

June 13, 1933.

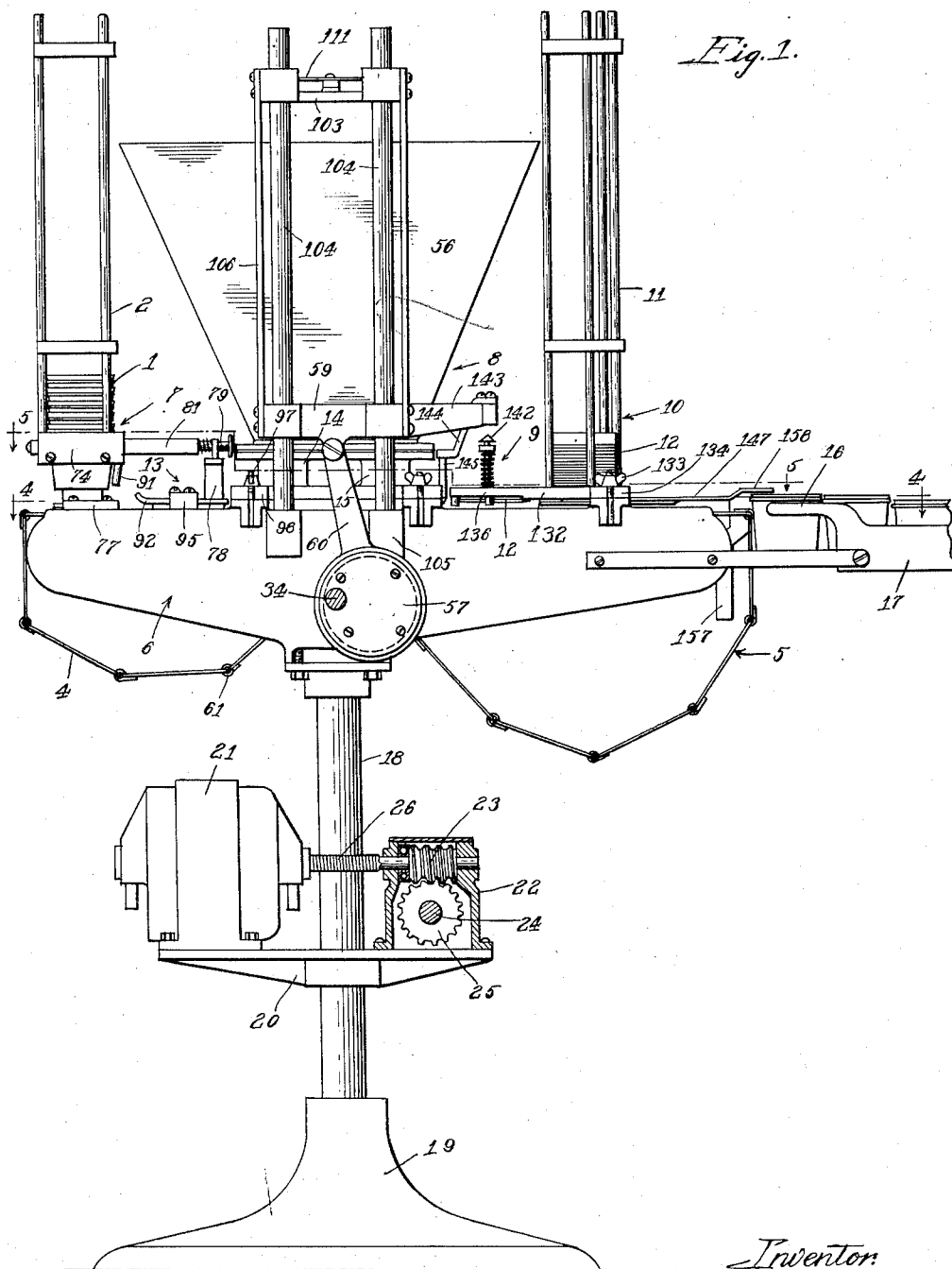
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1,913,743

FILLING AND CAPPING MACHINE

Filed Dec. 2, 1925

7 Sheets-Sheet 1



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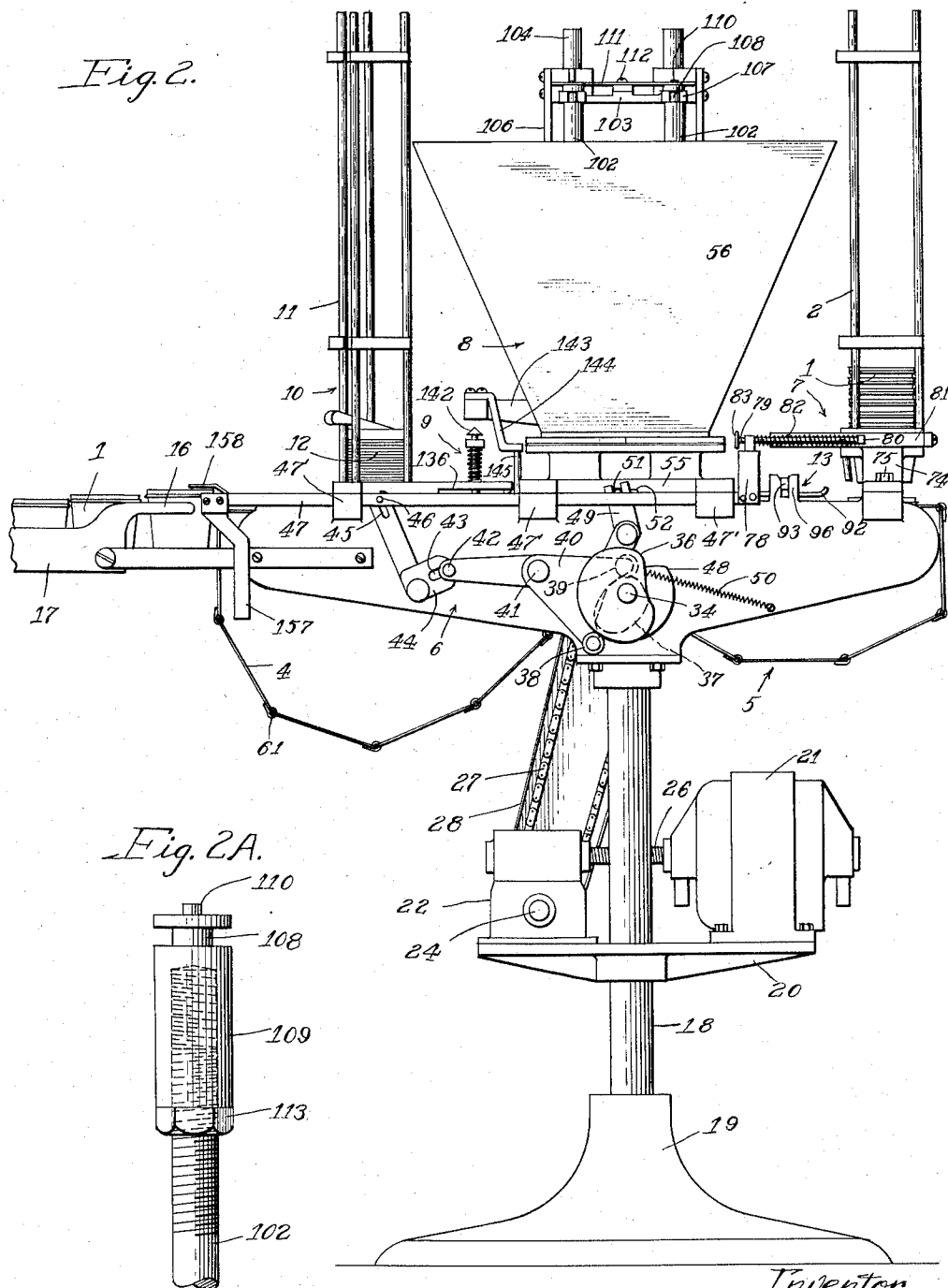
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7 Sheets-Sheet 2



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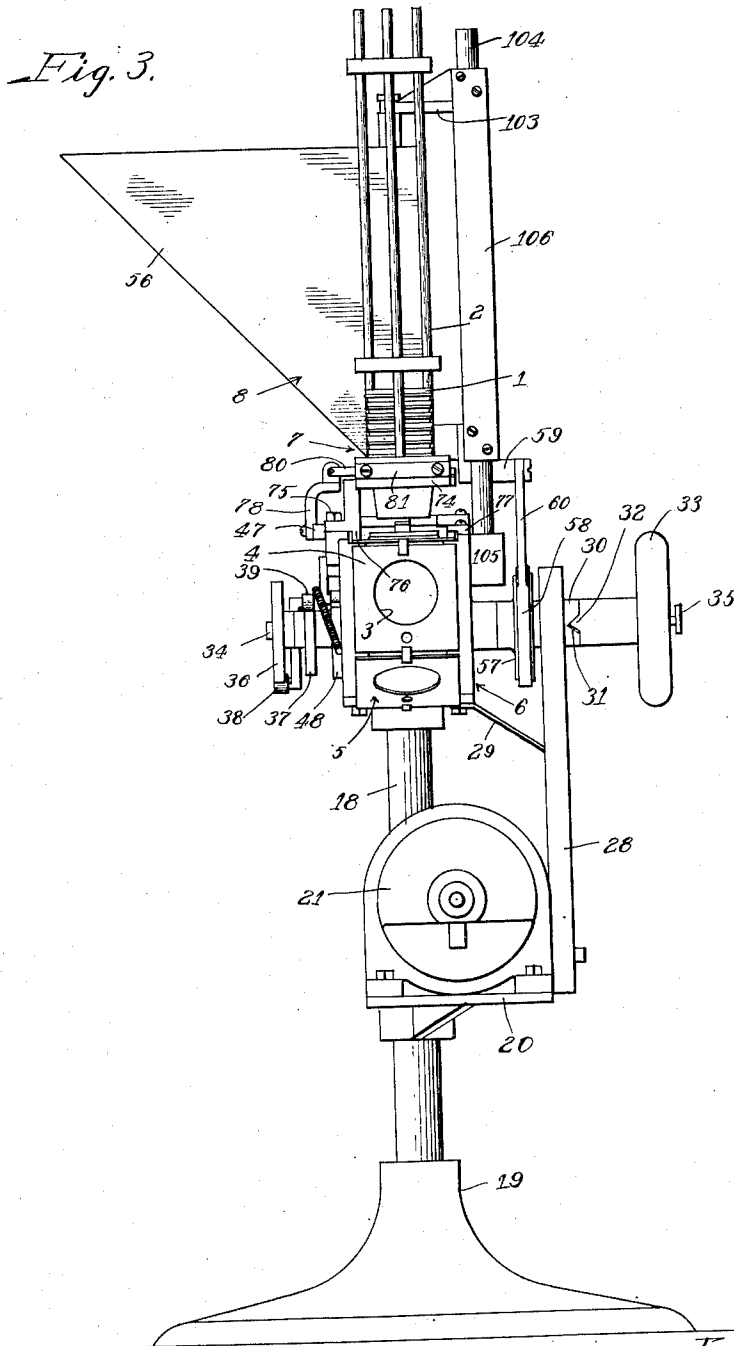
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FILLING AND CAPPING MACHINE

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7 Sheets-Sheet 3



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FILLING AND CAPPING MACHINE

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7 Sheets-Sheet 4

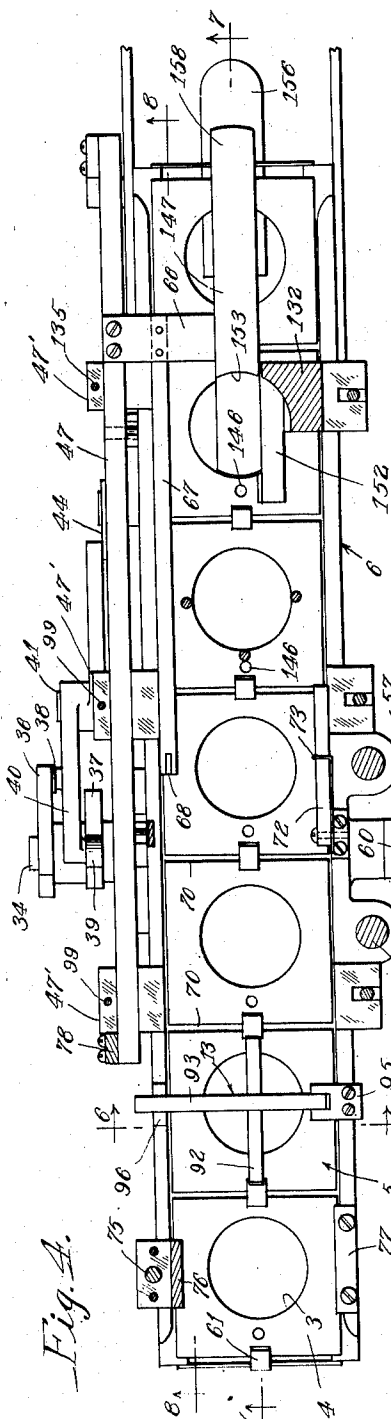


Fig. 4.

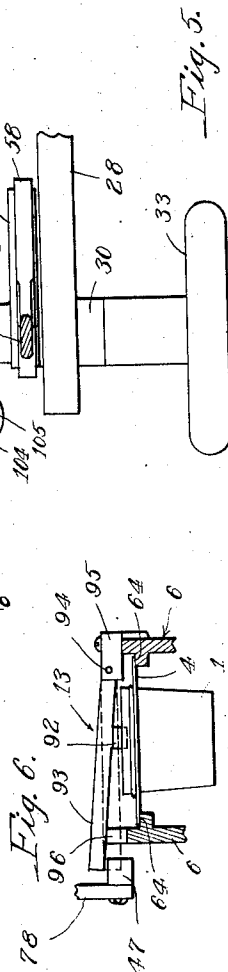
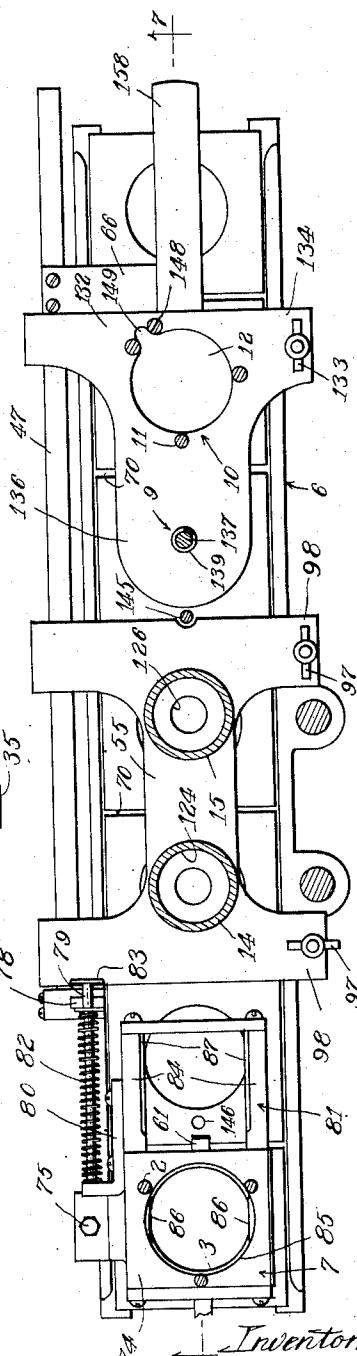


Fig. 5.



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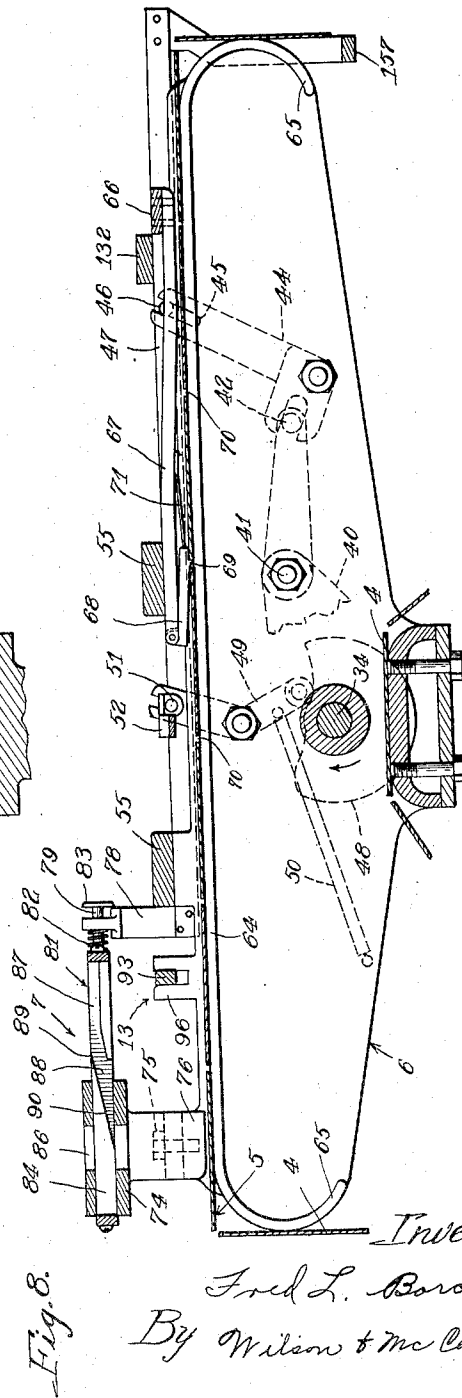
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FILLING AND CAPPING MACHINE

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7 Sheets-Sheet 5



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FILLING AND CAPPING MACHINE

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Fig. 11.

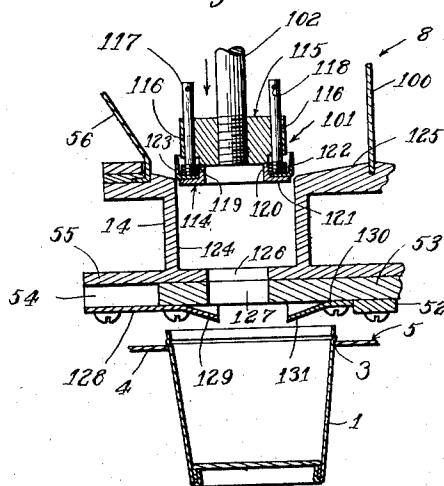


Fig. 12.

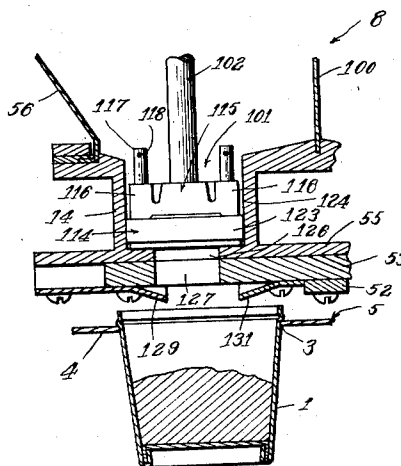


Fig. 14.

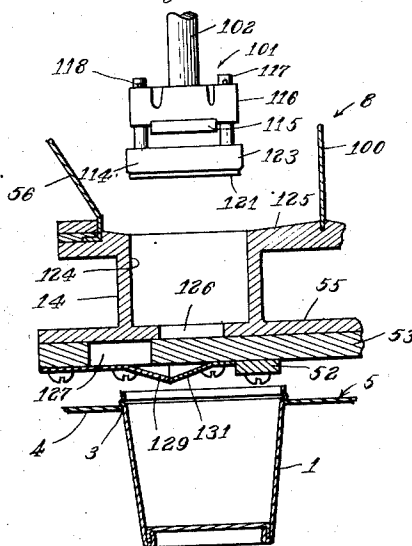
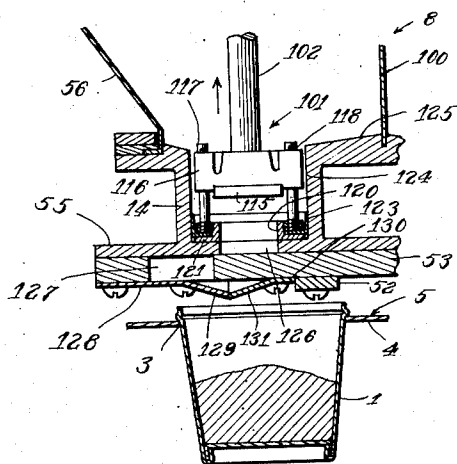


Fig. 13.



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UNITED STATES PATENT OFFICE

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FILLING AND CAPPING MACHINE

Application filed December 2, 1925. Serial No. 72,618.

This invention relates generally to dispensing apparatus and more particularly to a filling and capping machine for filling cups or other suitable containers with a measured amount of one or two kinds of ice cream or sherbet and cream and capping the same for future delivery to the ultimate consumer.

Among the more important objects of the present invention are to provide a machine which:

First, performs the work specified in an absolutely sanitary manner and with extreme rapidity for volume production in factories.

Secondly, fills an accurately measured amount of one or two flavors of cream or sherbet and cream in the desired proportions subject to variation as the operator desires and without in any way affecting the quality and merchantability of the cream but making the cream available to the consumer in a handier and more appetizing form.

Thirdly, operates entirely automatically and stops instantly in the event any excessive resistance is imposed to the machine's operation by the accidental insertion of anything into an operating part of the machine so that jamming and consequent breakage are avoided and possible injury to the operator as well without providing complicated, cumbersome, and expensive guards on the machine.

Fourthly, stops automatically in the event of a failure of the cup supply or when a defective or crumpled cup is fed into the machine thereby avoiding loss of cream and messing of the machine.

Fifthly, permits of manual turning over by a hand wheel and stoppage of power operation by merely resisting the turning of the hand wheel by light hand pressure.

Sixthly, embodies a novel cup dispenser of a simple positive-acting type and durable construction.

Seventhly, embodies a novel form of filling mechanism which accurately measures and dispenses the cream or sherbet and cream in the desired proportions.

Eighthly, embodies a novel form of cap dispensing and applying mechanisms, and

Ninthly, embodies the improvements here-

inabove specified incorporated in a single machine in a compact arrangement permitting of concerted and efficient operation conveniently from a common power source and further enabling economical construction.

The invention embraces still further objects and advantages which will become apparent to one skilled in the art to which this invention relates during the course of the following specification in which reference is made to the accompanying drawings, wherein—

Figure 1 is a front view of the machine of the present invention the driving connection from the motor being removed and the gearing transmission casing being shown in section;

Fig. 2 is a view of the reverse side of the machine;

Fig. 2A is an elevational detail on an enlarged scale of an adjustable connection provided for the cream dispensing pistons with their operating cross head;

Fig. 3 is an end view looking at the right hand end of the machine as shown in Fig. 2;

Fig. 4 is a horizontal longitudinal section through the machine on a slightly enlarged scale taken in the plane of the line 4—4 of Fig. 1;

Fig. 5 is a similar section taken on the line 5—5 of Fig. 1;

Fig. 6 is a transverse vertical sectional detail taken on the line 6—6 of Fig. 4 showing the cup rider for automatically stopping the machine in the event of a failure of the cup supply;

Fig. 7 is a central vertical longitudinal section through the machine taken on the line 7—7 of Figs. 4 and 5;

Fig. 8 is another vertical longitudinal section taken on the line 8—8 of Fig. 4;

Figs. 9 and 10 are views corresponding to Figs. 7 and 8 with the parts in altered positions corresponding to a phase of the machine's operation; and

Figs. 11 to 14 inclusive are further enlarged central vertical sectional details of the filling mechanism illustrating the complete cycle of operations involved in filling the cups with

measured amounts of cream or sherbet, only one of the two dispensing and measuring cylinders used being shown.

Throughout the views the same reference numerals are applied to corresponding parts.

The filling and capping machine of the present invention is designed to produce what are known to the trade as packaged sundaes which are individual cups intended for delivery to the ultimate consumer primarily as a handy confection for home or picnic consumption. The cups or other containers suited for this purpose are preferably of waxed paper which are relatively inexpensive and intended to be thrown away after they have served their purpose. Ice cream of one or two kinds or sherbet and cream is filled in the cups in a semi-frozen, whipped, creamy condition as it comes from the freezer, and the filled cups, sealed with caps as they come from the machine at the factory, are placed in cans to go into the hardening room. The cream or sherbet and cream are eventually delivered to the ultimate consumer in the individual packages from which the caps are easily removable preferably with a tab provided thereon. Where both sherbet and cream or cream of two flavors are filled in the cups, the proportions may be varied as desired or the cup as it is fed through the machine may first be half filled with sherbet or ice cream of one flavor and then filled to the top with ice cream of another flavor or if but one flavor is to be used, both stages of filling will of course be carried on with the same cream to result in filled cups which are not only handy for the consumer but present the cream in an appetizing fashion.

Referring to the drawings, the cups or other suitable containers 1 are fed one by one from a holder or magazine 2 into the openings 3 provided in plates 4 of an endless linked carrier or belt 5. The latter, as will presently appear, is fed step by step from end to end of a frame 6 which constitutes a unitary support for the cup dispenser 7, of which the holder 2 forms a part, the cream dispensing mechanism 8, the capping mechanism 9, and the cap dispenser 10 comprising a holder 11 for caps 12. For the purposes of a general understanding of the invention at the outset, it will suffice to state that the cups after entering the carrier pass beneath a rider 13 and by keeping the same elevated prevent the stoppage of the machine. Upon a failure of the cup supply when the rider is not elevated, the machine automatically stops and the supply must be replenished before continuing operation. After passing the rider, the next station reached by the cup is beneath the first measuring cylinder 14 from which a measured amount of sherbet is dispensed into the cup in case the cups are to be filled with sherbet and cream. The next station is beneath the second and last measur-

ing cylinder 15 from which another measured amount of cream is dispensed into the cup sufficient to fill the same. It is obvious that where cream alone is dispensed of different flavors one flavor will be dispensed from the cylinder 14 and the other from the cylinder 15, or in case only one flavor is to be used, the one cylinder will operate to supply half of the cream and the other cylinder the other half. However, in the case of different flavors of cream or in the dispensing of sherbet and cream, it is intended to provide for any desired variation in the proportions of the two materials. The filled cup at the next station after leaving the cylinder 15 is closed with a cap 12 by the capping mechanism 9 and in the course of three more step by step advances of the carrier 5 enters upon fingers 16 extending toward the machine from a chute 17. The filled cups are removed from the chute 17 and placed into cans which are removed to a hardening room. The production of the filled cups goes on at a rapid rate, as many as forty-five cups being filled per minute. The various sections of which the machine is composed will now be treated separately under different heads for purposes of convenience and clearness.

Power and manual drive

The frame 6 is supported on a pedestal 18 having an ample base 19. The column of the pedestal supports a bracket 20 on which a motor 21 is mounted. A gearing transmission casing 22 on the bracket 20 provides bearings for a worm 23 and a shaft 24 having a worm gear 25 fixed thereon and meshing with the worm 23. A heavy coiled torsion spring 26 provides a flexible drive coupling connection for the motor 21 with the worm 23. A sprocket on the projecting end of the shaft 24 drives a chain 27 operating within a guard 28 held in proper relation to the chain by a bracket 29 extending from the frame 6. A driven sprocket has a hub 30 providing clutch jaws 31 to receive the clutch teeth 32 on the hub of a hand wheel 33. The hand wheel 33 is suitably keyed or splined to the main drive shaft 34 to permit manual turning over of the machine when the occasion arises. A push button 35 at the center of the hand wheel 33 controls a clutch mechanism (not shown) so that when depressed the driven sprocket drives the shaft 34 through the hub of the hand wheel 33. A light pressure by the hand on the wheel 33 causes the latter to release the clutch and stop the machine. On the other hand, any excessive resistance imposed to the operation of the machine as, for example, by the dropping into operative position of the rider 13, as will presently appear, or by the introduction of anything in an operating part will also result in a releasing of the clutch so that the machine stops instantly in such an

eventuality. Thus, if the operator should accidentally get his hand caught in an operating part, no injury can result. At the same time if something gets caught in the machine which would otherwise result in a jamming and breakage of parts, the machine will instantly stop and the trouble may be taken care of. The details of the clutch form a part of a copending application Serial No. 199,972 filed June 20, 1927. All of the operating mechanisms incorporated in the machine derive their power from the shaft 34 as will now be brought out.

A pair of cam disks 36 and 37 are fixed on the shaft 34 and have rollers 38 and 39, respectively, operating on the peripheries thereof. These rollers are carried on studs on offsets on opposite sides of a rocker arm 40 pivoted at 41 to the side of the frame 6. The free end of the rocker arm 40 bears a pin 42 operating in a slot 43 in one arm of a bell crank lever 44, the other and longer arm of which has a slotted end 45 receiving a pin 46 to reciprocate a slide 47 in guides 47' provided in bosses projecting from the side of the frame 6. The operation of the cams 36 and 37 results in oscillation of the rocker arm 40 and through it also of the bell crank lever 44 which in turn transmits positive back and forth reciprocation to the slide 47. The slide 47 is an operating part of principal importance in the machine as it has connections with most of the operating mechanisms hereinafter described.

A third cam disk 48 is fixed on the shaft 34 and has a roller operating on the periphery thereof to oscillate a rocker arm 49 which is held with the roller normally in contact with the periphery of the cam by a tension spring 50. The rocker arm 49 is pivoted to the side of the frame 6. The opposite forked end of the arm 49 receives a pin 51 on an arm 52 secured to and extending from the side of a slide 53 operating in guides 54 provided in a base 55 on which the hopper 56 is mounted and in which the cylinders 14 and 15 are provided. The slide 53, as will presently appear, controls the dispensing of cream from the mechanism 8. It will appear that the cam 48 will serve to operate the rocker arm 49 to move the slide fairly rapidly in one direction as the roller on the rocker arm rides over the nose of the cam. When the relief portion of the cam eventually arrives opposite the roller, the spring 50 snaps the slide back to its initial position. As will presently appear, these are movements of the slide corresponding respectively to the closing and opening of the dispensing ports.

At the opposite side of the machine, an eccentric disk 57 is fixed on the shaft 34 and operates in a strap 58 to give vertical reciprocation to a cross-head 59 through a pitman rod connection 60. The cross-head 59,

as will hereinafter appear, operates the dispensing pistons in the dispensing mechanism 8.

Carrier advancing means

The endless carrier 5, as previously stated, comprises a plurality of plates 4 linked together, as indicated at 61, preferably by the interlooping of tongues on each of the plates with openings in the adjacent edges of the next plates and turned over to form eyelets. The plates are stamped from sheet metal stock and give complete support to the cups for the filling and capping operations so that they will not crumple. The circular openings 3 receive the cups with the annular bead 62 provided on the cups at the rim thereof engaging about the openings. The caps 12 are impressed into the mouths of the cups for sealing engagement in the annular groove 63 afforded on the inside wall of the cups due to the annular bead 62. The plates 4 of the carrier 5 rest flat on tracks 64 provided at opposite sides of the carrier in the frame 6. The tracks 64 are straight and merge with curved tracks 65 at opposite ends of the frame 6 where the plates 4 enter upon and leave the tracks 64. The slide 47 has a cross-arm 66 fixed thereon to which a rod 67 parallel with the slide 47 is fixed and arranged to reciprocate with the slide over the carrier 5 at one side of the frame 6. The free end of the rod 67 has a latch 68 pivoted thereto which has a tooth 69 at its free end arranged to ride into the spaces indicated at 70 which occur between the adjoining edges of the plates 4 of the carrier 5. The latch is urged toward the carrier by a light spring 71. Another latch or pawl 72 is pivoted at the opposite side of the frame and is similarly urged into engagement at its free end in the spaces 70 by a light spring 73. The latch 68 advances the carrier step by step and the latch 72 serves merely to retain the carrier at each step. Thus viewing Figs. 4 and 8, when the slide 47 moves to the left the latch 72 holds the carrier against backward movement. On the return stroke of the slide, the latch 68, which has moved to the next space 70 the width of one plate apart from its former position, advances the entire carrier and its contents to the right one step and at the limit of its movement the latch 72 drops into engagement in the same space with the latch 68 and thereby retains the carrier in its new position until a succeeding advancing movement. In the step by step progress of the carrier in steps equal to the width of any one of the plates 4 the cups 1 are advanced from station to station through the cycle of operations described above.

Cup dispensing mechanism

The cup dispenser 7 comprises a base 74 in which the holder 2 is mounted, the latter

preferably comprising a plurality of parallel vertical rods set in the base and joined together by circular bands, as shown, whereby to support a stack of nested cups. The base 74 is suitably fixed to the frame 6 at one side thereof as by means of a single bolt 75 and is positioned by dowel pins, as indicated in Fig. 4. A depending lug 76 upon the base 74 provides a guide for the carrier 5 over one of the tracks 64 where the plates 4 center upon the tracks. A plate 77 fixed to the frame 6 at the other side thereof provides a guide for the opposite side of the carrier over the other track 64. The guides 76 and 77 properly position the plates as they enter upon the tracks beneath the cup dispenser so that they receive the cups properly. The slide 47 has an upstanding finger 78 fixed to the one end thereof which is forked at its free end to receive a rod 79 fixed to a bracket 80 secured to the side of a sliding frame 81 operating in guides provided in the base 74. A coiled compression spring 82 acts between the finger 78 and the offset end of the bracket 80 about the rod 79 whereby to move the sliding frame 81 under spring pressure to the left as the dispenser is viewed in Fig. 5 when the slide 47 moves to the left. On the return of the slide 47, the forked finger 78 engages the headed end 83 of the rod 79 and positively retracts the sliding frame 81 to the position shown in Fig. 5.

The sliding frame 81 comprises a pair of parallel rods 84 the inner adjacent edges of which project slightly within a circular opening 85 provided in the base 74 of the cup dispenser. The annular bead 62 on the cups 1 rests on the shoulders 86 provided at opposite sides of the opening by the rods 84 when the frame 81 is in the position shown in Fig. 5. The inner adjacent edges of the rods 84 are recessed longitudinally at their outer ends, as shown at 87, to provide shelves onto which the lowest cup of the stack will drop when the frame 81 is moved to the left to the position shown in Figs. 9 and 10. Each of the recesses 87 is coextensive with a slot 88 leading diagonally away from the upper surface of the rods 84 to the lower faces thereof, as most clearly shown in Fig. 8. A knife edge 89 is presented at the upper end of the slot 88 which will enter beneath the bead on the second to the bottom cup of the stack when the bottom cup rests on the shelf at 87. Thus, on the return stroke of the frame 81 to the right from the position shown in Fig. 10 to that shown in Fig. 8, the bottom cup of the stack rides out and free of the stack through the slots 88 and is wedged out of adhesion with the stack by the inclined cam surfaces 90 defining the upper edges of the slots 88. The second to the bottom cup of the stack is retained on the shoulders 86 and thus becomes the bottom cup of the stack. A finger 91 is provided on the bottom of the base

74 projecting toward the carrier to guide the bottom of the cup toward the opening 3 coming into position beneath the dispenser. In fact, if it occurs that the cup does not fall directly into the opening but rests to one side toward the finger 91 it will be moved over and into the opening as soon as the carrier commences to move on its next advance. It is obvious from the discussion of the carrier advancing means that the feeding of cups one by one is in proper relation to the advancing step by step of the carrier so that each plate of the endless chain carrier is provided with a cup which it carries from the one end of the frame 6 to the other through the course of the operations first above described. If desired, the cup dispensing mechanism just described may be replaced by one conforming to the disclosure in my application Serial No. 143,340, filed October 22, 1926.

Automatic carrier stop

The rider 13, as was previously stated, serves as an automatic stop in the event of a failure of the cup supply. As illustrated most clearly in Figs. 4, 6, and 7, the rider 13 comprises a finger or feeler 92 extending lengthwise relative to the carrier 5 and having its one end curved upwardly to ride easily over the top of a cup as the carrier advances with the cups therebeneath. The finger 92 is mounted on a latch 93 pivoted at 94 on a plate 95 secured to one side of the frame 6. The free end of the latch 93 projects beyond the opposite side of the frame normally just out of the path of movement of the reciprocating slide 47, as most clearly appears in Fig. 6. A pair of lugs 96 provide guides for the free end of the latch and constitute a support therefor to prevent deflection laterally of the latch in the event the latch falls into operative position indicated by the dotted line position in Fig. 6, where the latch is in the path of movement of the slide 47 and will be engaged thereby to stop the machine. This happens, of course, when the cup supply fails so that the finger 92 does not encounter a cup to hold the rider elevated in its inoperative position. The resistance to the movement of the slide 47 results in a stopping of the machine due to the action of the clutch mechanism previously generally described. The moment the machine stops, the operator will become aware of the need for more cups and can take care of the matter so as to continue the operation of the machine. In this way, there is no possibility of ice cream being discharged from the cylinders 14 and 15 where there is no cup to receive the same and loss of cream and messing of the machine are avoided.

Cream dispensing mechanism

The cups, after passing the rider 13, pass in two steps under the cream dispensing

mechanism 8 to be partly filled first with sherbet and then filled to the top with cream or, if desired, to be partly filled first with one flavor of cream and then filled to the top with another flavor or, in case only one flavor is to be used, the cup will first be half filled at the cylinder 14 and receive the other half portion at the cylinder 15. The proportions filled at the two cylinders may be varied as desired, as will presently appear.

Considering first the construction of the dispensing mechanism, it will be noted that the base 55 is fastened on the frame 6 by the tightening of two wing nuts 97 on eye bolts 15 pivoted to the frame 6 that enter into slots in the lugs 98 at opposite sides of the base 55. The base 55 is positioned in proper relation to the carrier 5 on the frame 6 as by means of dowels 99 received in the guides 47 of the slide 47 (see Fig. 4). The dispensing mechanism is thus quickly detachable as a unit from the machine for the purposes of cleaning and sterilizing. The hopper 56 has a middle partition 100 dividing the hopper into two compartments in each of which a dispensing piston 101 is arranged to operate. The latter have rods 102 extending vertically out of the mouth of the hopper for connection with a cross-head 103. The cross-head 103 slides on guide rods 104 mounted in bosses 105 in the frame 6 and is connected with the cross-head 59 by strips 106 so as to reciprocate vertically with the cross-head 59. The latter, as previously described, is operated from the eccentric 57 which is driven with the main drive shaft 34. The cross-head 103 constitutes a yoke having spaced slotted heads 107 to receive the reduced necks 108 provided on adjustable tappets 109 threading on the externally threaded ends of the rods 102. Small knobs 110 are provided on the ends of the tappets 109 which are received in openings in the opposite ends of a leaf spring 111 fastened at its mid-point by a screw 112 to the cross-head 103. By flexing the leaf spring 111 off the knobs 110, it is possible to remove the rods from their connections with the cross-head in an obvious manner. The removing of the rods and the pistons connected therewith is necessitated when it is desired to remove the hopper from the machine and of course enables the cleaning of the rods and pistons. The tappets 109 due to their threaded connection with the rods afford adjustability of the effective length of the rods. Lock nuts 113 are provided threading on the rods 102 to jam up against the bottom of the tappets 109 to lock the rods in their adjusted condition, as most clearly shown in Fig. 2A. The shortening or lengthening of the rods 102 determines the depth to which the pistons 101 will be moved into the cylinders 14 and 15 and thereby determines the amount of cream or sherbet dispensed, as will more clearly appear in the following discussion.

The pistons 101, as most clearly appears in Figs. 11 to 14 inclusive, are of the valved type and comprise a piston part proper designated by the reference numeral 114 and a valve part designated by the numeral 115. The valve part 115 is generally cylindrical in form and threads on the lower end of the rod 102 and provides guides 116 at opposite sides for pins 117 which fit relatively freely therein and are connected with the piston part 114. The pins 117 provide a lost motion connection between the piston part 114 and the valve part 115 limited by cotter pins 118. The valve 115 is arranged to engage a seat 119 about a central opening 120 in the head 121 of the piston part 114. The head 121 has threaded connection with a ring 122 which bears the pins 117 and, by the threaded connection, a cup leather packing 123 is clinched in the piston part 114 with the lip of the cup leather extending outwardly relative to the bore 124 of the measuring cylinder 14 or 15 as the case may be. The pistons 101 are guided into the bores 124 partly by the fact that the bottoms 125 of the hopper compartments slope toward the bores of the cylinders and partly because the mouth of the bore 124 is rounded and the cup leather 123 is relatively yielding and conformable and will slip easily into the bore. The pistons are not rigid with their rods on the cross-head 103 but are intended to be self-centering in the bores of the cylinders and exact alignment is not necessary to the nicety of performance of the machine. Furthermore, the pistons operate in and are lubricated practically by the cream. At the same time, the cream, since it is at all times on both sides of the piston in the hopper compartments and in the measuring cylinders, forms a perfect liquid seal for the pistons. The operation is smooth and noiseless. All of the parts coming in contact with the cream are tinned to avoid any deterioration and consequent contamination of the cream. The provision of the cup leather packings eliminates the rubbing together of metal parts which, as is well-known in the art, is objectionable since the tin surface rubs off and blackens the cream. Where the pins 117 slide in the guides 116, the fit is so loose and the relative movement so small that there is no objectionable rubbing off of the tinned surface of the brass parts. The sloping of the bottoms of the hopper compartments and the sloping of the side walls of the hopper induce the cream to flow toward the mouth of the bores of the measuring cylinders without the necessity for any collecting and agitating paddles to concentrate the cream at the desired points.

The measuring cylinders have dispensing ports 126 arranged to register with ports 127 in the slide 53 above referred to. When the ports are in register, as shown in Figs. 11 and 12, the cream in the cylinder drops down into

the cup ready to receive it. The pistons, as will more clearly appear hereinafter, measure the amount segregated from the main supply and, while the cream drops mainly by gravity in a haphazard clump or heap in the cup, it is discharged in a certain sense by the piston which follows the cream and clears the cylinder so that exactly the same amount of cream or nearly so is discharged at each operation. At this point, it may be remarked that the machine will dispense any fluid or plastic materials other than ice cream or sherbet such, for example, as fruits, vegetables, cheese, butters, syrups, and the like.

The slide 53, as above described, operates in guides 54 in the base 55 of the cream dispensing mechanism. Plates 128 are secured to the bottom side of the base 55 and form a complementary side of the guide 54 and keep the slide 53 assembled with the base when the hopper is removed from the machine. A lip 129 is provided by a curved depression at one end of the plate 128. Another plate 130 is fixed to the slide 53 and has a similar lip 131 facing the lip 129 arranged to be brought into engagement with the latter, as shown in Figs. 13 and 14, to nip off any cream depending from the cylinder that has failed to drop into the cup due to the rapidity with which the operation is carried out and because of the viscosity of the cream. This nipping off of any adhering clot of cream avoids the messing of the machine by drippings. Each of the measuring cylinders, it will be noted, is equipped with the nippers 129 and 131.

In the operation of the mechanism described, the parts assume the relative positions shown in the complete cycle of operation illustrated in Figs. 11 to 14 inclusive. In Fig. 11, the measuring cylinder 14 is completely charged with cream and the piston rod 102 is traveling downwardly as indicated by the arrow. The piston part 114 upon encountering the cream in the cylinder closes with the valve part 115 and the two parts move into the cylinder together. The opening of the port 126 by the slide 53 having its port 127 coming in register with the port 126 is timed to occur at about the instant when the piston 101 is in the position shown. This is a factor in determining the measuring of the amount of cream dispensed. The piston in moving to the position shown in Fig. 12 clears the cylinder of all of the cream contained therein the cream being forced out partly by the piston following it and partly by mere gravity. In Fig. 12 it will be noted that the piston has moved to the extreme bottom of the cylinder. If, however, the effective length of the rod 102 is varied by the means shown in Fig. 2A as previously described, the piston may be made to stop short of the bottom of the cylinder so as not to expel as large an amount of cream. Substantially as soon as the piston reaches the bottom

of its stroke, whether it moves to the extreme bottom of the cylinder or not, the port 126 is closed, as shown in Fig. 13. Otherwise the measuring of the amount of cream dispensed could not as well be accurately predetermined by the adjustment in the effective length of the rods 102 because the cream would tend of itself to drop by gravity out of the cylinder. In Fig. 13 it will be noted that the rod 102 has commenced its upward travel. The friction resulting between the cup leather packing 123 and the cylinder wall causes the movement of the valve part 115 away from the piston part 114 thus leaving the opening 120 uncovered. As the piston assembly 101 rises out of the bore of the cylinder there is a certain amount of suction created in back of it and cream is forced down by atmospheric pressure through the opening 120 in back of the piston completely filling any void in the cylinder. The piston assembly 101 rises clear away from the mouth of the bore 124 to the position shown in Fig. 14 so that cream is quite free to flow into and fill the measuring cylinder. The succeeding down stroke of the piston assembly brings the parts thereof ultimately to the position shown in Fig. 11 at which instant the port 126 is again opened and the cycle of operations above described is repeated, a measured amount of cream being dispensed in each cycle of operation. At no stage of the dispensing operation is the cream subjected to any appreciable pressure and the condition of "knocking the air out", as it is known to the trade, does not arise and there is no contraction and resultant loss to the manufacturer and the consumer does not get a heavier and less creamy product. The product is absolutely free from large water crystals and is perfectly smooth to the palate. It is noted in Figs. 11 to 14 that the cup after having the measured amount of cream dispensed thereto as shown in Fig. 12, remains under the measuring cylinder until the port 126 is closed and any adhering clot of cream is nipped off by the nippers 129 and 131. As soon as that occurs, the carrier 5 is advanced one step to bring a new cup into position for the succeeding operation, as indicated in Fig. 14.

The operations above described are also clearly shown in Figs. 7 and 9 from which a better understanding of the cooperation of the two measuring cylinders may be gotten. Thus in Fig. 7, the cup beneath the cylinder 15 corresponds to that shown in Figs. 12 and 13 which has been advanced from the cylinder 14 where it received its initial charge of cream or sherbet as the case may be. The parts in Fig. 7 are shown in approximately the position shown in Fig. 11 when the cream is being discharged from the measuring cylinders into the cups. Fig. 9 indicates the completion of the operation with the pistons

withdrawn from the cylinders substantially as shown in Fig. 14. It will be noted that the cup under cylinder 14 has its initial charge of cream and the one under cylinder 15 has its entire complement of cream. The slide 53 has moved to the left and closed the port 126 and the cup dispenser 7 has released the bottom cup of the stack for delivery as soon as the carrier advances on its next step.

The various novel features of the cream dispensing mechanism form the subject matter of divisional application Serial No. 199, 971, filed June 20, 1927.

Cap dispensing and applying mechanism

The cups, immediately after filling, are capped by the mechanism 9 or more exactly when one cup is receiving its last charge of cream the cup last filled is being capped. The two operations are carried out simultaneously. The cap dispenser 10 has a base 132 secured by a wing nut 133 which threads on an eye bolt pivoted to the frame 6 that engages in a slot in a laterally projecting lug 134 on the base 132. The base 132 is properly positioned with respect to the carrier 5 suitably by a dowel 135 and has an extension 136 extending longitudinally relative to the carrier 5 in which a plunger rod 137 is guided for vertical movement. The rod 137 bears a capping piston 138 the lower face of which is suitably slightly convex for a purpose which will presently appear. A coiled compression spring 139 about the rod 137 acts between the base 132 and a nut 140 rigid with the rod 137 normally to retract the piston 138 to the position shown in Figs. 7 and 9. The nut 140 threads on a screw 141 threading in the end of the rod 137 and serves as a lock nut therefor to retain the same in any desired position of adjustment to determine the elevation with respect to the base 132 of a head 142 provided on the screw 141. The head 142 is engaged by an arm 143 in the course of the downward travel thereof. This arm projects laterally from the cross-head 59 as indicated in Fig. 1. By virtue of this relation of the capping mechanism 9 with the cross-head 59 the capping operation is carried out simultaneously with the dispensing operation, as previously noted. It is obvious that the degree to which the head 142 is elevated to be engaged sooner or later in the course of travel downward of the arm 143 determines the depth to which the cap will be impressed in the cup. The screw 141 is therefore adjusted so that the caps will be impressed to an extent to insure their entering in the annular internal grooves 63 inside the mouths of the cups.

A bracket 144 is fixed on the outer end of the arm 143 bearing a pin 145 the lower end of which is pointed, as indicated, to be certain of entry into registration holes 146 provided in the plates 4 of the endless carrier 5. The position of all of the parts operating in the

capping of the cups being fixed one in relation to another with the exception of the plates 4, it becomes necessary to center each plate exactly with respect to the capping piston in order to insure that the caps will be entered properly into the mouths of the cups as they are fed one by one to the capping piston. The pointed end of the pin 145 in entering into the holes 146 in succession causes a slight joggling one way or another of each plate into exact centered relation with respect to the capping piston. There is thus no possibility of crumpling and destroying a cup or of improperly sealing the same.

The caps 12 are dispensed one by one from the holder 11 by a slide 147. The holder comprises a plurality of vertical rods set in the base 132 and joined together by bands, as shown, to support a stack of caps. The holder provides a space between two parallel rods indicated at 148 through which the tabs 149 on the caps 12 project and through which also the handle 150 of a follower weight 151 is arranged to project as shown in Fig. 7. The tabs 149, as first above mentioned, are for the purpose of permitting easy removal of the caps from the cups by the consumer. The slide 147 is integral with or secured to the cross-arm 66 which moves with the slide 47 so that the slides 147 and 47 move together. The slide 147 is supported and guided on an arm 152 projecting from a depending portion of the base 132. A depression is provided in the end of the slide 147 at 153 equivalent to the thickness of one cap. This permits the scaling off of the lowest cap of the stack by movement of the slide from the position shown in Fig. 7 to that shown in Fig. 9 while the stack is supported on top of the slide throughout the course of the movement of the latter. Upon arriving beneath the piston 138 the cap engages a stop 154 depending from the base 132 adjacent the piston 138. A small pin 155 depending from the base 138 rides over the cap as it is moved into position by the slide and in riding over the edge thereof when the cap is fully advanced serves to hold the cap against returning with the slide when the latter moves from the position shown in Fig. 9 back to that shown in Fig. 7. The cap is gripped firmly enough between the stop 154 and the pin 155 to require a movement of the piston 138 to dislodge it. This occurs only when a cup to be capped has been moved into position and the arm 143 has engaged the head 142 in the capping operation. The convex lower face of the piston 138 causes a slight dishing of the cap and the cap is actually slightly cramped in the gripping means. It is of course apparent that the sinking of the cap to the desired depth in the cup is readily accomplished with a cup centered as above described with respect to the capping piston. When forced into the cup, the dishing of the

cap facilitates the entry of the edges thereof into the annular groove 63 in the cup and a tight seal results especially when the cap has an opportunity to straighten out in the cup. If desired, the cap dispensing and applying mechanism just described may be replaced by one conforming to the disclosure in my application Serial No. 143,341, filed October 22, 1926.

The presence of the tab 149 on each cap also presents a problem in the capping of paper cups, because the cap is usually of stiff material, often times much heavier than the material of the cup itself and there is danger, therefore, of the tab causing the splitting or tearing of the cup as the cap is pressed into place. This difficulty is met in accordance with the present invention by the supporting of the cup circumferentially of its capping end on the plate 4, so that the mouth of the cup cannot be spread and the tab will accordingly be bent up in the entry of the cap in the cup.

The filled cups after the capping, ride up onto an inclined finger 156 beneath the carrier 5 which is supported on a bracket 157 secured to the end of the slide 47. The finger 156 therefore reciprocates with the slide 47 and with the slide 147. In riding up the inclined finger the cups are slightly raised out of their engagement in the openings in the plates 4 as shown in Fig. 9 just before leaving the machine to enter upon the chute 17 on the finger 16. Another finger 158 is provided by an extension of the slide 147 to prevent tipping over of the cup when raised and delivered out of the machine onto the finger 16 of the chute 17. With the cups raised slightly, the plates 4, as the carrier 5 is advanced one step from the position shown in Fig. 9 to that shown in Fig. 7, fall free of the cups and the finger 156 extends out through the opening in the plates while supporting the cups and presenting them to the chute. The cups rest on the entering end of the chute until shoved along by the next cup and are removed by hand or otherwise from the far end of the chute to be placed in cans for removal to a hardening room.

In conclusion, attention is called to the fact that while I have made reference throughout the foregoing description to "cups", and still more particularly "paper cups", it should be understood that the invention, at least in certain of its phases, is not limited to operation with this or any other particular kind of receptacle and the appended claims should be accordingly construed. Furthermore, while the description and claims repeatedly have reference to "cream" or "ice cream" as the material dispensed, it should be understood that any material lending itself to handling in a similar way is entirely within the contemplation and purview of the invention.

It is believed that the foregoing conveys a clear understanding of the objects prefaced above, and while I have illustrated but a single working embodiment, it should be understood that changes might be made in details of construction without departing from the spirit and scope of the invention as expressed in the appended claims:

I claim:

1. In a machine of the character described, the combination with an endless carrier, and a reciprocating element arranged to advance said carrier continuously in one direction step by step, of a cup dispenser for supplying cups one by one to said carrier at each step taken thereby, comprising a cup holder for retaining a stack of nested cups, and a reciprocating member having a connection with the aforesaid reciprocating element to be operated by the latter to release cups one by one from the bottom of the stack upon each reciprocation of said member.

2. In a machine of the character described, the combination with an endless carrier, and a reciprocating element arranged to advance said carrier continuously in one direction step by step, of a cup dispenser for supplying cups one by one to said carrier at each step taken thereby, comprising a cup holder for retaining a stack of nested cups, and a reciprocating member having a connection with the aforesaid reciprocating element to be operated by the latter to release cups one by one from the bottom of the stack upon each reciprocation of said member, the connection between said member and said element being a resilient one for operation in one direction and a positive one for operation in the other direction.

3. In a machine of the character described, the combination with an endless carrier, and a reciprocating element arranged to advance said carrier continuously in one direction step by step, of a cup dispenser arranged to drop cups one by one onto said carrier at each step taken thereby, comprising a holder to retain a stack of nested cups, a slide operating in said holder beneath the stack of cups arranged when moved in one direction to segregate the bottom cup of the stack and when moved in the other direction to release the segregated cup and to retain the next cup thereabove, and means providing an operating connection between said slide and said reciprocating element.

4. In a machine of the character described, an endless carrier for feeding cups to be filled, a reciprocating element for advancing said carrier step by step continuously in one direction, a holder to receive a stack of caps for application to the cups, and a reciprocating member for dispensing caps from said holder one by one having an operating connection with the aforesaid reciprocating element.

5. In a machine of the character described,

a horizontal elongated supporting frame providing ways thereon, an endless belt type conveyor operating from end to end of said frame, the conveyor being adapted to have receptacles thereon, like cups, adapted to be filled and requiring capping, a horizontally reciprocating element for advancing the conveyor step by step progressively toward one end of said frame, a holder containing caps, another horizontally reciprocating element operatively connected with the other reciprocating element for feeding caps one by one in proper timed relation to the step by step movement of the conveyor, and means for applying the caps to the cups.

6. In a machine of the character described, a carrier for feeding cups one by one in a step by step movement to be filled, means for advancing the carrier step by step progressively in one direction, a dispensing cylinder, a piston operating up and down in said cylinder to discharge material therefrom into said cups, a plunger operating up and down and serving by operation on the carrier to insure accurate positioning of the cups at each advance thereof, and a single device operating up and down having connection with said piston for operating the same and also arranged to operate said plunger.

7. In a machine of the character described, a carrier for feeding cups one by one in a step by step movement to be filled, a dispensing cylinder, a piston operating up and down in said cylinder to discharge material therefrom into said cups, a holder for caps to be applied to said cups, means for dispensing caps one by one for application to the cups, a plunger operating up and down for applying the caps to the cups, means for advancing the carrier step by step progressively in one direction, another plunger operating up and down and serving at each step to operate on the carrier to insure accurately indexed position thereof, and a single means operating up and down having connection with said piston for operating the same and also arranged to operate said plungers.

8. In a machine of the character described, a carrier for feeding cups one by one in a step by step movement to be filled, a horizontally reciprocating element for advancing the carrier step by step progressively in one direction, a dispensing cylinder, a piston operating up and down in said cylinder to discharge material therefrom into said cups, a holder for caps to be applied to said cups, another horizontally reciprocating element for dispensing caps one by one for application to the cups, the said reciprocating elements operating in timed relation with one another, a plunger operating up and down for applying the caps to the cups, and a single means operating up and down having

connection with said piston for operating the same and also operatively connected with said plunger.

9. In a machine of the character described, an endless carrier arranged to be fed step by step continuously in one direction for feeding cups, means for filling the cups, a holder for caps, means for dispensing caps from said holder one by one in timed relation to the step by step movement of said carrier to feed a cap for each cup, a plunger for applying the caps to the cups, and means operating up and down arranged to position a cup in exact register with the plunger for capping and arranged to operate said plunger to apply the caps to the cups.

10. In a machine of the character described, an endless carrier moving step by step continuously in one direction, a reciprocating element for advancing said carrier, a cup holder, a cap holder, means for dispensing material into said cups, a reciprocating cup dispenser for said cup holder, a reciprocating cap dispenser for said cap holder, and connections for said cup and cap dispensers with said first mentioned reciprocating element for operating said dispensers therewith.

11. In a machine of the character described, an endless carrier for feeding cups, a reciprocating element arranged to advance the carrier step by step progressively in one direction, a reciprocating dispensing valve for dispensing material into said cups, a cup holder, a cap holder, a reciprocating cup dispenser for said cup holder, a reciprocating cap dispenser for said cap holder, and means for connecting certain of said dispensers with the reciprocating element for operation thereby in timed relation therewith, all of said dispensers being operated in a predetermined timed relation with one another.

12. In a machine of the character described, an endless carrier for feeding cups to be filled, a horizontally reciprocating carrier advancer, a cup holder, a reciprocating cup dispenser for said holder, a cap holder, a reciprocating cap dispenser for said holder, means for operating said reciprocating cup and cap dispensers and the reciprocating advancer in a predetermined timed relation, a dispensing cylinder, a vertically operating plunger for dispensing material therefrom, a vertically operating cap applying plunger, and means for operating said dispensing and cap applying plungers together.

13. In a machine of the character described, an endless carrier for feeding cups to be filled, a cup holder, a reciprocating cup dispenser in said holder, a cap holder, a reciprocating cap dispenser in said holder, means for operating said cup and cap dispensers in timed relation, a dispensing cylinder, a vertically operating plunger for

dispensing material therefrom, a vertically operating cap applying plunger, a vertically operating member for registering a cup to be capped with the capping plunger, and a common means operating vertically arranged to operate said member together with said dispensing and cap applying plungers.

14. In a machine of the character described, an endless carrier for feeding cups to be filled, a horizontally reciprocating element for advancing said carrier step by step continuously in one direction, a cup holder, a horizontally reciprocating cup dispenser in said holder, a cap holder, a horizontally reciprocating cap dispenser in said holder, means for operating said cup and cap dispensers and said carrier advancing element together, a dispensing cylinder, a vertically operating plunger for dispensing material therefrom, a vertically operating cap applying plunger, and means for operating said dispensing and cap applying plungers together.

15. In a machine of the character described, an endless carrier for feeding cups to be filled, a horizontally reciprocating element for advancing said carrier step by step continuously in one direction, a cup holder, a horizontally reciprocating cup dispenser in said holder, a cap holder, a horizontally reciprocating cap dispenser in said holder, means for operating said cup and cap dispensers and said carrier advancing element together, a dispensing cylinder, a vertically operating plunger for dispensing material therefrom, a vertically operating cap applying plunger, a vertically operating member for registering a cup to be capped with the capping plunger, and a common means operating vertically arranged to operate said member together with said dispensing and cap applying plungers.

16. In a machine of the character described, a frame, an endless carrier operating therein for feeding cups to be filled, a cup holder, a reciprocating cup dispenser in said holder, a cap holder, a reciprocating cap dispenser in said holder, a power shaft in said frame, a reciprocating slide operating in said frame, an operating connection between said slide and said shaft for reciprocating the former in the rotation of the latter, and operating connections between said dispensers and said slide.

17. In a machine of the character described, a frame, an endless carrier operating therein for feeding cups to be filled, a cup holder, a reciprocating cup dispenser in said holder, a cap holder, a reciprocating cap dispenser in said holder, a power shaft in said frame, a reciprocating slide operating in said frame, an operating connection between said slide and said shaft for reciprocating the former in the rotation of the latter, operating connections between said dispensers and said slide, a reciprocating element for advancing

said carrier step by step in one direction, and an operating connection between said element and said slide.

18. In a machine of the character described, a frame, an endless carrier operating therein for a feeding cups to be filled, a dispensing cylinder, a reciprocating slide valve controlling the discharge therefrom, a power shaft in said frame, an operating connection between said shaft and said valve for reciprocating the latter in the rotation of the former, a cup holder, a reciprocating cup dispenser in said holder, a reciprocating slide operating in said frame, an operating connection between said slide and said shaft for reciprocating the former in the rotation of the latter, and operating connections between said slide and said cup dispenser.

19. In a machine of the character described, a frame, an endless carrier operating therein for feeding cups to be filled, a dispensing cylinder, a reciprocating slide valve controlling the discharge therefrom, a power shaft in said frame, an operating connection between said shaft and said valve for reciprocating the latter in the rotation of the former, a cup holder, a reciprocating cup dispenser in said holder, a cap holder, a reciprocating cap dispenser in said holder, a reciprocating slide operating in said frame, an operating connection between said slide and said shaft for reciprocating the former in the rotation of the latter, and operating connections between said slide and said cup and cap dispensers.

20. In a machine of the character described, a frame, an endless carrier operating therein for feeding cups to be filled, a dispensing cylinder, a reciprocating slide valve controlling the discharge therefrom, a power shaft in said frame, an operating connection between said shaft and said valve for reciprocating the latter in the rotation of the former, a cup holder, a reciprocating cup dispenser in said holder, a reciprocating slide operating in said frame, an operating connection between said slide and said shaft for reciprocating the former in the rotation of the latter, operating connections between said slide and said cup dispenser, a reciprocating element for advancing said carrier in said frame step by step in one direction, and an operating connection between said element and said slide.

21. In a machine of the character described, a frame, an endless carrier operating therein for feeding cups to be filled, a dispensing cylinder, a reciprocating slide valve controlling the discharge therefrom, a power shaft in said frame, an operating connection between said shaft and said valve for reciprocating the latter in the rotation of the former, a cup holder, a reciprocating cup dispenser in said holder, a cap holder, a reciprocating cap dispenser in said holder, a

reciprocating slide operating in said frame, an operating connection between said slide and said shaft for reciprocating the former in the rotation of the latter, operating connections between said slide and said cup and cap dispensers, a reciprocating element for advancing said carrier in said frame step by step in one direction, and an operating connection between said element and said slide.

22. In a machine of the character described, a frame, an endless carrier operating in said frame for feeding cups to be filled, a dispensing cylinder, a vertically reciprocating plunger operating in said cylinder for dispensing material therefrom into said cups, a vertically reciprocating cap applying plunger, a vertically reciprocating member for registering a cup to be capped with said capping plunger, a single vertically reciprocating means for operating said member together with said plungers, a power shaft in said frame, and an operating connection between said shaft and said vertically reciprocating means for reciprocating the latter in the rotation of the former.

23. In a machine of the character described, a frame, an endless carrier operating in said frame for feeding cups to be filled, a dispensing cylinder, a vertically reciprocating plunger operating in said cylinder for dispensing material therefrom into said cups, a vertically reciprocating cap applying plunger, a single vertically reciprocating means for operating said plungers together, a power shaft in said frame, an operating connection between said vertically reciprocating means and said shaft for reciprocating the former in the rotation of the latter, a horizontally reciprocating slide valve for controlling the discharge from said cylinder, and an operating connection between said slide valve and said shaft for reciprocating the former in the rotation of the latter.

24. In a machine of the character described, a frame, an endless carrier operating in said frame for feeding cups to be filled, a dispensing cylinder, a vertically reciprocating plunger operating in said cylinder for dispensing material therefrom into said cups, a vertically reciprocating cap applying plunger, a single vertically reciprocating means for operating said plungers together, a power shaft in said frame, an operating connection between said vertically reciprocating means and said shaft for reciprocating the former in the rotation of the latter, a horizontally reciprocating element for advancing said carrier step by step in one direction, and an operating connection between said element and said shaft for reciprocating the former in the rotation of the latter.

25. In a machine of the character described, a frame, an endless carrier operating in said frame for feeding cups to be

filled, a dispensing cylinder, a vertically reciprocating plunger operating in said cylinder for dispensing material therefrom into said cups, a vertically reciprocating cap applying plunger, a single vertically reciprocating means for operating said plungers together, a power shaft in said frame, an operating connection between said vertically reciprocating means and said shaft for reciprocating the former in the rotation of the latter, cup dispensing and cap dispensing means, a reciprocating slide having connections with said dispensers to operate the same together, and an operating connection between said slide and said shaft for reciprocating the former in the rotation of the latter.

26. In a machine of the character described, a frame, an endless carrier operating in said frame for feeding cups to be filled, a dispensing cylinder, a vertically reciprocating plunger operating in said cylinder for dispensing material therefrom into said cups, a vertically reciprocating cap applying plunger, a single vertically reciprocating means for operating said plungers together, a power shaft in said frame, an operating connection between said vertically reciprocating means and said shaft for reciprocating the former in the rotation of the latter, a horizontally reciprocating element for advancing said carrier step by step in one direction, a slide operating in said frame, a cup holder, a horizontally reciprocating cup dispenser operating in said holder, a cap holder, a horizontally reciprocating cap dispenser in said holder, connections between said slide and said reciprocating element and each of said dispensers for operating the same together, and an operating connection between said slide and said power shaft for reciprocating the former in the rotation of the latter.

27. In a machine of the character described, comprising a frame and an endless link belt carrier operating from end to end of said frame for feeding cups to be filled, said links each supporting a cup in an opening therein, means for advancing said carrier link by link, a reciprocating element at the end of said frame moving from one terminal position to another, the movement of said element to one terminal position serving to raise a cup out of its opening in the carrier, the cup being thereafter supported in such raised position and so conveyed in the movement of said reciprocating element to the other terminal position, the cup in the latter position of said element being free of the carrier and extended from the frame, and means for receiving the cups from the reciprocating element.

28. In a machine of the character described comprising a frame and an endless linked belt carrier composed of perforated plates each arranged to support a cup in its opening by a

rim thereon, the said carrier being arranged to convey the cups on one flight thereof toward one end of the frame, means for advancing said carrier link by link progressively in one direction, a reciprocating element comprising an inclined bottom portion arranged in the movement of said element to its one terminal position to raise the cup by engagement with the bottom thereof out of its opening, and a top portion arranged at the same time to hold the cup on the lower portion by engagement with the top thereof, said element being arranged in the movement from the last mentioned terminal position to its other terminal position to convey the cup free of the carrier and extend the same from the end of the frame, the perforated plates of said carrier being arranged in turning at the end of the frame from the top flight to the lower flight to receive the lower portion of said element in the openings thereof whereby to permit extension of said element from the end of the frame, and means for receiving cups from said element.

29. In a cup filling and capping machine, an endless cup carrier, a cup holder, means for dispensing cups therefrom one by one to said carrier, a hopper for the material to be dispensed, means for dispensing material therefrom into the cups in said carrier in succession, a cap holder, means for dispensing caps one by one from said holder, means to apply the dispensed caps to said cups in succession, a source of power for operating all of the above means, a clutch for transmitting the power to said means arranged to be disengaged in the event of excessive resistance to operation of the carrier or any one of said means, and a stop device normally held in inoperative position by cups feeding past the same on the carrier but arranged in the event of a failure of a cup supply or in the event the cup dispenser otherwise fails to operate to move to operative position and interfere with the operation of one of the above-mentioned parts and thereby effect disengagement of the clutch.

30. In a machine of the character described, an endless carrier for feeding cups, a reciprocating element for advancing said carrier step by step continuously in one direction, a holder to receive a stack of caps for application to the cups, a reciprocating member for dispensing caps from said holder one by one having an operating connection with the aforesaid reciprocating element, and reciprocating means arranged to raise the cups out of their position in the carrier after the same have received caps, said reciprocating means also having an operating connection with the aforesaid reciprocating element.

31. In a machine of the character described, an endless carrier for feeding cups to be filled, means for dispensing cups one by one to said carrier, a cap holder, a horizontally reciprocating cap dispenser in said holder, means for operating said cap dispenser, said cup and cap dispensing means being operated in timed relation to one another, a dispensing cylinder, a vertically operating plunger for dispensing material therefrom, a vertically operating cap applying plunger, a vertically operating carrier registering plunger, and means for operating said dispensing, registering and cap applying plungers together.

32. In a machine of the character described, an endless carrier for feeding cups to be filled, a horizontally reciprocating element for advancing said carrier step by step continuously in one direction, means for dispensing cups one by one to said carrier, said cup dispensing means being operated in timed relation to the advancing of the carrier, a cap holder, a horizontally reciprocating cap dispenser in said holder, means for operating said cap dispenser and said carrier advancing element together, a dispensing cylinder, a vertically operating plunger for dispensing material therefrom, a vertically operating cap applying plunger, and means for operating said dispensing and cap applying plungers together.

33. A machine as set forth in claim 31 including a horizontally reciprocating device for raising the cups out of position in the carrier after the caps have been applied, said device being operated with said cap dispenser.

34. A machine as set forth in claim 32, including a horizontally reciprocating device for raising the cups out of position in the carrier after the same have been capped, said device being operated with the cap dispenser and carrier advancing element.

35. In a machine of the character described, a frame, an endless carrier operating therein for feeding cups to be filled, a dispensing cylinder, a reciprocating slide valve controlling the discharge therefrom, a power shaft in said frame, an operating connection between said shaft and said valve for reciprocating the latter in the rotation of the former, means for dispensing cups one by one to said carrier, a cap holder, a reciprocating cap dispenser in said holder, a reciprocating slide operating in said frame, an operating connection between said slide and said shaft for reciprocating the former in the rotation of the latter, and operating connections between said slide and said cap dispenser, said cup dispensing means being operated in timed relation to the cap dispenser.

36. In a machine of the character described, a frame, an endless carrier operating therein for feeding cups to be filled, a dispensing cylinder, a reciprocating slide valve controlling the discharge therefrom, a power shaft in said frame, an operating connection between said shaft and said valve for reciprocating the latter in the rotation of the

cating cap dispenser in said holder, means for operating said cap dispenser, said cup and cap dispensing means being operated in timed relation to one another, a dispensing cylinder, a vertically operating plunger for dispensing material therefrom, a vertically operating cap applying plunger, a vertically operating carrier registering plunger, and means for operating said dispensing, registering and cap applying plungers together.

32. In a machine of the character described, an endless carrier for feeding cups to be filled, a horizontally reciprocating element for advancing said carrier step by step continuously in one direction, means for dispensing cups one by one to said carrier, said cup dispensing means being operated in timed relation to the advancing of the carrier, a cap holder, a horizontally reciprocating cap dispenser in said holder, means for operating said cap dispenser and said carrier advancing element together, a dispensing cylinder, a vertically operating plunger for dispensing material therefrom, a vertically operating cap applying plunger, and means for operating said dispensing and cap applying plungers together.

33. A machine as set forth in claim 31 including a horizontally reciprocating device for raising the cups out of position in the carrier after the caps have been applied, said device being operated with said cap dispenser.

34. A machine as set forth in claim 32, including a horizontally reciprocating device for raising the cups out of position in the carrier after the same have been capped, said device being operated with the cap dispenser and carrier advancing element.

35. In a machine of the character described, a frame, an endless carrier operating therein for feeding cups to be filled, a dispensing cylinder, a reciprocating slide valve controlling the discharge therefrom, a power shaft in said frame, an operating connection between said shaft and said valve for reciprocating the latter in the rotation of the former, means for dispensing cups one by one to said carrier, a cap holder, a reciprocating cap dispenser in said holder, a reciprocating slide operating in said frame, an operating connection between said slide and said shaft for reciprocating the former in the rotation of the latter, and operating connections between said slide and said cap dispenser, said cup dispensing means being operated in timed relation to the cap dispenser.

36. In a machine of the character described, a frame, an endless carrier operating therein for feeding cups to be filled, a dispensing cylinder, a reciprocating slide valve controlling the discharge therefrom, a power shaft in said frame, an operating connection between said shaft and said valve for reciprocating the latter in the rotation of the

former, means for dispensing cups one by one to said carrier, a reciprocating slide operating in said frame, an operating connection between said slide and said shaft for reciprocating the former in the rotation of the latter, a reciprocating element for advancing said carrier in said frame step by step in one direction, and an operating connection between said element and said slide, the cup dispensing means being operated in timed relation to the step by step advancing of the carrier.

37. A machine as set forth in claim 36 including a reciprocating device for raising the cups out of their position in the carrier after the same have been filled, said device having an operating connection with the last mentioned reciprocating slide, whereby to be operated in proper relation to the step by step advancing of the carrier.

38. In a machine of the character described, the combination with an endless carrier arranged to be advanced progressively in one direction step by step so as to feed cups to be filled and subsequently capped, of a material dispenser, a reciprocating valve for dispensing material from said dispenser into said cups, the said valve being operated in timed relation to the step by step advancing of the carrier, a cap holder, a reciprocating element for feeding caps one by one from said holder to the cups, said last mentioned reciprocating element being operated in timed relation with the reciprocating valve and with the step by step movement of the carrier, means for applying the caps to the cups, and a reciprocating device operatively connected with the reciprocating cap feeding element to operate in a predetermined timed relation therewith, said device being arranged in the movement thereof to one of its terminal positions to raise the cups off the carrier and in the movement thereof to the other terminal position to convey the same away from the carrier.

39. In a machine of the character described, the combination with an endless carrier arranged to be advanced progressively in one direction step by step so as to feed cups to be filled and subsequently capped, of a material dispenser, a reciprocating valve for dispensing material from said dispenser into said cups, the said valve being operated in timed relation to the step by step advancing of the carrier, a cap holder, a reciprocating element for feeding caps one by one from said holder to the cups, said last mentioned reciprocating element being operated in timed relation with the reciprocating valve and with the step by step movement of the carrier, means for applying the caps to the cups, wherein the last mentioned means comprising a capping plunger operating up and down in timed relation to the step by step movement of

the carrier, and another plunger also moving up and down in timed relation to the last mentioned plunger serving by operation on the carrier to jog the same one way or the other from the position to which the same has been advanced whereby accurately to index the same at each step by step advancement thereof to insure proper application of the caps to the cups.

40. In a machine of the character described, the combination with an endless carrier and a reciprocating element arranged to advance the carrier step by step progressively in one direction, of a cup dispenser for supplying cups one by one to said carrier at each step taken thereby comprising a reciprocating member operatively connected with the aforesaid reciprocating element for operation therewith in a predetermined timed relation.

41. A machine as set forth in claim 40 including a material dispenser and a reciprocating dispensing valve for discharging material into said cups, said valve being operated in timed relation with the reciprocating element and reciprocating member and with the step by step movement of the carrier.

42. In a machine of the character described, the combination of an elongated supporting frame providing ways thereon, an endless belt type conveyor operating on said ways from end to end of said frame and adapted to have cups placed thereon at one end of said frame to be carried to the other end thereby, a reciprocating element cooperating with said conveyor to advance the same step by step in one direction, a hopper for material to be dispensed mounted intermediate the ends of said frame over said conveyor, a holder for caps disposed adjacent said hopper over said conveyor and arranged to have cups fed thereto from beneath the hopper, a reciprocating valve for said hopper for dispensing material into the cups, and a reciprocating cap feeder for the holder arranged to feed caps one by one to the cups, said cap feeder being operated in timed relation with the reciprocating valve, and one of the two last mentioned reciprocating parts being operatively connected with the first mentioned reciprocating element whereby the operations of dispensing and cap feeding are in timed relation to the movement of the conveyor.

43. A machine as set forth in claim 42 including a vertically reciprocating plunger for applying the caps to the cups, said plunger being operated in a timed relation with the other reciprocating elements, and another plunger reciprocating vertically like the last mentioned plunger and in timed relation therewith, said last mentioned plunger being arranged to operate on the conveyor accurately to index the same at each step by step advancement thereof whereby to insure proper application of the caps to the cups.

44. A machine as set forth in claim 42

including a vertically reciprocating plunger for applying the caps to the cups, said plunger being operated in a timed relation with the other reciprocating elements, another plunger reciprocating vertically like the last mentioned plunger and in timed relation therewith, said last mentioned plunger being arranged to operate on the conveyor accurately to index the same at each step by step advancement thereof whereby to insure proper application of the caps to the cups, and a reciprocating dispensing plunger for the hopper operated in timed relation with the reciprocating valve for discharging material from the hopper.

45. A machine as set forth in claim 42 including a vertically reciprocating dispensing plunger for the hopper operated in timed relation with the reciprocating valve, and another vertically reciprocating plunger operated in time relation with the dispensing plunger and arranged by operation on the conveyor accurately to index the same at each step by step advancement thereof.

46. A machine as set forth in claim 42 including a reciprocating device at the discharge end of the frame operatively connected with the cap feeder so as to operate in a predetermined timed relation therewith, said device in moving to one terminal position being arranged to pick up the cups off the conveyor and in the movement thereof to the other terminal position to convey the same away for removal from the machine.

47. In a machine of the character described, the combination of an elongated frame providing longitudinal guideways thereon, an endless carrier operating on said guideways endwise of the frame and arranged to have receptacles, such as cups, carried thereby, the said cups being arranged to be placed on the carrier at one end of the frame, a hopper for the material to be dispensed disposed over said carrier intermediate the ends of the frame, a reciprocating element on the frame cooperating with the carrier to advance the latter step by step in one direction, a transverse cam shaft in said frame below the hopper and arranged to be continuously driven, a cam on said shaft for communicating the reciprocation to the reciprocating element, whereby to advance the carrier at regular intervals, a vertically reciprocating piston associated with the hopper for discharging measured amounts of material from the hopper, and an eccentric on said shaft having a connecting rod fitting thereon and connected with the piston for operating the same in timed relation with the advancement of the carrier.

48. In a machine of the character described, the combination of an elongated frame providing longitudinal guideways thereon, an endless carrier operating on said guideways endwise of the frame and arranged

to have receptacles, such as cups, carried thereby, the said cups being arranged to be placed on the carrier at one end of the frame, a hopper for the material to be dispensed disposed over said carrier intermediate the ends of the frame, a reciprocating element on the frame cooperating with the carrier to advance the latter step by step in one direction, a reciprocating valve for dispensing material from the hopper, said valve being operated in timed relation with the aforesaid reciprocating element, a cap container at the outlet end of said frame disposed over the carrier, and a reciprocating cap dispenser for said container operatively connected with the aforesaid reciprocating element whereby to operate in a predetermined timed relation therewith.

49. A machine as set forth in claim 48, including a single control shaft mounted transversely in said frame beneath the hopper, said shaft having a cam thereon for operating the reciprocating element, and said machine further including a vertically reciprocating piston for discharging material from the hopper, and an eccentric on said shaft having a connecting rod bearing thereon and connected with said piston for operating the latter in a predetermined timed relation with the advancement of the carrier.

50. In a machine of the character described, the combination of an elongated frame providing longitudinal guideways thereon, an endless carrier operating on said guideway endwise of the frame and arranged to have receptacles, such as cups, carried thereby, a hopper for the material to be dispensed disposed over said carrier intermediate the ends of the frame, a reciprocating element on the frame cooperating with the carrier to advance the latter step by step in one direction, a reciprocating valve for dispensing material from said hopper, said valve being operated in timed relation with the aforesaid reciprocating element, and a cup dispenser disposed over the carrier at the one end of said frame and arranged upon each operation to dispense one cup, said dispenser being operatively connected with the aforesaid reciprocating element whereby to operate in a predetermined timed relation therewith.

51. A machine as set forth in claim 50, including a cap container disposed over the carrier at the other end of said frame, and a reciprocating cap dispenser operatively connected with the reciprocating element whereby to operate in a predetermined timed relation therewith.

52. A machine as set forth in claim 50, including a single control shaft disposed transversely in said frame beneath the hopper, said shaft having a cam thereon for operating the reciprocating element, a vertically reciprocating piston in said hopper for discharging material therefrom, and an eccentric on said

shaft having a connecting rod bearing thereon and connected with said piston whereby to operate the piston in timed relation with the advancement of the carrier.

53. In a machine of the character described, the combination of an elongated frame providing longitudinal guideways thereon, an endless carrier operating on said guideway endwise of the frame and arranged to have receptacles, such as cups, carried thereby, the said cups being arranged to be placed on the carrier at one end of the frame, a hopper for the material to be dispensed disposed over said carrier intermediate the ends of the frame, a reciprocating element on the frame cooperating with the carrier to advance the latter step by step in one direction, a reciprocating valve for dispensing material from the hopper, said valve being operated in timed relation with the aforesaid reciprocating element, and a second reciprocating element at the outlet end of the frame having a portion thereof arranged in the movement of said element to its one terminal position to engage the end-most cup on the carrier and raise it clear of the carrier, said element in the movement thereof to its other terminal position serving to convey the cup off the carrier and extend the same from the end of the frame for reception by a suitable receiver, said second reciprocating element being operatively connected with the first reciprocating element for operation in a predetermined timed relation therewith.

54. A machine as set forth in claim 53, including a reciprocating cup dispenser disposed over the carrier at the opposite end of said frame, said dispenser being operatively connected with the first mentioned reciprocating element whereby the same is arranged to be operated in a predetermined timed relation therewith.

55. In a machine of the character described, an endless carrier arranged to be fed step by step continuously in one direction, means for dispensing cups or the like one by one to said carrier in timed relation with its step by step operation, means for filling the cups, cap dispensing means arranged to be operated in timed relation with the other means so as to feed a cap for each cup, cap applying means, and means arranged to be operated after each step by step advancement of the carrier to jog the carrier one way or the other whereby to accurately position the same properly with respect to the cup dispensing means, filling means, and cap applying means.

56. In a machine of the character described, an endless carrier arranged to be fed step by step continuously in one direction for feeding cups or other receptacles to be capped, cap dispensing means operated in timed relation to the step by step movement of the carrier to feed a cap for each cup, cap

applying means, and means arranged to be operated after each step by step advancement of the carrier to jog the carrier one way or the other whereby to accurately position the same properly with respect to the cap applying means.

57. In a machine of the character described, an endless carrier arranged to be fed step by step continuously in one direction for feeding cups or other receptacles to be filled and capped, means for filling the cups, said means being operated in timed relation with the step by step movement of the carrier to fill the cups between movements of the carrier, cap dispensing means, said means being operated in timed relation with the movement of the carrier to feed a cap for each cup, cap applying means, and means arranged to be operated after each step by step advancement of the carrier to jog the carrier one way or the other whereby to accurately position the same properly with respect to the filling means and cap applying means.

58. In an automatic machine, such as a filling and capping machine, the combination of an endless carrier arranged to be fed step by step continuously in one direction, means for advancing the carrier step by step, and means arranged to be operated after each step by step advancement of the carrier to jog the carrier one way or the other whereby to accurately position the same properly.

59. In a machine of the character described, a frame, an endless carrier operating thereon for feeding cups to be filled, a reciprocating cup dispenser, a reciprocating cap dispenser, a power shaft in said frame, a reciprocating slide operating in said frame, an operating connection between said slide and said shaft for reciprocating the former in the rotation of the latter, the reciprocating cup and cap dispensers being operated in timed relation to one another and to the advancement of the carrier, and operating connections between at least one of said dispensers and said slide.

60. A machine as set forth in claim 59 including an operating connection between the carrier and the slide, said connection being so constructed whereby movement is communicated to the carrier in the movement of the slide in one direction, the slide in its movement in the other direction being arranged to operate the dispenser connected therewith.

61. In an automatic machine, such as a filling and capping machine, the combination of an endless carrier arranged to be advanced continuously in one direction for feeding cups or the like for filling or capping, or both, means for advancing the carrier step by step, there being other means for the filling or capping operations operated in timed relation with the advancement of the carrier, a source of power for operating all of the above

means, a clutch for transmitting the power to said means arranged to be disengaged in the event of excessive resistance to operation of the carrier, and a stop device normally held in inoperative position by cups or the like feeding past the same on the carrier, but arranged in the absence of a cup to move to operative position and interfere with the operation of the carrier and thereby affect disengagement of the clutch.

62. In an automatic machine of the character described, the combination of an endless carrier arranged to be advanced continuously in one direction for feeding articles, means for advancing the carrier, a source of power for operating said means, a clutch for transmitting the power to said means arranged to be disengaged in the event of excessive resistance to operation of the carrier, and a stop device normally held in inoperative position by the articles feeding past the same on the carrier but arranged in the absence of an article to move to operative position and interfere with the normal operation of the carrier and thereby affect disengagement of the clutch.

63. In a machine of the character described, means for feeding cups or the like one by one in a step by step movement to be capped, cap feeding means arranged to feed one cap for each cup, a capper for applying the caps to the cups, a device operating up and down and arranged upon each downward movement to register a cup in a predetermined desired position in proper alignment with the capper for good application of the cap to the cup, and means for operating said device in timed relation to the operation of the cup feeding means so that the downward movement of the device occurs after each advancement of the cups, said capper also operating up and down like the cup registering device, the two being operated by the same means, and said registering device being in leading relation to the capper so as to insure proper registration of the cup prior to the capping operation.

64. In a filling and capping machine of the character described, cup dispensing means arranged to deliver one cup or the like at a time, cup feeding means for advancing the cups in the machine step by step, filling means, capping means beyond the filling means in relation to the direction of movement of the cup feeding means, whereby the cups after being filled are arranged to be capped one by one, a source of power having connection with all of said means for normally operating the same in a predetermined timed relation to one another, and a device between the cup dispensing means and the filling means arranged to engage each cup before its delivery to the filling means, said device being thereby normally held in inoperative position but being arranged in

the absence of a cup to move to operative position and stop the operation of the machine by the power source.

65. In a machine of the character described, cup dispensing means arranged to deliver one cup or the like at a time, cup feeding means for advancing the cup in the machine step by step, filling means, a source of power having connection with all of said means for normally operating the same in a predetermined timed relation to one another, and a device between the cup dispensing means and the filling means arranged to engage each cup before its delivery to the filling means, said device being thereby normally held in inoperative position but being arranged in the absence of a cup to move to operative position and stop the operation of the machine by the power source.

66. In a machine of the class described, the combination of means for feeding cups or the like step by step in one direction, capping means for applying caps one by one to the cups, a power source for normally operating said means in a predetermined timed relation, and a device disposed so as to engage each cup prior to its delivery to the capping means, said device being thereby normally held in an inoperative position but being arranged in the absence of a cup to move to operative position and stop the operation of the machine by the power source.

67. In a machine of the class described, the combination with means for feeding cups or the like horizontally to a capping station, of cap feeding means serving to deliver one cap for each cup, a cap registering plunger, a cap applying plunger, and a single operating part reciprocating substantially vertically and having the two plungers thereon in such relation to one another that the registering plunger is arranged to first jog the cup one way or the other from the position to which the same has been advanced by the cup feeding means whereby to bring the same into a predetermined position for capping, whereupon the cap applying plunger is arranged to apply the cap to the cup.

68. In a device for capping cups or other containers made of paper or similar material and having an annular internal shoulder at the capping end to receive a cap thereon, means for supporting a cup externally at its capping end in the plane of the aforesaid internal shoulder whereby to prevent damage to the cup in the application of a cap, and a capping plunger operable in register with said means.

69. In a capper, the combination of a supporting plate having a circular opening therein to receive a container to be capped, the container having an outwardly projecting rim or bead at the capping end and the circular opening in the plate being of such a size that the rim or bead will rest on the

plate, whereby to permit application of a cap under pressure into the capping end of the container disposed in the opening, and means registering with the opening in the plate for pressing a cap into position in the container.

70. In a capper for applying tabbed caps of paper or similar material to containers made of paper or similar material each having an annular rim or bead at the capping end, means for supporting a container externally of the capping end adjacent the rim or bead and in the vicinity where the tab of the cap comes in capping, whereby to prevent damaging the container in the application of a tabbed cap thereto and cause the bending up of the tab, and a capping plunger operable in register with said means.

In witness of the foregoing I affix my signature.

FRED L. BORCHERT.