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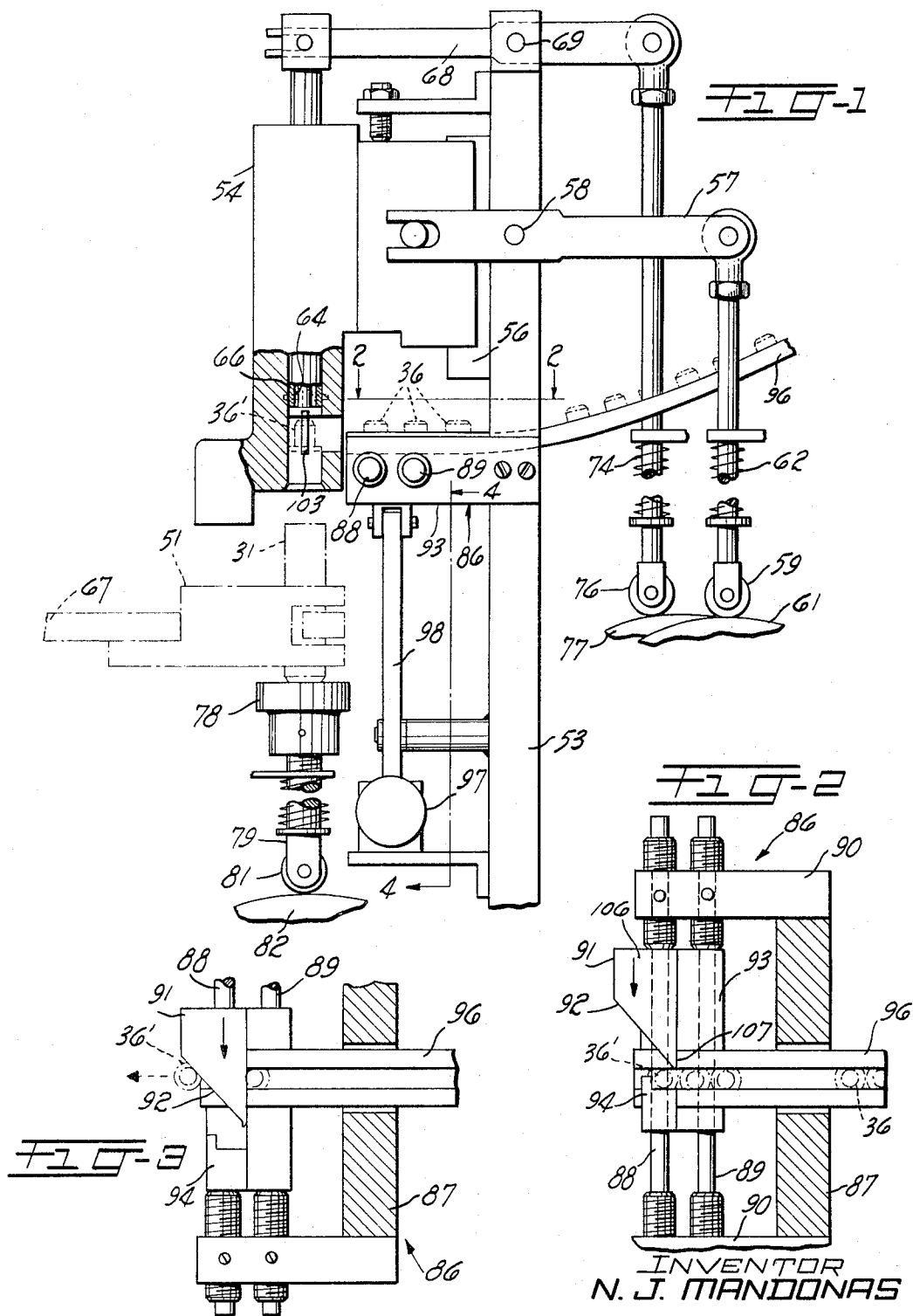
N. J. MANDONAS

3,367,012

ASSEMBLY APPARATUS

Filed Sept. 27, 1965

2 Sheets-Sheet 1



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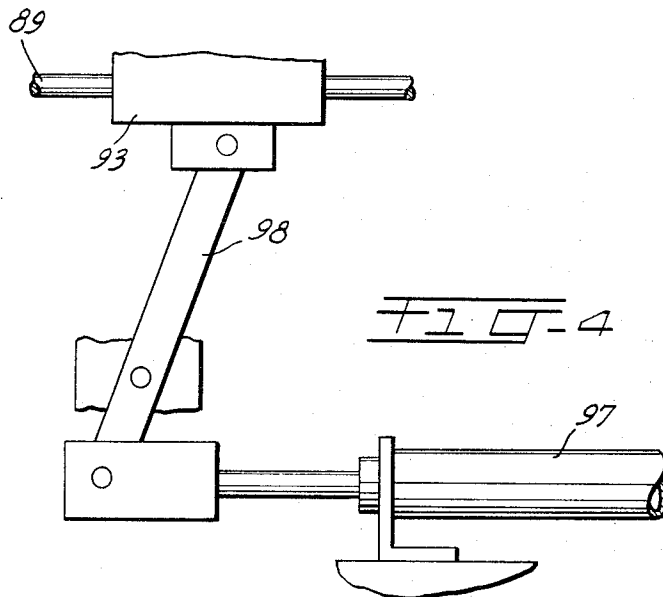
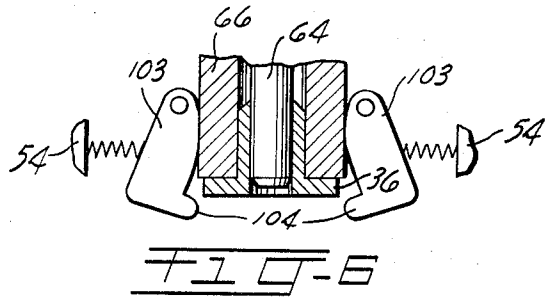
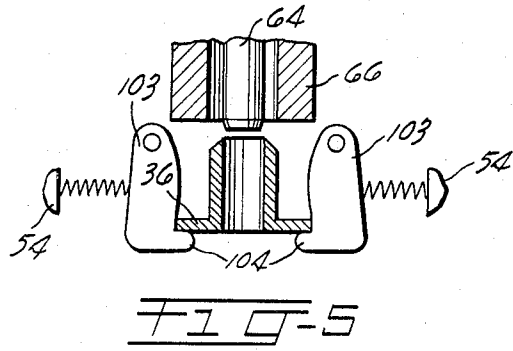
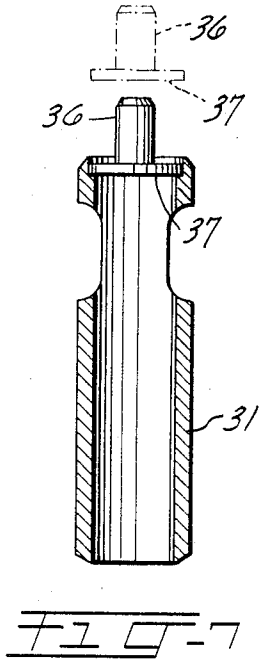
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2 Sheets-Sheet 2



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ASSEMBLY APPARATUS

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1 Claim. (Cl. 29—203)

ABSTRACT OF THE DISCLOSURE

An apparatus for assembling a terminal cap and a hollow cylindrical body wherein a cap is advanced to a pair of spring-biased fingers which hold the cap above a cylindrical body fed to a position below the cap and a tube moves downwardly to release the cap from the fingers and press it into an interior shoulder near the top of the cylindrical body.

This invention relates to an assembly apparatus, and more particularly to an apparatus for assembling terminal caps on hollow cylindrical bodies in the manufacture of coaxial cable connectors.

This application is copending with N. J. Mandonas et al. application Ser. No. 490,514, filed Sept. 27, 1965, W. T. Nowell application Ser. No. 490,558, filed Sept. 27, 1965, and N. J. Mandonas-E. T. Stocker application Ser. No. 490,619, filed Sept. 27, 1965, all filed concurrently with and assigned to the same assignee as this application.

In the manufacture of coaxial cable connectors 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 of the parts were tedious and time consuming. Consequently, a need arose for automatic facilities for assembling the parts of coaxial cable connectors accurately, quickly, and economically.

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

Another object is to provide an apparatus for assembling terminal caps on hollow cylindrical bodies.

Another object is to provide an apparatus for automatically assembling terminal caps on hollow cylindrical bodies in the manufacture of coaxial cable connectors accurately, quickly, and economically.

With these and other objects in view, the present invention contemplates an apparatus for feeding a terminal cap to a position above a hollow cylindrical body of a coaxial cable connector which had been advanced to a predetermined location. The body is supported while the cap is moved downward and press-fitted into the top of the body.

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 a terminal cap to a cylindrical body, incorporating certain principles of the invention;

FIG. 2 is a view taken along line 2—2 of FIG. 1, and shows a shuttle mechanism for advancing the terminal cap to a predetermined work position;

FIG. 3 is an enlarged view of a portion of the shuttle mechanism after it has been operated to advance the terminal cap to the work position;

FIG. 4 is a view taken along line 4—4 of FIG. 1, and shows a device for operating the shuttle mechanism;

FIG. 5 is an enlarged view of spring-biased fingers for temporarily supporting the terminal cap in the work position;

FIG. 6 is a view of the fingers during the release of the terminal cap therefrom; and

FIG. 7 is a view of the terminal cap just prior to being inserted onto the top of the hollow body.

Referring to FIG. 7, there is shown a hollow cylindrical body 31 of a coaxial cable connector to which a terminal cap 36, having a rim 37, is to be assembled 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 main frame 53 having a housing 54 slidably mounted thereon. Housing 54 is movable up and down on a slide 56 of frame 53 by a first linkage 57 which is pivoted about a pin 58 projecting laterally from frame 53. Linkage 57 has a cam follower 59 mounted on its lower end which is urged to follow the contour of a first cam 61 by a spring 62. The upward movement of housing 54 is limited by an adjustable stop 63.

Housing 54 contains a tube 66 having a guide rod 64 concentrically mounted therein, the tube being vertically movable within the housing. The diameter of tube 66 is greater than that of cap 36, but less than that of body 31. Tube 66 is connected to a second linkage 68, which is pivotal about a pin 69 projecting laterally from frame 53, for moving tube 66 vertically within housing 54. Linkage 68 has a cam follower 76 mounted on its lower end which is urged to follow the contour of a cam 77 by a spring 74.

A platform 78 is located beneath and vertically aligned with tube 66, and is movable up and down by a rod 79. Rod 79 has a cam follower 81 mounted on its lower end which is urged to follow the contour of a cam 82 by a spring 83.

Referring to FIGS. 1 and 2, a shuttle mechanism 86 (FIG. 1) is mounted on frame 53. As best seen in FIG. 2, shuttle mechanism 86 includes a carriage 87 having a pair of rods 88 and 89 mounted between a pair of legs 90 of carriage 87. A blade 91, having a slanted edge 92, is mounted on a block 93 which is slidable on rods 88 and 89. Also mounted on block 93 is a stop member 94 located opposite blade 91. A track 96, secured to frame 53, passes just over the top of block 93 and just under blade 91. A linkage 98 is connected to block 93 and is movable by an air cylinder to operate shuttle mechanism 86.

In FIG. 1, a pair of oppositely disposed fingers 103 are pivotably mounted on housing 54. As best seen in FIG. 5, each finger 103 has an extension 104 for temporarily supporting terminal cap 36 in the work position of the apparatus.

Operation

In the operation of the apparatus of the invention, fixture 51 advances connector body 31 to the work position, such that body 31 is vertically aligned between tube 66 and platform 78. Fixture 51 and body 31, may be advanced by carrier 67 from station I of an assembly apparatus disclosed in N. J. Mandonas et al. application Ser. No. 490,514, filed Sept. 27, 1965. In being advanced to the work position of the apparatus, fixture 51 actuates a switch (not shown) for starting a cycle of operations.

The switch completes a circuit (not shown) to actuate air cylinder 97 (FIG. 4) which operates linkage 98 for moving block 93 of shuttle mechanism 86 in the direction of arrow 106 (FIG. 2). The movement of block 93 carries blade 91 such that its tip 107 moves behind leading cap 36. The slanted edge 92 of blade 91 then pushes cap 36 (FIG. 3) along track 96 to the predetermined position, whereat it is held by fingers 103. As best seen in FIGS. 5 and 6, extensions 104 of fingers 103 support rim 37 of cap 36. The next cap 36 (FIG. 3) is prevented from being advanced by the back of blade 91.

Cams 61 and 82 are rotated such that linkage 57 and rod 79 respectively move housing 54 downward and plat-

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form 78 upward. During this movement of housing 54, tube 64 moves downward with housing 54, engages the inner sides of fingers 103 (FIG. 5) and spreads the fingers (FIG. 6). Guide rod 64 enters the opening in cap 36 and tube 66 moves over cap 36 until it abuts rim 37 there-
of.

When housing 54 reaches the end of its path of travel, cam 77 rotates such that linkage 68 advances tube 66 downward to press-fit cap 36 into the top of body 31.

Thereafter, cams 61, 77 and 82 rotate to restore housing 54, tube 66, and platform 78, respectively, to their initial positions. Likewise, shuttle mechanism 86 is returned to its initial position and another cap 36 is advanced along track 96 to abut stop member 94.

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 terminal cap on a hollow cylindrical body, comprising:
 - means for advancing a hollow cylindrical body in a vertical orientation to a predetermined work position,
 - a shuttle mechanism, rendered effective during the advancement of the body to the work position, for feeding a terminal cap to a predetermined location above the top of the body in the work position,
 - a pair of spring-biased fingers for receiving the cap

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and temporarily supporting it in the predetermined location,

a platform movable to support the bottom of the body after it has been advanced to the work position,

a housing, having an opening vertically aligned with the cap when it is in the predetermined location, the opening being slightly greater than the outer diameter of the body,

a tube, movable within the housing, and having an opening therein with a diameter greater than that of the cap but less than that of the body, and

linkage and cam means for moving the platform to support the bottom of the body, for moving the housing downward over the cap, and for moving the tube over the cap to release it from the fingers and to press it into the top of the body.

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