

Aug. 27, 1935.

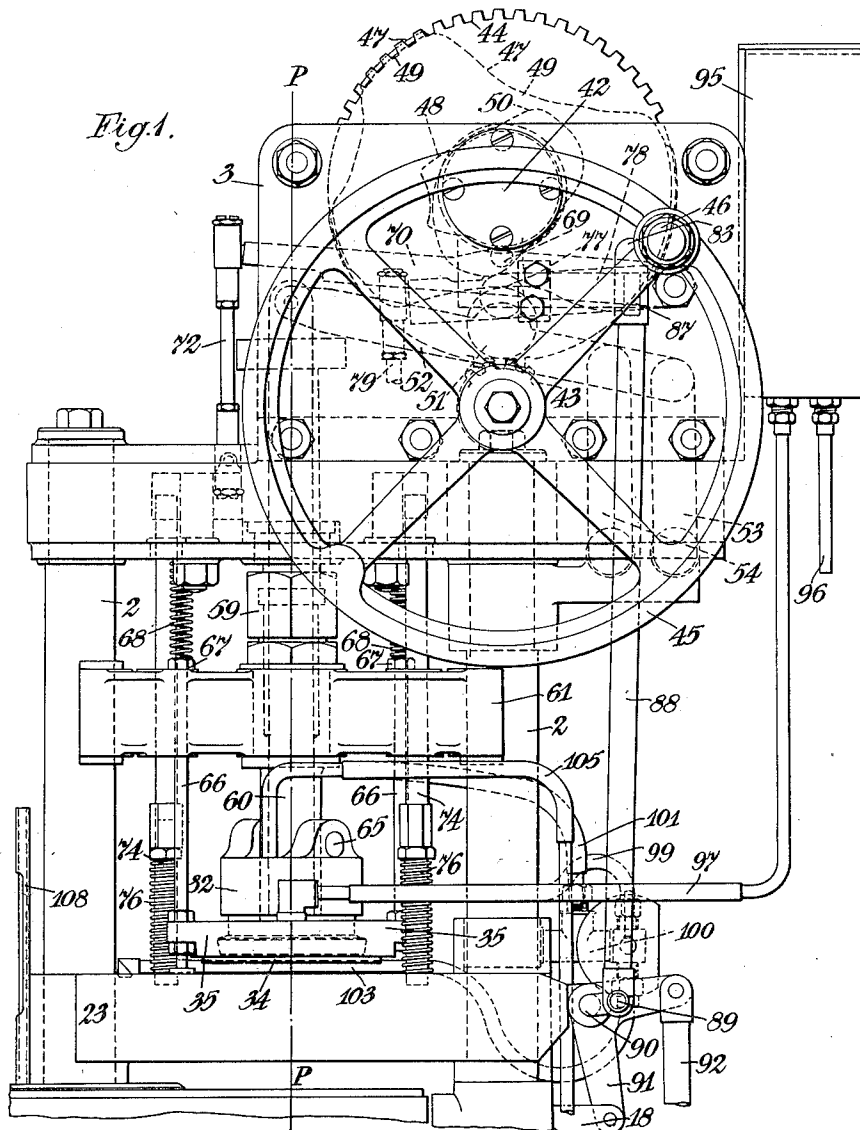
H. M. WARE

2,012,364

APPARATUS FOR SEALING PAPER OR LIKE BOTTLES OR CONTAINERS

Filed Oct. 21, 1931

6 Sheets-Sheet 1



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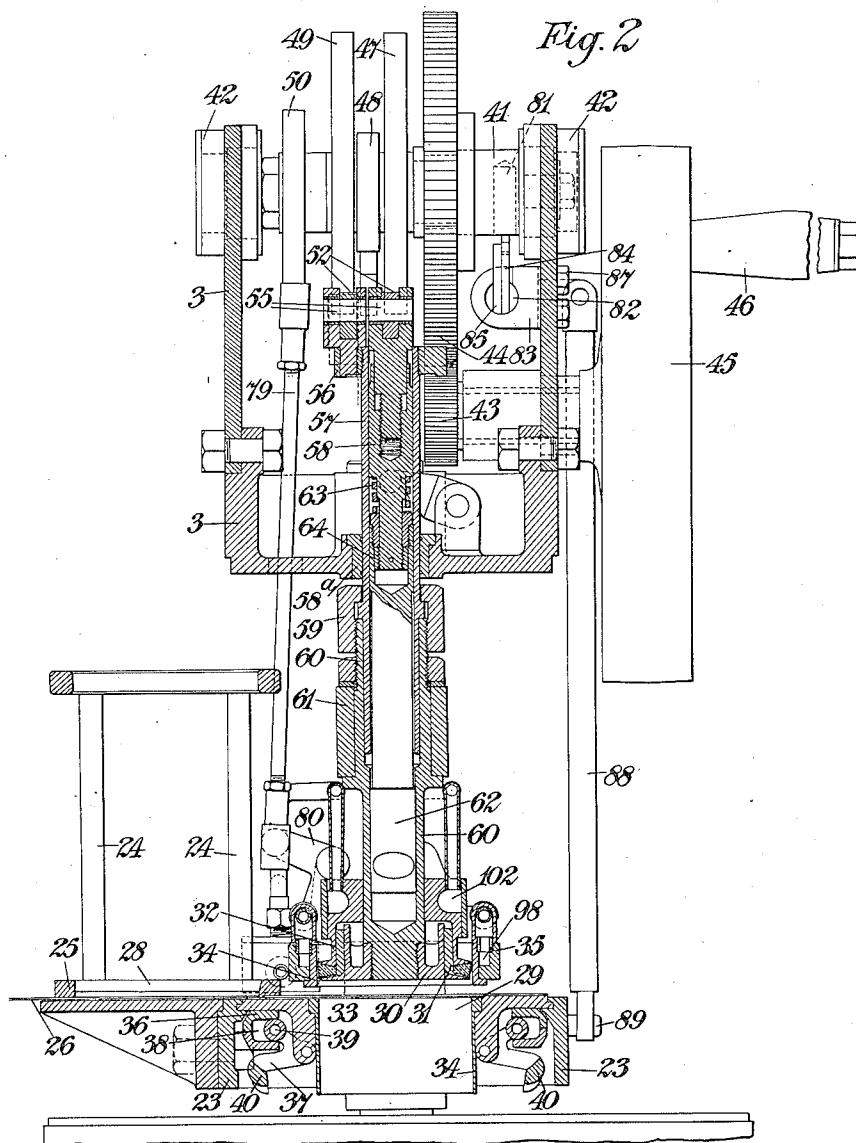
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6 Sheets-Sheet 2



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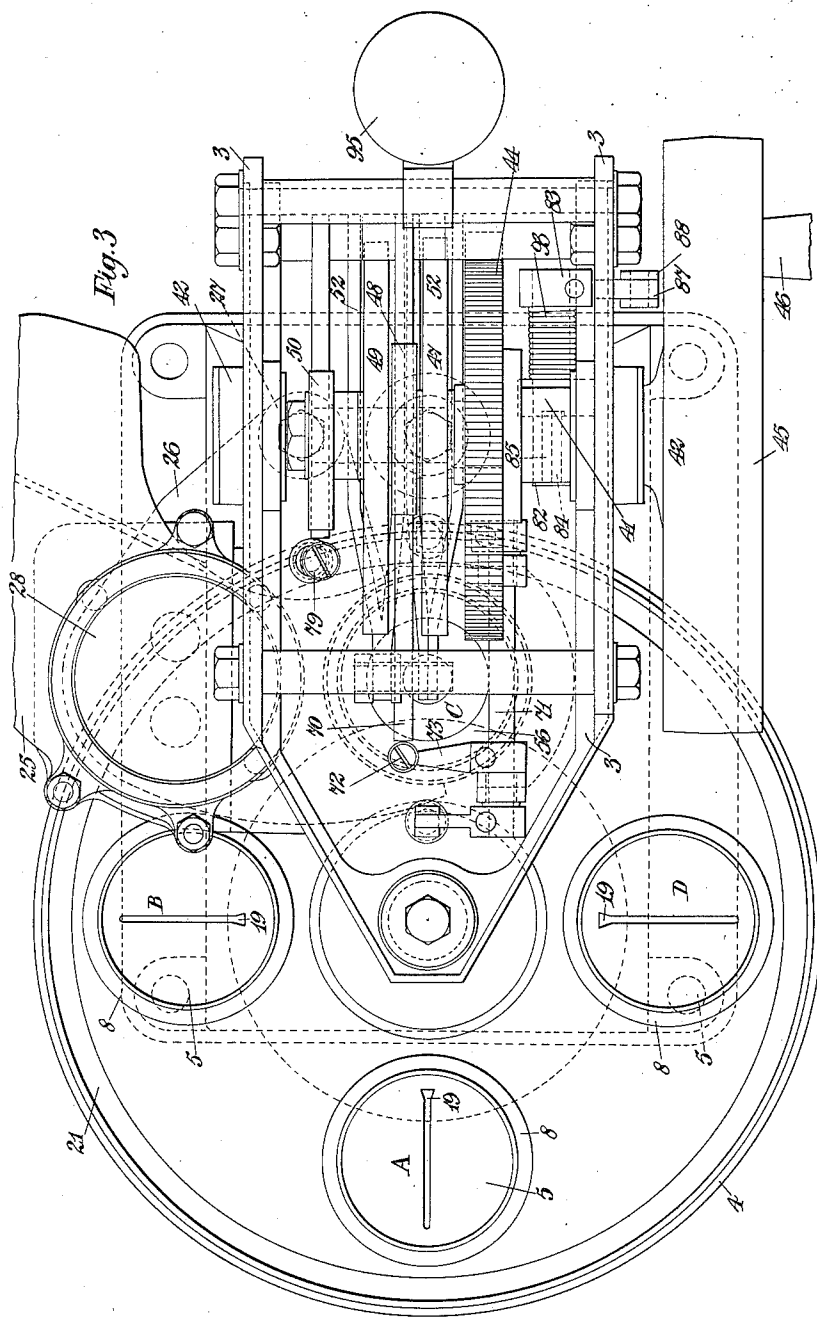
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6 Sheets-Sheet 3



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6 Sheets-Sheet 4.

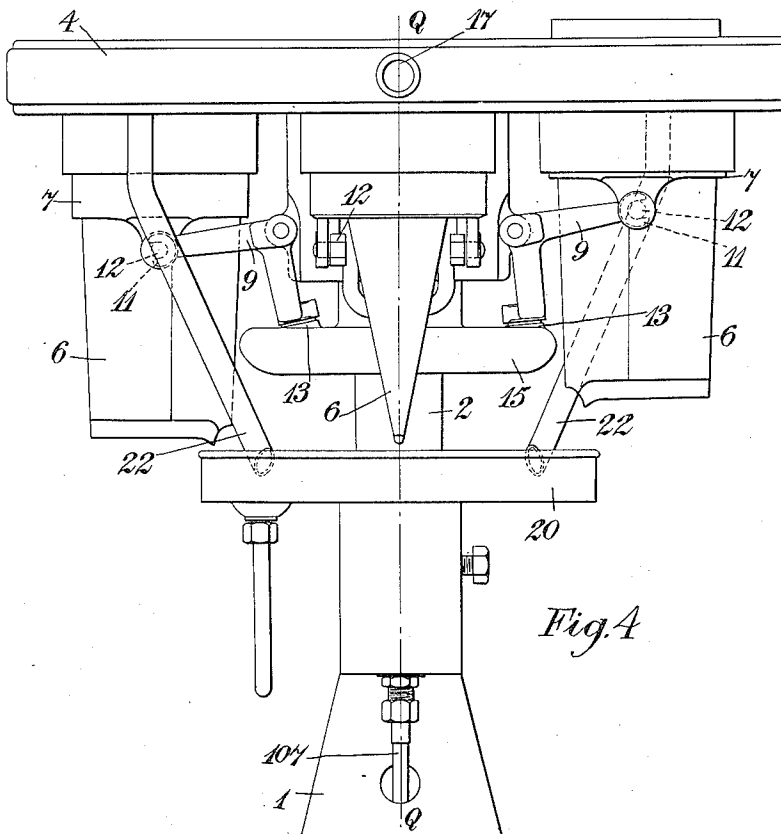


Fig. 4

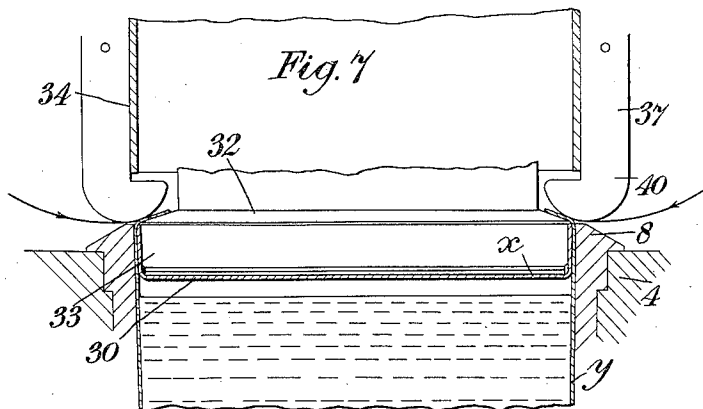


Fig. 7

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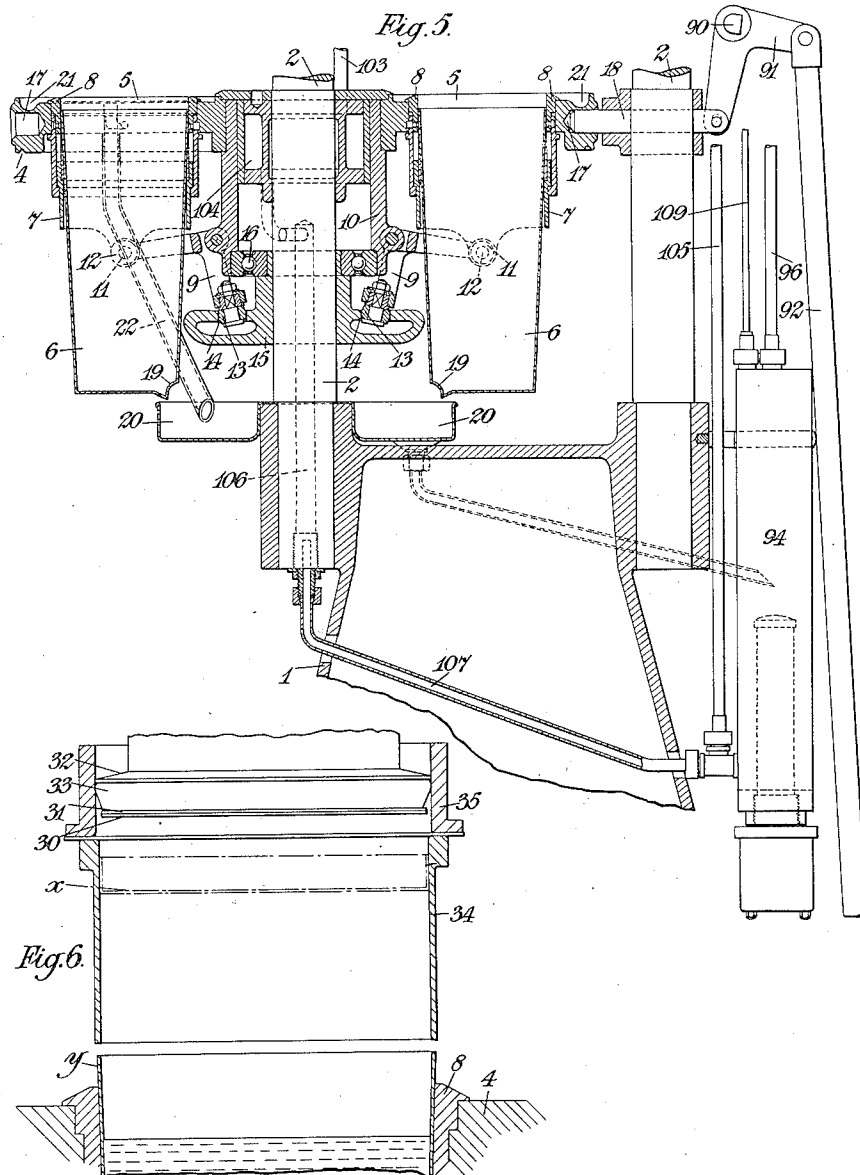
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6 Sheets-Sheet 5



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6 Sheets-Sheet 6

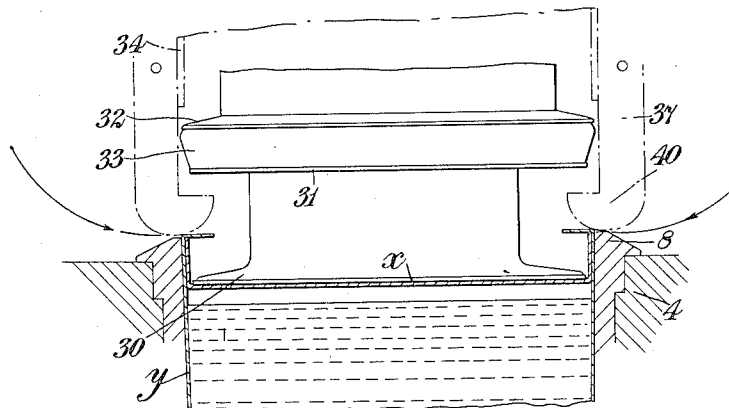


Fig. 8

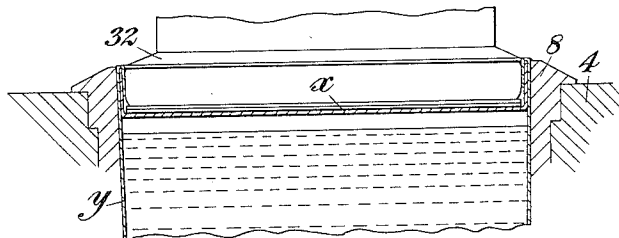


Fig. 9

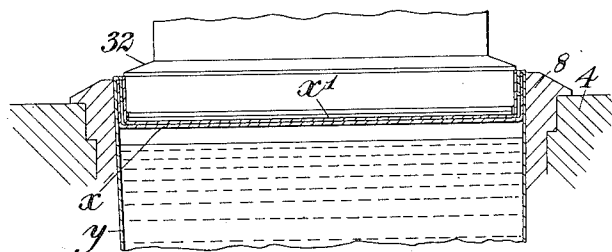


Fig. 10.



Fig.11

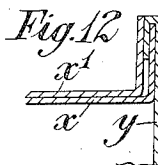


Fig. 12



Fig.13

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UNITED STATES PATENT OFFICE

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APPARATUS FOR SEALING PAPER OR LIKE
BOTTLES OR CONTAINERSHerbert Maclean Ware, Northwood, Middlesex,
EnglandApplication October 21, 1931, Serial No. 570,232
In Great Britain October 21, 1930

9 Claims. (Cl. 93—6)

This invention relates to apparatus for sealing paper or like bottles or containers by inserting a flanged cap or disc within the open end or ends of the container body. The flanged sealing caps are placed within the open ends of the containers with the disc or centre portion thereof disposed innermost and with the flange in contact with the inner periphery of the container.

The invention has for its object to provide improved apparatus for closing the ends of containers in the above manner and with this object in view the invention consists in the novel features of construction and combination herein-after described, illustrated and claimed.

In the accompanying drawings:—

Figure 1 is a side elevation of the upper part of one form of machine according to the invention;

Figure 2 is a sectional front elevation of the upper part of this machine taken on the line P—P of Figure 1;

Figure 3 is a plan view of this machine;

Figure 4 is a front elevation of the lower part of this machine;

Figure 5 is a sectional side elevation of the lower part of this machine taken on the line Q—Q of Figure 4;

Figures 6 to 10 show diagrammatically successive stages in the process of sealing a carton, and

Figures 11 to 13 are sections through the joint between the lid of a carton and the body thereof during successive stages in the sealing process.

In carrying the invention into effect in one convenient manner as applied by way of example to sealing the end of a container, such as may be made from paper, cardboard or other flexible material and may be waxed or otherwise proofed and adapted to contain foodstuffs or other articles, solid or liquid, such as milk, a flanged sealing cap or disc is inserted in the open end of the container body and a portion of the end of the latter is turned down over the flange of the sealing cap and the parts of the container at this point are firmly pressed together so as to complete the seal.

When the flanged sealing cap is first placed in position within the open end of the container a portion of this end of the latter projects beyond the end of the flange of the cap (the latter being inserted with its flange pointing outwardly relatively to the interior of the container). The flange is then pressed tightly against the wall of the container while the latter is supported within a suitable die or casing. The projecting por-

tion of the container is then folded inwardly and downwardly over the flange of the cap and pressure applied to the parts, i. e. the end portion of the body of the container, the turned down portion thereof and the flange of the sealing cap which is positioned between these two parts of the container so as to complete the seal.

Alternatively, the above process may be reversed and a portion of the flange of the sealing cap turned outwardly and downwardly so as to embrace the end of the wall of the container.

The pressure employed in the sealing process may be applied from within or outside the container or in both directions.

Apparatus for carrying out the sealing operation in connection with the sealing of milk or other liquid containers and as is illustrated in the drawings comprises a base 1 having pillars 2 rigidly secured thereto, a head 3 rigidly secured to the pillars and a table 4 rotatably mounted on one of the pillars and provided with any convenient number of apertures 5, in the example here illustrated four apertures, housing sheaths 6, which hold the containers during the sealing processes. The sheaths 6 are made of thin springy sheet metal, for the purpose later to be described, to conform to the shape of the containers and are attached to carriers 7 slidably mounted in bushes 8 fixed within the apertures 5, which bushes 8 are chamfered at their upper portions where necessary to continue the sloping profile of the container.

Bell crank levers 9 pivotally mounted on a table bearing member 10 have each one arm forked to surround the sheaths 6 and provided with slots 11 engaging with pins 12 secured to the carrier 7, while the other arm carries a roller 13 engaging in a cam groove 14 formed in the cam member 15 which is rigidly secured to a pillar 2. The arrangement is such that when the table is rotated each roller 13 passes successively over a part of the groove 14 which deviates outwardly from a circular outline at which point, therefore, the bell crank lever will be operated and the sheaths moved vertically upwards.

The table is rotatably supported by a ball bearing 16 and is provided with equally spaced index holes 17 (Figures 4 and 5) corresponding to the number of apertures 5 and an index pin 18 slidably mounted in one of the pillars 2 is arranged to engage with these holes.

Each sheath 6 is formed with a lipped aperture 19 disposed above a circular tray 20 whereby any liquid which is spilt into the sheath may be collected and suitably drained away. The

table 4 is provided with a gutter 21 and drain pipe 22 for the same purpose.

It should be pointed out here that this machine is intended to seal containers which are closed at one end and are sealed at the other end, after the container has been filled with the required liquid.

One or both of the bottom corners of the sheath may be cut off, which arrangement, besides providing a drain, also has the advantage of avoiding damage to the corners of the container when this is inserted.

It is found that during the sealing process later to be described the flanged lid acts like a piston when being inserted into the container, compressing somewhat the air therein. This causes a slight expansion of the container sides and it is the purpose of the previously-mentioned springy construction of the sheaths to allow this to take place freely.

The index holes 17 and pin 18 are so disposed that each aperture 5 may be located immediately below and coaxial with the lid flanging and sealing mechanism.

The flanging mechanism is carried on a base member 23 (Figures 1 and 2) secured to the two pillars 2 and having vertically upstanding guides 24 forming a magazine to contain a pile of circular lid discs (constituting the sealing caps or discs above referred to) secured to a cover plate 25 bolted thereto. The under surface of the cover plate 25 is spaced somewhat from the surface of the base member by washers held between the two surfaces and in this space a feeding quadrant 26 of thin sheet metal is arranged to oscillate in a horizontal plane about a pivot 27 (Figure 3) by means presently to be described. The feeding quadrant has one edge formed with a semicircular profile adapted to engage with the edge of a lid disc. When inoperative, it rests in a position on the outer side of the magazine, and, the pile of discs therein, passing through an aperture 23 in the cover plate 25, then rest on the surface of the base member 2. When operated, the feeding quadrant swings around the pivot 27 in an anticlockwise direction (Figure 3), engages the edge of the lowest lid disc in the pile, and, sliding this along the surface of the base member 23, places it in position above an aperture 29 in the base member and coaxial therewith. It is then returned to its inoperative position and the pile of discs, which meanwhile has been supported on a backwardly extending portion thereof, now descends by the distance of one disc's thickness so that the next disc is in feeding position. A weight is preferably placed at the top of the pile to assist in the feeding process.

Flanging is now effected by the descent of a composite plunger which comprises a bottom punch member 30 (Figure 2), a retaining member 31, a top punch member 32 and a rubber or other resilient ring 33 included between the retaining member 31 and the top punch member 32. The centre portion of the disc is driven down by the bottom punch member 30 into a guide bush 34 mounted in the base member 23 while its edges are turned up and flanged by the edge of the said bush 34. Somewhat before the bottom punch member 30 makes contact with the disc, a pressure ring 35 is released, and, being urged downwardly by spring pressure, presses the periphery of the disc against the surface of the base member 23. This pressure is continued throughout the flanging process and serves to secure a satis-

factory flange by effecting an even distribution of the creases that occur in flanging. The process up to this point is illustrated diagrammatically in Figure 6 where the lid disc is indicated by x and a container which has been previously inserted into the table bush 8 and is in position for sealing is indicated by y .

The flanged disc as shown by chain dotted lines in Figure 6 is now placed by further descent of the composite plunger already referred to in the mouth of the container y located in the table 4 immediately beneath the guide bush, the amount of the descent being so regulated that the sides of the container may extend a substantial distance above the top of the flange, the open end of the container extending above the end of the bush 8.

With the bottom punch member 30 remaining in its lowered position, the top punch member 32 is now caused to move downwards a further small distance, thereby compressing the rubber ring between the said two punch members and causing it to expand radially. The flange of the lid and the side of the container are thus squeezed tightly together between the said rubber ring and the inside of the bush 8.

Simultaneously with the application of this squeezing pressure a sleeve 36 (Figure 2) is moved downwards, whereby a peripherally disposed series of folding fingers 37, pivotally mounted on the base member 23 and engaging with grooves 38 in the sleeve 36 by rollers 39, are swung inwards so that shoes 40 carried thereby engage with the upstanding wall of the container y folding it inwards over the back of the top punch member 32 as shown diagrammatically in Figure 7. By this means a crease is formed around the container wall, preferably level with top of the flange on the lid disc.

The folder fingers are now withdrawn and the top punch member 32, together with the retaining member 31 and the rubber ring 33, raised clear of the container, the bottom punch member 30 still remaining in position (see Figure 3). The rubber ring retaining member 31 is slidably mounted in the top punch member 32 but is only permitted a limited movement therein.

The ascent of the top punch member 32 straightens out the turned-over portion of the container wall, but such portion is turned over again with the top punch member in its raised position by a further operation of the folding fingers 37, this stage of the operation being shown in Figure 8.

Finally the fingers 37 being withdrawn, the top punch member is caused to descend again, and, engaging with the inturned container wall, folds it completely over the disc flange and again squeezes the parts together by compression of the rubber ring; this stage is illustrated diagrammatically in Figures 9 and 11. A slight upward movement of the top punch member then releases the sealing pressure, whereupon the composite plunger is withdrawn from the container.

The mechanism, by which these movements of the punch mechanism are effected, is contained in the head 3 (Figures 1 and 2) and comprises a cam shaft 41 mounted in bearings 42 and driven through a pinion 43 and wheel 44 from a driving wheel 45, which latter wheel may be turned by hand by means of a handle 46 or by a belt forming around its rim. The cam shaft 41 carries four cams 47, 48, 49 and 50 operating respectively through suitable connecting means, the top punch member 32, the folding fingers 37, 75

the bottom punch member 30 and the feeding quadrant 26.

The cams 47 and 49 engage with rollers 51 carried on similar levers 52 which are each pivotally connected at one end to the head 3 by links 53, springs 54 being provided to urge the rollers into contact with the cams. The other ends of the levers 52 are pivotally connected by pins 55, one by means of a flange 56 to a sliding sleeve 57 and the other to a plunger 58 slidably mounted within the said sleeve. The sleeve 57 passes through a bush 58^a in the head 3 and is connected by a cap nut 59 to another sleeve 60, to which a crosshead 61, arranged to slide up and down the pillars 2, is secured. Upon the end of this sleeve 60 the bottom punch member 30 is mounted. The plunger 58 is resiliently connected for downward movements to another plunger 62 through the medium of a spring 63, a stop collar 64 being provided to ensure a positive connection for upward movements. The said plunger 62 (Figure 1) is connected to the top punch member 32 by a pin 65 which passes transversely through plunger and punch member and through elongated holes in the sleeve 60.

The cam 43 is arranged to depress the lever 52 until the flange 56 carried by the sleeve 57 meets a stop formed by a boss formed in the head 3 to carry the bush 58^a. In order to prevent strain or damage to the mechanism resulting from slight inaccuracies in assembly of the parts, the link 53 is arranged to contract resiliently, being preferably constructed of two parts arranged to slide one within the other, a strong spring being provided to prevent such movement except under severe stress.

Rods 66, secured at their lower ends to the pressure ring 35, extend upwards through holes, in which they are free to slide, formed in the crosshead 61 and are provided with stop nuts 67 and compression springs 68. When the crosshead 61 rises with the sleeve 57 etc. to the top of its stroke it engages the said stop nuts and by means of the rod 66 lifts the pressure ring 35 clear of the base member as previously described. On the descent of the crosshead the springs 68 are free to urge the rods 66 and pressure ring 35 downwards.

In order to withstand the endwise thrust of the cam 43 on the lever 52, tending to rotate the sleeve 57 about its axis, the flange 56 is preferably provided with an extension which slides up and down in a tubular guide secured to the head 3, thus preventing any movement of the lever 52 in an endwise direction and consequent rotation of the sleeve 57.

The cam 48 operates the folding fingers through the medium of a roller 69 carried by a lever 70 pivotally mounted on the head 3 and a rocking shaft 71 rotatably mounted in the said head, which shaft is connected to the lever 70 by a connecting rod 72 and a lever 73 secured to the shaft and is connected to the sleeve 36 by a pair of rods 74 coupled to the other levers 75 also mounted on the said rocking shaft 71. Compression springs 76 encircle the rods 74 and normally maintain the sleeve 36 in its upper position.

The cam 50 operates the feeding quadrant 26 through the medium of a roller 77 carried by a lever 78 pivotally mounted on the head 3, a connecting rod 79 coupling the lever 78 to a bell crank 80 and a further ball-ended connecting rod (not shown) by which the said bell crank 80 is coupled to the feeding quadrant so as to oscil-

late it in a horizontal plane. The movement of the feeding quadrant being limited by a stop, a resilient connection of the kind previously described in relation to the cam 49 and its associated mechanism is preferably embodied in the quadrant operating mechanism. Instead of employing a ball-ended connecting rod to transmit the movements of the bell crank 80 to the feeding quadrant, the bell crank or its equivalent may be formed with bevel teeth engaging other bevel teeth formed on the feeding quadrant.

A suitable spring is provided to keep the roller 77 in engagement with the cam 50.

The cams 47, 48, 49 and 50 are so shaped and disposed relatively to one another as to impart the above-described movements in their correct sequence.

The drive to the cam shaft 41 is transmitted thereto from the spur wheel 44 through a clutch mechanism which comprises a key or dog radially slidable in a bore 81 in the cam shaft 41 and urged outwards by a spring. When in its normal or outer position, the said key engages in a keyway formed in the hub of the spur wheel 44 thereby clutching the latter to the cam shaft 41. A rocking spindle 82, rotatably carried in a bearing 83 secured to the head 3, is provided with two adjacently disposed inclined ramps or plates 84, 85, either of which may engage with an inclined ramp 86 formed on the aforesaid key, thereby forcing it radially inwards against its controlling spring and disengaging the spur wheel 44 from the cam shaft 41. The ramp 85 is, for a purpose presently to be described, somewhat displaced along the spindle 82 relatively to the adjacent ramp 84, the disposition being such that the inclined portion of the ramp 85 commences in a position roughly level with the termination of the ramp 84. The rocking spindle is operatively connected to the index pin 18 through a lever 87 secured to the said spindle, a connecting rod 88 and the cranked end 89 of a further rocking spindle 90 rotatably mounted on the base member 23 and provided with a bell crank lever 91. One arm of the said bell crank lever is operatively coupled to the index pin 18, while the other is connected by a rod 92 to a foot pedal carried on the lower part of the base 1. A spring 93, encircling the rocking spindle 82 and preferably assisted by another spring or springs associated with the aforesaid foot pedal, maintains the mechanism in the position illustrated in the drawings, in which the index pin 18 is in engagement with the index holes 17 and the ramp 84 is set to engage the key ramp 86.

With the mechanism in the position shown, the cam shaft 41 will always be disengaged, after one revolution thereof, from the spur wheel 44 by the interaction of the ramps 84 and 85. On depression of the aforesaid foot pedal by which the index pin 18 is withdrawn so that the table 4 may be manually rotated, the rocking spindle 82 is tilted to the right (in Figure 2) thus moving the ramp 84 out of the way of the ramp 86. The key is now free momentarily to clutch the cam shaft and spur wheel together, but is immediately caused to disengage them again after a small rotation of the cam shaft, by the engagement of the ramp 86 with the second ramp 85 carried by the rocking spindle 82. The cam shaft 41 is thus restrained from rotation until the rocking spindle, by tilting to the left, consequent on the re-entry of the index pin 18 into a hole 17, moves the ramp 85 clear of the key ramp 86. The key, being then free to move radially outwards.

clutches the cam shaft 41 to the spur wheel 44 for a further revolution of the former, until it is again forced inwards to effect disconnection of the cam shaft and spur wheel, by the engagement of the key ramp 86 with the ramp 84 now in its original position.

The object of this arrangement, i. e. the provision of the extra ramp 85, is to ensure that the cam shaft can only be operated to cause descent of the punch members when a table orifice 5 is in correct position beneath them, this condition being indicated by the entry of the index pin 18 into an index hole 17.

Those parts of the mechanism which come into contact with the container rim or the lid flange during the flanging and sealing operations are preferably heated in order to soften the wax with which these members are coated, preferably by the circulation of hot water. For this purpose a heater 94 may be provided, having electrical or other suitable heating means embodied therewith, from which hot water flows by the thermo-siphon principle to a header tank 95 by way of a pipe 96. From thence it passes through a partly flexible pipe 97 to a channel 98 formed within the pressure ring 35 and thence by a pipe 99 to a three-way fitting 100. From the said fitting it is conducted by a pipe 101 to a channel 102 formed within the top punch member 32 or by a pipe 103 to a channel 104 formed within the hub of the table 4. The water returns to the heater from the top punch member by a partly flexible pipe 105 and from the table hub by a passage 106 formed in the pillar 2 and by a pipe 107. The three-way fitting referred to above is so arranged that hot water can be delivered alternatively to the punch or to the table or to the punch and table together. A thermometer 108 is provided to indicate the temperature of the table hub. It should be noted that the bushes 8 surrounding the containers receive their heat by conduction from the channel 104 by conduction through the body of the table. Vent pipes 109 are provided to allow the escape of air from the heating system.

The operation of the machine in the sealing of filled cartons is as follows:—

It will be assumed that the driving wheel 45 is being continuously rotated either by hand or power (though such continuous rotation is not essential) and that the table is located by the index pin 18 in one of its four positions, and, further, that the magazine is filled with suitable lid discs.

Referring to Figure 3, an empty container is inserted into a sheath in the position denoted by 'A'. The foot pedal is then depressed to withdraw the index pin and to allow the table to be turned by hand until the container is in the position denoted by 'B', when the table is locked by releasing the foot pedal and the container is filled by any convenient means. The table is again released by depression of the foot pedal and turned to bring the container into the sealing position denoted by 'C'. Upon its location in this position by the entry of the index pin 18 into a hole 17 after the release of the foot pedal, the clutch mechanism engages the cam shaft with the rotating spur wheel 44 and the flanging and sealing process commences. This process, as previously described, lasts through one revolution of the cam shaft after which, this latter is automatically disengaged and stopped by the interaction of the ramps 84 and 86 and comprises: the placing of the blank in position; flanging and insert-

ing it into the mouth of the container; the application of preliminary sealing pressure and preliminary folding; withdrawal of the top punch member and subsequent descent of the same to effect final folding application of final sealing pressure and withdrawal of the punches.

It may be found desirable to supplement the seal thus effected, which is illustrated in Figure 11, by the introduction and sealing of a second lid x' within that already sealed in position. This is effected by a second depression and release of the foot pedal whereby the cam shaft makes a further revolution to flange and insert a lid x', as shown in Figures 10 and 12, and to seal it finally in position, as shown in Figure 13. The second lid x' may conveniently be formed of plain, unproofed material for which purpose the discs are piled alternately plain and waxed in the magazine. Alternatively the second lid may be formed of waxed material. Lastly, the foot pedal is depressed again and the table turned to bring the filled and sealed container into the position denoted by D, when, having been automatically lifted by the ejector mechanism previously described, it is removed from the machine.

It must be understood that, in normal operation, four containers are being dealt with simultaneously by the machine, three being respectively inserted at A, filled at B and removed at D while the fourth is being sealed at C.

With the form of machine described, it is necessary, after the flanging and sealing of the first lid in position, to wait while the cam shaft makes a complete revolution before the clutch can be re-engaged to effect the flanging and sealing of the second lid. It is proposed to obviate this pause and generally to improve the action of the machine by providing an alternative form of clutch mechanism. This mechanism comprises an auxiliary shaft, slidably and rotatably mounted in bearings secured to the head 3, driven from the cam shaft speed at half the speed thereof by a pinion and spur wheel and carrying a disc having a pair of ramps formed thereon similarly to the ramps 84 and 85 previously described. Suitable levers engaging with collars formed on the said auxiliary shaft enable this to be moved endwise against the action of a spring by the depression of the operating foot pedal. This endwise movement enables the said ramp to pass another stationary ramp, operatively connected with a clutch mechanism, in a manner analogous to the present mechanism. In this case, however, the clutch comprises a coned friction disc slidably keyed to the cam shaft 41 and engaging a conical friction surface in the spur wheel 44, while the operative connection takes the form of a rod extending through an axial bore in the cam shaft and coupled at one end to the said friction disc and at the other to a bell crank carrying the said stationary ramp.

By the use of this arrangement of a half speed shaft in combination with a friction clutch, the machine trips itself out of action after two revolutions of the cam shaft instead of one as at present and is further capable of re-initiating operation immediately the foot pedal is released.

It is to be understood that the invention is not limited to the above described details but is capable of being variously modified to suit any conditions or practical requirements it may be desired to fulfil.

Further, the machine is not limited to the sealing of the ends of containers of the kind above referred to and illustrated but is applicable to

other forms of containers such as may be adapted to contain solids and powders and where the filling operation is to be performed before the seal is applied, as would be the case in a container which is only open at one end, the filling means may be embodied with the sealing machine, if desired.

What is claimed is,

1. An apparatus for sealing the end of a container, comprising a holder for the container, means for forcing a cap disc into the container and simultaneously forming a peripheral flange thereon so as to complete the cap, means subsequently operable for bending the upper part of the container wall over the cap, and means operable for forcing the bent-over portion of the container into sealing engagement with the flange of the cap.

2. An apparatus as claimed in claim 1 comprising means for feeding the cap disc over the open end of the container, and means adapted to bear upon the periphery of the cap as it is forced into the container.

3. An apparatus as claimed in claim 1, wherein the means for forcing the cap disc into the container comprise a movable punch having a resilient radially expansible member engageable with the cap flange.

4. An apparatus as claimed in claim 1 wherein the means for bending over the upper portion of the container wall consists of a plurality of pivotally mounted fingers.

5. An apparatus as claimed in claim 1, wherein the means for inserting the sealing cap into the open end of the container is also operable to insert another flange cap into the container and in sealing engagement with the first cap inserted into the container.

6. An apparatus as claimed in claim 1 wherein

the holder for the container consists of a movable portion, and means are provided for moving such portion after the sealing operation in order to facilitate the removal of the container.

7. An apparatus as claimed in claim 1 wherein the holder for the container is formed from flexible material.

8. An apparatus for sealing the end of a container comprising a holder for the container, a plunger for forcing a cap disc into the end of the container and forming a flange around the periphery of the disc and means for bending over the upper end of the container upon a surface of the plunger, said plunger including means for bending the bent-over portion of the container wall into sealing engagement with the flange of the cap disc and the plunger being operable first to press together the flange of the cap and the upper portion of the wall of the container and then to press together the flange and container wall portion.

9. An apparatus for sealing the end of a container, comprising a holder for the container, a plunger for forcing a cap disc into the end of the container and forming a flange around the periphery of the disc, the said plunger comprising an outer portion adapted to bear upon the disc part of the cap and an inner portion which is movable relatively to the lower portion, means for bending the end portion of the container onto a surface of the inner plunger portion and means for moving the inner plunger portion away from the outer plunger portion, so that the latter may remain within the flanged cap, and then returning the inner plunger portion in order to fold the previously bent container end portion against the flange of the closure cap.

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