Feb. 7, 1939. S. J. LIACOS 2,146,150

TURNSTILE

Filed Dec. 5, 1936 3 Sheets-Sheet 2

FIG. 6

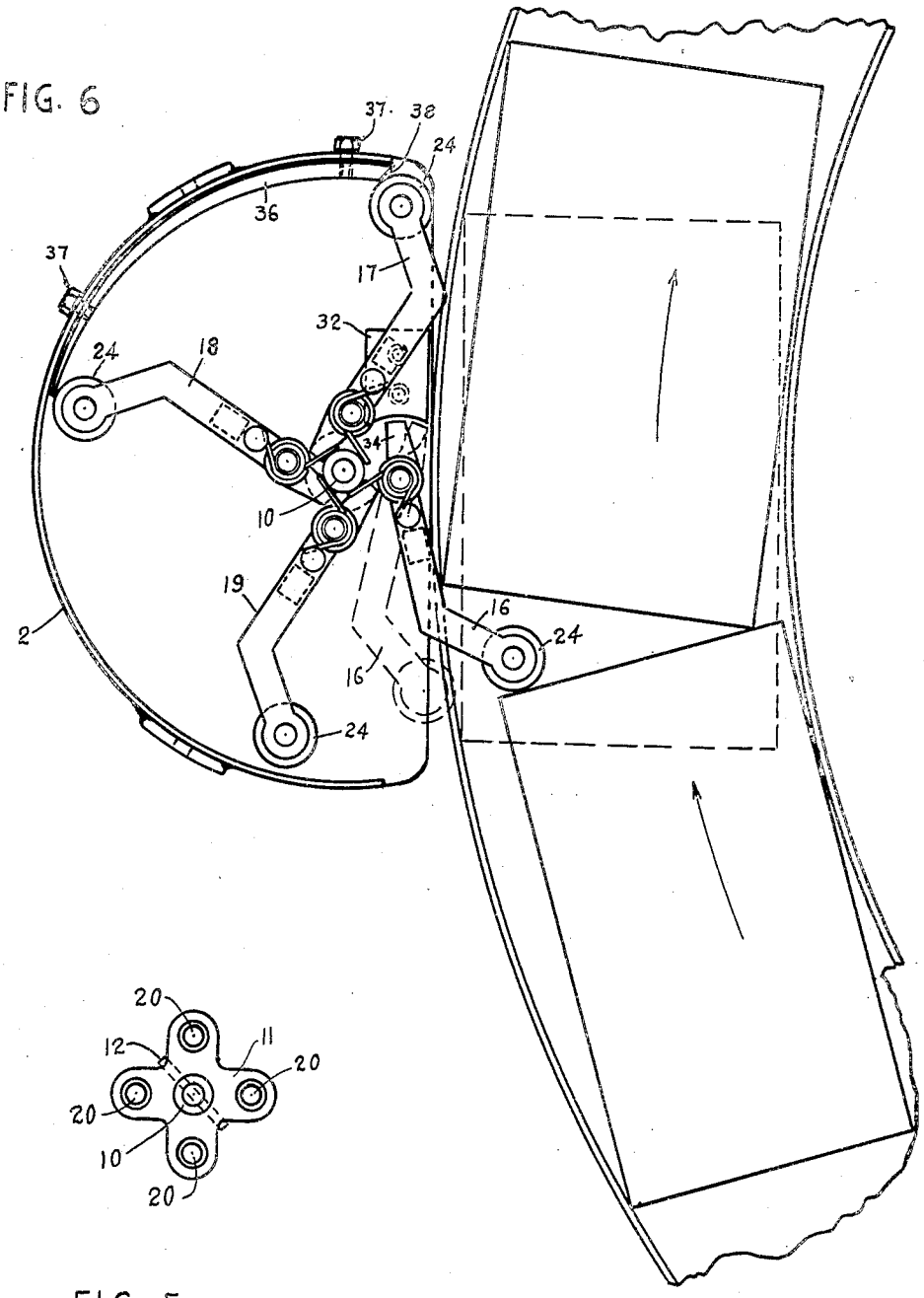


FIG. 5

INVENTOR.
STAVROS J. LIACOS
BY Geo. M. Dowe
ATTORNEYS.

Feb. 7, 1939. S. J. LIACOS 2,146,150

TURNSTILE

Filed Dec. 5, 1936 3 Sheets-Sheet 1

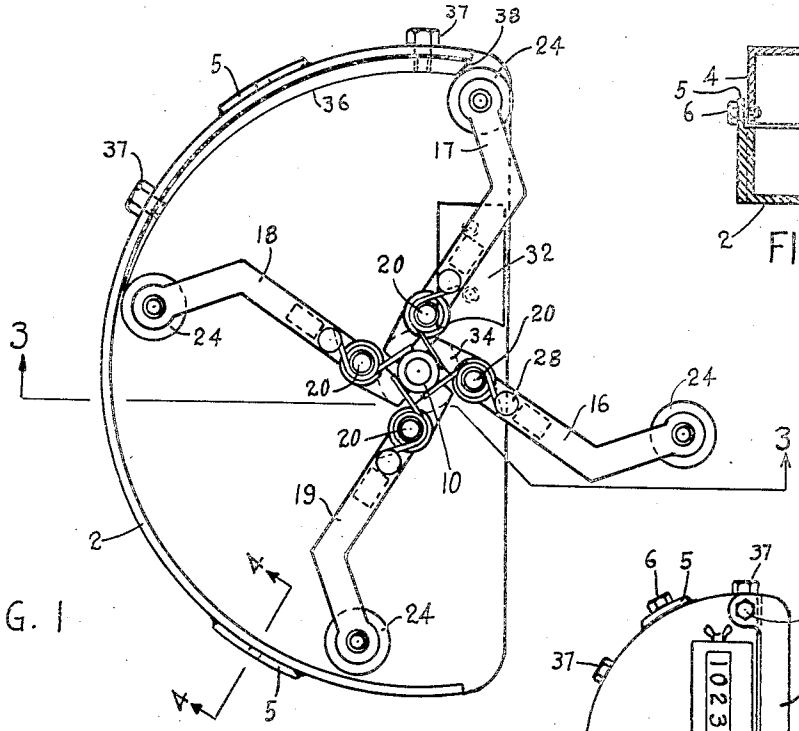


FIG. 1

FIG. 4

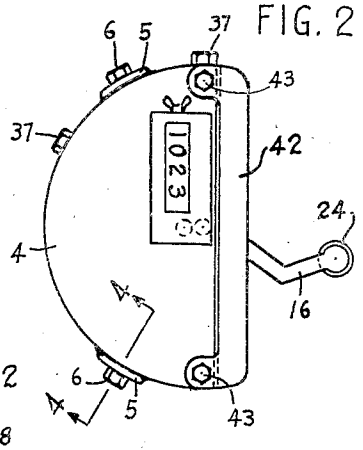


FIG. 2

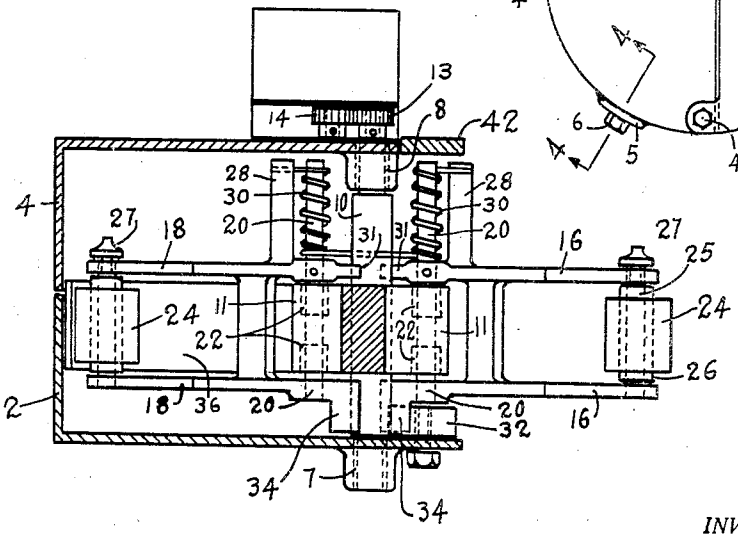


FIG. 3

INVENTOR.
STAVROS J. LIACOS
BY Geo. M. Dowe
ATTORNEY.

Feb. 7, 1939. S. J. LIACOS 2,146,150

TURNSTILE

Filed Dec. 5, 1936 3 Sheets-Sheet 3

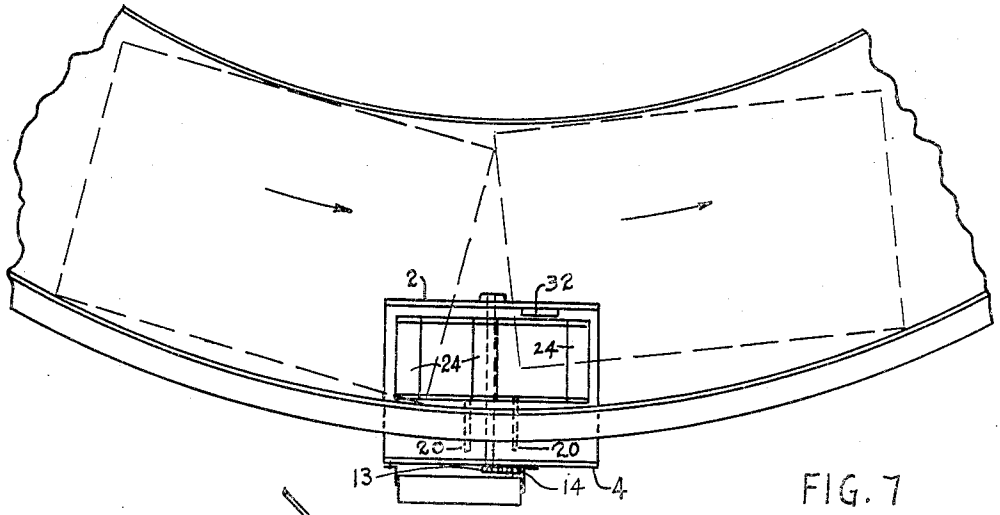


FIG. 7

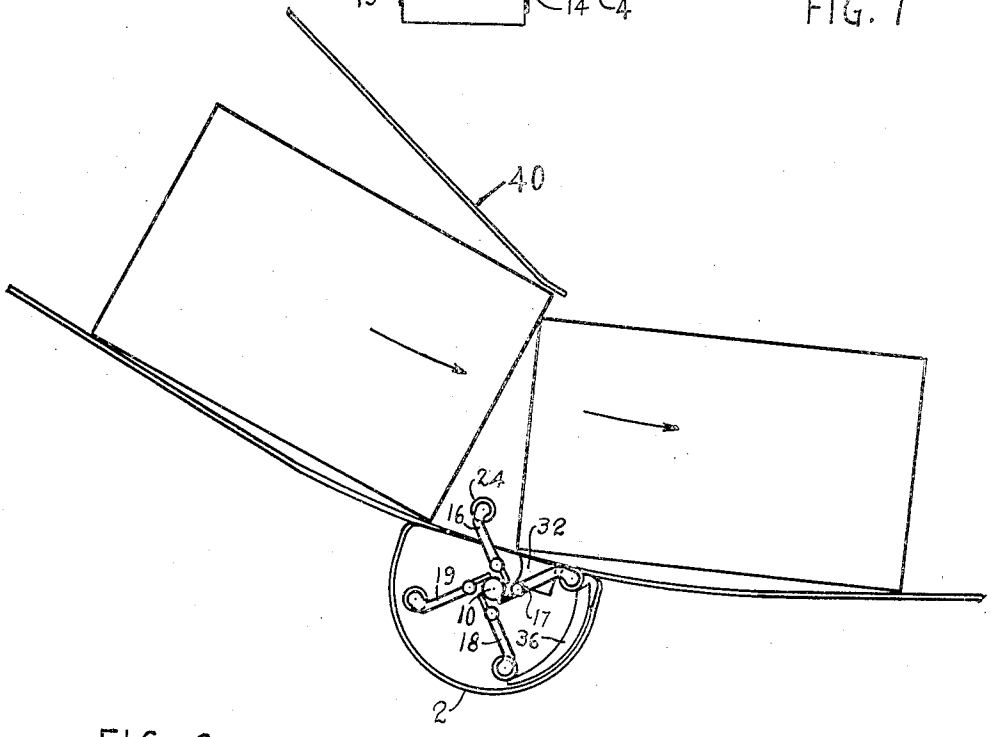


FIG. 8

INVENTOR.
STAVROS J. LIACOS
BY Geo. M. Dowe
ATTORNEYS.

Patented Feb. 7, 1939

2,146,150

UNITED STATES PATENT OFFICE

2,146,150

TURNSTILE

Stavros J. Liacos, Brooklyn, N. Y., now by judicial change of name Stephen John Lewis

Application December 5, 1936, Serial No. 114,310

8 Claims. (Cl. 235—98)

The herein described invention relates broadly to turnstiles and more particularly to a package operated turnstile in which the passage of individual objects may be indicated, for example, by means of a counting mechanism.

The invention has for its objects the provision of a turnstile which will permit the passage of objects occupying more space than that normally existing between the turnstile arms; a turnstile which is reliable in operation; one in which overthrow is prevented and in which a definite position of the turnstile is assured at each step of movement thereof enabling an accurate count to be had of the objects passing through the turnstile.

In the attainment of these and other objects, an important feature of the invention relates to the provision of yielding arms which permit the passage of objects which otherwise would be blocked by the turnstile.

Another feature of the invention relates to the utilization of the yieldability of the arms to render effective an overthrow preventing means.

A further feature relates to the utilization of the yieldability of the arms in cooperation with means to prevent backward rotation of the turnstile and accurately to locate the turnstile at each step of movement thereof thereby enabling a correct count of objects passing therethrough to be had.

A still further feature relates to the provision of arms which are bent in the plane of their motion which bending more readily assures the positioning of an arm in the space between two closely following objects to be counted.

Further features and advantages will become apparent from the following description and claims when taken in connection with the accompanying drawings in which:

Figure 1 is a top plan view of my improved turnstile with the top portion of the casing removed and with the turnstile arms in normal position.

Figure 2 is a top plan view on a smaller scale with the top portion of the casing in place and showing the counting mechanism in position.

Figure 3 is a section on the line 3—3 of Figure 1 and on the same scale thereof.

Figure 4 is a detailed sectional view on the line 4—4 of Figure 1 but on a smaller scale.

Figure 5 is a detail of the spider on which the turnstile arms are mounted.

Figure 6 is a view similar to Figure 1, but showing the position which the arms of the turnstile assume during operation.

Figure 7 is a top plan view of a turnstile similar in general construction to that illustrated in Figures 1 and 6 but which is adapted to be positioned underneath a conveyor operating substantially in a horizontal plane and to be actuated by the packages passing therealong; and

Figure 8 is a side elevation of a turnstile similar to that shown in Figure 1 but situated underneath a runway or chute in which the packages move in a general vertical plane.

Referring to the drawings, there is provided a casing which for convenience in construction and assembly, is divided into two sections 2 and 4, Figure 3. The section 2 is provided with upstanding lugs 5, Figures 1, 2 and 4, screw bolts 6 passing through the lugs and through the section 4 of the casing securing the two parts of the casing together.

Within the casing and journaled in bearings 7 and 8 is a shaft 10 to which is secured a spider 11, Figure 5, by means of a pin 12. In order that the rotation of the shaft and spider may be indicated or counted, a pinion 13 is secured to the end of the shaft 10 shown in Figure 3, which pinion engages a pinion 14 forming part of a revolution counter of any well known construction, which may be either mechanically or electrically operated.

A series of turnstile arms 16, 17, 18 and 19 are each pivotally mounted on the spider 11, said arms being carried by shafts 20 which are journaled in bushings 22, Figure 3, carried by the spider. These shafts 20 project beyond the spider to a point adjacent the top of the casing section 4 as shown in Figure 3.

The turnstile arms are forked as shown in Figure 3 and between the forks near the outer ends thereof is pivotally supported a roller 24, each roller having a bushing 25 freely rotatable on a pivot pin 26. In order to lubricate the roller bearings a grease gun cap 27 is provided.

The upper fork of each turnstile arm is provided with an upwardly projecting lug 28. About each of the shafts 20 is slipped a coiled spring 30 one end of which bears against a lug 28 and the other end of which bears against the shaft 10. These springs 30 tend to rotate each turnstile arm about the shaft 20 in an anti-clockwise direction as viewed in Figure 1. This movement, however, is limited by a lug 31 which also engages the shaft 10. Such lug may be a prolongation of the upper fork of each of the turnstile arms.

By reason of the springs 30 being mounted and operating in the manner described, each turnstile arm is yieldable in a clockwise direction as

viewed in Figures 1 and 6 through an angle of approximately 90° but when pressure is brought to bear against the roller 24, the lug 31, when in contact with the shaft 10, causes the anticlockwise movement of the turnstile arm to be transmitted to the spider 11 and hence to the shaft 10 which in turn actuates the counter.

One of the functions performed by the yieldability of the turnstile arms is illustrated in Figure 6 wherein the turnstile is shown adjacent a runway or conveyor which is curved in the vicinity of the turnstile. In this figure a package is shown in dash outline as having engaged the roller of the arm 17 and moved the turnstile shaft through one-quarter of a turn. It will be noted that the package is of such length that it cannot fit between two turnstile arms when said arms are in their normal position. However, due to the fact that the following arm 16 is backwardly yieldable, said arm assumes the dotted line position shown in Figure 6 and permits the package to pass through the turnstile to the full line position. The arm 16, however, is urged by its spring 30 and moves to the full line position shown in Figure 6 in front of the following package which in turn passes through the turnstile actuating it another one-quarter turn. It is also to be noted that the curved runway enables the packages to take the position shown, leaving a gap between adjacent packages into which gap a turnstile arm may locate itself. It is obvious, that if the arms were rigidly fixed a package of the size shown in Figure 6 could not pass.

In order that the passage of each package or object may be accurately counted, it is necessary that the turnstile make but one step of movement during the passage of each object. To accomplish this purpose, I provide a stop 32 secured to the section 2 of the casing as shown in Figure 3 which stop has a curved face against which a lug 34, projecting from the lower fork of each turnstile arm, may abut. The lug 34, however, is not in position to abut the stop 32 unless a turnstile arm has been deflected backwardly from its normal position. This will be apparent from a comparison of Figures 1 and 6. In Figure 1, the arm 16 is shown in normal position and here the lug 34 is free from the stop 32. In Figure 6, however, the arm 16 is shown as having been deflected and in this figure the lug 34, indicated partly in dotted outline, is shown as having been positioned to engage the stop if the shaft 10 tended to rotate further as might happen if the arm 17 had been moved very violently towards its position shown in Figure 6. In this way overthrow of the parts is prevented and accurate counting assured.

To assure a definite position of the turnstile at each step by step movement thereof, I provide a cam 36 secured to the section 2 of the casing by means of bolts 37, Figures 1 and 6. This cam has an abrupt shoulder 38 adjacent to which the roller 24 of an arm rests in normal position. The next adjacent arm, as 18, Figure 6, has its roller positioned just beyond the other end of the cam. The manner in which this cam functions can be illustrated by reference to Figure 6. As long as the arm 16 remains in its yieldable position there is no movement of the shaft 10 and spider carried thereby. As the leading package, however, passes along the runway, the arm 16 urged by its spring 30 tends to fall in behind the leading package and rotates on the shaft 20 until the lug 31 of the arm 16 engages the shaft. The arm 16 then ceases its rotation about the shaft 20 but up to this time the arm 17 remains in the position shown. As soon, however, as the following package moves the arm 16 from its then normal position, the arm revolves about the center of the shaft 10 thereby causing the shaft 10 and spider 11 to rotate. The arm 17 yields backwardly to permit the roller 24 to ride up the face 38 and onto the curved face of the cam 36. As soon, however, as the turnstile has been operated one-quarter of a turn, the roller 24 rides off the opposite end of the cam and the spring 30 forces the arm to normal position with the lug 34 abutting the shaft 10, as shown for the arm 18, Figure 6. Any tendency to rotate the turnstile in a backward direction is prevented by the cam 36 in conjunction with the arm 18 or any other arm in similar position. Furthermore, as the roller 24 of any arm bears against the cam surface 36, the spring 30 tends to cause rotation of the spider 11 and to bring it and the arms carried thereby, to normal position.

The arms of the turnstile are shown as slightly bent or elbowed and this construction is provided to permit an arm more readily to fall into the space between two packages especially where the packages are of different widths. As shown in Figure 6, for instance, the following package is narrower than the leading package and is positioned against the right edge of the runway as shown in said figure. The bend in the turnstile arm however, permits the roller to be positioned in front of the package so that the package may actuate the turnstile at the proper time.

In Figure 7, the turnstile is adapted to be placed beneath a conveyor moving in a substantially horizontal plane. The construction of the turnstile is substantially the same as the construction already described, with the exception that for some purposes the rollers 24 are made longer and the turnstile arms may be somewhat shorter as indicated in Figure 8. Since the bottom of the packages in the form illustrated in Figure 7 travel in the same plane, it is possible to utilize shorter arms with the same accuracy of counting as is possible with the longer arms shown in Figures 1 and 6. With the shorter arms likewise the speed of the counting operation of the turnstile is somewhat greater. The greater length of rollers also lends itself to proper engagement with packages or boxes in which the bottom is open. In such case the rollers are long enough to engage on the edges or rims of the boxes. In Figure 8 the turnstile is located under a runway or chute and in such case there is a tendency for the boxes to ride up on one another. To prevent this, a plate 40 is provided.

In order to permit access to the springs 30, I provide a removable plate 42, Figure 2, secured to the section 4 of the casing by screw bolts 43. When this plate is removed, any spring whose arm is in a position occupied by the arm 16, Figure 1, will be exposed and in case of breakage the broken spring may be readily removed and a new spring inserted in its place.

While I have described a specific use of my improved turnstile, it is nevertheless to be understood that it is not confined to the counting of boxes or packages but is useful in connection with any objects where the space occupied by an object is greater than that between turnstile arms when such arms are in normal position. It is quite common to provide turnstiles at the entrance of games, platforms for trains, and the like, through which persons pass after paying an admission fee. It is essential in such turnstiles

that only one person pass at a time but it is desirable that the passage through this turnstile be conveniently accomplished. It frequently happens that passengers boarding trains carry packages with them and that difficulty is experienced in passing through turnstile having rigidly mounted arms. The present invention lends itself admirably to turnstiles of this character.

It is obvious, therefore, that variations may be resorted to within the scope of the foregoing disclosure without departing from the spirit of the invention. It is also obvious that parts of the invention may be used without others.

What I claim is:

1. A counter and operating mechanism therefor, said operating mechanism including a shaft, a member carried by said shaft, a plurality of arms each pivoted to said member, each arm having a portion extending beyond its pivotal point towards said shaft and limited in its pivotal movement by said shaft, and a spring tending to urge each arm towards shaft engaging position.

2. A turnstile having a rotatable member, a counter operated by said member upon a definite degree of rotation thereof, a plurality of arms carried by said member for rotating it step by step to actuate said counter, each arm yieldable to permit passage of an object occupying a space greater than the space between adjacent arms when in normal position and means for preventing overthrow of said rotatable member rendered effective by the yielding movement of an arm.

3. A package operated turnstile having a plurality of arms each adapted to be engaged by a package passing the turnstile, each arm yieldable backwardly to permit passage of a package occupying greater space than that between adjacent arms when in normal position, each arm having a bend between its end in the plane of its motion to enable it more readily to engage between successive packages.

4. A turnstile having a plurality of arms each adapted to be engaged by an object passing the turnstile, each arm yieldably mounted, a roller at the end of each arm, a stationary cam having an abrupt rise at one end and tapering towards its opposite end, said abrupt rise defining the normal position of the turnstile when a roller on an arm is adjacent said rise, the tapering portion of the cam surface in cooperation with the yieldability of an arm tending to cause rotation of the turnstile in normal direction of movement thereof, said cam surface also acting to prevent reverse movement of the turnstile.

5. A turnstile having a rotatable member, a plurality of object engaging yielding arms pivoted to said member, means to prevent pivotal movement of each arm when engaged by an object passing through the turnstile to thereby move said rotatable member, said means permitting yielding of an arm in the opposite direction through an angle approximating 90° to permit the passage of an object occupying greater space than the normal space between adjacent arms.

6. A device of the class described, said device having a rotatable member and a plurality of arms pivotally carried thereby, yielding means tending to project each arm into the path of successive objects passing through the turnstile, means to limit the pivotal movement of each arm thereby to transmit movement of each arm to said rotatable member, said yielding means permitting the movement of an arm in the opposite direction to the normal turning movement of the turnstile to permit the passage of an object occupying greater space than the normal space between adjacent arms.

7. A package operated turnstile, said turnstile having a rotatable member, a plurality of arms pivotally mounted on said member, said arms adapted to be engaged by packages passing through the turnstile, each arm having a motion of revolution about the center of said rotatable member and a motion of rotation about its own pivot, means to limit the pivotal movement of an arm in the direction of normal turning of the turnstile, resilient means tending to move an arm as far as permitted by said limiting means, but allowing movement of an arm in the opposite direction to permit the passage of an object occupying greater space than the normal space between adjacent arms when said arms are in engagement with said limiting means.

8. A counter and operating mechanism therefor, said operating mechanism including a shaft, a member carried by said shaft, a plurality of arms each pivoted to said member, means to limit the pivotal movement of an arm on said member in one direction to operate the counter by the revolution of an arm about said shaft through a definite arc of orbital movement, each arm being so mounted on said member as to permit pivotal movement of said arm in the opposite direction to permit the passage of an object occupying greater space than the normal space between adjacent arms when said arms are in engagement with said limiting means.

STAVROS J. LIACOS.