

Jan. 10, 1956

E. R. MOESCH

2,730,268

CUP DISPENSER

Filed April 22, 1952

3 Sheets-Sheet 1

Fig. 1.

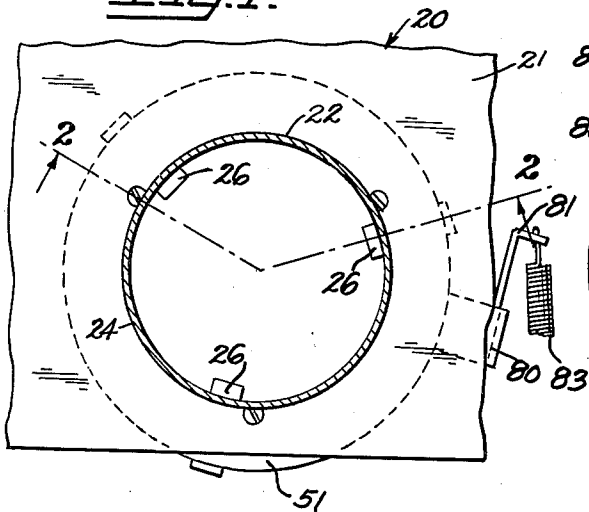


Fig. 4.

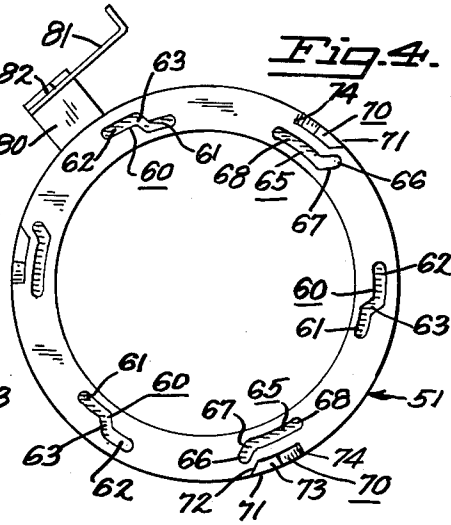


Fig. 2.

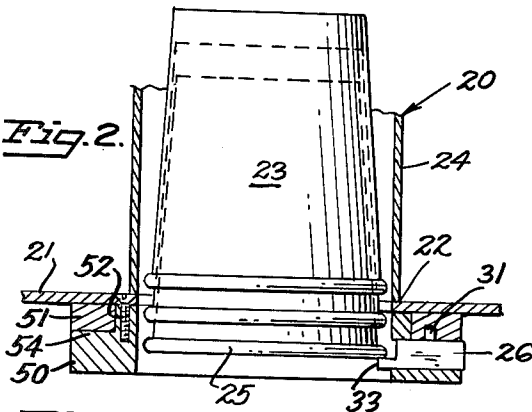


Fig. 5.

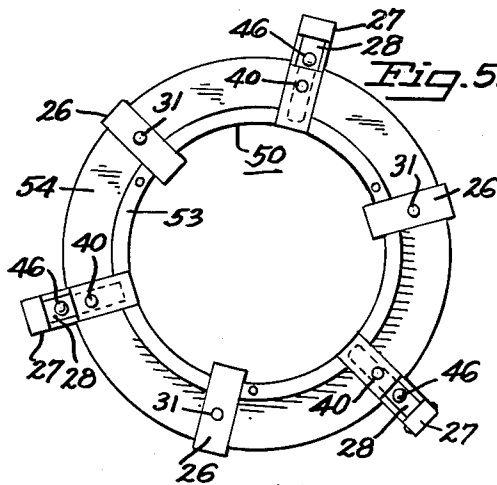


Fig. 3.

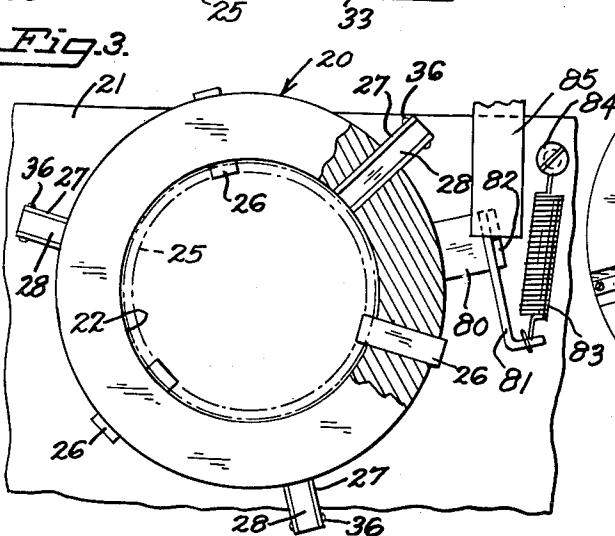
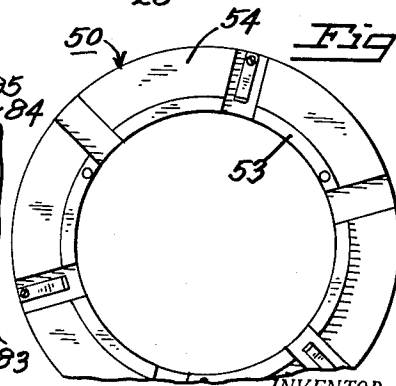


Fig. 6.



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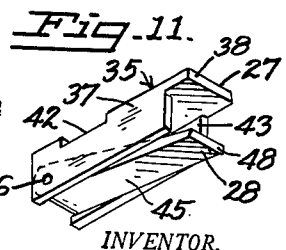
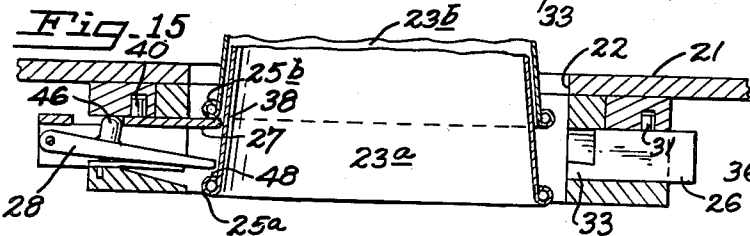
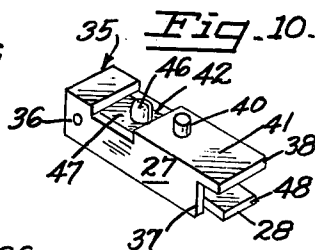
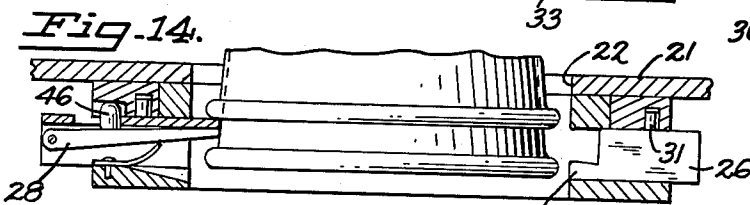
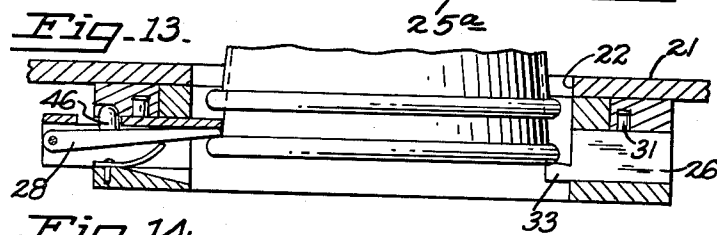
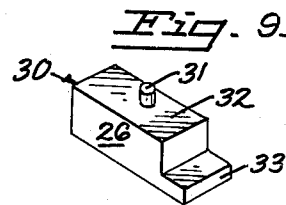
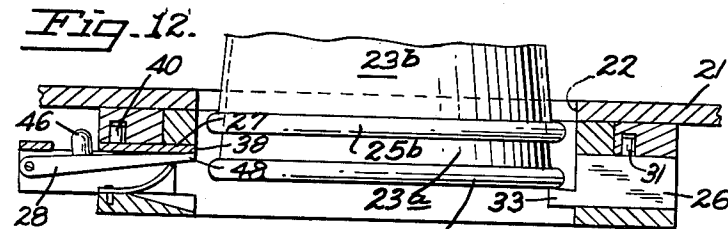
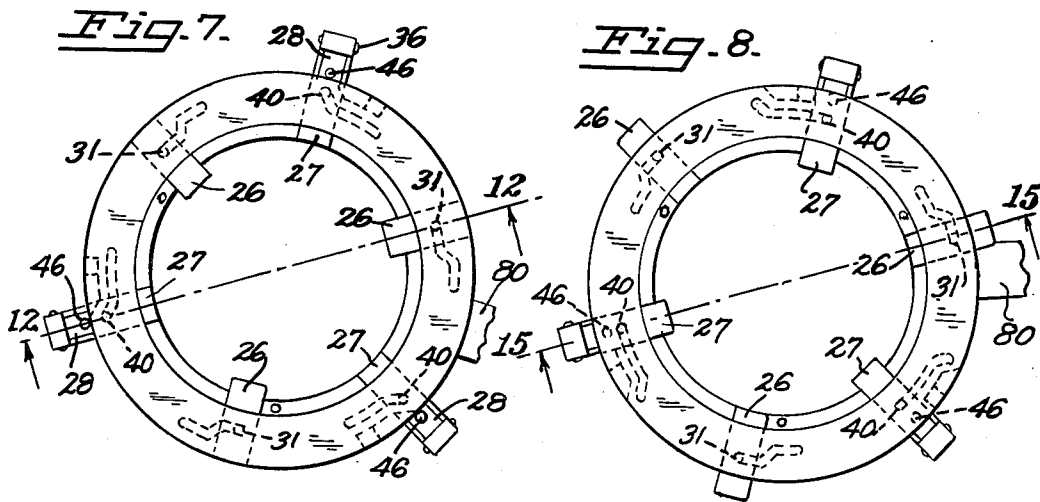
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CUP DISPENSER

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3 Sheets-Sheet 2



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CUP DISPENSER

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3 Sheets-Sheet 3

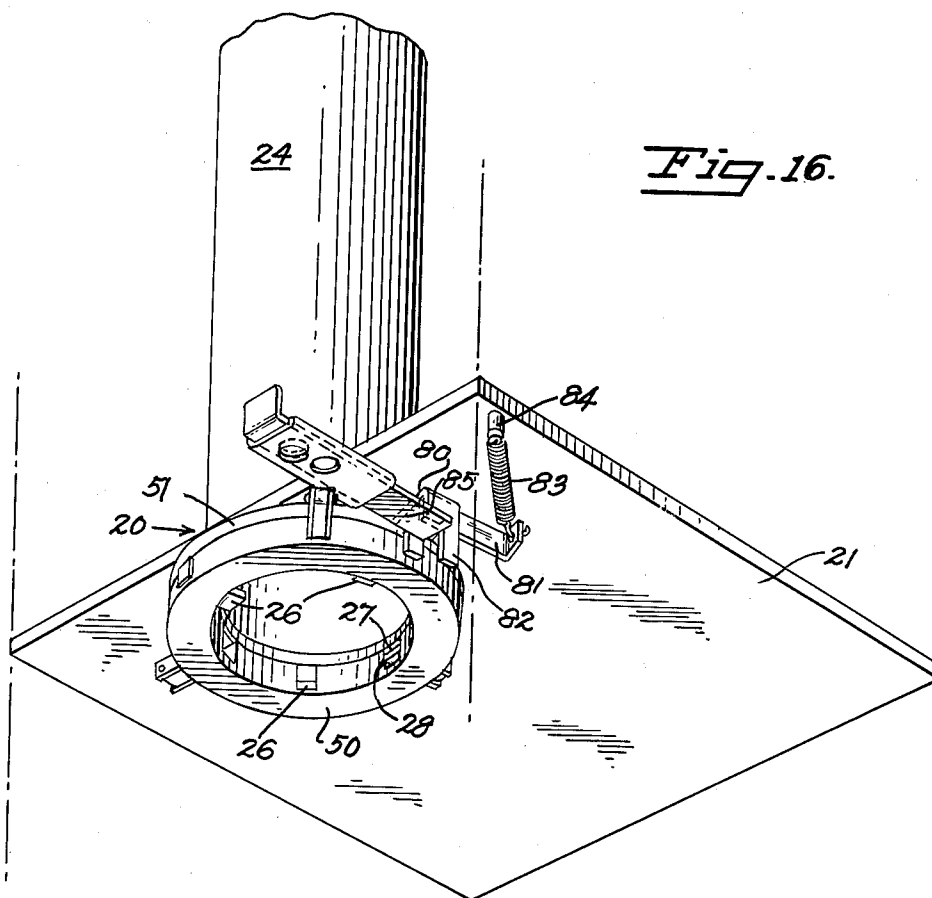


Fig. 16.

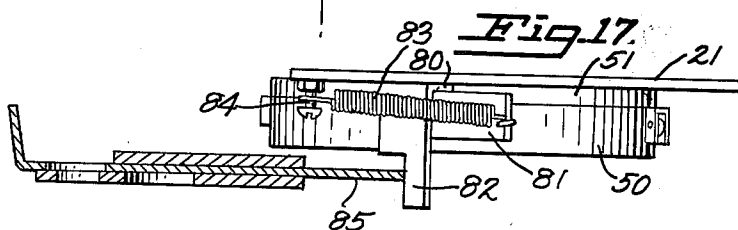


Fig. 17.

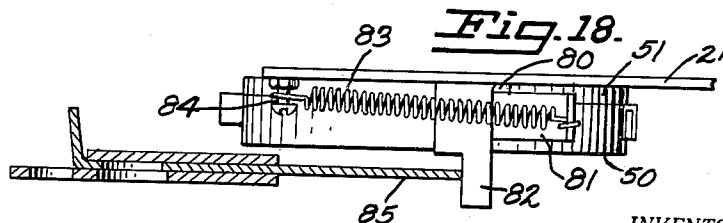


Fig. 18.

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2,730,268

CUP DISPENSER

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Application April 22, 1952, Serial No. 283,556

4 Claims. (Cl. 221—221)

This invention relates to an improved cup dispensing device. More particularly it relates to an improved machine for dispensing rimmed cups from a stack, by separating the lowermost cup from the remainder of the stack and ejecting it down through a dispensing opening.

The invention has solved problems in connection with dispensing cups that have a flange or beaded rim at the top and that taper in somewhat toward the bottom, so that they may nest together compactly. Such cups are normally fitted together so tightly that, even when the stack of cups is inverted, the lowermost cup will not fall out. This clinging together of the cups has long been a problem in dispensing machines. This invention solves this problem by a foolproof apparatus for positively separating the lowermost cup from the stack and ejecting it.

This invention has also solved the problem insuring that only one cup will be dispensed at a time; the bottom cup, and only the bottom cup, is mechanically separated from the cups above it and is mechanically ejected before any other cup comes to the separation position.

The invention includes three sets of fingers arranged around the circumference of the dispensing opening and adapted to be moved radially into and out from the opening. The sets of fingers are arranged on different levels. A lower set of fingers normally supports the stack of cups. When a cup is to be dispensed from the stack, an upper set of fingers moves radially inwardly into a position between the beaded rim of the lowermost cup and the rim of the cup above it, thereby supporting all the cups except the lowermost one. The lower set of fingers is then backed away, leaving the lowermost cup unsupported. Then the third set of fingers, located in assembly with and immediately below the upper set of fingers, moves down against the flange or beaded rim of the lowermost cup, separating it from the stack and positively ejecting it. Then the lower fingers return to support the stack, and the upper fingers and ejection fingers are withdrawn, so that the device is ready for the next cycle of operation.

The three sets of fingers are operated by a foolproof cam mechanism, which can perform only one cycle at a time. This cam mechanism may, if desired, be operated by a coin-controlled means, or it may be operated by another type of actuator.

Other objects and advantages of the invention will appear from the following description of a preferred embodiment presented, in accordance with U. S. Revised Statutes, Section 4888, as illustrative of the invention but not with the intention of limiting the invention merely to the details described herein, or other than as indicated by the appended claims.

In the drawings:

Fig. 1 is a top plan view of a cup dispensing device embodying the principles of the invention. The supporting plate has been broken off adjacent the dispensing mechanism, and the housing for the stack of cups is

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shown in section. These parts playing no direct part in the present invention.

Fig. 2 is a view in section taken along the line 2—2 in Fig. 1 and showing the lower part of a stack of cups with the housing tube for the cups broken off.

Fig. 3 is a bottom plan view of the device shown in Fig. 1, a portion being broken away and shown in section.

Fig. 4 is a bottom plan view of the upper or movable cam ring.

Fig. 5 is a top plan view of the lower or stationary ring with the fingers in place.

Fig. 6 is a top plan view of the lower or stationary finger-supporting ring, a portion thereof being broken off and the fingers removed.

Fig. 7 is a top plan view of the ring assembly, showing in dotted lines the relative position of the cam grooves, the cam followers, and the cup-dispensing fingers at the beginning and end of a cycle, when the lower fingers are in position to support the whole stack of cups, including the lowermost cup.

Fig. 8 is a view similar to Fig. 7 showing the relative positions of the cam grooves, cam followers, and cup-dispensing fingers in the middle of the cycle, when the upper fingers are in position for holding all the cups except the lowermost cup and the lower fingers have been withdrawn, leaving the lowermost cup unsupported, and the ejection fingers have been moved down to eject the lowermost cup.

Fig. 9 is a view in perspective of one of the lower fingers.

Fig. 10 is a view in perspective, looking from above, of one of the upper fingers and its associated ejection finger.

Fig. 11 is another view in perspective, but looking from below, of the finger assembly of Fig. 10.

Fig. 12 is an enlarged view in section taken on the line 12—12 in Fig. 7 and showing the relative position of the lower and upper fingers before the cycle is initiated or at the end of a cycle, when the lower fingers support the whole stack of cups and the upper fingers are withdrawn out of the dispensing passage.

Fig. 13 is a view similar to Fig. 12 showing the relative positions of the fingers at the first step in the cycle of operation. The lower fingers still support the stack of cups, but the upper fingers have moved in between the flange of the lowermost cup and the flange of the next cup thereabove.

Fig. 14 is a view similar to Figs. 12 and 13, showing the relative positions of the fingers at the second stage of the cycle of operations. The lower fingers have now been withdrawn and the upper fingers support the stack of cups, leaving the lowermost cup unsupported.

Fig. 15 is a view generally similar to Figs. 12, 13, and 14, and taken along the line 15—15 in Fig. 8, showing the relative positions of the fingers at the third stage in the operating cycle. The ejection fingers are shown in the process of ejecting the lowermost cup while the upper fingers hold the remainder of the stack of cups.

Fig. 16 is a view in perspective, looking from below of the dispenser, indicating the edges of the frame with dot-dash lines.

Fig. 17 is a view in elevation and partly in section of a portion of the device showing the position of the coin slide in its outmost position, corresponding to Fig. 7.

Fig. 18 is a view similar to Fig. 17, showing the position of the coin slide in its inmost position, corresponding to Fig. 8.

As Figs. 1—3 show, the cup dispenser 20 is supported by a flat plate 21 that has a circular opening or cup-dispensing passage 22. A tubular housing 24 aligned with the passage 22 contains a stack of inverted, nested paper cups 23, with their rims 25 facing downwardly.

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The device, however, is also operable, without change, for dispensing cups that are right-side-up.

The release of the lowest cup 23a from the stack and its ejection through the passage 22 is effected by three sets of cam-controlled fingers 26, 27, and 28, which are arranged around the passage 22 and are movable back and forth radially, into and out of the passage 22.

A lower finger 26 is shown in Fig. 9. It comprises a stepped rectangular bar 30 with a cam-following stud 31 on its upper surface 32. Its radially inner end terminates in the cup-supporting ledge 33.

Figs. 10 and 11 show an assembly 35, comprising an upper finger 27 to which an ejection finger 28 is pivoted by the pin 36.

Each upper finger 27 is an inverted U-shaped channel member 37 whose projecting tip 38 is adapted to support the stack of cups 23 temporarily while the bottom cup 23a is removed. There is a cam-following stud 40 on the upper surface 41 of the channel member 37, and an opening 42 extends through the surface 41 into the central channel 43.

Each ejection finger 28 fits in one of the channels 43, and is a thin, preferably wedge-shaped bar 45 with a cam-following stud 46 on its upper surface 47, projecting upwardly through the opening 42. The pivot pin 36 secures the radially outer end of the finger 28 to the finger 27, so that the slender tip 48 of the bar 45 is free to swing up and down.

The fingers 26, 27, and 28 are supported by and controlled by a pair of cooperating rings 50 and 51. The lower, stationary, finger-supporting ring 50 (see Figs. 2 and 5) may be secured by a bolt 52 (Fig. 2) to the underside of the support plate 21 around the opening 22. The upper surface 53 of the ring 50 is preferably provided with a relieved annular shelf 54 around its outer periphery (see Figs. 2 and 5), to accommodate the upper or cam ring 51. A plurality of equally-spaced channels 55, 56 (six are shown in the drawings, by way of example), extend radially across the ring 50 (see Fig. 6). The channels 55 support the radially slidable lower fingers 26, while the channels 56 (which slope downwardly at their radially inward ends 57) support the radially slidable upper fingers 27 and the ejection fingers 28. A spring 58 is provided in the channels 56 for urging the ejection fingers 28 normally upwardly against the upper fingers 27, so that the tips 38 and 48 are normally in contact.

The movements of the fingers 26, 27, and 28 back and forth in the channels 55 and 56, and the dispensing of the cups 23 are controlled by the movable cam ring 51. The ring 51 is rotatably-slidably mounted on the annular shelf 54 of the stationary lower ring 50 being held between the ring 50 and the plate 21. The ring 51 operates the fingers as it is turned back and forth across a short arc.

The ring 51 (see Fig. 4) is provided with three sets of cam grooves 60, 65, and 70, one set for each set of the fingers. (This number may be varied, so long as the number of fingers and the number of grooves are the same.) One set of grooves 60 engages the cam follower 31 of the lower finger 30. The groove 60 comprises two concentric arcuate portions 61 and 62, spaced apart radially, and joined by an angular portion 63. Normally, except during the operating cycle, the cam follower 31 will be in the inner arcuate portion 61, so that the finger 26 is in its radially inward position where the ledge 33 supports the stack of cups 23. When the cam ring 51 is rotated through a small arc (counterclockwise as seen in Figs. 7 and 8), the cam groove 60 causes the finger 26 to be retracted as the cam follower 31 moves along the groove portion 63 until when it reaches the outer groove portion 62, the finger 26 is fully retracted. The portions 61 and 62 are substantially the same length, and the portion 63 is preferably located about centrally in the groove 60.

A second cam groove 65 controls each upper finger 27,

by means of its cam follower 40. The groove 65 has, reading counterclockwise in Fig. 4 and clockwise in Figs. 7 and 8, an outer extremity 66 (which is the normal position of the follower 40 except during the cycle of operations) a short angular inwardly-extending portion 67, and a long arcuate portion 68. By means of the cam groove 65, the finger 27 is moved inwardly at the very beginning of its cycle and is held there from then on until retracted at the very end of the cycle. Due to the relative shape of the grooves 60 and 65, the upper finger 27 is moved inwardly before the lower finger 26 is retracted, so that the stack of cups 23 will not be dropped. But due to the difference in levels, the upper finger 27 does not support the lowest cup, 23a, but instead supports the next-to-the-lowest cup 23b.

A third cam groove 70 controls the vertical movement of each ejection finger 28, by means of the cam follower 46. This groove 70 is generally parallel with the groove 65, but is open at the outer periphery at 71. The follower 46 engages the groove 70 during the operating cycle moving radially inwardly and horizontally across the angular portion 72 to the arcuate portion 73, the far end 74 of which slopes downwardly, to move the cam follower 46 downwardly and thereby swing the outer ejecting tip 48 downwardly against the pressure of its spring 58 (see Figs. 14 and 15).

As stated before, the ring 50 is secured by the bolt 52 to the plate 21, so that it is stationary. The ring 51 may have a bracket 80 (see Figs. 1, 3, 16, 17, and 18) to which is secured a projection 81 and a depending portion 82. The projection 81 is generally L-shaped and a spring 83 is secured between its outer end and an anchor 84 that is secured to the plate 21. A coin slide 85 or some other type of actuating bar is provided to engage the depending portion 82 of the bracket 80 and to rotate the ring 51 in a clockwise direction, as seen in Fig. 16, to move the device from the position shown in Figs. 7 and 17 to the position shown in Figs. 8 and 18 on withdrawal of the slide 85, the spring 83 will restore the ring 51 to its original position.

The cycle of operations of the fingers is best illustrated in Figs. 12-15. Fig. 12 shows the relative positions of the fingers at the beginning and end of the cycle. The finger 26 projects inwardly and supports the cups 23, because its cam follower 31 is in the groove portion 61 (see Fig. 7). The upper finger 27 is at its radially-outward extremity, out of contact with the cups 23, its cam follower 40 being at the outer end 66 of its groove 65. The cam follower 46 is outside the groove 70; so the ejector fingers 28 are held in their upper position by the spring 58, with the tips 48 and 38 in contact.

The cycle of operations may be begun by pushing in the plunger or slide 85 which may or may not be coin controlled. The slide 85 engages the depending portion 82 of the bracket-lever 80 and causes the cam ring 51 to rotate in a counter-clockwise direction, as seen in Figs. 7 and 8, or clockwise as seen in Fig. 16, from the Fig. 17 position to the Fig. 18 position. Following their respective grooves 60, 65, and 70, the cam followers 31, 40, and 46 control the radial positions of the fingers 26, 27, and 28. The upper finger 27 and ejector finger 28 move radially inwardly and project in between the flange 25a of the lowermost cup 23a and the flange 25b of the cup 23b thereabove (Fig. 13). The lower finger 26 remains supporting the stack (Fig. 13) until the upper finger 27 is in position, and then it is withdrawn (Fig. 14) as its cam follower 31 passes along the groove portion 63 to the portion 62.

With the lower finger 26 withdrawn, the lowermost cup 23a is unsupported. Then it is positively ejected when the ejector finger 28 is moved into its Fig. 15 position by the slanting portion 74 of its groove 70 acting on the cam follower 46. This forces the bottom cup 23a down and out, positively separating it from the rest of the stack. This is the limit of rotation of the cam

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ring 51 and completes the first half cycle, during which the cup is ejected. The slide 85 is now in the position shown in Fig. 18.

The second half cycle prepares the device so that it is ready to eject another cup. As the spring 83 moves the cam ring 51 and the slide 85 back toward their original positions, the cams and cam followers first move the ejector finger tip 48 back up against the upper finger tip 38 (Fig. 14). Then the lower fingers 26 are moved out below the stack of cups. After the lower fingers 26 are in position, the upper fingers 27 and the ejector fingers 28 are retracted to their Fig. 13 position. The stack of cups 23 then drops down onto the ledges 33 of the fingers 26, and the cup which was 23b at the beginning of the cycle is now the lowermost cup 23a and is in a position to be dispensed.

The foolproof selection of one cup at a time and its positive ejection continues so long as there is at least one cup in the stack. The device will dispense cups from a stack that is right side up in the same manner, and it can be adapted to dispense any type of beaded cup, no matter what its shape, by changing the size and shape of the rings 50 and 51, in an obvious manner.

What is claimed is:

1. A dispenser for stackable paper cups having a beaded rim including in combination a support plate having a cup dispensing passage therethrough; a stationary ring secured below said plate and having an annular relieved portion therearound and a plurality of radial slots thereacross; a first set of generally radial fingers slidable radially in alternate said slots and adapted to be projected into said passage to support the rim of the lowermost of a stack of paper cups and to be withdrawn therefrom, said first fingers each having a cam-following stud on the upper surface thereof; a second set of radial fingers slidable radially in the remainder of said slots along a level above said first set of fingers, and adapted to be projected into said passage between the rims of the lowermost cup and the cup immediately thereabove, to support all but one of said stack of cups, each said second finger having a cam-following stud on its upper surface; a set of ejection fingers pivoted to said second fingers therebelow for swinging movement of their radially inner ends against or down from the radially inner ends of said second fingers, said ejection fingers having cam-following studs on their upper surfaces; springs in said slots normally urging said ejection fingers up against said second fingers; a cam ring mounted rotatably on said annular relieved portion of said stationary ring, and having a cammed groove for each said finger, each groove for said first set of fingers comprising an inner arc and an outer arc joined by a diagonal portion at about midway between their ends, the groove for each of said second set of fingers comprising a short diagonal portion and a long arcuate portion located at the radial inner end thereof so that said second fingers are projected out into said passage before the first set of fingers is withdrawn from said passage when said ring is turned in one direction and said second set is withdrawn only after said first set of fingers has been projected back in when said ring is turned in the opposite direction, the spacing between the levels of said sets of fingers being substantially equal to the spacing between the rims of adjacent cups in said stacks, the cam grooves for each ejection finger paralleling the cam groove for its associated second finger and having in the arcuate portion thereof a downwardly inclined portion that forces said ejection finger down, so as to eject a cup; means for rotating said cam ring in said first direction; and spring means secured to said rotating means for returning said cam ring back to its original position.

2. In a paper cup dispenser, the combination with a tubular holder adapted to contain a stack of paper cups in inverted position with the rims of the cups facing downwardly, of a support plate having a cup dispensing passage therethrough aligned with said holder; a stationary

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ring secured below said plate and having an annular relieved portion therearound and a plurality of radial slots thereacross; a first set of generally radial fingers each comprising a stepped block slidable radially in alternate said slots and having a tip on its radially inward stepped down end that is adapted to be projected into said passage to support the rim of the lowermost of a stack of paper cups and to be withdrawn therefrom, said first fingers each having a cam-following stud on the upper surface thereof; a second set of radial fingers comprising an inverted channel member slidable radially in the remainder of said slots with a tip extending radially inwardly along a level above said first set of fingers, and adapted to be projected into said passage between the rims of the lowermost cup and the cup immediately thereabove, to support all but one of said stack of cups, each said second finger having a cam-following stud on its upper surface and an opening through its upper surface radially outwardly from said stud; a set of generally flat, wedge-shaped ejection fingers pivotally secured to said second fingers inside said channels, with their outer tips below and parallel to the tips of said second fingers, said ejection fingers having cam following studs on their upper surfaces projecting through the opening in the upper surface of said second finger; springs in said radial slots normally urging the tips of said ejection fingers against the tips of said second fingers; a cam ring mounted rotatably on said annular relieved portion of said stationary ring, and having a cammed groove for each said finger, each groove for said first set of fingers comprising an inner arc and an outer arc joined by a diagonal portion at about midway between their ends, the groove for each of said second set of fingers comprising a short diagonal portion and a long arcuate portion located at the radial inner end thereof so that said second fingers are projected out into said passage before the first set of fingers is withdrawn from said passage when said ring is turned in one direction and said second set is withdrawn only after said first set of fingers has been projected back in when said ring is turned in the opposite direction, the spacing between the levels of said sets of fingers being substantially equal to the spacing between the rims of adjacent cups in said stack; the cam groove for each of said ejection fingers paralleling each said second-finger-groove and having in its arcuate portion a downwardly inclined portion adapted to force said ejection finger downwardly so that it will engage the rim of the lowest cup of the stack and eject said cup; means for engaging said cam ring and rotating it in said first direction; and spring means for returning said cam ring back to its original position.

3. A dispenser for stackable paper cups having a beaded rim including in combination a support plate having a cup dispensing passage therethrough; a stationary ring secured below said plate and having an annular relieved portion therearound and a plurality of radial slots thereacross; a first set of generally radial fingers slidable radially in alternate said slots and adapted to be projected into said passage to support the rim of the lowermost of a stack of paper cups and to be withdrawn therefrom, said first fingers each having a cam-following stud on the upper surface thereof; a second set of radial fingers slidable radially in the remainder of said slots along a level above said first set of fingers, and adapted to be projected into said passage between the rims of the lowermost cup and the cup immediately thereabove, to support all but one of said stack of cups, each said second finger having a cam-following stud on its upper surface; a set of ejection fingers pivoted to said second fingers therebelow for swinging movement of their radially inner ends against or down from the radially inner ends of said second fingers, said ejection fingers having cam-following studs on their upper surfaces; springs in said slots normally urging said ejection fingers up against said second fingers; a cam ring mounted rotatably on said annular relieved portion of said stationary ring, and having a cammed groove for each said finger, each groove for said first set

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of fingers comprising an inner arc and an outer arc joined by a diagonal portion at about midway between their ends, the groove for each of said second set of fingers comprising a short diagonal portion and a long arcuate portion located at the radial inner end thereof so that said second fingers are projected out into said passage before the first set of fingers is withdrawn from said passage when said ring is turned in one direction and said second set is withdrawn only after said first set of fingers has been projected back in when said ring is turned in the opposite direction, the spacing between the levels of said sets of fingers being substantially equal to the spacing between the rims of adjacent cups in said stacks, the cam grooves for each ejection finger paralleling the cam groove for its associated second finger and having in the arcuate portion thereof a downwardly inclined portion that forces said ejection finger down, so as to eject a cup; a bracket secured to said cam ring; a plunger for engaging said bracket so as to rotate said cam ring in said first direction; and a spring secured to said bracket at one end and to said support plate at its other end for returning said cam ring back to its original position.

4. In a paper cup dispenser of the type having two sets of cam-operated fingers alternately spaced around a cup dispensing opening in radial grooves, a first set of said fingers being normally adapted to support the rim of the lowermost of a stack of paper cups and to be withdrawn therefrom, the combination in which the second set of radial fingers comprises an inverted channel member slidable radially in its slots with its horizontal wall having a tip extending radially inwardly beyond its depending vertical sides and along a level above said first set of fingers, and adapted to be projected into said passage between the rims of the lowermost cup and the cup immediately thereabove, to support all but the lowermost of said stack of cups, each said second finger having a cam-following stud on its upper surface and an opening through its upper surface radially outwardly from said stud; a set of generally flat, wedge-shaped ejection fingers pivotally

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secured to said second fingers inside said channels, with their outer tips below and parallel to the tips of said second fingers, said ejection fingers having cam following studs on their upper surfaces projecting through the openings in the upper surface of said second fingers; leaf springs in said radial slots normally urging the tips of said ejection fingers against the tips of said second fingers; a rotatably mounted cam ring having a cammed groove for each said finger, each groove for said first set of fingers comprising an inner arc and an outer arc both concentric with the cup opening and joined by a diagonal portion at about midway between their ends, the groove for each of said second set of fingers comprising a short diagonal portion and a long arcuate portion concentric with said cup opening and located at the radially inner end thereof so that said second fingers are projected out into said passage before the first set of fingers is withdrawn from said passage when said ring is turned in one direction, and said second set is withdrawn only after said first set of fingers has been projected back in when said ring is turned in the opposite direction, the spacing between the levels of said sets of fingers being substantially equal to the spacing between the rims of adjacent cups in said stack; the cam groove for each of said ejection fingers paralleling each said second-finger-groove and having in its arcuate portion a downwardly inclined portion adapted to force the outer end of said ejection finger downwardly so that it will engage the rim of the lowest cup of the stack and eject said cup.

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