

(No Model.)

2 Sheets—Sheet 1.

C. E. DRESSLER.

APPARATUS FOR GENERATING ELECTRICITY FOR LIGHTING OR HEATING RAILROAD CARS.

No. 568,193.

Patented Sept. 22, 1896.

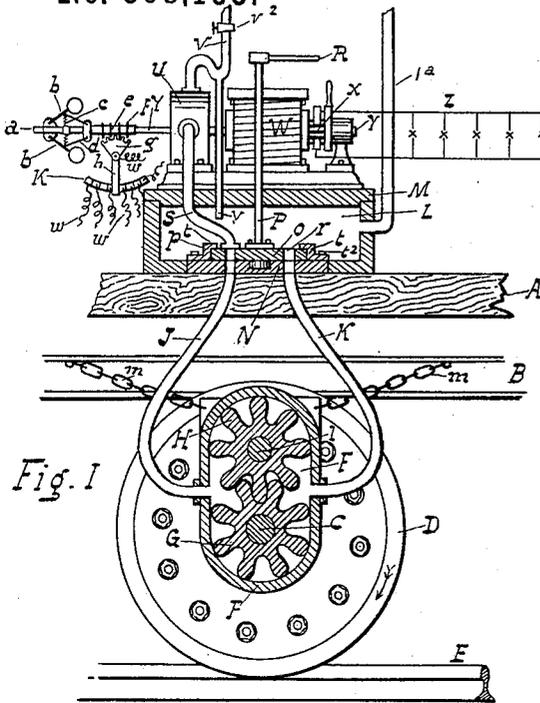


Fig. I

Fig. II

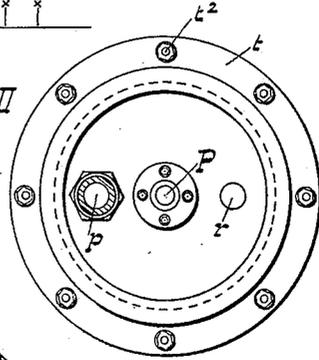


Fig. III

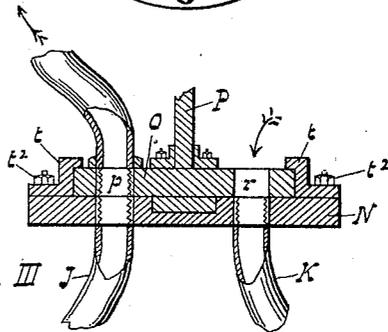


Fig. IV

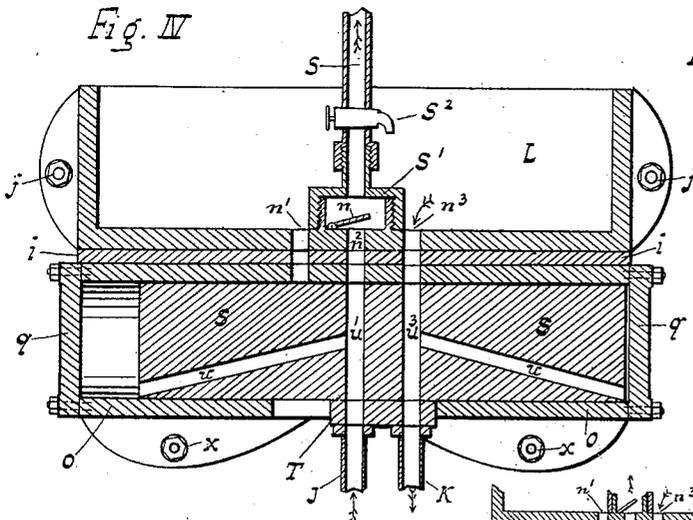
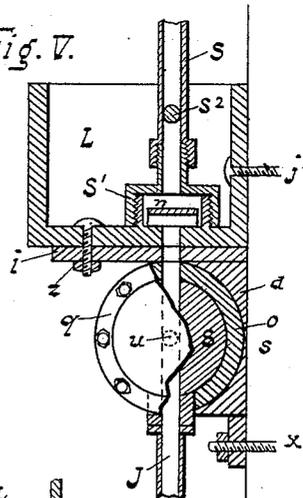


Fig. V



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INVENTOR  
*Charles E. Dressler*

Fig. VI

(No Model.)

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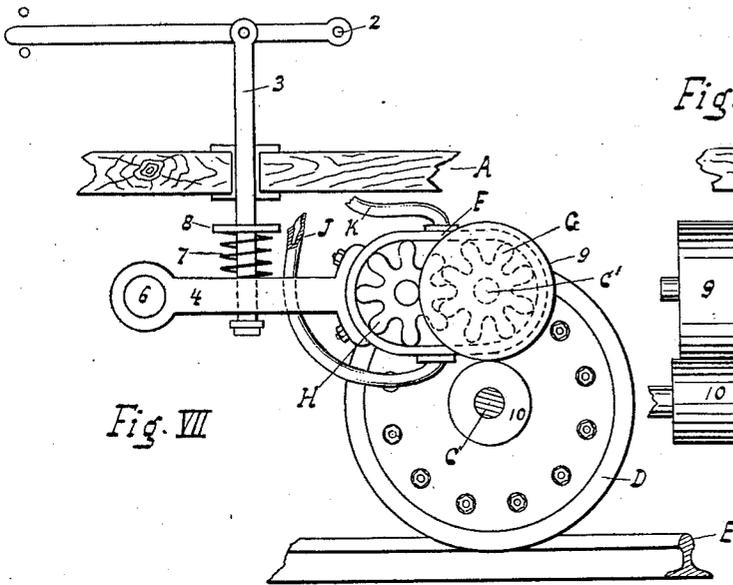


Fig. VII

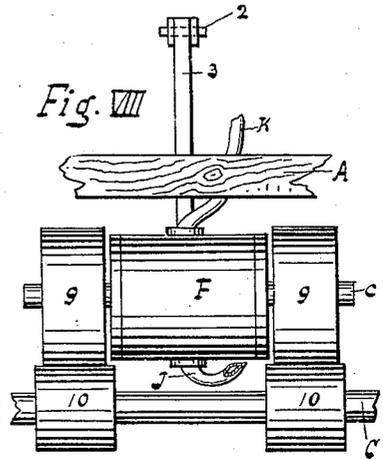


Fig. VIII

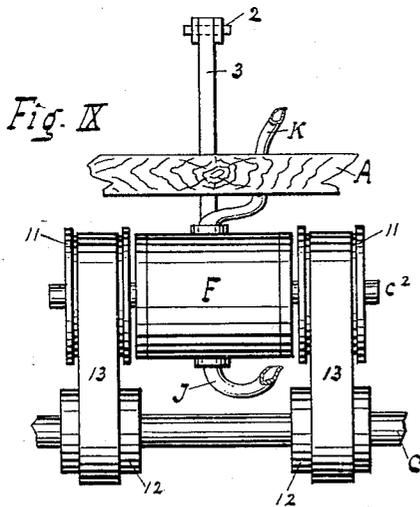


Fig. IX

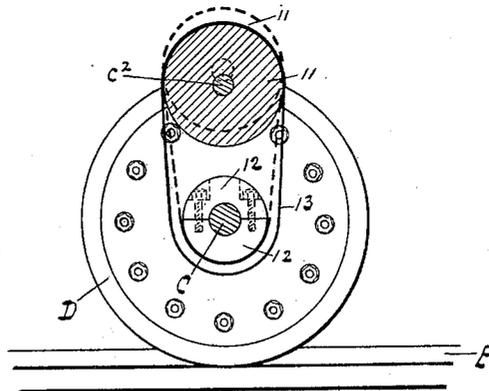


Fig. X

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# UNITED STATES PATENT OFFICE.

CHARLES E. DRESSLER, OF NEW YORK, N. Y.

APPARATUS FOR GENERATING ELECTRICITY FOR LIGHTING OR HEATING RAILROAD-CARS.

SPECIFICATION forming part of Letters Patent No. 568,193, dated September 22, 1896.

Application filed May 2, 1894. Serial No. 509,742. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. DRESSLER, of the city of New York, in the county and State of New York, have invented a new and useful Apparatus for Generating Electricity for Lighting or Heating Railroad-Cars, which invention is fully set forth and illustrated in the following specification and accompanying drawings.

10 The object of this invention is to generate electricity within a car by a dynamo operated by a motor or engine actuated by fluid-pressure transmitted from a pump or blower operated directly or indirectly by an axle of the moving car. Its object is also, incidentally, to ventilate the car at the same time.

The invention will first be described in detail, and then set forth in the claims.

15 In the accompanying drawings, Figure 1 is a sectional side elevation of one method of applying my invention to a railroad-car and operating the same by a car-axle direct. Fig. 2 is a plan, enlarged, of the interior or bottom of the tank and valve shown in Fig. 1. Fig. 25 3 is a transverse vertical mid-section through Fig. 2. Fig. 4 is a longitudinal vertical mid-section through an automatic reversing-valve and attachments, hereinafter described. Fig. 5 is a transverse vertical mid-section through Fig. 4. Fig. 6 is a longitudinal section of a modification in construction of the valve and cylinder shown in Figs. 4 and 5. Fig. 7 shows in side elevation a method of operating my invention from the car-axle by means of interposed friction-gear. Fig. 8 is an end view of Fig. 7, the car-wheels being omitted. Fig. 9 shows in end view a method of operating my invention from the car-axle by means of interposed pulleys and belting, the car-wheels being omitted. Fig. 10 is a side view, partly in section, of Fig. 9.

35 In said figures the several parts are indicated by reference letters and numerals, the same parts in each figure being indicated by like letters or numerals, as follows:

45 The letter A, Figs. 1, 2, and 3, indicates a portion of the floor or inside bottom of a railroad-car; B, a portion of the frame of a truck upon which the car is mounted; C, the car-axle, and D one of the car-wheels secured to said axle. Said wheel rests on the track-rail E. A rotary pump or blower F, which may

be of any approved pattern, has one of its impellers, G, secured to the car-axle C, its other impeller, H, being mounted on a shaft I, secured in the casing of the pump. The tendency of said pump to rotate about the axle C may be prevented by the chains *m*, secured to any suitable part of the truck-frame B. From the casing of the pump F two pipes J and K lead up through the bottom of the car to ports N, within a box or tank L, provided with a cover M. Said pipes are made of rubber or other preferably flexible material with some slack in length if the truck be a swinging truck; but if a stationary truck be used the pipes J K may be made of any suitable material and need not be flexible. A rotary valve *o*, provided with ports *p r*, is secured on the seat N by a flanged sleeve *t* and bolts and nuts *t'*, and is provided with a rod P and handle R for rotating the valve by hand at will, so that the ports *p r* in the valve may be reversed to coincide, respectively, with either one of the ports in the valve-seat N. From the port *p* in the valve *o* a flexible or slack pipe S is led to the induction side of a rotary motor or other engine U, mounted on a dynamo-shaft Y. The eduction-pipe V leads from said engine to any convenient point, where it opens outside of the car into the atmosphere. The pipe *l'* leads up from the box L, preferably to some point near the top of the inside of the car. A drip-pipe *v* leads from the pipe V down and into the box M. On the shaft Y is secured the armature of a dynamo W, having a commutator X on one end of said shaft and a centrifugal governor *a* on the other end of the same. Said governor is provided with ball-arms *b* and springs *c*, connected by rods *d* to a sliding sleeve *e* on the shaft Y, which sleeve is provided with collars *f*. Said collars mesh into a toothed sector *g*, provided with a contact-arm *h*, which rests on a curved switch-plate *k*. The wires *w* form electric circuits between said arm *h* and switch-plate *k* and other points, as will be hereinafter explained. A lamp-circuit Z is supplied from the dynamo either direct or through a storage battery of any approved form and in any approved manner.

100 The armature of the dynamo W within the car is rotated in the following-described manner: Assuming the car-wheel D to be revolvy-

ing toward the left, either air or some suitable liquid, such as water or some non-congealable fluid or mixture, preferably of a lubricating nature, will be drawn down from the box L through the pipe K into the right-hand or induction side of the pump or blower F and discharged at the desired speed in suitable volume from the eduction-pipes J and S into the motor or engine U, actuating the same and causing it to rotate the armature-shaft Y of the dynamo W at the desired average speed when the car has the necessary average velocity. The fluid thus forced into the engine U after actuating the same is exhausted out of the pipe V into the atmosphere, if the actuating fluid used should be atmospheric air; but if such fluid be a liquid the pipe V will be turned to discharge downward, as through the pipe  $v$  into the box L, whence the liquid will be drawn into the pump or blower F and be used in the same round over and over again with practically no loss. Such liquid will not require to be renewed, therefore, except at long intervals; if kept free from impurities and leakage or loss by evaporation be prevented. If the actuating fluid used should be air, then the air may reach the box L, down from near the top of the inside of the car through the pipe  $l^a$ , and thence be discharged through the pipe V into the atmosphere outside of the car, thus ventilating the car by a gentle exhaustion of an upper stratum of impure air, while fresh air may enter the car through any openings that may be provided at a lower level. In this case the pipe  $v$  may be converted into a mere drip-pipe to return any oil or other lubricant to the box L after it has been passed through the pump F and motor U. Thus but little, if any, of such lubricant will be wasted or lost, and in any event the lubrication will be continuous and automatic.

Now assuming that the car-wheel D is reversed and travels to the right, an operator immediately turns the valve  $o$  on its seat N by means of the rod P and handle R until the ports  $p$   $r$  change places, when the actuating fluid is drawn down from the box L through the pipe J into the left-hand, now the induction, side of the pump or blower F, and forced out of the same through the pipe K (now converted into an eduction-pipe) and exhaust-pipe S, as before, into the motor U. Thus though the pump or blower F is driven in the opposite direction the engine or motor U, and with it the dynamo-shaft Y, continues to be driven unreversed in direction. Hence the armature-shaft and commutator X of the dynamo are never reversed in direction of rotation, whether the car runs in one direction or the other. If the valve  $o$  be turned only so far as to cover the ports in its seat, that is, so that the ports  $p$   $r$  do not register with the ports in the valve-seat N, then no air will reach the pump F, and hence, though said pump will continue to rotate while the car-wheels are in motion, yet the pump will not

actuate the motor within the car; but, of course, the valve arrangement above described does not operate automatically, for which purpose I prefer to use the automatic valve arrangement shown in Figs. 4 and 5, which may be substituted for the non-automatic shown in the preceding figures. In this automatic arrangement the same pipes J, K, and S are used, as before; but said pipes are connected to a different valve arrangement in connection with the tank or box L, secured in place within the car by bolts and nuts  $j$  through side flanges and bolts and nuts  $x$  through its bottom to a shelf or other support  $i$ . The top of the tank L may be provided with a tight-fitting cover, as shown at M, Fig. 1. Below the shelf  $i$ , secured in place through flanges by bolts and nuts  $x$ , is a cylinder O, provided with heads  $q$  and a piston-valve  $s$ , somewhat shorter than the inside length of the cylinder, thus giving sufficient clearance for said valve to move its desired travel within the cylinder O. The piston-valve  $s$  is provided with two ports  $u'$   $u^2$ , and the tank L is provided with two ports  $n'$   $n^2$ . Between said last-named ports, secured to the bottom of the tank L, is a valve casing or chamber  $S'$ , within which is a check-valve  $n$ , covering a port  $n^2$ , and from which chamber the pipe S leads to the motor U, Fig. 1. The piston-valve  $s$  is also provided with two inclined passage-ways  $u$ , which extend through from each end of the valve to the ports  $n'$   $n^2$ . The object of making these passage-ways inclined instead of parallel to the bore of the cylinder is to cause all liquid lubricants which may settle in the bottom of the cylinder to be drawn therefrom and circulated by the pump. A block or feather T, provided with ports in register with ports  $n'$   $n^2$ , is secured to the bottom of the piston-valve  $s$  through a slot in the cylinder O, and to said block the pipes J and K are secured. Instead of slotting the cylinder O and providing the piston-valve  $s$  with a feather T, the pipes J K may be secured to nozzles or ports in the cylinder, as shown in Fig. 6, the ports  $u'$   $u^2$  in the piston-valve  $s$  being cut out or widened at bottom in order to unlap or connect the proper upper and lower cylinder-ports at the proper time to effect the proper ingress and egress of the actuating fluid to and from the pump F. By thus securing the pipes J and K to the cylinder O instead of to the piston-valve  $s$  all resistance (except its own friction) to the reversal of the piston-valve  $s$  is removed. A bolt or bolts  $q^2$ , secured to the cylinder-head  $q$ , may be inserted loosely in a hole in one or both ends of the piston  $s$  out of the axis of said piston. This bolt will prevent the piston from turning or rotating in its cylinder or casing O.

The operation of the piston-valve, which is automatic, is as follows: The pump F, when operated in one direction, draws the air or other fluid down the port  $n^2$  and discharges the fluid through the ports  $u'$  and  $u^2$  and

check-valve  $n$  and pipe  $S$  to the motor  $U$ , whence it is discharged out of the pipe  $V$  or down through pipe  $v$  into the tank  $L$ , as before described, as may be desired. When the pump  $F$  is reversed by the reversal of the car-wheels' rotation, the pump will draw or exhaust the air or other fluid down the port  $u'$ . This will close the check-valve  $n$  and exhaust the clearance and port  $u$  at the left-hand end of the cylinder, Fig. 4, and at the same time force a pressure-current through the pipe  $K$  and ports  $u u^3$  on the right-hand end of the cylinder  $O$ . This exhaustion on one end and pressure on the other end of the valve  $s$  will force it to travel over to the left-hand end of the cylinder  $O$ , and thus the current of fluid-pressure will pass up through the pipe  $K$ , port  $n^2$ , check-valve  $n$ , and pipe  $S$  to the motor, continuing the motion of said motor in the same direction unchanged by the reversal of the pump's motion. In case the pump be secured direct to the axle and it be desired to stop the motor or dynamo while the car-wheels are still in motion, this can be easily effected by turning the two-way cock  $S^2$  in the pipe  $S$  so as to discharge into the tank  $L$ , in which event, whether air or liquid be used in the pump, the motor will cease to operate. No danger of breakage can occur by the turning of the two-way cock in either direction, as it cannot close the pipe  $S$  to a free delivery. An ordinary stop cock or valve  $v^3$  may be put in the pipe  $V$  above its junction with the pipe  $v$ , which when closed will prevent any danger of loss of liquid through the pipe  $V$  when liquid is used. The closing of this cock can in no event result in breakage, as a free delivery is left through the pipe  $v$  into the tank  $L$ .

In Figs. 7 and 8 is shown a method of driving the pump or blower  $F$  by friction-gearing. Friction-gears 10 are secured on the car-axle  $C$ , and other friction-gears, 9, are secured to the shaft or spindle  $c'$  of the impeller  $G$  of the pump  $F$ , said pump being secured by bolts to the flanged end of an arm or lever fulcrumed at the point 6 to the frame of the car-truck. The weight or leverage of the pump  $F$  keeps its friction-gears 9 in constant contact with the friction-gears 10 on the car-axle, which gears when the car-wheels are in motion transmit the requisite power to the friction-gears 9 to drive the rotary impellers  $G$  and  $H$  of the pump  $F$ . By means of the lever 1, fulcrumed at 2 within the car, and the rod 3, provided with a bottom collar, the friction-gears 9 may be elevated out of contact with the gears 10, and thus stop the pump  $F$  from operating while the cars are in motion. Said gears may be pressed into greater frictional contact by the spring 7 under the collar 8 on the rod 3 and be permitted also, by means of said spring, to be automatically thrown out of contact in case a violent upward jolting of the car should take place, due to a rough track or to the presence of some obstruction to the wheels.

Instead of friction-gearing, belting may be substituted, as shown in Figs. 9 and 10, in which figures pulleys 11 on the spindle  $c^2$  of the pump  $F$  are driven by pulleys 12 on the car-axle  $C$  and belts 13 around said pulleys. The pump  $F$  is secured to the rod 3, secured at the point 2 to a lever, such as lever 1 in Fig. 7. This arrangement forms a belt-tightener, by means of which the belts 13 may always be held in proper tension for driving the pump  $F$  when desired; but if it be desired to stop the pump while the car-wheels are in motion the belts can be slacked up sufficiently for such purpose. The pulleys 12 are shown of the split form for securing them to the axles after the wheels have been forced thereon. With a swinging truck if either of the levers 1 is extended into the car the floor must be slotted through to let the lever oscillate with the swing of the truck, or the lever may be operated by cords or wire rope through holes in the car-floor, the lever being below the floor.

Any one of these three described methods may be adopted for driving the pump  $F$ , as may be preferred, and if the car-wheels have first been driven on the axles the friction-gears may be secured thereon in split form, as shown for the pulleys 12 in Fig. 10. The pump  $F$  also may have its impeller  $G$  and casing suitably divided and secured together over the car-axle in a neat and durable manner if it be desired to mount the pump directly on the axle, which method has the advantages of lessening the number of parts, doing away with all valves and closing up all the moving parts within a dust-excluding case.

By means of the invention herein described all air-storage tanks or reservoirs on the car are successfully dispensed with and a continuous driven current of air or liquid (not stored-up compressed air) is supplied by a rotary blower or pump to the motor and so that the motor operates the dynamo always in the same direction regardless of the direction in which the rotary blower or pump may be driven by the moving car.

Any pump or blower with its necessary auxiliaries, or any motor or engine in the car, may be used, of such suitable forms as may be preferred; but I prefer some approved form of rotary pump or blower for use on the truck, for the reasons above given.

For regulating the distribution of the electric current generated by the dynamo, Fig. 1, the wires  $w$  may connect the dynamo, the circuit-closer  $h$ , and the several contact-points on the switch-plate  $k$  in any suitable number of circuits with the storage battery, the illuminating-circuit of lamps, or with any electric heating device, so that one circuit may increase or diminish reciprocally and automatically the strength of the field-magnets of the dynamo, according as the car-wheels decrease or increase their speed of revolution below or above a certain average. This au-

automatic regulation for a uniform output of electric current within a certain maximum and minimum of speed of rotation of the car-wheels, and consequently of the dynamo-armature also, is accomplished by the action of the governor in moving the contact-arm *h* to a certain point on or to connect certain contact-points on the switch-plate *k*. Another circuit may be formed of certain of the wires *w* to connect the dynamo, the storage battery, and the lamps or heating device, so that the battery may supply the light or the heat. Another circuit may be formed of certain of the wires *w* to connect the dynamo directly to the lamps or heating device. Another circuit may be formed of certain of the wires *w* to connect the dynamo and storage battery in any suitable manner for the purpose of charging or recharging the battery by the dynamo. The variations in speed of rotation of the governor and its state of rest may be utilized to accomplish some or all of these purposes by its control of the position of the contact-arm *h*.

25 The governor *a*, for simplicity of illustration, is shown set horizontally on the shaft *Y*; but said governor may be set vertically and operated by the shaft *Y* in any usual manner, as by belting or gearing, and may be of any approved form other than that shown in Fig. 1.

30 Having thus fully described my said invention, I claim—

1. In a system of railway-car lighting or heating, the combination of a dynamo; a motor therefor; a pump or blower operated from the axle of the moving car; a valve-chamber, connected to said motor and pump; a valve, within said chamber, provided with induction and eduction ports in the body of the valve; and means for reversing said valve so that the induction-port will become the eduction-port and vice versa; whereby when the motion of the pump is reversed by the reversal of the car-wheels, the reversal of the ports in said valve causes the motor to continue its motion unreversed.

2. In a system of railway-car lighting or heating, the combination of a dynamo; a motor therefor; a rotary pump or blower operated from the axle of the moving car; a valve-chamber connected to said motor and pump; a valve, within said chamber, provided with induction and eduction ports in the body of the valve; and means for reversing said valve so that the induction-port will become the eduction-port and vice versa; whereby, when the motion of the pump is reversed by the reversal of the car-wheels, the reversal of the ports in said valve causes the motor to continue its motion unreversed.

3. In a system of railway-car lighting or heating, the combination of a dynamo; a motor therefor; a pump or blower operated from the axle of the moving car; a valve-chamber connected by pipes to said motor and pump; a valve, within said chamber, provided with

an induction-port and an eduction-port in the body of the valve; means for reversing said valve so that the induction-port will become the eduction-port and vice versa; an eduction-pipe leading from said motor; and a pipe, as *v*, connecting said eduction-pipe with said valve-chamber for the purposes set forth.

4. In a system of railway-car lighting or heating, the combination of a dynamo; a motor therefor; a pump or blower operated from the axle of the moving car; a valve-chamber connected to said motor and pump; a valve within said chamber, provided with induction and eduction ports in the body of the valve; and means for automatically reversing said valve so that the induction-port will become the eduction-port and vice versa; whereby when the motion of the pump is reversed by the reversal of the car-wheels, the automatic reversal of the ports in said valve causes the motor to continue its motion unreversed.

5. In a system of railway-car lighting or heating, the combination of a dynamo; a motor therefor; a rotary pump or blower secured to and rotated by the car-axle; a valve-chamber connected to said motor and pump; a valve, within said chamber, provided with ports in the body of the valve adapted to cause the automatic reversal of said valve; whereby, when the motion of the pump is reversed by the reversal of the car-wheels, the direction of fluid-pressure, generated by the pump, is automatically preserved unchanged when said current enters the motor.

6. In a system of railway-car lighting or heating the combination of a dynamo; a motor therefor; a pump or blower operated from the axle of the moving car; a valve connected to said motor and pump and provided with ports in the body of the valve adapted to cause the automatic reversal of said valve; and a check-valve; for the purposes set forth.

7. In a system of railway-car lighting or heating, in combination with a motor and with a pump or blower operated by power whose source is the axle of the moving car, a reversing-valve connected by pipes to said motor and pump and composed of a cylinder and a piston or plunger, inclosed within and shorter than the same, and provided with through transverse ports, centrally, and a longitudinal port extending from each end and connecting with one of said central ports, whereby, when the pump is reversed, said valve changes each of said central ports, so that the entrance-port becomes the exit-port and vice versa.

8. In a system of railway-car lighting or heating, the combination of a dynamo; a motor therefor; a pump or blower operated by power whose source is the axle of the moving car; a reversing-valve, composed of a cylinder and a piston or plunger inclosed within and shorter than the same and provided with transverse and longitudinal ports; pipes con-

nectingsaid valves with said motor and pump; and a check-valve as *n*, for the purposes set forth.

9. In a system of railway-car lighting or heating, the combination of a dynamo; a motor therefor; a pump or blower operated from the axle of the moving car; a supply tank or chamber; and a valve connected by pipes to said motor and pump and provided with ports in the body of the valve adapted to cause the automatic reversal of said valve.

10. In a system of railway-car lighting or heating, the combination of a dynamo; a motor therefor; a pump or blower operated by power whose source is the axle of the moving car; a supply tank or chamber as *L*; a valve as *s* connected by pipes to said motor and pump; a check-valve, as *n*, in one of said pipes and a two-way cock, as *S*<sup>2</sup>, in the pipe connecting said check-valve with said motor, for the purposes set forth.

11. In a system of railway-car lighting or heating, the combination of a dynamo; a motor therefor; a pump or blower operated from

the axle of the moving car; a valve-chamber connected to said motor and pump; a valve within said chamber, provided with induction and eduction ports in the body of the valve; means for reversing said valve so that the induction-port will become the eduction-port and vice versa; and an induction-pipe, leading from the interior of the car to said valve-chamber.

12. In a system of railway-car lighting or heating, the combination of a dynamo; a motor therefor; a pump or blower operated by power whose source is the axle of the moving car; a valve-chamber and valve connected by pipes to said motor and pump; an induction-pipe leading from the interior of the car to said valve-chamber; an eduction-pipe leading from said motor; and a pipe, as *v*, connecting said eduction-pipe with said valve-chamber.

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