

March 30, 1926.

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F. HEDLEY ET AL  
TURNSTILE MECHANISM

Filed June 25, 1921

5 Sheets-Sheet 1

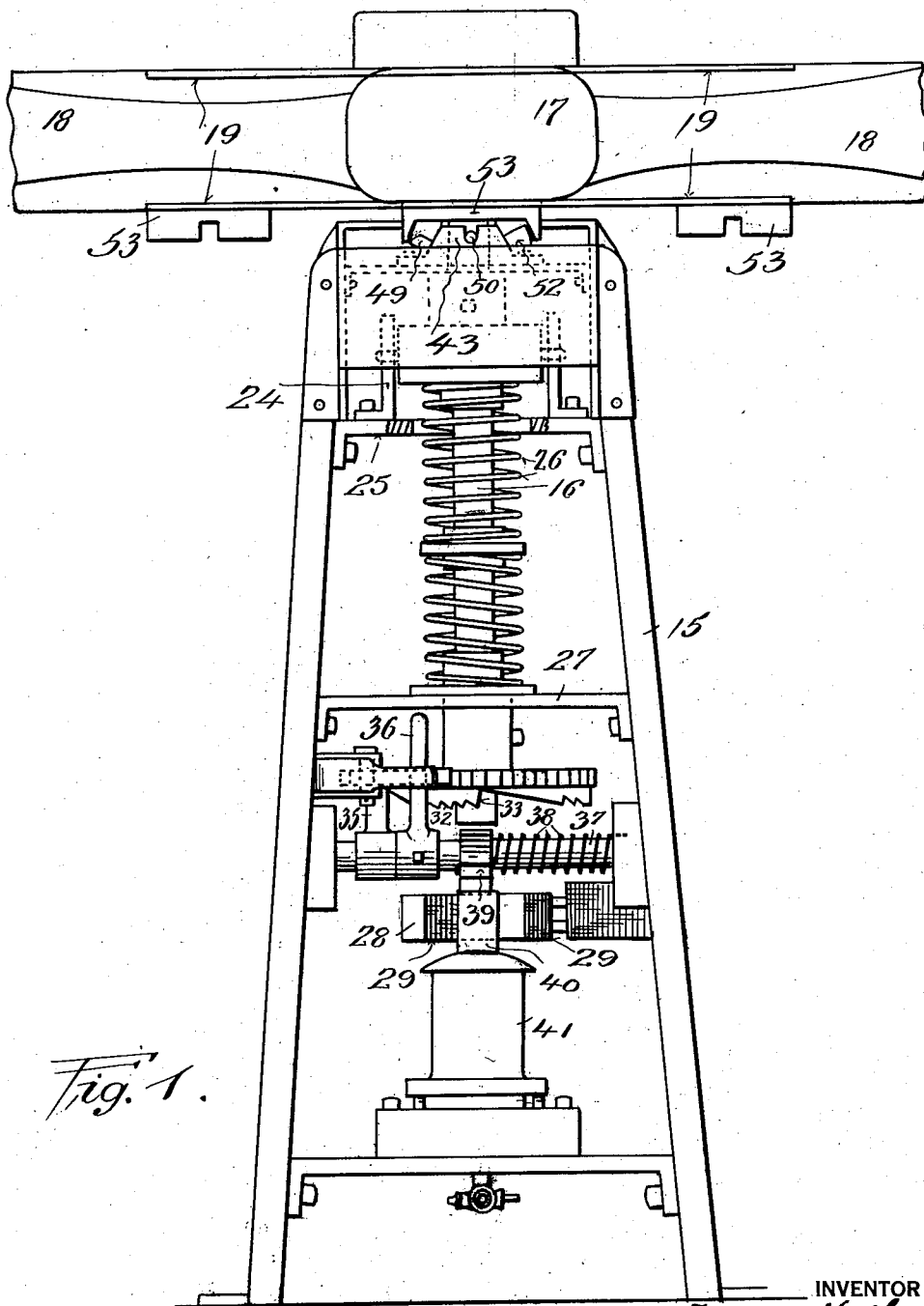


Fig. 1.

INVENTOR  
Frank Hedley  
BY *Chas* ATTORNEYS  
James S. Dwyer  
Dwyer & Dwyer

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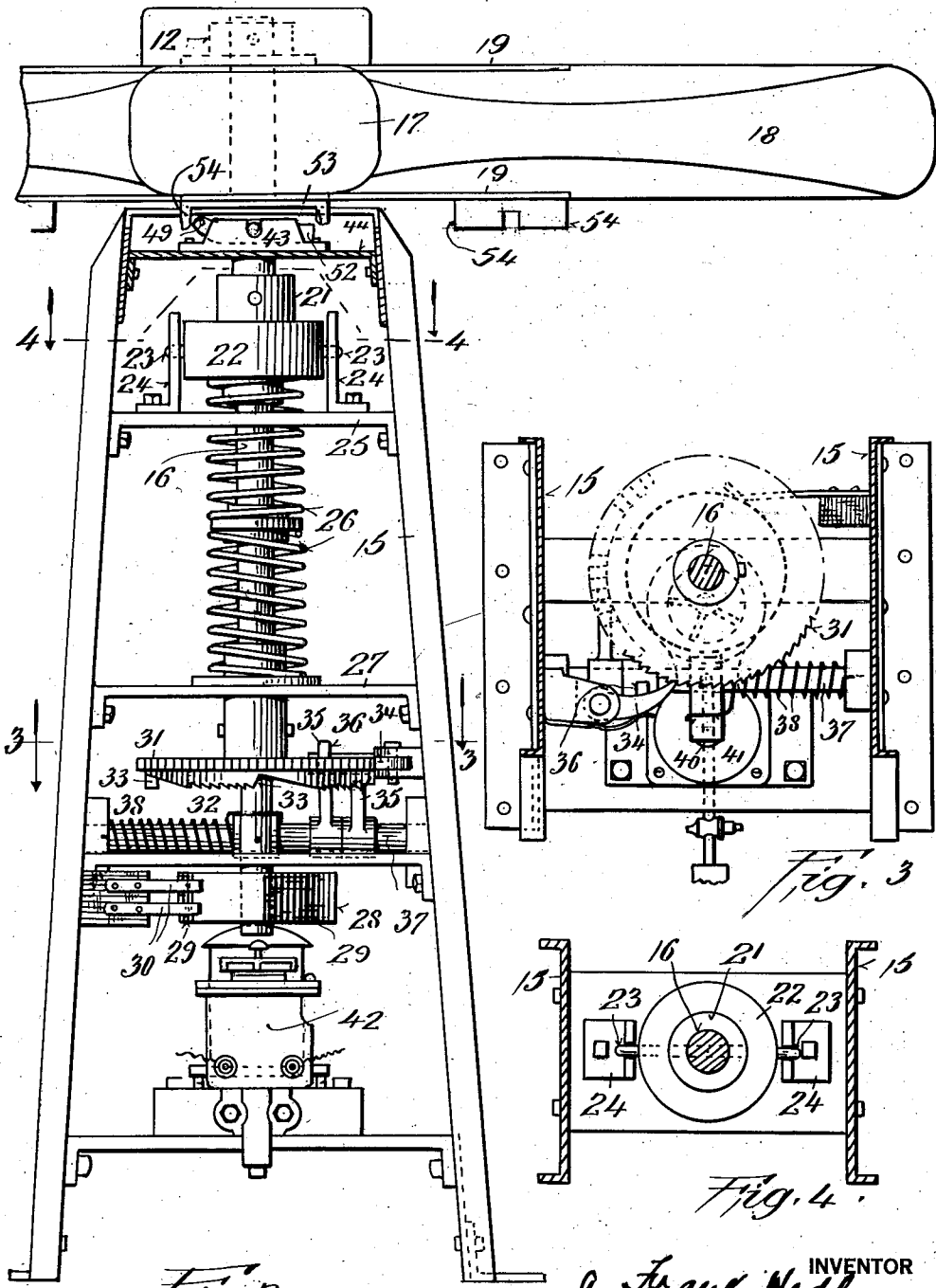


Fig. 2

Fig. 3

Fig. 4

INVENTOR  
*Frank Hedley*  
*and James S. Doyle*  
BY *their* ATTORNEYS  
*Darby & Darby*

March 30, 1926.

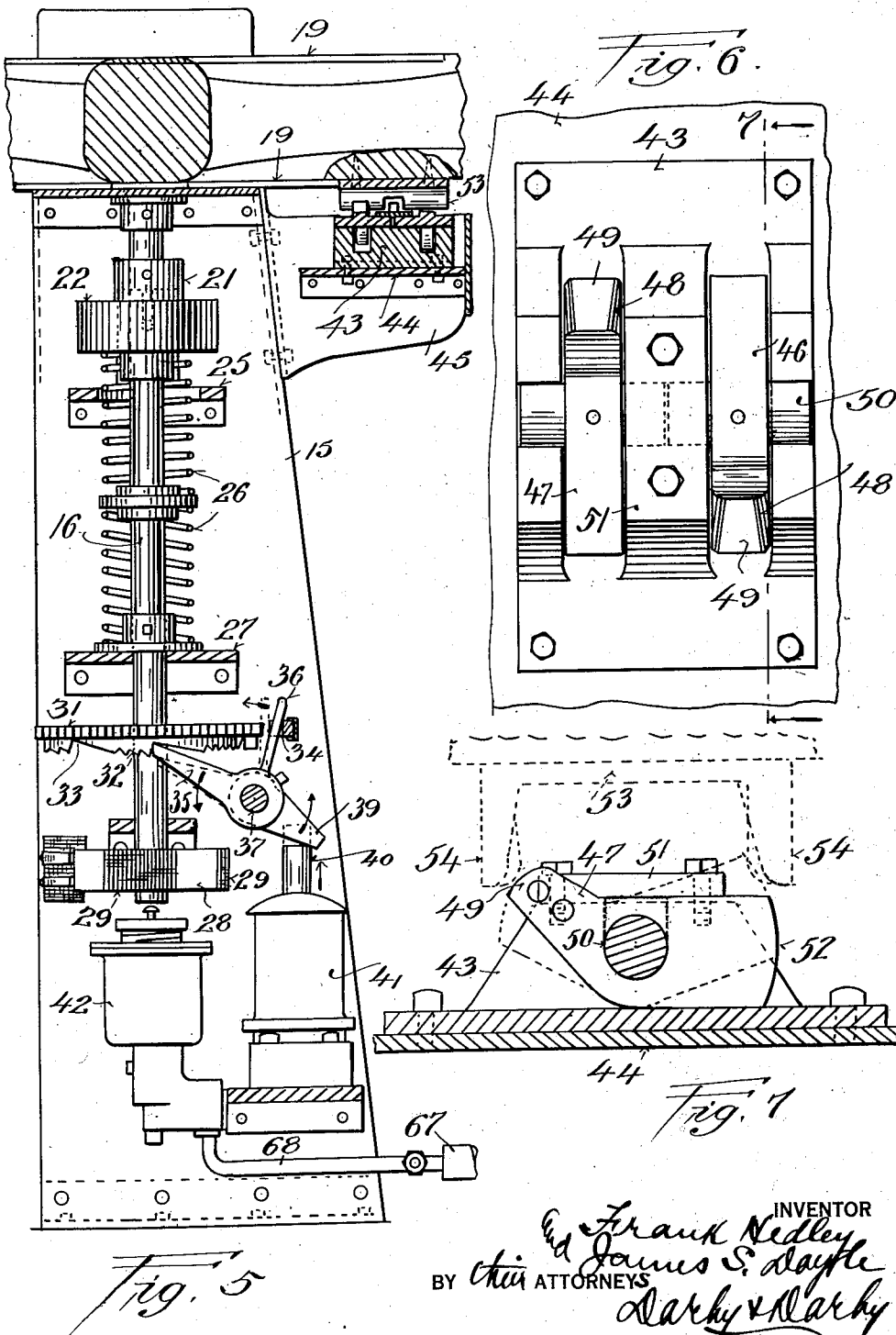
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5 Sheets-Sheet 3



INVENTOR  
*Frank Hedley*  
*James S. Dayle*  
BY *Chas* ATTORNEYS  
*Marby & Marby*

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Fig. 8

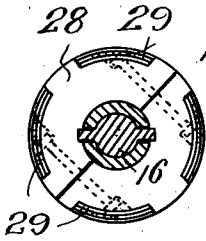
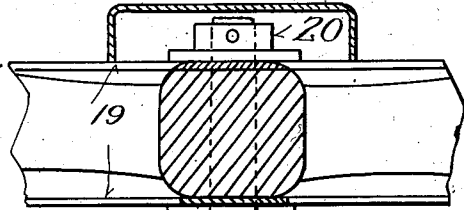


Fig. 11.

Fig. 10.

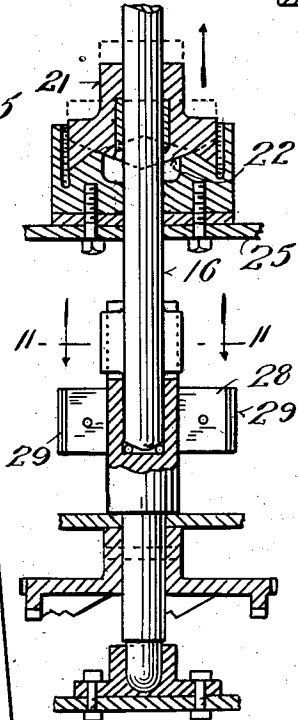
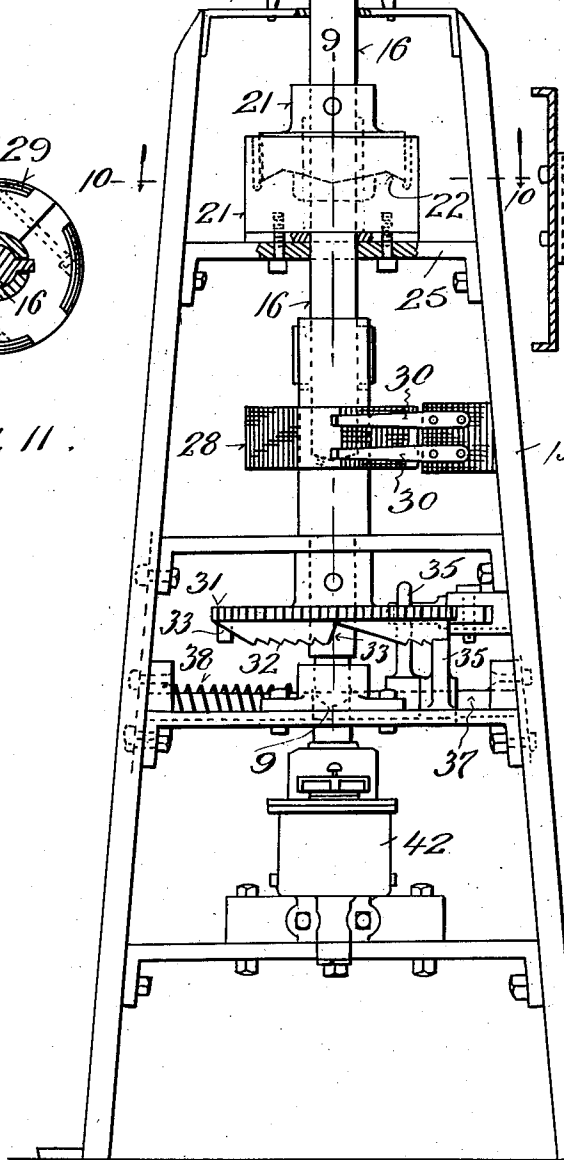
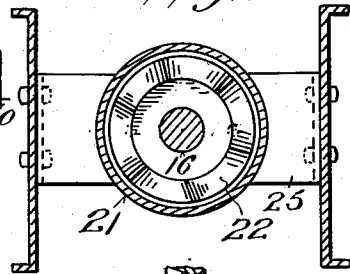


Fig. 9

INVENTOR

Frank Hedley

and James S. Doyle

BY ATTORNEYS

Arby & Arby

March 30, 1926.

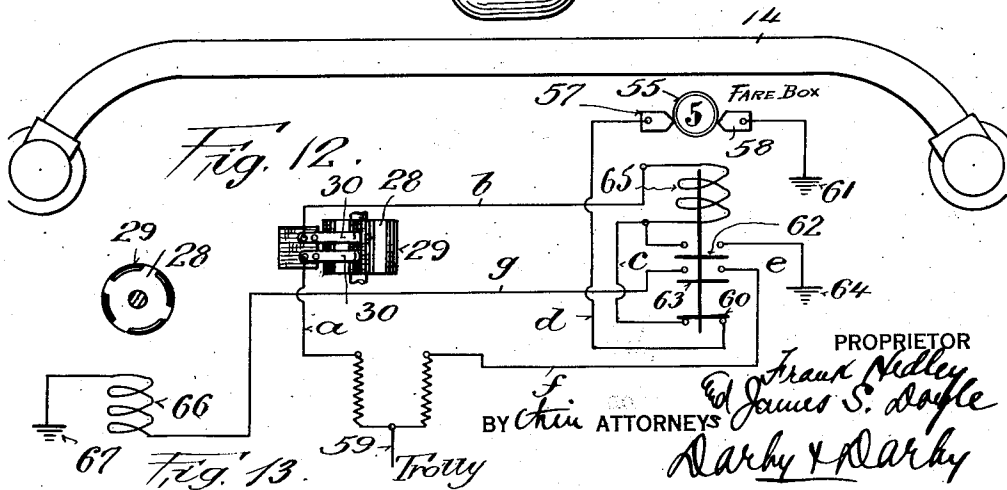
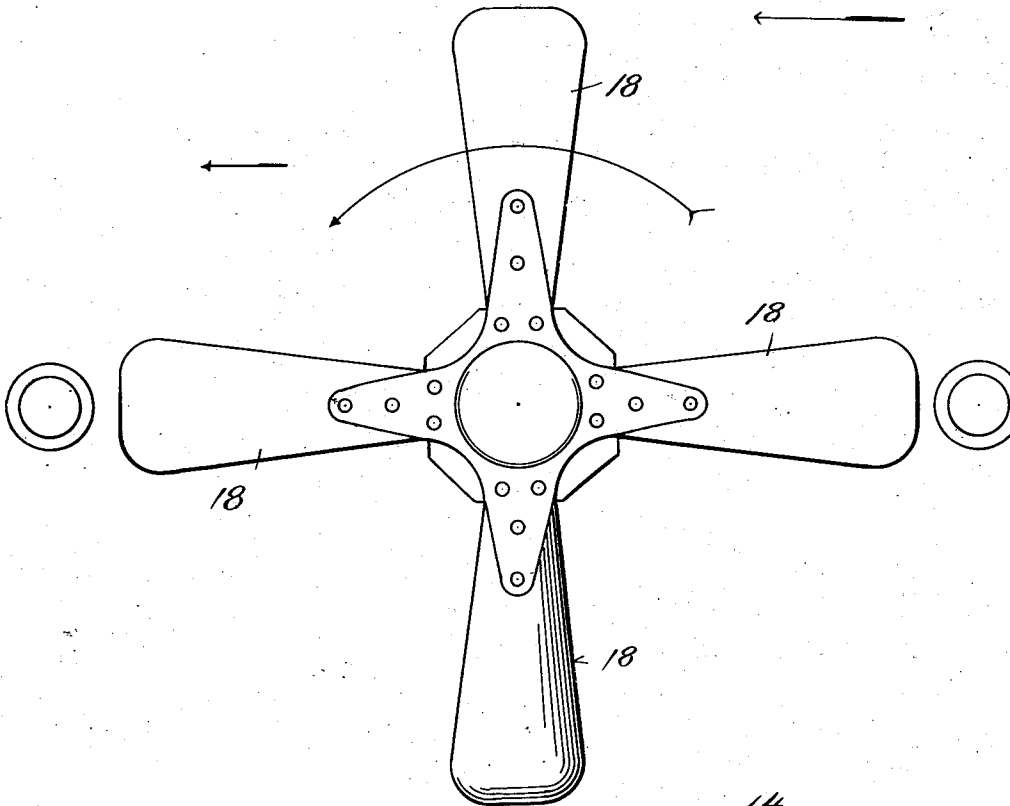
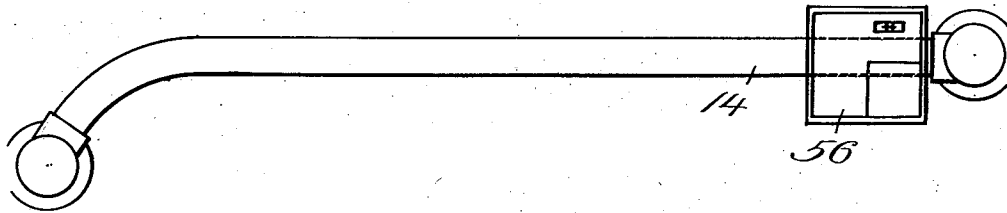
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F. HEDLEY ET AL

TURNSTILE MECHANISM

Filed June 25, 1921

5 Sheets-Sheet 5



PROPRIETOR  
 Frank Hedley  
 Ed James S. Doyle  
 Darby & Darby  
 BY CHIEF ATTORNEYS

# UNITED STATES PATENT OFFICE.

FRANK HEDLEY, OF YONKERS, AND JAMES S. DOYLE, OF MOUNT VERNON, NEW YORK.

## TURNSTILE MECHANISM.

Application filed June 25, 1921. Serial No. 430,285.

*To all whom it may concern:*

Be it known that we, FRANK HEDLEY and JAMES S. DOYLE, both citizens of the United States, and residing, respectively, at Yonkers and Mount Vernon, county of Westchester, State of New York, have made a certain new and useful Invention in Turnstile Mechanism, of which the following is a specification.

This invention relates to turnstile mechanism.

The object of the invention is to provide a turnstile mechanism which is coin controlled for controlling a restricted passageway.

A further object of the invention is to provide a turnstile mechanism which is normally locked against movement for passage through a restricted passageway in one direction, but free for movement for passage through a passageway in the other direction.

A further object of the invention is to provide means to automatically prevent a too rapid operation of a turnstile mechanism.

Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location and relative arrangement of parts all as will be more fully hereinafter set forth, as shown in the accompanying drawings and finally pointed out in the appended claims.

Referring to the accompanying drawings,—

Fig. 1 is a view in front elevation of a turnstile mechanism embodying the principles of our invention;

Fig. 2 is a view in rear elevation of the same;

Fig. 3 is a view in horizontal section on the line 3—3, Fig. 2, looking in the direction of the arrows;

Fig. 4 is a view similar to Fig. 3 on the line 4—4, Fig. 2, looking in the direction of the arrows;

Fig. 5 is a view in vertical section on the line 5—5, Fig. 2, looking in the direction of the arrows;

Fig. 6 is a broken detail view in top plan showing the arrangement of stop lugs;

Fig. 7 is a similar view on the line 7—7, Fig. 6, looking in the direction of the arrows;

Fig. 8 is a view similar to Fig. 2, showing

a slightly modified arrangement embodying the principles of our invention;

Fig. 9 is a broken detail view in vertical section on the line 9—9, Fig. 8;

Fig. 10 is a view in horizontal section on the line 10—10, Fig. 8, looking in the direction of the arrows;

Fig. 11 is a view in section on the line 11—11, Fig. 9, looking in the direction of the arrows;

Fig. 12 is a top plan view of a registering mechanism embodying the principles of our invention;

Fig. 13 is a circuit diagram illustrating the operation of a registering mechanism embodying our invention.

The same part is designated by the same reference numeral wherever it occurs throughout the several views.

In entrances to platforms or stations of subway, elevated, surface railway and street car systems, amusement places, theatres, ferries and the like, it is a common custom to employ restricted passageways having turnstiles to control passage through such passageways to permit passage there-through in one direction only. Sometimes the turnstile is employed to effect a registration of persons passing through the passageway, thereby insuring that only one person at a time may pass through the passageway, and that a fare be collected from each person passing through and a registration of the numbers.

Our present invention relates to apparatus of this general character. Experience, however, has shown that in the use of apparatus of this nature, it frequently happens that a person may pass through the turnstile or otherwise operate the same too rapidly to permit the registering mechanism to function properly, or to cause the turnstile arms to overthrow or pass beyond predetermined limits of movement for a single person, and hence enable two or more persons to pass through with only one actuation of the registering mechanism, and where controlled by the passage of a coin, permitting two or more persons to pass through when only a single coin is employed. It is among the special purposes of our present invention to provide a turnstile mechanism of this general character wherein provision is made of means to prevent and to automatically lock a turnstile against oper-

ation at a too rapid rate of speed. It is also among the special purposes of our present invention to provide means which will insure a proper centering of the turnstile in a predetermined position after each actuation thereof.

In carrying out our present invention, we employ suitable railings 14, which are spaced apart to provide a passageway between them, and within this passageway we locate the turnstile mechanism in such relation that a person may pass through the passageway in one direction at one side of the turnstile, and in the opposite direction at the same side of the turnstile, as clearly indicated in Fig. 12. The turnstile structure includes a framework 15, and mounted in said framework, and preferably centrally with respect thereto, is a shaft 16, upon the upper end of which is mounted a hub 17, carrying the radial arms 18. The hub 17 is held between plates 19, a cap nut 20 serving to clamp and hold the hub 17 and plates 19 upon the upper end of the shaft 16.

Upon the shaft 16 is mounted the centering cam head 21 to rotate with said shaft. This cam head co-operates with a cam head 22, which is fixed relatively to the cam head 21. In the arrangement shown in Figs. 1, 2, 4 and 5, the cam head 22 is held against rotative movement by means of pins 23, which extend into vertical slots formed in brackets 24, mounted upon a cross member 25, connecting the side portions of the frame. This arrangement permits a movement of the cam head 22 towards and from the cam head 21, but retains said cam head 22 against rotative movement. Any suitable or convenient yielding tension may be imposed upon cam head 22 normally pressing the same or the cam face thereof against the cam face of cam head 21. For this purpose we have shown a spring 26 interposed between a cross piece 27 of the frame, and the under side of the cam head 22, and normally exerting its tension to press yieldingly the cam head 22 upwardly towards the cam head 21. Co-operating cam faces of the heads 21, 22, are shown more clearly in Figs. 8 and 9. These cam faces are formed with interlocking space projections corresponding in number and relation to the arms 18 of the turnstile, so that when the turnstile arms are rotarily displaced, the cam surface of the head 21 will ride over the co-operating cam surfaces of head 22, the latter yielding against the tension of spring 26 until the next seating engagement occurs.

This affords a very simple and effective centering arrangement to insure the proper centering of the turnstile at each step of its rotative operation.

In the modification of Figs. 8 and 9, we

dispense with the tension spring 26, and depend upon the action of gravity due to the weight of the turnstile hub and arms, as well as that of the shaft 16. In other words, the shaft carrying the hub and arms is longitudinally movable vertically. In this arrangement the cam head 22 is fixed upon the cross member 25 of the frame.

Upon shaft 16, either below the ratchet mechanism presently to be described, as in Figs. 2 and 5, or above said ratchet mechanism, as in Figs. 8 and 9, is mounted block 28, upon which are mounted conductor sections 29, with which co-operate contact fingers 30, through which the coin controlled circuit arrangement is controlled.

Mounted upon the shaft 16 is a ratchet wheel having ratchet teeth 31 on its peripheral edge, and also having on its under surface ratchet teeth 32 arranged in groups, each group being separated by a shoulder 33. The shoulders 33 are displaced apart from each other a distance corresponding to the distance apart of the turnstile arms 18. Co-operating with the peripheral teeth 31 is a spring pressed pawl 34, and co-operating with the shoulders 33 is a locking dog 35. The pawl 34 is controlled by an arm 36. The locking dog 35 and the arm 36 are mounted upon a shaft 37, which extends transversely across the frame, and has mounted thereon a tension spring 38, operating to impart a rotative tension to said shaft which normally tends to press the dog 35 into locking engagement with respect to the shoulders 33 of the ratchet wheel, and the arm 36 in position to hold the pawl 34 out of engagement with the ratchet teeth 31. An arm 39 connected to the shaft 37 is arranged in the path of the projection 40 from a piston operating in a small pneumatic cylinder 41. With this arrangement it will be seen that when air pressure is admitted to the lower end of cylinder 41, the projection 40 is operated to engage the arm 39, and to rock shaft 37, thereby withdrawing locking dog 35 from engagement with the shoulder 33 of the ratchet wheel, while at the same time the arm 36 is moved in a direction to permit the pawl 34 to engage the ratchet teeth 31 of the ratchet wheel, thereby permitting the free rotation of the ratchet wheel and turnstile shaft for entrance operation, for example. When the air pressure is exhausted from cylinder 41, the locking dog 35 is restored to locking engagement with respect to the shoulder 33 of the ratchet wheel, thereby retaining and locking the turnstile in the position determined by the relation of a locking shoulder 33, and hence locking the turnstile against, for example, entrance operation. Where locking shoulders 33 and teeth 32 are so positioned as to permit the free operation or rotation of the ratchet wheel and turnstile

shaft in one direction, for example, in the direction of exit operation, the locking pawl and shoulder engagement only locks the turnstile against operation in the other or, for instance, entrance direction. The pawl 34 forms a detent to prevent reverse rotation of the turnstile arms and shaft when the locking dog 35 is disengaged, and consequently when a rotative movement is once inaugurated of the turnstile arms in entrance direction, that movement must be completed through at least one step of operation or until the pressure medium is again exhausted from the cylinder 41.

The supply of pressure medium to the cylinder 41 may be controlled in any suitable or convenient manner. For this purpose we have indicated a magnet valve device 42, the circuit of which, in the case of the coin controlled apparatus, is controlled by the deposit of a coin, as will presently more clearly appear.

In order to prevent derangement of the apparatus by reason of a too rapid rotation of the turnstile arms in either direction, or the operation of said arms at a rate of speed too great to permit proper functioning of the devices controlled by the deposit of a single coin, or to prevent the turnstile arms from being operated so rapidly that two or more persons may pass through the apparatus by depositing only a single coin, we provide an automatic stop mechanism shown more clearly in Figs. 1, 2, 5, 6 and 7. This automatic stop mechanism is exceedingly simple, and consists of a mounting 43 carried by a cross member 44 of the framework, or a bracket 45 mounted on the framework (see Fig. 5). Pivotaly mounted in the member 43 are stop pawls 46, 47. These pawls have upwardly extending noses 48, the nose of one of said pawls permits rotation in one direction and the nose of the other of said pawls in the opposite direction with reference to the direction of rotative movement of the turnstile arms, said noses having rounded end surfaces as indicated at 49 (see Figs. 6 and 7). Each of these pawls is carried by a pintle 50, which is journaled in the mounting 43, and are retained in their seats by a retaining plate 51. The heel end surfaces of the dogs 46 and 47 are rounded off as indicated at 52 (see Fig. 7).

Mounted upon each arm of the turnstile is a channel plate or member 53 in position for the edge flanges 54 thereof to pass over the stop dogs 46, 47, as the arms successively pass over the mounting 43. The stop dogs are so proportioned that they normally lie in position for the noses 49 thereof to extend above the mounting 43, and into position to be engaged by flanges 54 of the channel members 53, and when so engaged said stop dogs are tilted about their pintles

50 so as to raise their heel portions 52. The operation of this stop device is very simple. Assuming that the turnstile is being operated for entrance operation, for example, the advancing flange 54, of the stop arm will engage the nose 49 of the stop dog, thereby tilting said dog into position for the heel portion 52 thereof to be engaged by the other flange of said member 53, thereby forming a stop to arrest the rotative movement of the turnstile arms. The flanges 54 are spaced a sufficient distance apart so that at a normal rate of speed of operation, the advance flange 54 of the member 53 will engage and ride over and past the projecting nose 49 of the stop dog, and permit the tilted heel end thereof to return to retracted position before the rearmost flange 54 engages said heel. If, however, the turnstile arm is operated too rapidly, or at an excessive speed, then a sufficient time interval does not elapse to permit the tilted stop dog tilted by the advance flange of the member 53, to return to normal position before the rearmost flange of the member 53 is brought into abutment with the heel surface 52, and hence the rotative movement of the arms is arrested. If the turnstile is turned in the opposite direction, the dog will be rocked just the same as before, but the heel portion thereof would in this case be tilted by the advance flange of the member 53, but would not form a stop, as there would be no second flange to abut against it. For this reason, we employ two stop pawls positioned in relatively opposite directions, so that the speed control of the turnstile is effected in whichever direction the turnstile is operated.

The fare control of the apparatus may be effected by any suitable arrangement. We have shown in Fig. 13 a circuit diagram to illustrate the principles involved, and wherein a coin or other token 55 is deposited in a fare box indicated generally at 56, Fig. 12, and effects a closing of circuit between terminals 57, 58. This completes a circuit from trolley or other current source at 59 through wire *a*, conductor fingers 30, and contacts 29, wire *b*, through the coils 65 of a relay magnet, wire *c*, bridging contact 60, wire *d*, contact 57, coin 55, contact 58, to ground at 61. Upon the closing of this circuit, the coils 65 are energized, and the switch members 62, 63 are closed upon contacts while the switch member 60 is opened. The closing of switch member 62 establishes a holding circuit for the coils 65 through wire *e* to ground at 64, thereby retaining the relay coils energized after the coin breaks the circuit between contacts 57, 58. The closing of the switch 63 which is accomplished when the coils of the relay are energized, completes the circuit from a current source or trolley 59 through wire *f*,



switch 63, wire *g*, and coils 66 of the magnet valve to ground at 67. This energizes the magnet valve 42 and opens the cylinder 41 to a compressed air source 67 through pipe connection 68, thereby actuating the projection 40 and closing the locking dog 35 from the ratchet wheel. The turnstile is then free to rotate, and as soon as its rotation commences, the fingers 30 pass off of a conductor strip 29, thereby breaking the circuit of relay 65, which causes switches 62 and 63 to open, and switch 60 to close, and hence restoring the circuit arrangement to its initial relation ready for another operation. The opening of the circuit switch 63 de-energizes the magnet valve 66, thereby shutting off the supply of pressure medium to cylinder 41, and opening the same to exhaust in a well known manner, thereby restoring the locking dog 35 to engaging relation with the locking shoulder 33 on the ratchet wheel.

From the foregoing description, it will be seen that we provide an exceedingly simple turnstile mechanism which is inexpensive to keep up, and is efficient in operation. The structure is simple, and complications of structure are eliminated. The apparatus is suitable for both entrance and exit passage, the entrance passage being controlled so as to permit actuation only by the deposit of a coin or token, such deposit effecting a release of the locking mechanism for a single step of operation. It will also be seen that after a single step of operation, the apparatus is properly centered or restored to position ready for a successive operation. It will also be seen that we provide against the danger, trouble and annoyance, and sometimes loss through an excessive speed of operation, while still permitting a sufficiently speedy action to avoid congestion of traffic through the apparatus. A station or entrance equipped with turnstile apparatus of the nature described is normally locked as an entrance, but is unlocked for exit operation, and, therefore, the apparatus constitutes in effect an automatic means for locking up a station to prevent entrance without fare prepayment, while remaining free for exit operation. This dispenses with the necessity for using separate exit gates or controls, and very simply and efficiently combines the entrance and exit operations in one structure.

Having now set forth the objects and nature of our invention and structures embodying the principles thereof, what we claim as new and useful and of our own invention, and desire to secure by Letters Patent, is:

1. A turnstile mechanism normally operable in opposite directions, the operation thereof in one direction being free and unrestricted, and that in the other direction be-

ing controlled or restricted, and means to control the speed of operation thereof.

2. A turnstile mechanism normally operable in opposite directions, the operation thereof in one direction being free and unrestricted, and that in the other direction being controlled or restricted, and automatic means to control the speed of operation thereof.

3. A turnstile mechanism including means to permit free passage therethrough in one direction, and a controlled or restricted passage in the other direction, and means to control the speed of operation thereof in either direction.

4. A turnstile mechanism for a restricted passageway, said mechanism operable in opposite directions for entrance and exit use respectively, and being normally locked against entrance operation, but free for exit operation, in combination with devices for releasing the mechanism for use for entrance operation and for restricting its speed.

5. A turnstile mechanism for a restricted passageway, said mechanism operable in opposite directions for entrance and exit use respectively, and being normally locked against entrance operation, but free for exit operation, in combination with devices for releasing the mechanism for use for entrance operation, said means operating to prevent reverse operation after being unlocked for entrance.

6. A control mechanism for a restricted passageway, including barrier devices, locking means operating to normally lock said devices against operation in one direction while permitting free operation in the opposite direction, and means for temporarily releasing said locking means and means for arresting excessive speed.

7. A turnstile mechanism including barrier arms rotatable in opposite directions and means to automatically stop said arms against rotation, when rotated above a predetermined speed in either direction.

8. A turnstile mechanism including barrier arms normally rotatable in opposite directions in combination with stop dogs arranged in the path of travel of said arms, to be engaged thereby, whereby rotative movement of said arms is arrested when rotatively moved at an excessive speed in either direction.

9. A turnstile mechanism including barrier arms, mounted to rotate in either direction, a mounting fixed in the path of said arms, a stop dog mounted in said mounting, and means carried by the arms to engage said dog, whereby said arms are arrested in case of excessive speed of rotative movement.

10. A turnstile mechanism including rotatively mounted barrier arms, a pivotally mounted stop dog arranged in the path of

movement of said arms, to be tilted thereby, and means carried by said arms to be engaged by the tilted dog to form a stop for the arms in case of excessive speed of rotative movement.

11. A turnstile mechanism including barrier arms, a channel member carried by each arm, a pivotally mounted dog arranged in the path of movement of said arms, said dog having a projecting nose to be engaged by one flange of the channel member, whereby said dog is tilted to engage the other flange of said channel member in case of excessive or abnormal state of rotative movement of said arms.

12. A turnstile mechanism including rotatable barrier arms in combination with oppositely disposed stop dogs arranged in the path of movement of said arms, to be engaged thereby as the arms pass thereover for actuation into position to form a stop for said arms in case of excessive speed of rotative movement in either direction.

13. A turnstile mechanism including a vertically disposed shaft a hub having radial arms said hub mounted on to rotate with said shaft, a stop dog arranged adjacent the path of said arms, means carried by each arm arranged to engage and tilt said dog, and means also carried by each arm to engage said dog when in tilted position to form a stop for said arms.

14. A turnstile mechanism including a vertically disposed shaft, a hub having radial arms, said hub mounted on to rotate with said shaft, a stop dog having a rounded projecting nose portion, means carried by each arm arranged to engage said projecting nose portion to tilt said dog, and means also carried by each arm to engage the heel end of said dog when in tilted position to form a stop for the arm.

15. A turnstile mechanism including a vertically disposed shaft, a hub having radial arms, said hub mounted on to rotate with said shaft, a stop dog having a rounded projecting nose portion and a heel portion, and spaced apart means carried by each arm, one of said spaced apart means arranged to engage and pass over said nose portion to cause the heel portion to tilt into position to form a stop for the other of said spaced apart means.

16. A turnstile mechanism including a vertically disposed shaft, a hub having radial arms, said hub mounted on to rotate with said shaft oppositely disposed tiltable stop dogs, each having a projecting nose portion, and spaced apart means carried by each arm, one of said spaced apart means adapted to engage and pass over said nose portions to tilt said dogs into position to form a stop for the other of said spaced apart means.

17. A turnstile mechanism including a vertically disposed shaft mounted for rota-

tion in opposite directions for entrance and exit operation respectively, and carrying turnstile arms, a wheel carried thereby having peripheral teeth and also having stop shoulders corresponding in position to said turnstile arms, a pawl co-operating with said peripheral teeth, a stop co-operating with said stop shoulders, and means whereby when said stop is disengaged from a stop shoulder, said pawl is engaged in said peripheral teeth.

18. A turnstile mechanism including a vertically disposed shaft carrying turnstile arms, a wheel carried thereby having peripheral teeth and also having stop shoulders corresponding in position to said turnstile arms, a pawl co-operating with said peripheral teeth, a stop co-operating with and normally engaging said stop shoulders, a controlling arm for said pawl, a shaft upon which said stop and pawl controlling arm is mounted, and means to rock said shaft whereby when said stop is disengaged said pawl is engaged.

19. A turnstile mechanism including a vertically disposed shaft carrying turnstile arms, a wheel carried thereby having peripheral teeth and also having stop shoulders corresponding in position to said turnstile arms, a pawl co-operating with said peripheral teeth, a stop co-operating with said stop shoulders, a controlling arm for said pawl, a shaft upon which said stop and pawl controlling arm is mounted, means to impose a tension on said shaft to normally hold said stop in engagement and said pawl out of engagement, and means to rock said shaft.

20. A turnstile mechanism including a vertically disposed shaft carrying turnstile arms, a wheel carried thereby having peripheral teeth and also having stop shoulders corresponding in position to said turnstile arms, a pawl co-operating with said peripheral teeth, a stop co-operating with said stop shoulders, and means whereby when said stop is disengaged from a stop shoulder said pawl is engaged in said peripheral teeth.

21. A turnstile mechanism including a vertically disposed shaft carrying radial arms, and means to permit said shaft to move rotatively in step by step operation in combination with centering means for each step of rotative movement of said shaft, including oppositely disposed cam heads mounted on said shaft and having engaging cam surfaces, one mounted on said shaft to rotate therewith and the other held against rotation, said cam heads being relatively movable the one towards or away from the other.

22. A turnstile mechanism including a vertically disposed shaft carrying radial arms, and means to permit said shaft to move rotatively in step by step operation in

combination with centering means for each step of rotative movement of said shaft, including oppositely disposed cam heads mounted on said shaft and having engaging cam surfaces, one mounted on said shaft to rotate therewith and the other held against rotation, said cam heads being relatively movable the one towards or away from the other, and means normally operating to yieldingly press said heads into engagement with each other.

23. A turnstile mechanism including a vertically disposed shaft carrying radial arms, and means to permit said shaft to move rotatively in step by step operation in combination with centering means for each step of rotative movement of said shaft, including oppositely disposed cam heads having engaging cam surfaces, one mounted on said shaft to rotate therewith and the other held against rotation, said cam heads being

relatively movable the one towards or away from the other, and a spring arranged to yieldingly press one of said heads into engagement with the other.

24. A turnstile mechanism operable in opposite directions, and means effective when said mechanism is operated in either direction to prevent reverse movement in the opposite direction.

25. A turnstile operable in both entrance and exit directions, and normally free for exit operation, means to normally lock the same against operation in entrance direction, and means to release said lock, said means also operating to lock the mechanism against exit operation.

In testimony whereof we have hereunto set our hands on this 20th day of June, A. D. 1921.

FRANK HEDLEY.  
JAMES S. DOYLE.