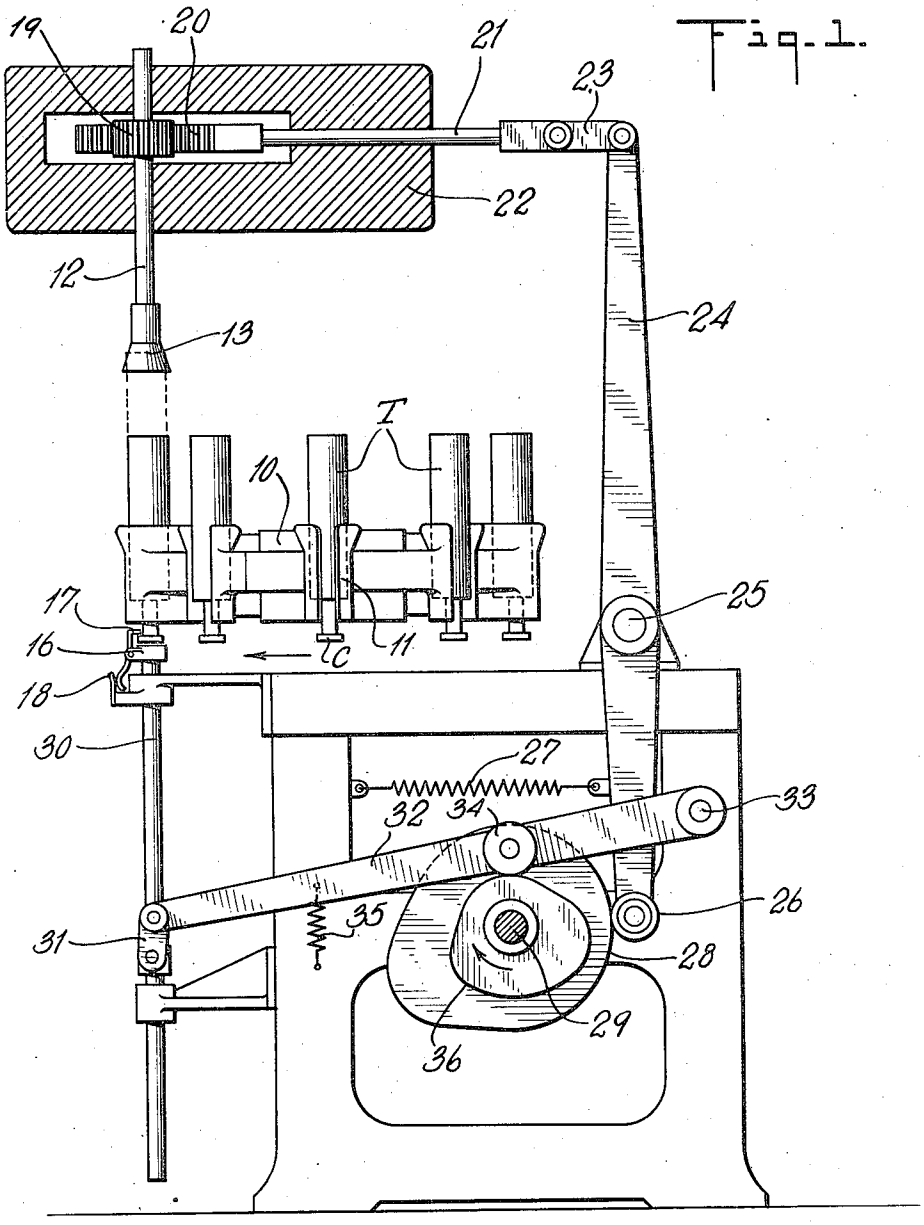
Oct. 24, 1944. A. G. ANDERSON 2,361,001

APPARATUS FOR HANDLING TUBES

Filed Sept. 30, 1942 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

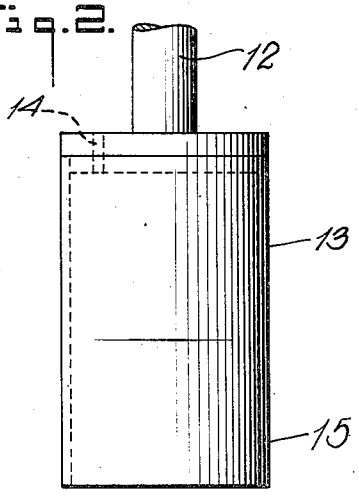


Fig. 3.

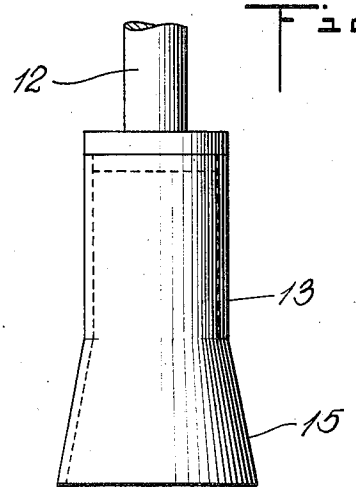


Fig. 4.

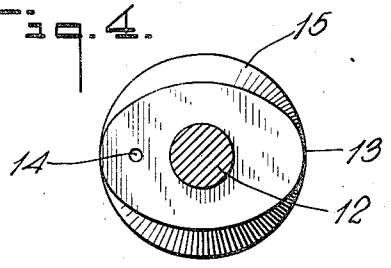
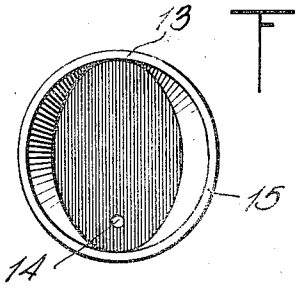


Fig. 5.



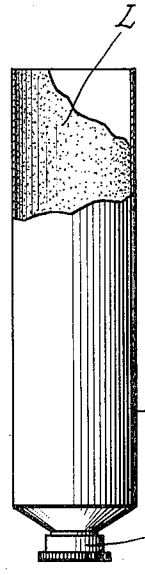


Fig. 6.

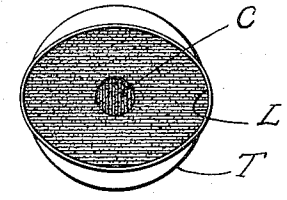


Fig. 2.

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UNITED STATES PATENT OFFICE

2,361,001

APPARATUS FOR HANDLING TUBES

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Application September 30, 1942, Serial No. 460,317

5 Claims. (Cl. 29—33)

This invention relates to apparatus for handling tubes of relatively soft material such, for example, as collapsible tubes for paste or the like.

An 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 and at the same time properly to shape the open end of the tube through which the paste is to be introduced to facilitate the operation of seaming such end after introduction of the paste.

Previous apparatus for screwing a cap to the tube have involved a gripping member inserted within the tube for the purpose of effecting rotation thereof. An apparatus of this type is subject to the possibility of injury to the lining provided in tubes for containing certain paste compositions.

A feature of the present apparatus is the fact that the tube-turning member engages the exterior surface only of the tube, thereby avoiding all possibility of injury to the inner surface or lining of the tube. Furthermore, the present apparatus converts the open end of the tube from circular to elliptical configuration thereby facilitating the operation of producing the seam at the end of the tube after it has been filled.

Other objects, novel features and advantages of this invention will become apparent from the following specification and accompanying drawings, wherein:

Fig. 1 is a side elevation partly in section of an embodiment of the invention;

Fig. 2 is an elevational view of the tube-turning member;

Fig. 3 is a view similar to Fig. 2 with the tube-rotating member oriented 90°;

Fig. 4 is a plan view of Fig. 2;

Fig. 5 is a bottom view of Fig. 3;

Fig. 6 is a side elevation partly broken away of a collapsible tube having a lining, and

Fig. 7 is a top view of Fig. 6 after conversion of the open end from circular to elliptical configuration.

An endless chain conveyor 10 is provided with vertical open end pockets 11 for supporting tubes T. The chain conveyor 10 runs over sprocket wheels (not shown) which revolve sidewise so that the conveyor 10 on each movement advances one step in the direction of the arrow, each step corresponding to the distance between the centers of two adjacent pockets 11. Above the path of travel of the pockets 11 there is provided a rotatable shaft 12, to the lower end of which is attached a tubular member 13 closed at its upper end except for an aperture 14 and open at its lower end. The upper portion of the member 13 is elliptical in cross-section while its open end is circular so as to provide a portion 15 of appreciable length which changes from circular to elliptical cross-section upwardly of the member 13. The inner periphery of the elliptical portion of the tubular member 13 is slightly less than the outer periphery of the tube T, while the periphery of the circular mouth of the member 13 exceeds the periphery of the tube T.

Below the conveyor 10 and opposite to the member 13 is provided an elevator member 16 having a hook 17 pivoted thereto and adapted to grip the cap C of a tube. The hook 17 is actuated by a spring (not shown) and coacts with an abutment 18 to clamp and release a cap C.

The shaft 12 is provided with a pinion 19 with which meshes a rack 20 secured to a rod 21 longitudinally slidable in a guide 22. By means of a link 23, the rod 21 is pivotally connected to the end of a lever 24 supported by a pivot 25 between its ends. At the remaining end of the lever 24 is provided a roller 26 and a spring 27 biases the lever 24 to maintain the roller 26 in engagement with the periphery of a cam disk 28 attached to a continuously rotating driving shaft 29.

The elevator 16 is supported by a spindle 30 and a link 31 connects the spindle 30 to an end of a lever 32 having its other end pivoted on the pin 33. The lever 32 is provided with a roller 34 and a spring 35 biases the lever 32 to press the roller 34 into contact with the periphery of a cam disk 36 attached to the shaft 29.

In the path of travel of the conveyor pockets there may be provided devices (not shown) for supplying filling material to the tube for sealing the ends of the tubes and for stamping and printing the tubes. These devices, however, form no part of the present invention and, therefore, are not illustrated.

In operation, an empty tube T having a cap C loosely screwed thereon is placed in a pocket 11 of the conveyor 10. The tube T is then moved sidewise in the direction of the arrow until it has obtained a position between the member 13 and the elevator 16. The elevator member 16 then lifts the tube to enter its upper end through the bell-shaped mouth 15 into the elliptical portion of the tubular member 13 thereby converting the open end of the tube into elliptical configuration with the outer surface of the tube frictionally engaging the inner elliptical surface of the tubular member. As the elevator 16 ascends, the hook 17 is released from the abutment 18 so that it grips the cap C. Si-

multaneously, or preferably after the top edge of the tube T has engaged the inner surface of the tapering portion 15 of the member 13, the member 13 is caused to revolve through a predetermined angle by swinging the lever 24, thus effecting sliding movement of the rod 21 and rack 20. The member 13 exerts sufficient friction on the tube to effect rotation thereof thereby screwing the tube tight to the cap which is held against rotation. After the cap has been screwed tight, the tube may either be held stationary by the cap and hook 17 or may continue to rotate and carry the cap with it, depending upon whether the friction between the member 13 and the tube T exceeds or is less than the friction between the hook 17 and the cap C. During the elevation of the tube, the open end of it is converted from circular cross-section to elliptical cross-section and if there is any slippage between the member 13 and the tube T, the only effect is to change the orientation of the axes of the elliptical portion relative to the body of the tube, such change being permitted by reason of the extreme flexibility of the metal comprising the tube. In the event that there is no design on the surface of the empty tube, it may be placed in a pocket 11 without making any attempt to orient the tube to any particular position. However, in the event that there is a design on the surface of the tube, the tube is placed in a pocket 11 with a predetermined orientation of the design so that after the tube is filled the design will bear the desired relation to the seam of the tube.

After the elevator has reached the top of its stroke it moves downwardly to remove the top end of the tube from the member 13 and the shape of the cams 28 and 36 is such that the member 13 remains stationary until the tube has been completely removed from the member 14, thereby preventing any possibility of unscrewing of the cap C during the downward movement of the elevator. The upper end of the tube T is left in elliptical shape and the limit of rotation of the member 13 is so fixed that the elliptical end of the tube is properly oriented with respect to the pocket 11 and the tube is properly presented to the seaming mechanism to facilitate the seaming operation. The tube is thereafter moved by the conveyor 10 to the successive stations for the operations of filling, seaming, etc.

As illustrated in Fig. 6, the tube T may be provided with an inner lining L which might be damaged if rotation of the tube were effected by a member placed within the tube. The apparatus above described eliminates all possibility of injury to the liner L since the member 13 engages only the exterior surface of the tube. Instead of rotating the tube as above described, means may be provided for rotating the elevator 16 while the tube is retained immovable by a non-rotatable member 13 of the same configuration as above described.

I claim:

1. In an apparatus for handling cylindrical tubes of a relatively soft material provided with a threaded closure cap, the combination of a smooth inner surface tubular member of elliptical cross section having a bell-shaped mouth, a member for supporting a tube by the cap, means for projecting a tube through said mouth into said tubular member to convert the open end of said tube to elliptical configuration with its outer surface frictionally engaging the inner elliptical surface of said tubular member, means for rotating said tubular and supporting members relative to each other to screw a cap to the tube, and means for withdrawing the tube from said tubular member after the cap is screwed to the tube.

2. In an apparatus for handling cylindrical tubes of a relatively soft material provided with a threaded closure cap, the combination of a rotatable smooth inner surface tubular member of elliptical cross-section having a bell-shaped bottom, a member reciprocable axially of said tubular member, means on said member for holding a tube cap, means for effecting to and fro movement of said reciprocable member to project a tube through said bell-shaped bottom into said tubular member to convert the end of said tube to elliptical configuration with its outer surface frictionally engaging the inner elliptical surface of said tubular member, and means for effecting clockwise and counterclockwise rotation of said tubular member, the relation of such two last-named means being such that the rotatable member is retained stationary during the initial movement of the reciprocable member away from the rotatable member.

3. An apparatus according to claim 2 in which the means for effecting movement of said reciprocable and rotatable members comprises cams and levers.

4. In an apparatus for handling cylindrical tubes of a relatively soft material provided with a threaded closure cap, the combination of a smooth inner surface rotatable tubular member of elliptical cross-section having a bell-shaped bottom, a member reciprocable axially of said tubular member, means on said member for holding a tube cap, means for effecting to and fro movement of said reciprocable member to project a tube through said bell-shaped bottom into said tubular member to convert the end of said tube to elliptical configuration with its outer surface frictionally engaging the inner elliptical surface of said tubular member, and means for effecting clockwise and counterclockwise rotation of said tubular member, the relation of said two last-named means being such that the rotatable member is retained stationary during the movement of the reciprocable member toward the rotatable member and is retained stationary during the initial movement of the reciprocable member away from the rotatable member.

5. An apparatus according to claim 4 in which the means for effecting movement of said reciprocable and rotatable members comprises cams and levers.

ANDERS GUSTAV ANDERSON.