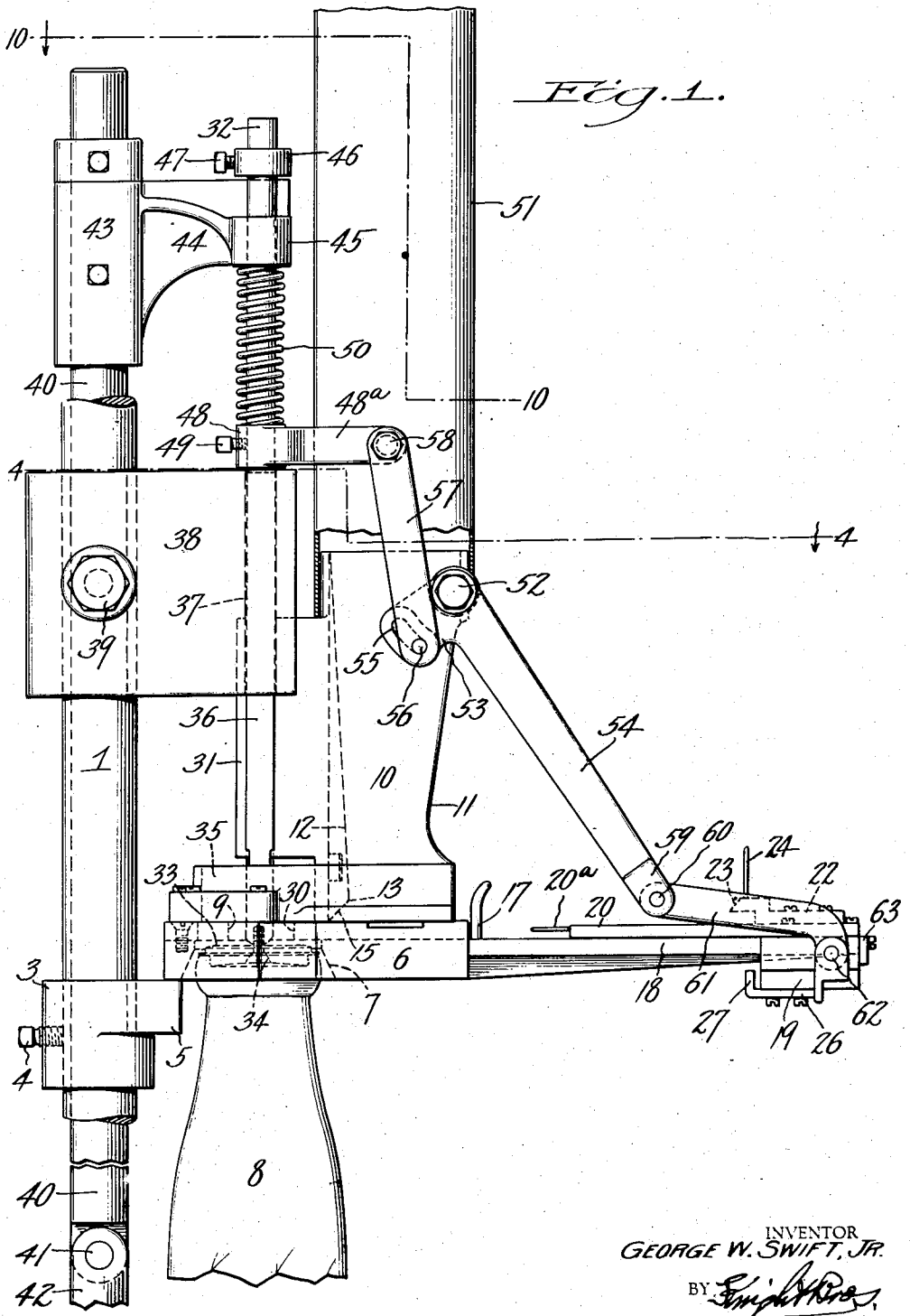
April 8, 1930. G. W. SWIFT, JR 1,753,449

BOTTLE CAPPING MACHINE

Filed Feb. 25, 1928 5 Sheets-Sheet 1

Fig. 1.



WITNESS
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April 8, 1930. G. W. SWIFT, JR 1,753,449

BOTTLE CAPPING MACHINE

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Fig. 2.

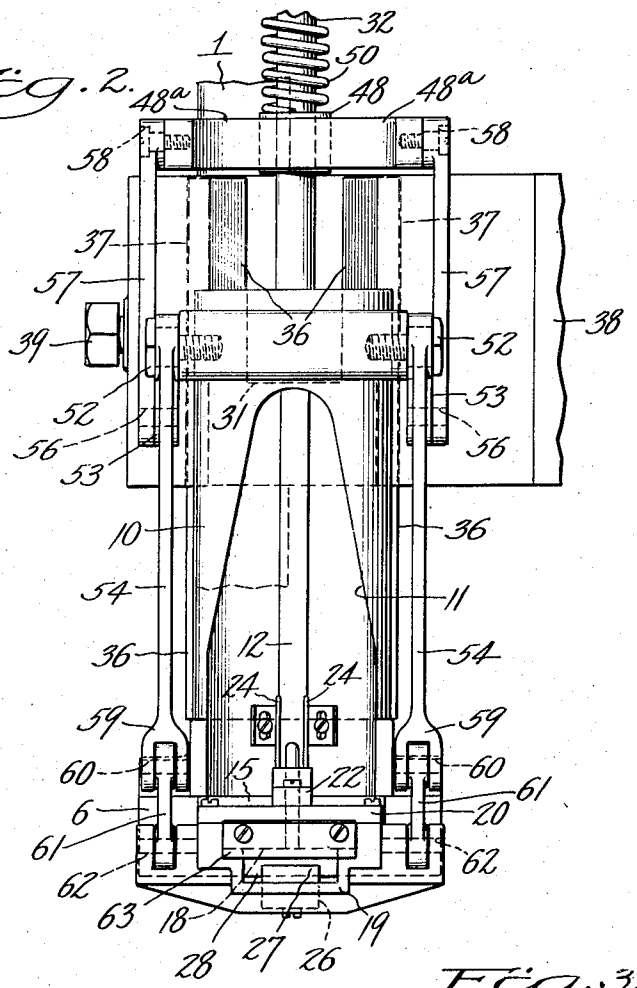
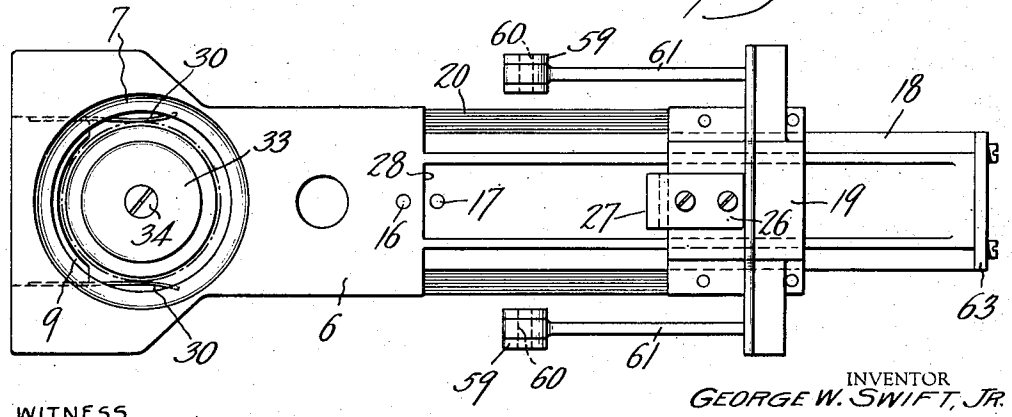


Fig. 3.



WITNESS

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April 8, 1930. G. W. SWIFT, JR 1,753,449

BOTTLE CAPPING MACHINE

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Fig. 4.

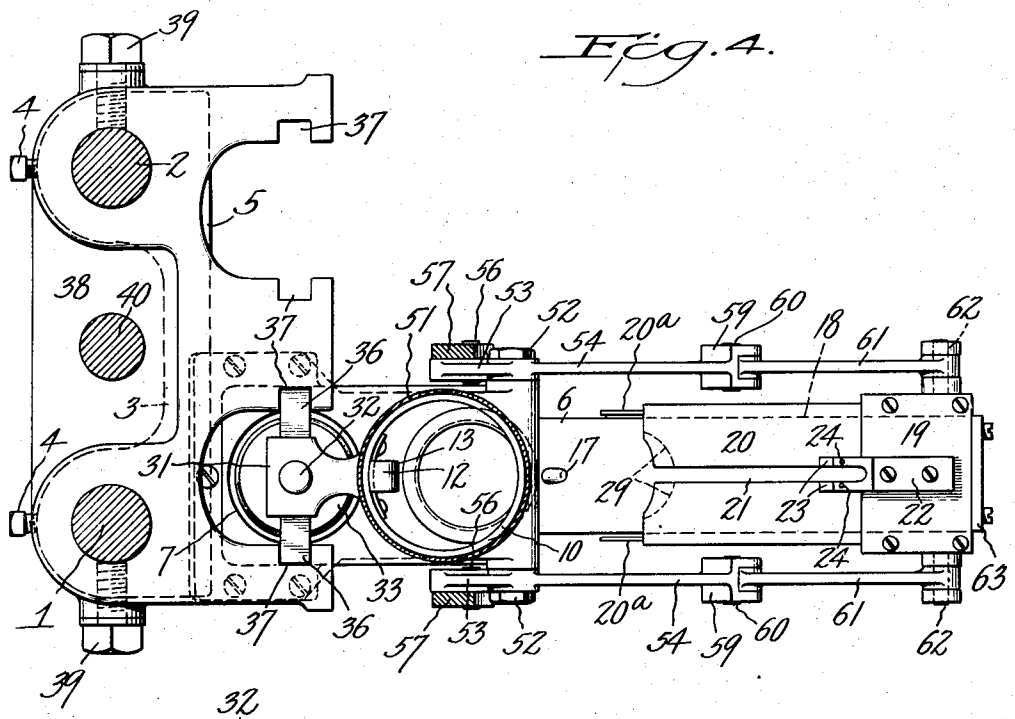
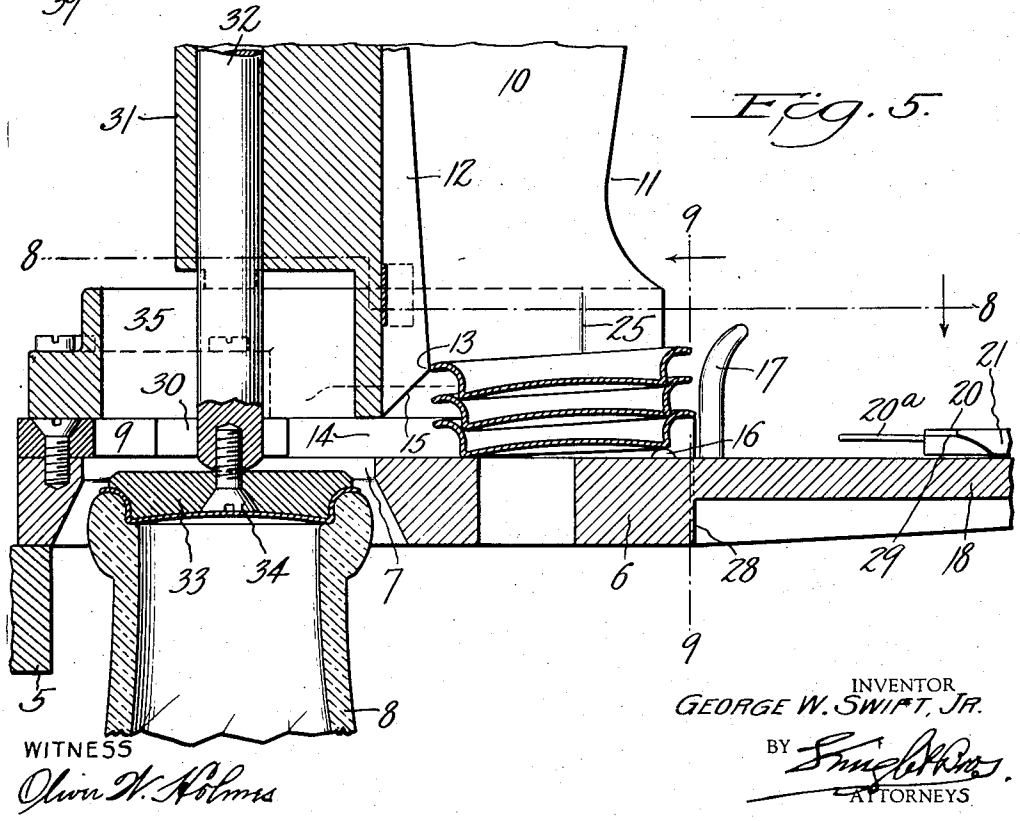


Fig. 5.



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April 8, 1930. G. W. SWIFT, JR 1,753,449

BOTTLE CAPPING MACHINE

Filed Feb. 25, 1928 5 Sheets-Sheet 4

Fig. 7.

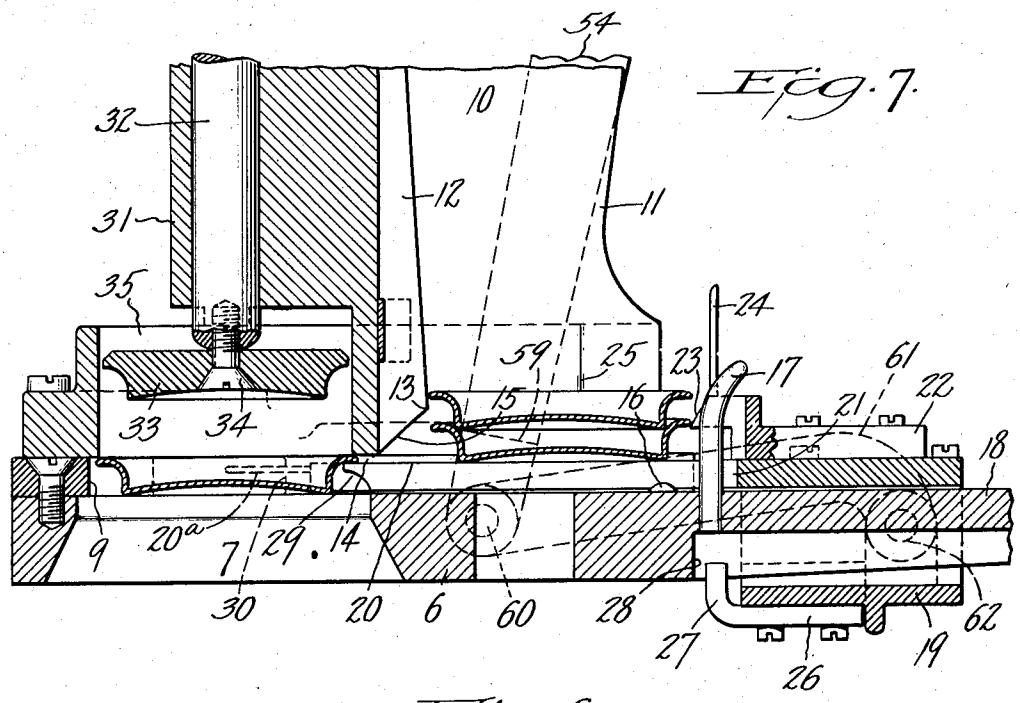
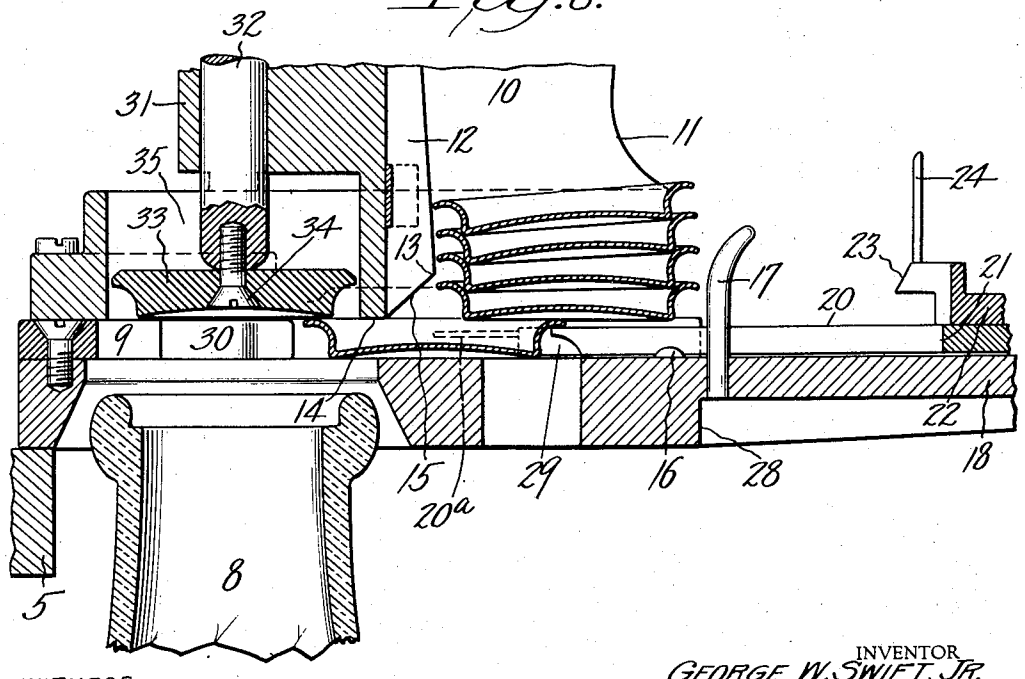


Fig. 6.



WITNESS

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April 8, 1930. G. W. SWIFT, JR 1,753,449

BOTTLE CAPPING MACHINE

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Fig. 8.

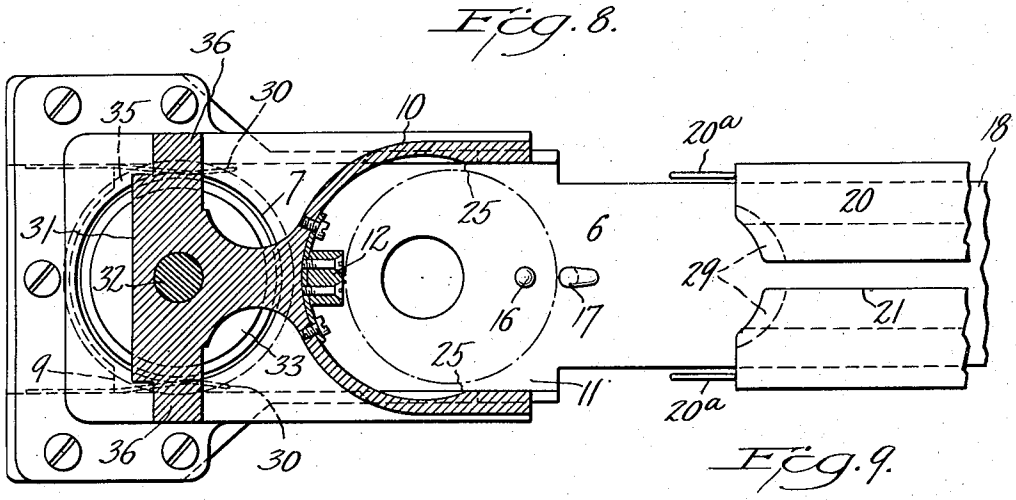


Fig. 9.

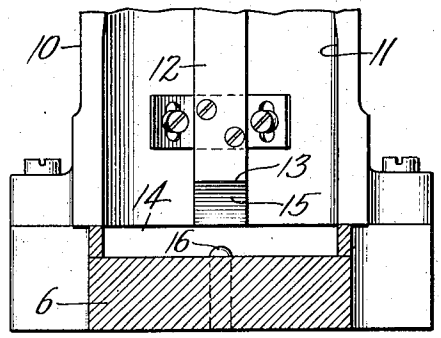


Fig. 10.

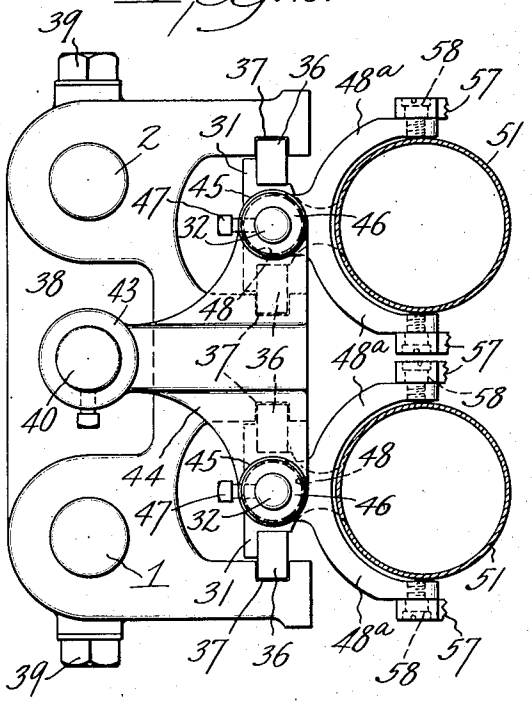
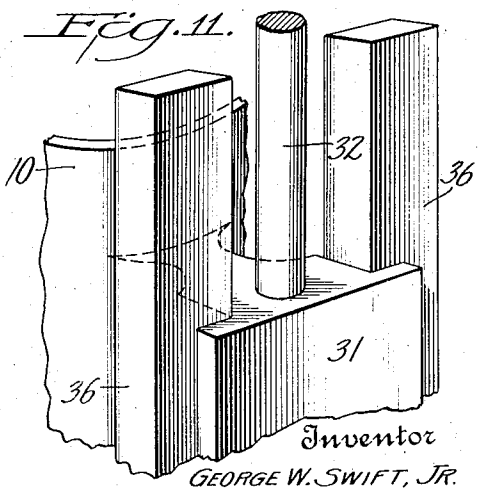


Fig. 11.



WITNESS

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Inventor

GEORGE W. SWIFT, JR.

By his Attorneys Smith & Pratt.

Patented Apr. 8, 1930 1,753,449

UNITED STATES PATENT OFFICE

GEORGE W. SWIFT, JR., OF BORDENTOWN, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO BOTTLE CAP PATENTS COMPANY, OF BORDENTOWN, NEW JERSEY, A CORPORATION OF NEW JERSEY

BOTTLE-CAPPING MACHINE

Application filed February 25, 1928. Serial No. 256,890.

This invention relates more especially to that type of bottle-capping machines in which the caps, previously arranged in a stack within a suitable container, are removed one at a time from the bottom of said container by means which deposit said caps successively in the path of a reciprocatory plunger which is operated periodically for applying the caps to vessels presented successively into position to receive them.

The main object of my invention is to provide cap-stacking and cap-feeding mechanism of improved construction which will operate rapidly and accurately to separate the caps one by one from the bottom of a prearranged stack which may be replenished from time to time at the top without interrupting the continuous operation of the machine.

One of the objects of my invention is to provide bottle-capping mechanism of simple construction which can be elevated automatically to permit the filled bottles to be moved into position to receive the caps and lowered again for the capping operation without materially retarding the speed of the bottle-capping machine.

Another object of my invention is to provide means of improved construction for separating successive caps from the bottom of a stack and cooperatively timing their presentation in the path of a reciprocatory plunger which applies them to the filled vessels.

Certain specific objects of my invention will appear in the specification, the particular construction and arrangement of the parts appertaining thereto, being recited in the claims.

A preferred embodiment of my invention is shown in the accompanying drawings, in which

Figure 1 is a side elevation of bottle-capping mechanism constructed according to the underlying principles of the present invention.

Figure 2 is an enlarged fragmentary front elevation of the same.

Figure 3 is an enlarged bottom plan view of the reciprocatory cap-feeding mechanism.

Figure 4 is a section on the line 4—4, Figure 1.

Figure 5 is an enlarged vertical section of the cap-feeding and cap-applying mechanism showing the relative positions of the parts at the completion of the cap-applying operation, the cap-feeding slide being in retracted position.

Figure 6 is a vertical section similar to Figure 5, showing the cap-applying plunger in raised position and a cap partly displaced from the cap-stacking hopper under a partial advance of the cap-feeding slide.

Figure 7 is a vertical section similar to Figures 5 and 6 showing the cap-feeding slide at the end of its forward stroke and a cap in position to be displaced downwardly to the mouth of a bottle by the next downward movement of the cap-applying plunger.

Figure 8 is a fragmentary horizontal section corresponding to the line 8—8, of Figure 5.

Figure 9 is a fragmentary vertical section corresponding to the line 9—9, Figure 5.

Figure 10 is a top plan view and horizontal section corresponding to the line 10—10 of Figure 1, parts being broken away.

Figure 11 is a perspective view of the reciprocatory supporting frame which carries the hopper for holding the caps and guides the plunger which applies said caps as they are fed from the hopper and presented thereto.

According to the embodiment of my invention shown on the drawings, the main frame of the machine includes two laterally spaced vertical uprights 1 and 2, which are rigidly united by a transverse beam or support 3 secured to each of said uprights by means of a set screw 4. Presented toward the right, according to Figure 1, is a ledge or support 5 upon which the forward ends of two laterally spaced feed-tables 6 normally rest. Each of said feed-tables is provided with an opening 7 through which successive caps may be applied to the mouths of bottles 8 in the manner to be hereinafter explained. Mounted above the feed-tables 6 and separated therefrom by spacing blocks 9 are hoppers or containers 10 into which caps may be charged at the top and separated one at a time from

the bottom. As shown in Figure 2, each of the hoppers 10 is provided with a downwardly enlarged opening 11 in the forward wall thereof which permits a progressive rearward displacement of the stacked caps as they move downwardly therethrough. For this purpose, a wedge-shaped gauge bar 12 is secured to the inner wall of hopper 10 to provide an inclined cap-guiding surface opposite to the opening 11. Said gauge bar increases in thickness downwardly to a point 13 adjacent to a discharge outlet 14, said discharge outlet 14 being formed in the forward wall of hopper 10 at the bottom. The lower end of said wedge bar 12 is provided with a downwardly-presented beveled surface 15 which terminates below at a point adjacent to the upper edge of outlet 14. Projecting upwardly from the upper surface of the feed-table 6 and centrally disposed with respect to the opening 11 in the rear wall of hopper 10, is a rounded lug or protuberance 16 which serves to elevate the rear edge of the stack. In this way, the lowermost cap in the stack is provided with two diametrically opposite points of support arranged in the central plane of feed of the caps as they are fed off from the hopper in the manner to be presently described. Immediately to the rear of and in line with lug 16 is an upwardly presented post 17 which is deflected rearwardly at its upper end to prevent undue rearward displacement of the caps under the wedging action of guide bar 12.

As shown best in Figure 3, each feed-table 6 is provided with a reduced rearwardly-presented portion 18 which constitutes a guide or support for reciprocally mounting a box-like cross-head 19. Connected to the cross-head 19, is a forwardly presented slide 20, said slide being provided with a longitudinal slot 21 to accommodate the post 17 and lug 16 as said slide moves forwardly during its cap feeding movements. Secured to the cover plate of the cross-head guide 19 is a jogger 22 which is bifurcated at its forward end to conform to the slot 21, the forward edges thereof being beveled at 23 to adapt said jogger to engage under the edge of a cap which is slidably supported by the slide 20 while the preceding cap is being moved to cap-applying position. Presented upwardly from each branch of the bifurcated jogger is a pusher pin 24 which on each forward stroke of slide 20 is adapted to return to their proper positions in the stack, any caps which may have been unduly displaced. As shown in Figure 8 of the drawings, the caps at the bottom of the stack are confined between the guiding surface of wedge bar 12, post 17, and laterally spaced guide surfaces 25 which are formed at the lower end of said hopper to extend parallel to the path of slide 20 and to slidably engage the lateral edges thereof. Secured to the bottom wall of cross-head 19 is a plate 26 provided with an upwardly bent end 27 which is adapted to engage a shoulder 28 formed in the bottom of feed-table 6. The forward end of slide 20 is provided with an arcuate recess 29 which conforms to the circular wall of a cap engaged thereby. Projecting forwardly from the forward end of slide 20 are laterally spaced pins 20^a which are adapted to engage the lateral wall of a cap and in connection with the arcuate recess 29, serve to center said cap during its movement into cap applying position.

From this description it will be understood that as the slide 20 moves forwardly from its retracted position, shown in Figures 1, 4 and 5, the lowermost cap will be displaced from the stack in the manner indicated in Figure 6. At the end of this forward movement, said cap will assume the position shown in Figure 7 in which position the opposite edges of its top flange will be yieldably gripped between laterally spaced leaf springs 30 shown in Figure 3.

Integral with the hopper 10 is a guide 31 within which is reciprocably mounted a plunger 32. Secured to the lower end of said plunger by means of a set screw 34 is a cap-applying disc 33 which, in its upper position, is positioned within a chamber 35 with which the casting 31 is provided.

As shown in Figures 1, 4, and 11, the guide 31 is provided with oppositely-presented ribs 36 which are reciprocably mounted in guideways 37, said guideways being formed as oppositely-presented grooves in a guide block 38 which is secured to the laterally-spaced guides or supports 1 and 2 by means of set screws 39. Reciprocably mounted in the bearing block 38 is a plunger 40 to the lower end of which is pivotally connected at 41 a crank-driven connecting rod 42. Secured to the upper end of plunger 40 is the hub portion 43 of a duplex bracket arm 44, said bracket arm being provided with laterally-spaced bearing lugs 45 which correspond respectively to the laterally-spaced cap-applying plungers 32. Thus, each of the plungers 32 is reciprocably mounted in one of the bearing lugs 45, a fixed collar 46 being secured to its upper end by means of a set screw 47. Interposed between each of the bearing lugs 45 and a bifurcated bracket arm 48 which is secured to the plunger 32 by means of a set screw 49, is a compression spring 50 which provides a yieldable power-transmitting connection between the bracket arm 44 and said bifurcated bracket arm.

As shown in Figures 2 and 10, each of the bifurcated brackets 48 is provided with laterally-spaced arms 48^a which straddle a tubular container 51, said container being removably connected to the upper end of one or the other of said hoppers 10. Threaded into the opposite lateral walls of each of the hoppers 10 are studs 52 upon which are pivotally mounted

oppositely-arranged bell crank levers, each of said levers comprising a short arm 53 and a long arm 54. The shorter arm 53 is provided with an arcuate slot 55 within which moves a pin 56 which is presented laterally from the lower end of a link 57. The upper ends of said links 57 are pivotally connected by pins 58 to the arms 48[a] of bifurcated bracket 48. The long arm 54 of each of the bell crank levers is provided with a bifurcated end 59 which carries a pin 60 to which is pivotally connected one end of a bent link 61. The downwardly deflected ends of the oppositely-arranged bent links 61 are pivotally connected to the cross-head 19 by means of pins 62. A stop 63 is arranged to limit the rearward movement of each cross-head 19.

Operation

The operation will now be readily understood; and briefly described is as follows.

The relative positions of the parts, shown in Figures 1 and 5, corresponds to the lowermost position of plunger 40. In this position of the parts, the cap-feeding tables 6 rest at their forward edges upon the rearwardly-presented ledge 5 of the transverse support 3, while the slide 20 is in its retracted position which corresponds to the lowermost positions of the bifurcated brackets 48. As the power-transmitting plunger moves upwardly, there is at first a lost-motion movement of the duplex bracket 44 along the cap-applying plungers 32 corresponding to the re-expansion of compression springs 50. As soon, however, as the duplex bracket 44 comes into engagement with the fixed collars 46 on the plungers 32, the cap-applying discs 33 are at first raised to the position shown in Figure 6 and afterwards raised to their uppermost positions shown in Figure 7. During the initial upward movement of the discs 33, the lost-motion connection between links 57 and bell crank levers 54 permit a slight delay in the next cap-feeding movement of slides 20 which are thus adapted to avoid interference with said discs. As said slides 20 move forwardly from the position shown in Figure 5, the bottom-most cap in the stack occupies a position indicated by broken lines in Figure 8. In this position, the cap is confined between the laterally-spaced walls 25 and arranged in front of the gage-post 17 with its rear edge elevated by the protuberance 16. It will be seen therefore that as the forward movement of slide 20 continues, the pins or fingers 20[a] will pass under the top flange of the cap on opposite sides of its cylindrical wall which is brought into engagement with the forward edge of the arcuate recess 29. As indicated in Figure 6, said cap is thereupon moved forwardly from the protuberance 16 and through discharge outlet 14 into position between the gripper leaf springs 30 in readiness to be operated upon on the next downward movement of plunger 32. The several parts now occupy the relative positions shown in Figure 7 and are temporarily locked in said positions while the table 6 with all the parts carried thereby are elevated bodily above the bottles 8 which are removed and immediately replaced by others in preparation for the next capping operation. By an inspection of Figure 7, it will be seen that as the slide 20 reaches the limit of its forward movement, the bifurcated jogger 22 with its forwardly-beveled edges 23 comes into engagement with the next lowermost cap in the stack which then rests upon said slide. As the flange of the last-mentioned cap is disposed below the rearmost point 13 of guide bar 12 while the cap next above it has its flange arranged above said point 13, the jogger 22 is adapted to exert a slight lift to the rear edge of the bottom cap while imparting thereto a forward displacement with respect to the cap next above it. As slide 20 is being retracted, said bottom cap is retained in position by the post 17 and as it drops from said slide, comes to rest with its rear edge resting upon protuberance 16 in readiness for a repetition of the cap-feeding movement of slide 20.

I claim:—

1. In cap-applying mechanism, the combination with a feed-table provided with an aperture, of a cap-feeding slide reciprocable towards and away from said aperture, a tubular hopper for caps arranged between said aperture and the retracted position of said slide, said hopper being provided with a downwardly-enlarged opening in one wall and a discharge outlet for caps in an opposite wall, a wedge bar mounted on the inner wall of said hopper opposite to said downwardly-enlarged opening, said hopper being provided with laterally-spaced cap-gaging walls extending inwardly from the lower end of said opening, and a rounded support projecting above the upper surface of said feed-table between said laterally-spaced cap-gaging walls, said slide being provided with a longitudinal slot for the accommodation of said rounded support.

2. In a machine for applying caps to milk bottles, the combination with a cap-supporting plate, of a cap-stacking hopper extending upwardly from said plate, said hopper being provided with a discharge outlet at the bottom, a downwardly-enlarged opening in its wall opposite to said discharge outlet, and with an inclined cap-engaging guide arranged above said discharge outlet for imparting a progressive displacement of said caps toward said downwardly-enlarged opening as they descend through said hopper, an upwardly-presented cap-gage arranged at the bottom of said downwardly-enlarged openings, and a reciprocatory slide movable on said cap-supporting plate for moving said caps one by

one through the discharge outlet in said hopper.

3. In a machine for applying caps to milk bottles, the combination with a cap-supporting plate provided with an opening through which caps may be applied to bottles presented thereto, of a cap-stacking hopper extending upwardly from said plate at one side of said opening, said hopper being provided with a discharge outlet adjacent said opening and with a cap-engaging guide for imparting a progressive displacement of said caps away from said discharge outlet as they descend through said hopper, an upwardly-presented horn oppositely arranged with respect to said cap-engaging guide for gaging the positions of said caps in the stack, a reciprocatory slide mounted on said cap-supporting plate for moving said caps one by one from the bottom of the stack through said discharge outlet to said opening in the cap-supporting plate, and a reciprocatory plunger for depressing a cap through said opening on to a bottle disposed below.

4. In a cap-applying mechanism, the combination with a feed-table provided with an aperture, of a cap-feeding slide reciprocable towards and away from said aperture, said slide being provided with laterally-spaced cap-engaging fingers, laterally-spaced cap-gripping fingers presented toward said slide on opposite sides of said aperture, a tubular hopper for caps arranged between said aperture and the retracted position of said slide, the inner wall of said hopper being provided with a rearwardly-inclined cap-guiding surface, and a stacking gage arranged diametrically opposite to said cap-guiding surface.

5. In a cap-applying machine, the combination with a cap-supporting plate provided with an opening, of a cap-stacking hopper offset from said opening, said hopper being provided with a cap-engaging guide for imparting a progressive displacement of said caps as they descend through said hopper, an upwardly-presented stacking gage arranged opposite to said cap-engaging guide for positioning said caps in the stack, a reciprocatory slide mounted on said cap-supporting plate for moving said caps one by one from the bottom of the stack into registry with said opening in the cap-supporting plate, said slide being provided with a slot forming laterally-divided portions reciprocable on opposite sides of said stacking-gage, a bifurcated jogger mounted on the slide at the rear end of said slot, said jogger being provided with laterally-spaced upwardly-presented pusher pins movable past said stacking-gage, and a reciprocatory plunger for applying a cap.

6. In cap-applying mechanism, the combination with a feed-table provided with an aperture, of a cap-stacking hopper mounted on said feed-table and provided with a lateral discharge outlet adjacent said aperture in the feed table, a cap-feeding slide reciprocable on said feed table towards and away from said aperture, the inner wall of said cap-stacking hopper being provided with a cap-gaging surface arranged above said discharge outlet and deviating from said inner wall of the hopper towards its lower end, said hopper being provided with a downwardly-enlarged opening in the wall thereof opposite to said cap-gaging surface and with laterally-spaced cap-gaging surfaces at the lower end of said opening, a rounded protuberance projecting upwardly from the upper surface of said feed-table and centrally disposed with respect to said laterally-spaced cap-gaging surfaces, a cap-gaging post presented upwardly from said feed-table, said post being arranged diametrically opposite to the first-mentioned cap-gaging surface with respect to an interposed cap, and a jogger mounted on said slide and provided with an upwardly-presented cap-engaging pin, said slide being provided with a central longitudinal slot for the accommodation of said rounded protuberance and cap-gaging post during the reciprocatory movements of said slide.

7. In cap-applying mechanism, the combination with a feed-table provided with an aperture, of a cap-feeding slide reciprocable towards and away from said aperture, a tubular hopper for caps arranged above said feed-table and between said aperture and the retracted position of said slide, said tubular hopper being provided with a discharge outlet for caps adjacent to said aperture in the feed-table and with laterally-spaced cap-gaging surfaces disposed on opposite sides of the central plane of said slide, a gage-post arranged between said tubular hopper and the retracted position of said slide, said slide being provided with a central longitudinal slot for the accommodation of said gage-post, a cap-gaging bar mounted on the inner wall of said hopper above said discharge outlet, said cap-gaging bar being provided with a cap-gaging surface deviating from the inner wall of said tubular hopper and inclined toward said gage-post, and a bifurcated jogger mounted on said slide at the inner end of said slot, the lower end of said cap-gaging bar being beveled off in a cap-guiding surface extending to the upper edge of said discharge outlet.

8. In cap-applying mechanism, the combination with a feed-table provided with an aperture, of a cap-feeding slide reciprocable towards and away from said aperture, a tubular hopper for caps arranged between said aperture and the retracted position of said slide, a rearwardly-presented downwardly-enlarged cap-gaging wedge mounted on the inner wall of said hopper, the lower end of said gaging wedge being beveled toward said

aperture, a centrally disposed rounded support projecting above the upper surface of said feed-table in the path of said slide and adjacent to the edge of said hopper farthest from said aperture, a stacking gage arranged between said tubular hopper and the retracted position of said slide, said slide being provided with a central longitudinal slot for the accommodation of said rounded support and stacking gage, and a bifurcated jogger mounted on said slide at the inner end of said slot.

9. In a cap-applying machine, the combination with a cap-feeding table provided with an opening for applying caps to bottles presented to said opening, a hopper arranged above said cap-feeding table, said hopper being provided with a downwardly-enlarged opening on one side of its axis and an inclined surface on the opposite side of its axis for wedging caps toward said opening as they descend in said hopper, and a slide reciprocable on said table for feeding caps to the cap-applying opening in said table.

10. In a bottle-capping machine, the combination with a cap-feeding table, of a cap-feeding slide reciprocable on said table, a hopper arranged above said cap-feeding table, said hopper being provided with a downwardly-enlarged opening on one side of its axis and an inclined surface on the opposite side of its axis for wedging caps toward said opening as they descend in said hopper, and means for elevating one edge of a stack of caps in said hopper at the bottom of said enlarged opening.

11. In a cap-applying machine, the combination with a cap-feeding table, of a hopper provided with a downwardly-enlarged opening on one side of its axis and an inclined surface on the opposite side of its axis for wedging caps toward said opening as they descend in said hopper, a cap-gaging post presented upwardly from said cap-feeding table, said gage post being centrally disposed with respect to said opening and said wedging surface, and a cap-feeding slide reciprocable on said table across the lower end of said hopper.

12. In a cap-applying machine, the combination with a cap-feeding table of a hopper arranged above said table, said hopper being provided with a downwardly-enlarged opening on one side of its axis and an inclined surface on the opposite side of its axis for wedging caps toward said opening as they descend in said hopper, laterally-spaced cap-guiding walls at the lower end of said downwardly-enlarged opening and a cap-feeding slide reciprocable on said table between said laterally-spaced guide walls, said hopper being provided with a discharge outlet centrally disposed with respect to the medial vertical plane of said laterally-spaced cap-guiding walls.

13. In a bottle-capping machine, the combination of a cap-feeding table, a cap-containing hopper mounted above said table, a cap-feeding slide reciprocable across the lower end of said hopper, said hopper being provided with laterally-spaced cap-guiding walls between which said slide reciprocates and a downwardly-inclined cap-wedging surface arranged centrally and transversely with respect to the guideway between said laterally spaced guide-walls.

14. In a cap-applying machine, the combination with a feed table of a cap-stacking hopper mounted on said feed table, a cap-feeding slide reciprocable on said feed-table across the lower end of said hopper, said hopper being provided with oppositely-arranged cap-discharge outlet and downwardly enlarged opening in the reciprocatory path of said slide, and a wedge-bar mounted on the inner wall of said hopper above said cap-discharge outlet.

15. In a cap-applying machine, the combination with a cap-feeding table, of a hopper for caps arranged above said cap-feeding table, said hopper being provided with a cap-discharge outlet and a cap-gaging opening arranged diametrically opposite to each other, a cap-feeding slide reciprocable on said feed-table and through said cap-discharge outlet and cap-gaging opening, said slide being provided with a central longitudinal slot, and a cap-retaining post presented upwardly from said cap-feeding table within said longitudinal slot and between the lateral edges of said cap-gaging opening.

16. In a cap-applying machine, the combination of a feed-table, a cap-stacking hopper mounted above and discharging at its lower end upon said feed-table, a cap-feeding slide reciprocable on said feed-table across the lower end of said hopper, said hopper being provided on one side with a cap-discharge outlet in the path of said slide and on its opposite side with laterally-spaced cap-gaging walls on opposite sides of the path of said slide, a cap-retaining post presented upwardly from said cap-feeding table between said laterally-spaced guide walls, said slide being provided with a longitudinal slot for accommodating said post, and a bifurcated jogger mounted on said slide at the inner end of said slot, said jogger being provided with laterally-spaced pusher pins.

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