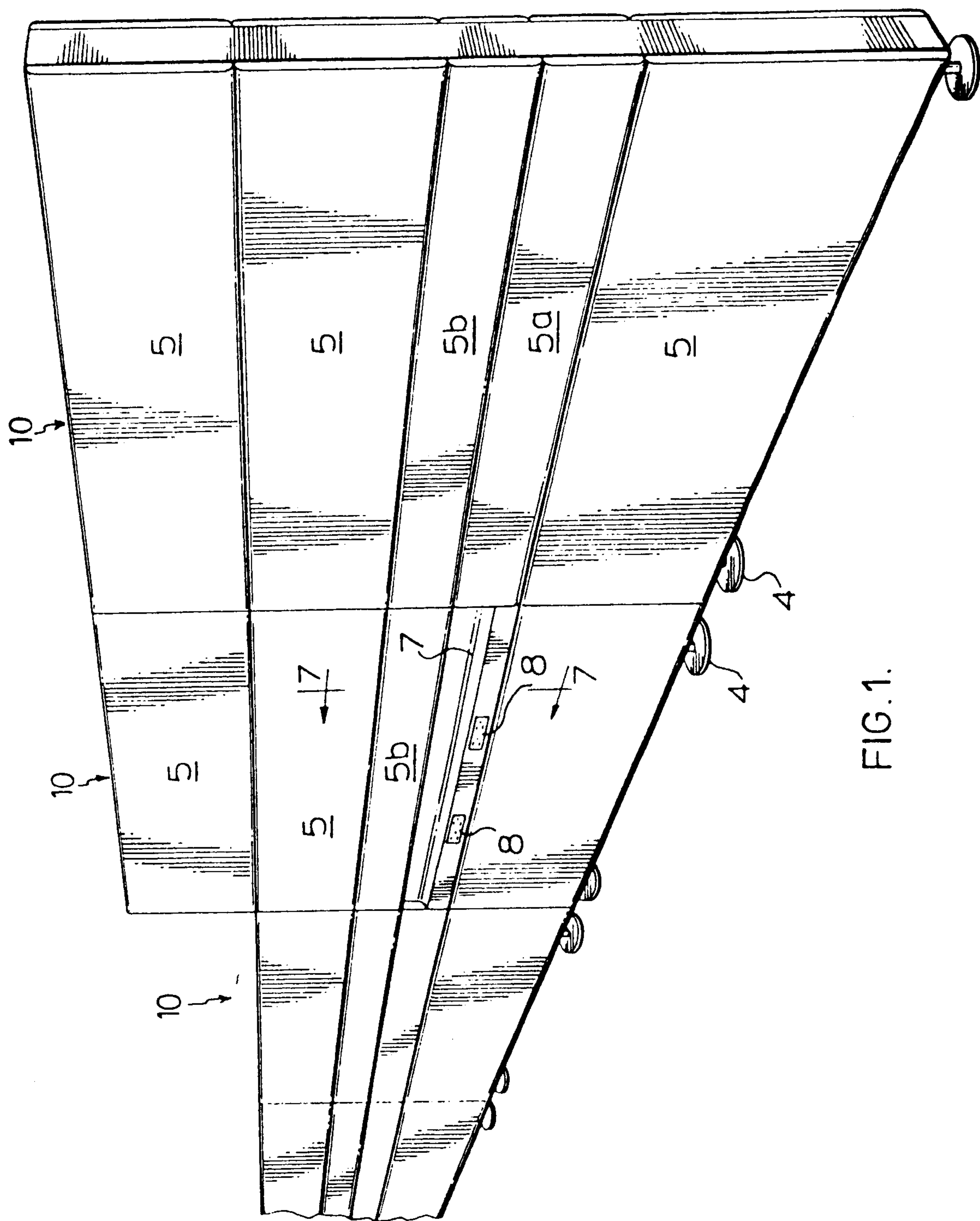


FIG.1.

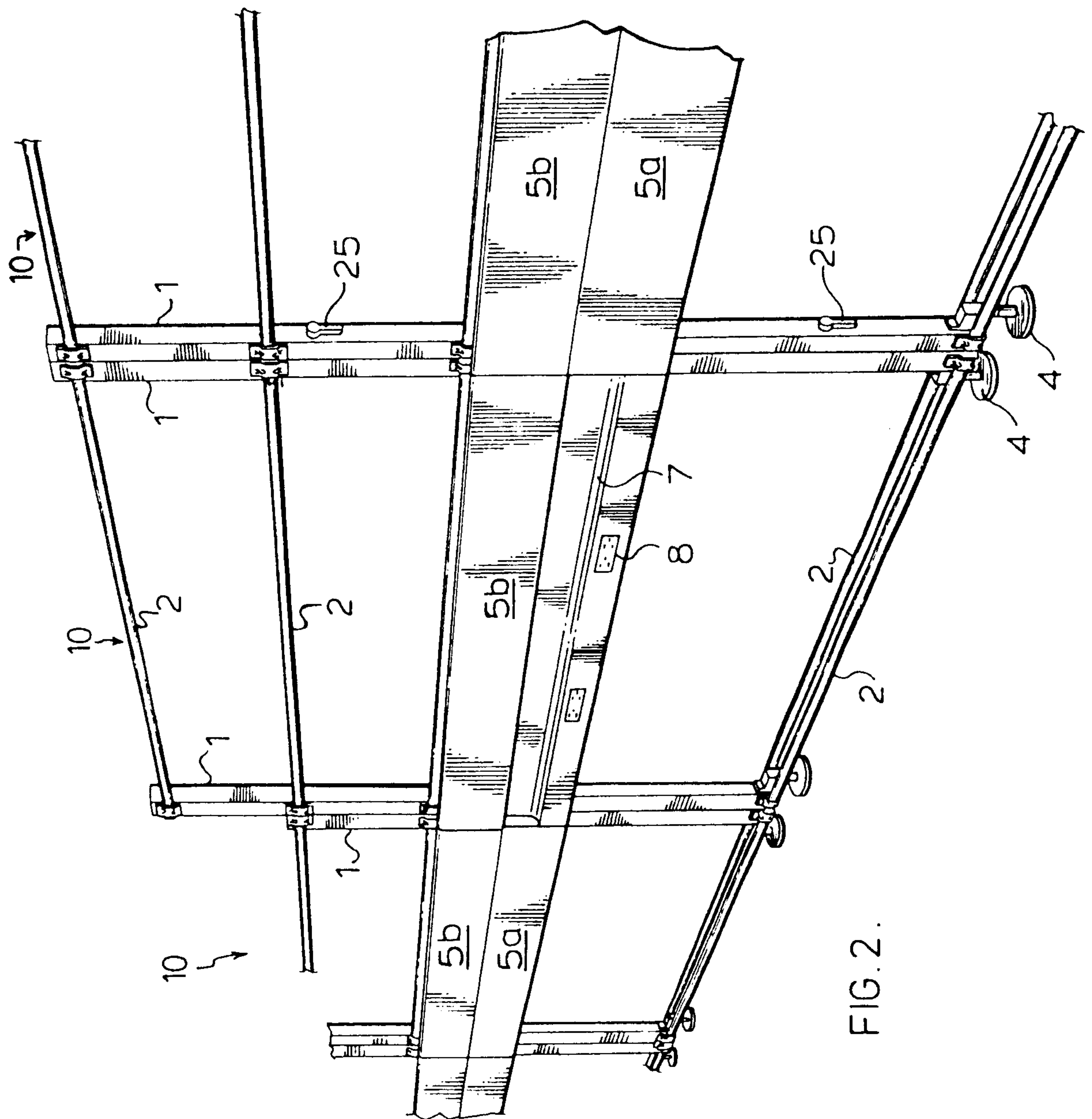
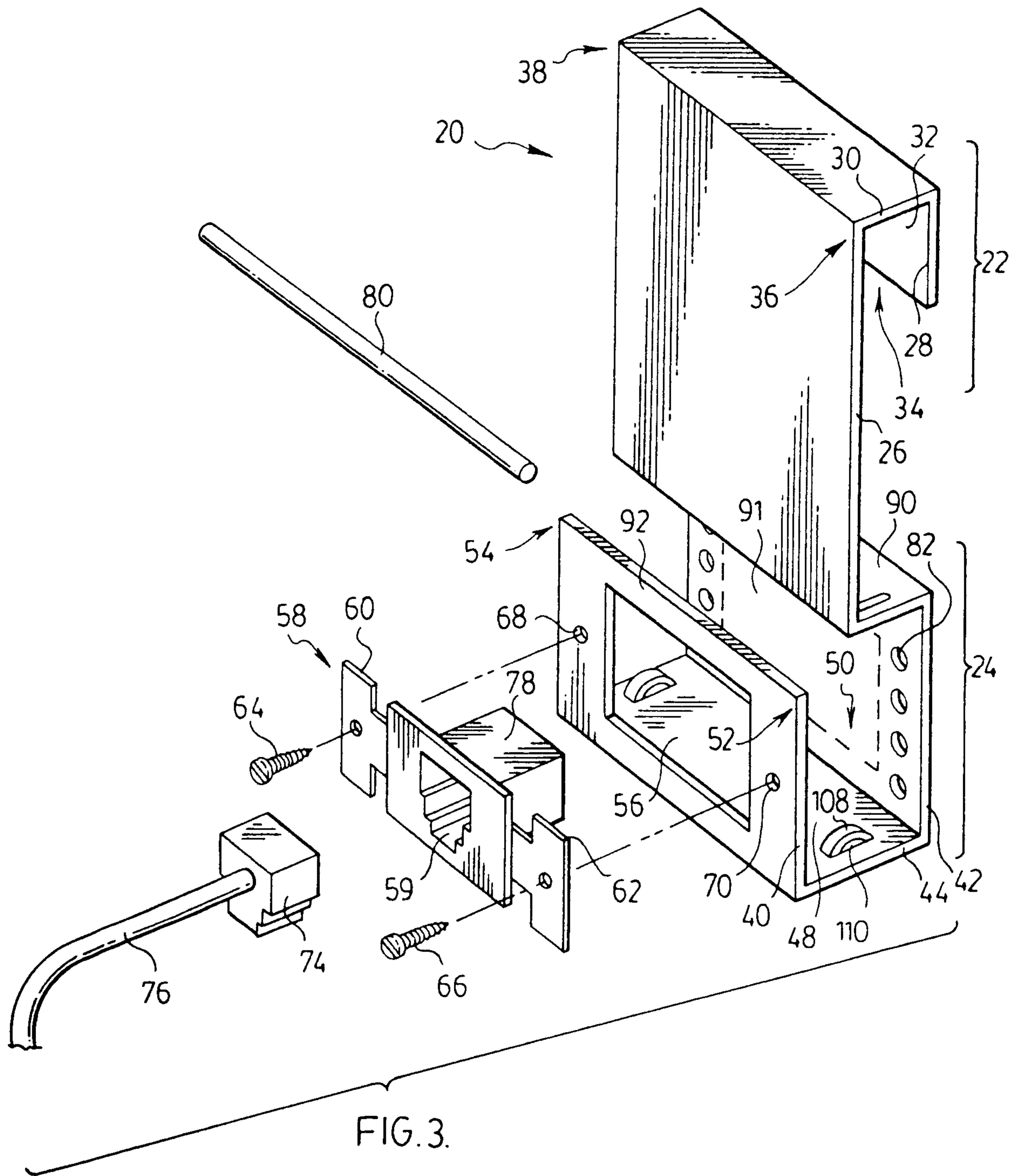
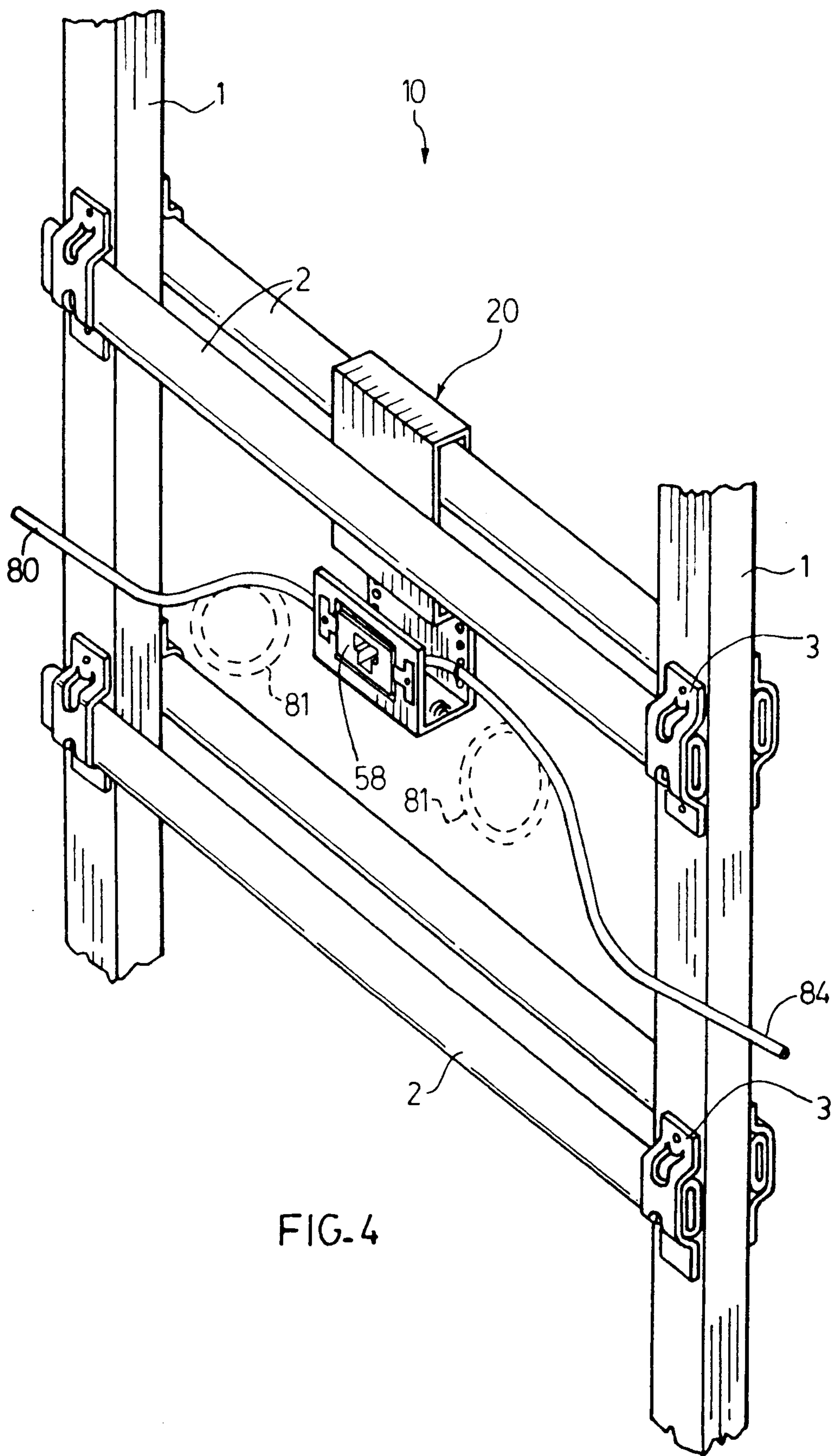


FIG. 2.





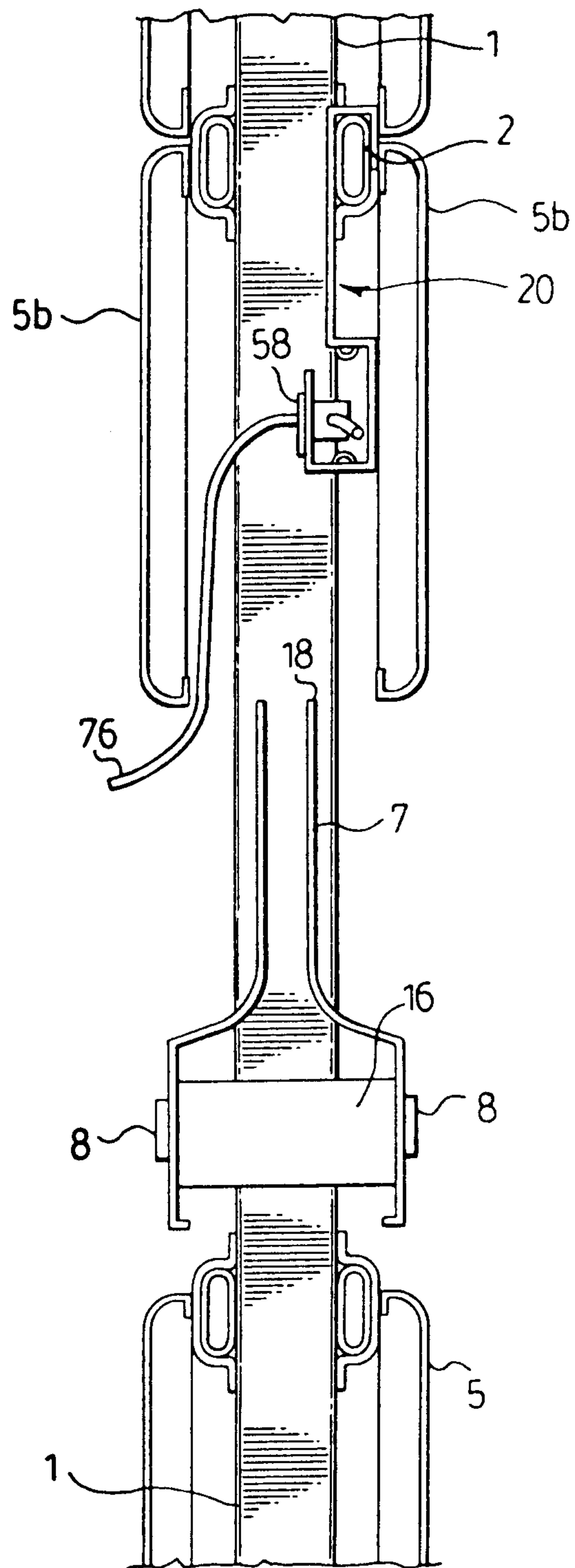


FIG. 6.

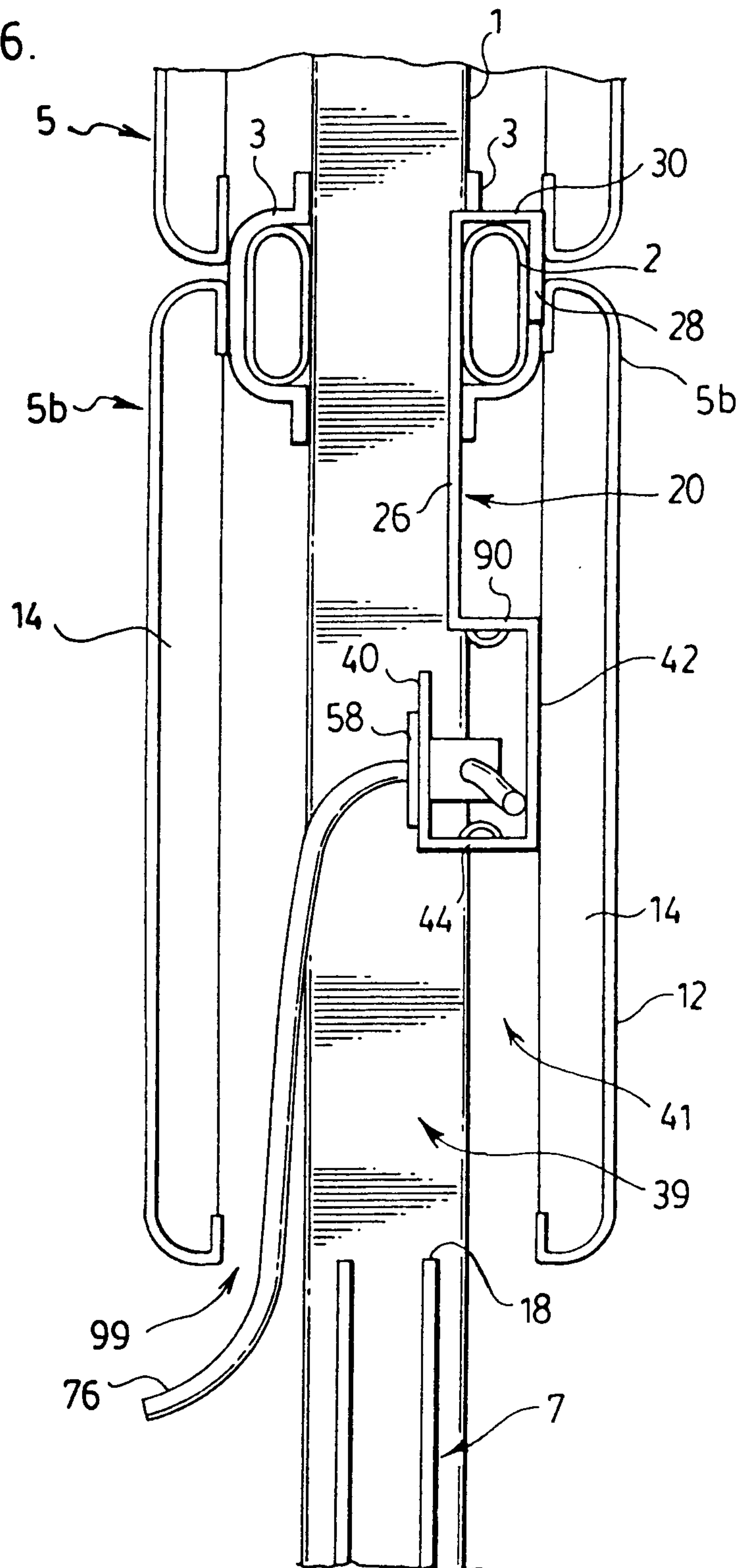
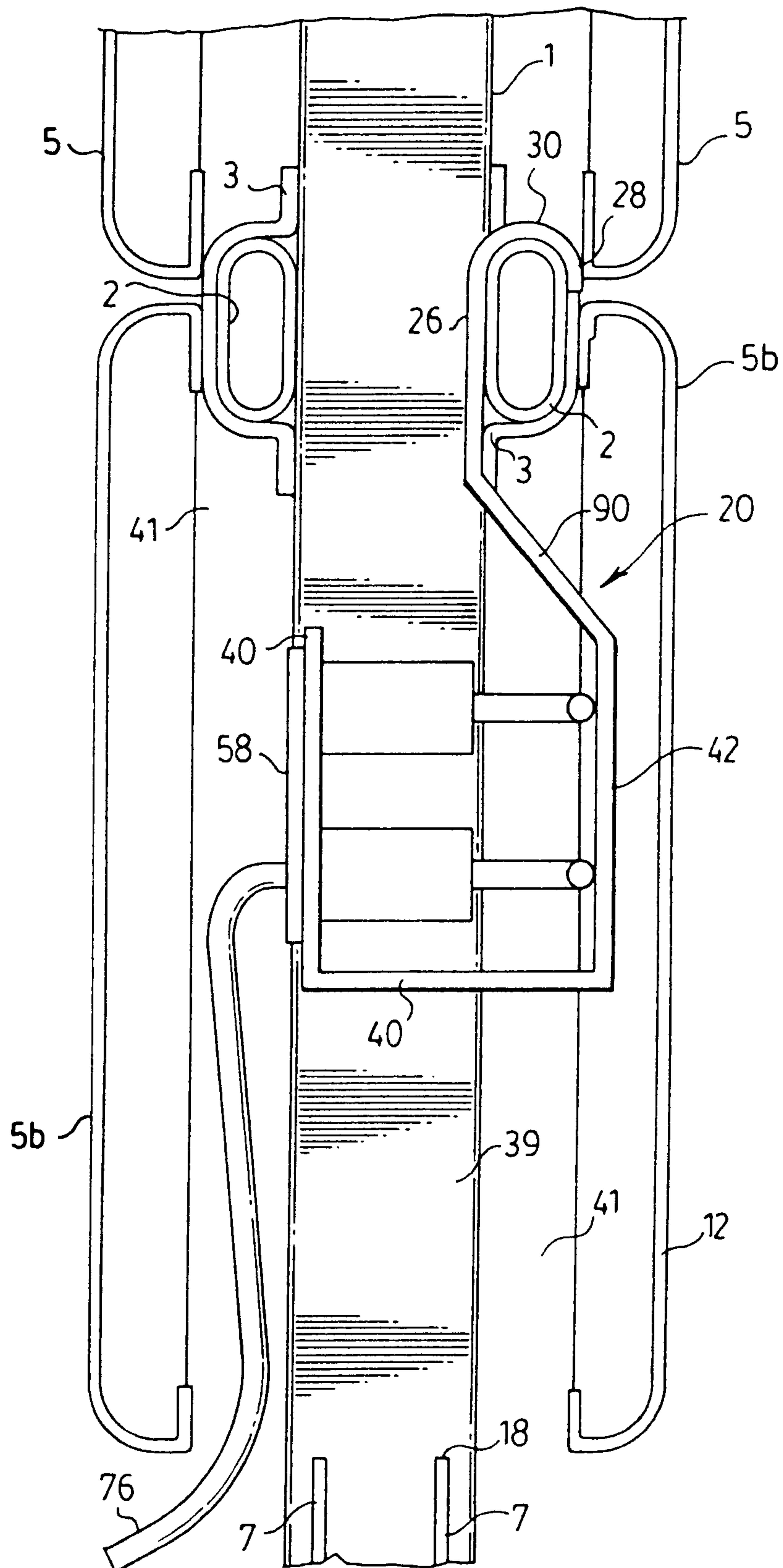
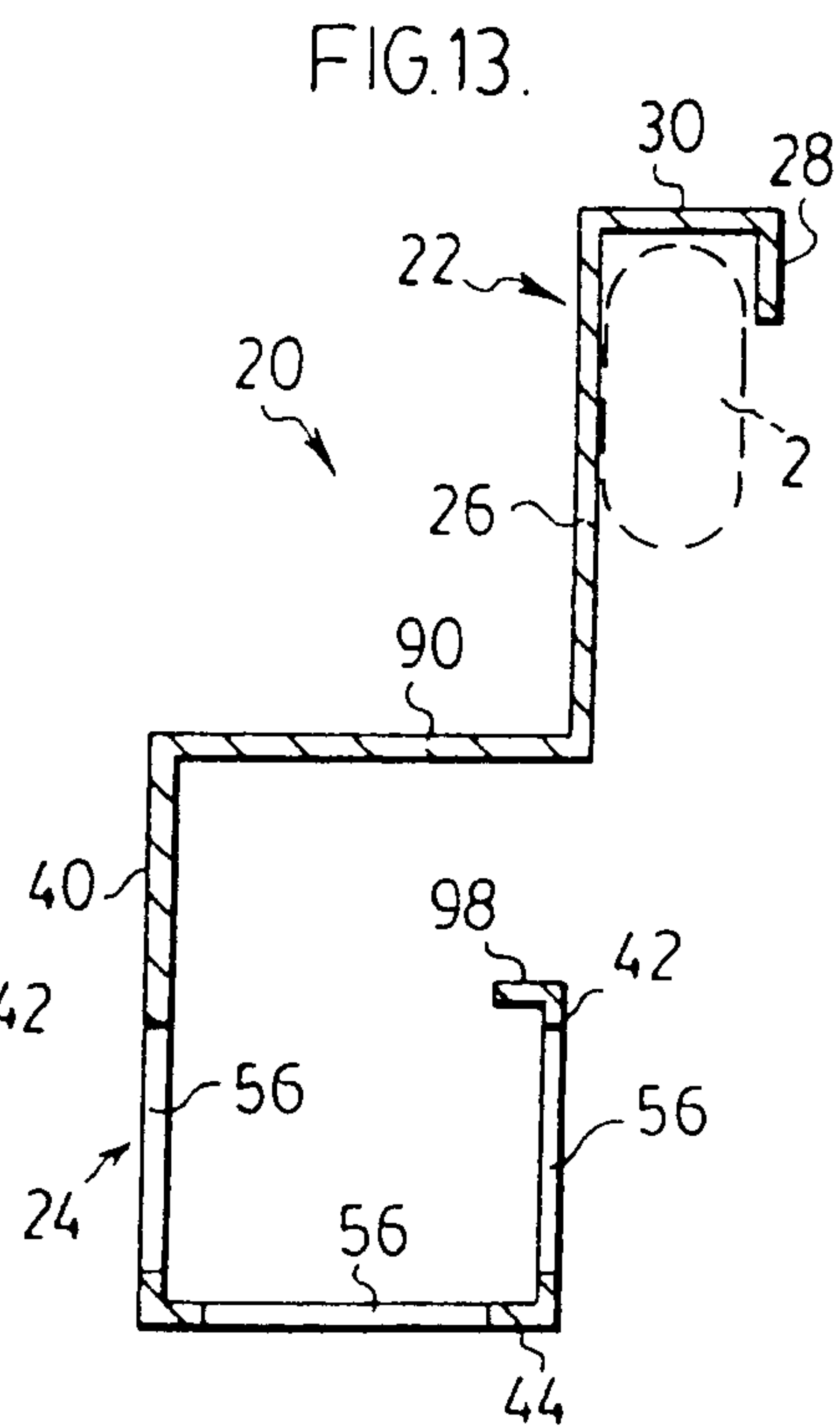
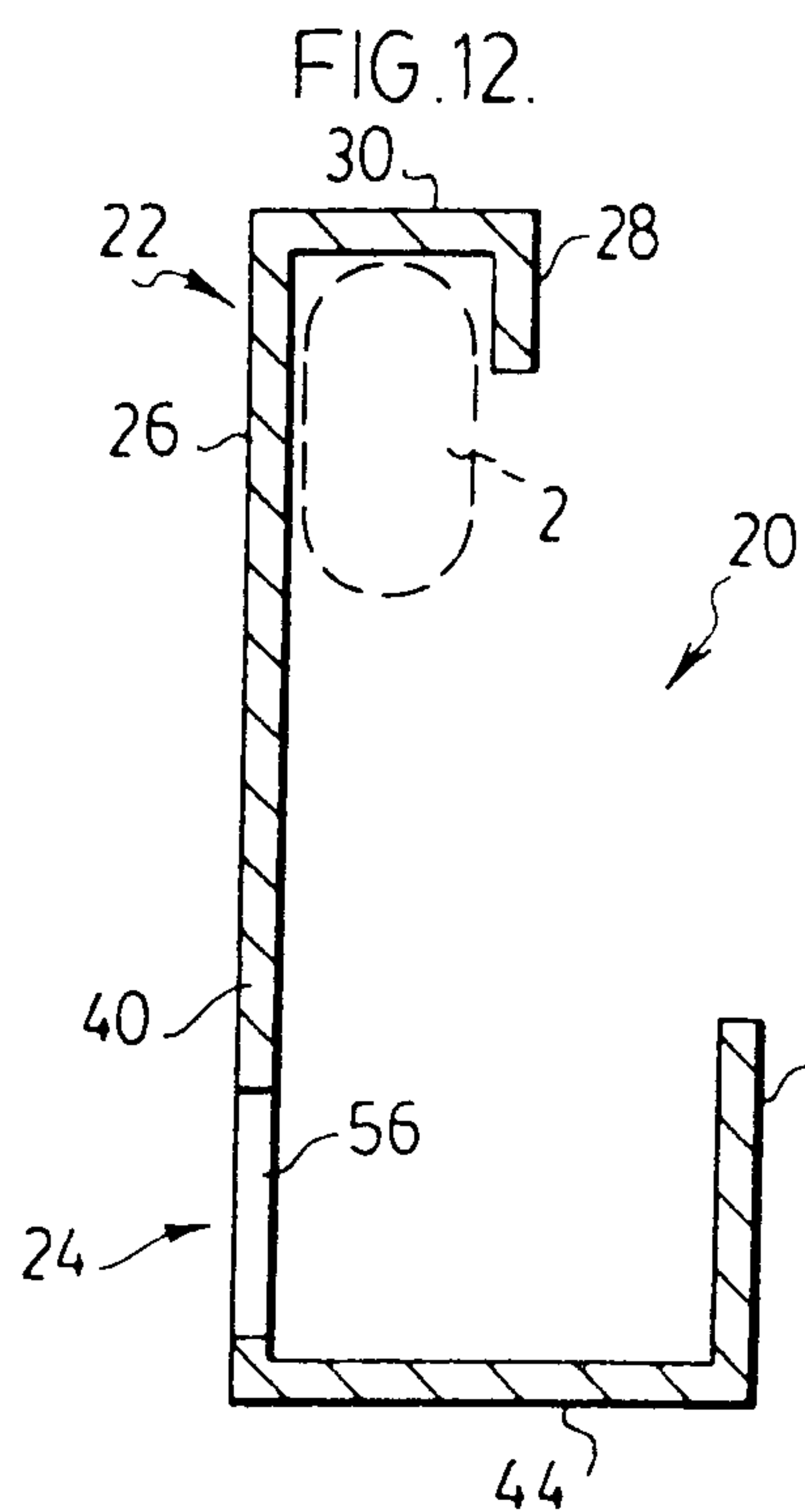
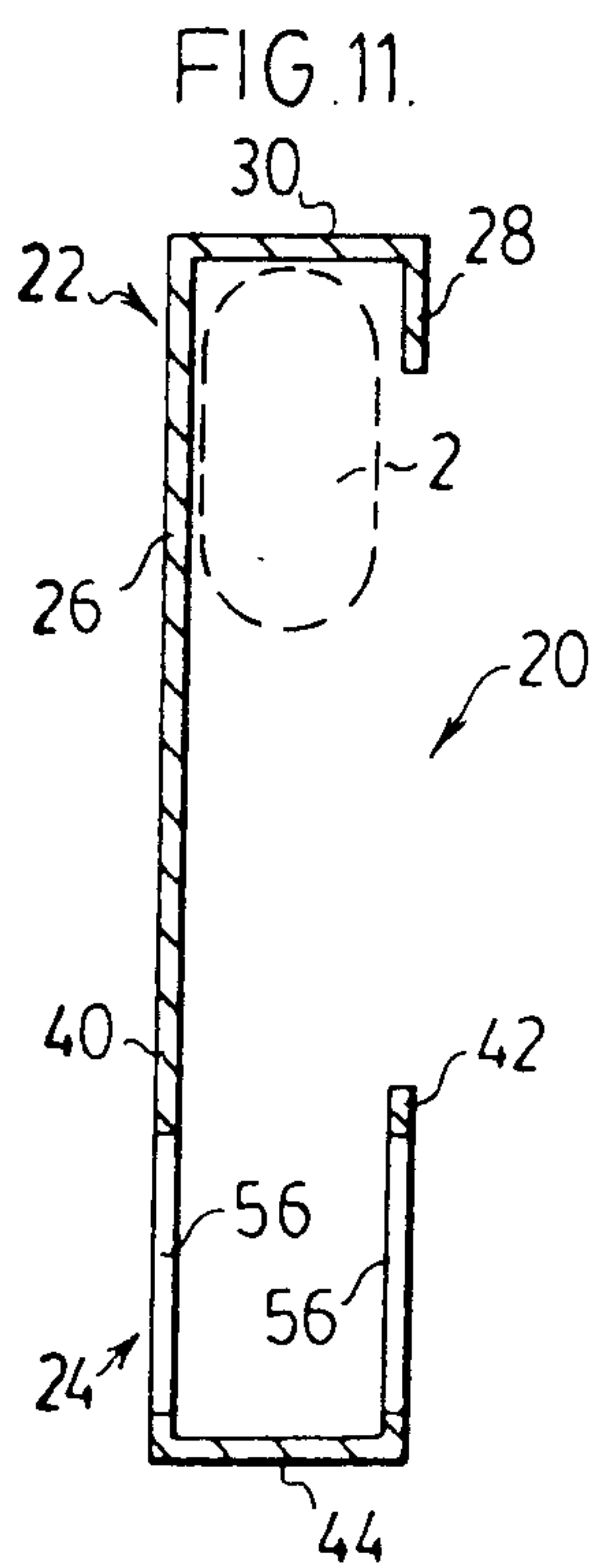
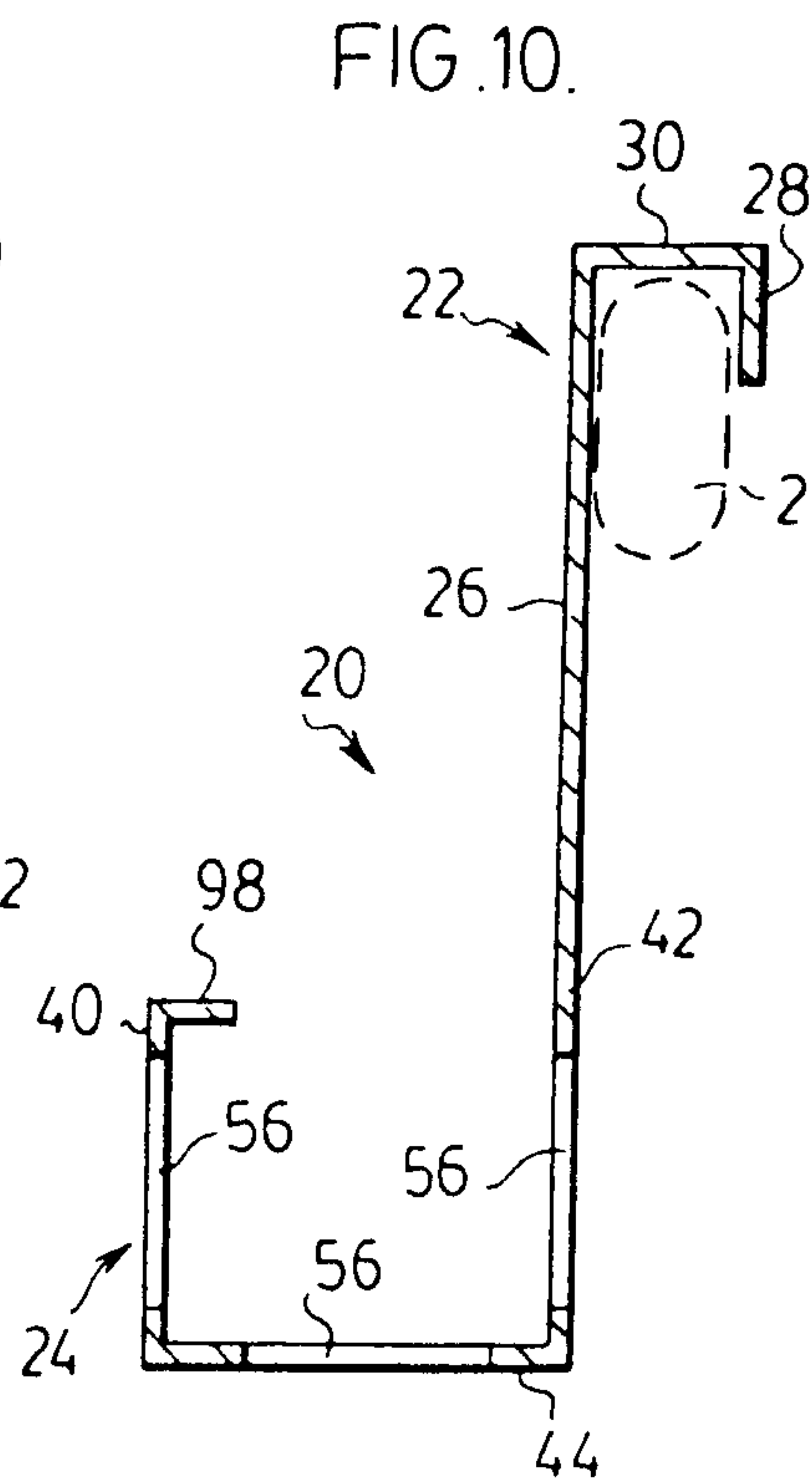
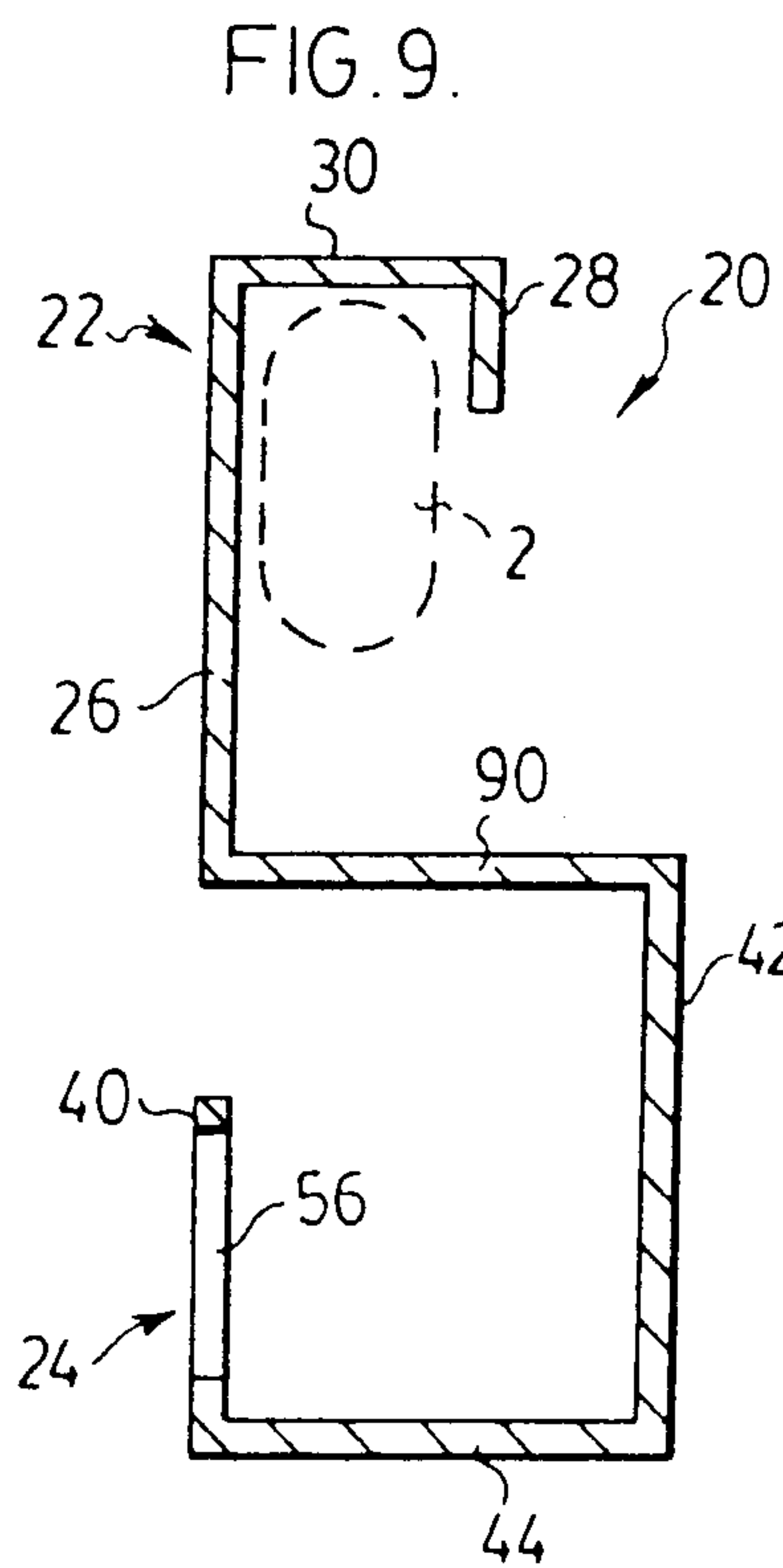
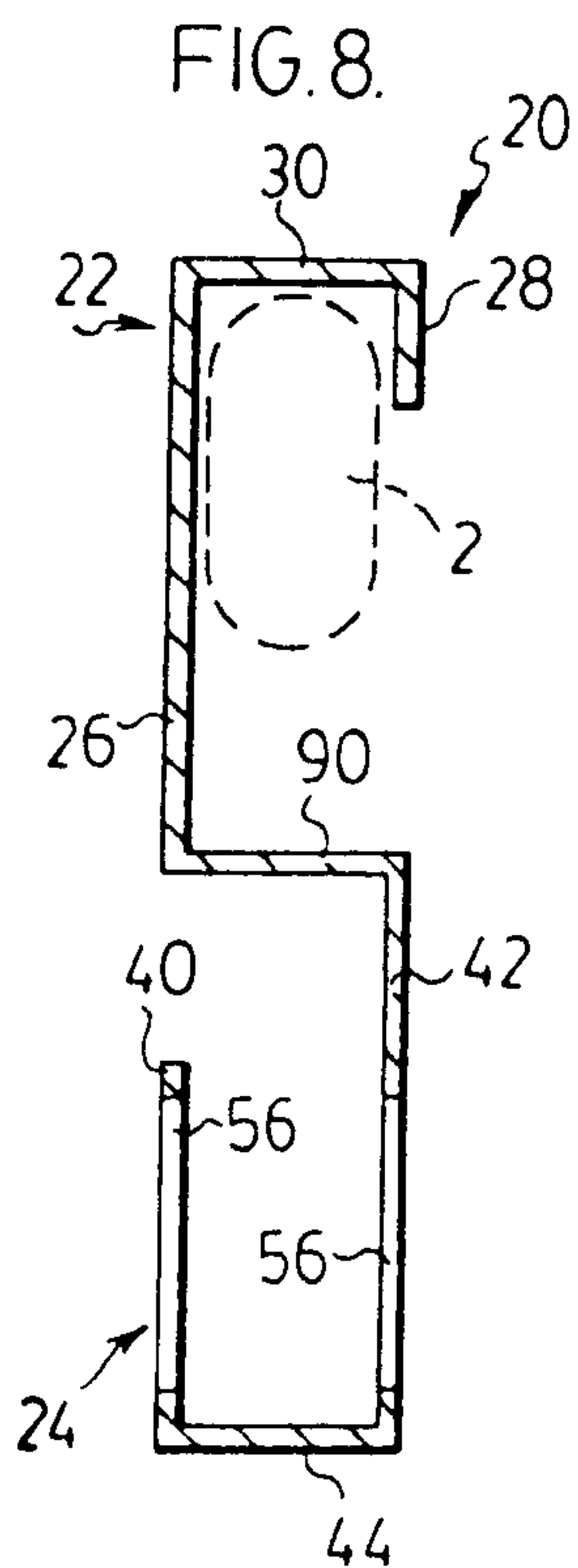
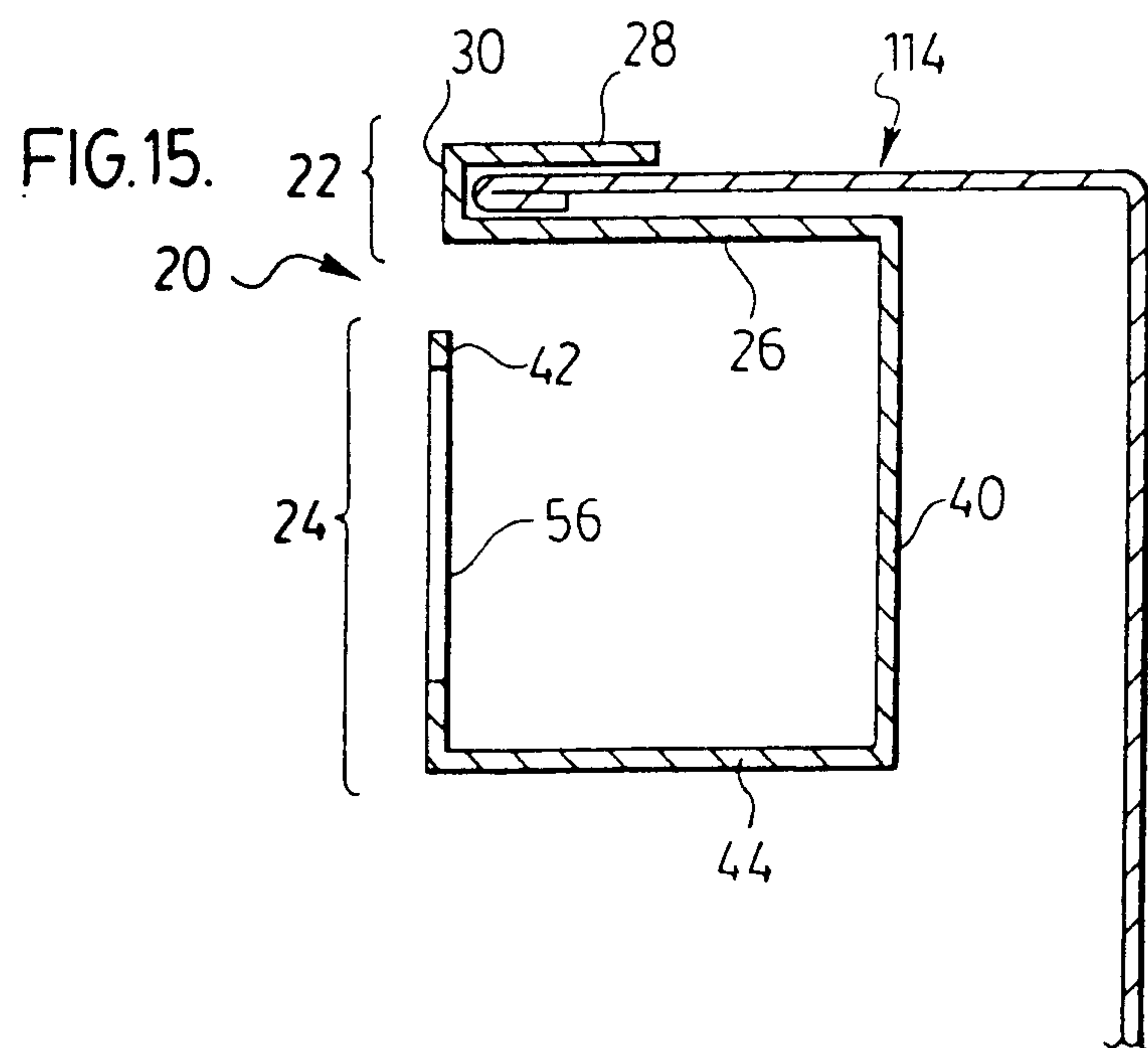
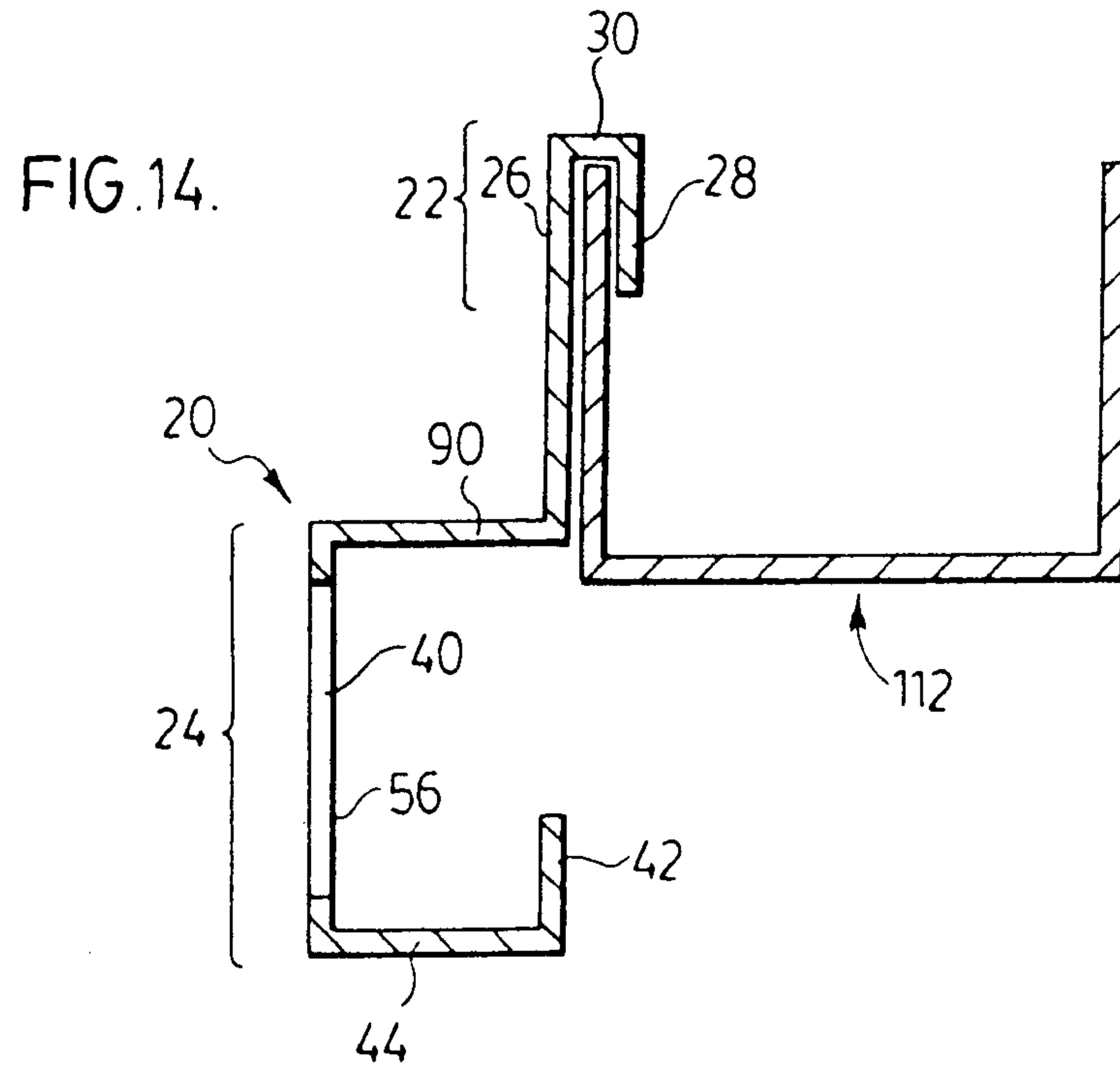
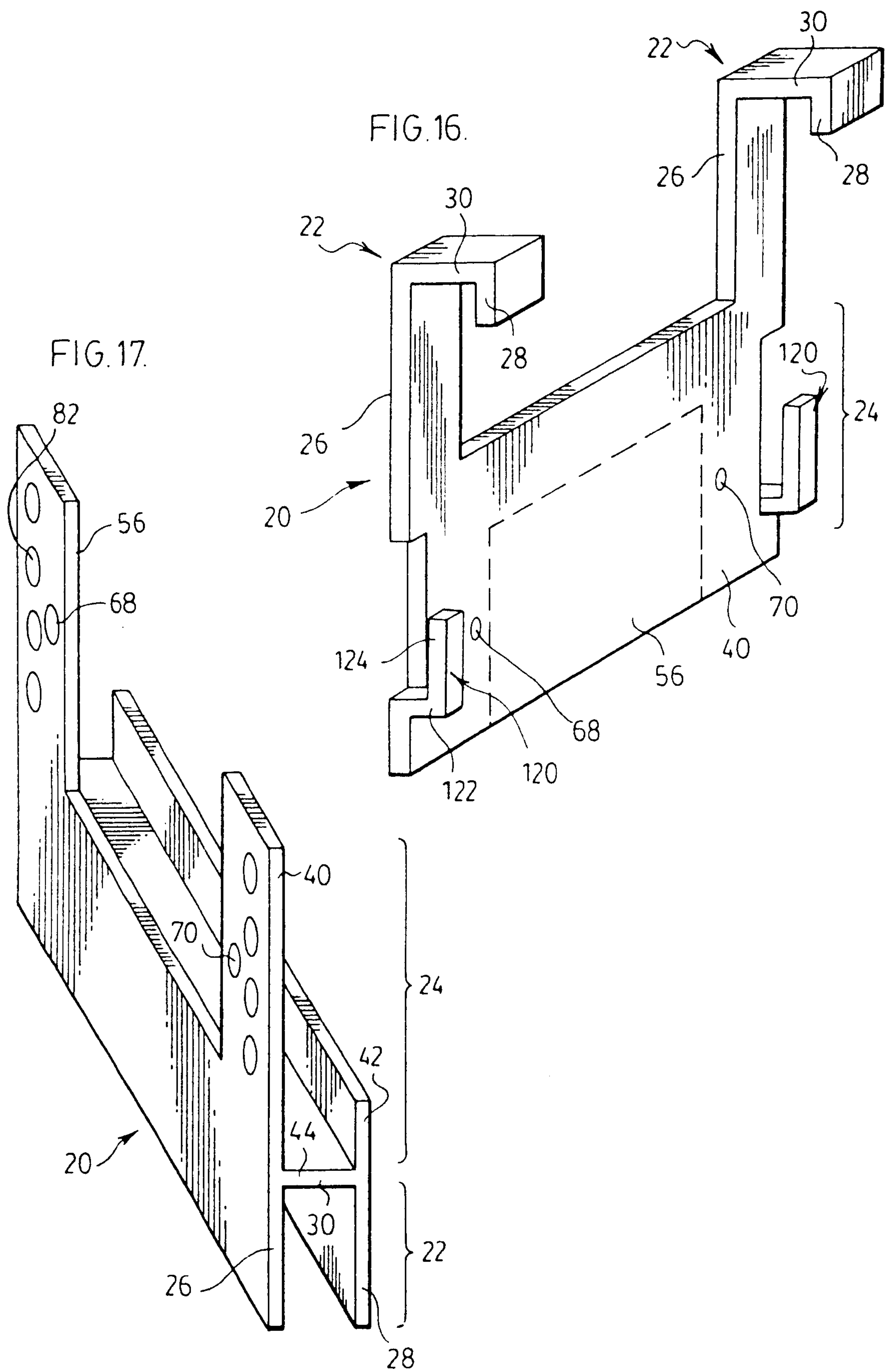


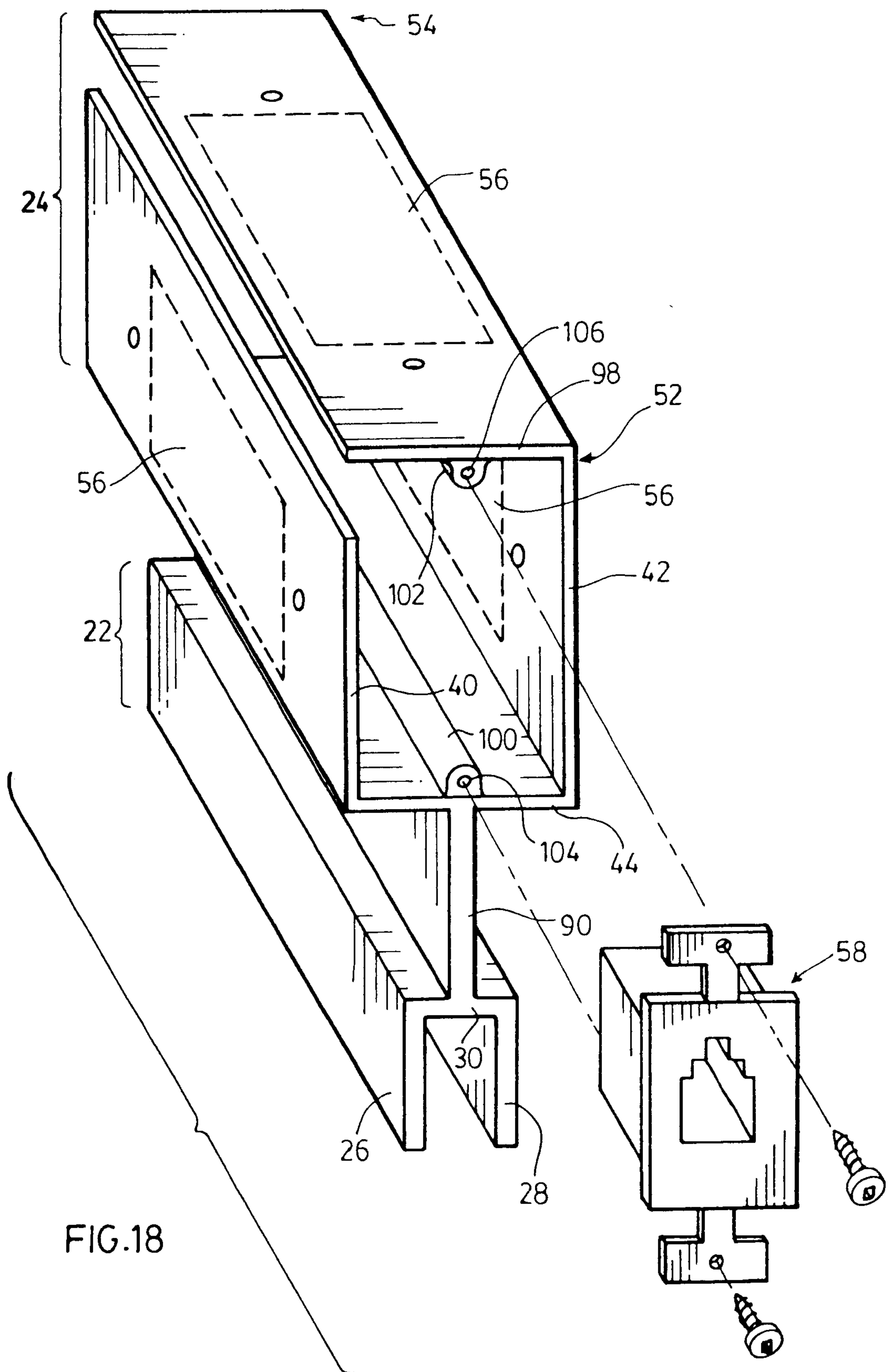
FIG. 7.











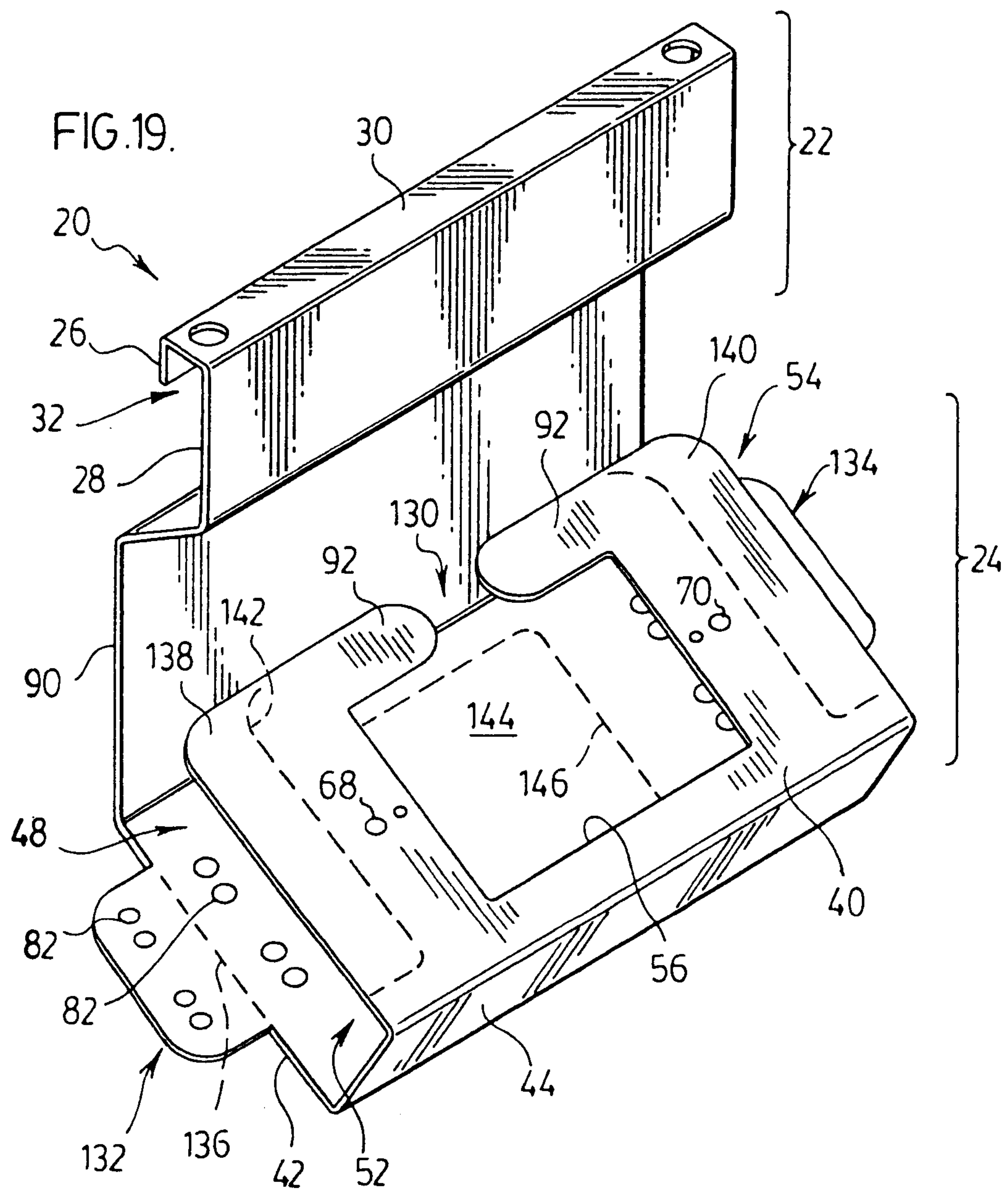


FIG. 20.

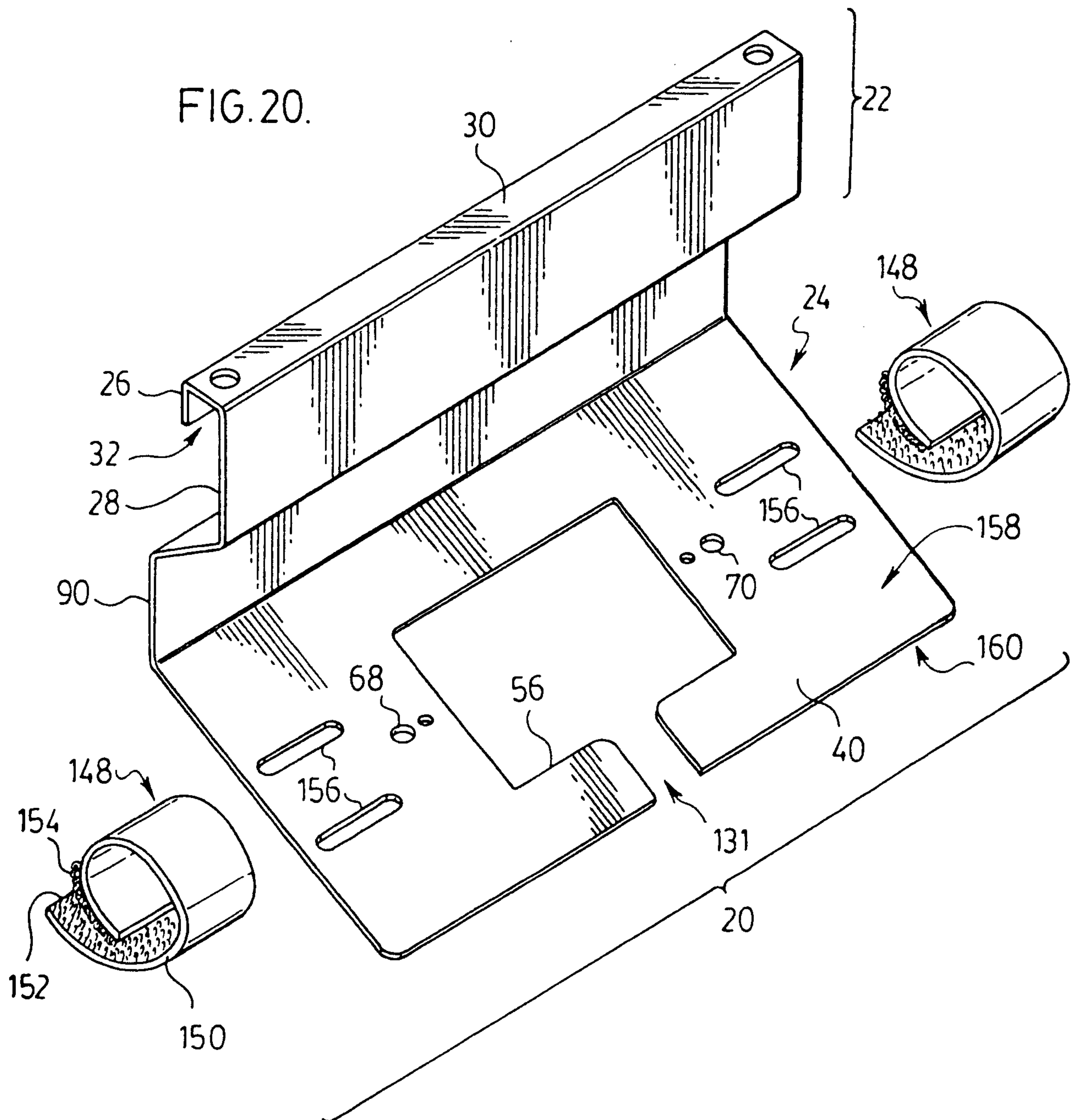
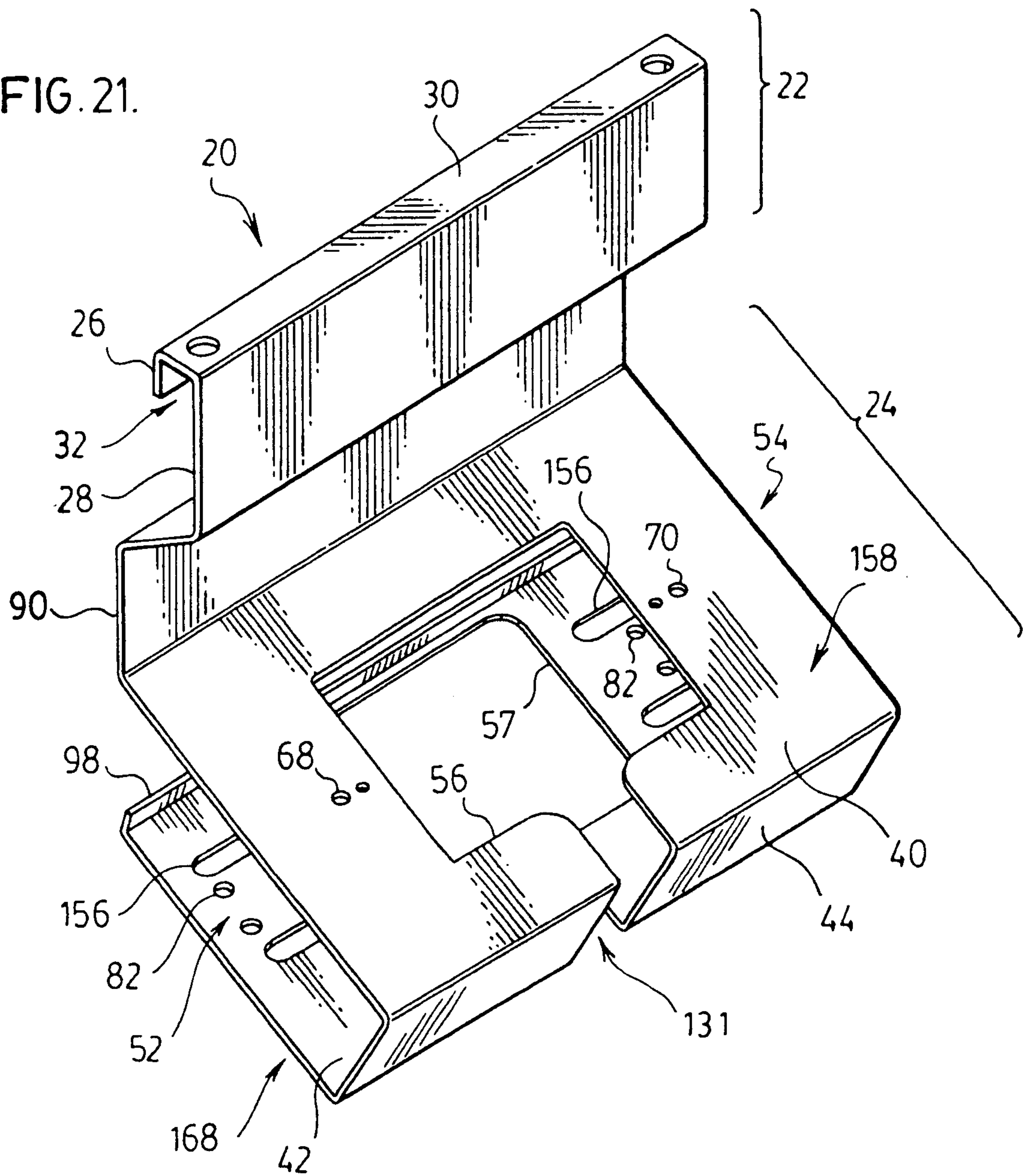


FIG. 21.



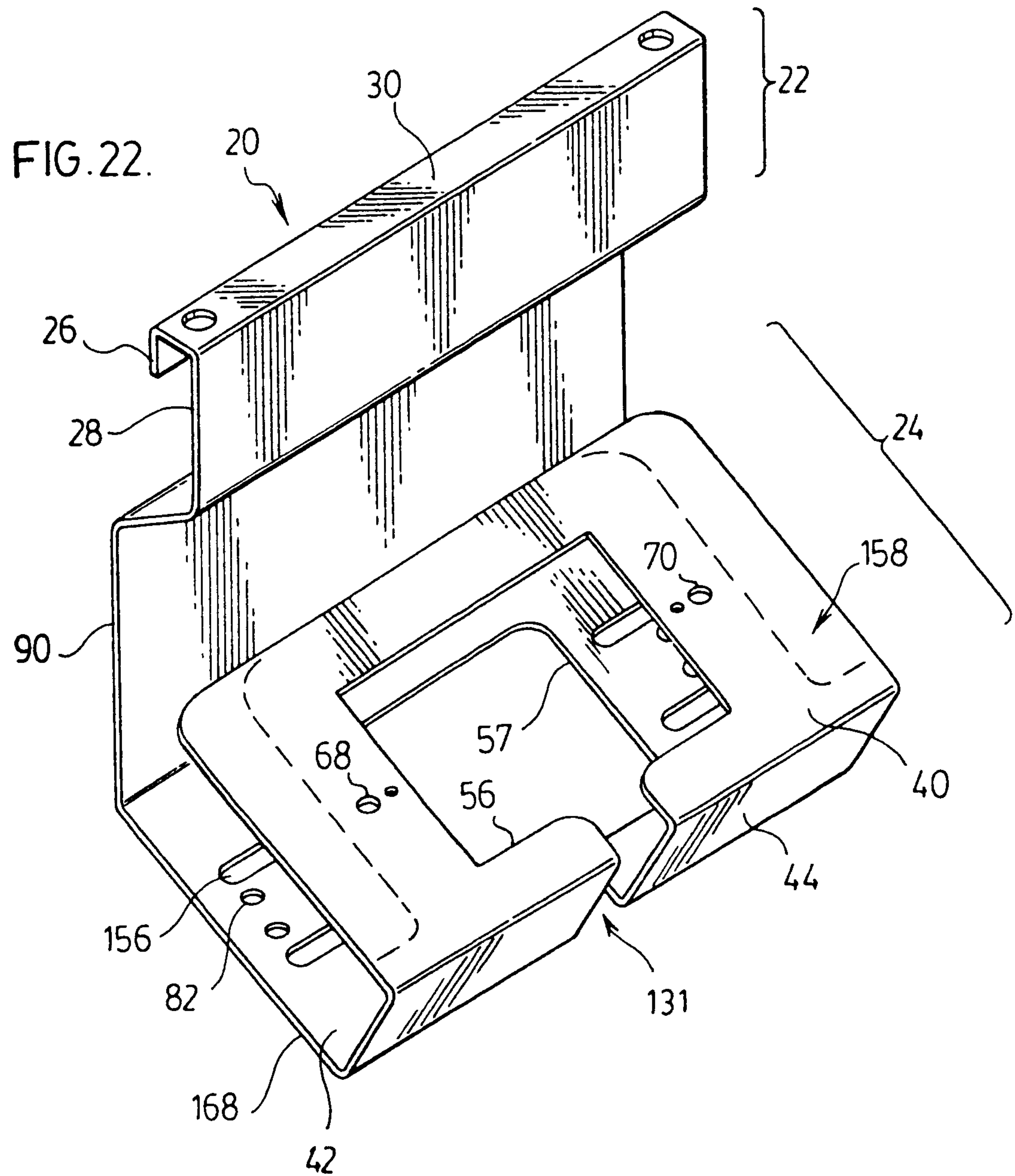
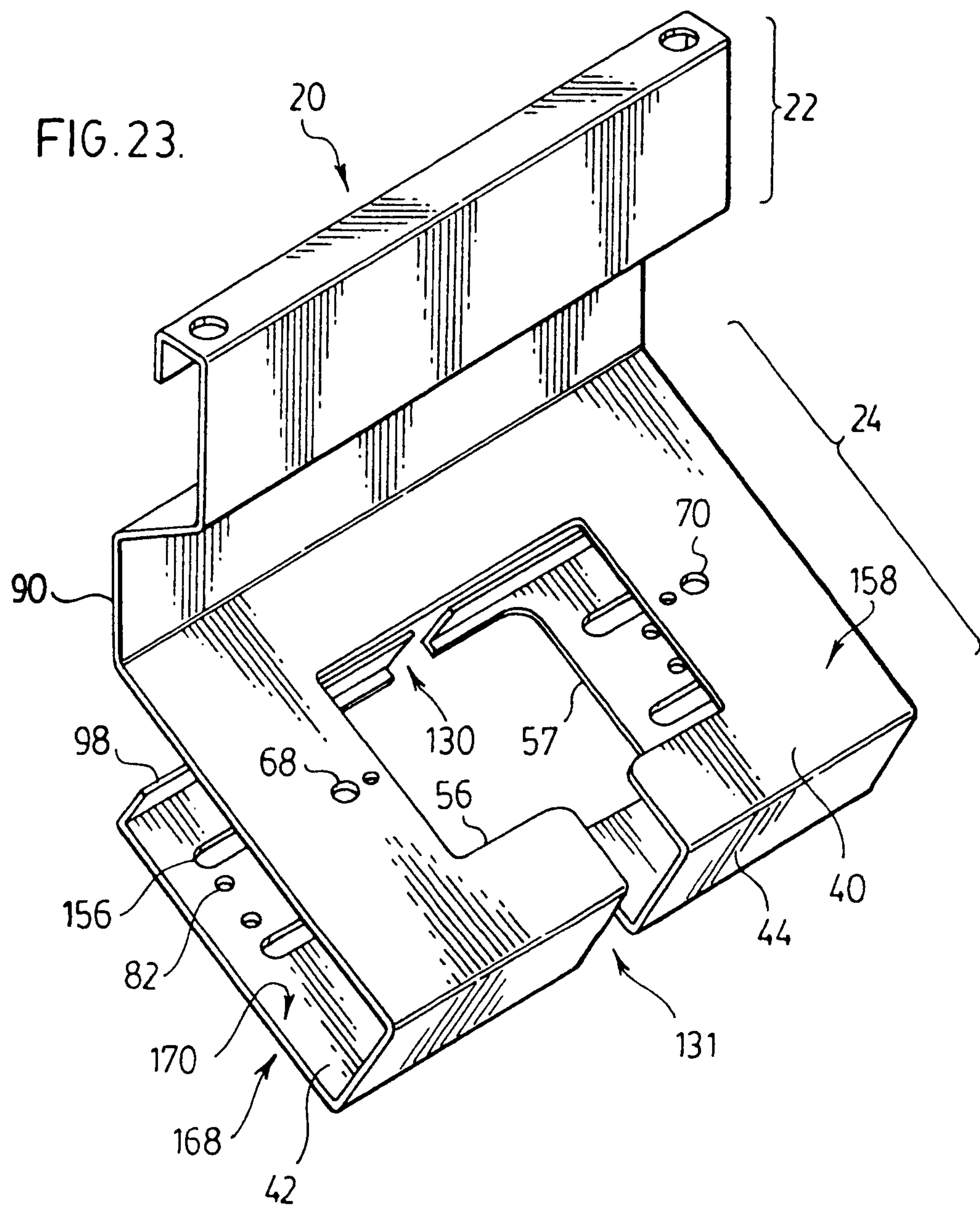


FIG. 23.



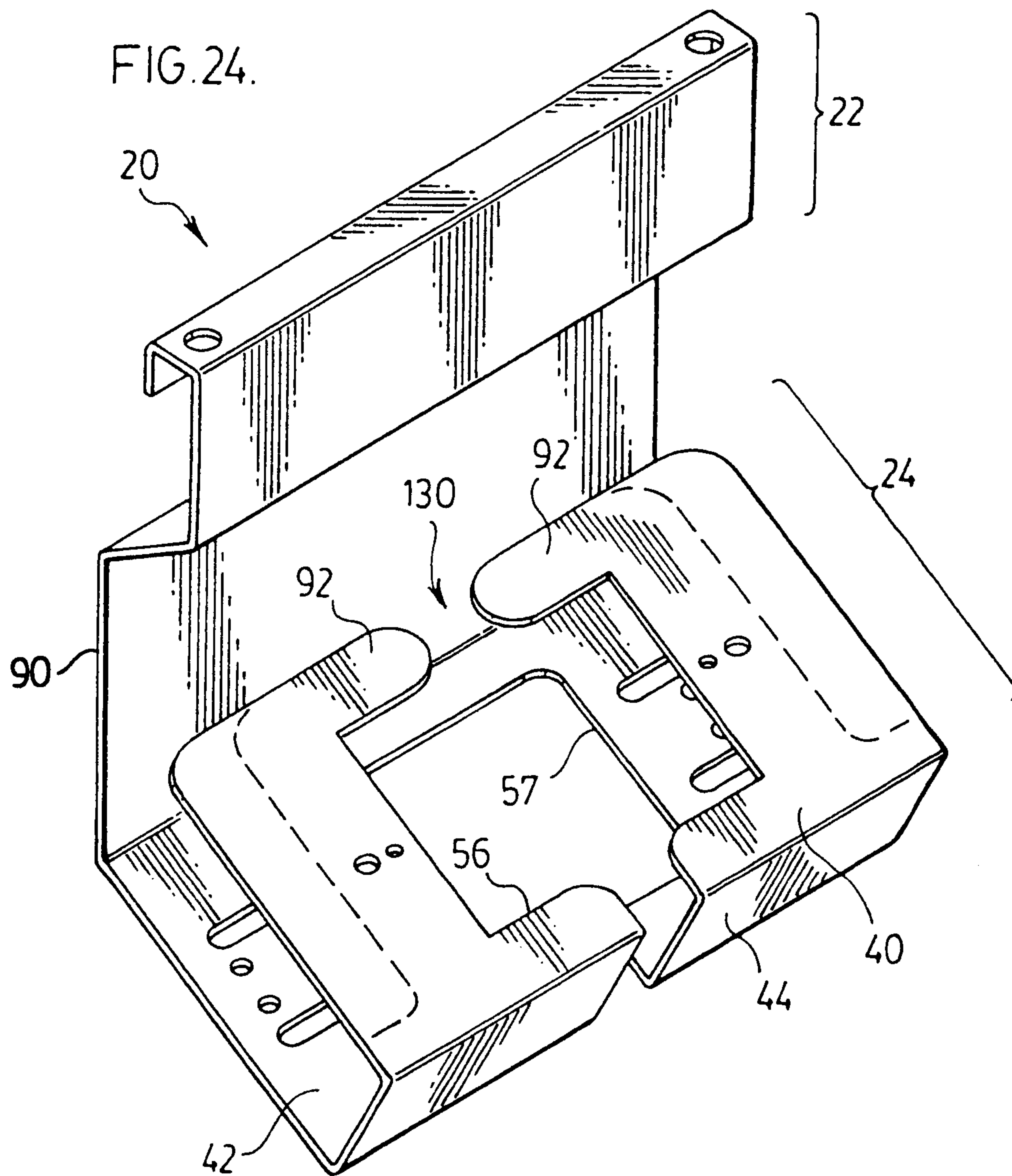


FIG. 25.

