Nov. 18, 1952 H. A. GERSBACH 2,618,085

COMBINED TURNSTILE AND ARTICLE DISPENSING MECHANISM

Filed Dec. 14, 1945 3 Sheets-Sheet 1

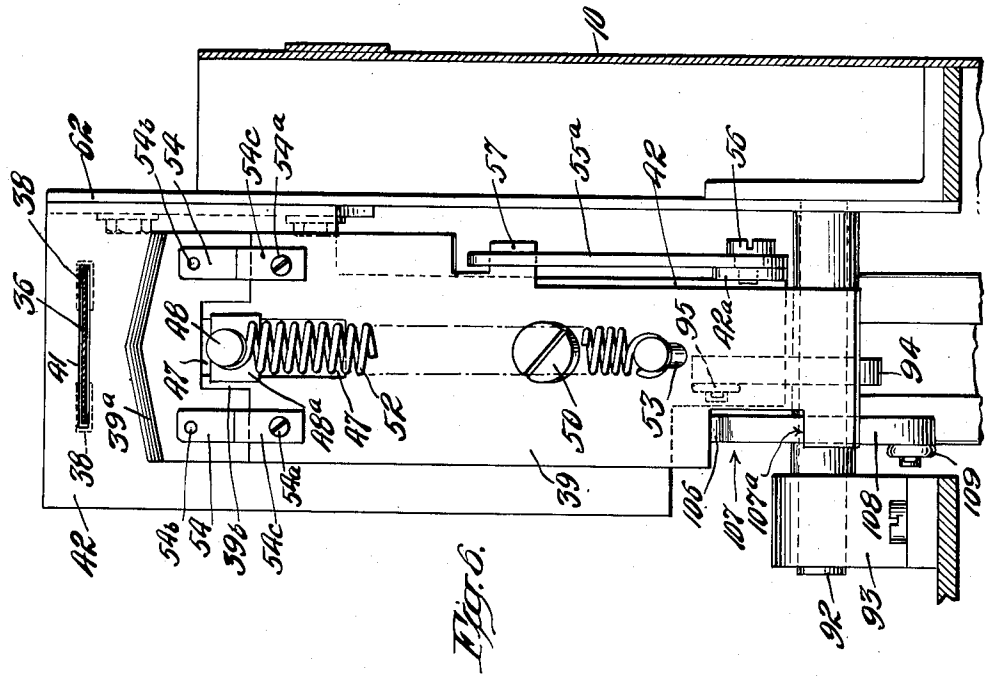


Fig. 6.

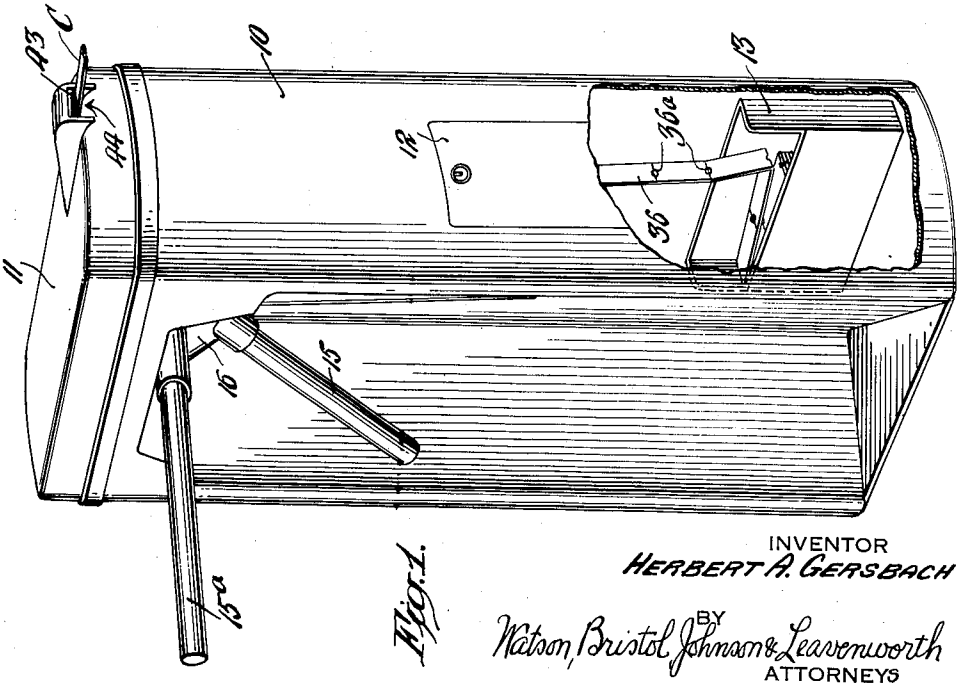


Fig. 1.

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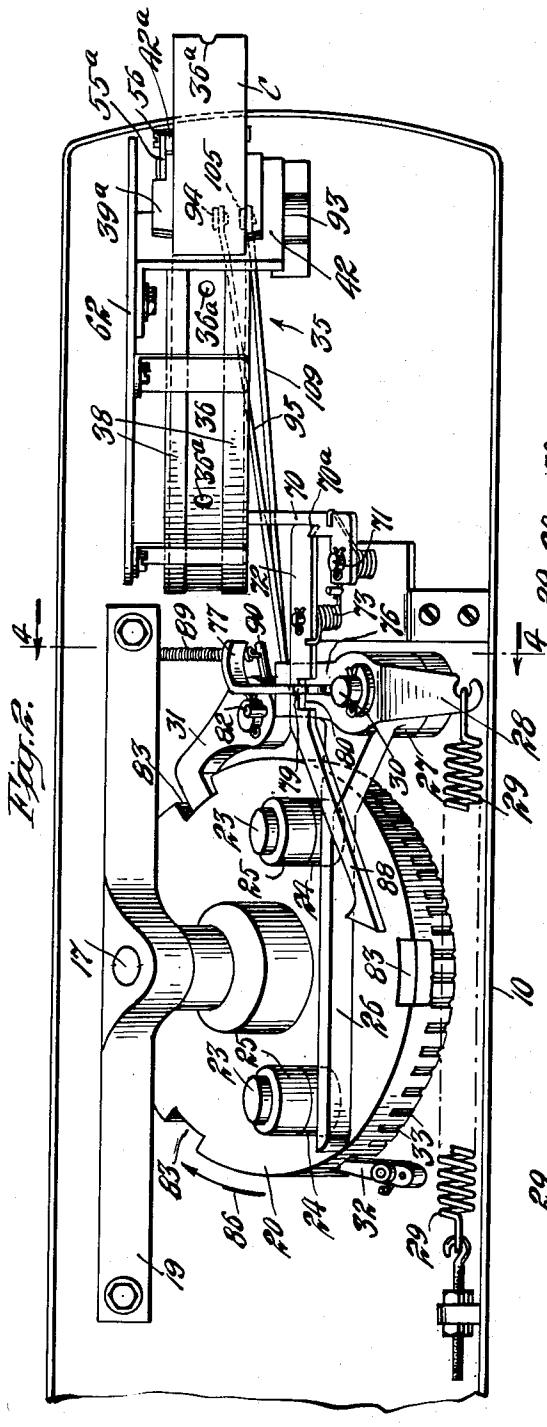


Fig. 2.

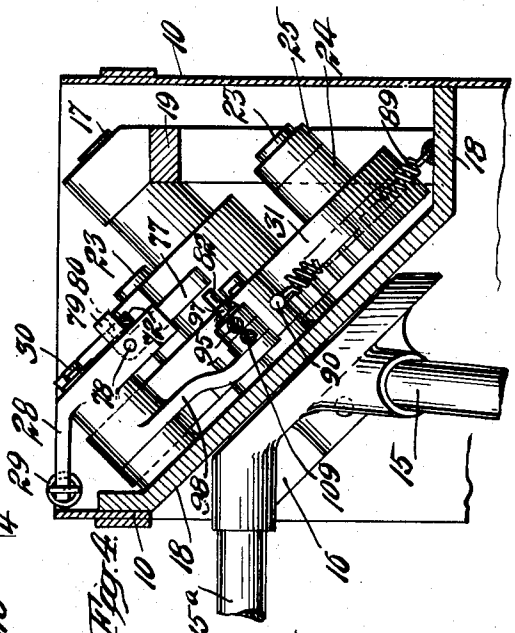


Fig. 4.

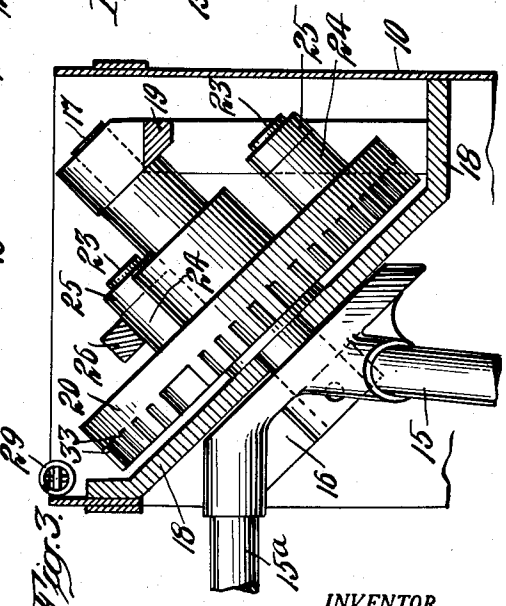


Fig. 3.

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Fig. 5.

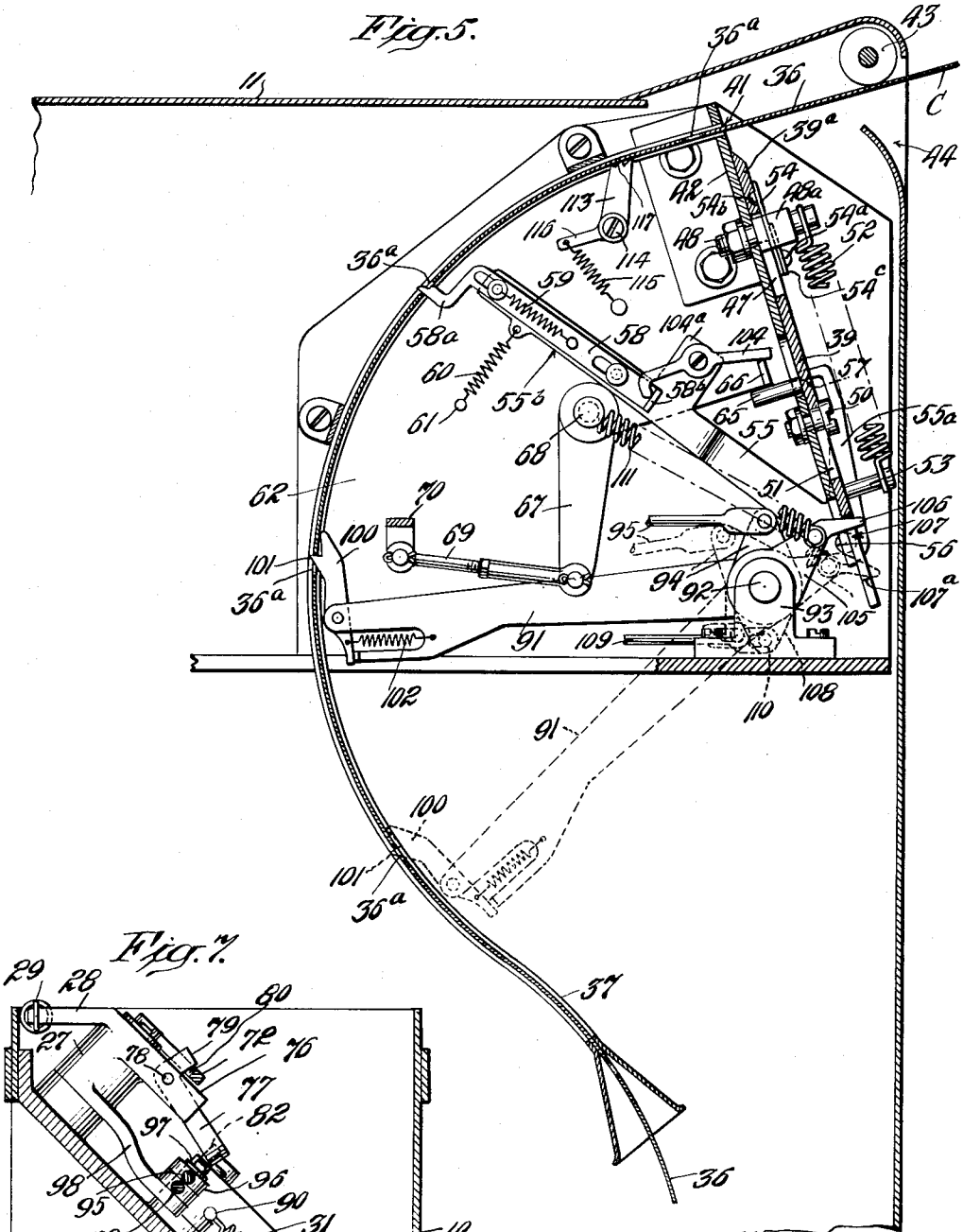


Fig. 7.

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COMBINED TURNSTILE AND ARTICLE DISPENSING MECHANISM

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Application December 14, 1945, Serial No. 634,924

8 Claims. (Cl. 39—3)

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The invention is concerned with a combined barrier and article dispensing means each of which is interrelated with and dependent upon the other for its control and operation. As specifically embodied in the machine hereof it comprises a turnstile which in its operation delivers a ticket or check in a position to be removed by a patron about to pass through the turnstile, the removal of the check being instrumental in unlocking the turnstile permitting passage therethrough, and operation of the turnstile by the person in passing through operating to feed forward another check where it is in a position to be taken by the next succeeding patron. A typical use is in connection with restaurants of a character where a customer receives a check upon entering upon which is subsequently punched the amount of the food purchased.

The invention comprises an improved machine of such general character and purpose which is compact in construction and dependable in operation, and affords a maximum of convenience and ease of operation to the customer. Various novel features are coordinated and so related as to produce the improved results. The character of these will appear more fully from the detailed description of the illustrative machine disclosed herein but certain features will be noted in general as a preliminary matter.

The machine is particularly well adapted to dispense checks from a continuous strip. When a patron approaches the device the leading end is exposed in a convenient position but is intact with the strip. A light pull, however, on the end of the strip causes a spring urged knife to snap across the strip in a quick shearing operation which severs the forward end portion and it thereupon becomes a freely removable article. In the particular example this article is a check such as is used in restaurants. This same action positions certain parts whereby the pressure then applied to the turnstile arm by the patron in his normal continued advance serves positively to withdraw a theretofore effective turnstile locking means.

The continued advance of the turnstile operates a mechanism for advancing the strip to present the end portion for the next patron. This mechanism is associated with a pressure member means for centering the turnstile in "home" position and takes advantage of the intermittent cyclic operation of such member to produce intermittent movements of the check feeding and dispensing elements in an appropriate timed relation to each other and to the turnstile. For example, the arrangement is such as to ensure that the shearing knife is withdrawn and in latched position free of the path of the check strip prior to initiating the forward feed of the strip.

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The arrangement of the machine and its functional parts are such that the patron may proceed through in a normal unbroken stride without being subjected to the annoyance of bumping against a locked turnstile; and at the same time the arrangement renders it impossible as a practical matter for the patron to obtain more than one check without resorting to conspicuous distortions.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 is a view in perspective of the complete housing embodying the associated turnstile and check delivering means;

Fig. 2 is a top plan view thereof looking down on the internal mechanism with the main cover of the casing removed;

Fig. 3 is a view looking from the right in Fig. 2, with most of the operating mechanism omitted, showing the rotatable turnstile head;

Fig. 4 is also a view looking from the right in Fig. 2 taken on approximately the section 4—4;

Fig. 5 is a view in elevation of the check strip feeding means;

Fig. 6 is a detail view of the check severing knife and associated mechanism looking from the right in Fig. 5, with the casing broken away; and

Fig. 7 is a detail view similar in general to Fig. 4, but with various elements omitted and showing particularly the mechanism in a position to release the turnstile locking pawl.

As shown generally in Fig. 1, the mechanism is located in a casing 10, having a removable top cover 11, and a movable side plate 12, giving access to the check strip magazine 13. The turnstile is of the type having three arms 15 rotatable about an axis at 45° to the horizontal and vertical. The arms are secured in a hub 16 which in turn is fixed to a shaft 17, having bearings in the lower plate 18 and upper bracket 19 as shown particularly in Figs. 2 and 3. A rotatable head 20 is also secured to the shaft 17. The turnstile

mechanism and check delivering means are of a character and are so associated as to form a generally compact arrangement requiring small space and adapted to present the leading check C in an appropriate and convenient position relative to the effective barrier arm 15*a* whereby the patron upon approaching naturally observes and picks up his check substantially in advance of contacting the barrier arm 15*a*. In this connection it will be noted that the arms of the turnstile rotate downwardly and inwardly underneath the operating mechanism.

The turnstile is provided with suitable means for centering the arm mechanism in home position. As specifically shown this means comprises three studs 23, located on the upper surface of the plate 20 and spaced at equal angles thereon corresponding to the spacing of the arms 15. Each stud carries a lower roller 24 and an upper roller 25. The lower rollers are adapted to be engaged by an arm 26 integral with a multiple arm member 27, the arm 28 of which has attached thereto a relatively strong tension spring 29 adapted to urge the member 27 and its arm 26 in a clockwise direction as shown in Fig. 2. A stud 30 fixed in the frame plate 18 provides a pivotal support for the member 27.

The turnstile head 20 is provided with a releasable locking pawl 31, the operation of which will be later described more in detail, and also with a ratchet pawl 32 spring pressed into engagement with the lower notched portion 33 of the edge of the plate 20, adapted to prevent reverse movement of the turnstile and its plate 20, that is, to permit clockwise rotation in Fig. 2, but to prevent reverse rotation thereof.

Certain features of the invention are suited for association with check feeding means of different types as e. g. either from a stack of individual checks or from a continuous strip but the combination here employed of a continuous strip feeding means exhibits particular advantages as will appear. The check strip feeding means is shown generally in Fig. 2 at 35, the details appearing more in Fig. 5. In general this mechanism lies in a vertical plane, the axis of the turnstile mechanism being at an angle of 45° thereto. As heretofore noted, the magazine 13 for the check strip is located in the bottom of the turnstile shell. The strip 36 may be of standard form such as that used in restaurants, each individual check having printed amounts thereon to be punched. The main supply may be on a reel or in accordion form as shown. The strip is provided with standard small openings 36*a* at regular intervals between the successive checks, which openings are employed in the feeding of the strip as will be described. The leading end of the strip 36 proceeds upwardly from the magazine through an arc shaped channel 37, comprising two spaced guide members 38 of sheet metal, U-shaped in cross-section, with the strip edges extending between the fingers of the respective U-sections as appears in Fig. 6. From the channel 37 the strip proceeds outwardly across the path of a knife 39 which operates adjacent the opening 41 in a bearing plate 42, underneath a freely rotatable roller 43, and out the opening 44.

The leading check C in normal position of the machine, extends a substantial distance beyond the face of the casing whereby it may be readily grasped by an entering patron.

The knife 39 is provided with an upper slot 47 adapted to receive a stud 48, secured in the plate 42, the stud being provided with a block 48*a* adapted to maintain the knife 39 against the surface of the plate 42. The lower end of the knife is similarly guided against the plate 42 by a screw bolt 50 secured in the plate 42, the knife 39 having a vertical slot 51 for receiving the bolt 50. The knife 39 is normally urged upwardly by a strong spring 52 hooked to a stud 53, secured on the lower end of the knife, the opposite end of the spring 52 being connected to the fixed post 48. The knife 39 may comprise a single piece but the present form provides certain advantages in constructing the end blade portion 39*a* as a separate part whereby it may be removed from the body portion for sharpening or replacement, and if desired, may be of different material. The bottom edge of the removable blade portion has a notch to receive the spaced tongue portions 39*b* of the body section. The section 39*a* is secured to the body portion by spring strips 54 which are fastened to the body portion by screws 54*a*, the upper ends having detents or buttons 54*b* which snap into depressions in upper blade section 39*a*. Additional part length spring plies 54*c* may also be employed to give added spring tension, the spring effect serving to urge the blade against its complementary shearing plate 42. It will be noted that the shearing stroke of the knife is derived altogether from its spring 52, and is independent of the force applied to the turnstile arm, or the speed with which the arm moves. The knife always exerts the same force for cutting off the ticket.

A bell crank 55 is mounted on a stud 56 threaded into an ear 42*a* on plate 42, and is adapted to oscillate thereon in the plane of the paper in Fig. 5. The bell crank includes a short arm 55*a* provided with an upper hook end adapted to engage over a lug 57 on the knife, as shown particularly in Fig. 6. The other arm 55*b* of the bell crank carries a slidable latch 58 provided with a finger 58*a* adapted to engage in a hole 36*a* of the check strip, the slidable latch being normally urged radially outward by a spring 59. The outer arm part 55*b* has a right angle offset with respect to the base part 55 so as to bring latch 58 in the plane of the strip openings 36*a*. The bell crank 55 is spring biased in a counter-clockwise direction by a spring 60 secured at one end thereto, the other end being secured to a post 61 located on the side plate 62 of the frame construction.

The cycle is initiated and the mechanism released by a patron grasping the exposed check C and pulling thereon, which requires but a very light force sufficient to overcome the relatively light spring 60. Pulling outward the check a short distance to the point where the first opening 36*a* in the check strip is opposite the shearing edge of the knife 39 rocks the bell crank 55 a corresponding distance, which releases the arm 55*a* from engagement over the lug 57 of the knife 39, whereupon spring 52 snaps the knife 39 upwardly, shearing off the leading check C.

The same operation serves through further linkage which will now be described to unlock the turnstile. Integral with the knife 39 is a pin 65 which strikes a right angle lug 66 on the bell crank 67 mounted to oscillate about a pin 68 secured in the side plate 62 of the frame. Upward movement of the blade and its pin 65 accordingly rocks the bell crank 67 counter-clockwise, pulling connecting link 69 to the right. This link 69 is connected to a latch arm 70 pivoted on a fixed pin 71 as shown particularly in Fig. 2. The latch

arm is normally spring urged in a counter-clockwise direction (in Fig. 2) by a coil spring on post 71, and has a tooth 70a adapted to receive a complemental tooth on the lever 72 which is urged by a spring 73 in a clockwise direction but is normally held in the latched position shown by the lever 70. Mounted on an arm 76 of the member 27 is a pawl releasing member 77. The member 77 is adapted to swing about its pivotal support 78 in a vertical plane, but is bodily carried on arm 76 as described. The lever 77 has an upstanding right angle lug part 79 which occupies a position in a notch 80 in the lever 72 and the lever 72 in normal latched position holds the outer end of the lever 77 in an elevated position as shown, for example, in Figs. 2 and 4. When, however, the arm 72 is released from the latch arm 70 permitting lever 72 to swing clockwise in Fig. 2, under the pressure of its spring, this permits the lever 77 to drop to a position as shown in the detail view of Fig. 7 where it is in a position, upon movement of the turnstile, to engage a pin 82 on the pawl 31, rocking pawl 31 to swing it out of its notch 83 in the turnstile head plate 20, as will be shortly described in more detail.

Assuming now that the leading check C has been pulled and the knife 39 has chopped it off and the linkage connected thereto has been operated, including the release of the latch arm 70 as described, the turnstile may now be operated by the patron, pushing on the arm 15a. Referring back to Fig. 2 again, as the turnstile, including the plate 20, starts to rotate in the direction of the arrow 86, in Fig. 2, the right hand roller 24 engages the arm 26, rocking the member 27 in a counter-clockwise direction at a relatively rapid rate so that before the plate 20 has rotated more than a short angular distance, the lever 77 engages pin 82 on the locking pawl 31 swinging the pawl out of its notch 83. The notch 83 in the plate 20 is of a length in the peripheral direction of plate 20, to provide a substantial clearance at the outer end of the pawl 31, such as to permit sufficient initial rotation of the plate 20, whereby the pawl is swung out of its notch, before it is engaged by the end shoulder of the notch 83. It will be observed that the force for actually withdrawing the locking pawl is supplied by the patron at the turnstile arm.

Continued rotation of the turnstile arm for the necessary 120° serves to feed forwardly the check strip 36 through means which will shortly be described, but for the time being, the description will be confined to the further operation of the mechanism appearing in Fig. 2 and its restoration to the locked position there shown. As the plate 20 continues in its rotation under pressure applied by the patron, the upper roller 25 on the stud 23 at the right engages the cam arm 88 on the lever 72, rocking it counter-clockwise against the force of its spring which permits the latch lever 70 to swing back into the position shown, wherein it holds the lever 72 in its latched position with the lever 77 in its elevated position free of pin 82 on locking pawl 31. A spring 89 leading from a fixed frame part to a pin 90, integral with the pawl 31, normally urges the pawl 31 in a counter-clockwise direction in Fig. 2, and when the arm 77 is in its elevated position and the turnstile has progressed to its next home position, the pawl 31 drops into locking engagement with the next notch 83 in the plate 20. It will be understood that when roller 24 on the stud 23 at the right passes dead center position with respect to the pressure arm 26, the latter under the pressure of heavy spring 29, serves to urge the turnstile forward automatically and to center and bring it to rest at its next home position.

The turnstile mechanism will preferably have associated therewith a suitable shock absorber means adapted to ease it into home position without substantial shock or noise. Such mechanism, however, is not specifically disclosed herein since it forms no part of the present invention. Also, a suitable register or meter means will preferably be employed to indicate the number of operations of the turnstile and accordingly, the number of patrons passing therethrough.

Referring to Fig. 5, in particular, the means operated from the turnstile for advancing the check strip will now be described. This comprises an oscillatable arm 91 mounted on the main shaft 92 supported at one end in bearing bracket 93 and at the opposite end in the vertical frame plate 62. Integral with arm 91 is a short arm 94 arranged at an angle thereto to which is connected a link 95, the opposite end of the link being connected through a suitable eye member 96 to a pin 97 on the lower arm 98 of the oscillatable member 27. The outer end of the arm 91 carries a feeding dog 100 provided with a projection 101 adapted to engage in a hole 36a of the check strip. The dog 100 is normally urged by tension spring 102 in a counter-clockwise direction, in Fig. 5, to cause it releasably to engage in the hole of the check strip. The shape and pivotal support for the dog 100, however, is such that when the check strip is normally advanced the short distance heretofore described to release the cutting knife 39, the check strip is free to move forwardly and cam the dog 100 from the strip opening 36a and permit the free advance of the strip the necessary small distance. Assuming now that the turnstile is being rotated in the forward direction, this pulls rod 95 to the left, swinging the arm 91 downwardly to the position shown in dotted lines, in Fig. 5, and then, as the advancing roller 24 on the plate 20 passes its midpoint or dead-center position with respect to the arm 26, the member 27 rotates backwardly, that is, clockwise, in Fig. 2, to the position shown which returns rod 95 to the right, swinging the arm 91 upwardly from the position shown in dotted lines, the tooth 101 on the dog 100 engaging in a hole 36a in the check strip, advancing it the distance of substantially one check to the position shown in Fig. 5.

Prior to the advance of the strip in the manner just described, the latch 58a on arm 55b has been released from its opening 36a in the strip by means of a small lever 104 pivoted on the projecting finger 104a of the arm 55b. This is effected by the pin 65 fixed to the knife 39 in its upward shearing movement, engaging the lug 66 on the bell crank 67 and rocking it counter-clockwise in the manner heretofore described, which in addition, causes the lug 66 to engage the right end of lever 104, rocking it counter-clockwise on its pivot, which results in the opposite end of the lever engaging a right angle lug 58b on the sildable latch 58, pulling the latch radially inward with respect to the arm 55b, and releasing the tooth 58a from its opening 36a in the check strip.

The means for restoring the knife to its retracted latched position comprises a second bell crank 105 mounted on the main shaft 92 having an upper arm with a finger 106 operable in a notch 107 in the lower left edge of the knife 39, as it appears in Fig. 6, and a downwardly extend-

ing arm 108, to which is secured a rod 109, the opposite end of the rod having an eye adapted to be received on the pin 97 on the arm 98 of the oscillatable multiple arm member 27, the rod 95 being also secured on the same pin as heretofore described (see Figs. 4 and 7). In the initial movement of the turnstile from the home position, both rods are moved to the left. The rod 95 as heretofore described initially swings downwardly the strip feeding arm 91 as on an idle stroke. During this same initial period, the movement of rod 109 to the left to its broken line position indicated in Fig. 5 rocks the bell crank 105 clockwise and the finger 106 engages against the shoulder 107*a* of the notch 107 of the blade 39 (Fig. 6) moving the blade downwardly which permits the finger on the arm 55*a* of the bell crank 55 to move clockwise into latching engagement with the lug 57 on the knife 39 and to restrain it in such locked position. This retraction of the blade, it will be observed, occurs prior to the upward feeding stroke of the strip advancing arm 91 so that the knife is withdrawn and there is no obstruction to the advance of the check strip.

The connection of the rod 109 through pin 110 to the lower arm 108 of bell crank 105 preferably includes an elongated slot in the end of the rod whereby one part may have a little extra travel with respect to the other if required at some point in the cycle, depending on the timing, and relation of the different elements. In this connection it may be noted that the upper arm having the finger 106 is connected by a tension spring 111 to a fixed part of the frame, such as the post 68. As the parts are arranged, when knife 39 is released, the finger 106 is free to travel a small distance upwardly if and when it is engaged by the shoulder 107*a* on the knife by reason of the above described lost motion connection between the rod 109 and its pin 110 fixed on the crank 105.

A suitable means is preferably embodied to prevent the check strip from moving reversely as for example under the frictional drag of the arm 91, in its downward swing. The means here provided comprises a small blade 113 shown in the upper part of Fig. 5 mounted on the stub shaft 114 and urged against the strip in the counter-clockwise direction by spring 115 connected to a finger 116 integral with blade 113. The outer end of the blade 113 is provided with saw teeth 117 and the angular position and character of the blade 113 are such as to permit the check strip to advance freely in the forward feeding direction but to clamp against the strip upon any tendency of the strip to move in the reverse direction.

A brief résumé of the operation is as follows: an approaching patron, in moving forward grasps the check C, giving it a slight pull which swings forward the arm 55*b*, releasing arm 55*a* from the lug 57 on the knife 39, permitting the latter to snap upwardly under the force of its spring 52 and the end portion C of the strip is severed through one of the openings 36*a* and is immediately freed and the patron proceeds without hesitation forwardly against the arm 15*a* of the turnstile, advancing it. As the knife snapped upwardly it operated through pin 65 thereon to rock bell crank 67 and pull latch arm 70 to the right, releasing pivoted lever 72 which permitted arm 77 to drop to its lowered position. As the patron continues advancing through the turnstile, the rocking of the multiple arm member 27 through the pressure arm 26 causes the arm 77 to engage pin 82, rocking pawl 31 from its notch in the turnstile head plate 20, permitting continued rotation of the turnstile to the next home position as determined by the pressure bar 26 and the locking pawl 31.

In the meantime, the rocking of the member 27 in the initially counter-clockwise direction pulls rod 109 to the left, which causes finger 106 on the bell crank 105 to lower the blade 39, and the spring 60 causes the bell crank 55 to rock counter-clockwise and the arm 55*a* to latch over the lug 57 on the knife, holding it in its latch retracted position. During this operation the feeding arm 91 has swung downwardly in Fig. 5 and in the continued rotation of the turnstile when the multiple arm 27 moves clockwise into the position shown, rod 95 will move back to the right, swinging upwardly arm 91, advancing the strip 36 the distance of approximately one check. At the termination of these operations the turnstile is again in its locked position and another check is presented at the opening 44 ready to be pulled out and taken by the next succeeding patron.

It will be understood that when the term "check" is employed in the specification and claims, it is not limited to the articles employed in restaurants for indicating the amount of a meal purchased, but may comprise any form of ticket or article which is capable of being dispensed in the manner described:

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In combination, a spring urged barrier operated pressure member, strip feeding and article severing means, operative connections from said pressure member to said feeding means and to said severing means whereby withdrawal of said article causes operation of said severing means and permits operation of said feeding means.

2. In combination, a spring urged barrier operated pressure member, strip feeding means and severing means for cutting off checks from the forward end of the strip, operative connections from said pressure member to said feeding means and to said severing means whereby pulling on the forward end of said strip causes operation of said severing means and permits operation of said feeding means from said pressure member.

3. In combination, a spring urged barrier operated pressure member, strip feeding means and article severing means, operative connections from said pressure member to said feeding means and to said severing means, a spring connected to operate said severing means, a latch engageable with said severing means to hold it in retracted position, a movably mounted control element interengaging with the strip and adapted to be moved by advancing movement of the strip effected by manually pulling thereon, and an operative connection from said element to said latch for releasing the latch by advancing movement of the strip.

4. In combination, a spring urged barrier operated pressure member, strip feeding and article severing means, an operative connection from said pressure member to said feeding means for operating it by movement of said pressure member, a spring connected to operate said severing

means, a latch engageable with said severing means to hold it in retracted position, a movably mounted control element interengaging with the strip and adapted to be moved by movement of the strip effected by manually pulling thereon, an operative connection from said element to said latch for releasing the latch by movement of said control element, and an operative connection from said pressure member to said severing means for restoring the latter to latched position by movement of said pressure member.

5. In combination, a spring urged barrier operated pressure member, strip feeding means and means for severing a check from the forward end thereof, an operative connection from said pressure member to said feeding means, a spring connected to operate said severing means, a latch engageable with said severing means to hold it in retracted position, a movably mounted control means interengaging with the strip and adapted to be moved by advancing movement of the strip effected by manually grasping the unsevered leading end portion and pulling forward the strip, and an operative connection from said control means to said latch for releasing the latch by said advancing movement of the strip said releasing operation being effected by advancing the strip a minor fraction of the length of an individual check.

6. In combination, a movable barrier, a spring urged pressure member operated by said barrier, a strip feeding means and article severing means, operative connections from said pressure member to said feeding means and to said severing means, locking means releasably engaging with said barrier, another operative connection from said pressure member to said locking means for moving said locking means to release position by movement of said pressure member, a movably mounted control element interengageable with the strip and adapted to be moved by the advance thereof, and a connection from said control element to said another operative connection for controlling the latter and thereby the operation release of said locking means.

7. In combination, a movable barrier, a spring urged pressure member operated by said barrier, a strip feeding means and article severing means, operative connections from said pressure member to said feeding means and to said severing means, a locking means releasably engaging with said barrier, a movably mounted lock releasing means having a position in which it is engageable with said locking means to release the latter, an actuating connection from said barrier to said lock releasing means for operating the latter by movement of said barrier, a movably mounted control element interengageable with the strip and adapted to be moved by the advance thereof, and an operative connection from said control element to said lock releasing means for controlling the operation thereof whereby manually pulling on the strip permits operation of said barrier.

8. In combination, a movable barrier, a spring urged pressure member operated by said barrier, strip feeding means and means for severing a check from the forward end thereof, an operative connection from said pressure member to said feeding means, a spring connected to operate said severing means, a latch engageable with said severing means to hold it in retracted position, locking means releasably engaging with said barrier, an actuating connection from said barrier to said locking means for moving said locking means to release position by movement of said barrier, a movably mounted control element interengageable with the strip and adapted to be moved by the advance thereof, an operative connection from said control element to said latch for releasing the latch by said advancing movement of the strip, and another operative connection from said control element to said actuating connection for controlling the operation of the latter.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,657,901	Rider	Jan. 31, 1928
1,993,951	Ashe	Mar. 12, 1935
2,204,897	Kilpatrick	June 18, 1940