(No Model.)

3 Sheets—Sheet 1.

H. W. HOOTON.

STREET CAR.

No. 510,138. Patented Dec. 5, 1893.

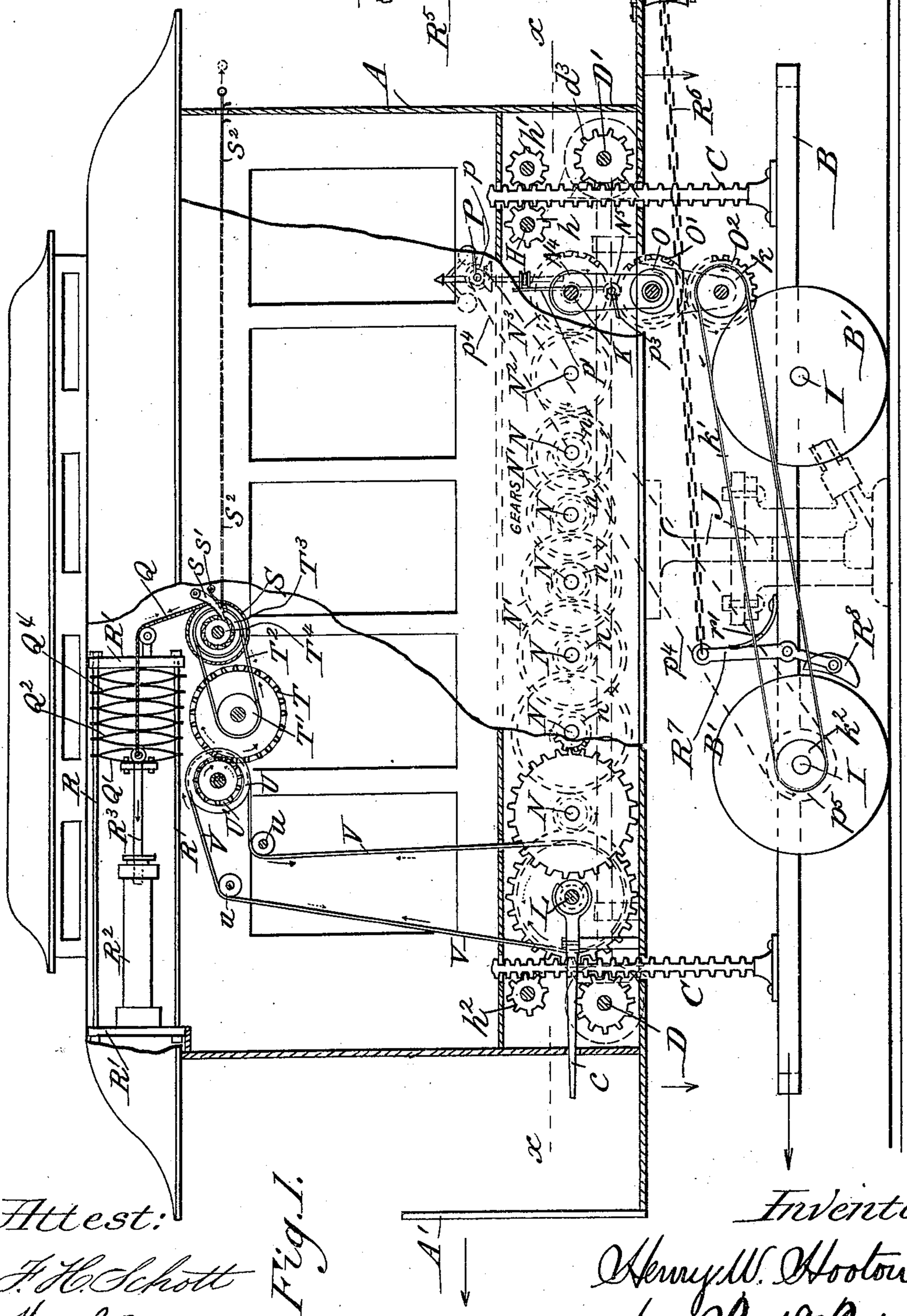

Fig. 1.

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(No Model.)

3 Sheets—Sheet 2.

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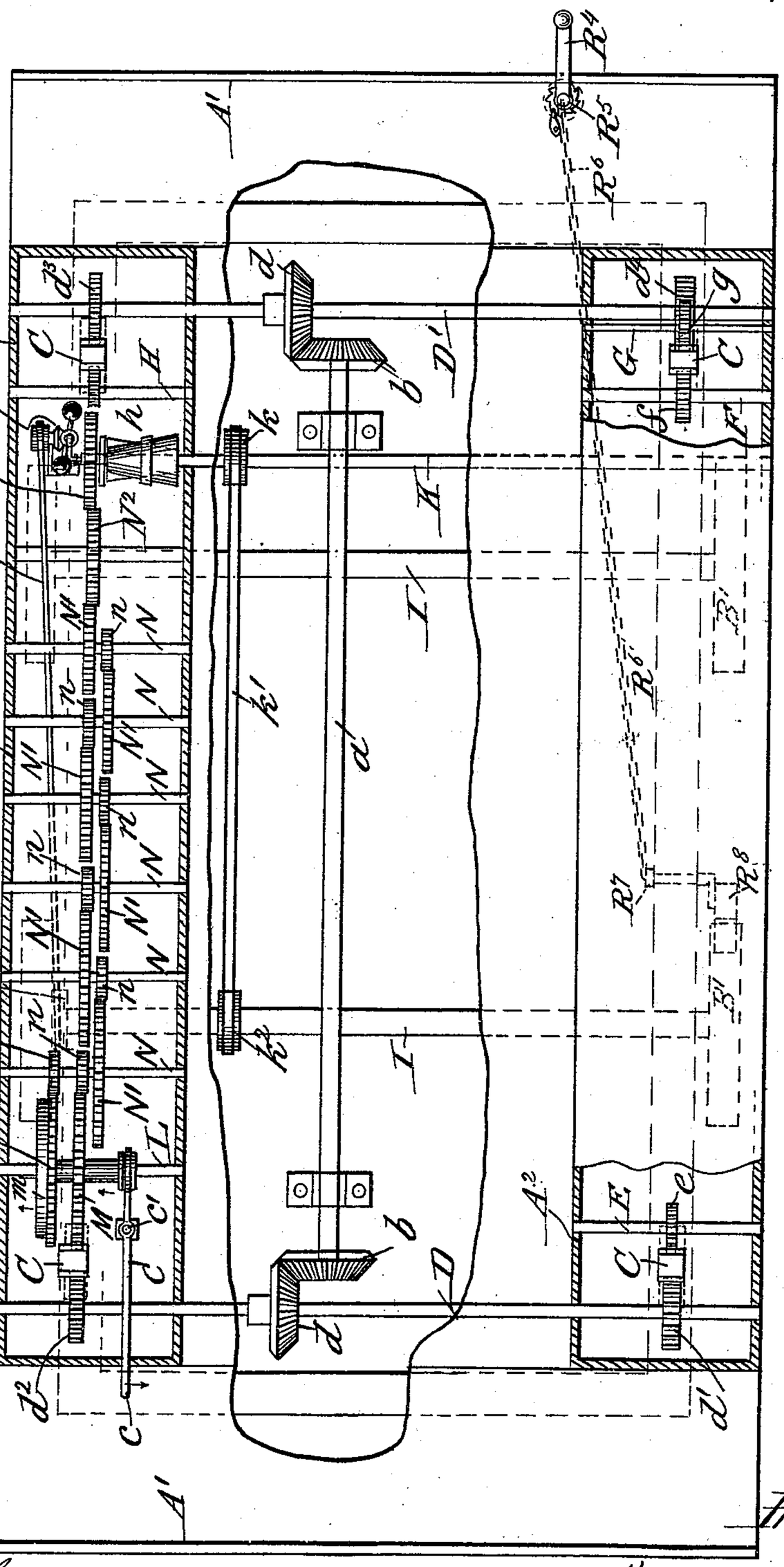

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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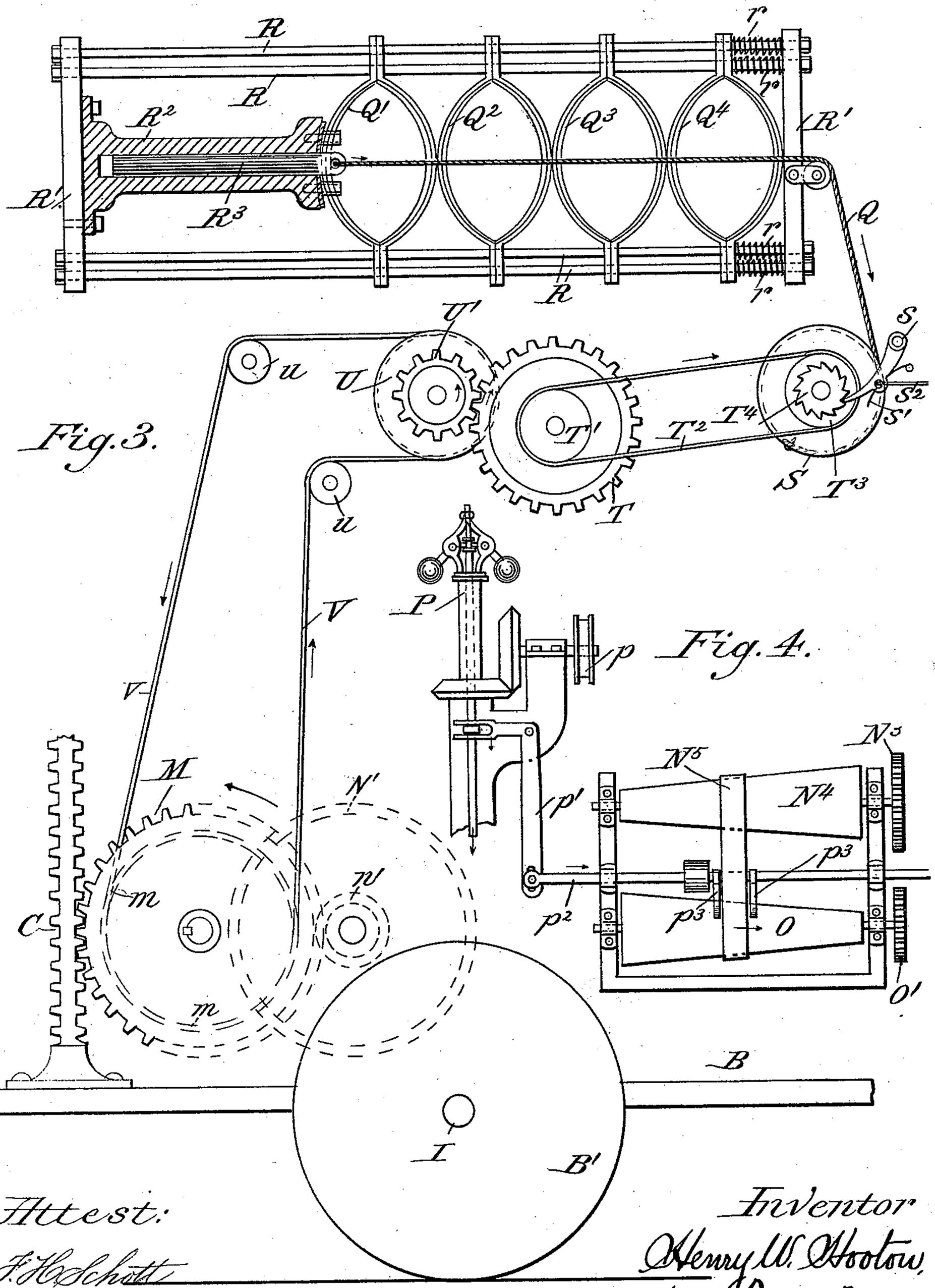

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

HENRY W. HOOTON, OF SALT LAKE CITY, UTAH TERRITORY.

STREET-CAR.

SPECIFICATION forming part of Letters Patent No. 510,138, dated December 5, 1893.

Application filed March 20, 1893. Serial No. 466,929. (No model.)

To all whom it may concern:

Be it known that I, HENRY W. HOOTON, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and Territory of Utah, have invented certain new and useful Improvements in Street-Cars; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in spring motor mechanism for driving street cars, the object of the invention being to provide an efficient motor arrangement for a street or other car which will propel the same easily and with the expenditure of but little power and at a small cost, and the invention therefore consists in the construction, arrangement and combination of the several parts, substantially as will be hereinafter described and claimed.

In the annexed drawings illustrating my invention: Figure 1 is a side elevation in partial section of my improved street car provided with the actuating mechanism involved in the present application. Fig. 2 is a sectional plan on the line *x x* of Fig. 1. Fig. 3 is an enlarged detail elevation in partial section of the spring arrangement which serves to propel the car at certain times. Fig. 4 is a detail elevation of the governor mechanism.

Similar letters of reference designate corresponding parts throughout all the different figures of the drawings.

A designates a street car of any suitable and desirable pattern having the front and rear platforms A′ A′ and the wheels B′ B′. Said car may be of any suitable construction which permits the arrangement therewith of the mechanical parts of the motor mechanism constituting the present invention.

B designates a horizontal platform or horizontal frame of suitable shape and size, it being located beneath the floor of the car, the car being vertically adjustable above the platform by mechanism to be presently described. The platform B has journaled therein the car axles *d d* on which the car wheels B′ are secured. On the horizontal platform or frame B are rigidly secured four upright rack bars C, said bars being located near the four corners of the platform B. These rack bars are preferably toothed on each edge. Said bars have a suitable length so that the main car frame A can be moved up and down a sufficient distance. In order to lift the car A, I employ any suitable kind of a jack operated by hydraulic or other power.

J designates one form of jack—see Fig. 1. When it is desired to lift the car the jack is placed underneath the platform and the car-body lifted to the desired height, after which the jack can be removed. The weight of the car and its contents causes the car-body to gradually descend and this descent furnishes the power through suitably arranged mechanism to propel the car forward. After the car body has settled or descended until it rests upon the platform B, then suitable spring mechanisms arranged suitably within the car come into operation in order to assist in propelling the car along to the point where the jack is located or to some place where the car body may again be lifted in place to supply the needed propelling force. Of course the springs will only be brought into play at certain times when the other propelling force has been found insufficient to carry the car as far as may be necessary.

In one end of the car body is journaled a horizontal shaft D and in the other end a similar horizontal shaft D′. These shafts D and D′ are placed between pinions *d d*, which engage bevel pinions *b b* on a horizontal shaft *a* carried in suitable bearings and located at right angles to the direction of the shafts D and D′. Referring now to shaft D it will be seen that it is provided near one end with a pinion *d′* which meshes with the adjacent rack bar C and near its other end it is provided with a similar pinion d^2 which meshes with the adjacent rack bar C—see Fig. 2.

E designates a short suitably journaled shaft having thereon a pinion *e* which engages the edge of rack bar C on the side opposite to where the pinion *d′* engages the same bar C. The horizontal shaft D′ is provided thereon near one end with a pinion d^4 and near the other end with a pinion d^3, both of which mesh with the teeth of the adjacent rack bars C. Adjacent to one of the rack bars C, that one, which is engaged by the pinion d^4, are two short shafts F and G, said shaft F carrying a pinion *f* and said shaft G

carrying a pinion g, which pinions f and g engage the said rack bar C on opposite edges and at opposite points. It will also be observed that another of the rack bars C, that which is engaged by the pinion d^3 is engaged by two pinions h and h' on opposite edges, said pinions being carried by suitable short shafts, suitably journaled, adjacent to the rack bar C. Also it will be noted that another pinion h^2 engages another of the rack bars C, that rack bar which is engaged by the pinion d^2, said pinion h^2 being carried by a short shaft journaled suitably at points above the shaft D so that the pinion h^2 may engage the teeth of rack bar C on the same side as pinion d^2.

K designates a horizontal shaft journaled in suitable bearings and provided with a belt pulley k around which passes a belt k' which also passes around another belt pulley k^2 fixed on one of the car wheel axles I.

M designates a gear wheel which is arranged to slide loosely upon a shaft L which is journaled in suitable bearings, said gear M being controlled in its movements by means of the hand lever c pivoted on the end of the post c' and provided with a fork which enters a slot in a sleeve which is integral with the gear M, there being likewise upon the shaft L another gear M' which has a flange m, providing a band pulley. The gear M is adapted to engage the teeth of the adjacent rack bar C. By manipulating the lever handle c, gear M can be thrown into or out of mesh as may be desired.

N N N N represent a series of parallel horizontal shafts suitably journaled in a box or compartment A^2 in one side of the main car body, said box compartment preferably being located below the longitudinal side seat which is generally arranged in a street car. Each one of said shafts N carries a gear wheel N' and a pinion n. The gear wheel on one shaft engages the pinion on the adjacent shaft throughout the series as shown in Fig. 2, the engagement being such that motion may be transmitted from one shaft to the other throughout the series. The gear M as also the gear M', engages pinions n and n' on the shaft N next adjacent to the shaft L, which carries the gears M and M'. It will thus be seen that the gear wheel N transmits motion to the other gears of the series and thus to the last gear N', which engages the gear N^2, which in turn meshes with a gear N^3. The gear N^3 is carried rigidly on the end of the shaft of a cone pulley N^4. Directly below the gear N^3 is another gear O' carried rigidly on the end of the shaft of another cone pulley O. The shafts of the cone pulleys N^4 and O are journaled in suitable frames. Said pulleys are reversely placed. N^5 denotes a belt passing around these pulleys and adjustable thereon by means of a belt shifting rod p^2 which is provided with a fork p^3 that embraces the belt N^5, one end of said rope p^2 being pivoted to the end of a bell crank p', the other end of which bell crank is forked to embrace a projection on the vertical rod belonging to the ball governor P. This governor is provided with a pulley p around which passes a belt p^4, which passes likewise around a pulley p^5, on one of the car axles I close up against one of the car wheels B' as shown in Figs. 1 and 2.

The gear mechanism which I have just described is used for the purpose of regulating the speed of the spring motor mechanism and thus control the speed of the car. We have seen that the gear N^3 is engaged and operated by means of the gear N^2. It will now be observed that the gear O' on the shaft of the other cone pulley engages with a gear O^2 on the shaft K, which shaft we have already seen carries the belt pulley k which is connected by a belt connection with the same car axle whereon is the other belt pulley p^5 to which we have just referred.

R^4 denotes a crank handle connected to a vertical shaft R^5, said crank handle being arranged in connection with one of the dashers of the car and serving as a brake handle. The lower end of the shaft R^5 is provided with a pulley around which winds a chain R^6 which connects with the end of a pivoted lever R^7 carrying a brake shoe R^8, which bears against the periphery of one of the car wheels B' and against said lever R^7 bears a flat spring r' which acts to keep the shoe R^8 normally out of contact with the periphery of the wheel.

It will be readily understood that when the brake shoe R^8 is kept pressed close against the periphery of the car wheel the wheels will be kept stationary and by reason of the intervening mechanism, the several parts of which are connected as I have already described, it will be impossible for the said mechanism to move since the braking action of the shoe R^8 will operate to block the movement of all the parts, and thus keep the car A from descending from its elevated position. However whenever the shoe R^8 is removed from the periphery of the wheel then the car will begin to descend on account of the action of gravity and accordingly motion will be communicated through the gearing, the belting, &c., to one of the car axles and it will be revolved and the car will be propelled forward, the governor which I have described regulating the speed or motion.

When the car is being elevated by means of the hydraulic jack or by means of any other suitable force, I shall by manipulating the lever c place the gear N out of mesh with the rack bar C. Then when I desire to propel the car, I place the gear N in mesh and then control the movement of the car by means of the brake.

We have already seen that on the shaft L which carries the gear M, there is another gear M' having an adjacent integral belt pulley m. Around this pulley m passes a belt V—see Fig. 3. The belt V passes around two pulleys u u and then around a belt pulley U. The pulley U is connected with a pinion U'.

The pinion U′ engages the gear wheel T which is connected to a pulley T′ around which passes a belt T^2 which also passes around another belt pulley T^3 which is connected to the pulley S. On the pulley T^3 is a ratchet wheel T^4, the teeth of which are engaged by the pawl *s* governed by a spring *s′* and having connected thereto a rod s^2 which runs horizontally through the top portion of the car to the rear end thereof where it is provided with an eye or loop, so that it may be readily grasped by the hand for the purpose of disengaging the pulley from the ratchet whenever it may be desired to do so.

Q designates a rope or cable which is connected to the pulley S and is adapted to wind thereon.

Although the gearing mechanism that I have just been describing is arranged preferably in the upper part of the car and in connection therewith I provide and arrange a frame having upper and lower horizontal parallel bars R R which are connected at their ends by means of cross bars R′ R′.

Q′ Q^2 Q^3 and Q^4, designate a series of elliptical springs having slotted projections, through which pass the horizontal bars R so that the said series of springs is arranged so as to slide upon said bars.

R^2 designates a centrally bored block which is bolted to the left hand cross bar R′ and contains a reciprocating plunger R^3 to which the ends of the rope Q is connected. The end of this plunger which has the connection with the rope is fixed rigidly to the nearest elliptical spring Q′. It will be obvious that as the pulley S rotates and winds thereon the rope Q, the result will be to reciprocate the plunger R^3 and compress the series of elliptical springs. The last elliptical spring Q^4 is arranged so that its slotted projections are located a short distance from the right hand cross bar R′ and between these slotted projections and the cross bar are coiled springs *r r* which assist in imparting a suitable tension or resiliency to the series of compressed springs.

Such is a brief description of the construction of the spring motor arrangements which I preferably locate in the top of the car and by means of which the car is propelled at certain times, notably after the propulsion resulting from the action has ceased owing to the complete descent of the car so as to rest upon the platform B. As the platform of the car body descends the result will be not only to propel the car forward but also to actuate the gearing connected with the spring arrangement and thus to compress the series of springs so that a certain amount of spring power is thus stored up or in other words it may be said that the actuating spring mechanism is wound up so as to be ready to apply its power whenever desired. Suppose now that the car body has descended so as to rest upon the platform B and that it is desired to apply the power of the spring to further propel the car. Then the gear M will be disengaged from the rack bar C and the pawl *s* will be disengaged from its ratchet T^4 and then as the springs expand the train of gearing and other connections between said springs and the car wheels, will be set in motion and the car will be propelled thereby.

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

1. The combination of the car body, the lower platform, a series of four upright rigid rack bars on said platform, gearing on the car body engaging said rack bars and a brake applied to the car wheel, substantially as described.

2. The combination of a vertically adjustable car body, the horizontal platform provided with upright rack bars engaged by gears on the car body, the trucks, the brake mechanism and suitably arranged gearing which operates when the car descends to propel the same forward through the interaction of the said gearing and mechanical appliances connecting it with the car wheels, substantially as described.

3. The combination of a vertically adjustable car body, a horizontal platform having upright rigid rack bars engaged by gears on the car body, a brake mechanism, a spring motor mechanism arranged within the car and suitable gearing so that the descent of the car may propel the same and the spring mechanism may operate as an auxiliary in the propulsion, substantially as described.

4. The combination of a vertically-adjustable car body a horizontal platform having upright rigid rack bars engaged by gears on the car body, a brake mechanism, a spring motor mechanism within the car, a gearing mechanism, together with suitable mechanical appliances whereby the descent of the car as also the power of the spring motors may be applied to propel the car and a governor mechanism for regulating the action and speed thereof, substantially as described.

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

HENRY W. HOOTON.

Witnesses:
THOS. KANE,
P. L. JOHNSON.