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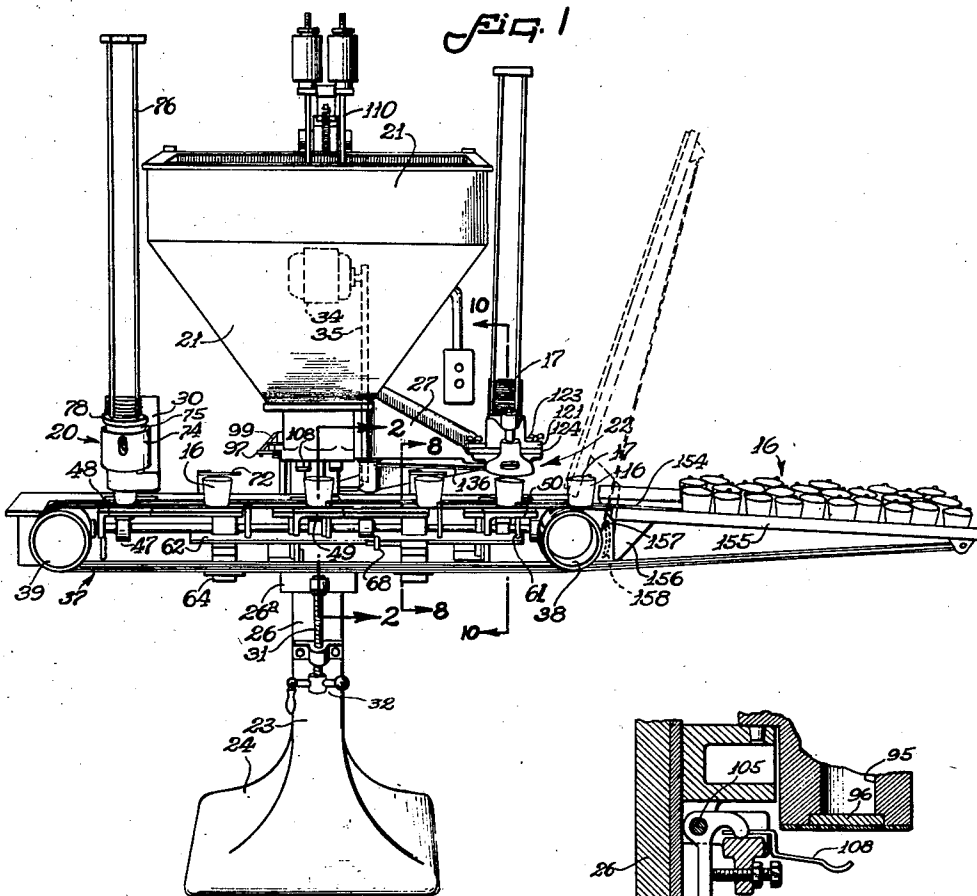
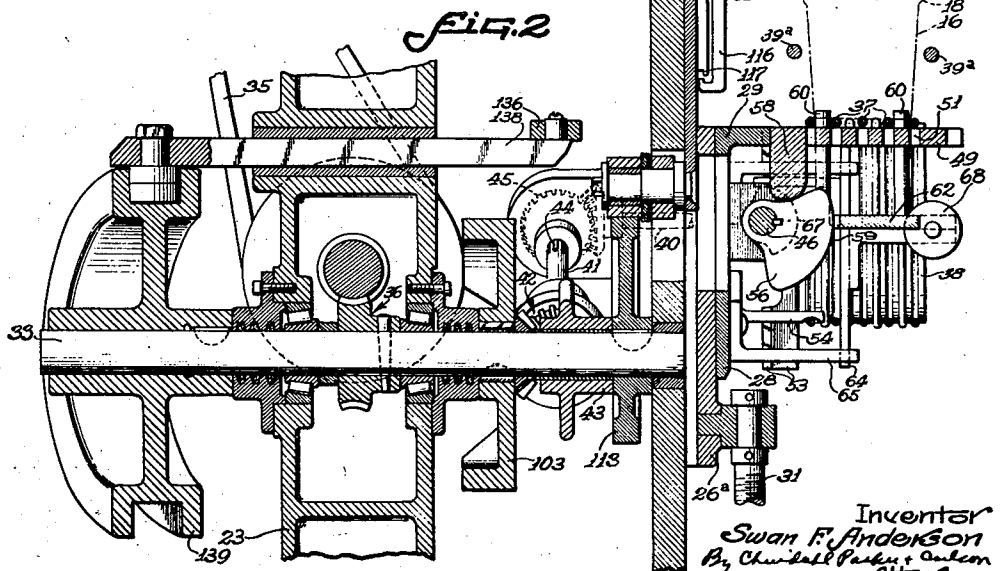
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2,029,299

COMBINED FILLING AND CAPPING MACHINE

Filed Sept. 30, 1932

4 Sheets-Sheet 1



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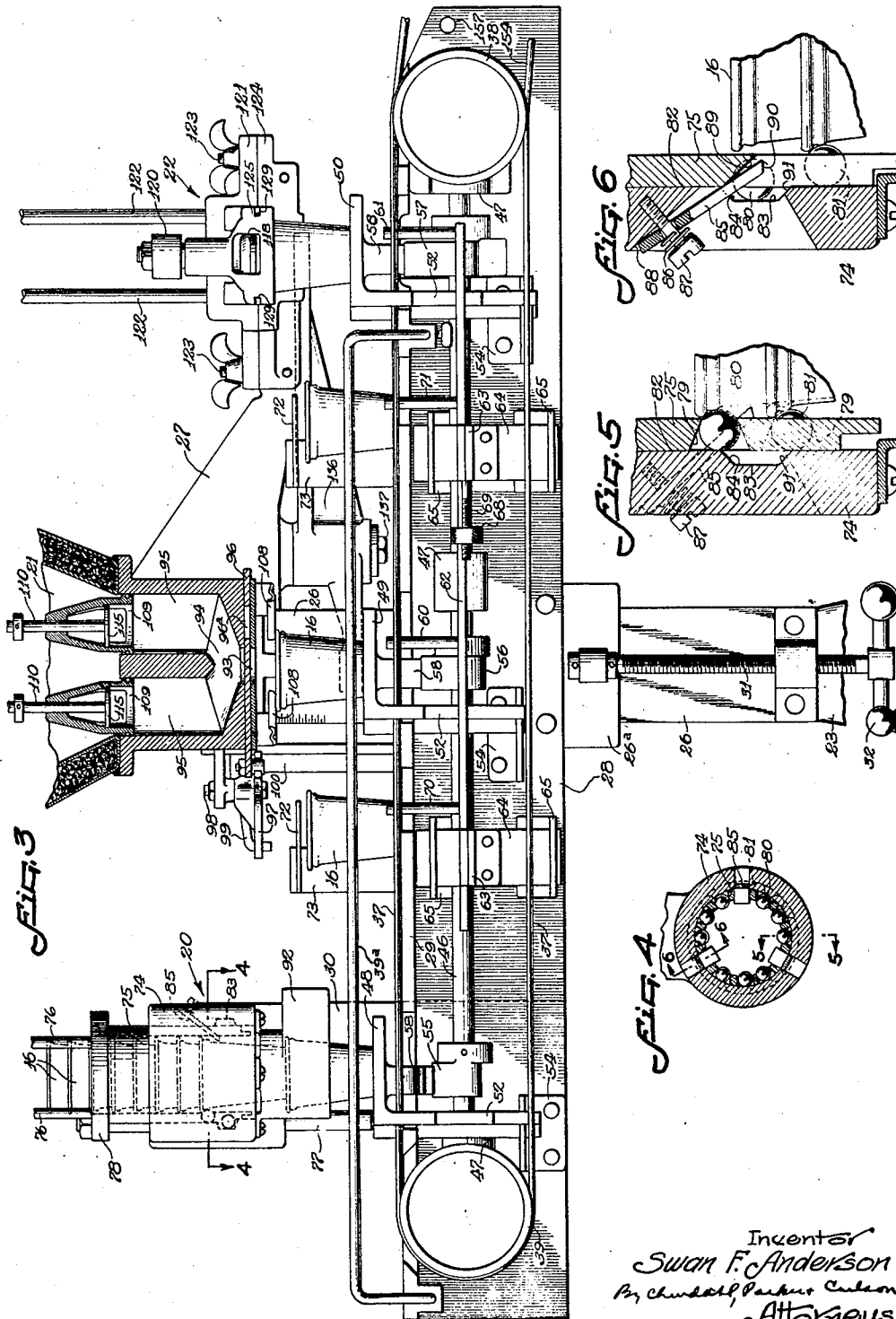
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COMBINED FILLING AND CAPPING MACHINE

Filed Sept. 30, 1932

4 Sheets-Sheet 2



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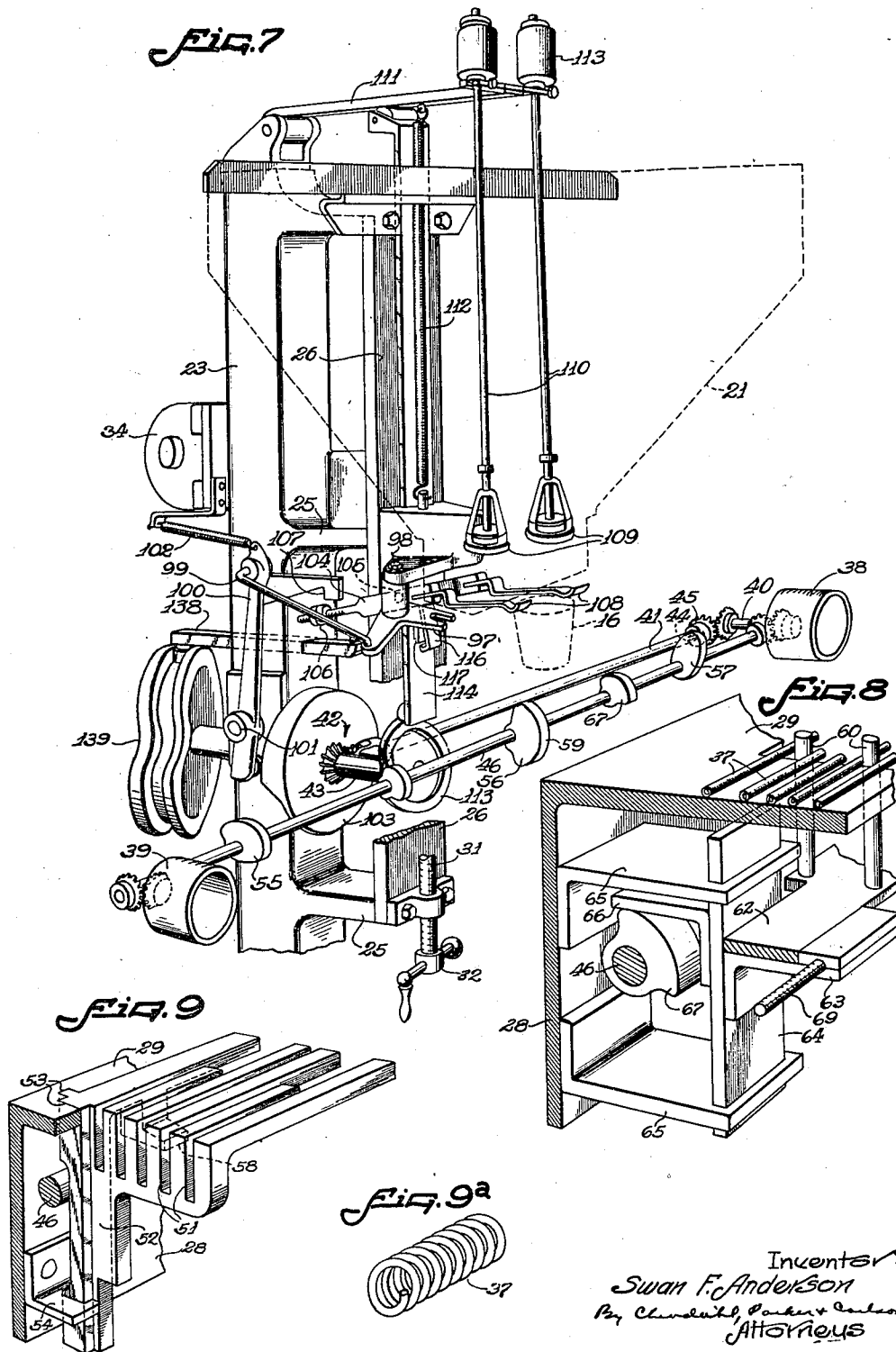
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COMBINED FILLING AND CAPPING MACHINE

Filed Sept. 30, 1932

4 Sheets-Sheet 3



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COMBINED FILLING AND CAPPING MACHINE

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4 Sheets-Sheet 4

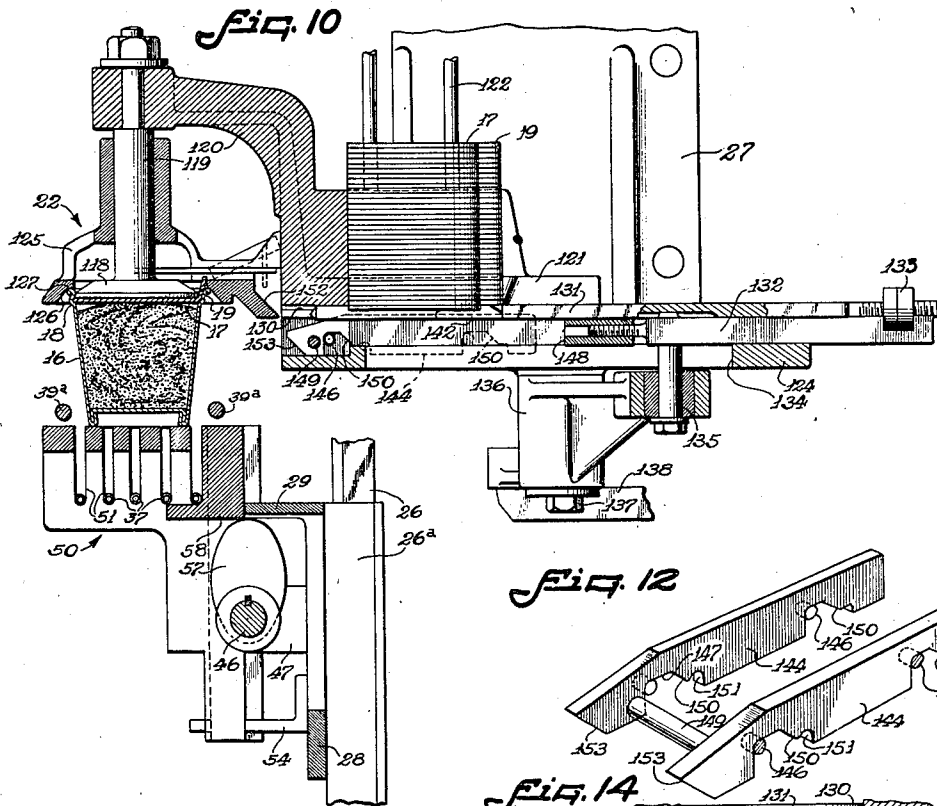


Fig. 12

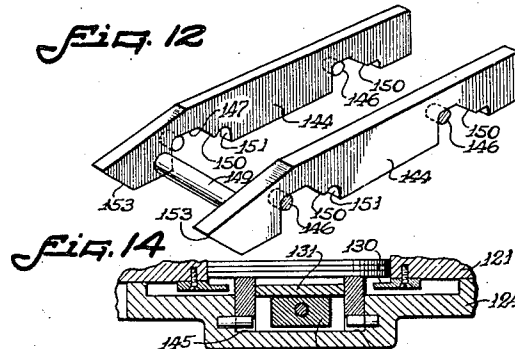


Fig. 14

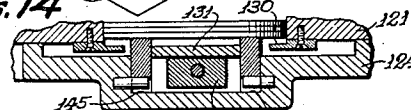


Fig. 15

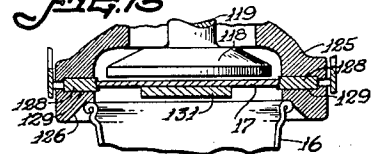
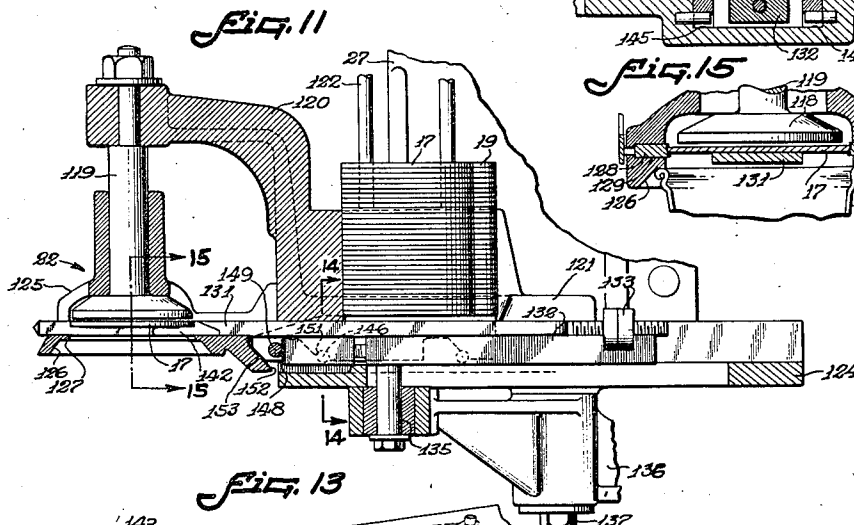
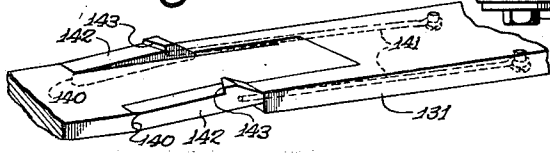


Fig. 13



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UNITED STATES PATENT OFFICE

2,029,299

COMBINED FILLING AND CAPPING
MACHINE

Swan F. Anderson, Rockford, Ill.

Application September 30, 1932, Serial No. 635,482

17 Claims. (Cl. 226—76)

This invention relates to the filling and capping of cups or containers into which liquid or semi-liquid materials such as ice cream are dispensed.

5 The general object of the present invention is to provide an automatic combined cup-dispensing, filling and capping machine which is capable of high speed production of filled containers, which is reliable in operation and readily adapt-
10 able to containers of different sizes, and relatively simpler in construction than machines for the same purpose heretofore produced.

Another object is to provide a mechanism for conveying cups from one station of the machine
15 and presenting the cups to the different mechanisms to operate thereon in a novel manner enabling the latter mechanisms to be simplified in construction and the cost of manufacture of the machine as a whole to be reduced accordingly.

20 The invention also resides in the construction of the cup conveyor and presenting mechanism by which adjustment of the machine for cups of different sizes is obtained.

25 Still another object is to simplify the number and complexity of the power driven parts by which the conveyor and the cup-dispensing, filling and capping mechanisms are actuated in timed relation.

Other objects and advantages of the invention
30 will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

35 Figure 1 is a front elevational view of a filling and capping machine embodying the features of the present invention.

Fig. 2 is a fragmentary sectional view taken along the line 2—2 of Fig. 1.

40 Fig. 3 is a fragmentary front elevational view showing a portion of the filling mechanism in section.

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 3.

45 Figs. 5 and 6 are sectional views taken respectively along the lines 5—5 and 6—6 of Fig. 4.

Fig. 7 is a perspective view of the main operating parts of the machine.

Fig. 8 is a perspective sectional view taken along the line 8—8 of Fig. 1.

50 Fig. 9 is a fragmentary perspective view of one of the cup elevating devices.

Fig. 9a is a perspective view of one of the conveyor belts.

55 Figs. 10 and 11 are sectional views taken along the line 10—10 of Fig. 1.

Figs. 12 and 13 are perspective views of different parts of the capping mechanism.

Figs. 14 and 15 are sectional views taken respectively along the lines 14—14 and 15—15 of Fig. 11.

5 In the form selected for purposes of illustration, the invention is embodied in an automatic machine for filling cups 16 with material such as ice cream and applying caps or disks 17 to the open ends of the filled cups. The cups commonly
10 used have downwardly tapering body portions adapted to receive the cap snugly at the upper end and providing an inwardly opening annular groove 18 in which the cap becomes seated with the withdrawal tab 19 on the cap projecting up-
15 wardly. The cups to be filled are stacked in a cup dispenser 20 and released one-by-one onto a conveyor by which they are moved to filling position beneath a hopper 21 containing the ice cream and thence to a capper 22.

20 The main frame of the machine comprises a post 23 upstanding from a pedestal 24 and having forwardly projecting arms 25 secured to a vertical plate 26 on the upper end of which the hopper 21 is mounted. The capper, which is also station-
25 arily mounted, is supported by a bracket 27 projecting from the post. Slidable upon vertical ways formed by the plate 26 is a bracket 26^a to which is secured a flat bar 28 disposed in a vertical plane and supporting a horizontal table 29
30 extending transversely of the machine beneath the cup dispenser, the filler and the capper. A bracket 30 supporting the cup dispenser is secured to the table at the end thereof opposite the capper.

35 The vertical position of the table is determined by a screw 31 interposed between the bracket 26^a and a nut on the lower arm 25 and adapted to be turned by a handle 32 to adjust the machine according to the height of the cups to be filled. This adjustment may be gauged by plac-
40 ing a cup to be filled upon the table and turning the handle until the cap line or groove 18 on the cup is at the level of a mark on the plate 26.

45 All of the mechanisms above referred to are driven from a main drive shaft 33 which makes one revolution in each cycle of the machine during which, in the present instance, one cup is fed onto the conveyor by the dispenser 20, the second preceding cup on the conveyor is filled
50 from the hopper, and the fourth preceding cup is closed by the capper 22. Herein the shaft projects rearwardly from the plate 26 and is journaled intermediate its ends in the post 23 being driven by an electric motor 34 through the me-
55

dium of a belt 35 and having a worm and worm-wheel connection 36 with the shaft.

The conveyor by which the cups are advanced with a step-by-step motion from the dispenser through the filling and capping positions runs continuously during operation of the machine and for purposes to appear later, comprises a series of endless belts 37 arranged in spaced parallel relation on drums 38 and 39 rotatably supported on opposite ends of the bar 28. As shown in Fig. 3, the upper portions of the drums are disposed in openings in the table 29 so that the upper straight runs of the belts are disposed above the table. To avoid the necessity of providing adjusting devices, each belt preferably comprises a resilient wire of small gauge wound into helical form as shown in Fig. 9a and possessing sufficient resiliency to maintain the belt taut on the supporting drums. In their movement by the conveyor, the cups are held against movement laterally of the conveyor by guide bars 39a on the table adjustable to accommodate cups of different diameters and positioned to locate the cups properly relative to the filling and capping mechanisms.

The conveyor is driven through a connection constructed to permit of the vertical adjustment above referred to while the connection remains engaged. For this purpose, the shaft 40 on which the drum 38 is carried is connected by bevel gears to one end of a shaft 41 rotatably supported on the rear side of the bar 28 and having its opposite end connected to the shaft 33 by bevel gears 42, one of which is rotatably supported by a sleeve 43 loose on the shaft 33. The shaft 41 is thus adapted to pivot about the center of the drive shaft during vertical adjustment of the table 29 which is made possible by virtue of the splined connection 44 (Fig. 2) between the gear 45 and the shaft 41 which connection provides for the necessary extensibility of the connection. Preferably, driving power is also applied to the conveyor drum 39 which is accomplished through the medium of a shaft 46 rotatably supported by lugs 47 projecting forwardly from the plate 28 and having its opposite ends connected by bevel gearing to the drum shafts.

During filling and capping each cup is elevated from the conveyor. For this purpose and to enable each cup dropped by the dispenser to be lowered gently onto the conveyor, horizontal platforms 48, 49 and 50 are located respectively at the dispensing, filling and capping stations and adapted to be raised and lowered in timed relation to the machine cycle. Each platform is disposed in an opening cut out from the table 29 and comprises a rectangularly shaped block having upwardly opening parallel slots 51 to receive the belts 37 and permit the platform to be raised to the desired height above the conveyor. To guide each platform vertically, the block has a depending leg 52 (Fig. 9) with square lugs 53 projecting therefrom and cooperating at their upper ends with correspondingly shaped notches in the table 29 and at their lower ends with notches in a bracket 54 secured to the bar 29. The platforms 48, 49, and 50 are actuated respectively by cams 55, 56, and 57 on the shaft 46 which, by virtue of the bevel gearing employed, operates at the same speed as the main drive shaft and in timed relation to the machine cycle. Each cam acts on a depending lug 58 on the platform and the different cams are shaped to raise their platforms substantially simulta-

neously. For reasons to appear later, the cam 57 permits the platform 50 to fall quickly after the uppermost position is reached while a relatively long dwell surface 59 on the cam 56 holds the cup raised for a substantial portion of the cycle to allow proper time for filling.

To properly position the cups for presentation to the filler and capper by the elevating devices above described, stops are provided which are adapted to be projected into the path of the cups on the conveyor to arrest the motion of the cups as they reach filling or capping positions opposite the respective platforms, the stops being retracted before the platforms are lowered, thereby allowing the conveyor to carry the cup forwardly to again rest upon the belts 37. In the present embodiment, the stops are in the form of pairs of fingers 60 and 61 (Figs. 3 and 8) upstanding from a bar 62 supported for endwise movement longitudinally of the conveyor by two horizontal shelves 63 each secured to and projecting forwardly from a slide 64 guided for vertical movement by brackets 65 which project forwardly from the plate 28. Projecting rearwardly from the slides are arms 66 which constitute the followers for cams 67 fast on the shaft 46 and shaped to raise the bar 62 and project the fingers 60 and 61 up through the conveyor belts and platforms 49 and 50 just before the platforms are raised by the cams 56 and 57. The upper ends of the fingers are thus positioned to engage the cup near the base thereof thus arresting the motion of the latter in proper positions. Retraction of the fingers beneath the conveyor occurs before the platforms reach their lowermost positions, the cups being then free to move forwardly with the belts 37.

By shifting the fingers 60 and 61 in a direction longitudinally of the conveyor, it will be apparent that the machine may be adapted for filling and capping cups of different sizes or diameters. Such adjustment is effected in the present instance by turning a thumb nut 68 (Fig. 3) having its periphery projecting into a notch in the bar 62 and threading onto a screw 69 projecting from one of the shelves 63 along the forward edge of the bar. As the nut is turned in one direction or the other, the bar is shifted in an endwise direction and the positions of both sets of fingers are varied as desired.

In a machine of the present type, it is desirable to space the cup-dispensing, filling and capping stations substantial distances apart. To accomplish this and also provide for high production without increasing the speed of the conveyor unduly, the present invention provides for the advance of each cup only a part of the distance between stations in each machine cycle so that during actual filling and capping an empty cup is disposed between the cup-dispensing and filling stations and a filled cup is disposed between the filling and capping stations. Thus the time required to advance the next cups into filling and capping positions is substantially reduced. This method of operation renders it desirable to bring the intermediate cups into timed relation to the machine cycle which may be accomplished by the addition of extra pairs of fingers 70 and 71 on the bar 62. The auxiliary stops are raised at the same time as the other fingers and serve to arrest the motion of two of the cups in the intermediate positions referred to thereby preventing such cups from being carried into engagement with the platforms 49 and 50 while the latter are raised during filling and capping of the ad-

jacent cups. To prevent the cups from being tipped over by the continuously moving conveyor while their motion is thus arrested, plates 72 on bracket arms 73 secured to the table 29 are adjusted to occupy positions immediately above the open ends of the cups when stopped by the fingers 70 and 71.

In the present embodiment, the cup dispenser 20 includes a cylindrical casing 74 secured to the table bracket 30 and enclosing and slidably supporting a sleeve 75 for vertical movement above the platform 48. The cups to be dispensed are held in a vertical stack by the sleeve and guide rods 76 upstanding therefrom. Release of the cups one at a time from the lower end of the stack is effected by raising and lowering the sleeve 75 relative to the casing, the movement of the platform 48 being utilized for this purpose. To this end, a rod 77 (Fig. 3) is guided for vertical reciprocation in the casing 74 with the lower end positioned for engagement by the platform 48 and the upper end attached to a lateral projection on a flange 78 at the upper end of the sleeve 75.

Around the periphery of the sleeve are two horizontal rows of recesses having inwardly tapering walls 79 terminating in circular openings at the inner peripheral surface of the sleeve and providing seats for balls 80 and 81. The size of the balls relative to the thickness of the sleeve 75 is such that when the balls are opposite the cylindrical inner surface 82 of the casing 74, portions of the balls will project from the inner surface of the sleeve. But when the sleeve is shifted vertically to bring the balls opposite taper-walled recesses 83 in the casing, the balls may move to a position flush with the inner sleeve surface.

When the platform 48 is in its lowermost position, the surface 82 will be opposite the lower row of balls 81 which will be projected through the sleeve 75 as shown in Fig. 6 so as to engage the lowermost cup near its upper edge thereby supporting the stack. At this time, the balls 80 of the upper row which are disposed below the lip of the second cup will be positioned in the recesses 83. Now as the sleeve is raised during upward movement of the platform, the stack of cups is raised by the balls 81 and the balls 80 become cammed inwardly into engagement with the second cup as they ride along the inclined surfaces 84 onto the vertical surface 82 (Fig. 5). The weight of the stack is now sustained by the balls 80 and the lowermost cup is released as the balls 81 come opposite the recesses 83 (Fig. 3).

Projecting downwardly and inwardly through registering openings in the casing and sleeve is an arm 85 constantly urged upwardly by a spring 86 acting between the arm and the head of a screw 87 extending through the arm adjacent the arm fulcrum 88. When the sleeve 75 is lowered as shown in Fig. 6, a surface 89 depresses the arm 85 retracting the free end 90 outside of the inner surface of the sleeve. As the sleeve rises, the arm is moved upwardly by the spring 86 and the end 90 is projected through the sleeve at a point between the lips of the first and second cups. In the continued upward movement of the sleeve but after retraction of the balls 81, the end 90 engages the lower cup from above thereby stripping the cup from the stack. When the released cup strikes the platform 48, its upper end is disposed above the lower end portion of the second cup so that the latter holds the released cup against tipping.

The weight of the cup stack is transferred from

the upper row of balls 80 to the balls 81 and the stripper arm 85 is retracted in the subsequent downward movement of the sleeve as the platform is lowered. Such transfer is effected as the balls 80 are retracted by coming opposite the recesses 83 which allows the stack to fall, this occurring after the balls 81 have been projected inwardly by engagement with the surfaces 91 and 82.

In the downward movement of the platform 48, the cup thereon is lowered gently onto the conveyor belts 37 thereby reducing to a minimum a tendency of the cup to be tipped over upon contacting the belts which occurs when the upper end of the released cup is below the lower end of the lowermost cup in the stack, thereby allowing the released cup to be advanced out of the dispensing station. A segmental skirt 92 on the casing 74 encloses the upper end of the cup effectually preventing tipping of the latter.

The cup is filled with ice cream while held in raised position on the platform 49 beneath an outlet opening 93 at the lower end of a chamber 94 communicating with the lower ends of two cylinders 95 communicating at their upper ends with the hopper. The outlet is controlled by a valve member in the form of a slide 96 adapted to close the outlet when positioned as shown in Fig. 3 and having an opening 96^a therein adapted to be brought into register with the outlet by movement of the slide to the left from said position. The slide is actuated by oscillation of a bell-crank 97 pivoted at 98 and connected by a rod 99 to the upper end of a lever 100 fulcrumed at 101. A spring 102 acts on the lever to move the valve slide from closed to open position as permitted by an open-faced cam 103 on the shaft 33. The cam is shaped to coordinate the movements of the slide 96 with that of the platform 49 allowing as much time as possible for filling to take place. Thus, the valve is allowed to open under the action of the spring 102 as soon as the platform reaches its uppermost position and is closed quickly and substantially simultaneously with lowering of the platform.

Means is provided which acts automatically to prevent opening of the hopper outlet and idle discharge of cream therefrom in the event that there is no cup on the platform 49 at the time when the cam 103 normally permits the spring 102 to act. Herein this means comprises a latch in the form of a lever 104 pivoted at 105 on the plate 26 and having an adjustable shoulder 106 at its rear end adapted for interengagement with a hook 107 on the lever 100. Projecting forwardly from the bifurcated forward end of the lever 104 are two feeler arms 108 disposed beneath the hopper on opposite sides of the outlet 93 thereof in position to be engaged by the upper edges of a cup on the platform 49. When the lever 104 is in retracted position holding the valve closed, the excessive weight of the arms 108 raises the rear end of the lever into engageable relation to the hook 107. If during subsequent release of the lever 100 to the action of the spring 102, there is no cup on the platform 49, the lever and the hook 107 will remain engaged, thereby preventing operation of the valve by the spring. But, if a cup is in proper position upon the platform, the arms 108 will be raised and the latch lever rendered ineffectual.

Ice cream from the hopper is discharged in measured quantities through the hopper outlet by downward movement of two pistons 109 disposed in cylinders 95 communicating at their

lower ends with the outlet valve chamber. Each piston is mounted for a limited degree of vertical movement on the lower end of a rod 110 secured at its upper end to the free end of an arm 111 pivoted at its other end to the post 23 and constantly urged downwardly under the action of a contractile spring 112 and weights 113. Downward movement of the arm 111 is controlled and upward movement effected by a cam 113 on the shaft 33 acting on the lower end of a follower bar 114 vertically slidable on the frame plate 26 and engageable at its upper end with the arm 111. The cam 113 is shaped to permit lowering of the arm 111 substantially simultaneously with opening of the outlet valve, the movement being reversed upon closing of the valve.

During downward movement of the pistons 109, liquid material from the hopper will be forced into the cup on the platform 49. Tipping or displacement of the cup by the force of the liquid thus discharged therein is prevented effectually by the feeler arms 108 which engage the upper edge of the cup and present the same firmly against the platform.

On the end of each rod 110 is a valve disk 115, adapted, in the initial downward movement of the rod, to move relative to the piston and become seated upon the piston proper. In the continued downward movement of the rod during which the openings 96 and 96^a are in register, the cream within the cylinder will be forced through the outlet into the cup on the platform 49. When the arm 111 is next raised, the rod 110 moves independently of the piston proper for a short distance raising the valve member from its seat thereby providing an opening through which the cream may flow into the cylinder 95 in the continued upward movement of the rod. It will be apparent that the length of the piston stroke and therefore the amount of cream dispensed in each cycle may be varied by adjusting the length of the piston rods.

In order to prevent the cream in the cylinder 95 from being placed under pressure in the event that the hopper outlet valve is held closed as above described, at the time when the arm 111 is normally actuated, the feeler lever 104 is provided with a hook 116 (Figs. 2 and 7) which, when the arms 108 are lowered, is moved in beneath a shoulder 117 on the bar 114 thereby preventing the latter from being lowered by the spring 112 in the event that no cup is in engagement with the arms when the cam 113 releases the bar for downward movement. If, however, the arms are engaged and raised by a cup, the latch hook 116 is withdrawn and the bar 114 permitted to move downwardly in the normal way.

Referring now to the capper 22, the upward movement of the platform 50 with a cup supported thereon is utilized to force a cap into the open end of the cup. To this end, a disk 118 (Figs. 10, 11, and 15) adapted to be received in the open end of the cup is secured to the lower end of a rod 119 secured at its upper end to a bracket arm 120 projecting forwardly from a plate 121 carrying guide rods 122 in which the caps are stacked, the plate itself being supported by and detachably clamped by bolts 123 to a plate 124 integral with the capper supporting bracket 27. Slidable vertically on the rod 119 is a housing 125 enclosing the disk 118 and having an upwardly converging annular surface 126 for centering the cup relative to an annular shoulder 127.

When the housing 125 is in its lower position (Fig. 11), the cap to be applied to the cup is supported directly beneath the disk 118 by the pivotal fingers 128 (Fig. 15) disposed in a horizontal guideway 129 and yieldably pressed inwardly beneath the under side thereof. Now as the platform 50 with a cup thereon is raised, the upper edge of the latter first strikes the surface 126 and after being centered by the latter engages the shoulder 127. The housing then rises with the cup, the cap being held against rising by the disk 118 and thus forced off from the fingers 128 into the open end of the cup, the edges of the cap becoming seated in the groove 18 as the housing reaches its uppermost position. The housing is lowered by gravity to the position shown in Fig. 11 as the platform 50 is retracted lowering the cup onto the conveyor.

The guideway 129 extends through a lateral extension of the housing 125 and, when the latter is in its lower position (Fig. 11), the guideway is aligned with a guideway defined by ledges 130 (Fig. 14) on the under side of the plate 121. At the rear end of the latter guideway, the plate 121 is apertured to receive the lowermost cap 17 in the stack which is arranged with the finger tabs 119 on the caps projecting rearwardly.

The lowermost cap is fed out of the stack along the guideways by a shuttle 131 reciprocable forwardly and backwardly through the housing 125 and supported from the plate 124 by a slide 132 also guided for endwise movement by the plate 124. The slide and shutter are adjustable longitudinally thereof by means of a nut 133 threading onto the rear end of the shuttle with its periphery disposed in an upwardly opening notch in the slide. Projecting downwardly from the slide 132 through a slot 134 is a pin 135 having a pivotal connection with one end of a lever 136 (Figs. 1 and 10) pivoted intermediate its ends on a vertical stud 137 and having its other end joined to a link 138 (Fig. 2). The latter is guided for endwise reciprocation by the post 23 and constitutes the follower of a barrel cam 139 on the shaft 33 shaped to shift the link backwardly and thereby feed the shuttle forwardly shortly after the capped cup is lowered out of engagement with the housing 125 and the latter has moved downwardly to bring the cap guideway into alignment with the guideway in the plate 121. Later the link 138 is moved forwardly to retract the shuttle from the housing 125, this occurring prior to the succeeding upward movement of the platform 50. Pivoted at 140 on the shuttle 131 and urged upwardly by spring 141 housed within the shuttle are two arms 142 having shoulders 143 upstanding therefrom adapted to engage the lowermost cap in the stack as the shuttle moves forwardly. Thus, during each forward stroke of the shuttle and slide, a cap is normally removed from the stack and slid along the guideways 130 and 129 into a position directly beneath the disk, the shoulders 143 stopping just short of the peripheral edge of the plunger 118.

Means is provided for preventing engagement of the lowermost cap 17 by the shoulders 143 during advance of the shuttle 131 in the event that there is already a cap within the housing 125, that is to say, in the event that the cap fed into the housing in the previous cycle of the machine is not removed by presentation of a cup thereto in the preceding upward movement of the platform 50. The means herein employed for this purpose comprises a member operable in the forward or cap-feeding movement of the shuttle to

raise the stack of caps above the level of the shoulders 143 and thus maintain the shuttle ineffectual until the housing 125 has been raised by a cup on the platform 50. Said member may take the form of two connected bars 144 in the guideway 145 on opposite sides of the shuttle at the forward end of the latter.

Normally, when the shuttle is retracted (Fig. 10), pins 146 projecting into the guideway 145 from the sides thereof are disposed opposite the flat surfaces 147 of notches on the undersides of the bars and in this position of the bars, the upper surfaces of the latter are substantially flush with the shuttle permitting the stack of caps to rest upon the latter and the lowermost cap to be engaged by the shoulders 143 in the next forward movement of the shuttle. In the latter part of this stroke but after the cap has been slid into the housing 125, the forward end 148 of the slide 132 strikes a rod 149 joining the forward ends of the bars 144 which are shifted forwardly in the final movement of the slide. In such movement, inclined surfaces 150 at the rear ends of the notches 147 ride upon the pins 146 which thereby raise the bars bodily, finally becoming seated in sockets 151 (see Fig. 11). The entire stack of caps is thus elevated so that if the bars 144 are allowed to remain thus shifted forwardly, the lowermost cap 17 will not be engaged in the succeeding forward movement of the shuttle.

Preferably, the upward movement of the housing 125 by a cup on the platform 50 is utilized to indicate removal of the cap from the housing and to cause retraction of the bars 144 before the next movement of the shuttle. For this purpose, a cam surface 152 is formed on a lateral extension of the housing 125 in a position to be disposed immediately beneath cooperating surfaces 153 on the bars 144 when the latter are shifted forwardly as shown in Fig. 11. Thus, as the housing 125 is raised by the cup, the bars 144 are cammed backwardly presenting the notches 147 to the pins which permit the bars to lower the stack of caps and again bring the lowermost cap into the path of the shoulders 143. In the event that there is no cup on the platform 50 when the latter is raised, the positions of the bars 144 will not be disturbed and the lowermost cap will be held above the shoulders 143 so that the shuttle will make an idle forward stroke in the next machine cycle. Jamming of the capper is thus prevented.

It will be observed that the plate 124 and the feeding mechanism thereon is, by virtue of the adjustment provided by the nut 133, adapted to accommodate caps of widely varying diameter. Thus, by making the plate 121 and the cap-applying mechanism proper detachable from the plate 124 and the feeding mechanism, the amount and cost of equipment required to be changed in order to adapt the machine to caps of widely varying sizes is reduced to a minimum. The plate 121, the cap guides 122, the capping housing 125 and the plunger 118 may be assembled as a unit capable of being detached readily simply by releasing the clamping bolts 123.

After being filled and capped as above described, each cup is lowered onto the conveyor and then transferred to an auxiliary conveyor constituting an extension of the main conveyor and adapted to be moved into an out-of-the-way position when the machine is not in use. The latter conveyor comprises a series of endless belts 154 (Fig. 1) alternating with the belts 37 and extending around the drum 38 and a pulley (not

shown) rotatably supported upon the free end of a collector tray 155. The opposite end of the tray is rigid with a plate 156 pivotally supported by the shaft 40 and adapted to be secured in different positions of angular adjustment by tightening a clamping bolt 157 projecting through a slot 158. By virtue of this mounting, the tray may be swung upwardly into vertical position thereby contributing to the compactness of the machine when not in use.

From the foregoing it will be apparent that I have provided a combined cup-dispensing, filling and capping machine which is rendered simple and inexpensive in construction and capable of high output by virtue of the novel manner in which the different mechanisms are coordinated for operation by a common drive unit and the cups are conveyed from one position to another and in timed relation to the machine cycle. Simply by adjustment of the stops for positioning the cups at the different stations or by adjusting the vertical position of the conveyor, the latter and the filling mechanism may be adapted to accommodate cups of widely varying sizes. The various safety mechanisms effectually maintain the cups properly positioned and in clean condition ready for packing.

No claim is made herein to the constructions of the filling and capping mechanisms per se which form the subject matter of copending divisional applications Serial No. 750,950, filed November 1, 1934 and Serial No. 755,714, filed December 3, 1934.

I claim as my invention:

1. A filling and capping machine comprising, in combination, mechanisms providing cup-dispensing, filling and capping stations arranged in spaced relation, a conveyor for supporting a succession of cups in spaced relation beneath said mechanisms and movable continuously past said stations, three platforms each located at one of said stations and adapted when raised to elevate a cup from said conveyor and present the same to one of said mechanisms, a common power-driven means operable to raise and lower said platforms in timed relation, means at the cup-dispensing station actuated by each upward movement of the platform at such station to drop a cup onto the platform, means for discharging material in measured quantities into the cups elevated by the platform at said filling station, and means actuated by the upward movement of the cup on the platform at said capping station to apply a cap to such cup.

2. A filling and capping machine comprising, in combination, filling and capping mechanisms stationarily mounted in spaced relation, an endless belt having a horizontal portion for supporting a series of cups in spaced relation beneath said mechanisms, means for advancing said belt continuously to carry the cups past said mechanisms successively, stop means at the respective stations for interrupting the advance of each cup while permitting continued advance of said belt, and elevating devices at said stations movable vertically while permitting continued movement of said belt and operable to raise off from said conveyor the cup in engagement with said stop means, and means for operating said stop means and elevating devices in timed relation to the movement of said conveyor.

3. In a machine of the character described, the combination of mechanisms providing cup-dispensing and filling stations arranged in spaced relation, a conveyor for supporting a succession

of cups in spaced relation beneath said mechanisms and movable continuously past said stations, means at the filling station adapted when actuated to elevate a cup from said conveyor and present the same to said filling mechanism, means adapted when actuated to dispense a cup onto said conveyor at the cup-dispensing station, and a common power driven means operable to actuate said elevating means and said cup-dispensing means in timed relation.

4. A filling and capping machine comprising, in combination, mechanism providing filling and capping stations arranged in spaced relation, a conveyor for supporting a succession of cups in spaced relation beneath said mechanisms and movable continuously past said stations, means at the filling station to elevate a cup from the conveyor and present the same to one of said mechanisms, means for causing a cap to be applied to a filled cup at the capping station, and a common power driven means for actuating said elevating means and said capping means.

5. A filling and capping machine comprising, in combination, mechanism providing cup-dispensing, filling and capping stations arranged in spaced relation, a conveyor for supporting a succession of cups in spaced relation beneath said mechanism and movable continuously past said stations, elevating devices at each of said stations movable in timed relation to raise the cups a predetermined distance above said conveyor, stops at said filling and capping stations adapted to be projected into the path of said cups to arrest the motion of two cups above the elevating devices at said latter stations before upward movement of the latter devices, and means at said cup-dispensing station operated by movement of the elevating device at such station to drop a cup thereon while the device is positioned above said conveyor.

6. In a filling and capping machine, the combination of filling and capping mechanisms stationarily mounted in spaced relation, an endless conveyor beneath said mechanisms driven continuously and adapted to advance a series of cups one-by-one past the mechanisms, a pair of stops movable into and out of the paths of said cups to arrest the motion of the cups opposite said mechanisms, power-driven means for advancing and retracting said stops, platforms opposite said mechanisms adapted to be raised and lowered in timed relation to the movement of said stops and when raised to elevate from the conveyor the cups engaged by said stops whereby to present such cups to said mechanisms respectively, and means by which said stops may be shifted longitudinally of said conveyor to adapt the machine for handling cups of different sizes.

7. In a filling and capping machine, the combination of an endless belt conveyor for supporting a succession of cups in spaced relation, filling and capping mechanisms arranged in spaced relation above said conveyor, a pair of platforms opposite said mechanisms adapted when raised to engage cups on said conveyor and present the same to said mechanisms, a pair of upstanding projections arranged in fixed spaced relation to each other and mounted for upward movement into the path of cups on said conveyor whereby to arrest the motion of cups opposite said mechanisms, means supporting said projections for bodily vertical movement and adjusting movement in unison and in a direction longitudinally of the conveyor to vary the positions of

said projections, and power-driven means adapted to raise said projections into the path of said cups and then raise said platforms in timed relation to the movements of said conveyor.

8. In a filling and capping machine, the combination of an endless belt conveyor for supporting a succession of cups in spaced relation, filling and capping mechanisms arranged in spaced relation above said conveyor, a pair of platforms opposite said mechanisms adapted when raised to engage cups on said conveyor and present the same to said mechanisms, a bar disposed below said conveyor and arranged for bodily vertical movement, spaced projections upstanding from said bar adapted when the bar is raised to be elevated through said platforms into the path of cups on said conveyor whereby to interrupt the movement of two cups directly above said platforms, a shaft extending along said conveyor, means on said shaft for raising and lowering said bar and platforms successively, and adjusting means by which said bar may be shifted longitudinally of said conveyor.

9. In a machine of the character described, a continuously operating horizontal conveyor for supporting a succession of cups in spaced relation, a mechanism operatively associated with the open ends of successive cups presented thereto by said conveyor, a platform movable vertically and periodically to elevate successive cups on said conveyor to said mechanism, a stop movable into and out of the path of the cups on said conveyor and adapted when disposed in said path to be engaged by the next cup on the conveyor and arrest the motion of the cup in a position above said platform, and means for raising and lowering said stop and platform in timed relation.

10. In a machine of the character described, the combination of a continuously moving endless conveyor, mechanism for dispensing cups one-by-one onto said conveyor, filling and capping mechanisms arranged in spaced relation along said conveyor, a plurality of stops operated in timed relation to said conveyor and movable into and out of the paths of the cups on said conveyor, said stops acting when withdrawn to permit advance of all of the cups and when disposed in said paths to arrest the motion of one cup in a position intermediate said dispensing and filling mechanisms, a second cup opposite said filling mechanism, a third cup intermediate said filling and capping mechanisms, and a fourth cup opposite said capping mechanism.

11. In a machine of the character described, the combination of filling and capping mechanisms arranged in spaced relation, a continuously moving endless conveyor for advancing a succession of cups beneath said mechanisms successively, a stop movable into and out of the path of the cups to arrest the movement of one of the cups opposite one of said mechanisms, a second stop movable into and out of the path of the cups at a point between said last mentioned mechanism and an adjacent mechanism, and means operating in timed relation to the movement of said conveyor to actuate said stops.

12. In a machine of the character described, the combination of an endless continuously moving conveyor for advancing a succession of cups along a predetermined path, a mechanism for operating upon each cup in a predetermined position, a stop movable into and out of the path of said cups and operable when in said path to arrest the motion of the next cup in said position, means for elevating the cup thus stopped to said mechanism

nism in timed relation to said conveyor and then to lower the cup, a second stop adapted to be projected into the path of the next cup on said conveyor and interrupt the movement thereof at a point spaced from said mechanism while said first mentioned cup is elevated above the conveyor, and means for retracting both of said stops in timed relation to the movements of said conveyor.

13. In a machine of the character described, the combination of an endless continuously moving conveyor for advancing a succession of cups along a predetermined path, a mechanism for operating upon each cup in a predetermined position, a stop movable into and out of the path of said cups and operable when in said path to arrest the motion of the cup, means for elevating the cup thus stopped to said mechanism in timed relation to said conveyor and then to lower the cup, a second stop adapted to be projected into the path of the next cup on said conveyor and interrupt the movement thereof at a point spaced from said mechanism and engageable with the lower portion of the cup to interrupt the motion thereof by said conveyor while the first mentioned cup is raised above the conveyor, and stationary means disposed above and spaced closely adjacent the open end of said latter cup when thus stopped and acting to prevent tipping of the cup by the conveyor.

14. In a machine of the character described, a mechanism stationarily mounted and arranged to operate upon the open end of a cup presented thereto, an endless conveyor mounted beneath said mechanism and adapted to support a series of cups in spaced relation, means supporting said conveyor for bodily movement toward and from said mechanism, means for driving said conveyor continuously to advance the cups thereon past said mechanism, a stop mounted on said supporting means for vertical movement into and out of the path of said cups and positioned to arrest the movement of successive cups opposite said mechanism, said stop being adjustable relative to said conveyor in a direction longitudinally of the latter, means on said supporting means for elevating the cup engaged by said stop and presenting the same to said mechanism, and a common means for actuating said stop and elevating means in timed relation.

15. In a filling and capping machine of the character described, the combination of a frame,

a horizontal support mounted on said frame for vertical adjusting movement, a pair of drums rotatably mounted on said support, an endless belt conveyor extending around said drums, a power driven shaft extending parallel to the axes of said drums and rotatably supported by said frame, filling and capping mechanisms disposed above said conveyor and adapted to be actuated from said shaft, a second shaft extending perpendicular to said first mentioned shaft and mounted on said support to swing about the axis of the latter shaft, and beveled gears connecting opposite ends of said second shaft to said first mentioned shaft and one of said drums respectively, and maintained in engagement with the first mentioned shaft and the drum in the different vertical positions of said support.

16. In a machine of the character described for filling and capping a succession of containers, the combination of filling and capping mechanisms arranged in spaced relation and stationarily mounted, an endless conveyor for supporting a succession of the containers to be filled and advancing the containers successively to said mechanisms, a support for said conveyor movably mounted beneath said mechanisms for vertical adjustment, stationarily mounted power driven means for actuating said mechanisms, and shafts and intermeshing gears providing a permanently engaged driving connection between said driving means and said conveyor and adapted to remain engaged in driving relation during vertical adjustment of said support.

17. In a machine of the character described, the combination of an endless horizontal belt conveyor adapted to support a succession of cups in spaced relation and movable continuously, a filler disposed above said conveyor and operable periodically to discharge measured quantities of material into the cups presented thereto, means supporting a stack of cups above said conveyor, an elevating device beneath the cups in said stack adapted to be raised above and lowered below the conveyor periodically, and means operating automatically when said device is above the conveyor to release the lowermost cup from said stack, the released cup being lowered onto said conveyor in the subsequent downward movement of said device.

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