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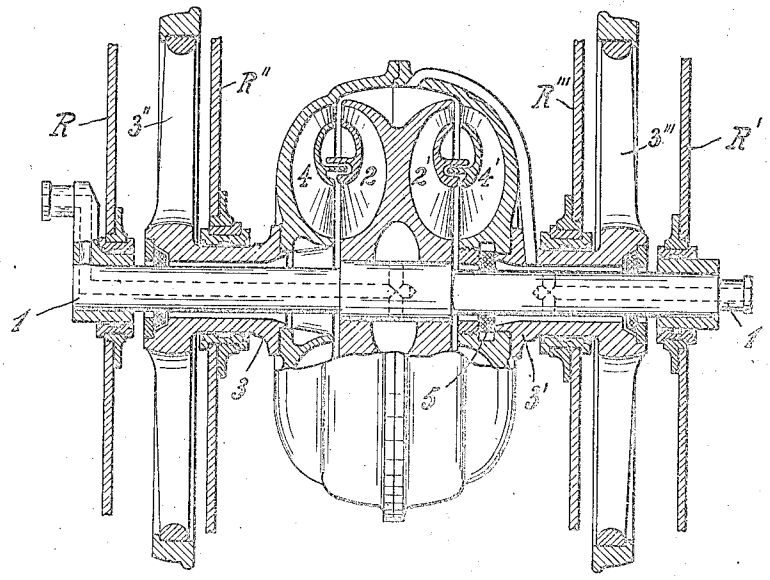
VEHICLE, MORE PARTICULARLY A LOCOMOTIVE WITH COMBUSTION ENGINE AND LIQUID DRIVING GEAR.

APPLICATION FILED JUNE 4, 1920. RENEWED JUNE 27, 1921.

1,389,562. Patented Aug. 30, 1921.

3 SHEETS—SHEET 1.

Fig. 1.



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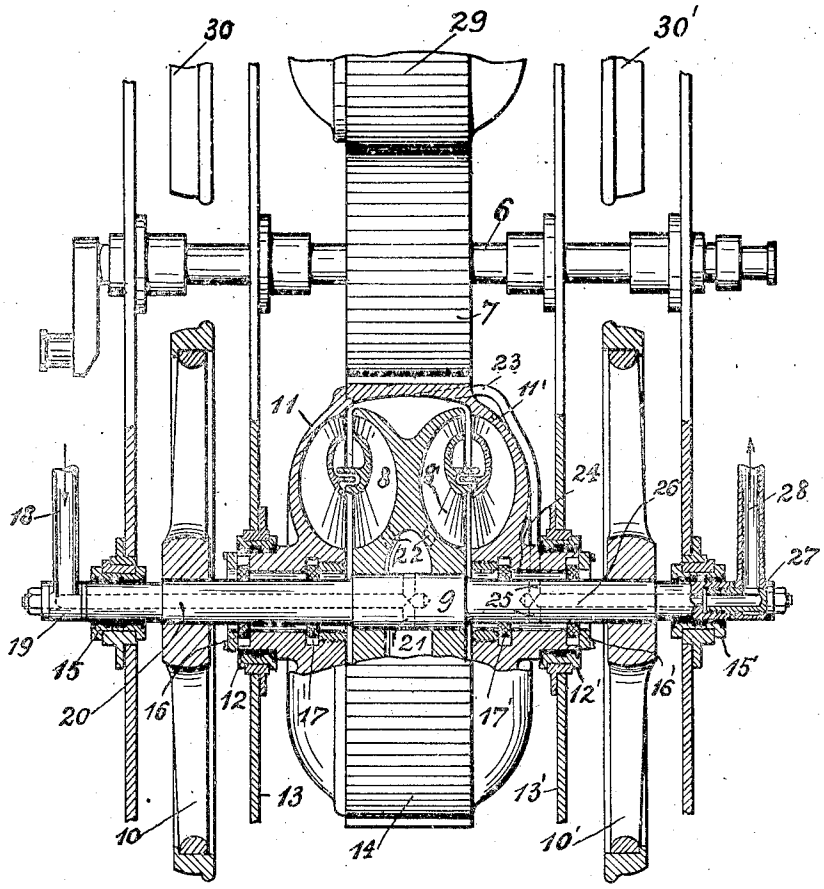
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3 SHEETS—SHEET 2.

Fig. 2.



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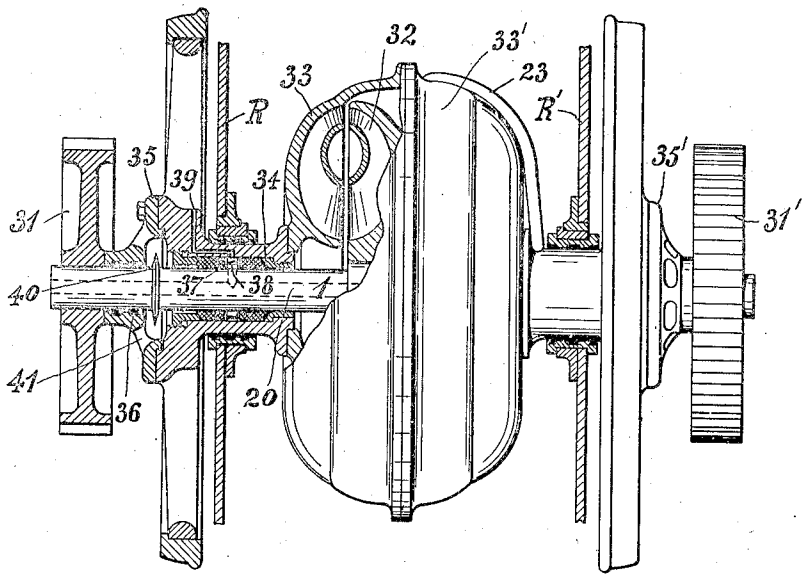
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3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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VEHICLE, MORE PARTICULARLY A LOCOMOTIVE, WITH COMBUSTION-ENGINE AND LIQUID DRIVING-GEAR.

1,389,562. Specification of Letters Patent. Patented Aug. 30, 1921.

Application filed June 4, 1920, Serial No. 386,591. Renewed June 27, 1921. Serial No. 480,906.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, HEINRICH SCHNEIDER, a citizen of the German Republic, and residing at Baden, Switzerland, have invented certain new and useful Improvements in Vehicles, More Particularly a Locomotive, with Combustion-Engine and Liquid Driving-Gear, (for which I have filed an application in Germany, April 14th, 1919,) of which the following is a specification.

The present invention has reference to a vehicle, more particularly a locomotive, with combustion engine and liquid driving gear. It is a well known fact that, in order to overcome the initial difficulties attendant on propelling a vehicle, more particularly on starting a locomotive by means of combustion power, detachable couplings or liquid driving-gears are used. When heavy work is to be done by a locomotive, the arrangement and placing of the engines and the liquid driving-gears affording the necessary number of revolutions and of an admissible weight is a task which presents very great difficulties, as is also the work of transmitting force, from the motor to the driving-gear and from the latter to the driving-shafts.

The present invention relates to a vehicle, more particularly a locomotive, with combustion-power engines and liquid driving-gear on the driving-shaft, in which the propulsion system, consisting of motors, mechanical transmission appliances and primary parts of the liquid driving-gear is firmly embedded in the framework of the locomotive, whereby the secondary part of the gear, which is built together with the driving-shafts, and upon which the weight of the locomotive is supported upon springs is rendered movable in all directions by an arrangement of movable stuffing boxes and by allowing the liquid driving-gear clearance room in all directions.

The construction and the running working of locomotives driven by combustion engines is rendered extremely simple by an arrangement of liquid driving-gears as described hereafter, as the principal motor can serve to fill the compressed air chambers when the train is standing still and the gears are empty, thus avoiding the use of large compressed air chambers and large auxiliary compressors necessary for direct propulsion.

Moreover a greater movability of the driving-shafts is obtained by simple means whereas hitherto steam and especially electric locomotives have alawys had to be equipped with very expensive and very complicated constructions.

By means of the above described arrangement of the liquid driving-gears the whole of the space above the platform can be kept free for the combustion-power engines, auxiliary appliances and for the service of the locomotive.

As the primary shafts are firmly embedded, a rigid propulsion system between the motor, frames and primary shafts is obtained and as there is an elastic connection only between the driving-wheels and the motor and the frames, the shock coming from the wheels is not transmitted to the motor, nor the shock from the motor to the wheels. This is of great importance, especially for fast locomotives, it increases the length of life both of the locomotive and its sub-construction and enables trains to be run at a high speed.

If several motors working independently of one another are equipped with liquid-driving gears, each motor and each gear can be switched on and off separately, so that each motor can work by itself with the gears belonging to it and the other motors can stand still with their gears empty.

Moreover, for example, when running down hill, the gear can be used as a brake; in such a case the motor is stopped or is used for filling the compressed air chamber.

Furthermore the gear permits of reversing the combustion engine while the train is going forward.

The present invention can also be used for starting only; in this case the liquid driving-gear only works at the start, the primary and secondary parts of the gear being coupled together by means of any device, as soon as a certain degree of speed is obtained.

It goes without saying that the parts of the gear can be constructed in any way, together with the driving-wheels or the wheel rims.

My invention will be best understood, when described in connection with the accompanying drawings in which Figure 1, Fig. 2 and Fig. 3 represent sections through the driving-shaft and liquid driving-gear of three examples of execution.

According to the first example of con-

struction shown in Fig. 1 the motor-shaft transmits by means of appliances (not shown in the drawing) for example coupling rods, toothed wheels, etc., the work done by the motor to the primary axle 1 which is firmly embedded in the frames R, R'. On this primary axle 1 are placed the primary parts of the liquid driving-gear 2, 2'. The secondary parts of the driving-gear 4, 4' are placed on the secondary shafts 3, 3', which are fitted up as hollow shafts, together with the driver wheels 3'', 3'''. The secondary shafts are embedded in the frames R'', R''' and rest upon springs. Movable stuffing boxes situated between the primary and secondary shafts prevent the liquid from escaping. The liquid is brought and carried off by the primary and secondary shafts.

The driving gear shown in the drawings, consists of two blade-wheels, the driving wheel portions 2, 2', of which act in operation as pumps, while the driven wheel portions 4, 4', act as turbines. The respective wheel portions are not in contact, and the transmission of power therethrough results solely through the flow of the liquid. The wheel portions may be provided with radial blades.

The invention is not concerned with a particular construction of liquid driving gear, but more particularly with the arrangement of such gear on the driving shafts and the arrangement of such gear with the rest of the combustion engine locomotive driving parts.

According to the second example of construction shown in Fig. 2 a rigidly fixed shaft 6 transmits the work done by the motor to the liquid driving-gear by means of the toothed wheel 7. The secondary part 8 of the liquid driving-gear is built together with the driving-shaft 9, upon which the driving-wheels 10, 10' are firmly fixed and is inclosed by the two-part primary part 11, 11' of the gear. The latter is embedded in bearings 12, 12' and is rigid in the frame 13, 13'; the part 11' has a toothed-rim 14 which is in contact with the toothed-wheel 7 and is driven by the latter. The driving-shaft 9 is embedded in bearings 15, 15' which are provided with springs, in the frame 13, 13'. The liquid driving-gear has clearance room on all sides and an arrangement of stuffing boxes 16, 16' and 17, 17' with radial movements, so that a radial and axial displacement of the driving-shaft is made possible.

The following devices are arranged for the purpose of filling and emptying the driving-gear.

Liquid is brought to the driving-shaft 9 through the pipe 18 and the joint 19 and conducted into the hollow boss of the primary part through the axial bore 20 and radial apertures 21 from whence it enters the working-chamber through openings 22. On the periphery of the gear-chamber there are arranged several pipes 23 which are fixed preferably at even intervals over its circumference. These pipes extend into the chamber 24 between the two stuffing boxes 16' and 17'. If the driving-gear is full, injected fresh water forces a part of the heated gear-water through the pipes 23 the stuffing box chamber 24, the apertures 25 and the axial bore 26 and then through the joint 27 and the pipe 28 into a collecting tank (not shown on the drawing).

The gear is emptied by means of compressed air, when the primary parts are turning. Like the liquid, the compressed air is induced through pipe 18, enters the working-chamber through the apertures 22 and forces the water, which is impelled to the periphery by reason of the turning movement, through the pipe 23, chamber 24 and pipe 28 into a collecting tank.

It may also be seen from indications in the drawing that the shaft 6 and wheel 7 are at the same time employed to drive a second gear 29 with driving-wheels 30, 30', which is arranged symmetrically to the liquid driving-gear described above.

Fig. 3 shows a gear, of which the secondary part is fitted up as a hollow shaft serving as a bearing for the driving-shaft upon which the primary part is fixed. The force of the motor (not shown in the drawing) is transmitted by gears 31, 31' to the primary part 32, 32' fixed to the driving-shaft 1. The secondary part 33, 33' forms a hollow shaft and is provided with bearings 34 carrying the driving-shaft 1. The secondary part 33, 33' carries brackets 35, 35' provided with bearings 36 serving as outer bearings to the shaft. The secondary part 33, 33' is carried by the frame R, R'. The filling and emptying of the gear is brought about in the same manner as in the example of execution according to Fig. 2.

In order to prevent any leakage, stuffing boxes 37 are provided which are supplied with chambers 38 taking up any leakage water, which through openings 39 can pass outside. The shaft 1 shows rings 40 slinging any leakage water, which should reach them, outside through the openings 41 of the bracket.

The working-chambers, by means of which, at the same time the thrust is neutralized are provided, in order to enable the gear to be of the smallest possible diameter and simplest possible construction and to utilize to the fullest extent the space between the driving-wheels. One of these working-chambers in the example given in the drawing consists of two blade-wheels, the primary part works as a pump and the secondary part as a turbine. The axial and radial clearances between the two gear-

shafts can be allowed variations within the limits, defined by a side displacement and the spring of the secondary shaft, without such variations exercising any perceptible influence on the degree of efficiency obtained.

The method of employing the above described vehicle is the following:

The starting of the motor of, say, an oil-driven engine, takes place when the train is standing still, as in the case of a stationary motor. If the driving-gear is empty when the start is made, it must be filled as soon as the motor has reached a certain number of revolutions. The gear can be partially or wholly filled while the train is starting. After filling the driving-gear, the motor is supplied with its largest quantity of fuel and the train is set in motion, as soon as the starting moment has arrived. The maximum supply is retained until normal speed is reached. At intermediary stations the motor can be allowed to continue to run with full or partially full or empty gear while the train is at rest; it does not require to be started afresh on each occasion. This reduces the consumption of "starting-air" to a minimum.

What I claim is:

1. In vehicles, more particularly in locomotives with combustion engines and mechanical transmission means, a liquid driving-gear, comprising a primary and a secondary part, mounted on the driving-shafts, one part at least of said liquid driving gear fitted up as a hollow shaft, and means for filling and emptying the gear through said hollow shaft.

2. In vehicles a liquid driving-gear, comprising rotating primary and secondary parts, mounted on the driving shafts, the secondary part built together with the driving-shaft and one part surrounding the other.

3. In vehicles with combustion engines and mechanical transmission means, a liquid driving-gear mounted on the driving-shaft, means for filling and emptying the gear, the secondary part of said liquid gear built together with the driving-wheels and fitted up as a hollow shaft.

4. In vehicles with combustion engines and mechanical transmission means a liquid driving-gear, mounted on the driving-shaft, means for filling and emptying the gear, the secondary part of said liquid gear built together with the driving-wheels and the primary part of the liquid gear fitted up as a hollow shaft.

5. In vehicles with combustion engines and mechanical transmission means a liquid driving-gear, mounted on the driving-shaft, means for filling and emptying the gear, the secondary part of said liquid gear built together with the driving-wheels and the primary shaft being lodged in the secondary part.

6. In vehicles with combustion engines and mechanical transmission means a liquid driving-gear, mounted on the driving-shaft, means for filling and emptying the gear, the secondary part of said liquid gear built together with the driving-wheels and the primary shaft being lodged in the frame of the car.

7. In vehicles the feature, that the propulsion system, consisting of combustion engines mechanical transmitting means and primary part of liquid driving-gear, mounted on the driving shaft, is firmly fixed to the frame of the car, means for disposing movably and with play in all directions of the secondary part of said liquid driving-gear, which is built together with the driving-wheels and upon which the weight of the car rest upon springs, means for filling the gear with liquid and means for emptying the gear.

8. In vehicles, more particularly in locctives with combustion engines and mechanical transmission means, a liquid driving-gear, comprising a primary and a secondary part, mounted on the driving-shafts, one part at least of said liquid driving-gear fitted up as a hollow shaft, and means consisting in a bore of the shaft for filling the working chambers of the gear with liquid and means for emptying the gear.

9. In vehicles, more particularly in locomotives with combustion engines and mechanical transmission means, a liquid driving-gear, comprising a primary and a secondary part, mounted on the driving-shafts, one part at least of said liquid driving-gear fitted up as a hollow shaft, and means consisting in a bore of the shaft for filling the working chambers of the gear with liquid and means for emptying the gear, comprising at least one pipe connecting the periphery of the working chamber and a stuffing box chamber, adapted for the passage of water when being pressed upon by compressed air.

10. In vehicles, with liquid driving-gear comprising rotating primary and secondary parts mounted on the driving-shaft the feature that said liquid driving gear presents two working chambers symmetrically adapted to each other.

In testimony whereof I have affixed my signature in presence of two witnesses.

HEINRICH SCHNEIDER.

Witnesses:

O. M. Aurig,

J. H. Koemus.