Nov. 28, 1967 D. L. ST. CLAIR ETAL 3,354,614

DISPENSING, FILLING AND CAPPING OF PORTION CONTAINERS

Filed Oct. 8, 1964 7 Sheets-Sheet 1

Fig. 1.

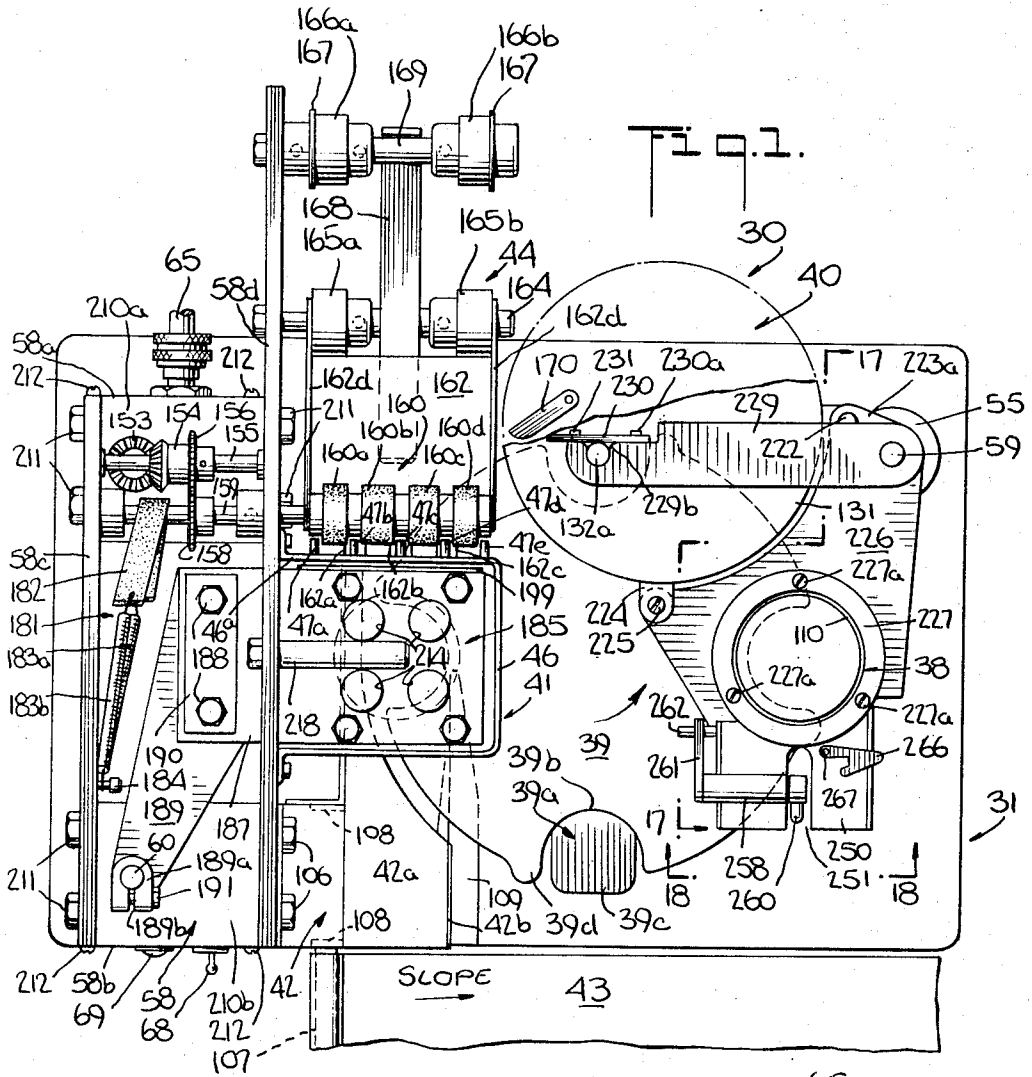


Fig. 6.

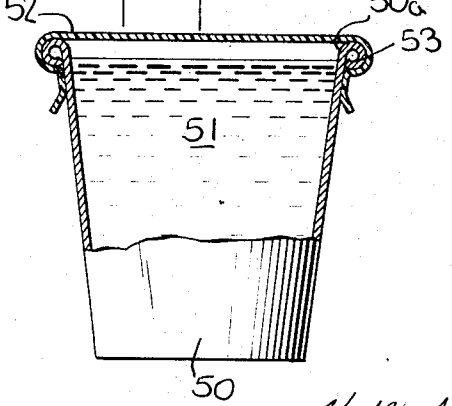
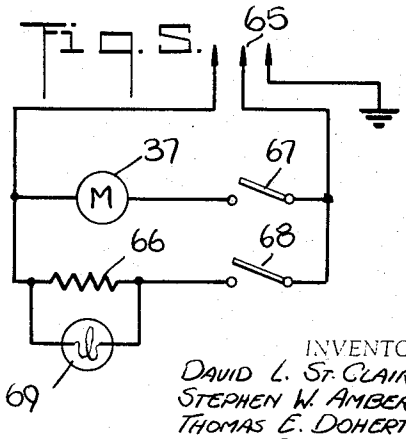


Fig. 5.



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DISPENSING, FILLING AND CAPPING OF PORTION CONTAINERS

Filed Oct. 8, 1964 7 Sheets-Sheet 2

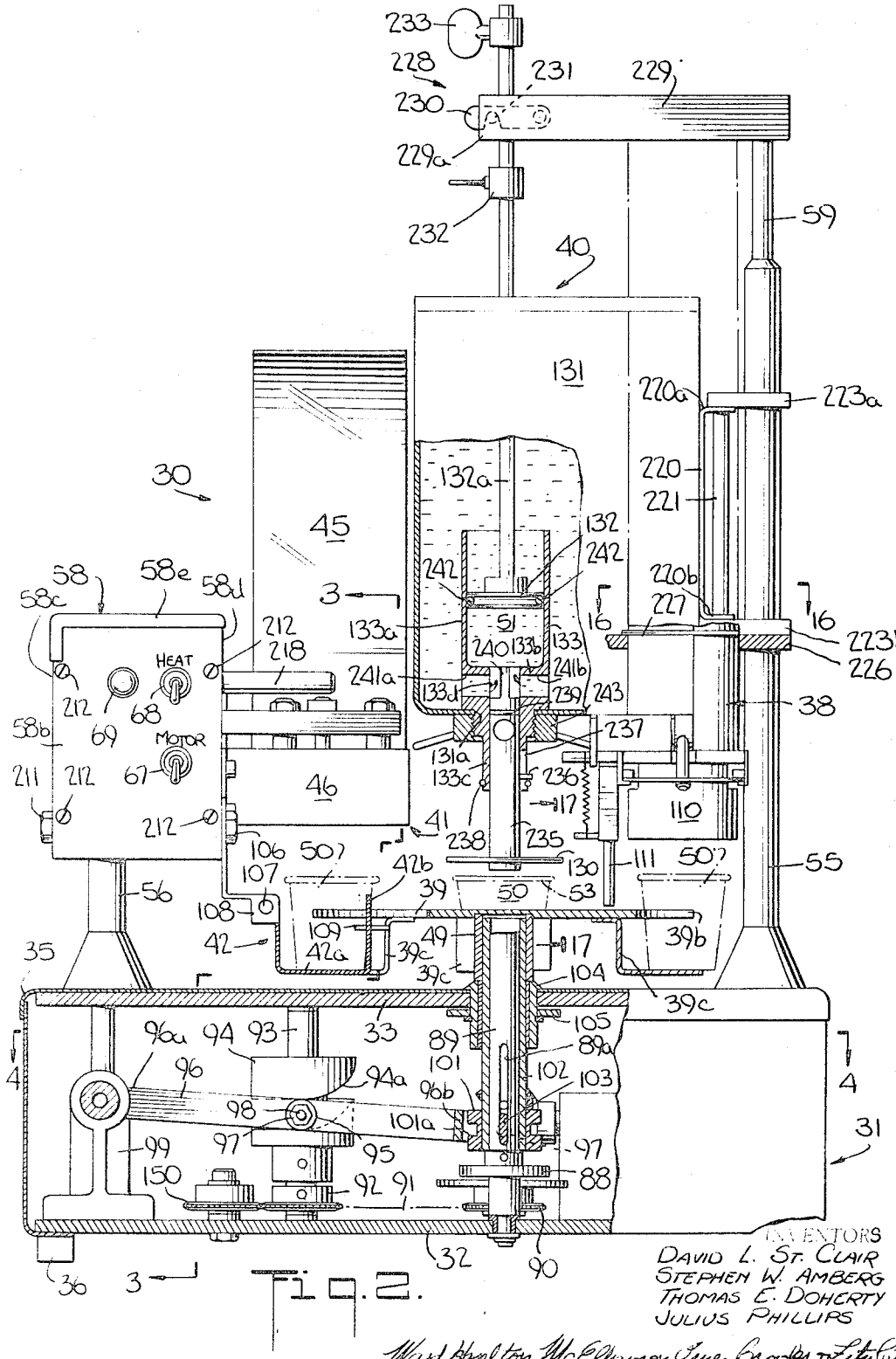


Fig. 2.

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DISPENSING, FILLING AND CAPPING OF PORTION CONTAINERS

Filed Oct. 8, 1964 7 Sheets-Sheet 3

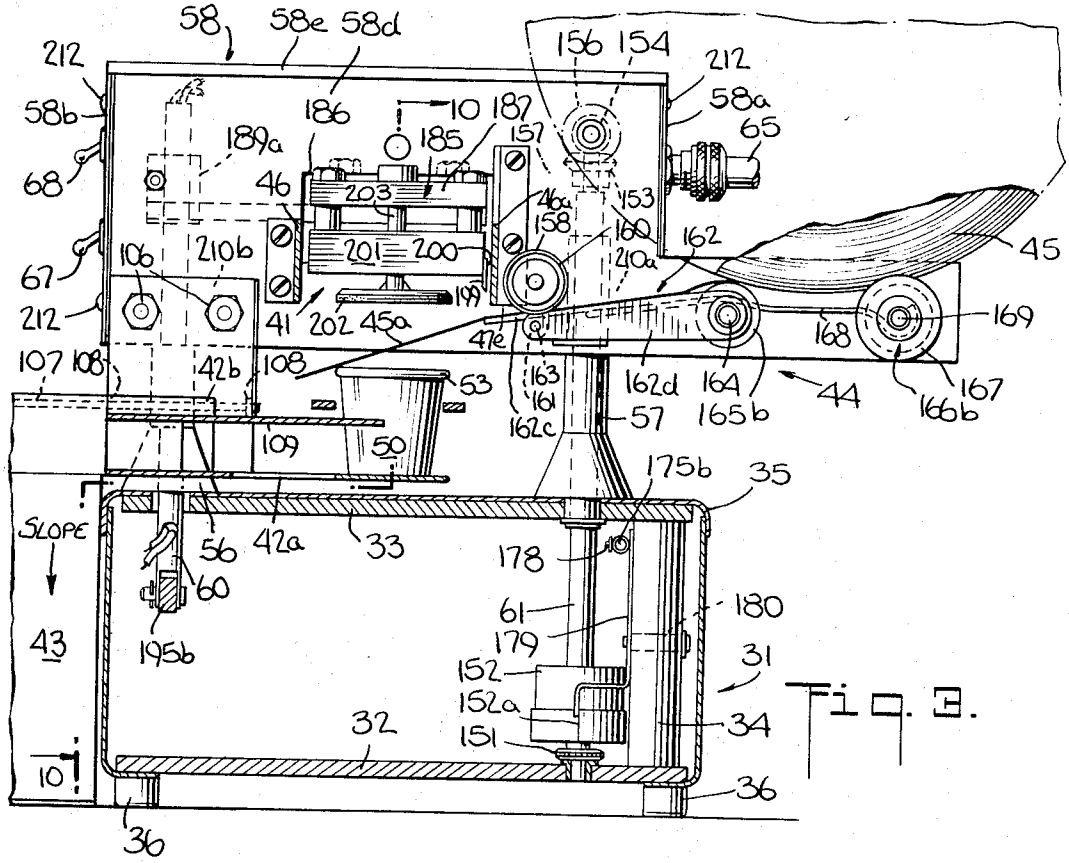


Fig. 3.

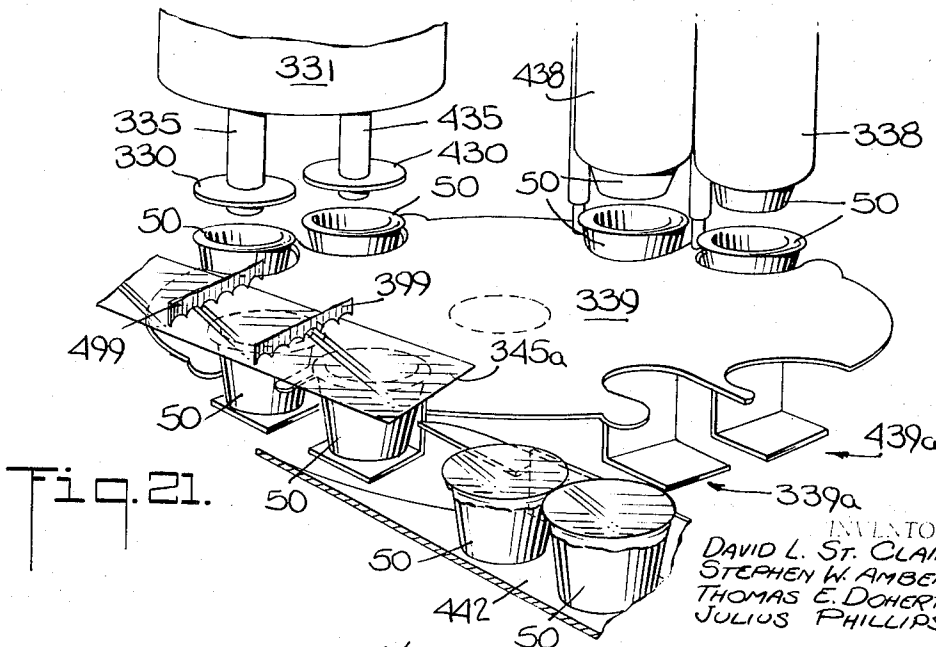


Fig. 21.

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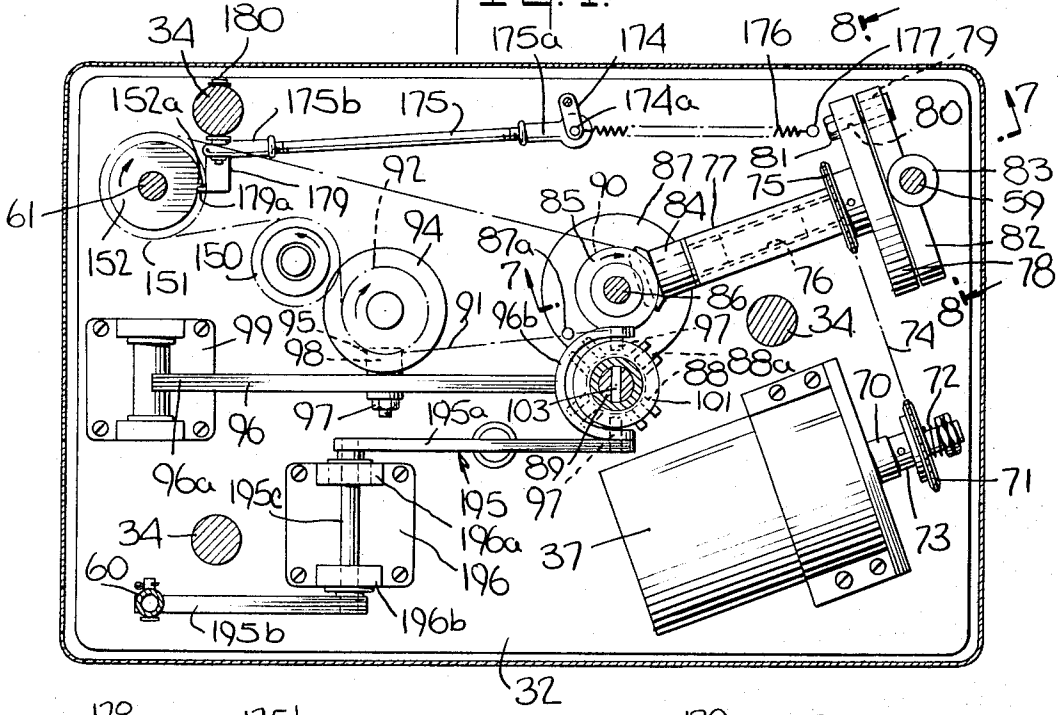
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DISPENSING, FILLING AND CAPPING OF PORTION CONTAINERS

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Fig. 4.



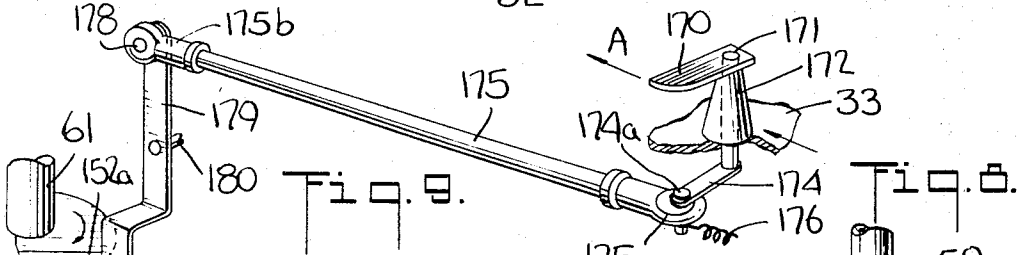


Fig. 9.

Fig. 8.

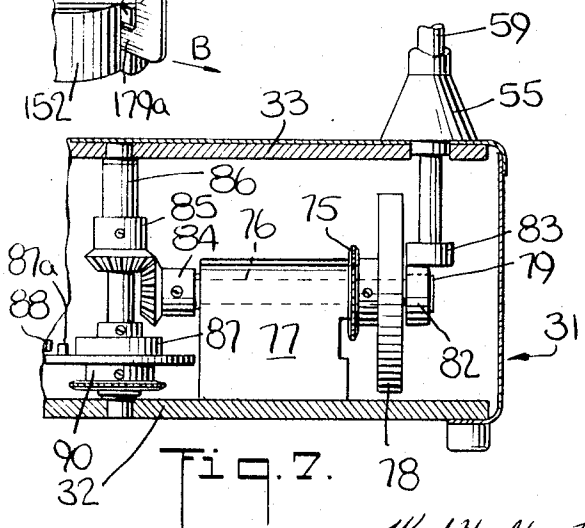
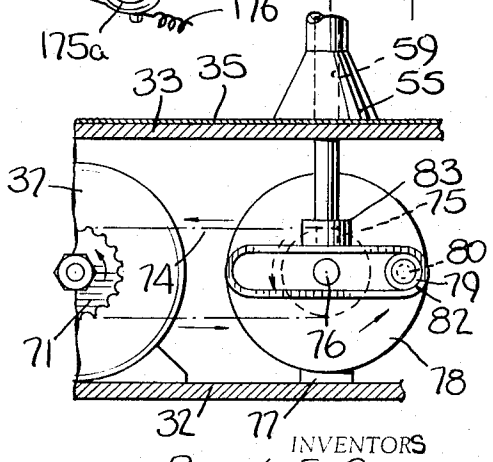


Fig. 7.



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DISPENSING, FILLING AND CAPPING OF PORTION CONTAINERS

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Fig. 11.

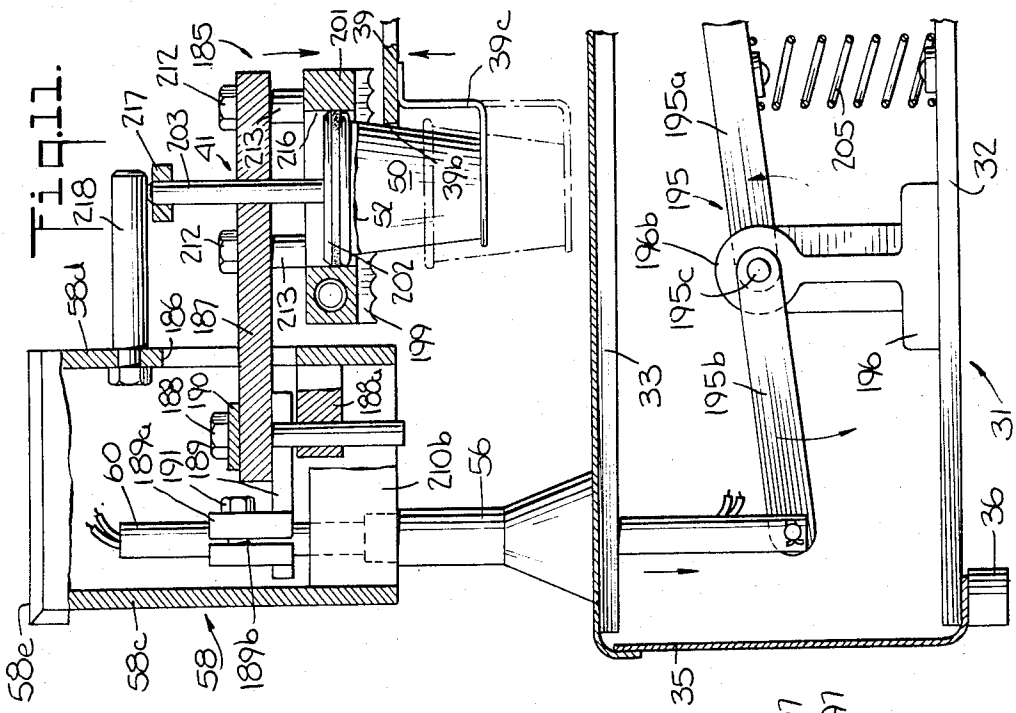
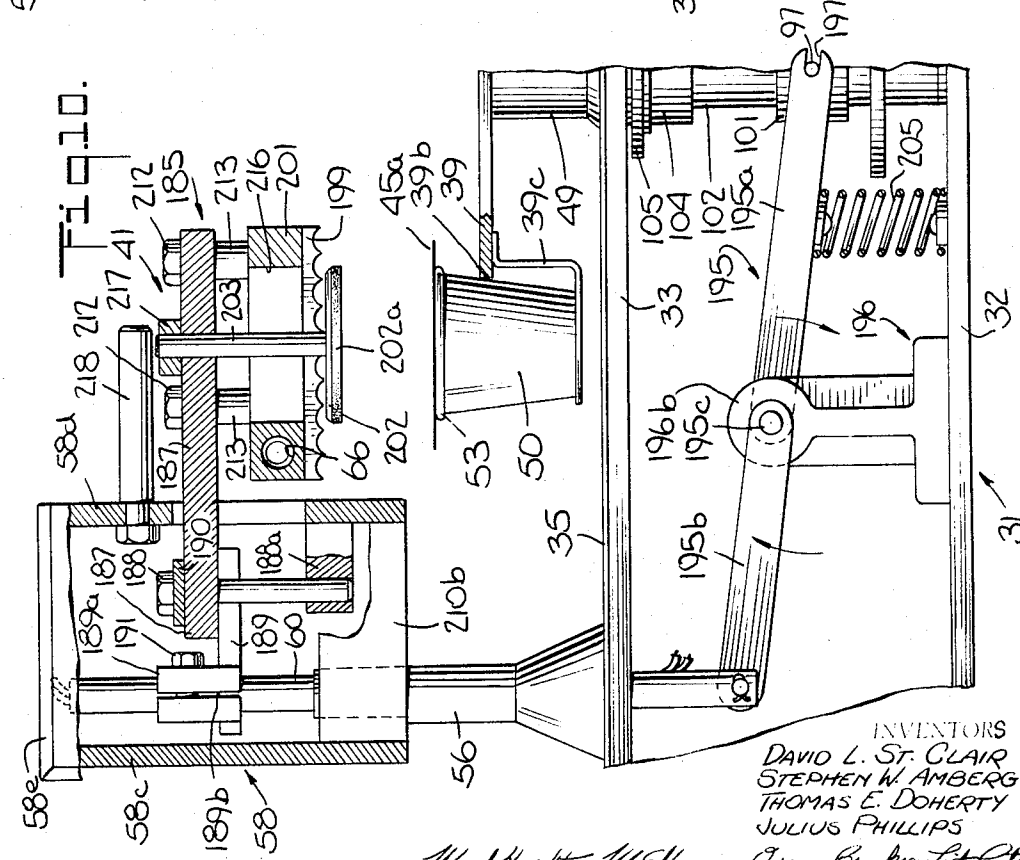


Fig. 10.



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DISPENSING, FILLING AND CAPPING OF PORTION CONTAINERS

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Fig. 15.

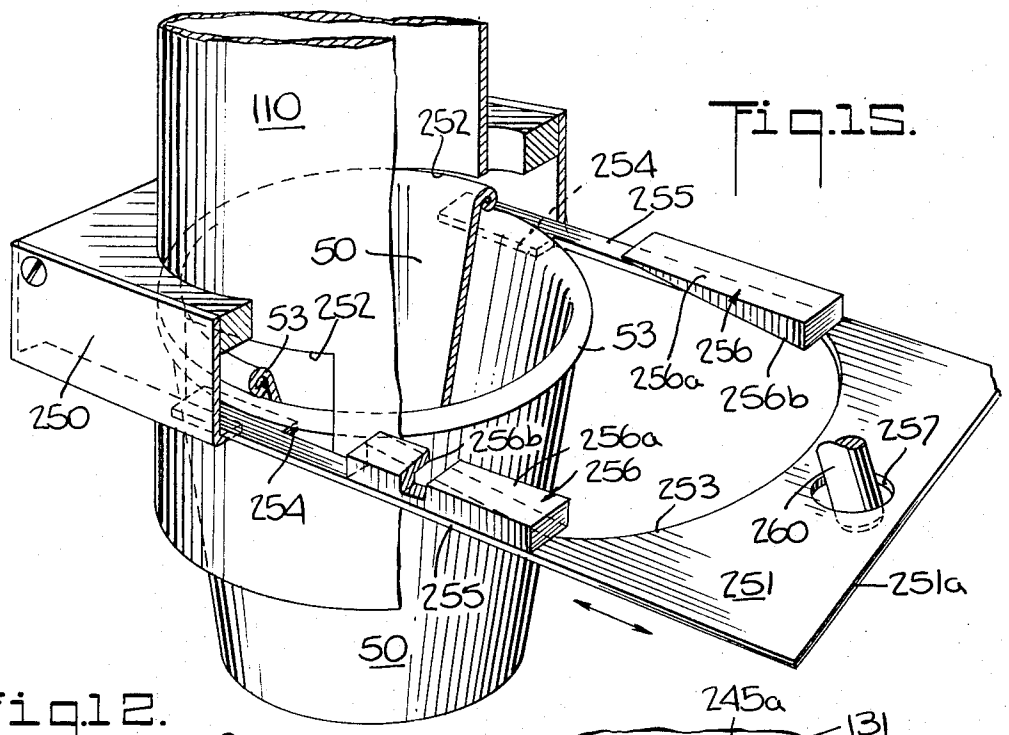
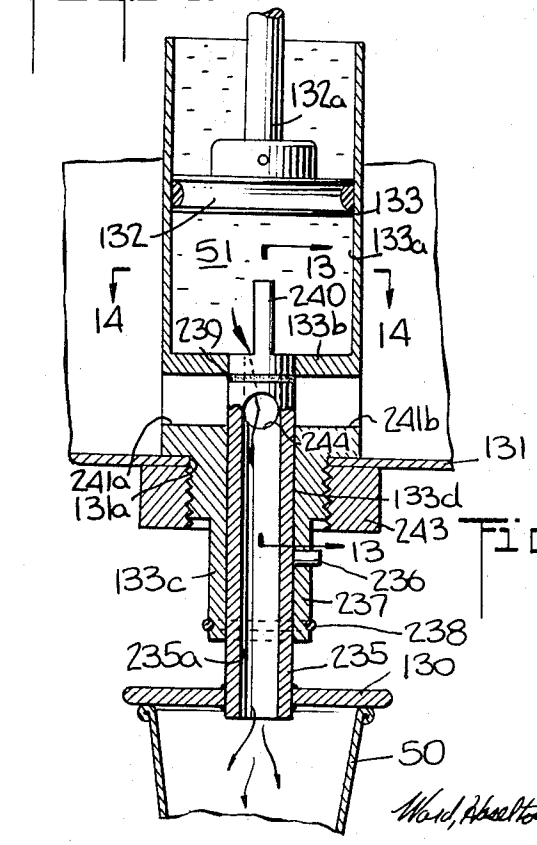


Fig. 12.



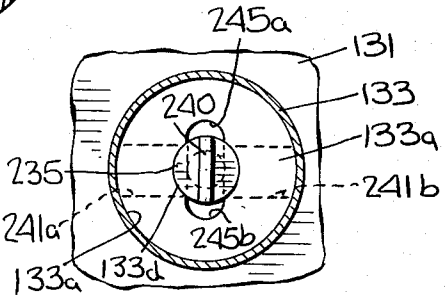


Fig. 14.

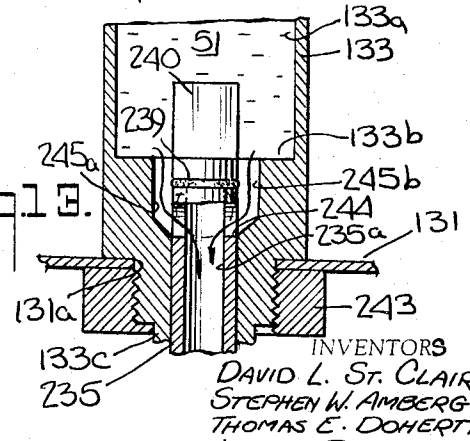


Fig. 13.

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Nov. 28, 1967 D. L. ST. CLAIR ETAL 3,354,614

DISPENSING, FILLING AND CAPPING OF PORTION CONTAINERS

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Fig. 17.

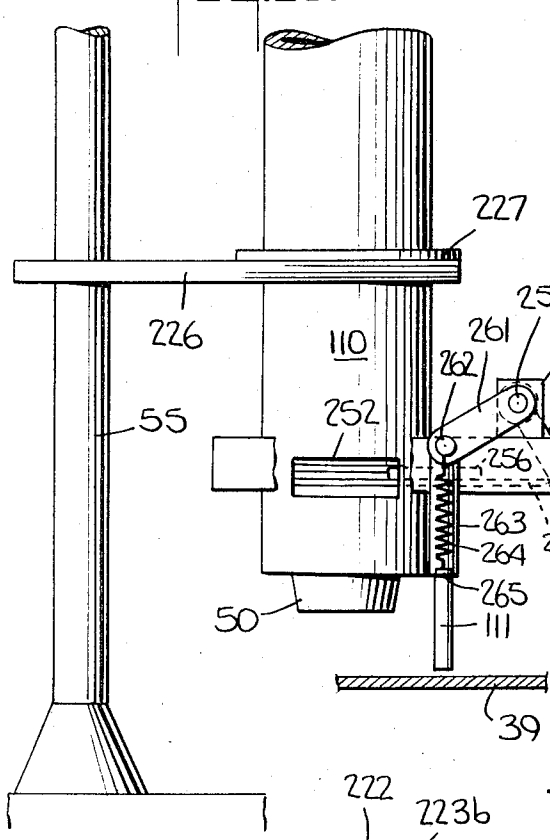


Fig. 18.

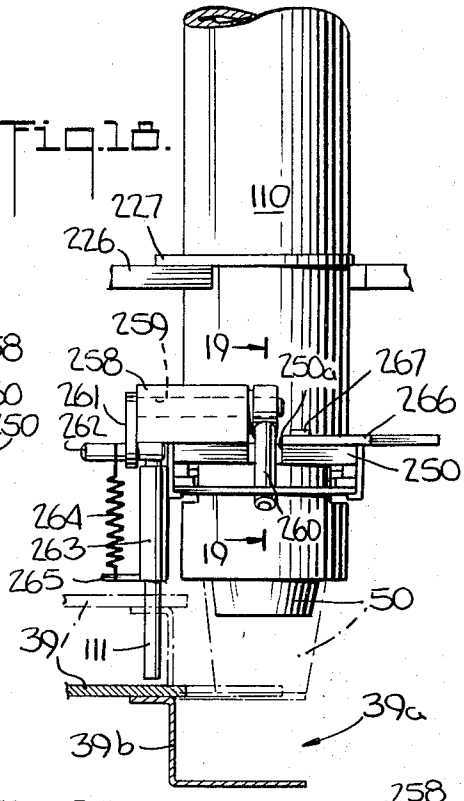


Fig. 19.

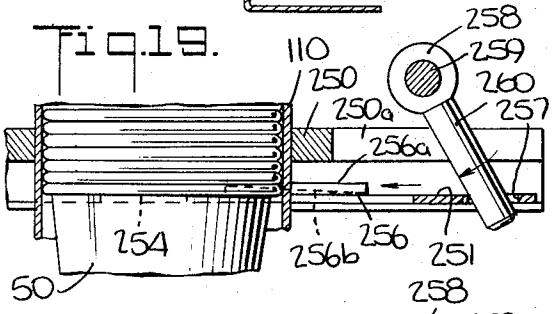


Fig. 16.

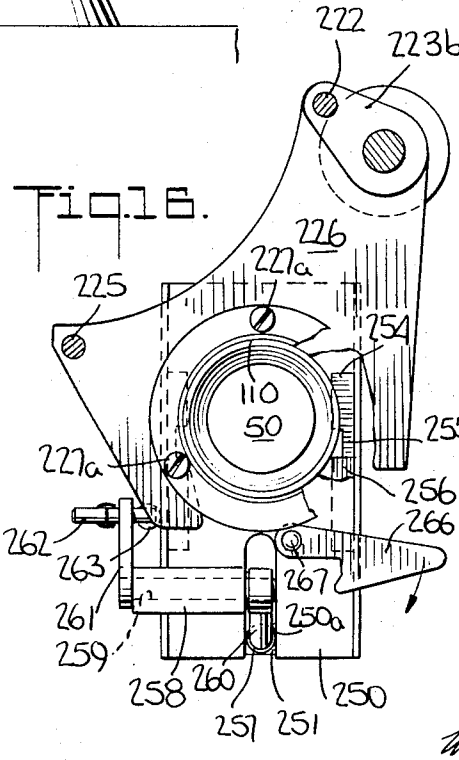
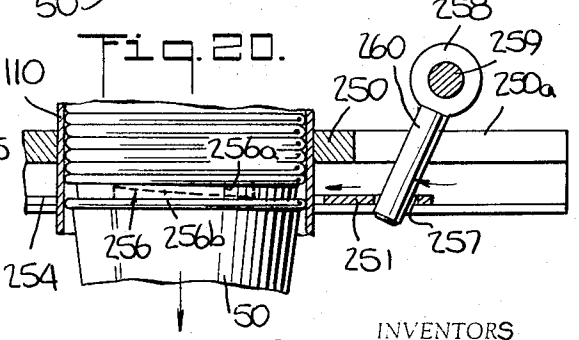


Fig. 20.



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United States Patent Office 3,354,614 Patented Nov. 28, 1967

3,354,614

DISPENSING, FILLING AND CAPPING OF PORTION CONTAINERS

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Filed Oct. 8, 1964, Ser. No. 402,496
40 Claims. (Cl. 53—282)

ABSTRACT OF THE DISCLOSURE

Unitary machine for dispensing, filling and shrink-film capping containers automatically; one or more containers simultaneously. Intermittent turret movement between stations actuates container dispenser; dispensed containers determine actuation of filler, shrink-film feed mechanism, and capper. Consult specification for interconnecting drive arrangements and operation. Filler has internal cylinder and piston for discharging pre-measured quantity of any suitable material from hopper, and adjustable lost-motion mechanism for pre-setting quantity. Film feeder feeds predetermined length of rolled film to proper position for clamping to container and for automatic cutting from roll during capping. Head type shrink-film capper is hot surface type having depending plunger for clamping and shielding film; includes knockout for capped container.

This invention relates to automatic techniques for dispensing, filling and capping paper or plastic receptacles such as small, cup-like, portion containers. More particularly, the invention relates to those techniques in which a shrink-film type closure is applied to the filled receptacle.

Although it may have other applications, the invention is especially useful in its embodiment providing a machine of comparatively miniature size as may be employed on counter-tops in restaurants, hospitals, and the like for metering out from a bulk supply and preparing individual, small quantity servings of liquid, semi-liquid, and perhaps even solid comestible items such as coffee cream, ketchup, mustard, salad dressing, etc. Of course, it is conceivable that the commodity being packaged might not be edible but may, for example, be grease, or oil, or paint, etc. in instances where individual portions thereof may be desired. However, the invention has been found particularly useful as applied in the preparation of small portions, ranging in quantity from a fraction to one full ounce, of coffee cream as may be served to customers who purchase cups of coffee in restaurants, and will therefore be described in connection with such use.

In restaurants, hospitals, meal depots at airlines, and in similar places there has existed a real need for a low cost, reliable and portable "counter-top" type machine for efficient packaging of individual servings of coffee cream. For example, one conventional merchandising technique relies upon daily deliveries of fresh coffee cream in bulk from the dairy and the manual or, at best, semi-automatic metering out of cream portions and the filling of one-ounce glass containers therewith by employees of the restaurant or hospital where such individual servings are required. The small glass containers are reusable and therefore must be washed and sterilized upon return, care being taken that neither the interiors nor the mouth rims thereof shall be touched by human hands as is the requirement of most health authorities. The glass containers may or may not be capped after being fully or partly filled with the coffee cream.

Another conventional technique relies upon the packaging of the individual coffee cream servings at the dairy

prior to delivery to the restaurant, the dairy being required to install usually complex and expensive filling and capping machinery for the purpose. Even though disposable and relatively inexpensive one-ounce paper cup-like receptacles are used in connection with this presently practiced technique, relatively expensive cardboard or metal foil type closures are used on the receptacles, and higher costs in handling and shipping and filled receptacles are always involved. It should also be noted that conventional insertable disc-type closures are often not approved by health authorities since they leave the mouth rim of the receptacles exposed and therefore susceptible to contamination. However, it is known that initial handling of the empty paper-type receptacles is more convenient than handling glass containers since they are nestable. Moreover, and in general, the employment of single-use paper receptacles for the purpose is preferable for sanitary reasons.

In its preferred embodiment to be described, the present invention provides a method and machine incorporating apparatus for receiving a nested stack of small, paper or plastic receptacles and a bulk supply of coffee cream, and for automatically dispensing the receptacles one at a time, and sequentially filling each with an accurately measured portion of coffee cream, capping the same with a shrink-film type closure, and discharging the so packaged portion to a convenient receptacle accumulation location in front of the machine. The integral apparatus and mechanisms and their arrangement in the machine are compact and not complex, and therefore contribute to the low initial cost and minimal maintenance requirements as are salient features of the machine. It is light in weight, rugged, and operates on conventional electric power as received from a wall outlet, and is therefore portable in nature. Moreover, both the machine and the packaged product which is its output conform to the most stringent sanitary requirements.

Further, and though it is probably known that comparatively inexpensive shrink-film closures on such portion containers would be desirable since they effectively shield the mouth rims of the containers and are easy to remove, it has not been understood how such closures might be individually and rapidly applied without the use of complicated, industrial type apparatus. Such commercial apparatus more often involves the installation of lengthy conveyors, and chamber type ovens and hot air blowers for shrinking the closure-forming film, all of which would be too costly or at least undesirable in local stores and restaurants. In this connection, it should be noted that hot air blower apparatus for applying the shrink film closures is not only noisy, but causes agitation and pick up of dust and the like, from the air or adjacent surfaces, and deposit of the same in or on the receptacle being capped, especially on the receptacle mouth rim immediately prior to the formation of the closure thereon since the air stream is directed theretowards. The shrink-film capping method and apparatus of the present invention does not involve the use of a blower or the like.

Briefly describing the invention in its preferred embodiment, the receptacle dispensing, filling and capping apparatus are mounted and compactly arranged on a handy-sized rectangular base measuring approximately 9" x 14", the base being about 4½" high and hollow to house a single drive motor for all of the apparatus, and other operating mechanisms of the machine. The overall height including the base, and considering the highest upwardly projecting apparatus thereon, is only about 21". The dispensing, filling and capping apparatus are arranged in semi-circular fashion about and at three of the four quadrant locations of an intermittently rotatable turret which receives the individual receptacles as they are dis-

pensed from the dispensing apparatus and transports the empty receptacles first to the receptacle filling station of the machine, then to the capping station where a shrink-film type closure is applied to each filled receptacle, and then to tangential discharge at the front of the machine. The discharged receptacles slide down a sloping ramp where they are accumulated for use.

The rotatable turret has four, quadrant located receptacle receiver stations, and it will therefore be seen that the receptacle dispensing, filling and capping operations are carried on simultaneously at three of the receiver stations as they are intermittently moved 90° of turret rotation between the respective of these operational stations of the machine. The simultaneous operation of the dispenser, filler, and capping apparatus is caused by a timed sequence of movement of certain operational mechanisms. These include a turret lift cam providing vertical reciprocal movement of the turret during the time of its rotational dwell at each of the operational stations of the machine. The upward movement of the turret depresses a plunger of the receptacle dispenser, wherein a nested stack of receptacles are contained, so as to cause one receptacle to be deposited on one of the receptacle receiver stations of the turret; the same upward movement of the turret causes the receptacle residing within the next preceding receptacle receiver station of the turret to depress a valve on the filling apparatus so as to dispense an accurately metered portion of coffee cream thereinto; and the same upward movement, in conjunction with a concurrent downward movement of the capping head apparatus, causes a closure to be formed on the now filled receptacle which resides within the first preceding of the three referred to receptacle receiver stations. Where a predetermined number of receptacles are to be capped, a dispenser stop lever may be moved into position to prevent further dispensing of receptacles at the time when the last two receptacles in the series are being respectively filled and capped just prior to shut down of the machine.

During each period of 90° rotational movement of the turret as it carries the receptacles from one operational station to the next, a controlled length of shrink-film material is automatically fed from a roll thereof into position under the capping head and over the receptacle on which the length of material will ultimately form a shrink-film closure. The film length is cut from the roll coincidentally with the aforementioned downward movement of the capping head apparatus which mounts a film cutting knife. However, by a lever mechanism adjacent the filler apparatus as will be described, the feeding out or not of the length of film is controlled and determined by whether or not a receptacle resides within the turret receiver station which will next appear under the capping head. Thus, the film is not wasted, or permitted to interfere with either the next capping operation itself or the completeness of the closure which will next be formed.

The overall arrangement and construction of the machine and its operational components makes it adaptable to modification, as will be described, to provide concurrent dispensing, filling and shrink-film capping of two or more receptacles, thus doubling or tripling, etc. the machine output without increasing machine speed.

Because the individual shrink-film closures are formed by small, square-shaped sheets of the film material, and because of the manner in which the periphery of each sheet is heated to form a closure, the closures will automatically include unshrunken pull-tab projections at four annular locations about the receptacle mouth rim to facilitate manual removal of the closure when the receptacle contents are to be consumed. Further with regard to the completed package, it will be noted that the heat-shrunken zone, the so-called "tape" of the closure, will be adequately tight to form a good seal capable of withstanding relatively rough handling or dropping, yet will not

be so inelastic as to create difficulty in removing the closure.

These and other objects, features and advantages of the invention will be apparent from the following detailed description thereof when read in connection with the accompanying drawings, in which:

FIGURE 1 is a top plan view of a machine in accordance with the invention and showing the general arrangement thereof, certain of its parts being removed or cut away for better clarity in the description;

FIGURE 2 is a side elevational front view showing of the machine, partially in cross-section or cut away for a better understanding thereof;

FIGURE 3 is a cross-sectional end elevation as seen from lines **3—3** of FIGURE 2;

FIGURE 4 is a cross-sectional top plan view of only the base of the machine, the section being taken at lines **4—4** of FIGURE 2;

FIGURE 5 is a schematic wiring diagram showing the electrical system which is incorporated in the machine;

FIGURE 6 is a partially sectionalized side elevation, to a greatly enlarged scale, of a filled and capped portion container which is produced by the machine;

FIGURE 7 is a fragmentary sectional elevation showing only a portion of the machine base as seen from lines **7—7** in FIGURE 4;

FIGURE 8 is a view similar to that of FIGURE 7, but as seen from lines **8—8** in FIGURE 4;

FIGURE 9 is an enlarged perspective showing of certain linkages and apparatus mounted on and within the machine base for controlling the film feeding apparatus of the machine;

FIGURES 10 and 11 are fragmentary and somewhat enlarged identical side sectional elevational showings of only the capping head apparatus of the machine in two of its operative positions, both views being taken at lines **10—10** of FIGURE 3;

FIGURE 12 is a similarly enlarged and fragmentary cross-sectional showing of the receptacle filler apparatus of the invention, and FIGURES 13 and 14 are other fragmentary cross-sections thereof as seen from lines **13—13** and **14—14**, respectively, of FIGURE 12;

FIGURE 15 is an enlarged and fragmentary perspective view of the receptacle dispensing apparatus of the machine to illustrate its operation;

FIGURE 16 is a sectional top plan view of only the receptacle dispensing apparatus of the machine as seen from lines **16—16** in FIGURE 2;

FIGURES 17 and 18 are fragmentary elevational showings of only the dispensing apparatus of the machine, the views being taken at lines **17—17** and **18—18**, respectively, in FIGURE 1, the FIGURE 17 showing being partially cut away to reveal certain details;

FIGURES 19 and 20 are fragmentary and identical sectional views, to an enlarged scale, of the dispensing apparatus to further illustrate its operation, both views being taken at lines **19—19** in FIGURE 18; and

FIGURE 21 is a fragmentary and somewhat diagrammatic perspective view of a modified form of machine in accordance with the invention.

Referring to the drawings, a receptacle dispensing, filling and shrink-film capping machine in accordance with the invention is generally indicated by reference numeral **30**. Its overall arrangement is illustrated by a comparison of FIGURES 1, 2 and 3. From these views, particularly FIGURES 2 and 3, it will be understood that the machine has a hollow base, generally indicated by numeral **31**, which rests on rubber feet **36** disposed at each of its four corners. The base **31** is formed by a rectangular shaped steel bottom plate **32** and a similarly shaped steel top plate **33**, the latter being supported in vertical spaced relation with respect to the former by three vertical base plate spacers **34** (FIGURE 4). The hollow base **31** is suitably enclosed by stainless steel side and top panelling **35** and houses an electric drive motor **37** (FIGURE 4) and other drive

mechanisms as will be explained. The motor **37** and its associated mechanisms operate, or ultimately cause operation of all of the operable apparatus of the machine in timed relation so that, referring particularly to the top plan view of the machine as shown by FIGURE 1, empty receptacles are automatically dispensed one at a time from the receptacle dispenser **38** on to the respective receptacle receiver stations **39***a* of the intermittently rotating turret **39** which serves as a receptacle transport and moves them sequentially to a receptacle filler apparatus **40** where each is automatically filled with a metered quantity of coffee cream, thence to a shrink-film capping apparatus **41** which automatically applies individual shrink-film type closures thereto, and thence to discharge by way of a discharge chute **42** and a downwardly sloping discharge ramp **43**.

Thus, the machine has basically three operative stations, although it will be appreciated that a shrink-film feeding apparatus, generally indicated by reference numeral **44** in FIGURES 1 and 3, is a coordinated functional operation of the machine in the overall. In connection with the latter, and referring to FIGURES 2 and 3, a roll **45** of shrink-film material, such as biaxially oriented medium density polyethylene having film thickness from about 0.0006" to about 0.001", is mounted in centerless fashion on the shrink-film feeding apparatus **44** and a length of the sheet material, suitable to provide one closure, is intermittently fed and severed therefrom in timed relation with respect to the capping operation in manner as will be described.

For a better understanding of the detailed apparatus description which follows, it should perhaps be here noted that the movement of the turret **39** is not only intermittently rotational to bring each of its quadrant disposed receptacle receiver stations **39***a* sequentially and momentarily into juxtaposition with the respective of the dispensing, filling and capping apparatus as aforesaid, but is also vertically reciprocal only at the time when its receptacle receiver stations are located below the respective quadrant positioned dispensing, filling and capping stations. During each momentary halt of its rotational movement, the turret moves a distance up and then down to automatically operate certain mechanisms of each apparatus for reasons as will become apparent.

It should be noted that the packaged product which is the output of the machine (in its embodiment being described) is a small, one-ounce paper cup or receptacle **50** which, as illustrated in FIGURE 6, is filled with coffee cream as indicated by numeral **51**, and has a shrink-film type closure **52** spanning its open top end **50***a* and enveloping its beaded mouth rim **53**.

Referring again to the overall frame arrangement of the machine, three tubular vertical posts are attached to the top of the hollow base **31** for supporting the several operational units which are mounted thereon. Referring to the right hand side of FIGURES 1 and 2, a relatively high tubular post **55** supports both the dispenser apparatus **38** and the filler apparatus **40** and, referring to the left hand side of FIGURE 2 and to FIGURE 3, a pair of relatively short tubular posts **56**, **57** supports what may be called the film sealer unit **58** which includes both the capping apparatus **41** and the film feeding apparatus **44**. The posts **55**, **56** and **57** are tubular in order that they may also serve to house certain shafts which transmit motion from the mechanisms situated within the hollow base **31** to the appropriate apparatus located above the base **31**. That is, the tubular post **55** provides a hollow shaftway for a vertically reciprocal filler plunger shaft **59** which operates the receptacle filler apparatus **40**; the tubular post **56** provides a shaftway for a vertically reciprocal shaft **60** which transmits its motion to capping apparatus **41** to cause cutting of the shrink film strip **45***a* as indicated in FIGURE 3; and the tubular post **57** provides a shaftway for the rotatable film drive shaft **61** which causes intermittent feeding of the film strip **45***a* from the shrink-film roll **45** as also indicated in FIGURE 3. The receptacle dispenser **38** is operated solely by the vertical reciprocal motion of the turret **39**.

The operation of the machine **30** is best understood by first referring to FIGURE 4. The drive motor **37** which is mounted on the bottom plate **32** drives all of the driven apparatus, as aforesaid. So that the machine is widely adaptable for counter-top use in restaurants and the like, the motor is a fractional horsepower fan type operating on 110 volts, 60 cycles from any standard outlet. Referring briefly to FIGURE 3, it receives its power from an input connection **65** located at the rear panel **58***a* of the sealing unit **58**.

Although for clarity the internal wiring is not fully illustrated in the drawings, it will be understood that the input wiring extends across the interior of the sealing unit housing, and that the wiring extends downwardly into the hollow base **31** via the tubular shaft **60**. The wiring diagram for the circuit is illustrated in FIGURE 5, and it is there shown that the circuit includes the motor **37** in parallel with the shrink film capping head heater **66**, a separate motor switch **67** and a heater switch **68** being in series in the respective of these parallel lines. The switches **67** and **68** are mounted on the front panel **58***b* of the sealing unit housing, as seen in FIGURES 2 and 3. An indicator light **69** is also mounted on the sealing unit front panel, as seen in FIGURE 2, the light **69** being connected in parallel with the heater **66** to indicate whether or not the heater is on.

Referring again to FIGURE 4, the output drive shaft **70** of the drive motor **37** rotates at a constant speed of 15 r.p.m. The shaft **70** mounts a motor drive sprocket **71** in a slip clutch arrangement which is provided by the coil spring **72** attached at the outer end of the shaft and which presses the sprocket **71** against a collar **73** which is attached to the shaft **70** at the opposite side of the sprocket **71**. A roller-less chain **74** connects the motor drive sprocket **71** with a filler drive sprocket **75** which, as best illustrated by FIGURES 7 and 8, is attached to a horizontally extending filler drive shaft **76**. The filler drive shaft **76** is journalled in a filler drive bearing block **77**, the latter being attached to the bottom plate **32**. The direction of rotation of the sprockets **71** and **75** is illustrated in FIGURE 8.

Vertical reciprocating movement of the filler plunger shaft **59** is provided by a filler yoke drive disc **78** which is also attached to the filler drive shaft **76**, the disc **78** having a laterally projecting roller cam **79** attached near its outer periphery, as by a roller shaft **80** and an attaching nut **81**. A filler yoke **82** is attached to the lower end of the filler plunger shaft **59**, as by the laterally projecting shaft seat **83** into which the plunger shaft **59** is threaded. The shaft seat **83** is, of course, welded or otherwise firmly attached to the yoke **82**. The filler yoke **82** has horizontal loop-shape and serves as a follower for the roller cam **79**. As best illustrated in FIGURE 8, the span of the interior track of the yoke **82** is equal to the diameter of the circular path of motion of the outer extremity of the roller cam **79** as it revolves with the rotation of the filler yoke drive disc **78**. When the drive disc **78** is in its top and bottom dead center positions the shaft **29** will be at the upper and lower extremities of its stroke, and when the drive disc **78** is in its position as illustrated in FIGURE 8, the filler plunger shaft **59** will be in the middle of its stroke towards its uppermost reciprocated position, and, as will later be more fully understood, the illustrated condition obtains when the turret has completed its indexing rotative movement and initiates its aforementioned lifting movement. As will subsequently be described, this reciprocating action of the shaft **59** will be utilized to meter out portions of coffee cream from the filler apparatus **40**.

Attached to the opposite end of the filler drive shaft **76** is a miter gear **84** which drives an associated miter gear **85** attached to a vertically disposed Geneva crank

shaft **86**, the latter being journalled at its opposite ends in the respective top and bottom plates **32**, **33** of the base **31**, as shown in FIGURE 7. The Geneva crank **87** is attached to the shaft **86** at a location below the miter gear **85**, as also seen in FIGURE 7. The crank **87** has a vertically projecting pin **87***a* which, with each full rotation of the crank **87**, engages one of the four radially projecting slots **88***a* of the Geneva wheel **88** (see FIGURE 4), the latter being attached to the centrally located and vertically extending turret shaft **89** which drives the turret **39**. Thus, during each full revolution of the filler drive shaft **76** and, hence, of the Geneva crank **87**, and as will be best understood by reference to FIGURE 4, the Geneva wheel **88** and therefore the turret **39** will move 90° of rotation to properly index the turret stations **39***a* to the next succeeding operational station of the machine.

To cause the aforementioned vertical reciprocal movement of the turret **39** in proper timed relation with respect to the aforementioned indexing of the turret stations, and referring briefly to FIGURE 7, another chain sprocket **90** is attached to the Geneva drive shaft **86** at a location below the Geneva crank **87** as shown. Referring now to FIGURE 2 (wherein the Geneva drive shaft **86** is actually located behind and is hidden by the turret shaft **89**), the sprocket **90** drives a chain **91** which engages a turret lift cam sprocket **92** which is attached to a vertically disposed turret lift cam shaft **93**, the latter being journalled within the top and bottom plates **32**, **33** of the base **31** as shown. Rotation of the shaft **93** rotates the turret lift cam **94** which is attached thereto, the lift cam **94** having a cam track **94***a*. The roller type cam follower which rides in the track **94***a* is indicated by reference numeral **95** and is attached centrally along the length of a turret operating lever **96**, as by a nut **97** which secures the roller shaft **98** thereto. As shown in FIGURES 2 and 4, one end **96***a* of the turret operating lever **96** is pivotally mounted on a bearing bracket **99** attached to the bottom plate **32** of the base **31**. The opposite end **96***b* of the turret operating lever **96** is yoke-shaped so as to straddle a turret lift collar **101** which is attached to a turret sleeve **102**, the latter being slidable vertically on the turret shaft **89**. The turret lift collar **101** has an annular slot **101***a* which receives and provides a journal for the laterally inward projecting pins **97** of the yoke end **96***b* of the turret operating lever **96**, as best illustrated in FIGURE 4. As will be understood from FIGURE 2, the turret lift collar **101** is attached to the turret sleeve **102** by a turret sleeve key **103** which extends into an elongated vertical slot **89***a* of the turret shaft to prevent annular movement of the turret sleeve and collar. Thus, the turret lift collar **101** and turret sleeve **102** are free to slide upwardly and downwardly as an integral unit along the turret shaft **89**, the turret sleeve **102** being slidable through a turret sleeve bushing **104** which is mounted in the top plate **33** as by a turret bushing retainer ring **105**. The upper end of the turret sleeve **102** projects above the top plate **33**, and mounts the turret **39**, as by a press fit engagement of a centrally located collar **49** of the latter as seen in FIGURE 2. Thus, vertical reciprocal movement of the turret sleeve **102** will cause similar movement of the turret **39**.

As previously mentioned, the vertical reciprocal movement of the turret **39** occurs only after the receptacle receiver stations **39***a* of the turret have been indexed, by rotation of the Geneva crank and wheel as aforesaid, into juxtaposition with the respective receptacle dispensing, filling, and capping stations of the machine, and before the turret is again rotated to move the receptacles on to the next operational station of the machine. This timed relation of the vertical reciprocal movement of the turret **39** with respect to each of its 90-degree rotational movements is achieved by the configuration of the cam track **94***a* of the turret lift cam **94**, as indicated in FIGURE 2. Although the development of the cam track **94***a* is not illustrated, it will be understood that the track includes a lower flat dwell portion which extends 90° of its circumference; a rise portion extending 90° of its circumference and providing ½" of lift of the follower roller **95**; an upper flat dwell portion extending 90° of its circumference; and a drop portion extending the remaining 90° of its circumference. The annular positioning of the lift cam **94** on the lift cam shaft **93** is related to the positioning of the Geneva crank **87** and wheel **88** on their respective shafts, and is such that the cam follower **95** is within the 90° lower dwell of the cam track **94***a* during the time of engagement of the Geneva crank pin **87***a* with one of the slots **88***a* of the Geneva wheel (i.e. while the turret **39** is being indexed 90°). By reason of the central location of the cam follower **95**, and the length of the turret operating lever **96**, the ½" rise provided by the turret lift cam **94** is converted to a 1" rise of the turret sleeve **102** at the yoke end **96***a* of the lever **96**, and thus the turret **39** is made to rise and fall a distance of 1" in its vertical reciprocating movement. Because the diameters of the drive sprockets **90** and **92** are the same, it will be understood that one complete stroke of the filler plunger shaft **59** occurs during one complete revolution of the turret lift cam **94**.

Referring to FIGURES 1 and 2, it should here be noted that the receptacle receiver stations **39***a* of the turret **39** are four in number. Each is formed by a semicircular recess **39***b* of the turret periphery at one of the four quadrant locations, and by a receptacle support bracket **39***c* thereunder. The support brackets **39***c* are L-shaped as shown in FIGURE 2 and are attached, as by welding, to the underside of the turret.

Further, at the rearward side of each of the semicircular recesses **39***b* with respect to the direction of rotation of the turret **39**, radially outward projections **39***d* of the main turret plate serve as push-outs for the respective receptacles when they are discharged on to the discharge chute **42** after being capped, the push-outs assuring that each receptacle is moved laterally along the chute **42** an additional incremental distance than would otherwise be the case so that the protruding beaded mouth rim **53** of the last discharged receptacle (which has low height) will not be tipped by the next upward movement of the turret **39**. In this connection, and referring to FIGURES 1, 2 and 3, it will be seen that the discharge chute **42** hangs from the housing of the sealing unit **58**, the same being attached to the side panel **58***d* of the latter as by bolts **106**. The chute provides a horizontally disposed and flat bottom surface **42***a* at the elevation of the bottoms of the receptacle support brackets **39***c*, the inner end edge of the surface **42***a* being suitably curved (FIGURE 1) to clear the support brackets **39***c* as they rotate with the turret **39**. A vertically disposed inner wall **42***b* guides the discharged receptacle to the downward sloping ramp **43** which is pivotally attached to the chute **42** by a rod **107** which passes through the brackets **108** of the chute **42** (FIGURE 2). The inner wall **42** also mounts a horizontally extending guide arm **109** which projects into the path of the receptacle **50** as it leaves the capping station to guide the receptacle on to the surface **42***a* of the chute. In this manner, the filled and capped receptacles are discharged from the machine and ultimately rest at the lower end of the sloping ramp **43**.

Referring now to FIGURE 2, it will be understood that the dispensing apparatus **38** is operated solely by the vertical reciprocating movement of the turret **39** and only at a time when a receptacle receiver station **39***a* has been positioned below the tubular dispenser magazine or body **110** to receive a receptacle. Gravity discharge of a receptacle **50** from the nested stack thereof within the tubular body **110** occurs when the rising turret **39** contacts and depresses the vertically movable plunger **111** of the dispensing apparatus **38**, as will subsequently be described in greater detail. Further, and after the dispensed empty receptacle has been indexed 90° to the

receptacle filling position, the next upward movement of the turret will bring the mouth rim **53** of the receptacle into contact with, and will lift a depending valve disc **130** of the filler apparatus **40** to permit discharge of a coffee cream portion **51** into the receptacle **50** from a bulk supply thereof contained in the filler hopper **131**. Although the filler operation will also be described in greater detail, it will be noted that, in the absence of a receptacle **50**, the filler will not operate. However, the piston **132**, whose shaft **132***a* is reciprocated responsive to the movement of the plunger shaft **59** (albeit via a lost motion connection as will be described), will complete one full stroke within the interiorly located piston tube **133** whether or not a receptacle is in position to be filled because of the cycle of movement of the filler plunger shaft **59**, as aforesaid. The filled receptacle is next indexed into position below the capping apparatus **41** which applies a shrink film closure to the receptacle.

As the filled receptacle **50** is indexed from the filling station of the machine to the capping station, a suitable length of shrink film material is automatically fed from the roll **45** thereof. Referring to FIGURES 1, 3 and 4, and particularly to the last said figure, it will be understood that the continuously running drive chain **91** extends from the lift cam sprocket **92** around an idler sprocket **150** and thence around a film feed clutch sprocket **151** from which it returns to the Geneva drive shaft sprocket **90**. The film feed clutch sprocket **151** is attached to the film drive shaft **61**, and an overrunning type film feed clutch **152** is also attached to the shaft **61**. When the clutch **152** is engaged, the film drive shaft **61** will rotate and, from FIGURES 1 and 3, it will be understood that a miter gear **153** attached to the upper end of the shaft drives an associated miter gear **154** to rotate the horizontally extending jack shaft **155** to which the latter is attached. The jack shaft **155** is journalled between the respective side panels **58***c* and **58***d* of the film sealing unit housing, as shown in FIGURE 1. The jack shaft **155** also mounts a chain sprocket **156**. The chain **157** which extends therearound engages the film drive roller shaft sprocket **158** which is attached to the horizontally disposed film drive roller shaft **159**, the latter also being journalled between the housing side panels **58***c* and **58***d*, as shown in FIGURE 1. However, the drive roller shaft **159** extends through the side panel **58***d* as shown and, at its outwardly projecting end, mounts a rubber film drive roller **160** which includes four film drive roller segments **160***a–d* of enlarged diameter as indicated.

As will be best understood from FIGURE 3, the film drive roller **160** is in fixed position, and a steel idler roller **161** is pressed upwardly thereagainst so as to grip the film sheet **45***a* therebetween and promote positive feeding of the film sheet. Although not fully illustrated, the idler roller **161** has four enlarged-diameter segments, similar to the film drive roller segments **160***a–d*, but each being considerably narrower to provide clearance spacing therebetween for the respective of the three, finger-like projections **162***a–c* of a film idler plate bracket **162** on which the idler roller **161** is mounted. The plate bracket **162** is generally of inverted U-shape to include downwardly depending sidewalls **162***d*, between the forward ends of which the idler roller shaft **13** is rotatably mounted as indicated. The four idler roller segments (not illustrated), of course, must engage and press upwardly against the undersides of the respective film drive roller segments **160***a–d*. This upward bias pressure on the free forward end of the plate bracket **162** is provided by a leaf spring **168** which is held in position by its under-and-over association with the respective of the film support idler roller shafts **169** and **164** as shown, the rearward ends of the plate bracket sidewalls **162***d* being pivotally mounted on the idler roller shaft **164**. The shaft **164** carries the idler roller pair **165***a*, **165***b* which, together with the idler roller pair **166***a*, **166***b* on the shaft **169**, supports the film roll **45** in centerless fashion, as previously mentioned. It will be noted that each of the rollers **166***a*, **166***b* has a side flange **167** to assure proper lateral positioning of the film roll **45**. The film sheet **45***a* passes between the film drive roller **160** and the idler roller **161** and idler plate projections **162***a–c* as shown in FIGURE 3.

In connection with the film feeding mechanism, it should also be noted that, at the lower edge of the rear wall **46***a* of the film heater guard **46**, five spaced apart lateral projections **47***a–e* thereof (see FIGURES 1 and 3) extend into the respective spaces between and alongside of the film drive roller segments **160***a–d*, at the underside thereof, to assure that the film sheet **45***a* does not electrostatically or otherwise adhere to and wind about the rubber film drive roller **160**.

The diameters of the sprockets **156** and **158** and of the drive roller **160** are such as to feed a predetermined length of the film sheet **45***a*, suitable for forming one shrink closure, into position across the open mouth of the filled receptacle **50** and below the capping apparatus **41** during the indexing of the receptacle into the capping position as illustrated in FIGURE 3. This suitable length is fed upon each full rotation of the film drive shaft **61**. The proper timing of the rotation of the shaft **61** with relation to the indexing of the receptacle from the filling position to the capping position is determined by the time of engagement of the film feed clutch **152**. Engagement of the clutch **152** is actuated by the receptacle itself during its indexing movement between the filling and capping stations of the machine, the receptacle contacting and depressing a pivotal film feed clutch control lever **170** (FIGURE 1) which is located immediately adjacent the filling station of the machine.

The mechanism which causes engagement of the clutch **152** upon actuation of the control lever **170** is shown in enlarged perspective in FIGURE 9, and is best understood by comparison of that figure with FIGURE 4. It will be noted that the control lever **170** is attached to a vertical shaft **171** which is journalled in a control lever post **172**, the latter being attached to the upper plate **33** of the base **31** of the machine. The height and location of the lever **170** is such that it will be contacted only by the body of the filled receptacle **50** as it initially moves away from the filling station of the machine. The lower end of the shaft **171** is attached to one end of a horizontally extending link **174**, the link **174** also being shown in FIGURE 4. The opposite end of the link **174** is pivotally attached, as by a pivot connection **174***a*, to the rearward end **175***a* of a film feed clutch link rod **175** which extends horizontally along the underside of the upper plate **33** of the hollow base **31**. The link rod **175** is biased in its illustrated rearward position by a spring **176**, the latter being attached between the end **175***a* of the link rod and a spring post **177** (FIGURE 4) which depends from the undersurface of the upper plate **33**. Accordingly, the lever **170** is normally biased into the path of the receptacle **50**, and it will be noted that the lever will not be depressed or otherwise engaged unless a receptacle is within one of the turret receiver stations **39***a*. Thus, a length of film sheet **45***a* will be fed only when the turret station contains a receptacle to be capped.

The opposite end **175***b* of the film feed clutch link rod **175** is pivotally connected, as by a pivot connection **178**, to the upper end of a vertically disposed and pivotably mounted film feed clutch operating lever **179**. The clutch operating lever **179** is mounted for pivotal movement at a central location along its length by a laterally extending shaft **180** which is journalled within a horizontal bore (not numbered) of one of the base plate spacers **34** as shown in FIGURE 4. The lower end of the lever **179** includes a lateral projection **179***a* which normally engages a flat, radially projecting surface **152***a* of the clutch **152**. Because of the bias of the spring **176** and the central location of the pivot point **180**, the lever projection **179***a* will normally be held in engagement with the clutch sur-

face 152*a* to prevent engagement of the clutch 152 until the lever 170 is depressed in the direction of arrow A in FIGURE 9. When the lever 170 is depressed by a receptacle as aforesaid, the attendant pivoting of the lever shaft 171 and link 174 will move the link rod 175 in the same direction, thereby causing the lower end projection 179*a* of the feed clutch operating lever 179 to move in the direction of arrow B (FIGURE 9) out of contact with the clutch surface 152*a*. Since depression of the lever 170 is only momentary, the link rod spring 176 will, upon movement of the receptacle out of engagement with lever 170, promptly again bias the operating lever lower end projection 179*a* toward the clutch 152 so that, after one full revolution of the clutch, the surface 152*a* of the latter will come against the operating lever projection and stop, thus disengaging and permitting the normal overrunning of the clutch. It will therefore be understood that a single depression of the lever 170 permits one revolution of the film drive shaft 61 so as to cause a predetermined appropriate length of the film sheet 45*a* to be fed under the capping apparatus 41. That is, a single revolution of the shaft 61 promotes one revolution of the jack shaft 155 and film drive roller shaft 159 and, hence, of the film drive roller 160. Further, it will be noted that the film drive roller shaft 159 is urged to a positive stop at the end of one revolution by a friction brake 181, the latter being a leather strip 182 looped around and biased against the drive roller shaft 159 by the springs 183*a*, 183*b* at the respective ends of the strip 182 as shown in FIGURE 1. The springs 183*a*, 183*b* are attached as by a spring mount pint 184, to the interior of the side panel 58*c* of the sealing unit housing, and it will be understood that the brake 181 will slip during the rotation of the drive roller shaft 159 which is induced by the positive chain and sprocket drive 156, 157, 158. However, as soon as positive rotation has stopped, the bias of the brake springs 183*a*, 183*b* becomes effective to bring the shaft 159 to a positive, immediate stop by frictional engagement of the leather strip 182 with the shaft 159. Thus, the film drive roller 160 is brought to an immediate stop so that the length of the film sheet 45*a* which is fed thereby is always of consistent, predetermined length.

Cutting of the film sheet 45*a* to provide an individual closure is effected simultaneously with the capping operation. Referring to FIGURES 1 and 3, the capping apparatus 41 includes a vertically reciprocal capping head, generally indicated by reference numeral 185, which projects outwardly of the sealing unit side panel 58*d* through a window-like rectangular opening 186 of the latter (FIGURE 3). Although further details and the operation of the capping head in applying a shrink-film closure to a receptacle will later be more fully described, it should be here noted that the movable capping head includes a relatively thick, rectangular shaped and horizontally disposed film heater insulated block 187 which is made of silicone and which, at its inner end (see FIGURE 1), is attached by bolts 188 to the widened end of a capping head support arm 189, the bolt connections 188 being through a steel bolt spacer plate 190 for protection of the silicone material, and the lower ends of the bolts 188 being slidable within respective bores (not numbered) of a lateral support bracket block 188*a* (FIGURE 10) attached to the housing panel 58*d*. The other end of the support arm 189 includes a vertical extending attachment collar 189*a* which is slitted longitudinally, as at 189*b* (FIGURE 1), to provide attachment to the vertically movable shaft 60. The attachment is made by tightening a threaded bolt 191 which extends across the slit 189*b*. Thus, vertical reciprocal movement of the shaft 60 causes the desired vertical reciprocal movement of the capping head 185.

The mechanism for promoting the vertical reciprocal movement of the shaft 60 is illustrated in FIGURES 4, 10 and 11. Referring first to FIGURES 4 and 10, it will be understood that motion to the shaft 60 is transmitted from the yoke end 96*b* of the turret operating lever 96 via a Z-shaped capping head operating lever which is generally indicated by reference numeral 195. Its longitudinally extending arms 195*a* and 195*b* are attached by the transversely extending shaft 195*c* which is journalled in the upright bearing portions 196*a*, 196*b* of a bearing mount block 196, the latter being attached to the bottom plate 32 of the hollow base 31. Referring to FIGURE 10, it is seen that the outer end of the lever arm 195*a* is slotted, as at 197, to receive the outwardly projecting portion of one of the pins 97 of the turret operating lever yoke end 96*b*. Thus, when the turret operating lever 96 is lifted and lowered by the rotational action of the turret lift cam 94, the pin connection at its yoke end causes the same vertical reciprocal movement to be imparted to the outer end of the lever arm 195*a* thus causing pivotal movement of the capping head operating lever 195. A turret helper spring 205 is attached below and at a middle location along the length of the arm 195*a*, as shown. The outer end of the other lever arm 195*b* is pivotally attached, as by pivot connection 198, to the lower end of the shaft 60, enough free play being provided in the pivot connection 198 to allow for slight relative lateral movement between the two. Accordingly, it will be understood that, as the turret 39 is lifted, the capping head 185 moves downwardly, and vice versa. It will also be noted that the capping head will begin moving downwardly, and will complete its full cycle of movement, only when a receptacle is fully in its capping position therebelow.

Since, as previously explained, film feeding will occur only during the time of indexing movement of a receptacle from the receptacle filling station to the receptacle capping station of the machine, the proper length of film to provide one closure will have been fed from the film roll 45, and the film feeding action will have terminated, at the time when the receptacle has arrived at the capping station. The length of film is then severed coincident with the downward movement of the capping head 185. Referring to FIGURES 1 and 3, it will be noted that the capping head 185 carries a film cutting knife 199 which is attached, as by screws 200, to the rearward end of the relatively square-shaped aluminum film heater block 201 of the capping head. The cutting edge of the knife 199 is serrated for better cutting action in conjunction with the finger-like leading edge of the film idler plate 162, and it will be noted that the receptacle 50 is being lifted concurrently with the downward movement of the capping head. It will also be noted from FIGURE 3 that a plunger disc 202 of the capping head, whose shaft 203 is mounted for free sliding movement within a bore (not numbered) of the heater insulating block 187, normally depends to an elevation below that of the cutting edge of the knife 199 so that knife cutting action is assisted by the "sandwiching" of the film sheet 45*a* between the disc 202 and the receptacle mouth rim 53 at the time when the knife 199 initiates its cut. Moreover, the relative distances of movement of the capping head and receptacle, prior to the time the mouth rim of the latter moves into the film heater block 201 for the capping operation, is such that the film sheet 45*a* is completely severed from the film roll 45 at the time the individual closure is formed.

Continuing now with a detailed description of the capping apparatus 41, it should first be noted from FIGURES 1, 2 and 3 that the housing of the sealing unit 58 is formed by a rear panel 58*a*, a front panel 58*b*, a pair of spaced apart side panels 58*c*, 58*d*, and a top panel 58*e*. The side panels 58*c* and 58*d* are spaced apart by a pair of panel spacer blocks 210*a*, 210*b* at the respective ends thereof, the blocks 210*a*, 210*b* being located near the bottom edges of the side panels and being attached between the latter by the respective bolt pairs 106 (which also mount the discharge chute 42) and 211. The bolts 211 which are situated behind the film plate bracket 162

are omitted from FIGURE 3 for clarity. The housing is supported by the vertical posts **56** and **57** which are press-fit within appropriate bores (not numbered) of the respective blocks **210***a*, **210***b* as indicated. The side panel **58***d* has a rectangular opening **186** as aforesaid, and has a rearward extension (not numbered) for supporting the film support roller shafts **164** and **169**. The front and rear panels **58***b* and **58***a* are attached to the side panels **58***c* and **58***d* by screws **212**.

Referring to FIGURE 10 which shows the vertically movable capping head **185** in its normal, raised position at the moment when the turret **39** has moved a filled receptacle **50** into position thereunder but prior to initiation of the upward movement of the turret, it will be understood that the aluminum heater block **201** is suspended from the insulating block **187** and attached in vertically spaced relation thereto by four bolts **212** and their associated spacers **213**, the bolts **212** passing through bores (not numbered) of the insulating block **187** and being threaded into the heater block **201**. As seen in FIGURE 1, the silicone insulating block **187** has four vent apertures **214** therethrough. The heater block **201** is heated to about 400° F. by a transversely extending rod type heating element **66**, the wiring for which (not shown) passes into the housing of the sealing unit **58** via the opening **186** in the panel **58***d*. The heater block **201** further includes a central aperture **216** having diameter only slightly larger than the diameter of the beaded mouth rim **53** of the receptacle **50**. For example, where the diameter of the receptacle bead is nominally 1¾ inches, the diameter of the aperture **216** is 1.780 inches.

As previously mentioned, the capping head **185** mounts a plunger disc **202** whose shaft **203** is freely slidable through a bore of the heater insulating block **187**, a retaining nut **217** being attached to the shaft **203** at the upper side of the insulating block. The plunger disc **202** has a neoprene sponge undersurface **202***a* which is bonded to the basic metal disc and, as shown by FIGURE 10, normally resides at an elevation below the underside of the heater block **216**. The diameter of the plunger disc **202** is substantially equal to the diameter of the receptacle bead **53** as, for example, 1.750 inches in the aforementioned example. A cup knockout stop **218** is attached to, and projects laterally from the side panel **58***d* to counteract any tendency of either the plunger **202** or film material **45***a* to "hang up" or bind within the heater block aperture **216** during the capping operation as will now be described.

As previously mentioned, as soon as the turret **39** completes its 90° indexing rotation, the turret will lift a distance of one inch during the period of its dwell at the rotated position. Thus, the filled receptacle **50** within the turret receiver station **39***a* and which is now located immediately below and aligned with the heater block aperture **216** will be lifted upwardly towards the capping head **185**. A suitable length of shrink film material **45***a* will have already been fed into position across the top of the receptacle mouth rim as previously described. Also as previously noted, and simultaneously with the upward movement of the turret **39**, the capping head **185** will move downwardly to meet the upwardly moving receptacle **50**. As shown in FIGURE 10, the film material **45***a* is considerably larger than, or oversized with relation to the mouth rim diameter of the receptacle **50**.

At about the halfway point during the simultaneous movement of the receptacle **50** and capping head **185** toward each other, and before the film sheet **45***a* has been severed from the roll **45** thereof, the plunger disc **202** comes into contact with the film sheet **45***a* and exerts its weight against the receptacle bead **53** to hold the former firmly in contact with the latter, and to shield the central area of the film **45***a* from heat as would otherwise shrink the same. As shown by FIGURE 11, the continued converging movement of the receptacle **50** and capping head **145** first causes a severing of the film sheet **45***a* (by the film cutting knife **199** as previously described), and then brings the receptacle mouth rim and closure film to a location within the heater block aperture **216**, the plunger disc **202** resting on the receptacle bead **53** all the while, and the capping head **185** sliding downwardly with relation to the plunger disc shaft **203**. Upon contact with the lower edge of the heater block aperture **216**, and during the time when the same is within the heater block aperture **216**, the peripheral excess of the film material **45***a* will be heated and shrunken about the top end of the receptacle **50**, this so-called "tape" of the now formed closure **52** shrinking tightly against the body of the receptacle **50** below the receptacle bead **53**, as illustrated in FIGURES 6 and 11. Because of the substantially square shape of the film sheet **45***a*, and by reason of their diagonally measured length as compared with the relatively short distance of movement of the receptacle mouth rim into the heater block aperture **216**, the four corner portions of the closure **52** will remain relatively unshrunken and out of contact with the receptacle body so as to form convenient projecting pull tabs (not numbered) for manually removing the closure **52** from the receptacle.

The film material and receptacle mouth rim remain within the heater block aperture **216** for a relatively short period of time, only about one or two seconds, whereupon by the lowering of the turret **39** and the simultaneous lifting of the capping head **145** by means as previously described the now sealed receptacle is moved out of the aperture **216** and lowered to the elevation of the bottom surface **42***a* of the receptacle discharge chute **42**, as seen in FIGURE 2. During this movement apart of the receptacle **50** and the capping head **185**, the plunger disc **202** remains in gravity contact with the receptacle bead **53** until the upwardly moving heater insulating block **187** contacts the underside of the nut **217** at the upper end of the plunger disc shaft **203** to lift the plunger disc **202** out of contact with the receptacle. As will be observed from FIGURE 11, during the time when the closure **52** is being formed, the upper end of the plunger disc shaft **203** is situated immediately under the knockout stop **218** so that, if for any reason the film closure **52** or plunger disc **202** tends to bind and remain within the heater block aperture **216** during the now intended diverging movement of the capping head and receptacle, the knockout stop **218** will prevent upward movement of the plunger disc shaft **203** and will therefore assure relative upward movement of the capping head **185** with respect to the latter. Separation of the capped receptacle from the capping head **185** is thereby always assured.

Turning now to the details of the construction and operation of the filler apparatus **40**, it should first be noted from FIGURE 2 that the hopper **131** of the apparatus is firmly but removably attached to the vertical post **55** within which the filler plunger shaft **59** reciprocates. The attachment is made by a vertical bracket **220**, which is welded to the side of the hopper **131**, the bracket having laterally projecting upper and lower ends **220***a*, **220***b* between which a rod **221** is welded in place as shown. The rod **221** has flattened end projections **222** (only one of which is partially shown in FIGURE 1) which project outward of the upper and lower bracket ends **220***a*, **220***b* and which fit snugly into respective slotted apertures (not numbered) of respective upper and lower support arms **223***a*, **223***b*, the lower arm **223***b* being welded to the post **55**. Referring to FIGURE 1, a projecting lug **224**, which is welded to the hopper **131**, is attached as by a tight fitting but removable pin **225** to a dispenser support bracket **226** which, in turn, is welded to the post **55** immediately below the lower hopper support arm **223***b* as shown. Thus, by removal of pin **225** and lifting of the hopper rod **221** out of the lower arm **223***b*, the hopper **131** is detachable from the post **55** and bracket **226**.

It should perhaps here be noted that the dispenser body **110** is firmly but removably mounted on the dis-

penser support bracket **226** by screw connections **227***a* (FIGURE 1) through the dispenser body flange **227**.

Referring to the general operation of the receptacle filler apparatus **40**, the vertical reciprocal movement of the filler plunger shaft **59** causes the piston **132** to move within the cylinder **133***a*, which is formed in a piston tube member **133**, via a lost motion connection generally indicated by reference numeral **228** between the plunger shaft **59** and the piston shaft **232***a*. Referring to FIGURE 2, a horizontally extending piston operating lever **229** is rigidly attached to the upper end of the filler plunger shaft **59** as shown. At the projecting free end **229***a* of the lever **229** a slidable connection is made to the piston shaft **132***a* as by the shaft receiving lever recess **229***b* (FIGURE 1) and a pivotable latch **230** for enclosing the piston rod **132***a* within the lever recess. The latch **230** is pivotable about one of its ends **230***a*, and is pivoted against a stop **231** of the lever **229** when the rod **132***a* is in position within the recess **229***b*, the clearance between the rod and the latch being such as to permit slidable movement of the lever **229** with respect to the rod. A thumb screw type lower stop **232** is mounted in fixed position on the piston rod **132***a* below the lever **229**, and a similar thumb screw type upper stop **233** is mounted on the rod **232***a* at a location above the lever **229**. Rather than being of a thumb screw type, the lower stop **232** might be of a fixed type, its location on the rod **132***a* being ordinarily regarded as permanent. Its location is determined by the position of the underside of the lever **229** with respect to the piston rod **132***a* when the plunger shaft **59** is in its lowermost position and the piston **132** is at its lowermost position against the bottom **133***b* of the cylinder **133***a*. The location of the upper stop **233** is adjustable along the length of the piston rod **132***a* for the purpose of varying the quantity of coffee cream which will be metered into, and discharged from the cylinder **133***a* to fill the individual receptacles **50**. That is, and as will be readily understood from FIGURE 2, a lower position of the stop **233** on the rod **132***a* would cause the piston operating lever **229** to make earlier contact therewith during the upward movement of the latter to thus impart longer upward stroke to the piston **132** and therefore a greater quantity of coffee cream to be metered into the cylinder **133***a* since the volume of the latter, as determined by the uppermost position of the piston **132**, will then be larger. Conversely, a higher location of the stop **233** along the length of the rod **132***a* would cause the piston **132** to remain for a longer time against the bottom **133***b* of the cylinder **133***a* during the upward stroke of the plunger shaft **59** before contact is made between the upwardly moving lever **229** and the underside of the upper stop **233** so that, because the highest point of movement of the lever **229** is fixed, the piston **132** will be ultimately lifted a shorter distance away from the cylinder bottom **133***b*. Thus, the cylinder volume, and therefore the amount of coffee cream as will be metered into the cylinder **133***a*, is reduced as the position of the upper stop **223** is higher along the rod **132***a*.

It should here be noted that conventional sizes of paper receptacles as are used to serve individual portions of coffee cream are of one-ounce, three-fourths ounce, and one-half ounce capacity, yet the diameters of their mouth rims are the same (i.e. 1¾"), a variation in the receptacle height being determinative of the variation in receptacle capacity. Accordingly, an appropriate adapter plate (not shown) will be placed upon the receptacle support bracket **39***b* to elevate the shorter receptacles such that the height of the mouth rims of all receptacles which the machine will fill and cap will be uniformly one-half inch below the valve disc **130**. Moreover, a commonly accepted serving of coffee cream is about five-eighths of an ounce, and it is sometimes the practice to only partially fill either a one-ounce or a three-fourths ounce standard receptacle with five-eighths of an ounce of cream. By an appropriate gauge on the piston rod **132***a* the location of the upper stop **233** may be varied and precisely determined to cover variations of the quantity of coffee cream desired to be dispensed into any such conventional receptacle within a range of from zero to one full ounce or more.

The construction and operation of the filler valve and piston in metering and dispensing a quantity of coffee cream into an individual receptacle is best shown by FIGURES 2, 12, 13 and 14. Referring first to FIGURE 2 wherein the valve is shown in its closed position, the depending valve disc **130** is attached to the lower end of a vertically slidable valve tube **235**, the latter having a central channel **235***a* and being mounted for slidable movement within the central tubular opening **133***d* of the piston tube member **133**. The valve tube **235** is limited in its movement by a laterally projecting pin **236** thereof which slides within a vertically extending slot **237** in the lower projecting portion **133***c* of the piston tube member, the pin **236** being retained in the slot **237** by an annular snap ring **238** which extends around the lower end of the projecting portion **133***c*. A neoprene O-ring type gasket **239** extends about the valve tube **235** adjacent its upper end to prevent leakage of cream between the valve tube and the tubular opening **133***d* in which it slides. The fairly tight fitting nature of the gasket **239** is such as to prevent the valve tube **235** from dropping by gravity to its lowermost position, but is not such as to unduly bind the valve and prevent it from sliding easily responsive to the upward pressure of the receptacle **50** on the valve disc **130** during turret lifting movement, as aforesaid. However, it will be understood that the valve tube **235** may require a positive assist in its downward movement because of the limited binding nature of the gasket **239**, and therefore the valve tube **235** includes a centrally located and upwardly projecting flat portion **240** which will be contacted by the piston **132** during the terminal portion of the downward movement of the latter. When the valve tube **235** is in its lowermost position as shown in FIGURE 2, the flat portion **240** also serves as a flow divider between the oppositely disposed cylinder inlet channels **241***a*, **241***b*, the plane of the flat portion **240** being disposed at right angles to the common axis of the two cylinder inlet passages **241***a*, **241***b*. It will therefore be apparent that, as the piston **132** is raised, coffee cream from the bulk supply thereof contained in the hopper **131** will be drawn into the cylinder **133***a* via the inlet passages **241***a*, **241***b* of the latter, the effective recessing of the opposite sides of the upper end of the valve tube **235**, as is provided by the plate portion **240**, completing the respective inlet passages to the cylinder **133***a* as indicated by the flow arrows in FIGURE 2.

It will be noted that the upper end of the cylinder tube **133***a* is closed by the piston **132**, a neoprene O-ring type gasket **242** of the piston preventing seepage between the piston and the wall of the cylinder. It will also be noted that the piston tube member **133** projects through a bottom opening **131***a* of the hopper and is held tightly in place by a wing nut **243** which is threaded on to the lower end of the piston tube member **133** where it projects below the hopper **131** as shown in FIGURE 2. Thus, the piston tube member **133** and valve apparatus is easily removable for cleaning.

Ejection of the metered portion of coffee cream from the cylinder **133***a* is illustrated in FIGURES 12–14. FIGURES 12 and 13 show the valve tube **235** in its uppermost position as it will appear when lifted by a receptacle **50**. Referring to FIGURES 12 and 14, it should first be noted that the central channel **235***a* of the valve tube **235** does not extend fully the length of the latter, but terminates at the transversely extending channel opening **244** near the upper end thereof. Referring to FIGURES 13 and 14, it will be understood that discharge of

the coffee cream portion **51** is via a pair of vertical discharge passages **245***a*, **245***b* which are formed in the piston tube member at the cylinder bottom **133***b* by respective recesses of the tubular opening **133***d* at opposite sides thereof. These discharge passages **245***a*, **245***b* have width equal to the diameter of the transversely extending channel **244** of the valve tube, and are recessed to a depth such that their total area for liquid passing therethrough is at least equal to the diameter of the valve tube channel **235***a*. Their height is such that they extend downwardly to the elevation of the lower edge of the channel **244** when the valve tube **235** is in its uppermost position, as illustrated in FIGURE 13. It will be noted that the cylinder inlet passages **241***a*, **241***b* are closed by the valve tube **235** and that the flat portion **240** of the valve tube projects into the interior of the cylinder **133***a* when the valve tube **235** is in its uppermost position.

Referring now to FIGURE 12, the piston **132** may be considered as having initiated its downward movement to eject the coffee cream **51** through the valve tube channel **235***a* and into the receptacle **50**, the latter being in its elevated position as aforesaid so as to bring the transverse channel **244** into juxtaposition with the piston tube discharge passages **245***a*, **245***b*. Because the cylinder **133***a* is completely filled with the liquid **51**, the liquid will not flow downwardly in the absence of positive downward urging by the piston **132**. As the piston travels through its downward stroke the liquid **51** is ejected, and it will be noted that the piston **132** will contact the upper end of the valve tube flat portion **240** and thus positively urge the valve tube **235** downwardly during the terminal portion of the piston stroke for reasons as aforesaid. However, the turret **39** and receptacle **50** will have initiated their downward movement at or before the time when the piston **132** makes contact with the valve tube flat portion **240**. The piston **132** and turret **39** travel downwardly at essentially the same rate so that the receptacle **50** will not be crushed between the valve disc **130** and the bottom of the receptacle receiver bracket **39***c* of the turret.

Considering that in a preferred embodiment the diameter of the transverse channel **244** is ¼" and that its centerline in the valve-open position (FIGURE 12) is ⅜" below the cylinder bottom **133***b*, it will be noted that the diameter and elevation of the transverse channel **244** in the valve-opened position is such that the valve will be fully shut during a terminal portion of the downward stroke of piston **132** and, therefore, a quantity of the liquid within the cylinder **133***a* will be expelled back into the liquid hopper **131** via the inlet passages **241***a*, **241***b* at such time. Thus, valve shut-off always occurs during or prior to the time when the lifted turret **39** has been lowered to its lowermost position. Further considering that the height of the valve tube flat portion **240** is ½", it is seen that the valve is shut during the last ¼" of downward movement of the piston. This corresponds to 11½° of rotation of the plunger shaft yoke disc **78** (FIGURE 8), considering that the diameter of the path of movement of the roller cam **79** is 2". It also corresponds to 22½° of rotation of the turret lift cam **94** since its period of rotation corresponds to that of the valve disc **78**. Further, and considering that the upper piston rod stop **233** (FIGURE 2) may be positioned against the plunger lever **229** when the latter is against the lower stop **232** so as to eliminate all lost motion, the maximum stroke of the piston **132** is 2", corresponding to the stroke of the plunger shaft **59**. However, the maximum quantity of coffee cream which may be dispensed is that determined by 1¾" of piston stroke under conditions and for the reason as aforesaid.

To dispense a predetermined quantity of coffee cream into a receptacle, the upper stop **233** should be positioned at a location above the plunger shaft lever **229** (when the latter is against the lower stop **232**) at a location which is equal to 1¾ inches minus the length of piston stroke as is necessary to determine the requisite predetermined volume of liquid between the cylinder **133***a*, considering not only the inside diameter of the cylinder but also the displacement volume of the valve tube flat portion **240**.

Referring now to the action of the filter apparatus in metering out and dispensing such predetermined quantity of coffee cream, in a preferred embodiment the position of the roller cam **79** is at bottom dead center with respect to the yoke disc **78** so that the plunger shaft **59** is initiating its upward movement at the time when the turret lift cam **74** is entering its 90° period of dwell commensurate with the indexing rotation of the turret **39**. Accordingly, the plunger shaft **59** begins to rise as the turret begins to rotate, but the piston **132** remains against the cylinder bottom **133***b* during the aforementioned distance of rise of the plunger towards contact with the upper stop **233** since the lever **229** is sliding on the piston rod **132***a*.

After the yoke disc **78** has rotated in counterclockwise direction (FIGURE 8) over an arc of movement determinative of such distance of upward movement of the plunger **59**, the lever **229** contacts the upper stop **233** so that the piston **132** begins to rise. The piston **132** rises the requisite distance during the remainder of the 180° of rotation of the yoke disc **78** to stop dead center positioning of the cam **79**. It will be noted that the turret lift cam **94** will begin to lift the turret **39** as the yoke disc **78** achieves 90° of its referred to movement and that, considering a turret lift of one inch and that the top of the receptacle **50** is initially one-half inch below the valve disc **130**, the filler valve will begin to open when the yoke disc has achieved 135° of the movement.

At the 180° point in the counterclockwise movement of the yoke disc **78**, the turret **39** will be in its fully lifted position, the filler valve will be completely open, and the piston **132** will be in its fully raised position.

Because of the slidable connection between the plunger shaft lever **229** and the piston rod **132***a*, the piston **132** will not commence its downward stroke until the yoke disc has rotated over a further arc of movement as is necessary to lower the lever **229** into contact with the lower stop **232** on the piston rod **132***a*. The turret lift cam **94** will have commensurately rotated over an equal angle of movement at the time when the piston **132** commences its downward stroke. Filling of the receptacle commences with the downward stroke of the piston, and will be completed at the time when the turret **39** is still ¼" above its lowermost position for reasons aforesaid. Thus, a typical operation of the filler apparatus **40** has been described.

Turning now to the details and operation of the receptacle dispensing apparatus **38**, reference is first made to FIGURE 15 wherein the basic shuttle action of the dispenser is illustrated. It is there shown that the dispenser tube **110**, in which a nested stack of receptacles **50** has been placed (only two of the receptacles being illustrated for clarity), has an attached shuttle shelf **250** (only a portion of which is shown) in which a transversely slidable shuttle **251** is mounted. The shuttle shelf **250** is attached adjacent the pair of window-like openings **252** formed at the opposite sides of the dispenser tube **110**, as shown. The shuttle **251** is a substantially U-shaped flat plate whose elongated opening **253**, along its major length adjacent the closed end **251***a* thereof, is slightly wider than the diameter of the receptacle bead **53** to permit the receptacles **50** to fall freely therethrough. The overall length of the opening **253** is at least one and one-half times the diameter of a receptacle **50**. At the open end **251***b* of the shuttle, the opening **253** is narrowed by a pair of inwardly projecting receptacle support elements **254** at opposite sides of the shuttle as shown. Thus, when the shuttle is in its normal receptacle supporting position as illustrated, the nested stack of receptacles rests on the support elements **254** and is prevented from dropping out of the dispenser tube **110**.

Attached along the upper surface of each leg portion **255** of the U-shaped shuttle is a receptacle stripper element **256** which projects inwardly of the opening **253** to the same extent as do the respective receptacle support elements **254**. Each stripper element **256** has a flat upper surface **256***a*, and is located along the length of its associated shuttle leg **255** such that the surface **256***a* will support the nested stack of receptacles **50** when the shuttle **251** has been moved to its receptacle dispensing position (FIGURE 20). Movement of the shuttle **251** to its receptacle dispensing position is effectuated by a movable pin **260** which engages an aperture **257** of the shuttle, as indicated in FIGURES 15 and 20. From FIGURE 15 it will be understood that the underside **256***b* of the surface **256***a*, where it projects into the opening **253**, slopes downwardly in the direction away from the dispenser tube **110**, and that the height of each stripper element **256**, above the upper surface of its associated shuttle leg **255**, is approximately equal to, or slightly greater than the height of the receptacle bead **53**. Thus, when the shuttle **251** is pushed inwardly to its dispensing position as illustrated in FIGURE 20, the sloping underside surface **256***b* of each stripper element **256** assures positive separation and stripping of the bottommost receptacle **50** from the nested stack thereof, while the top surface **256***a* of the stripper element supports the remaining receptacles in the stack. The stripped receptacle **50** falls by gravity through the shuttle opening **253** and on to one of the receptacle receiver brackets **39***b* of the turret **39** which, as previously described, has been located below the dispenser tube **110**. When the shuttle **251** is thereafter moved outwardly to its position as shown in FIGURE 15, the stack of receptacles **50** will drop from the stripper element top surfaces **256***a* to rest on the receptacle support elements **254** until the shuttle **251** is again actuated.

Actuation of the shuttle via the movable pin **260** and responsive to the lifting action of turret **39** is best understood by reference to FIGURES 16–20. Referring first to FIGURES 16 and 18, it is seen that the shuttle shelf **250** extends laterally outward of the dispenser tube **110** and therefore also serves as a support for a transversely extending bearing block **258**. The shuttle shelf is longitudinally slotted, as at **250***a*, to provide movement clearance for the pin **260** which projects through the slot to its engagement with the shuttle aperture **257**. The fixed bearing block **258** provides a journal for the pivotable shaft **259**, to one end of which the depending pin **260** is attached, and is at an elevated location with respect to the shuttle shelf upper surface so as to permit a wide swing of the pin **260** to appropriately move the shuttle **251**. Thus, and as illustrated by FIGURES 19 and 20 which show two positions of the shuttle **251** during its movement from its normal receptacle supporting position as shown in FIGURES 15 and 17 to its receptacle dispensing position as shown in FIGURE 20, pivotal movement of the shaft **259** in the clockwise direction of the arrow pivots the depending pin **260** so that the lower end of the latter so moves the shuttle by its engagement with the shuttle aperture **257**. It is apparent that pivoting the shaft **259** in counterclockwise direction will return the shuttle **251** to its receptacle supporting position as shown in FIGURE 15.

Referring now to FIGURE 17 it is seen that a shuttle actuating lever **261** is attached to the other end of the pivotable shaft **258**, the lever **261** being oriented at 90° with respect to the direction of the pin **260**. At its free end, the lever **261** has a transversely extending shoulder pin **262** (FIGURE 16), the latter projecting at both sides of the lever **261**. As perhaps best shown by FIGURES 17 and 18, the inwardly directed projection of the lever **261** is engaged by the vertically reciprocal plunger **111** when the latter is lifted by the turret **39** as previously mentioned so that, as will be apparent from FIGURE 17, the one-inch rise of the turret **39** will depress the plunger **111** the same distance to pivot the lever **261** and shaft **259** and thus shift the shuttle as indicated in FIGURES 19 and 20. The plunger **111** is slidable within a plunger tube **263** which is attached to one side of the shuttle shelf **250** as seen in FIGURE 18.

As previously described, the turret will rise only after a receptacle receiver station **39***a* has been rotated and halted in position immediately below the bottom opening of the dispenser tube **110**, and therefore the dispenser apparatus **40** will be actuated only at such times. The resulting shift of the shuttle **251** to its dispensing position causes the shuttle stripper element to strip the bottommost receptacle **50** from the receptacle stack so that it is deposited on the turret receiver bracket **39***b* as indicated by dotted lines in FIGURE 18. The turret **39** then moves downwardly, as aforesaid.

The downward movement of the turret **39** permits the plunger **111** to drop downwardly to relieve its pressure of engagement with the shoulder pin **262**. So that the pin **262** follows the downward movement of the plunger **111** to thereby pivot the shaft **259** and pin **260** and thus return the shuttle **251** to its normal receptacle supporting position, a spring **264** is attached between the outwardly directed projection of the pin **262** and a spring mounting lug **265** which is attached to the lower end of the plunger tube **263**, as best illustrated by FIGURE 18. Thus, the spring **264** normally biases the shuttle **251** into its receptacle supporting position as shown in FIGURES 15 and 17.

A manually pivotable dispenser shut-off lock **266** (FIGURE 16) is pivotally connected, as by a pivot pin **267**, to the upper surface of the shuttle shelf **250** adjacent the forwardmost position of movement of the shuttle pin **260**. The shut-off lock **266** is pivoted in the direction of the arrow (FIGURE 16) when dispenser action is to be terminated while receptacles remain within the dispenser tube **110**, and while the machine **30** continues to operate to permit the two preceding dispensed receptacles to be filled and capped. For example, immediately after the last in a predetermined number or series of receptacles has been dispensed, the lock **266** is pivoted 90° into the path of the shuttle pin **260** as it would otherwise return to its normal position responsive to the bias of the spring **264**. The recessed portion **268** of the lock **266** will engage the pin **260** and prevent its return by overcoming the bias of the spring **264**. Thus, the shoulder pin **262** of the lever **261** is held away from the top end of the plunger **111** so that the reciprocal movement of the latter, responsive to the vertical movement of the turret **39**, is ineffective to operate the dispenser.

Referring now to the somewhat diagrammatic showing of FIGURE 21, it will be understood that the machine **30** may be modified to double its filled and capped receptacle output without increasing the machine speed. That is, the turret **339** may be provided with four quadrant-disposed pairs **339***a*, **439***a* of receptacle receiver stations, rather than single stations, the pairs being aligned in the direction of the turret circumference. It is conceivable that the paired receptacle receiver stations could be radially aligned, or that double-pairs of circumferentially and radially aligned receptacle receiver stations for quadrupling machine output might be provided, although ancillary receptacle discharge means such as vertically movable or pivotable receptacle knockout arms would probably be required.

However, in the illustrated arrangement wherein the pairs of receptacles will be automatically and conveniently discharged from the machine by the discharge chute **442** as has been described, a pair of receptacle dispensers **338**, **438** are mounted at one quadrant of the machine for dispensing a pair of receptacles **50** into the respective of the paired receiver stations **339***a*, **439***a*. The dispensers are adjacent one another, and operate responsive to vertical movement of the turret **339** by mechanisms as previously described.

The filler apparatus 340 may include but one hopper 331 but in any event will include an appropriately disposed pair of valves and valve discs 330, 430 with which the respective receptacles will make contact during the filling operation. The valve tubes 335, 435 will operate within individual cylinders (not shown) within the hopper 331, and it will be noted that the coincidentally actuating pistons within the cylinders may be operated by a single filler plunger shaft (not shown), having a lost motion connection to each of the two piston rods which actuate the pair of pistons.

Individual shrink-film closures will be simultaneously applied to the respective of the paired receptacles at the capping station 441 of the machine. The vertically movable capping head (not shown), will have a pair of adjacent apertures for simultaneously receiving both receptacles, a cutting knife 399 (FIGURE 21), being attached to the capping head between the suitable spaced receptacle receiving apertures thereof for severing the single sheet 345*a* of shrink-film material as will be automatically fed as aforesaid to form both closures. The sheet 345*a* will be severed from the roll of film (not shown), by an additional knife 499 attached to the rearward end of the capping head.

Thus, a receptacle dispensing, filling and shrink-film capping machine and method has been described which achieves all of the objects of the invention.

What is claimed is:

1. A machine for dispensing, filling and capping receptacles, said machine comprising a base having receptacle transport means mounted for movement thereon, said transport means having means providing a plurality of receptacle receiver stations thereof, respective receptacle dispensing, filler, and shrink-film capping apparatus mounted on said base in spaced apart relation with respect to each other in said operational sequence and adjacent said receptacle transport means, and drive means mounted on said base including means for moving said receptacle transport means to respectively and successively position its said receptacle receiver stations in operational alignment with said receptacle dispensing, filler and shrink-film capping apparatus, said receptacle dispensing apparatus having actuating means actuated by movement of said receptacle transport means to position at least one receptacle on each said receptacle receiver station when the receiver station is in said operational alignment therewith, and said receptacle filler and shrink-film capping apparatus being respectively adapted for actuation upon contact of a receptacle on one of said receptacle receiver stations when in said operational alignment therewith.

2. A machine according to claim 1 wherein each said receptacle receiver station is adapted to receive at least two receptacles in adjacent, laterally spaced apart relation with respect to each other, and said receptacle dispensing apparatus is adapted to dispense, and each of said receptacle filler apparatus and shrink-film capping apparatus is adapted to perform its respective operational function simultaneously upon, said number of receptacles in each receptacle receiver station.

3. A machine according to claim 1 wherein said receptacle transport means comprises a rotatable turret, said receptacle receiver stations being disposed in spaced apart relation about the periphery of said turret, and said receptacle dispensing, filler, and capping apparatus are positioned at corresponding spaced apart peripheral locations with respect to said turret.

4. A machine according to claim 3 wherein said turret is disposed in vertically spaced relation with respect to said base, and said means providing each said receptacle receiver station comprises bracket means for supporting the received receptacle whereby the bottom of the receptacle is disposed a distance below said turret, all of said bracket means and said turret being further adapted to permit removal of each said receptacle from the respective of said receptacle receiver stations by lateral movement of the receptacle in radially outward direction with respect to said turret, and said base further has guide arm means disposed between said turret and said base substantially adjacent said capping apparatus for contacting by the respective of said receptacles during rotational movement of said turret, said guide arm means being further positioned radially inward of said peripheral disposition of the receptacle receiver stations whereby, upon said contacting of said guide arm means by the respective of said receptacles and upon subsequent rotational movement of said turret, the respective receptacles are so removed from the respective of said receiver stations.

5. A machine according to claim 4 wherein said base further has a chute portion adjacent said guide arm means for guiding said removed receptacles to a remote location with respect to said turret.

6. A machine for dispensing, filling and capping receptacles, said machine comprising a base having receptacle transport means mounted for movement thereon, receptacle dispensing apparatus including a magazine for containing a nested stack of receptacles and means for dispensing said receptacles one at a time from said stack on to said transport means, receptacle filler apparatus including bulk supply means for supplying the material with which each receptacle will be filled and means including valve means for discharging a predetermined portion of said material from the bulk supply thereof into each of said dispensed receptacles, shrink-film capping apparatus including a heated capping head for applying an individual shrink-film closure to each of said so-filled receptacles, apparatus for feeding shrink-film material between said capping head and the receptacle on which said shrink-film closure will be formed, and means for moving said receptacle transport means, said receptacle transport means being positioned and movable with respect to said receptacle dispensing, filler, and capping apparatus to transport each said dispensed receptacle from said dispensing apparatus to said filler apparatus and thence to said capping apparatus, all of said dispensing, filler, and capping apparatus being mounted on said base, said film feeding apparatus comprising means for supporting the shrink-film material to be fed, drive roll means for engaging said film material adjacent to its leading edge and for so feeding a predetermined length thereof, receptacle sensor means for sensing the presence of a receptacle on said transport means while being moved to said capping head, and means between said receptacle sensor means and said drive roll means for so actuating the latter only in response to said sensing of a receptacle by the receptacle sensor means.

7. A machine according to claim 6 wherein said film feeding apparatus is mounted on said shrink-film capping apparatus.

8. A machine according to claim 6 wherein said receptacle transport means comprises a rotatable turret, said means for moving said transport means comprises means for rotating said turret, and said dispensing, filler, and capping apparatus are positioned at spaced apart circumferential locations with respect to, and adjacent the periphery of said turret.

9. A machine according to claim 8 wherein said turret has at least three receptacle receiver stations at equally spaced apart circumferential locations for receiving said dispensed receptacles, said spaced apart circumferential locations of said dispensing, filler, and capping apparatus being respectively associated with each of said three receptacle receiver stations when said turret is in a given rotational position, and said means for rotating said turret includes means providing intermittent rotating movement thereof whereby said receptacle receiver stations are caused to dwell at each said apparatus location for a period during the rotation of said turret.

10. A machine for dispensing, filling and capping receptacles, said machine comprising a base having a rotatable

turret mounted thereon, said turret having at least three receptacle receiver stations at equally spaced apart circumferential locations, receptacle dispensing apparatus including a magazine for containing a nested stack of receptacles and means for dispensing individual receptacles from said stack on to the respective of said receptacle receiver stations, receptacle filler apparatus including bulk supply means for supplying the material with which each receptacle will be filled and means including valve means for discharging a predetermined portion of said material from the bulk supply thereof into each of said dispensed receptacles, shrink-film capping apparatus including a heated capping head for applying an individual shrink-film closure to each of said so-filled receptacles, apparatus for feeding shrink-film material between said capping head and the receptacle on which said shrink-film closure will be formed, said dispensing, filling and capping apparatus being mounted on said base at respective spaced apart circumferential locations with respect to, and adjacent the periphery of said turret which are respectively associated with each of said three receptacle receiver stations when said turret is in a given rotational position, and means for intermittently rotating said turret whereby each said receptacle receiver station is moved from said dispensing apparatus to said filler apparatus and thence to said capping apparatus and caused to dwell at each said apparatus location for a period during the rotation of said turret, said means for rotating said turret further comprising means providing intermittent vertical reciprocal movement of the turret with respect to said base during said periods of dwell whereby, simultaneously upon each upward movement thereof, said turret is moved into contact with said dispensing apparatus to actuate the same to dispense a receptacle on to one of said receptacle receiver stations and other receptacles, situated on the other of said receptacle receiver stations, are respectively moved substantially into contact with said filler apparatus and said heated capping head of said capping apparatus, said filler apparatus and said capping apparatus being operable responsive to said contact by a receptacle whereby the receptacles are respectively so filled and so capped.

11. A machine according to claim **10** wherein said means of the dispenser apparatus for dispensing said receptacles one at a time comprises a dispenser shuttle mounted on said magazine for slidable movement in direction transversely of said magazine between a first position and a second position, depressible spring plunger means, and arm means between said shuttle and said spring plunger means, said spring plunger means normally biasing said shuttle towards its said first position, and said spring plunger means being disposed vertically and within the path of said turret whereby during said upward movement of the turret said turret depresses said spring plunger means, said arm means being movable responsive to said depressing of the spring plunger means to move said shuttle to its said second position.

12. A machine according to claim **11** wherein said arms means comprises a horizontally disposed shaft mounted substantially on said magazine for pivotal movement, a first lever attached to said shaft and projecting laterally therefrom into the path of movement of said spring plunger means, and a second lever attached to said shaft and projecting laterally therefrom to engagement with said shuttle.

13. A machine according to claim **10** wherein said means providing intermittent vertical reciprocal movement of said turret comprises a continuously rotating turret lift cam mounted on said base, said lift cam having a cam track, and cam follower means mounted on said base and engaging said cam track and said turret, said cam track including inclined portions whereby said cam follower means imparts said vertical reciprocal movement of said turret lift cam.

14. A machine according to claim **13** wherein said capping head of said shrink-film capping apparatus is mounted for vertical reciprocal movement in direction opposite to that of said turret, and said means for rotating said turret further comprises connection means between said cam follower means and said capping head for imparting said vertical reciprocal movement to the latter substantially commensurate with said vertical reciprocal movement imparted to said turret.

15. A machine according to claim **13** wherein said cam track further includes a dwell portion between its said inclined portions, said cam follower means engaging said dwell portion during said intermittent rotative movement of the turret.

16. A machine according to claim **15** wherein said means for rotating said turret further comprises a Geneva drive for imparting said intermittent rotating movement to the turret, said Geneva drive being mounted on said base and including a Geneva wheel and a continuously rotating Geneva crank adjacent said Geneva wheel, and connection means between said Geneva wheel and said turret whereby, during each revolution of said Geneva crank, said crank periodically engages said Geneva wheel to rotate the same and said turret only a portion of one revolution, said cam follower means engaging said dwell portion of said turret lift cam track during said engagement of said Geneva crank with said Geneva wheel.

17. A machine for dispensing, filling and capping receptacles, said machine comprising a base having a rotatable turret mounted thereon, said turret having means providing at least three annularly spaced apart receptacle receiver stations thereof, and respective receptacle dispensing, filler, and shrink-film capping apparatus attached to said base and arranged in said sequence of operations adjacent the periphery of said turret at the respective of said receptacle receiver stations when said turret is in a given rotational position, means for intermittently rotating said turret to move its said receiver stations successively and simultaneously into respective operational positions with respect to said dispensing, filler and capping apparatus and for momentarily maintaining said receiver stations in said operational positions, means for moving said turret upwardly and then downwardly during the time when said receiver stations are so maintained in their said operation positions whereby, simultaneously upon each upward movement thereof, said turret is moved into contact with said dispensing apparatus to actuate the same to dispense a receptacle on to that turret receiver station which is in operational position with respect thereto and other receptacles, situated on other of said turret receiver stations, are moved substantially into respective contact with said filler apparatus and said capping apparatus, said filler apparatus and said capping apparatus being operable responsive to said contact by receptacle whereby the receptacles are respectively filled and capped, shrink-film feeding apparatus in fixed position with respect to said base, and means for actuating said shrink-film feeding apparatus responsive to each said intermittent rotating movement of said turret and to the presence of a receptacle in that turret receiver station which is in operational position with respect to said filler apparatus.

18. A machine according to claim **17** wherein said means for actuating said shrink-film feeding apparatus comprises a depressible lever mounted on said base adjacent said receptacle filler apparatus and disposed to be contacted and depressed by a receptacle on that receptacle receiver station which is in operational position with respect to said filler apparatus as it is moved from said filler apparatus to said capping apparatus.

19. A machine according to claim **17** wherein said shrink-film capping apparatus includes a capping head, said shrink-film feeding apparatus is at a location between said filler apparatus and said capping apparatus, and said shrink-film feeding apparatus when so actuated feeds a predetermined length of shrink-film material between said capping head and said receptacle whose presence caused

said actuation thereof, the speed of said shrink-film feeding apparatus being in timed relation with respect to the speed of said intermittent rotating movement of the turret, and the location and direction of feeding of the fed film being such that said receptacle, while moving from its operational position with respect to said filler apparatus to its operational position with respect to said capping apparatus, contacts and supports the film while the latter is being so fed.

20. A machine according to claim **19** wherein said capping head is mounted for vertical reciprocal movement with respect to said shrink-film feeding apparatus, said capping head having knife means attached thereto and disposed for severing said predetermined length of said material commensurate with each downward movement of said capping head.

21. A machine according to claim **20** wherein said knife means is heated.

22. A machine according to claim **20** wherein said shrink-film feeding apparatus includes substantially fixed horizontal plate means having a forward edge adjacent to the vertical plane of movement of said capping head knife means, said shrink-film feeding apparatus being adapted to feed said predetermined length of said material across the top surface of said plate means and towards its said forward edge whereby said forward edge of the plate means assists said cutting action of the knife means.

23. A machine comprising a base having receptacle transport means mounted for movement thereon, receptacle filler apparatus mounted on said base adjacent said receptacle transport means, said receptacle filler apparatus including bulk supply means for supplying the material with which receptacles placed on said transport means will be filled and means including valve means for discharging a predetermined portion of said material from the bulk supply thereof into said receptacles, said filler apparatus further including a reciprocal plunger for metering out said predetermined portion of material from said bulk supply, shrink-film capping apparatus mounted on said base adjacent said receptacle transport means including a vertically reciprocal capping head for applying individual shrink-film closures to said receptacles when so filled, apparatus for feeding shrink-film material between said capping head and the receptacle on which said shrink-film closure will be formed including means for mounting a roll of shrink-film material and a rotatable drive shaft for so feeding a predetermined length of film from said roll, and drive means for actuating said plunger of the filler apparatus and said capping head of the capping apparatus and said drive shaft of the shrink-film feeding apparatus.

24. A machine according to claim **23** wherein said drive means comprises a single motor means, and connection means between said motor means and said filler plunger and said capping apparatus capping head and said film feeding apparatus drive shaft whereby said motor means drives all of the same.

25. A machine according to claim **24** wherein said connection means includes a rotatable cam mounted on said base and connected in driven relation with respect to said motor means, and cam follower means between said cam and said filler plunger for imparting said reciprocal movement to the latter.

26. A machine according to claim **25** wherein said cam follower means comprises an elongated yoke, and said cam comprises a rotatable disc having a fixed projection adjacent its periphery, said fixed projection being in engagement with said yoke.

27. A machine according to claim **23** wherein said filler plunger comprises a piston and a piston shaft, and said drive means comprises motor means, cam means driven by said motor means, a plunger shaft mounted for reciprocal movement responsive to said driving of the cam means, and lost motion connection means between said plunger shaft and said piston shaft.

28. A machine according to claim **27** wherein said lost motion connection means comprises an arm attached at one of its ends to said plunger shaft and slidably engaging said piston shaft at the other of its ends, and means on said piston shaft for engagement by said arm after a preselected period of said slidable movement of said arm relative to said piston shaft whereby said piston shaft moves responsive to movement of said plunger shaft.

29. A machine according to claim **28** wherein said means on said piston shaft for engagement by said arm comprises upper and lower stop means at respective locations above and below said arm, at least said upper stop means being adjustable along the length of said piston shaft.

30. A machine according to claim **23** wherein said bulk supply means comprises a hopper for containing a supply of said material, and said filler apparatus further comprises piston tube means within said hopper, said piston tube means including means defining a cylinder, cylinder inlet channel means below said cylinder for passage of said material from the interior of said hopper into said cylinder, and vertically disposed open passage means extending from the interior of said cylinder to a location below said hopper, and said filler apparatus valve means comprises a valve mounted for vertically slidable movement within said piston tube passage means, said valve having a closed upper end, an open lower end, means defining a central outlet channel thereof extending between its said ends, and means defining a laterally disposed valve inlet opening to its said central outlet channel at a location below its said upper end, said valve being slidable between an upper position and a lower position thereof, said vertically disposed open passage means of the piston tube means including a widened portion communicating with said valve inlet opening when said valve is in its said upper position, said valve closing off said communication of said widened portion and said cylinder inlet channel means being in communication with the interior of said cylinder when said valve is in its said lower position, and said valve closing off said communication of said cylinder inlet channel means when said valve is in its said upper position.

31. A machine according to claim **23** wherein said drive means comprises motor means, means driven by said motor means for moving said receptacle transport means, and means between said receptacle transport moving means and said capping head for imparting said vertical reciprocal movement to the latter responsive to movement of the former.

32. A machine according to claim **31** wherein said receptacle transport moving means comprises a continuously rotating lift cam in driven relation with respect to said motor means and including a cam track having inclined portions for determining vertical reciprocal movement of a cam follower, an arm having an end mounted for vertical pivotal movement on said base and an opposite end connected to said receptable transport means, a cam follower mounted on said arm at a middle location along its length and in following engagement with said lift cam track whereby said vertical pivotal movement is imparted to said arm during rotation of said lift cam, and said means between said receptacle transport moving means and said capping head comprises second arm means mounted at a middle location along its length for vertical pivotal movement on said base, said second arm means having an end substantially engaging said opposite end of the first said arm and an opposite end connected to said capping head for imparting said vertically reciprocal movement to the latter responsive to said pivotal movement of the first said arm.

33. A machine according to claim **23** wherein said drive means comprises motor means, a rotatable shaft mounted on said base, said shaft being connected to said

film feeding apparatus drive shaft for imparting rotational movement thereto, an overrunning type clutch mounted on said rotatable shaft and in driven relation with respect to said motor means, and clutch actuating means for causing engagement between said clutch and said rotatable shaft responsive to the movement of a receptacle, situated on said receptacle transport means, towards said shrink-film capping apparatus.

34. A machine according to claim **33** wherein said clutch actuating means comprises a horizontally disposed lever mounted for pivotal movement on said base.

35. In a receptacle filling machine having a base, the improvement comprising receptacle support means mounted for vertical reciprocal movement on said base and adapted to receive a receptacle to be filled, drive means mounted on said base for imparting said movement to the receptacle support means, and receptacle filler apparatus comprising bulk supply means for supplying the material with which said receptacle will be filled, vertically slidable valve means normally projecting to a lowered position thereof for contact and sliding to a raised position thereof by said receptacle when the latter is moved upwardly during said movement of said receptacle support means, means defining a cylinder for containing a measured portion of said material and including inlet channel means for passage of said material from the bulk supply thereof into said cylinder when said valve means is in its said lowered position and discharge passage means permitting discharge of said portion of material from said cylinder through said valve means when said valve means is in its said raised position, a piston mounted for slidable movement within said cylinder for determining said measured portion of material, a piston shaft attached to said piston, and connection means between said piston shaft and said drive means for imparting reciprocal movement to said piston, said movement of the piston being in a direction to decrease the volume of said cylinder when said valve means is in its said raised position, said connection means including adjustable means for providing lost motion between said piston shaft and said drive means to determine the quantity of said measured portion of material.

36. In a receptacle filling machine the improvement according to claim **35** wherein said connection means between said piston shaft and said drive means comprises a plunger shaft mounted on said base for reciprocal movement, means connecting said drive means to said plunger shaft to impart said reciprocal movement thereto, means providing a normally slidable connection between said plunger shaft and said piston shaft, and stop means on said piston shaft at one side of said slidable connection means, said slidable connection means engaging said stop means during said movement of the plunger shaft to impart said movement to the piston shaft, said lost motion means comprising adjustable stop means positionable along the length of said piston shaft at the opposite side of said slidable connection means.

37. In a machine for filling a receptacle, the improvement comprising a hopper for containing a bulk supply of the material with which said receptacle will be filled, said hopper having a bottom end through which said material will pass into said receptacle, piston tube means attached to said bottom end of the hopper and including means defining a vertically disposed cylinder and a vertically disposed opening extending from the interior of said cylinder to a location exterior of said hopper at its said bottom end, a piston mounted for reciprocating movement within said cylinder, and a valve mounted for vertically slidable movement within said piston tube means opening, said valve being slidable between an upper position and a lower position thereof and having a closed but laterally recessed upper end which is disposed below said cylinder when said valve is in its said lower position, said valve further including an open lower end, means defining a valve outlet channel extending from its said open lower end to a location below its said upper end, and means defining a valve inlet opening to said valve outlet channel at said location below its said upper end, said piston tube means further including means defining a cylinder outlet channel extending between said cylinder and said valve inlet opening when said valve means is in its said upper position, and a cylinder inlet opening extending from its said vertically disposed opening to the interior of said hopper, said recessed upper end of the valve means being adjacent said cylinder inlet opening when said valve means is in its said lower position.

38. Shrink-film capping apparatus for forming a shrink-film type closure on the mouth rim of a receptacle from an oversized sheet of shrink-film material positioned on and extending across said receptacle mouth rim to provide an overhanging peripheral edge portion of the sheet surrounding the latter, said apparatus comprising a capping head including a heater block having an underside surface and means defining a vertically disposed cavity of the heater block extending inwardly from its said underside surface, said cavity having configuration the same as, and size only slightly larger than said receptacle mouth rim for receiving the latter in freely fitting relation, means for heating at least the cavity-surrounding edge of said heater block to shrink-film shrinking temperature, a plunger disc for shielding only that area of said shrink-film sheet which extends across said receptacle mouth rim from the heat of said heater block, said plunger disc having configuration the same as, and size only slightly smaller than said cavity for freely slidable movement of the disc within said cavity, said plunger disc having an underside surface of heat insulating material for contacting said receptacle mouth rim, and means mounting said plunger disc for vertically slidable reciprocal movement between a first opsition whereat its said underside surface is below said underside surface of the heater block and a second position whereat its underside surface is within said cavity at a location spaced vertically away from said heater block underside surface, said plunger disc being normally biased to its said first position, and means for aligning said receptacle mouth rim with and positioning the same within said heater block cavity whereby said overhanging edge portion of said sheet of shrink-film material contacts said cavity-surrounding edge of the heater block, said capping head being mounted for vertical reciprocal movement between a raised position and a lowered position thereof, said plunger disc mounting means including a shaft attached to and extending upwardly from said plunger disc and having an upper end disposed substantially above said capping head, and stop means in fixed position, said stop means being disposed immediately adjacent said disc shaft upper end for contact by the latter when said capping head is in its said raised position, said disc shaft having length, and the distance of travel of said capping head during its said movement being such that said disc is in its said first position when said capping head is in its said raised position.

39. In receptacle dispensing apparatus having a vertically disposed magazine for containing a nested stack of receptacles and including an open lower end through which said receptacles will be dispensed one at a time, and receptacle retention and stripping means mounted at said magazine lower end for movement between a first position thereof supporting said stack of receptacles and a second position thereof to dispense one receptacle and support the remaining receptacles in said stack of receptacles, the improvement comprising lateral projection means of said receptacle retention and stripping means whereby urging of said projection means in respectively opposite directions moves said receptacle retention and stripping means between its said first and second positions, vertically disposed plunger means projecting below said magazine lower end and mounted substantially on said magazine for vertically slidable movement, arm means pivotally mounted substantially on said magazine

and including one end disposed within the path of said slidable movement of said plunger means and an opposite end engaging said lateral projection means, and spring means having a fixed end mounted substantially on said magazine and an opposite end attached to said arm means and normally biasing said one end of the latter into contact with said plunger means, whereby upward movement of said plunger means pivots said arm means to move said receptacle retention and stripping means from its said first to its said second position and whereby, when said plunger is moved downwardly, the bias of said spring means moves said receptacle retention and stripping means from its said second to its said first position.

40. In receptacle dispensing apparatus, the improvement according to claim 39 wherein said apparatus further includes a positionable stop mounted substantially on said magazine for movement into and out of the path of movement of said arm means when said receptacle retention and stripping means is in its said second position whereby,

when said stop is positioned in said path, said stop overcomes the bias of said spring means to prevent said movement of the receptacle retention and stripping means from its said second to its said first position.

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CERTIFICATE OF CORRECTION

Patent No. 3,354,614 November 28, 1967

David L. St. Clair et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 23, line 58, for "arms" read -- arm --; line 73, after "movement" insert -- to said turret during said rotating movement --; column 24, line 43, for "operation" read -- operational --; column 28, line 35, for "opsition" read -- position --.

Signed and sealed this 17th day of December 1968.

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

EDWARD J. BRENNER

Commissioner of Patents