L. F. McNALLY.

TRAP DOOR FOR VESTIBULE CARS.

APPLICATION FILED OCT. 30, 1916.

1,228,938.

Patented June 5, 1917.

2 SHEETS—SHEET 1.

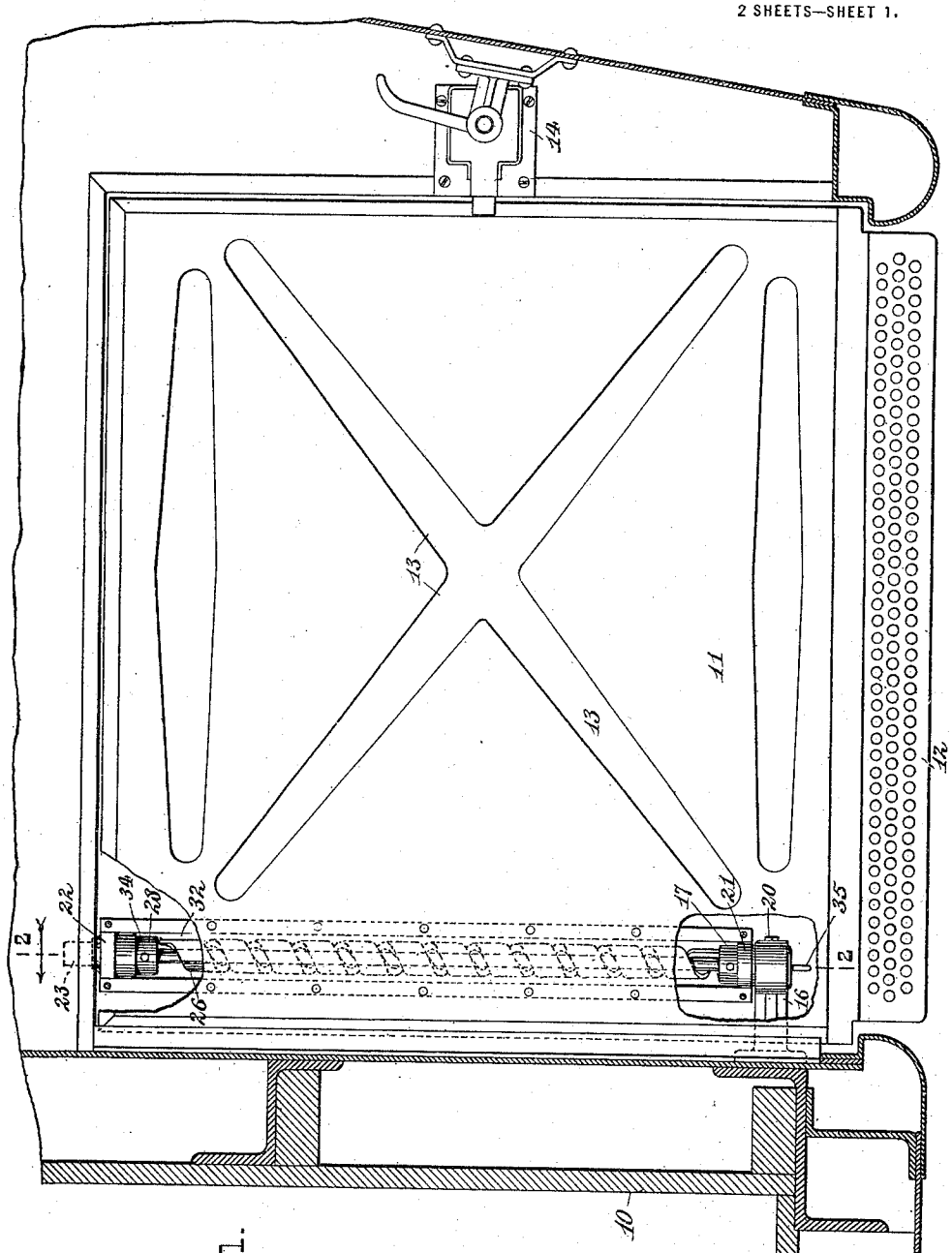


FIG. 1.

WITNESSES

A. J. Walsh

R. M. Clark.

INVENTOR

Leo F. McNally.

BY

George Cook & Sons.

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

L. F. McNALLY.

TRAP DOOR FOR VESTIBULE CARS.

APPLICATION FILED OCT. 30, 1916.

1,228,938.

Patented June 5, 1917.

2 SHEETS—SHEET 2.

Fig. 2.

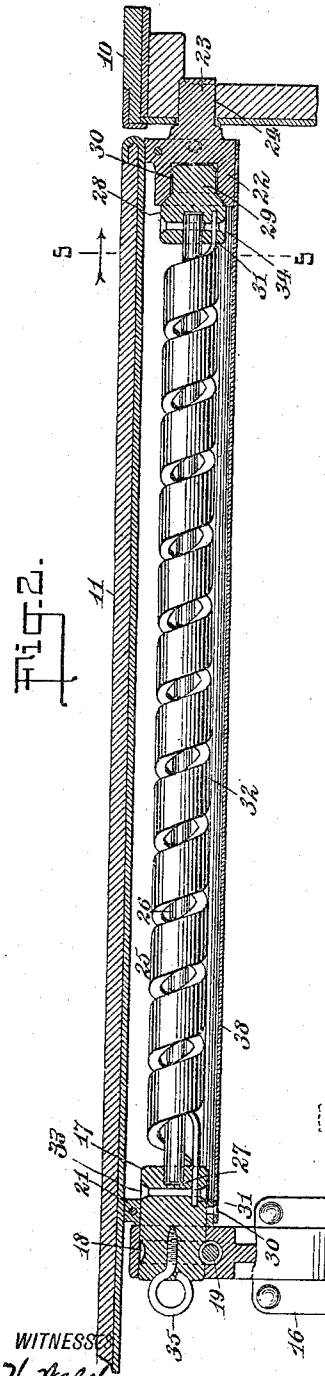


Fig. 5.

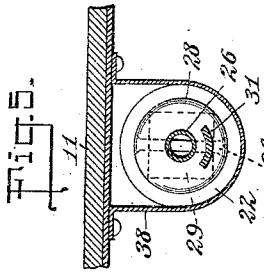


Fig. 6.

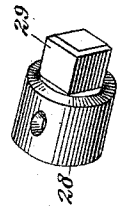


Fig. 4.

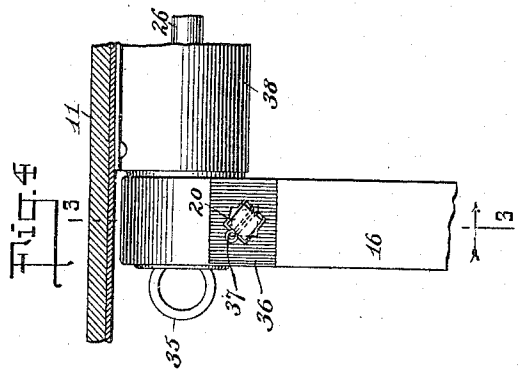
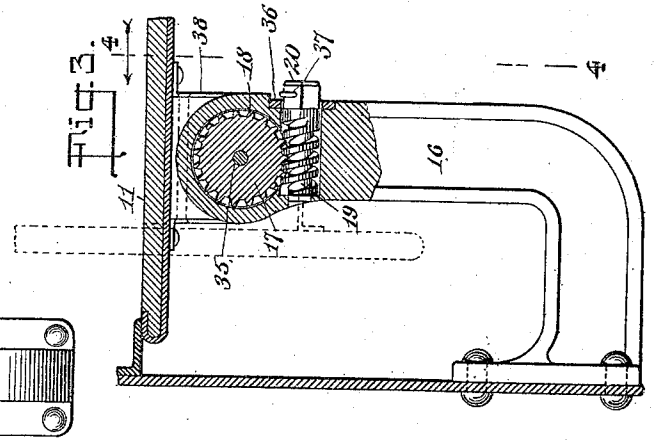


Fig. 3.



WITNESSES:

A. V. Nash

R. M. Clark

INVENTOR

Leo F. McNally.

BY

George Cook & Sons

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

LEO F. McNALLY, OF BROOKLYN, NEW YORK, ASSIGNOR TO TRANSPORTATION UTILITIES COMPANY, OF NEW YORK, N. Y., A CORPORATION OF WEST VIRGINIA.

TRAP-DOOR FOR VESTIBULE-CARS.

1,228,938. Specification of Letters Patent. Patented June 5, 1917.

Application filed October 30, 1916. Serial No. 128,419.

To all whom it may concern:

Be it known that I, LEO F. McNALLY, a citizen of the United States, and a resident of New York, borough of Brooklyn, in the county of Kings and State of New York, have made and invented certain new and useful Improvements in Trap-Doors for Vestibule-Cars, of which the following is a specification.

My invention relates to trap doors for vestibule cars, and particularly to the hinge mechanism thereof.

An object of the present invention is to provide a trap door and hinge mechanism which is so constructed that when the door is released, it will be raised in a smooth manner, and with decreasing speed, so as to prevent the door from slamming as it reaches its uppermost position, although attaining such position with a speed sufficient to enter behind a spring latch.

In accomplishing the above-mentioned object, a torsional spring, composed of closely wound convolutions, and formed of material of oblong cross section, is used, it having been found that the decrease in the torsional moment of such a spring through a given displacement, approximates the decrease in the gravitational moment of the door as it rotates upon its hinge. The marked and rapid change in the torsion of this spring, renders it essential that a suitable mechanism be provided for accurately regulating the initial torsional force of the spring. With this in view, I have provided a hinge mechanism for the trap door, in which one of the bearing members for the door, which member also engages one extremity of the lifting spring, is provided with teeth formed thereon which engage a threaded bolt which extends tangential thereto, forming in fact a worm gearing. The worm projects through the front of one of the brackets of the hinge rendering it conveniently accessible and allowing the tension of the spring to be easily and accurately adjusted.

A further object is to provide a hinge mechanism in which the raising spring, and accompanying parts which form the power element of the hinge, may be removed in their entirety, and vice versa, may be assembled and connected together before inserted in place in the hinge mechanism.

A further object is to provide a hinge mechanism which is completely housed and protected so as to effectually exclude dust and all other foreign matter therefrom, which, in connection with the simple and rugged design of the various parts which go to make up the trap door and hinge mechanism, insures the proper working and raising of the trap door under varying conditions and throughout a long period of time.

Other objects and advantages will appear as the description proceeds, wherein it is to be understood that changes in the precise embodiment of the invention may be made within the scope of what is claimed without departing from the spirit thereof.

The preferred embodiment of my invention is disclosed in the accompanying drawings, wherein:

Figure 1 is a top plan view, partially in section, of my improved trap door and hinge mechanism;

Fig. 2 is a view in vertical section, taken on the line 2—2 of Fig. 1;

Fig. 3 is a view in vertical section taken on the line 3—3 of Fig. 4, illustrating the worm and gear adjustment mechanism for regulating the initial torsional force of the elevating or raising spring;

Fig. 4 is a view in vertical section taken on the line 4—4 of Fig. 3;

Fig. 5 is a view in vertical section taken on the line 5—5 of Fig. 2; and

Fig. 6 is a view in perspective of the attaching member for one end of the power element.

Referring specifically to the several views, portions of the platform 10 of a vestibule car are illustrated in Fig. 1, to which platform the trap door 11 is hingedly secured. This trap door is of the usual design, and includes the customary threshold 12, and strengthening ribs or channels 13.

As a support for the trap door, and in order that the same will be raised when released from the latch 14, a hinge mechanism is provided, and includes a bracket 16, which supports one extremity of the moving element of the hinge. A supporting member 17 is journaled in the upper extremity of the bracket, and is provided with gear teeth 18, which mesh with a worm gear bolt 19, the latter being also journaled in the upper extremity of the bracket, and is provided at its outer end with the wrench-engageable head 20. As the worm is forcibly rotated, a cor-

responding, and materially reduced, rotation is imparted to the supporting member 17, this rotation of the supporting member being utilized to regulate the torsional force of the lifting spring, as hereinafter described. A bearing member 21 is carried by, and rigidly secured to, the trap door 11, and receives the supporting member 17 therethrough, and is adapted to rotate thereon. The bearing member 21 is attached to the trap door by first securing it to a casing 38 hereinafter described and then securing the casing to the trap door all of which is more clearly illustrated in Fig. 3 of the drawings. A second bearing for the trap door is provided by the rigid securement of the pivotal supporting member 22, which is fixedly secured to the trap door through the intervention of the casing 38 as above described and is provided with the trunnion 23 which pivotally engages, and effects a bearing with, an opening 24 formed in the adjacent portion of the platform 10. The trap door is accordingly mounted for pivotal movement at two widely spaced points.

In order that the trap door may be smoothly raised from a horizontal to a vertical position, the raising element 25 is provided, and includes in addition to the supporting member 17, a shaft 26, which rotates loosely within an opening 27 formed in the end of the supporting member 17, and is fixedly secured at its opposite extremity to a driving member 28. The driving member is illustrated in detail in Fig. 6, and comprises a polygonal end portion 29 which extends into a correspondingly shaped opening 30 formed in the end of the pivotal supporting member 22. The supporting member 17, and pivotal supporting member 22 are provided with spring-receiving slots 31, into which the ends of the torsional spring 32 extend, and are fixedly secured in place by the rivets 33 and 34. The supporting members 17 and 22, with the shaft 26 and torsional spring 32 extending therebetween, form what is termed the power element, and may be removed in its entirety, by first removing the worm gear 19. The removal and insertion of the power element is rendered more convenient by the presence of an eyelet 35 which is secured to, and projects beyond, the end of the supporting member 17. The spring 32 is formed of relatively wide, thin material, so that the torsional moment thereof will rapidly decrease, approximating the decrease in the force required to move the door from a horizontal to a vertical position. By so designing the spring, the door is positively and rapidly moved from its initial location, but slows up as it approaches and attains its uppermost or vertical position, so that the door attains its open position without slamming or hammering against its uppermost support, although sufficient momentum is preserved so that the door will successfully pass behind such latch mechanism as may be used to hold it in its raised position.

The torsional spring, being of such construction that its torsional force rapidly changes through limited displacements, renders it essential that a nicety of adjustment be provided for regulating its initial torsional force. This is accomplished by the use of the worm and gear mechanism which is formed as a part of the supporting member 22 and supporting bracket 16. The worm, engaging as it does, the gear is adapted to rotate the same and hold it in adjusted position. In order to prevent the worm gear from becoming accidentally turned or displaced, through the constant vibration and jarring of the car, a locking washer 36 is provided, and is preferably formed with an opening of octagonal outline, which is adapted to receive the square bolt head 20 of the worm gear therein, and retain it in its adjusted position. A cotter key 37 extends through an opening in the bolt head 20 and holds the locking washer in place. A casing or housing 38 is secured to the trap door and the bearing member 21 and supporting member 22, and completely incloses all moving parts of the hinge mechanism, and provides for the long and serviceable life thereof.

What I claim is:

1. A hinge mechanism for trap doors, comprising a torsional spring formed of relatively wide, thin material, adapted to exert a rapidly decreasing force, means for rotatably supporting said trap door and for receiving the action of said spring thereon, for the elevation of said door, and a worm and gear adjusting mechanism engaging said spring and adapted to regulate the tension thereof.

2. A hinge mechanism for trap doors, comprising a fixed bracket, a supporting member journaled therein and provided with gear teeth thereon, a worm gear journaled in said bracket, engaging the teeth of said supporting member and adapted to rotate the same, a shaft loosely carried by said supporting member, a driving member carried at the opposite end of said shaft, a torsional spring secured to, and extending between, said supporting member and said driving member.

3. A hinge mechanism for trap doors, comprising a fixed bracket, a supporting member journaled therein and provided with gear teeth thereon, a worm gear journaled in said bracket, engaging the teeth of said supporting member and adapted to rotate the same, a shaft loosely carried by said supporting member, a driving member carried at the opposite end of said shaft, a torsional spring secured to, and extending between, said supporting member and said driving member, and in combination there-

with, a trap door provided with a bearing member rotatably mounted upon said supporting member, and a pivotal member fixedly secured to said trap door, provided with an opening receiving said driving member therein.

4. In an apparatus of the class described, the combination of a door, a hinge supporting mechanism therefor, a torsional spring member acting upon the door and adapted to forcibly move the same, and a worm and gear mechanism connected to said torsional spring member and adapted to accurately regulate the torsional tension thereof.

5. In an apparatus of the class described, the combination of a trap door, means for mounting the same for hinged movement, a torsional spring member acting upon said trap door and adapted to forcibly raise the same, a gear engaging said torsional spring, a worm meshing with said gear and adapted to rotate the same and to regulate and hold in adjusted condition the said torsional spring.

6. In combination, a trap door, a supporting hinge mechanism therefor including a bracket, a torsional spring member engaging said hinge mechanism and adapted to forcibly raise said door, a gear connected to said spring, and a worm member carried by said bracket engaging said gear and adapted to rotate the same for the regulation and adjustment of the tension of the spring and hold the same in adjusted condition.

7. In combination, a trap door, a supporting hinge mechanism therefor including a bracket, a torsional spring member engaging said hinge mechanism and adapted to forcibly raise said door, a gear connected to said spring, a worm member carried by said bracket engaging said gear and adapted to rotate the same for the regulation and adjustment of the tension of the spring and hold the same in adjusted condition, and means for locking said worm in adjusted position.

8. In combination, a trap door, a pivotal member fixedly secured to said trap door and a bearing member fixedly secured to the remote portion of said trap door, a supporting structure adapted to rotatably receive a portion of the said pivotal member of the trap door therein, a supporting member provided with an opening therein in alinement with the said bearing member of the trap door, a door opening and supporting mechanism removably fitting within the alined bearing members and non-rotatably engaging the said pivotal member, the said mechanism including a supporting member journaled within the said bearing members and provided with gear teeth, a torsional spring secured to said supporting member and a driving member secured to a remote extremity of said spring adapted to engage the said pivotal member; and a worm member carried by the said fixed bearing member engaging the teeth of the supporting member and adapted to regulate and hold in adjusted position the said torsional spring.

Signed at New York, borough of Manhattan, in the county of New York, and State of New York, this 28th day of October, A. D. 1916.

LEO F. McNALLY.

Witnesses:
A. M. LINDENSTRUTH,
H. B. CHAMBERLAIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."