

April 15, 1941.

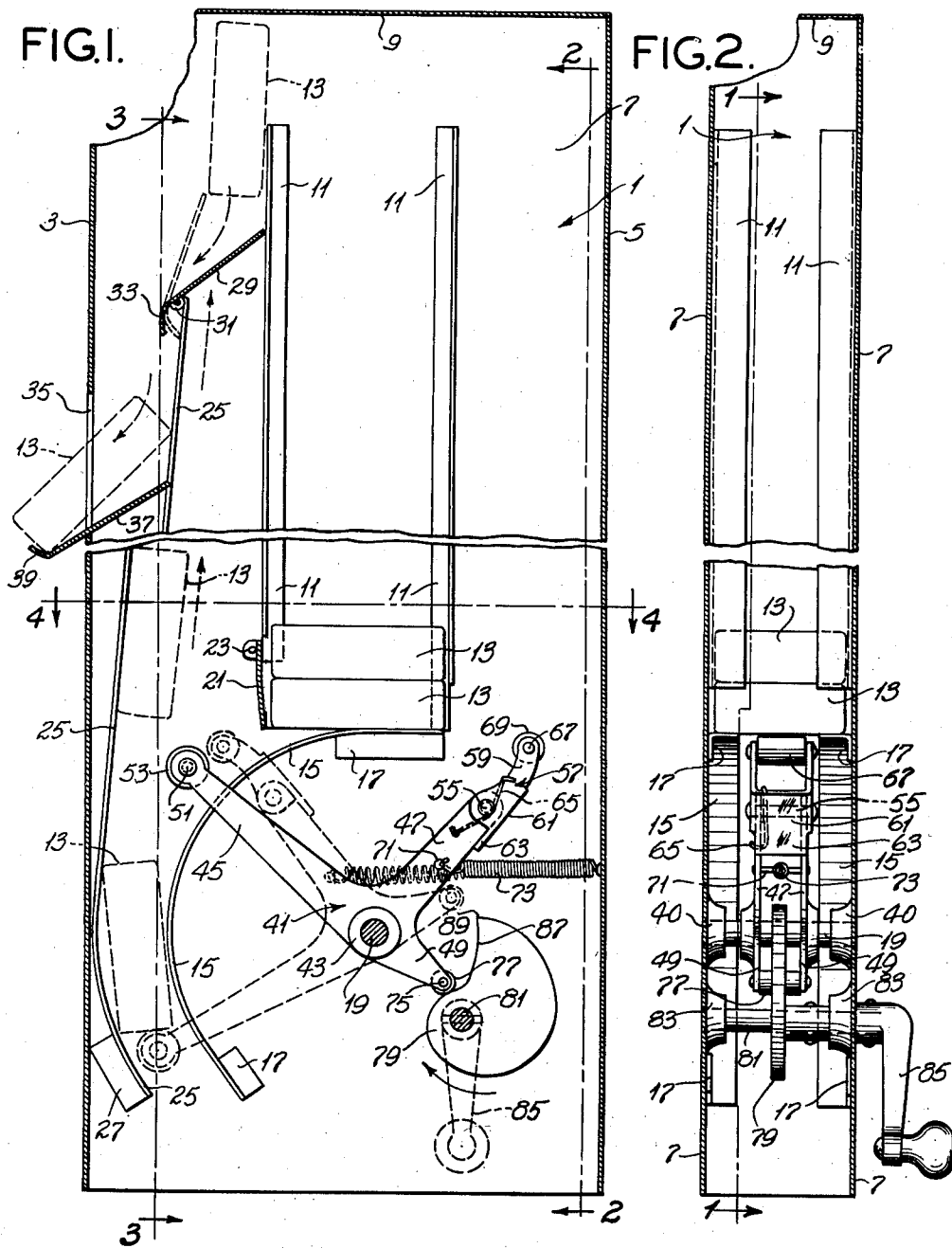
B. W. FRY

2,238,725

ARTICLE DELIVERY MACHINE

Filed Aug. 17, 1939.

2 Sheets-Sheet 1



Benjamin W. Fry,
Inventor,
Haynes, Koenig and Wolf,
Attorneys.

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2 Sheets-Sheet 2

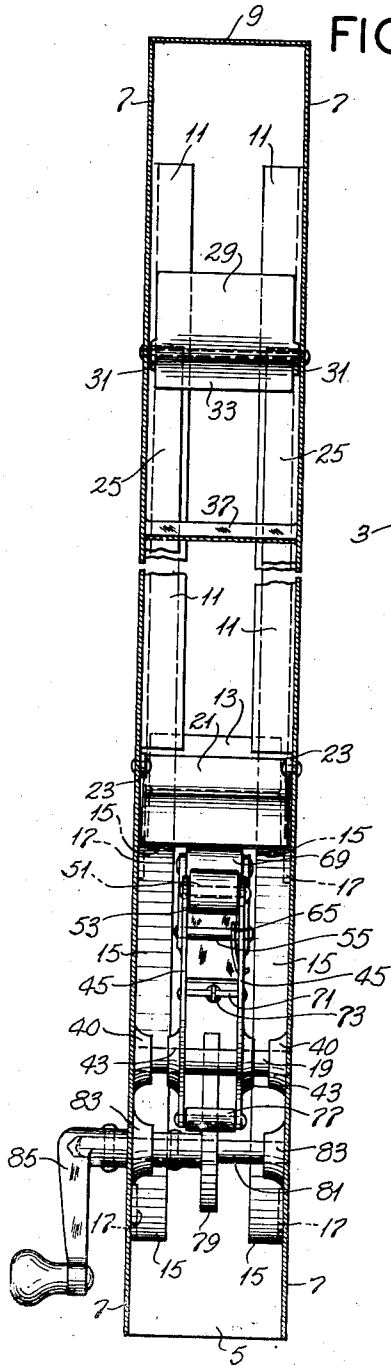


FIG. 3.

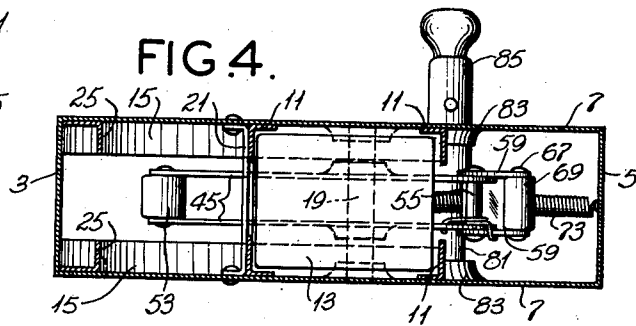


FIG. 4.

Benjamin W. Fry,
Inventor,
Haynes, Koenig and Wolf
Attorneys.

UNITED STATES PATENT OFFICE

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ARTICLE DELIVERY MACHINE

Benjamin W. Fry, University City, Mo.

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13 Claims. (Cl. 312—63)

This invention relates to article delivery machines, and with regard to certain more specific features, to article delivery means for dispensing machines, such as vending machines and the like.

Among the several objects of the invention may be noted the provision of article delivery means of the class described which, located at a relatively low level, removes an article from the bottom of a stack of articles and automatically delivers said article at a level substantially above the bottom of the stack, such as at the top of said stack; the provision of a machine of the class described which is adapted for use, for example, in a cigarette vending machine, to deliver the bottom package of a stack of cigarette packages from a position near the floor to normal hand level, or a like relatively higher level; the provision of a machine of the class described which performs the desired delivery action quickly and positively, but without injuring the article being delivered; and the provision of a machine of the class described which is relatively simple and economical in construction, and simple and reliable in operation. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a vertical cross section of an article delivery machine embodying the present invention, taken substantially along line 1—1 of Fig. 2; and

Figures 2, 3, and 4 are cross sections taken substantially along lines 2—2, 3—3, and 4—4, respectively, of Fig. 1.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

In most cigarette vending machines, the store of packages of cigarettes to be vended is maintained in a vertical stack, and the delivery of the vended package is made from off the bottom of the stack. This system offers numerous advantages, as gravity may be relied upon to force additional packages into position to be delivered from the bottom of the stack.

However, for the sake of convenience, it is necessary that a vending machine of the type

herein concerned deliver its article, such as the package of cigarettes, at a level at which the purchaser can readily pick up the delivered package. Ordinarily, this means that the package should be delivered at a point not less than the order of two and a half feet above floor level. With most vending machines heretofore made, it has been customary to elevate the entire stack or supply of articles above this desired minimum level, so that the delivered package may be dropped, or at least maintained level, from the bottom of the stack to the point of delivery. Consequently there has been present in the prior vending machines of this type a waste space of two and one-half feet or more, extending from the bottom of the storage stack of articles to the floor level. It is one of the principal objects of the present invention to provide article delivery means which permits the extension of the stack of articles to be delivered clear down to approximately the floor level, and which takes the articles to be delivered off the bottom of said stack, but which still delivers the article at about hand level or the like.

With the present invention, for example, cigarette and like vending machines can, for the first time, be built in console, rather than cabinet models.

Referring now more particularly to the drawings, there is illustrated an article storage and delivery unit which may readily be embodied in dispensing or vending machines of the class heretofore indicated. This unit, it will readily be understood, is well adapted for multiple installation in connection with a vending machine of the type concerned; but the principles of the present invention are as well illustrated by one unit as by a multiplicity of such units arranged in a battery, and in the interest of simplicity, therefore, the illustration and description of the present invention is confined to a single unit embodying it.

The unit referred to is housed in a sheet metal box 1, for example, which may desirably comprise a front wall 3, a back wall 5, side walls 7, and a top 9. The box 1 may be of any desired height. The top 9 is desirably removable for loading purposes.

Mounted on the inside surfaces of side walls 7 are pairs of oppositely facing, parallel angle bars 11, which serve as means for establishing and holding a stack of articles 13 to be delivered. The bars 11 extend nearly to the top 9 of the box 1, upwardly, and downwardly to a point about six or seven inches, for example, from the bottom of the box 1. The articles 13 to be delivered,

such as packages of cigarettes, are stacked in superimposed relationship in the enclosure provided by the four angle bars 11. The bottom supporting means for this stack is provided by the upper, substantially horizontal ends of a pair of forwardly and downwardly curving tracks or flanges 15, which are attached to their respective side walls by suitable brackets 17. The major portions of tracks 15 are, roughly, circular about an axis represented by a shaft 19, hereinafter to be more fully described.

The top ends of tracks 15 are spaced beneath the bottom edges of the rear pair of angle pieces 11 a distance preferably only slightly less than the vertical thickness of one of the articles 13. However, the front pair of angle pieces 11 preferably terminates downwardly at a point only slightly less than the thickness of two such articles 13 arranged in superimposed relationship. Forming a continuation of the front pair of angle pieces 11, at their lower ends, is a flap or trap door 21, pivoted near its upper edge, at its sides, on ears 23 riveted or otherwise affixed to the side walls 7 of the box. The trap door 21 preferably turns freely on its pivot, and preferably extends clear across between side walls 7 (see Fig. 3).

Numerals 25 indicate a pair of tracks, secured as by brackets 27 to the inner surfaces of the side walls 7, and extending vertically from a point near the bottoms of tracks 15 to substantially the top of the box 1, or at least up to an elevation a few inches above the level at which it is desired to deliver the articles. At their bottom ends, the tracks 25 curve in a parallel manner to the lower ends of the tracks 15, sufficient space being provided between the tracks 15 and 25, however, so that one of the articles 13 (see dotted lines in Fig. 1) may freely slide therebetween. Above their curved lower portions, the tracks 25 slope gradually inwardly, away from the front 3 of the box, until, at their tops, the tracks 25 are spaced back from the front 3 of the box by a distance somewhat greater than the thickness of one of the articles 13.

At the upper ends of the tracks 25 the box 1 is provided with a trap door 29, which preferably extends clear across the box 1, and is freely pivoted substantially at the top end of the tracks 25 on ears 31 riveted or otherwise secured to the side walls 7. The trap door 29 is of sufficient width, from front to back, that when it is released, its back edge comes to rest against the front surfaces of the front pair of angle pieces 11, with the trap door itself in a forwardly and downwardly sloping position. The front edge of the trap door 29, as indicated by numeral 33, is preferably curved downwardly in a smooth curve.

Somewhat below the level of the trap door 29 the front 3 of the box 1 is provided with an article delivery opening indicated by numeral 35, and this opening 35 is bottomed by a platform or chute 37 extending across the box 1 and from the track 25 forwardly to a point outside the front wall 3 of the box 1, where it preferably terminates as a lip 39. The chute 37 likewise slopes downwardly and forwardly.

Mounted on the aforementioned shaft 19 is an article discharging mechanism which will next be described. The shaft 19 itself is supported in bearings 40 mounted on the side walls 7.

Numerals 41 indicate a pair of parallel three-armed brackets that are suitably mounted in hubs 43 on said shaft 19. Either the hubs 43 rotate on the shaft 19, or the shaft 19 rotates on

its bearings 40. Each bracket has three arms 45, 47 and 49 substantially radiating from the hubs 43 and disposed at successive angles of substantially 90° with respect to each other. The arms 45 are the longest, and have a radial length such that they extend to a position substantially midway between the tracks 15 and the tracks 25. The brackets 41, it will be understood, are spaced apart a sufficient distance so that the arms 45 can freely pass between the tracks 15 as mounted on the opposite side walls 7 of the box. Rotatably supported on a suitable pin 51 extending across between the outer ends of the two arms 45 of the two brackets 41 is a roller or like element 53.

The intermediate bracket arms 47, which are between the arms 45 and the arms 49, are somewhat shorter in length than the arms 45, and supported between the ends of the two arms 47 is a pin 55 on which is pivotally mounted an extension piece indicated generally by numeral 57. The extension piece 57 comprises side arms 59, which in effect comprise overlying extensions of the arms 47 of the brackets 41, and a cross piece 61 extending between the side pieces 59 and bridging the interval between the arms 47. The cross piece 61 has an inward extension 63, which abuts the sides of the ends of arms 47 and limits the clockwise rotation of the extension 57 on the pin 55 to an angular position in which the side arms 59 are substantially radially disposed with respect to the central shaft 19. A coil spring 65 is provided around the pin 55, with one of its ends anchored in one of the arms 47, and its other end anchored against the front edge of one of the extending arms 59, so as always to urge said extension 57 to rotate in a clockwise direction on the pin 55. Extending across between the extreme ends of side extensions 59 is a pin 67, on which freely turns a roller 69.

Also extending across between arms 47, at a point about mid-position along their lengths, is a pin 71, to which is secured one end of a tension spring 73, the other end of which is made fast to the rear wall 5 of the box 1. The tension spring 73 is arranged so as to always maintain a clockwise rotating tendency on the pair of brackets 41.

The third and shortest arms 49 of the brackets 41 carry at their outer extremities a cross pin 75, on which is rotatably mounted a roller or cam follower 77. The cam follower 77 engages, under tension provided by the spring 73, the edge of a generally spiral cam 79, which is mounted and keyed on a shaft 81, the latter being supported in bearings 83 mounted on the side walls 7, in a parallel relationship to the shaft 19. The shaft 81 extends outwardly through one of the side walls 7, and is there provided with a turning handle or crank 85.

It will be understood, of course, that in a vending machine or the like, the crank 85 may be replaced by a suitable coin-released or like actuating mechanism; the crank 85 is shown by way of example only as a means for imparting rotation to the cam 79.

The cam 79, as mentioned, is of a generally spiral type, with an edge that commences at an angular point of minimum radial distance from the shaft 81 and progresses, angularly, at gradually increasing radial distances to a point substantially 360° removed from the initial point, where it is at maximum radial distance from the shaft 81. The edge of the cam then returns along an approximately radial line, indicated by numeral 87, to the aforementioned starting point

of minimum radial distance from the shaft 81. The radial edge 87 of the cam 79 provides a sharp drop-off point or shoulder indicated by numeral 89.

The operation of the article delivery means as thus described will next be indicated.

It is assumed that there is present in the space provided by the angle bars 11, a stack of articles 13 to be delivered. It is also assumed that the elements of the article discharging means are in their full-line position as shown in Fig. 1, under the influence of the tension spring 73 and 55.

The crank 85 is now turned so as to cause the cam 79, as viewed in Fig. 1, to rotate in a clockwise direction. The cam follower 77, riding on the edge of the cam 79, is thus gradually rotated in an upward direction, causing counterclockwise rotation of the brackets 41 on the shaft 19 against the tension spring 73.

Soon the roller 69 engages the rear edge of the lowermost article 13 in the stack, and commences to push said article forwardly. The forwardly moving article 13 pushes the trap door 21 forwardly out of its way, and as the motion progresses, the article 13 slides outwardly along tracks 15 until it is entirely freed from the stack, whereupon it drops, between tracks 15 and 25, under the influence of gravity, until it comes to rest against the roller 53 supported on arms 45 of brackets 41. By this time, the cam follower 77 has nearly reached the shoulder or drop-off point 89 of said cam 79, and the brackets 41 are substantially in their dotted line position as shown in Fig. 1.

Immediately after the article 13 left the bottom of the stack, the trap door 21, under the influence of gravity, returned to its normal, downwardly hanging position.

When, now, the cam follower 77 passes off the drop-off point 89 of the cam 79, the entire bracket assembly, under the influence of the tension spring 73, rotates in a clockwise manner to snap back to its initial or full line position. This snap movement of brackets 41 causes the roller 53, against which the article 13 is resting, to hurl said article vertically upwardly, with considerable force. As the article 13 shoots upwardly, it slides against the tracks 25 until it reaches the trap door 29, and it then has sufficient remaining force to rotate said trap door 29 in a counterclockwise direction to an open position, whereupon the article 13 continues to rise to a topmost position indicated in dotted lines in Fig. 1. In the meanwhile, the trap door 29 will have fallen back to its normal or closed position, under the influence of gravity. The article 13, having stopped its upward movement, now commences to fall, and as it falls it hits the sloping trap door 29 and is directed forwardly to continue its fall between the front 3 of the box 1 and the front surfaces of the tracks 25, ultimately to slide out opening 35 on chute 37, to a point where the recipient may receive it.

In connection with the return or clockwise movement of the brackets 41, under the influence of the spring 73, the extension 57 pivots on the pin 55 at the ends of bracket arms 47, in a counterclockwise direction, so that it passes entirely under the stack of articles 13, without dislodging any of said articles backwardly. Then, as soon as said extension 57 has cleared the back of the stack of articles, it snaps, under its own spring 65, back to its extended, or full line position as shown in Fig. 1, ready for the delivery operation on another article 13.

It will readily be seen that numerous other means could be provided, in lieu of the cam 79 and cam follower 77, for imparting the desired movement to the brackets 41. For example, the shaft 19 might be directly rotated through a ratchet mechanism that automatically provides for a slippage when the dotted line position of the brackets 41 was reached. It is accordingly to be considered that the cam 79 and cam follower 77 are shown by way of illustration only, as suitable means for imparting the desired rotation of the brackets 41.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. Article delivery means comprising means for maintaining a vertical stack of articles, means for withdrawing an article from the bottom of the stack, means associated with the withdrawing means for automatically elevating the withdrawn article to an elevation substantially above the bottom of the stack, and means for discharging the elevated article at a point not substantially beneath its point of maximum elevation.

2. Article delivery means comprising means for maintaining a vertical stack of articles, means for withdrawing an article from the bottom of the stack, means for automatically elevating the withdrawn article to an elevation substantially above the bottom of the stack, and means for discharging the elevated article at a point not substantially beneath its point of maximum elevation, said last-named means comprising a sloping trap door adapted to be pushed aside by the article in the course of its elevating movement.

3. Article delivery means comprising means for maintaining a vertical stack of articles, means for withdrawing an article from the bottom of the stack, means for automatically elevating the withdrawn article to an elevation substantially above the bottom of the stack, and means for discharging the elevated article at a point not substantially beneath its point of maximum elevation, said withdrawing and elevating means being connected together for coextensive movement.

4. Article delivery means comprising means for maintaining a vertical stack of articles, a pair of spaced means, means supporting said spaced means for coextensive movement at the bottom of said stack, so that upon movement of said pair of spaced means in one direction one of the spaced means pushes an article off the bottom of the stack onto the other spaced means, and upon subsequent movement of said pair of spaced means in the opposite direction, the said other spaced means hurls the article upwardly, and means for guiding the upward movement of the hurled article.

5. Article delivery means comprising means for maintaining a vertical stack of articles, a pair of spaced means, means supporting said spaced means for coextensive movement at the bottom of said stack, so that upon movement of said pair of spaced means in one direction one of the spaced means pushes an article off the bottom of the stack onto the other spaced means, and upon subsequent movement of said pair of spaced

means in the opposite direction, the said other spaced means hurls the article upwardly, the first-named spaced means being provided with collapsing means whereby it passes under the bottom of the stack, in the second-named direction of movement, without dislodging an article therefrom, and means for guiding the upward movement of the hurled article.

6. Article delivery means comprising means for maintaining a vertical stack of articles, a pair of spaced means, means supporting said spaced means for coextensive movement at the bottom of said stack, so that upon movement of said pair of spaced means in one direction one of the spaced means pushes an article off the bottom of the stack onto the other spaced means, and upon subsequent movement of said pair of spaced means in the opposite direction, the said other spaced means hurls the article upwardly, means for guiding the upward movement of the hurled article, and means providing the said spaced means with the said two directions of movement in proper sequence.

7. Article delivery means comprising means for maintaining a vertical stack of articles, a shaft disposed beneath the bottom of said stack, a bracket on said shaft, said bracket supporting two means radially spaced from said shaft and angularly spaced from each other, and means for rotating the bracket first in one direction so that one of said two means pushes an article from the bottom of the stack onto the second of said two means, and then rotating the bracket in the reverse direction so that the second of said two means hurls the article on it upwardly, and means for guiding the upward movement of the hurled article.

8. Article delivery means comprising means for maintaining a vertical stack of articles, a shaft disposed beneath the bottom of said stack, a bracket on said shaft, said bracket supporting two means radially spaced from said shaft and angularly spaced from each other, and means for rotating the bracket first in one direction so that one of said two means pushes an article from the bottom of the stack onto the second of said two means, and then rotating the bracket in the reverse direction with a rapid, snap action, so that the second of said two means hurls the article on it upwardly, and means for guiding the upward movement of the hurled article.

9. Article delivery means comprising means for maintaining a vertical stack of articles, a shaft disposed beneath the bottom of said stack, a bracket on said shaft, said bracket supporting two means radially spaced from said shaft and angularly spaced from each other, and means for rotating the bracket first in one direction so that one of said two means pushes an article from the bottom of the stack onto the second of said two means, and then rotating the bracket in the reverse direction so that the second of said two means hurls the article on it upwardly, and tracks guiding the hurled article to a discharge point substantially above the bottom of the stack.

10. Article delivery means comprising means for maintaining a vertical stack of articles, a shaft disposed beneath the bottom of said stack, a bracket on said shaft, said bracket supporting two means radially spaced from said shaft and

angularly spaced from each other, and means for rotating the bracket first in one direction so that one of said two means pushes an article from the bottom of the stack onto the second of said two means, and then rotating the bracket in the reverse direction so that the second of said two means hurls the article on it upwardly, and tracks guiding the hurled article to a discharge point substantially above the bottom of the stack, a trap door adapted to be opened by the article ascending said tracks, and a delivery chute, said trap door closing after the article passes and thereafter, as the article commences falling, directing the article into the delivery chute.

11. Article delivery means comprising means for maintaining a vertical stack of articles, a shaft disposed beneath the bottom of said stack, a bracket on said shaft, said bracket supporting two means radially spaced from said shaft and angularly spaced from each other, and means for rotating the bracket first in one direction so that one of said two means pushes an article from the bottom of the stack onto the second of said two means, and then rotating the bracket in the reverse direction so that the second of said two means hurls the article on it upwardly, and means for guiding the upward movement of the hurled article, said bracket-rotating means comprising a rotatable substantially spiral cam, means for rotating said cam, and a cam follower on said bracket engaging said cam.

12. Article delivery means comprising means for maintaining a vertical stack of articles, a shaft disposed beneath the bottom of said stack, a bracket on said shaft, said bracket supporting two means radially spaced from said shaft and angularly spaced from each other, and means for rotating the bracket first in one direction so that one of said two means pushes an article from the bottom of the stack onto the second of said two means, and then rotating the bracket in the reverse direction so that the second of said two means hurls the article on it upwardly, and means for guiding the upward movement of the hurled article, said bracket-rotating means comprising a rotatable substantially spiral cam, means for rotating said cam, and a cam follower on said bracket engaging said cam, together with spring means urging said bracket to rotate in the said reverse direction.

13. Article delivery means comprising means for maintaining a vertical stack of articles, a shaft disposed beneath the bottom of said stack, a bracket on said shaft, said bracket supporting two means radially spaced from said shaft and angularly spaced from each other, and means for rotating the bracket first in one direction so that one of said two means pushes an article from the bottom of the stack onto the second of said two means, and then rotating the bracket in the reverse direction so that the second of said two means hurls the article on it upwardly, and means for guiding the upward movement of the hurled article, said stack-maintaining means being provided at its bottom with a trap door permitting the aforesaid pushing of an article off the bottom of the stack, but preventing an article from reentering the bottom of the stack.

BENJAMIN W. FRY.