

July 23, 1963

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3,098,585

CUP DISPENSER

Filed Oct. 19, 1960

2 Sheets-Sheet 1

Fig. 1

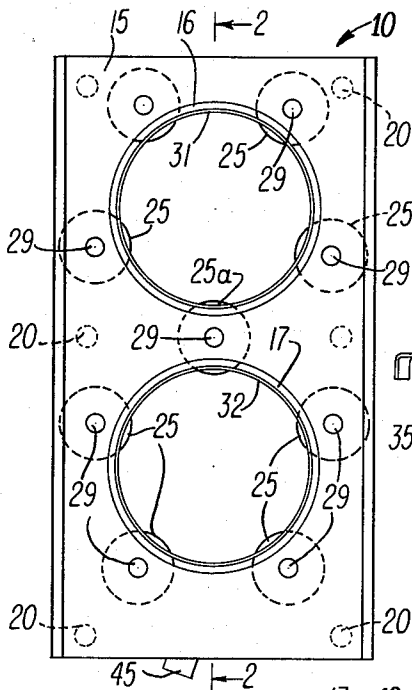


Fig. 2

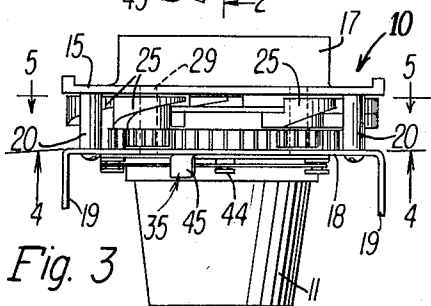
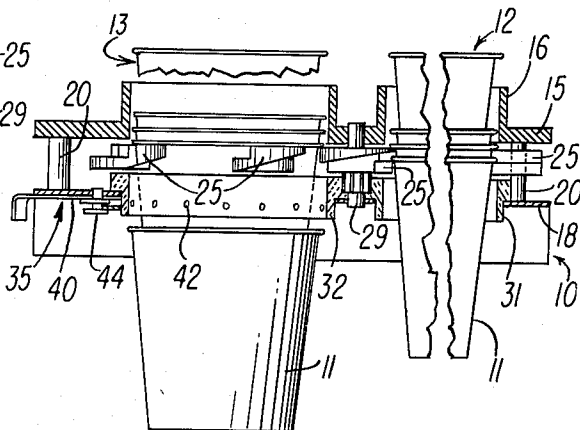


FIG. 7a

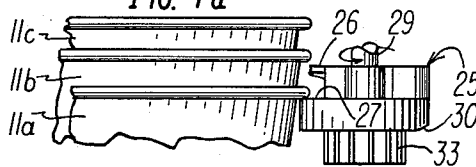


FIG. 7b

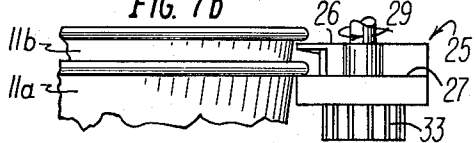


FIG. 7c

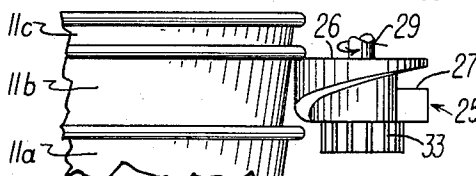
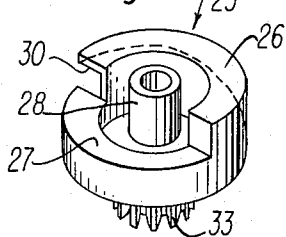


Fig. 6



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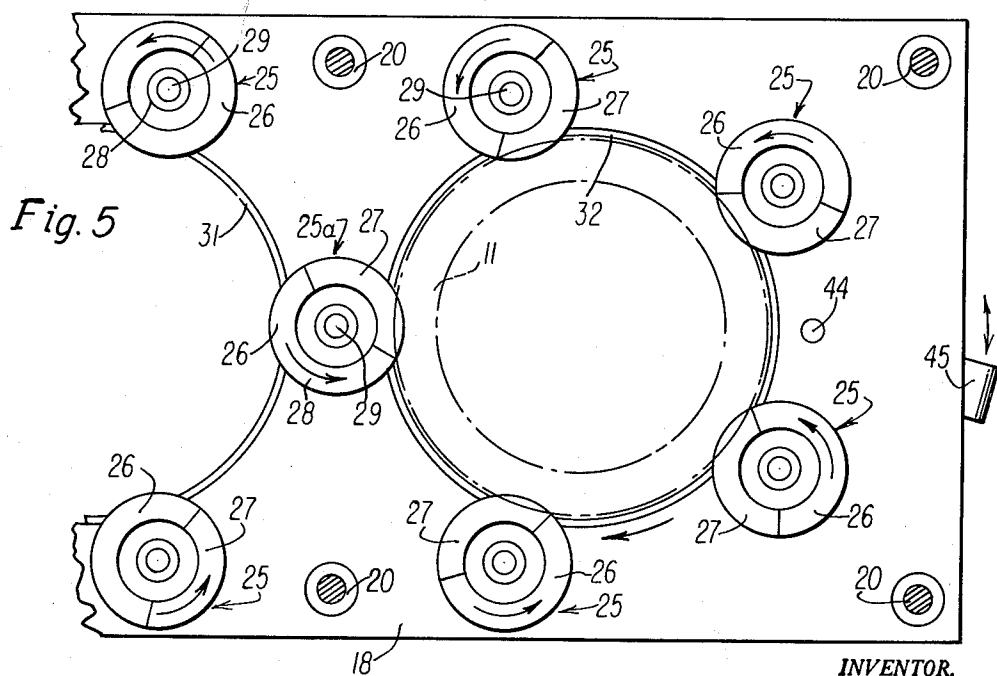
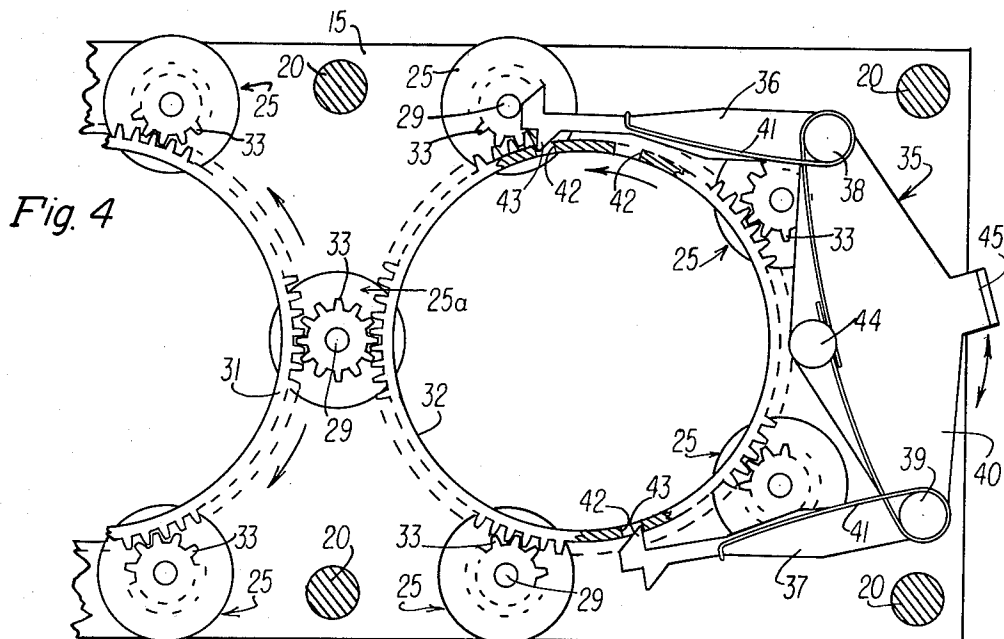
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3,098,585

CUP DISPENSER

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2 Claims. (Cl. 221-116)

The present invention relates to vending devices and concerns more particularly a mechanism for dispensing paper cups or similarly configured articles.

Vending machines, particularly those of the coin-operated variety, should be as reliable in operation as possible. Such machines are often left unattended for fairly long periods of time and an operating failure puts the machine "out of business" as well as creates ill will toward the machine operator and the merchandise being offered.

One of the most troublesome vending problems has been the foolproof and reliable dispensing of paper cups. Cup dispensers have often had a tendency to either jam and fail to properly dispense a cup or else to feed more than one cup at a time. These difficulties partly arise from the inherent lack of uniformity between individual paper cups, particularly the slight size variations in the rolled rims of the cups.

Accordingly, it is the primary object of the invention to provide a novel cup dispenser that reliably and accurately dispenses cups one by one from a stack.

It is a collateral object to provide a novel cup dispenser having a positive cup feeding action and which minimizes the likelihood of jamming so as to be virtually foolproof.

A further object of the invention is to provide a cup dispenser of the above type that is compact so as to require little installation space. It is also an object to provide such a dispenser that is quite versatile in that a number of units may be readily coupled together for feeding any number of cups upon a given operating movement.

Moreover, it is an object to provide a cup dispenser, as characterized above, that is exceptionally simple in design, having few moving parts, so as to be very economical to manufacture and easy to maintain.

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

FIGURE 1 is a plan of a cup dispenser constructed in accordance with the present invention;

FIG. 2 is a section taken approximately along the line 2-2 of FIG. 1;

FIG. 3 is an end elevation of the dispenser shown in FIG. 1;

FIG. 4 is an enlarged fragmentary section taken approximately along the line 4-4 of FIG. 3 but with the bottom frame plate removed;

FIG. 5 is an enlarged fragmentary section taken approximately along the line 5-5 of FIG. 3;

FIG. 6 is an enlarged perspective of one of the feeding cams employed in the dispenser shown in FIG. 1; and

FIGS. 7a, 7b and 7c are fragmentary, partially diagrammatic, views showing, in stop-motion form, the operation of one of the feeding cams embodied in the dispenser shown in FIG. 1.

While the invention will be described in connection with a preferred embodiment, it will be understood that I do not intend to limit the invention to that embodiment. On the contrary, I intend to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

Turning first to FIGS. 1 to 3, there is shown a cup dispenser 10 embodying the invention and adapted to feed cups 11, one by one from a pair of cup stacks 12 and

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13. In the illustrated form of the invention, cups are fed alternately from the stacks 12 and 13 with one cup being dispensed at a time.

The preferred dispenser 10 includes an upper frame plate 15 having integral stack supporting collars 16 and 17 surrounding the respective stacks of cups 12 and 13. Spaced from the upper frame plate 15 is a lower frame plate 18 having circular openings aligned with the collars 16, 17 and a pair of mounting flanges 19. The flanges 19 can be conveniently employed for bolting or otherwise securing the dispenser 10 in a desired operating location. The upper and lower frame plates 15 and 18 are rigidly secured together by a plurality of posts 20.

In carrying out the invention, a plurality of cup feeding cams 25 are journaled about the collars 16, 17 and are coupled together for simultaneous and uniform rotation. The cams 25 are identically disposed with respect to the collars they surround and have supporting ledges 26 and dropping ledges 27 diametrically opposed and vertically spaced so that the ledges alternately underlie the rims of the bottom, and next to bottom, cups as the cams rotate. In this way, the cup stacks are always supported and rotation of the cams 25 one full turn releases the lowermost cup in the supported stack.

In the illustrated embodiment, the cams 25 around the collar 16 are oppositely phased with respect to the cams around the collar 17. Each set of cams is rotatably coupled and provision is made to rotate the cams, always in the same direction, by one half revolution or 180 degree steps. Thus, as the cams are stepped, the lowermost cups drop first from the stack 12 and then the stack 13.

In the illustrated construction, five cams 25 are disposed equi-distantly about each of the collars 16 and 17 with one cam 25a being located midway between the collars so as to be considered a member of each group of cams. Since the cams 25 rotate in 180 degree steps, and since the group of cams about the collar 16 is oppositely phased with respect to the group of cams about the collar 17, the midpoint cam 25a remains in proper relationship with each group of cams (note FIG. 5).

Considering the feeding cams 25 of the invention in greater detail, each cam is preferably formed as a single integral unit (see particularly FIG. 6) including a body portion 28 journaled by a pin 29 that is received in the frame plates 15, 18 (see also FIGS. 1 and 2). The supporting ledge 26 is semi-annular, extending slightly more than half way around the cam, and projects from the body portion 28 to underlie the rims of the cups 11. The dropping ledge 27 is also semi-annular, extending slightly less than half way around the cam, and projects from the body portion 28 diametrically opposite the supporting ledge 26.

The ledges 26 and 27 lie in generally horizontal planes and are spaced apart a distance less than the distance between adjacent rims of the cups 11 when they are stacked, as can be best seen in FIGS. 7a-7c. This spacing permits the supporting ledge 26 to swing under the rim of the next to bottom cup as the stack of cups is supported by engagement of the dropping ledge 27 with the rim of the lowermost cup in the stack.

For positively discharging the cups, a downwardly facing spiral camming surface 30 is formed on the underside of the supporting ledge 26 so as to extend down below the level of the dropping ledge 27. The surface 30 is formed so as to exert a downward force on the tops of the cups as the cam 25 rotates in the direction of the arrows shown in FIGS. 6 and 7a to 7c.

So as to better understand the operation of the feeding cams 25, reference will be made to FIGS. 7a-c which illustrate successive steps during a one half revolution, or 180 degree step, of one of the cams 25. In FIG. 7a the rim of the lowermost cup 11a rests on the

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dropping ledge 27 and the cam 25 thus supports the cup 11a and the succeeding cups in the stack 11b and 11c. This is one of the two rest positions of the cam 25 and it can be seen that only the dropping ledge 27 is in engagement with any one of the cups and that the ledge 26 is clear of the cup stack so the cups can uniformly and properly settle down on the ledge 27.

Immediately upon rotation of the cam 25 in the direction of the arrows shown in FIGS. 7a-c, the supporting ledge 26 swings beneath the rim of the second from the bottom cup 11b while the lowermost cup 11a, and thus the stack of cups, remain supported by the dropping ledge 27. This intermediate position is illustrated in FIG. 7b. As the cam 25 continues to revolve, the dropping ledge 27 swings out from beneath the rim of the lowermost cup 11a and continued movement of the cam brings the camming surface 30 into engagement with the top of the cup so as to drive the cup downwardly and free of the dispenser. At the end of its 180 degree step, the cam 25 comes to rest in the position shown in FIG. 7c with the rim of the cup 11b resting on the supporting ledge 26 so as to also support the overlying cup 11c and thus the cup stack.

During the next half revolution or 180 degree step of the cam 25 from the position shown in FIG. 7c, no cup is released but rather the supporting ledge 26 is swung from beneath the rim of the cup 11b so that its rim drops down to rest on the dropping ledge 27 and the cup 11b assumes the position of the cup 11a shown in FIG. 7a.

It therefore requires a full revolution of each set of the cams 25 to release the lowermost cup in the stack supported by those cams. However, since two sets of cams and two stacks of cups are provided, and since the cams in each set are oppositely disposed, each half revolution of all of the cams 25 results in the release of one cup from one of the stacks 12 or 13.

It will now also be appreciated that since the cams 25 rotate to their FIG. 7a positions and then stop, there is adequate time for the stack of cups to settle downwardly from the supporting ledges 26 to the dropping ledges 27 and thus the succeeding movement of the cam supporting ledge 26 under the rim of the next to bottom cup cannot catch the cups in the act of dropping so as to jam the dispenser mechanism. It other words, since the feeding cams 25 always rotate in the same direction and in 180 degree steps with pauses between each succeeding step, there is no critical timed relationship between rotation of the cams and the downward feeding of the cups which must be exactly maintained for successful operation. As a result, the dispenser 10 is virtually jamproof. The positive down feeding action of the spiral cam surface 30 also contributes to the reliable operation of the dispenser.

As a further feature of the invention, the cams 25 about each of the collars 16, 17 are rotatably coupled by ring gears 31 and 32, respectively, which are journaled in the circular openings formed in the bottom frame plate 18. The outwardly facing teeth of the annular ring gears 31, 32 mesh with gear portions 33 formed integrally with each of the cams 25. The ring gears 31, 32 thus act as sun gears for the gear portions 33 of the surrounding cams and rotation of the ring gears results in uniform and simultaneous rotation of the cams. Since each of the ring gears 31, 32 are in meshing engagement with the gear portion 33 of the mid-point cam 25a, it will be understood that each of the ring gears will rotate simultaneously and in the same direction.

Preferably, the ring gears 31, 32 are formed of a plastic such as nylon so as to produce quiet, virtually frictionless operation. The ring gears 31, 32 are aligned with the collars 16 and 17 respectively so as to define therewith continuous cup passages through the dispenser 10.

For rotating the feeding cams 25 in 180 degree steps, a pawl and ratchet drive 35 is secured to the bottom frame plate 18 so as to intermittently advance the ring gear 32.

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As best seen in FIG. 4, the drive 35 includes a pair of pawls 36 and 37 pivoted at 38 and 39 respectively on a rocker arm 40. The pawls 36, 37 are urged by torsion springs 41 toward the ring gear 32 and the ring gear is formed with a plurality of equally spaced drive holes 42 adapted to receive operating fingers 43 on the pawls. The rocker arm 40 is pivoted at 44 to the lower frame plate 18 and is provided with an operating tongue 45 which extends beyond the edge of the lower frame plate 18.

It can thus be seen that by reciprocating the tongue 45, the fingers 43 on their respective pawls 36, 37 move from one set of drive holes 42 to the adjacent set of holes so that return movement of the tongue 45 drives the ring gear 32 one step. The ring gears 31, 32 and the gear portions 33 of the feeding cams are proportioned so that a single advance movement imparted by the drive mechanism 35 carries the feeding cams through one half revolution or a single 180 degree step. Those skilled in the art will appreciate that the tongue 45 can be reciprocated by any convenient mechanism forming a portion of the vending machine or dispensing apparatus in which the cup dispenser 10 is utilized.

It will now be apparent that the cup dispenser 10 is of an unusually simple design and hence is quite economical to manufacture. The relatively few moving parts makes assembly of the dispenser relatively easy and minimizes maintenance problems. The arrangement of the ring gears 31, 32 within the sets of cup-feeding cams 25 results in a particularly compact construction so that the dispenser requires very little mounting space.

It will also be understood that any number of ring gears and surrounding feeding cams similar to the ring gears 31, 32 and the cams 25 can be rotatably coupled as are the gears 31 and 32. Thus, any number of cup stacks can be supported and a single advance of the cup-feeding cams will dispense any desired number of cups. Alternatively, it will also be understood that a single ring gear and surrounding set of cams supporting but a single cup stack could also be utilized, the only requirement being a double actuation of the drive mechanism 35 for each cup dispensed or else modification of the drive mechanism so that the cams 25 are rotated a full 360 degrees upon each actuation of the drive mechanism.

It will also be clear that although each of the cams 25 have one set of ledges 26, 27 and are thus rotated in 180 degree steps, it would be equally within the scope of the invention to form the cams with additional sets of alternating supporting and dropping ledges and to rotate such cams in shorter steps corresponding to the spacing of the ledges.

I claim as my invention:

1. A cup dispenser comprising, in combination, a frame including a generally horizontal frame plate having a pair of spaced circular cup stack receiving openings, a plurality of cup-feeding cams journaled in said frame about each of said openings with one cam spaced midway between the two openings, said cams each having supporting ledges and dropping ledges diametrically disposed and vertically spaced so that said ledges alternately underlie the rims of the bottom and next to bottom cups of stacks in said openings upon rotation of the cams, said cams being phased so that each cam is identically disposed with respect to its adjacent opening as is that cam which is midway between the openings, each of said cams having a gear portion, an annular ring gear journaled in each of said frame openings, said ring gears being respectively in meshing engagement with the gear portions on each of those cams surrounding the respective openings and both ring gears meshing with the gear portion of that cam midway between the openings, and means for rotating said cams in one direction.

2. A cup dispenser comprising, in combination, a frame including a pair of generally horizontal frame plates having pairs of spaced circular cup stack receiving openings, at least five cup-feeding cams journaled between said

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frame plates about each of said openings with one cam spaced midway between the two openings, said cams each having supporting ledges and dropping ledges diametrically disposed and vertically spaced so that said ledges alternately underlie the rims of the bottom and next to bottom cups of stacks in said openings upon rotation of the cams, said cams being phased so that each cam is identically disposed with respect to their adjacent opening as is that cam which is midway between the openings, each of said cams having a gear portion, a pair of annular ring gears formed of plastic bearing material rotatably fitted in said opening so as to define cup passages through said plates, said ring gears being respectively in meshing engagement with the gear portions on each of those cams surrounding the respective openings and both ring gears meshing with the gear portion of that cam midway between the openings, and a pawl and ratchet drive mounted in said

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frame for intermittently rotating one of said ring gears in one direction so as to advance said cams in steps of 180 degrees.

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