Aug. 23, 1938. B. A. E. JOHNSON 2,127,974

APPARATUS FOR HANDLING TUBES

Filed April 18, 1938 2 Sheets-Sheet 1

FIG. 1

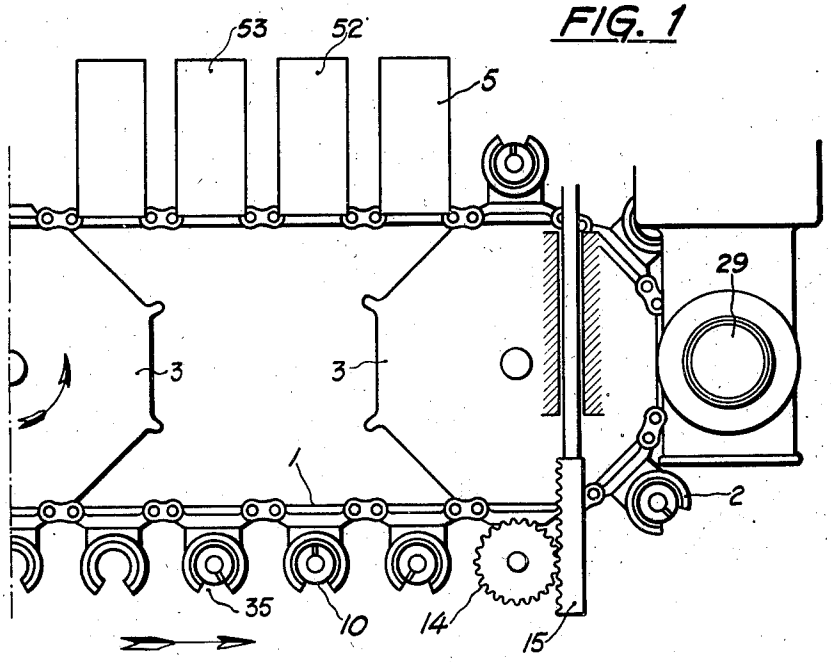


FIG. 4

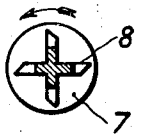
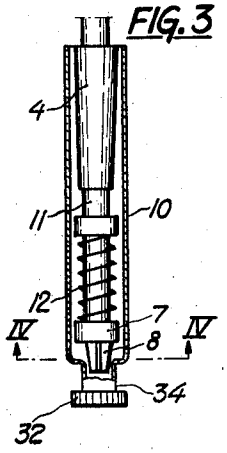


FIG. 3



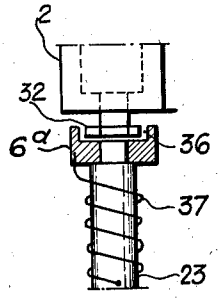


FIG. 5

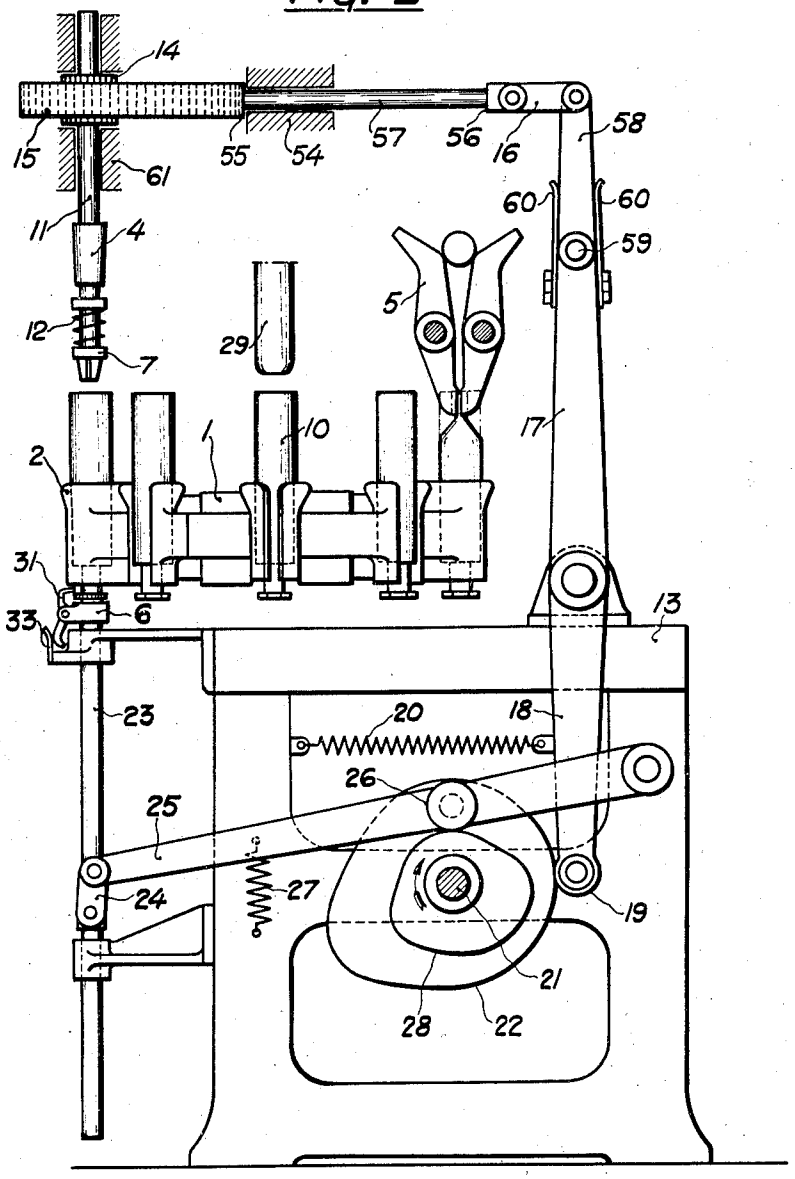
Inventor,
Bror A. E. Johnson,
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FIG. 2



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UNITED STATES PATENT OFFICE

2,127,974

APPARATUS FOR HANDLING TUBES

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Application April 18, 1938, Serial No. 202,735
In Sweden April 19, 1937

9 Claims. (Cl. 226—88)

This invention relates to an apparatus for handling tubes of relatively soft material, such as collapsible tubes for paste or the like, and it is an object of the invention to provide simple and efficient means for screwing a cap tight to the tube, which means do not injure the tube and do not require any particular development of the tube to obtain the result aimed at.

Another object of the invention is to provide simple and efficient means for screwing a cap tight to a tube which previously has been placed in a machine in a correct angular position with respect to a print, label or other mark on the tube and without disturbing the said angular position or without disarranging the tubes once put in order with respect to said print, label or the like.

Still another object of the invention is to provide simple and efficient means for screwing a cap tight to a tube on utilizing every rotary movement of said means for obtaining the result aimed at.

With these and other objects not specifically mentioned in view, the invention consists in certain constructions and combinations which will be hereinafter fully described and then specially set forth in the claims hereunto appended.

In the accompanying drawings,

Fig. 1 is a plan view of an embodiment of the invention;

Fig. 2 is a side elevational view partly in section of the embodiment illustrated in Fig. 1;

Fig. 3 is an elevational view of part of the apparatus enclosed by a tube, the latter being shown in longitudinal section;

Fig. 4 is a cross-sectional view of a part of the apparatus taken on the line IV—IV in Fig. 3; and

Fig. 5 illustrates partly in section a modified part of the apparatus.

Referring to the drawings, an endless chain conveyor 1 is provided with vertical, open-ended pockets 2 for supporting tubes 10. The chain conveyor 1 runs over sprocket wheels 3 which revolve stepwise, so that the conveyor 1 at each movement advances one step in the direction of the arrow (Fig. 1), each step corresponding to the distance between the centres of two adjacent pockets 2. Above the path of travel of the pockets 2 there is provided a rotary mandrel 4. Below the conveyor 1 opposite to the mandrel 4 is provided an elevator member 6 having a hook 31 pivoted thereto and adapted to grip the caps 32 of the tubes. The hook is actuated by a spring (not shown) and coacts with an abutment 33 to open and close about the cap of the tube. The mandrel 4 is provided with a tube driver 7 the end of which has sharp-edged wings 8. Conveniently the wings 8 taper, so that they can be introduced into the neck 34 of the tube 10 as shown in Fig. 3. The driver 7 is axially displaceable but not rotatably mounted on a spindle 11 of the mandrel 4 and it is forced down by a spring 12 which may be relatively weak. The spindle 11 is rotatably journalled but axially immovable in a bearing 61 in the machine frame 13. The spindle is keyed to a gear wheel 14 which meshes with a toothed rack 15. The rack 15 is secured to a rod 57 which is slidable longitudinally in a guide 54 and connected to a link 16. The end 55 of the rack and a shoulder 56 on the rod 57 serve as abutments that limit the strokes of the rod 57. The link 16 is pivotally connected to another link 58 which is pivoted on a pin 59 to one arm 17 of a double-armed lever the other arm 18 of which carries a roller 19 which is by a spring 20 pressed against the periphery of a cam disc 22 keyed to a continuously rotating driving shaft 21. The link 58 is yieldingly pivoted to the arm 17 as it is held by two blade springs 60 which yield when the abutments 55 and 56 strike against the ends of the guide 54.

The member 6 is supported by a spindle 23, which is by means of a link 24 connected to a lever 25. The latter is provided with a roller 26 which is by means of a spring 27 pressed against a cam disc 28 keyed to the shaft 21.

Furthermore, above the path of travel of the conveyor pockets there may be provided a device 29 for supplying filling material to the tube, a mechanism 5 for sealing the tubes, and mechanisms 52 and 53 for stamping and printing the tubes.

In operation, empty tubes having caps 32 loosely screwed thereto are placed at 35 in a pocket 2 of the conveyor 1. The tubes may be arranged to be turned into correct angular positions by a device similar to that described in my Patent No. 2,104,485, but it is assumed by way of example that the operator places the tubes manually into the pockets in correct angular positions with respect to a print, label or other mark on the tube. When placed in the pockets 2 the tube 10 is moved stepwise in the direction of the arrow (Fig. 1) until it has obtained a position below the mandrel 4. Then the elevator member 6 elevates the tube and puts it around the mandrel 4, so that the end of the driver 7 enters the neck of the tube and the edges of the wings 8 press against the bottom end thereof.

When the elevator member 6 ascends its hook

31 is released from the abutment 33 so that it grips the cap 32 of the tube. Simultaneously or preferably after the wings 8 have been pressed against the bottom of the tube the mandrel 4 is caused to revolve through a predetermined angle or a predetermined number of semi-revolutions or complete revolutions which is effected by swinging the lever 17, 18 thus moving the rack 15 until the abutment 56 bears upon an end of the guide 54. Thereby the wings 8 drive the tube whilst the cap 32 is pressed against the supporting member 6 which together with the hook 31 holds the cap 32, so that the latter will be screwed tight to the tube. After the cap has been screwed tight the tube is rotated further until the abutment 56 strikes against the guide 54. On this continued rotation the cap will rotate upon the member 6, and the rotation is finished when the tube has attained a predetermined angular position defined by the guide 54 and abutment 56. Then the tube 10 is again moved down into the pocket 2 under the drawing action of the hook 31 embracing the cap 32, and at the same time the mandrel 4 is swung back to its initial position defined by the abutment 55 bearing upon the other end of the guide 54, as shown in Fig. 2. The tube is thereafter moved by the conveyor 1 to a filling station 29 and further to a sealing mechanism 5 and to the stamping and printing mechanisms, and thereby the tube occupies a predetermined angular position in the pocket 2 with respect to a print, label or the like on said tube.

In Fig. 5 is illustrated another embodiment of the means for retaining the cap 32 when the tube is rotated. The cap is polygonal and enclosed by a correspondingly shaped elevator member 6^a the cavity 36 of which is of polygonal shape. The member 6^a is rotatably mounted on the upper end of the rod 23. The rod 23 is enclosed by a spring 37 one end of which is secured to the rod 23. The upper end of the spring 37 is secured to the elevator member 6^a. Thereby, after the tube cap 32 has been screwed tight, the member 6^a will against the action of the spring 37 swing together with the cap 32 when the rotation of the tube is continued.

Instead of rotating the tube as described above, means may be provided for rotating the supporting member 6 or 6^a whilst the tube is retained immovable by a non-rotatable mandrel 4 adapted to be inserted into the tube.

I claim:—

1. In an apparatus for handling tubes of relatively soft material provided with a threaded closure cap, the combination of a mandrel having an end provided with sharp portions, a member for supporting the tube by said cap, means for positioning said tube on said mandrel and pressing said sharp portions against a bottom of said tube, and means for rotating said mandrel and said supporting member relative to one another to screw said cap to said tube.

2. In an apparatus for handling tubes of relatively soft material provided with a threaded closure cap, the combination of a mandrel having sharp-edged portions at its end, a member for supporting the tube by said cap, means for positioning said tube on said mandrel and pressing said sharp-edged portions against a bottom of said tube, and means for rotating said mandrel and said supporting member relative to one another to screw said cap to said tube.

3. In an apparatus for handling tubes of relatively soft material provided with a threaded closure cap, the combination of a mandrel having sharp-edged wings at its end, a member for supporting the tube by said cap, means for positioning said tube on said mandrel and pressing said sharp-edged wings against a bottom of said tube, and means for rotating said mandrel and said supporting member relative to one another to screw said cap to said tube.

4. In an apparatus for handling tubes of a relatively soft material provided with a neck and a threaded closure cap on said neck, the combination of a mandrel having a sharp-edged tapered end adapted to be partly introduced into said neck, a member for supporting the tube by said cap, means for positioning said tube on said mandrel and pressing said sharp-edged end into said neck, and means for rotating said mandrel and said supporting member relative to one another to screw said cap to said tube.

5. In an apparatus for handling tubes of a relatively soft material provided with a threaded closure cap, the combination of a mandrel having an end provided with sharp portions, a member for supporting the tube by said cap, means for positioning said tube on said mandrel and pressing said sharp portions against a bottom of said tube, and means for rotating said mandrel and said supporting member relative to one another to screw said cap to said tube, said positioning means and said rotating means being operably interconnected first to press said sharp portions against the bottom of the tube and thereafter to cause relative rotation through a predetermined angle.

6. In an apparatus for handling tubes of a relatively soft material provided with a marked portion and a threaded closure cap, the combination of a tube carrier, a station for positioning the tube to make its marked portion assume a predetermined position relative to said carrier, a mandrel having an end provided with sharp portions, means for moving the tube from said station into position opposite to said mandrel, a member for supporting the tube by said cap, means for positioning said tube on said mandrel and pressing said sharp portions against a bottom of said tube, and means for rotating said mandrel and said supporting member relative to one another to screw said cap to said tube, said positioning means and said rotating means being operably interconnected first to press the sharp portions against the bottom of the tube and thereafter to cause relative rotation through a predetermined angle.

7. In an apparatus for handling tubes of relatively soft material provided with a threaded closure cap, the combination of a mandrel having an end provided with sharp portions, a member for supporting the tube by said cap, means for positioning said tube on said mandrel and pressing said sharp portions against a bottom of said tube, and means for rotating said mandrel and said supporting member relative to one another to screw said cap to said tube, said supporting member being adapted to permit with yielding resistance rotation of the tube cap relative to same.

8. In an apparatus for handling tubes of a relatively soft material provided with a threaded closure cap, the combination of a mandrel having an end provided with sharp portions, a member for supporting the tube by said cap, means for positioning said tube on said mandrel and pressing said sharp portions against a bottom of said tube, and means for rotating said mandrel

and said supporting member relative to one another to screw said cap to said tube, said positioning means and said rotating means being operably interconnected first to press said sharp portions against the bottom of the tube and thereafter to cause relative rotation through a predetermined angle, said supporting member being adapted to permit with yielding resistance rotation of the tube cap relative to same.

9. In an apparatus for handling tubes of relatively soft material provided with a threaded closure cap, the combination of a mandrel having an end provided with sharp portions, a member for supporting the tube of said cap, an abutment, means for positioning the tube on said mandrel and pressing said sharp portions against a bottom of said tube, and means for rotating said mandrel and said supporting member relative to one another to screw said cap to said tube, said positioning means and said rotating means being operably interconnected first to press said sharp portions against the bottom of the tube and thereafter to cause relative rotation through a predetermined angle defined by said abutment.

BROR ANDERS EMIL JOHNSON.