

No. 713,828.

Patented Nov. 18, 1902.

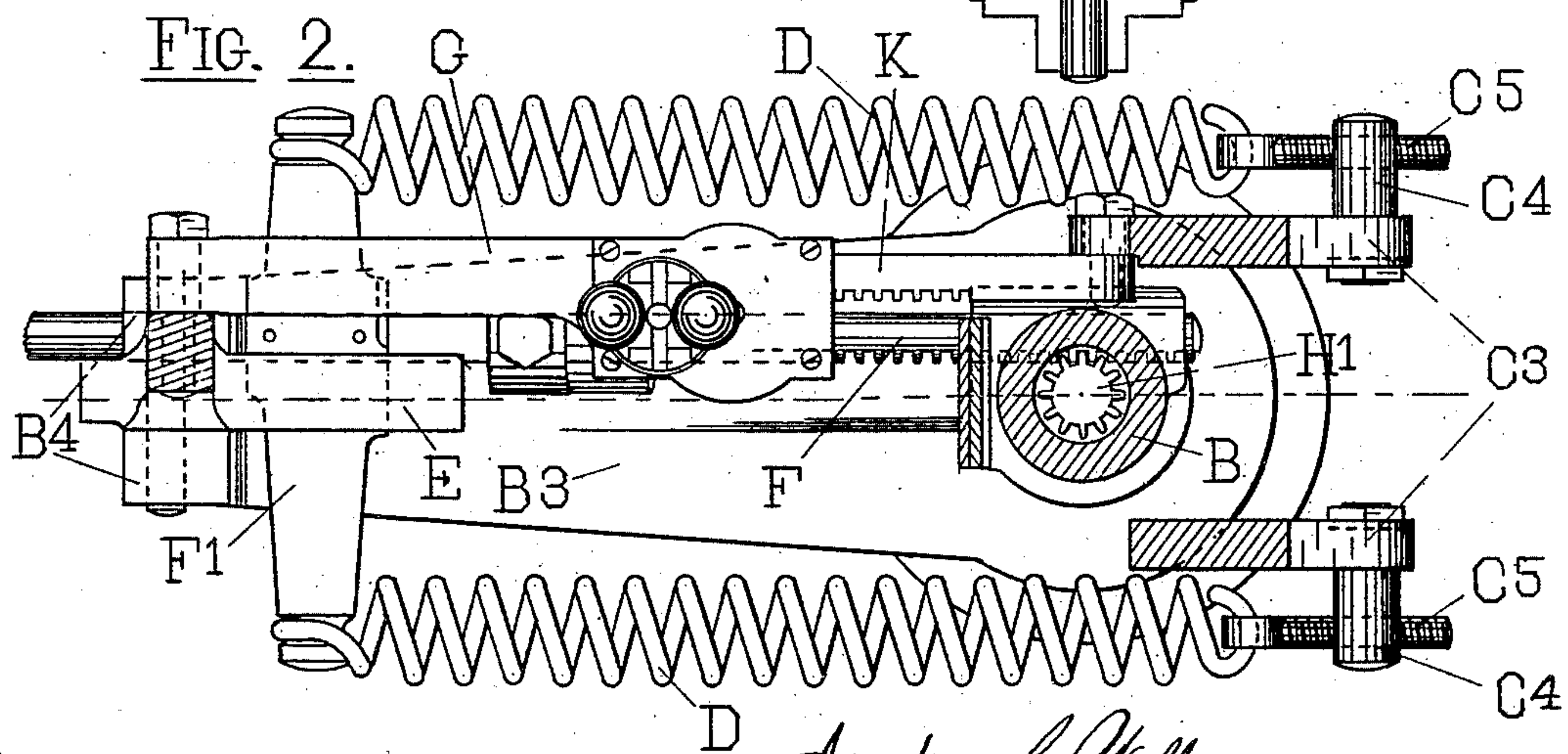
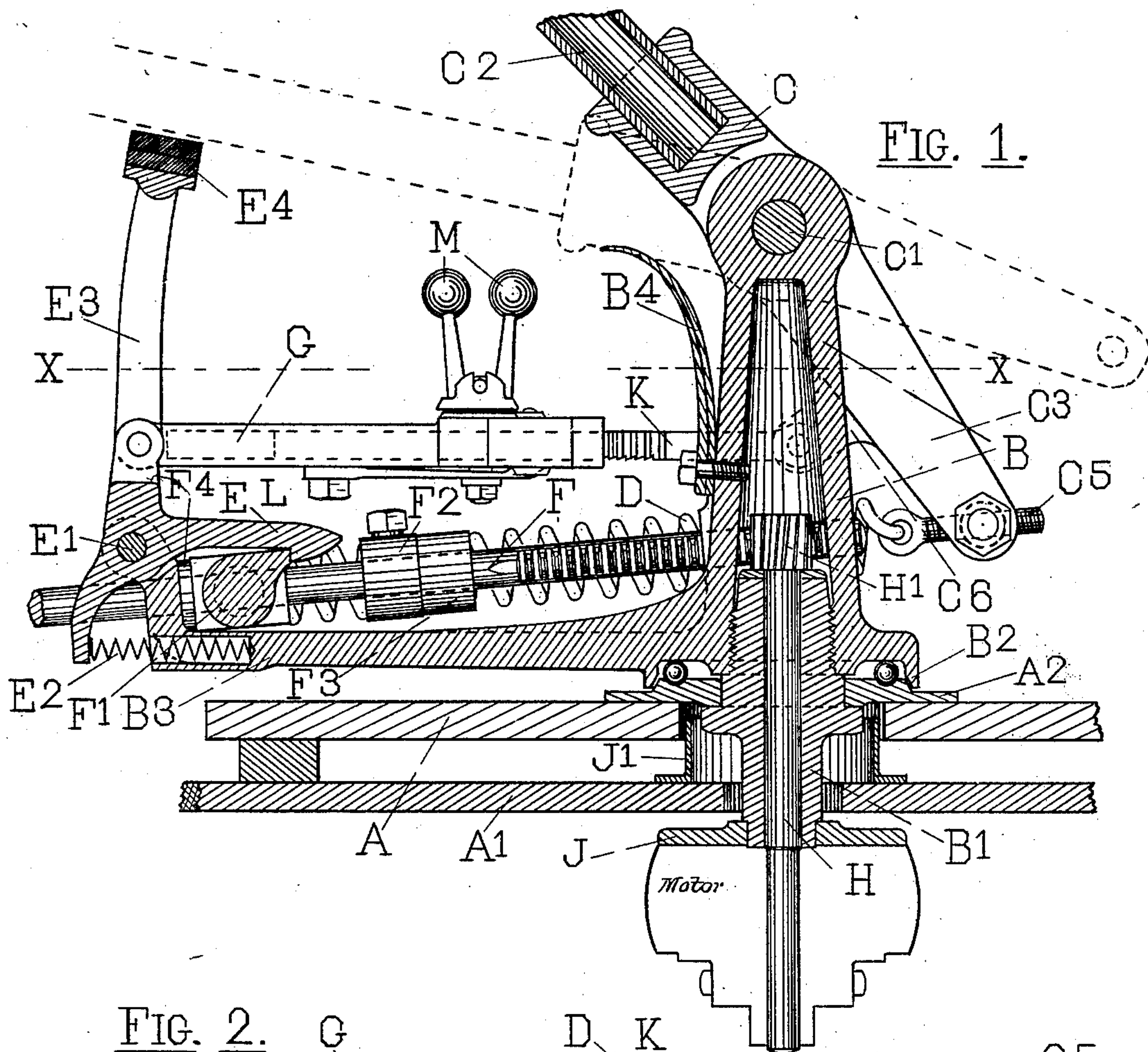
A. C. WOLFE.

AUTOMATIC RELEASING DEVICE FOR SAFETY TROLLEYS.

(Application filed Feb. 6, 1902.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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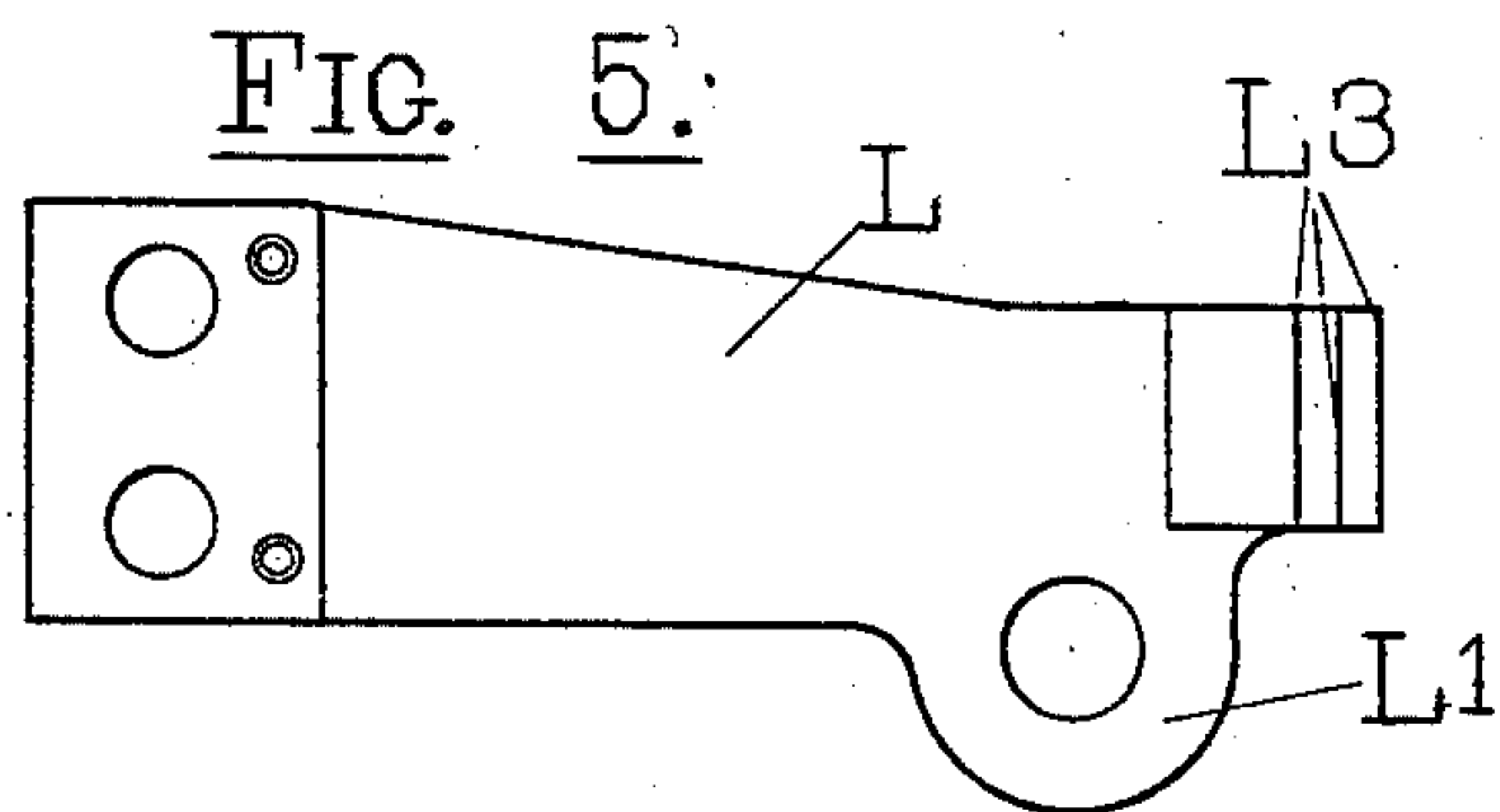
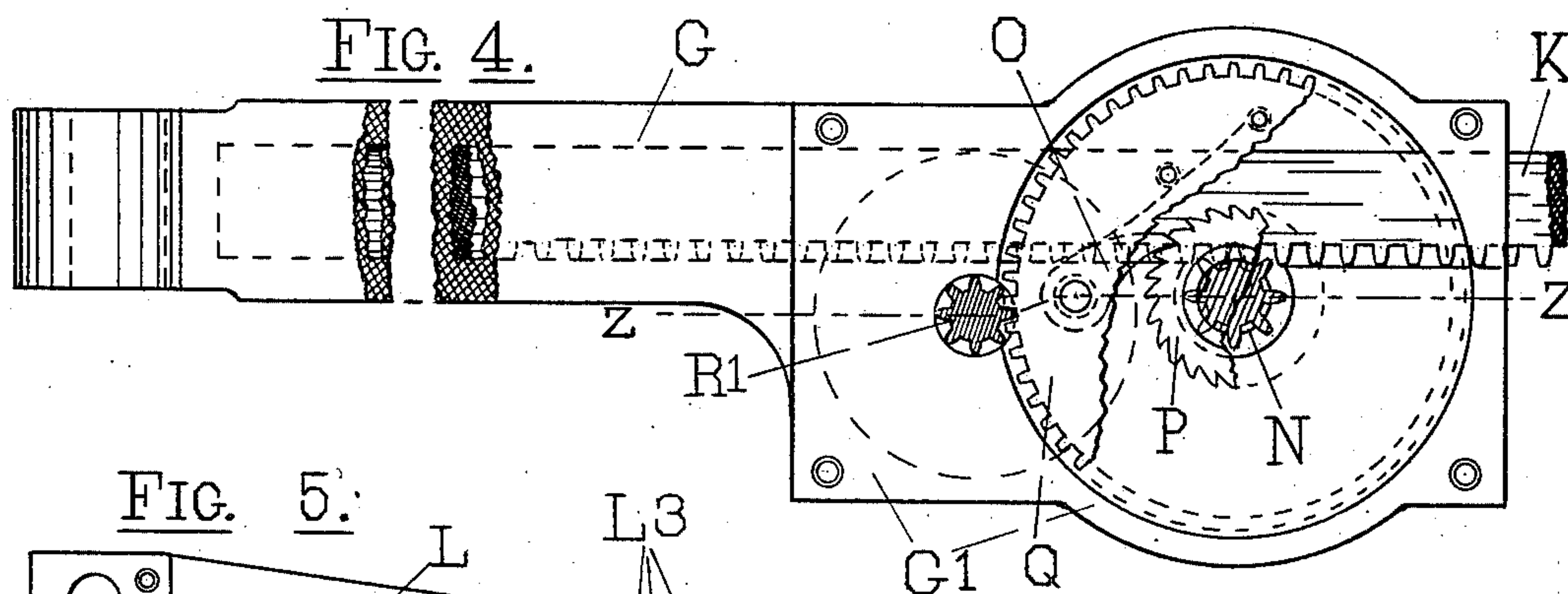
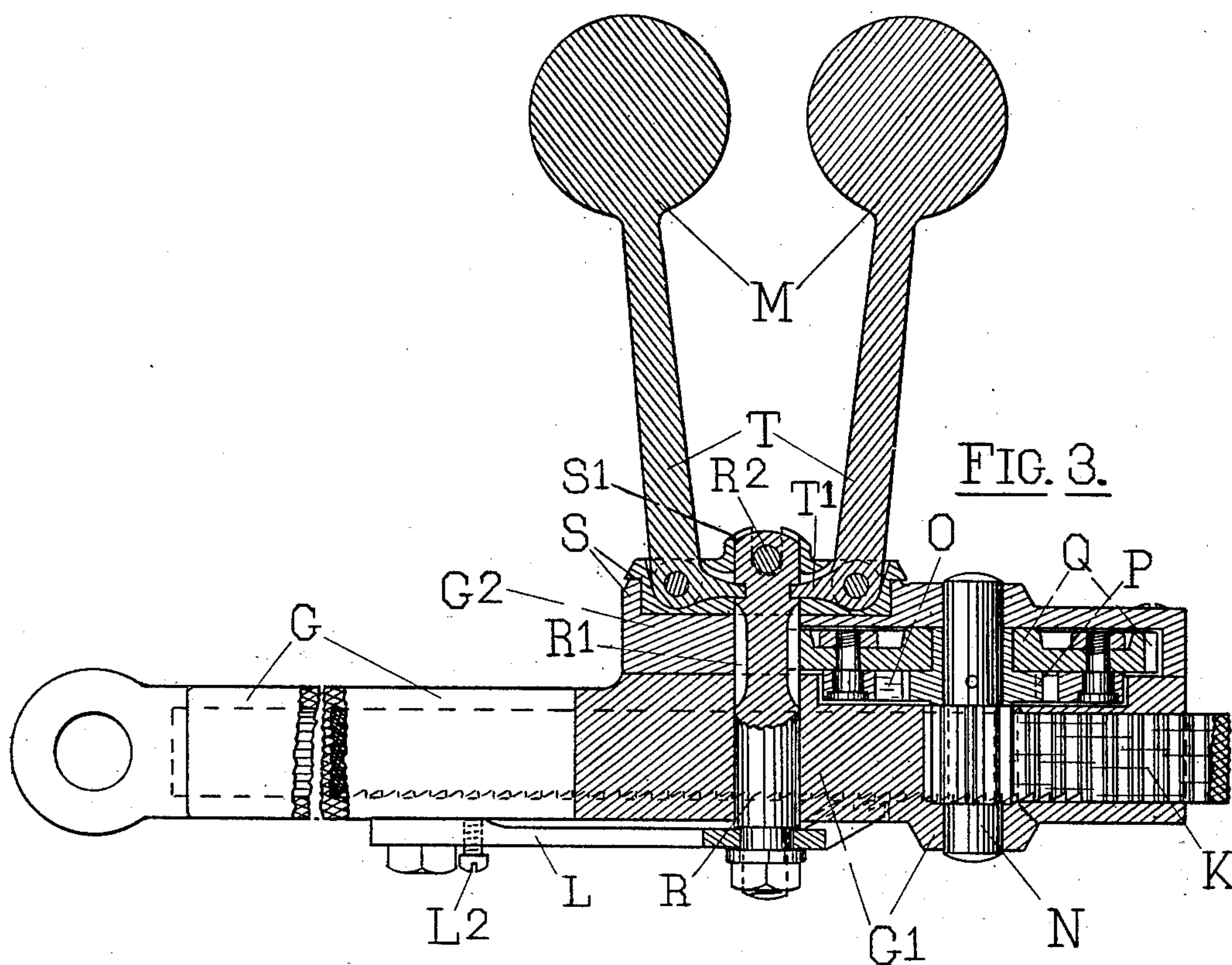
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UNITED STATES PATENT OFFICE.

ANDREW C. WOLFE, OF DENVER, COLORADO, ASSIGNOR OF ONE-FOURTH
TO WILBUR L. BARNES, OF DENVER, COLORADO.

AUTOMATIC RELEASING DEVICE FOR SAFETY-TROLLEYS.

SPECIFICATION forming part of Letters Patent No. 713,828, dated November 18, 1902.

Application filed February 6, 1902. Serial No. 92,940. (No model.)

To all whom it may concern:

Be it known that I, ANDREW C. WOLFE, a citizen of the United States, residing in the city of Denver, county of Arapahoe, and State of Colorado, (and whose post-office address is No. 622 Eighteenth avenue,) have invented a new and useful Automatic Releasing Device for Safety-Trolleys, of which the following is a specification.

10 This invention relates to "safety-trolleys" or trolleys in which the trolley-pole after leaving the wire and momentarily rising above the wire thereby releases itself and falls to a position too low to strike the cross-wires; and
15 it consists chiefly in an automatic releasing device for the support for the sustaining-springs and also of minor devices associated therewith.

Among the objects of this invention are,
20 first, to provide a releasing device for safety-trolley bases in which mechanical means shall cause the disengaging or releasing of the movable spring-support when the trolley-pole rises rapidly, as when it leaves the wire; second, to
25 provide a releasing means which shall cause the release of the sustaining mechanism when the pole rises faster than a predetermined rate and at the same rate whether the pole be running at medium height or near its highest
30 or lowest running positions; third, to provide an easy and convenient means of returning the sustaining-spring support and trolley-pole to their upper or normal running positions after the car has been stopped to replace the pole
35 under the wire. One particular use for such a trolley-releasing device is where the cars pass under an overhead structure, as a bridge or elevated railway, the object being to automatically lower the pole from a position in
40 which it would endanger the cross-wires or the pole whether it was at the time of leaving the wire running high or low.

The above objects are accomplished by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a central longitudinal sectional elevation of a trolley-base having the improved releasing and returning devices incorporated in it. The position of a small electric motor for the return of the parts is shown
50 in outline upon the bottom part of the verti-

cal shaft. Fig. 2 is a plan view of the trolley-base shown in Fig. 1, the swivel-post and fork, also the limit-stop, being shown in section at line X X of Fig. 1. Fig. 3 is a longitudinal sectional elevation of the disengaging mechanism on an enlarged scale and principally as seen at line Z Z of Fig. 4 and looking up therein. A portion of the inclosing member is broken away to show the right-hand portion of the rack or disengaging-rod. Fig. 4 is a plan view of the disengaging mechanism shown in Fig. 3 with the cap and other upper parts removed. A major portion of the large governor-gear is broken away to
65 more clearly show the ratchet, pawl, and rack beneath, and a portion of the ratchet and shaft is broken away to show the pinion beneath. In Figs. 3 and 4 a portion of the sleeve is represented as broken away, it being too
70 long to be fully shown in these views. Fig. 5 is a plan view of the spring-pawl. The lowered position of the pole and corresponding position of the fork are shown by dotted lines in Fig. 1.

Similar characters designate like parts in the several views.

The trolley-board and roof of an electric car are represented in Fig. 1 by A and A', respectively. To A is secured in any ordinary
80 manner a swivel-plate A² for the support of the trolley-base proper. The head or swivel-post B is revolvably mounted on the plate A² in any desirable manner, as by means of the hollow stud B' being fitted into a hole in the
85 center of A² and screwed up to a shoulder or otherwise secured in B. The joint between A² and B is preferably provided with a ball-bearing, as represented, to sustain the weight of the imposed trolley-base and make the
90 same very free to turn. A dust-excluding flange B² surrounds the ball-bearing to aid in keeping the same clean.

The trolley-pole support is pivotally mounted upon the upper portion of B and may be
95 of any desired form, as the fork C shown, which is fitted to tip freely upon the pin C'. The ordinary hollow trolley-pole C² is secured in the upper end of the fork in the usual manner, the top part being broken away in Fig. 100
1. The lower ends of the fork C³ are each provided with a horizontal stud C⁴, in which

are screwed the adjustable eyebolts C^5 , into which are hooked the sustaining-springs D . The support for the opposite ends of springs D will be described later.

5 The swivel-post B is provided with a rearward extension B^3 , the extreme rear end being turned upward and bifurcated. In the bifurcated portion B^4 is pivotally mounted a retaining-hook E on the pin E' . Slidably
10 mounted in suitable guide-holes in B and B^3 is a spring-support carrying rod F , a vertical toothed rack being cut in the side of the front portion of the rod for a purpose to be later described. Back of the middle of rod F is fixedly
15 secured upon it a cross-piece F' , the end portions of which are provided with annular grooves and have hooked upon them the rear ends of the sustaining-springs D , and the rod F is moved backward to tighten the tension of the springs and tend to raise the pole
20 C^2 and is moved or allowed to move forward under the tension of the springs D to the lower the pole. The upper forward edge of cross-piece F' is provided with a face for engagement with the retaining-hook E , by means
25 of which the springs D are held in their operative or sustaining position.

A projection of the hook E extends downward at the rear, and a compression-spring
30 E^2 tends thereby to force the hook into engagement with the cross-piece F' . A set-collar F^2 is located as desired upon the central portion of rod F , and an adjoining elastic washer F^3 , preferably of rubber, encircles the
35 rod, and upon the disengagement of hook E this strikes against a boss on B and cushions the blow, which is delivered by the force of the springs D . An elastic washer F^4 is preferably placed between the cross-piece F'
40 and the rising portion of the extension B^3 to cushion and make less noisy the rearward or retractive movement of rod F .

A vertical arm E^3 of the hook E has pivoted to it a sleeve G , which forms one of the principal
45 parts of the releasing device, and the upper extremity of this arm is preferably provided with a block of rubber E^4 to act as a stop for the downward movement of the trolley-pole C^2 . A bent spring B^4 is secured to
50 the rear side of B and takes the chief part of the blow from the descent of the pole C^2 , though this blow is usually very light, owing to the fact that the movement of the spring-support F' when released is limited, so as to
55 cause the springs D to nearly sustain the pole, and the angle maintained by the springs and fork are such that the pole is raised with approximately the same force when high, low, or in a mid-position. As the springs are more
60 extended, and therefore stiffer, the angle at which they pull is more acute, and hence they are less effective. The greater proportion of the weight of the pole to be lifted when low is taken into consideration in calculating the
65 angle.

Passing vertically through the center of the

hollow stud B' is a small shaft having a pinion formed at its top end, and this shaft H is for the return or retraction of the spring-support F and F' , the pinion H' being in engagement
70 with the rack formed in rod F , as is shown in Fig. 2. The hollow stud B' is provided with a flange J , which is secured thereto in any desirable manner, and the purpose
75 of the flange is to support a small electric motor for operating the shaft H . The position of such a motor is shown in outline in Fig. 1 and is intended to be operated by a storage battery, (not shown,) which is automatically
80 charged from the electric wires of the car in the usual manner. Upon the trolley-pole leaving the wire and subsequently being disengaged and lowered the car is brought to a stop, whereupon the motoneer or conductor
85 of the car throws a switch, (not shown,) which admits current from the storage battery to the motor attached to plate or flange J , the motor moves the rod F with F' toward the rear, and they are secured in their normal
90 position by the hook E . A flange J' surrounds the opening through the roof A' of the car for the exclusion of rain, snow, &c.

The releasing device proper consists in a novel form of connection between the trolley-fork and the hook or its equivalent, which
95 holds the spring-support in its normal operative position.

The principal parts of the releasing device are a sleeve member G , a push-rod member K , provided with a rack and with a series of
100 ratchet-teeth and mounted to slide freely within the sleeve G , a pawl member L , secured to the sleeve G and capable of being moved into and out of engagement with the ratchet-teeth of rod K , a governor mounted
105 on the sleeve G and driven by gearing in engagement with the rack of the rod K , and a spring opposing the action of the governor and tending to withdraw the pawl from engagement with the ratchet-teeth of rod K .
110 The governor will be designated in a general way by M , and the spring is incorporated with the pawl L , the intermediate portion being formed thin and tempered as a spring.

As previously stated, the sleeve G is pivoted to the vertical arm of the hook E , and the mating rod K is pivotally secured to an extension C^6 of the lower portion of the fork
115 C^3 . Consequently there will be relative movement between the rod K and sleeve G whenever the trolley-pole C^2 rises or lowers, provided the hook E remains stationary and in engagement with support F' . This relative
120 movement, when in the direction of the movement of the rod K into the sleeve G , is made to turn the governor, and when the revolution of the governor is at a sufficiently rapid
125 rate the governor M is made to raise the pawl L into engagement with the ratchet-teeth of rod K , and a continuation of the upward
130 movement of the pole C^2 therefore raises the hook E , releasing the sustaining-springs D

and allowing the pole to drop until arrested by the tightening of the springs D and the sustaining force of the spring B⁴.

The front end of the sleeve G is enlarged into a plate portion G', which is a support for the governor M, and a cap G² is secured upon G' in any desired manner, as by screws.

Having bearings in the plate G' and cap G² is a short pinion-shaft N, its position being such that the pinion will be in engagement with the rack formed in the side of the square rod K. Fixedly secured upon shaft N above the pinion is a ratchet-wheel P, and above the ratchet-wheel is a gear Q, which is freely revoluble about the shaft N. This gear Q is provided with one or more pawls O of the well-known form for engaging with the ratchet-wheel P, the said pawls being provided with the usual spring for causing their engagement with the ratchet-wheel. The direction of the ratchet-teeth of wheel P is such that the gear Q will be forced to rotate when the rod K is moved into the sleeve G, but may not necessarily rotate when it is moved out of the sleeve. Also revolubly mounted in the plate G' and cap G² is a vertical governor-shaft R, which has a pinion portion R', which is in engagement with the gear Q. The lower end of shaft R is provided with a shoulder and a nut, and between these is inclosed a wing portion L' of the pawl L, and by means of which the free end of the pawl is raised by and with the shaft R. Surrounding the upper end of shaft R is a disk S, which is revolubly mounted in a suitable bearing in cap G² and is made to turn with shaft R by means of a pin R², which extends at its ends into suitable slots in raised portions S' at the sides of the disk S. The shaft R and pin R² are free to slide up and down a short distance in the disk S. Pivotaly mounted in the disk S are two opposite governor-arms T, having the usual balls or weights at their free ends, and horizontal arms T' are in engagement with suitable notches in the sides of shaft R, by means of which the shaft R is raised when the governor-balls are impelled outward or separated, as by centrifugal force. The pawl L as a spring is adjusted by means of the screws L² to resist the centrifugal action of the governor-balls until they revolve at the desired speed, when the force of the spring is overcome, and the teeth L³ of the pawl are then raised into engagement with the ratchet-teeth of the rod K. A spring of any desired form or connection may be substituted for the spring portion of the pawl L to resist the governor action and withdraw the pawl from engagement with the ratchet-teeth of rod K. The automatic disengaging device, therefore, is inoperative at low relative movements between the rod K and sleeve G; but with high or rapid relative movements between K and G or of K in G the pawl L is made to lock them together, as far as the inward movement of K is concerned, whereupon this disengaging device becomes operative.

Any suitable means of returning the spring-support F' and rod F may be used, but the one shown saves the necessity of material exertion and is quick. It is also such a form as is not interfered with by the turning of the trolley-base on the car.

The releasing device is capable of operation with any trolley-base wherein spring tension is reduced to lower the pole out of danger.

The centrifugal action of the governor may be opposed by a spring of any desired form, or by the mere gravity of the vertically-moving parts, if so preferred, or the pawl L and the spring to control the same may be separate members, as may seem desirable.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent of the United States, the following:

1. In a safety-trolley-disengaging device, the combination with a sleeve member, of a push-rod slidable in said sleeve member a series of ratchet-notches on said push-rod; a pawl on said sleeve member adapted to engage said ratchet-notches; a rack upon said push-rod; a governor in operative engagement with said pawl; and gearing for actuating said governor, in operative engagement with said rack.

2. In a safety-trolley-disengaging device, the combination with a sleeve member, of a push-rod slidable in said sleeve member a series of ratchet-notches on said push-rod; a pawl on said sleeve member adapted to engage said ratchet-notches; a rack upon said push-rod; a pinion revolubly mounted in said sleeve member and engaging said rack; a governor in operative engagement with said pawl; and ratchet-driven gearing between said pinion and said governor, for operating the governor and pawl from a movement of the push-rod in one direction only.

3. In a safety-trolley-disengaging device, the combination with relatively movable sleeve and rod members, of a governor carried by one of said members; driving means for said governor comprising a pinion in engagement with a rack upon the other of said members; ratchet and gear connections between said pinion and said governor; and a pawl in operative connection with said governor, in position and adapted to stop the sliding of the rod into the sleeve when the governor is revolved up to operative speed.

4. In a safety-trolley-disengaging device, the combination with a sleeve and a rod slidably mounted therein, of a series of ratchet-teeth and a rack upon said rod; a pinion-shaft and a governor-shaft revolubly mounted in said sleeve; ratchet-gearing from said pinion-shaft to said governor-shaft; a disk revolubly mounted in a cap of the said sleeve and concentric with said governor-shaft; a pin through the said governor-shaft in engagement with slots in the said disk, whereby the disk is rotated by the governor-shaft and the governor-shaft is slidable in the disk; gov-

ernor-levers pivotally mounted in said disk and having arms in engagement with notches in said governor-shaft; and a spring-pawl in operative engagement with said governor-shaft, whereby the pawl will be made to engage the ratchet-notches of the rod when the rod is pushed rapidly into the sleeve.

5. In a safety-trolley base, the combination with a pivoted pole-support, of a sliding spring-support; a retaining-hook for said spring-support; sustaining-springs connecting said pole-support and said spring-support; and a disengaging means for said retaining-hook, embodying a geared centrifugal governor.

6. In a safety-trolley base, the combination with a pivoted pole-support, of a sliding spring-support; sustaining-springs connecting said supports; a retaining-hook engaging said spring-support; a sleeve member pivoted to said hook; a push-rod pivoted to said pole-support and slidable in said sleeve member; a spring-actuated pawl secured upon said sleeve and adapted to engage ratchet-teeth of said push-rod; and a governor, in position and adapted to throw said pawl into engagement with said push-rod.

7. In a safety-trolley base, the combination with a pivoted pole-fork, of sustaining-springs attached to said fork; a slidable rod having a cross-piece supporting said springs; a retaining-hook and a cushioned stop for said spring-support; a spring to check the downward movement of said pole-fork; and means substantially as described for disengaging said retaining-hook.

8. In a swivel safety-trolley base, the combination with a pivoted pole-fork; of sustain-

ing-springs engaging said fork; a slidable support for said sustaining-springs; a retaining-hook for said support; a vertical pinion-shaft at the swivel-center of the trolley-base, in operative engagement with said support; a motor on said vertical shaft; and a governor-controlled disengaging device connecting said fork and said retaining-hook.

9. In a swivel safety-trolley base, the combination with a pivoted trolley-pole, of sustaining-springs connected with said pole; a slidable support for said springs; an adjustable elastic stop for said support; a retaining-hook for said support; a resisting-spring and limit-stop for the downward movement of said pole; a vertical motor-shaft at the swivel-center, for the retraction of said support; and a governor-controlled disengaging means for said retaining-hook.

10. In a safety-trolley base, the combination with a spring-sustained trolley-pole, of a swivel-base; a swivel-plate; a ball-bearing between said base and said plate; a slidable spring-support; a retaining-hook for said support; and disengaging means for said hook, embodying a governor-carrying member and a governor-gearing member slidable therewith; and means for the retraction of said support.

In testimony whereof I have signed my name to this specification, in presence of two subscribing witnesses, at Denver, Colorado, this 28th day of January, A. D. 1902.

ANDREW C. WOLFE. [L. S.]

Witnesses:

GEO. D. NOBLE,
L. S. McKEE.