(No Model.)

W. J. WALKER & A. L. BEDFORD.

MOTOR.

No. 507,769. Patented Oct. 31, 1893.

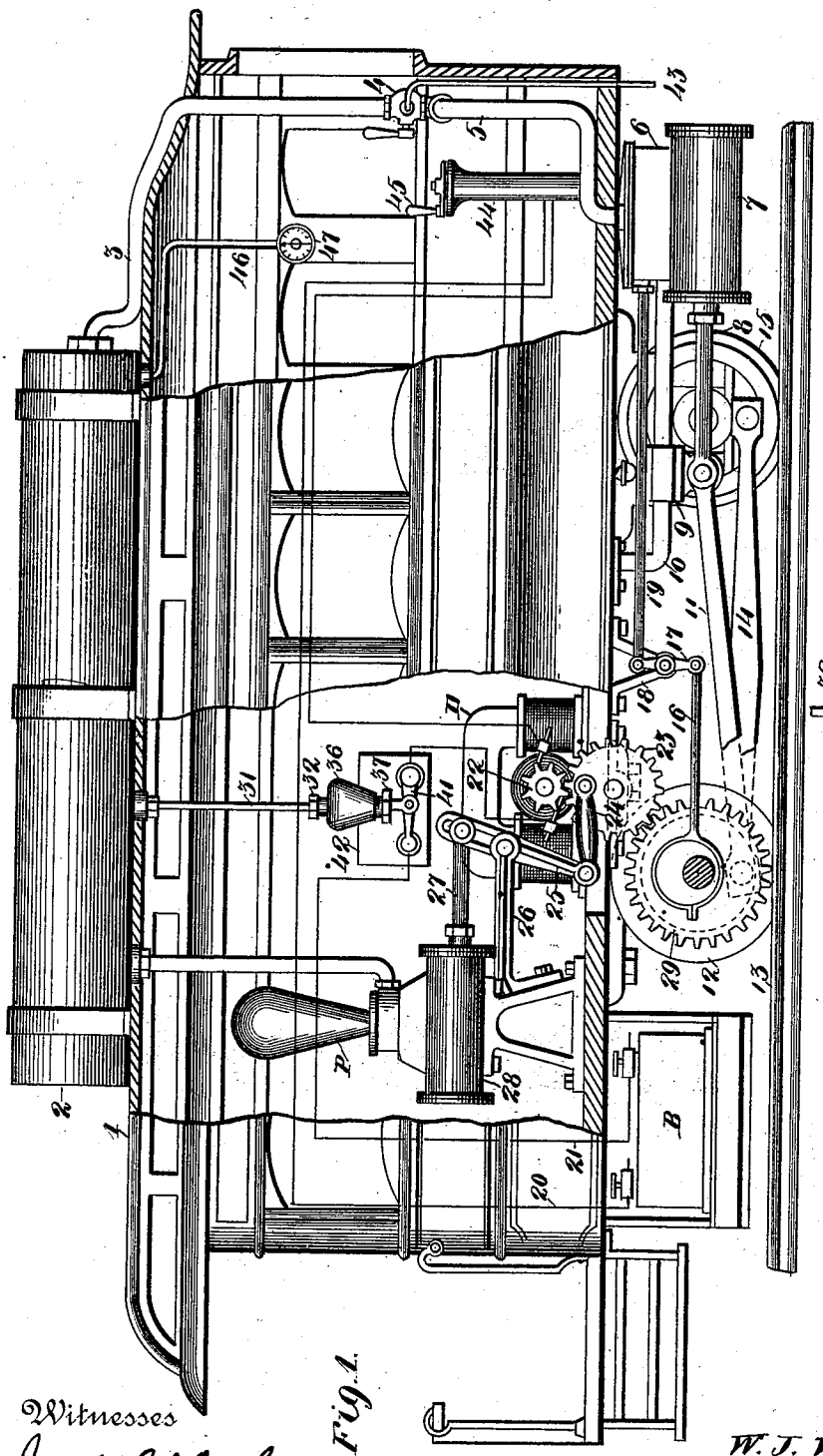

Fig. 1.

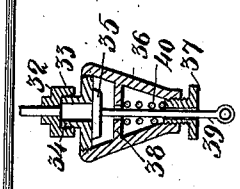

Fig. 2.

Witnesses
James J. Hanchon
Jno. P. Thompson

Inventors
W. J. Walker and
A. L. Bedford.
By their Attorneys
Keller & Starek

UNITED STATES PATENT OFFICE.

WILLIAM J. WALKER AND ALEXANDER L. BEDFORD, OF ST. LOUIS, MISSOURI.

MOTOR.

SPECIFICATION forming part of Letters Patent No. 507,769, dated October 31, 1893.

Application filed March 15, 1893. Serial No. 466,075. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM J. WALKER and ALEXANDER L. BEDFORD, of the city of St. Louis, Missouri, have jointly invented certain new and useful Improvements in Motors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

Our invention has relation to improvements in combined air and electric motors and consists in the novel arrangement and combination of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 represents a side elevation of a car with parts broken away showing our invention applied thereto; and Fig. 2 is a section of the valve controlling the switch lever.

The present invention is a modification of that described in the specification of an application for motor filed March 6, 1893, Serial No. 464,838; and differs in particulars involving the position the various parts occupy with relation to one another, the present device being capable of operation in case the air derived from the air tank failed to operate on account of breakage or accident to the parts connected therewith. In detail the present modification may be described as follows:

Referring to the drawings, 1 represents a car to which our invention is applied. On top of the car, or in any other convenient location is mounted a receptacle or tank 2 of suitable size and capable of withstanding an internal pressure of any suitable number of pounds per square inch of surface. From said tank leads a pipe 3 conveying air by way of a two-way valve 4 and the pipe 5, to the valve chest 6 of the air cylinder 7, there being one such pipe 5, chest, and cylinder and their co-operating parts on either side of the car. The cylinder and valve chest are preferably located below the floor of the car, but we do not limit ourselves to the precise location of the parts. The driving mechanism is of the ordinary construction and consists of the ordinary piston to which is connected a piston rod 8. The cross head 9 slides in a guide 10 and is secured to one end of the main connecting rod 11 which in turn operates the wheel 12 on the rail 13 and the connecting rod 14 connects the first wheel 12 with the wheel 15. The eccentric rod 16 is connected to the rocker bar 17 secured in the present instance to a depending bracket 18 and the rocker bar operates the valve stem 19 secured to the valve within the valve chest. All these parts are of the ordinary construction and further details will be unnecessary.

In a suitable receptacle or box below the floor of the car is placed a secondary or storage battery B from the opposite poles of which extend the conducting wires 20, and 21, the current from the battery passing through the same and operating a dynamo or electric motor D of any convenient type. The pinion 22 of the driving shaft thereof meshes with a gear 23 to which is movably connected at a convenient point, a connecting rod 24 which operates a rocking lever 25 pivoted to a bracket 26, said lever reciprocating the piston rod 27 of the cylinder 28 of an air pump P. The end of the lever 25 which operates the rod 27 is slotted as shown, to prevent binding of the parts. The air pump is connected to the tank 2 by a suitable pipe which conveys air to the tank during the operation of the pump, that is, while the car is in motion. The tank 2 is provided with a pressure gage 47 connected to the tank by a pipe 46.

At a convenient point in the path of the pipe 3 is a two-way valve 4 located above the pipe 5 and from the casing of the said valve and at right angles thereto is a pipe 43 of reduced diameter leading to any convenient air brake mechanism (not shown) which operates an ordinary brake against the wheels of the car. In one position of the valve 4 the air is admitted into the pipe 5 for operating the air motor under the car, and in another position of the said valve the air is admitted to the brakes by way of the pipe 43 as is clear from the ordinary operation of a two-way valve. When the limit of pressure within the tank 2 has been reached at any time, particularly when the car is moving down grade under the influence of gravity and the dynamo is operated by the movement of the car through the intermediate gear 23 interposed between the pinion 22 and the gear 29 keyed to the wheel 12 of the car, we provide means for cutting off the current passing from the battery B to the dynamo D which operates the air pump P by virtue of a positive and inde

pendent power derived from such battery and which is independent from the power derived from the car by the intermediate gearing referred to. When the current is thus shut off the car moving under the influence of gravity will accordingly have additional friction to overcome and the rapidity of the pump will be checked thus checking the too rapid accumulation of air in the tank 2. This is accomplished by the automatic switch valve shown in detail in Fig. 2. The pipe 31 leads from the tank 2 and terminates in a plate 32 having a depending flange 33 which is interiorly screw-threaded and to which is secured a short tube 34 the interior of which forms a chamber above the valve piston 35. To the bottom of the tube 34 is secured a casing 36 into the open end of which is passed an adjusting nut 37. Through this nut and through a central opening of a rib 38 within the casing and secured to the valve piston, passes loosely a valve stem 39 and between the adjusting nut 37 and the rib 38 is confined a spring 40 which encircles the stem and whose upper end is attached to the stem. By means of the adjusting nut the spring is set to any desired tension. It will be apparent that if too much pressure accumulates in the tank 2, the same will depress the valve piston 35 and consequently depress the valve stem 39. The lower end of the stem is loosely connected to a switch lever 41 pivoted in the path of the conducting wire 21 on a switch board 42. It is apparent that a depression of the stem 39 will throw the switch lever 41, or rather one end thereof, off from the wire 21, thus shutting off the current from the dynamo.

In certain particulars the present invention resembles that described in our pending application above referred to; but the following differences and the advantages resulting therefrom are to be noted. It will be seen that the main driving wheel 12 has keyed thereto a gear 29 and this by the intermediate gear 23 may be made to drive the dynamo D through the pinion 22. Of course the pinion 22 could be positively driven by the gear 29 only when the car moved down grade under the action of gravity, as the available energy derived from the air motor 7 is utilized in giving motion to the car on a level track, or on an upward grade. When the car is moving on a level or going up hill, the current of the dynamo is the independent agent which gives positive motion or rotation to the shaft of the pinion 22, and just enough current (or a little more) is passed to the dynamo to give the pinion 22 a circumferential velocity equal to or just a little greater than the circumferential velocity of the gear 23. Under these circumstances although the pinion 22 is meshed with the gear 23, no positive action derived from the gear 23 will be used to drive the pinion 22 but said pinion will simply turn circumferentially in unison with the gear 23 so that no back action or resistance will be offered from that source against the action of the air motor. This of course will be obvious; and with the parts geared as described it will be apparent that in going down a slight grade, the air motor can be shut off altogether, and the car can be moved under the action of gravity combined with the action of the dynamo. Again, in case of breakage or some accident to the air motor, the amount of current passed into the dynamo can be increased in any well known manner, for example by means of a variable resistance (not here shown) or by a variable storage battery, and this increased current may be made to run the car directly, through the intermediate gear 23, and the gear 29 keyed to the driving wheel. The dynamo can therefore be utilized either to operate the air pump alone, or in cases of emergency, to both move the car and the air pump, or, when the car moves down a grade, it may drive the car together with the joint action of gravity.

Of course in cases where the dynamo is used to drive the car, the pump always operates, but the danger of too much accumulation of air pressure within the tank 2 is obviated on account of the presence of the valve shown in Fig. 2.

When the car is stopped and the brakes applied the current from the dynamo is also shut off by any ordinary switch 44 provided with an operating handle 45 as clearly shown in the drawings.

Having described our invention, what we claim is—

1. A car motor comprising a suitable air-storage tank, an air motor operated by the air from said tank, and an electric motor or dynamo revolving with the wheels of said car, but driven positively by an independent source of electrical energy, substantially as set forth.

2. In a car motor, a suitable air motor, an electric motor operating in unison with said air motor, and suitable gearing to positively drive the mechanism of the car, when the air motor is shut off, or in case of breakage, substantially as set forth.

3. In a car motor, a suitable air motor, driving mechanism between said motor and the wheels of the car, a dynamo having a driving pinion on the shaft thereof, an independent source of electrical energy for positively driving said dynamo, a gear secured to the driving wheel of the car, intermediate gearing between said gear and the pinion of the dynamo whereby the dynamo may turn in unison with said gearing, but by virtue of an independent power, an air pump operated by the dynamo, and an air tank communicating with said air pump, substantially as set forth.

4. In a car motor, a suitable air motor connected to the driving wheels of said car, an electric motor also connected to said driving wheels, a two-way valve for controlling the motor, and a suitable switch stand having an operating handle for controlling the current

leading to the electric motor, substantially as set forth.

5. In a car motor, a suitable air motor operating the driving wheel through suitable intermediate mechanism, a gear 29 on the driving wheel, a suitable dynamo capable of operation under a current of variable intensity, a pinion 22 on the driving shaft of said dynamo, an intermediate gear 23 between said pinion and the gear 29, an air pump, and driving mechanism for operating said pump secured to the intermediate gear 23, substantially as set forth.

6. In a car motor, a suitable air motor connected to the driving wheels of said car, a dynamo capable of operating under the influence of a variable current, said dynamo adapted to move in unison with the air motor, and suitable gearing between the air motor and dynamo, substantially as set forth.

In testimony whereof we affix our signatures in the presence of two witnesses.

WILLIAM J. WALKER.
ALEXANDER L. BEDFORD.

Witnesses:
JAMES J. O'DONOHOE,
EMIL STAREK.