

E. P. VAUX.  
Steam Street-Car.

No. 199,762.

Patented Jan. 29, 1878.

Fig 1.

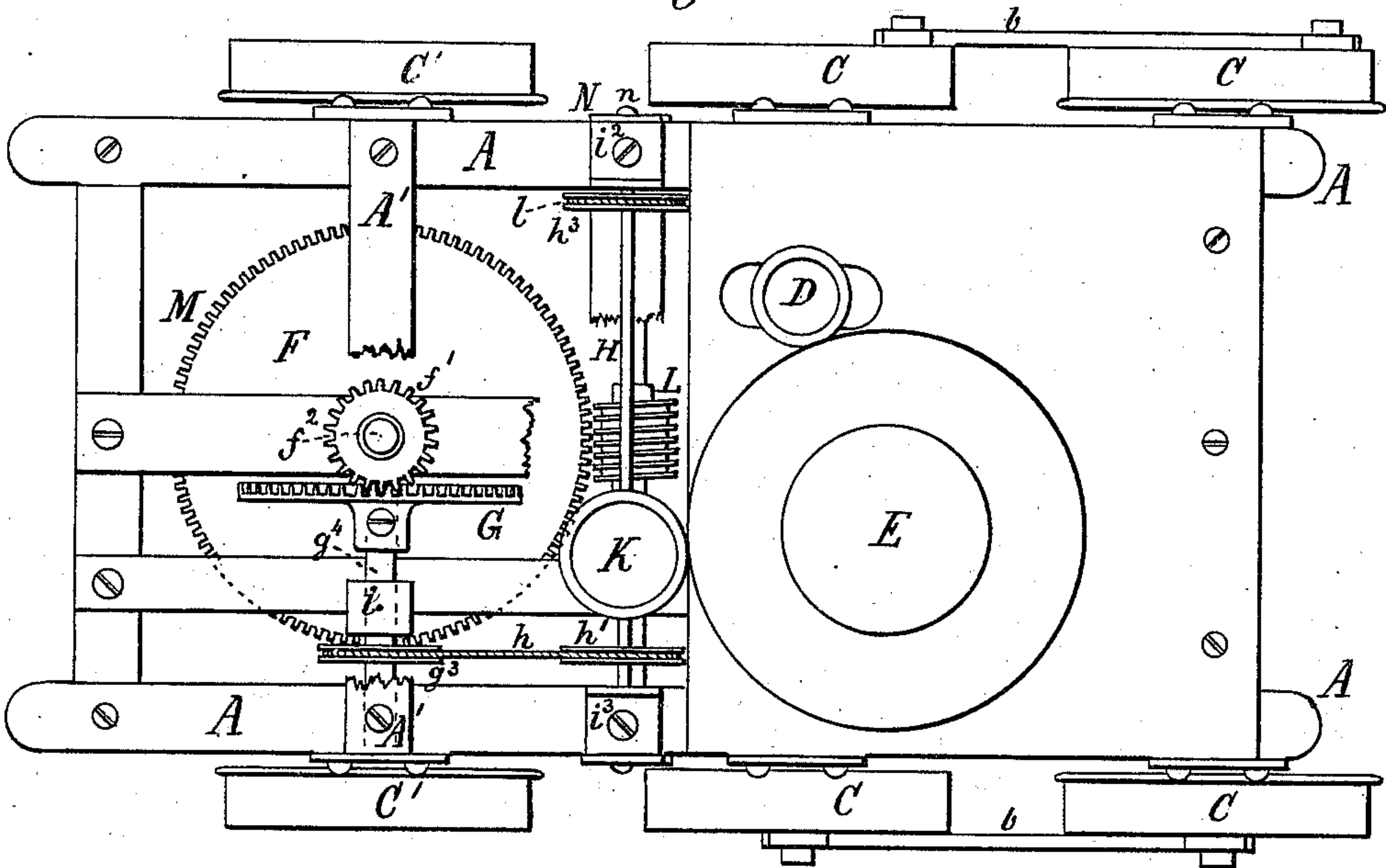
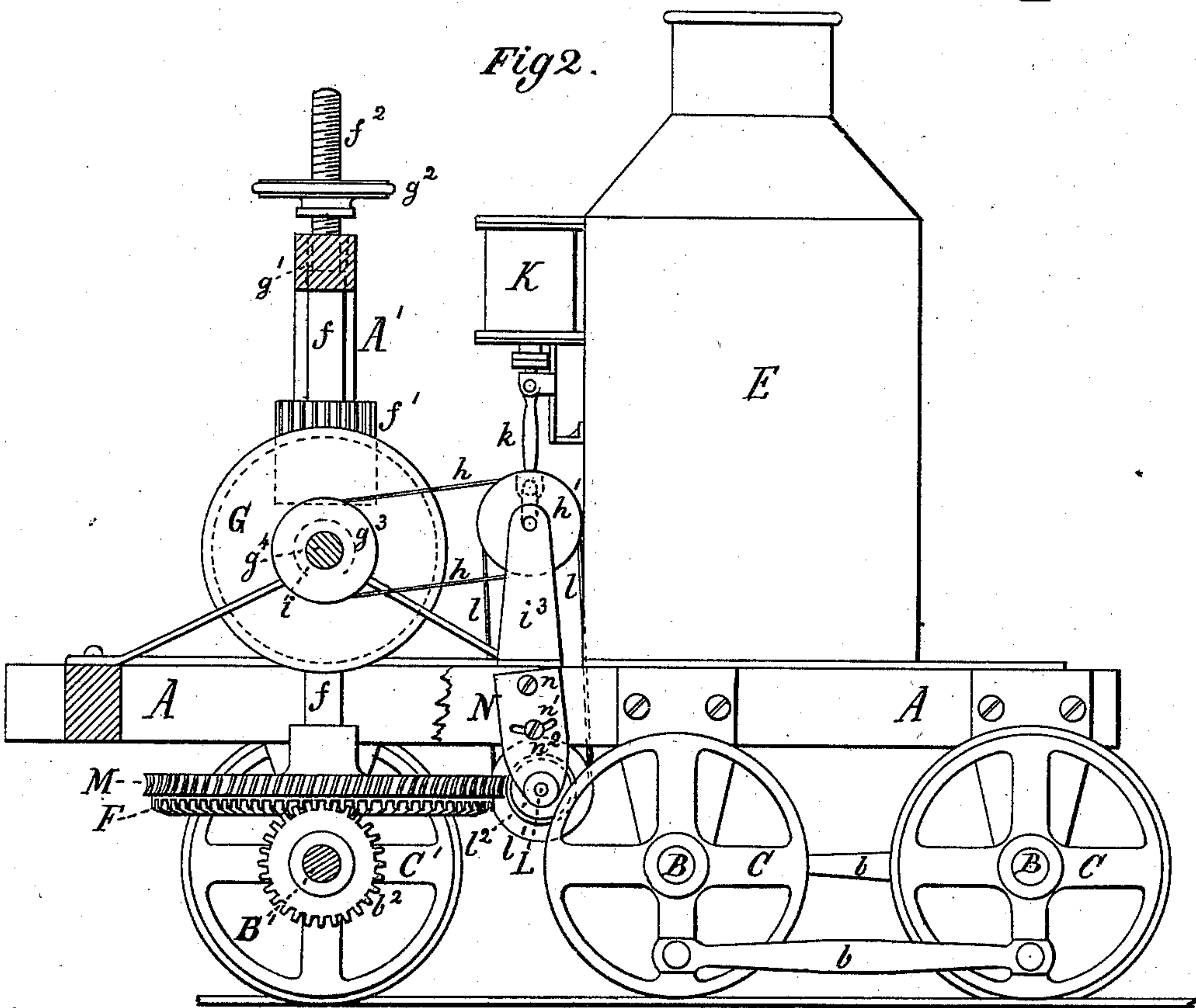


Fig 2.



Witnesses:  
James Martin Jr.  
J. P. Theodore Lang.

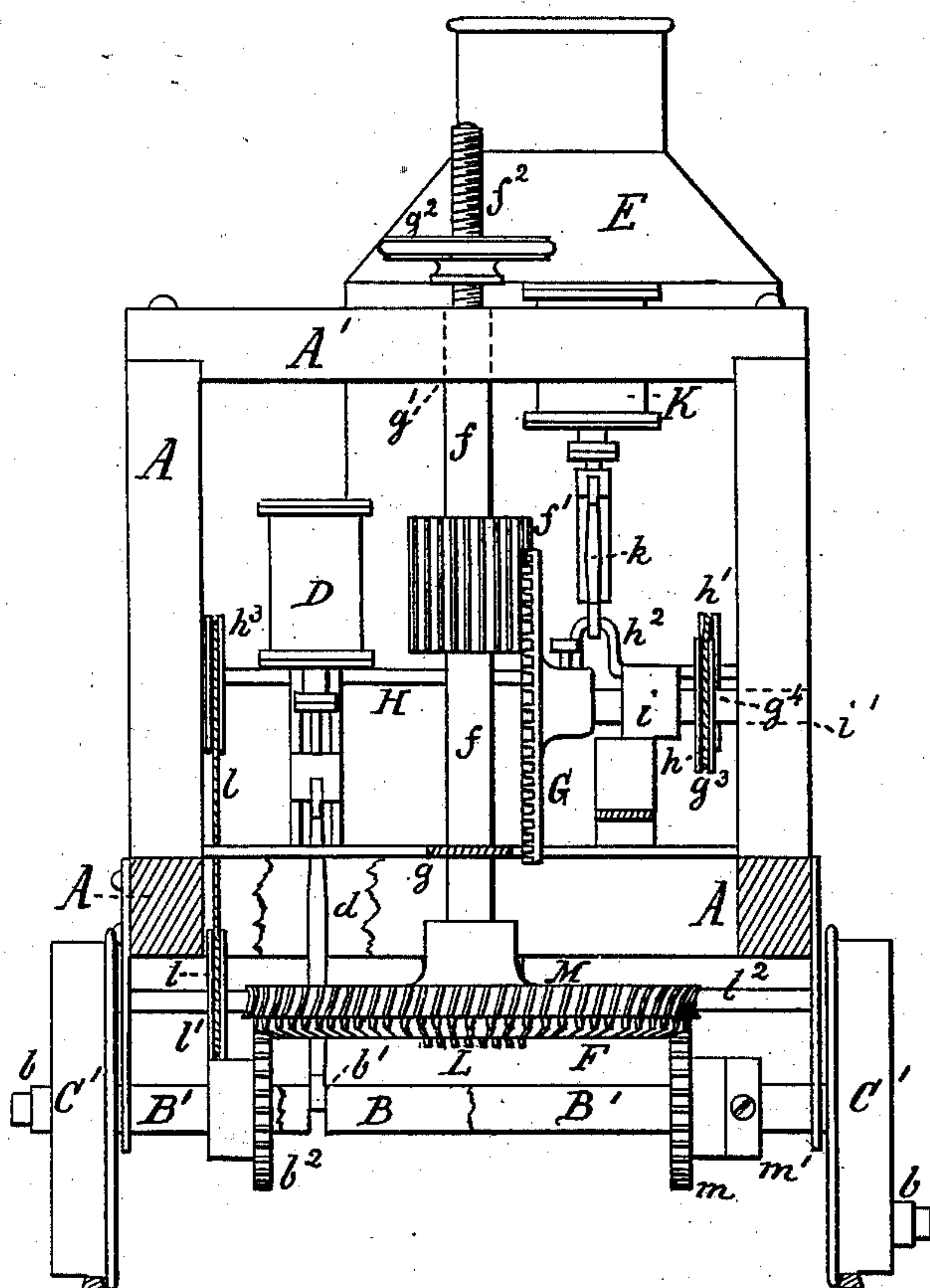
Inventor:  
Ethan P. Vaux  
Mason, Fendick & Lawrence

E. P. VAUX.  
Steam Street-Car.

No. 199,762.

Patented Jan. 29, 1878.

Fig 3.



Witnesses:  
James Martin Jr.  
J. P. Theodore Lang.

Inventor:  
Ethan P. Vaux  
by  
Mason, Fenwick & Lawrence



# UNITED STATES PATENT OFFICE.

ETHAN P. VAUX, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR OF ONE-HALF HIS RIGHT TO WILLIAM POWELL, OF SAME PLACE.

## IMPROVEMENT IN STEAM STREET-CARS.

Specification forming part of Letters Patent No. **199,762**, dated January 29, 1878; application filed December 22, 1877.

*To all whom it may concern:*

Be it known that I, ETHAN P. VAUX, of the city and county of Washington, in the District of Columbia, have invented certain new and useful Combinations of Auxiliary Mechanism for Street and other Cars, which are fully set forth in the following specification and accompanying drawings, in which latter—

Figure 1 is a plan view of my auxiliary mechanism applied to a locomotive-truck frame. Fig. 2 is a side elevation of the same, the parts being fully exposed to view by having portions of the truck-frame sectioned and broken away. Fig. 3 is a front elevation of the same, the frame being sectioned and broken away so as to exhibit the parts more plainly.

The propulsion or locomotion of street-cars by steam-power has so far proved advantageous only on level ground, or on ground with very slight grade; but it has not yet satisfactorily superseded horse-power in hilly regions, for the reason that a large and powerful engine, under ordinary plans, must be employed for propelling a car up a tolerably steep incline, which engine, on account of its great weight and clumsiness of its parts, is unfit for street-car purposes as well as very fast propulsion, while a light engine, suitable for such purposes and capable of swift propulsion, lacks the power necessary for ascending steep hills. I propose to overcome the two named objections by adding to a steam-locomotive truck of ordinary construction an auxiliary driving-shaft, with wheels connected with a device for giving speed and a device for giving power, both devices being alternately moved by an auxiliary steam-engine, which is used, at the will of the engineer, either for increasing the speed or the power of the locomotive, and is thrown out of use when the single main steam-engine is capable of doing the work required.

The nature of my invention consists in certain constructions, combinations, and arrangements of parts, hereinafter described and specifically claimed, whereby a steam-locomotive truck is produced which is adapted to run with either a single small engine or both such engine and an auxiliary engine, which produces either increased speed or increased power in addition to and in excess of that

which the single engine of the ordinary locomotive produces.

In the drawings, A represents the truck-frame of a locomotive; B B, the axles; B', an auxiliary axle; C, the wheels of the axles B, and C' the wheels of axle B'. The wheels C are coupled by means of side rods *b*, in the usual manner, and one of the axles B is provided with a crank, *b*<sup>1</sup>, which is revolved by the connecting-rod *d* of a steam-engine, D, upon a boiler, E.

There are other known constructions or devices beside the one just described for propelling street passenger-cars, to any one of which my improved auxiliary mechanism may be added without change of the nature of my invention.

The axle B' is provided with a gear-wheel, *b*<sup>2</sup>, which is driven by a large toothed crown-wheel, F, on an upright shaft, *f*. The shaft *f* is provided with a trunnion-pin, *f*<sup>1</sup>, arranged between the bearings *g* *g*<sup>1</sup> of the shaft, which bearings are on a frame, A A', of the locomotive-truck. On the upper end of this shaft a screw, *f*<sup>2</sup>, is formed, on which is a hand-wheel, *g*<sup>2</sup>, whereby the shaft *f* may be raised or lowered. A wheel, G, gears into the pinion *f*<sup>1</sup>, and is driven by means of a pulley, *g*<sup>3</sup>, on its shaft *g*<sup>4</sup>, and a cord or chain, *h*. The shaft *g*<sup>4</sup> is mounted in suitable bearings *i* *i*, so that it may be shifted longitudinally, and thus the wheel G thrown into or out of gear with the wheel *f*<sup>1</sup>. The cord or chain *h* is operated by a pulley, *h*<sup>1</sup>, upon a crank-shaft, H, the crank *h*<sup>2</sup> of which is driven by the connecting-rod *k* of an auxiliary steam-engine, K, fastened to the boiler E. The crank-shaft H is supported by suitable bearings *i*<sup>2</sup> *i*<sup>3</sup>, and is provided with a second pulley, *h*<sup>3</sup>, which, by means of a cord or chain, *l*, drives another pulley, *l*<sup>1</sup>, on a shaft, *l*<sup>2</sup>. The shaft *l*<sup>2</sup> is provided with a worm-wheel, L, which gears into the screw-wheel M on the periphery of the wheel F. The shaft *l*<sup>2</sup> is mounted in swinging hangers N, pivoted at *n*, and provided with concentric slots *n*<sup>1</sup> and clamping-screws *n*<sup>2</sup>. This construction serves to make the worm-wheel L movable in or out of gear with the screw-wheel M.

The axle B' is provided with a loose gear-wheel, *m*, kept in position by a collar, *m*<sup>1</sup>.



The gear-wheel  $m$  is of the same size and construction as the wheel  $b^2$ , and it gears into the opposite side of the wheel  $G$ , and thereby keeps it balanced horizontally. By means of the band or chain  $h$  and wheels  $b^2$ ,  $F$ ,  $f^1$ , and  $G$ , the wheels  $C'$  may be driven at a very high speed; and by means of the band or chain  $l$ , worm  $L$ , screw-wheel  $M$ , and gear-wheels  $b^2$  and  $F$  the truck-wheels  $C'$  may be driven with great power.

**Operation:** Under ordinary circumstances the car is propelled by a single engine, in which case the auxiliary engine is stopped, the wheel  $F$  raised by means of the nut  $g^2$  out of gear with the wheel  $b^2$ , the worm-wheel  $L$  swung back from the screw-wheel periphery  $M$ , and the wheel  $G$  pushed off the pinion  $f^1$ . If an increased speed beyond that derived from the single small engine is desired, the wheel  $G$  is moved into gear with the pinion  $f^1$ , and the wheel  $F$  is let down by means of the screw  $f^2$  and nut  $g^2$  into gear with the wheels  $b^2$  and  $m$ , and the auxiliary engine  $K$  is started forward or backward, as occasion requires, and thus the two engines are made to work in concert. If a hill is to be ascended, and the single small main engine  $D$ , or both the engines together, are not powerful enough to propel the car under the adjustment last made, the wheel  $G$  is moved out of gear with the pinion  $f^1$  and the worm-wheel  $L$  is moved into gear with the screw-wheel periphery  $M$  of the wheel  $F$ , and thus while both engines work in concert a decreased speed with great power is effected. The additional friction-surface gained by the auxiliary wheels  $C'$  renders my speed and power increasing devices more effective than a direct connection of the said devices with only the main wheels  $C$ , inasmuch as by allowing the wheels  $C'$  to move independently of the main wheels  $C$  the locomotive-truck with six wheels can turn curves with the same facility as a truck mounted on four wheels. Moreover, when the speed or the power increasing devices are applied, either the wheels  $C'$  or  $C$  may occasionally slip upon the track without communicating such motion to each other, thereby securing a steady and easy motion over the track.

I contemplate to increase the traction or the

bite of the auxiliary wheels  $C'$  by throwing as much weight as possible upon the axle  $B'$  by means of set-screws appropriately applied, or by other suitable means.

By my invention the necessity of using a central rail and horizontal griping or gearing wheels is avoided, and at the same time the desired and necessary traction produced upon the two ordinary rails.

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

1. In a locomotive-truck,  $A$ , having wheels  $C$   $C'$ , the combination of a main propelling-engine and an auxiliary engine and the intermediate auxiliary mechanisms, whereby the traction may be increased or diminished alternately, at the will of the operator, substantially as set forth.

2. In a locomotive-truck,  $A$ , the combination of independently-operated main driving-wheels  $C$  and the independently-operated auxiliary driving-wheels  $C'$  and intermediate auxiliary mechanism, whereby the speed may be alternately increased or diminished, substantially as set forth.

3. The combination of the axle  $B'$ , wheel  $b^2$ , wheel  $F$ , having a screw-wheel periphery,  $M$ , and the propelling worm-wheel  $L$ , having swinging supports  $N$ , substantially as and for the purpose set forth.

4. The combination of the axle  $B'$ , having traction-wheels  $C'$ , the wheel  $b^2$ , the wheel  $F$ , having a shaft,  $f$ , elevating-screw  $f^2$ , and hand-wheel  $g^2$ , the pinion  $f^1$ , and the propelling-wheel  $G$ , substantially as and for the purpose set forth.

5. The combination of the boiler  $E$ , the main engine  $D$ , the auxiliary engine  $K$ , and the mechanism described for changing speed and power alternately, substantially as and for the purpose set forth.

Witness my hand in the matter of my application for a patent for combinations of auxiliary mechanism for street and other cars this 21st day December, A. D. 1877.

ETHAN PARMER VAUX.

Witnesses:

R. L. FENWICK,  
W. O. LYMAN.