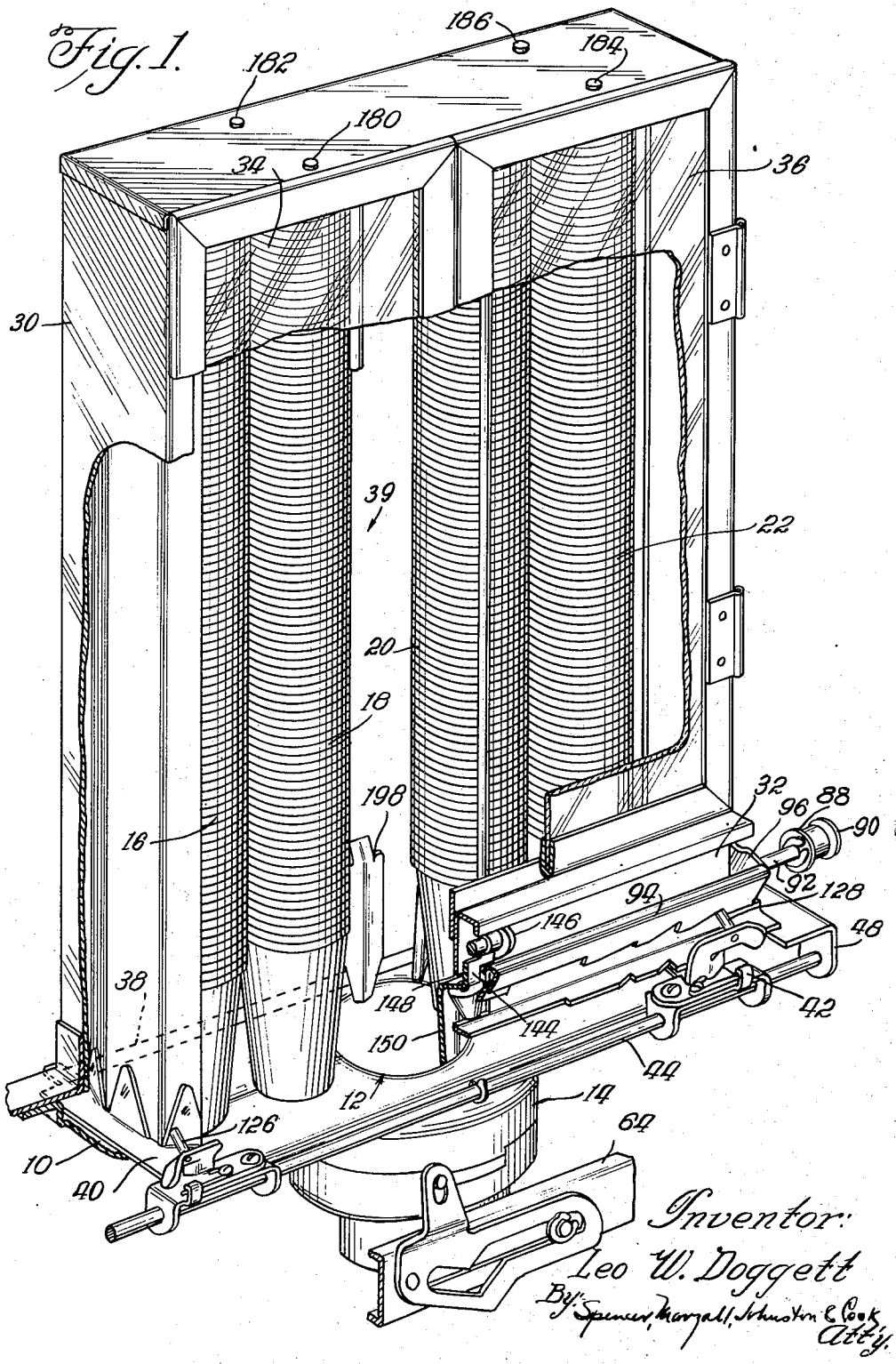
March 6, 1945. L. W. DOGGETT 2,370,848

MULTIPLE STACK LOADING MECHANISM FOR CUP DISPENSERS

Filed July 31, 1941 5 Sheets-Sheet 1

Fig. 1.



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MULTIPLE STACK LOADING MECHANISM FOR CUP DISPENSERS

Filed July 31, 1941 5 Sheets-Sheet 2

Fig. 5.

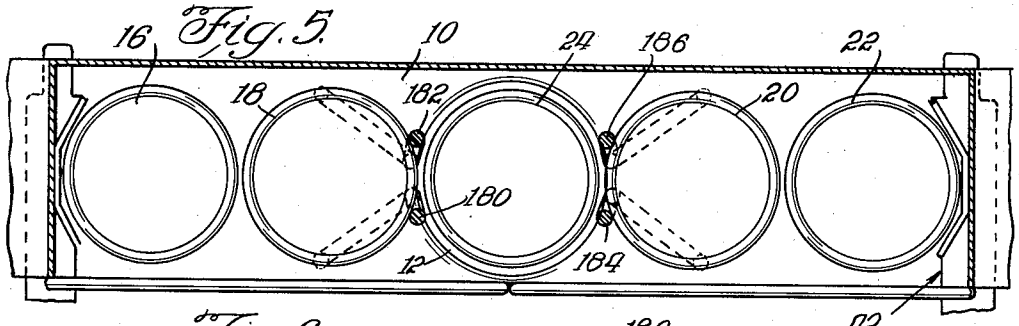


Fig. 6.

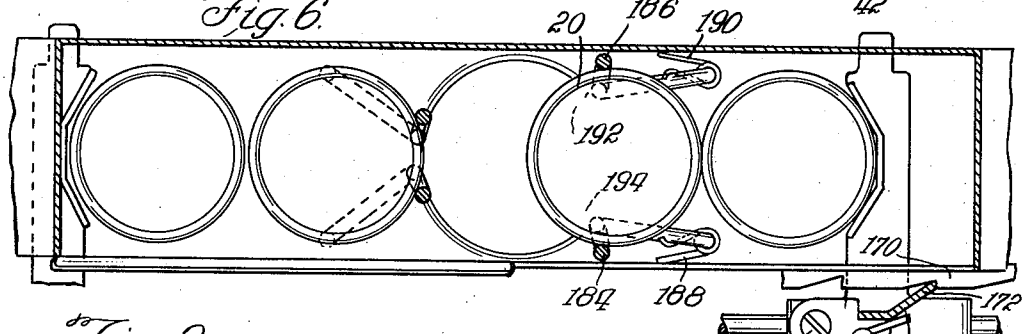


Fig. 2.

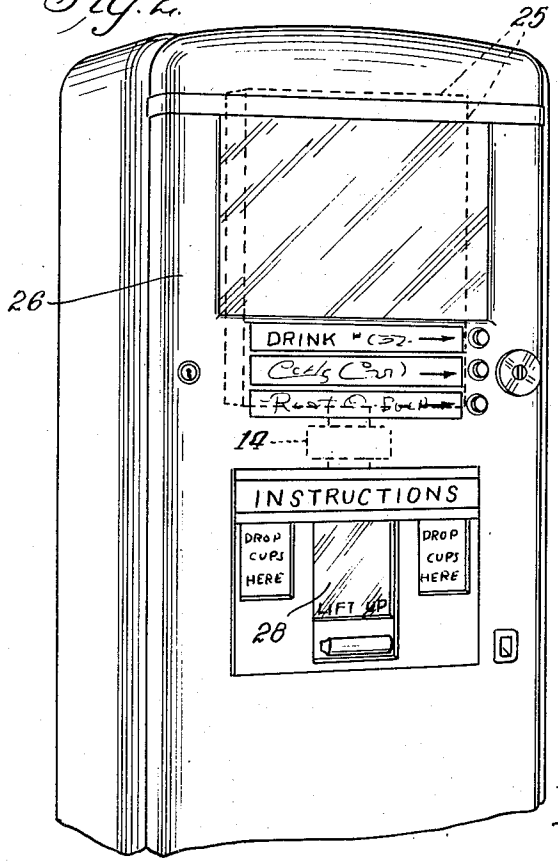
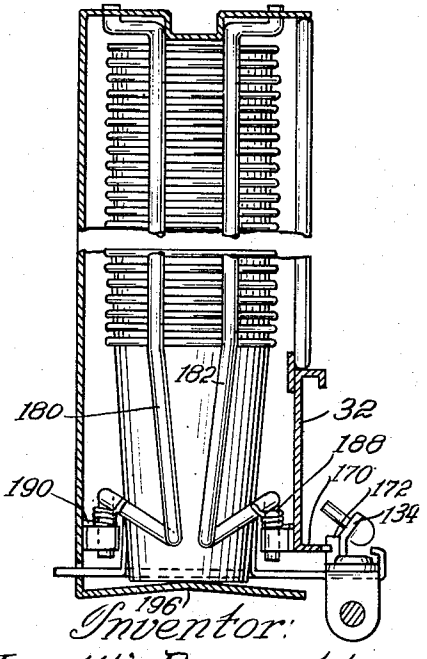


Fig. 15.



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MULTIPLE STACK LOADING MECHANISM FOR CUP DISPENSERS

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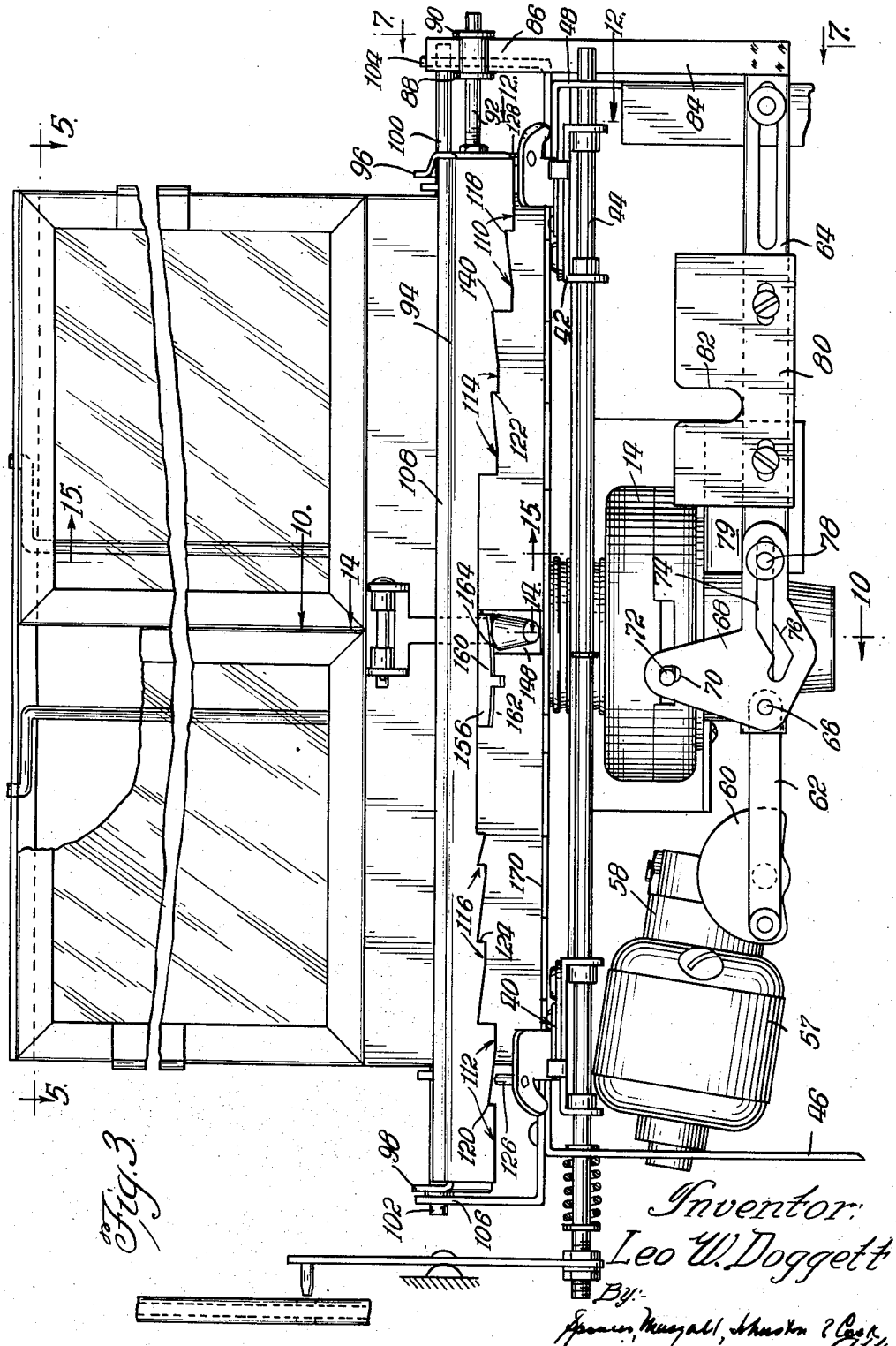

Fig. 3.

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MULTIPLE STACK LOADING MECHANISM FOR CUP DISPENSERS

Filed July 31, 1941 5 Sheets-Sheet 4

Fig. 7.

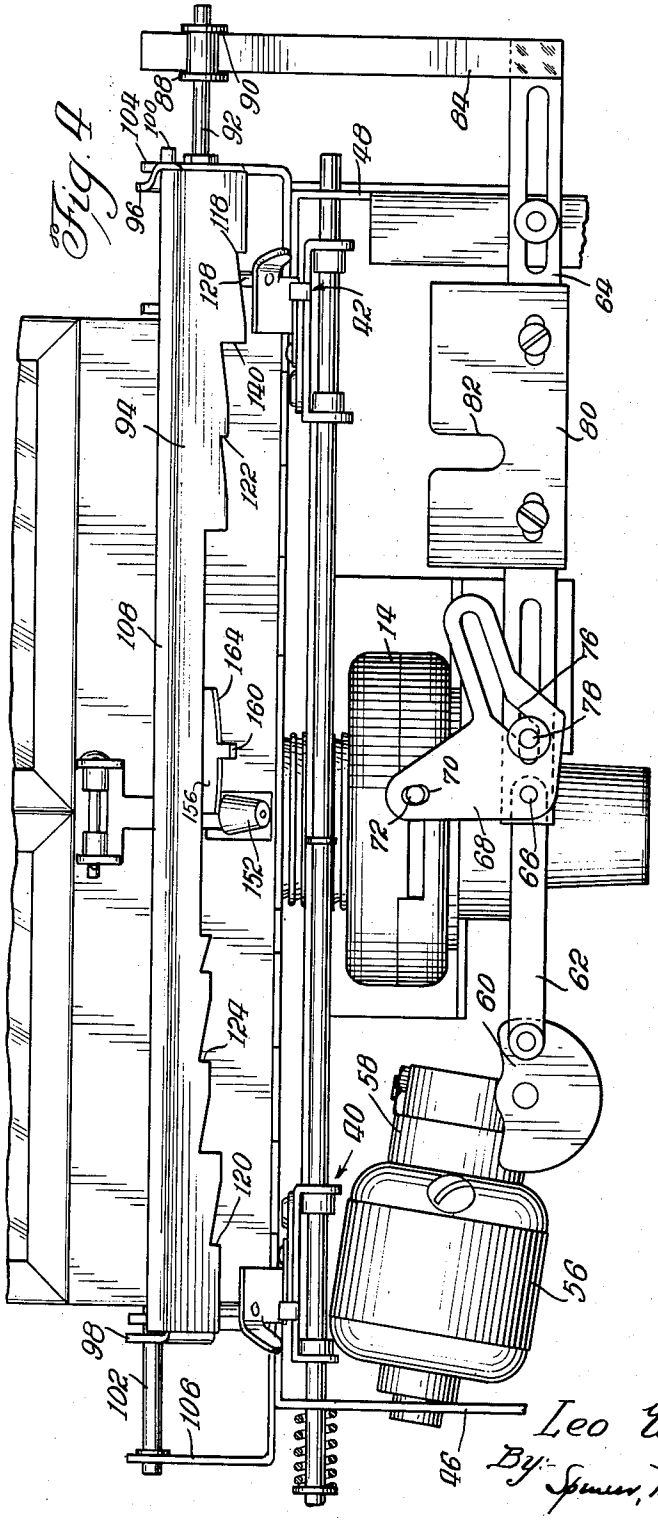
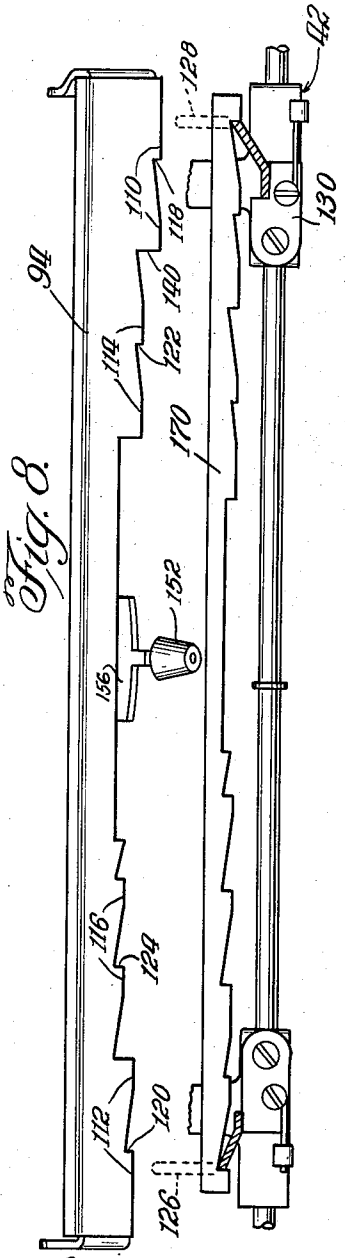


Fig. 8.



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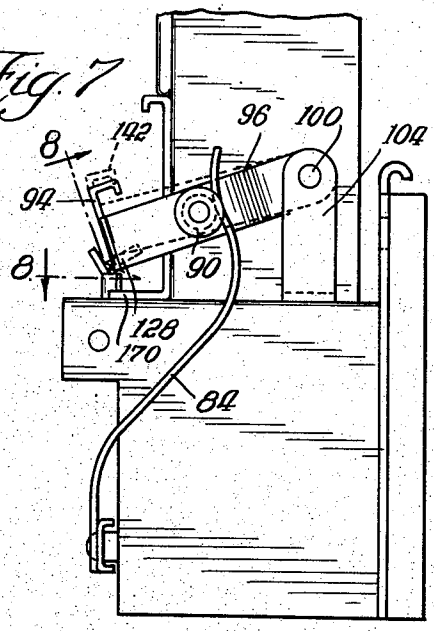
MULTIPLE STACK LOADING MECHANISM FOR CUP DISPENSERS

Filed July 31, 1941 5 Sheets-Sheet 5

Fig. 7



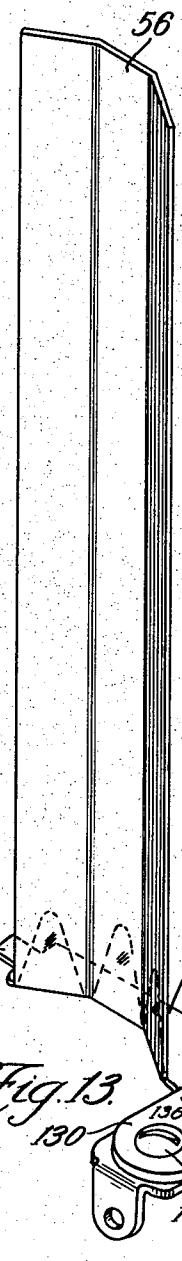
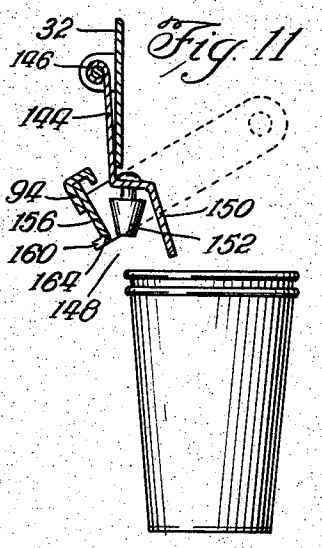


Fig. 11



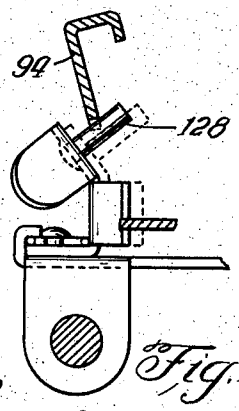


Fig. 12.

Fig. 14

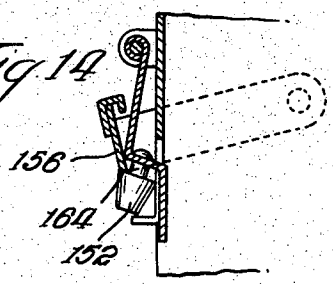


Fig. 10.

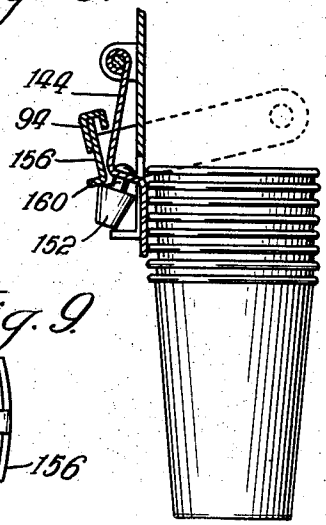
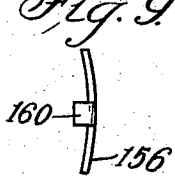


Fig. 13.

Fig. 9



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Patented Mar. 6, 1945

2,370,848

UNITED STATES PATENT OFFICE

2,370,848

MULTIPLE STACK LOADING MECHANISM FOR CUP DISPENSERS

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Application July 31, 1941, Serial No. 404,795

18 Claims. (Cl. 312—43)

This invention relates to a multiple stack loading mechanism for cup dispensers.

Broadly, the object of this invention is to provide an "in-line" stack loading mechanism wherein a cup dispenser is located at a point intermediate the ends of a shelf supporting a plurality of stacks of cups. In order that the problem may be clearly perceived, attention is invited to two types of in-line cup stack loading mechanism now in use. One type is illustrated in the patent to Olsen, No. 1,881,894, wherein a plurality of stacks of cups are positioned on a movable shelf for delivery to a cup dispenser positioned at one end of the shelf. Such a cup stack loading mechanism has a width such that when used in an ordinary vending machine it is necessary to position the cup dispenser at one side of the machine or to reduce the number of cup stacks to two or three. The second type of in-line cup loading mechanism is illustrated in a co-pending application, that of John W. Carlson, Serial No. 350,192. In this type, the cup dispensers are positioned centrally of the loading mechanism and hence can be used to drop cups directly below upon a shelf for the filling operation. In this type, however, it will be observed that each empty magazine moves into space which was not previously occupied. This is waste space. Because of the dimensions of the vending machine, therefore, the maximum number of cup stacks that can be employed in this type is limited.

The first object of this invention is to utilize a broad shelf for supporting stacks of cups while dispensing from the center of the shelf.

One of the features of this invention is the provision of an elongated shelf having an opening centrally thereof with a cup dispenser mounted therebelow. On each side of the opening two stacks of cups may be positioned on the shelf with a fifth stack positioned in the cup dispenser itself. Provision is made for moving the stacks of cups successively into the cup dispenser from both ends of the shelf. By this arrangement a maximum quantity of cups may be positioned on the shelf while permitting the cup dispenser to be centrally positioned with respect to the mechanism. This makes possible a short vertical drop from the cup dispenser to a centrally positioned beverage pouring station.

A further object of this invention is to load a stack of cups from one side of the cup dispenser and then a stack from the other side of the cup dispenser with the result that in those locations where the machine is not cycled frequently enough between calls by a service man to exhaust the cup supply, added cups will be used only after exhaustion of beverage cups in the machine. On this point, if the mechanism were so designed that the two stacks of cups to the right of the cup dispenser were first moved into delivery position and these were followed by the two stacks of cups to the left of the cup dispenser, in those locations where the machine was cycled between calls of a service man just sufficiently to use two to three stacks of cups, the service man would always reload the shelf to the right of the cup dispenser while the cups to the left might stand unused indefinitely. By the alternating loading arrangement, this objection is removed.

It will be appreciated that the foregoing two objects are attained while meeting one fundamental consideration and that is the employment of a fixed shelf for supporting the cups and positioning the cups along the shelf. This arrangement, while requiring additional motive power, nevertheless eliminates carrier members and the like which all too frequently get out of repair. In this connection, the applicant has introduced an improvement, namely, a slight longitudinal ledge centrally of the shelf which tends to establish a two point contact between a stack of cups and the shelf. The cups, being waxed, slide more easily from position to position due to this limited contact.

Another object of this invention is to assure proper delivery of a stack of cups to the cup dispenser from the delivery shelf. Where stacks of cups are pushed along a shelf by a second stack of cups, the pushing pressure is applied at the rims of the cup, and consequently there is a tendency due to frictional resistance of the bottom cup with the shelf to lag so that when a stack of cups has been pushed directly over a hole in the shelf, the stack may not drop into the hole because the rear edge of the bottom cup has not cleared the edge of the hole. A feature of this invention which eliminates this possibility is a spring actuated delivery device which acts upon the lowermost cup near its bottom to force it into the hole leading to the cup dispenser at the proper moment.

A further object of this invention is to utilize the means for causing the vending machine to cycle as the means for moving a stack of cups into the cup dispenser when the supply to the latter has become low. And, in conjunction with this type of drive, to employ a new and novel testing finger. Some cup loading mechanisms em-

ploy spring devices for moving a stack of cups into loading position, the spring device being permitted to function by means of the action of some sort of an escapement. Applicant employs a testing finger which functions to hold a drive bar out of engagement with a pusher member unless the testing finger drops into a second position which occurs when there is an absence of cups at a given point above the cup dispenser.

Another object of this invention is to design all equipment so that it may be readily adapted to handle cups of various sizes. At the present time a seven or eight ounce cup is generally used in the trade but it will be appreciated that it is necessary that a cup stack loading mechanism be not rendered obsolete by the coming into vogue of a ten or twelve ounce cup. The difference between a ten or twelve ounce cup and a seven or eight ounce cup is not a difference solely in height but in the diameter of the base and the rim. Toward this end, that portion of the stack loading mechanism which holds the cup dispenser is so designed that different types of cup dispensers may be interchangeably positioned and the dimensions of the shelf opening and the like are such that larger cups may be accommodated.

Another feature of applicant's invention is the positioning of the entire stack loading mechanism within a cabinet having a glass front. The employment of a cabinet has not been common in the past. It serves, however, to keep the cups clean and the glass front makes it possible to determine without opening the casing whether or not the cup magazines need refilling.

These and such other objects as may hereinafter appear are attained in one embodiment of the invention shown in the accompanying drawings, comprising five sheets, wherein:

Figure 1 is a perspective view of the multiple stack loading mechanism as a whole;

Figure 2 is a front view of a vending machine showing in dotted outline the position on the back of the door occupied by the multiple stack loading mechanism;

Figure 3 is a front view in elevation showing the driving mechanism when the vending machine is in off position;

Figure 4 is a view similar to Figure 3 when the vending machine mechanism has reached the midpoint of its cycle;

Figure 5 is a plan view of the cup stacks on the loading mechanism shelf prior to functioning of the loading mechanism;

Figure 6 is a view similar to Figure 5 after the right hand loading mechanism has been moved by one step;

Figure 7 is an end view taken on the line 7—7 of Figure 3;

Figure 8 is a developed view taken on the line 8—8 of Figure 7;

Figure 9 is a bottom view of the guide rail taken on the line 9—9 of Figure 3;

Figure 10 is a cross-sectional view taken on the line 10—10 of Figure 3;

Figure 11 is a side view showing the position of the testing finger when the stack of cups above the cup dispenser has become depleted;

Figure 12 is a view taken on the line 12—12 of Figure 3;

Figure 13 is a perspective view of the pusher member;

Figure 14 is a view taken on the line 14—14 of Figure 3; and

Figure 15 is a view of the snap action members for seating a stack of cups in the cup dispenser, taken on the line 15—15 of Figure 3.

Continuing to refer to the drawings, and particularly to Figure 1, a broad object of centrally positioning a cup dispenser with relation to a plurality of stacks of cups stored in substantially a straight line is attained by means of an elongated shelf 10 having an aperture 12 midway its length with a conventional cup dispenser as 14 beneath the aperture. Referring to Figure 5, the shelf 10 is of a length sufficient to receive cup stacks 16 and 18 on one side of the aperture 12 and cup stacks 20 and 22 on the other side. By this arrangement, a fifth stack 24 may be positioned in the cup dispenser so that the full capacity of the device is five stacks of cups.

Returning now to Figure 1, the principle of operation of applicant's device is to advance alternately stacks of cups from the opposite sides of the aperture 12 to a position where the stacks will drop into the cup dispenser 14. Thus, after the central stack of cups has been exhausted by functioning of a vending machine in which such a cup stack loading mechanism is employed, the stack of cups 20 is moved to the left until it drops through the aperture 12 into the cup dispenser 14. When the stack of cups 20 has been exhausted, the stack of cups 18 is moved to the right until it drops through the aperture 12 into the cup dispenser 14. In succeeding stages, the cup stack 22 is moved to the left and after it has been exhausted the cup stack 16 is moved to the right. After all of the cups have been exhausted, means are provided for rendering the vending machine inoperative as by causing a coin received by a coin mechanism to be returned to the patron.

It will be understood, therefore, that broadly the invention resides in positioning a plurality of stacks of cups in a line on a shelf and without employing individual magazines causing the cup stacks to be loaded successively into a cup dispenser which is centrally positioned with respect to the shelf. Referring for a moment to Figure 2, the dotted lines 25 indicate the position on the back of a vending machine door 26 occupied by the assembly shown in Figure 1. The cup dispenser 14 is shown in dotted outline and it will be observed that there is a straight short vertical drop into a cup chamber or beverage pouring station positioned behind the glass door 28. As has been explained, it is convenient to locate the cup chamber in the middle of the front of the vending machine and existing in-line cup stack loading mechanisms must either be of comparatively small capacity as in the John W. Carlson co-pending application, Serial No. 350,192, or if a type such as that shown by Olsen, Patent No. 1,881,894 is employed, a sloping chute from that side of the vending machine where the cup dispenser is positioned to the middle thereof must be provided, and this increases the distance necessary between the bottom of the cup dispenser and the floor of the cup chamber. If this latter arrangement is employed, the cup chamber door must either be lowered in the machine or the height of the machine must be increased or the height of the cup stacks must be decreased.

Returning to Figure 1, a cabinet 30 having a lower closed front panel 32 with glass doors 34 and 36 is mounted by any suitable means above the shelf. A slot 38 across the bottom of a back wall 39 functions as one of the guide means for two pusher elements 40 and 42. The other guide means for the pusher elements 40 and 42 is a

guide bar 44 which, referring to Figure 3, is mounted forwardly and slightly below the shelf 10 in brackets 46 and 48. The two pusher members 40 and 42 are similar, being complementary, so that, referring to Figure 13, a perspective view of only the right hand pusher member need be shown. An inverted U-shaped member 50 attached to the pusher member 42 guides the latter by holes engaging the guide rail 44. Integral with the main body portion of the U-shaped member 50 is a flat extending arm 52 for resting on the shelf 10 and having a tongue 54 for insertion, referring to Figure 1, in the slot 38. Mounted at substantially right angles to the arm 52 is a pusher wall 56 comprising vertical panel members shaped to engage at a plurality of points a stack of cups. Further details of the pusher member will be described hereinafter.

Returning to Figure 1, it is apparent that in order to function, one of the pusher members 40 or 42 must move toward the aperture 12 when the cups in the cup dispenser have dropped below the shelf 10. This end could be accomplished in a variety of ways, depending upon the source of power used. It would be possible to provide spring operated means exerting a constant pressure on the two pusher members 40 and 42 which by means of some sort of an escapement would be permitted to move the two pusher members 40 and 42 at certain times.

It is preferable, however, to employ the driving means utilized in the vending machine for the reason that this driving mechanism has ample power and is much less subject to breakdown than spring operated devices. Referring to Figure 3, the power for moving stacks of cups is derived from a motor 57 which through a speed reducer 58 and a rotatable member 60 reciprocates a link 62 in driving engagement with an arm 64 at a pivotal point 66. A plate 68 pivotally mounted at the point 66 on the arm 64 has a hole 70 in which is inserted an actuating arm 72 of the cup dispenser 14. An internal track 74 on the arm 64 and an internal track 76 on the plate 68 both ride a guiding lug 78 mounted on a portion 79 fixed with respect to the dispenser, the configuration of the internal track 76 being such as to cause the cup dispenser to be actuated at the beginning of a stroke while toward the end of the forward stroke, the internal track at 76 rocks the plate 68 about its pivot 66 and movement of the arm 72 ceases. In this connection see the position of the plate 68 in Figure 4 where the arm 64 is in its furthermost position to the right. Returning to Figure 3, a second plate 80 mounted by any suitable means on the arm 64 has a means such as the guideway 82 for engaging driving means within the vending machine.

At the end of the driving arm 64 is an upwardly extending member 84 having its end 86 positioned between two discs 88 and 90 mounted on a short shaft 92 which in turn is rigidly fastened to a drive bar 94, see also Figure 1. This drive bar 94, referring again to Figure 3, is a U-shaped member having two side arms 96 and 98, which arms, see Figure 7, have holes in their outer ends so that they may be supported on shafts 100 and 102 disposed in brackets 104 and 106, see Figure 3. Returning to Figure 7, it is evident that the drive bar 94 may be raised or lowered about its pivot 100, and, referring to Figure 3, it is evident that the drive bar 94 may be moved laterally, that is, in Figure 3, from left to right along the two short shafts 100 and 102. The drive bar 94, therefore, is capable of two movements, a reciprocating movement from left to right and a vertical movement. Returning to Figure 7, the arm member 84 maintains its driving relationship between the two discs 88 (see also in Figure 3) and 90, regardless of vertical movements of the drive bar 94.

Referring to Figure 3, the lower half of the drive bar is cut into a series of steps, each step comprising two portions and each step being at a different distance from the top edge 108 of the drive bar 94. The first step which is furthermost from the edge 108 is identified by the numeral 110; the second step at the other end of the drive bar by the numeral 112; the third step next to the first step by the numeral 114; and, the fourth step by the numeral 116. Each step contains a shallow notch as 118, 120, 122 and 124. The drive bar 94, referring to Figure 1, causes the pusher elements 40 and 42 to operate in the desired manner by engaging lugs 126 and 128 on the pusher elements 40 and 42 under selected circumstances.

Referring to Figure 13, a member 130 is pivoted on a screw 132 and has at its free end a bracket member 134 carrying the lug 128. A spring element 136 urges the member 130 in the direction of the arrow 138. For present purposes, however, it will be assumed that the member 130 is rigidly fastened to the pusher member 42.

Referring now to Figure 3, and assuming that there are no cups in the loading mechanism or in the cup dispenser, each time that the vending machine is caused to cycle, that is, each time that the motor 57 causes the drive arm 64 to make one full stroke from left to right and back to left, the drive bar 94 will make a similar stroke. On the fore stroke, the drive bar 94 moves to the right, being held at a given vertical position by means of the step 110 engaging the lug 128 until the notch 118 in the drive bar 94 drops over the lug 128. It will be noted, referring to the left hand end of the drive bar 94, that the lug 126 does not come into contact with the second step 112, because this step is held out of engagement with the lug 126 by the lower step 110. The end of the fore stroke is shown in Figure 4 where the notch 118 has passed to the right of the lug 128. On the back stroke of the drive bar 94, the notch 118 pulls the pusher member 42 to the left.

The next time that the vending machine is cycled, the operation is repeated but this time, referring to Figure 3, the deep notch 140 drops over the lug 128 so that the drive bar 94 would drop until it engaged the step 114. This, however, does not occur because the next step after 110 is the step 112 at the other end of the drive bar 94 and inasmuch as the lugs 126 and 128 are at exactly the same height, when the lug 128 drops into the notch 140 the height of the drive bar 94 is controlled by the step 112 which rests on the lug 126. Returning to the second cycling of the machine, after the notch 140 has dropped over the lug 128, on the return stroke the pusher member 42 is drawn to the left. The distance travelled by the pusher member 42 from the position shown in Figure 3 to the position which it occupies after it has been moved by two steps, is related to the size of the cups on the delivery shelf, so that, referring to Figure 5, two movements of the pusher member 42 to the left will cause the stack of cups 22 to occupy the position of the stack of cups 20 and the stack of

cups 20 will have dropped through the aperture 12 into the cup dispenser so as to occupy the position of the stack of cups 24.

On the third and fourth cycling of the machine, the drive bar 94 will move the pusher member 40 to the right so that, referring to Figure 5, the stack of cups 16 will occupy the position of the stack of cups 18 and the stack of cups 18 will have dropped into the aperture 12. Referring to Figure 5, when stack 18 is moved into dispensing position at the end of the forward stroke of the fourth cycle, element 152 moves bar 94 up so that notch 122 is not engaged with pin 128. On the fifth and sixth cycles of the machine, the lug 128 will function in association with the notches in the step 114 to cause the pusher member 42 to move further to the left while on the seventh and eighth cycles of the machine the lug 126 will function in association with the notches in the step 116 to move the pusher member 40 to the right.

By the arrangement described, it is apparent that the pusher element 42 moves to the left by one column of cups, which step is followed by the pusher element 40 moving to the right by one column of cups and then these two steps are repeated.

As described, the pusher elements must only operate when the stack of cups above the cup dispenser 14 has dropped below the level of the shelf 10. In order to render the driving mechanism operative only at desired times, that is, when the stack of cups above the cup dispenser 14 has become nearly exhausted, the drive bar 94, see Figure 7, is held upwardly in dotted position 142 out of engagement with the lugs 128. This position is maintained by a testing finger, which, referring to Figure 11, is an arm 144 pivotally suspended from a bracket 146 on the lower front panel 32 of the casing, see Figure 1. Returning to Figure 11, an aperture 148 in this front panel 32 immediately above the shelf 10 permits an inwardly and downwardly turned end 150 of the testing arm 144 to enter the space occupied by any stack of cups above the cup dispenser. Mounted upon the end 150 is a truncated cone roller member 152. When there are cups adjacent the opening 148, the testing arm 144 is held in the position shown in Figure 10 where in turn it holds the drive bar 94, upwardly in a position out of engagement with either lug 126 or 128. The surface of the truncated cone 152 slips easily on the sharp edge 164 of a guide rail 156 attached to the drive bar 94 whereby it is possible for the weight of a stack of cups in dropping into the cup dispenser to move the downwardly turned end 150, see Figure 11, of the testing arm 144 outwardly to cause member 152 to engage the guide rail 156 and force it upwardly into the position shown in Figure 10. As will be apparent by reference to Figure 11, member 152 is released from guide rail 156 by gravity when the cup stack level falls below end 150.

As a consequence of this arrangement, the eight cycles of the machine heretofore described as necessary for moving the pusher elements 40 and 42 from their outermost positions to the innermost positions are only permitted to occur when the testing arm 144 has moved inwardly due to an absence of cups above the cup dispenser so as to permit the drive bar 94 to engage either lug 126 or lug 128. Inasmuch as after each two cycles of the machine, a stack of cups drops into the cup dispenser and thereby cams outwardly the testing arm 144 so as to lift the drive bar 94 out of engagement with the lugs 126 and 128, the loading mechanism functions in two stage steps, each step occurring after the exhaustion of a given cup stack.

Attention is now invited to the manner of functioning of the guide rail 156, see Figure 11, and the truncated cone bearing 152. Referring to Figure 3, the guide rail 156 is a strip of metal fastened to the back of the drive bar 94. The guide rail has a forwardly extending portion 160. The bottom edges 162 and 164 of the guide rail 156 are sharpened and would form a continuous guide excepting for the interruption at the midpoint created by the outwardly turned lug 160. The relationship of the edge 164 to the forwardly projecting lug 160 is shown in Figure 11. In Figure 10, the truncated cone bearing 152 is shown engaging the guide rail at its midpoint, namely, adjacent the forwardly projecting lug 160. In Figure 14, the truncated cone bearing 152 is shown engaging the guide rail 156 at one of its sharpened edges 162 or 164. Referring to Figure 9, it will be noted that the guide rail 156 is slightly bowed outwardly, that is, away from the magazine loading mechanism.

The purpose of this guide rail and its relationship to the truncated cone bearing 152 is to permit the testing finger 150 to test the presence of cups at only the time when the truncated cone member 152 is in engagement with the rail at the point of the outwardly turned lug 160, as in Figure 10. It is evident that by looking at Figure 3 this occurs on the middle of the forward stroke of the drive bar 94 or the middle of the back stroke of the drive bar 94. At all other times, the upper edge of the truncated cone bearing 152 will be caught under either one of the sharp edges 162 or 164 of the guide rail 156. This relationship is shown in Figure 14. Inasmuch as the guide rail 156 is bowed as shown in Figure 9, the guide rail draws the bearing member 152 away from the stack of cups. At the beginning and the end of each cycle of the vending machine, the testing finger 150 is not pressing against the cups adjacent the aperture 148, and it follows that the dispensing of a cup by the cup dispenser 14, see Figure 3, may take place at any one of these times so as to permit the stack of cups to drop downwardly by one cup without being affected by any pressure by the testing finger 150. While this pressure exerted by the testing finger 150 against the sides of the cups would not prevent descent of the cup stack when there was a considerable number of cups above the aperture 148, it would be sufficiently great to interfere with the descent of cups when only a few cups were left in the stack. It is, therefore, important that the testing finger not rest against the side of the cups adjacent to the aperture 148 at the time when the cup drop downwardly due to the dispensing of one cup from the bottom.

A refinement in the means of controlling the engagement of the notches in the drive bar 94 with either of the lugs 126 or 128 on the pusher members 40 and 42 consist of a series of notches on a ledge adjacent the pusher members 40 and 42, which notches in conjunction with pawls on the pusher members 40 and 42 further control the position of the lugs 126 and 128 relative to the drive bar 94. Referring to Figure 3, the rail containing these notches is identified by the numeral 170 and referring to Figure 7, it will be noted that this rail is a forwardly projecting end of the lower front panel 32 of the housing.

Referring to Figure 6, it will be noted that an inwardly directed edge 172 of the bracket 134, which was described in connection with Figure 13 as being part of a member 130 capable of pivotal movement on the screw 132, constitutes a pawl. As shown in Figure 6 and also in Figure 7, the pawl 172 engages the rail 170 under pressure by the spring 136 which is also shown in Figure 13. The relationship of the notches in the rail 170 to the notches in the drive bar 94 is shown in Figure 8. Referring now to Figure 8, it will be understood that a movement of the pusher member 42 toward the left will cause the member 130 to move clockwise, and in so doing, referring to Figure 12, the lug 128 will move closer to the drive bar 94. Because the notches in the rail 170 are at the midpoint between the notches in the drive bar 94, it follows that the rail 170 will urge the lug 128 into engagement with the drive bar 94 primarily when a notch in the drive bar 94 is about to engage the lug 128. By this arrangement the driving relationship between the drive bar 94 and the pusher member 42 is more definitely established.

As indicated in the introductory portion of this specification, considerable trouble was encountered in assuring clearance of the lower edge of the bottom cup of a stack of cups over the edge of the aperture above the cup dispenser. This was due to the fact that the stack of cups being pushed over the aperture is being pushed at its rims and inasmuch as the rim of the bottommost cup is some four inches above the delivery shelf and because the cups do not have a great taper, the bottom rearward edge of the botton cup would tend to lag behind the stack, that is to say, the stack would tend to curve backwardly away from the direction of movement. Applicant provides positive means for automatically pushing the bottom of the stack of cups into the aperture.

Referring to Figure 5, two sets of pusher rods 180 and 182, and 184 and 186 are mounted for pivotal movement in the top of the cabinet, see Figure 1, and the shelf 40. Each pair of pusher rods are urged toward each other by spring means, such as 188 and 190, see Figure 6, and inasmuch as their main body portion extends vertically to a point some distance from their respective pivotal points, it is apparent that they may assume the position shown in the left hand portion of Figure 6 or they may be spread apart by an advancing stack of cups as in the right hand portion of Figure 6. Referring to Figure 15, the bottoms of the pusher arms 180 and 182 extend forwardly so as to reach under the rim of a receding stack of cups so as to advance the bottom of the lowermost cup at the same rate as the rims. The action is quite simple. On the first cycle of the machine wherein a stack of cups is being advanced into position over the aperture, the pusher rods 184 and 186 leave the position shown in Figure 5 and are spread apart by the stack of cups 20 into the position shown in Figure 6. On the second cycling of the machine, the stack of cups 20 is pushed past a dead center with respect to the two pusher rods 184 and 186 which, due to the action of the springs 188 and 190, tend to push or kick the entire stack of cups quickly into loading position. The forward projecting portions 192 and 194 function to push the bottom cup over the edge and the two pusher rods as a whole tend to give a quick movement to the stack of cups quite apart from the movement imparted by the pusher member. In short, the final loading results from the snap just before the end of the fore stroke of the loading mechanism.

Attention is invited to the raised portion 196 of the shelf shown in Figure 15 whereby a line contact is established, between the stack of cups and the shelf in order to facilitate delivery. Also, referring to Figure 1, a guide 198 is mounted on the back wall of the cabinet 30 to act as a counter-force to any misaligning tendency of the cups in the stack due to the action of the testing finger during each cycling of the machine.

The foregoing sets forth the broad ideas and the specific means which the applicant has shown for attaining those ideas. It will be appreciated that the particular structures employed are conditioned upon certain specific conditions which this particular application must meet, but which conditions would not be present in other applications. Thus, for example, in this particular application the entire driving arrangement is based upon a source of power which is to be utilized for running other equipment in the vending machine. If a separate source of power were to be used, it would be understood that the specific arrangement might be quite different. It will further be understood that the minor features of this invention, such as the means for assuring driving engagement between the main driving bar 94 and the lugs 126 and 128 may be omitted without impairing the general functioning of the machine. Moreover, the minor features all contribute to a generally successful cup loading mechanism.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A stack loading mechanism for a cup dispenser comprising an elongated shelf, an opening disposed between the ends of said elongated shelf for positioning above a cup dispenser, means for pushing stacks of cups from one side of said opening thereinto, means for pushing other stacks of cups from the opposite side into said opening, and means to actuate said first and second named means alternately.

2. A stack loading mechanism for a cup dispenser comprising a delivery zone, means for moving stacks of cups into said delivery zone from a plurality of sides thereof first from one side and then from another, and means for rendering inoperative said stack moving means until a stack of cups in the delivery zone has reached a predetermined stage of exhaustion.

3. A stack loading mechanism for a cup dispenser comprising a delivery zone, means for moving stacks of cups into said delivery zone from a plurality of sides thereof first from one side and then from another, and means for rendering inoperative said stack moving means until a stack of cups in the delivery zone has reached a predetermined state of exhaustion, said latter named means comprising a testing finger positioned to engage cups disposed in the delivery zone.

4. A stack loading mechanism for a cup dispenser comprising a cup stack supporting member having an opening disposed therein for positioning above a cup dispenser, a pair of pusher members disposed on opposite sides of the opening, and means for advancing said pusher members alternately toward the opening.

5. A stack loading mechanism for a cup dispenser comprising a cup stack supporting member having an opening disposed therein for posi-

tioning above a cup dispenser, a pair of pusher members disposed on opposite sides of the opening, a driving lug on each pusher member, a driving bar disposed adjacent to said driving lugs, and means for causing said driving bar to engage first one lug and then the other.

6. A stack loading mechanism for a cup dispenser comprising a cup stack supporting member having an opening disposed therein for positioning above a cup dispenser, a pair of pusher members disposed on opposite sides of the opening, a driving lug on each pusher member, a driving bar disposed above said lugs and having a series of inverted steps on each outer end thereof, the levels of the steps on one end being at the midpoint respectively of the levels of the steps on the other end whereby the driving bar will rest upon one or the other of said lugs, and means for reciprocating the driving bar whereby it will move first one pusher member and then the other.

7. A stack loading mechanism for a cup dispenser comprising a cup stack supporting member having an opening disposed therein for positioning above a cup dispenser, a pair of pusher members disposed on opposite sides of the opening, a driving lug on each pusher member, a driving bar disposed above said lugs and having a series of inverted steps on each outer end thereof, the levels of the steps on one end being at a midpoint respectively of the levels of the steps on the other end whereby the driving bar will rest upon one or the other of said lugs, a notch at the midpoint of each step, and means for reciprocating the driving bar by more than half the length of each step whereby two movements of the driving bar will be required to clear the lug of either pusher member from a given step.

8. A stack loading mechanism for a cup dispenser comprising a cup stack supporting member having an opening disposed therein with a cup dispenser mounted therebelow, a pair of pusher members disposed on opposite sides of the opening, a driving lug on each pusher member, a driving bar disposed above said lugs and having a series of inverted steps on each outer end thereof, the levels of the steps on one end being at a midpoint respectively of the levels of the steps on the other end whereby the driving bar will rest upon one or the other of said lugs, a notch at the midpoint of each step, means for reciprocating the driving bar by more than half the length of each step whereby two movements of the driving bar will be required to clear the lug of either pusher member from a given step, and means for urging each lug into engagement with a notch or edge of a step in order to minimize disengagement during a driving operation.

9. A stack loading mechanism for a cup dispenser comprising means for supporting in alignment on both sides of an opening for positioning above a cup dispenser a plurality of stacks of cups, a pair of pusher members one on each side of the opening and movable toward each other, a cup testing element disposed adjacent the opening, a driving bar reciprocable in a line parallel to the movement of the pusher members and having means normally engageable with the pusher members for alternately moving them toward the opening, and means controlled by the testing finger for holding the driving bar out of engagement with the pusher member excepting when there is an absence of cups at said opening.

10. A stack loading mechanism for a cup dispenser comprising means for supporting in alignment on both sides of an opening for positioning above a cup dispenser a plurality of stacks of cups, a pair of pusher members one on each side of the opening and movable toward each other, a cup testing element pivotally suspended adjacent said opening, a driving bar reciprocable in a line parallel to the movement of the pusher members and having means normally engageable with the pusher members for alternately moving them toward the opening, and means controlled by the testing finger for holding the driving bar out of engagement with the pusher members excepting when there is an absence of cups at said opening, said last named means comprising a guide rail on the driving bar supported by a bearing surface on the testing finger whereby the testing finger will hold the driving bar out of engagement with the pusher elements except when an absence of cups at said opening permits the testing finger to drop the driving bar into driving engagement with one of the two pusher elements.

11. A stack loading mechanism for a cup dispenser comprising means for supporting in alignment on both sides of an opening for positioning above a cup dispenser a plurality of stacks of cups, a pair of pusher members one on each side of the opening and movable toward each other, a cup testing element pivotally suspended adjacent said opening, a driving bar reciprocable in a line parallel to the movement of the pusher members and having means normally engageable with the pusher members for alternately moving them toward said opening, and means controlled by the testing finger for holding the driving bar out of engagement with the pusher members excepting when there is an absence of cups at the opening, said last named means comprising an arcuate guide rail suspended at its midpoint from the driving bar with its free ends curving away from the testing finger and a following and supporting member on the testing finger engaging said guide rail whereby the testing finger supports the driving bar but is itself controlled by the arcuate guide rail.

12. A stack loading mechanism for a cup dispenser comprising means for supporting in alignment on both sides of an opening for positioning above a cup dispenser a plurality of stacks of cups, a pair of pusher members one on each side of said opening and movable toward each other, a cup testing element pivotally suspended adjacent said opening, a driving bar reciprocable in a line parallel to the movement of the pusher members and having means normally engageable with the pusher members for alternately moving them toward the cup dispenser, and means controlled by the testing finger for holding the driving bar out of engagement with the pusher members excepting when there is an absence of cups at said opening, said last named means comprising an arcuate guide rail suspended at its midpoint from the driving bar with its free ends curving away from the testing finger, a lug on the guide rail at its midpoint, and a following element mounted on the testing finger and capable of holding the testing finger in close association with the driving bar when engaging the guide rail, whereby the following element on the testing finger may come into engagement with the guide rail on the driving bar at the lug and hold the testing finger away from the cup stack at the lug.

13. A stack loading mechanism for a cup dis-

penser comprising, a delivery zone, means for supporting stacks of cups on a plurality of sides of said delivery zone, means for moving the stacks of cups to said delivery zone, and means for actuating said last named means to move said cup stacks one at a time to said delivery zone first from one side thereof and then from another side thereof.

14. A stack loading mechanism for a cup dispenser comprising, a shelf having an opening therein located above a cup dispenser and adapted to have cup stacks located thereon at each side of said opening, means for advancing a cup stack to be deposited in said opening, and means contacting the lowermost cup of the stack below the rim thereof to positively advance the bottom of the lowermast cup to said opening.

15. A stack loading mechanism for a cup dispenser comprising, a delivery zone, immobile means for supporting stacks of cups adjacent said delivery zone, means for slidably advancing said cup stacks to said delivery zone one at a time, and means for positively advancing the bottom of the lowermost cup of the stack to said delivery zone.

16. A stack loading mechanism for a cup dispenser comprising, an immobile shelf for supporting a group of cup stacks in alinement, a delivery zone, primary means for slidably advancing said group of cup stacks intermittently toward said delivery zone, and secondary advancing means to center and maintain vertically the endmost cup stack being deposited in the delivery zone.

17. In a stack loading mechanism for a cup dispenser, an immobile shelf having an upwardly extending longitudinal ridge thereon for supporting a plurality of cup stacks, a delivery zone, and means for slidably advancing said cup stacks to said delivery zone and depositing therein one at a time.

18. A stack loading mechanism for a cup dispenser comprising, a cup stack supporting member having an opening disposed therein for positioning above a cup dispenser, a pair of pusher members disposed on opposite sides of the opening, a bar disposed adjacent said pusher members and mounted for reciprocating movement, and means for causing said bar to move first one pusher member and then the other.

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