Oct. 30, 1956 M. R. GATHERIDGE 2,768,491

CAPPING MACHINE WITH AUTOMATIC CAP FEEDER

Filed Nov. 27, 1953 4 Sheets-Sheet 1

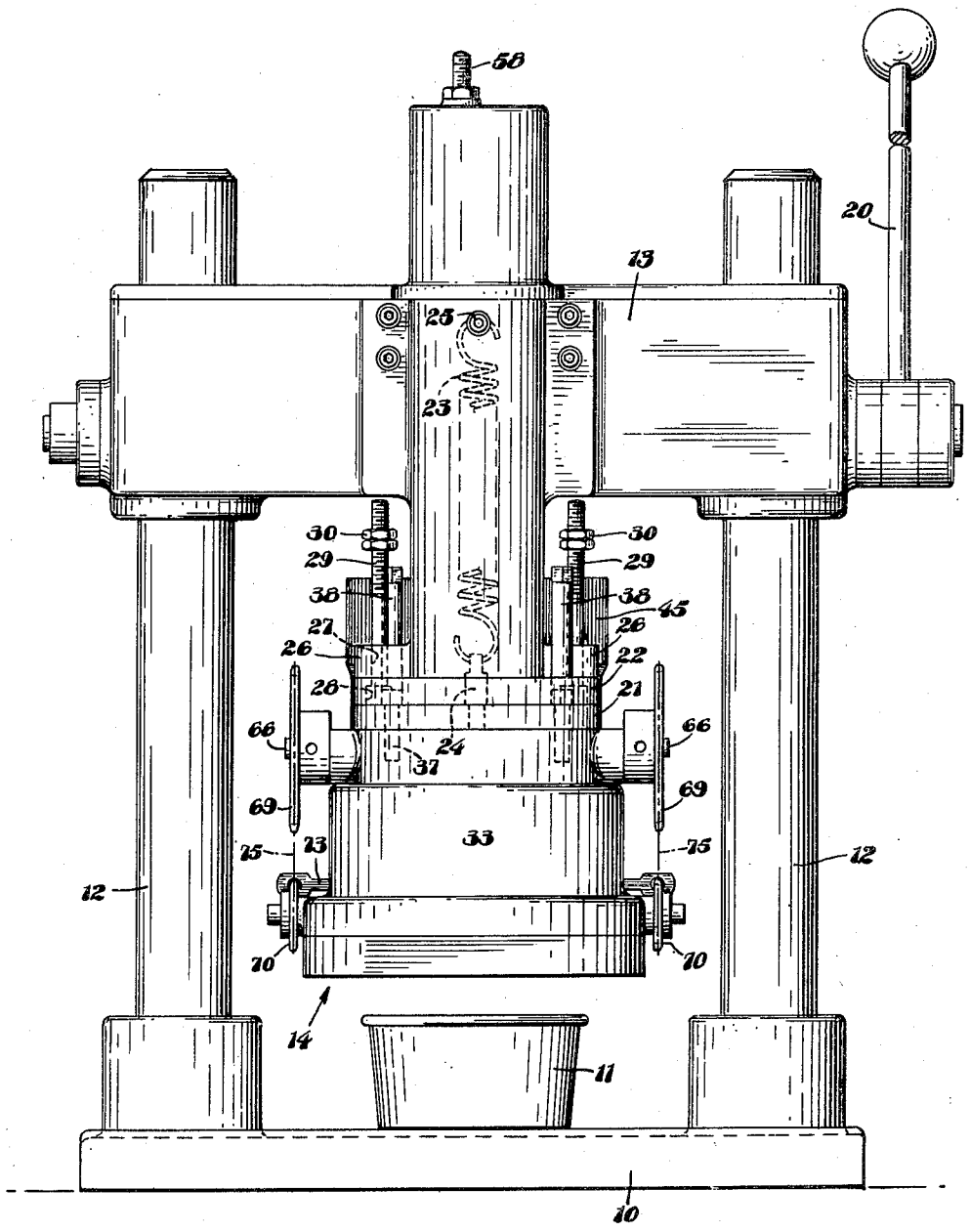


Fig. 1.

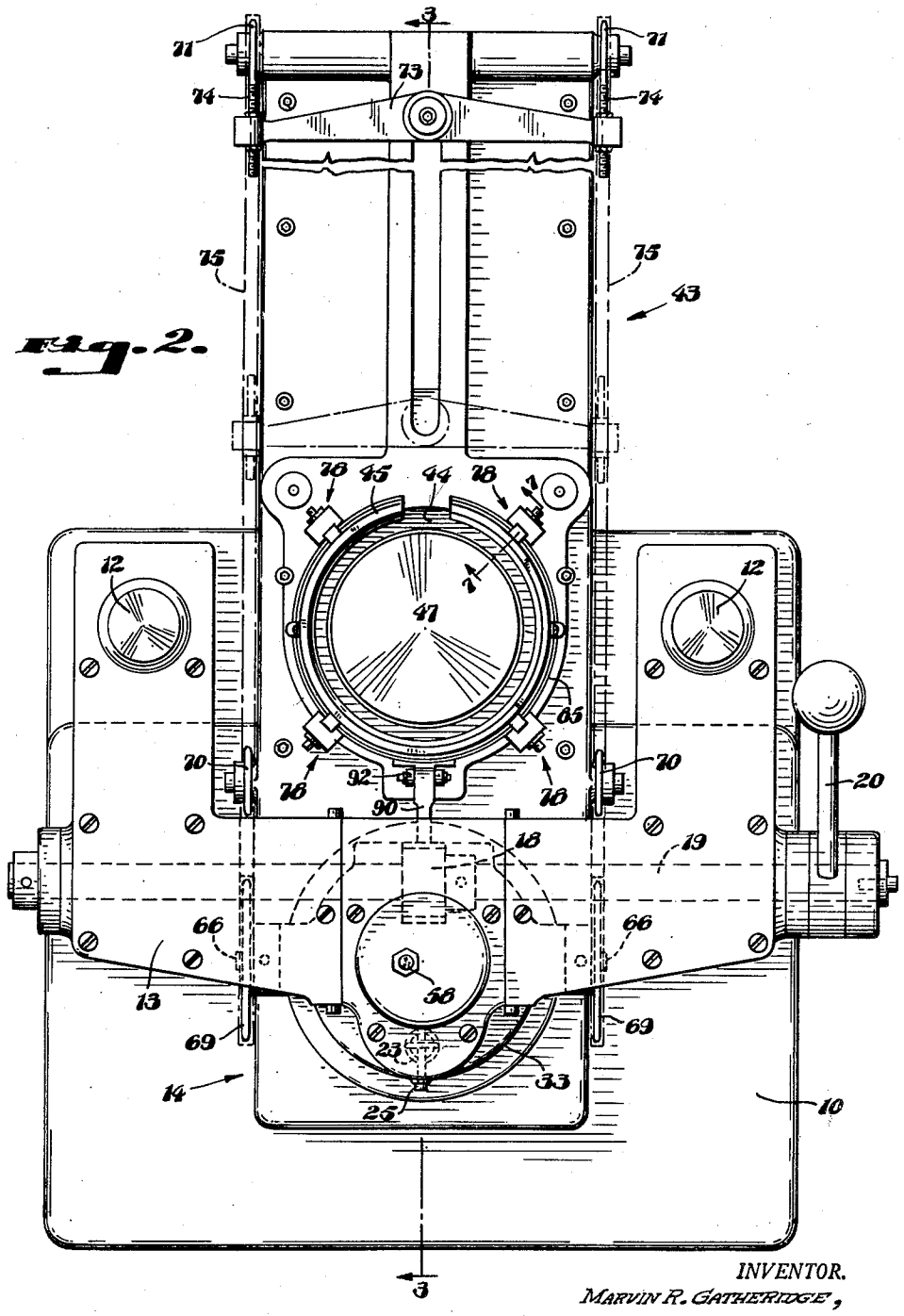
INVENTOR.
MARVIN R. GATHERIDGE,
BY:
Harold B. Hood.
ATTORNEY.

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Fig. 2.



INVENTOR.
MARVIN R. GATHERIDGE,
BY:
Harold B. Hood
ATTORNEY.

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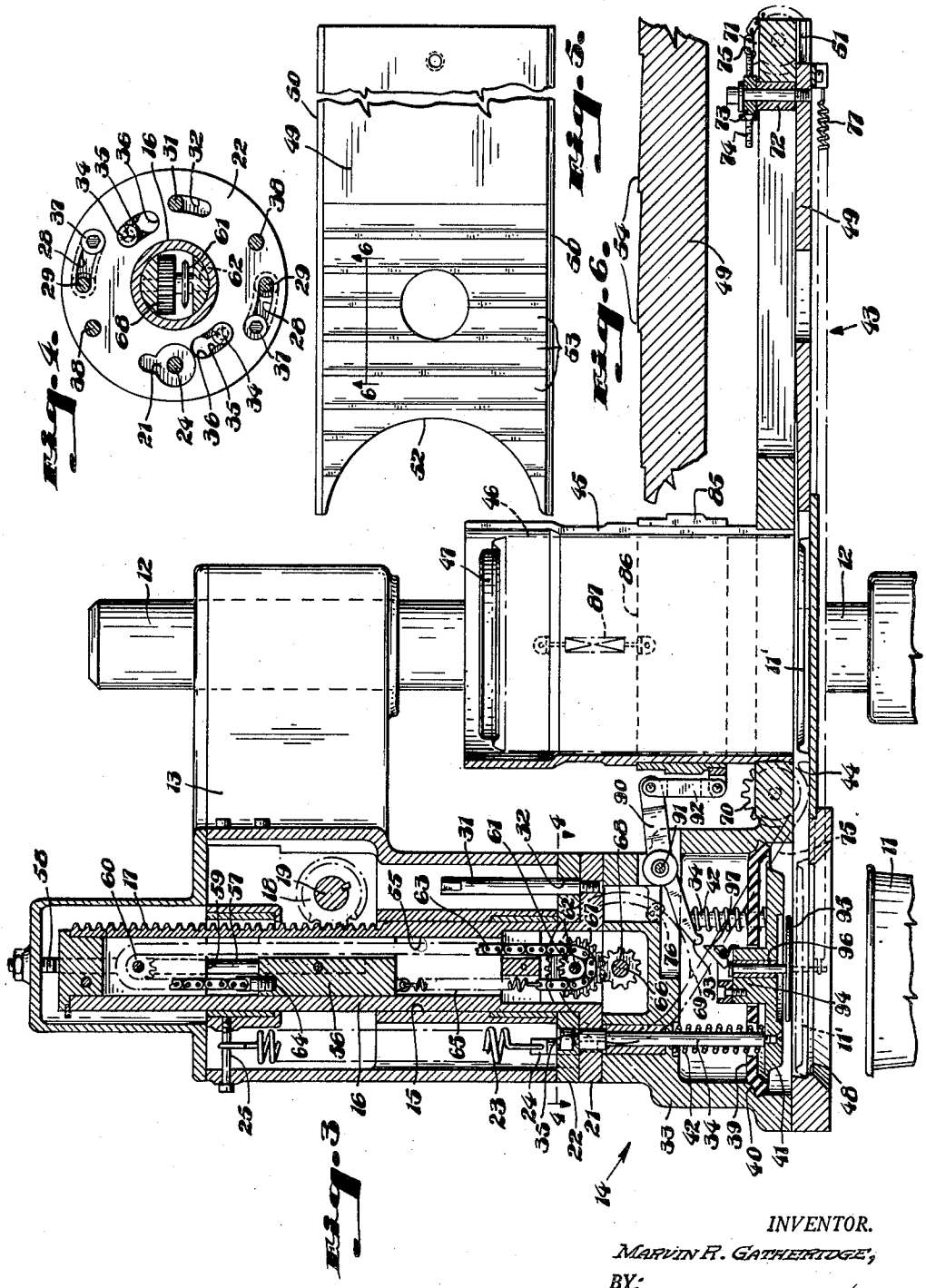


Fig. 3

Fig. 4.

Fig. 5.

Fig. 6.

INVENTOR.
MARVIN R. GATHERIDGE,
BY:
Harold B. Wood
ATTORNEY.

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CAPPING MACHINE WITH AUTOMATIC CAP FEEDER

Filed Nov. 27, 1953 4 Sheets-Sheet 4

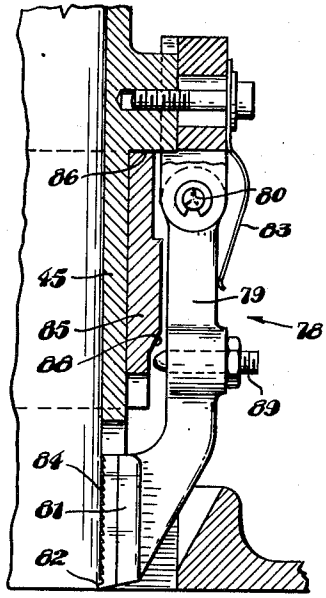


Fig. 7.

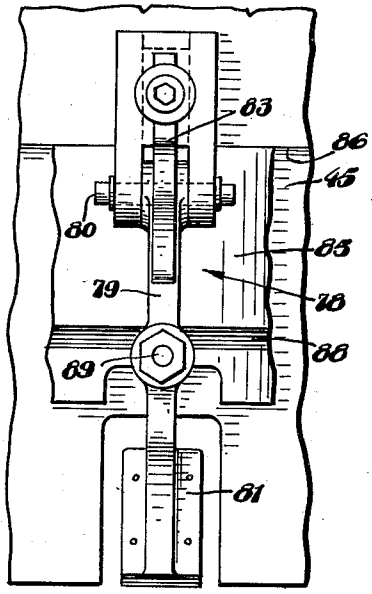


Fig. 8.

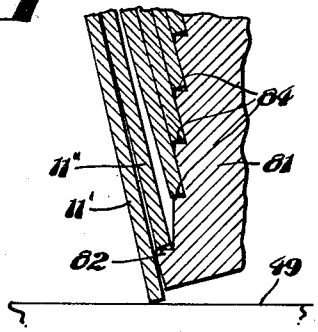
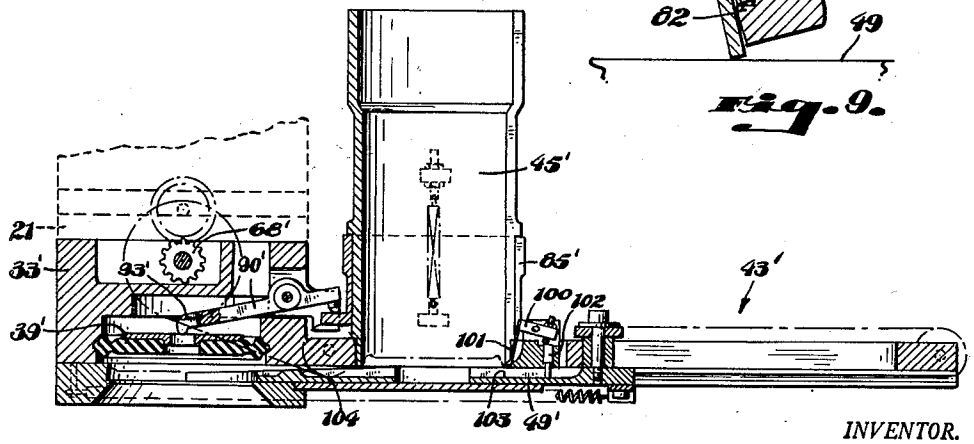


Fig. 9.



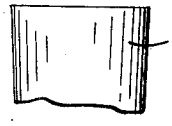


Fig. 10.

INVENTOR.
MARVIN R. GATHERIDGE,
BY:
Harold B. Hood
ATTORNEY.

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CAPPING MACHINE WITH AUTOMATIC CAP FEEDER

Marvin R. Gatheridge, Indianapolis, Ind., assignor to Huyler's, New York, N. Y., and Indianapolis, Ind., a corporation of New York

Application November 27, 1953, Serial No. 394,666

32 Claims. (Cl. 53—310)

The present invention relates to a capping machine for crimping the skirt of a deformable cap upon the rim of an open-mouthed receptacle, and particularly to such a machine which includes mechanism for automatically placing the caps upon the receptacles preparatory to such crimping operation.

The primary object is to provide, in such a capping machine, a magazine for storing a supply of caps and transfer means for receiving caps serially from said magazine and for delivering such caps to a position to be deposited over the rim of the receptacle as the capping head moves toward the receptacle.

A further object is to provide a driving train for actuating such transfer means in response to movement of the capping head toward and away from the receptacle.

Another object is to provide means for releasing the lowermost cap in the magazine, for delivery to the capping head, upon each actuation of the capping head during which a cap is placed upon a receptacle, but to withhold release of said cap upon any actuation of the capping head in which no receptacle is in place to receive the previously released cap.

Still another object is to provide mounting means, independent of the platform which supports the receptacle, for a pressure-sustaining plate engageable with the cap during the crimping operation, the movement of such plate relative to the capping head acting to release the lowermost cap in the magazine.

Ancillary objects will become apparent as the description proceeds.

To the accomplishment of the above and related objects, my invention may be embodied in the forms illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific constructions illustrated and described, so long as the scope of the appended claims is not violated.

Fig. 1 is a front elevation of a preferred form of machine embodying my invention;

Fig. 2 is a plan view of the machine of Fig. 1;

Fig. 3 is a sectional view through the machine of Fig. 2 taken substantially upon the line 3—3 thereof;

Fig. 4 is a horizontal sectional view taken substantially upon line 4—4 of Fig. 3 and showing a detail of the machine;

Fig. 5 is a plan view of an element of the machine;

Fig. 6 is a fragmentary sectional view taken substantially upon line 6—6 of Fig. 5 and drawn to an enlarged scale;

Fig. 7 is an enlarged side elevation, partially in section, of the mechanism used for releasably retaining the caps in the magazine of the machine, looking in the direction of the arrows of line 7—7 of Fig. 2;

Fig. 8 is a front elevation of the mechanism of Fig. 7;

Fig. 9 is a greatly enlarged sectional view of a portion of the mechanism of Figs. 7 and 8 showing the manner of engagement with the caps in the magazine; and

Fig. 10 is a view similar to Fig. 3 but showing a modified form of trigger means for releasing the caps from the magazine.

Referring more particularly to the drawings, the machine comprises a platform 10 adapted to support the bottom of a receptacle 11. The machine illustrated in Figs. 1, 2 and 3 is intended primarily, but not solely, for use in applying caps to axially fragile receptacles, and the machine illustrated in Fig. 10 is for use primarily with axially rigid receptacles. The receptacle 11 may be placed manually or automatically in position on the platform 10.

A pair of posts 12, 12 are supported from platform 10 and in turn support a framework 13 in a normally fixed attitude relative to platform 10. This framework supports a capping head, referred to generally by the reference numeral 14, for movement toward and away from the platform respectively into and out of operative engagement with a receptacle supported on the platform.

Frame 13 is formed to provide an axial bore 15, substantially perpendicular to the platform 10, and a ram member 16 is reciprocably received in said bore for movement towards and away from said platform (Fig. 3). Ram 16 is formed to provide a rack 17 extending axially thereon. A pinion 18, meshing with rack 17, is keyed to a shaft 19 journalled in frame 13 and adapted to be oscillated by means of a handle 20, or the like. Obviously, the shaft 19 may alternatively be mechanically driven. Rotation of shaft 19 in one direction will move ram 16 toward platform 10, and opposite rotation of said shaft will move the ram away from the platform.

Ram 16 is here shown provided with a radially projecting collar 21 on the end thereof adjacent platform 10, and a ring member 22 is sleeved on ram 16 and confined between the collar and frame 13, for a purpose soon to become apparent. A coiled spring 23 has one end connected to a pin 24, penetrating ring 22 and fixed to collar 21 and the opposite end is connected to frame 13, as at 25, to yieldingly urge ram 16 toward its uppermost position.

Frame 13 is provided, adjacent ring member 22, with a pair of radially projecting lugs 26, 26 (Fig. 1) each provided with a bore 27 therethrough along a line substantially parallel to the axis of ram 16. Ring member 22 is formed with a pair of peripherally elongated, undercut slots 28, 28 (Figs. 1 and 4), registering with bores 27, 27, and a pair of studs 29, 29, have their headed ends nested in the undercuts of slots 28, 28, and pass through the said slots and the respective bores 27. Each stud 29 is provided with stop nuts 30, 30 engageable with the associated lug 26 to limit the distance said ring member can be moved away from frame 13. Thereby, ring member 22 is free for limited rotation relative to ram 16, while being restricted somewhat by nuts 30 against axial movement.

Preferably, but not necessarily, a guide pin 31 is supported on collar 21 and projects through a peripherally-extending slot 32 in ring member 22 to limit such rotation of the ring member.

By rotating ring member 22 substantially 20° from its illustrated position in Fig. 4, the ram 16 is prepared for the reception thereon of a bell-shaped housing 33. Housing 33 is provided with a plurality of shouldered posts 34 (Figs. 3 and 4) extending into the interior of the housing, and axially reciprocable relative thereto. Ring member 22 is provided, for each such post, with a peripherally-extending, undercut slot 35 enlarged as at 36 to pass the end of the post 34 when the housing 33 is placed against collar 21, the shoulder of the post engaging the undercut portion of the slot 35, upon subsequent return of the ring member 22 to its illustrated position in Fig. 4. As can be seen from an inspection

of Fig. 3, this locks the posts 34 solidly to ring member 22. Headed bolts 37 (Figs. 1 and 4) are then passed through slots 28, through aligned bores in collar 21, and engaged in tapped bores in housing 33 to draw the housing solidly against collar 21. At the same time, shouldered pins 38 are passed through suitable bores in ring member 22, aligned bores in collar 21, and engaged in tapped bores in housing 33 to serve as guides for the ring member 22 and to lock ring member 22 against subsequent rotation. Thus, it will be seen that the housing 33 can be quickly and easily attached to or removed from the collar 21 of ram 16.

A plastically deformable crimping member 39 (Fig. 3) spans the mouth of the bell-housing 33 and is peripherally supported from the housing for movement therewith but is free for movement axially relative thereto. The inner wall of the housing 33, which is engaged by the perimeter of member 39 is shaped to form a camming surface, as at 40, and upon slight relative movement between the housing 33 and the member 39 in one direction, the perimeter of the crimping member is forced toward platform 10 and radially toward the center of member 39. When the rim of the receptacle is properly positioned within housing 33, such deformation of crimping member 39 serves to mold the skirt of a cap, resting over the receptacle mouth rim, into conforming engagement with the receptacle rim.

As shown, the member 39 is carried for movement with the housing 33 (constituting the cam member) as it is moved toward platform 10, such movement of the crimping member being arrested (by means to be described) while the housing continues to move toward the platform initiating the required relative movement between the cam surface 40 and the member 39. It will be apparent that upon the deformation of the perimetral portion of member 39, a relatively large force will be exerted in the direction of receptacle 11, both axially and radially inwardly. Where the receptacle is axially and radially fragile, it becomes necessary to provide some means for sustaining or limiting this force in order to prevent crushing of the receptacle.

To this end, I provide a head member in the form of a plate 41, arranged adjacent the crimping member 39 on the side thereof adjacent platform 10 and centrally supported in this position upon the lower ends of the posts 34. As shown, I have provided a slight clearance between the adjacent surfaces of crimping member 39 and the plate 41. The amount of such clearance can be nicely regulated by adjustment of nuts 30, 30 on studs 29, for a purpose presently to become apparent.

Coiled springs 42 are sleeved on posts 34 and confined between plate 41 and housing 33, with a slight initial compression, to urge the plate toward the open end of the housing and away from the crimping member 39.

As the ram 16 is moved toward platform 10, carrying with it the housing 33, crimping member 39 and the plate 41, stop nuts 30 on studs 29 are moved toward the lugs 26 on frame 13. In the present illustration the nuts 30 are so adjusted that the plate 41 will engage the body of the cap 11' shortly before the engagement of nuts 30 with lugs 26. Continued movement of ram 16 toward the platform will, thereafter, act through the coiled springs 42, to force plate 41 beneath the upper plane of the receptacle rim causing the body of cap 11' to become slightly indented and the rim portion of the cap to be seated solidly against the receptacle rim. At that moment, downward movement of plate 41 will be arrested by engagement of nuts 30 with lugs 26 and further downward movement of the ram will cause additional compression of springs 42, with receptacle 11 sustaining only a very slight load. Such further movement will also initiate relative movement between plate 41 and crimping member 39 to cause the crimping member to move toward plate 41 until it strikes the adjacent surface of said plate.

Such engagement will arrest further bodily movement of the crimping member 39; and thereafter, as housing 33 continues to move toward the plateform, the perimetral portion of member 39 will be deformed, as previously described.

Under certain conditions, it is desirable that the cap body not be indented, as above described, and in such instance, it is necessary only to adjust the nuts 30 to a position such that they will engage the lugs 26 the instant plate 41 engages the body of a cap 11' supported on a container 11, to initiate relative movement between crimping member 39 and housing 33. Thus, no downward pressure will be exerted against receptacle 11.

When the housing 33 reaches the bottom of its stroke, and the crimping operation is complete, movement of ram 16 is reversed and the ram is returned to its uppermost position by reverse movement of shaft 19 aided by spring 23. The instant such upward movement of the ram commences, relative movement between plate 41 and housing 33 in the opposite direction will be initiated, under the influence of springs 42, and such movement will continue until the collar 21 on the ram 16 engages ring member 22. Such relative movement will then cease and the plate 41 and housing 33 will be moved away from engagement with receptacle 11.

As stated heretofore, it is a primary object of my invention to provide means for automatically placing a cap over the open mouth of the receptacle 11 preparatory to the crimping of the cap skirt about the rim of the receptacle. To this end, I provide an outrigger 43 supported from the housing 33 for movement therewith, and arranged in a plane substantially perpendicular to the line of reciprocation of ram 16. This outrigger 43 provides a surface 44 facing away from platform 10.

Upon outrigger 43, I provide a cylindrical cap magazine 45 having a lower open end spaced slightly above the surface 44. A stack of caps 46 is adapted to be supported in this magazine, with the skirts of the caps in telescopical association, to be released one at a time onto the outrigger surface 44 by means of mechanism later to be described. Preferably, I provide a weight 47 to be supported on the top of the cap stack to urge the stack downward.

Outrigger surface 44 extends from beneath the open end of magazine 45 to a position beneath the open end of the housing 33 and is there provided with a lipped opening 48 of a size sufficient just to pass the rim of a receptacle moving relatively into housing 33 (Fig. 3). Upon outrigger 43 I provide means for receiving the lowermost cap 11' from the magazine and for transferring this cap to its dotted line position in Fig. 3 with the cap skirt resting upon the lip of the opening 48. As the housing 33 is moved toward platform 10, the cap 11' is deposited over the receptacle mouth rim and thereafter crimped upon the rim as previously described.

The transfer means comprises a pusher member in the form of a plate 49 provided with laterally extending tongues 50 (Fig. 5) for reception in mating grooves 51 (Fig. 3) in outrigger 43 whereby the plate 49 is guided for movement on the outrigger toward and away from housing 33, in a path substantially normal to the line of reciprocation of said housing. Preferably, the forward end (that end adjacent housing 33) of plate 49 is formed with a semi-circular indentation 52 conforming substantially to the shape of the cap skirts. The plate is adapted to be moved between end limits in which the forward end is moved between a position immediately adjacent the near side of the opening 48 in outrigger 43 and a position on the side of magazine 45 remote from capping head 14.

By means of mechanism later to be described, a cap 11' is adapted to be released from the magazine at a time when the pusher plate 49 is in its position nearest capping head 14, and falls upon the upper surface of the plate 49.

As the plate is moved to its right-hand position (as viewed in Fig. 3), the cap drops off the upper surface of plate 49 and onto the surface 44 in front of the forward end of the pusher plate. Subsequent movement of the plate to the left will carry the cap to its position straddling the outrigger opening 48.

As before explained, the caps are stacked in the magazine with their skirts in telescopic association. Due to the resiliency of the material from which the caps are formed, the lowermost cap in the stack, even after all support is taken away, will frequently remain held to the next higher cap in the stack. It then becomes necessary to provide some means for breaking the frictional engagement between the lowermost cap and the next higher cap in the stack.

I have found that if a vibrating force is applied to the cap rim, the cap will be jarred loose from the stack. To this end, I taper the upper surface of the pusher plate 49 to incline downward toward the forward end from a position near the axis of the magazine 45 when the plate is in its extreme left-hand position. A plurality of serrations are formed in this upper surface transversely thereof, to provide steps 54 descending toward the forward end of the plate (Fig. 6). As the plate 49 is moved toward its right-hand position (Fig. 3) while the cap 11' rests upon the upper surface of the plate, the cap skirt is raised slightly and dropped as it passes over each step 54. At the same time, the upper surface of plate 49 retreats from the cap stack so that the cap 11' is caused to fall away from the stack a little farther with each contact with a step 54. By the time the forward end of plate 49 moves from beneath the cap, the cap is entirely freed from the next higher cap and drops into the forward indentation 52 in the plate.

To effect reciprocation of pusher plate 49 synchronously with respect to movement of the capping head 14, I provide a driving train now to be described.

The ram 16 is provided with an axial bore 55. A block 56 is guided for relative reciprocation within this bore and carries a pin 57 projecting axially upward therefrom. Frame 13 supports a stop member, in the path of the pin 57, here shown in the form of a stud 58 threadedly adjustable along the axis of pin 57 whereby the uppermost position of block 56 can be nicely regulated. Ram 16 is provided further with a pick-up shoulder 59 disposed in the path of block 56 and spaced from the adjacent end of the block a predetermined distance in the direction of upward movement of the block. This distance is regulated, of course, by the adjustment of stop 58.

Thus, it will be seen that if the block 56 is held in its uppermost position while the ram 16 moves downward, relative movement in one direction between the ram and the block will occur until such relative movement is arrested by engagement of the pick-up shoulder 59 with the block. Thereafter, the block will be carried along with the ram. When the ram reaches the bottom of its stroke and its movement is reversed, the block 56 will move upward with the ram until the pin 57 engages the stop 58 to arrest such movement of the block. Thereafter, as the ram continues its upward movement, relative movement in the opposite direction between block 56 and ram 16 will result. It is this relative movement between the block and ram which I utilize to drive the pusher plate 49.

Spaced axially from the opposite ends of block 56, I provide a pair of sprockets 60 and 61. Sprocket 60 is journalled on ram 16 for rotation about an axis substantially normal to the axis of the ram, and sprocket 61 is keyed to an axle 62 journalled in ram 16 for rotation about an axis substantially parallel to the axis of sprocket 60. A chain 63 is trained around the sprocket pair and is anchored at one end to block 56, by means of the threaded pin 64, and at the other end, preferably through the medium of a tension-maintaining spring 65, as clearly shown in Fig. 3. It will be apparent that upon relative movement between block 56 and ram 16, axle 62 will be caused to rotate in one direction or the other depending upon the direction of such relative movement.

Journalled in housing 33 closely adjacent axle 62 is a further axle 66. A gear 67, keyed to axle 62, meshes with a gear 68 keyed to axle 66. Rotation of axle 62 is thereby imparted to axle 66. It will be apparent, of course, that the axle 62 could be eliminated and the sprocket 61 keyed directly to axle 66, and, by fixing the block 56 to the opposite run of chain 63, axle 66 could be made to turn in the same direction in response to similar relative movement between block 56 and ram 16. However, because of the desirability of being able to remove housing 33 easily from ram 16, for the purpose of substituting a different size capping head, I prefer to use the illustrated structure. A different capping head, such as that illustrated in Fig. 10 and later to be described, can be easily attached to the ram 16 and driven through the meshing of the gears 67 and a gear 68' equivalent to the gear 68.

On either side of housing 33, and on the opposite ends of axle 66, are keyed a pair of sprockets 69, 69. Idler sprockets 70, 70 are journalled on outrigger 43 adjacent housing 33, and a further pair of idler sprockets 71, 71 (sometimes referred to herein as guide means) are journalled on the outboard end of the outrigger.

At the end of the pusher plate 49, opposite the mentioned forward end, is supported a spacer block 72, in turn supporting a bar 73 spanning the distance between sprockets 71, 71. A screw 74 is supported on each end of bar 73 for adjustment axially along a line substantially parallel to the direction of movement of plate 49. A chain 75 is provided for each set of sprockets 69, 70 and 71, and each is fixed at one end to a screw 74, trained around sprockets 71, 70 and 69, with the other end of the chain fixed to the sprocket 69 as at 76 (Fig. 3). Thus, it will be seen that, as the sprocket 69 is rotated by axle 66 in a direction to wind the chain 75 upon the sprocket, the chain, guided by sprocket 71, will pull the pusher plate 49 away from the capping head 14. Rotation of sprocket 69 in the opposite direction will pay out the chain 75 permitting pusher plate 49 to be moved toward the capping head.

A coiled spring 77, or the like, has one end fixed to the pusher plate 49 and its opposite end anchored to the housing 33 to move pusher plate toward capping head 14 upon sprocket 69 turning to pay out chain 75. This pulling force of spring 77 is transmitted through chain 75 to the sprocket 69 and creates a torque in axle 66 tending to turn the axle in a counter-clockwise direction, as viewed in Fig. 3. This torque is transmitted through gears 68 and 67 to axle 62 and results in a force tending to move the run of chain 63 connected to block 56 upward to force the block resiliently against the stop 58. This is the means referred to before which tends to hold the block 56 against its stop as ram 16 commences its downward movement.

As explained above, such downward movement of ram 16, while block 56 is being held resiliently against stop 58, results in rotation of axles 62 and 66 and in a direction to unwind the chain 75 from sprocket 69. This pays out the chain permitting the force of spring 77 to move pusher plate 49 toward the capping head 14. Upon upward movement of ram 16, the force of spring 77, acting through chain 75, tends to hold the block 56 against the pick-up shoulder 59 until post 57 again engages stop 58. Relative movement between block 56 and ram 16 in the opposite direction then occurs as ram 16 moves into its illustrated position. This, of course, results, as explained before, in rotation of axles 62 and 66 in a direction to wind the chain 75 upon sprocket 69, thereby pulling pusher plate 49 away from capping head 14 against the force of spring 77. Spring 23 is, of course, much heavier than spring 77 so that spring 77 cannot pull ram 16 downward to bring pick-up shoulder 59 into contact with block 56.

To provide for the release of a single cap from the magazine 45, after an actuation of ram 16 in which the previously released cap was placed on a receptacle, I provide one or more retaining means, referred to generally by the reference numeral 78 (see Figs. 7 and 8). Each such means comprises an arm member 79 pivotally mounted at one end upon the magazine 45, as at 80, for swinging movement of the opposite end toward and away from the magazine substantially in a plane including the axis of the magazine. A shoe 81 is fixed to said opposite arm end and an aperture is provided in the magazine to permit the engagement of the shoe with a stack of caps in the magazine. The shoe is provided with a toe 82 (see especially Fig. 9) adapted to be swung under the rim of the skirt of the lowermost cap 11' in the stack.

A leaf spring 83, or the like, engages arm 79 to urge toe 82 toward engagement with the lowermost cap skirt. Preferably, but not necessarily, the shoe 81 is formed with a plurality of serrations transversely thereof providing a series of upwardly facing shoulders 84 for engagement by a plurality of caps near the lower end of the stack. Thus, a support is provided for several of the caps near the bottom of the stack to place the weight of the stack upon more than just the lowermost cap in the stack.

As the arm is moved to swing the toe 82, and the shoulders 84, out from beneath the caps in the stack, the entire stack will drop upon the upper surface of the pusher plate 49, and as the arms are returned to their illustrated positions in Figs. 7 and 9, the toe 82 will move beneath the next higher cap 11'' in the stack, and the shoulders 84 will move beneath the rims of the still higher caps. This will leave cap 11' resting on the surface of pusher plate 49, to be jarred loose from cap 11'' and dropped to the surface 44 of outrigger 43, as previously described.

To actuate the arm or arms 79, I provide a collar 85 sleeved on magazine 45 and normally held in abutment with a shoulder 86, formed on magazine 45, by means of one or more springs 87, or the like (Fig. 3). The collar is provided with a cam surface 88 (Fig. 7) and the arms 79 are provided with followers in the form of threaded studs 89. As the collar is moved downward, the surface 88 engages the stud 89 to swing the shoe 81 away from the cap stack. As the collar moves upward, the surface 88 moves away from stud 89 and the shoe is returned to engagement with the stack by spring 83. It will be seen that this structure makes for self-alignment of the shoes with the stack, independent of the cam 85.

To actuate collar 85, I provide a lever 90 pivotally mounted on the housing 33, as at 91, and connected at one end through a link 92 to collar 85 (Fig. 3). The opposite end 93 of the lever is arranged near the center of the interior of the housing 33.

Plate 41 is centrally provided with a pedestal 94. It is entirely feasible to arrange the end 93 of lever 90 directly in the path of pedestal 94 so that, upon relative movement between plate 41 and housing 33, end 93 will be engaged to rock lever 90 about its axis thereby moving cam collar 85 downward releasing the cap stack. Thus, the plate 41 would constitute the trigger mechanism for retaining means 78. This would mean, however, that a cap would be released from the stack upon every stroke of ram 16, even though no receptacle were in position to receive the previously released cap.

To avoid this occurrence, and to provide for the release of a further cap from the magazine only when the previously released cap has been placed on a receptacle, I prefer to provide feeler means to indicate when a receptacle has received such previously released cap. To this end, I locate the end 93 of lever 90 just out of the path of pedestal 94. A further plate 95 (Fig. 3) is supported from a pin 96 reciprocably carried in pedestal 94, and a pocket is provided in plate 41 to receive plate 95. A rocker 97 is pivotally carried on the end of pedestal 94 and is adapted to be swung so that one end thereof is moved into the path of lever end 93. The opposite end of the rocker is spring-biased into engagement with the adjacent end of pin 96, to hold the said one end thereof resiliently out of the path of lever end 93.

As the capping head is moved downward and relative movement between plate 41 and housing 33 is initiated, if no receptacle is in position to be capped, the rocker 97 will simply move past the lever end 93 and no further cap will be released from the magazine. If, however, a receptacle is in position to be capped, it will pick up the cap, resting over opening 48 in outrigger 43, and as the plate 41 approaches the cap, plate 95 will engage the cap and be moved into the pocket in plate 41. This will force the pin 96 upward, rocking rocker 97 to swing said one end thereof into the path of lever end 93, swinging the lever 90 to actuate cam collar 85. No waste of caps thereby results from actuation of the capping head when no receptacle is in position to receive a cap.

In Fig. 10, I have shown a modification of the machine in a form which is intended for use only with receptacles, themselves capable of withstanding the force of the crimping member. The housing 33' is fixed to the ram collar 21 in precisely the manner as housing 33. Housing 33' carries a gear 68' to mesh with the gear 67. The drive for pusher plate 49' is the same as for plate 49, the difference residing primarily in the actuating means for the retaining means 78 on the magazine.

Since the receptacle 11*a* is capable of withstanding the force of the crimping member 39', carried by housing 33' the pressure-sustaining plate 41 is eliminated from this structure. Relative movement between crimping member 39' and housing 33' is caused by direct contact of the crimping member with the receptacle. Therefore, if no receptacle is in place to be capped, no such relative movement will take place and no further cap will be released from the magazine.

The lever 90' has its end 93' located in the path of movement of crimping member 39' to be swung by said member every time relative movement takes place between the member and housing 33'. The opposite end of lever 90' is arranged directly in contact with a shoulder provided on cam collar 85'.

The embodiment of Fig. 10 is intended primarily for use with a smaller cap than is used in the first-described embodiment, and I have found that, because of the extreme lightness of this size cap, the lowermost cap will not always drop away from the stack, even when stepped serrations such as 54 are provided in the upper surface of the pusher plate 49'. For this reason, I have found it desirable to provide an additional means for releasing this cap to be used separately or in conjunction with the serrations 54.

This means comprises a rocker 100 supported on the outrigger 43' for oscillation substantially in a plane including the axis of magazine 45'. A finger, here shown as a spring leaf 101 is carried on one end of rocker 100 and bears against a stop on outrigger 43' so that as rocker 100 is swung counter-clockwise, the finger will be flexed to force the free end thereof against the rim of the lowermost cap in the stack, kicking the cap free from the next higher cap.

To operate this kicker mechanism, I provide a push-rod 102 reciprocably mounted in outrigger 43' to bear, at one end, against the free end of rocker 100, and with the other end of the push-rod taking into a longitudinal groove 103 in pusher plate 49'.

Near the forward end of pusher plate 49', I provide a raised camming surface 104 in the groove 103. As the pusher plate is moved from its illustrated position to the right, cam surface 104 will engage push-rod 102 to shift it axially, swinging rocker 100 about its axis, thereby kicking loose the lowermost cap whose skirt depends below the toe 82.

My machine constitutes a general improvement over

machines heretofore used for similar purposes and, in addition, provides automatic means for placing the caps upon the receptacles, a task heretofore performed only by hand. The particular driving mechanism and its arrangement, makes the machine universally adaptable to the use of capping heads for various size receptacles without any alterations in the mechanism other than merely changing capping heads.

I claim as my invention:

1. In a machine for applying a skirted cap to the open mouth of a receptacle, the combination of a platform adapted to support the bottom of such receptacle, a capping head supported above said platform for registry with a receptacle so supported thereon and adapted to be moved toward and away from said platform respectively into and out of operative engagement with such a receptacle to crimp the skirt of a cap, resting over the mouth of the receptacle, into conforming engagement with the rim of the receptacle mouth, means for so moving said capping head, means supported from said capping head for receiving, upon movement of said supported means in one direction, such a skirted cap and for delivering such cap, upon movement of said supported means in the opposite direction, to a position between said capping head and said platform to be deposited over the open receptacle mouth as said capping head is moved toward such operative engagement with said receptacle, and a driving train operatively connected to drive said supported means in said one direction upon movement of said capping head away from said platform, and to drive said supported means in said opposite direction upon movement of said capping head toward said platform.

2. The machine of claim 1 in which said means supported from said capping head comprises a pusher element guided for rectilinear movement toward and away from said capping head in a path substantially normal to the line of movement of said capping head, said driving train comprising a member carried by said capping head for movement axially relative thereto upon movement of said capping head toward and away from said platform, pick-up means carried by said capping head and engageable with said member, after movement of said capping head a predetermined distance toward said platform, to arrest such relative movement between said capping head and said member, stop means normally fixed relative to said platform and engageable by said member to limit movement of said member away from said platform, means yieldingly connected to urge said member toward engagement with said stop means, and means drivingly connecting said member and said pusher element for movement of said pusher element toward said capping head upon relative movement between said member and said capping head during movement of said capping head toward said platform, and for movement of said pusher element away from said capping head upon relative movement between said member and said capping head during movement of said capping head away from said platform.

3. The machine of claim 2 including adjustment means for moving said stop means toward and away from said platform.

4. In a machine for applying a skirted cap to the open mouth of a receptacle, the combination of a platform adapted to support the bottom of such receptacle, a capping head supported above said platform for registry with a receptacle so supported thereon and adapted to be moved toward and away from said platform respectively into and out of operative engagement with such a receptacle to crimp the skirt of a cap, resting over the mouth of the receptacle, into conforming engagement with the rim of the receptacle mouth, means for so moving said capping head, means supported from said capping head for receiving, upon movement of said supported means in one direction, such a skirted cap and for delivering such cap, upon movement of said supported means in the opposite direction, to a position between said capping head and said platform to be deposited over the open receptacle mouth as said capping head is moved toward such operative engagement with said receptacle, and a driving train operatively connected to drive said supported means in said one direction upon movement of said capping head away from said platform, and to drive said supported means in said opposite direction upon movement of said capping head toward said platform, said supported means comprising a pusher element guided for rectilinear movement toward and away from said capping head in a path substantially normal to the line of movement of said capping head, said driving train comprising a member carried by said capping head for movement axially relative thereto upon movement of said capping head toward and away from said platform, pick-up means carried by said capping head and engageable with said member, after movement of said capping head a predetermined distance toward said platform, to arrest such relative movement between said capping head and said member, stop means normally fixed relative to said platform and engageable by said member to limit movement of said member away from said platform, means yieldingly connected to urge said member toward engagement with said stop means, a rotatable element journalled on said capping head intermediate said member and said pusher element, said member being movable relatively toward and away from said rotatable element, means drivingly connecting said member and said rotatable element for rotation of said rotatable element in one direction upon movement of said member relatively away from said rotatable element and for rotation of said rotatable element in the opposite direction upon movement of said member relatively toward said rotatable element, and means drivingly connecting said rotatable element and said pusher element to move said pusher element toward said capping head upon rotation of said rotatable element in said one direction and for movement of said pusher element away from said capping head upon rotation of said rotatable element in said opposite direction.

5. The machine of claim 4 in which the means drivingly connecting said member and said rotatable element comprises a first sprocket journalled on said capping head on the side of said member remote from said rotatable element, a second sprocket journalled on said capping head on the side of said member adjacent said rotatable element, a chain trained about said sprockets and fixed at a point in one run thereof to said member, and means drivingly connecting one of said sprockets to said rotatable member.

6. The machine of claim 4 in which the means drivingly connecting said rotatable element and said pusher element comprises guide means supported from said capping head near the end of said pusher element remote from said capping head, a flexible strand member, wrapped at one end about said rotatable element, passed around said guide means and fixed at the opposite end to said pusher element, rotation of said rotatable element in said one direction acting to pay out said strand member, and rotation of said rotatable element in the opposite direction tending to take up said strand member, and means yieldingly engaging said pusher element to urge it toward said capping head.

7. In a machine for applying a skirted cap to the open mouth of a receptacle, the combination of a platform adapted to support the bottom of such receptacle, a capping head supported above said platform for registry with a receptacle so supported thereon and adapted to be moved toward and away from said platform respectively into and out of operative engagement with such a receptacle to crimp the skirt of a cap, resting over the mouth of the receptacle, into conforming engagement with the rim of the receptacle mouth, means for so moving said capping head, means supported from said capping head

for receiving, upon movement of said supported means in one direction, such a skirted cap and for delivering such cap, upon movement of said supported means in the opposite direction, to a position between said capping head and said platform to be deposited over the open receptacle mouth as said capping head is moved toward such operative engagement with said receptacle, and a driving train operatively connected to drive said supported means in said one direction upon movement of said capping head away from said platform, and to drive said supported means in said opposite direction upon movement of said capping head toward said platform, said supported means comprising a pusher element guided for rectilinear movement toward and away from said capping head in a path substantially normal to the line of movement of said capping head, said driving train comprising a member carried by said capping head for movement axially relative thereto upon movement of said capping head toward and away from said platform, pick-up means carried by said capping head and engageable with said member, after movement of said capping head a predetermined distance toward said platform, to arrest such relative movement between said capping head and said member, stop means normally fixed relative to said platform and engageable by said member to limit movement of said member away from said platform, means yieldingly connected to urge said member toward engagement with said stop means, a first sprocket journalled for rotation on said capping head about an axis substantially normal to the path of movement of said pusher element, a pair of sprockets journalled on said capping head on opposite sides of said member for rotation about axes substantially normal to the line of movement of said capping head, a chain trained about said sprocket pair and fixed at a point in one of the runs thereof to said member, means drivingly connecting said first sprocket and said sprocket pair, an idler sprocket supported from said capping head at a point near the end of said pusher element remote from said capping head, a further chain having one end wrapped about said first sprocket and fixed thereto, said chain being trained about said idler sprocket and fixed at its other end to said pusher element, and means yieldably connected to urge said pusher element toward said capping head.

8. The machine of claim 7 including adjustment means for varying the effective length of said further chain.

9. In a machine for applying a skirted cap to the open mouth of a receptacle, the combination of a platform adapted to support the bottom of such a receptacle, a capping head supported above said platform for registry with a receptacle so supported thereon and adapted to be moved toward and away from said platform respectively into and out of operative engagement with such a receptacle to crimp the skirt of a cap, resting over the mouth of the receptacle, into conforming engagement with the rim of the receptacle mouth, means for so moving said capping head, an outrigger supported from said capping head for movement therewith, a magazine supported on said outrigger for storing a stack of such skirted caps and open at its end adjacent said platform, retaining means for releasably holding a stack of caps in said magazine, transfer means carried by said outrigger and guided, between said magazine open end and said platform, for movement toward and away from said capping head along a path substantially normal to the line of movement of said capping head, said transfer means being adapted to receive a cap from said magazine, upon movement of said capping head away from said platform, and to transfer said cap to a position between said capping head and said platform upon movement of said capping head toward said platform, means for so moving said transfer means, and actuator means operatively connected to said retaining means to release the lowermost cap in said stack onto said transfer means only upon the previously released cap having been crimped upon the rim of a receptacle.

10. In a machine for applying a skirted cap to the open mouth of a receptacle, the combination of a platform adapted to support the bottom of such a receptacle, a capping head supported above said platform for registry with a receptacle so supported thereon and adapted to be moved toward and away from said platform respectively into and out of operative engagement with such a receptacle to crimp the skirt of a cap, resting over the mouth of the receptacle, into conforming engagement with the rim of the receptacle mouth, means for so moving said capping head, an outrigger supported from said capping head for movement therewith, a magazine supported on said outrigger for storing a stack of such skirted caps and open at its end adjacent said platform, retaining means for releasably holding a stack of caps in said magazine, transfer means carried by said outrigger and guided, between said magazine open end and said platform, for movement toward and away from said capping head along a path substantially normal to the line of movement of said capping head, said transfer means being adapted to receive a cap from said magazine, upon movement of said capping head away from said platform, and to transfer said cap to a position between said capping head and said platform upon movement of said capping head toward said platform, means for so moving said transfer means, trigger means supported from said capping head for movement therewith but yieldable for movement axially relative thereto, said tragger means being arranged for engagement with a cap supported on a receptacle as said capping head is moved toward said platform and into operative engagement with such a cap, the movement of said trigger means with said capping head being arrested upon such engagement while said capping head continues to move toward said platform initiating relative movement between said trigger means and said capping head, and a lever supported from said capping head and operatively connected, at one end thereof, to said retaining means and engageable at the opposite end with said trigger means for movement by said trigger means, upon such relative movement thereof, to actuate said retaining means to release said lowermost cap from said stack.

11. The machine of claim 10 in which said trigger means comprises a plate carried by said capping head for movement therewith, means engageable with said plate, as said capping head moves toward said platform, to arrest movement of said plate toward said platform while said capping head continues to move toward said platform, said plate being adapted to engage the rim of a receptacle substantially at the instant of such arrested movement thereof, a further lever pivotally supported upon said plate for swinging movement of one end thereof into and out of operative engagement with the adjacent end of the first-said lever, means yieldably biasing said further lever out of such engagement with the first-said lever end, and a feeler element supported on said plate for movement relative thereto and engageable by a cap resting over the receptacle mouth, just prior to the movement of said plate being so arrested, to initiate such relative movement thereof, said feeler element being operatively engageable with said further lever to swing said one end thereof, upon such relative movement between said feeler element and said plate, into such engagement with the first-said lever end.

12. In a machine for applying a skirted cap to the open mouth of a receptacle, the combination of a platform adapted to support the bottom of such a receptacle, a capping head supported above said platform for registry with a receptacle so supported thereon and adapted to be moved toward and away from said platform respectively into and out of operative engagement with such a receptacle to crimp the skirt of a cap, resting over the

mouth of the receptacle, into conforming engagement with the rim of a receptacle mouth, means for so moving said capping head, an outrigger supported from said capping head for movement therewith, a magazine supported on said outrigger for storing a stack of such skirted caps and open at its end adjacent said platform, retaining means for releasably holding a stack of caps in said magazine, transfer means carried by said outrigger and guided, between said magazine open end and said platform, for movement toward and away from said capping head along a path substantially normal to the line of movement of said capping head, said transfer means being adapted to receive a cap from said magazine, upon movement of said capping head away from said platform, and to transfer said cap to a position between said capping head and said platform upon movement of said capping head toward said platform, means for so moving said transfer means, and actuator means operatively connected to said retaining means to release the lowermost cap in said stack onto said transfer means only upon the previously released cap having been crimped upon the rim of a receptacle, said retaining means comprising one or more members each having a toe portion engageable beneath the rim of the lowermost cap in said stack, means supported from said outrigger and mounting said members for movement of said toe portions out of such engagement with said cap rim to permit said stack of caps to drop a predetermined distance, and for movement of said toe portions into such engagement with the rim of the next higher cap in said stack, and cam means for so moving said members upon relative movement between said cam means and said members, said actuator means being operatively connected to shift said cam means in one direction to release said cap stack, and in the opposite direction to engage said cap stack.

13. The machine of claim 12 in which each of said members comprises a shoe portion including said toe portions, said shoe portions being formed with a plurality of serrations presenting shoulder surfaces arranged in the direction of the axis of said cap stack, certain of said shoulder surfaces moving beneath the rims of said caps, as said toe portion is moved beneath the rim of the lowermost cap in said stack, to sustain a portion of the weight of said cap stack.

14. The machine of claim 12 in which said members are moved positively out of engagement with said cap stacks by movement of said cam means in one direction, and including spring means engaging said members to urge said members resiliently toward engagement with said cap stack upon movement of said cam means in the opposite direction.

15. The machine of claim 12 in which said actuator means comprises trigger means supported from said capping head for movement therewith, but yieldable for movement axially relative thereto, said trigger means being arrangeable for engagement with a receptacle as said capping head is moved toward said platform and into operative engagement with the receptacle, the movement of said trigger means with said capping head being arrested upon such engagement with said receptacle while said capping head continues to move toward said platform initiating relative movement between said trigger means and said capping head, a lever supported from said capping head and operatively connected at one end to said cam means and engageable at one end by said trigger means for movement by said trigger means, upon such relative movement thereof, to shift said cam means in a direction to move said member toe portions out of engagement with the rim of said lowermost stack, and means resiliently engaging said cam means to urge said cam means in the opposite direction to move said member toe portions into such engagement with the rim of the next higher cap in the stack.

16. The machine of claim 15 in which said trigger means comprises a plate carried by said capping head for movement therewith, means engageable with said plate, as said capping head moves toward said platform, to arrest movement of said plate toward said platform while said capping head continues to move toward said platform, said plate being adapted to engage the rim of a receptacle substantially at the instant of such arrested movement thereof, a further lever pivotally supported upon said plate for swinging movement of one end thereof into and out of operative engagement with the adjacent end of the first-said lever, means yieldably biasing said further lever out of such engagement with the first-said lever end, and a feeler element supported on said plate for movement relative thereto and engageable by a cap resting over the receptacle mouth, just prior to the movement of said plate being so arrested to initiate such relative movement thereof, said feeler element being operatively engageable with said further lever to swing said one end thereof, upon such relative movement between said feeler element and said plate, into such engagement with the first-said lower end.

17. In a machine for applying a skirted cap to the open mouth of a receptacle, the combination of a platform adapted to support the bottom of such a receptacle, a capping head supported above said platform for registry with a receptacle so supported thereon and adapted to be moved toward and away from said platform respectively into and out of operative engagement with such a receptacle to crimp the skirt of a cap, resting over the mouth of the receptacle, into conforming engagement with the rim of the receptacle mouth, means for so moving said capping head, an outrigger supported from said capping head for movement therewith, a magazine supported on said outrigger for storing a stack of such skirted caps and open at its end adjacent said platform, retaining means for releasably holding a stack of caps in said magazine, transfer means carried by said outrigger and guided, between said magazine open end and said platform, for movement toward and away from said capping head along a path substantially normal to the line of movement of said capping head, said transfer means being adapted to receive a cap from said magazine, upon movement of said capping head away from said platform, and to transfer said cap to a position between said capping head and said platform upon movement of said capping head toward said platform, means for so moving said transfer means, and actuator means operatively connected to said retaining means to release the lowermost cap in said stack onto said transfer means only upon the previously released cap having been crimped upon the rim of a receptacle, said outrigger presenting a surface toward the open end of said magazine, but spaced slightly therefrom, and extending therefrom to a position beneath said capping head, said outrigger being provided with a lipped opening through said surface, registering with said capping head, through which the rim of a receptacle may pass as said capping head is moved toward operative engagement with such receptacle, said transfer means comprising a pusher plate supported on said outrigger surface between said surface and the open end of said magazine and guided for movement of the forward end of said plate between a position adjacent the near edge of said lipped opening and a position on the side of said magazine remote from said capping head, said plate being of a length sufficient to close said open magazine end when said plate forward end is in its first said position, said actuator means moving said retaining means out of engagement with said stack of caps, when said pusher plate is in its first-said position, to drop said cap stack upon said pusher plate and to return said retaining means into engagement with all but the lowermost cap in said stack prior to said pusher plate being moved to its second said position, said lowermost cap dropping upon said outrigger surface ahead of said forward end of said pusher plate as said pusher

plate is moved to its second-said position, and being pushed by said pusher plate, upon moving to its first-said position, to a position spanning the opening in said outrigger surface with the rim of the cap skirt resting on the lip of the outrigger opening.

18. The machine of claim 17 in which the surface of said pusher plate facing said magazine is inclined downwardly toward said forward end of said pusher plate.

19. The machine of claim 17 in which the surface of said pusher plate facing said magazine is inclined downwardly toward said forward end of said pusher plate and is formed to provide a plurality of serially arranged depressions separated in the line of movement of said pusher plate, the rim of said lowermost cap being successively engaged with said depressions, as said plate is moved toward its second-said position, to impart a vibration to said cap to cause it to drop away from the next higher cap in said stack.

20. The machine of claim 17 in which the surface of said pusher plate facing said magazine is inclined downwardly toward said forward end of said pusher plate, said surface being provided with a plurality of descending steps extending transversely to the line of movement of said pusher plate, the rim of said lowermost cap being engaged by the steps in said pusher plate surface, as said plate is moved toward its second-said position, to impart a vibration to said cap to cause it to drop away from the next higher cap in said stack.

21. The machine of claim 17 including kicker means mounted for movement into and out of engagement with the rim of said lowermost cap in said stack, said pusher plate being formed to provide a camming surface, near said forward end thereof, engageable with said kicker means to move said kicker means into such engagement with said cap rim, as said pusher plate approaches its second-said position, to jar said lowermost cap away from the next higher cap in said stack.

22. The machine of claim 21 in which said kicker means comprises a rocker, means pivotally supporting said rocker intermediate its ends near the open end of said magazine for oscillation in a plane including the axis of said magazine, a plunger guided for reciprocation adjacent one end of said rocker along a line substantially perpendicular to said pusher plate, said camming surface on said pusher plate being engageable with said plunger to shift it axially to swing said rocker in one direction about its axis, and a finger carried on said rocker and swingable into engagement with the rim of said lowermost cap when said rocker is so swung about its axis.

23. In a machine for applying a skirted cap to the open mouth of a receptacle, the combination of a platform adapted to support the bottom of such a receptacle, a frame member fixedly supported above said platform, a capping head supported in said frame member for registry with a receptacle so supported on said platform and movable toward and away from said platform respectively into and out of operative engagement with such a receptacle, a plastically-deformable crimping member supported from said capping head for movement therewith but yieldable for movement axially relative thereto, said crimping member engaging a cap resting over the rim of a receptacle mouth, as said capping head is moved toward said platform, to arrest movement of said crimping member while said capping head continues toward said platform thereby initiating relative movement between said crimping member and said capping head in one direction, cam means carried by said capping head and perimetrally engageable with said crimping member to force the member into crimping engagement with the skirt of said cap, upon such relative movement of said crimping member in said one direction, to mold the cap skirt into conforming engagement with the receptacle rim, a magazine for storing a stack of such skirted caps supported for movement with said capping head and having an open lower end, transfer means adapted to receive a cap from said magazine open lower end and to transfer said cap to a position beneath said capping head to be deposited over the open mouth of a receptacle as said capping head moves toward said platform, retaining means for releasably holding said stack of caps in said magazine and operable to release the lowermost cap in said stack onto said transfer means, a lever supported for rocking movement from said capping head with one end thereof mounted in the path of said crimping member to be engaged and rocked by said crimping member upon such relative movement between said member and said capping head in said one direction, the opposite end of said lever being operatively connected to said retaining means to operate said retaining means, upon such rocking of said lever, to release said lowermost cap in said stack.

24. The machine of claim 23 including a plate centrally arranged adjacent said crimping member between said crimping member and said platform and movable with said capping head but yieldable for movement axially relative to said capping head, supporting means for said plate extending into proximity with said frame member and including a stop member engageable with said frame member as said capping head is moved toward said platform to arrest movement of said plate and said crimping member toward said platform substantially at the instant said crimping member arrives at its position of engagement with said cap resting on said receptacle, said plate being adapted to sustain the pressure exerted by said crimping member during the molding of said cap skirt over said receptacle rim, a rocker member pivotally supported upon said plate for swinging movement of one end thereof into and out of the path of said one end of said lever, means yieldably biasing said rocker end out of said path, and a feeler element supported on said plate for movement relative thereto and engageable with a cap resting over the receptacle mouth, just prior to the movement of said plate being arrested, to initiate such relative movement between said feeler element and said plate, said feeler element being engageable with said rocker member to swing said rocker end, upon relative movement between said plate and said capping head, into the path of said one end of said lever.

25. In a machine for molding the skirt of a deformable cap into conforming engagement with the rim of the open mouth of an axially fragile receptacle by means of a plastically-deformable crimping member, a cam member adapted to peripherally engage said crimping member to force the perimetral portions thereof, upon relative movement between said cam member and said crimping member in one direction, into molding engagement with the skirt of the cap resting on the rim of the receptacle mouth, and a head member centrally interposed between said crimping member and the body of the cap to sustain the pressure exerted by said crimping member while so molding said cap skirt, the invention of means for supporting and moving said crimping member, said cam member and said head member into operative engagement with such a receptacle comprising a platform for supporting the bottom of the receptacle, a frame fixedly supported above said platform, ram means reciprocably supported from said frame for axial movement toward and away from said platform, means for so reciprocating said ram means, said cam member being fixed to said ram means for movement therewith, means supporting said crimping member from said ram means for movement therewith but yieldable, upon engagement of said crimping member with the rim of the receptacle mouth, to permit such relative movement between said crimping member and said cam member in said one direction, carrier means supported from said ram means for movement therewith, but yieldable for movement axially relative thereto, and supporting said head member for movement therewith, and limiting means connected between said carrier means and said

frame and adapted to permit limited movement of said carrier means toward said platform but to arrest movement of said carrier means in that direction, substantially at the instant said crimping member arrives at its position of engagement with said receptacle, to arrest movement of said head member and said crimping member toward said platform while said cam member continues to move toward said platform to initiate the desired relative movement between said crimping member and said cam member in said one direction.

26. The machine of claim 25 in which said ram means includes a radially-projecting collar on the end thereof adjacent said platform, said cam member being fixed to said collar, and said carrier means comprises a ring member sleeved on said ram means and confined for movement relative thereto between said collar and said frame, one or more axially rigid spacer elements fixed, at opposite ends, between said ring member and said head member, and spring means operatively connected to urge said head plate toward movement away from said collar.

27. The machine of claim 26 in which said limiting means comprises one or more headed elements arranged between said frame member and said ring member and fixed at the end opposite the head thereof to one of said members, said head being engageable with the other of said members, upon movement of said ring member with said ram means a predetermined distance toward said platform, to arrest such movement of said ring member.

28. The machine of claim 27 in which the head of said headed element is axially adjustable on said headed element.

29. A driving train comprising a ram member mounted for reciprocation along a fixed line between a first position and a second position, means for yieldingly holding said ram member in said first position, means for moving said ram member toward said second position, a first element carried by said ram member for movement therewith but yieldable for movement axially relative thereto, a stationary stop means supported adjacent said ram member in the path of movement of said first element and engageable with said element as said ram member moves toward said first position to arrest movement of said first element with said ram member and to initiate relative movement between said element and said ram member as said ram member continues toward said first position, means yieldably urging said first element toward engagement with said stop means, pick-up means carried by said ram member for movement therewith in the path of said first element and engageable with said element as said ram member moves toward said second position to arrest relative movement between said first element and said ram member and to carry said first element along with said ram member as said member continues to move toward said second position, a second element supported from said ram member and guided for reciprocation along a path substantially normal to said fixed line between a position spaced from said fixed line and a position adjacent said fixed line, rotating means carried by said ram member for movement therewith, means drivingly connecting said first element and said rotating means to rotate said means in one direction upon relative movement between said first element and said ram member in one direction, and to rotate said means in the opposite direction upon relative movement between said first element and said ram member in the opposite direction, and means drivingly connecting said rotating means and said second element to move said second element toward its position adjacent said fixed line upon such rotation of said rotating means in one direction, and to move said second element toward its position spaced from said fixed line upon rotation of said rotating means in the opposite direction.

30. The device of claim 29 in which the driving connection between said first element and said rotating means comprises a pair of sprockets journalled for rotation on said ram member on opposite sides of said first element, a chain trained around said sprockets and fixed at a point in one run thereof to said first element, and means connecting one of said sprockets to drive said rotating element upon rotation of said one sprocket.

31. The device of claim 30 in which said last-said means comprises a first gear fixed for rotation with said one sprocket, and a second gear fixed for rotation with said rotating element, said two gears being in mesh.

32. The device of claim 30 in which said rotating member comprises a sprocket, and the driving connection between said rotating member and said second element comprises a chain fixed at one end to said sprocket, wrapped about said sprocket, and fixed at the other end to said second element, and means resiliently engaging said second element to urge it in a direction to create and maintain a tension in said chain.

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