May 20, 1958 A. L. RANKIN, JR 2,835,409

DISPENSING APPARATUS

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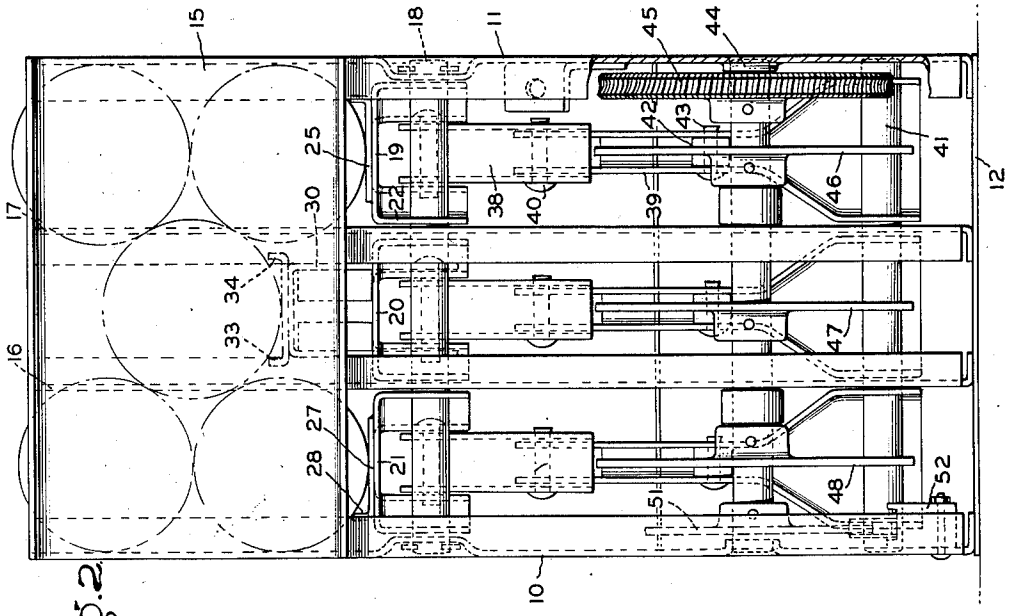

Fig. 2.

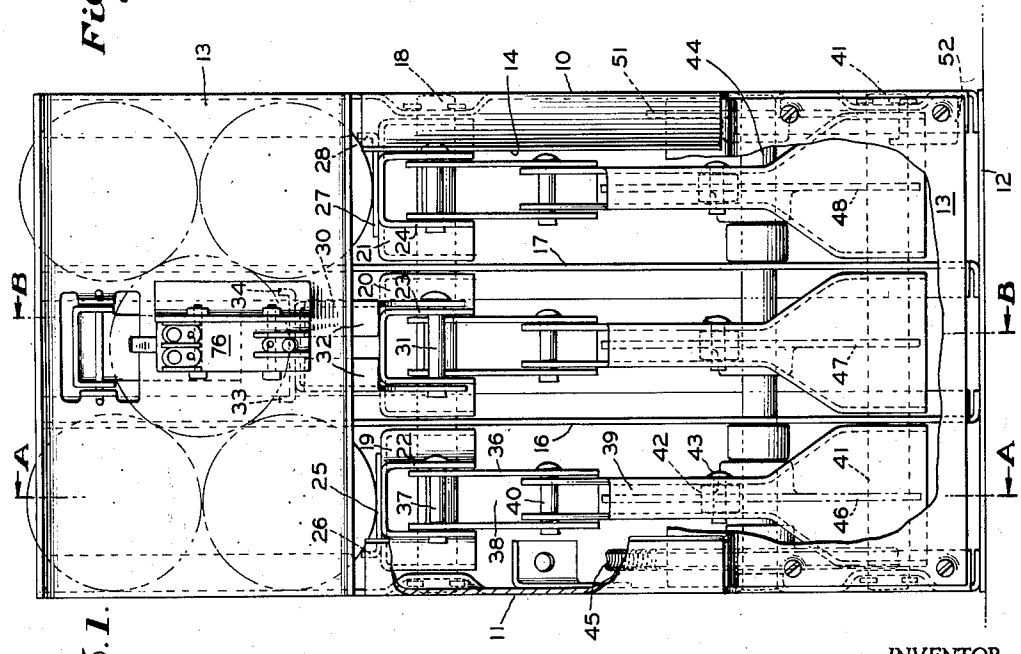

Fig. 1.

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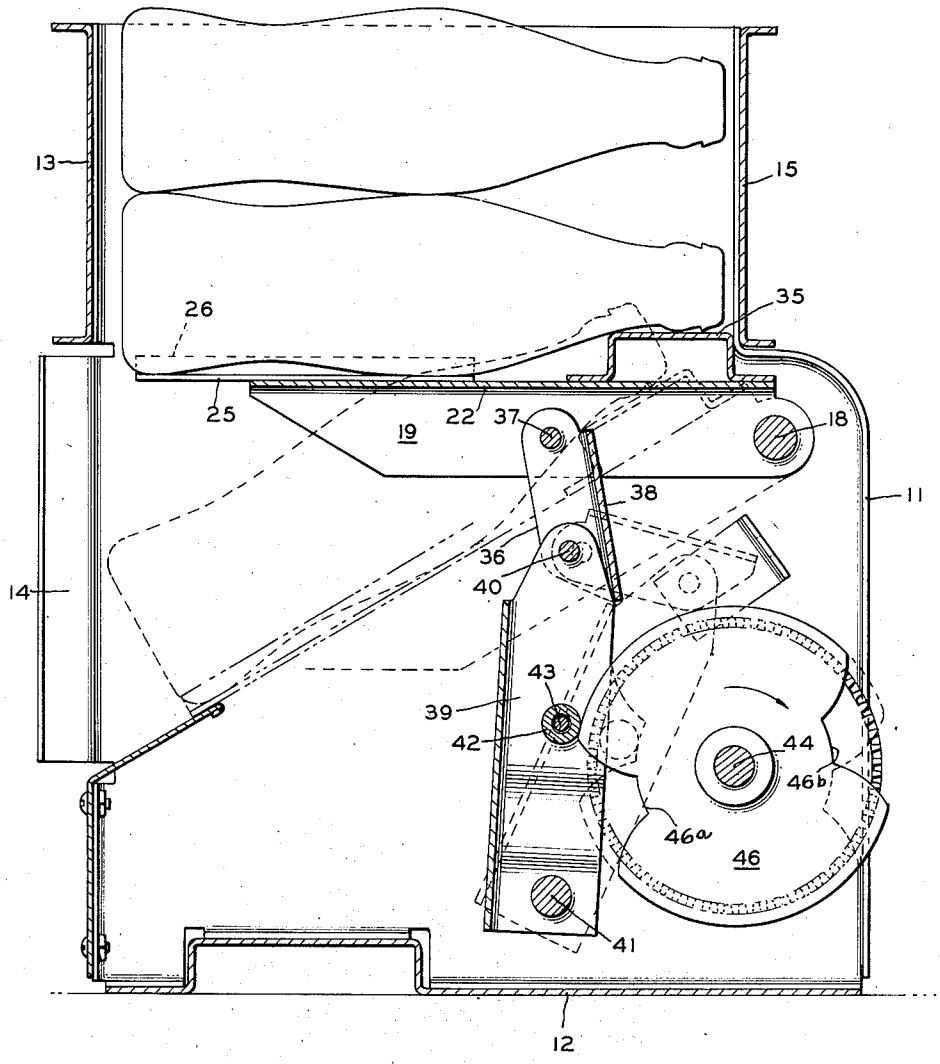
Fig. 3.



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DISPENSING APPARATUS

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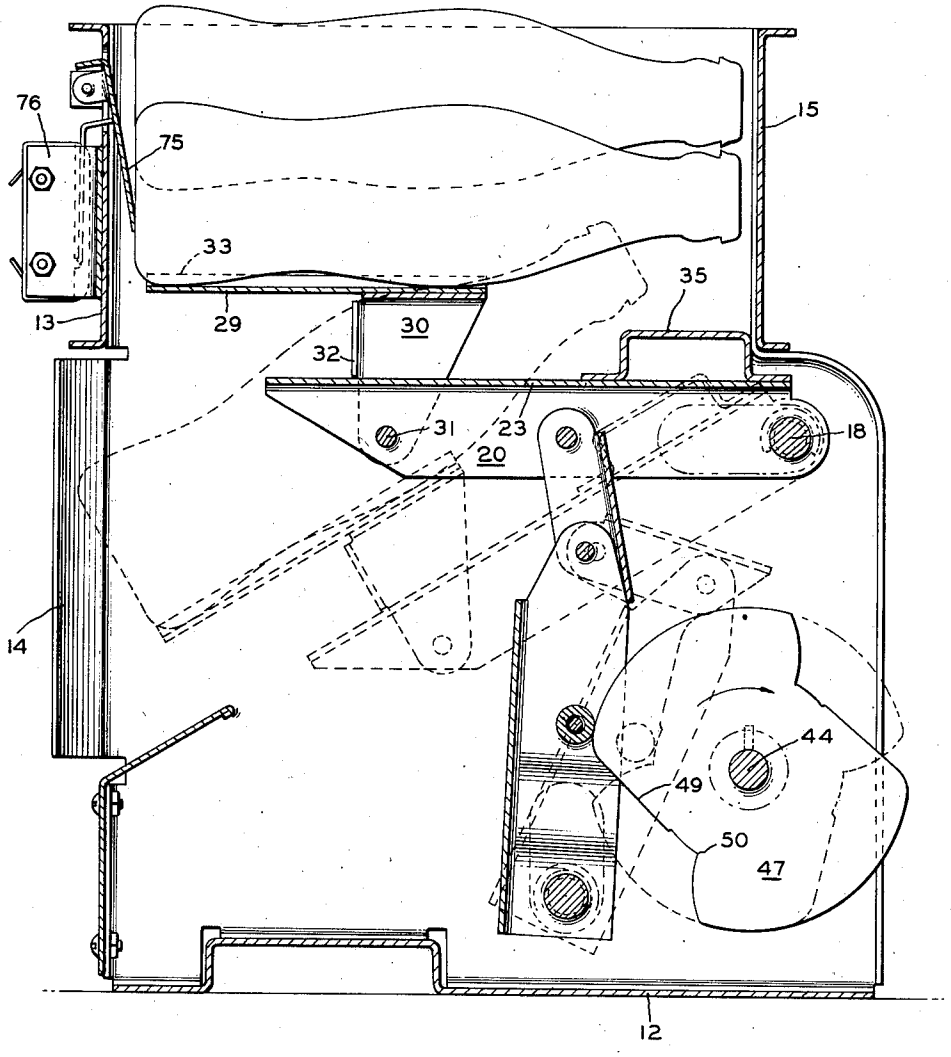
Fig. 4.



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DISPENSING APPARATUS

Filed July 25, 1955 4 Sheets-Sheet 4

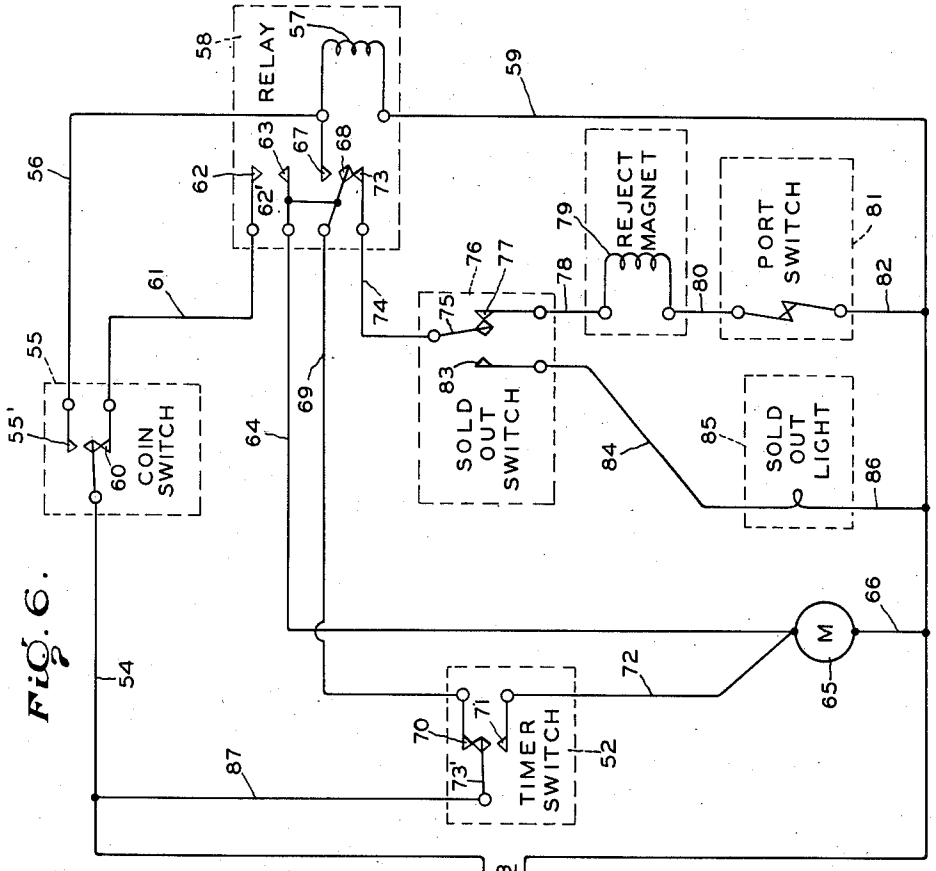

Fig. 6.

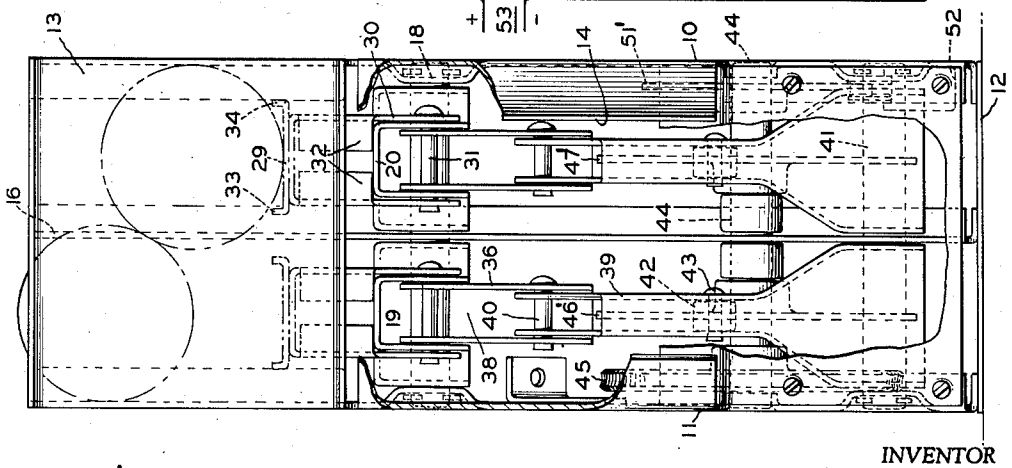

Fig. 5.

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United States Patent Office 2,835,409 Patented May 20, 1958

2,835,409

DISPENSING APPARATUS

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Application July 25, 1955, Serial No. 523,958

9 Claims. (Cl. 221—67)

This invention relates to dispensing apparatus for use in automatic vending machines particularly adapted to dispense substantially cylindrical articles such as beverage bottles one at a time and in sequence from stacks of articles arranged in overlapping staggered relationship.

Even more particularly this invention relates to dispensing apparatus for use in vending machines which include an insulated enclosure containing a series of vertically disposed adjacent chambers, each chamber of which has oppositely disposed parallel walls spaced apart a distance such that the articles to be vended are stored in interlocking relationship with their longitudinal axes horizontal. Two, three, or more stacks of articles to be vended are disposed in these chambers in overlapping staggered relationship, and the dispensing apparatus includes a support member positioned beneath each stack to individually move beneath the stack to release therefrom the lowermost article to be dispensed, the articles being dispensed in sequence from successive stacks. A cam shaft is rotated in progressive sequential steps to release the supports in sequence and the cam shaft returns the previously released support to supporting position before the next article is dispensed.

More particularly still this invention relates to a novel construction and operation of the support members positioned beneath each stack of articles.

It is an object of the present invention to provide novel dispensing apparatus for vending machines of the type described of relatively simple construction which is cheap to manufacture and inexpensive to maintain.

Another object is to provide such dispensing apparatus in which the support member is arranged axially under the cylindrical article to be dispensed and is mounted on a pivot at one end thereof, the support member being actuated by a rotating cam through the medium of pivoted legs one of which is engaged by the cam.

Another object of the present invention is to provide dispensing apparatus for cylindrical objects in which the support member has an auxiliary support pivoted thereto for supporting the middle stack of articles in a three stack dispenser so that all of the support members may be pivoted on the same pivot and to reduce the drop of the stacks of articles arranged in overlapped staggered relationship.

Another and further object of the present invention is to provide novel dispensing apparatus of the type described when the articles to be vended are arranged in two stacks in overlapping staggered relationship.

Other and further objects of the present invention will appear from the following description of an illustrative embodiment of the same.

The dispensing apparatus of the present invention is capable of various mechanical embodiments two of which are shown in the accompanying drawings and are described hereinafter to illustrate the invention. These illustrative embodiments of the present invention should in no way be construed as defining or limiting the same

and reference should be had to the appended claims to determine the scope of the invention.

In the accompanying drawings, in which like reference characters indicate like parts, Fig. 1 is a front view of an embodiment of dispensing apparatus in accordance with the present invention with a portion of the front wall thereof broken away to show the interior construction;

Fig. 2 is a view from the rear of the embodiment of Fig. 1 showing the cam arrangement and cam drive mechanism;

Fig. 3 is a view, partially in section, on the line A—A of Fig. 1;

Fig. 4 is a view partially in section on the line B—B of Fig. 1;

Fig. 5 is a front view of another embodiment of the the present invention as seen from the front for dispensing cylindrical articles arranged in overlapping staggered relationship in two stacks; and

Fig. 6 is a diagrammatic circuit arrangement of an electric circuit suitable for energizing an electric motor driving the cam shaft of the dispensing apparatus of Figs. 1–4 and of Fig. 5.

Referring now more particularly to Figs. 1–4 it will be seen that the embodiment of the present invention there illustrated provides for the sequential dispensing of cylindrical articles arranged in overlapping staggered relationship in three stacks, a support being provided beneath each stack, the supports being rotated to article dispensing position sequentially by cams mounted on a common cam shaft with one cam provided for each support. As will be evidenced from the showing of the articles in dotted lines, and as described hereinafter, the lowermost articles in the two outside stacks can be dispensed while the remaining articles in these stacks and the center stack as well are held solely by support of the lowermost article of the center stack. Thereafter, when the article at the bottom of the center stack is dispensed, all three stacks move downwardly together until the outside stacks are supported at their bottoms and in turn support all of the central stack except for its lowermost article.

This dispensing apparatus includes spaced parallel side plates **10** and **11** which are secured in spaced parallel relationship by bottom **12** to which they are suitably secured and a front plate **13** which is apertured at **14** to provide an opening through which the cylindrical articles are dispensed. Walls **10** and **11** are spaced apart a distance determined by the diameter of the cylindrical articles to be dispensed and this distance is such that these articles are stored with their longitudinal axes horizontal in overlapping staggered and interlocking relationship. This distance may be determined to provide storage for the maximum number of cylindrical articles and at the same time provide the over-lapping staggered relationship so that the three stacks of articles may be supported only by the support for the middle stack after articles from the left and right stack, as seen in Fig. 1, have been dispensed. A partial back **15** is also provided and vertical guide plates **16** and **17** are secured thereto to guide articles such as the usual soft drink bottles which have necks of reduced diameter arranged adjacent back **15** to dispense the bottles bottom first.

A shaft **18** is mounted in walls **10** and **11** and adjacent rear wall **15**. Support members **19**, **20** and **21** are mounted for rotation on shaft **18** and extend from shaft **18** toward front **13**, one beneath each stack of articles to be dispensed and extending substantially the full length of the cylindrical articles supported. Support members **19**, **20** and **21** include channel shaped pieces **22**, **23** and **24**, respectively, shaft **18** passing through both downturned portions of each such channel member. An extension plate **25** is suitably secured to member **22** to provide additional support for the base of the article

to be dispensed and extension 25 is provided with an upturned guide flange 26. Channel member 24 is provided with a similar extension 27 which has upturned guide 28. Guides 26 and 28 prevent lateral displacement of the cylindrical articles during dispensing.

Support member 20 supporting the middle stack of cylindrical articles and its channel shaped member 23, as described above, also include an extension member 29, but instead of being secured rigidly to the channel member as in the case of supports 19 and 21, extension 29 is spaced from channel member 23 by means of cradle 30 which is pivoted to support 20 on rod 31. Cradle 30 rotates clockwise about rod 31 during dispensing of the middle stack of articles to hold extension 29 in a horizontal position, while all three stacks of articles move down as hereinafter described until supports 19 and 21 for the outside stacks of articles come into supporting relationship with their respective stacks and cradle 30 then rotates in a counterclockwise direction (Fig. 4) about pivot 31 until stop 32 engages the surface of channel member 23 to bring the cylindrical article on support 29 in dispensing position. Support 29 is provided with upstanding guide extensions 33 and 34 to prevent lateral displacement of the cylindrical article during dispensing.

When bottles are to be dispensed neck supports 35 may be provided on supports 19 and 21 adjacent shaft 18.

Each of supports 19, 20 and 21 is actuated by a pivoted lever and cam arrangement which will be described in detail for support 19, as seen in Fig. 3. A channel shaped leg 36 is mounted for rotation on shaft 37 which eytends between the downturned sides of channel member 22 said leg having a rear wall 38. A second, and longer, channel shaped leg 39 pivots in leg 36 on rod 40 and rotates at its lower extremity about rod 41. Rod 41 extends between side walls 10 and 11 and mounts the other two legs corresponding to leg 39. Wall 38 of leg 36 is so disposed as to engage the adjacent edges of leg 39 to prevent pivot points 37, 40 and 41 from falling in the same straight line. A cam follower 42 is mounted for rotation on shaft 43 which is mounted in the side walls of leg 39.

Cam shaft 44 is mounted for rotation in side walls 10 and 11 beneath shaft 18 and behind cam followers 42. Cam shaft 44 is rotated by worm gear 45 suitably secured at one end thereof. Worm gear 45 is driven by any suitable worm and gear, not shown, which in turn is driven by an electric motor which will be referred to in connection with Fig. 6. Cams 46, 47 and 48 are mounted on cam shaft 44 for rotation therewith, cam 46 engaging cam follower 42 to actuate support 19, cam 47 actuating support 20, and cam 48 actuating support 21. Since supports 19, 20 and 21 are to be actuated in the sequence support 19, support 21 and support 20 the low points in the cams may be arranged 120° apart. In the embodiment of the present invention here disclosed, however, each cam is provided with two low portions and the low portions of the successive cams must therefore be arranged with 60° displacement to provide the successive operation of supports 19, 21 and 20, as described above. Cam 46 is provided with diametrically opposed low points 46*a* and 46*b*.

It will now be seen that upon rotation of cam shaft 44 in a clockwise direction as seen in Fig. 3 cam follower 42 will enter low point 46*a* and leg 39 will rotate in a clockwise direction about rod 41. Leg 36 will then rotate in a counterclockwise direction about pivot 40 permitting support member 19 to rotate in a counterclockwise direction about shaft 18 so that the cylindrical article carried by support 19 and its extension 25 is brought to an inclined position from which it will slide by gravity off of support 19 and its extension 25 and outwardly through the dispensing opening 14. The next cylindrical article immediately above the cylindrical article being dispensed will not be dispensed since it is in overlapping staggered relationship with the cylindrical articles carried by supports 20 and 21.

When the dispenser is again actuated cam shaft 44 will be rotated in a clockwise direction and cam follower 42 will leave low point 46*a* rotating leg 39 in a counterclockwise direction which in turn rotates leg 36 in a clockwise direction about pivot 40 and support 19 is returned to its horizontal position. This rotation of cam shaft 44 brings the low point of cam 48 into position corresponding to that of the low point 46*a* in Fig. 3 and further rotation permits support 21 to rotate into dispensing position and to dispense the cylindrical article which it carries. No other cylindrical articles are dispensed at this time since the stacks of cylindrical articles are in overlapping staggered relationship supported by the cylindrical article carried by extension 29 of support 20.

When the dispensing apparatus is again actuated cam shaft 44 is rotated and support 21 is raised to its horizontal position. Meanwhile a low point of cam 47 moves into position to permit support 20 to rotate in a counterclockwise direction as seen in Fig. 4 to lower the cylindrical article carried by support extension 29 and then to rotate it into dispensing position. At this time all of the cylindrical articles in the apparatus are carried by support 20 and its extension 29 and all three stacks must move downwardly until the cylindrical articles in the outside stacks come into engagement with supports 19 and 21. This downward movement should be gradual and easy. The cylindrical article carried by extension 29 should therefor remain with its axis in a horizontal position until supports 19 and 21 take the weight of the cylindrical articles in the dispenser. It is for this reason that extension 29 is pivoted at 31 so that the cylindrical article which it carries will remain horizontal during the downward movement of the stacks of articles. Cam 47 is provided with a gradual approach 49 to the low point 50 so that rotation of support 20 will be gradual and easy.

When the dispensing apparatus is next actuated cam shaft 44 is rotated in a clockwise direction, cam 47 rotates support member 20 into horizontal position and extension 29 engages the lowest cylindrical article in the middle stack, and cam 46 moves its low point 46*b* into position to permit support 19 to move into dispensing position again. Thereafter the dispensing sequence is repeated as above described.

As will now be apparent, cam shaft 44 is rotated in a step wise manner one step for each actuation of the apparatus so that only one cylindrical article is dispensed at a time. For this purpose the motor driving worm gear 45 is energized through an electric circuit which must be de-energized when one of the supports 19, 20 or 21 moves to dispensing position. A suitable cam 51 is therefore mounted on cam shaft 44 and operates timer switch 52 to open the motor circuit as soon as the predetermined degree of rotation of shaft 44 has been accomplished. In the embodiment as described above for dispensing a single cylindrical article for each 60° rotation of cam shaft 44, cam 51 is provided with six equally spaced high points around its circumference so that timer switch 52 will be opened briefly for each dispensing operation as will be apparent from consideration of Fig. 6.

Fig. 6 diagrams a suitable circuit for use with this embodiment of the dispensing apparatus and includes a suitable source of electrical energy 53 one side of which is connected by wire 54 to a suitable coin actuated switch 55. One pole 55′ of switch 55 is connected by wire 56 to one side of coil 57 of relay 58. The other side of coil 57 is connected by wire 59 to the other side of source 53. The other contact 60 of coin switch 55 is connected by wire 61 to one side 62 of a suitable switch 62′, the other side 63 of the switch 62′ being connected by wire 64 to a suitable motor 65 which in turn is connected at 66 to wire 59. Relay 58 is provided with a contact 67 connected to wire 56. Contact arm 68 of relay 58 is

connected by wire 69 to one side 70 of timer switch 52. The other contact 71 of timer switch 52 is connected by wire 72 to motor 65. Timer switch 52 is provided with a moveable contact arm 73' which is actuated by the high points on cam 51. Moveable contact 68 of relay 58 normally engages contact 73 thereof and contact 73 is connected by wire 74 to movable arm 75 of "sold out" switch 76. "Sold out" switch has one pole 77 connected by wire 78 to a conventional coin reject magnet 79 and magnet 79 is connected by wire 80 to port switch 81 which in turn is connected by wire 82 to wire 59. "Sold out" switch 76 includes a contact 83 which is connected by wire 84 to a "sold out" light 85 and the circuit is completed through wire 86 and wire 59.

When a coin is inserted in the coin switch 55 the movable arm thereof momentarily engages contact 55' closing the circuit to relay 58. Energization of relay 58 moves contact 68 into engagement with contact 67 and moves conatct 63 into engagement with contact 62. Since contact 73' is normally in engagement with contact 70 current then flows through wire 87, contacts 73' and 70, wire 69, and contacts 67 and 68 to continue to energize coil 57 after coin switch 55 returns to normal engagement with contact 60. Current then flows through wire 54 to contact 60, wire 61, contacts 62 and 63, and wire 64 to motor 65 to drive the same, the motor circuit being completed through wires 66 and 59. Motor 65 rotates cam shaft 44 through the predetermined number of degrees until a high point on cam 51 changes timer switch 52 so that contact 73' engages contact 71. This change at switch 52 breaks the circuit to relay 58 and relay 58 and its contacts return to their normal positions as shown. Contact 73' continues to engage contact 71 to continue energization of motor 65 until the high point on cam 51 passes switch 52 permitting contact 73 to return to engagement with contact 70 breaking the circuit to motor 65. This sequence of operations is followed for each article dispensed.

The circuit of Fig. 6 includes a "sold out" switch which is provided with a moving contact 75 which engages the stack of cylindrical articles in the dispensing apparatus containing the last article to be dispensed. When this last article is dispensed contact 75 will be shifted into engagement with contact 83, the "sold out" light will be illuminated and the reject magnet 79 will be deenergized so that coins entering the coin switch will be returned and motor 65 cannot be energized.

The embodiment of the present invention of Fig. 5 provides for dispensing from two stacks of cylindrical articles arranged in parallel overlapping staggered relationship. In this embodiment, however, during each dispensing operation all of the cylindrical articles must be moved downwardly a distance of one half a diameter and it is therefore necessary to provide each support 19 and 20 with a pivoted support extension similar to extension 29 of Fig. 4. Cams 46' and 47' must also be appropriately arranged to provide a gradual entrance to the low points thereon so that the cylindrical articles will be lowered gradually during dispensing of the supporting article and to shift the support from one stack to the other in an easy and gradual manner. With two low points on each of cams 46' and 47' four dispensing operations will take place for each rotation of cam shaft 44 and accordingly cam 51' is provided with four equally spaced high points thereon for appropriate actuation of timer switch 52.

It will now be seen that by the present invention there has been provided novel dispensing apparatus which in every way satisfies the several objects discussed above.

Changes to and modifications of the illustrative embodiments described above may now be suggested to those skilled in the art without departing from the present inventive concept. Reference should therefore be had to the appended claims to determine the scope of this invention.

What is claimed is:

1. In dispensing apparatus for substantially cylindrical objects, means laterally supporting a plurailty of said objects arranged in at least two vertical stacks in interlocking relationship with their longitudinal axes substantially horizontal, a support beneath each stack extending parallel to the axis of the objects, means rotatably mounting said supports adjacent one end thereof and adjacent an end of the objects, a leg pivoted to each of said supports, a second leg pivoted to each of said first named legs and mounted on a fixed pivot at its opposite end, cam engaging means on each of said second legs, a cam shaft, a cam on said cam shaft engaging each of said cam engaging means rotating the adjacent of said second legs about its fixed pivot, said second leg rotating the adjacent of said first legs and the adjacent support, said cams being constructed and arranged to rotate said supports downwardly in sequence to dispense the objects in sequence from the stacks of objects.

2. In dispensing apparatus as described in claim 1 having three vertical stacks of substantially cylindrical objects in interlocking relationship, a support extension pivoted to and extending above the middle one of said supports.

3. In dispensing apparatus as described in claim 1 having two vertical stacks of substantially cylindrical objects in interlocking relationship, a support extension extending axially of the supported objects pivoted to and extending above each of said supports for limited rotation with respect thereto.

4. In dispensing apparatus, a housing, a dispensing port in said housing, substantially cylindrical objects in substantially horizontal position in at least two vertical interlocking stacks in said housing above said port, means laterally supporting said stacks in interlocking relationship, a pivot member extending across said housing adjacent the end of said objects away from said port, a support rotatably mounted on said pivot member extending axially beneath each of the stacks, a leg pivoted to each of said supports, a second leg pivoted to each of said first legs and mounted at its other end on a pivot extending across said housing, a cam shaft extending across said housing adjacent said second legs, a cam on said cam shaft engaging each of said second legs to rotate the respective one of said supports about said pivot member into dispensing position adjacent said port and to return the support to supporting position, said cams being constructed and arranged to rotate said supports into dispensing position in sequence to dispense the objects in sequence from the stacks of objects.

5. In dispensing apparatus as described in claim 4 having three stacks of objects, a support extension pivoted to and extending above the middle one of said supports.

6. In dispensing apparatus as described in claim 4 having two vertical stacks of objects, a support extension extending axially of the objects pivoted to and extending above each of said supports for limited rotation with respect thereto.

7. Dispensing apparatus for substantially cylindrical objects stacked above and supported by one another with their axes substantially horizontal, comprising means laterally supporting at least two stacks in interlocking relationship, a plurality of dispensing supports one beneath each stack, said supports being pivoted on axes transverse to the axes of said articles and underlying said stacks adjacent one end thereof, and means for tilting said supports sequentially about said transverse axes to downwardly inclined positions for dispensing the lowermost articles from the stacks above the tilted supports, at least one of said supports comprising two members pivotally connected together, one of said members being pivoted on said transverse axis and operated by said tilting means, the second member being a stack-supporting member pivoted on said first member and free to assume and

maintain a horizontal position above said first member as said first member tilts about its transverse axis.

8. Dispensing apparatus as defined in claim 7, said tilting means comprising means for limiting the downward swinging movement of said first member to provide its gradual descent to dispensing position.

9. Dispensing apparatus as defined in claim 7, said second member being maintained in horizontal position by the superposed descending stack and an adjacent interlocked descending stack until said adjacent stack is supported by its support, the weight of the remaining single

article thereafter supported by sad second member causing it to pivot on said first member to an inclined dispensing position as said first member completes its tilting movement to dispensing position.

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