(No Model.) 2 Sheets—Sheet 1.

M. W. DEWEY.

ELECTRIC FIRE ENGINE.

No. 464,244. Patented Dec. 1, 1891.

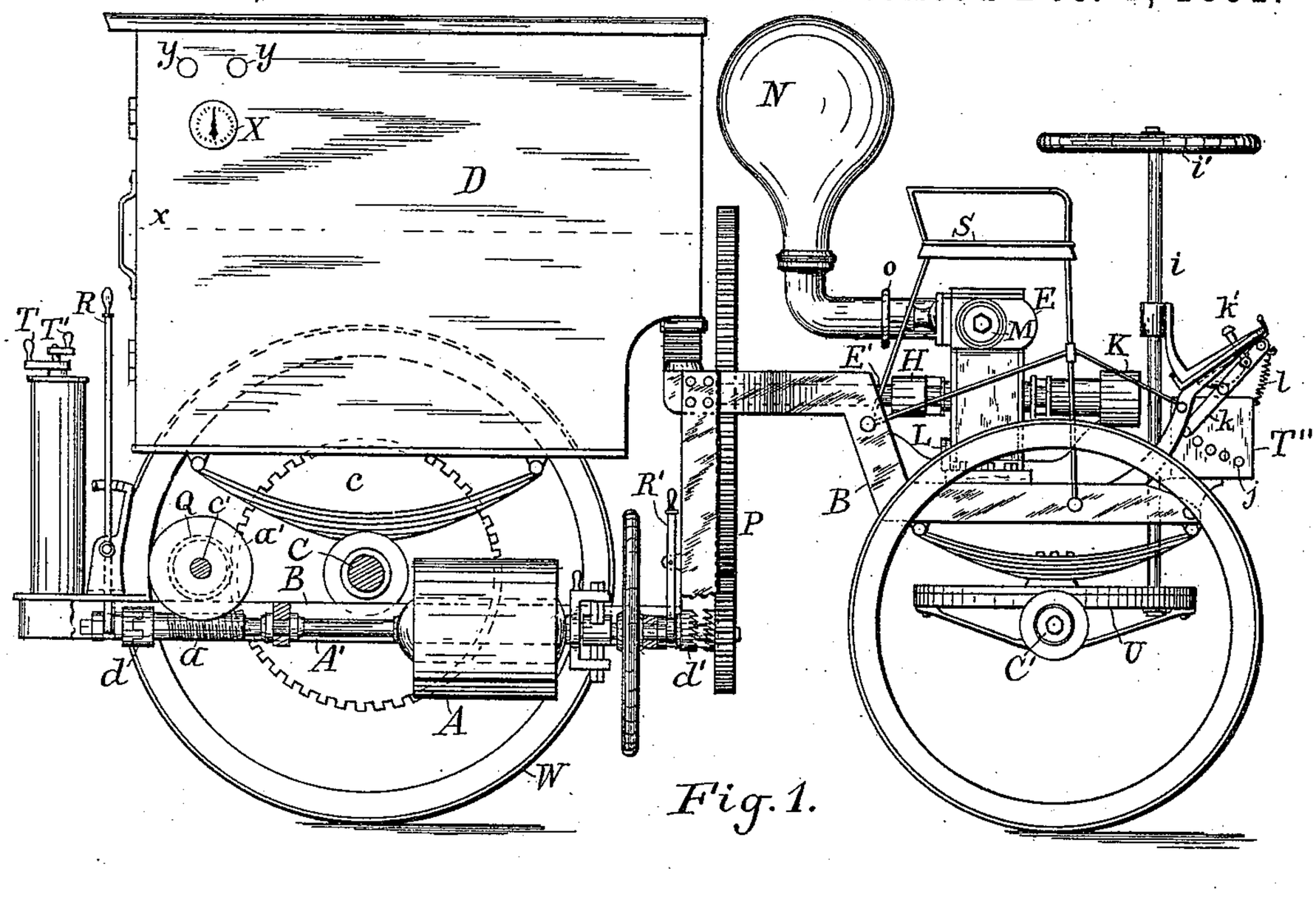

Fig. 1.

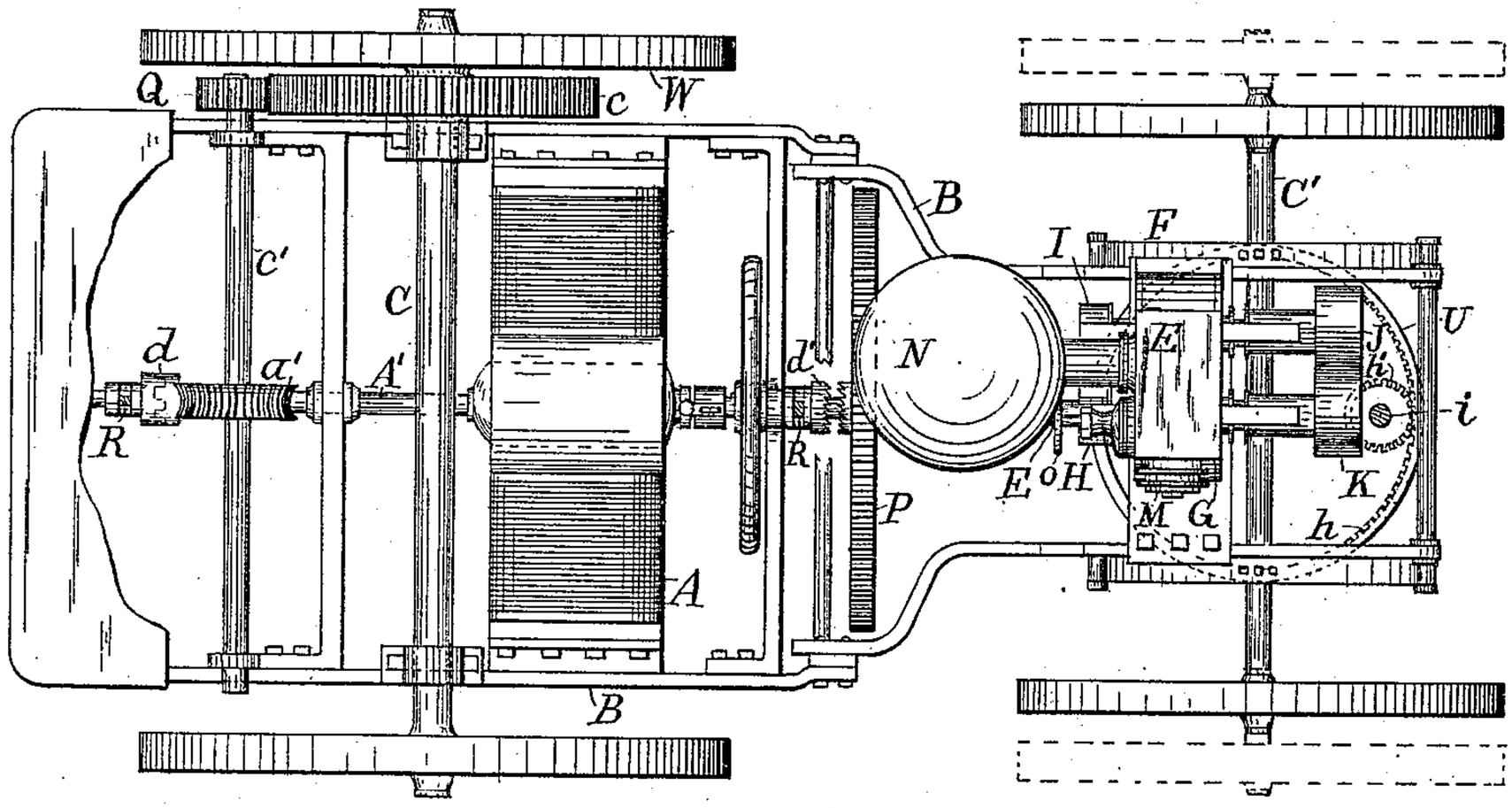

Fig. 2.

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C. L. Benditson

INVENTOR:
Mark W. Dewey,
by Duell, Laass & Duell,
his ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

M. W. DEWEY.

ELECTRIC FIRE ENGINE.

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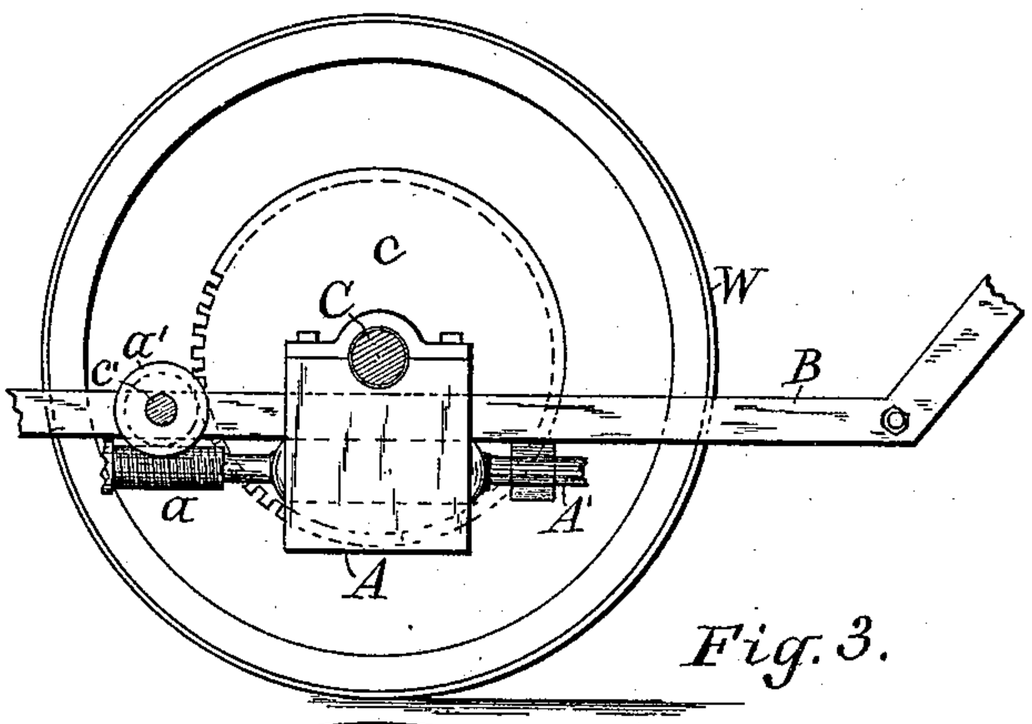

Fig. 3.

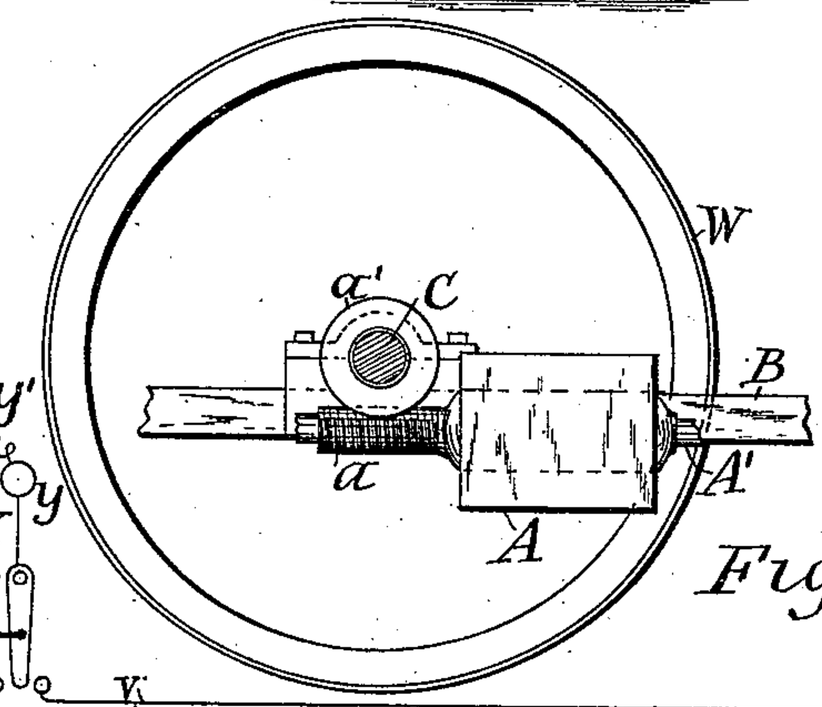

Fig. 4.

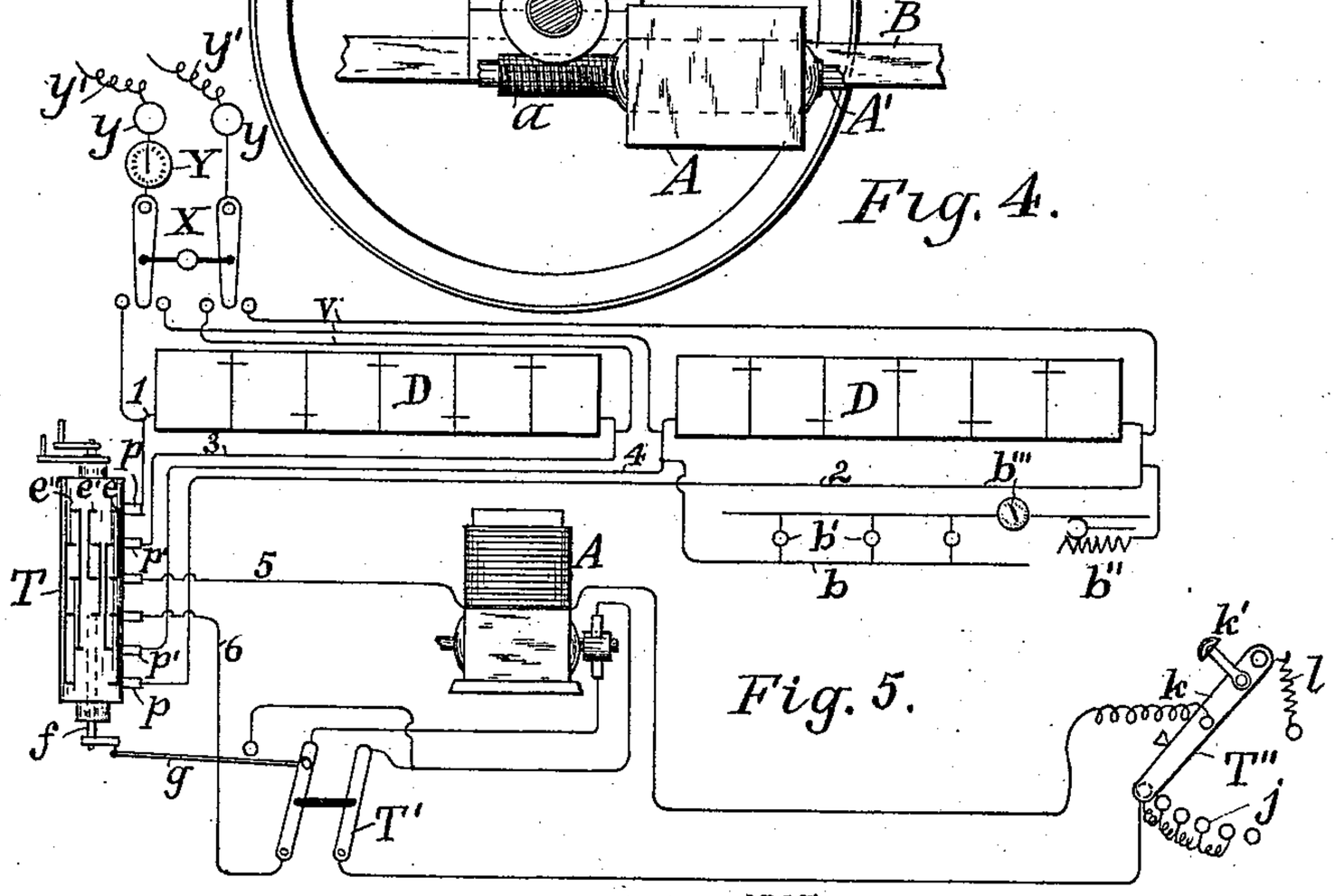

Fig. 5.

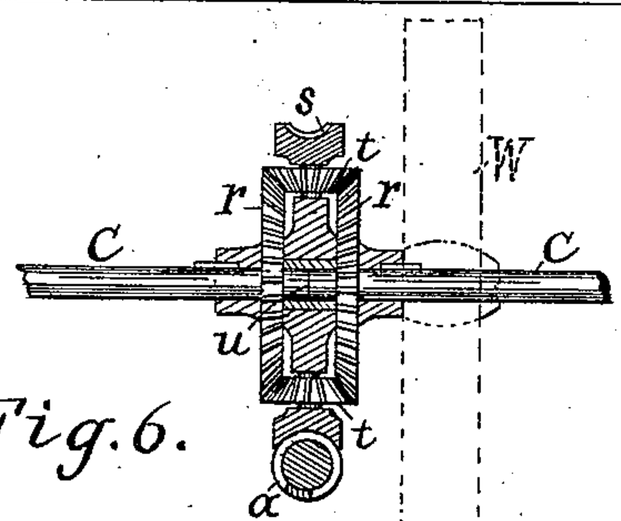

Fig. 6.

WITNESSES:

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INVENTOR:

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UNITED STATES PATENT OFFICE.

MARK W. DEWEY, OF SYRACUSE, NEW YORK, ASSIGNOR TO THE DEWEY CORPORATION, OF SAME PLACE.

ELECTRIC FIRE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 464,244, dated December 1, 1891.

Application filed February 9, 1891. Serial No. 380,710. (No model.)

To all whom it may concern:

Be it known that I, MARK W. DEWEY, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Electric Fire-Engines, (Case 84,) of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to certain improvements in electrically-propelled vehicles and electric fire-engines, and is similar in some respects to my invention set forth in my patent, No. 446,703, dated February 17, 1891.

The object of my invention is to electrically propel an electric fire-engine to and from a fire, so that it will not be necessary to employ horses for this purpose and to save the time heretofore lost in hitching them to the engine, as the electrically-propelled engine is always ready to start at the instant the alarm is sounded, and does not consume any energy while not in use.

The object of my invention also is to apply the necessary apparatus to accomplish my invention to a fire-engine having a rotary pump mounted thereon with its driving-shaft extending lengthwise of the vehicle or to an engine having a pump mounted and supported upon the front part of the frame of the vehicle above the plane of the axis of the front axle.

To this end my invention consists in the combination of a wheeled vehicle having two axles and a frame, a pump fixed to the front part of the frame, a driving-shaft for said pump extending lengthwise of the vehicle, an electric motor supported upon the vehicle having its armature-shaft lower than the driving-shaft of the pump and gearing between the said shafts.

My invention consists, also, in the combination of a wheeled vehicle having a frame, a pump fixed to the front part of the frame, an electric motor supported upon the vehicle having its armature-shaft disposed eccentrically in relation to the axis of the pump-shaft, and suitable gearing between the two shafts.

My invention consists, further, in the combination of a wheeled vehicle having a frame, a rotary pump fixed upon the front part of the frame and having its driving-shaft extending lengthwise of the vehicle, an electric motor supported upon the vehicle nearer the rear axle, means to connect said motor either with the wheels of the vehicle to propel the same or with the pump, as desired; and my invention consists, still further, in certain other combinations of parts hereinafter described, and specifically set forth in the claims.

Referring briefly to the drawings, Figure 1 is a side elevation of my improved fire-engine with a part of its frame broken away to show the gearing clearly. Fig. 2 is a plan view taken below the battery or the receptacle containing the same and below the seat and steering-wheel. Figs. 3 and 4 are modifications of the rear part of the engine. Fig. 5 is a diagrammatic view of certain parts of the apparatus, circuits, and connections on the engine; and Fig. 6 is a view of the compensating gear that may be employed.

In the drawings, A represents the electric motor suitably secured to and supported by the frame B or rear axle of the engine, but preferably with its armature-shaft extending lengthwise of the vehicle and below the horizontal plane of the axis of the rear axle C to allow a battery or its receptacle D to be placed above said axle and as near the same as practicable, so that the battery will be as low as possible. The battery is preferably placed low, in order that its weight may not render the vehicle top-heavy and to allow the battery to be removed and replaced more conveniently.

E is a rotary pump which is rigidly fixed to the front part of the frame of the engine and which may be of any suitable form of construction. The pump shown in the drawings is similar to that employed in the Silsby fire-engine, which is well adapted to this purpose, and as such rotary pumps are common it will be sufficient to say that it consists of two intersecting cylinders F and G, in which work two rotating interlocking pistons, the shafts of which H and I are geared together within the casings J and K. The water from the hydrant enters the pump at L and is forced by the rotation of the pistons, which are caused to revolve by the motor A into the water-chest E and through the opening at M, whereat the

fire-hose may be attached. Uniformity of pressure is maintained, as usual, by the air-chamber N and the quantity of water discharged is regulated by the valve *o* or in any other suitable manner.

P is the gearing or mechanical connection between the armature-shaft A′ of the motor and the main shaft E′ of the pump, and Q is the gearing or mechanical connection between the said motor and the axle C. In the said connection to and upon the axle I preferably place a well-known compensating gear *c* to facilitate in turning corners or to allow the relative movement of the wheels carried by the driving-axle, but do not limit myself to any particular form of mechanical connection either between the motor and axle or between the motor and pump. The said compensating gear is shown clearly in Fig. 6 of the drawings. One wheel W (shown in dotted lines) may be sleeved upon to turn freely on the axle C, while the other driving-wheel is keyed fast. The latter is not shown in the figure. A bevel-gear *r* is fixed to the hub of the wheel W and a similar gear *r′* is keyed to the driving-axle. Between these revolves a spur or worm gear *s*, which is driven by the motor A and which carries two small bevel-pinions *t t*, the latter engaging both bevel-wheels *r* and *r′*, their axles being in the plane of the revolution of the large gear *s*. It will be obvious that, resistances being equal on both wheels, if the spur-gear *s* be turned, it will carry with it both driving-wheels at the same time with equal angular velocities, the effort exerted by the motor being equal at both wheels at all times. If the engine be turning a corner, however, the greater resistance on the inside wheel retards that, while the outer wheel necessarily moves more rapidly over its longer path, and, while the motor still exerts the same force on both wheels, the work done is distributed unequally between them through the then revolving bevel-pinions without loss and without either wheel being necessarily slipped or disengaged.

When the compensating gear is at or near the center of the axle, the said axle may be divided at *u*, as shown in Fig. 6, the bevel-gears *r* and *r′*, keyed to their respective parts of the axle, and the driving-wheels also keyed to the parts of the axle to rotate with it and with relation to each other.

When the motor-shaft is extended at right angles to the driving-axle, I preferably provide it with a worm or screw *a*, which may directly operate the compensating gear, or operate the same through an intermediate shaft *c′*, having a pinion to work in mesh with the spur-gear of the compensating gear, and a worm-wheel *a′*, to be rotated by the worm on the motor-shaft, as shown in Figs. 1, 2, and 3. Should it be desired, however, the said worm may rotate a worm-wheel *a′*, keyed directly to the driving-axle C, without a compensating gear, as shown in Fig. 4 of the drawings.

If desired, and in order to make the vehicle shorter, the motor A may be placed beneath the rear axle C, and in some cases suspended from the same, as shown in Fig. 3.

R is a lever to operate the clutch mechanism *d* on the motor-shaft to disconnect the motor A from the axle, and R′ is a lever to operate the clutch mechanism *d′* on the opposite end of the motor-shaft to connect the motor with the pump, or vice versa, when desired.

C′ is the front axle of the engine.

U is the fifth-wheel having a circle rigidly or flexibly secured to said axle, and having a rack *h* thereon for a gear-wheel *h′* to work in.

i is an upright shaft extending upward from the said gear-wheel to a large hand-wheel *i′*, directly in front of the steersman's seat S.

The engine may be provided with the usual braking apparatus, and a gong in a convenient position to be operated by the steersman while steering the vehicle.

It is preferred to keep two sets of batteries charged at the engine-house, one being in the receptacle D on the engine and the other reserved for use when the former is discharged, the reserved battery to be sent for and brought to the engine at the fire by the supply-wagon when required.

The battery on the engine may be of any suitable size, is preferably divided in two equal parts, and one part placed above the other in the receptacle or cab D. If desired, a shell may be placed in the cab, as indicated by the dotted line *x* in Fig. 1, to support the upper part of the said battery.

The connection of the circuit with respect to the motor A, the parts of the battery, &c., and the switching apparatus T, T′, and T″ is shown in Fig. 5. The switch T consists of a series of fixed contact-points connected to different points in the series of cells. The extreme terminals *p* are connected to the opposite ends of the entire series of cells, respectively, by wires 1 and 2. The divided terminals are connected to the next two adjacent fixed terminals *p′* by wires 3 and 4. The two central fixed terminals are connected to opposite ends of the motor-circuit 5 and 6. The cylindrical rotating surface of the switch T is shown produced and bears three rows of contacts *e e′ e″*. When the row of contacts *e* is in contact with terminals *p*, the motor is connected with the entire number of cells in series. When the row of contacts *e′* is in contact with terminals *p*, the motor is connected with one-half the entire number of cells in series. When the row of contacts *e″* is in contact with terminals *p*, the motor is connected with two parallel series of cells, each series being one half the entire series. The motor is preferably series-wound and the armature-coils are connected in the circuit through a current-reversing switch T′. By operating switch T′, the current flowing in the circuit has its direction reversed through that portion of the circuit containing the armature-coils, whereby the direction of move-

ment of the motor is reversed. This switch is operated by rotating the shaft *f*, which is connected to one of the levers of the switch through a crank and connecting-rod *g*. The velocity of the motor may not only be regulated by the switch T, but, if desired, by rotating the brushes of the commutator more or less around the shaft of the armature.

The switch T″ is an adjustable resistance in the circuit to control the speed of the motor, and is placed on the front part of the engine in a convenient position to be operated by the foot of the steersman. This switch consists of a series of contacts *j*, with resistances between, connected to one terminal of the circuit, and a lever *k*, pivoted at one end and adapted to have its free end moved over the said series of contacts and connected to the other terminal of the circuit. A foot-piece *k′* is fixed to a spindle which extends down through the foot-board to and near the pivoted end of the lever to operate the latter. A spring *l* is suitably arranged to hold the lever in a position wherein the resistance is cut out of circuit and by the pressure applied with the foot the lever is moved to include more or less resistance in the circuit to reduce the speed of the motor.

I do not limit myself to the switching apparatus shown and described, as any suitable and well-known devices may be used instead.

b is a lamp-circuit or circuit containing suitable electric translating devices for any purpose.

b′ are lamps connected in parallel.

b″ is an adjustable resistance to regulate the current in the circuit, and *b‴* is a current-indicator.

If it is desired to utilize when at a fire a convenient source of electricity to operate the motor A, terminals *y y* may be provided, to be connected with the terminals of such a source by suitable electric connections *y′ y′*. The secondary battery or a part thereof may also be charged by the source, and to accomplish this electric connections V may extend, as shown, from the poles of the battery to contacts of a switch X, connected to the terminals *y y*, which switch may be connected with the poles of either part of the battery, as desired.

Y is a suitable meter or current-indicator in the circuit between the switch and one of the terminals *y*.

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

1. In a fire-engine, the combination of a wheeled vehicle having two axles and a frame, a pump fixed to the front part of the frame, a driving-shaft for said pump, extending lengthwise of the vehicle, an electric motor supported upon the vehicle, having its armature-shaft lower than the driving-shaft of the pump, and gearing between the said shafts.

2. In a fire-engine, the combination of a wheeled vehicle having two axles and a frame, a rotary pump fixed to the front part of the frame, a driving-shaft for said pump, extending lengthwise of the vehicle, an electric motor supported upon the vehicle, having its armature-shaft extending lengthwise of the vehicle and parallel but lower than the driving-shaft of the pump, and gearing between the said shafts.

3. In a fire-engine, the combination of a wheeled vehicle having two axles and a frame, a pump fixed to the front part of the frame, a driving-shaft for said pump, extending lengthwise of the vehicle, an electric motor supported upon the vehicle, having its armature-shaft below the plane of the axis of the rear axle of the vehicle and lower than the driving-shaft of the pump, and gearing between the said shafts.

4. In a fire-engine, the combination of a wheeled vehicle having two axles and a frame, a pump fixed to the front part of the frame, having its driving-shaft extending lengthwise of the vehicle, an electric motor supported upon the vehicle and connected with the pump, and means for connecting said motor with the rear axle or the wheels thereof to drive the vehicle.

5. In a fire-engine, the combination of a wheeled vehicle having a frame, a pump fixed to the front part of the frame, an electric motor supported upon the vehicle, having its armature-shaft disposed eccentrically in relation to the axis of the pump-shaft, and suitable gearing between the two shafts.

6. In a fire-engine, the combination of a wheeled vehicle having a frame, a pump fixed to the front part of the frame, an electric motor supported upon the vehicle, having its armature-shaft disposed eccentrically in relation to the axis of the pump-shaft, suitable gearing between the two shafts, and means for connecting said motor with the rear axle or the wheels thereof to drive the vehicle.

7. In a fire-engine, the combination of a wheeled vehicle having two axles and a frame, a pump fixed to the front part of the frame, a driving-shaft for said pump, extending lengthwise of the vehicle, an electric motor supported upon the vehicle, having its armature-shaft below the plane of the axis of the rear axle of the vehicle, gearing between the said shafts, and means for connecting said motor with the rear axle or the wheels thereof to drive the vehicle.

8. The combination, in an electrically-propelled vehicle, of an electric motor mounted thereon, a mechanical connection between said motor and the axle of the vehicle containing a compensating gear in said connection to permit the relative movement of the wheels, and a screw mounted directly on an extension of the armature-shaft to operate said gear.

9. The combination, in an electrically-propelled vehicle, of an electric motor mounted thereon, having its armature-shaft at right angles to the driving-axle, and a mechanical

connection between the motor-shaft and the axle, and containing a compensating gear mounted upon the central part of said axle to permit of the relative movement of the wheels carried by the said axle.

10. In a fire-engine, the combination of a wheeled vehicle having a frame, a pump fixed to the front part of the frame, and an electric motor suspended below the rear axle of the vehicle and connected to the pump.

11. The combination, in an electrically-propelled vehicle, of an electric motor mounted thereon, having its armature-shaft at right angles to the driving-axle, a mechanical connection between the motor-shaft and the axle, containing a compensating gear to permit of the relative movement of the wheels carried by the said axle, a battery on the vehicle above the rear axle, and electric connections between the battery and motor.

12. In a fire-engine, the combination of a wheeled vehicle having two axles and a frame, a pump fixed to the front part of the frame, a driving-shaft for said pump, extending lengthwise of the vehicle, an electric motor supported upon the vehicle, having its armature-shaft lower than the driving-shaft of the pump, gearing between the said shafts, a battery on the vehicle above the rear axle, and electric connections between the battery and motor.

13. In a fire-engine, the combination of a wheeled vehicle having a frame, a pump fixed to the front part of the frame, an electric motor supported upon the vehicle, having its armature-shaft disposed eccentrically in relation to the axis of the pump-shaft, suitable gearing between the two shafts, a battery on the vehicle, and electric connections between the battery and motor.

14. In a fire-engine, the combination of a wheeled vehicle having two axles and a frame, a pump fixed to the front part of the frame and having its driving-shaft extending lengthwise of the vehicle, an electric motor supported upon the vehicle and connected to the pump, means for connecting the said motor with an axle of the vehicle to drive the same, a battery on the vehicle, and electric connections between the battery and the motor.

15. In a fire-engine, the combination of a wheeled vehicle having two axles and a frame, a pump fixed to the front part of the frame and having its driving-shaft extending lengthwise of the vehicle, an electric motor supported upon the vehicle, with its armature-shaft below the plane of the axis of the rear axle and connected to the pump, means for connecting the said motor with an axle of the vehicle to drive the same, a battery on the vehicle above the said axle, and electric connections between the battery and motor.

16. In a fire-engine, the combination of a wheeled vehicle having a frame, a rotary pump fixed upon the front part of the frame and having its driving-shaft extending lengthwise of the vehicle, an electric motor supported upon the vehicle nearer the rear axle, means to connect said motor either with the wheels of the vehicle to propel the same or with the pump, as desired.

17. In a fire-engine, the combination of a wheeled vehicle, an electric motor mounted upon the vehicle, having its armature-shaft below the plane of the axis of the wheels of the vehicle, and a suitable pump on the vehicle, connected with the said motor to be driven thereby.

18. In a fire-engine, the combination of a wheeled vehicle, an electric motor mounted upon the vehicle, having its armature-shaft below the plane of the axis of the wheels of the vehicle, and a pump mounted on the frame of the vehicle above the plane of the axis of the wheels and connected to the said motor to be driven thereby.

In testimony whereof I have hereunto signed my name this 4th day of February, 1891.

MARK W. DEWEY. [L. S.]

Witnesses:
C. H. DUELL,
H. M. SEAMANS.