

No. 737,513.

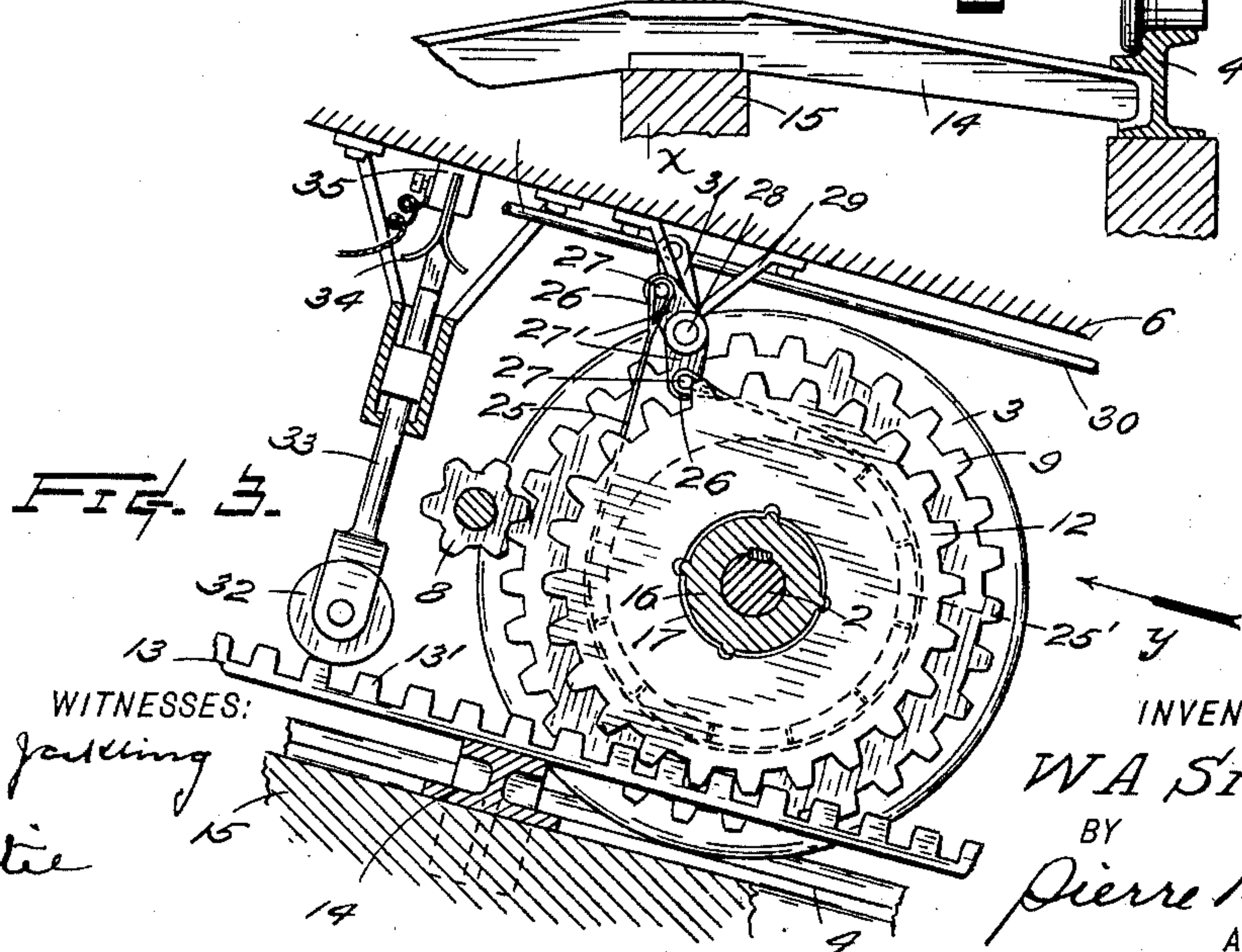
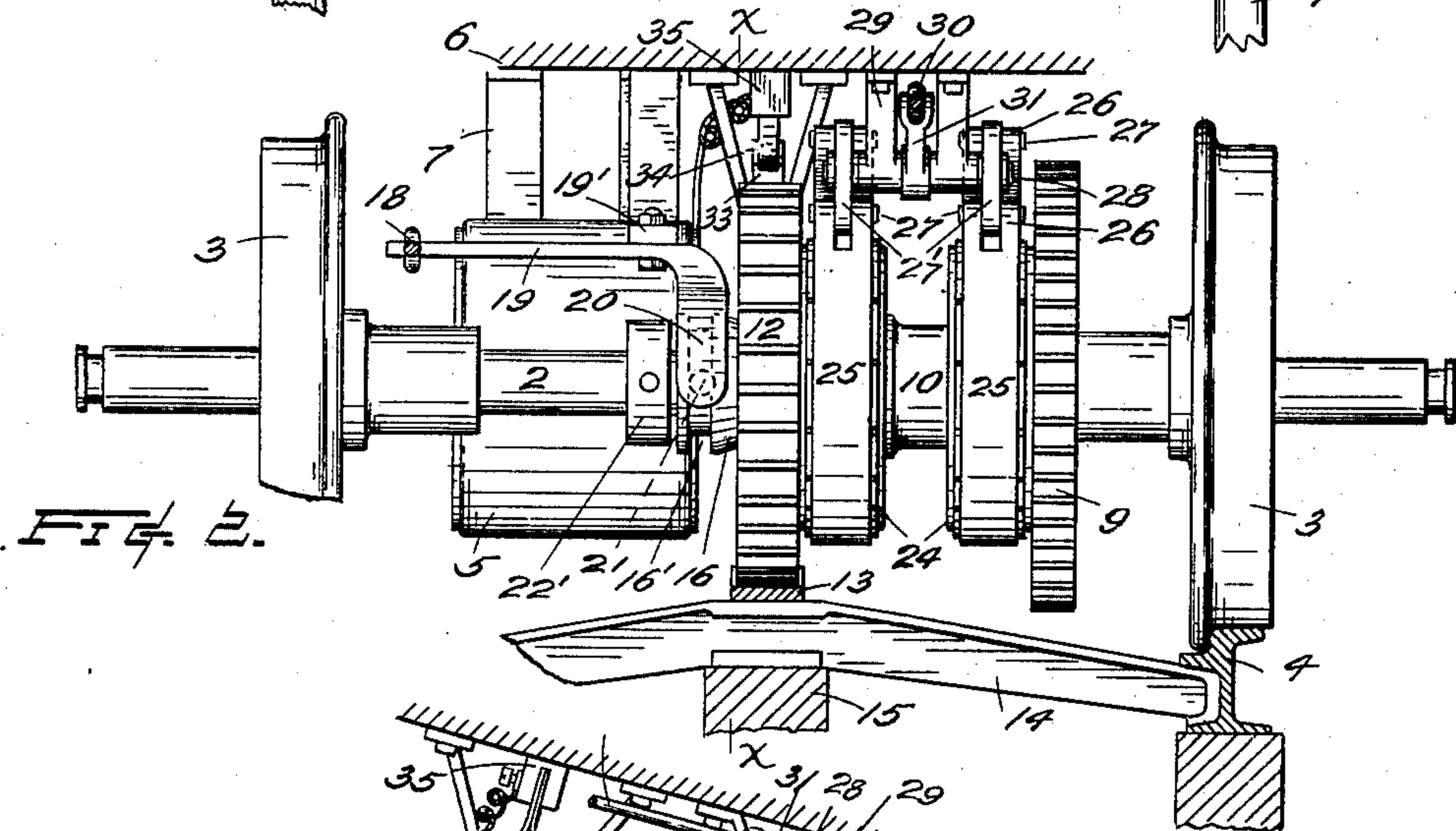
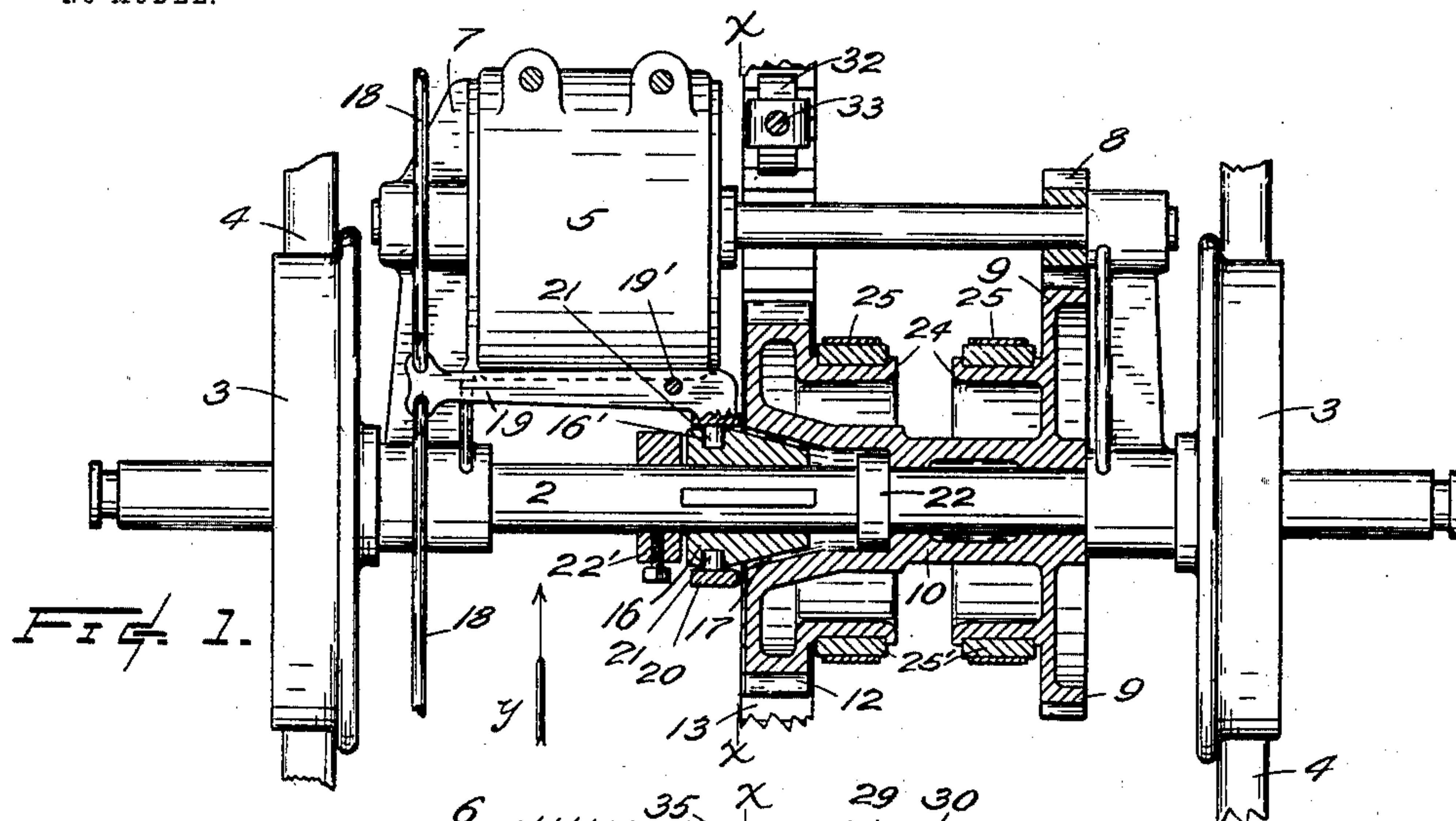
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W. A. SNYDER.

APPARATUS FOR CONTROLLING MOVEMENT OF CARS UPON INCLINES.

APPLICATION FILED MAR. 16, 1903.

NO MODEL.



WITNESSES:
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APPARATUS FOR CONTROLLING MOVEMENT OF CARS UPON INCLINES.

SPECIFICATION forming part of Letters Patent No. 737,513, dated August 25, 1903.

Application filed March 16, 1903. Serial No. 147,997. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. SNYDER, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Apparatus for Controlling the Movement of Cars Upon Inclines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to traction-railway cars.

The invention is applicable to cars which travel upon tracks and which are driven by motors of usual or special construction which may be carried upon the car-body or attached to the truck and may interchangeably be used in transmitting motion from a primary or supplemental driving-motor to propel the car by the tractive force of the usual car-wheels against the track-rails or it may be used to operate a toothed wheel which positively engages a corresponding rail or rack, whereby it provides means to ascend or descend very steep grades or inclines. These features make the invention especially valuable for use on electric cars operating in cities where the variations of loads carried are considerable and where the streets traveled upon are of different grades.

It has heretofore been found necessary under the above-mentioned conditions to install upon each car a plurality of motors at great initial cost and of an aggregate voltage far in excess of the ordinary demands of traffic or by the use of cables operated from a powerhouse or by counterweights, and of these methods the cable system is the only one which is capable of use on the steeper grades, and when used in connection with an electric car is found to be extremely disadvantageous both from a financial aspect and from incommoding the public due to the loss of time consumed in coupling or disconnecting the cars with the cable at the tops and bottoms of the various hills.

The invention consists in the various novel features of construction and the arrangement and combinations thereof, as will be herein- after fully described, illustrated in the accompanying drawings, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of my invention, shown partly in section, applied to a car-truck axle. Fig. 2 is an end elevation of the same, taken in the direction of the arrows *y* of Figs. 1 and 3. Fig. 3 is a longitudinal section on line *x* of the other views.

Referring to the said drawings, 2 designates a car-wheel axle; 3, the supporting or traction wheels mounted thereon; 4, track-rails, and 5 a motor of any suitable design, which is connected to the aforesaid axles and to the truck-body 6 by suitable framework, such as 7. Fixedly mounted upon the armature-shaft of the motor is a toothed pinion 8, which meshes with a gear-wheel 9, integrally connected by a sleeve 10 with a toothed gear 12. This last-named gear meshes with the teeth 13' of a rack 13, rigidly secured to the road-bed—as, for instance, by transversely-arranged bridge-pieces 14, secured by both extremities to the track-rails and intermediately to a longitudinal timber 15. The rack is preferably positioned above the plane of and mid-distant between the track-rails. The sleeve 10 is normally loose upon the axle, but is adapted to be clutched securely thereto by a suitable clutch mechanism, as, preferably, by a cone-wheel 16, splined to the axle, making engagement in a correspondingly-shaped recess 17 in the end of the sleeve. The cone-wheel is shifted longitudinally of the axle into or out of operative engagement with the said sleeve by means of suitable controlling devices, such as a lever within reach of the motorman, connected by reach-rods 18, the bell-crank lever 19, fulcrumed at 19' and provided with a bifurcated end 20 to straddle the cone-wheel and having internally-projecting studs 21, which engage with an annular groove 16' of the said cone-wheel. 22 and 22' are respectively collars secured to the shaft to prevent the longitudinal displacement of the sleeve and to limit the movement of the said cone-wheel relatively of the axle. Annular drum-flanges 24 are provided upon the gear-wheels 9 and 12, adapted to be frictionally engaged by brake-bands 25, which are preferably lined with a plurality of blocks 25', made of fibrous or other suitable material. The extremities of the said bands are provided with loops 26 for making connection with pins 27, passed

through lever-arms 27' of a vibratory shaft 28. This shaft is journaled in suitable hangers or supports, such as 29, secured to the truck. The said shaft, and consequently the
 5 brake mechanism described, is operated by devices upon the car-platforms through the medium of reach-rods 30, connected to an arm 31 of the shaft.

Where the invention is used with cars designed for traveling over approximately flat
 10 surfaces and an occasional incline or steep ascent, the rack and its engaging mechanism is only intended for use on the latter—i. e., the hills—and with such intermittent service
 15 provision is made whereby the motor actuating the rack-gear is cut out to prevent the rotary parts, both of the motor and its connections, being dangerously accelerated when the rack-gear becomes disengaged when car-
 20 ried beyond the terminals of the rack thereat. Any suitable means may be utilized for this purpose, such as making the said rack-rail the negative conduit for the electric operating-current and having a wiper, such as a
 25 wheel 32, rotatably secured in a vertically-movable arm 33, which makes or breaks the electric circuit according to its being forced into contact with spring socket-pieces 34 of a binding-post 35 when the said wheel mounts
 30 upon the rack or is withdrawn therefrom as the wheel travels beyond and is not borne by the rack.

The operation of the invention is as follows: In traveling over even surfaces the sleeve
 35 carrying the driven and the rack-gear wheels would be coupled by the aforescribed clutch to the axle, and consequently when power is applied through the motor the car is propelled by the tractive force of the car-wheels
 40 upon the rails unless, of course, the motor herein described were used solely as an auxiliary to a main driving-motor, when it would then be entirely cut out until required in ascending grades or where the main motor was
 45 disabled by reason of the burning out of its brushes or other causes. In going up ascents the said gear-sleeve is uncoupled from its axle and the power is transmitted directly to the rack, when the car-wheels would act solely
 50 as car-supporting members, and in descending grades the sleeve would still be uncoupled from its shaft and the rack-gear would continuously engage the rack and insure a positive hold thereon as the rack-gear rotated.
 55 Oftentimes, however, the momentum of the car would be so great that the supplemental means, such as the brake-band aforescribed, would be utilized to reduce the stress

upon the motor, or should it be deemed desirable the brake portion could on occasion
 60 be advantageously used without the motor.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In apparatus of the class described, the
 65 combination with a car-wheel axle, a toothed rail fixedly secured to the track-bed, and a motor provided with a toothed pinion upon its armature-shaft; of gearing loosely mounted upon the said axle and meshing respec-
 70 tively with the said pinion and with the toothed rail and means to rigidly couple the gearing to the axle.

2. In apparatus of the class described, the
 75 combination with the wheel-axle, a toothed rail fixedly secured to the track-bed and a motor having a toothed pinion upon its armature-shaft; of a toothed wheel engaging with the said pinion and integrally connected with a toothed wheel adapted to engage with
 80 the said rail, the said toothed wheels being mounted normally loose upon the said axle.

3. In apparatus of the class described, the
 85 combination with a toothed rail fixedly connected to a track-bed, a wheel-axle, and a motor provided with a toothed pinion upon the armature-shaft; of a toothed wheel mounted normally loose upon the axle meshing with the said pinion and integrally connected with
 90 another toothed wheel adapted to mesh with the said rack, the last-named toothed wheel, a clutch member splined to the said axle and adapted to engage with the said toothed
 95 wheels whereby the latter are coupled to the axle, and means to move the said clutch member into and out of engagement with the said toothed wheels.

4. In apparatus of the class described, the
 100 combination with a rack fixedly secured to a track-bed, a wheel-axle, a toothed wheel mounted upon the said axle and adapted to engage with the said rack, and means to rotate said toothed wheel independently of or integrally with said wheel; of a brake device
 105 comprising annular drum-flange integral of said tooth-wheel, a band extending about the periphery of the drum-flange, and means to tighten the said band into operative engagement with the said drum-flange.

In testimony whereof I affix my signature
 110 in presence of two witnesses.

W. A. SNYDER.

Witnesses:

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