

July 24, 1928.

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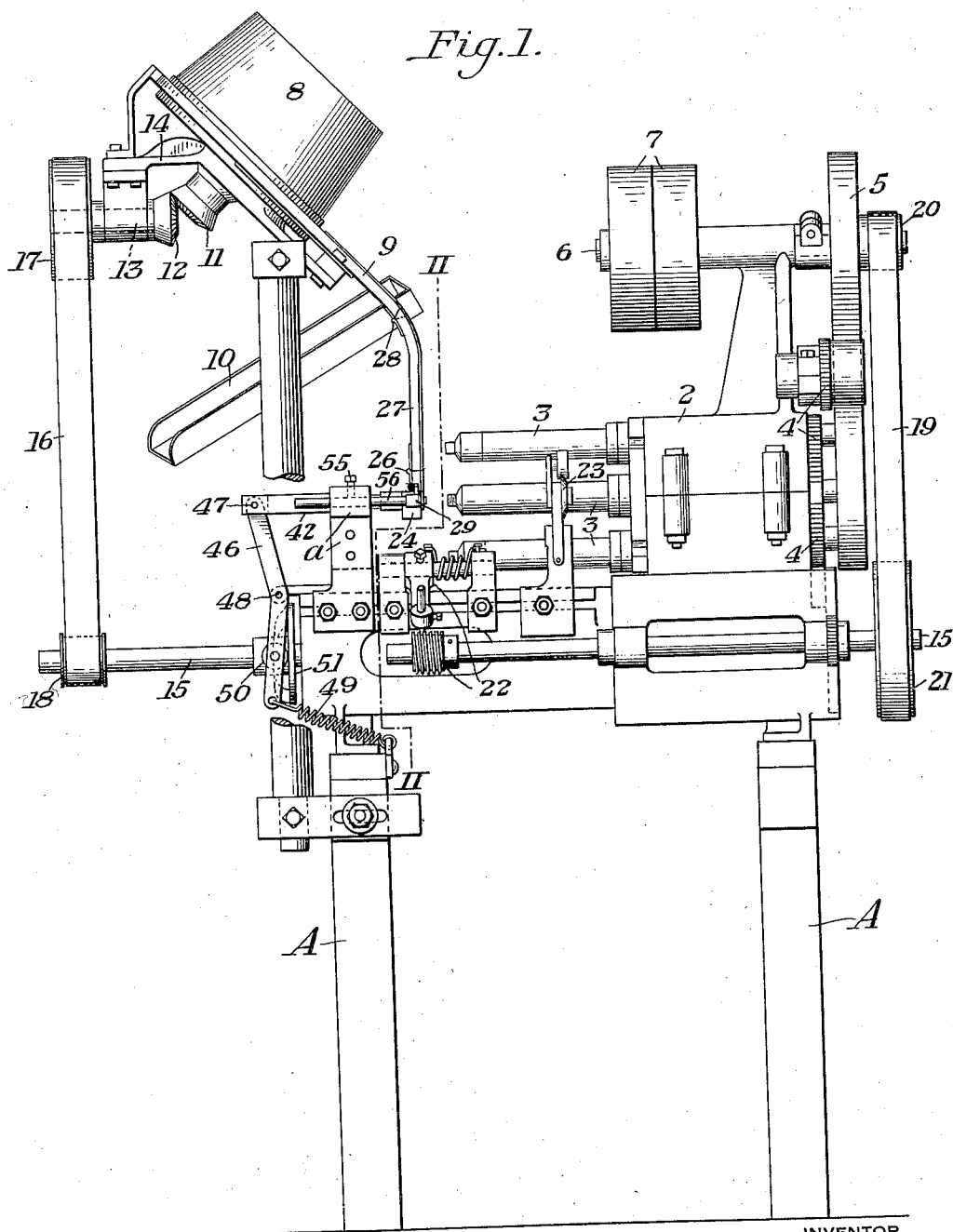
W. T. DAVIS

CAP APPLYING MEANS FOR TUBE WORKING MACHINES

Filed April 20, 1923

3 Sheets-Sheet 1

Fig. 1.



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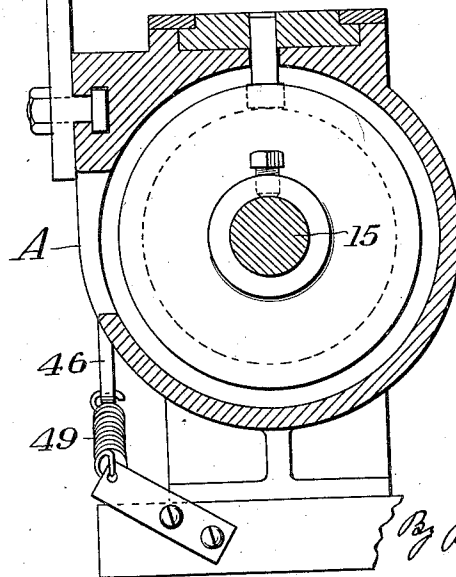
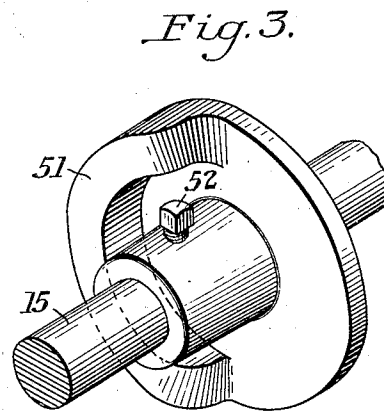
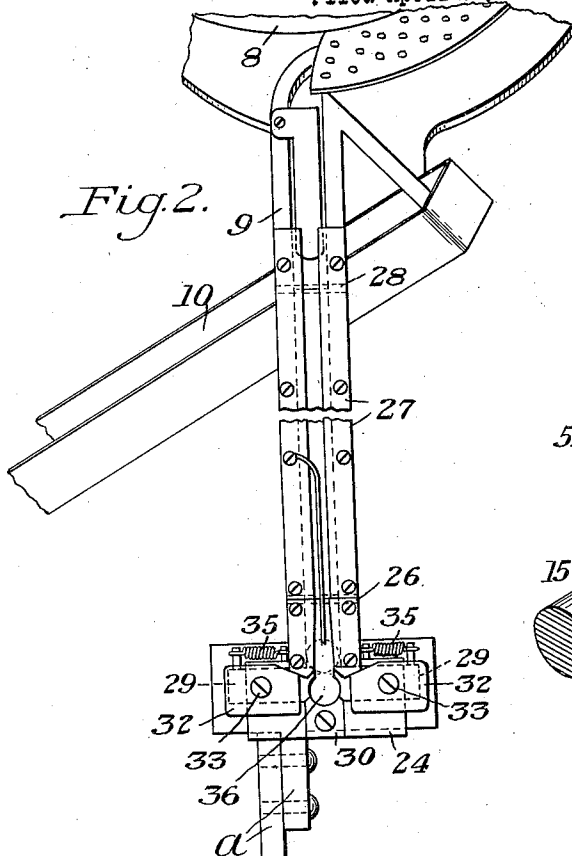
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CAP APPLYING MEANS FOR TUBE WORKING MACHINES

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3 Sheets-Sheet 2



INVENTOR

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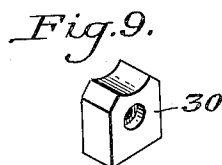
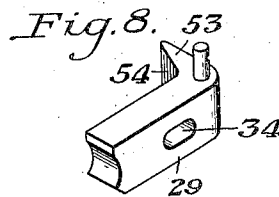
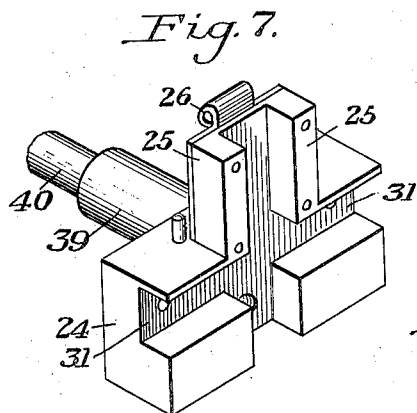
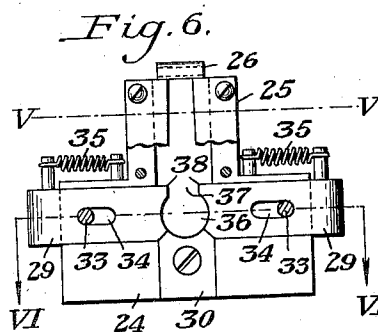
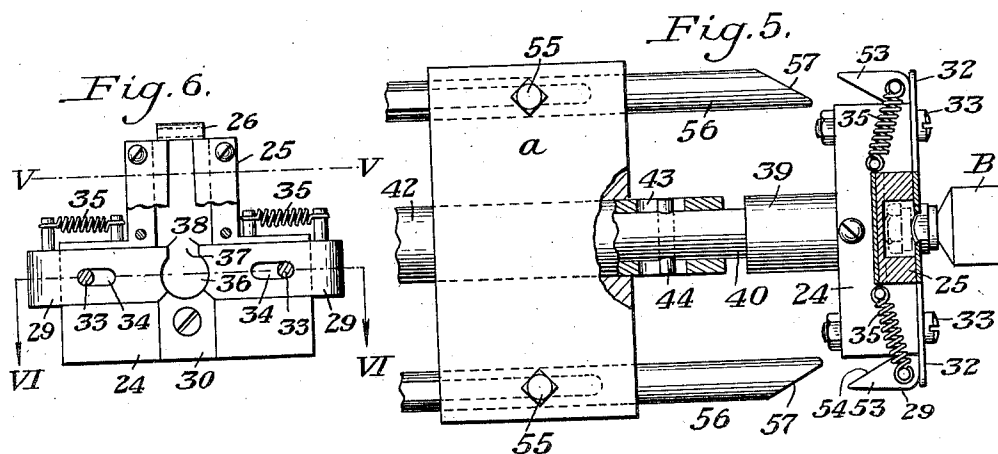
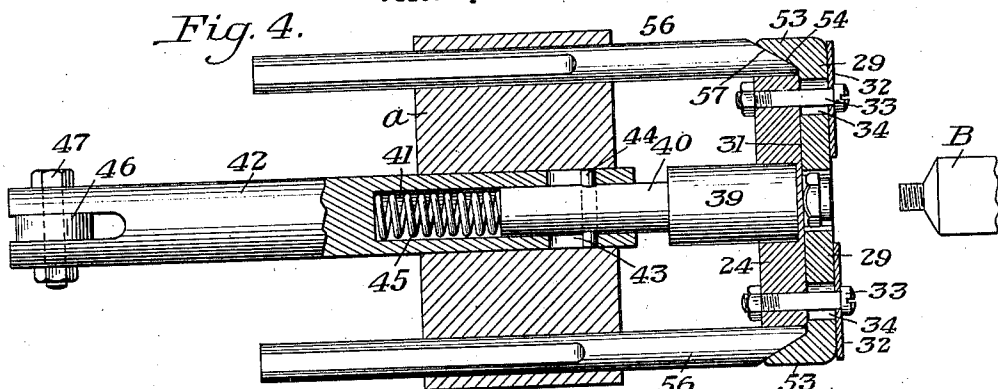
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GAP APPLYING MEANS FOR TUBE WORKING MACHINES

Filed April 20, 1923

3 Sheets-Sheet 3



Walter T. Davis
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His Atty's

UNITED STATES PATENT OFFICE.

WALTER T. DAVIS, OF WHEELING, WEST VIRGINIA, ASSIGNOR TO WHEELING STAMPING COMPANY, OF WHEELING, WEST VIRGINIA, A CORPORATION OF WEST VIRGINIA.

CAP-APPLYING MEANS FOR TUBE-WORKING MACHINES.

Application filed April 20, 1923. Serial No. 633,444.

The present invention relates broadly to the manufacture of collapsible tubes, and more particularly to cap-applying means for tube-working machines.

In the patent to John A. McGinnis, No. 1,457,179, of May 29, 1923, there is disclosed a tube-working machine having means for automatically applying caps to the threaded necks of the tubes, said means embodying a reciprocating chuck adapted to receive a cap from a cap-receiving cavity at the bottom of a delivery chute and to be moved to a position to engage said cap with the screw-threaded neck of a tube supported on a rotating mandrel and to be thereafter retracted into a position to receive another cap, the machine being provided with a rotary mandrel-carrying turret having a step-by-step rotation to bring each of a plurality of tube holding mandrels successively into cap-receiving position, and the cap-applying means operating in synchronism with the step-by-step rotation of the turret to supply a cap to each tube as it is brought into operative position with respect thereto by the turret. An objection to the cap-applying means therein disclosed is that in case a mandrel comes into operative position with respect thereto without a tube thereon, the cap held in the chuck is pushed out of the same by the following cap and either falls to the floor or is jammed between the chuck and the next tube or mandrel brought into operative position, thereby rendering the cap useless and interfering with the smooth operation of the machine.

The present invention overcomes the above-mentioned difficulty by so constructing the reciprocating cap-applying chuck and the delivery chute as to enable the said chuck to receive another cap from the chute only in case the cap previously held by said chuck has been applied to the neck of a tube.

Another feature of the invention is a simplified and more economical construction of cap-applying means.

In the accompanying drawings:

Figure 1 is a side elevation, partly broken away, of a machine embodying my invention;

Figure 2 is a view, partly in elevation and partly in vertical section, of certain parts of the machine, including my invention, the sec-

tion being taken on the line II—II of Figure 1;

Figure 3 is a perspective view of the cam member for actuating the chuck carrying plunger in one direction and of a portion of the shaft upon which said cam member is mounted;

Figure 4 is a view, partly in plan and partly in horizontal section, of the reciprocating chuck and cooperating parts, the chuck being shown in retracted or inoperative position with respect to a tube to be supplied with a cap;

Figure 5 is a view similar to Figure 4 showing the chuck in cap-applying position;

Figure 6 is a front view of the chuck;

Figure 7 is a perspective view of the chuck with the chuck jaws removed;

Figure 8 is a perspective view of one of the sliding chuck jaws, and

Figure 9 is a perspective view of the stationary chuck jaw.

While my invention is broadly applicable to various types of machines for manufacturing collapsible tubes, I have herein shown it as applied to a machine of the type illustrated in my co-pending application, Serial No. 633,443 filed April 20, 1923, which embodies means for cutting the formed tubes to length, means for forming screw-threads in the necks of the tubes, means for trimming the ends of the tubes, and means for applying caps to the threaded necks.

Referring to the drawings, the reference character A designates the frame of the machine. This machine is provided with a rotary mandrel-carrying turret 2 which is designed to have a step-by-step rotation, and which carries four tube-holding rotatable mandrels 3. The actuating gears for the turret and mandrels are indicated by the reference numeral 4, these gears being driven through a belt 5 from a power-shaft 6, the latter having fast-and-loose pulleys 7 thereon.

The machine is provided with a feed hopper 8 of any well-known selective character and adapted to feed the caps into a suitable delivery chute 9 having an overflow spout 10. The chute 9 delivers the caps to my improved cap-applying means. The feed hopper is mounted for rotation and is provided for that purpose with a bevel gear 11 meshing

with a bevel gear 12 on a shaft 13, the latter being journaled in the bracket 14 which supports the hopper. The shaft 13 is driven from a shaft 15 through a belt 16 which engages pulleys 17 and 18 on the shafts 13 and 15, respectively, the shaft 15 being driven from the power-shaft 6 through a belt 19 engaging pulleys 20 and 21 on the said shafts 6 and 15, respectively.

10 In the operation of the machine, the mandrel carrying turret is given a step-by-step rotation to carry each mandrel successively into each of four operative positions 90° apart. At one operative position into which 15 each mandrel is brought, a collapsible tube to be operated upon is placed thereon by an operative; at the second position, the neck of the tube is threaded by threading means 22 forming the subject-matter of my co-pending 20 application and the end thereof trimmed to open up the discharge passage therein; at the third position, each tube is cut to length by a cutter 23 and the cap applied to the threaded neck thereof; and at the fourth 25 position, each tube is removed from its mandrel by the operative.

The cap-applying means of the present invention is illustrated in detail in Figures 2 to 9, inclusive. The said means comprises a 30 chuck 24 constructed and arranged to receive the caps singly and in succession as delivered by the delivery chute 9 and to apply the same to the threaded necks of tubes supported on the rotating mandrels 3 as said mandrels 35 are brought successively into operative position with respect to the cap-applying means. The chuck 24 has formed integral therewith the lower end portion 25 of the delivery chute 9, said lower end portion 25 being 40 hinged at 26 to the lower end of a section 27 of said chute, the latter being hinged at 28 to the upper portion of the chute, whereby a flexible delivery chute is provided enabling the lower end portion 25 thereof to partake 45 of the reciprocatory movements of the chuck.

The chuck 24 carries a pair of opposite sliding jaws 29 and a fixed jaw 30. The jaws 29 are held in lateral guideways 31 in 50 the chuck by detachable plates 32, the latter being held in position on the chuck by screw-bolts 33 which pass through slots 34 in the sliding jaws, the bolts 33 and slots 34, therefore, limiting the extent of the sliding movements of the said jaws. Springs 35 fastened 55 at one end to the jaws 29 and at the opposite end to the chuck 24 maintain said jaws normally in advanced or cap-engaging position. As seen by reference to Figure 6, the inner 60 ends of the jaws 29 and 30 are formed with arcuate edges which co-operate to define a recess 36 for accommodating a cap. When the jaws 29 are advanced, as shown in Figure 6, the space 37 between the upper portions 38 of the inner ends of the jaws 29 is in-

sufficient to permit a cap to drop from the delivery chute into said recess 36, but when the jaws 29 are retracted by means to be hereinafter described, this space is enlarged sufficiently to permit a cap to fall into said 70 recess.

The chuck 24 is supported upon an end of a plunger 39 which has a reduced portion 40 sliding in the bore 41 formed in one end portion of a rod 42. Diametrically opposite 75 slots 43 are formed through the cylindrical wall of the rod 42 surrounding the bore 41 and a pin 44 extending transversely through the reduced portion 40 of the plunger 39 engages in said slots to thereby limit relative 80 axial movement between the plunger 39 and rod 42 and to prevent relative rotational movement between said parts. A coil spring 45 is arranged in the bore 41 and has one end 85 in engagement with the bottom wall of said bore and its other end in engagement with the end of the reduced portion 40 of the plunger 39.

The rod 42 is slidably mounted in an adjustable bracket *a* and has its end portion, 90 opposite that having the bore 41, bifurcated. This bifurcated end portion straddles one end of a bell-crank lever 46, a bolt 47 forming a pivotal connection between said lever and the bifurcated end of the rod. The bell- 95 crank lever 46 is pivotally connected at its angle by a pivot pin 48 to the frame A and a coil spring 49 connects the opposite end of said lever 46 to said frame. The arm of the lever 46 to which the spring 49 is connected 100 carries an antifriction roller 50, the said roller co-operating with a face-cam 51, adjustably secured to the shaft 15 by a set screw 52.

Referring to Figures 4 and 5, it will be seen that each of the sliding jaws 29 is 105 formed at its outer end with a flange 53 extending at right angles thereto and provided with an inwardly facing beveled surface 54. Adjustably secured in the bracket *a*, by means of set screws 55, on opposite sides of 110 the sliding rod 42 and parallel thereto, is a pair of rods 56. Each rod 56 has an end thereof formed with an outwardly facing beveled surface 57 for co-operation with the corresponding inwardly facing beveled surface 54 of a jaw 29. 115

The operation of the cap-applying means is as follows: Assuming the parts to be in retracted or inoperative position as shown in Figures 1 and 4, it will be seen that the 120 beveled surfaces 57 of the rods 56 are in engagement with the corresponding beveled surfaces 54 of the sliding chuck jaws 29, whereby said chuck jaws have been moved to open position, permitting a cap to fall 125 by gravity through the space 37 and occupy the recess 36 between the inner ends of the jaws 29 and 30. When the face-cam 51 engages the roller 50, the bell-crank lever 46 is rocked in a clockwise direction (Figure 130

1) in opposition to the spring 49, thereby, through the rod 42, spring 45 and plunger 39, moving the chuck 24 to the right (Figure 1) to engage the cap occupying the recess 36 with the threaded neck of a rotating tube B. At the first part of this movement of the chuck 24 to the right, the beveled surfaces 54 of the sliding jaws 29 are moved out of engagement with the beveled surfaces 57 of the rods 56, thereby permitting the springs 35 to move the sliding jaws 29 inwardly to cause their inner ends to frictionally engage the head of the cap in the recess 36 to prevent rotation thereof during the applying operation. As soon as the threads on the neck of the rotating tube B take hold of the threads on the cap, the further rotation of the tube causes the cap to be screwed up upon the neck thereof, thus drawing the cap out of the recess 36. The function of the spring 45 is obviously to enable the cap to be pressed against the neck of the tube with a yielding pressure during the applying operation, in order that the threads in the tube neck and in the cap may not be damaged. When the parts are moved from the operative, or cap-applying, position shown in Figure 5 of the drawings to the inoperative, or cap-receiving, position shown in Figure 4, the sliding jaws 29 are moved to open position through the engagement of the beveled surfaces 54 on the jaws with the beveled surfaces 57 on the rods 56. If the cap held in the recess 36 has been applied to a tube upon the previous movement of the applying means to operative position, another cap will fall into the recess 36 upon the movement of the jaws 29 to open position, but if the cap held in the recess 36 has not been applied because, for instance, of the absence of a tube on the rotating mandrel, another cap cannot fall into the recess, since the recess is already occupied by a cap. It will be apparent, therefore, that the present invention provides a construction of cap-applying means in which the cap applying chuck can only receive another cap from the delivery chute in case the cap previously held thereby has been applied to a tube.

Another important feature of the cap-applying chuck of the present invention is that it embodies bodily-movable means having a smooth uniform sliding friction-surface for engagement with each cap to hold the same in correct operative position while being applied to the threaded neck of the tube, while permitting the cap to be gradually drawn out of the chuck as it is screwed up upon the neck of the tube without putting any undue strain upon the cap tending to distort or mutilate the same.

While I have shown and described a preferred embodiment of my invention, it will be understood that the drawings do not de-

fine the limits of the invention, as changes may be made in the construction, arrangement and operation therein disclosed without departing from the spirit of my invention or scope of my broader claims.

I claim:

1. In a collapsible tube-working machine, cap-delivery means and means for receiving a cap by gravity directly from said delivery means and frictionally holding the same by engagement with its periphery only and applying the same to the threaded neck of a tube, substantially as described.

2. In a collapsible tube-working machine, cap-delivery means and means for receiving a cap by gravity directly from said delivery means and frictionally holding the same by engagement with its periphery only and applying the same to the threaded neck of a tube, said receiving and applying means being constructed and arranged to prevent the delivery of another cap thereto while a cap is held therein, substantially as described.

3. In a collapsible tube-working machine, a bodily-movable cap-applying chuck, and means movable with said chuck for delivering caps thereto, substantially as described.

4. In a collapsible tube-working machine, a bodily-movable cap-applying chuck and a flexible cap-delivery chute having its delivery end portion attached to and movable with said chuck, substantially as described.

5. In a collapsible tube-working machine, a non-rotating cap-applying chuck movable in one direction to apply a cap to the threaded neck of a tube, and means for delivering a cap directly into said chuck in a direction at substantially right angles to said direction of movement of said chuck, said chuck being adapted to hold a cap therein solely by frictional engagement with its periphery, substantially as described.

6. In a collapsible tube-working machine, cap-applying means having relatively movable members for frictionally holding a cap therein, means for yieldingly maintaining said members in cap-engaging position, and means for relatively moving said members out of cap-engaging position, substantially as described.

7. In a collapsible tube-working machine, a cap-applying chuck having relatively movable jaws for frictionally engaging the periphery of a cap for holding the same therein solely by such frictional engagement, and means for delivering a cap directly to said jaws, said chuck being constructed to prevent a cap from being delivered to said jaws when another cap is positioned therebetween, substantially as described.

8. In a collapsible tube-working machine, a cap-applying chuck having relatively movable jaws for frictionally holding a cap therein, means for limiting the relative inward movement of said jaws, yielding means

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for normally maintaining said jaws at the limit of their inward movement, said jaws when in said position preventing the delivery of a cap thereto, means for producing relative outward movement of said jaws, and means for delivering a cap to said jaws when moved outwardly by said means, substantially as described.

9. In a collapsible tube-working machine, a cap-applying chuck having relatively movable jaws for frictionally holding a cap therein, means for relatively moving said jaws into cap-engaging position, means for relatively moving said jaws out of cap-engaging position, and means for delivering caps singly and in succession to said jaws, the construction being such that when a cap is in position between said jaws another cap is prevented from being delivered thereto, substantially as described.

10. In a collapsible tube-working machine, a bodily-movable chuck having relatively movable jaws for frictionally holding a cap therein, means for moving said chuck back forth from a cap-receiving station to a cap-applying station, means for normally maintaining the jaws in cap-engaging position, means at the receiving station for engaging said jaws and moving the same out of cap-engaging position, and means for delivering a cap to said jaws when in the latter position, substantially as described.

11. In a collapsible tube-working machine, a chuck having a pair of sliding jaws for frictionally holding a cap therein, each of said jaws having a beveled surface, yielding means for normally maintaining said jaws in cap-engaging position, means for reciprocating said chuck between a cap-receiving station and a cap-applying station, stationary means for co-operation with the beveled surfaces of said jaws at said receiving station for moving said jaws out of cap-engaging position, and means for delivering a cap to said jaws when in the latter position, substantially as described.

12. In a collapsible tube-working machine, tube-holding means, bodily-movable means

for frictionally holding a cap in position to be applied to the neck of a tube on said tube-holding means, means for delivering a cap to said cap holding means, and means for moving said cap-holding means to and from cap-applying position with respect to said tube-holding means, said last-mentioned means being constructed to yieldingly maintain the cap-holding means in cap-applying position, substantially as described.

13. In a collapsible tube-working machine, bodily-movable cap-applying means, means for moving said cap-applying means to and from cap-applying position, and means for delivering a cap to said applying means by gravity, said applying means being constructed to frictionally hold said cap therein by engagement with its periphery only, substantially as described.

14. A cap applying means for collapsible tubes including a tube supporting member, a chuck member, one of said members being movable toward and away from the other, means operable upon the movement of the movable member away from the other member for opening the chuck, means for closing the chuck on the approach of one member toward the other, and means for feeding a cap into the chuck when the same is open and empty.

15. A cap applying means for collapsible tubes including a tube supporting member, a chuck member, said chuck comprising a supporting block having sliding jaws thereon, said jaws having cap gripping surfaces and cap feed control fingers, a cap delivery chute terminating at the chuck, said fingers being reciprocable across the end of the chute, one of said members being movable toward and away from the other, and means operable upon the movement of the movable member away from the other for opening the jaws of the chuck, and other means for closing the chuck.

In testimony whereof I have hereunto set my hand.

WALTER T. DAVIS.