

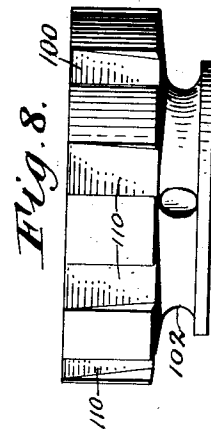
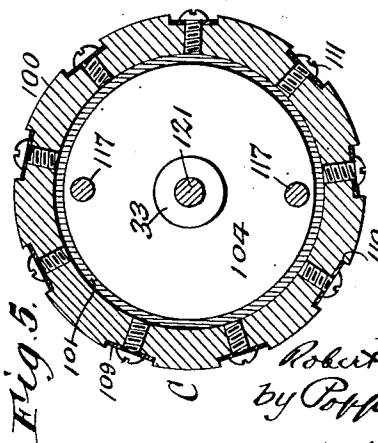
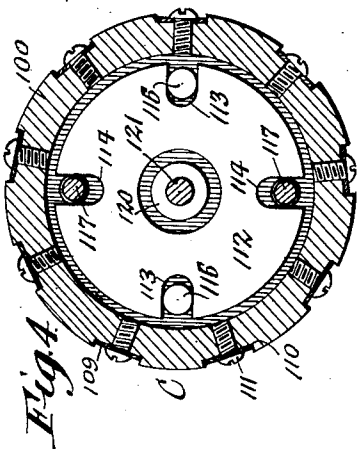
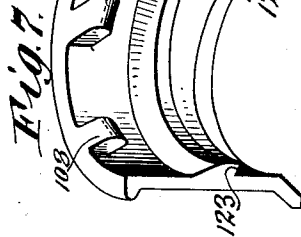
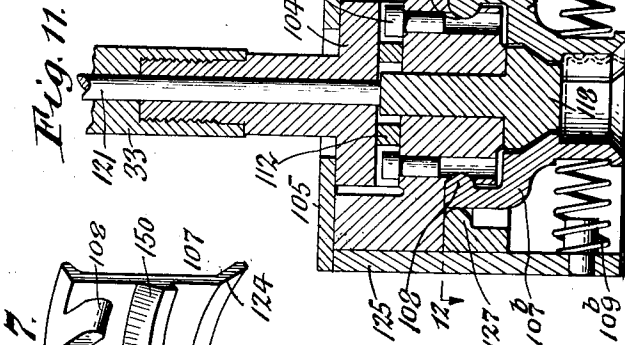
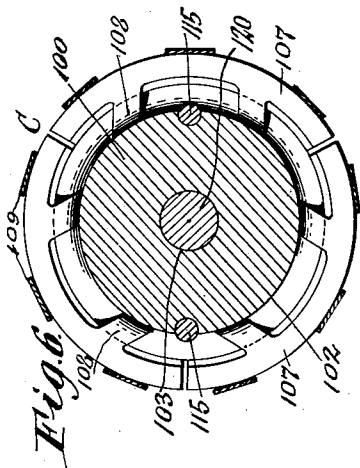
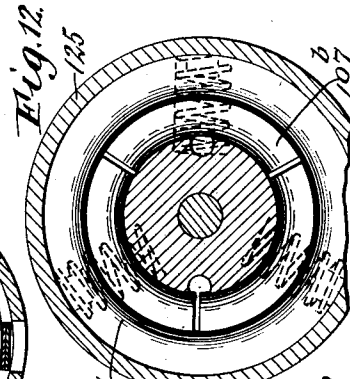
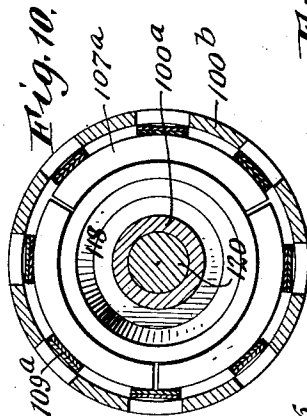
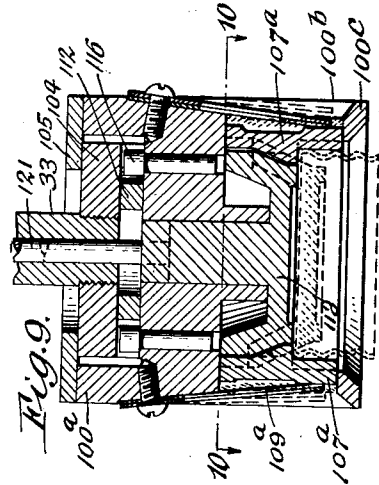
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R. N. CUNDALL
BOTTLE CAPPING MACHINE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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BOTTLE-CAPPING MACHINE

Application filed January 29, 1925. Serial No. 5,515.

In my pending application for patent, Serial No. 577,418 I have disclosed a machine for applying caps or covers to bottles or jars wherein a series of cap applying chucks mounted on a rotatable head or turret is movable in relation to a cap feeder and to a bottle or jar feeder and performs the operations of taking the caps from the cap feeder and applying them to the bottles or jars successively advanced by the bottle or jar feeder.

My present invention relates to a machine of the above general type and more particularly to the cap applying chuck structure of such a machine.

The principal object of the invention is to provide a cap applying chuck which will successfully meet certain conditions which are peculiar to bottles or jars having sheet metal caps or covers. These conditions, briefly stated, are irregularity in the outline of the bottom edge of the cap, slight variations in the diameter of the cap and slight eccentricity of the tops or necks of the containers. In the manufacture of sheet metal caps, the first operation of drawing the cup or blank from which the cap is made frequently leaves the bottom edge irregular. The thread is rolled into the sides of the cap by holding the cap while rotating between two flat surfaces pressing against the two faces of the top of the cap. Any irregularities that exist in the lower edge of the cap are accentuated by this operation. By means of the present invention the cap is located in the chuck by at least one of the same surfaces that was used to provide a locating point during the manufacture of the cap and in this way it is assured that the cap is held true in the chuck. The present invention also provides for holding the caps with substantially the same tension notwithstanding the slight variations in diameter which may be found in different caps. The present invention also provides for holding the cap rigidly and truly in the chuck while at the same time providing that the chuck shall accommodate itself to any slight eccentricity of the top or neck of the container to which the cap is to be attached.

A further object of the invention is to pro-

vide a cap applying chuck which will hold the cap securely and in such manner that the cap cannot be distorted or deformed, even when made of thin or soft metal.

A further object is to provide for varying the degree of tension with which the cap is held in the chuck in order to meet different requirements as to the tightness of the cap on the bottle or jar.

The invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a view partly in side elevation and partly in vertical section showing certain features of the machine to which the invention is applicable and also showing different positions and operative conditions of chucks in which the features of the invention are incorporated.

Figure 2 is a detail vertical sectional view of the cap applying chuck.

Figure 3 is a bottom plan view thereof.

Figure 4 is a horizontal sectional view looking in the direction of the arrows 4—4 of Figure 2.

Figure 5 is a horizontal sectional view looking in the direction of the arrows 5—5 of Figure 2.

Figure 6 is a horizontal sectional view on the line 6—6 of Figure 2.

Figure 7 is a detail prospective view of a jaw of the chuck.

Figure 8 is a detail elevation of the chuck body.

Figure 9 is a vertical sectional view showing a chuck of modified form.

Figure 10 is a sectional view on the line 10—10 of Figure 9.

Figure 11 is a vertical sectional view showing a further modification.

Figure 12 is a horizontal sectional view on the line 12—12 of Figure 11.

Figure 1 shows such details of the machine as are necessary to an understanding of the features of operation and utility of the present invention. It is not deemed necessary to describe these machine features in any extended detail since they are fully described in my said co-pending application and since a brief recapitulation of these features, using therefor the same reference characters

which are employed in my copending application, will suffice to make clear their operative relation to the chuck structure in which the invention consists.

The machine features illustrated in Figure 1 are the stationary table 19, the rotatable table 31 arranged within an opening 20 formed in the table 19, the upper head 26, the intermediate head 27 and the lower head 30, all of which heads and the table 31 are suitably coupled together to rotate as a unit, the stationary master gear 40 arranged between the heads 27 and 30, the stationary cam 48 arranged above the master gear, the fixed and movable jar clamping elements 81 and 83 mounted on the table 31, the rotatable cap feeding disk 58 and one of the cap holders 59 mounted on the disk 58. The parts above described are of the same form as the corresponding parts of the machine shown in my said co-pending application except that the stationary cam 48 has the profile of its working face varied so as to accomplish certain operations, to be hereafter described in detail, which are peculiar to the use of the chuck structure of the present invention.

The cap applying chucks are indicated generally at C and are operated both axially and rotatably by vertical shafts 33 mounted in suitable bearings 34 and 35 provided on the heads 30 and 27 respectively. The shafts 33 are each formed or provided with pinions 39 which engage the master gear wheel 40, said gear wheel being of such extent from face to face that the engagement of the pinions 39 therewith is maintained throughout the range of axial movement of the shafts 33. The shafts 33 are also provided with cross heads 42 which carry guide rods 41 that work through openings in the head 26 and which also carry rollers 49 for co-operation with the profiled upper edge of the cam 48. Each cap applying chuck C is a self-contained unit removably fitted to its corresponding operating shaft 33.

Referring to Figures 1 to 8:

The chuck includes a body 100 having a circular recess 101 open to its upper face (Figure 2) and below said recess having a portion of reduced diameter which is formed with a circumscribing groove 102 (Figures 2 and 8) and with a central axial bore 103. The chuck is connected to its operating shaft 33 by a driving plate 104 which is threaded or otherwise suitably connected to the lower end of said shaft and which fits in the recess 101 and the body 100 is hung from the plate 104 by means of a hanger plate 105 secured by screws 106 to the upper face of said body and engaging over the plate 104. The cap engaging elements of the chuck are jaws 107 which are arranged in annular series and are preferably three in number, each jaw having at its upper end inwardly pro-

jecting lugs 108 which conformably fit in the groove 102 and form fulcrums about which the jaws may rock, the jaws being pressed inward by springs 109 which engage their outer faces and are fitted in vertical grooves 110 formed in the outer face of the body 100, the springs being secured to said body by screws 111. The jaws 107 are mounted below the part of the body 100 in which the recess 101 is formed and as normally pressed inward by the springs 109 assume the form of a cylinder. The driving connections between the chuck body and the shaft 33 are such as to permit the chuck body to have a measure of lateral slippage or play relatively to said shaft for the purpose of compensating for any slight eccentricity of the threaded neck of the jar or bottle 145. The driving connections preferably consist of a flat ring 112 which is arranged in the recess 101 below the plate 104 and is provided in its margin with diametrically opposite recesses 113 and with a second pair of diametrically opposite recesses 114 arranged on a line at right angles to the diameter on which the recesses 113 are arranged. The ring 112 is connected to the body 100 by vertical pins 115 fitted in openings in said body and having heads 116 which fit in the recesses 113. The ring 112 is also connected to the plate 104 by vertical pins 117 which are fitted in the plate 104 and engage at their lower ends with the recesses 114 of the ring 112. The recesses 113 and 114 are of such length as to permit relative play or movement therein of the pins 115 and 117 respectively and thereby the body 100 may shift laterally relatively to the shaft 33 within the limits prescribed. By providing the pins 115 and 117 and the corresponding recesses therefor in the ring 112 two directions of lateral shifting are possible and the self-adjustment of the chuck to any eccentricity of the threaded neck of the bottle or jar is thereby facilitated. In one direction of lateral shifting the body 100 shifts relatively to the ring 112, the pins 115 and recesses 113 providing the guides and in the other direction of lateral shifting the body 100 and the ring 112 shift relatively to the plate 104, the pins 117 and recesses 114 providing the guides. It will, of course, be obvious that no matter what position the body 100 may be required to assume within the limits of its lateral play the pins 115 and 117 and the ring 112 are operative positively to couple the body 100 and plate 104 so that said body will be driven rotatably by said plate.

At a period of the operation of the chuck, as will be more fully described at a later point, it is desirable to open the jaws 107 in order to cause them to release any cap held therein and for which a bottle or jar may not have been supplied. To accomplish this operation a vertically movable spreader disk

118 is arranged below the body 100 and has its circumferential face provided with a downwardly tapering cam surface 119 which engages conforming cam surfaces 150 formed on the inner faces of the jaws 107. The spreader 118 is provided on its upper face with a centrally located post 120 which fits slidably in the central opening 103 of the body 100 and is engaged by a rod 121 mounted for axial sliding movement in an axial bore of the corresponding shaft 33. The rod 121 projects beyond the upper end of the shaft 33 and at a period of the rotation of the table 31 engages a stop 122 (Figure 1) by which as the shaft 33 is elevated the rod 121 is relatively lowered, that is to say held against being elevated, with the result that the disk 118 by the co-operation of its cam surface 119 with the cam surfaces 150 of the jaws 107 rocks said jaws outward about their fulcrums 108.

Below the cam surface 150 each jaw 107 is formed with an internal shoulder 123 which is normally flush with the under face of the spreader 118. The cylinder formed by the jaws 107 has a flaring or bell mouth 124 by which the jaws are enabled freely to take over the cap 14 arranged upon the cap holder 59. It will, of course, be understood that the pressure with which the jaws 107 engage the cap can be regulated in any suitable manner as by providing two or more leaf springs for each jaw or otherwise varying the tension of the springs. It is obvious that the jaws 107 being spring controlled will accommodate themselves to any variations in the diameters of the caps and will grip each of the caps with substantially the same tension. Inasmuch as the jaws grip the cap practically uniformly throughout its circumferential wall and also bear upon its upper face there is no possibility of the cap being distorted.

In Figure 1 there is illustrated by broken lines the position and condition of a chuck at the time the spreader 118 is operated to move the jaws outward. Thereafter due to the profile of the cam 48 the chuck moves downward until it comes to a position in which it is aligned with a cap 14 fitted on a holder 59 of the rotating cap feeder 58. The downward movement of the chuck is completed at such time, the spreader 118 being the first part of the chuck to engage the cap and engaging the upper face of the same. When the spreader 118 engages the cap it is thereby pushed upward relatively to the descending chuck body 100 with the result that the spreader is forced against the under face of said body and the jaws 107 are permitted to be swung inward under the pressure of their springs 109. In such inward swinging movement the shoulders 123 of the jaws engage the top of the cap thereby locating the same relatively to the chuck and the portions

of the jaws below said shoulders engage the cylindrical portion of the cap. This position and condition of a chuck is illustrated in the case of the chuck shown at the left side of Figure 1. As the rotation of the table 31 continues the chuck is then raised, carrying the cap with it, to an elevation at which it will clear the bottle or jar 145 which has been advanced into capping position by the bottle or jar feed mechanism (not shown). The chuck then descends and as the rotation of the table continues screws the cap on to the bottle or jar, the completion of this operation being shown in the case of the chuck at the right side of Figure 1. Thereafter, the jar being held against upward displacement by the clamping elements 81 and 83 the chuck is raised so as to disengage it from the jar which is thereupon ejected from the machine in the manner described in my said pending application, this raising of the chuck being continued until the chuck is brought to the position and condition shown by broken lines in Figure 1. It will be noted that the stop 122 by which the spreader 118 is actuated may be adjustable and for this purpose may be in the form of a screw which can be set at any desired position.

The modified construction shown in Figures 9 and 10 differs from the construction shown in Figure 1 only in that the jaws, here designated as 107^a are not fulcrumed but are mounted for radial sliding movement. In this modified construction the chuck body, here designated as 100^a, is formed with downwardly projecting bars 100^b between which the jaws 107^a are fitted, these bars being connected at their lower end by a bell mouth annulus 100^c which provides a lower support for the jaws and which also provides a bell mouth for the chuck similar to the bell mouth 124 provided in the construction of Figure 2. Figure 9 also shows the chuck jaws as backed by superposed springs, here designated 109^a instead of by a single spring as in the construction first described. In other respects the construction shown in Figures 9 and 10 is similar to the construction shown in Figures 2 to 8. Figures 11 and 12 illustrate a further modification in which the jaws, here designated as 107^b are fulcrumed as in the construction shown in Figure 1 but are backed by helical springs 109^b instead of by coil springs. In this modified construction a cylinder 125 surrounds the chuck body and is secured thereto by screws 126. This cylinder is provided with an internal rib or flange 127 which is secured by screws 128 and which bears against the jaws 107^b at or near their upper ends in order to hold said upper ends against displacement relatively to the groove in which the fulcrum lugs are fitted. In other respects this modified construction resembles the construction shown in Figure 2.

Having fully described my invention, I claim:—

1. In a bottle capping machine having a rotary chuck operating shaft, a rotary cap applying chuck comprising a body, means carried by the body for engagement with a cap, a drive plate connected to said shaft and means of driving connection between said plate and said body and permitting of lateral play of said body relatively to said plate.
2. In a bottle capping machine having a rotary chuck operating shaft, a rotary cap applying chuck comprising a body, a series of jaws carried by the body and mounted for inward and outward movement, springs acting on the jaws to force them inward, a drive plate connected to said shaft, and means of driving connection between said plate and said body and permitting of lateral play of said body relatively to said plate.
3. In a bottle capping machine having a rotary chuck operating shaft, a rotary cap applying chuck comprising a body, means carried by the body for engagement with a cap, a drive plate connected to said shaft, said body having a recess open to its upper face in which said plate is fitted, a hanger plate secured to said body and engaging said drive plate from above, and means of driving connection between said drive plate and said body and permitting of lateral play of said body relatively to said drive plate.
4. In a bottle capping machine having a rotary chuck operating shaft, a rotary cap applying chuck comprising a body, means carried by the body for engagement with a cap, a drive plate connected to said shaft, an element arranged under said plate and having two pairs of radially disposed recesses, those of one pair located midway between those of the other pair, pins fitted into said body and projecting into the recesses of one pair and pins fitted to said drive plate and projecting into the recesses of the other pair, said recesses being of such extent that said pins may play lengthwise thereof.
5. In a bottle capping machine, a rotary cap applying chuck comprising a body, a series of jaws carried by the body and mounted for inward and outward movement, springs acting on the jaws to force them inward, and a spreader disk mounted for axial movement within the jaws, said disk being operative to force them outward and also being operative to engage the top of the cap, said jaws being formed with internal shoulders to engage the top of the cap and said shoulders being flush with the under face of said disk.
6. In a bottle capping machine having a rotary chuck operating shaft, a rotary cap applying chuck comprising a body, means carried by the body for engagement with a cap, a drive plate connected to said shaft, a flat ring arranged under said drive plate and having two pairs of radially disposed recesses, those of one pair located midway between those of the other pair, pins fitted into said body and projecting into the recesses of one pair, pins fitted to said drive plate and projecting in the recesses of said other pair, said recesses being of such extent that said pins may play lengthwise thereof, and a spreader disk confined in said jaws and operative by relative axial downward movement to spread said jaws apart, said disk having a central upright post projecting through said body and through said ring, said shaft having an axial bore, in combination with an operating rod for said disk slidably mounted in said axial bore and engageable with said post.
7. In a bottle capping machine, a rotary cap applying chuck comprising a body, spring pressed jaws carried by the body and mounted for inward and outward movement, said jaws being adapted when moved inwardly to engage and support a cap, and an element axially movable relatively to the chuck and operative in the space delimited by said jaws to engage and eject a cap supported by said jaws, in combination with means operative at a period of the operation of the machine for causing a relative operative movement of said axially movable element.
8. In a bottle capping machine, a rotary cap applying chuck comprising a body, spring pressed jaws carried by the body and mounted for inward and outward movement, said jaws being operative to support a cap which is wholly disengaged from the container to which it is to be applied and an element axially movable relatively to the chuck and enclosed within and formed to engage said jaws whereby during its relative movement in one direction said element will force said jaws relatively outward, said element also being engageable with a cap, in combination with means for relatively vertically moving the chuck whereby to apply a cap and other means operative at a subsequent period for relatively moving said element and causing the same to move said jaws outward and in case a cap be confined within said jaws to push the same from the chuck.
9. In a bottle capping machine, a rotary cap applying chuck comprising a body, spring pressed jaws carried by the body and mounted for inward and outward movement, said jaws being adapted when moved inwardly to engage and support a cap, and a cap ejecting element axially movable relatively to the chuck and operative within the jaws in combination with means for operating the chuck to apply a cap and other means operative at a subsequent period for operatively moving said element relatively to the chuck whereby if a cap at such time be confined within said jaws said element will eject said cap.

10. In a bottle capping machine, a cap feeding means, a cap applying chuck, a driving shaft for the chuck, said chuck comprising spring pressed individually yieldable jaws which are adapted to engage and support a cap, a relatively movable cap ejecting element axially movable relatively to said chuck and operative within the jaws, said relatively movable element being operative to spread the jaws during its relative movement to eject a cap, means for operating the chuck to apply a cap, means operative at a subsequent period for operatively moving said relatively movable element whereby if a cap at such time be confined within the jaws said relatively movable element will eject said cap, and means operative at a further subsequent period for producing an axial movement of the chuck to engage a cap supplied by the feeding means, said relatively movable element being restored by the relative thrust of the cap so engaged to its initial position thereby permitting the jaws to close upon the cap.

11. In a bottle capping machine, a driving shaft, a cap applying chuck comprising spring pressed jaws which are individually yieldably engaged with said cap and means for supporting said chuck from said shaft and operative to communicate the rotation of said shaft to said chuck, the latter being mounted for bodily lateral shifting movement within determined limits relatively to said shaft.

12. In a bottle capping machine, a rotary cap applying chuck comprising a body, spring pressed jaws carried by the body and mounted for inward and outward movement, said jaws being adapted when moved inwardly to engage and support a cap, and an element axially movable relatively to the chuck and normally engaging the cap, said element being operative in the space delimited by said jaws to eject said cap from the jaws.

In testimony whereof I affix my signature.

ROBERT N. CUNDALL.