ABSTRACT OF THE DISCLOSURE

A rotatable turnstile construction adapted for use in supermarkets, theaters, auditoriums and the like and including a compact light weight readily assembled mounting means separable from a post and having rotatable arm means associated therewith and provided with cam means for locating and centering turnstile arms transverse to the passageway. Releasable lock means are provided to secure each arm in passageway closing position, the lock means including a two-position latchable means, one position being locked position and the other position being a hold open position. The construction also includes a novel arrangement for cam follower biasing means which facilitates assembly of the construction.

BACKGROUND OF THE INVENTION

Turnstiles are extensively used to control, direct and limit passage of large numbers of persons into and from selected areas, or locations such as supermarkets, amusement areas, athletic stadiums, and auditoriums and the like. Prior proposed turnstiles have included a plurality of arms rotatable about a vertical axis or an inclined axis. Such prior proposed turnstile constructions have included several disadvantages. In such prior constructions an upstanding metal cabinet was secured to the floor and housed a rotatable gear or circular rack engageable by a pawl or dog for locking a turnstile arm in passageway closing position. Springs biased the arm to closed position and were so arranged that the approach to such closed position by the arm was rapid and forceful. Thus, a person who had not been sufficiently agile or quick in passing through the turnstile would be slapped or hit in the back by the arm. Small children were sometimes struck on the back of the head. In operator and coin-controlled prior proposed turnstiles the person passing through the turnstile would often lean or push against the arm before release of the pawl with the rack teeth. Such pressure was often sufficient to release mechanism (solenoid operated) was not sufficiently powerful to overcome the engagement of the pawl with the rack teeth. As a result, the person had to back away from the arm and in the case of coin-operated turnstiles may have lost his coin. In addition, the clearance between prior proposed turnstile arms and edges of the cabinet was so small that a hand or fingers of a person placed on or near adjacent parts of the turnstile were sometimes pinched or crushed between edges of the cabinet and a moving arm. In addition, prior proposed turnstile arms were so angularly arranged with respect to each other that a person entering the turnstile might strike a lower arm which was partially pointed toward the passageway and thus cause bruising of a leg or tearing of clothing. Such prior proposed turnstile constructions were relatively heavy, and expensive and complex to manufacture and maintain.

The present invention contemplates a novel turnstile construction which obviates the disadvantages of the prior proposed turnstiles and which includes a light weight, virtually injury free inexpensive turnstile construction. The present turnstile construction includes a plurality of turnstile arms, adjacent arms being spaced apart with an included angle of 90° to eliminate arm interference with the passage of a person through the turnstile. The arms are carried by a rotatable mounting means which is carried by a mounting plate readily supported on a post to provide ample clearance for the arms. The rotatable mounting means includes a spring biased cam roller and plate arrangement in which cam recesses are configured to position a turnstile arm at gate closed position and to approach said position with decreasing force so that a slow moving person passing through the turnstile will be at most only gentle or lightly tapped on the back by the arm. The release means of the invention includes a lock roller which facilitates release under pressure when a person leans against an arm while awaiting release of the turnstile.

The present invention therefore contemplates a rotatable turnstile construction having a novel means for controlling step by step rotation of the turnstile during the passage of persons through the turnstile construction. An object of the invention is to disclose and provide a turnstile construction including a compact arrangement of cam means and biasing means therefor for controlling movement and positioning of the turnstile arms.

Another object of the invention is to disclose and provide a rotatable turnstile construction including a readily releasable lock means for locking a turnstile arm in passage closed position.

Another object of the present invention is to disclose and provide a turnstile construction wherein the releasable lock means includes at least a lock position and a hold open position.

A further object of the present invention is to disclose and provide a rotatable turnstile construction in which spring means biasing cam follower means are conveniently and accessibly arranged with respect to the axis of rotation of the turnstile to facilitate assembly and the mounting means is readily changed to provide a reversal of direction of rotation.

A still further object of the present invention is to disclose and provide a rotatable turnstile construction including a releasable locking means having a latch means cooperable with cam means in novel manner.

Additional objects of the present invention include a rotatable turnstile construction which is silent in operation, wherein the spring biased cam rollers and cam plate move the arm into closed position in a gentle manner; wherein the lock means for the release means is operable under pressure and wherein the arrangement of the turnstile construction on a post facilitates installation of adjacent rail fencing and provides a clean view-unobstructed appearance.

Various other objects and advantages of the present invention will be readily apparent from the following description and drawings in which an embodiment of the invention is shown.

In the drawings:

FIG. 1 is a fragmentary elevational view of a rotatable turnstile construction embodying this invention;
FIG. 2 is an enlarged fragmentary sectional view taken in the plane indicated by line II—II of FIG. 1 and showing releasable lock means in locked position (gate closed);
FIG. 3 is an enlarged fragmentary sectional view taken in the planes indicated by line III—III of FIG. 2;
FIG. 4 is a transverse sectional view taken in the plane indicated by line IV—IV of FIG. 3;
FIG. 5 is a fragmentary view of lock means embodying this invention in intermediate position, the view being taken in the same plane as FIG. 2;
FIG. 6 is an enlarged fragmentary view taken in the same plane as FIG. 2 and showing the lock member in full release position;
FIG. 7 is a fragmentary sectional view taken in the vertical plane indicated by line VII—VII of FIG. 2; FIG. 8 is a fragmentary sectional view taken in the vertical plane indicated by line VIII—VIII of FIG. 2; FIG. 9 is a view taken from the plane indicated by line IX—IX of FIG. 3; FIG. 10 is a fragmentary view taken in the same plane as FIG. 9 and showing a modification of the turnstile construction.

FIG. 11 is a fragmentary side elevational view of a different gate opening construction in which a turnstile embodying this invention is mounted.

In the embodiment of the invention shown in FIGS. 1–9, inclusive, a rotatable turnstile construction generally indicated at 15, FIG. 1, may be employed to control traffic into and out of selected areas defined by suitable railings and posts or other fencing means. In the illustration, up-standing posts 16 define an opening or passageway 17 through horizontal rails 18 which form the rail or fence system. The rotatable turnstile construction 15 serves to limit passage through an opening 17 to one person at a time and may be controlled so as to block such passage if desired. Such posts and railing system together with rotatable turnstiles are useful in supermarket areas and wherever effective control, direction and, if desired, counting of persons entering or leaving a certain area is desired.

The turnstile construction 15 may comprise a mounting plate member 20 having a horizontal end portion 21 adapted to be secured by a suitable bolt assembly as at 22 to an upstanding post 16 at one side of the passageway 17. Plate 20 may be inclined upwardly and adjacent its opposite end may carry a stationary shaft means 24 supported along an axis normal to plate 20 by a bolt and nut assembly 25. Assembly 25 extends downwardly from the bottom face of plate 20 and carries a cylindrical spacer block 26 keyed by pin 27 to plate 20 and to an enlarged cylindrical clutch body member 28 which provides a shoulder 29 outwardly of spacer member 24. Clutch body member 28 may be provided with axially extending circumferentially spaced slots 30, each slot 30 receiving a segmental roller 31 held within slot 30 by an annular retainer wire element 32. Each roller 31 may be biased in one direction by a leaf spring 33. The diameter of segmental roller 31 is sufficient so that a cylindrical surface portion of roller 31 extends beyond the cylindrical surface of the clutch body member 28 for rolling engagement with rotatable hub means 35 in one direction of rotation.

Rotatable hub means 35 includes a cylindrical body 36 enlosed over clutch body member 28 in contact with cylindrical surface portions of rollers 31 for free rotation about the axis of the rotatable means. The upper end portion of cylindrical portion 36 receives therein a rotatable spacer ring 38 secured against relative rotation thereto by a plurality of circularly spaced set screws 39, only one of which is shown in FIG. 3.

The hub means 35, in the present example, includes three angularly disposed turnstile arms 41, each having an end portion fitted within a socket 42 in hub member 35. The axis of each arm 41 is suitably inclined to the axis of the rotatable hub means so that the topmost arm will be positioned horizontally across passageway 17. In addition, adjacent arms 41 are disposed with a subtended angle of 90° therebetween and in such relation to the axis of the hub assembly that when one arm 41 is horizontal, the other two arms define a vertical plane so that they do not project into the opening or passageway beneath the arm 41 in horizontal position. The ends of arms 41 may be secured in the sockets 42 in any suitable manner as by a press fit or setscrews.

Means to position and hold the top turnstile arm 41 across passageway 17 may comprise camming means including a cam disc 45 carried between spacer ring 38 and the bottom face of plate 20; the disc 45 being pinned to ring 38 as by countersunk screw bolts 47. The circumferential edge 48 of cam disc 45 may be provided with cam edge recesses 49 of selected contour for controlling the position of the rotatable hub means and arms 41, as they are raised during the passage of a person through the gate and to stop the arms 41 in selected position. Cam recess 49 includes a bottom recess portion 50 which, when engaged by a cam roller 52, serves to locate, position and normally hold an arm 41 in horizontal position across passageway 17.

Each cam roller 52 may be rotatably mounted on one end of a shaft 53 having its axis parallel to the axis of the rotatable hub member 35. Each shaft 53 projects through an enlarged circular port 54 provided in plate 20 with an end portion of shaft 53 projecting above the top surface of plate 20 for connection to one end of a biasing spring means 55, the other end of said spring means having a connection to a circular connecting disc 56 carried on bolt 25. In this example, two of said pins 53 pass through ports in associated link members 57 adjacent one of the ends thereof, the opposite ends of said link members 57 each being pivotally mounted at 58 to plate 20. Springs 55 bias link members 57 and rollers 52 radially inwardly so that the rollers engage and follow the cam edge face 48 on disc 56. Link members 57 may be provided loose sustainable engagement with the top surface of plate 20.

In this example, a third pin 53 is not provided with a link member 57 and is cooperatively associated with means to releasably lock turnstile arms in a gate closing position as now described.

Means for releasably locking the turnstile arms in such gate closing position may comprise a cam roller support bar 60 of angular configuration and having one end pivotally connected as at 61 to and beneath plate 20. Bar 60 includes a radially inwardly extending portion 62 provided with a port 63 for receiving an extended portion 64 of associated pin 53 to provide a connection with the cam follower roller 52. Bar 60 is also provided with a locking pony 66 which projects beyond cam roller 52 a selected distance and which may be provided with a diagonal end face 67.

The releasable lock means also comprises a lock member 69 having its long axis positioned generally perpendicular to the long axis of bar 60 and pivotally mounted at 70 between its free face to plate 20. The pivotal mounting of bar 70 is shown in detail in FIG. 8 and may comprise a stud bolt 71 threaded as at 72 to plate 20 and an anti-friction or bearing sleeve 73 carried by bolt 71. Between anti-friction sleeve 73 and lock member 69 may be provided a bushing 74 of resilient shock absorbing material so that pivotal and locking action of lock member 69 is resiliently cushioned to absorb shocks caused by operation of the turnstile as later described.

The end of lock member 69 adjacent to lock engagement portion 66 of bar 60 is provided with a roller 76 pivotally mounted on an offset end of member 69 as at 77. Roller 76 is engageable with inclined face 67 and a contiguous longitudinal back face 67a of bar 60 as later described. Lock member 69 is biased towards face 67 by spring means 78, one end of said spring having a connection at 79 to lock member 69, and the other end having a connection at 80 to plate 20. In locked position (FIG. 2), roller 76 is positioned opposite back face 67a of bar 60. Rotational movement of disc 45 caused by a person attempting to pass through the closed passageway will be prevented because retraction of the cam roller 52 associated with bar 60 will be stopped by abutment of surface 67a with lock roller 76.

Means to release lock member 69 from locked position may include solenoid means 82 having a solenoid arm 83 carrying a pin 84 received in a slot 85 in the end member 69 opposite to lock roller 76 for pivoting lock member 69 about pivot 70 to cause the lock roller 76 to move away from surface 67a and against spring 78 (FIG. 5). Solenoid means 82 may be actuated by well-known switch means located at a station by a person selling admission.
tickets or otherwise checking on entry through the turnstile. Manual release means may also be employed in place of solenoid means 82.

The initial release position of member 69 and a latch means is best shown in FIG. 5, roller 76 being spaced away from the engagement portion 66 of bar 60. In this position, bar 60 is free to move in a clockwise direction about pivot axis 61 thereby permitting the roller 52 to move along recess cam edge face 49 so as to permit rotation of the turnstile arms. In the position shown in FIG. 5 lock member 69 has a latch portion 87 extending normal thereto and engageable by a latch member 88 pivotally mounted at 89 to plate member 20. Latch member 88 carries a transverse adjustable screw-bolt 90 having threaded engagement with a threaded bore passing through latch member 88 so that bolt 90 may be selectively positioned and longitudinally adjusted and retained by a nut 91. The screw-bolt 90 has a head 92 which is adapted to contact the back face of bar 60. The opposite end of the bolt may project beyond nut 91 for positioning a compression coil spring 94 seated at one end against nut 91 and at its opposite end as at 95 against the housing of solenoid 82.

Latch member 88 is provided with a latch end portion 97 of stepped or successively shouldered configuration. Latch portion 87 engages the roller surface 76 and latch portion 87 will be in abutment at 101 with latch portion 97 of latch member 88. Thus, a turnstile arm is in closed locked position and the turnstile assembly cannot rotate.

In this embodiment of the invention when it is desired to permit passage of a person through the turnstile construction, solenoid 82 is momentarily actuated so that lock member 69 is rotated into the position shown in FIG. 5 where latch portion 87 engages as at 99 the first step or shoulder 98 of latch member 88. In such position of lock member 69, it will be apparent that lock roller 76 is spaced from inclined edge face 67 of bar 60 and that upon rotation of roller 52 about its pivotal axis 61 by the engagement of cam roller 52 with the cam edge face 49, the lock edge face 67 will pass by lock roller 76. In this partially released or hold open condition of the lock member and latch member, the latch bolt head 92 will be spaced from the back edge face of bar 60 and edge face 67 and bar 60 will clear roller 76 as roller 52 clamps the steep portion of cavity 49.

As the turnstile arms are further rotated the roller 52 reaches the top of the steep portion of cavity 49 (FIG. 6 phantom lines) and urges bar 60 in a clockwise direction about its axis 61 until the back edge face of bar 60 contacts head 92. When this contact is made, continued movement of bar 60 causes the adjustment bolt 90 and latch member 88 to be rotated clockwise about its pivotal axis 89 to withdraw and release the engagement of latch portion 87 and latch end 97 and to thereby provide an open unlatched condition with sufficient space for roller 52 to pressure engage and follow the outer circumferential edge 48 of disc 45.

Upon further rotation cam roller 52 follows the gradual inclined edge face 49 into the next cavity by biasing action of spring 55 on the bar 60. As the latch member lowers in position, the adjustment bolt continues to follow bar 60 and disengages therewith at a position where the latch portion 87 is generally opposite the second stepped shoulder 100. At this intermediate position the inclined end face 67 on bar 60 is still opposite and in engagement with lock roller 76 so that movement of roller 76 and lock member 69 towards the latch member means. Thus when the bottom of cavity 49, bar 60 is in its locked position as in FIG. 2, latch portion 87 engages as at 101 the latch member 88 and the lock roller 76 is positioned opposite edge face portion 67a so as to prevent rotation of the turnstile arms.

The arrangement of the stepped shoulders 99 and 100 permits actuation of lock member 69 into a hold open position (controlled by an operator or coin machine) so that the turnstile arms are ready and free for rotation to permit the passage through.

The cam cavity 49 may be selectively configured to obtain a desired locking or stopping action of the turnstile arms. In this example a steep incline at one side of the cavity permits the arms to be rapidly released while the gradual incline at the other side of the cavity facilitates gradual, gentle movement of the arms into their locked position and at a speed which will not forcibly strike the back of a person. Such gentle action is provided by relaxing of the springs 54 as roller 52 moves deeper into the cam cavity 49.

In the example of the invention shown in FIGS. 10 and 11 the turnstile construction is essentially the same as the above example except that a lock means is not provided. As shown in FIG. 10 the hub assembly includes a unidirectional clutch means 130, 131, 133 as described above. A cam disc 145, cam edge face 148 thereon, and cam roller 152 in engagement therewith is similar to that shown in FIG. 5. As at 100 the exception that the bar 60 is omitted and in its place a roller 152, shaft 153, spring 155, and disc 156 is provided in place of the lockable arrangement previously described. In the embodiment shown in FIG. 10 it will be apparent that the turnstile construction will admit or permit the passage therethrough of individuals moving in one direction. No lock means are provided and therefore successive persons may readily pass through the turnstile.

It will be understood that the configuration of the cam edge faces 48 and 148 may include different contours and in the event it is desired to have a turnstile construction which moves in one direction as well as the other direction, the configuration of the cam, recess or cavity 49, 149 can be made symmetrical with respect to the bottom of the cavity so that such uniform symmetrical cam action can be readily achieved.

It will be apparent that in assembly of the turnstile construction the solenoid 82, bar 60, and lock member 69 may be readily mounted on the bottom face of plate 20. The stationary shaft means including bolt 25, spacer 26, and clutch means 28 may be preassembled with disc 48 and ring 38 and pinned or keyed to plate 20 by pin 27. The direction of rotation may be readily selected by the positioning of clutch 28 in the construction shown changing the rotational orientation of springs 33 and needle-like rollers 31 in recesses 30. Cam plate 48 is also reversed or turned over so that the cam cavity contour is disposed to provide the desired arm closing action. Upon securing this assembly to plate 20 by nut and bolt means 25, the pivoted links 57, shafts 53 with rollers 52, and biasing springs 55 may be readily assembled on top of plate 20. Suitable covers 104, 105 are provided to enclose the assembly. If desirable the turnstile head assembly and plate 20 may be removed from the post for maintenance, subassembly or unit replacement at or away from the turnstile location.

It should be noted that when pressure is applied to a turnstile arm face 67a on bar 60 is pressed tightly against lock roller 76. However, because of the rolling contact of roller 76 therewith, the solenoid 82 can pivot lock member 69, such pivoting being assisted by the mechanical advantage achieved by selective location of the pivot axis of member 69. Thus jamming of the release means by pressure against a turnstile arm is substantially precluded.

Various modifications and changes may be made in the turnstile construction shown above and all such changes coming within the scope of the appended claims are embraced thereby.
I claim:

1. In a rotatable turnstile construction, the combination comprising:
   a mounting plate means including an upwardly inclined portion;
   rotatable means supported from said plate means for rotation about an inclined axis normal to the plate means;
   said rotatable means including a rotatable hub member;
   a plurality of angularly spaced arms carried by said hub member, each arm being positionable horizontally and defining with a second arm a vertical plane when a third arm is in horizontal position;
   a nonrotatable shaft means supporting said hub member;
   and means to sequentially position said arms in horizontal position by incremental rotation of said rotatable hub member;
   said positioning means including a cam member rotatable with said hub member and presenting a cam edge face at one side of said plate means;
   a plurality of cam follower roller means mounted on said plate means for engagement with said cam edge face, and means on the opposite side of said plate means for biasing at least certain of said cam follower roller means into pressure engagement with said cam face.

2. A construction as stated in claim 1 wherein said cam follower means includes:
   a pin member pivotally connected to said plate at said opposite side thereof.
   a pin carried by said cam follower roller means extending from one side to the opposite side of said plate means and connected with said link member, and a spring connecting said link means to said shaft means.

3. A construction as stated in claim 1 including means for releasably locking one of said cam follower roller means in selected relation to said cam edge face for holding a selected arm in horizontal position.

4. A construction as stated in claim 3 wherein said lock means includes a lock member having a pivotal connection to said plate means and including a latch engagement portion,
   a pivoted latch member having selected sequential engagement with said latch portion,
   and means carried by said latch member for engagement with said cam follower roller means to hold said latch member out of latching engagement when said arms are moving to and from horizontal position.

5. A construction as stated in claim 4 including means to actuate said pivoted lock member.

6. A construction as stated in claim 4 wherein said latch member includes stepped engagement faces for contact with said latch portion.

7. A construction as stated in claim 4 including a spring biasing said latch member toward said cam follower roller means.

8. A construction as stated in claim 4 wherein said means carried by said latch member for engagement with said cam follower roller means includes an adjustable contact member.

9. A construction as stated in claim 4 including shock resistant means pivotally mounting said lock member.

10. A construction as stated in claim 1 wherein said cam edge face is configured to reduce biasing pressure of said biasing means before said arms reach a horizontal closed position.

11. A construction as stated in claim 3 wherein said releasable lock means includes a lock roller rollingly engaging a cooperating lock surface on one of said cam follower means.

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DENNIS L. TAYLOR, Primary Examiner