Nov. 24, 1964 A. MULLER 3,158,288

COIN OPERABLE RELEASE MECHANISM

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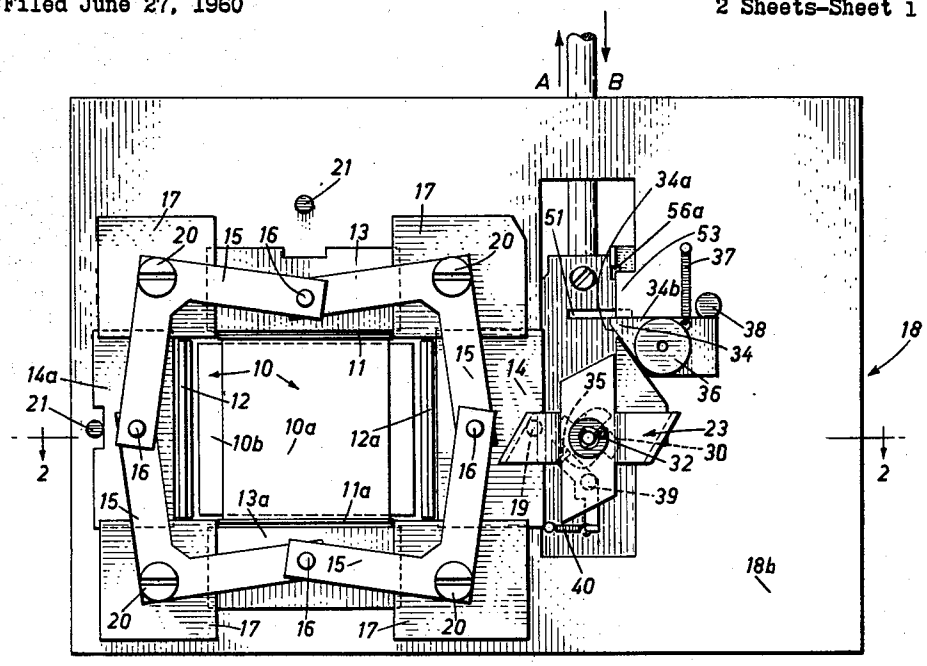


FIG. 1

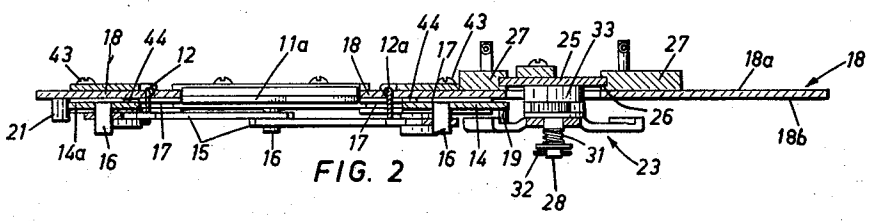


FIG. 2

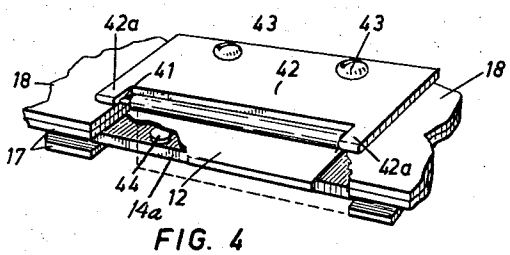


FIG. 4

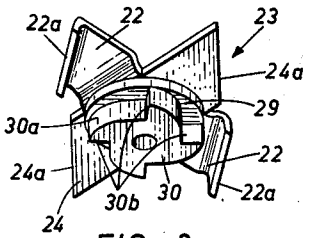


FIG. 3

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FIG. 5

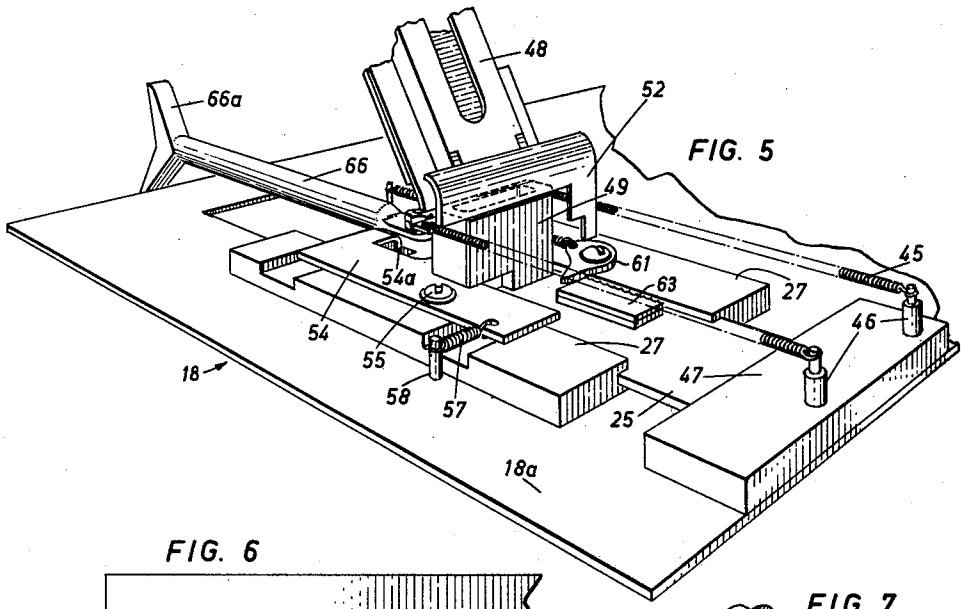


FIG. 6

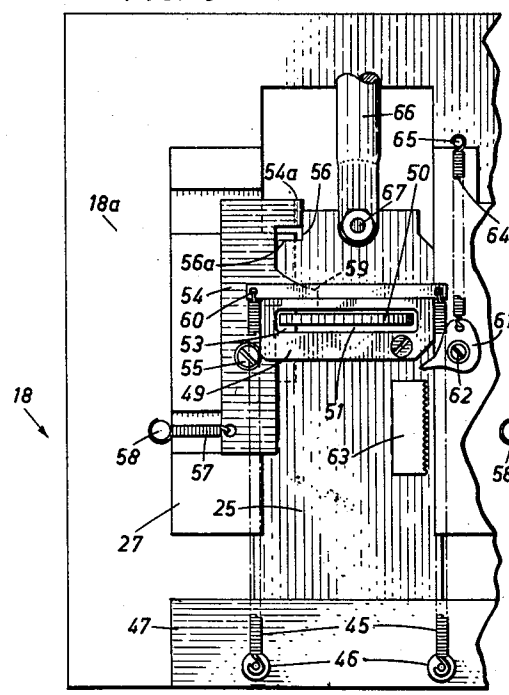
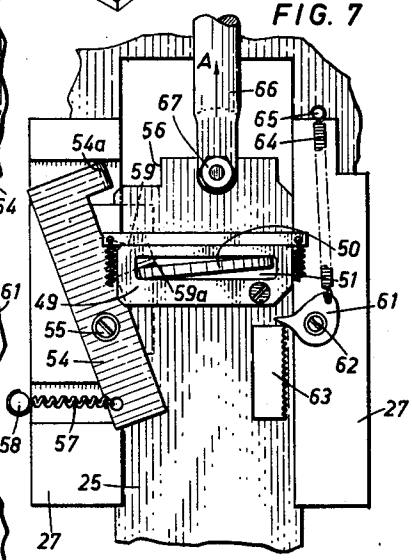


FIG. 7



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COIN OPERABLE RELEASE MECHANISM

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1 Claim. (Cl. 221—67)

This invention relates to an article release mechanism particularly for use in vending machines and the like the mechanism to be released for operation by insertion of a coin or other suitable object.

Postage stamp vending machines, for example, at present in use dispense a folded card rectangular in shape containing postage stamps within the folder. The method of stacking cards in the machine prior to dispensing often causes the release of more than one card upon inserting a coin of the value of a single purchase. The reverse also holds true in respect of some machines in that in some instances no card is released upon insertion of a coin for lack of a positive releasing mechanism.

It is another disadvantage of prior machines that the coin or other suitable object used to release the mechanism for operation falls directly into a receptacle after tripping a separate mechanism effecting release of the locking arrangement of the device, during free passage of the coin to the receptacle. The complexity of parts necessary in such a device is generally uneconomical in addition to being inherently prone to failure due to the number of extra moving parts required.

Upon inserting a coin into certain other types of vending machines and upon commencement of operation, the coin is permitted to fall into the coin receptable so that upon releasing the operating arm or lever for any reason before receipt of the vended article the coin is lost and another must be inserted before an article will be released.

It is an object of this invention to stack cards of equal rectangular dimension in alternate arrangement whereby adjacent cards are aligned one upon the other so that the width dimension of alternate cards is aligned with the length dimension of adjacent cards.

It is another object of the invention to provide a release mechanism for alternately arranged cross-stacked rectangular articles in a magazine adapted to suddenly release no more than one article during each release cycle.

It is a further object of this invention to provide a release mechanism which depends upon the presence of the coin as a part of the mechanism to permit operation thereof.

It is another object of the invention to provide a positive release mechanism in which an article must be dispensed before another coin may be utilized as a part of the release mechanism.

The foregoing disadvantages of prior machines all having coin operating release mechanisms may be overcome by the provision of a first pair of oppositely disposed hinged shelves or shelf plates adapted in the one limiting position to be disposed laterally toward one another and in the other limiting position to be disposed downwardly in release position about their hinges; a second pair of like opposed shelves disposed substantially at right angles to the first pair; laterally disposed shelf actuating plates or supporting means adapted to engage said shelves to dispose the same in their relative positions for support of the articles; linkage operatively connecting said plates whereby inward motion of one pair of plates causes outward motion of the other pair; means limiting the motion of the plates to permit lateral disposition of the one pair of support shelves and corresponding downward disposition of the other pair of support shelves, permitting release of a cross-stacked card or other article within the downwardly disposed pair and corresponding suspension

of remaining articles by the laterally disposed pair through suspension of the next alternately positioned card by the latter pair of shelves.

The stated and other objects of the invention will be appreciated by a study of the following specification taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a plan view of the underside of the device indicating the relation between the plate and shelf actuating linkage and the coin operable release mechanism together with the location of a number of cross-stacked articles to be singly released;

FIGURE 2 is a section of the device taken along the line 2—2 of FIGURE 1;

FIGURE 3 is a perspective view to an enlarged scale of a portion of the plate actuating device;

FIGURE 4 indicates a partially cut-away perspective view of a hinged shelf or support plate of the invention in the article supporting, laterally disposed position showing the hinge portion thereof, the shelf actuating plate and in broken line the release or downwardly disposed position of the shelf;

FIGURE 5 is a view in perspective of the upper portion of the coin operable release mechanism of the device;

FIGURE 6 is a plan view of the coin operable release mechanism including a coin after deposit but before actuation thereof;

FIGURE 7 is a plan view of the coin operable release mechanism in the released position during actuation thereof with a coin in a release position and further indicating a retraction preventing means.

In the drawings a group of cross-stacked articles **10** are shown in FIGURE 1 in which the lowermost article **10***a* is retained by opposed shelves **11** and **11***a* in their laterally disposed positions prior to release. Oppositely disposed shelves **12** and **12***a* are indicated in their suspended unengaging positions, shelves **12** and **12***a* being disposed at right angles to shelves **11** and **11***a*.

The lowermost card or article **10***a* is stacked in a manner so that its length dimension permits contact with the shelves **11** and **11***a* while its shorter width dimension is such that it will not engage shelves **12** and **12***a* in their subsequent laterally extended position. Card **10***b* having the same dimensions as those of card **10***a*, is shown partly in broken line in position for engagement with shelves **12** and **12***a* in their subsequent extended position while its width dimension is sufficiently short to prevent engagement thereof with shelves **11** and **11***a*.

The cards to be dispensed are rectangular in form having dimensions of greater length than width with the cards being supportable along their width dimensions by opposed shelves. The width dimension of the cards is less than the distance between the edges of the extended opposed shelves preventing engagement along their length dimension in any position of the shelves.

The length dimension of the articles or cards is less than the distance between the shelves in their downwardly disposed positions so that a card upon release may fall freely therebetween.

Shelf actuating plates **13** and **13***a* FIGURE 1 are disposed for engagement with their corresponding shelves **11** and **11***a* upon inward disposition of the plates and shelf actuating plates **14** and **14***a* are disposed for engagement with their corresponding shelves **12** and **12***a* upon inward disposition of the plates.

Linkage arms **15** are connected to plates **13**, **13***a* **14** and **14***a* through pins **16** in the manner shown in FIGURE 1 such that inward disposition of plates **14** and **14***a* results in corresponding outward positioning of plates **13** and **13***a*. Actuating plates **13** and **13***a*, **14** and **14***a* are slidably supported in slotted guideways **17** as shown particularly in FIGURES 2 and 4, fastened to base plate **18**

having a rectangular opening for retaining and singly releasing a number of cross-stacked articles.

Shelf actuating plate 14 is operatively connected to the actuating means through a pin 19 which provides motion to plates 13, 13*a*, 14 and 14*a* through linkage arms 15 each linkage arm having a fulcrum through the fastening means 20 on guides 17. Pins 21 FIGURES 1 and 2 provide stops limiting the outward motion of plates 13 and 14*a* through engagement of the pins by a recessed portion of the said plates. Linkage arms 15 comprise right angular members or levers commonly joined at their extremities through pins 16 and, as stated, pivotally joined to guide members 17.

Plate 14 is reciprocably actuable through the action of flanged arm 22 of the essentially cross-shaped rotor member generally designated by the reference numeral 23 which is adapted to rotate only in a counter-clockwise direction, and through contact of arm 24 of said member through its cam edge 24*a* with pin 19. Member 23 is rotatably fixed to a slidable member 25 adapted to slide within grooves 26 of support members 27 rigidly fastened to the upper surface 18*a* of base plate 18. The motion of slidable member 25 is reciprocating in a direction at right angles to that of plates 14 and 14*a* and parallel to that of plates 13 and 13*a*. Member 23 is adapted to be rotatable on the sliding member 25 and has imparted to it a reciprocal motion corresponding to that of slidable member 25. Accordingly through the action of linkage arms 15 about their pivotal points 20 corresponding plate 14*a* will be extended to its outward position limited by stop 21 and plates 13 and 13*a* will be exerted towards their extreme inward position. The next cycle of operation comprising again counter-clockwise rotation of member 23 and subsequent engagement of edge 24*a* of arm 24 with pin 19 of plate 14 in its extreme outward position and upon further rotation of member 23 plate 14 is urged inwardly to its furthermost inward position. Thus plate 14*a* through action of linkage arms 15 is also exerted to an inward position and plates 13 and 13*a* are exerted to an outward position limited by the engagement of plate 13 with stop 21 as particularly shown in FIGURES 1 and 2.

Member 23 is rotatable upon shaft 28 fixed to sliding member 25 and extending downwardly therefrom. The said member has rigidly affixed thereto a spacer washer 29 and a ratchet wheel 30 substantially as shown in FIGURE 3.

Referring to FIGURE 2 it may be seen that the rotor member 23, spacing washer 29 and ratchet wheel 30 are retained upon shaft 28 by means of a spring 31 and a cotter pin or other suitable fastening means 32. A spacer washer 33 is adapted to retain the member 23 below slidable member 25.

The ratchet wheel 30 comprises essentially rounded surfaces 30*a* and flat pawl contacting surfaces 30*b*. Flat surfaces 30*b* are adapted for co-operation during an operation of the reciprocating cycle of member 23 on slidable member 25 with a pawl 34 in the one operation and with pawl 35 in another operation as explained below.

Having regard to FIGURE 1, upon motion of sliding member 25 in the direction of arrow A a rounded surface 30*a* of ratchet wheel 30, as indicated in broken line, will contact the cam edge 34*a* of pawl 34 moving the pawl in the direction of arrow A about its pivot 36 against the bias of spring 37 to permit passage of ratchet wheel 30 beyond edge 34*b* of pawl 34. Upon movement of the sliding member 25 in the opposite direction as indicated by the arrow B flat surface 30*b* of ratchet wheel 30 will engage pawl 34, anchored by means of pin 38 to provide a counter-clockwise rotation of the ratchet wheel 30 and corresponding counter-clockwise rotation of member 23. It will be realized that due to the positioning of the four teeth of ratchet wheel 30 a complete cycle of sliding member 25 will result in a 90° rotation of member 23 on

shaft 28. Member 23 is prevented from rotation in a clockwise direction by action of pawl 35 adapted for co-operation after a 90° rotation of member 23, with a flat surface 30*b* of ratchet wheel 30. Pawl 35 upon counter-clockwise rotation of ratchet wheel 30 is adapted to ride over a curved surface 30*a* of ratchet wheel 30 for a subsequent engagement with a flat surface 30*b* of said ratchet wheel 30, the pawl 35 being adapted to pivot about pin 39 against the bias of spring 40.

Upon displacement of member 23 in the direction of arrow B after rotation thereof assuming that plate 14 is in the inward position the flange 22*a* of arm 22 of rotor member 23 will engage pin 19 and serve as a cam surface to urge plate 14 to its outward limited position upon completion of the motion of member 23 upon sliding member 25.

The next complete cycle of the device comprises movement of sliding member 25 in the direction of arrow A, subsequent 90° counter-clockwise rotation of member 23 through action of pawl 34 with ratchet wheel 30 and a further downward motion in the direction of arrow B to engage cam surface 24*a* of arm 24 of member 23 with pin 19 to exert plate 14 to its inward position.

As clearly indicated in FIGURES 2 and 3 arms 22 of member 23 are bent downwardly to enable clearance between the arms and pin 19 permitting engagement of the pin by flanges 22*a* when in position therefor.

Having regard to the foregoing it may be seen that upon motion of the sliding member 25 in the direction of arrow A an arm of member 23 is positioned for engagement with pin 19 of plate 14 such that upon said engagement plate 14 may be urged either inwardly or outwardly depending upon the arm engaged therewith causing a similar motion of plate 14*a* and relatively opposite motion of plates 13 and 13*a* as described through the operation of linkage arms 15.

Shelves 11 and 11*a*, 12 and 12*a* are hinged as indicated in FIGURE 4 by means of pins 41 engaged between base plate 18 and the arms 42*a* of hinge plate 42 secured to base plate 18 by means of screws or other suitable means 43.

Having regard to FIGURES 2 and 4, upon inward disposition of a corresponding plate a shelf normally in its hinged or suspended position (FIGURE 2) will be urged about its hinge 41 inwardly and upwardly by engagement of the edge of the plate with the lower surface of the shelf. A stud 44 positioned on the upper surface of the plate adjacent the leading edge thereof is also adapted for engagement with the lower surface of a corresponding shelf such that upon moving a corresponding plate from its inward position towards its outward position the shelf will be supported along the length of its lower surface and will be suddenly released upon withdrawal of the plate and stud 44 past the flat surface of the shelf towards the rounded portion of the hinge, thereby providing a substantially lateral position of the shelf while any flat portion thereof is engaged by the stud 44.

In this manner it may be seen that upon actuation of plate 14 through pin 19 from the inward position towards its outward position shelves 12 and 12*a* will be retained in their lateral position while shelves 11 and 11*a* in co-operation with the inwardly approaching corresponding plates 13 and 13*a* each attain their lateral positions until studs 44 are sufficiently withdrawn to be disconnected from the flat portion of the lower surfaces of shelves 12 and 12*a* permitting an abrupt disposition of the said shelves to their hinged or suspended positions effecting release of a card supported thereby.

As indicated in FIGURES 5, 6 and 7 showing respectively perspective and plan views of the upper portion of the device, sliding member 25 slidably engaged within grooved retaining blocks 27 is adapted to slide laterally in the direction of arrow A against the bias of springs 45 anchored to the upper surface 18*a* of base plate 18 through

pins 46 and block 47, and in the direction of arrow B to the normal position abutting block 47. A coin receiving slide 48 is adapted to deliver a coin deposited therein to a coin guiding means 49 rigidly attached to slide 25 to dispose the coin 50 within slot 51 FIGURES 1 and 6 in sliding member 25. A guard 52 attached to blocks 27 is adapted to guide the coin from the receiving slide 48 to the coin guiding means 49.

In the position of the device shown in FIGURES 1, 5 and 6, the coin 50 is prevented from dropping through slot 51 by means of its contact with an extending lip portion 53 of base plate 18, since the exposed length of slot 51 in the retracted position of slide member 25 is shorter than the diameter of the coin to be deposited due to the obstruction thereto caused by the said lip portion of base plate 18.

A slide restraining member 54 is pivotally anchored on one of the blocks 27 adjacent the lip portion of base plate 18 by means of a screw or other suitable means 55 said member having a downwardly extending flange 54*a* for engagement with edge 56 of sliding member 25 and for engagement with edge 56*a* of a shoulder of said member 25. Slide restraining member 54 in the unbiased position of the device is adapted to restrain sliding of member 25 by engagement of flange 54*a* with edge 56*a* of the sliding member. The end of the restraining member remote from the flanged end is connected to a spring 57 anchored to base plate 18 by means of pin 58 to retain said member in the unbiased position thereof for engagement of flange 54*a* with edge 56*a* and edge 56. Slide restraining member 54 has an extending lug portion 59 having a flat surface portion 59*a* adapted for contact with coin 50 during the operation of the device. Block 27 is grooved as indicated in FIGURES 5, 6 and 7 to permit arcuate motion of flange 54*a* on member 54 against the bias of spring 57 during operation of the device as hereinafter explained.

A bracket member 60 rigidly attached to coin guiding means 49 is adapted to engage springs 45 at their ends remote from the ends attached to pins 46.

Ratchet arm 61 pivotally mounted to the other of blocks 27 through a screw or other suitable means 62 is adapted to engage the rack teeth of ratchet member 63 rigidly attached to sliding member 25, upon motion of said sliding member in the direction indicated in FIGURE 7 by the arrow A. A portion of ratchet arm 61 is attached to a spring 64 anchored to base plate 18 through a pin 65 said spring in the normal unbiased position retaining ratchet arm 61 in a neutral position as shown in FIGURE 6.

An actuating arm 66 having a hand gripping portion 66*a* is rigidly fastened to the end of sliding member 25 through a nut and bolt or other suitable fastening means 67.

In operation with a plurality of cross-stacked articles the lowermost article being suspended by a pair of shelves as indicated in FIGURE 1, a coin is deposited within coin receiving slide 48 and thence to coin guiding means 49, FIGURE 5, to deposit a coin within slot 51 as indicated in FIGURES 6 and 7. The coin is retained within slot 51 by the abutment of coin 50 with the extending lip portion 53 of base plate 18. Sliding member 25 is normally restrained from operation by contact of the downwardly extending flange 54*a* with edge 56*a* of slide member 25, FIGURES 1, 6 and 7. Upon depositing coin 50 within slot 51 and upon actuating arm 66 in the direction of arrow A, a portion of the coin abuts the surface 59*a* of the extending lug portion 59 of slide restraining member 54 and upon further motion of the slide through the action of arm 66 in the direction of arrow A as shown in FIGURE 7, slide restraining member 54 is pivoted in a counter-clockwise direction about pivot point 53 against the bias of spring 57 to dispose the downwardly extending flange 54*a* within the upper groove of block 27 thus permitting slide member 25 to slide within the associated grooves of blocks 27. Springs 45 anchored to block 47 through pins 46 are attached to bracket member 60 in engagement with coin guiding means 49 to normally retain the end of sliding member 25 against block 47 in the non-operative position thereof.

Upon movement of sliding member 25 in the direction of arrow A against the bias of springs 45, restraining member 54, on contact with coin 50, is disposed into a position to permit extension of the sliding member such that the rack teeth of ratchet member 63 are permitted to engage the ratchet arm 61 as clearly shown in FIGURE 7. Upon contact of the rack teeth with the ratchet arm slide member 25 is restrained from moving in the opposite direction as indicated by the arrow B, FIGURE 1. Upon further movement of slide member 25 in the direction of arrow A the coin 50 is permitted to drop through slot 51 once the coin is drawn beyond the inwardly extending lip portion 53 of base plate 18. At this point slide member 25 is restrained from movement in the direction of arrow B by the contact of ratchet arm 61 with rack teeth of member 63, thus a full positive movement in the direction of arrow A must be completed to disengage ratchet arm 61 from rack teeth 63 before return movement of the slides, in the direction of arrow B, is possible.

Having regard to FIGURE 1, the cards or articles to be dispensed are cross-stacked as hereinbefore explained so that the lowermost article is retained upon shelves 11 and 11*a*, supporting the remaining stacked articles. Upon depositing a coin and upon actuation of arm 66 and upon pivoting of the slide restraining member 54 to release slide member 25, a rounded surface of ratchet wheel 30 contacts the cam edge 34*a* of pawl 34 disposing the pawl in a clockwise direction against the bias of spring 37 to dispose a flat surface of ratchet wheel 30 beyond edge 34*b* of pawl 34, and to further dispose the rack teeth of member 63 beyond ratchet arm 61, FIGURES 6 and 7. Pawl 34 upon returning to its normal position is prevented from further counter-clockwise rotation by the engagement of an edge thereof with stop 38.

Upon release of arm 66 allowing slide member 25 to be drawn to its normal position against block 47 under the action of springs 45, a flat surface of ratchet wheel 30, rigidly fastened to rotor member 23 contacts the upper edge of pawl 34 thus rotating rotor member 23 in a counter-clockwise direction. In the position of the device as shown in FIGURE 1, upon rotating the rotor member in the counter-clockwise direction and upon retraction of sliding member 25 towards its normal position, the cam edge of arm 24*a* contacts pin 19 rigidly fastened to plate 14 to dispose that plate inwardly together with plate 14*a* through linkage 15, and to dispose plates 13 and 13*a* outwardly through the co-operation of linkage 15 to a limiting position against stop 21. Upon actuation of the plates in this manner shelves 11 and 11*a* would be released and permitted to hang in their suspended positions from hinges 41 after plates 12 and 12*a* have been urged to their inward lateral positions to contact the next card or article in the cross-stacked relationship, thereby releasing the lowermost card. Shelves 11 and 11*a* are in contact with studs 44 during the withdrawal of plates 13 and 13*a* such that shelves 12 and 12*a*, during inward disposition of plates 14 and 14*a* and their associated studs, attain their inward lateral disposition before the shelves 11 and 11*a* are released from contact with their corresponding studs 44. In this manner upon release of the lowermost article the remaining articles are suspended by the next article upon its respective shelves thus preventing the release of more than one article during one cycle of the coin operated release mechanism.

Following the 90° counter-clockwise rotation of rotor member 23 pawl 35 engages a flat surface 30*b* of ratchet wheel 30 to prevent rotation of the rotor in a clockwise direction. During rotation of the rotor member as described pawl 35 engages a curved surface 30*a* of ratchet

wheel 30 to a position preventing clockwise rotation by engagement thereof with the next flat surface 30*b* of said ratchet wheel.

The next complete cycle of the device to release the next article from co-operation with shelves 12 and 12*a* is conducted by sliding the slide member within the grooves in block 27 after depositing a coin within slot 51 to dispose the ratchet wheel above pawl 34, release of the sliding member to rotate the rotor member by engagement of a flat surface 30*b* of ratchet wheel 30 with the edge 34*b* of pawl 34 and engagement of the downwardly extending flange 22*a* of arm 22 with pin 19 on plate 14 thus urging plate 14 to its outward limiting position by further travel of sliding member 25 within the grooves of blocks 27 to its normal position against block 47.

What I claim is:

Release mechanism for cross-stacked identical rectangular flat articles of greater length than width and comprising in combination: a base plate having a rectangular opening therein adapted freely to accommodate a stack of said articles therethrough; four article support shelves hingably connected to said base plate within said opening along respective sides thereof said shelves being adapted normally to depend freely within said opening for free passage of said stacked articles therethrough; a pair of shelf actuating plates for each support shelf; means slidably guiding each said plate in a horizontal plane into and out of a position of support underlying its said support shelf and in a direction normal to the axis of the hinge; vertically pivoted linkage means operatively relating said actuating plates and effecting motion of one disposed pair of actuating plates to a supporting position for the support shelves associated therewith and effecting corresponding outward motion of the remaining shelf actuating plates effecting withdrawal of the latter from support of the associated shelves; a reversible two stroke actuating plate, an operating member connected to said actuating plate for manual operation of said pairs of actuating plates; transmission means interconnecting said linkage means and said operating member and moving one pair of said actuating plates into a shelf supporting position upon one actuation of said operating member and effecting withdrawal of the other pair of said slidable actuating plates from said position.

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