Sept. 15, 1931. A. H. DU GRENIER 1,823,093

VENDING MACHINE

Filed Dec. 7, 1927 3 Sheets-Sheet 1

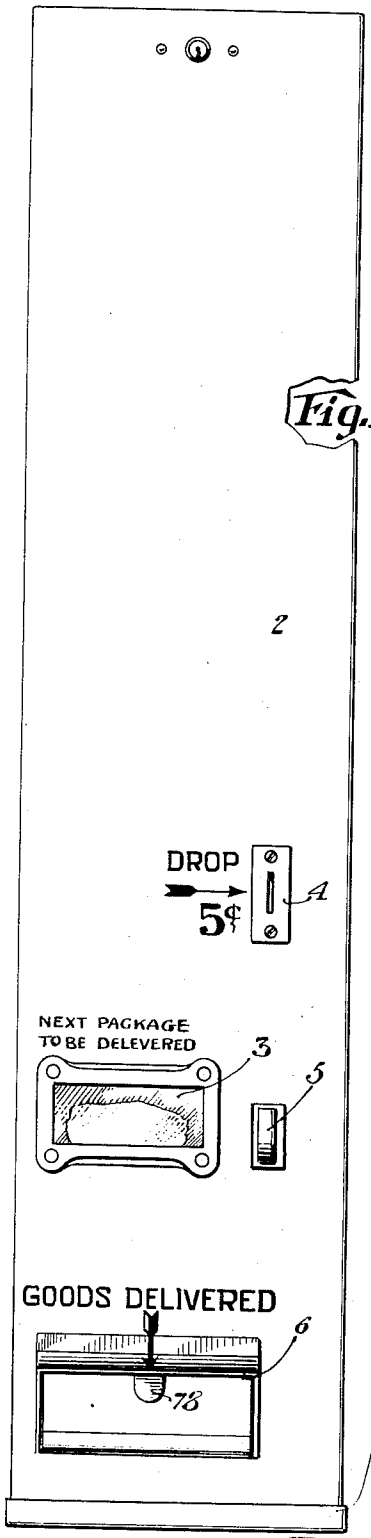


Fig.1

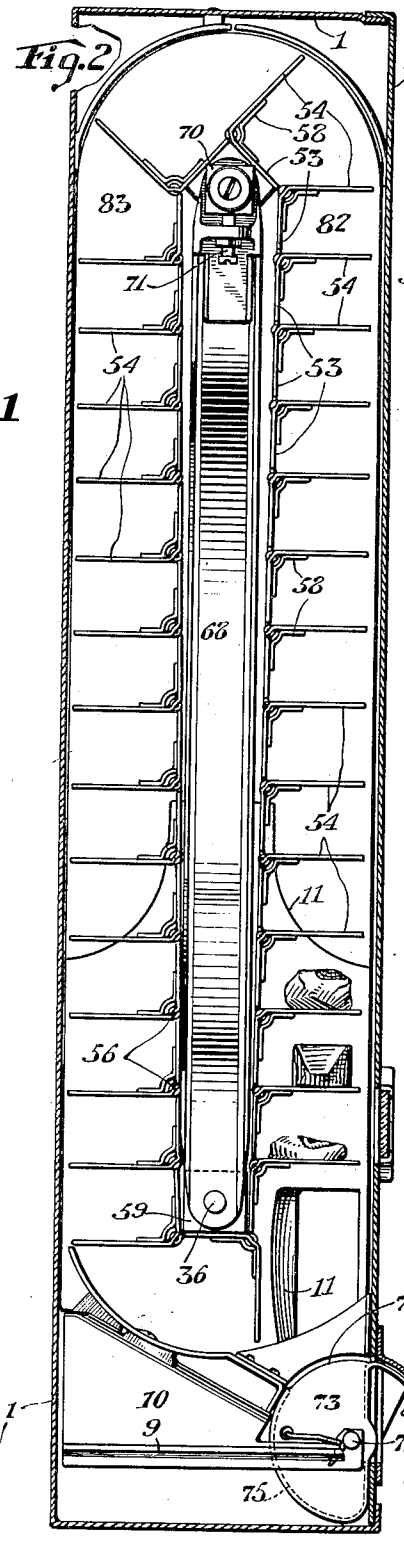


Fig.2

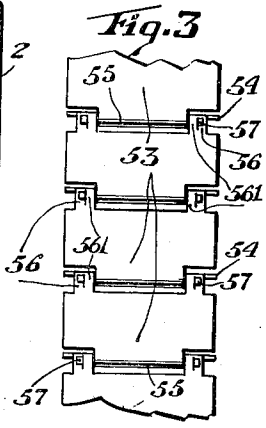


Fig.3

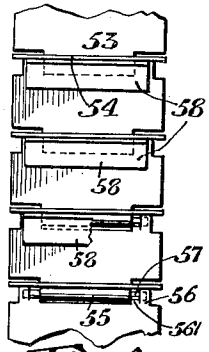


Fig.4

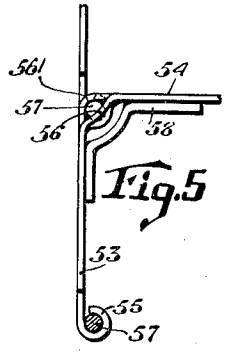


Fig.5

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VENDING MACHINE

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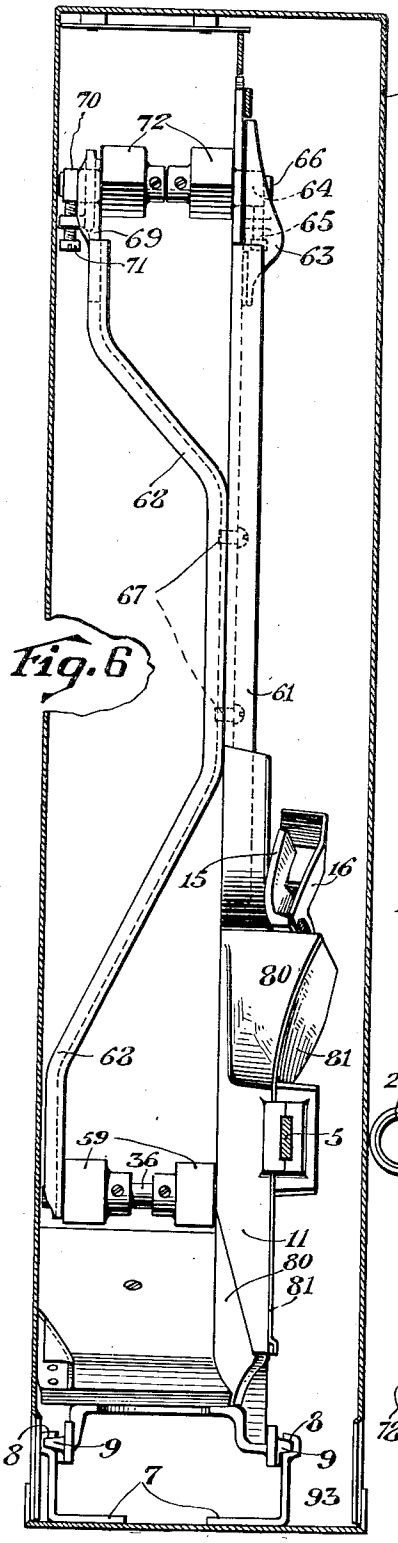


Fig. 6

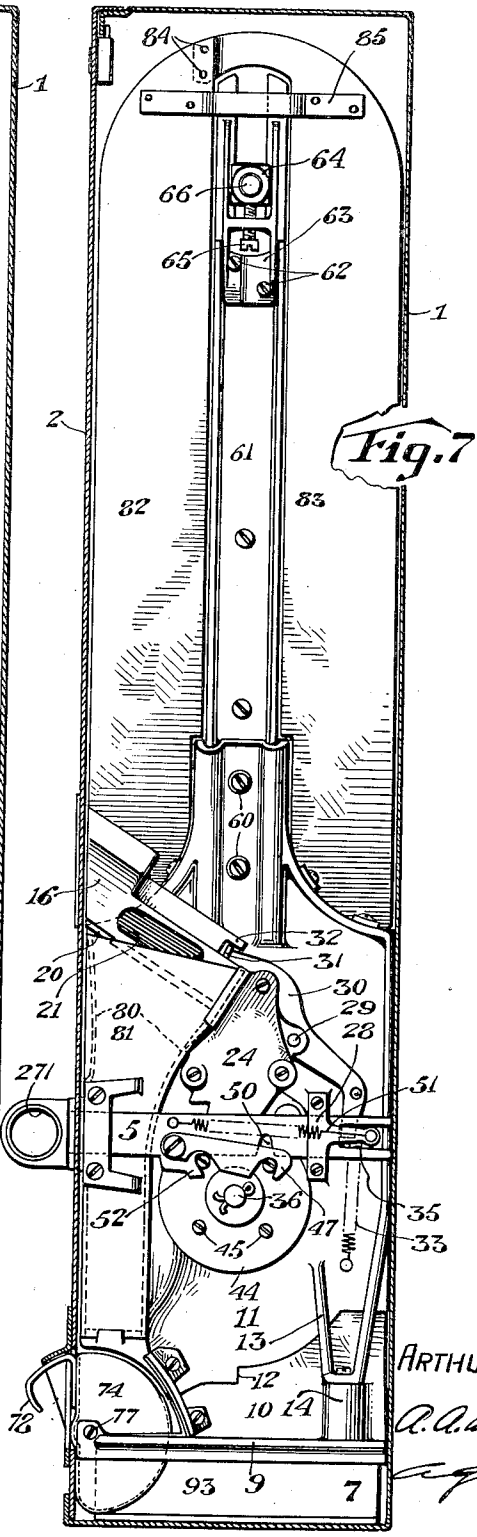


Fig. 7

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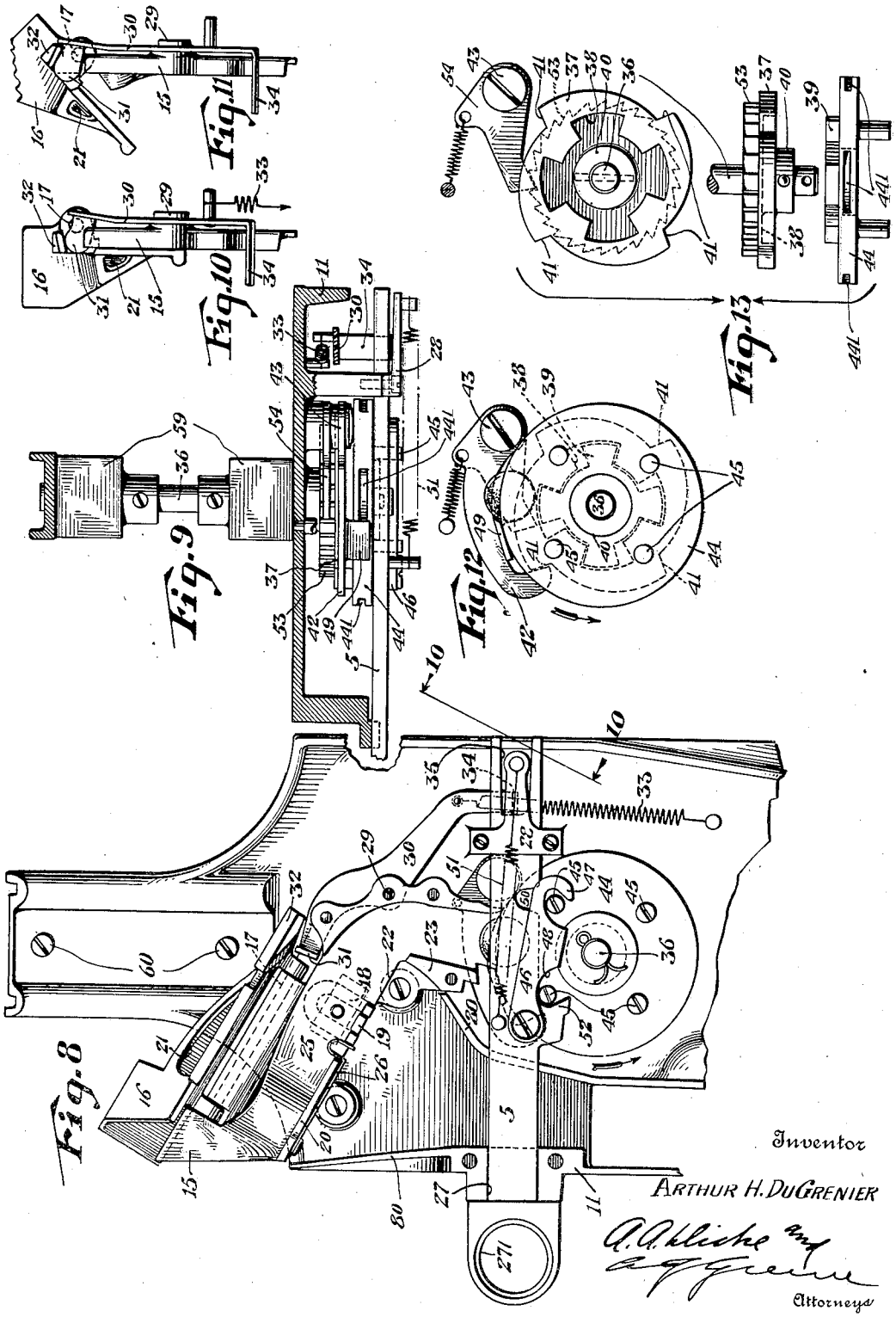


Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

Fig. 13

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UNITED STATES PATENT OFFICE

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VENDING MACHINE

Application filed December 7, 1927. Serial No. 238,297.

The present invention relates to that class of dispensing machines which are coin controlled in action and has for its objects the ends commonly sought in vending machines of this character including compactness, simplicity and durability, but more particularly it is sought to first increase the capacity of the machine, second, to permit the delivery of the articles with a minimum of manual effort and finally to provide a mechanism which cannot be readily deranged or unsuccessfully operated by any user not familiar with the same or successfully operated by any person who attempts to defraud the machine by insertion of articles as substitutes for coins.

The invention has for its main object particularly, to improve that class of machines wherein there is provided a plurality of compartments that may contain the same or different commodities with means for bringing one of the compartments into position for delivering one of the articles. While the improvements are applied to this particular class of machine they are, nevertheless, capable of being applied either in part or in whole to other classes of machines.

As hitherto constructed, machines have been so devised that the articles to be vended are stacked in vertical piles so that by coin controlled means the lowermost package may be separated from the stack and caused to be delivered to the customer.

In order that a large number of articles may be carried by the machine so as to eliminate frequent charges the supply chamber is usually quite high and it will be obvious that the longer or higher the stack the greater the pressure placed upon the lowermost article. For some classes of goods the pressure applied is not objectionable, but for other classes, such as a chocolate and goods of which the base is some material liable to become sticky or soft under the action of heat or pressure, this is very objectionable and commodities falling within the above class cannot be suitably dispensed by machines in which the articles are stacked one upon the other.

Furthermore, in order to attract the customer and to provide a package which is distinct in appearance or novel in form, manufacturers have dressed and wrapped their respective commodities in such a manner that the advertising value and attractiveness would be greatly lessened if such articles were stacked one upon the other.

Therefore, in order that packages may be vended in their original wrapper to obtain the full benefit thereof and to prevent the deleterious action caused by the stacking of adjacent articles the present machine provides an improved form of chamber whereby the articles to be vended may be individually and separately carried by suitable compartments.

In order to permit the article to be next vended to be viewed by a proposed customer the enclosing cabinet is preferably provided with a glass panel so that the customer may observe the article which would be delivered by a subsequent operation of the machine. It is intended that the glass panel be sufficiently large so that the package may be observed at some distance thus allowing the advertising value of the wrapper of the package to be fully obtained. In the preferred embodiment the articles to be vended are carried by horizontal vanes of an endless chain which is supported by a plurality of supporting shafts. One of these shafts, which may be designated as the main operating shaft, is geared to the chain and is partially rotated by a projecting operating slide. The slide is normally locked against operation, but is released upon the insertion of a proper coin. The partial rotation of the main delivery shaft is such that the weight of the articles carried by the chain will assist the rotation of the shaft as caused by the operation of the slide, so as to greatly assist the operator in delivering the article. This construction results in an easy operating machine requiring a minimum of manual effort.

Machines of this character find ready adaptation in places in which the vertical space is plentiful but the horizontal space at a premium and by means of the chain construction the capacity of the machine per

unit of measure horizontally is greatly increased over the form of machines in which a single stack vertically is provided.

A further object of the invention is to provide a chain construction and devices for carrying and supporting the chain in such a way that an article supporting shelf is moved from a horizontal to a vertical position in a single step of movement.

A further object of the machine is to provide an improved form of coin testing mechanism whereby to detect and deflect spurious coins or substitutes and more specifically to provide means for casting aside articles which, if permitted to reach the mechanism, would clog and possibly damage the same, thereby entailing untold trouble and expense in the removal and repair of the machine, in addition to the loss of sales while the machine is out of order.

It is also an object of the present invention to provide a machine for carrying out the above objects which is comparatively simple in construction, inexpensive to manufacture and install, and which is thoroughly reliable and highly efficient in its operation.

The above and such other objects as may hereinafter appear are obtained by the novel structure and combination and arrangement of parts to be hereinafter described and claimed. Reference will now be had to the accompanying drawings forming part of the specification wherein:

Fig. 1 is a front elevation of the vending machine constructed in accordance with the present invention.

Fig. 2 is a vertical sectional view taken thru the left side of the machine showing the manner in which the articles to be vended are individually supported and their relation to the article delivery pocket.

Fig. 3 is a back view of several of the components of the chain delivery mechanism.

Fig. 4 is a front view of several of the components of the chain delivery mechanism.

Fig. 5 is an end view of a part of the chain delivery mechanism showing particularly the manner in which the components of the chain are hingedly connected together.

Fig. 6 is a vertical sectional view of the front of the improved vending machine.

Fig. 7 is a vertical sectional view of the right side of the machine and discloses the coin controlling mechanism devised therefore.

Fig. 8 is an enlarged view in side elevation illustrating particularly the coin receiving and testing chute and its relationship to the releasing mechanism for the operating shaft of the machine.

Fig. 9 is a top plan view of the coin releasing mechanism.

Fig. 10 is an end view of the coin testing mechanism taken on the line 10—10, Fig. 8.

Fig. 11 is an end view similar to Fig. 10 and illustrates the manner in which one of the members comprising the coin testing chute is pivotally supported and swing about its pivotal point.

Fig. 12 is a view in side elevation of some of the parts comprising the coin releasing mechanism.

Fig. 13 is a view, partly in plan, and partly in side elevation, illustrating a number of parts appurtenant to the coin releasing mechanism.

Cabinet and framework

Referring to the drawings and specifically describing the invention the numeral 1 (Fig. 1) designates the enclosing cabinet of the machine which may be made of any desired material and in any shape and configuration, that disclosed in the drawings being, however, the preferred form. Detachable from the enclosing cabinet 1 is a front plate 2 which is adapted to cover most of the operating parts of the machine. The plate 2 carries a glass panel 3 thru which the articles to be vended may be viewed. Above the glass panel 3 and to the right is a slotted plate 4 in which the coins are introduced for the purpose of releasing an actuating slide 5 in order that the article desired may be delivered to a delivery slot 6 formed in the front plate 2.

Referring more particularly to Fig. 6, it will be observed that resting upon the base of the cabinet 1 and securely attached thereto by means of rivets, welding or other suitable fastening means, is a pair of angular plates 7, the vertical plate of each being bent so as to form guide channels 8. The guide channels 8 face each other oppositely to receive ribs 9 formed on the underside of an integral casting 10. The casting 10 is, in the present disclosure, the means for supporting the operating parts of the machine and the operating parts are, therefore, detachable from the enclosing cabinet 4 by reason of the guide channel and rib construction just described. Resting upon the frame supporting member 10 is an irregular shaped casting 11. As shown in Fig. 7 one side of the casting rests upon the supporting base member 10 and also as shown in Fig. 2 the other side of the framework 11 also rests upon the supporting base member 10. As best shown in Fig. 7 a stepped portion 12 between the castings 10 and 11 is provided so as to insure the proper relationship between the castings and to further insure the same there is integral with one side of the casting 11 (Fig. 7) an integral U-shaped rib 13 apertured so as to receive a screw passing into a boss 14 integral with the base supporting member 10. By means of the above construction the proper relationship

between the castings 10 and 11 is insured. The front plate 2 may be attached to the castings 10 and 11 by any suitable fastening means.

Coin testing mechanism

Passing now to that feature of the mechanism of this apparatus which performs a particularly important function with respect to the operation, namely, the means whereby the machine is released for operation, it may be stated that the machine is preferably provided with a coin testing apparatus whereby only genuine coins of the proper value will release the machine for operation. Any suitable mechanism for attaining the above purpose may be adopted and one form of mechanism which may be used is shown and described in the application to Arthur H. Du Grenier, Serial No. 112,011, filed May 27, 1926. This mechanism forms no part of the present invention and will, therefore, be described but briefly.

Registering with the slot in a coin receiving plate 4 is a coin chute which comprises a fixed side 15 (Figs. 6, 8, 10, and 11) and a movable side 16 hingedly mounted by a pin 17 to the stationary side 15. Movement of the hinged side opens the chute and affects the release of coins or other objects that may be retained or held therein.

Carried by the stationary side 15 of the chute is a magnet 18 (Fig. 8) of the horseshoe type having its termini so bent and arranged that they are adjacent a lug 19 forming part of the base of the chute and it may here be mentioned that the material of the coin chute of which it is constructed is of a suitable non-magnetic composition.

As clearly shown in Fig. 8, the lug 19 and a rib 20 together form part of the base of the coin chute over which the coin rolls between the sides 15 and 16 of the chute. As best shown in Figs. 6 and 8 the coin chute is inclined horizontally and laterally as well. The side of the chute 16 (Fig. 7) is provided with an elongated opening 21, the width of which is slightly less than the diameter of the coin which it is desired should release the machine for operation. The inclination of the coin chute laterally is adapted to cause coins of a diameter less than standard to drop thru the opening 21 and into the article delivery pocket as will be explained hereinafter. Genuine coins will roll down the chute and if of the proper diameter and of sufficient weight and non-magnetic, such coins will bridge a gap 22 (Fig. 8) between one of the termini of the horseshoe magnet 18 and a lug 23 integral with the stationary side 15 of the coin chute. In order to further guide the proper coins to the mechanism forming part of the releasing device for the machine the lower portion of the side 15 of the coin receiving chute is covered by a stationary plate 24 (Fig. 7).

If a substitute for a coin such as a disk of a magnetic material is introduced in the machine it will roll down the chute until it reaches the magnet 18 and by the action of the magnet upon the disk the rolling motion of the disk will be retarded so that its momentum is not sufficient to cause it to bridge the gap 22. Substitutes of this character will, therefore, find their way into the article delivery pocket of the machine in a manner which will be described hereinafter.

However, if a disk is introduced in the machine which is of the proper diameter, non-magnetic, but lighter than the proper coin, as it passes down the inclination of the chute it will abut against the looped end 25 of a flat spring 26 attached to the underside of the member 15. This will either retard the velocity of the disk as it rolls down the chute so it is unable to bridge the gap 22 or it will hold the disk above the loop 25 so that it may be released in a manner that will presently be described.

Slidably mounted in a guide slot 27 (Fig. 8) formed in one part of the casting 11 and a guide bracket 28 (Fig. 8) attached by screws to the casting 11 is the operating slide 5 which preferably is provided at the end which projects thru the front plate 2 with a ring 271 adapted to receive one of the fingers of the operator. Pivotally mounted by a screw 29 to the side 15 of the coin chute is a bell-crank lever 30 having a lug 31 adapted to engage a lug 32 integral with the side 16 (Fig. 10 and 11) so that by an operation of the bell-crank lever the side 16 of the coin chute may be swung about its pivotal point 17 away from the side 15. A spring 33 (Fig. 8) attached to the lower portion of the bell-crank lever 30 tends to rock the lever to accomplish this function but is prevented by the engagement of a lug 34 with the vertical side of a slot 35 formed in the rear end of the operating slide 5. However, the slide 5 is susceptible of an initial operation without releasing the machine for operation so that this partial movement of the slide is sufficient to permit the spring 33 to act upon the bell-crank lever 30 rocking the latter so as to slightly separate the stationary and movable sides of the coin chute. It follows, therefore, that in the event that articles have been introduced in the machine such as disks which are unable to depress the spring 26 by virtue of the fact that they are lighter than proper coins, or matches, hair pins, nails, keys or the like, they will temporarily be held in the coin chute, but upon an initial operation of the machine any article which is so lodged will thereupon be released and fall into a delivery pocket.

Summarizing the above therefore, it will

be noted that it will be practically impossible to release the machine for operation by introducing an article which is not of the proper form, size and material and, furthermore, the device takes care of articles which might tend to clog the coin releasing mechanism and put the machine out of order by rejecting and deflecting the same at their point of entry. The means whereby the proper coins release the machine for operation so that the article to be vended may be delivered to the operator will now be described.

Coin releasing mechanism

In general, the articles to be vended are carried by a chain which is given a step of movement under control of a main operating shaft 36 (see Fig. 2). The means whereby the slide 5 rotates the shaft 36 to permit the delivery of an article comprises the following mechanism:

Attached to the shaft 36 (Fig. 13) is a locking disk 37 which is recessed internally at 38 to receive a spider 39 which fits loosely upon a collar 40 of the locking element 37. The locking disk 37 carries a plurality of locking shoulders 41, one of which is normally engaged by the hooked end of a spring-urged locking arm 42 which is pivoted by a pin 43 to an integral extension of the framework 11. Integral with the spider 39 or attached by any suitable means is a coin receiving disk 44 provided with a plurality of coin receiving slots 441. As best shown in Fig. 8 one of these slots or pockets is normally in registration with the lower end of the coin delivery chute. The coin receiving disk 44 is also provided with a plurality of laterally extending pins 45 which are disposed at an angle of 90° apart. The pins 45 are in the plane of a gravity operated connecting member 46 pivoted to the slide 5. The rearward end of the connecting member 46 has a hook 47 normally engaging one of the pins 45 and is recessed at 48 to permit this engaging relationship.

It will also be observed in Fig. 12 that the arms of the spider 39 are of a width less than the corresponding recess in the locking arm 37 so that a movement may be given to the slide 5 independent of the shaft 36. From the foregoing it will be obvious that this initial movement permits the opening of the movable side 16 of the coin chute to permit the rejection of improper articles inserted in the coin chute. This movement, furthermore, permits a coin in one of the slots 441 in the coin receiving disks 44 to engage a lug 49 integral with the locking arm 42 so as to disengage the hooked portion from one of the locking shoulders 41 thereby releasing the shaft 36 so that further movement of the slide 5, under control of the operator, will permit the hooked portion 47 to engage one of the studs 45 thereby rotating the shaft 36 and during this time one of the pins 45 will be received by a recess 50 formed in the underside of the slide 5. The slide 5 is withdrawn by the operator against the tension in a spring 51 and at the extreme outward movement of the slide 5 the shaft 36 will have been given a rotation of substantially 90° at which time one of the articles will be delivered to the delivery pocket of the machine as will be explained hereinafter.

The slide 5 is returned by the action of the returning spring 51, the connecting plate 46 being lifted upwardly by the camming action of one of the pins 45. The return movement of the slide 5 is limited by the co-action of one of the pins 45 with a stop shoulder 52 formed on the slide 5 and at the extreme inward movement of the slide 5 the member 46 will drop down under the action of gravity so that the hook 47 again engages one of the pins 45.

Retrograde movement of the shaft 36 is prevented by means of a ratchet toothed wheel 53 which is rigid or integral with the locking disk 37, engaging a full-stroke pawl 54 pivotally mounted on the pin 43.

The articles to be vended are carried by a chain which is made up of plates comprising, as best shown in Fig. 5, a vertical or link portion 53 and a horizontal or shelf portion 54, the corner being suitably rounded. The mid-section of the lower edge of each link 53 projects beyond the end sections and is turned into a loop 55 which forms half of a hinge by which successive links are joined. The other half of the hinge comprises the straps 56 and 561 formed at the angle between each shelf 54 and its link 53 and bent to pass respectively below and above hinge pins 57, which pins likewise pass thru the loops 55. In the present disclosure, in order to receive the looped portion 55 a considerable amount of material is cut away at the angle and in order to compensate therefore and firmly support the shelves 54, stiffener pieces 58 may be secured thereto by welding or in any other desirable manner. However, it will be understood that by otherwise forming the loops 55 and 56 the plate 58 may be dispensed with. By joining successive sections in this way a continuous chain may be formed, the shelves 54 being adapted to receive the articles to be vended. Such a chain mounted in the machine is seen in Fig. 2. The lower portion of the chain passes around a pair of blocks 59 (Figs. 2 and 6) the blocks being pinned to the main operating shaft 36. In order to support the chain at its upper end, there is securely attached to the upper portion of the casting 11 (see Fig. 7) by means of a pair of screws 60 an upright member 61. Attached to the extreme upward portion of

the upright member 61 by screws 62 is a bracket 63 slotted at its extreme upward end to receive a journal block 64. By means of an adjusting screw 65 the journal block 64 and shaft 66 received thereby may be adjusted vertically. Also attached to the upright member 61 by means of a pair of rivets 67 is a channel plate 68 which, at its lower end receives the shaft 36 and extends upwardly and is suitably bent so that it is spaced apart at its extreme upward end from the upright member 61. The channel bar 68 has rigidly secured thereto a bracket 69 in which is slidably mounted a journal block 70 which receives the other end of the shaft 66. By means of an adjusting screw 71 the journal blocks 70 may also be adjusted. The shaft 66 has pinned thereto a pair of blocks 72 about which the chain also passes. By the above construction, it will be noted that a very rigid mounting for the chain mechanism is provided. As best shown in Fig. 2, the article to be next vended is visible thru the glass panel 3 and upon a subsequent partial rotation of the shaft 36 the chain will be partially rotated so that the article appearing in the glass panel 3 will drop downwardly so as to be received by the customer operating the machine. As the chain is partially rotated the horizontal plate 54 thereof will permit the article to be vended to drop downwardly where it may be received in a suitable opening in the case.

In order to prevent injury of the mechanism by persons who might attempt to damage the machine by inserting their hands or instruments thru the opening provided to receive the articles to be dispensed, there is preferably provided a pivoted receptacle which normally receives the article to be vended. By rotating the receptacle about its pivot the article received thereby is made accessible to the operator, but during this operation the interior mechanism is effectively protected against access thereto. The article delivery receiving receptacle comprises preferably a cup comprised of side plates 73 and 74 joined by an integral base 75, it being noted that the receptacle is slotted at 76 so that the article may drop into the receptacle resting upon the base 75. The receptacle is hinged by means of a pivot pin 77 carried by a portion of the framework 10. The front of the receptacle carries a finger piece 78, it being noted that the front of the cabinet is suitably cut away so that manipulation of the finger-piece 78 may be readily permitted and that access to the interior of the receptacle by means of the slot 76 may also be permitted. When the chain is given a partial rotation the article to be vended drops down in the slot 76 into the delivery receptacle and by grasping the finger 78 to rotate the receptacle about its pivotal point 77 the article may be received by the insertion of a hand thru the slot 76, but during this movement it will be noted that as the article delivery receptacle is being rotated the portion 75 will effectively close the gap normally provided by the slot 76 thereby effectively preventing the insertion of any instruments or the hands of the operator of the machine. It will be noted that a protecting shield 78*a* is secured to the front wall 2 of the container (Fig. 2) and extends outwardly therefrom so as to cover the slot or opening 76 during the intermediate position of the receptacle between its registry with the article delivery means and the position where it is accessible to the purchaser. By this construction, the opening 76 is accessible to the purchaser only after it is substantially completely out of register with the delivery means. It is to be understood that a portion of the opening 76 may be connected simultaneously with the article delivery means and the exterior of the apparatus provided that the extent of such openings is kept sufficiently small to render it impractical, if not literally impossible, to reach through or to insert a wire or instrument for the purpose of tampering with the inside mechanism of the apparatus.

As previously stated, the mechanism may be withdrawn from the enclosing cabinet 2 and when this relationship exists the articles to be vended may be placed upon the horizontal plates 54 of the chain. All the articles which are to the front of the pivots 66 and 36 are placed in their normal position, but the articles which are in the back of the machine are placed upside down since the chain will, upon turning about the pivotal point 66, turn these articles to their proper and normal positions where the printed matter may be readily viewed thru the glass panel 3. It should also be observed that when the machine is loaded the greater weight is to the back of the machine, but any backward movement of the chain will be prevented by the full-stroke mechanism previously described. After an article has been vended and if the merchandise loaded upon the front and back portions of the chain is the same the load will be counter-balanced and equal, but upon successive vending operations the greater weight will be upon the front of the machine and as the machine is successively operated the operation will thereby become successively easier since the weight will assist in rotating the shaft 36 and the extent to which the load assists the operator will be dependent upon the adjustment given to the shaft 66.

As previously stated any bad coins or articles which are introduced into the machine and which are not capable of releasing the machine for operation will be returned to the customer.

Referring particularly to Fig. 8, it will be

noted that the frame 11 is provided with a plurality of raised ribs 80 and by means of a plate 81 (Fig. 7) attached to the frame 11 the coin chute thus formed will direct improper coins and articles to the article delivery receptacle since the lower portion of the chute registers with the former.

As will be observed in Fig. 2, the horizontal vanes of the chain fit closely to the sides of the enclosing cabinet limiting the sideways movement of the articles carried by the chain. The back of the enclosing cabinet, as viewed in Fig. 6, will also prevent endwise movement in a rearward direction of the articles carried by the chain, and in order to prevent endwise movement of the articles forwardly there is securely attached to the bracket 60 a pair of parallel plates 82 and 83 joined at their upper ends by rivets 84 and securely attached by pins to a bracket 85 preferably welded to the upper end of channel member 61. Therefore, it will be noted from the above construction the articles to be vended are confined in their respective pockets.

The method of operation of the improved machine is as follows:

Assuming that the machine is loaded with articles to be vended, the customer will insert a coin in the coin slot of the plate 4. The coin passes into the coin receiving chute, and if it is a proper one it will depress the loop portion 23 of the spring 20 (Fig. 8) pass by the termini of the magnet 18, jump the gap 22 and lodge in one of the coin receiving slots 44. By means of the ring 271 the customer will withdraw the slide 5 so that upon an initial operation of the machine the spring 33 will rock the bell-crank lever 29 opening the side 16 of the coin chute. At this time the connecting plate 46 engaging one of the pins 45 will rock the coin receiving plate 43 so that the coin in slot 44 will engage the lug 49 of the locking arm 42 thereby withdrawing the locking hook from one of the shoulders 41 of the locking disk 37. At this time one of the arms of the spider 39 co-acting with the recess formed in the locking plate 37 will rotate the shaft 36 whereupon the block 59 will give a partial rotation of the chain. This will permit the article visible thru the glass panel 3 to drop downwardly into the article receiving pocket. The operator will, after this operation, release the slide 5 so that it may return to its normal position at which time the connecting plate 46 will engage another pin 44 in readiness for an ensuing operation of the machine. The coin which operates the machine will be rotated counter-clockwise and will fall downwardly as indicated by the arrow in Fig. 8 and will be received by a pocket indicated by reference character 93 which is between the side of the frame 11 and right side of the enclosing cabinet.

If the customer should introduce an article which is lighter than a good coin, it will be stopped by the spring 20 and will be lodged in the coin chute, or will drop thru the aperture 22. If the disk introduced is magnetic, it will be halted by the magnet 18 and drop thru the gap 22, and thence downwardly in the chute formed by the ribs 80 and plate 81 to the article delivery pocket. Articles which are lodged in the coin chute will be released upon initial operation of the machine, since at this time, the bell-crank lever 29 will be rocked permitting the side of the chute 16 to be rocked so that the articles will fall down thru the chute into the article delivery receiving pocket.

The invention is not to be considered as limited to the precise mechanisms illustrated and described, but is to be construed as extending to all equivalent devices falling within a broad interpretation of the appended claims.

What is claimed is:

1. In a machine of the character described, a continuous chain comprising links, each link being provided with a link portion and an integral perpendicularly extending shelf, means for joining said links comprising a loop at the free edge of the link portion, a recess adjacent the angle between the link and shelf portions to receive said loop of an adjacent link, integral straps laterally adjacent said recess, and a hinge pin adapted to be received by said loop of one link and between said straps of an adjacent link.

2. In a machine of the character described, a continuous chain provided with article supporting shelves, means for supporting said chain comprising a vertically extending casting, bearings in said casting, upper and lower chain supporting shafts each having one end journaled in one of said bearings, a framepiece secured at its midsection to said casting and having end portions spaced therefrom, and bearings for said shafts in said framepiece.

3. In a machine of the character described, an article receiving and delivering chain, means for supporting said chain comprising a single vertically extending casting and an auxiliary support secured to said casting at its midsection but spaced therefrom at its ends.

4. In a machine of the character described, chain supporting means comprising a base member, a main support projecting therefrom and secured thereto, an auxiliary support secured at its midsection to said main support and having offset ends, and a pair of shafts journaled in said auxiliary

support and said main support and base member respectively.

5. In a vending machine having a substantially vertical wall with an opening in the lower portion thereof, a receptacle positioned in said opening and mounted for rotation about a horizontal axis parallel to said wall, said receptacle having an opening in its upper portion normally in register with article delivery means within said wall, means for rotating said receptacle about its axis to bring said opening without the wall, and a protecting shield extending from said wall to cover said opening while it is passing from one position to the other.

6. In a chain conveyor of the character described, a plurality of links each formed from a single substantially rectangular sheet of metal bent into two portions at substantially right angles to each other, the central portion of the material at the angle being cut away to provide a recess and the edge of one of said two portions being sufficiently narrow to enter into said recess of an adjacent link, the material at said edge portion and the metal adjacent said cut away portion being bent to form bearings for a connecting pivotal member.

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