

(No Model.)

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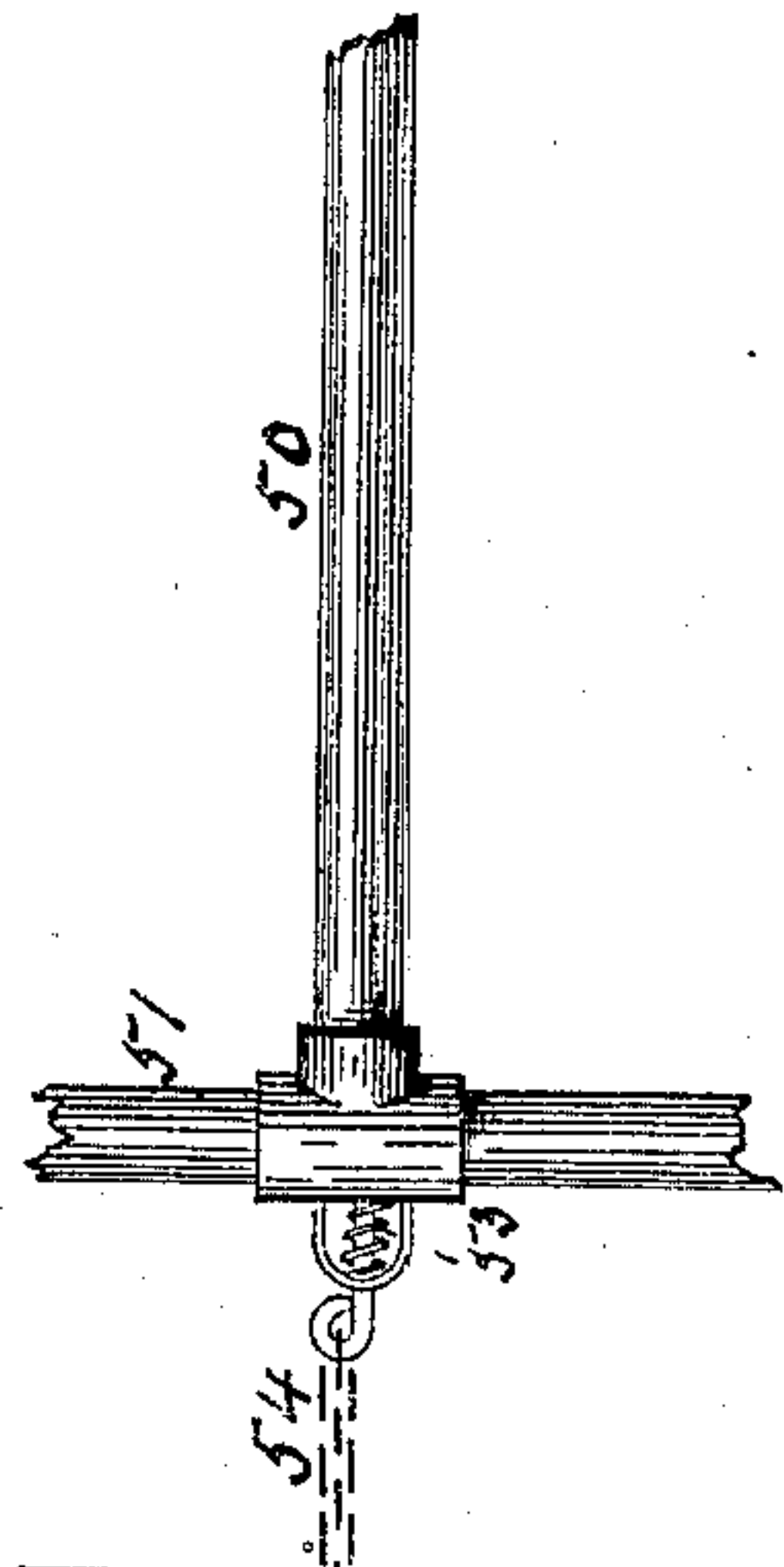
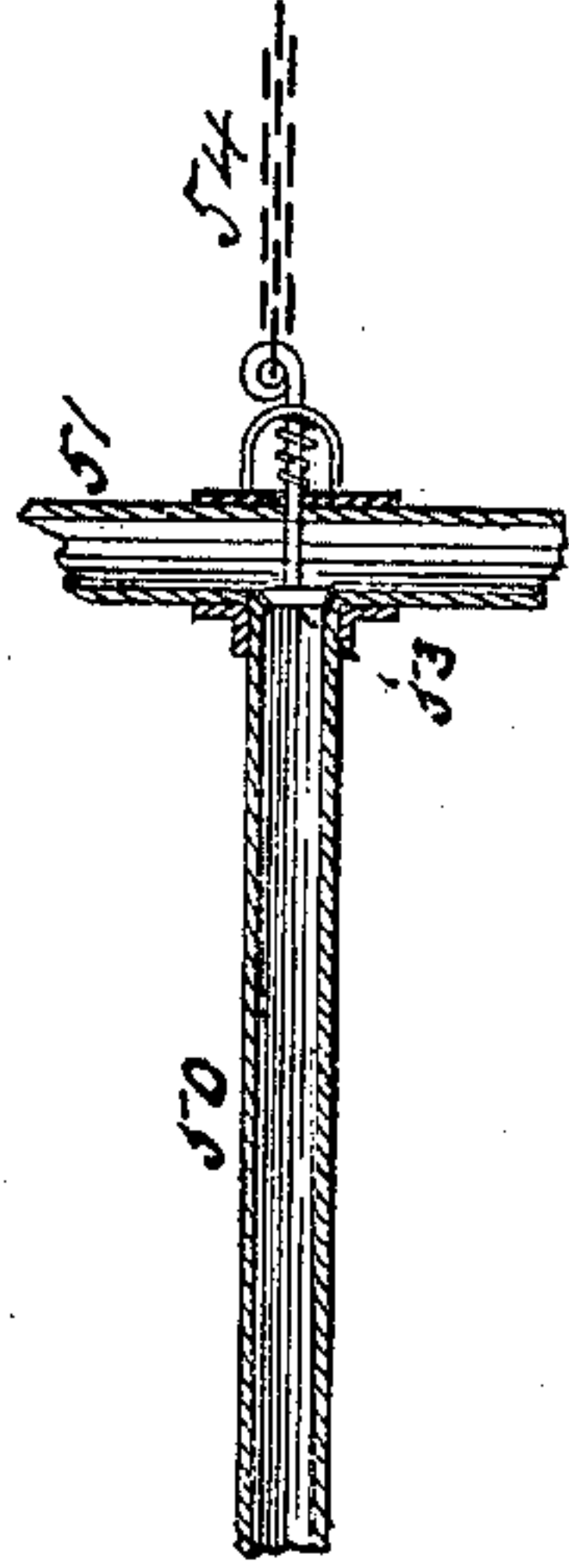
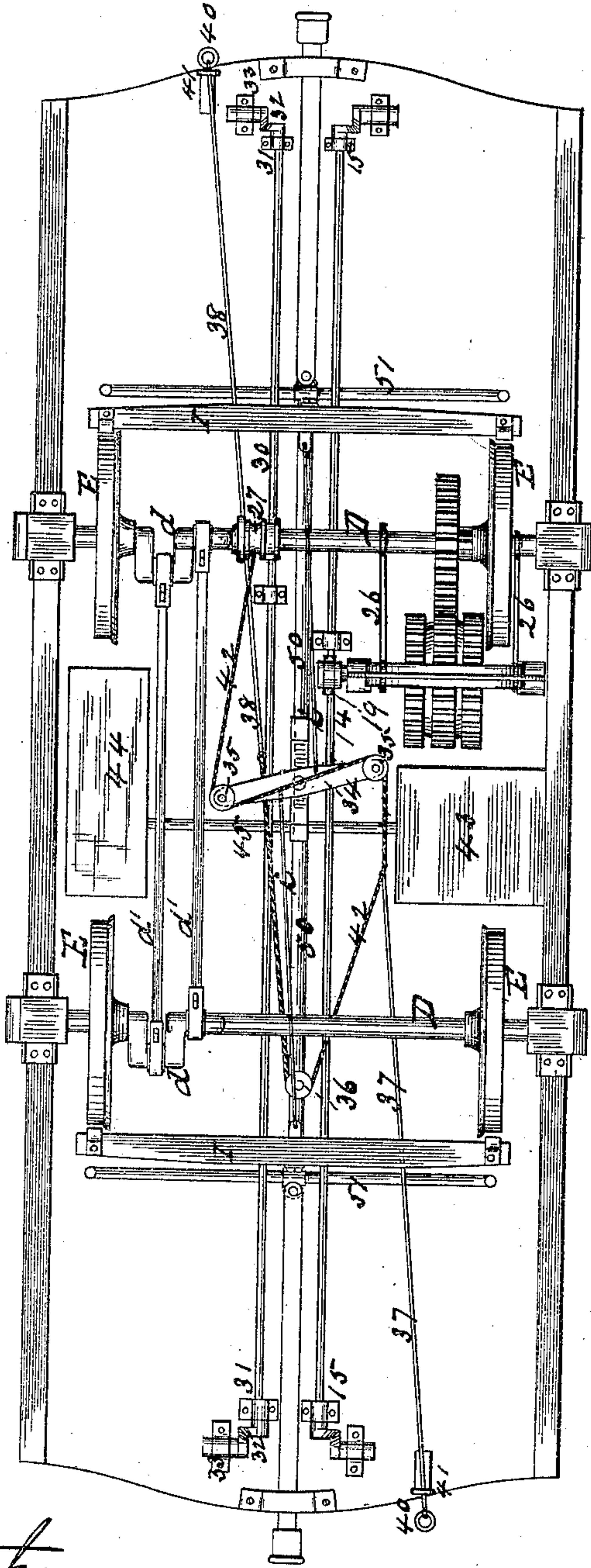
J. NOBLE.

POWER DRIVEN STREET CAR.

No. 369,610.

Patented Sept. 6, 1887.

Fig. 1.



Attest,

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Inventor,

Jay Noble

(No Model.)

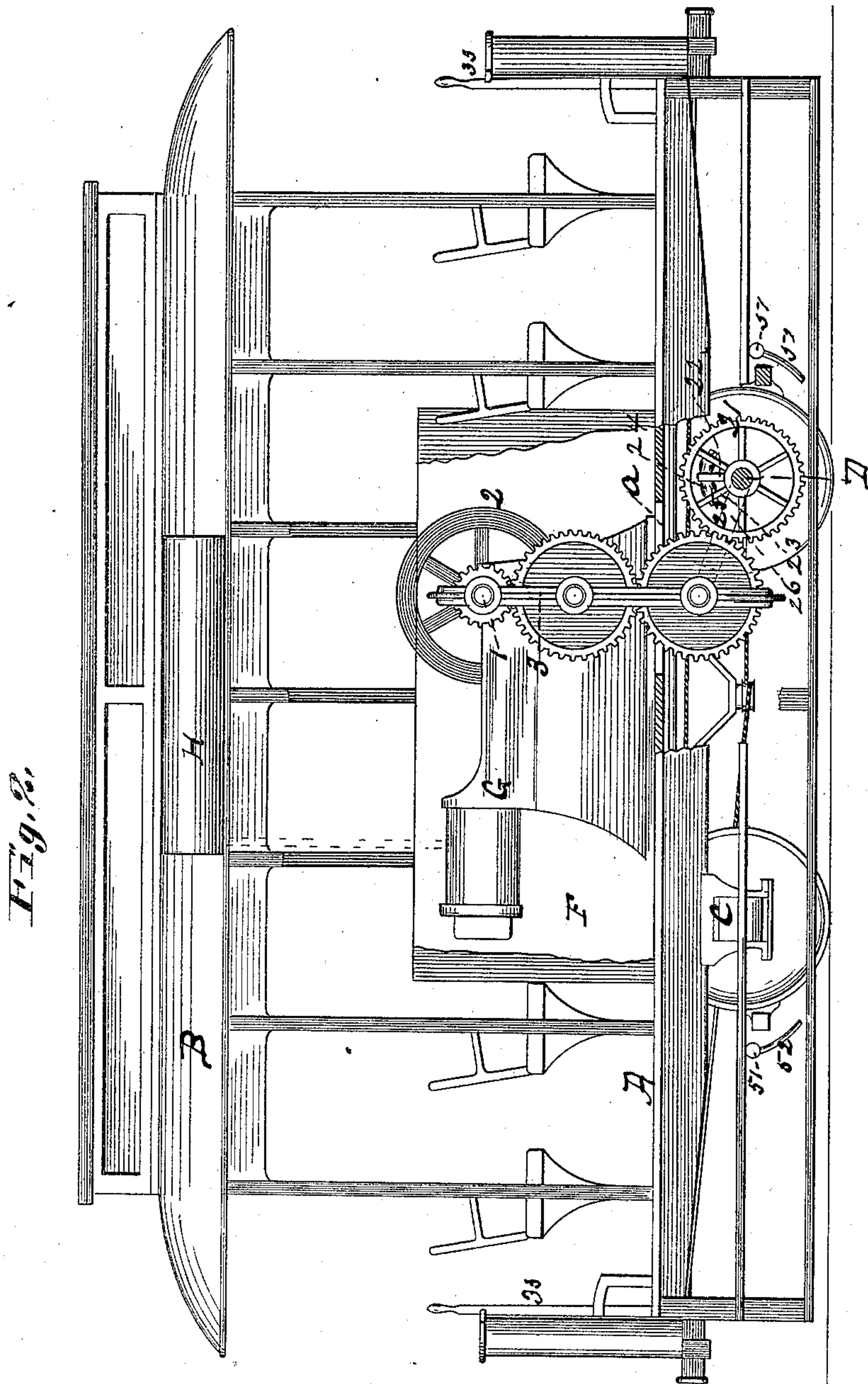
3 Sheets—Sheet 2.

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3 Sheets—Sheet 3.

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Fig. 3.

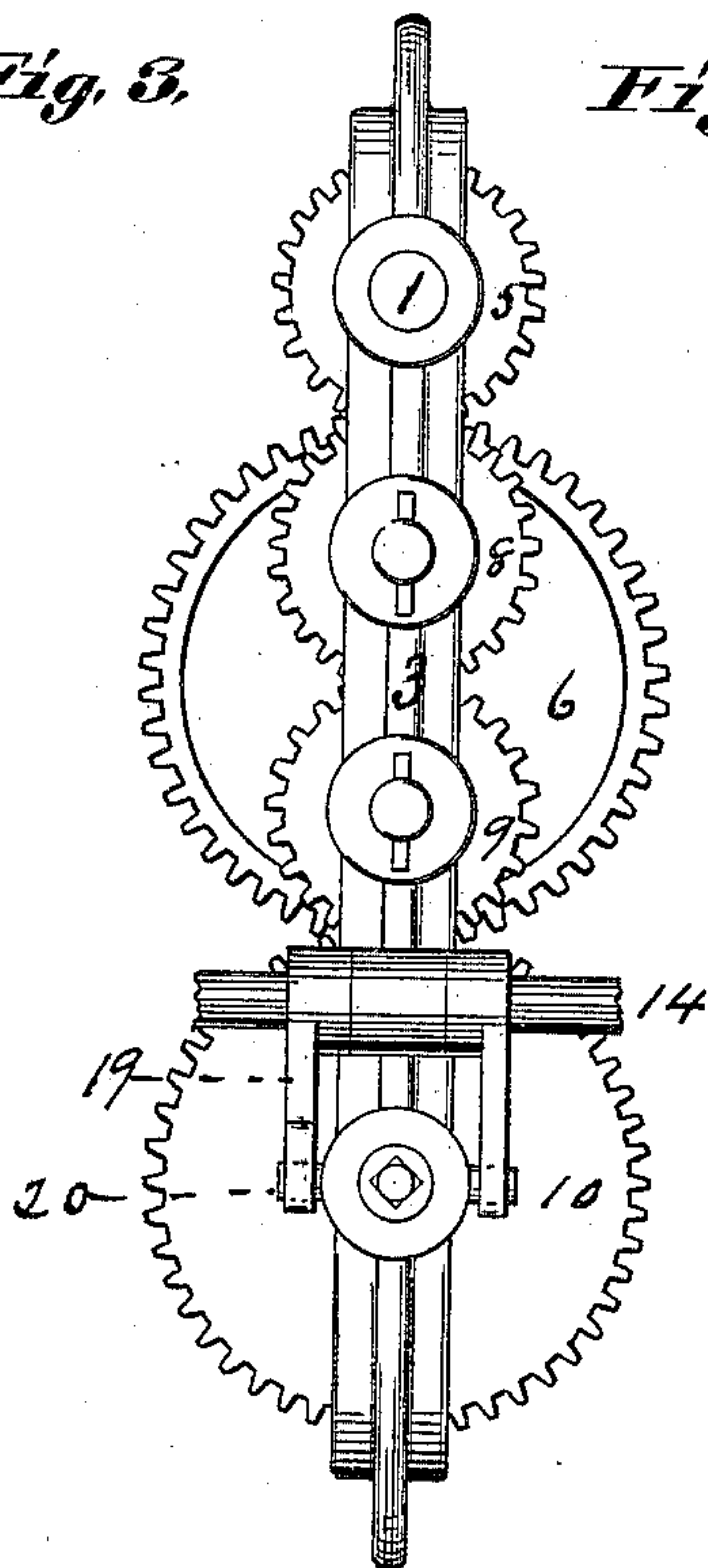


Fig. 4.

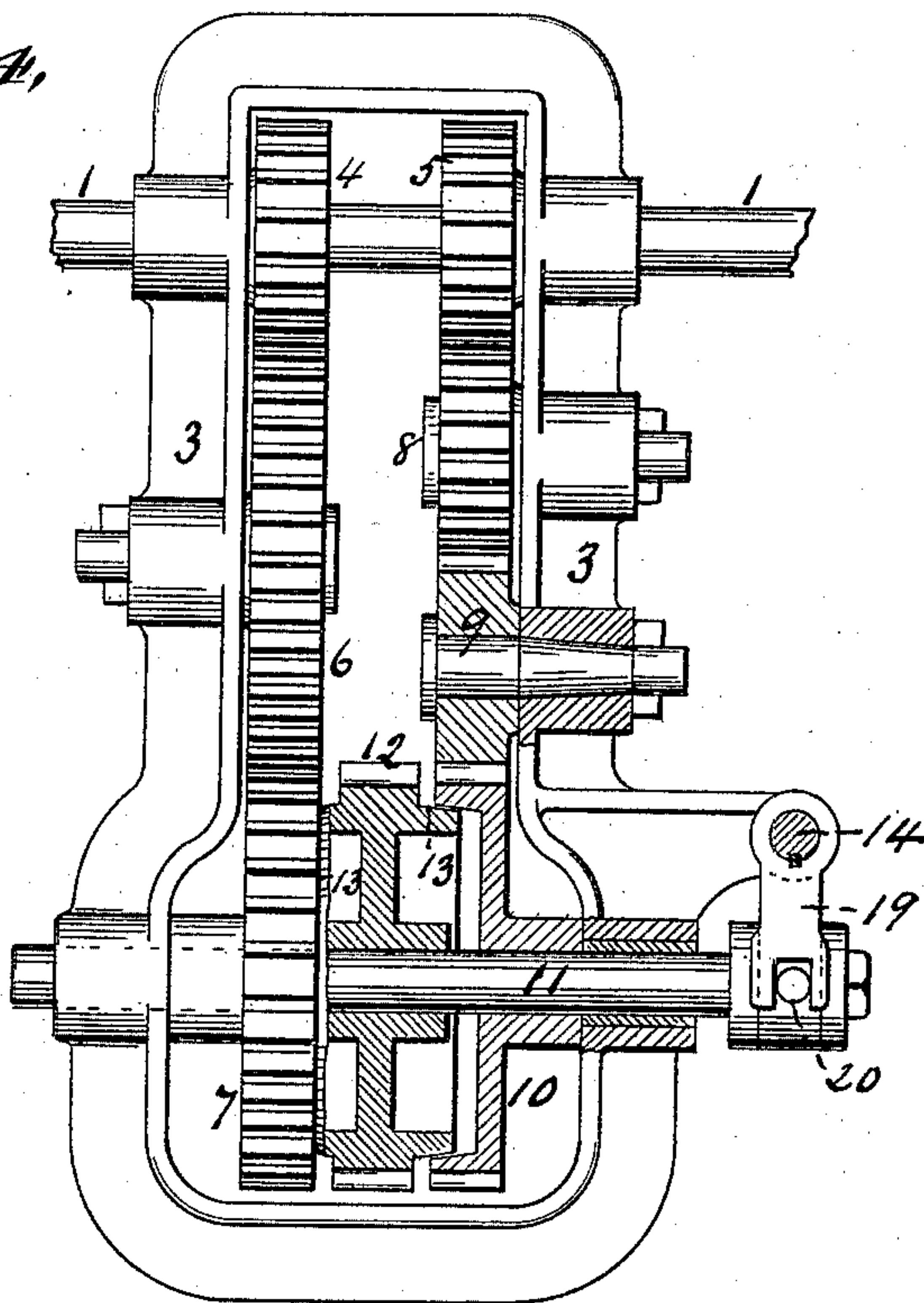


Fig. 5.

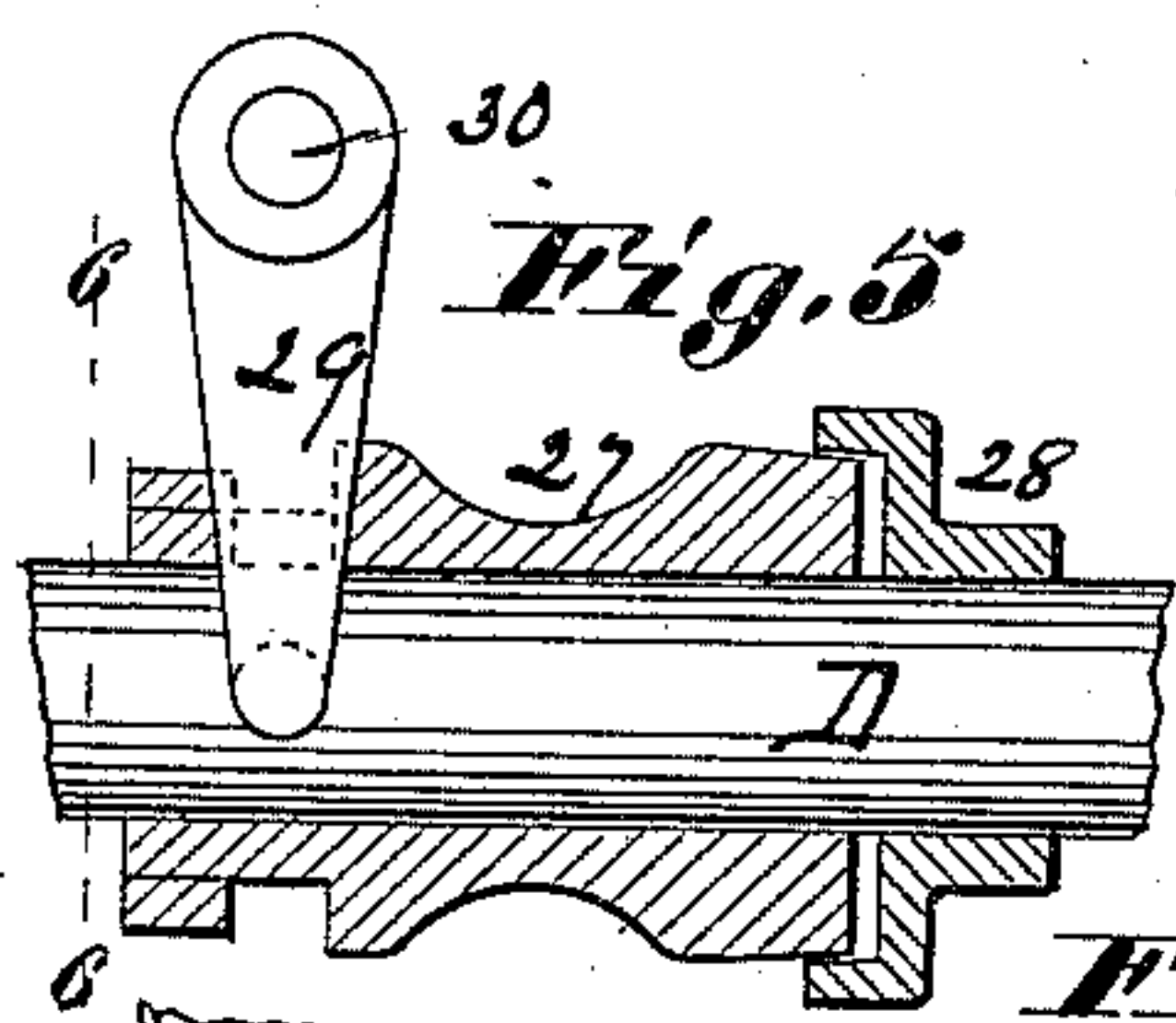


Fig. 6.

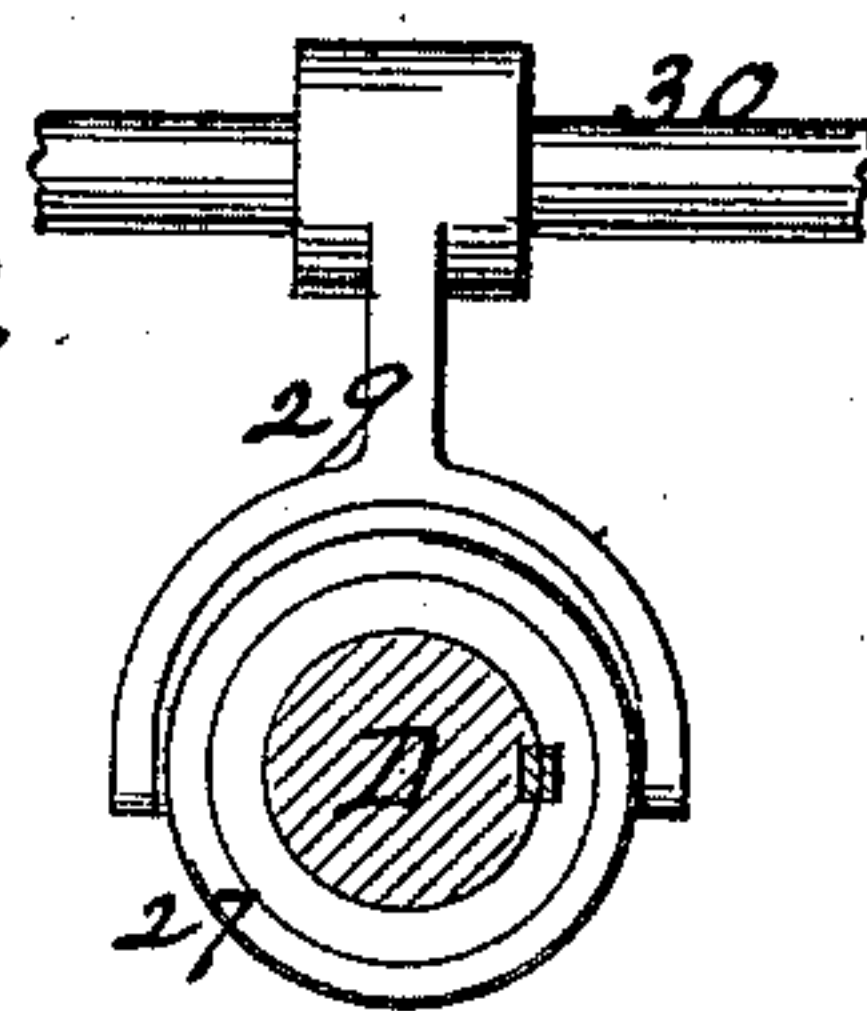


Fig. 7.

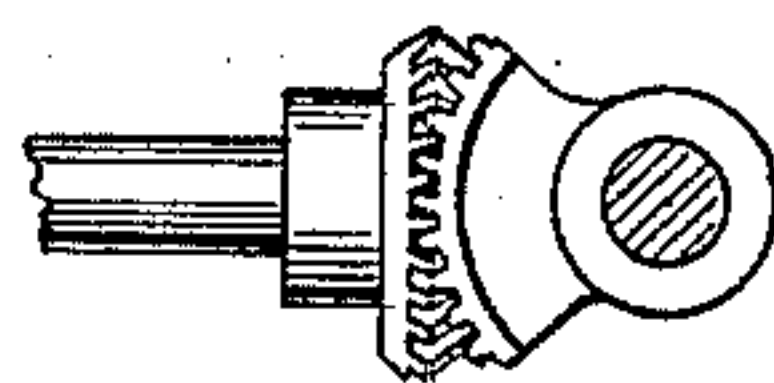


Fig. 8.

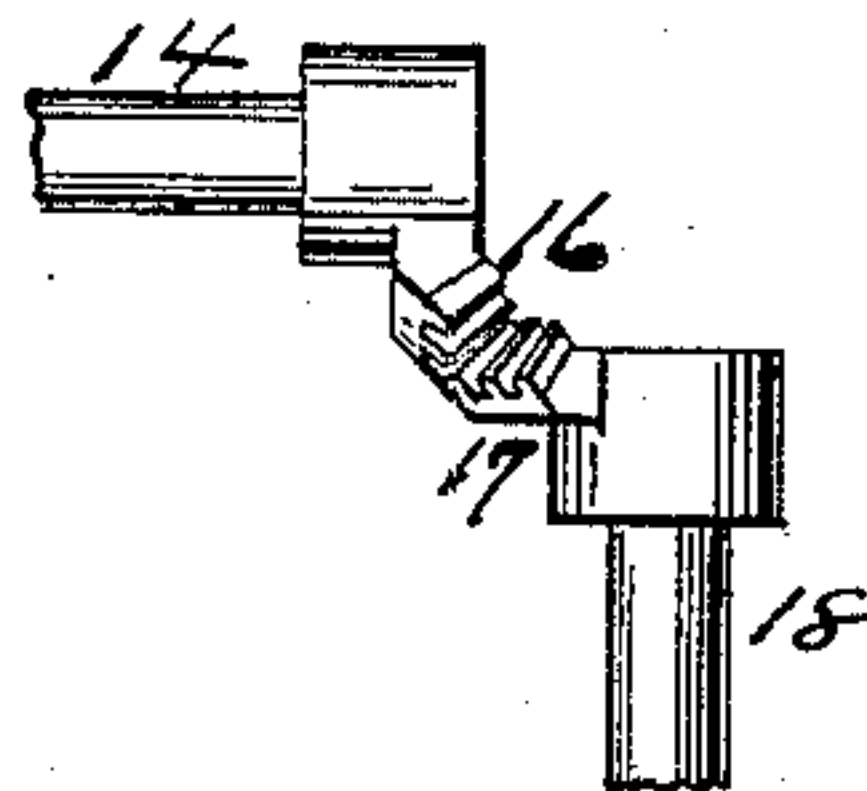
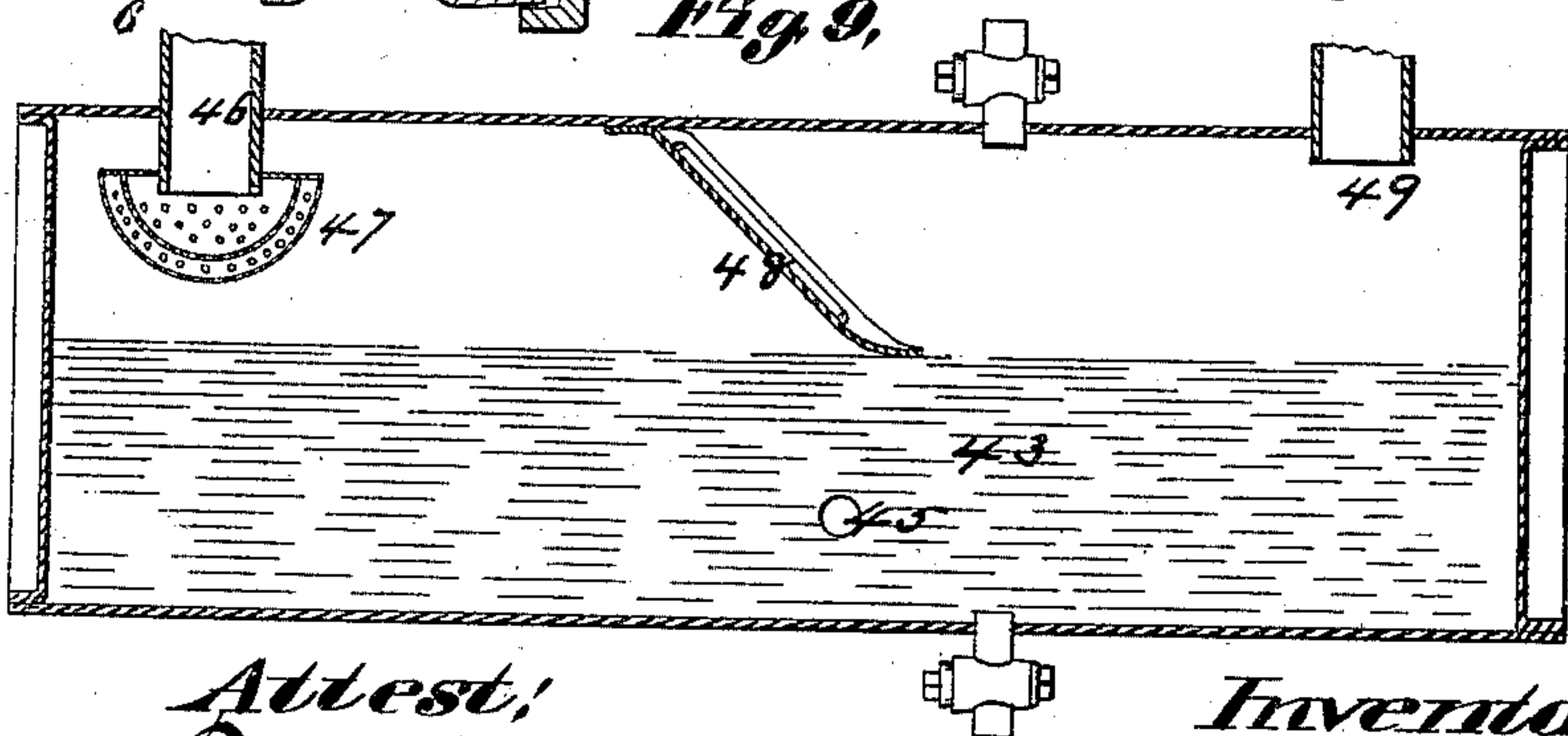


Fig. 9.



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UNITED STATES PATENT OFFICE.

JAY NOBLE, OF ST. LOUIS, MISSOURI.

POWER-DRIVEN STREET-CAR.

SPECIFICATION forming part of Letters Patent No. 369,610, dated September 6, 1887.

Application filed April 28, 1886. Serial No. 200,424. (No model.)

To all whom it may concern:

Be it known that I, JAY NOBLE, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Power-Driven Street-Cars; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a bottom view of a street-car having devices embodying my invention applied. Fig. 2 is a side elevation of a street-car, partly in section, showing devices applied thereto and embodying my invention. Fig. 3 is a detached enlarged side view of the suspended or compensating gearing by means of which the power is transmitted from the motor to the axle. Fig. 4 is a front elevation of the same, partly in section, showing the friction-clutch and shipper by means of which the direction of the car is reversed. Fig. 5 is an enlarged sectional detail view of the friction-clutch of the brake mechanism shown in Fig. 1. Fig. 6 is a detail view of the shipper shown in Fig. 5. Figs. 7 and 8 are detail views of the ends of the rods for operating the shippers and the segments thereon, as also the segments on the lower ends of the levers. Fig. 9 is a longitudinal vertical section of the wash-tank to muffle and deodorize the waste products where a gas or similar engine is used as a motor.

Like letters refer to like parts wherever they occur.

My present invention relates to the construction of mechanism for applying power to drive street-cars, to means for applying the brakes to power-driven street-cars, and also the means for counteracting the disagreeable noise and odors of the escaping waste and products from gas-engines and similar motors when applied to street-cars as a motor.

Among the present objectionable features of power-driven street-cars, and which have operated in a great measure to prevent the introduction thereof, notwithstanding the many conceded advantages, are, first, the difficulty experienced in stopping and reversing; secondly, the liability to derangement of the power-transmitting mechanism, owing to the irregular and surging movement of the car on its trucks, frequent stops, &c.; thirdly, the liability to derangement and destruction of the driving mechanism from the surging and sudden strains from the axle and motor in stopping and starting the car; and, fourthly, from the noise and odor of the waste products when a gas or similar engine is used as a motor.

The first objectionable feature I overcome by means of a double train of gearing with unequal number of idlers and shifting friction-clutch, and this embodies the one feature of my invention.

The second objectionable feature I overcome by swinging or suspending the power-transmitting gearing from the power-shaft of the motor, so that it can adapt itself to changes in position between the car-body and its truck or the driven axle, and this embodies another feature of my invention.

The third objectionable feature I overcome by interposing between the driven axle and the driving mechanism, which is suspended from the shaft of the motor, a yielding substance or a buffer-spring, which shall neutralize any sudden shocks or strains from the motor to the axle, as in starting or reversing, or from the axle to the motor, as in stopping, applying the brakes, &c.

The fourth objectionable feature I overcome by employing a muffler and wash-tank which receives the exhaust from the motor, (or gas-engine,) and this constitutes a feature of my invention. This feature or wash-tank also provides means for wetting the track to lay the dust, and also to improve the traction and prevent the slipping of the wheels, which may be considered as an additional feature of my present invention.

There are also other features of minor importance, which will hereinafter more fully appear.

I will now proceed to describe my invention more specifically, so that others skilled in the art to which it appertains may apply the same.

In the drawings, A indicates the bed of the car; B, its roof; C, boxes in which are journaled the car-axles D, provided with the wheels E, all of which may be of the character shown in the drawings, or any approved construction.

Within a suitable casing, F, preferably located centrally of the middle of the car-bed

A, is the motor G, from which the power-transmitting gear may extend through a slot, *a*, of the bed to connect with the gearing on one of the car-axles. This motor G may be of any suitable character, but is preferably some one of the many forms of gas-engine of, say, from four (4) to ten (10) horse-power, as such engines are well adapted for driving cars, and in case a gas-engine is employed the gas or gasoline supply reservoir may be suspended from the roof of the car, as at H.

1 indicates the power-shaft of the motor, supported in suitable bearings, and, if desired, provided with a fly-wheel, 2. Loosely journaled on and suspended from the power-shaft 1 is a frame, 3, which carries the gearing for transmitting the power from the power-shaft to the axle, and it will be perceived that by thus detaching the journal-supports of the gearing from the bed and rendering them movable or compensating they cannot be materially affected by the surging of the bed or change of the relation between the bed and the driven axle. This frame 3 may be of any suitable form, of any desired material, or made up of any number of sections, but is preferably a single loop-shaped casting having two vertical bars or sides to support two sets or trains of pinions.

Secured to the power-shaft 1 so as to turn therewith are the two pinions 4 and 5, the pinion 4 meshing with the single idler 6, which in turn meshes with the driving-pinion 7, while the pinion 5 meshes with the idler 8, which in turn meshes with a second idler, 9, and the last idler with a second driving-pinion, 10, by which means, it will be noted, the driving-pinions 7 and 10 are driven in reverse direction from the same power-shaft, 1, and without reversing the motor.

On reference to Fig. 4 of the drawings it will be seen that the driving-pinions 7 and 10 are each shells forming one half of a friction-clutch, and that said pinions 7 and 10 are loosely journaled on a sliding shaft, 11, which carries a pinion, 12, fast thereon, said pinion located between the two pinions 7 and 10. The pinion 12 has on each face a cone, 13, so that it can, when the shaft 11 is properly shifted, engage with either pinion 7 or 10, as the case may be, forming a cone-clutch, so that the pinion 12 will be driven in one or the other direction, accordingly as it engages with one or the other driving-pinion. When it stands midway between the pinions 7 and 10, as shown in Fig. 4, it will not be driven by either and the car will stop.

It will be noted that the bearings or journals of all the above-described gearing are on the frame 3, which swings on the power-shaft and independent of the car-bed.

Projecting from the pendent frame 3 is a bracket or arm having an eye or slot, through which passes a shifting-rod, 14, having bearings 15 on the under side or bottom of the car. The length of the rod 14, which extends from end to end of the car, permits it to spring be-

tween the points of its support sufficiently to accommodate any vibration of the gearing-frame 3, and said rod is provided at each end with a segment-rack, 16, which gears with a similar segment-rack, 17, on the lower end of a staff or a lever, 18, (as the case may be,) so that by operating the lever 18 at either end of the car the shifting-rod 14 may be rotated one quarter-turn, (more or less.) Secured on said shifting-rod 14 by a spline or feather, so as to move with the rod, and on the two sides of the arm extending out from the frame 3, (see Figs. 3 and 4,) are two forked or bifurcated arms, 19, which engage pins 20 on the end of sliding shaft 11, and this forms the shipping mechanism by means of which the pinion 12 may be operated from either end of the car to stop, start, or reverse the movement of the car.

The pendent frame 3 projects through a slot or opening, *a*, in the bed of the car, and the pinion 12 engages with a pinion, 21, on one of the axles D, and this imparts the power from the power-shaft 1 to drive the axle.

As before pointed out, if the gearing were rigid in its supports and in its connections with the power-shaft and with the axle or driven shaft, it would be liable to derangement and destruction from shocks and strains in starting and stopping the car. Therefore the pinion 21 is loose on the axle D, while from the axle projects a lug or arm, 22, between which and the spokes 23 are interposed rubber, spiral-spring, or equivalent buffers 24, the whole connected by a loose through-bolt, 25, so that a yielding or spring resistance is interposed between the power-gearing and the axle to take up the shock or strain in starting or stopping.

In order to provide for any lateral motion of the bed A on the axles and still preserve the driving contact or meshing of pinions 12 and 21, one or both of said pinions are made wide enough to prevent their disengaging, while to obviate any possible irregularity in applying the power from the rise and fall of the bed on its springs, or from surging of the bed, one or more radius-bars, 26, (or links,) are used to couple the shaft 11 of the driving-pinions 7 10 12 with the axle D, which carries the pinion 21, which radius-bars, while preventing the pinions 12 and 21 from disengaging, still allow of the accommodation of the transmitting-gearing to all movements of the bed A. The axles D D are provided with cranks *d* and connected pitmen or rods *d'*, so that one axle is driven from the other.

Upon one of the axles D, preferably the same which is driven from the motor G and carries the pinion 21 and buffers 24, is a cone friction-clutch, 27, having its shell 28 secured to the axle D, while the cone 27 slides thereon, and is controlled by a bifurcated shipper, 29, operated by a rod, 30, supported on the bottom of the bed A by bearings 31, and having at its ends segments 32, which gear with segments on levers 33. This rod 30 is similar to shifting-rod 14, and when rotated a quarter-turn, by means of its levers 33, throws the clutch

either into or out of action, according to the position given the lever. This clutch 27 may be termed the "brake-clutch."

I indicate the brake-beams, pivoted on a suitable support, usually the bed A. At a point between the brake-beams is a lever, 34, each arm of which is provided with a pulley or anti-friction roller, 35, and connected with one of the brake-beams by a rod, *i*. On the bottom of bed A or other suitable supports of the lever 34 is a third pulley or anti-friction roller, 36, while extending from each end of the bed is a brake-rod, 37 38, said rods having a limited inward motion, which is arrested when the rods are drawn in, so that the eyes 40 strike the bearings 41. This brake system is completed by a chain or rope, 42, one end of which is secured to the clutch 27, the rope or chain passing thence around the pulleys 35 on lever 34 to brake-rod 37, thence around fixed pulley 36, and having its other end secured to brake-rod 38. If, now, the cone-clutch 27 28 is moved by lever 33 to apply the brakes, the motion of axle D will wind rope or chain 42 on clutch 27 and draw in the brake-rods 37 38 until they become fixed, when the further winding of the rope or chain 42 will rock the pivoted lever 34, and through *i i* operate the brake-beams I I and apply the brakes.

When there are two or more cars coupled together, the brake-rods 37 or 38 of the cars may be connected, and applying the brakes to one car will then apply them to all the cars. The arrangement of the pivoted lever 34, its rod-connections *i i* to the brake-beams I I, and the anti-friction pulleys 35 and 36, with rope or chain 42, forms an equalizing system which will divide up and apply the power equally or uniformly to all the wheels.

Secured to the bottom of the car, preferably at or near its transverse center, is a wash-tank, 43, which is filled from one-half to two-thirds full of water, and in conjunction therewith may be employed an auxiliary reservoir or fountain, 44, the two connected by one or more cross-pipes, 45. This wash-tank has a double purpose: first, to wash and deodorize the waste products when a gas-engine or similar motor is used, and for this purpose the exhaust-pipe 46, where it enters the tank, is surrounded by a muffler, 47, or finely-perforated cage of any desired pattern, which breaks up the waste products into fine jets and disseminates the products, so as to obviate the disagreeable blowing or whistling noise made by their escaping. It has also a flexible pendent or floating diaphragm or apron, 48, interposed between the exhaust-pipe 46 and the escape pipe or port 49, so as to cause the finely-divided products of combustion to pass over or through the water of the tank to remove any disagreeable odors therefrom before their escape into the air. This feature of the invention renders practicable the use of gas-motors on the cars.

The second function of the water-tank is to provide means for wetting down the track to

lay the dust and to increase the traction when the track is only partly wet and slippery, and for this purpose the tank or tanks may have a system of pipes, 45 50 51, leading to the front and rear of the wheels, with flexible jets or nozzles 52 (see Fig. 2) projecting down over the track. These pipes should be provided with suitable valves, so as to control the delivery of the jets at either end of the car, according to the direction in which the car is moving; and for this purpose I prefer the spring-seated valves 53, (see Sheet 1,) arranged at the ends of the pipes 50 and operated by pull chains or cords 54, extending to the ends of the cars near the levers 18 and 33, so that the whole system of mechanism for starting and stopping the car, applying the brakes, or wetting down the track can be controlled from either end of the car.

The great advantages of my invention are, first, the separation of the supports of the driving-gearing from the car-bed, so as to leave it free to adjust itself to the constantly-changing relations of bed and axle, so that all strains and shocks from that source are avoided; secondly, the double line of gearing with intermediate shifting-clutch, which enables the direction of the car to be quickly and readily reversed without reversing the motor; thirdly, the interposed yielding connection or buffer between the motor and driven axle, which enables the car to be instantly stopped, started, or reversed without shock to the motor or driving-gear; fourthly, the joint action of the suspended gearing and buffer relieves the operative device from all shocks and strains liable to derange or deteriorate the devices; fifthly, the tank enables me to wash and deodorize the gases from the motor, lay the dust, and increase the traction, not only by weighting the car at will, but also by wetting the track. There are other and minor advantages—such as the ability to control the car from either end; the ability to place the operator at the front of the car, where he can best observe the track, note obstructions, and notice the signal of the passengers; the simple and natural movements of the two levers in starting and stopping the cars and applying the brakes, which movements soon become a habit, leaving the operator free to watch the track and streets, all of which and many others will readily suggest themselves to persons familiar with the management of street-railways.

Having thus described the nature, operation, and advantages of my invention, what I desire to secure by Letters Patent is—

1. The combination, with a street-car and a motor for propelling the same, of driving-gear suspended from the power-shaft of the motor, and a device for preserving the mesh of the driving-gear with the pinion on the car-axle, substantially as and for the purposes specified.

2. The combination, with a street-car and a motor thereon, of a frame suspended from the power-shaft of the motor, and a series of

driving pinions having their journals or bearings on the suspended frame, substantially as and for the purposes specified.

3. The combination, with the power-shaft of the motor, of the suspended loop-frame, two sets of pinions journaled therein, and pinions on the power-shaft, which mesh with the trains of gearing supported by the suspended loop-frame, substantially as and for the purposes specified.

4. The combination, with a street-car, of a motor, two trains of gearing having an unequal number of idlers, so as to obtain reverse motion, said gearing suspended from the power-shaft, and an interposed shifting-clutch gear, substantially as and for purposes specified.

5. The combination, with a street-car, of a motor, a train of driving-gearing suspended from the power-shaft, a pinion on the axle, and radius-bars which connect the axles of the driving pinions and the driven axle, substantially as and for the purpose specified.

6. The combination, with a street-car, of a motor, two trains of driving-gearing suspended from the power-shaft of the motor, an interposed shifting-clutch gear-wheel, a shipper, and a rod for actuating the shipper from either end of the car, substantially as and for the purposes specified.

7. The combination, with a street-car, of a gas-motor, driving-gearing actuated by the motor for propelling the car, and a muffler and a wash-tank for receiving the exhaust of the motor, substantially as and for the purpose specified.

8. The combination, with a street-car, of a gas-motor, driving-gear actuated thereby for propelling the car, a waste-tank for receiving the exhaust of the motor, and spray or jet pipes for delivering the tank-water on the track, substantially as and for the purposes specified.

9. The combination, with a power-driven street-car, of a brake system consisting of brake-rods 37 and 38, pivoted lever 34, connected to the brake-beams by rods or chains, fixed pulley 36, rope or chain 42, and shifting friction-clutch 27 on the driven axle, substantially as and for the purpose specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 28th day of April, 1886.

JAY NOBLE.

Witnesses:

F. W. RITTER, Jr.,
EDWIN S. CLARKSON.