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(54) **APPARATUS FOR CONNECTING ELECTRICAL CONNECTORS TO CABLE.**

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Description

This invention relates to apparatus for connecting to the conductors of a flat, multiconductor cable, electrical connectors having terminals provided with conductor receiving portions, and especially concerns such apparatus for producing electrical harnesses each comprising a plurality of such connectors.

There is described in EP-A1-0196740, apparatus for connecting to the conductors of a flat, multiconductor cable, electrical connectors having electrical terminals provided with cable conductor receiving portions, the apparatus comprising a press which is actuatable to apply the connectors to the cable by inserting the cable conductors into said conductor receiving portions, means for feeding the cable intermittently through the press, and connector orienting means for supplying the connectors to the press in a plurality of different orientations and including a first connector receiving member which is rotatable to determine a first orientation of each connector.

Although this known apparatus is capable of orienting connectors on the cable so that some project from one side of the cable and some from the other, and is also capable of applying the connectors to the cable in different endwise orientations, the known apparatus, which comprises a robot adapted to perform some of the connector orienting operations and a multiplicity of associated stations around the robot, is, although it has proved to be most successful in use, of complicated construction and is, therefore expensive to produce.

The present invention is intended to provide apparatus as defined in the second paragraph of this specification, but which is simpler and more compact than the known apparatus and is more economical to manufacture.

According to the invention, the apparatus is characterized by first transfer means for transferring each connector from said first connector receiving member when the connector has been oriented thereby, to a second connector receiving member which is rotatable to determine a second orientation of the connector; and by second transfer means for transferring the connector from the second connector receiving member when the connector has been oriented thereby, to the press.

The first connector receiving member may be in the form of a pair of rotatable jaws connected to a frame of the apparatus and being rotatable by a rotary air cylinder on the frame, the second connector receiving member being in the form of a simple turn table also mounted to the frame and having drive means on the frame. Both of the transferring means may be in the form of push rods.

The jaws may be translatable transversely of a plurality of rows of electrical connectors fed in parallel relationship towards the jaws, to select a desired kind of connector for application to the cable.

Where the connectors are of the kind which comprise a connector body arranged to mate with a cover having conductor stuffing means for forcing the conductors into the wire receiving portions of the terminals, the connector bodies are supplied to the first connector receiving member with the covers partially mated therewith, a cover separating station being provided between the two connector receiving members for separating the covers from the connector bodies. In this case, the turntable is provided with a pair of parallel recesses, each for receiving either a connector body or a cover according to the angular position of the turntable the press comprising a pair of pusher plates, one disposed on either side of the cable and each arranged to receive either a connector body or a connector cover according to said angular position of the turntable. Cable severing means are provided for severing the cable when a required number of connectors have been applied thereto.

For a better understanding of the invention and to show how it may be carried into effect, reference will now be made by way of example to the accompanying drawings in which:

FIGURE 1 is a side view, shown partly in section, of a first electrical connector;

FIGURE 2 is a similar view to that of Figure 1, but showing a second and different electrical connector;

FIGURE 3 is a schematic, isometric, view of harness making apparatus for selectively applying to a flat multiconductor cable, electrical conductors according to Figures 1 and 2;

FIGURE 4 is a top plan view of the apparatus;

FIGURE 5 is a side view of a first connector orienting station of the apparatus, taken in the direction of the arrow 5 in Figure 7, and showing parts of the station in a first operating position;

FIGURE 6 is a similar view to that of Figure 5 but showing said parts of the orienting station in a second operating position;

FIGURE 7 is a top plan view of the first connector orienting station showing said parts in said first position;

FIGURE 8 is a similar view to that of Figure 7, but showing said parts in said second position;

FIGURE 9 is a view taken on the lines 9-9 of Figure 4 illustrating a cover separating station of the apparatus, and showing parts thereof in a first operating position;

FIGURE 10 is a similar view to that of Figure 9 but showing parts of the cover separating station in a second operating position;

FIGURE 11 is an isometric view illustrating a second connector orienting station of the apparatus and the transfer of a connector and its cover therefrom, to a connector application station of the apparatus;

FIGURE 12 is a side view, shown partly in section, and with parts omitted, of the termination station;

FIGURE 13 is a top plan view of the termination station;

FIGURE 14 is a side view of the termination station showing parts thereof in a first operating position;

FIGURE 15 is a fragmentary side view, shown partly in section, illustrating details of Figure 14 but showing said parts in a second operating position; and

FIGURE 16 is a similar view to that of Figure 15 but showing said parts in a third operating position.

As shown in Figure 1, an elongate electrical connector C1 comprises a connector body CB1 and a connector cover CO1. In the body CB1 are two rows of electrical terminals T1 each having a conductor receiving portion RP provided with a conductor receiving slot S. Each terminal T1 has a tab T extending into a skirt SK of the body CB1 for mating with a female electrical terminal (not shown) of a mating connector (not shown) inserted into the skirt SK. The cover CO1 has wire stuffer projections WP each for forcing the conductor of a multiconductor flat, flexible cable FFC (Figure 3), into a respective slot S, as the cover CO1 is driven down, from the position in which it is shown, onto the connector body CB1. At each end of the body CB1, are two vertically spaced latching spurs LM and LM'. Each upper (as seen in Figure 1) and smaller, spur LM engages in an opening O in a side arm of the cover CO1 to retain it releasably attached to the body CB1. When the cover CO1 is driven down to cause the projections WP to force the conductors into the slots S, the lower (as seen in Figure 1) and larger, latch arm LM' engages in the opening O, fixedly to secure the cover CO1 to the body CB1. The connector C1 has opposite ends E1 and E1'. Figure 2 shows a connector C2 having a connector body CB2 and a cover CO2 which is identical to the cover CO1. The body CB2 differs from the body CB1 in that its terminals T2 have contact tails CT projecting below the body CB2 for reception in holes in a circuit board (not shown), to be soldered to conductors thereon. The connector C2 has ends E2 and E2'.

The apparatus and its operation will now be described in outline, with reference to Figure 3. The apparatus comprises a first connector orienting station 2, a connector cover separating station 4, a second connector orienting station 6, and a

connector application station 8.

At the station 2, is a first connector receiving member in the form of a connector retaining jaw assembly 10 which is rotatable about a horizontal axis X between two angular positions spaced from each other by 180 degrees as determined by a harness making program of a control microprocessor (not shown). The jaw assembly 10 is translatable, according to the program, along a first horizontal axis Y and a second horizontal axis Z extending at right angles to the axis Y and parallel to the axis X. The jaw assembly 10 comprises a jaw 12 which can be swung towards and away from a fixed jaw 14 about a horizontal axis K, parallel to the axis Y, between the open position in which the jaws 12 and 14 are shown in Figure 3, and a closed position in which a connector C1 or C2 to be received by the assembly 10 is enclosed between a flat surface 15 of the jaw 14 and the walls of a recess 16 in the jaw 12.

A row of first connectors C1 mounted on a length of adhesive tape AT1 and a row of second connectors C2, parallel to, but spaced from, the row of connectors C1, and mounted on a length of adhesive tape AT2 are arranged to be intermittently fed along guide tracks 18 and 20, respectively, from respective storage reels (not shown) by means of tape pulling rolls (not shown) beneath the jaw assembly 10, towards of the assembly 10, in accordance with the program.

Where the jaw assembly 10 is to pick up a connector C1, in the course of the program, the assembly 10 is translated along the axis Y with the jaws 12 and 14 in an open position to place them opposite to the leading connector C1 on the tape AT1 and the assembly 10 is advanced to its forward end position along the axis Y. The pulling rolls of the tape AT1 are then actuated to draw the row of connectors C1 towards the assembly 10, the tape AT1 passing over a nose 22 so that the leading connector C1 is pulled from the tape AT1 and is thereby transferred to the surface 15 of the jaw 14 so as to lie between the jaws 14 and 16. The jaw 12 is then closed about the axis K to confine the connector C1 on the surface 15 and the assembly 10 is rotated about the axis X, if that is required by the program, to reverse the endwise orientation of connector C1 retained in assembly 10, so that the end E1 of the connector faces rightwardly (as seen in Figure 3). The assembly 10 is now retracted to its rear end position along the axis Y and a push rod 26 is advanced in the direction of the arrow J in Figure 3 slidably to drive the connector C1 from between the jaws 12 and 14, and to transfer the connector to the station 4 so that its body CB1 is slidably inserted into a nest 28 provided in a vertically movable connector body holder 30 of the station 4, which is arranged to be

driven in vertical reciprocating motion. The holder 30 is then lowered so that the nest 28 is positioned in alignment with ejector fingers 32 at the station 4, which project from a cover separating tool 34, said fingers 32, being arranged in two pairs of superposed fingers 32 which straddle the holder 30. The tool 34 is now advanced in the direction of the arrow A to drive the cover CO1 of the connector C1 in the nest 28 away from its body CB1, as shown in full lines into a cover receiving nest (not shown). Push rods 36 and 38 are now advanced in the direction of the arrow P in Figure 3 to transfer the body CB1 in the nest 28, and the now separated cover CO1, into respective grooves 40 and 42 in a second connector receiving member in the form of turntable 44 which is mounted at the station 6, for rotation about a vertical axis through 90 degrees in either sense as indicated by the arrow Q. Where the body CB1 in the groove 40 is to be applied to the right hand (as seen in Figure 3) side of the tape FFC and the cover CO1 to the opposite side thereof, the turntable 44 is rotated to bring the end E1' of the body CB1 in the groove 40 into alignment with a first push rod 46 and the corresponding end of the cover CO1 in the groove 42 into alignment with a second push rod 48. The push rods 46 and 48 are then advanced in the direction of the arrow R, that is to say at right angles to the direction of movement of the rods 26, 36 and 38, to transfer the body CB1 into a nest 50 in a first applicator push plate 52 of a press 54 at the station 8, and the cover CO1 into a nest 56 in a second applicator push plate 58 of the press 54. The cable FFC which is intermittently advanced downwardly between the plates 52 and 58 by steps of predetermined length, and the plates 52 and 58 are advanced to drive the cover CO1 towards the body CB1, whereby the stuffer projections WP force respective conductors of the cable FFC into respective slots S of the terminals T1 of the body CB1 and the spurs LM' engage in the openings O. When the number of connectors CB1 and CB2 prescribed according to the harness-making program, has been applied to the cable FFC a cable-severing blade 60 is advanced in the direction of the arrow M to sever the cable FFC adjacent to the connector last applied thereto, in cooperation with a cable severing anvil 62.

Where a connector C2 is to be applied to the cable FFC, the assembly 10 at the station 2 is translated to a position in alignment with the leading connector C2 of the row of connectors C2 to receive it in the manner described above with reference to a connector C1. Where the end E1' or E2' of any leading connector C1 or C2 is to face rightwardly (as seen in Figure 3), the assembly 10 is not rotated about the axis X when it has received the connector. Likewise, if a cover CO1 or CO2 is

to be applied to the right hand (as seen in Figure 3) side of the cable FFC, and the corresponding connector body CB1 or CB2, as the case may be, is to be applied to the left hand side of the cable FFC, the turntable 44 is rotated to bring the connector body in alignment with the push rod 48 and the connector cover into alignment with the push rod 46.

As will be apparent from the above description, the apparatus can selectively apply connectors C1 and C2 to the cable FFC at any desired position therealong, each in a selected one of four different orientations with respect to the cable FFC, that is to say with the cover on one side or the other, and with either end of the connector facing in a given direction, in accordance with the particular harness making program with which the microprocessor has been provided.

The push plate of the press 54, which carries the cover is always applied to the cable before the other push plate in order to avoid lateral displacement of the cable by the connector body.

The apparatus and its operation will now be described in greater detail with reference to Figures 4 to 16.

As shown in Figure 4, the apparatus comprises a single frame generally referenced 64 to which the stations 2, 4, 6 and 8 are mounted.

As shown in Figures 5-8, a main block 67 of the assembly 10, of which block the jaw 14 is a part, is connected to the piston rod 66 of a pneumatic piston and cylinder unit 68 for operating the jaw 12. An optical sensor 70 is provided in the block 67 for sensing the presence of a connector C1 or C2 in the assembly 10. The unit 68 is connected to the spindle of a motor 72 in the form of a rotary air cylinder for rotating the assembly 10. The motor 72 is fixed to a bracket 74 which is in turn secured, by way of a slide 75, to a horizontally shiftable subframe 76. The slide 75 is slidable in the direction of the Z-axis relative to the subframe 76. The subframe 76 is connected to a slide 78 mounted for horizontal sliding movement relative to the frame 64 on a slideway 80 (Figures 4 and 5). The subframe 76 is fixed to the slide 78 by means of a fastening plate 82 on each side of the slide 78, and only one of which is shown. The assembly 10 is driven back and forth along the Z-axis by means of drive means (not shown). An amplifier 77 for sensor 70 is provided on the subframe 76. The slide 78 is driven in horizontal reciprocating motion, to move the assembly 10 along the axis Y to select a connector C1 or C2 according to the program, by means of a rack and pinion drive system (not shown) in a housing 84 on the frame 64. The subframe 76 comprises an end plate 86 containing a track, in which the push rod 26 is slidable by means of a piston and cylinder drive unit 88 fixed

to a side plate 96 of the subframe 76 and having a piston rod 90 secured to a bracket 92 on the push rod 26, to drive it through a working stroke to transfer a connector C1 or C2 from the assembly 10 to the station 4. The piston rod 66 is connected to the block 67 by way of a bracket 94, so that the drive unit 68 is vertically offset from the path of movement of the push rod 26. As shown in Figure 4, the tracks 18 and 20 are mounted on plates 98 projecting laterally from the frame 64 and to which are secured guard plates 100 for the rows of connectors C1 and C2 on the tracks 18 and 20. Figures 5 and 7 show the assembly 10 in its advanced position to receive a connector C1 and Figures 6 and 8 show the assembly 10 in its retracted position along the axis Z ready for rotation about the axis X.

As shown in Figures 9 and 10, the connector holder 30 is driven through a downward stroke to lower the nest 28 and through an upward return stroke to raise it, by means of a vertical piston and cylinder unit 102, also shown in Figure 4, the cover separating tool 34 and thus the ejector fingers 32 being driven by a horizontal piston and cylinder unit 104 which is shown in Figure 4. The unit 102 is mounted to the top of an elongate slideway block 106 defining a vertical slideway 108 for the connector holder 30 which is fixedly attached to the piston rod 110 of the unit 102. The block 106 is mounted in a subframe 112 to the bottom plate 114 of which is secured a horizontal slideway block 116 defining slideways 117 for the fingers 32. One end of the unit 104 is secured to the block 116, the other end of the unit 104 being mounted in the block 106. The piston rod 118 of the unit 104 is fixed to a bracket 120 which is attached to the ejector fingers 32 by means of pin and socket connections 122, only one of which is shown. The cover-receiving nest mentioned above with reference to Figure 3, and which is not shown therein, is referenced 124 in Figures 9 and 10. It comprises a triangular cross section top plate 126, the upper end of which is pivotally attached to the block 106 by means of a pivot pin 128, the lower face 130 of the plate 126, and the upper face of a bottom block 132 fixed to the plate 114, defining upper and lower walls, respectively, of the nest 124. A slide 134, which is slidable horizontally in the block 132, has an arm 136 which is slidable in the nest 124 and is urged by springs (not shown) inwardly of the nest 124 to assume a normal position in which the free end face 138 of the arm 136, which face has therein a cover-receiving recess 140 is substantially coincident with the inner vertical wall 142 of the plate 126, which face 142 is formed with a vertical cover-receiving channel 144 communicating with the slideway 108 and extending parallel thereto. Figure 9 shows the connector holder 30 in

its raised position, with a connector C1 in the nest 28 with its cover CO1 engaged in the recess 144 and abutting the surface 142, the piston rod 118 being in an advanced position so that the fingers 32 are retracted. Figure 10 shows the connector holder 30 in its lowered position and after the piston rod 118 has been retracted to cause the ejector fingers 32 to advance and thereby to separate the cover CO1 from the connector body CB1, and to drive the cover CO1 into the recess 140 of the arm 136, driving the arm 136, and thus the slide 134 rightwardly (as seen in Figure 10) so that the cover CO1 is received in the nest 124 and is releasably held in position between the end face 138 and the ejector fingers 32. Should a cover CO1 or CO2 jam in the nest 124, the plate 126 can be raised about the pivot pin 128 to allow the jammed cover to be removed from the nest 124. The push rods 36 and 38 are driven by a piston and cylinder unit 146 which, as shown in Figure 4, extends parallel to, and projects slightly to one side of, the unit 88. A guide track 148 communicates with the nest 28, in the lowered, Figure 10 position of the connector holder 30, a guide track 150 communicating with the space between the surface 138 of the arm 136 and the leading ends of the ejector fingers 32, when the ejector fingers 32 are in their Figure 10 position. When the piston rod of the unit 146, which is connected to the push rods 36 and 38, is advanced, these push the body and the cover from their Figure 10 positions in the station 4, along the tracks 148 and 150 respectively, and into the grooves 40 and 42 of the turntable 44.- (Figure 4)

The push rods 46 and 48 are driven by a horizontal piston and cylinder unit 152, to the piston rod 154 of which the rods 46 and 48 are connected, as shown in Figure 4. The turntable 44 is driven by a stepping motor 156 therebelow as indicated in broken lines in Figure 4. The push rods 46 and 48, run in guide channels 158 and 160, respectively, formed in a top plate 163 of the station 6, in an opening in which plate 136, the turntable 44 is rotatable, as best seen in Figure 11, by means of its motor 156, which lies below the plate 163. When the turntable 44 has been rotated by its motor 156 to align the grooves 40 and 42 with the push rods 46 and 48, and thus with the guide channels 158 and 160, the grooves 40 and 42 are also aligned with respective connector body or connector cover guideways 162 and 164 formed in the plate 163 in alignment with the channels 158 and 160, each guideway 162 and 164 being cross-sectionally configured to receive either a connector body or its cover. The guideways 162 and 164 communicate with, and are aligned with, the nests 50 and 56, respectively, of the plates 52 and 58, respectively, at the station 8. When the piston rod

154 of the unit 152 is advanced, the push rods 46 and 48 drive the connector body and the connector cover in the grooves 40 and 42, along the guide-ways 162 and 164 and position them in their respective nests 50 and 56.

As shown in Figure 14, the connector application station 8 comprises a subframe 164 having a central harness receiving vertical channel 166 to a base plate 168 of which are mounted on either side of the channel 166 a drive piston and cylinder unit 170 for the push plate 52 and a drive piston and cylinder unit 172 for the push plate 58. The piston rod 174 of each of these units is connected to one end of a link 176 by means of a pivot pin 178, the other end of the link 176 being pivotally connected by means of a pivot pin 180, to the respective push plate 52 or 58, near its end remote from the respective nest 50 or 56. The push plates 50 and 58 which have depending lugs 181 running in grooves 183 in push plate support brackets 182, on a top plate 184 of the subframe 164, are normally urged in a direction away from one another by springs 186 acting between the toggle links 176 and the brackets 182. In order to apply a connector body and a connector cover in the respective nests 50 and 56, to the cable FFC, the units 170 and 172 are actuated sequentially to advance their piston rods 174 to rotate the links 176 so as to drive the push plates 52 and 58 towards one another. As shown in Figures 15 and 16, the drive unit for the push plate carrying the connector cover is first actuated so that the cable FFC is enclosed by the cover, the drive unit for the push plate carrying the connector body being actuated subsequently, to drive it into the cover.

As shown in Figures 12 13 15 and 16, the cable severing blade 60 which is mounted above the push plates 52 and 58, and which is slidable along a cross plate 188 mounted between side plates 190 of the subframe 164, is arranged to be driven towards and away from the anvil 62 by means of a piston and cylinder drive unit 192 having a piston rod 194 connected to the blade 60 by means of a linkage 196. The unit 192 is secured to a subframe 198 on the plate 188 from which extends centrally of the subframe 198, a vertical cable guide 200 aligned with the channel 166, for guiding the cable FFC between the blade 60 and anvil 62 and between the push plates 52 and 58. There projects laterally from the subframe 198, a cable feed stepping motor 202 (Figures 4 and 13), the spindle of which is connected to the shaft 204 (Figure 12) of a driving gear wheel 206 which drives a further gear wheel 208 meshing with a gear wheel 210 fixed to a cable drive roller 212 having a shaft 214 and projecting through a slot 216 in the guide 200 to engage one side of the cable FFC extending therethrough. The shaft 214

of the roller 212 is mounted for rotation in one end of a bifurcated pusher lever 218, the other end of which is pivotally mounted to the subframe 198. Opposite to the roller 212 in the subframe 198, is mounted an idle roller 220, also projecting into the slot 216 to engage the other side of the cable FFC. The roller 212 is urged against the cable FFC in driving relationship therewith, by the spring 222 which urges the lever 218 in a clockwise (as seen in Figure 12) sense, whereby the cable FFC is driven downwardly each time the motor 204 is run.

There are provided, sensors 224 (Figures 7 and 8) for monitoring the horizontal position of the slide 75, sensors 226 (Figures 9 and 10) for monitoring the vertical position of the connector holder 30, sensors 228 for monitoring the horizontal positions of the push rods 32, and sensors 230 for monitoring the horizontal positions of the push plates 52 and 58. These sensors as well as the sensor 70 and other sensors (not shown) for monitoring the positions of the other moving parts of the apparatus, serve for signalling the state of the parts concerned to the microprocessor which may be arranged to inhibit further operation of the apparatus in the event of any malfunction thereof.

Claims

1. Apparatus for connecting to the conductors of a flat, multiconductor cable (FFC), electrical connectors (C1 and C2) having electrical terminals (T1 and T2) provided with cable conductor receiving portions (RP), the apparatus comprising a press (54) which is actuable to apply said connectors to the cable (FFC) by inserting the cable conductors into said conductor receiving portions (RP), means (202) for feeding the cable (FFC) intermittently through the press (54), and connector orienting means (10 and 44) for supplying the connectors (C1 and C2) to the press (54) in a plurality of different orientations and including a first connector receiving member (10) which is rotatable to determine a first orientation of each connector (C1 and C2); characterized by first transfer means (26, 36, 38) for transferring each connector (C1 and C2) from said first connector receiving member (10) when the connector (C1 or C2) has been oriented thereby, to a second connector receiving member (44) which is rotatable to determine a second orientation of the connector (C1 or C2); and by second transfer means (46, 48) for transferring the connector (C1 or C2) from the second connector receiving member (44), when the connector (C1 or C2) has been oriented thereby, to the press (54).

2. Apparatus according to claim 1 characterized in that the first connector receiving member is in the form of a pair of jaws (12 and 14) rotatably mounted to a frame (64) of the apparatus and being rotatable by drive means (72) on said frame (64); and in that the second connector receiving member is in the form of a turntable (44) also mounted for rotation to the frame (64) and having drive means (156) on the frame (64), said jaws (12 and 14) being arranged for orienting the connectors (C1 or C2) endwise, and said turntable (44) serving to orient said connectors (C1 or C2) so that some project from one side of the cable (FFC) and some from the other when the connectors (C1 or C2) have been applied to the cable (FFC) by the press (54).

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3. Apparatus according to 1 or 2, characterized in that said first connector-receiving member (10) is translatable transversely of a plurality of rows of different electrical connectors (C1 and C2) fed in parallel relationship towards the first connector receiving member (10), to select a connector (C1 or C2) from any of said rows for application to the cable (FFC).

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4. Apparatus according to claim 1, 2 or 3, for use with connectors (C1 and C2) each of which comprises a connector body (CB1 or CB2) arranged to mate with a cover (CO1 or CO2) having conductor stuffing means (WP) for forcing the conductors of the cable (FFC) into the cable conductor receiving portions (RP) of the terminals (T1 and T2); characterized in that the connector bodies (CB1 and CB2) are supplied to the first connector receiving member (10) with the covers (CO1 and CO2) partially mated therewith, a cover separating station (4) being provided between the two connector-receiving members (10 and 44) for separating the covers (CO1 and CO2) from the connector bodies (CB1 and CB2), the second connector-receiving member (44) having a pair of parallel recesses (40 and 42) each adapted to receive either a connector body (CB1 or CB2), or a cover (CO1 or CO2), the press (54) comprising a pair of connector applying members (52 and 58) one disposed on each side of the cable (FFC) and each arranged to receive either a connector body (CB1 or CB2), or a connector cover (CO1 or CO2), as determined by said angular position of the second connector receiving member (44).

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5. Apparatus according to claim 4, characterized in that the cover separating station (4) comprises a connector holder (30) mounted for reciprocating axial movement and having a first nest (28), for receiving an electrical connector (C1 or C2) transferred from said first connector-receiving member (10) by a first transfer member (26) of said first transfer means (26, 36, 38), in a first axial position of said connector holder (30), means (32) being provided for separating, in a second axial position of the connector holder (30), the cover (CO1 or CO2) from the connector body (CB1 or CB2) in said first nest (26) and for moving the cover into a second nest (124) spaced from the connector holder (30) at right angles to its direction of movement, said recesses (40 and 42) in said second connector-receiving member (10) each being aligned with a respective one of said first and second nests (26 and 124) in a given angular position of said second connector-receiving member (44) for the transfer of the connector body (CB1 or CB2) and the connector cover (CO1 or CO2) by second transfer members (36 and 38) of said first transfer means (26, 36, 38) from their respective nests (26 and 124) into respective ones of the recesses (40 and 42) of the second connector-receiving member (44).

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6. Apparatus according to claim 5, characterized in that said first transfer member is in the form of a push rod (26) having a drive unit (88) for advancing it to drive a connector (C1 or C2) in the first connector-receiving means (10) into said first nest (28), in said first axial position of the connector holder (30), said second transfer members comprising a first pair of push rods (36 and 38) having drive means (146) for advancing them to drive a connector body (CB1 or CB2) in said first nest (28) and a connector cover (CO1 or CO2) in said second nest (124), each into a respective recess (40 or 42) of the second connector-receiving member (44), said second transfer means comprising a second pair of push rods (46 and 48) having drive means (152) for advancing them to drive a connector body (CB1 or CB2) in one recess (40 or 42) of the second connector-receiving member (44) and a connector cover (CO1 or CO2) in the other recess (40 or 42) thereof each into a respective nest (50 or 56) of a respective one of said connector applying members (52 and 58).

6. Apparatus according to claim 5, characterized in that said first transfer member is in the form of a push rod (26) having a drive unit (88) for advancing it to drive a connector (C1 or C2) in the first connector-receiving means (10) into said first nest (28), in said first axial position of the connector holder (30), said second transfer members comprising a first pair of push rods (36 and 38) having drive means (146) for advancing them to drive a connector body (CB1 or CB2) in said first nest (28) and a connector cover (CO1 or CO2) in said second nest (124), each into a respective recess (40 or 42) of the second connector-receiving member (44), said second transfer means comprising a second pair of push rods (46 and 48) having drive means (152) for advancing them to drive a connector body (CB1 or CB2) in one recess (40 or 42) of the second connector-receiving member (44) and a connector cover (CO1 or CO2) in the other recess (40 or 42) thereof each into a respective nest (50 or 56) of a respective one of said connector applying members (52 and 58).
7. Apparatus according to claim 5 or 6, characterized in that said cover separating station comprises a pair of ejector fingers (32) arranged to straddle said connector holder (30) in the second axial position thereof and having a drive unit (104) for advancing said fingers (32) to

separate the cover (CO1 or CO2) from the connector body (CB1 or CB2) in said first nest (28) in said second axial position of the connector holder (30) and to drive said cover (CO1 or CO2) against a spring-loaded arm (136) projecting into said second nest (124) to retract the arm (136) outwardly of that nest (124) so as to align the cover (CO1 or CO2) in the second nest (124) with the respective second transfer member (38).

8. Apparatus according to any one of the preceding claims, characterized in that the first connector-receiving member (10) is mounted to a slide (75) for driving the first connector-receiving member (10) towards and away from parallel rows of first and second connectors (C1 and C2) each mounted on a first length of adhesive tape (AT1 or AT2), said slide (75) being connected to a rotary air cylinder (72) for rotating a piston and cylinder drive unit (68) to rotate the first connector-receiving member (10) about the axis of said piston rod (66), the rotary air cylinder (72) being connected to drive means (84) for translating it into alignment with a selected one of said rows of connectors (C1 and C2), means being provided for advancing each length of tape (AT1 and AT2) towards the first connector-receiving member (10) in an advanced position of the slide (75) to locate a connector (C1 or C2) of the respective row in the first connector-receiving member (10).

9. Apparatus according to any one of claims 4 to 7, characterized in that the connector-applying members (50 and 58) of the press (54) are provided with discrete drive means (170 and 172) for selectively driving one of said applying members (52 and 58) towards the cable (FFC) before the other such member (52 or 58).

10. Apparatus according to any one of the preceding claims, characterized in that said cable feeding means comprises a stepping motor (202) drivingly coupled to a cable drive roller (212) by way of a gear train (204, 208) mounted on a spring-loaded arm (218) urging said drive roller (212) against the cable (FFC), frictionally to engage it between said drive roller (212) and an idle roller (220) on the other side of the cable (FFC).

Patentansprüche

1. Vorrichtung zum Anschließen elektrischer Verbinder (C1 und C2) an den Leitern eines flachen Mehrleiterkabels (FFC), wobei die elektrischen Verbinder (C1 und C2) elektrische Anschlüsse (T1 und T2) aufweisen, die mit Kabelleiternaufnahmeabschnitten (RP) ausgestattet sind, wobei die Vorrichtung über eine Presse (54), die zur Anbringung der Verbinder an dem Kabel (FFC) durch Einsetzen der Kabelverbinder in die Kabelaufnahmeabschnitte (RP) betätigbar ist, über Mittel (202) zum intermittierenden Zuführen des Kabels (FFC) durch die Presse (54) hindurch und über Verbinderausrichtmittel (10 und 44) zum Zuführen der Verbinder (C1 und C2) zu der Presse (54) in einer Vielzahl unterschiedlicher Ausrichtungen und mit einem ersten Verbinderaufnahmeteil (10) verfügt, das drehbar ist, um eine erste Ausrichtung jedes Verbinders (C1 und C2) zu bestimmen, **gekennzeichnet** durch erste Übergabemittel (26, 36, 38) zur Übergabe jedes Verbinders (C1 und C2) von dem ersten Verbinderaufnahmeteil (10), wenn der Verbinder (C1 oder C2) hierdurch ausgerichtet worden ist, an ein zweites Verbinderaufnahmeteil (44), das drehbar ist, um eine zweite Ausrichtung des Verbinders (C1 oder C2) zu bestimmen, und durch zweite Übergabemittel (46, 48) zur Übergabe des Verbinders (C1 oder C2) von dem zweiten Verbinderaufnahmeteil (44), wenn der Verbinder (C1 oder C2) hierdurch ausgerichtet worden ist, an die Presse (54).

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet**, daß das erste Verbinderaufnahmeteil die Form eines Paares von Backen (12 und 14) aufweist, die an einem Rahmen (64) der Vorrichtung drehbar angeordnet und durch Antriebsmittel (72) an dem Rahmen (64) drehbar sind, und daß das zweite Verbinderaufnahmeteil die Form eines Drehtellers (44) aufweist, der ebenfalls drehbar an dem Rahmen (64) angeordnet ist und Antriebsmittel (156) an dem Rahmen (64) aufweist, wobei die Backen (12 und 14) zur endseitigen Ausrichtung der Verbinder (C1 oder C2) angeordnet sind und der Drehteller (44) zur Ausrichtung der Verbinder (C1 oder C2) derart dient, daß einige von einer Seite des Kabels (FFC) und einige von der anderen Seite aus vorstehen, wenn die Verbinder (C1 oder C2) an dem Kabel (FFC) mittels der Presse (54) angebracht worden sind.

3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet**, daß das erste Verbinderaufnahmeteil (10) zu einer Vielzahl von Reihen unterschiedlicher elektrischer Verbinder (C1 und C2) quer verschiebbar ist, die in paralleler Beziehung in Richtung auf das erste Verbinderaufnahmeteil (10) zugeführt werden, um einen ersten Verbinder (C1 oder C2) zu einer ersten Ausrichtung zu bringen, und ein zweites Verbinderaufnahmeteil (44) zu einer Vielzahl von Reihen unterschiedlicher elektrischer Verbinder (C1 und C2) quer verschiebbar ist, die in paralleler Beziehung in Richtung auf das zweite Verbinderaufnahmeteil (44) zugeführt werden, um einen zweiten Verbinder (C1 oder C2) zu einer zweiten Ausrichtung zu bringen.

4. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet**, daß das erste Verbinderaufnahmeteil (10) zu einer Vielzahl von Reihen unterschiedlicher elektrischer Verbinder (C1 und C2) quer verschiebbar ist, die in paralleler Beziehung in Richtung auf das erste Verbinderaufnahmeteil (10) zugeführt werden, um einen ersten Verbinder (C1 oder C2) zu einer ersten Ausrichtung zu bringen, und ein zweites Verbinderaufnahmeteil (44) zu einer Vielzahl von Reihen unterschiedlicher elektrischer Verbinder (C1 und C2) quer verschiebbar ist, die in paralleler Beziehung in Richtung auf das zweite Verbinderaufnahmeteil (44) zugeführt werden, um einen zweiten Verbinder (C1 oder C2) zu einer zweiten Ausrichtung zu bringen.

nen Verbinder (C1 oder C2) aus einer der Reihen zur Anbringung an dem Kabel (FFC) auszuwählen.

4. Vorrichtung nach Anspruch 1, 2 oder 3, zur Verwendung mit Verbindern (C1 und C2), deren jeder über einen Verbinderkörper (CB1 oder CB2) verfügt, der zum Zusammenfügen mit einer Abdeckung (CO1 oder CO2) dient, die Leitereinbringmittel (WP) zum Eindrücken der Leiter des Kabels (FFC) in die Kabelleiternaufnahmeabschnitte (RP) der Anschlüsse (T1 und T2) aufweist, **dadurch gekennzeichnet**, daß die Verbinderkörper (CB1 und CB2) dem ersten Verbinderaufnahmeteil (10) mit teilweise mit diesen zusammengefügt Abdeckungen (CO1 und CO2) zugeführt werden, wobei eine Abdeckungstrennstation (4) zwischen den beiden Verbinderaufnahmeteilen (10 und 44) zum Abtrennen der Abdeckungen (CO1 und CO2) von den Verbinderkörpern (CB1 und CB2) vorgesehen ist, das zweite Verbinderaufnahmeteil (44) ein Paar parallele Aussparungen (40 und 42) aufweist, deren jede zur Aufnahme entweder eines Verbinderkörpers (CB1 oder CB2) oder einer Abdeckung (CO1 oder CO2) geeignet ist, wobei die Presse (54) über ein Paar Verbinderanbringungsteile (52 und 58) verfügt, von denen eines an jeder Seite des Kabels (FFC) angeordnet ist und die je zur Aufnahme entweder eines Verbinderkörpers (CB1 oder CB2) oder einer Verbinderabdeckung (CO1 und CO2) dienen, wie durch die Winkelstellung des zweiten Verbinderaufnahmeteils (44) bestimmt ist.
5. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet**, daß die Abdeckungstrennstation (4) über einen Verbinderhalter (30) verfügt, der axial hin- und herbewegbar angeordnet ist und ein erstes Nest (28) aufweist zur Aufnahme eines elektrischen Verbinders (C1 oder C2), der von dem ersten Verbinderaufnahmeteil (10) mittels eines ersten Übergabeteils (26) des ersten Übergabemittels (26, 36, 38) übergeben worden ist, in einer ersten Axialstellung des Verbinderhalters (30), wobei ein Mittel (32) vorgesehen ist zum Abtrennen, in einer zweiten Axialstellung des Verbinderhalters (30), der Abdeckung (CO1 oder CO2) von dem Verbinderkörper (CB1 oder CB2) in dem ersten Nest (28) und zur Bewegung der Abdeckung in ein zweites Nest (124), das in einem Abstand von dem Verbinderhalter (30) unter rechten Winkeln zu dessen Bewegungsrichtung angeordnet ist, wobei Aussparungen (40 und 42) in dem zweiten Verbinderaufnahmeteil (44) vorgesehen sind, die je mit einem jeweiligen Nest des

ersten und des zweiten Nestes (28 und 124) in einer gegebenen Winkelstellung des zweiten Verbinderaufnahmeteils (44) zur Übergabe des Verbinderkörpers (CB1 oder CB2) und der Verbinderabdeckung (CO1 oder CO2) mittels zweiter Übergabeteile (36 und 38) des ersten Übergabemittels (26, 36, 38) aus ihren jeweiligen Nestern (28 und 124) in jeweilige Aussparungen (40 und 42) des zweiten Verbinderaufnahmeteils (44) fluchtend ausgerichtet sind.

6. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet**, daß das erste Übergabeteil die Form einer Drückstange (26) mit einer Antriebseinheit (88) zu ihrer Vorwärtsbewegung zur Bewegung eines Verbinders (C1 oder C2) in dem ersten Verbinderaufnahmemittel (10) in das erste Nest (28) hinein, in der ersten Axialstellung des Verbinderhalters (30), aufweist, wobei das zweite Übergabeteil über ein Paar Drückstangen (36 und 38) mit Antriebsmitteln (146) zu ihrer Vorwärtsbewegung zum Bewegen eines Verbinderkörpers (CB1 oder CB2) in dem ersten Nest (28) und einer Verbinderabdeckung (CO1 oder CO2) in dem zweiten Nest (124) je in eine zugehörige Aussparung (40 oder 42) des zweiten Verbinderaufnahmeteils (44) verfügt und wobei das zweite Übergabemittel über ein zweites Paar Drückstangen (46 und 48) mit einem Antriebsmittel (152) zu ihrer Vorwärtsbewegung zum Bewegen eines Verbinderkörpers (CB1 oder CB2) in einer Aussparung (40 oder 42) des zweiten Verbinderaufnahmeteils (44) und einer Verbinderabdeckung (CO1 oder CO2) in der anderen Aussparung (40 oder 42) je in ein jeweiliges Nest (50 oder 56) eines jeweiligen Verbinderanbringungsteils (52 und 58) verfügt.
7. Vorrichtung nach Anspruch 5 oder 6, **dadurch gekennzeichnet**, daß die Abdeckungstrennstation über ein Paar Auswerferfinger (32) verfügt, die zum Übergreifen des Verbinderhalters (30) in der zweiten Axialstellung desselben dienen, und eine Antriebseinheit (104) zur Vorwärtsbewegung der Finger (32) aufweist, um die Abdeckung (CO1 oder CO2) von dem Verbinderkörper (CB1 oder CB2) in dem ersten Nest (28) in der zweiten Axialstellung des Verbinderhalters (30) abzutrennen und die Abdeckung (CO1 oder CO2) gegen einen federbelasteten Arm (136) zu bewegen, der in das zweite Nest (124) vorsteht, um den Arm (136) aus dem Nest (124) heraus zurückzuziehen, um die Abdeckung (CO1 oder CO2) in dem zweiten Nest (124) mit dem jeweiligen zweiten Übergabeteil (38) fluchtend auszurichten.

8. Vorrichtung nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß das erste Verbinderaufnahmeteil (10) an einem Schlitten (75) zur Bewegung des ersten Verbinderaufnahmeteils (10) in Richtung auf parallele Reihen erster und zweiter Verbinder (C1 und C2) und von diesen weg angeordnet ist, die je an einem ersten Längenstück eines Klebebandes (AT1 oder AT2) angeordnet sind, wobei der Schlitten (75) mit einem Dreh-Luftzylinder (72) zur Drehbewegung einer Kolben- und Zylinder-Antriebseinheit (68) in Verbindung steht, um das erste Verbinderaufnahmeteil (10) um die Achse der Kolbenstange (66) zu drehen, wobei der Dreh-Luftzylinder (72) mit einem Antriebsmittel (84) zu seiner Überführung in eine Fluchtung mit einer ausgewählten Reihe der Reihen der Verbinder (C1 und C2) in Verbindung steht und ein Mittel zur Vorwärtsbewegung jedes Längenstücks des Bandes (AT1 und AT2) in Richtung auf das erste Verbinderaufnahmeteil (10) in einer vorbewegten Stellung des Schlittens (74) vorgesehen ist, um einen Verbinder (C1 oder C2) der jeweiligen Reihe in dem ersten Verbinderaufnahmeteil (10) anzuordnen.
9. Vorrichtung nach irgendeinem der Ansprüche 4 bis 7, **dadurch gekennzeichnet**, daß die Verbinderanbringungsteile (50 und 58) der Presse (54) mit einzelnen Antriebsmitteln (170 und 172) zur selektiven Bewegung eines der Anbringungsteile (52 und 58) in Richtung auf das Kabel (FFC) vor dem jeweils anderen Teil (52 oder 58) ausgestattet sind.
10. Vorrichtung nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet**, daß das Kabelzuführungsmittel über einen Schrittmotor (202) verfügt, der antriebsmäßig an eine Kabelantriebsrolle (212) mittels eines Getriebezugs (204, 208) angeschlossen ist, die an einem federbelasteten Arm (218) angeordnet ist, der die Antriebsrolle (212) gegen das Kabel (FFC) drückt, um es reibungsbehaftet zwischen der Antriebsrolle (212) und einer Leerlaufrolle (220) an der anderen Seite des Kabels (FFC) zu erfassen.

Revendications

1. Appareil pour connecter aux conducteurs d'un câble plat (FFC) à conducteurs multiples des connecteurs électriques (C1 et C2) ayant des bornes électriques (T1 et T2) pourvues de parties (RP) de réception de conducteurs du câble, l'appareil comportant une presse (54) qui peut être actionnée pour poser lesdits

connecteurs sur le câble (FFC) en insérant les conducteurs du câble dans lesdites parties (RP) de réception de conducteurs, des moyens (202) destinés à faire avancer le câble (FFC) par intermittence à travers la presse (54), et des moyens (10 et 44) d'orientation de connecteurs destinés à amener les connecteurs (C1 et C2) à la presse (54) dans plusieurs orientations différentes et comprenant un premier élément (10) de réception de connecteur qui peut être tourné pour déterminer une première orientation de chaque connecteur (C1 et C2) ; caractérisé par des premiers moyens de transfert (26, 36, 38) destinés à transférer chaque connecteur (C1 et C2) dudit premier élément (10) de réception de connecteur lorsque le connecteur (C1 ou C2) a été orienté par celui-ci vers un second élément (44) de réception de connecteur qui peut être tourné pour déterminer une seconde orientation du connecteur (C1 ou C2) ; et par des seconds moyens de transfert (46 et 48) destinés à transférer le connecteur (C1 ou C2) depuis le second élément (44) de réception de connecteur, lorsque le connecteur (C1 ou C2) a été orienté par celui-ci, jusqu'à la presse (54).

2. Appareil selon la revendication 1, caractérisé en ce que le premier élément de réception de connecteur se présente sous la forme de deux mâchoires (12 et 14) montées de façon à pouvoir tourner sur un bâti (64) de l'appareil et pouvant être tournées par des moyens d'entraînement (72) situés sur ledit bâti (64) ; et en ce que le second élément de réception de connecteur se présente sous la forme d'un plateau tournant (44) qui est également monté de façon à pouvoir tourner sur le bâti (64) et qui comporte des moyens d'entraînement (156) situés sur le bâti (64), lesdites mâchoires (12 et 14) étant disposées de façon à orienter les connecteurs (C1 ou C2) en bout, et ledit plateau tournant (44) servant à orienter lesdits connecteurs (C1 ou C2) de manière que certains fassent saillie d'un côté du câble (FFC) et que d'autres fassent saillie de l'autre côté du câble lorsque les connecteurs (C1 ou C2) ont été posés sur le câble (FFC) par la presse (54).

3. Appareil selon la revendication 1 ou 2, caractérisé en ce que ledit premier élément (10) de réception de connecteur peut être translaté transversalement à plusieurs rangées de connecteurs électriques différents (C1 et C2) avancés dans une disposition parallèle vers le premier élément (10) de réception de connecteur.

teur, afin de sélectionner un connecteur (C1 ou C2) parmi l'une quelconque desdites rangées pour le poser sur le câble (FFC).

4. Appareil selon la revendication 1, 2 ou 3, à utiliser avec des connecteurs (C1 et C2) comportant chacun un corps (CB1 ou CB2) de connecteur disposé de façon à s'accoupler avec un capot (CO1 ou CO2) comportant des moyens (WP) d'enfoncement de conducteurs destinés à introduire à force les conducteurs du câble (FFC) dans les parties (RP) de réception de conducteur du câble des bornes (T1 et T2) ; caractérisé en ce que les corps de connecteurs (CB1 et CB2) sont amenés au premier élément (10) de réception de connecteur avec les capots (CO1 et CO2) partiellement accouplés avec eux, un poste (4) de séparation de capots étant prévu entre les deux éléments (10 et 44) de réception de connecteurs pour séparer les capots (CO1 et CO2) des corps de connecteur (CB1 et CB2), le second élément (44) de réception de connecteur présentant deux évidements parallèles (40 et 42) destinés chacun à recevoir un corps de connecteur (CB1 ou CB2) ou un capot (CO1 ou CO2), la presse (54) comportant deux éléments (52 et 58) de pose de connecteur disposés de part et d'autre du câble (FFC) et agencés chacun de façon à recevoir un corps de connecteur (CB1 ou CB2) ou un capot de connecteur (CO1 ou CO2), comme déterminé par ladite position angulaire du second élément (44) de réception de connecteur.
5. Appareil selon la revendication 4, caractérisé en ce que le poste (4) de séparation de capot comprend un support (30) de connecteur monté de façon à effectuer un mouvement alternatif axial et ayant un premier logement (28), destiné à recevoir un connecteur électrique (C1 ou C2) transféré depuis ledit premier élément (10) de réception de connecteur par un premier élément de transfert (26) desdits premiers moyens de transfert (26, 36, 38), dans une première position axiale dudit support (30) de connecteur, des moyens (32) étant prévus pour séparer, dans une seconde position axiale du support (30) de connecteur, le capot (CO1 ou CO2) du corps de connecteur (CB1 ou CB2) dans ledit premier logement (28) et pour amener le capot dans un deuxième logement (124) espacé du support (30) de connecteur à angle droit avec sa direction de déplacement, lesdits évidements (40 et 42) dans ledit second élément (44) de réception de connecteur étant alignés chacun avec l'un, respectif, desdits

premier et deuxième logements (28 et 124) dans une position angulaire donnée dudit second élément (44) de réception de connecteur pour le transfert du corps de connecteur (CB1 ou CB2) et du capot de connecteur (CO1 ou CO2) par des seconds éléments de transfert (36 et 38) desdits premiers moyens de transfert (26, 36, 38) depuis leurs logements respectifs (28 et 124) jusque dans certains, respectifs, des évidements (40 et 42) du second élément (44) de réception de connecteur.

6. Appareil selon la revendication 5, caractérisé en ce que ledit premier élément de transfert se présente sous la forme d'un poussoir (26) ayant une unité d'entraînement (88) destinée à le faire avancer pour entraîner un connecteur (C1 ou C2) situé dans les premiers moyens (10) de réception de connecteur jusque dans ledit premier logement (28), dans ladite première position axiale du support (30) de connecteur, lesdits seconds éléments de transfert comprenant une première paire de poussoirs (36 et 38) ayant des moyens d'entraînement (146) destinés à les faire avancer pour entraîner un corps de connecteur (CB1 ou CB2) situé dans ledit premier logement (28) et un capot de connecteur (CO1 ou CO2) situé dans ledit deuxième logement (124), chacun jusque dans un évidement respectif (40 ou 42) du second élément (44) de réception de connecteur, lesdits seconds moyens de transfert comprenant une seconde paire de poussoirs (46 et 48) ayant des moyens d'entraînement (152) destinés à les faire avancer pour entraîner un corps de connecteur (CB1 ou CB2) situé dans un évidement (40 ou 42) du second élément (44) de réception de connecteur et un capot (CO1 ou CO2) de connecteur dans l'autre évidement (40 ou 42) de cet élément dans un logement respectif (50 ou 56) de l'un, respectif, desdits éléments (52 et 58) de pose de connecteur.
7. Appareil selon la revendication 5 ou 6, caractérisé en ce que ledit poste de séparation de capot comprend une paire de doigts éjecteurs (32) disposés de façon à chevaucher ledit support (30) de connecteur dans sa seconde position axiale et ayant une unité d'entraînement (104) destinée à faire avancer lesdits doigts (32) pour séparer le capot (CO1 ou CO2) du corps de connecteur (CB1 ou CB2) dans ledit premier logement (28) dans ladite seconde position axiale du support (30) de connecteur et pour entraîner ledit capot (CO1 ou CO2) contre un bras (136), rappelé par ressort, faisant saillie dans ledit second logement (124) afin de

rétracter le bras (136) vers l'extérieur de son logement (124) pour aligner le capot (CO1 ou CO2) situé dans le second logement (124) avec le second élément respectif (38) de transfert.

5

8. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce que le premier élément (10) de réception de connecteur est monté sur un coulisseau (75) destiné à rapprocher et éloigner le premier élément (10) de réception de connecteur de rangées parallèles de premiers et seconds connecteurs (C1 et C2) montés chacun sur une première longueur de ruban adhésif (AT1 ou AT2), ledit coulisseau (75) étant relié à un cylindre pneumatique rotatif (72) destiné à faire tourner une unité (68) d'entraînement à piston et cylindre pour faire tourner le premier élément (10) de réception de connecteur autour de l'axe de ladite tige de piston (66), le cylindre pneumatique rotatif (72) étant relié à des moyens d'entraînement (84) destinés à le translater jusqu'en alignement avec l'une, choisie, desdites rangées de connecteurs (C1 et C2), des moyens étant prévus pour faire avancer chaque longueur de ruban (AT1 et AT2) vers le premier élément (10) de réception de connecteur dans une position avancée du coulisseau (75) afin de placer un connecteur (C1 ou C2) de la rangée respective dans le premier élément (10) de réception de connecteur.
- 10
- 15
- 20
- 25
- 30
9. Appareil selon l'une quelconque des revendications 4 à 7, caractérisé en ce que les éléments (50 et 58) de pose de connecteurs de la presse (54) sont pourvus de moyens d'entraînement distincts (170 et 172) destinés à entraîner sélectivement l'un desdits éléments (52 et 58) de pose vers le câble (FFC) avant l'autre (52 ou 58) de ces éléments.
- 35
- 40
10. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce que lesdits moyens d'avance de câble comprennent un moteur pas à pas (202) accouplé en entraînement à un rouleau (212) d'entraînement de câble au moyen d'un train d'engrenages (204, 208) monté sur un bras (218) rappelé par ressort rappelant ledit rouleau d'entraînement (212) contre le câble (FFC), afin qu'il soit engagé à frottement entre ledit rouleau d'entraînement (212) et un rouleau fou (220) situé sur l'autre côté du câble (FFC).
- 45
- 50

55

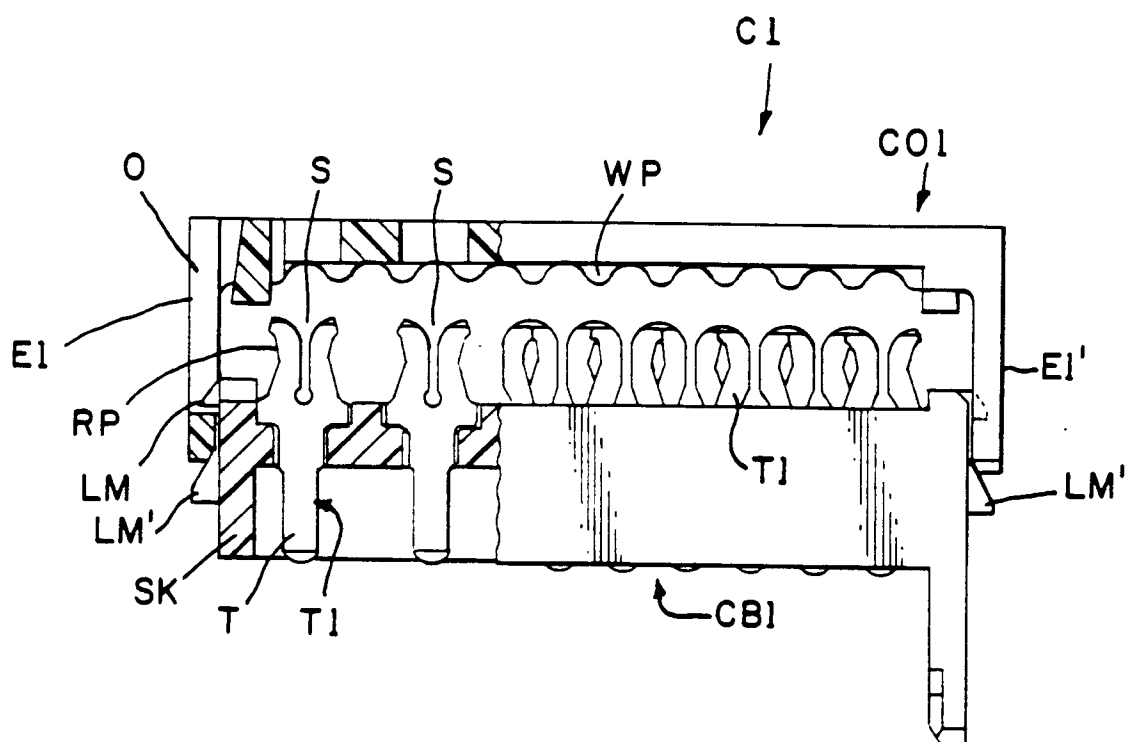


FIG. 1

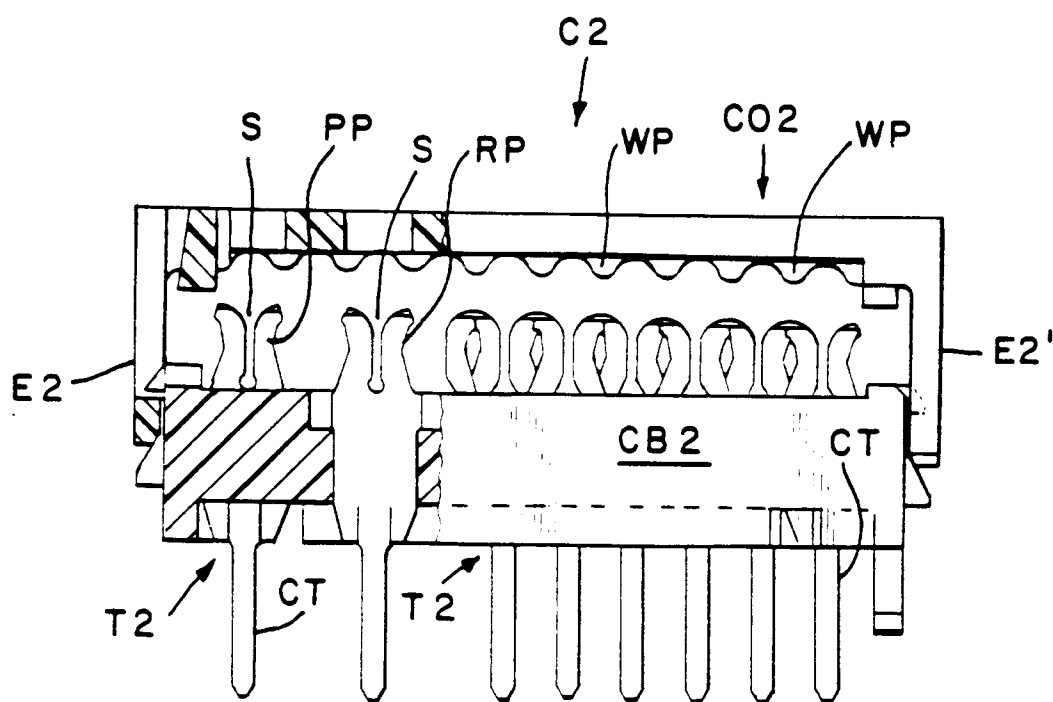
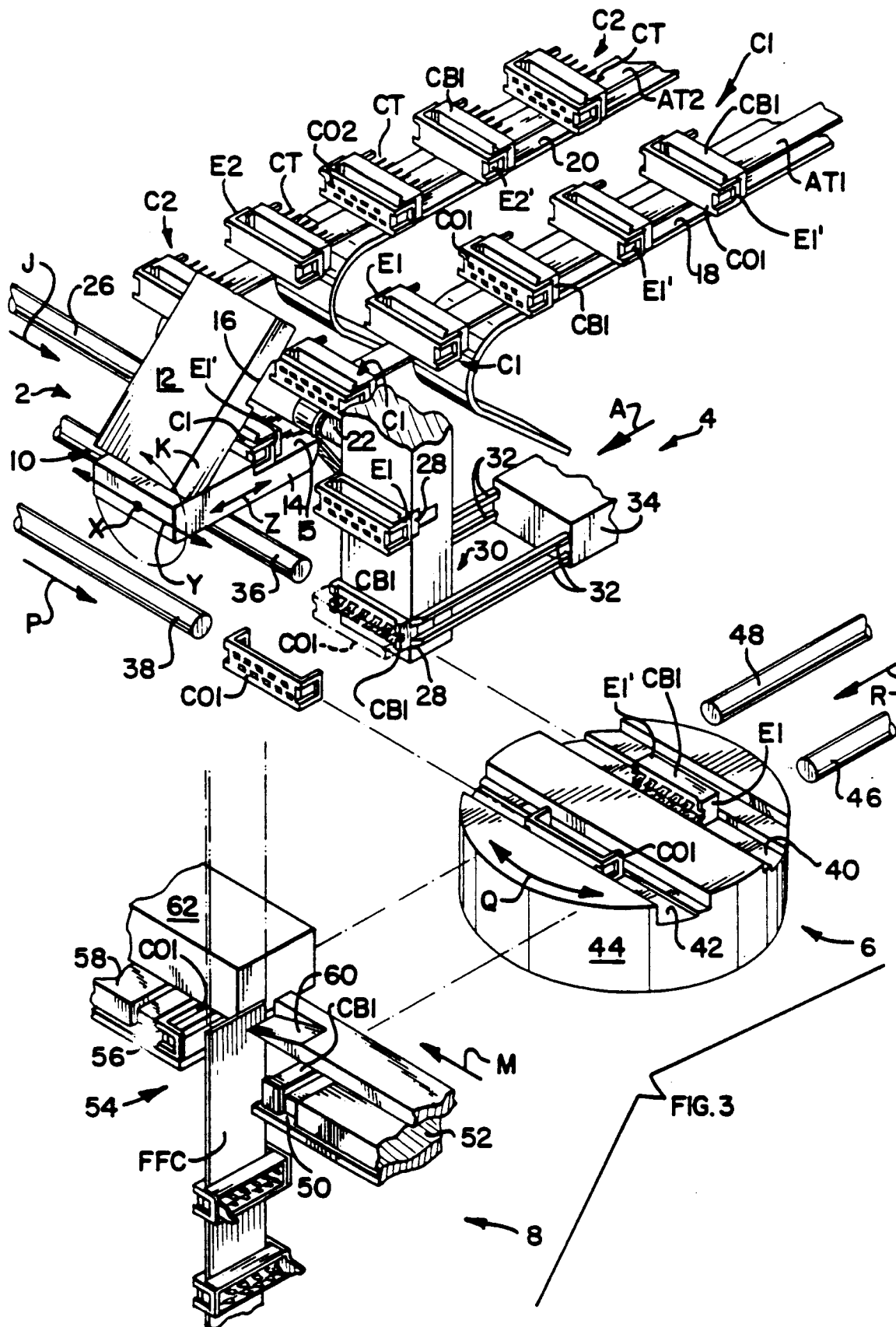


FIG. 2



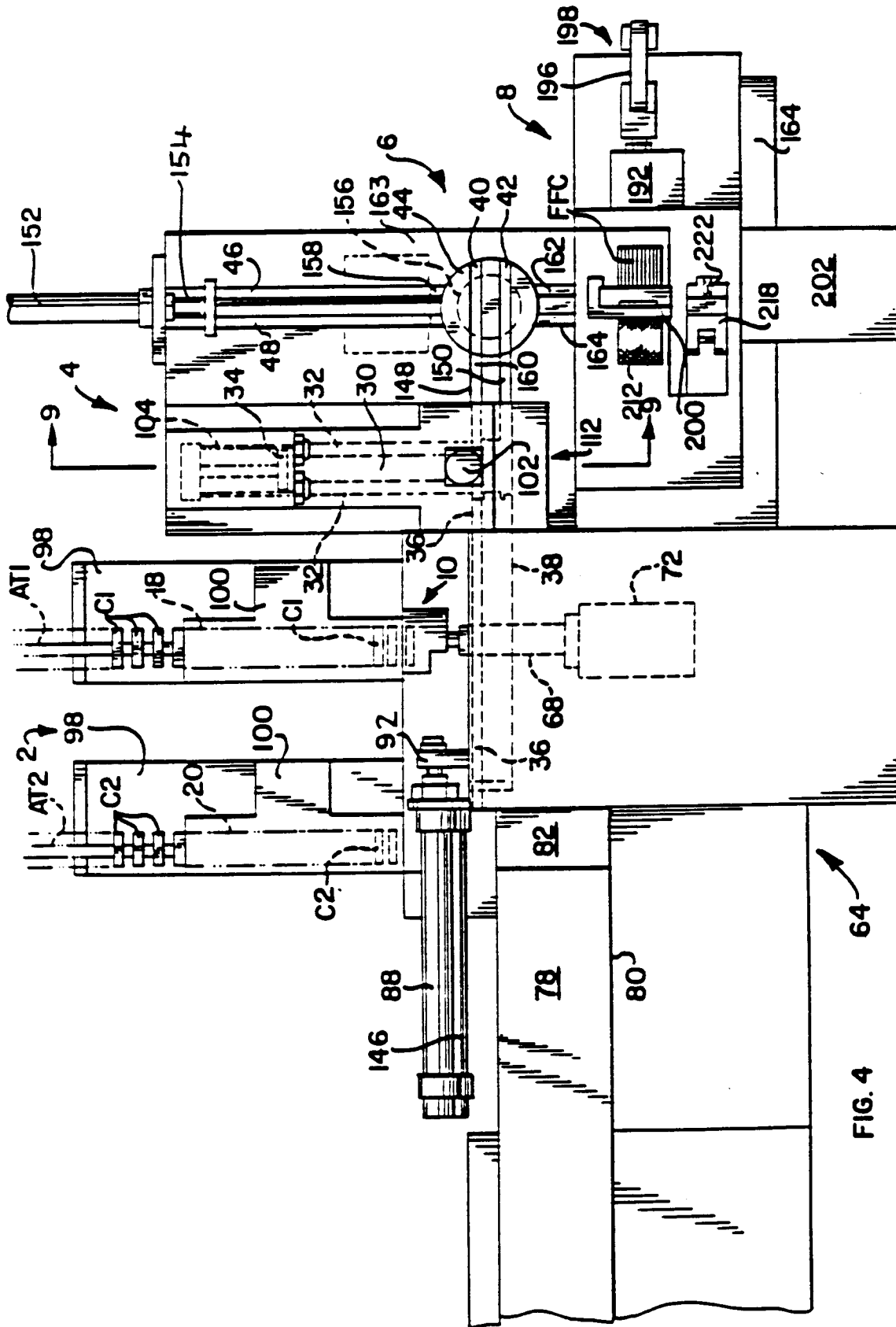
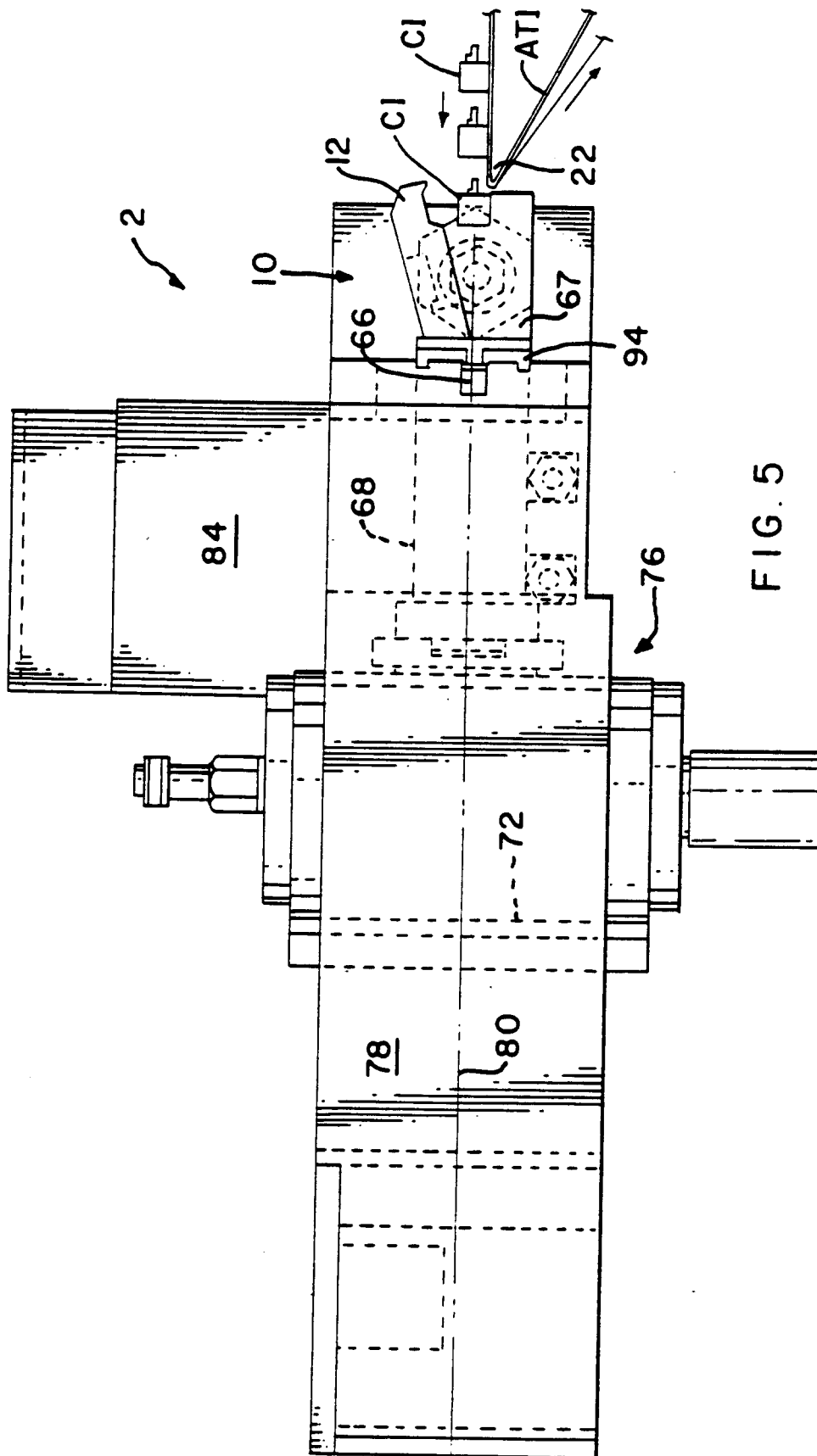
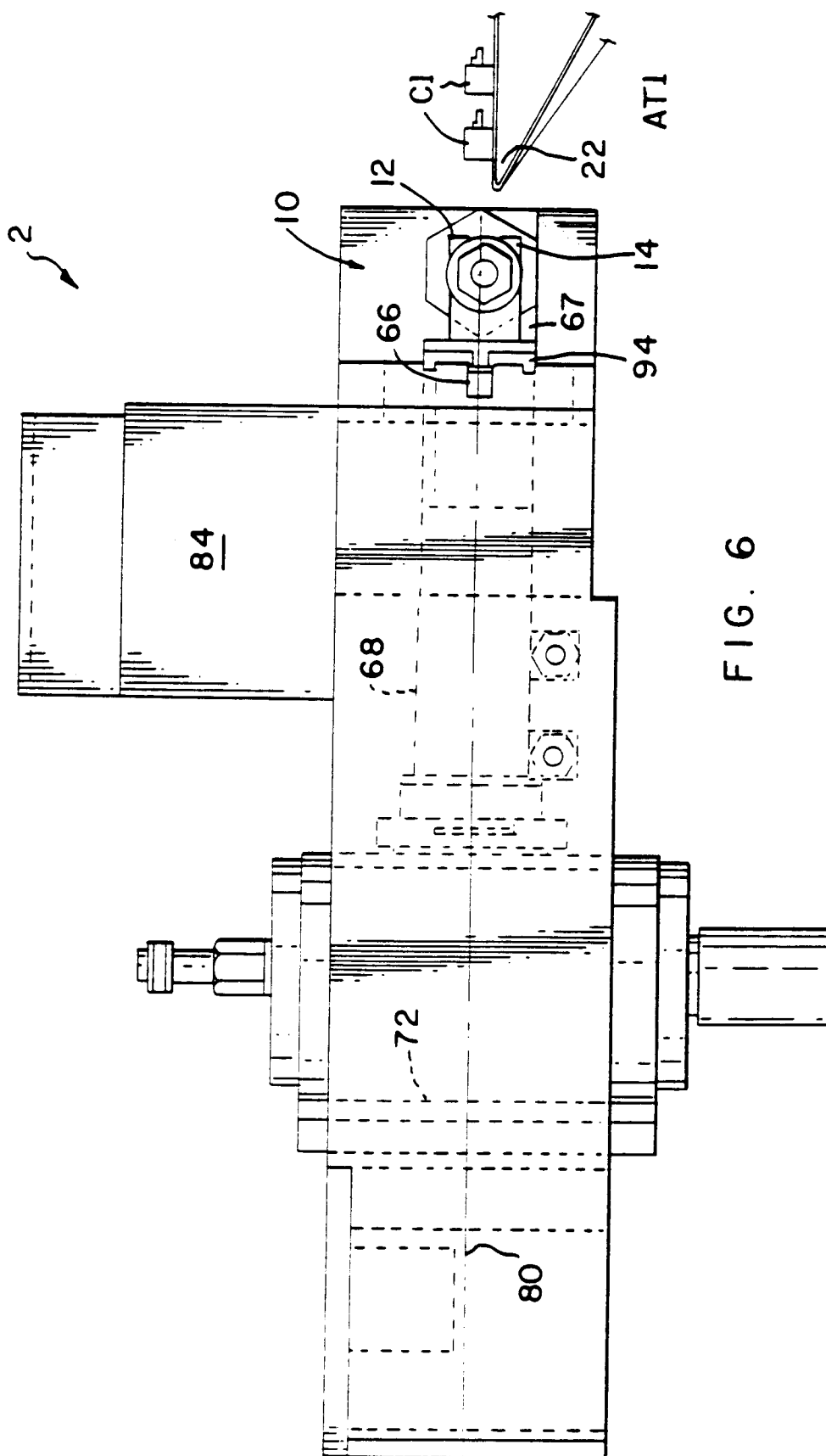
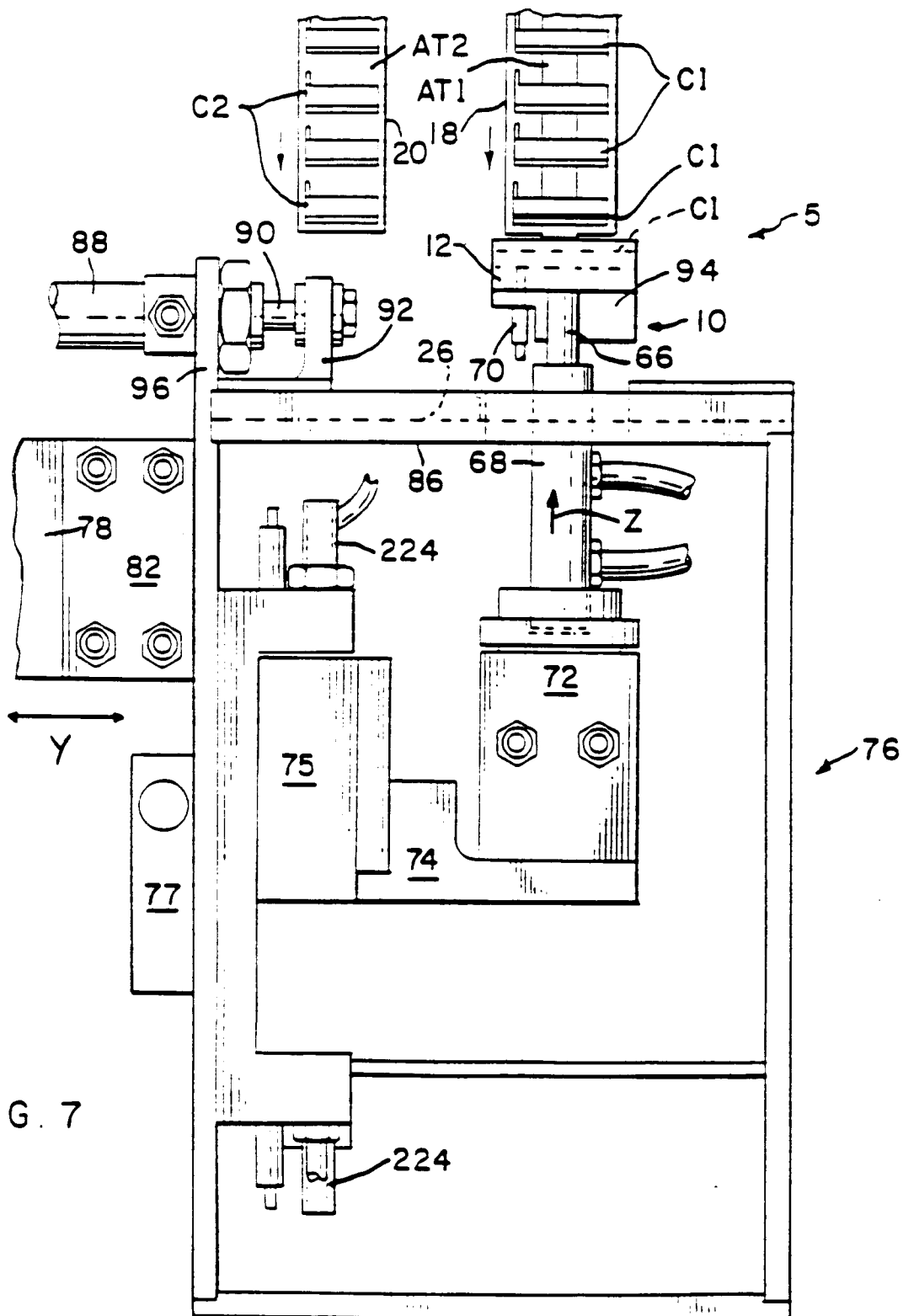


FIG. 4







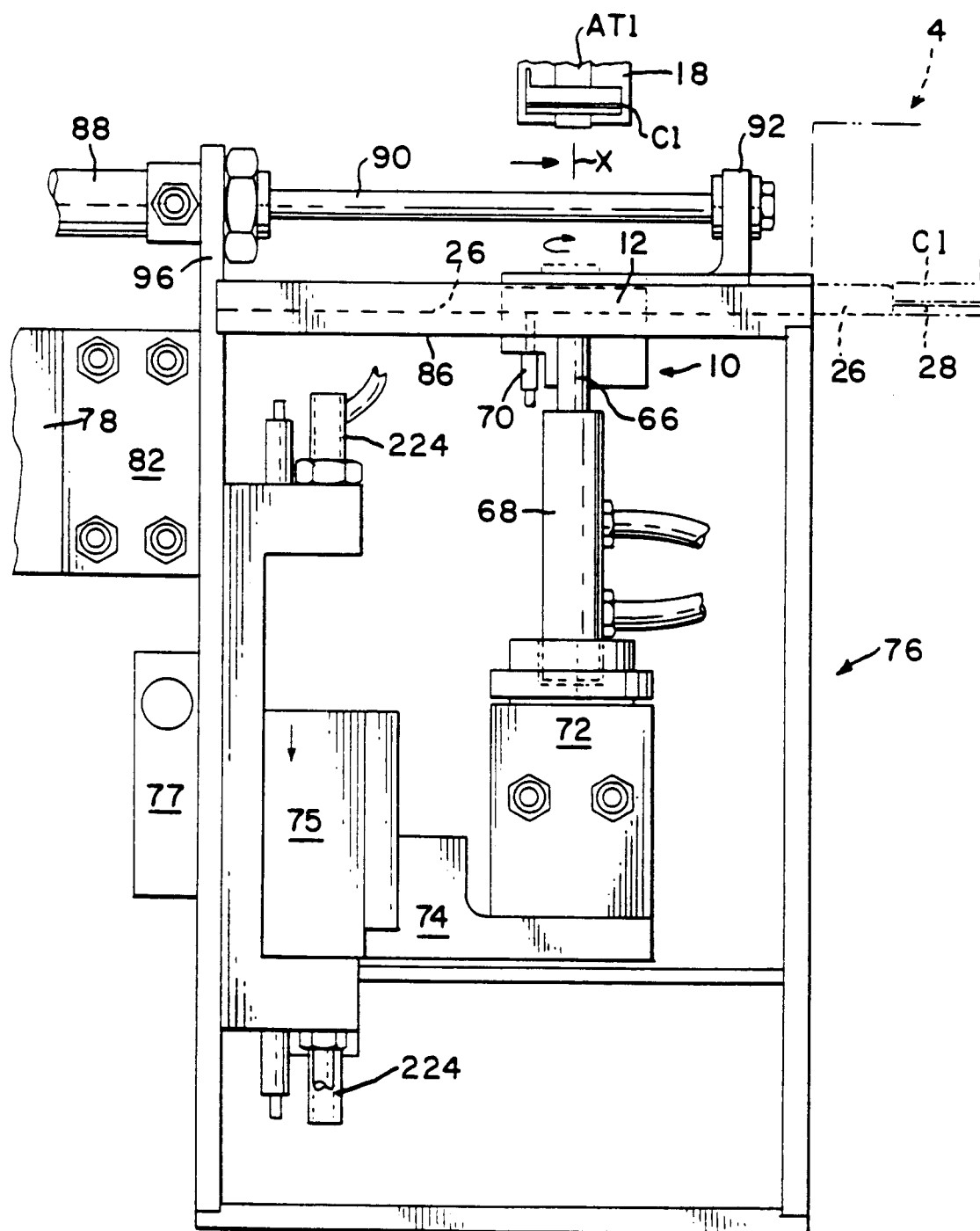


FIG. 8

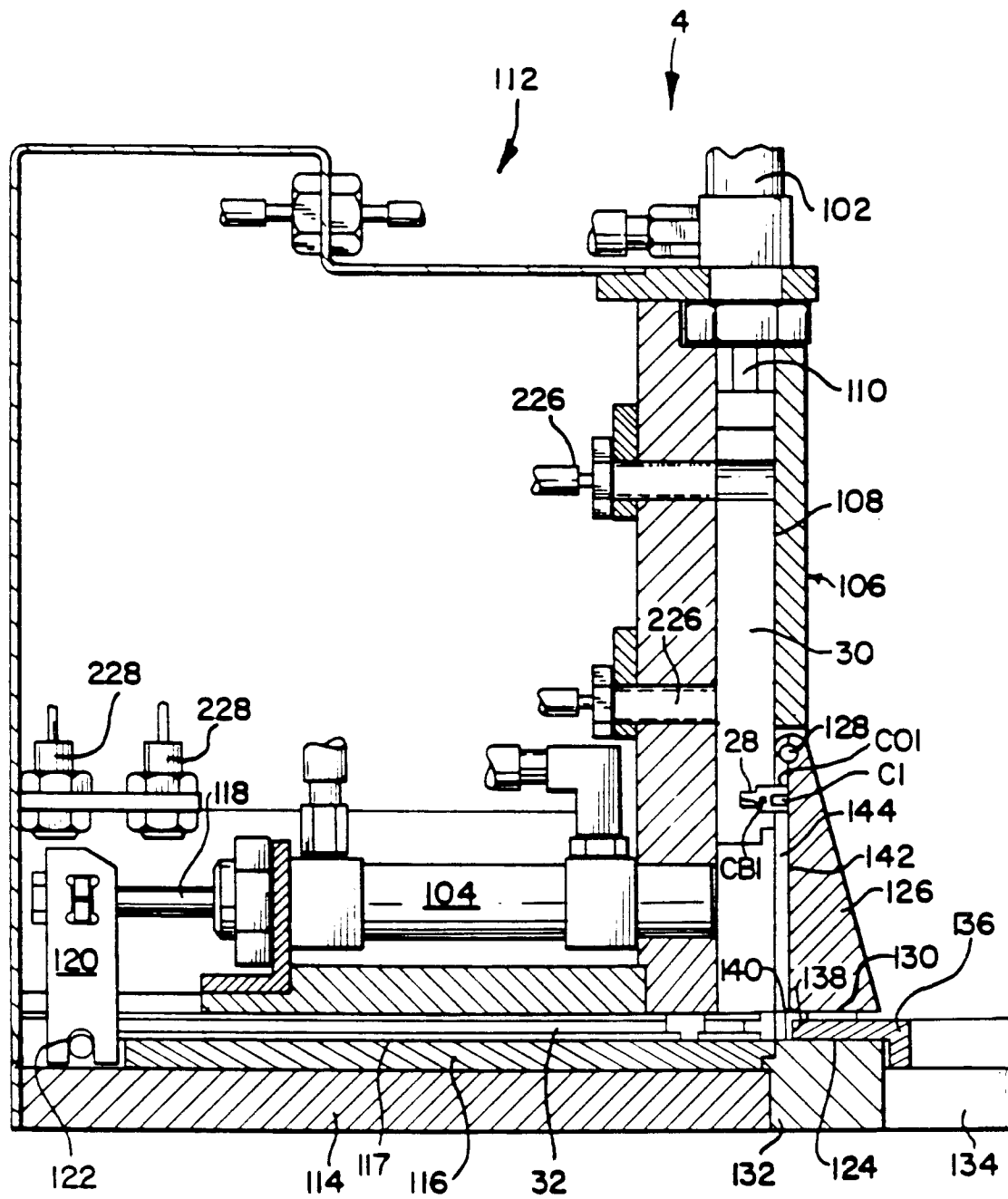


FIG. 9

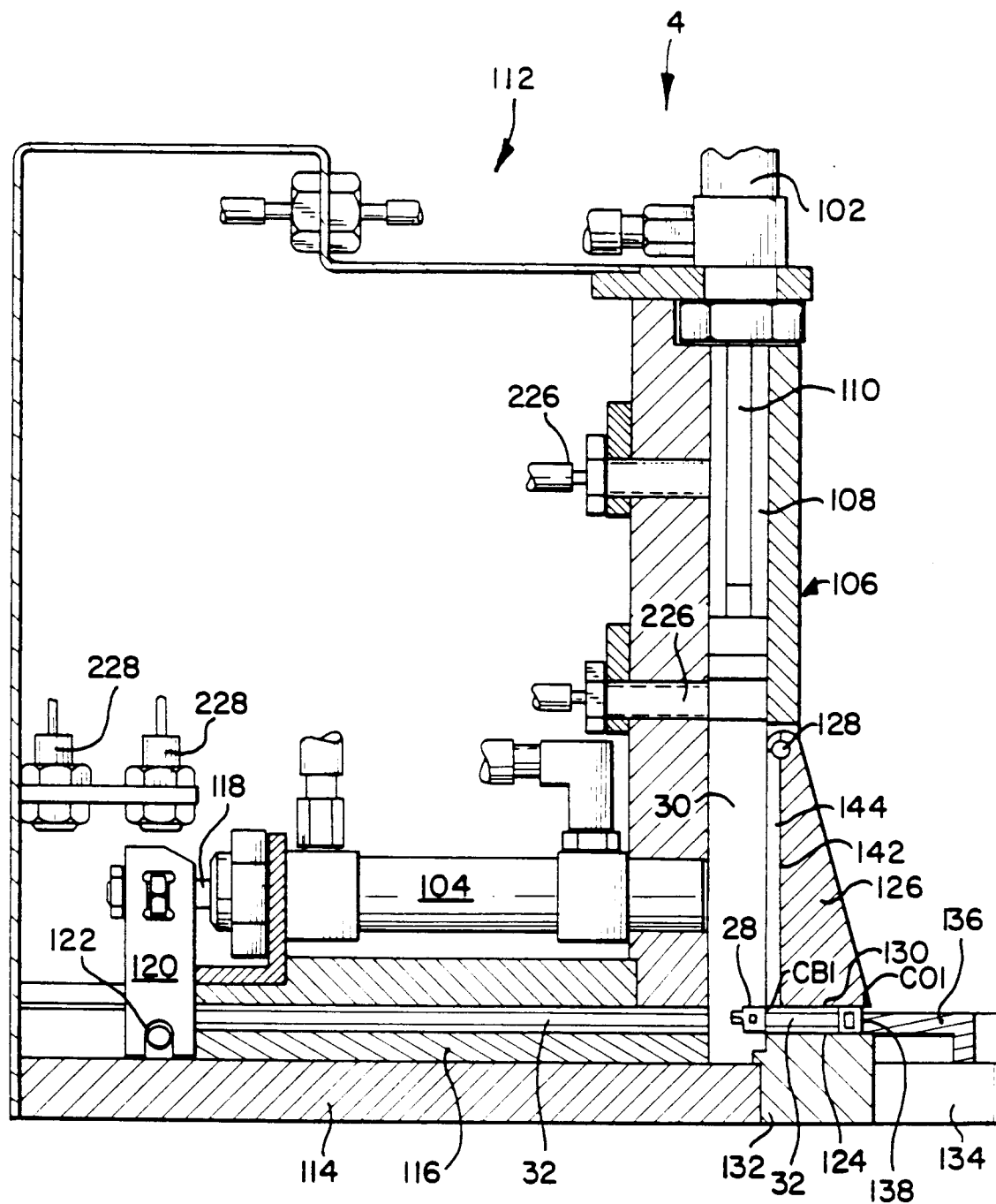


FIG. 10

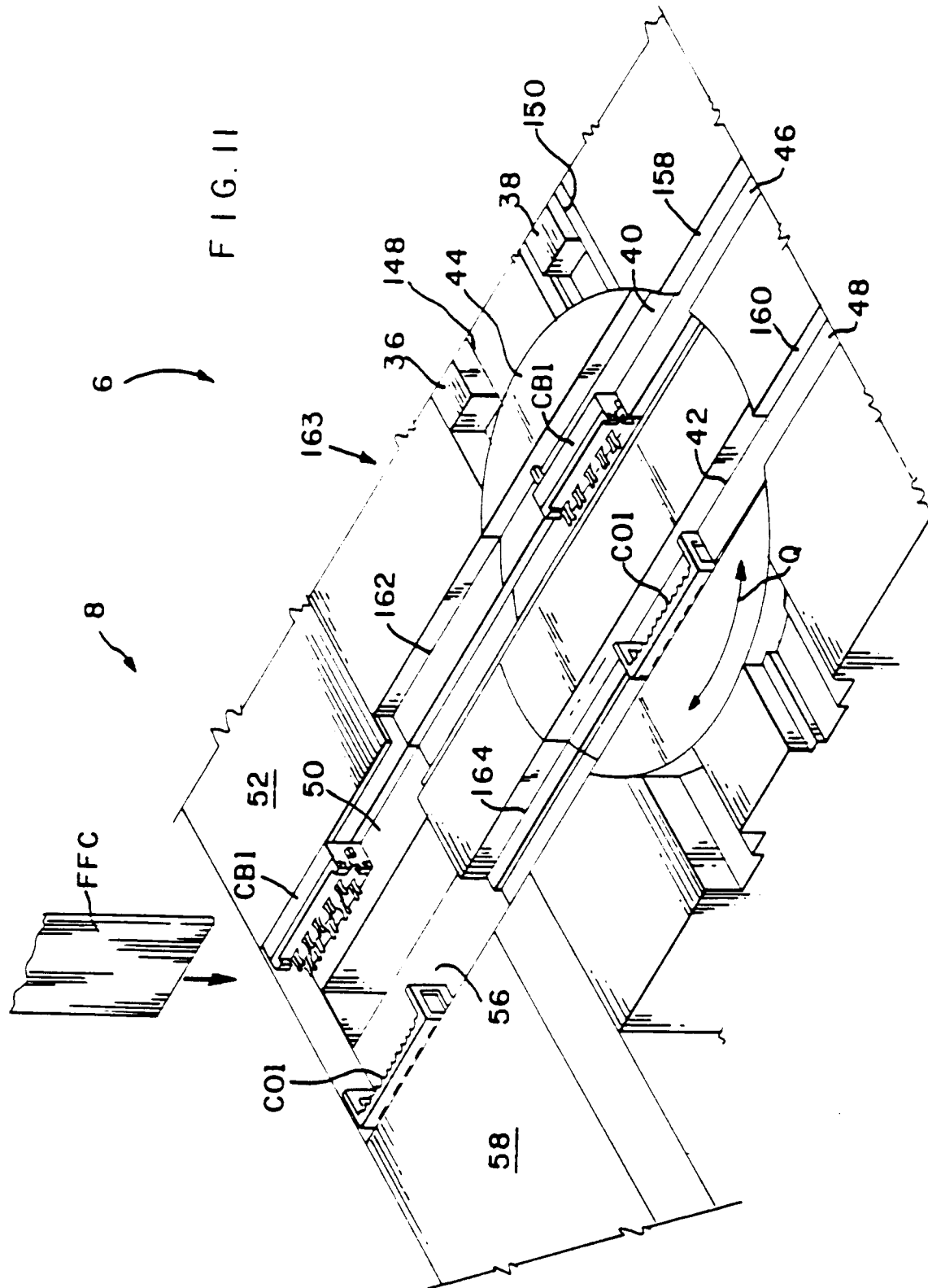
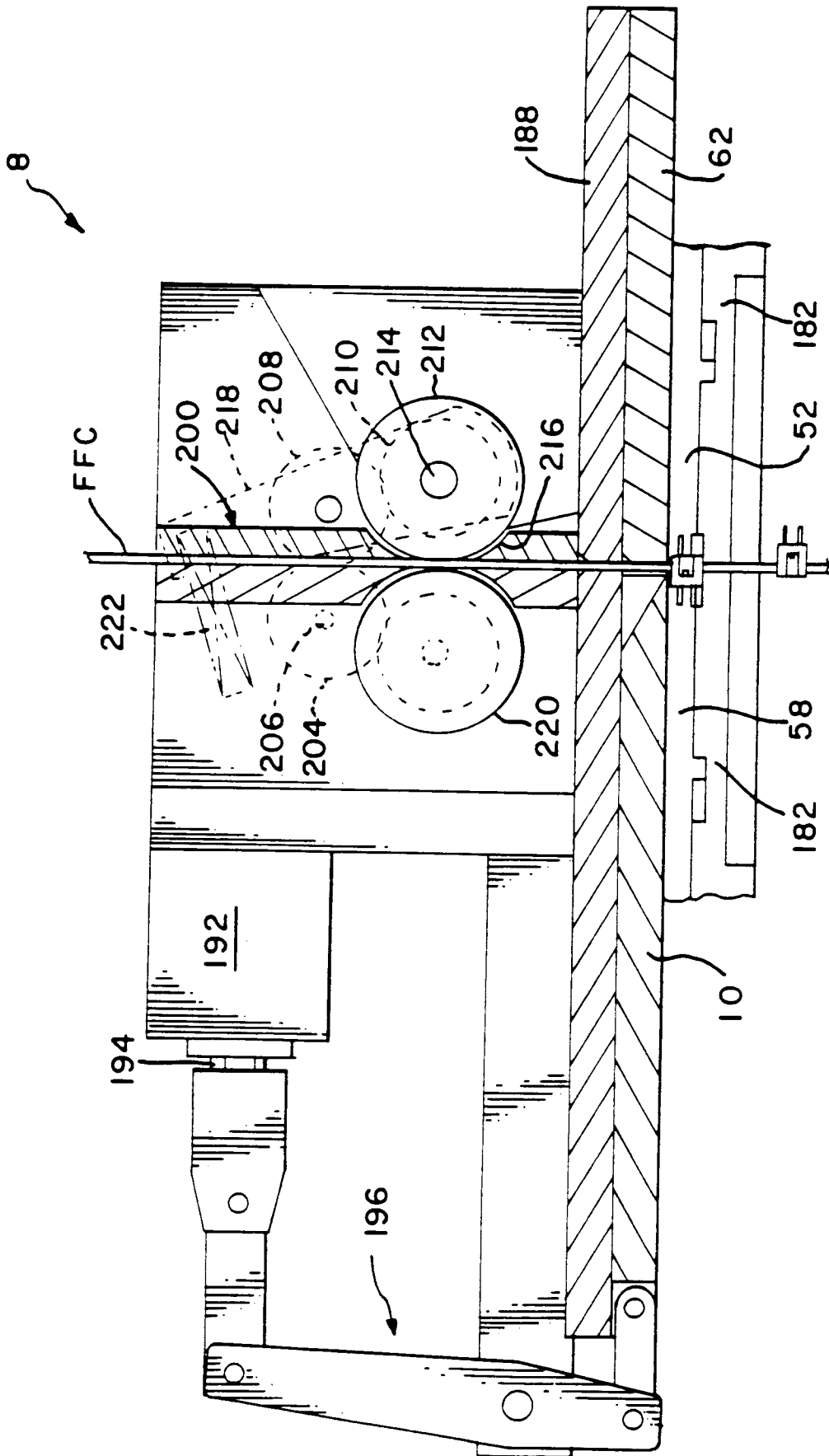
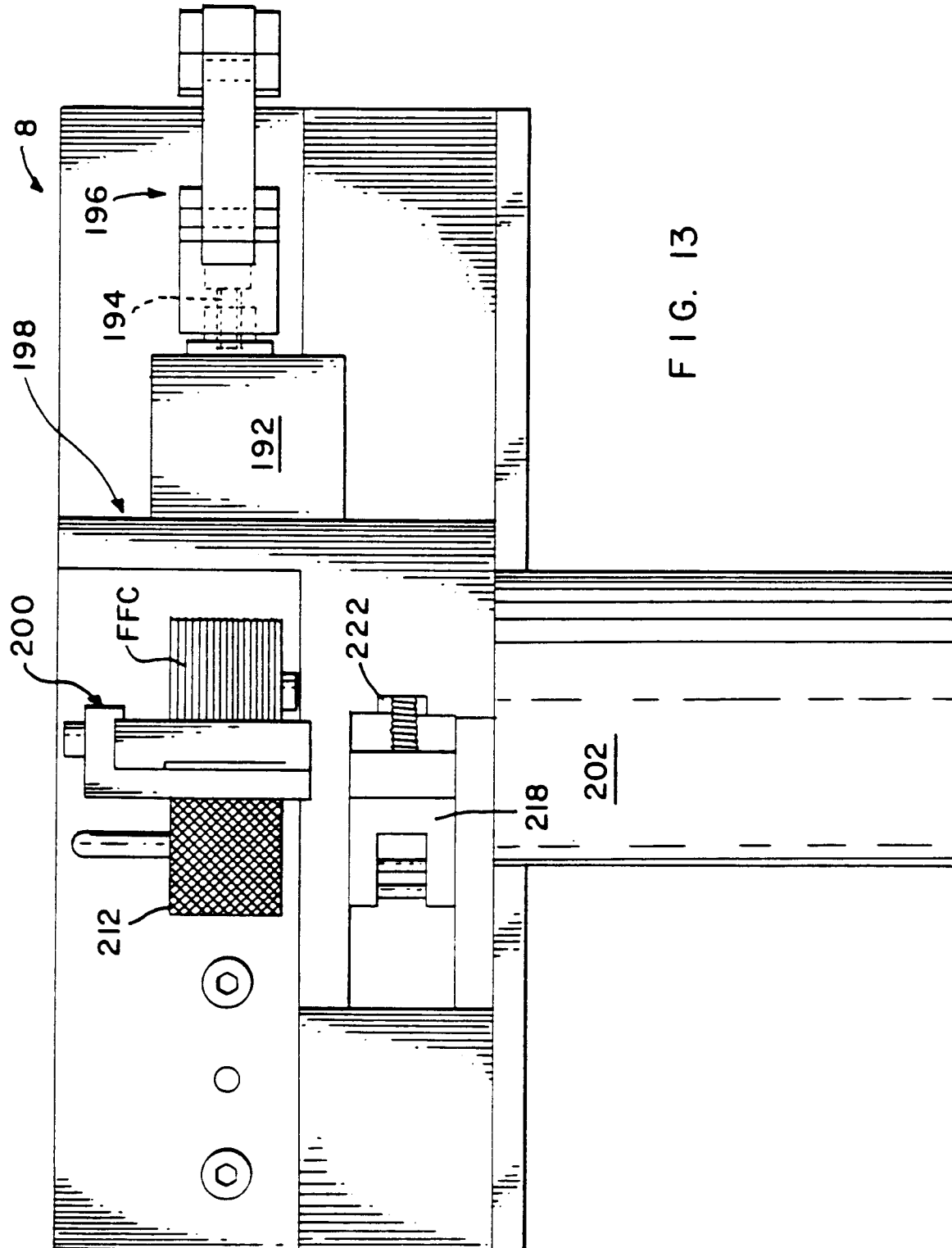
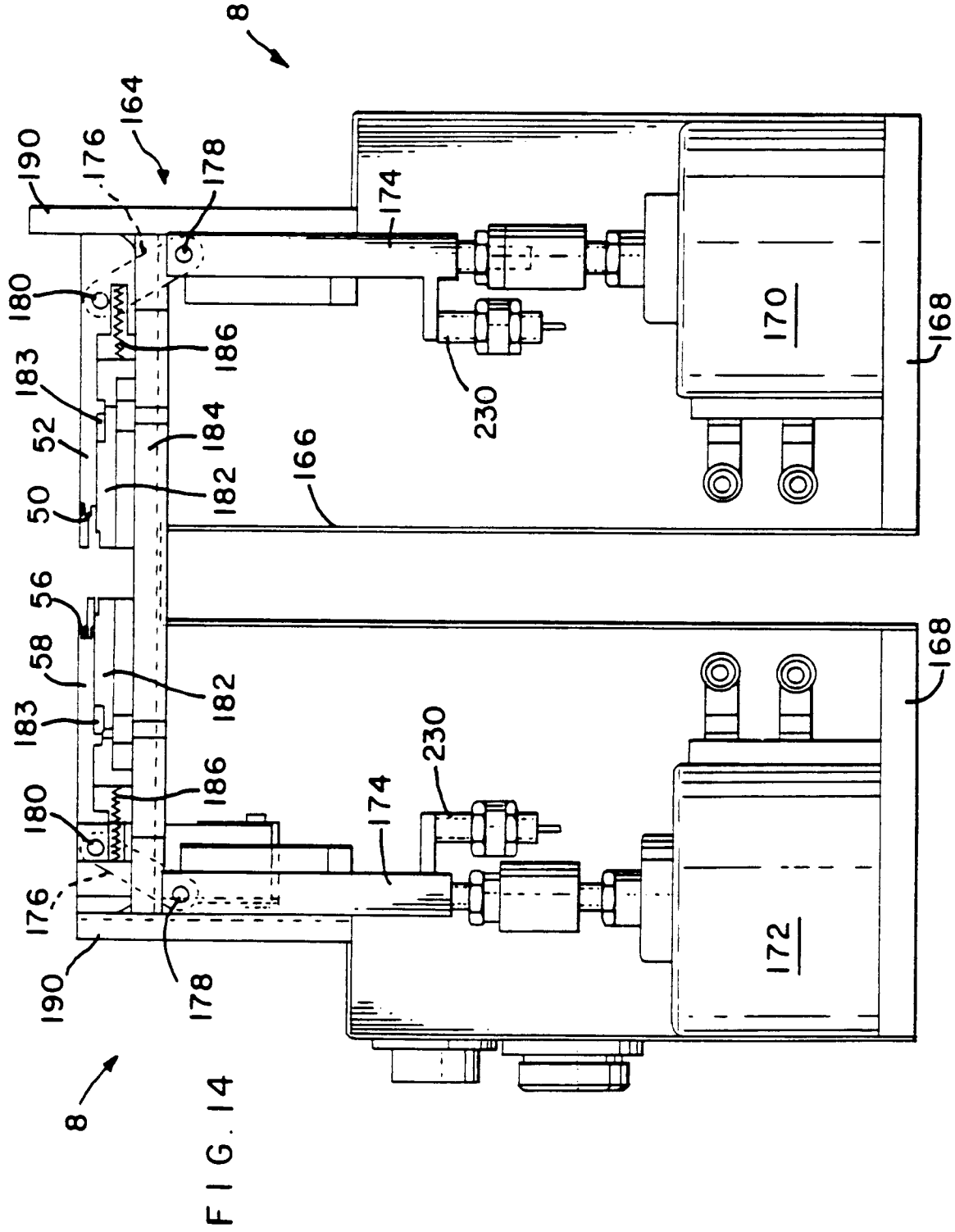


FIG. 12







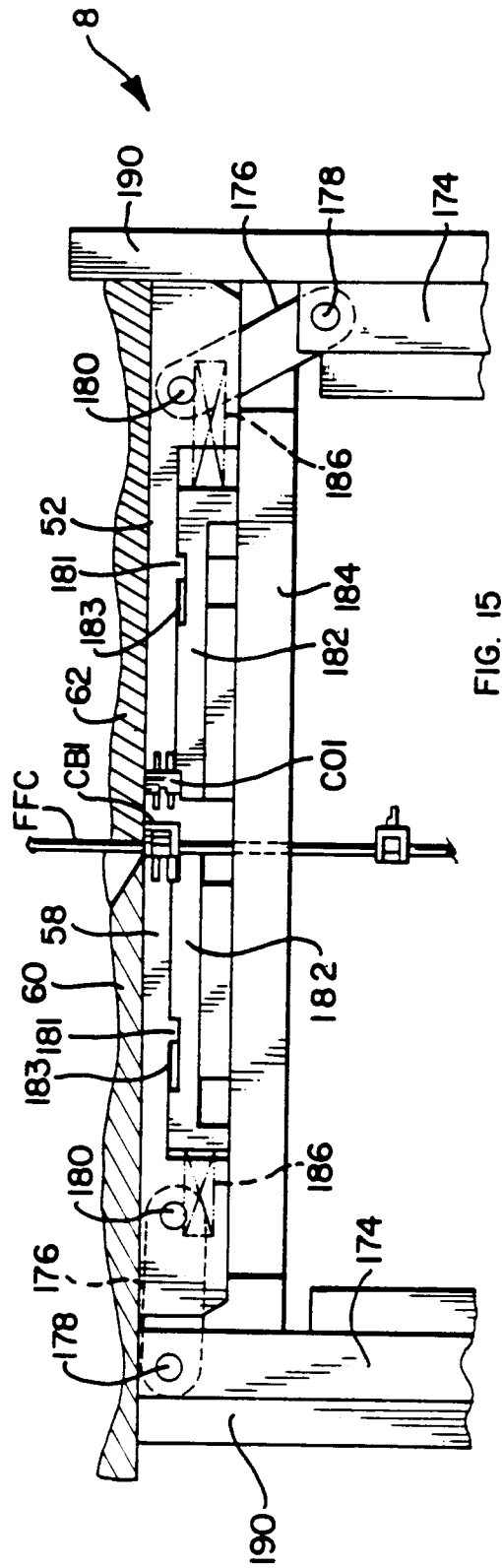


FIG. 15

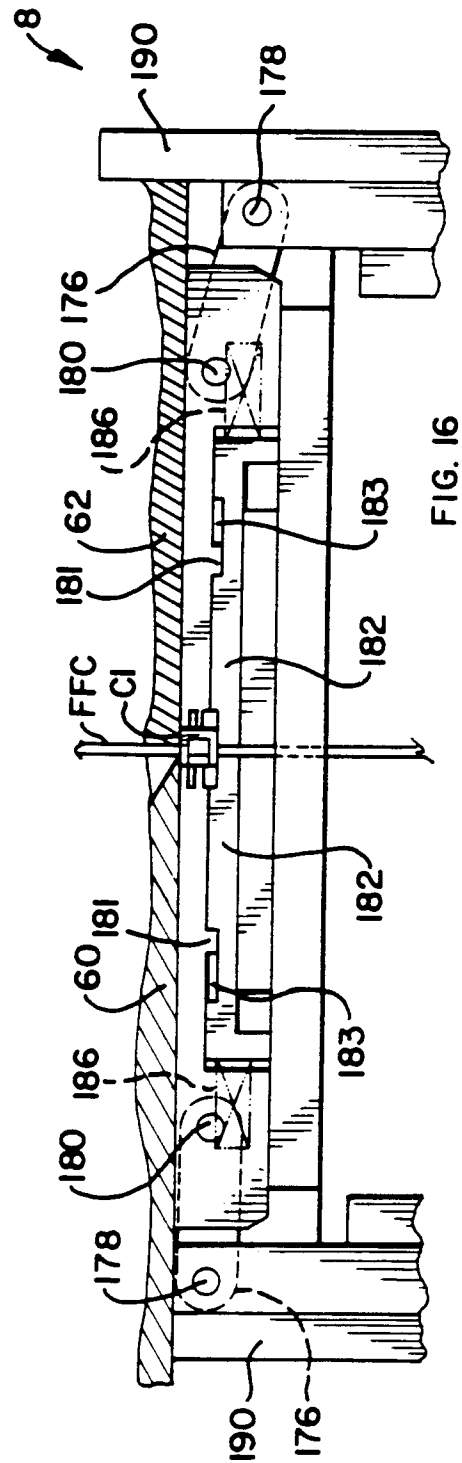


FIG. 16