

Feb. 9, 1932.

H. A. NAU

1,844,784

TURNSTILE

Original Filed Nov. 29, 1930 3 Sheets-Sheet 1

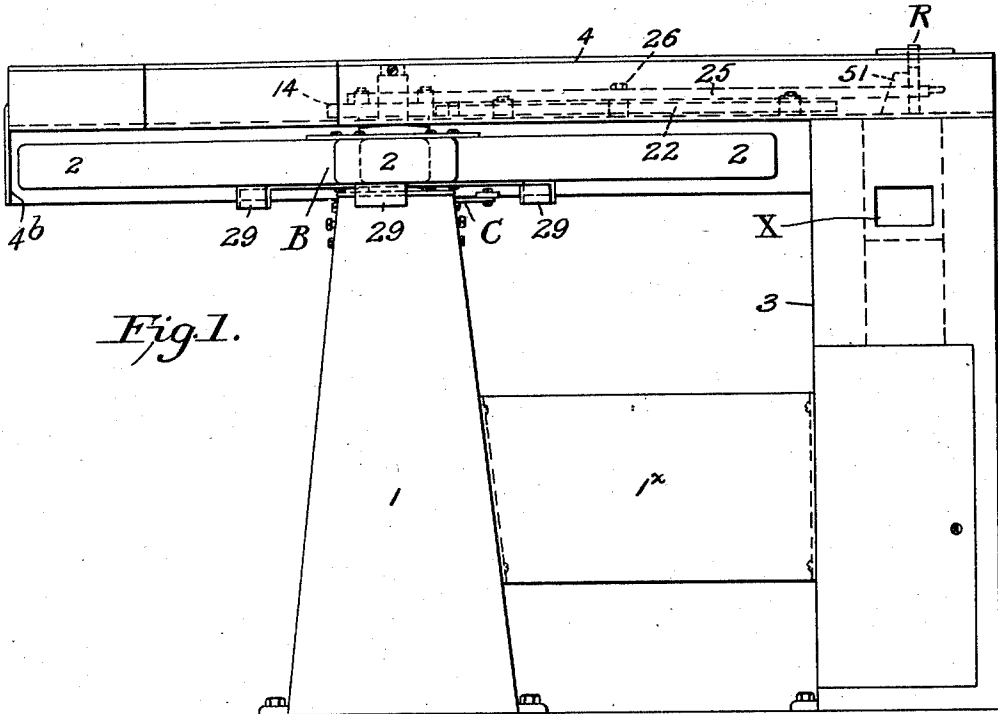


Fig. 1.

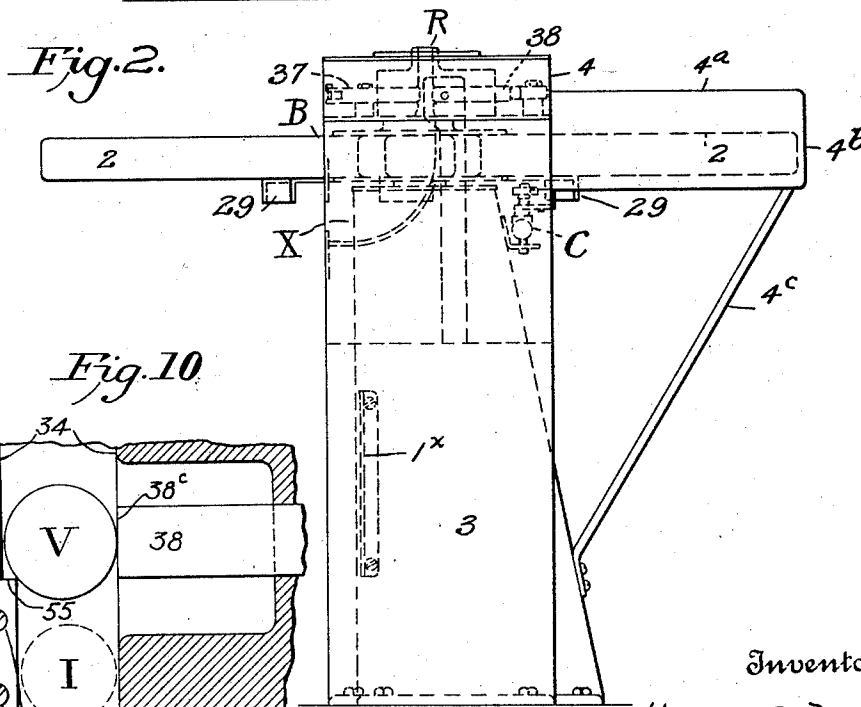


Fig. 2.

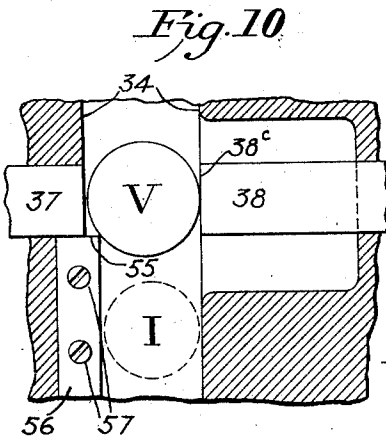


Fig. 10.

Inventor

By *Henry A. Nau*
Attorneys
Nathan, Bowman & Helferich

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Fig. 3.

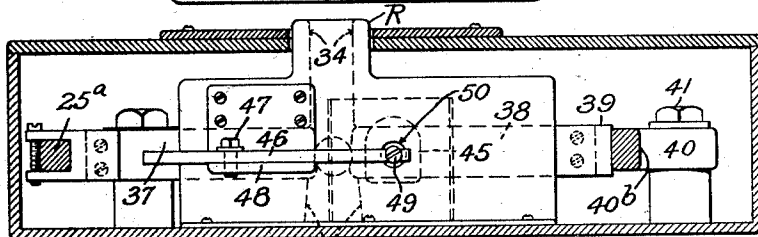
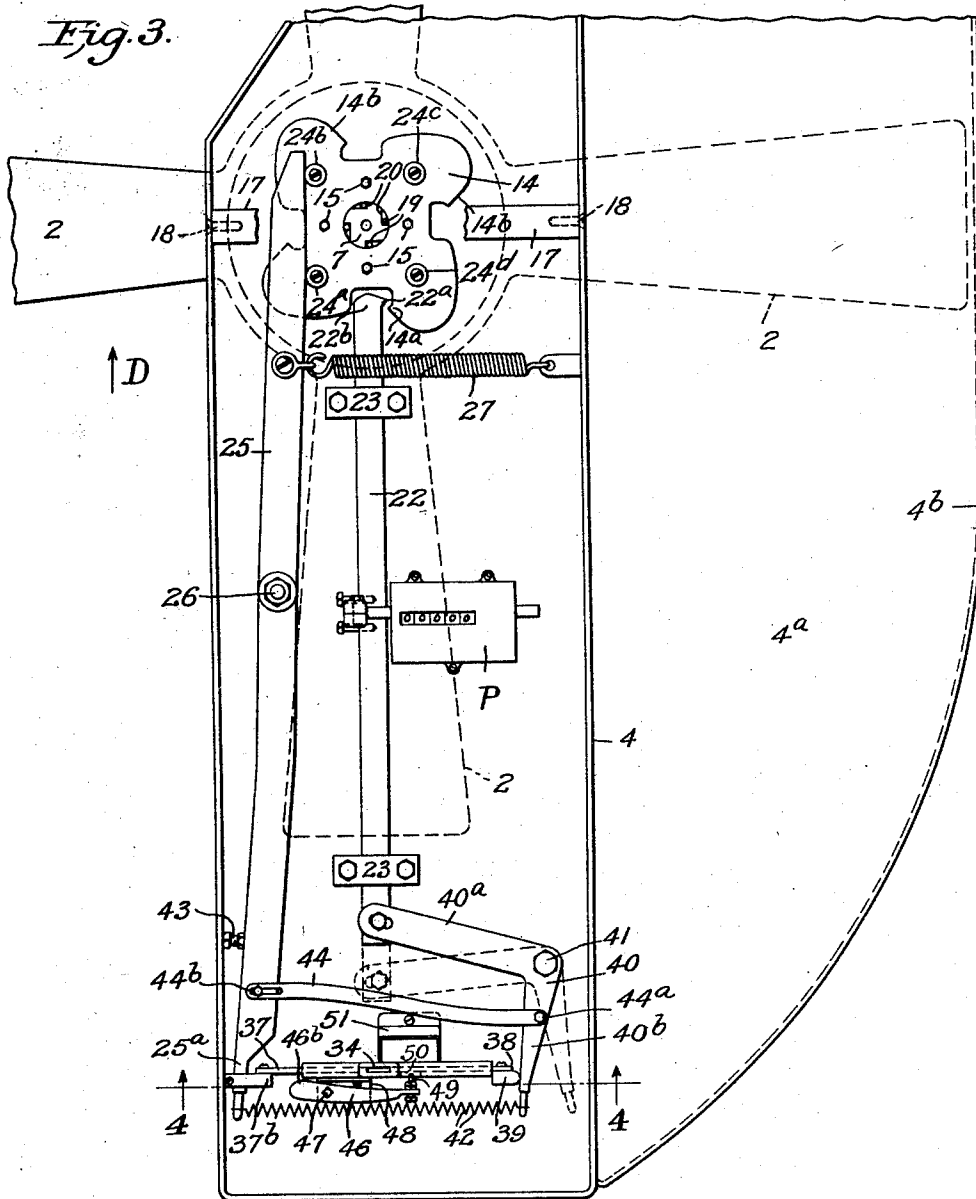


Fig. 4.

Inventor

By *Henry A. Nau*
Nathan, Bowman & Helfrich

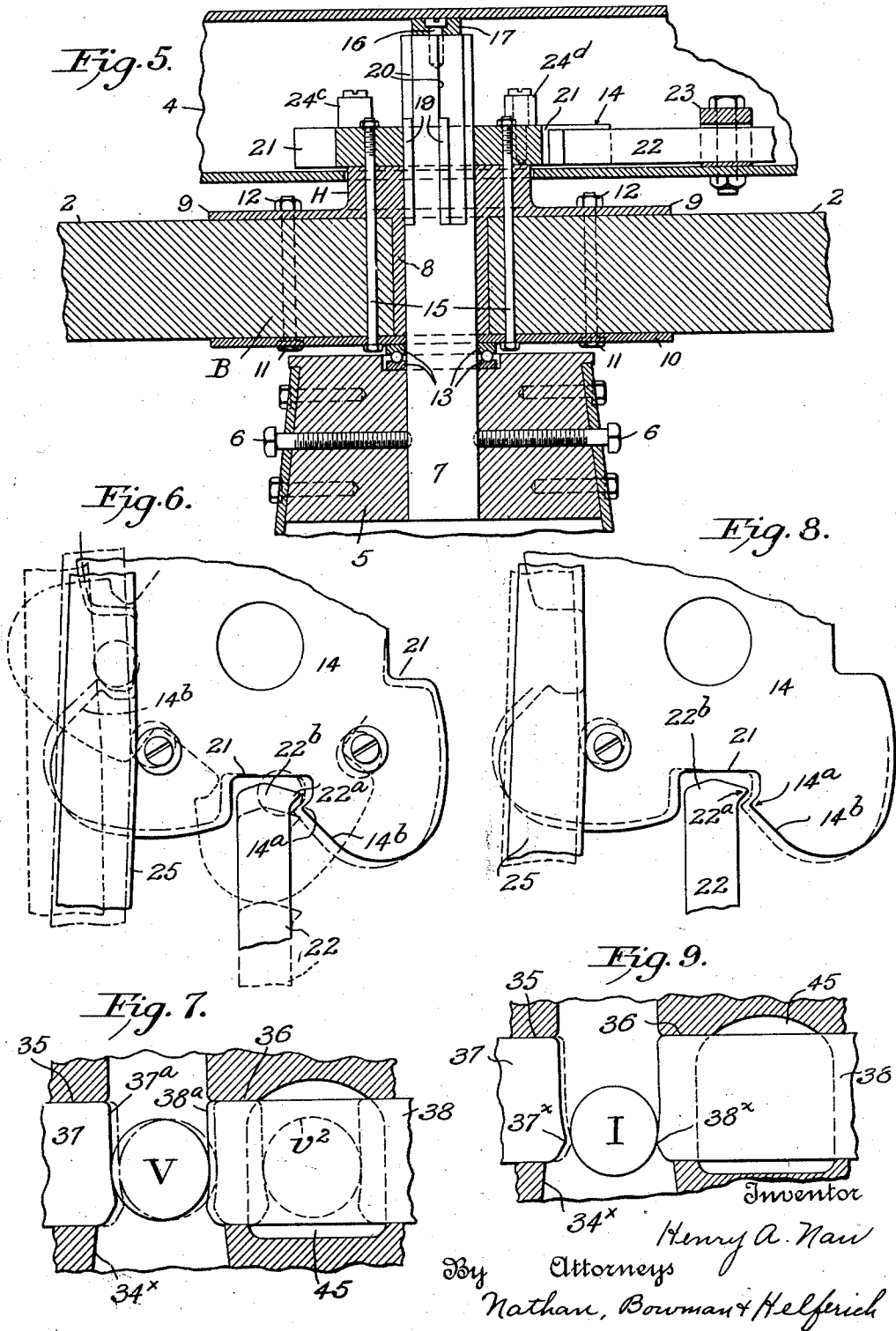
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H. A. NAU

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TURNSTILE

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UNITED STATES PATENT OFFICE

HENRY A. NAU, OF NEW YORK, N. Y.

TURNSTILE

Original application filed November 29, 1930, Serial No. 499,043. Divided and this application filed July 4, 1931. Serial No. 548,717.

This application is a division of my application Serial No. 499,043 filed November 29, 1930.

The present invention relates to a coin-controlled turnstile of the all-mechanical type and has for an object to provide a turnstile of that type which will overcome certain undesirable features of prior constructions, which will eliminate inherent defects thereof, and which will, therefore, render available an improved turnstile positive in its action and capable of operating for a great period of time without failure or attention.

One objection to existing turnstiles is due to the fact that although various devices have been proposed to prevent operation of the stiles by coins or tokens of a size smaller than those for which the machines were designed, nevertheless by certain manipulation of the stiles it has been possible to operate them with coins of smaller size, such, for example, as by a penny in a machine designed to be actuated by nickels only.

A further object of this invention is to provide means whereby operation of the stile will be positively prevented by the use of coins of the size next smaller than that for which the machine is designed, while affording sufficient latitude to permit the use of either full size or worn coins of a given denomination. This object has been attained, as hereinafter will be more fully explained.

Another object is to provide a coin-controlled unlocking device of that type in which the coin constitutes a part of the unlocking mechanism, to provide means, automatically actuated at a predetermined point in the operation of the device, to release the coin and to provide means cooperating therewith positively to eject the coin from said mechanism. This object also has been attained as hereinafter will appear.

Other objects and advantages will be in part indicated in the following description and in part rendered apparent therefrom in connection with the annexed drawings.

To enable others skilled in the art so fully to apprehend the underlying features hereof that they may embody the same in the various ways contemplated by this invention, draw-

ings depicting a preferred typical construction have been annexed as a part of this disclosure and, in such drawings, like characters of reference denote corresponding parts throughout all the views, of which:—

Figure 1 is a side elevation of a turnstile embodying the present invention. Fig. 2 is a right end view of Fig. 1. Fig. 3 is an enlarged plan view of a portion of the improved turnstile, with the cover removed, showing more particularly the locking mechanism. Fig. 4 is an enlarged section substantially on the line 4—4 of Fig. 3. Fig. 5 is a vertical sectional view through the upper end of the supporting pedestal and the means for rotatably supporting the arms thereon. Fig. 6 is a detail plan of the locking cam and bar and parts associated therewith, showing, in broken lines, various positions assumed during operation. Fig. 7, is a detail view of the coin slides showing, in broken lines, positions corresponding to the positions illustrated in Fig. 6, Figs. 6 and 7 illustrating the operation of the unlocking means when using a coin of the size for which the machine is designed. Figs. 8 and 9 are views similar to Figs. 6 and 7 showing the position of the parts when attempting to operate the machine by a coin of a smaller size. Fig. 10 is a view similar to Fig. 7 but showing a modified form of coin retaining means.

Referring more specifically to the drawings this invention is disclosed as embodied in a turnstile comprising a pedestal to standard 1 which supports, at its upper end, the intermittently rotatable barrier B comprising a hub H and radial arms 2 fixed therein. Located forwardly of the barrier is an upright column 3 which serves as a support for one end of a horizontally disposed housing 4 within which is arranged the barrier-locking mechanism, later to be described. The column 3 also serves as a collecting receptacle for coins utilized to operate the turnstile. The standard 1, and column 3 are connected together by a plate 1* which serves as a combined barrier and brace.

The barrier B is rotatably supported upon the column 1 as best shown in Fig. 5. With in the upper end of the column there is se-

cured a bearing block 5 into which is fixed, as by screws 6, one end a vertically disposed shaft 7 upon which the hub H of the barrier is rotatably journaled. The hub comprises a sleeve 8 formed integral with a flange 9, which overlies and engages the arms, and a disk 10 which underlies the arms. Bolts 11, passed through the disk 10, arms 2 and flange 9, have nuts 12 threaded thereon whereby the arms and the elements of the hub are all securely held together to turn as a unit on the shaft 7. An anti-friction bearing 13 intermediate the disk 10 and the block 5 serves to transmit to the latter the weight of the barrier and parts carried thereby and to maintain the barrier freely rotatable. Upon the hub H, within the housing 4, there is secured a locking cam plate 14 later to be referred to. Bolts 15 passing through the cam plate 14, arms 2 and disk 10 serve to secure the cam to the hub and assist in holding the arms and hub together. To the upper end of the shaft is secured, as by screw 16, a cross bar 17 the ends of which are secured to the housing 4 by screws 18, as shown in Fig. 3. This serves to support the housing 4 on the shaft 7 and to hold the housing against lateral movement.

When it is desired to use the device as a one-way machine, suitable means may be provided to prevent retrograde movement of the barrier. In Figs. 3 and 5 this means is illustrated as a one-way clutch mechanism of conventional form comprising rollers 19 fitted into tapered notches 20 formed in the periphery of the shaft 7. As is well understood, rotation of the barrier in one direction, i. e. clockwise as seen in Fig. 3 will cause the rollers to move into the notches where they do not obstruct rotation of the barrier. An attempt to rotate the barrier in the opposite direction will cause the rollers to be moved outwardly in the notches thereby causing them to bind between the longitudinal wall of the notches and the wall of the cylindrical bore in the cam 14 and sleeve 8 through which the shaft 7 passes, thereby locking the barrier against rotation.

The cam plate 14 is formed with a plurality of notches 21 adapted to receive one end 22^b of a locking bar 22 slidably mounted in bearing blocks 23 secured upon the floor of the housing 4. The end 22^b of the bar 22 is normally maintained in one of the notches 21 as shown in full lines in Fig. 3 and may be withdrawn therefrom, to permit rotation of the barrier, only after the insertion of a proper coin, token or check into an unlocking mechanism later to be described.

Means is provided for insuring that the barrier will be brought to one of its home positions i. e. a position in which one of the arms 2 obstructs passage through the usual aisle or passageway indicated by the arrow D in Fig. 3 after each operation of the stile. This means consists of rollers 24^a, 24^b, 24^c, 24^d car-

ried by the cam plate 14 and adapted, upon rotation of the barrier, successively to engage one end of a lever 25 fulcrumed at 26 within the housing 4. A coil spring 27, connected at one end to the lever 25 and at the other end to the housing 4, tends to maintain the lever in the position shown in Fig. 3. During the first 45° movement from this position the roller 24^a will force the lever 25 outwardly in opposition to the spring 27. After this half-way position has been passed the lever, under the influence of the spring, reacts upon the roller 24^a and causes further rotation of the cam and the barrier until a full 90° movement has been effected and the roller 24^a has assumed the position now occupied by the roller 24^b. Thus quarter rotations of the barrier are successively effected, after each of which the barrier is brought to rest with one of the arms perpendicular to the passageway, as shown in Fig. 3. A register P, mounted in the housing 4 and actuated by reciprocation of the locking bar 22 automatically records the number of operations of the barrier.

At the side of the turnstile, remote from the passageway D, the housing 4 is formed with a horizontal extension 4^a terminating in a downwardly projecting flange or apron 4^b which together form a guard for the arms 2. This guard also serves to define one side of the passageway D when a plurality of the turnstiles are set up in a row, thereby dispensing with, all rails, chains etc. heretofore required. A brace 4^c connecting the lower portion of the standard 1 with the outermost portion of the extension 4^a serves to support the latter and constitutes a barrier to prevent so-called "ducking under".

As illustrated, the improved turnstile is shown as provided with an hydraulic shock absorber, designated generally as C, adapted upon each quarter turn of the barrier to be actuated by a member 29 carried by each of the radial arms 2. This device serves to overcome the momentum of the barrier and to bring it to rest after each quarter turn thereof, without noise and without vibration. Inasmuch as this device is fully covered in my above noted application and forms no part of the present invention, detailed illustration and description thereof in this application is deemed unnecessary.

The coin controlled means for unlocking the barrier will now be described. At the forward or entrance end of the turnstile the housing 4 is provided with a coin receiver R provided with a coin slot 34 arranged transverse to the housing. Arranged to slide horizontally in guideways 35 and 36, formed in the coin receiver R, are coin-bars 37 and 38 whose adjacent ends 37^a and 38^a are normally maintained beneath and in line with the coin slot 34 and are so formed and spaced apart as to retain between them, as shown in full lines in Fig. 7 a coin or token of the proper

diameter which has been dropped into the coin slot 34. Should a coin of smaller diameter be inserted in the coin slot it will pass freely through the space between the adjacent ends of the coin-bars, through the slot 34^x therebeneath and thence into the coin return box X in the side of the column 3.

The coin-bar 37 is connected with the forward end 25^a of the lever 25 previously referred to. The end of the coin-bar 38, remote from the coin slot, has secured to it an abutment block 39 adapted to engage the end of the coin receptacle thereby to limit the inward movement of the bar. This bar is normally forced inwardly to the positions shown in Figs. 3 and 4 by the action of a bell-crank lever 40 fulcrumed at 41 to the housing 4. One arm 40^a of the bell-crank lever is connected with the locking bar 22 and the other arm 40^b thereof bears normally against the block 39. A coil spring 42 interposed between the end 25^a of the lever 25 and the arm 40^b of the bell-crank lever normally tends to turn the bell-crank-lever from its dotted line position in Fig. 3 to its full line position, thereby tending to force the locking bar toward the cam 14 and to hold the coin-bar 38 in the position shown in Figs. 3 and 4. An adjusting screw 43 threaded into the lever 25 and adapted to engage the side wall of the housing 4 serves to limit the swinging movement of the lever 25 in one direction and thereby to determine the retracted position of the coin bar 37. By adjusting the screw 43 the space between the adjacent ends of the coin bars may be varied.

To insure against the barrier remaining open (that is freely rotatable without the insertion of the proper coin) should the spring 42 break or due to sticking of the parts fail to force the end of the locking bar into the notch 21 in the cam 14 each time the barrier reaches a home position, auxiliary means is provided for actuating the locking bar 22. This consists of a link 44 having one end pivoted at 44^a to the bell-crank lever 40 and its other end connected by a pin-and-slot connection 44^b, with the lever 25. The pin-and-slot connection, under normal operation, permits the bell-crank lever to move independently of the lever 25 for purposes hereinafter to be explained, but acts, in case of emergency, to pull the link 44 and thereby swing the lever 40 and slide the locking bar to its locking position.

Operation

The operation of the improved turnstile is as follows: A patron approaches the turnstile and deposits a coin or token V of predetermined diameter in the coin receptacle. The coin passes downwardly in the coin slot and is held suspended therebeneath by its engagement with the adjacent ends of the coin-bars. Then, passing through the passage-

way D, the patron engages the barrier arm extending across said passageway and initiates rotation of the barrier. The first angular movement of the barrier, and the cam plate 14 carried thereby, causes one of the rollers (in Fig. 3 the roller 24^a) carried by the cam plate to swing the lever 25 counter-clockwise from the position shown in full lines in Fig. 6 to the position shown in dot-dash lines. This initial movement causes the end 25^a of the lever to push the coin-bar 37 to the right to the position shown in dot-dash lines in Fig. 7. This movement of the coin-bar 37 effects, through the coin V, coin-bar 38 and bell-crank lever 40 retraction of the locking bar 22 from the position shown in full lines, Fig. 6 to that shown in dot-dash lines. It will be noticed that in this position a tooth 22^a formed on the locking bar has passed beyond the point of a similar tooth 14^a, one of which is formed on the cam plate adjacent each of the locking notches 21. Further rotation of the barrier causes the roller to swing the lever 25 further in a counter-clockwise direction which in turn slides the coin-bar 37 to the right toward the position indicated in dotted lines in Fig. 7. During this further movement of the coin-bar 37 the coin V shifts the coin-bar 38 to the right and places the coin V in the position *v*² shown in dotted lines in Fig. 7, from which position it is permitted to fall through an opening 45, into a container in the column 3.

The cam plate 14 is formed, adjacent each of the locking notches 21, with a cam surface 14^b which, during rotation of the barrier, engages the end 22^b of the locking bar 22 and acts to shift the bar and swing the lever 40 slightly faster than those elements normally would be moved by the action of the coin-bar 38. This causes the arm 40^b to be moved out of contact with the block 39 on the coin-bar 38 whereby backward pressure of the bar on the coin is relieved, thereby permitting the coin freely to fall from between the coin-bars 37 and 38.

To insure that the coin will be removed from between the coin-bars, even though the coin should be sticky, this invention proposes a coin ejector which will positively eject the coin. This consists of a lever 46, fulcrumed at 47 on a bracket 48 secured to the coin receptacle. One end of the lever carries a pin 49 adapted to be projected through an aperture 50 in the wall of the coin receptacle adjacent the coin opening 45, thereby to eject the coin from between the ends of the coin-bars should it inadvertently fail to fall therefrom.

Swinging movement is given to the lever 46 at each reciprocation of the coin-bar 37 by the engagement of a shoulder 37^b with a cam shaped end 46^b of the lever. A suitable spring serves to swing the lever in the oppo-

site direction, thereby to withdraw the ejector pin, when the shoulder 37^b moves out of engagement with the lever. To insure that the ejected coin will pass downwardly through the coin passage and into the coin container, a sheet metal hood 51 is secured upon the floor of the housing 4 adjacent the opening 45 in the coin receptacle.

As hereinbefore stated, one of the objections to coin controlled turnstiles, as previously constructed, is that it has been possible to operate them by a coin of a size smaller than that for which the machine was designed. This heretofore has been possible by first turning the barrier as far as the play in parts will permit before inserting an undersize coin. This initial movement of the parts has been enough to close the coin gap sufficiently to cause the walls of the coin-bars to retain an undersize coin. Then, by manipulation of the barrier, the coin could be shifted to a point between the coin-bars in which pressure on the barrier would withdraw the barrier lock and permit rotation thereof.

The present invention provides means whereby operation of the device by an undersize coin is precluded. This has been effected by so forming and proportioning the parts that, in the absence of a proper coin, initial rotation of the barrier such as would take up the gap between the coin-bars to such an extent that they would retain between them an undersize coin, takes up substantially all of the play between the side wall of the locking notch and the adjacent wall of the locking element. Therefore with an undersize coin between the coin-bars there is not sufficient angular movement of the cam plate 14 available to cause, through the lever 25 coin-bars etc., withdrawal of the end of the locking element 22 from the locking notch 21.

If desired, this locking of the device against actuation by an undersize coin may be made even more positive by providing the locking bar and the cam plate 14 with interlocking teeth 22^a and 14^a respectively as shown in Figs. 8 and 9. When the barrier has been given an initial angular movement, such as would move the coin-bar 37 toward the bar 38 sufficiently to retain between their high points 37^x and 38^x respectively, an undersize coin I as indicated in Fig. 9, the tooth 14^a lies within the path of movement of the tooth 22^a thereby precluding retraction of the end of the locking bar from the locking notch 21 in the cam plate and preventing further rotation of the barrier.

Fig. 10 illustrates a modified form of coin retaining means. This modified construction differs from that hereinbefore described in that instead of the coin being supported by being held between the adjacent ends of the bars 37 and 38, as shown in Fig. 7, it rests upon a fixed abutment 55 provided by the coin

receiver R and against a movable abutment consisting of the forward end 38^c of the bar 38 which in this construction preferably is straight. The distance between the end 38^c and the seat 55 determines the diameter of coin intended to operate the device. Fig. 10 illustrates, in full lines, a nickel being held and, in dotted lines, a penny (being of less width than the space between the end 38^c and the seat 55), passing therethrough.

If desired, the abutment 55 may be formed on an integral portion of the coin receiver R, but preferably it will be provided by a separate piece of wear-resisting material 56 secured to the member R as by screws 57.

The bar 37 serves, as hereinbefore described, to move the coin edgewise thereby to shift the bar 38 and the parts connected therewith to withdraw the locking bar 22 from the locking notches 21 in the coin plate 14.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can, by applying current knowledge, readily adapt it for various utilizations by retaining one or more of the features that, from the standpoint of the prior art, fairly constitute essential characteristics of either the generic or specific aspects of this invention, and therefore, such adaptations should be, and are intended to be, comprehended within the meaning and range of equivalency of the following claims:—

Having thus revealed this invention, I claim as new and desire to secure the following combinations and elements, or equivalents thereof, by Letters Patent of United States:—

1. A turnstile combining a rotatable barrier; a member rotatable with said barrier and provided with a locking notch; a housing enclosing said member; a locking bar slidably mounted in said housing and having a portion adapted to enter said notch to lock said barrier against rotation; a bell-crank lever fulcrumed in said housing and having one arm connected with said locking bar; a lever of the first order fulcrumed in said housing and having one end adjacent said member; a stud on said member adapted, during rotation of said barrier, to swing said lever; an operative connection between the other end of said lever and the other arm of said bell-crank lever, said operative connection including two slide bars and a connecting coin therebetween, the initial movement of said member serving, through said lever, operative connection and bell-crank lever, to withdraw said locking bar from said locking notch.

2. In a device of the character described, a rotatable barrier, an element rotatable therewith and provided with a locking notch and a cam surface; a slidable locking bar having a portion adapted to engage said notch to

prevent material rotation of said barrier and a surface adapted to be engaged by said cam; a coin controlled device including first and second slide bars, said bars being arranged in alignment with their adjacent ends spaced apart and shaped to receive and hold between them a coin of predetermined diameter, said coin forming an operative connection between said bars; means actuated by an initial movement of said barrier to shift said first slide bar and thereby said coin and said second slide bar; means actuated by said second slide bar to withdraw said locking bar from said notch, said cam surface acting during further rotation of said barrier to shift said locking bar and the last named means to relieve the pressure on said coin thereby to permit it to fall from between said first and second slide bars.

3. A device of the character described combining a rotatable barrier; locking means to hold said barrier in substantially predetermined angular positions but permitting slight initial angular movement thereof; coin controlled means including a swinging lever actuated by the initial rotation of said barrier to render said locking means ineffective; and a swinging member actuated by said lever upon further movement of said barrier to eject a coin from said coin controlled means.

4. A device of the character described combining a rotatable barrier; a member rotatable therewith provided with a plurality of locking notches; a locking bar having a portion adapted successively to project into said notches to lock said barrier against substantial rotation; means for withdrawing the projecting portion of said locking bar from its complemental notch including a lever actuated by the initial rotation of said barrier, a first slidable coin-bar connected to be actuated by said lever, a second slidable coin-bar arranged in alignment with the first coin-bar, said coin-bars having their adjacent ends shaped and spaced apart sufficiently to receive and hold an actuating coin, and an operative connection between the second coin-bar and said locking bar; and means including a swinging lever actuated upon further movement of said lever to eject said coin from between said coin-bars.

5. A coin controlled turnstile combining a rotatable barrier; a member rotatable with said barrier and provided with a plurality of locking walls; a locking element having a portion adapted to engage said walls to prevent material rotation of said barrier; coin controlled means adapted to receive a coin of predetermined diameter for withdrawing said element out of the path of said locking walls; and means including interlocking portions carried by said member and element and adapted to be placed in interlocking position by initial rotation of said barrier to prevent

the operation of said coin controlled means by a coin of smaller diameter.

6. A coin controlled turnstile combining a rotatable barrier; a member rotatable with said barrier and provided with a plurality of locking notches; a locking member adapted to engage said notches to prevent material rotation of said member and barrier but adapted to permit a limited initial rotation thereof; coin controlled means adapted upon the insertion of a coin of a predetermined diameter and the initial rotation of said barrier to withdraw said locking member from said notches; a tooth formed on said rotatable member adjacent each of said notches; and a complemental tooth on said locking member, the first named tooth being adapted, in the absence of a coin of said predetermined diameter, by the initial rotation of said barrier to be placed in the path of the second named tooth thereby to prevent the withdrawal of the locking bar and operation of said coin controlled means by a coin smaller than the predetermined size.

7. A turnstile combining a rotatable barrier; a member rotatable with said barrier and provided with a plurality of locking notches; a locking bar having a portion adapted to engage said notches to lock said barrier against material rotation; coin controlled means for withdrawing said locking bar from said locking notches; spring means for returning said locking bar to its locking position; and auxiliary means active upon failure of said spring means, for returning said locking bar to locking position.

8. A coin controlled turnstile combining a rotatable barrier; a member rotatable with said barrier and provided with a plurality of locking notches; a locking member having a portion adapted to enter one of said notches thereby to prevent material rotation of said barrier but adapted to permit limited initial rotation thereof; coin controlled means adapted upon the insertion of a coin of a predetermined diameter and the initial rotation of said barrier to withdraw said locking member from the engaged notch, said coin controlled means including two endwise movable slide bars adapted to engage a coin and being so constructed and arranged that with an undersize coin inserted in said coin controlled means the available initial movement of said barrier is insufficient to withdraw said locking member from the engaged locking notch.

9. A coin controlled turnstile combining a rotatable barrier; means comprising a locking plate and a cooperating locking bar for locking said barrier against substantial rotation but permitting limited movement thereof; mechanism for rendering said locking means ineffective, said mechanism comprising a lever, a slide bar connected with said lever, a coin receiver affording a coin abutment ad-

- jacent the end of said slide bar, said slide bar engaging one edge of a coin and cooperating with said abutment to retain the coin, and an actuating bar aligned with said slide bar and engaging the opposite edge of the coin, said actuating bar serving upon initial movement of said barrier to shift said coin and thereby said slide bar and locking bar to effect release of said barrier.
- 10 10. A coin controlled turnstile combining a rotatable barrier: means for locking said barrier against substantial rotation but permitting limited rotary movement thereof; mechanism for rendering said means ineffective, said mechanism comprising a slide bar connected with said locking means, a coin receiver affording a coin chute and a stationary coin retaining seat within said chute and adjacent the end of said slide bar, said slide bar engaging one edge of a coin and cooperating with said seat to retain the coin suspended, an actuating member aligned with said slide bar and engaging the opposite edge of said coin, said actuating member being
- 25 moved by the initial rotary movement of said barrier and serving to shift said coin and slide bar to release said barrier locking means; and means actuated by rotation of said barrier to shift said slide bar relative to said actuating member to release said coin and permit it to fall.
- 30 11. In a device of the character described, a rotatable barrier; an element rotatable therewith and provided with a locking notch and a cam surface; a slidable locking bar having a portion adapted to engage said notch to prevent material rotation of said barrier and a surface to be engaged by said cam; a coin controlled device including a
- 35 coin receiver including a coin slot; an abutment in said slot adapted to engage one edge of a coin; first and second slide bars arranged in alignment with their adjacent ends spaced apart, one of said bars engaging an edge of the coin and cooperating with said abutment to hold said coin between the ends of said slide bars; means actuated by an initial movement of said barrier to shift said first slide bar and thereby said coin and
- 45 said second slide bar; means actuated by said second slide bar to withdraw said locking bar from said notch, said cam surface acting during further rotation of said barrier to shift said locking bar and the second bar to relieve the pressure on said coin thereby to permit it to fall from between said first and second slide bars.
- 50 12. In a turnstile, a rotatable member, means including a locking bar to lock said member against substantial rotation but permitting limited angular movement thereof; coin controlled means to release said member locking means, the last named means including aligned slide bars spaced apart to receive
- 55 a coin edgewise between them; an operative connection between said rotatable member and one of said slide bars; an operative connection between the other slide bar and said locking bar said parts being so constructed and arranged that the limited angular movement of said member acts through said slide bars and the coin therebetween to withdraw said locking bar; and means including cooperating cam surfaces provided by said member and locking bar actuated by further angular movement of said member to cause one of said slide bars to be moved more rapidly than the other thereby to effect relative movement between said slide bars to cause them to release the coin.
- In witness whereof, I have hereunto subscribed my name.
- HENRY A. NAU.