

Nov. 6, 1962

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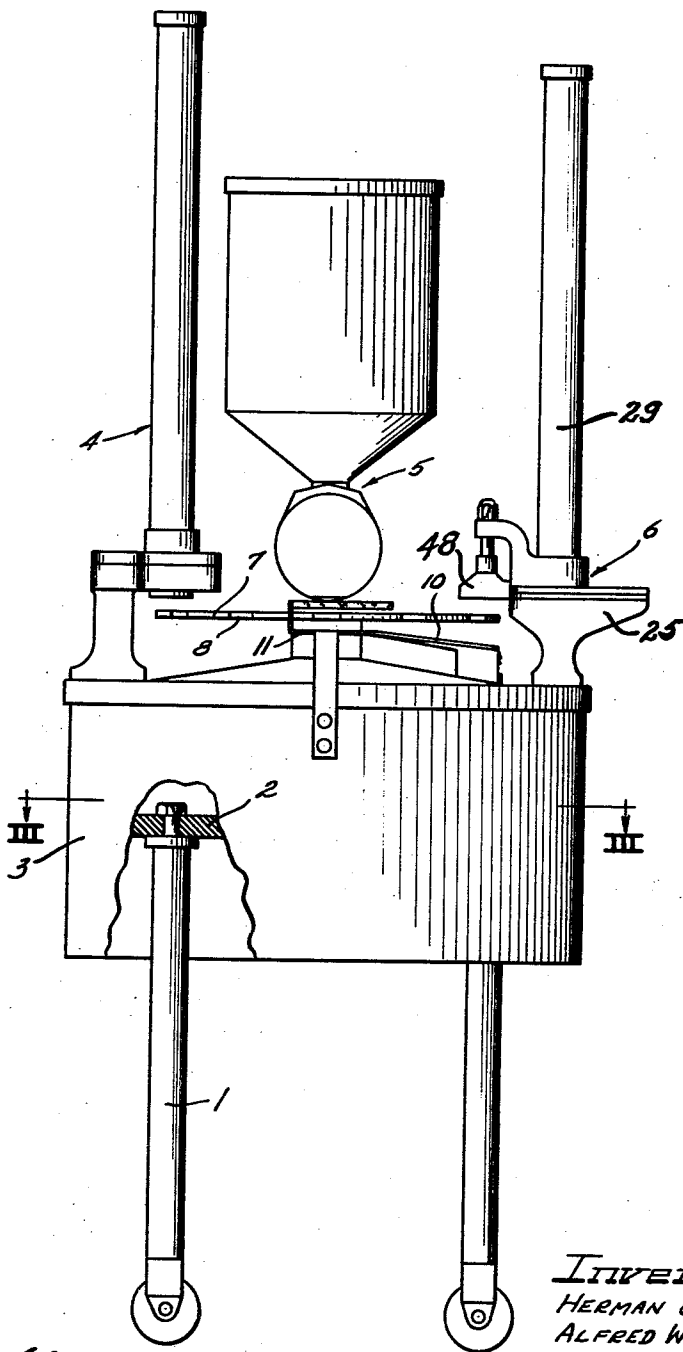
3,061,987

CONTAINER CAPPING MECHANISM

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5 Sheets-Sheet 1

Fig. 1



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Fig. 2

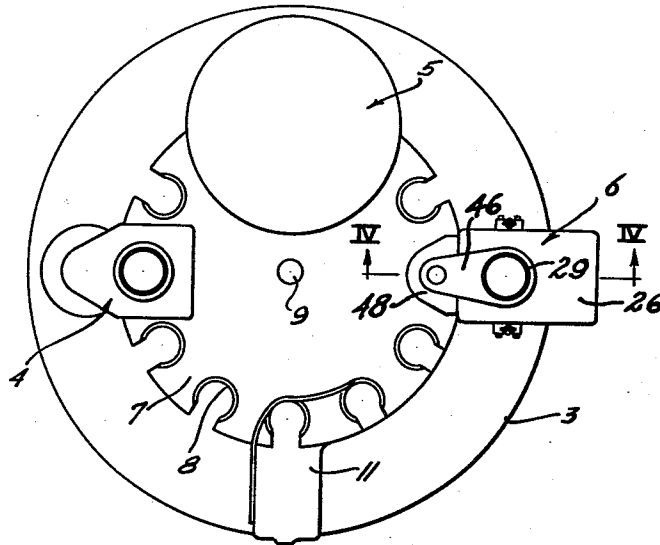
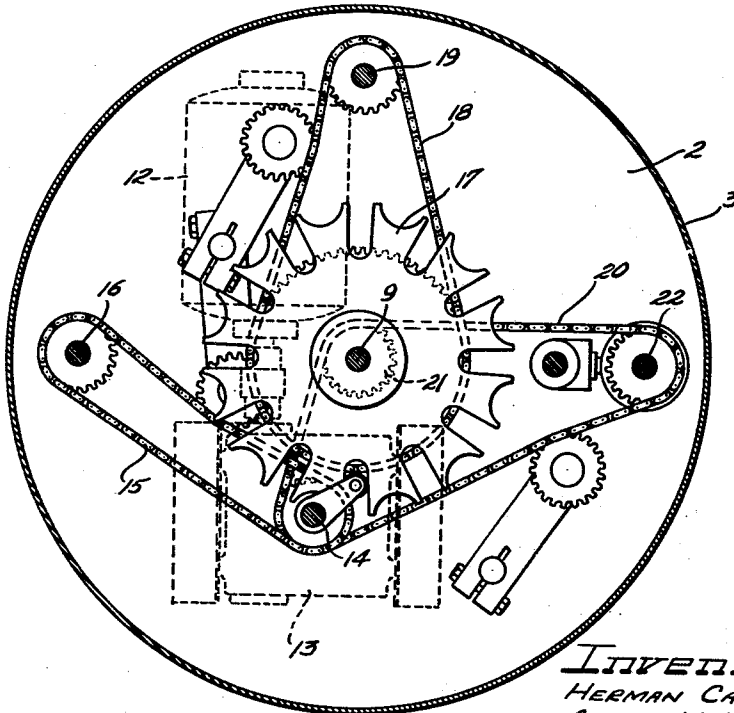


Fig. 3



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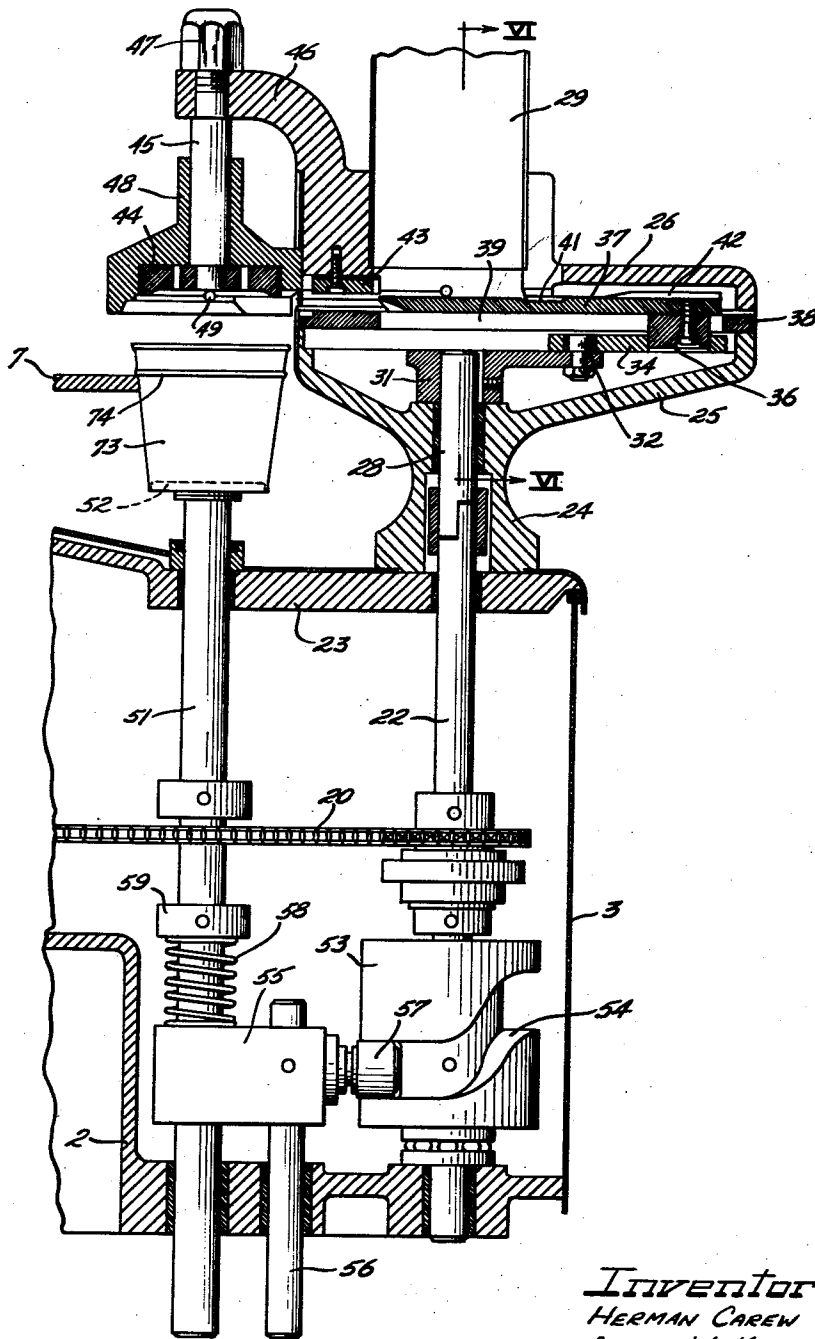
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Fig. 4



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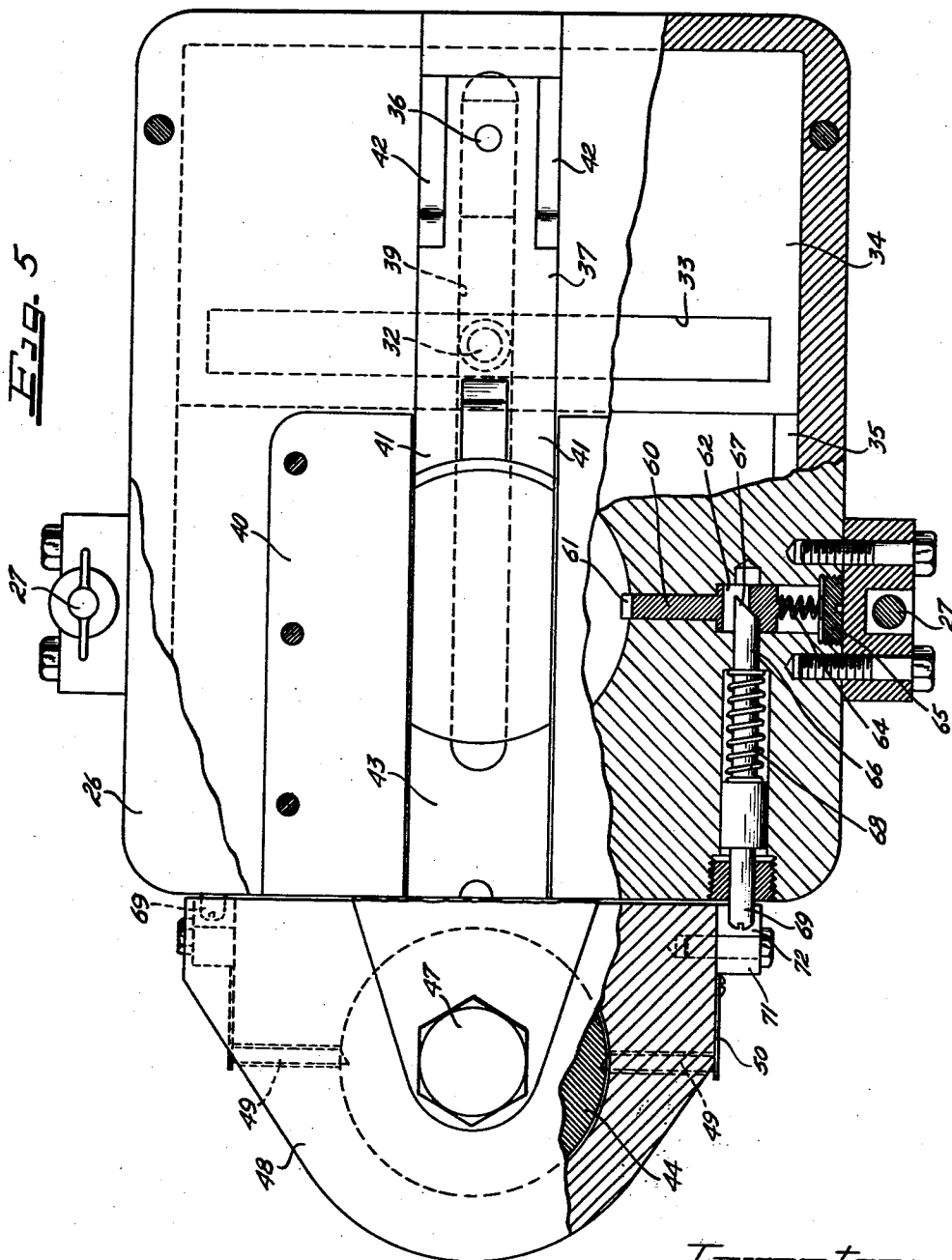
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CONTAINER CAPPING MECHANISM

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Fig. 6

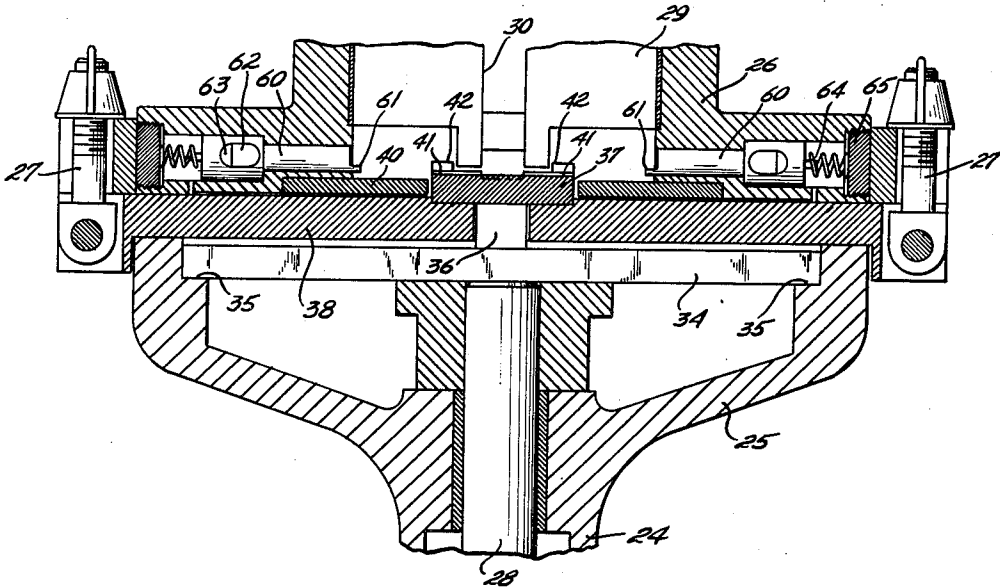


Fig. 7

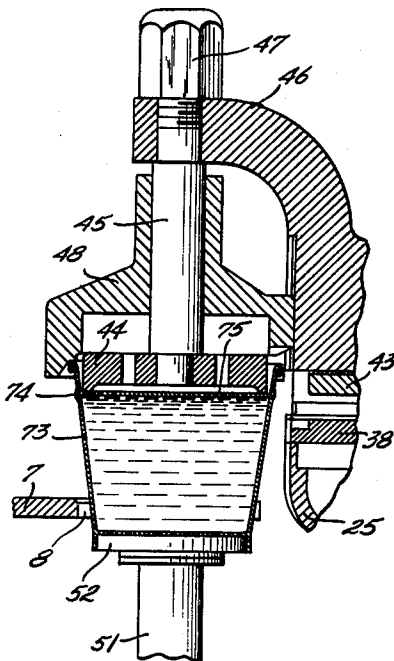
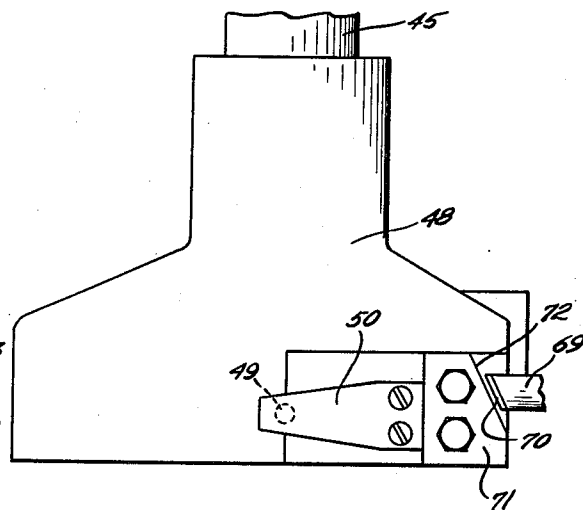


Fig. 8



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CONTAINER CAPPING MECHANISM

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Original application Feb. 21, 1956, Ser. No. 567,017, now Patent No. 2,969,632, dated Jan. 31, 1961. Divided and this application May 25, 1960, Ser. No. 31,733
6 Claims. (Cl. 53—67)

This invention relates to improvements in a container capping mechanism, and more particularly to an automatic mechanism that may be operated continuously if desired and which operates to place a cap or cover in or on a container previously filled with a commodity, such containers being successively delivered to capping position by any suitable means. The invention is highly desirable for use in conjunction with mechanism for dispensing and filling temporary containers, such as paper or plastic containers, of the single usage type, such containers being utilized for the packaging of various commodities such as ice cream, cottage cheese, liquids of various types, which are purchased at a store for home usage, and also utilized for service to a consumer at a table or the like in the nature of ramekins containing cream, tartar sauce, cocktail sauce, etc., although the instant invention may be utilized in many locations for capping purposes as will be apparent to one skilled in the art.

The instant application is a division of our copending application entitled "Automatic Container Dispensing, Filling and Capping Machine," filed February 21, 1956, Serial No. 567,017, now Patent No. 2,969,632.

In the past, many and various types of capping mechanisms have been developed, both for temporary as well as permanent containers. In many cases, these formerly known capping mechanisms were operated manually, the operator manipulating a hand lever or the like whenever a cap was to be applied. Such machines were obviously too slow and uneconomical for present day needs. In other instances, capping mechanisms heretofore developed were semiautomatic, in that the operator would press a button or energize a treadle when the actual capping operation was to be accomplished, but again such machines were too slow and uneconomical for rapid commercial work. In several instances formerly known capping mechanisms were operated automatically but intermittently, and in many cases capping machines heretofore known were not capable of operating continuously and satisfactorily. Both intermittent and continuously operating capping machines were prone to jam as a result of dispensing a cap at each predetermined time interval regardless of whether a container was present to receive the cap. Should no container be present, another cap would be ejected or fed on top of the first cap and jamming would result with consequent destruction of caps and possibly filled containers as well, causing the aggravation of shutting down the machinery until the jam could be cleared. Capping machines or mechanisms operated heretofore were in many cases further objectionable in that the capping operation itself was not sufficiently accurate, the machines were cumbersome and slow in operation, and not subject to economical maintenance, as well as not being subject to ready and simple dismantling for effective cleansing as is required when food products are involved.

With the foregoing in mind, it is an important object of the instant invention to provide a capping machine capable of being operated continuously, if desired, and which is so constructed that a second cap cannot be

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dispensed until the previously dispensed cap has been taken away or applied to a container.

Another object of the instant invention is the provision of automatic container capping mechanism so arranged that if no container is in position to receive a cap, no cap will be supplied by the mechanism.

Also an object of this invention is the provision of automatic container capping mechanism so constructed that the dispensing or delivery of a second cap is dependent upon contact and movement of a part of the mechanism by the container receiving the previously dispensed cap.

It is also a desideratum of this invention to provide an automatic container capping mechanism in which caps are successively dispensed from the bottom of a stack of caps, and wherein upon the dispensing of the lowermost cap, the stack thereabove is automatically maintained in elevated position so the dispensing of a second cap cannot occur, until the previously dispensed cap is placed in or upon a container.

Still a further feature of the invention resides in the provision of automatic container capping mechanism in which caps are successively dispensed from the bottom of a stack of caps, and wherein upon the dispensing of the lowermost cap, the stack is automatically elevated and so held by retaining mechanism releasable only upon movement of a part of the mechanism by a container receiving the previously dispensed cap.

It is also an object of this invention to provide automatic container capping mechanism wherein caps are successively dispensed from a stack of caps, and upon the delivery of a cap to capping position, the remainder of the stack is held out of dispensing position and the dispensed cap is held in position for engagement with the container, the construction being such that the container receiving the dispensed cap automatically moves a part of the mechanism, releasing the dispensed cap holding means and causing the stack to return to dispensing position.

Still a further feature of the invention is the provision of automatic container capping mechanism, wherein at least the parts that may possibly come in contact with the food commodity may be readily removed and thoroughly cleansed, the mechanism being economical to produce, operate and maintain, and which mechanism occupies a minimum of floor space.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a side elevational view of a machine including a capping mechanism embodying principles of the instant invention, this figure disclosing one example of use for the instant invention, parts being broken away to illustrate parts therebeneath in section;

FIGURE 2 is a top plan view of the structure of FIGURE 1;

FIGURE 3 is an enlarged plan sectional view taken substantially as indicated by the line III—III of FIGURE 1, looking in the direction of the arrows, and illustrating the drive mechanism;

FIGURE 4 is a fragmentary vertical sectional view, with parts shown in elevation, and enlarged, taken substantially as indicated by the line IV—IV of FIGURE 2;

FIGURE 5 is an enlarged plan view of the capping mechanism of FIGURE 4, with parts removed including the cap magazine, and parts broken away to illustrate other parts in section therebeneath;

FIGURE 6 is an enlarged fragmentary transverse vertical sectional view, with parts in elevation, taken substantially as indicated by the line VI—VI of FIGURE 4;

FIGURE 7 is a fragmentary enlargement of the upper left-hand portion of FIGURE 4, but showing the container receiving a cap; and

FIGURE 8 is a fragmentary enlarged side elevational view of the central portion of the structure of FIGURE 7, illustrating the capping bell with cam controlling means thereon.

As shown on the drawings:

By way of example only, the instant capping mechanism is shown incorporated in a machine capable of dispensing empty containers, filling the containers, and capping the containers, all substantially continuously. It will be understood, however, that the instant invention may be utilized with substantially any kind of container conveying or carrying mechanisms, or the filled containers may be placed in capping position by hand, if so desired. It will also be understood that the capping mechanism is effective for capping containers of substantially any size, it being only necessary to manufacture certain parts of the capping mechanism of a proper size to accommodate containers or a series of containers of preselected size.

The machine with which the instant invention is shown associated includes a plurality of legs or supports 1 secured at their upper ends to a base platform or frame plate 2 within a decorative casing or housing 3. On top of the housing 3 there is mounted container dispensing mechanism generally indicated by numeral 4, container filling mechanism generally indicated by numeral 5, and container capping mechanism generally indicated by numeral 6, these various mechanisms being spaced approximately 90° apart as seen best in FIGURE 2. Container conveying means, in this instance in the form of an intermittently rotated turntable 7 having container receiving notches 8 in the circumference thereof and mounted on the upper end of a shaft 9, successively moves containers from the dispensing mechanism 4 to the filling mechanism 5, and thence to the capping mechanism 6. After being capped, the containers ride up an incline 10 to free them from the respective notches 8, and are discharged along a chute 11 for further packaging or handling.

With reference now to FIGURE 3, it will be seen that all of the mechanisms are driven from a motor 12 and gear box 13 disposed beneath the frame plate 2 by way of a shaft 14 connected to the gear box. Through a suitable chain and sprocket arrangement 15, a shaft 16 is continuously driven, this shaft operating the dispensing mechanism 4. Keyed to the aforesaid shaft 9 is a Geneva wheel 17 through which the shaft 9 is intermittently rotated from the shaft 14, and a chain and sprocket arrangement 18 intermittently rotates a shaft 19 which actuates the container filling mechanism 5. Still another chain and sprocket wheel arrangement 20 including a sprocket 21 floating on the shaft 9 and rotating relatively thereto effects a continuous rotation of a shaft 22 which actuates the capping mechanism embodied in the instant invention.

The machine in general including the mechanisms 4, 5 and 6, and the filling mechanism in particular as well as the method of filling containers are all more fully described and claimed in our aforesaid copending application, while the capping mechanism per se forms the subject matter of the instant application, and it should be understood that the use of this capping mechanism is by no means confined to a machine of the character shown in FIGURES 1, 2 and 3.

The capping mechanism itself is best seen in FIGURES 4 to 8 inclusive of the drawings. As stated above, the capping mechanism is driven by way of the shaft 22 which extends through an upper frame plate 23 into the hollow base 24 of a housing 25 closed by a cover 26 secured thereto by swing bolts 27 or in any other suitable manner. This housing supports the major part of the capping mechanism. The drive shaft 22 is keyed at its upper end to a stub shaft 28 in alignment therewith, which stub shaft actually moves some of the parts of the capping mechanism.

An open bottomed magazine 29 for a stack of caps communicates with an opening in the housing cover 26,

and this magazine 29 is preferably provided with a slot 30 (FIGURE 6) so that the supply of caps is visible to the operator.

Keyed to the upper end of the stub shaft 28 is an eccentric 31 on the outer end of which is an upstanding shoe or roller 32 entered into a slot 33 in a slide plate 34, as best seen in FIGURES 4 and 5. The slide plate is movable backward and forward by the action of the eccentric on a track formed by a shoulder formation 35 in the housing 25. A shuttle key 36 connects the slide plate 34 to a lid ejector or shuttle 37 which reciprocates on a shuttle guide plate 38 between the housing 25 and its cover 26, the guide plate 38 being slotted as indicated at 39 to accommodate the shuttle key 36. The shuttle 37, as seen in FIGURES 5 and 6, is considerably narrower than the slide plate 34 and moves backward and forward between a pair of oppositely disposed lid plates 40, and beneath the magazine 29.

As seen best in FIGURE 4, the shuttle 37 when in its farthest position of withdrawal, nevertheless extends under the magazine 29, and the shuttle is provided adjacent the circumference of the magazine with a pair of spaced elevations 41—41 which engage the lowermost lid of the stack to move it during the ejecting operation. Rearwardly of the ejecting shoulders or elevations 41—41, the shuttle is provided with a pair of integral elevated track-like formations 42—43 substantially in alignment with the ejecting shoulders and having sloping forward ends as best seen in FIGURES 4 and 5. During an ejecting operation, these elevations move under the stack of lids in the magazine 29 and support the entire stack at the time the lowermost lid or cap is ejected. As seen in FIGURES 4 and 5, as the shell moves to the left to eject the lowermost cap in a leftward direction, a suitable stripper block 43 effectively prevents movement of any but the lowermost cap.

When a cap is ejected as above described, it passes beneath a capper head 44 fixed to the lower end of a stationary supporting rod 45 having a threaded portion extending through a bracket arm 46 integral with the housing cover 26. The rod 45 is retained in position by a nut 47 above the arm 46, whereby the capper head is readily and easily removable for cleansing purposes. A member 48, which in the illustrated instance has generally the shape of a bell, is slidable on the rod 45 and movable relatively to the capper head. This bell member 48 is of sufficient weight to fall by gravity to its lowermost position resting on the capper head, as seen in FIGURE 4.

As seen best in FIGURES 5 and 8, the bell 48 carries a pair of oppositely disposed lid retaining pins 49—49. Each pin 49 is urged inwardly by a leaf spring 50 carried on the side of the bell, and as seen best in FIGURE 5 the inner ends of the pins 49 are preferably beveled or skived to provide a sharp engaging edge. When a cap is delivered by the shuttle 37 to the underface of the capping head 44, the cap is retained in position by the pins 49—49 frictionally engaging the edge of the cap. This engagement is released at the time the cap is placed in or on a container by an upward movement of the bell carrying the pins 49 therewith.

When a filled container reaches the capping station or arrives in a proper location to be capped, the filled container is elevated to the capping head by means of a ram 51 having a container engaging head 52 on the upper end thereof. With reference to FIGURE 4 it will be seen that the ram is reciprocated by means of a cam 53 keyed to the lower end of the drive shaft 22 and provided with a cam groove 54 therein. The lower portion of the ram carries a block 55 having a guide rod 56 keyed thereto and depending therefrom, both the ram and the guide block extending through the aforesaid frame plate 2 so as to prevent rotation of the ram. This block 55 carries

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a cam rider in the form of a roller 57 extending into the cam groove 54. As the drive shaft 22 rotates, the cam groove forces the ram 51 upwardly and downwardly completing a reciprocatory cycle for each revolution of the shaft. Any shock that might occur is absorbed by a coil spring 58 disposed between the block 55 and a collar 59 keyed to the ram.

At this point, it should be explained that the cam 53 is shown 180° out of phase, or opposite to its correct position in FIGURE 4, for purposes of clarity. It will be noted that in this figure the ejecting shuttle 37 is shown in its fully retracted position, and at that time the ram 51 should be in its elevated position (FIGURE 7), and the cam actually would be rotated 180° from the position shown in FIGURE 4. However, the cam has purposely been illustrated out of its normal position and with the ram in its lower position so as to eliminate possible confusion and better portray the parts of the mechanism in this figure of the drawings.

In the instant construction, means are provided to prevent the ejection of a second cap before the previously ejected cap has been applied to a filled container. In other words, regardless of the operation of the ejector mechanism, as long as a cap remains over the capper head 44, a second cap cannot be ejected. Consequently, there is no jamming of the mechanism.

To this end, a pair of opposed stack supporting pins 60—60 (FIGURES 5 and 6) are provided in opposite sides of the housing cover 26. Each pin is provided with a stack supporting shoulder formation 61 on the inner end thereof. Each pin is also provided with a transverse opening 62 therethrough having a sloping wall 63 at the outer side thereof. A coil spring 64 disposed between the outer end of a pin and threaded cap member 65 secured in the housing cover 26 urges each pin inwardly so that the shoulder formation 61 thereon projects beneath the cap stack in position to support the same in elevated position. In the event these pins remain in the position seen in FIGURES 5 and 6, the stack of caps will be held in elevated position and it will be impossible for the ejector to expel another cap. The shoulders 61 on the pins automatically enter beneath the stack of caps as each cap is ejected, because the stack is elevated by the track-like formations 42—42 on the ejector shuttle 37.

It is necessary, therefore, to retract the pins 60—60 each time a filled container receives a cap, and this is accomplished by way of a pair of retraction pins, there being one retraction pin assembly for each of the pins 60. The retraction pin assemblies are mounted on opposite sides of the cover part 26 of the housing as seen in FIGURES 5 and 6. Each retraction pin assembly embodies a pin 66 normally extending partially into the opening 62 in the respective stack supporting pins 60, the inner end of the pin 66 being skived as indicated at 67 in FIGURE 5 to rest against the sloping wall 63 of the pin 60. The retraction pin 66 is normally urged outwardly by a coil spring 68 disposed therearound into what may be termed disengaged position, or that position seen in FIGURE 5. One end 69 of each pin projects through the housing cover 26 and is also cut off obliquely as indicated at 70 in FIGURE 8, and this end of the pin extends over a fixed cam 71 secured to the bell 48, which cam has a sloping actuating face 72 under the oblique end 70 of the pin.

At the time a filled container is capped, having been raised upwardly against the bell by the ram 51, the container elevates the bell, and the cam 71 forces the respective pin 66 inwardly against the action of the spring 68 so that the inner end 67 of the pin forces the stack supporting pin 60 outwardly to permit the stack of lids or caps to drop down upon the forward portion of the ejecting shuttle. But, if there is no cup to receive the lid on the capping head 44 and at the same time elevate the bell, the pins 60—60 will not be retracted but will remain in stack supporting position, and another move-

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ment of the ejector shuttle will not contact a cap, but pass freely under the stack.

In operation, the instant capping mechanism is extremely simple, quick acting, and positive. By way of example, we have illustrated a cup or container associated with the capping mechanism which may be in the form commonly known as a flat bottom paper cup. The cup, designated 73, in this instance has an annular bead formation adjacent the mouth thereof forming an internal cap receiving groove, and the bottom of the cup is recessed somewhat, the ram head 52 being sized to enter that recess.

As the drive shaft 22 rotates, the shuttle 37 is moved forwardly to eject the cap and lodge that cap between the holding pins 49—49 over the capping head 44. As the shuttle retracts to the position seen in FIGURE 4, the cam 53 causes the ram 51 to elevate the container 73 until its rim contacts the bell 48 and elevates that bell to the position seen in FIGURE 7 so that a cap 75 will enter into the container. The upward movement of the bell, of course, takes the holding pins 49—49 away from the cap so that it is released, and at the same time this upward movement retracts the stack holding pin 60—60 so that the cap stack will again drop down upon the ejector shuttle. As the bell is elevated, the capping head 44 forces the cap into the container so that it seats in the aforesaid groove at 74.

Immediately upon the completion of this operation, the ejector shuttle again moves outwardly and forces another cap into position on the head 44, at the same time elevating the stack of caps by means of the track-like members 42—42 and the stack supporting pins 60—60 again move into position under the stack. If the ejected lid is taken by a container, the operation is repeated. If there is no container present to receive the ejected lid, the bell 48 will not be raised, and the stack supporting pins will not be retracted, and upon the next outward movement of the ejector shuttle no lid will be ejected. Consequently, while operation of the ejecting mechanism may be continuous, a second lid can never be ejected until the first lid has been taken away. There can therefore be no jamming of lids in the capper bell or under the stripper block or elsewhere along the course of travel, and the mechanism operates efficiently and accurately as long as there is an adequate supply of lids available.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

We claim as our invention:

1. In a container capping mechanism, a housing, a magazine for a stack of caps on said housing, an ejector slide in said housing beneath said stack, means to reciprocate said slide to eject caps one at a time, a capper head to receive an ejected cap, resiliently urged means to enter below the stack of caps and hold the same elevated above ejection position upon each cap ejection, and means controlled by the movement of a container into position to receive a cap from said head to release said resiliently urged means and permit the stack to drop into position for another cap ejection.

2. In a container capping mechanism, a housing, a magazine for a stack of caps on said housing, an ejector slide in said housing beneath said stack, means to reciprocate said slide to eject caps one at a time, a capper head to receive an ejected cap, resiliently urged means to enter below the stack of caps and hold the same elevated above ejection position upon each cap ejection, means to successively move containers to be capped under said capper head, and movable means associated with said capper head and contacted by a container receiving a cap to release said resiliently urged means to permit the stack of caps to drop into position for the ejection of another cap.

3. In a container capping mechanism, a housing having an opening therein, a magazine for a stack of caps over said opening, a reciprocable ejector beneath said stack, drive means for said ejector, stack elevating means

on said ejector, resiliently biased stack supporting means automatically operable upon elevation of the stack, a head to receive an ejected cap, movable means adjacent said head to retract said stack supporting means, and means to move a container toward said head into contact with said movable means to actuate the same contemporaneously with receiving the ejected cap.

4. In a container capping mechanism, a housing having an opening therein, a magazine for a stack of caps over said opening, a reciprocatory ejector movable beneath said magazine to eject caps one at a time, a fixed capper head adjacent said housing, a bell overhanging said head and movable relatively thereto, means carried by said bell to hold a cap on said head, a drive shaft to actuate said ejector, a cam on said shaft, a reciprocable ram actuated by said cam, and a container engaging head on said ram to move a container toward said capper head and move said bell to release the cap on said capper head.

5. In a container capping mechanism, a housing having an opening therein, a magazine for a stack of caps over said opening, a reciprocatory ejector movable beneath said magazine to eject caps one at a time, a fixed capper head adjacent said housing, a bell overhanging said head and movable relatively thereto, means carried by said bell to hold a cap on said head, automatic means

to prevent a second cap being dispensed by said ejector, means carried by said bell to release said automatic means, a drive shaft to actuate said ejector, a cam on said shaft, a reciprocable cam actuated by said cam, and a container engaging head on said ram to move a container toward said capper head and move said bell to release the cap on said capper head and release said automatic means.

6. In a container capping mechanism, supporting means, a magazine for a stack of caps on said means, a reciprocable ejector beneath said stack, stack elevating means on said ejector, separate stack supporting means including opposed members movable beneath the lowermost cap of the stack when the stack is elevated, a head to receive an ejected cap, movable means adjacent said head to retract said stack supporting members, and means to move a container toward said head into contact with said movable means to actuate the same contemporaneously with receiving a cap from said head.

References Cited in the file of this patent

UNITED STATES PATENTS

2,026,856	Youngdahl	Jan. 7, 1936
2,260,349	Stewart et al.	Oct. 28, 1941
2,264,738	Blann	Dec. 2, 1941