

(No Model.)

J. B. PUGH.

SPRING MOTOR FOR STREET CARS.

No. 302,671.

Patented July 29, 1884.

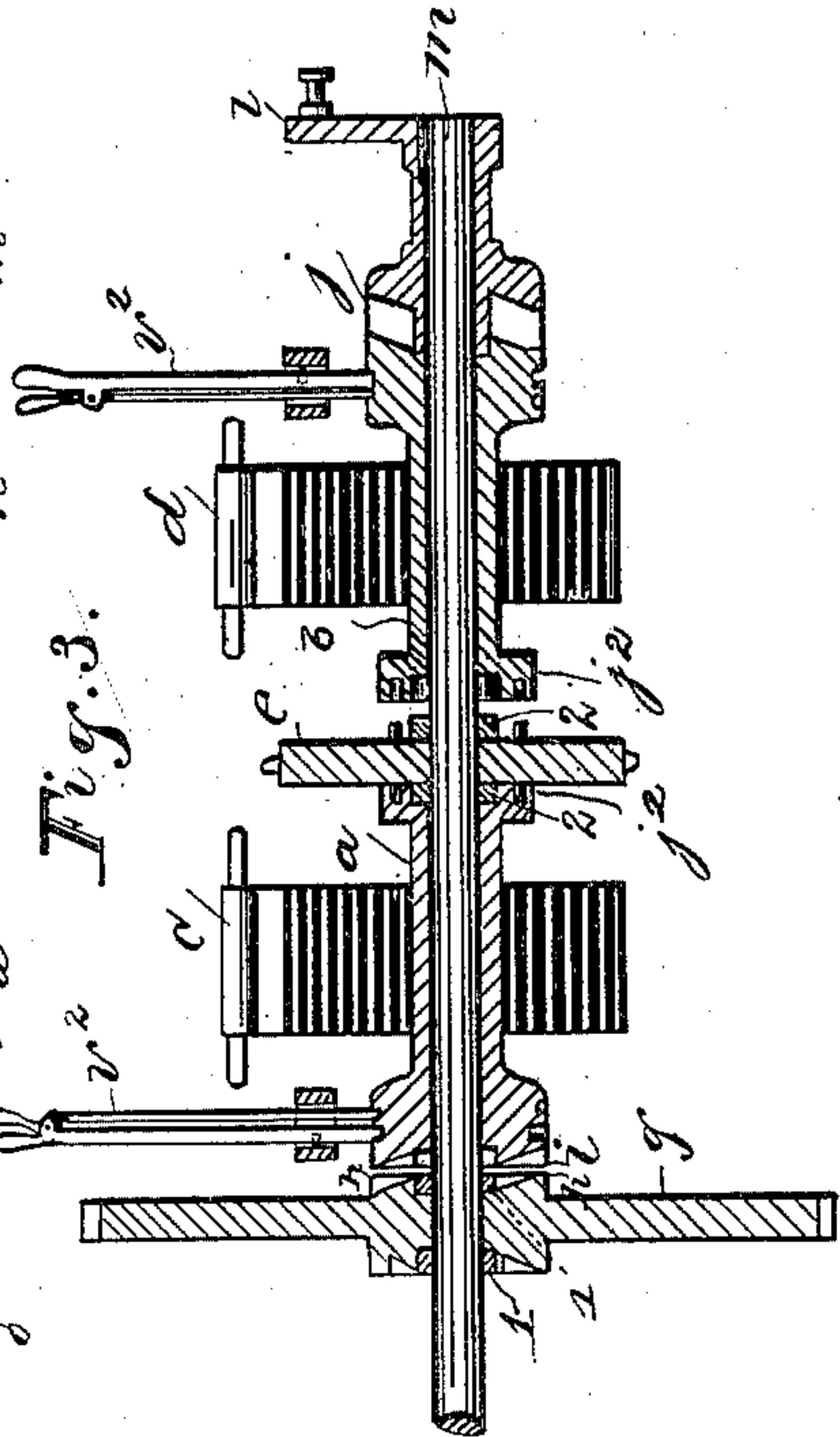
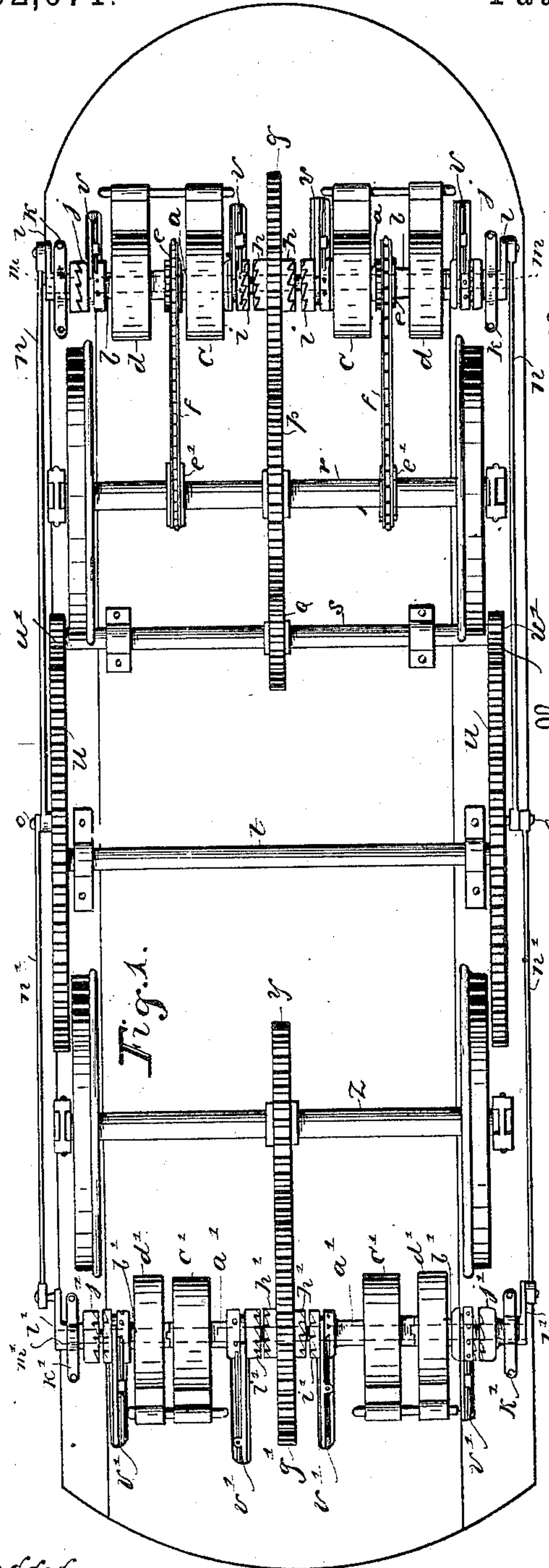
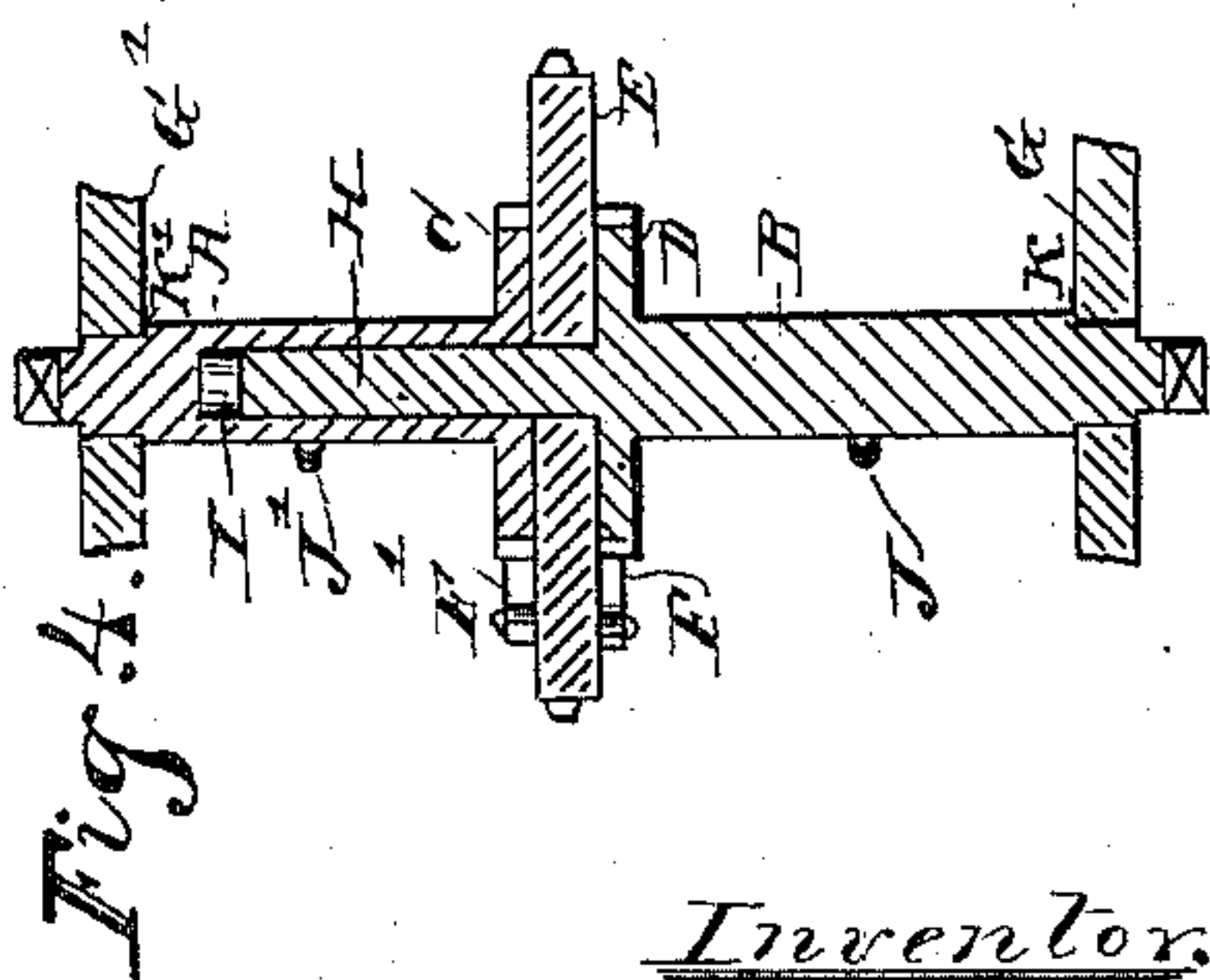
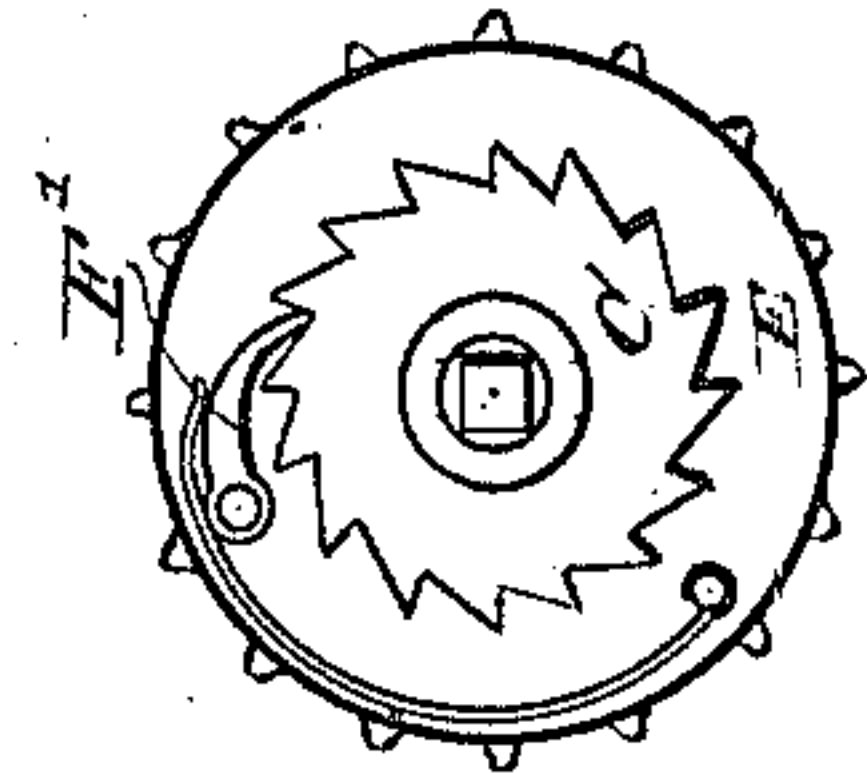


Fig. 2.



Witnesses:  
L. P. McCormack  
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Inventor:  
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by Smith & Soeper attys



# UNITED STATES PATENT OFFICE.

JESSE B. PUGH, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF ONE-HALF TO  
E. A. NICHOLS AND A. S. VIEIRIA, BOTH OF SAME PLACE.

## SPRING-MOTOR FOR STREET-CARS.

SPECIFICATION forming part of Letters Patent No. 302,671, dated July 29, 1884.

Application filed January 7, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, JESSE B. PUGH, of the city of Indianapolis, county of Marion, and State of Indiana, have invented certain new and useful Improvements in Spring-Motors for Street-Cars, of which the following is a correct specification.

My invention relates to improvements in spring-motors for street-cars and any other machinery wherein coiled springs are employed as motive power.

The objects of my invention are, first, to provide means for winding up each spring employed in a spring-motor independently of every other spring employed in the same machine; second, to provide a device for stopping the motion of the street-cars, and at the same time wind up my springs; third, to provide means for utilizing the momentum attained by street-cars in descending heavy downgrades for winding up the springs of street-cars provided with my device. I attain these objects by means of the mechanism described in this specification.

Referring to the drawings filed herewith and made a part of this specification, and in which similar letters of reference relate to similar parts of my invention, Figure 1 represents the under side of a street-car with my device attached. Fig. 3 is a longitudinal section of my power-shaft adapted to street-cars or heavy machinery, where four or more springs are employed. Fig. 4 represents a longitudinal section of my power-shaft adapted to light machinery, where only two springs are employed. Fig. 2 is an end view of Fig. 4.

In Fig. 1,  $aa'a'$  are sleeves, to which are attached steel coil-springs  $cc$ ,  $d'd'$ , and  $c'e'$ ,  $d'd'$ , in the usual manner. Said sleeves are provided at each end with clutches  $ii$ ,  $jj$ ,  $i'i'$ , and  $j'j'$ , and are made to work loosely on shafts  $mm'$ , which shafts extend across the under side of the car, and are journaled at each end to hangers  $kk$  and  $k'k'$ , attached to the frame of the car.

$ll$  and  $l'l'$  are cranks attached to the end of the shafts  $mm'$  by means of keys.

$nn$  and  $n'n'$  are connecting-rods connecting the cranks  $ll$  and  $l'l'$  with the main gear-wheels  $uu$  by means of crank-pins  $oo$ .

$g$  and  $g'$  are cog-wheels revolving loosely around the shafts  $m$  and  $m'$ , and held firmly in position by means of collars. (Indicated in Fig. 3 by the characters 1 1.)

$ee$  are chain-wheels working loosely around the shaft  $m$ , and are held in position by collars. (Indicated in Fig. 3 by the characters 2 2.)

$hh$  and  $h'h'$  are clutches cast on the sides of cog-wheels  $g$  and  $g'$ , to engage with clutches  $ii$  and  $i'i'$  of sleeves  $aa$  and  $a'a'$ .

$e'e'$  are sprocket or chain wheels, rigidly mounted on the axle  $r$  of the car.

$p$  and  $y$  are cog-wheels rigidly mounted on the axles  $r$  and  $z$  of the car.

$Q$  is a cog-wheel rigidly mounted on transmission-shaft  $s$ , upon each end of which shaft are rigidly mounted the pinions  $u'u'$ .

In Fig. 3,  $v^2 v^2$  represent ordinary link-levers used in winding up my springs and shifting my device into gear.

In Fig. 4,  $D$  and  $C$  represent ratchet-wheels rigidly attached to shafts  $A$  and  $B$ , extending outward, and revolving in journal-boxes  $G$  and  $G'$ .

$E$  is a chain-wheel revolving between the two ratchet-wheels  $C$  and  $D$ , rigidly mounted on the shafts  $A$  and  $B$ .

$H$  is a portion of the shaft  $B$ , turned or cast smaller to fit into the hollow portion of shaft  $A$ , as indicated in Fig. 4.

$F$  and  $F'$  are ratchet-pawls to engage with ratchet-wheels  $C$  and  $D$ .

$J$  and  $J'$  are hooks rigidly attached to shafts  $A$  and  $B$ , to which the springs for actuating this device are attached.

It will be readily seen that the two shafts  $A$  and  $B$ , when put together as indicated in the drawings, and firmly held together by means of shoulders  $K$  and  $K'$  and journal-boxes  $G$  and  $G'$ , form one continuous shaft, the spring on either end of which can be wound up independently of the other, and thus the power of two springs be brought to bear upon the wheel  $E$ , instead of one spring, as in ordinary shafts.

The operation of my device is as follows: The springs  $cc$  and  $dd$  being wound, said springs  $cc$  and  $dd$  attached to the sleeves  $bb$ , and  $aa$  brought into engagement, by means of clutches  $j^2 j^2$ , with the pin-clutches on the sides of the chain-wheels  $ee$ , in uncoiling, impart a rotary



motion to said sleeves, which carry with them the chain-wheels *e e*, transmitting, through the endless chains *f f*, the same rotary motion to the sprocket-wheels *e' e'*, rigidly mounted on the axle *r* of the street-car, causing the car to move forward. I can increase the speed of the car by shifting the springs *c' c'* and *d' d'* into engagement with the outer or crank clutches, *j' j'*, and transmitting their power to the gear-wheels *u u* by means of connecting-rods *n' n'*, and thence through pinions *u' u'* to the transmitting gear-shaft *s* and gear-wheels *Q*, imparting this additional power through gear-wheel *p* to the axle *r* of the car, and by this means bring to bear the entire force of all my springs on the axle of the car to impel the car forward. When I desire to stop or check the speed of the car, I shift the clutches *i' i'* into engagement with clutches *h h* of cog-wheel *g'*, when the momentum of the car will cause the springs *c' c'* to wind up as long as the car continues in motion, which the resistance of the springs will check. In descending heavy downgrades, I shift springs *c c* into engagement with cog-wheel *g*, and also, if desired, I shift the springs *c' c'* and *d' d'* into engagement with cog-wheel *g'* by means of clutches *h h* and *h' h'*, when the momentum of the car will wind all these springs so long as the car continues in motion, thus storing up power which can be applied on level or up grades in impelling the car forward, as described above. I propose to apply this method of winding my springs also to cars drawn by horses or mules, for stopping and assisting to start such cars. An ordinary brake can be provided to hold the car in position while passengers are getting on and off.

In Fig. 1, *v v v v v' v' v' v'* represent openings through the bottom of the car, through which the levers *v<sup>2</sup> v<sup>2</sup>* pass. The method of operating and manner of applying these levers I have not described in this specification, as I make no claim on them.

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

1. In a spring-motor for street-cars, the combination of an inner shaft, *m*, having cranks *l l*, chain-wheels *e e*, and their clutches, as specified, wheel *g*, provided with the specified clutches, collars 1, 1, 2, and 2, connecting-rods *n n*, gear-wheels *u u*, and pinions *u' u'*, all combined as specified, in the manner and for the purpose set forth.

2. In a spring-motor for street-cars, the combination of inner shaft, *m'*, having cranks *l' l'*, the gear-wheel *g'*, engaging with gear-wheel *y*, connecting-rods *n' n'*, and sleeves *a'*, all constructed, combined, and actuated as described, substantially in the manner and for the purpose set forth.

3. In a spring-motor for street-cars, the combination of shafts *m* and *m'*, sleeves *a* and *a'*, gear-wheels *g* and *g'*, chain-wheels *e e* and *e' e'*, connecting-rods *n n* and *n' n'*, gear-wheels *u u*, and pinions *u' u'*, all constructed, combined, and actuated substantially in the manner and for the purpose set forth.

4. In a device for propelling machinery, the combination of shaft A, having its ratchet-wheel C, journal-socket I, shoulder K', and hook J', with shaft B and its ratchet-wheel D, spindle H, shoulder K, and hook J, forming, when combined, a continuous power-shaft for supporting and actuating wheel E, provided with ratchet-pawls F and F', substantially in the manner and for the purpose set forth.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 18th day of December, A. D. one thousand eight hundred and eighty-three, (1883.)

JESSE B. PUGH. [L. S.]

In presence of—

WILLIAM S. FROHLIGER,  
H. J. EVERETT.