

No. 700,763.

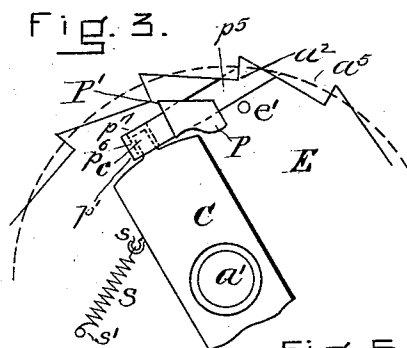
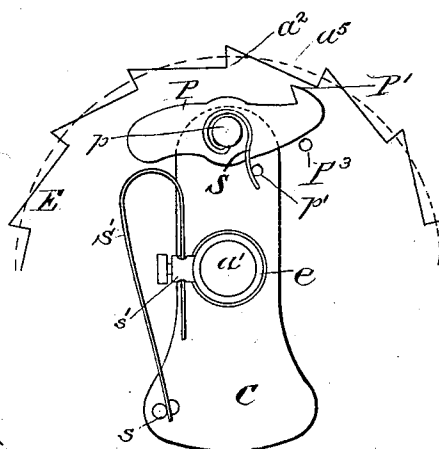
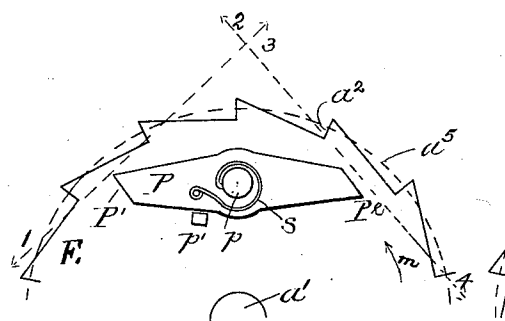
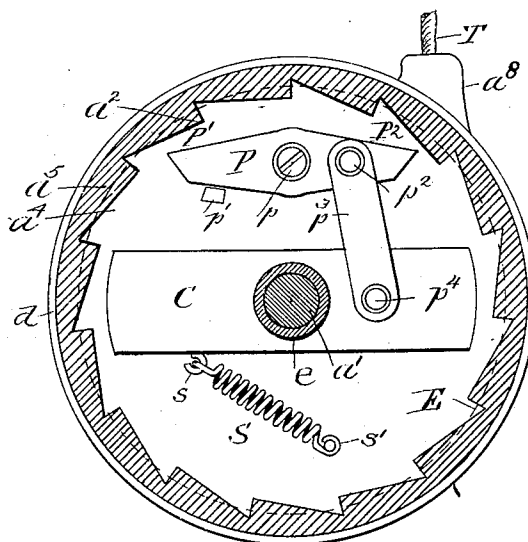
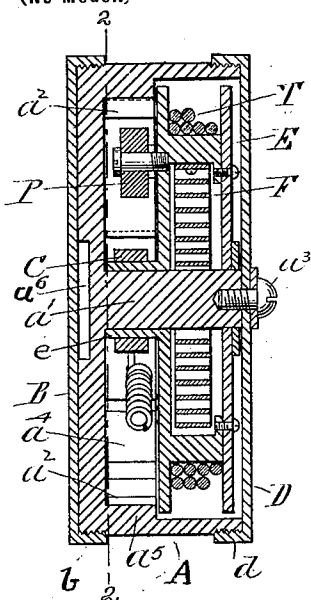
Patented May 27, 1902.

A. W. HAM.

TROLLEY CATCHER.

(Application filed Oct. 23, 1901.)

(No Model.)



WITNESSES.

Etchall

Frank S. Kirtland

INVENTOR-

By Albert W. Ham,
Roberts & Cushman,
attorneys.

UNITED STATES PATENT OFFICE.

ALBERT W. HAM, OF LANSINGBURG, NEW YORK.

TROLLEY-CATCHER.

SPECIFICATION forming part of Letters Patent No. 700,763, dated May 27, 1902.

Application filed October 23, 1901. Serial No. 79,635. (No model.)

To all whom it may concern:

Be it known that I, ALBERT W. HAM, a citizen of the United States, residing in Lansingburg, in the county of Rensselaer and State of New York, have invented a new and useful Improvement in Trolley-Catchers, of which the following is a specification.

My invention relates to trolley-catching apparatus; and it consists in a novel arrangement of clutching parts which produces great sensitiveness and reliability of action when action is required and is nevertheless unresponsive under any conditions except those of emergency, which call for the instant operation of the trolley-catcher. My improvements also are characterized by great simplicity in construction, which enables the trolley-catcher to be made strong and durable and free from liability to disarrangement.

The principle of operation of my improved trolley-catcher I believe to be wholly new. In all the other trolley-catchers with which I am acquainted the working parts depend for operation on centrifugal force, and therefore have to be nicely adjusted, so as to act only when a predetermined maximum speed of rotation of the trolley-cord reel is attained. In many of these devices springs are relied on to give the required adjustment and to restrain the working parts from operation under all normal conditions. As is well known, springs do not long retain their initial tension and are liable to changes in condition, especially when exposed to the action of rust or dirt. The working parts of my new trolley-catcher are balanced, so that any uniform speed of rotation of the trolley-reel or any steady increment in rotative speed neither disturbs nor to any appreciable extent tends to disturb their normal arrangement; but a sudden increase of rotative speed of the trolley-reel, such as results when the trolley jumps the wire, is instantly responded to by the catching devices, which stop the further ascent of the trolley instantly. I employ to obtain these desirable results merely the inertia of movable parts and use a light spring only to hold these parts steady in their normal position under normal conditions. This spring performs no such function as do the springs of trolley-catchers heretofore constructed and is under no more tension when

the trolley-reel is rotating rapidly and at uniform speed than when the trolley-reel is still.

In the drawings hereto annexed, which illustrate an embodiment of my invention, Figure 1 is a vertical cross-section of a trolley-catcher, and Fig. 2 is a rear section of the same with the back plate removed to show the working parts. Fig. 3 is a view similar to Fig. 2 and shows the clutching parts which embody my invention reduced to a simple and elementary form. Fig. 4 is a view similar to Fig. 2 and shows a variation in the specific application of my invention; and Fig. 5, a view similar to Fig. 2, shows still another specific variation.

These several figures indicate that the principle of controlling the clutch members of a trolley-catcher by the inertia of movable parts may be expressed in many ways without deviating in the least from the underlying idea. It is, I believe, best to employ some form of device in which the mass of the parts is sufficiently large to manifest considerable inertia on the application of any sudden increment of force, because the sure action of the contrivance will then be less likely to be interfered with by any accidental impediments, such as the accumulation of rust or dirt. I prefer, therefore, the specific arrangement of parts shown in Figs. 1 and 2 and will devote the greater part of the following description to that form of trolley-catcher, first, however, alluding to the elementary example shown in Fig. 3, which exhibits the principle of operation by perhaps the simplest structure.

E, Fig. 3, represents a rotating disk or reel, which turns in the direction of the arrow *m*. At *a*⁵ there is a fixed rack, whose teeth *a*² form the stationary member of the clutch. The other member of the clutch is a pawl P, loosely pivoted on the pin *p*.

P' is the operating end of the pawl P, and P² is a projection which balances the pawl evenly on its pivot, so that there is little or no tendency for it to turn on the pivot *p* under the influence of gravity or centrifugal force. A light spring S holds the pawl P against the stop *p'*, which is fixed on the disk or reel E. No matter how fast the disk E may revolve, so long as its speed is constant or only slowly increasing, the spring S, though very light, will hold the engaging point P' out of reach of

the rack-teeth a^3 . Centrifugal force does not in the least tend to turn the pawl P on its pivot-pin p , and it is better that it should not, for if the pawl P were not well balanced the spring S would have to be stronger than is consistent with sensitivity of the clutch to sudden increments of rotative speed. If a disk, such as E, were to be rapidly rotated in the direction of the arrow m and then suddenly stopped, the pivoted pawl P would continue to rotate in the same direction, responding to the tangential couple represented by the arrows 1 and 2. Conversely, if the disk E is suddenly started to rotate in the direction of the arrow m the inertia of the pawl P, expressed by the tangential couple 3 4, rotates the pawl (relatively to the reel E) in a direction opposite to the arrow m , and the engaging point P' enters the first tooth-space of the rack a^5 ; or, otherwise expressed, the operation is as follows: When the disk E is suddenly started or is given a sudden increment of speed in the direction of the arrow m , the pivoted pawl P, by reason of inertia, resists deflection from its previous position and moves directly into the tooth-space first presented to it.

Although the structure shown in Fig. 3 is entirely operative, it is, for reasons above stated, desirable to employ a clutch member of greater mass than that of the pawl P, Fig. 3, and I therefore prefer the device shown in Figs. 1 and 2.

The cylindrical dashboard-casting A is provided with a front plate D and back plate B, suitably flanged at d and b , respectively, for convenience in attachment to the casting A. At the back of the casting A and diametrically across the same there is provided a groove a^6 , which registers with an aperture in the flange of the back plate B and affords the means for attaching the trolley-catcher to the dashboard of the car in the usual manner. A spindle a' , secured to or integral with the casting A, projects forward to the front plate D, to which it is secured by the screw a^3 . The spindle a' serves as a bearing for the trolley-cord reel E. Back of the space occupied by the trolley-cord reel E there is provided a shallow cylindrical depression a^4 , of which the side walls a^5 are provided with internal rack-teeth a^2 . A hollow hub e , secured to or integral with the reel E, fits and turns upon the rear portion of the spindle a' . A spring F, coiled within the hollow portion of the reel E, serves to keep the trolley-cord T under constant proper tension and to wind in slack as the trolley may descend. In cross-section in Fig. 1 there is seen the portion C of the clutch member which is carried by the rotative reel E. The clutch arrangement is, however, better shown in Fig. 2. The clutch consists of two members, the stationary member being the rack a^2 , the other member being carried by the rotating reel E. This reel-carried clutch member comprises the pawl P, pivoted at p upon the back plate of the reel E, and the actuator C, which is connected

with the pawl P by the link p^3 , the latter being pivoted to the pawl and actuator at p^2 and p^1 , respectively. The actuator C is pivotally hung upon the hub e , so as to turn freely and loosely thereon when obliged to do so. A light spring S, secured to the actuator C at s and to the reel E at s' , serves to hold the reel-carried clutch member in position with the pawl P resting against the stop p' . The pawl P is so proportioned that the ends P' P² substantially balance each other, and likewise the actuator C is symmetrically balanced upon the reel-hub e . The trolley-cord T, as shown at Fig. 2, emerges from the casting A through the hub a^3 , which is suitably secured to or cast integral with the cylindrical shell portion of the casting A. In operation while the reel E is stationary or is rotating with only a gradual increment of speed the light spring S holds the reel-carried clutch member stationary with relation to the reel; but if a sudden increment of speed is imparted to the reel E, as by the trolley jumping from the trolley-wire, the yielding tension of the spring S, between the reel-carried clutch member and reel, permits the inertia of the clutch member to assert itself and to move the clutch member with relation to the reel, and thus to advance the engaging point P' of the pawl P into clutch with the teeth a^2 of the rack. This of course stops the reel at once, and the trolley, if it has left the trolley-wire, is restrained from rising to a dangerous height. In practice this clutch apparatus is so sensitive and prompt in action that the trolley itself cannot rise far from the wire or do any damage whatever to the trolley-wire supports. In many cases the impact which causes the trolley to jump from the wire depresses the trolley so far that its return is checked by the trolley-catcher above described before the trolley rises any higher than the wire itself. The advantage of my inertia trolley-catcher lies largely in the fact that it never tends to act while normal conditions are maintained, but revolves with the reel almost as an integral part thereof. When, however, a sudden jerk of the trolley calls for the instant action of the trolley-catcher, the inertia-controlled clutch mechanism acts at once. The location of the actuator C is such that it can be given considerable mass, and thus it reinforces the lighter mass of the pawl P and actuates it in case of emergency with more promptness and certainty than might be expected with the pawl P alone to constitute the reel-carried member of the clutch mechanism.

Other forms of clutch mechanism which embody all the principles of my inertia-controller may readily be contrived by skilled mechanics, and I suggest two other forms as equivalent to the elementary structure (shown in Fig. 3) and also to the preferred structure. (Shown in Figs. 1 and 2.) In Fig. 4, for instance, I show the actuator C as provided with a pivot p , upon which is carried the pawl P. The hub e is provided with spring-anchor-

age s' , and the spring S' , secured therein, loosely engages the actuator at s . A stop P^3 is fixed to the reel E , and the spring S , acting upon the pawl P , holds the same normally against the stop p' , which is mounted on the actuator C . With this arrangement, again, under normal conditions the spring S' retains the reel-carried clutch member substantially stationary with relation to the reel; but when the reel suddenly starts to rotate and the inertia of the actuator C causes the same to lag behind the reel for an instant the pin P^3 strikes against the inclined edge of the pawl P and forces the engaging end P' into a tooth-space in the rack a^2 . In Fig. 5 the pawl P is mounted in a slide or groove p^5 , cut for the purpose in the back wall of the reel E . The gaging end P' of the pawl P normally passes close to the ends of the rack-teeth a^2 as the reel E revolves. The pawl P is provided with a base p^6 , the latter being perforated at p^7 to receive the pin c , which is secured to or integral with the actuator C , which, as in the previous cases, is pivotally hung at the center of the reel E . The spring S , secured to the actuator at s and to the reel at s' , normally holds the reel-carried clutch member in contact with the stop p' , which in this case is the end wall of the slot or groove p^5 . A stop-pin e' serves to reinforce the pawl P and to sustain the shock of stopping the reel. When a sudden increment of speed is given to the reel E , the inertia of the reel-carried clutch member causes the pawl P to move toward the circumference of the reel and into engagement with the teeth in the rack a^2 .

What I claim, and desire to secure by Letters Patent, is—

1. The combination of a reel, its winding-spring, a clutch, whereof one member is stationary, the other carried by the reel and loosely mounted thereon, in such manner that the inertia of the said reel-carried clutch member moves it into clutch with the stationary clutch member when the rotative speed of the reel is suddenly increased.

2. The combination of a reel, its winding-spring, a clutch, whereof one member is stationary, the other carried by the reel and loosely mounted thereon, in such manner that the inertia of the said reel-carried clutch member moves it into clutch with the stationary clutch member when the rotative speed of the reel is suddenly increased, and a yielding connection between the reel and the clutch member carried thereby.

3. In a trolley-catcher, the combination with a reel mounted on a fixed support, a winding-spring for the reel, a clutch, whereof one member is stationary and the other member is movably mounted on the reel and comprises a loosely-mounted clutch-actuator, the clutch-actuator a yielding connection between the said actuator and the reel, the several parts arranged so that the inertia of the clutch-actuator changes the relative positions of the actuator and reel when the rotative speed of

the reel is suddenly increased, and moves the clutch members together.

4. In a trolley-catcher, the combination with a reel, mounted on a fixed support, a winding-spring for the reel, a clutch, whereof one member is stationary, and the other member is movably mounted on the reel and comprises a clutch-actuator, the clutch-actuator, consisting of a piece loosely mounted on the reel, a yielding connection between the actuator and the reel, the several parts so arranged that the inertia of the clutch-actuator changes the relative positions of the actuator and the reel and moves the clutch members together when the rotative speed of the reel is suddenly increased.

5. In a trolley-catcher, the combination with a reel mounted on a fixed support, a winding-spring for the reel, a clutch, whereof one member is stationary and the other member is movably mounted on the reel and comprises a clutch-actuator, the clutch-actuator, consisting of a piece loosely mounted concentrically with the reel, a yielding connection between the actuator and the reel, the several parts so arranged that the inertia of the clutch-actuator changes the relative positions of the actuator and the reel and moves the clutch members together when the rotative speed of the reel is suddenly increased.

6. The combination, in a trolley-catcher, of the reel, winding-spring, stationary support, rack thereon, pawl mounted on the reel and connected to an inertia-controlled pawl-actuator, the said pawl-actuator, consisting of a bar loosely mounted on a hub attached to and concentric with the reel, and a spring connecting the reel and actuator-bar, whereby the pawl is normally held clear of the rack, substantially as described.

7. The combination of a reel, its winding-spring, a clutch, whereof one member is stationary, the other carried by the reel, loosely mounted thereon, and balanced with respect to centrifugal force, in such manner that the inertia of the said reel-carried clutch member moves it into clutch with the stationary clutch member when the rotative speed of the reel is suddenly increased.

8. The combination of a reel, its winding-spring, a clutch, whereof one member is stationary, the other carried by the reel, loosely mounted thereon, and balanced with respect to centrifugal force, in such manner that the inertia of the said reel-carried clutch member moves it into clutch with the stationary clutch member when the rotative speed of the reel is suddenly increased, and a yielding connection between the reel and the clutch member carried thereby.

9. In a trolley-catcher, the combination with a reel mounted on a fixed support, a winding-spring for the reel, a clutch, whereof one member is stationary, and the other member is movably mounted on the reel in balance with respect to centrifugal force, and

comprises a loosely-mounted clutch-actuator, the clutch-actuator, a yielding connection between the said actuator and the reel, the several parts arranged so that the inertia of the
5 clutch-actuator changes the relative positions of the actuator and reel when the rotative speed of the reel is suddenly increased, and moves the clutch members together.

10. In a trolley-catcher, the combination
10 with a reel mounted on a fixed support, a winding-spring for the reel, a clutch, whereof one member is stationary and the other member is movably mounted on the reel and comprises a clutch-actuator, the clutch-actuator,
15 consisting of a piece loosely mounted concen-

trically with the reel in balance with respect to centrifugal force, a yielding connection between the actuator and the reel, the several parts so arranged that the inertia of the clutch-actuator changes the relative positions
20 of the actuator and the reel and moves the clutch members together when the rotative speed of the reel is suddenly increased.

Signed by me at Troy, New York, this 16th day of October, 1901.

ALBERT W. HAM.

Witnesses:

FRANCIS J. MOLLOY,
GEO. F. MARKHAM.