

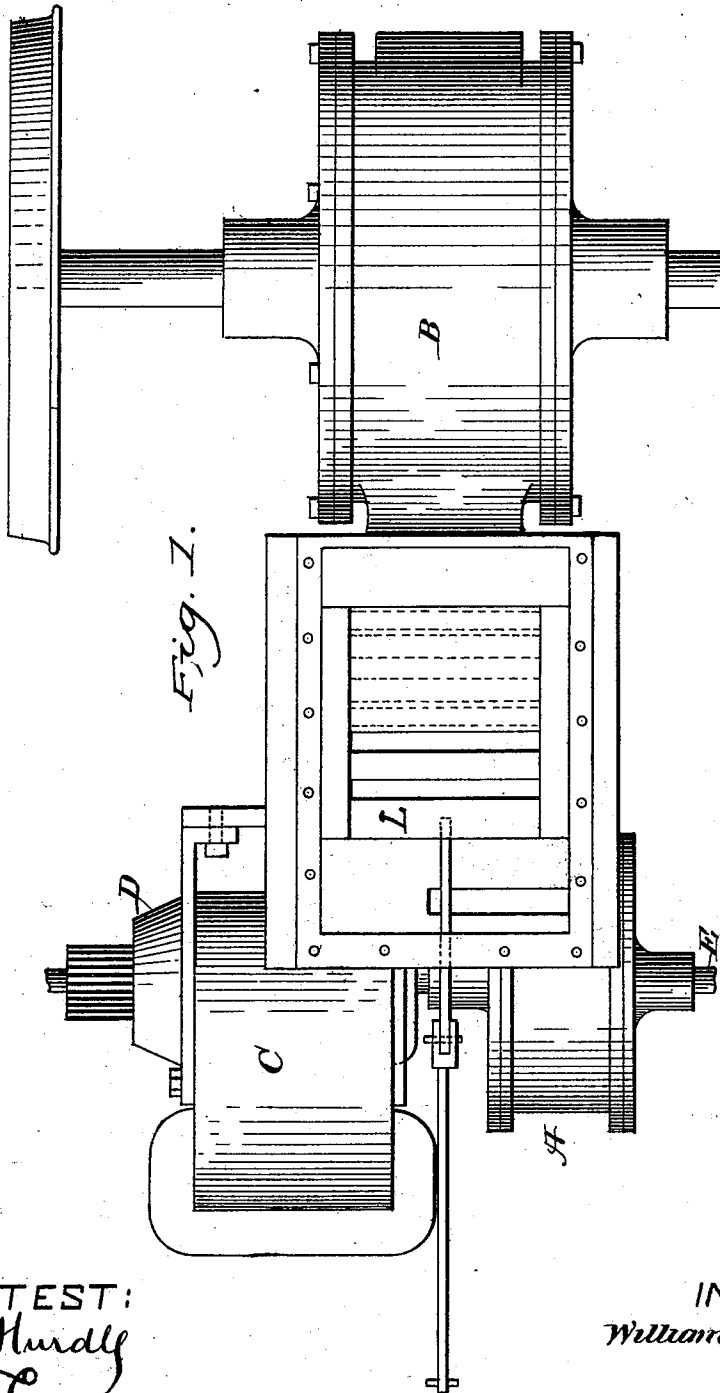
(No Model.)

2 Sheets—Sheet 1.

W. HOCHHAUSEN.
SPEED REDUCING AND POWER MULTIPLYING HYDRAULIC GEAR FOR
ELECTRIC RAILROAD CARS.

No. 510,600.

Patented Dec. 12, 1893.



ATTEST:
J. Hurdle
T. P. Conroy

INVENTOR:
William Hochhausen

By *H. C. Townsend*
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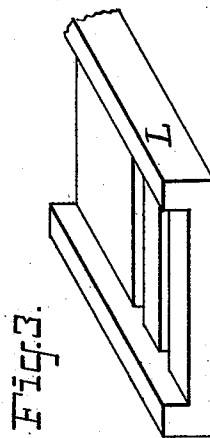
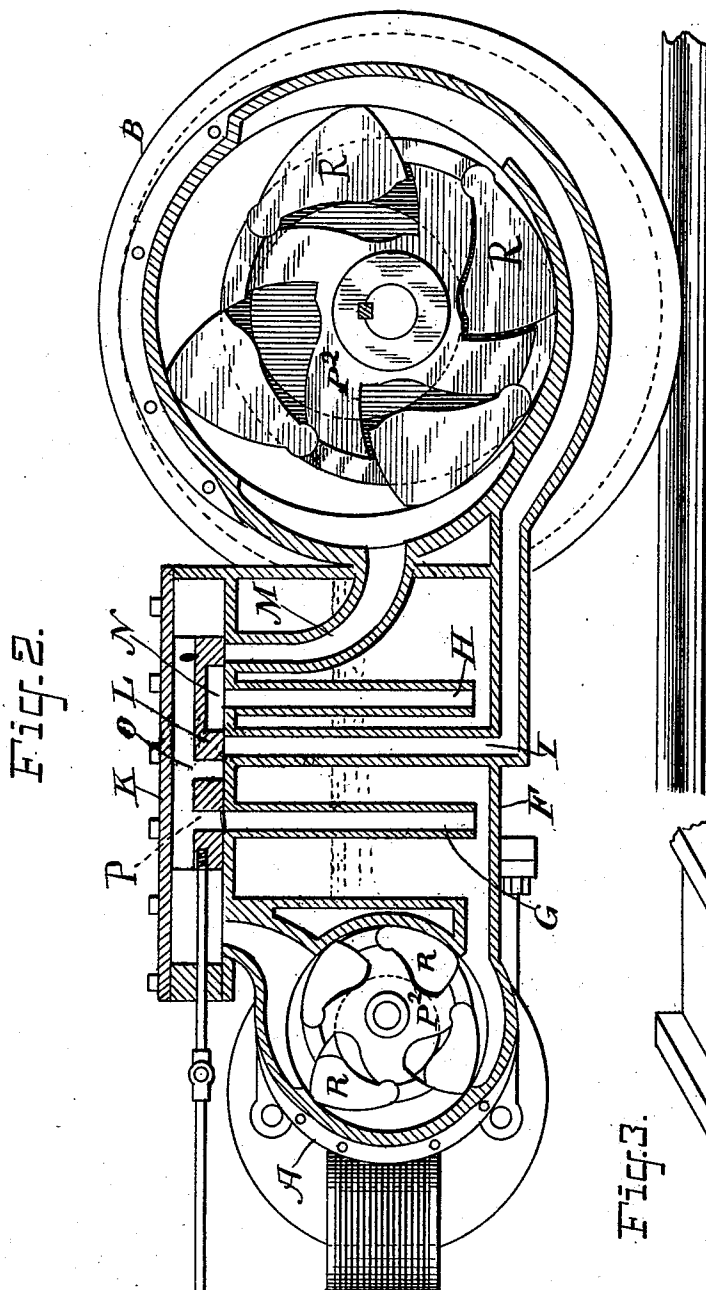
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W. HOCHHAUSEN.
SPEED REDUCING AND POWER MULTIPLYING HYDRAULIC GEAR FOR
ELECTRIC RAILROAD CARS.

No. 510,600.

Patented Dec. 12, 1893.



ATTEST:
J. H. Mudd
T. F. Courcy

INVENTOR:
William Hochhausen
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Attorney

UNITED STATES PATENT OFFICE.

WILLIAM HOCHHAUSEN, OF BROOKLYN, NEW YORK.

SPEED-REDUCING AND POWER-MULTIPLYING HYDRAULIC GEAR FOR ELECTRIC-RAILROAD CARS.

SPECIFICATION forming part of Letters Patent No. 510,600, dated December 12, 1893.

Application filed December 26, 1890. Serial No. 375,768. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HOCHHAUSEN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Speed-Reducing and Power-Multiplying Hydraulic Gear for Electric-Railroad Cars, of which the following is a specification.

The object of my invention is to provide a simple and effective substitute for the mechanical speed reducing gear at present in use on electric railway motors, although my invention is applicable to other classes of work where it is desired that the driving mechanism should run at a slower speed than the driving power or mechanism.

My invention consists in the combinations of devices and apparatus hereinafter described and more particularly specified in the claims.

I have herein shown my invention as applied to an electric railway car in which application my invention finds its great utility.

In applying my invention to the running of a railway car, I place the pump on the shaft of the electric motor and I place the engine directly upon the axle of the car wheel.

I prefer to use oil as the circulating liquid because of its lubricating capacity and it is not liable to freeze.

In the accompanying drawings:—Figure 1, is a plan of an apparatus embodying my invention, the cover of the valve case being removed. Fig. 2, is a horizontal section through the pump, motor and connecting pipes or passages. Fig. 3, is a perspective of the slide valve for reversing the circulation and controlling the by-pass.

The organization of apparatus which is herein shown and described provides for the reversal of the movement of the car axle while the motor may be running constantly in the same direction, and it also provides for the stoppage of the car while the motor may be allowed to run continuously.

While I have shown the invention as carried out by the employment of a rotary pump and a rotary hydraulic motor, and while my invention is of the greatest value and utility when pumps and engines of this character are used, I do not limit myself to such form.

A, is the casing of the rotary pump the shaft of which is coupled directly to or forms an ex-

tension of the armature shaft for an electric motor C, the armature of which is indicated at D.

B, is the casing of the rotary hydraulic engine which, as shown, is larger than the pump A, so as to be of greater capacity or in other words to have a greater piston area. By this means it is obvious that the rotary engine will be driven at a much less speed than the rotary pump. The size of the connecting pipes for circulating the fluid from the pump to the motor and back to the pump is not material excepting that it is desirable to make them of as large area and as short as convenient in order to decrease the friction of the circulating liquid.

The rotary parts of the hydraulic engine are secured directly to the car axle.

The construction of the rotary pump and engine which I prefer to employ is one forming the subject of another application for patent filed by me November 10, 1890, Serial No. 370,992. The parts are briefly as follows:

P², is a rotary drum preferably made solid and rotating in the casing A, or B, on a shaft eccentric to the circle of such casing. Mounted on this drum are the wings or vanes R, of the motor, each of which latter is loosely pivoted on the drum at one end while its opposite or larger end, formed on the arc of a circle, moves in and out between the drum and the exterior of the casing. The wings are moved out and in at the proper times as usual in pumps by means of side extensions near their forward or piston surfaces which enter a circular cam groove formed on the inside of the casings, said cam groove being concentric with the casing. The parts of the wings or the side extensions therefrom where they engage with the sides or edges of the cam grooves are formed on the arcs of a circle the diameter of which is the same as the width of the groove so that they will fill the groove whatever the position of the wings. This construction may, however, obviously be varied without departing from my invention and is not further described in detail for that reason and because rotary pumps and rotary hydraulic engines are well known and other forms may be substituted for those shown.

F, is a case the interior of which forms a

part of the circulating passages and into which extend pipes G, H, as shown, leading from the valve case K.

M, is a pipe or passage which leads from one side of the hydraulic engine to the valve casing and I, is another passage leading from the opposite side thereof to the valve casing for the purpose of permitting the direction of flow of the liquid to be controlled in the engine.

The pump connects on the one side with the spaces in the casing F, and on the other side with the spaces in the valve casing above the valve L, which is a slide valve cut away at its top to allow free communication from the pump to the openings P, O, cut through said valve and adapted to register with ports connected to the passages F, L. This slide valve is cut away at N, on its under side to control the passages I, M, H. This valve and passages controlled thereby simply form a means whereby the liquid driven by the pump may pass in greater or less amount directly around the engine without flowing through the same, and whereby further its direction of flowing in said engine may be reversed.

Other forms of valve and arrangement of passages will readily suggest themselves to those skilled in the art as suitable for producing the same action.

The operation of the apparatus is as follows:—In the position of the parts shown, the circulation of the liquid under the action of the pump A, will be directly by port P, and passage G, to the oil or liquid space of casing F, and back to the pump, and the rotary engine will remain at rest although the electric motor C, may be running at its full speed. When the valve L, is moved to the left the by-pass just mentioned will be gradually closed and a passage will be gradually opened between the valve casing and pipe M, and also between the pipe I, and pipe H, so that a gradually decreasing amount of the liquid will be shunted from the motor B, and a gradually increasing amount may pass by pipe M, to drive the motor, and after leaving the same may return by passages I, H, and casing F, to the pump. By this means the motor B, may be started gradually without jarring or shock. When the valve has been moved to close entirely the port connecting to the by-pass and to open entirely the port connecting to passages N, the hydraulic motor will be driven at its full speed. To stop the motor the valve is restored to the position shown, thus allowing all of the liquid circulation to take place by the by-pass. To reverse the direction of rotation, the valve is moved to the right thus cutting off the by-pass as be-

fore and opening connection between the port O, of the valve and the passage I, at the same time forming connection between the passage M, and the pipe H, leading to the casing F. The liquid now flows in the opposite direction by way of passage I, to the hydraulic motor and returns to the pump by passage M. It will be seen that during these various operations the speed of the motor C, and the direction of its revolution may be always the same and that nevertheless the speed and the direction of movement of the car may be controlled and such car stopped and started readily and without jar or shock. It will also be seen that the speed of the car may be readily controlled by determining the amount of liquid which shall flow through the by-pass which can be done by setting the valve.

It will be obvious that the rotary motor might be subdivided into two or more motors the combined piston areas of which would be equal to that of the single motor to be employed, and in my claims I include such an arrangement, wherever I claim as an element of the invention, a liquid motor.

What I claim as my invention is—

1. The combination, substantially as described, with a rotary electric motor, of a rotary pump located on the armature shaft thereof, a rotary engine, a casing interposed between the pump and engine, a slide valve located on said casing, passages connecting the pump with the valve and casing, passages leading from either side of the engine to the valve, and discharge ports from the valve into the casing.

2. The combination, substantially as described, with a rotary pump and a rotary engine, of the intermediate casing, a valve chamber thereon, passages connecting the pump with the casing and the valve chamber, other passages directly connecting the engine with the valve chamber, and passages as G, H, leading from the valve chamber into the casing.

3. The combination, substantially as described, with a rotary pump and a rotary motor, of the intermediate case F, provided with the inwardly projecting pipes G, H, and the inlet and outlet pipes I, M, opening through ports in the valve seat, and a slide valve constructed to control said ports, as and for the purpose described.

Signed at New York, in the county of New York and State of New York, this 24th day of December, A. D. 1890.

WILLIAM HOCHHAUSEN.

Witnesses:

THOS. F. CONREY,
H. C. TOWNSEND.