F. V. MATHEWS.

STREET-CAR ENGINES.

No. 194,452. Patented Aug. 21, 1877.

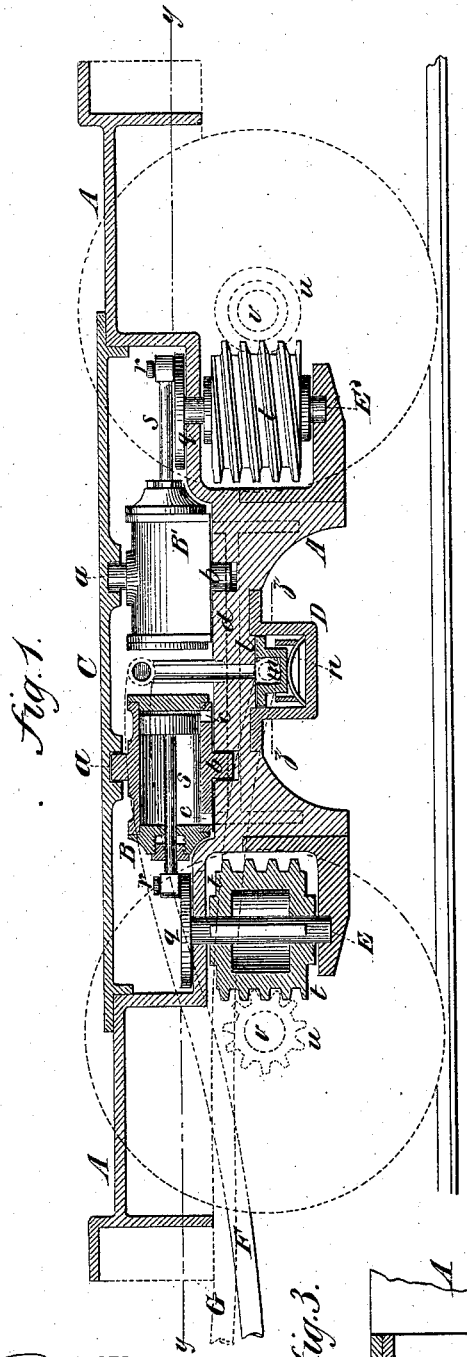

Fig. 1.

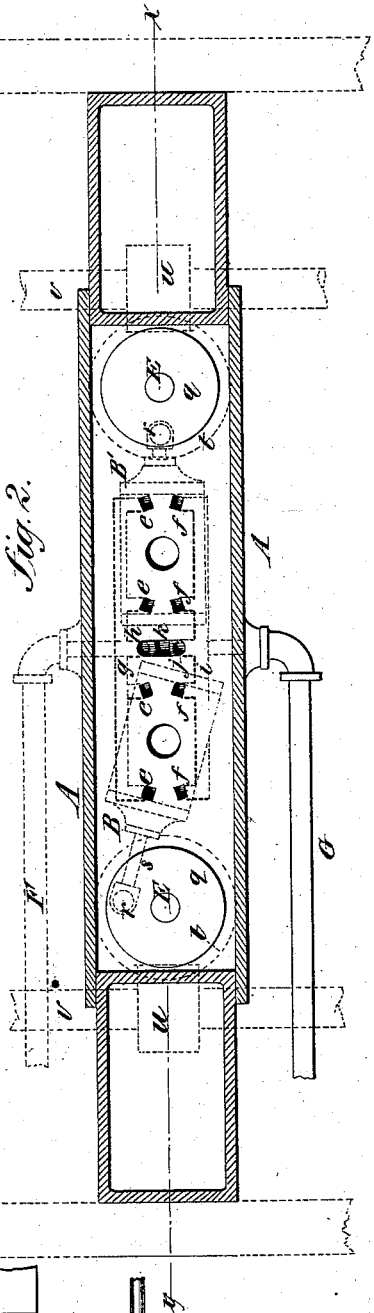

Fig. 2.

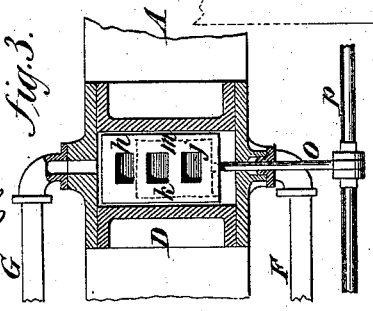

Fig. 3.

WITNESSES:

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FRANCIS V. MATHEWS, OF NEW ORLEANS, LOUISIANA.

IMPROVEMENT IN STREET-CAR ENGINES.

Specification forming part of Letters Patent No. **194,452**, dated August 21, 1877; application filed December 23, 1876.

To all whom it may concern:

Be it known that I, FRANCIS V. MATHEWS, of New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and Improved Street-Car Motor, of which the following is a specification:

Figure 1 is a vertical longitudinal section of my improved motor, taken on line *x x* in Fig. 2. Fig. 2 is a horizontal section on line *y y* in Fig. 1. Fig. 3 is a detail view of the reversing-valve taken on line *z z* in Fig. 1.

Similar letters of reference indicate corresponding parts.

My invention relates to motors for driving street and other cars; and it consists of a pair of oscillating steam-cylinders supported under the car by the truck, and provided with vertical shafts upon which are placed worm-wheels that engage with wheels on the car-axles.

A is the frame of the engine, which is attached to and supported by the truck-frame of the car.

B B′ are oscillating steam-cylinders, whose upper trunnions *a* are journaled in the support C, and lower trunnions *b* are journaled in the main frame A. These cylinders are provided with central ports *c* at their ends, and with a face that is fitted steam-tight to the part *d* of the engine-frame.

Ports *e* and *f* are formed in the face of the part *d*, through which steam is admitted and exhausts from the cylinders.

The ports *e* are connected by a passage, *g*, (shown in dotted lines,) which leads to a port, *h*, in the valve-seat *l* of the steam-chest D, and the ports *f* are connected by a passage, *i*, that leads to the port *j* in the valve-seat *l*.

Between the ports *h* and *j* there is an exhaust-port, *k*, and a valve, *m*, capable of covering either of the ports *h j*, and the exhaust-port *k* is pressed against the valve-seat by the spring *n*. The valve *m* is provided with a rod, *o*, that is connected with an arm on a rocking-shaft, *p*, that is connected with a suitable lever in the car by which it is moved.

E E′ are vertical shafts journaled in the frame A, and provided with crank-disks *q* at their upper ends, from which the crank-pins *r* project.

The piston-rods *s* of the cylinders B B′ are connected with the said crank-pins.

Upon the shafts E E′ the endless screws or worms *t* are secured which engage the wheels *n* on the car-axles *v*.

The engines run in opposite directions, which gives to both axles a motion in the same direction the screws being placed on opposite sides of the axles.

Steam is admitted to the steam-chest through the pipe F, and escapes through the pipe G.

The valve *m* is placed so that it covers one of the ports *h j* and the exhaust-port *k*, when steam enters the exposed port and drives the engines, the used steam escaping through the covered port and the exhaust-port.

When it is desired to reverse the engine, the valve is moved so as to admit steam through what was before the exhaust-port, and to permit the used steam to escape through the other port.

The crank-pins *r* may be connected by a rod when the cylinders will assist each other.

The frame of the engine is constructed so as to inclose the cylinders, worm-wheels, and other working parts of the engine, so that none of the parts are exposed to dust, and all noise is confined, so as to be unobservable.

It is obvious that the cylinders may be so arranged as to work upon a single shaft, or they may be connected directly to one of the axles.

The motor is compact and simple, inexpensive in its construction, and effective in its operation. Any person of ordinary intelligence may run it, and keep it in order.

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

The combination, with front and rear truck-axles, of two oscillating steam-cylinders, B B′, whose pistons are connected by opposite cranks with shafts E, said shafts being provided with worms *t* that drive the axle-pinions, as shown and described.

FRANCIS V. MATHEWS.

Witnesses:

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