

Sept. 4, 1956

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2,761,486

DECAPPER ADAPTING MECHANISM

Original Filed April 27, 1946

2 Sheets-Sheet 1

FIG. 1.

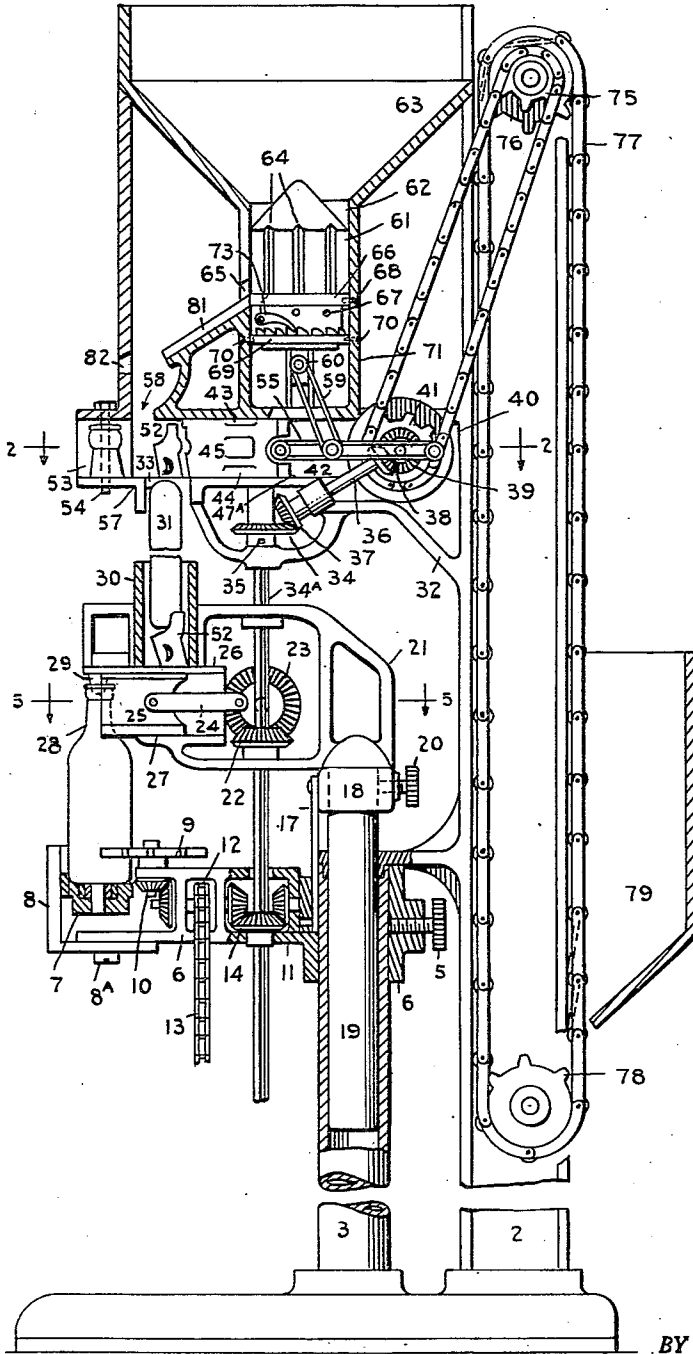


FIG. 6.

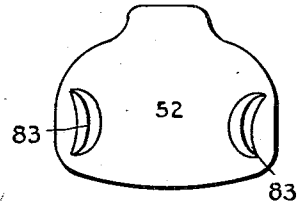


FIG. 7.

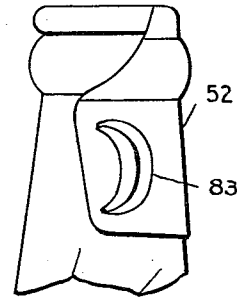
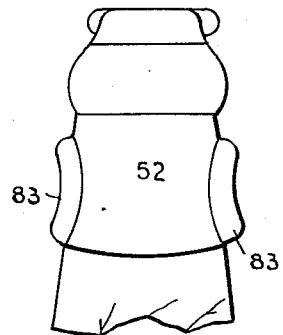


FIG. 8.



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2 Sheets-Sheet 2

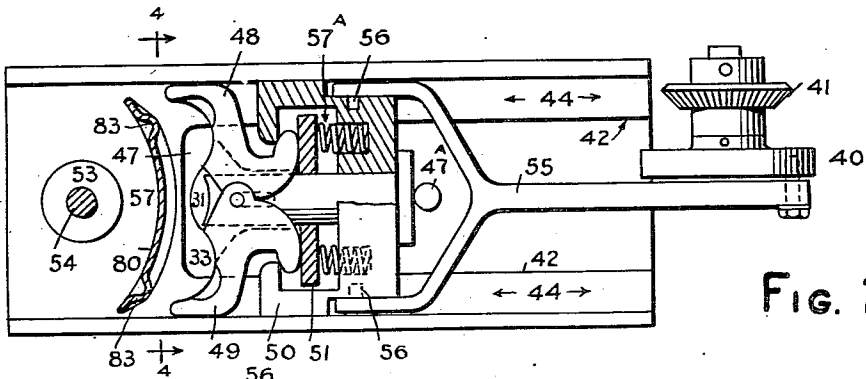


FIG. 2.

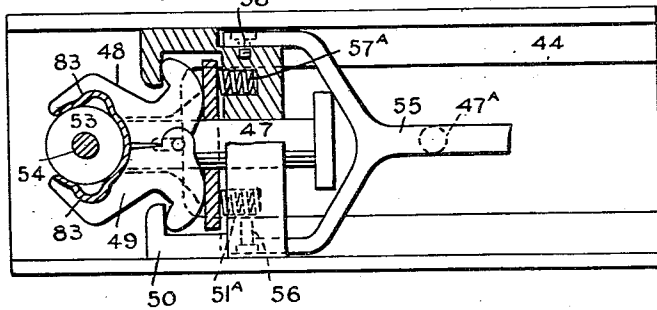


FIG. 3.

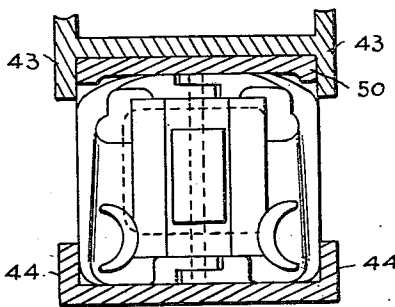
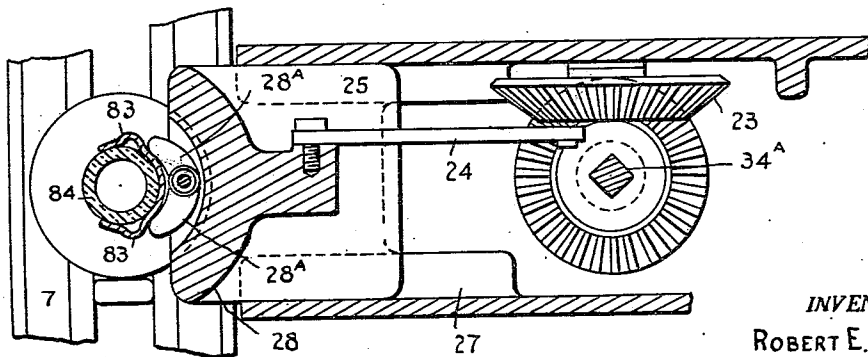


FIG. 4.

FIG. 5.



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DECAPPER ADAPTING MECHANISM

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Original application April 27, 1946, Serial No. 665,535, now Patent No. 2,607,106, dated August 19, 1952. Divided and this application May 28, 1952, Serial No. 290,533

2 Claims. (Cl. 153—44)

My invention relates to improvements in machines for forming and applying accessory devices to bottles or other containers and particularly relates to a machine for forming to fit and applying an individual decapper for bottles and like containers, especially those designed for closure by crown caps.

This application is a division of my co-pending application, filed April 27, 1946, Ser. No. 665,535, now Patent No. 2,607,106, granted Aug. 19, 1952, for a Collar Decapper Applying Machine.

The object of this invention is to provide in such a machine desirable mechanism for adapting to bottle neck finish while in progress toward the bottle a decapping collar of thin sheet material received in the machine in partly arcuated, open collar, commercial form and fed into proper position between a readily changeable shaping arbor and die therefor designed to impart suitable final formation to the collar to grippingly fit the head and neck finish of the bottle to which it is progressing—which formation may include embossment of a label or advertising design if so desired—and then after the final formation, which by full arcuation induces lateral resiliency in the collar, strip same from the arbor and release it to applying means which push it onto the bottle neck.

Said desirable collar adapting mechanism claimed herein consists of an arbor of bottle neck shape but lesser diameter detachably mounted at a runway end in such a machine to be contacted by a detachably mounted compound die that is reciprocatively movable in said runway to abut said arbor and rigidly press die wings around it and recede therefrom with wings resilient to a point where the wings extend—to thus release toward bottle application each decapping collar given final formation by said arbor and die.

I attain my object by the mechanism illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation, with portions in vertical section, of an entire machine, showing the shaping arbor facing the runway for shaping die, with a partly arcuated, commercial form, decapping collar between arbor and die.

Fig. 2 is a horizontal section on line 2—2 of Fig. 1, prior to action of shaping die on the partly arcuated, commercial form, decapping collar.

Fig. 3 is a horizontal section on line 2—2 of Fig. 1 showing action of the shaping die on the commercial form decapping collar and the shaping arbor.

Fig. 4 is a facial elevation of the shaping die, on line 4—4 of Fig. 2.

Fig. 5 is a horizontal section on line 5—5 of Fig. 1, showing application of a fully formed decapping collar to a bottle.

Fig. 6 is a rear elevation of a partly arcuated, open collar, commercial form decapping collar.

Fig. 7 is a side elevation of a bottle head with a collar decapper applied thereto, as fully formed from the open collar, commercial form.

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Fig. 8 is rear elevation of a collar decapper as applied to a bottle.

Similar numerals indicate similar parts throughout the several views.

My collar decapper applying machine is shown herein as an example of a complete machine to receive in open collar form, adapt to bottle fit, and apply to bottle in finished form my decapping collar—with my desirable adapting mechanism incorporated therein as the final-forming means. This machine is made mainly of suitable cast or wrought metal and designed to stand beside a chain conveyor which carries bottles to be filled and crowned. A base 1 supports a main standard 2 which may be substantially of I-beam shape, and forward of same on the base is erected a tubular lesser standard 3 that is attached to the main standard at its upper end by a bracket 4 extended from the said main standard. Slidably mounted upon said tubular lesser standard 3 and adjustable vertically on same to suit the height of a bottle conveyor, by means of a slide collar and a set screw 5, is a bracket 6 which terminally embraces the chain conveyor 7 by the upward extension of an end arm 8, adjustable by set screw 8A, which may act as a guide and back support for the bottles travelling on the chain conveyor. On bracket 6 opposite said end arm 8 is rotatably mounted a star wheel 9 with its arms extending over the conveyor 7 to intercept and engage a passing bottle and rotate as it moves along, the end arm 8 co-operating to contactually center the bottle in and between the embracing arms of the star wheel 9 at one point of the rotation of same. The stem of star wheel 9 is mounted in bracket 6 and extends through its bearing to mount on its lower end a bevel gear wheel 10 which engages a train of gears 11 in which is included a sprocket wheel 12 from which a drive chain 13 extends to a source of motive power. Included in said gear train 11 is a hub-mounted horizontally rotating gear wheel 14 which has squared central aperture through its axis of rotation. Said gear train 11 terminates adjacent lesser standard 3 in the bracket 6 in a flat disk wheel 15 having a transverse aperture off center in its face which engages a pivot stud on the lower end of a driving bar 17 that extends upward therefrom to pivotally engage a vertically adjustable collar 18 which is slidably mounted on the shank 19 of the decapper applying mechanism, which shank 19 is tubular and slides vertically within the tubular lesser standard 3. The collar 18 is held in position upon the shank 19 by a set screw 20, which affords means of adjusting the decapper applying mechanism to suit the height of the bottles to which the decappers are to be applied, the eccentric movement of disk wheel 16, by means of bar 17, raising and lowering the applicator from and into steadying head contact with the bottles passing on conveyor 7. The tubular shank 19 of the applying mechanism supports a head portion comprised of a bracket 21 which extends forwardly over the lower bracket 6 and carries the decapper applying means. A hub-mounted bevel gear wheel 22 rotates horizontally on said bracket 21 and has square central aperture transverse of its rotative axis, similar to that in gear wheel 15 on bracket 6 which is immediately below said wheel 22 and in vertical axial alignment with same. Geared at right angle to said wheel 22 and pivoted on bracket 21 is a vertically rotative gear wheel 23 of larger diameter which has a flat face on which is pivoted, suitably off center, one end of a driving bar 24 the other end of which is pivoted to a horizontally reciprocative plunger 25, which moves to and fro in a runway formed in bracket 21 by rail bearings 26 and 27 as said gear wheel 23 rotates. The forward end 28 of said plunger 25 is vertically hollowed and spring hinged in the center of said hollow are two horizontally face plates 28A, preferably of hard rubber

or the like, which are designed to resiliently contact the finished decapper collar, without defacing same, and push it upon a bottle neck when the bottle is intercepted by the intercepting mechanism below, until the laterally resilient decapping collar snaps into place on the bottle, as shown in Fig. 7. In the forwardly projected of bracket 21, at the end of the upper bearing rail 26 of applying plunger 25, is mounted invertedly a shanked cone, of hard rubber or the like, preferably, held in place by insertion of its shank in the bracket frame, that is designed to descend into the mouth of the bottle intercepted and steady it while the plunger 25 thrusts a collar decapper upon the bottle. Rearward of this steadying cone 29 a tubular shaft 30 extends upward through the bracket frame, forming an opening in and above the runway of the applying plunger to permit a fully formed decapper collar to drop in front of applicer when the latter is in retracted position, or temporarily rest upon the top of said applicer if it is in forward position at the moment. Partly housed in said tubular shaft 30 is a metal slide post 31 down which the full formed decapper collars may embracingly slide within the said shaft 30. Vertically above and in alignment with the bottle intercepting mechanism, a bracket 32 extends from the main standard 2 and the upper end of said slide post 31 is attached to one side of a trap opening 33 in the lower side of said bracket 32. Adjacent the opening 33 and rearward of same there is mounted in the frame of bracket 32 for horizontal rotation a bevel gear wheel 34 that is in axial alignment with the square holed gear wheels 15 and 22 in the bottle intercepting and collar applying mechanisms below it on vertically adjustable bracket 6 and 21, which slide on and in the tubular lesser standard 3. Structurally integral with said gear wheel 34, which is hub mounted, is a square drive shaft 34A which extends downward vertically and passes slidably through the squared apertures in said lower gear wheels 15 and 22, being thus adapted to be turned by rotation of the lower gear wheel 15 by drive chain 13 and so transmit motion to the upper gear wheel 22 as it passes through same and finally rotate the uppermost wheel 34 in which it is secured terminally, as by pin 35. Mounted on the bracket 32 so as to mesh diagonally in said bevel gear wheel 34 is a transmission shaft 36 that has gear wheel terminals 37 and 38 which engage said wheel 34 and a bevel gear 39 on the front face of a vertically rotative disk wheel 40 pivoted above and rearwardly of said wheel 34, the said disk wheel 40 having a sprocket wheel 41 mounted on its reverse side. The said wheel 40 is pivoted centrally opposite a runway 42 formed thereat in bracket 32 by bearing rails 43 and 44. In said runway 42 is detachably mounted for reciprocative movement therein a compound shaping die comprised of various hinged and otherwise assembled co-operative parts, as 46, 47, 48, 50 and 51, in Figs. 1, 2, 3 and 4, and adapted to wrap a semi-formed decapping collar around a detachably mounted shaping arbor, as 53, by contact therewith, said shaping arbor being fixed in the path of the said shaping die by securing means, such as pin 54, and readily changeable for a differently shaped arbor if desired, as by withdrawal and replacement of said pin 54. A forked driving bar 55 pivotally and detachably engages the rear body of the compound die 45, as by means of studs 56 at the fork ends engaging apertures in said body. The flat rearward end of said driving bar 55 is pivoted on the flat face of the sprocket wheel 41 on the reverse side of the disk wheel 40, suitably off the center of same. The shaping die 45 thus moves to and from the arbor 53 as the disk wheel 40 rotates, and both die and arbor may be readily removed and replaced if others of different shape are desired to give final form to semi-formed decapping collars to fit the head and neck finish of different bottles. In the lower bearing 44 of the shaper runway 42 there is located, suitably distant from the arbor 53, the exit opening 33 for fully arcuated decapping collars. Immediately before the arbor 53 the

runway floor forms a stop ledge 57 on which the semi-formed decapper collar may drop to rest in front of arbor 53, through the overhead inlet opening 58 which is located above said stop ledge 57. On the shaper driving bar 55, beyond the radius of disk wheel 40, is pivoted the lower end of an agitator bar 59 the upper end of which is pivoted as at 60 on the shank of a feed drum 61 with a domed top that is vertically and rotatively movable in the funnel shaft 62 of funnel shaped upper feed hopper 63 that is adapted to receive semi-formed decapping collars and direct them into vertical grooves, as 64, of suitable formation to receive them in desired position, that are formed on and in the circumference of said feed drum 61, between same and the inner wall of said funnel shaft 62, the bottom of which grooves are closed except at one discharge port 65, by a collar 66 mounted upon said feed drum body below said grooves and supported as by pins 67, but held in the funnel shaft 62 as by screw head 68 in a wall slot in said shaft. This permits the collar 66 a limited vertical movement with the feed drum 61 but no rotative movement with it, as such lateral movement would block the discharge port 65. At suitable distance below said feed drum body, in the funnel shaft 62, a rack collar 69 is set within the shaft and secured to its wall, as by screws 70, thus forming an encircling rack around the lower ungrooved portion 71 of the drum body. Above this rack 69 on the drum body is freely pivoted a pawl 73 that is adapted to engage the rack 69 except when the feed drum ascends into hopper 63 to the limit of its vertical movement in the funnel shaft by action of the agitator bar 59. Then the pawl clears engagement with the rack and drops into rack teeth more vertically below its pivotal point. Thus when the feed drum descends by downward movement of the agitator bar 59 the new tooth engagement of pawl 73 with the rack operates to rotate the drum a space laterally, to both induce entrance of further semi-formed collars into the drum grooves from the funnel hopper 63 above and also move another vertical chute toward the discharge port 65. From the sprocket wheel 41 on the reverse of wheel disk 40 a drive chain ascends diagonally to the driving sprocket 75 of a sprocket wheel 76 that is pivoted at the top of main standard 2, adjacent the funnel hopper edge. This wheel 76 on its main sprocket carries a conveyor chain of linked segments 77 that passes down the inner side of main standard 2 and around a suitable sprocket wheel 78 that is pivoted on said standard 2 adjacent its base, thence ascending along the rear face of the standard through a lower hopper 79—preferably usable for feeding open collars in bulk because more accessible, that is mounted on the standard 2 rear face and designed to feed its contents against the ascending conveyor chain 77, the linked segments of which are designed to engage semi-formed collars in desired position and lift them to the upper funnel feed hopper 63, discharging them into same as the chain links invert in going over the sprocket wheel 75 adjacent the edge of said funnel hopper.

The operation of this my complete decapper-receiving, final-forming and applying machine which incorporates my mechanism for this purpose claimed herein as most desirable is effected as follows: First it is assumed that the machine is set up beside a chain conveyor for bottles and its connection therewith established by adjustment of brackets 6 and 21 to engage the said conveyor and suit the height of the bottles used, the latter adjustment providing that the steadying cone on bracket 21 will have enough rise and fall to enter and lift clear of the bottle mouths. Vertical adjustment of the brackets 6 and 21 is, of course, effected through their slidable mounting on and in the lesser standard 3 and the collar 18 and use of set screws 9 and 20. Then, preferably, the lower hopper is filled with the partly arcuated, open collar, commercial form collar decappers—the upper hopper, not being so accessible for feeding but usable in emer-

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gency, normally functioning as a feeding reservoir of the open-formed collars passing to feed channels. The ascending conveyor chain 77 then passing upward on the inner wall of lower hopper 79 engages a succession of the open collars in its linked segments and carries them up to the top of main standard 2, where the conveyor chain inverts its linked segments as it passes over the sprocket wheel 75 at the edge of upper hopper 63 and thus dumps the carried blanks into said hopper, one after the other, in best position to facilitate their descent down the funnel-like wall of said upper hopper to the shaft 62 in same and the top of feed drum 61. There it either immediately enters one of the vertical grooves or slideways of the drum, as 64, or awaits proper entrance thereto alone or as one of an accumulation of blanks thereat, through the rise and rotative fall of said feed drum in the funnel shaft by operation of the mechanism below same: the agitator bar 59; driving bar 55; disk wheel 40; pawl 73; and rack collar 69. The open collar decapper, as 80, having entered and descended to the bottom of one of said slide grooves, as 64, awaits rotation of that groove to the discharge port 65, where it slides down a discharging slideway 81, dives head-first into an opposed opening or trip hole 82 in the frame of bracket 32 at that point which is suitably smaller than the blank body, so that the body weight causes the blank to swing around, pivoted on the trip hole edge, and drop downward through the opening 58 above the stop ledge 57, to come to rest on said ledge in front of arbor 53 in proper position for shaping die action. The shaping die 45 then advances against the decapper blank (open-formed collar) by operation of drive bar 55 and its eccentric pivoting on wheel 40, and pushes the blank against arbor 53, which stops the central die member 47 and causes wings 48 and 49 of the die to converge under the advancing pressure of the die body 50 on them through the spring plate 51, as the die body slides along the shank of the retarded center member 47, which abuts the blank and arbor, and the wings 48 and 47 press the blank sides forward and around the shaping arbor. Then in the withdrawal of the shaping from the arbor the central member 47 of the die is static and the wings 48 and 49 have no rear pressure upon them other than that exerted by the weak plate springs 51a and are diverged largely by the wedging effect of the arbor curvature upon their outer ends, thus pulling the fully formed blank (now a fully arcuated collar and laterally resilient) off the arbor by engagement of the wing recesses with the ears 83 now extending laterally from the collar. This engagement of the wings of the shaping die with the ears of the fully arcuated collar pulls the collar back from the arbor to a point where the wings release it above the exit well 33, by central die member 47 butting at rear end against a stud 47A while the shaping die body recedes farther, thus extending the wings. Then the fully arcuated decapping collar, embracive of the slide post 31 in said exit well 33, slides down to come to rest upon the top of the applying plunger 24—and drop off same as it recedes or lands immediately in front of said plunger if it is already receded enough. The next forward movement of the applying plunger 24 then pushes the fully arcuated collar decapper onto the head and neck finish of the bottle that is travelling on chain conveyor 7, which has at that moment reached the peak of its interception on said conveyor by the arms of star wheel 9 and the dip of steadying cone 29 into its mouth, and is backed by the end arm 8 of bracket 6. The bottle, with collar decapper duly applied to it, then continues on its way to filling and capping operations—and the action is repeated.

I claim:

1. In a mechanism for bending decappers to conform to the shape of a particular bottle neck so as to adhere thereto and extend around the same over an arc of more than 180 degrees, the decapper being preformed with a length corresponding to the length of the above

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mentioned arc and being provided with ears near its opposite ends, a die mechanism and an arbor having a shape corresponding to shape of the bottle neck, but of less diameter, disposed to receive a decapper therebetween, said die mechanism comprising a reciprocally mounted body member, a slidable center member mounted in said body member, means for reciprocating said body member, wings carried by said slidable center member, said wings being arranged for engagement with a decapper, means for moving said wings to an open position as the body member is moved away from said arbor, means to cause convergence of said wings when a decapper carried thereby is forced against the arbor during the forward movement of the body member, the arrangement of mechanism being such that said center member and wings thereon engage and carry a decapper against the arbor, bend the decapper about the arbor, then remove the decapper from the arbor through the interengagement of the ears of the decapper with the recesses in the wings, and finally releases the decapper near the rearward limit of the movement of body member.

2. In a mechanism for bending decappers to conform to the shape of a particular bottle neck so as to adhere thereto and to extend around the same over an arc of more than 180 degrees, the decapper being preformed with a length corresponding to the length of the above mentioned arc and being formed with projecting ears near its opposite ends, a reciprocally mounted die mechanism and an arbor having a shape corresponding to the shape of the bottle neck, but of less diameter, disposed to receive a decapper therebetween, means for reciprocating said die mechanism, and a fixed part located in the path of movement of said die mechanism, said die mechanism comprising a body member connected to said reciprocating means, a center member slidably mounted in the body member, wings hinged on said center member and having recesses to receive the ears of the decappers, said wings also having arms which are received in said body member and disposed to engage with inwardly projecting means on the body member to cause opening of the wings when the center member is moved forwardly with respect to the body member, said fixed part being arranged to engage with said center member in its travel away from said arbor and produce divergence of said wings, and spring-pressed means in the body member engaging the arms on said wings and yieldly acting to hold the wings in open position, said spring pressed means also acting in conjunction with said arms to move the wings toward a closed position when the center member is moved rearwardly in the body member by engagement of said center member with the work and arbor, the arrangement of mechanism being such that the center member and the wings engage and carry a decapper against the arbor, bend the decapper about the arbor as result of the center member being moved rearwardly in the body member, then remove the decapper from the arbor through the interengagement of the ears of decapper with the recesses in the wings, and finally releases the decapper due to center member being forced forwardly in the body member by abutting said fixed part while the body member continues to move away from the arbor, thus fully diverging the wings.

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