

Feb. 27, 1968

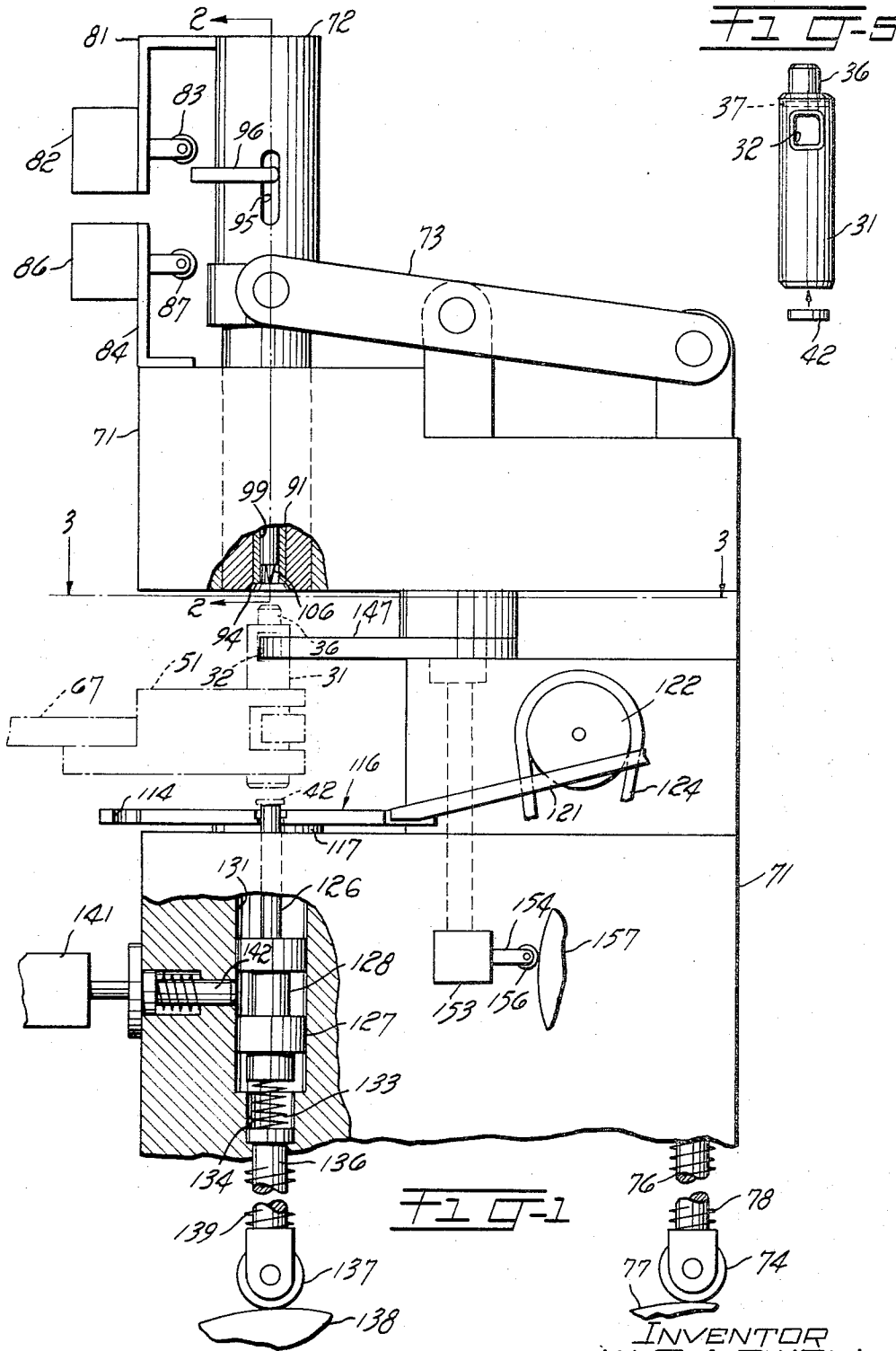
W. T. NOWELL

3,370,338

ASSEMBLY APPARATUS

Filed Sept. 27, 1965

2 Sheets-Sheet 1



INVENTOR
W. T. NOWELL
BY M. A. Adams
ATTORNEY

Feb. 27, 1968

W. T. NOWELL

3,370,338

ASSEMBLY APPARATUS

Filed Sept. 27, 1965

2 Sheets-Sheet 2

FIG-3

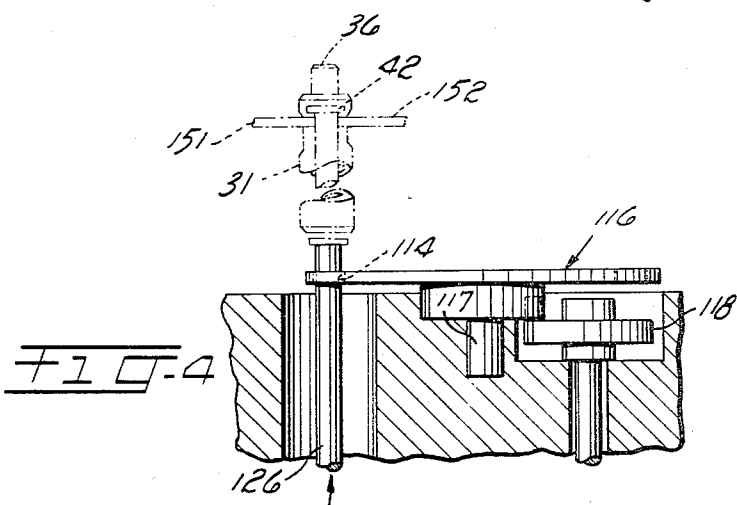
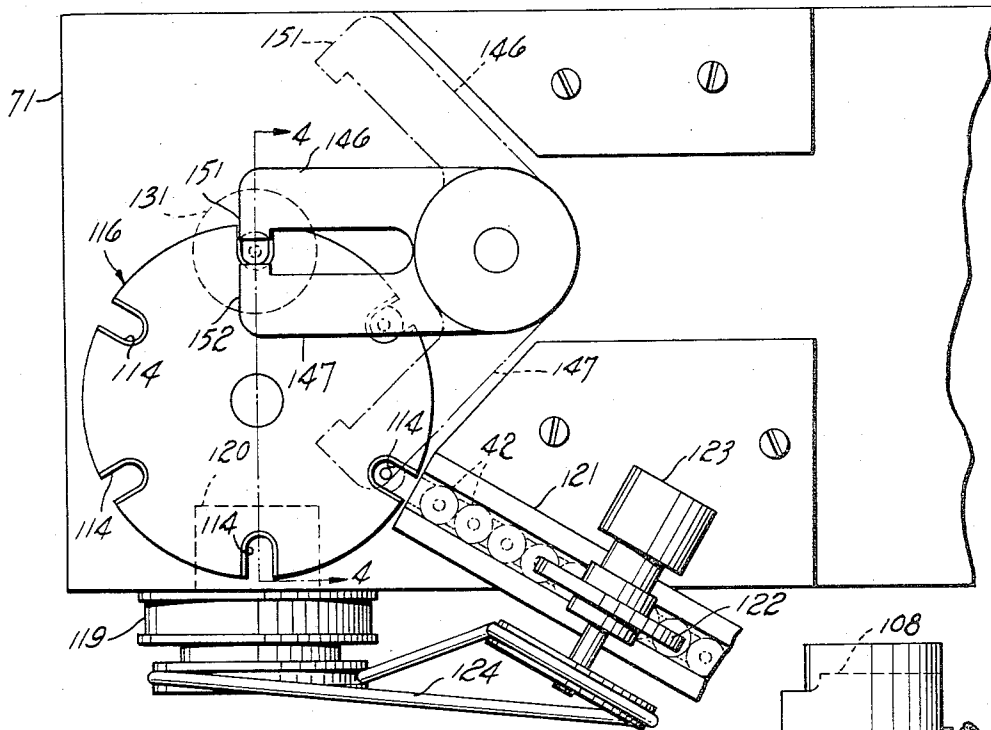


FIG-4

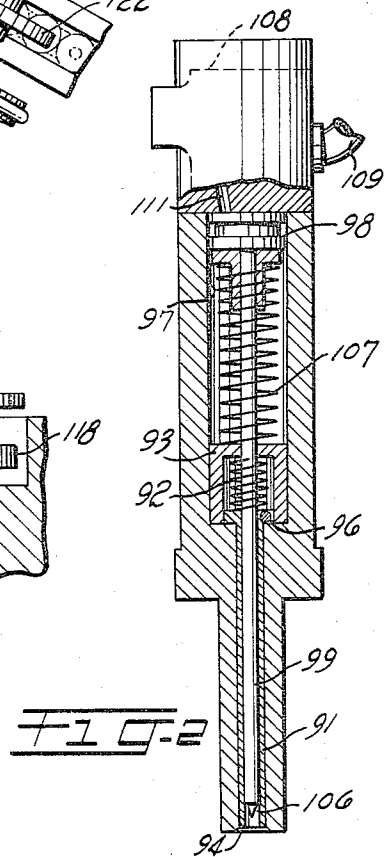


FIG-2

1

3,370,338

ASSEMBLY APPARATUS

Winford T. Nowell, Groveland, Mass., assignor to Western Electric Company, Incorporated, New York, N.Y., a corporation of New York

Filed Sept. 27, 1965, Ser. No. 490,558

4 Claims. (Cl. 29—203)

ABSTRACT OF THE DISCLOSURE

An assembly apparatus for assembling a disc in a prescribed location within a hollow cylindrical body having openings wherein the disc is inserted in a position within the body adjacent the openings and a pair of jaws move into the openings beneath the disc to support it while a ram crimps wall portions of the body adjacent the openings against the jaws to secure the disc in place.

This invention relates to an assembly apparatus, and more particularly to an apparatus for assembling insulating discs beneath terminal caps within hollow cylindrical bodies and securing the discs in place in the manufacture of coaxial cable connectors.

This application is copending with N. J. Mandonas et al. application Ser. No. 490,514, N. J. Mandonas application Ser. No. 490,618, and N. J. Mandonas et al. application Ser. No. 490,619, all filed Sept. 27, 1963 concurrently with and assigned to the same assignee as this application.

In the manufacture of coaxial cable connectors as practiced before this invention, the various parts comprising the connectors were assembled together and tested manually. These parts must be accurately positioned with respect to one another; thus, the manual assembly, positioning, and testing thereof were tedious and time consuming. Consequently, a need arose for automatic facilities for assembling the component parts of coaxial cable connectors accurately, quickly, and economically.

Accordingly, an object of this invention is to provide a new and improved automatic assembly apparatus.

Another object is to provide an apparatus for assembling insulating discs beneath terminal caps within hollow cylindrical bodies and securing the discs in place in the manufacture of coaxial cable connectors. A related object is to provide such an apparatus for automatically assembling the discs and the connector bodies accurately, quickly, and economically.

With these and other objects in view, the present invention contemplates an apparatus for advancing an insulating disc to a position beneath a hollow cylindrical body of a coaxial cable connector, the body having a terminal cap located thereon. After arrival in such position, the disc is advanced upwardly into the body to a position just beneath the cap, and is thereafter secured in place.

Other objects and advantages of the invention will become apparent by reference to the following detailed specification and accompanying drawings, wherein:

FIG. 1 is a side view of an apparatus for assembling an insulating disc beneath a terminal cap within a hollow cylindrical body, incorporating certain principles of the invention;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a view taken along line 3—3 of FIG. 1 and shows a Geneva wheel and a pair of movable jaws mounted in alignment with one of the positions of the wheel;

FIG. 4 is a partial sectional view taken along line 4—4

2

of FIG. 3 and shows a rod supporting an insulating disc within a cylindrical body; and

FIG. 5 is a view showing an insulating disc just prior to being inserted into a cylindrical body.

Referring first to FIG. 5, there is shown a hollow cylindrical body 31 having a pair of oppositely disposed windows 32 formed through the walls of the body. A terminal cap 36, having a base rim 37, is mounted on top of body 31. An insulating disc 42 is to be inserted into body 31 in a prescribed position below and abutting cap 36 within body 31 by the apparatus of this invention. Body 31 is supported in a fixture 51 (FIG. 1) which is mounted on a carrier 67, such as an indexing chain or conveyor.

With reference to FIG. 1, the apparatus includes a frame 71 in which is slidably mounted a ram 72. Ram 72 is reciprocably movable in a vertical plane by a linkage 73 which is connected to a cam follower 74 by a rod 76. Cam follower 74 is urged into contact with a cam 77 by a spring 78.

Mounted on a bracket 81, attached to the top of ram 72, is a switch 82 having a switch arm 83. Mounted on a bracket 84, attached to housing 71, is another switch 86 having a switch arm 87.

As shown in FIGS. 1 and 2, ram 72 includes a sleeve 91 slidably mounted therein which is urged downwardly by a spring 92 contained in a cap 93 (FIG. 2). Ram 72 has a chamfer 94 formed on its lower end. A pin 96 is mounted on sleeve 91 and extends through an opening 95 (FIG. 1) in ram 72 and is aligned with switch arms 83 and 87. Ram 72 includes a cylinder 97 which contains a piston head 98 to which is attached a piston rod 99 having a pointed tip 106 formed on its lower end. Rod 99 is slidably mounted for vertical movement within sleeve 91 and is urged upwardly within cylinder 97 by a spring 107. A solenoid operated valve 108, shown schematically, is mounted in the top of ram 72 and controls the passage of air from an air supply (not shown) through an air hose 109 to a passageway 111 which leads into cylinder 97.

Referring to FIGS. 1 and 3, a Geneva wheel 116 has a plurality of slots 114 formed therein. Wheel 116 is mounted in a bearing support 117 and is indexed by a gear 118 (FIG. 4) which is driven by a shaft coupled through a gear box 120 to motor 119 (FIG. 3). A track 121 is tilted from the horizontal (FIG. 1) and has its lowermost end located adjacent to wheel 116. Track 121 has a supply of insulating discs 42 fed thereto by a conventional feeding mechanism (not shown). A slight pressure is maintained on discs 42 by a brush 122 mounted in a support 123 on frame 71. Brush 122 is driven by a belt 124 which is driven by motor 119.

A push rod 126 (FIG. 1) is connected to a piston 127 having a notch 128 formed therein, and is aligned with rod 99 of ram 72. Piston 127 is movable in a vertical plane within a cylinder 131 formed in frame 71. Another rod 136 is mounted for reciprocal movement in a vertical plane within another cylinder 134 formed in frame 71, and is separated from piston 127 by a spring 133. Rod 136 has mounted on its lower end a cam follower 137 which is urged into contact with a cam 138 by a spring 139. A solenoid 141 (FIG. 1) is mounted on frame 71 and has an armature connected to a spring-biased plunger 142 which is aligned with notch 128 in piston 127.

A pair of arms 146 and 147 (FIG. 3) have jaws 151 and 152 formed on the ends thereof, respectively. Arms 146 and 147 are operated from the solid line position to the dotted line position, shown in FIG. 3, through a ratchet mechanism 153, shown schematically. Ratchet mechanism 153 is driven by a rod 154 having a cam follower 156 mounted on the end thereof which is in contact with a cam 157.

Cams 77, 138, and 157 are all driven in proper sequence by motor 119 through gear box 120.

Operation

In the operation of the apparatus of this invention, fixture 51 advances body 31 to the work position; that is, body 31 is vertically aligned with rod 99 contained in ram 72 and rod 126 connected to piston 127. Fixture 51 and body 31 may be advanced by carrier 67 from Station II of an assembly apparatus disclosed in N. J. Mandonas et al. application Ser. No. 490,514.

As fixture 51 and body 31 are indexed to the work position, wheel 116 is also indexed to position a slot 114, having a disc 42 contained therein, just below body 31 (FIG. 1). Brush 122 maintains a slight pressure on the insulating disc 42 in track 121, so that the first disc 42 of the row of discs is urged into slot 114 when that slot stops at a position opposite track 121 (FIG. 3).

Assuming that the fixture 51 has been advanced to the work position and wheel 116 has indexed a disc 42 to a position aligned with rod 126, cam 77 rotates to move ram 72 downwardly until chamfer 94 meets the top of body 31. During the downward movement of ram 72, sleeve 91 is urged upwardly against spring 92 by terminal cap 36, so that pin 96 actuates switch arm 83 of switch 82. Upon actuation of switch 82, solenoid valve 108 admits air through hose 109 to passageway 111 and into cylinder 97. This air pressure acts on piston head 98 to move piston rod 99 downwardly so that tip 106 of rod 99 is moved through terminal cap 36 and body 31 to enter the opening in disc 42.

Substantially simultaneously with the downward movement of rod 99, cam 138 rotates to move piston rod 126 upwardly, so that tip 106 of rod 99 clamps disc 42 to rod 126. Rod 126 continues to move upwardly so that disc 42 is moved upwardly to abut rim 37 of cap 36. With push rod 126 at the top of its stroke, cam 157 rotates to operate arms 146 and 147, thereby moving jaws 151 and 152 into windows 32 of body 31 to support disc 42 (FIG. 4). Thereafter, rod 99 is returned to its initial position by spring 107, and rod 126 is returned to its initial position by completion of a cycle of cam 138.

Ram 72 is then moved downwardly further, so that chamfer 94 rolls the top of body 31 over and pushes body 31 downward slightly to crimp the top of windows 32 against jaws 151 and 152, thereby staking disc 42 in place. Cams 77 and 156 are rotated to complete a cycle thereof, thereby moving ram 72 and arms 146 and 147 to their initial positions.

In the event that a body 31 is indexed to the work position without a terminal cap 36 located on the top thereof, sleeve 91 is not depressed when ram 72 is moved downward and pin 96 actuates switch arm 87 of switch 86. Upon actuation of switch 86, a circuit (not shown) is completed to energize solenoid 141 which moves plunger 142 into notch 128 of piston 127. Therefore, when cam 138 is rotated, spring 133 is merely depressed and rod 126 is precluded from moving a disc 42 upwardly.

It is to be understood that the above-described embodiment is merely illustrative of the principles of the invention and other embodiments may be devised without departing from the scope of the invention.

What is claimed is:

1. An apparatus for assembling a disc in a prescribed location within a hollow cylindrical body member having openings formed through the walls thereof, comprising: a plurality of fixtures for holding the body members, a carrier for sequentially indexing the fixtures to a predetermined work position, means for advancing a disc to a location below the body member in the work position,

means for moving the disc from the location beneath the body member to a prescribed location within the body member,

means actuated after the disc has been moved to the prescribed location for deforming the body to secure the disc therein comprising:

a ram, having an opening therein, and movable until the walls of the opening come into contact with the body, and

a plurality of jaws movable into the openings in the body member under the disc in the prescribed location, the ram being moved further to crimp wall portions of the body adjacent the openings against the jaws, thereby securing the disc in the prescribed location, and

drive means for operating the various means in a prescribed sequence.

2. The apparatus according to claim 1 wherein the disc advancing means includes:

a Geneva wheel having slots formed about its periphery,

means for feeding discs into the slots of the wheel, the wheel being indexed by the drive means to advance the discs from the feeding means to the location below the body member in the work position.

3. The apparatus according to claim 2 wherein the disc moving means includes:

a rod aligned with a body member in the work position, the rod being moved by the drive means to transport a disc out of a slot and into the body member to the prescribed location therein.

4. An apparatus for assembling a disc in prescribed location within a hollow cylindrical body member, having a terminal cap mounted on its top and openings formed through the walls thereof adjacent the cap, comprising:

a plurality of fixtures for holding the body members, a carrier for sequentially indexing the fixtures to a predetermined work position,

a Geneva wheel having slots formed about its periphery,

drive means,

means for feeding discs into the slots of the wheel, the wheel being indexed by the drive means to advance the discs from the feeding means to the location below the body member in the work position,

a rod aligned with a body member in the work position, the rod being moved by the drive means to transport the disc out of the slot and into the body member to the prescribed location,

a ram having an opening therein, and movable by the drive means until the cap is received in the opening and the walls of the opening come into contact with the body, and

a plurality of jaws movable by the drive means into the openings in the body member under the disc in the prescribed location, the ram being moved further to push the body to crimp wall portions thereof adjacent the openings against the jaws, thereby securing the disc in the prescribed location.

References Cited

UNITED STATES PATENTS

3,037,269	6/1962	Barkstrom	29—203
3,121,281	2/1964	Petro	29—211 X
3,167,779	2/1965	Ahearn	29—203
3,221,403	12/1965	Simonton	29—511

THOMAS H. EAGER, *Primary Examiner.*