United States Patent [19]

Lamberson

[11] **3,914,902**

[45] **Oct. 28, 1975**

[54] **TURNSTILE**

[75] Inventor: **Everett W. Lamberson**, Los Angeles, Calif.

[73] Assignee: **Hardware Specialties Sales Co.**, Los Angeles, Calif.

[22] Filed: **July 1, 1974**

[21] Appl. No.: **484,942**

[52] **U.S. Cl.** **49/47**; 188/85

[51] **Int. Cl.²** **E06B 11/08**

[58] **Field of Search** ..... 49/47, 46, 43, 44, 42, 49/45, 141; 74/333; 192/41 R; 235/93; 188/85

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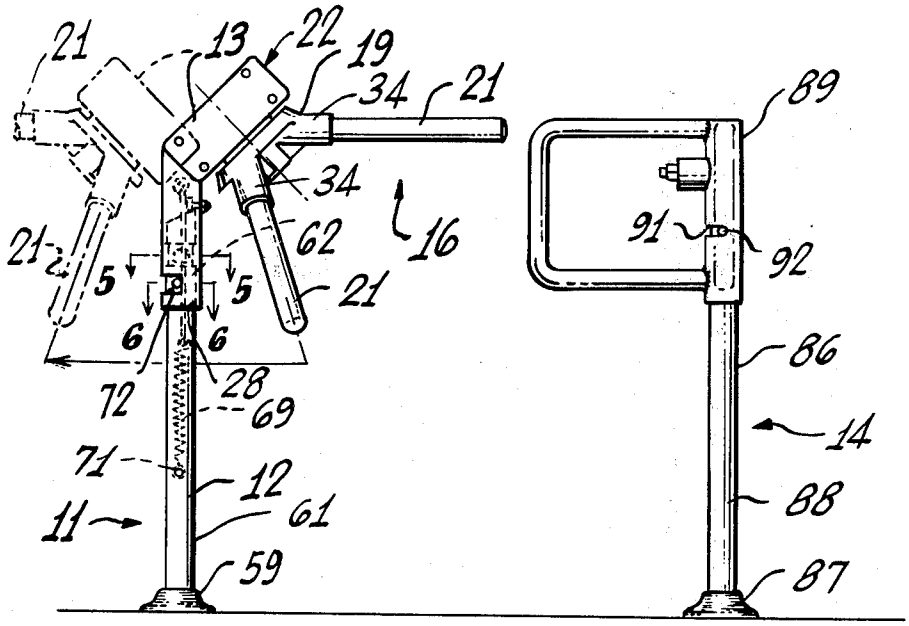
Primary Examiner—Philip C. Kannan

Attorney, Agent, or Firm—Fulwider Patton Rieber Lee & Utecht

[57] **ABSTRACT**

An improved turnstile comprising a turnstile head including a shaft, a rotatable hub mounted on the shaft carrying a plurality of extending arms and an improved spur and pinion gear assembly disposed within the turnstile head for one way rotation of the hub. The turnstile head is pivotally mounted on a support for rotation about an axis defined by the support. The improved turnstile cooperates with a barrier member to provide in one mode, a controlled passageway for the passage therethrough of individuals in a single direction and in a second mode wherein the turnstile head and barrier member are pivoted away from each other to provide an unobstructed passageway.

5 Claims, 7 Drawing Figures



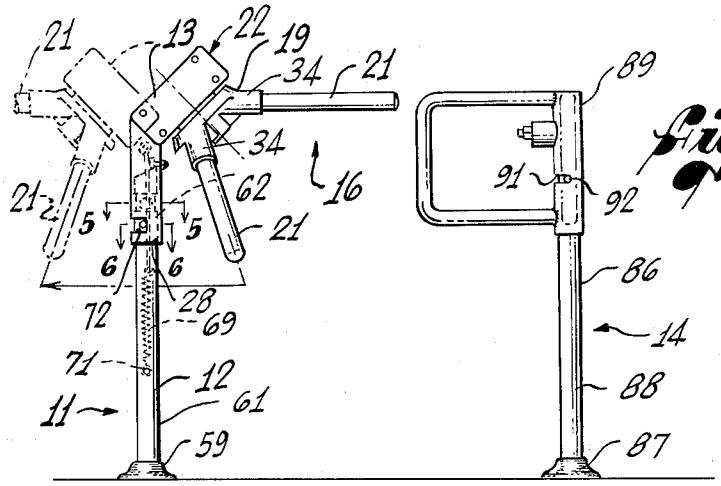


Fig. 1

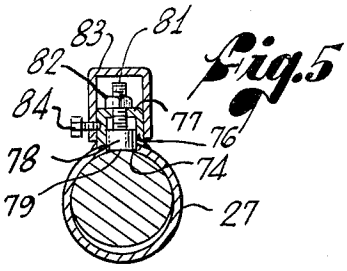


Fig. 5

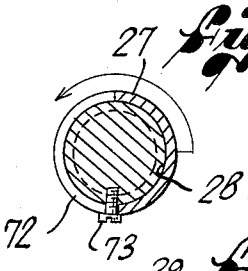


Fig. 6

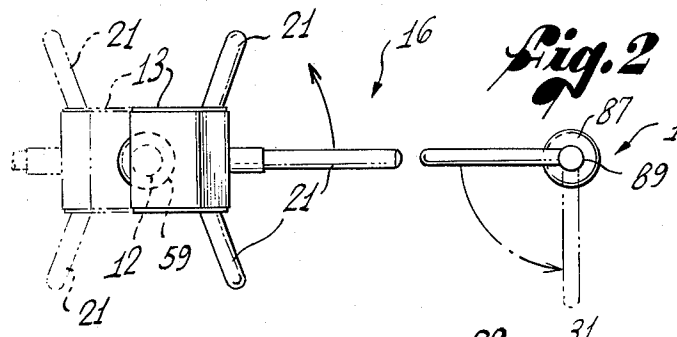


Fig. 2

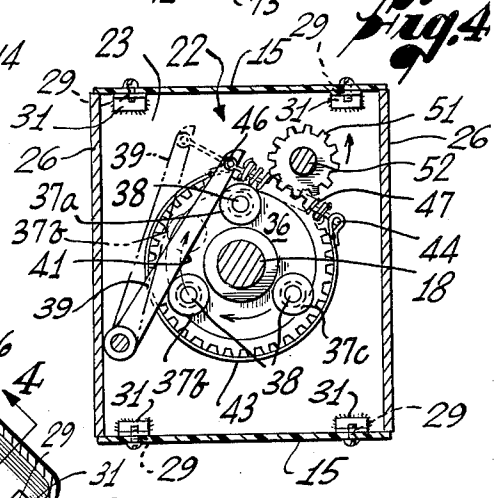


Fig. 4

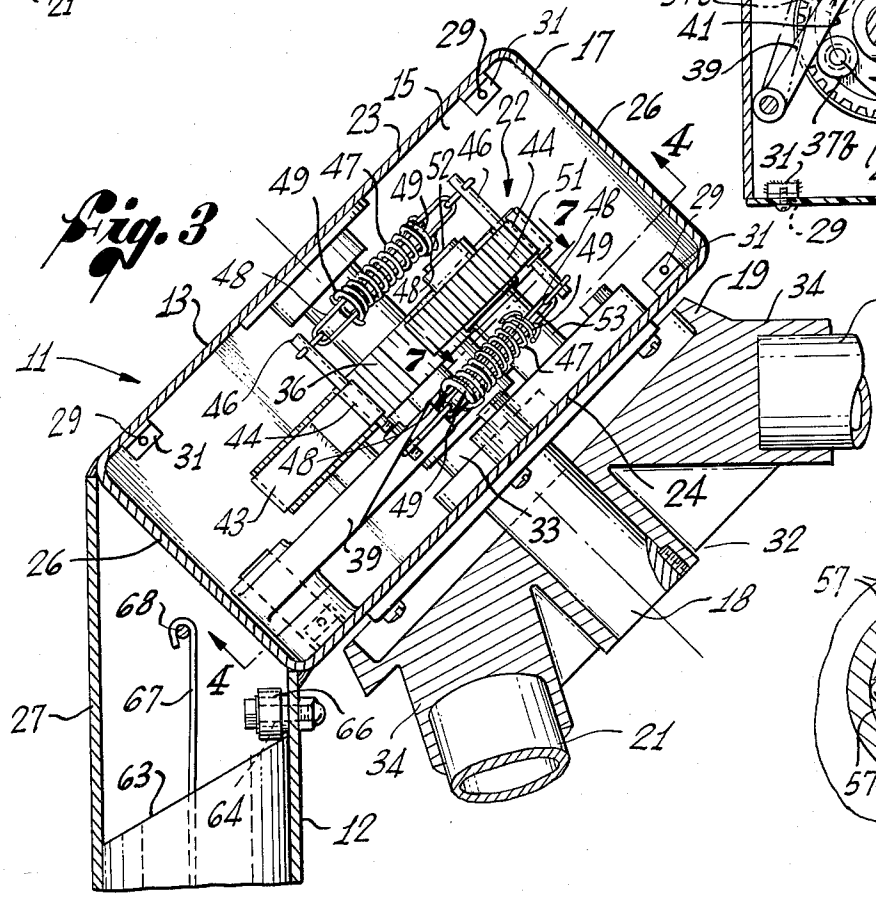


Fig. 3

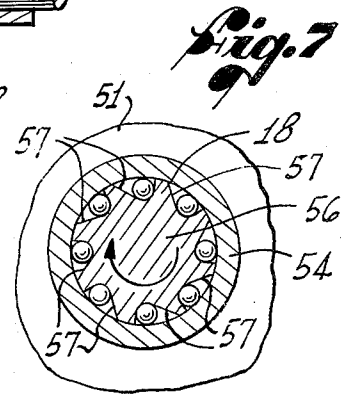


Fig. 7

TURNSTILE

BACKGROUND OF THE INVENTION

This invention relates generally to turnstiles and more particularly to improvements in turnstiles allowing for greater safety and convenience in connection with the use thereof.

The use of turnstiles in those situations where it is desired to keep accurate record of the number of persons entering a certain location or to provide means for selectively admitting persons with the price of admission are very well known in the art. Numerous types of turnstiles are available and generally comprise one or more arms which extend into a passageway and which are carried by a hub adapted for rotation in a single direction. Mechanism may be provided for counting the number of hub rotations and/or which are releasable only upon insertion of one or more coins of the proper denomination which represent the price of admission for passing through the turnstile.

A popular form of turnstile is the so-called "space saver" wherein the hub is mounted for rotation at an angle of approximately 45° from horizontal and the arms radiate outwardly from the hub in a cone type formation. In such a turnstile which normally utilizes three arms, one arm is in a substantially horizontal passage barring position while the remaining arms are in a generally vertical position. Such turnstiles utilize approximately half the space required for other types of turnstiles where the hub is mounted for rotation about a substantially vertical axis and the extending arms are contained in a horizontal plane of the hub.

Most turnstiles include a ratchet wheel which is carried by a shaft keyed to the hub and which rotates responsive to the rotation of the hub. A plurality of pawls are in engagement with the ratchet wheel to allow rotation in only a single direction. Means are provided for urging the ratchet wheel and associated rotating hub into the next succeeding "home" position. A pneumatic shock absorber is provided to prevent the hub from moving past its home position due to its inertia and for silencing the operation of the ratchet and pawl system.

In operation, conventional turnstiles have the annoying effect of the next succeeding arm striking an individual as he is passing through the turnstile. This is due to an increase in hub rotational speed which is caused by the mechanism urging the hub into its next succeeding home position. Moreover, in the event of emergencies, conventional turnstiles are normally provided with clutch means, shear pin means or the like to allow the arms and hub to rotate in an opposite direction if sufficient pressure is applied to overcome the clutch or shear pin. However, the arms of the turnstile continue to impede the passageway, and even though rotation of the arms in the opposite direction is afforded, the mere presence of the arms in the passageway represents a safety hazard in a panic situation.

In addition to the foregoing undesirable features of turnstiles, the ratchet and pawl mechanism, including the pneumatic shock absorber, is expensive to manufacture and raises the cost of manufacture and maintenance of the turnstile. Accordingly, prior art turnstiles can be said to be only partially successful in the provision of single directional passageways and other types of crowd control, particularly from the safety standpoint.

The present invention provides an improved turnstile wherein the extending arms can be removed from the passageway quickly and conveniently in the event of an emergency situation or the like. In addition the present invention provides an improved gearing system for controlling the rotation of the arms and hub of the turnstile in a manner which avoids the annoying problem connected with the passage through conventional turnstiles. The gearing system of the present invention is cheaper to manufacture and maintain and requires less space.

SUMMARY OF THE INVENTION

In accordance with the present invention, an improved turnstile, generally of the "space saver" type described above, includes a turnstile head pivotally mounted on a support for rotation about an axis defined by the support. A shaft is journaled in the turnstile head and a hub is keyed to the shaft for the rotation thereof responsive to the rotation of the hub. Arms carried by the hub radiate therefrom in a conical formation as is conventional with "space saver" type turnstiles, and when indexed in the home position, one of the arms is disposed in a substantially horizontal passage barring position while the remaining arms are disposed in a substantially vertical position. The improved gear assembly is disposed within the turnstile head.

More particularly, a spur gear is keyed to the shaft at the end thereof opposite the end portion to which the hub is keyed and is in meshed relationship with a pinion gear which is journaled in the turnstile head and which is provided with a roller clutch which allows for rotation of the pinion gear in a single direction only. Three depending roller cams are disposed about the periphery of the spur gear which is aligned on the shaft so that the roller cams are substantially radially aligned with the extending arms carried by the hub. A cam follower arm is pivotally mounted at one end for contact by the roller cams as the spur gear is rotated. Spring means cooperating with the cam follower arm urge the spur gear and the hub back into a home position.

Other aspects and advantages of the invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of the turnstile of the present invention illustrated as being in cooperation with a barrier to provide a restricted one-way passage and further shown in broken line the turnstile of the present invention swung into an unobstructing position;

FIG. 2 is a top plan view of an embodiment of the present invention similar to that shown in FIG. 1 and further showing, in broken line, the barrier moved into an unobstructed position;

FIG. 3 is an enlarged side view, partially in section, of the turnstile of the present invention;

FIG. 4 is an enlarged sectional view taken along line 4—4 of FIG. 3;

FIG. 5 is a sectional view taken along line 5—5 of FIG. 1;

FIG. 6 is a sectional view taken along line 6—6 of FIG. 1; and

FIG. 7 is an enlarged sectional view, partially broken away for compactness of illustration, showing the roller clutch assembly utilized to impart one way rotation for

the gear assembly of the turnstile of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

As shown in the drawings, the invention is embodied in a barrier system and an improved turnstile shown generally as **11**, comprising a support **12** and turnstile head **13** carried on the support for rotation about an axis defined thereby. A barrier shown generally as **14** is aligned with the turnstile **11** to cooperate therewith in defining a single direction passage, shown generally as **16.** The barrier **14** is also rotatable so that it and the turnstile **11** can be swung into unobstructing position with respect to the passage **16.**

In accordance with a primary aspect of the present invention, the turnstile head **13** includes a housing **17,** a rotatable shaft **18** extending through one wall of the housing and journaled therein, and a hub **19** carrying extending arms **21** keyed to the shaft. An improved spur and pinion gear assembly, indicated generally as **22,** is disposed within the housing **17** to allow for rotation of the hub **19** in a single direction between a plurality of home positions where one of the extending arms **21** is disposed in a passage barring position.

As is more specifically illustrated in FIGS. **3** and **4,** the housing **17** comprises a generally rectangularly shaped hollow body having upper and lower walls, **23** and **24,** and side walls **26.** A depending tubular mounting sleeve **27** having an open end **28** is affixed to one of the side walls **26** by suitable means, such as welding, for mounting of the housing **17** on the support **12.** As illustrated, the mounting sleeve **27** is disposed at an angle to the sidewall **26** to which it is affixed so that as mounted, the housing **17** is disposed at an angle to the horizontal, preferably about **45°.** The housing **17** is completed by end plates **15,** which are affixed to the housing by screws, not shown, threadably engaged in a threaded passage **29** provided in tabs **31** affixed to the inner surfaces of the upper and lower walls, **23** and **24.**

The shaft **18** extends through the lower wall **24** of the housing **17** and is rotatably journaled therein by a conventional bushing, not shown. The shaft **18** defines an outer portion **32** which extends externally of the lower wall **24** and an inner portion **33** extending into the interior of the housing **17.**

The hub **19** is keyed to the outer portion **32** of the shaft **18** for rotation therewith and the hub includes three socket members **34** in which are mounted the extending arms **21.** The extending arms **21** radiate outwardly form the axis of the hub **19** in a generally conical formation. As illustrated, the hub **19** is in the home position with one of the extending arms **21** extending substantially horizontally in a passage barring position and the remaining arms extending downwardly in a non-obstructing attitude. As the hub **19** rotates, the arms **21** describe a conical path moving between a substantially horizontal position and the downward position.

A spur gear **36** is keyed to the inner portion **33** of the shaft **18** and rotates with the shaft responsive to the rotation of the hub **19.** Three roller cams **37***a*, **37***b* and **37***c* are disposed about the periphery of the spur gear **36** and each roller cam is journaled on a depending shaft **38** carried by the spur gear for rotation about an axis defined by the depending shaft. Each roller cam **37***a*, **37***b* and **37***c* is disposed about the spur gear **36** in a position corresponding to the position of the extending arms **21** on the hub **19.** Thus, the spur gear **36** is aligned on the shaft **18** so that a line extended through the axis of rotation of a roller cam **37** will intersect with a line extended through the longitudinal axis of a corresponding extending arm **21.**

An elongated cam follower arm **39** having a camming surface **41** disposed toward the roller cams **37** is connected at one end to a shaft **42** extending normally from the lower wall **24** of the housing **17** for pivoting about an axis defined by the shaft responsive to the urging of the roller cams **37** against the caming surface. A friction band **43** is disposed about a major portion of the circumference of the spur gear **36.** The friction band **43** is formed of spring steel or the like having a set so that the band clamps about the circumference of the spur gear **36.** The ends of the friction band are turned back on themselves to define open ended cylindrical portions **44** through each of which extends an elongated pin **46,** the lower extending end portion of one of the pins **46** being carried by the opposite free end of the cam follower arm **39.** A normally expanded coil spring **47** is positioned between the extending upper end portions of the pins **46** and between the free end of the cam follower arm and the lower extending end portion of the other pin for urging follower arm **39** inwardly against the roller cams **37.** The springs **46** are carried between the ends of the rods by elongated wire loops **48** extending laterally from each of the rods **46** and from the free end of the cam follower arm **39** and having U-shaped ends turned back over a cap **49** disposed at each end of each of the coil springs **47.**

A pinion gear **51,** in meshed relationship with the spur gear **36,** is journaled on a shaft **52** for rotation about an axis defined by the shaft. The shaft **52** is carried in a boss **53** affixed to the lower wall **24** of the housing **17.** As is more specifically shown in FIG. **7,** the pinion gear **51** is adapted for one way rotation by a conventional roller clutch which includes an outer race **54** coaxially affixed to the pinion gear and an inner race **56** defined by the shaft **52.** The inner race **56** is provided with a plurality of grooves and camming surfaces **57** defining a cage for a plurality of rollers **58** disposed between the inner race and the outer race. As illustrated, motion of the outer race **54** in a clockwise direction can freely occur, while motion of the outer race in a counterclockwise direction is prevented by the rollers **58** being cammed against the outer race **54.** The camming action locks the inner race **56** and the outer race **54** preventing rotation in a counterclockwise direction.

In operation, the gear assembly **26** is normally indexed in the home position as shown in solid lines in FIG. **4** with the cam follower arm **39** at it's innermost position and the camming surface **41** in contact with two of the roller cams, **37***a* and **37***b*. Rotation of the hub causes the spur gear **36** to rotate and the cam roller **37***b* to act against the camming surface **41** of the cam follower arm **39** causing it to pivot outwardly until it reaches its maximum point shown in broken line in FIG. **4.** Outward pivoting of the cam follower arm compresses the normally expanded springs **47** and as roller cam **37***b* passes the point of maximum extention with respect to the cam follower arm **39,** the spring **47** acting against the free end of the cam follower arm cause it to pivot inwardly and the camming surface **41** acts against the roller cam **37***b* to rotate the spur gear **36** until the cam roller **37***b* reaches the position formerly occupied by cam roller **37***a* at which point the energy

of the springs is expended. The roller cam 37*c* occupies the position formerly occupied by roller cam 37*b* adjacent the pivoted end of the cam follower arm **39** which effects a reindexing of the gear assembly **26** in the home position and aids in preventing inertial rotation of the spur gear **36** past the home position.

The friction band **43** exerts a substantially uniform drag on the spur gear **36** so that increased rotational speed during the inward pivoting of the cam follower arm **39** is prevented. Due to the resilient nature of the friction band **43,** the end thereof carried by the cam follower arm **39** is free to move with the free end of the cam follower arm. Rotation of the gear assembly **26** in the opposite direction is prevented by pinion gear **51** as previously described.

Although the foregoing discussion relates to a space saver type turnstile, it will be evident that the gear assembly **22** may be utilized in other types of turnstiles such as when the axis of rotation of the hub is substantially vertical.

It will also be evident that conventional counter mechanisms may be utilized in the gear assembly **22** of the present invention. Thus, a counter may be mechanically linked with the cam follower arm **39** or otherwise engaged with the spur gear **36** or the pinion gear **51.**

In accordance with the present invention, the turnstile head **13** is pivotally mounted on the support **12** for rotation about an axis defined by the support. In this manner the extending arms **21** can be moved between a passage barring position and a non-obstructing position. This feature of the invention is highly desirable, particularly in the case of an emergency when it is necessary to provide unobstructed passage for rapid movement therethrough.

As is more specifically shown in FIGS. **3, 5** and **6,** the support **12** for the turnstile head **13** comprises a base **59** and upstanding hollow post **61** having an enlarged upper end portion **62** and a biased upper end **63.** The upper end portion **62** is received within the mounting sleeve **27** of the housing **17.** A laterally, inwardly extending shaft **64** is provided in the wall of the mounting sleeve **27** and a roller **66** is journeled on the inner end of the shaft for carrying the turnstile head **13** on the biased upper end **63** for rotation about an axis defined by the post **61.** A downwardly depending connecting rod **67** is carried by a laterally extending pin **68** in the mounting sleeve **27** and is connected to a spring **69** carried by a laterally extending pin **71** in the post **61.** The rod **67** and the spring **69** cooperate aid in preventing unintentional upward movement of the turnstile head **13** on the post **61.**

A close ended slot **72** extends around a portion of the lower end of the mounting sleeve **27** and cooperates with a stop bolt **73** (FIG. **6**) threadably engaged in the upper end portion **62** of the post **61** extending outwardly therefrom through the slot to limit rotation of the turnstile head **13** between a first position with the extending arms **21** barring the passage **16** and a second position with the turnstile head pivoted about the post so that the arms are in a non-obstructing position with respect to the passage.

The amount of force required to rotate the turnstile head about the post **61** is adjustable so that more or less force need be exerted in order to effect the pivoting of the turnstile head **13.** As is most clearly shown in FIG. **5,** an aperture **74** and a boss **76** having a threaded passage **77** communicating with the aperture are provided on the mounting sleeve **27.** A piston **78** having an innerface **79** contoured to correspond with the curvature of the upper portion **62** of the post **61** is loosely carried in the aperture **74.** A threaded shaft **81** is engaged in the threaded passage **77** for contacting the piston **78** to adjustably urge the innerface **79** against the upper portion **62** of the post **61** and a lock nut **82** locks the shaft once it is adjusted. A cap **83** is provided over the boss **76** and is held in position by bolt **84.**

When in the normal position with the extending arms **21** in the passage barring position, it is preferred that the roller **66** be located on the uppermost portion of the biased upper end **63** of the post **61.** As the turnstile head **13** is pivoted, the roller **66** travels down the biased end **63,** thus utilizing gravity to aid in the pivoting movement. The rod **67** and spring **69** pulling downwardly on the turn stile head **13** aid in maintaining the roller **66** in contact with the biased upper end **63** and in the pivoting movement.

As previously mentioned, the turnstile **11** of the present invention can be utilized in combination with a barrier **14** which can also be pivoted into a non-obstructing position. The combination allows for use of a passageway for a crowd controlling entrance when the turnstile **11** and the barrier **14** are in one position and as an unobstructed exit when the turnstile and barrier are swung into unobstructing positions.

As is more specifically shown in FIGS. **1** and **2,** the barrier **14** comprises a support **86** including a base **87,** an upstanding post **88** and a gate member **89** pivotally carried on the upper end of the post for swinging about an axis defined by the post. A slot **91** provided in the gate member **89** cooperates with a stop **92** carried by the post **88** to limit the pivoting movement of the gate member **89** to between a passage barring position where the gate member cooperates with the extending arms **21** of the turnstile **11** to define a controlled passageway and non-obstructing position, shown in broken line, where both the gate member **89** and the extending arms of the turnstile are moved into non-obstructing positions and the passageway is open.

I claim:

1. In a tunstile comprising turnstile means, a shaft journaled in said support means and including opposed extending ends, an armed hub mounted on one end of said shaft, a spur gear mounted on the opposite end of said shaft, said spur gear including cam means corresponding to the position of said hub arms; an elongated cam follower arm pivotally carried at one end thereof by said support means and means normally urging the opposite end of said arm into the path of said cam means, the improvement comprising:

a friction band disposed about a portion of the circumference of said spur gear in frictional engagement therewith;

an extending pin carried by each end of said band, said pin extending parallel to the axis of rotation of said spur gear and defining an upper extending end portion and a lower extending end portion, said lower extending end portion of one of said pins being carried by said opposite end of said arm; and

a coil spring carried between said upper extending end potion of said pins and a coil spring carried between said opposite end of said arm and said lower extending end portion of said other pin, whereby said coil springs act to urge said arm into the path of said cam means.

2. A turnstile comprising:

a turnstile head including a rotatable hub having three extending arms radiating outwardly therefrom in a conical formation, said hub being adapted for rotation about an axis disposed at an angle to the horizontal; and

an upstanding support including an upper end pivotally carrying said turnstile head whereby said turnstile head is swingable between a first position with at least one of said extending arms in a passage barring position and a second position with said extending arms clear of said passage.

3. The turnstile of claim 9 wherein said turnstile head comprises:

a generally rectangular housing including upper, lower and side walls and a angularly disposed tubular, mounting sleeve affixed at one end to one of said side walls and open at the opposite end;

a shaft journaled in said lower wall and defining an outer extending portion carrying said hub and an inner end portion disposed in said housing;

a spur gear carried at said inner end portion of said shaft for rotation in response to rotation of said hub and said shaft, said spur gear carrying three depending shafts, each of which rotatably carries a roller cam for rotation about an axis defined by said shaft, said shafts being disposed about the periphery of said spur gear so that each of said roller cams are aligned with a corresponding extending arm whereby a line extended through the axis of rotation of each of said roller cams intersects a line extended through the longitudinal axis of each of said corresponding extending arms;

an elongated cam follower arm pivotally connect at one end to a shaft extending from said lower wall and having an opposite free end; said cam follower arm having a camming surface disposed towards said roller cams for contact therewith, said cam follower arm being pivoted between a home position with said camming surface contacting two of said roller cams and an intermediate position with said camming surface in contact with one of said roller cams responsive to the rotation of said hub and spur gear and urging of said one roller cam;

a friction band disposed about a portion of the circumference of said spur gear, said friction band having a set so that said band is urged into frictional engagement with said spur gear, said friction band defining two ends, one end being carried by said free end of said cam follower arm;

at least one coil spring disposed between said free end of said cam follower arm and the other end of said friction band for urging said cam follower arm to pivot from said intermediate position to said home position thereby acting against said one roller cam to rotate said spur gear and said hub into the home position; and

a pinion gear disposed between said ends of said friction band in meshed relation with said spur gear, said pinion gear being journaled on a shaft carried by said lower wall for rotation in a single direction thereby to allow rotation of said spur gear in one direction and for locking said spur gear to prevent rotation thereof in the opposite direction.

4. The turnstile of claim 2 wherein:

said upper end of said support is disposed in said mounting sleeve of said turnstile head; and

a roller is journaled in said mounting sleeve for engagement with said upper end and for travel about said upper end.

5. The turnstile of claim 4 further including means limiting travel of said roller about said upper end of said support whereby said turnstile head is limited to pivoting between said first position and said second position.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,914,902
DATED : October 28, 1975
INVENTOR(S) : Everett W. Lamberson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 42 change "journeled" to -- journaled --;

line 49, after "cooperate" insert -- to --;

Column 7, line 34, change "connect" to read -- connected --.

Column 6, line 43, claim 1, change "tunstile" to -- turnstile --

line 64, change "potion" to -- portion --;

Column 7, line 13, change "9" to -- 2 --;

Column 8, line 27, change "2" to -- 1 --.

Signed and Sealed this

tenth Day of *February 1976*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks