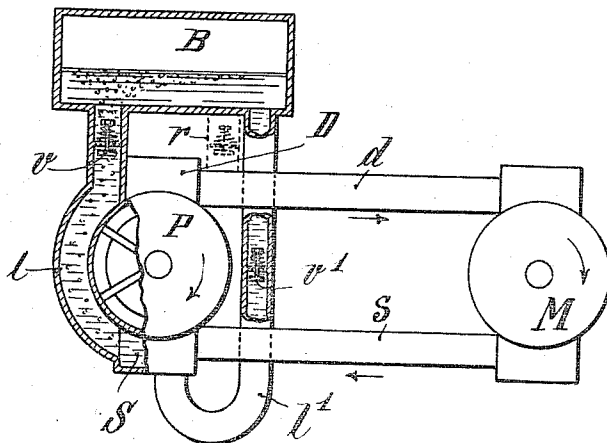


R. EISERMANN.
 MEANS FOR REMOVING AIR FROM HYDRAULIC TRANSMISSION GEARS.
 APPLICATION FILED MAY 18, 1910.

985,986.

Patented Mar. 7, 1911.



Witnesses,
 B. Kommer
 May Ellis

Inventor,
 Rudolf Eisermann,
 By Henry Orth atty.

UNITED STATES PATENT OFFICE.

RUDOLF EISERMANN, OF BERLIN, GERMANY, ASSIGNOR TO INTERNATIONALE
ROTATIONS-MASCHINEN GESELLSCHAFT M. B. H., OF BERLIN, GERMANY.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, RUDOLF EISERMANN, engineer, a subject of the King of Prussia, residing at Berlin, Germany, have invented 5 certain new and useful Improvements in Means for Removing Air from Hydraulic Transmission-Gears; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as 10 will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this 15 specification.

In the hydraulic transmission of power it has been observed that very annoying stoppages are caused by air entering into the spaces containing the driving medium (generally oil) in consequence of leakages in the 20 system of vessels or through the bearings, which it will never be possible to keep perfectly air tight. The air which has thus entered will mix in the form of bubbles with 25 the driving medium and cause the same to foam. Air entered in such a manner into the driving medium is not easily removed. The attempt to let the air collect at the highest point and evacuate it from there has 30 failed, as the bubbles can rise but very slowly in the viscid liquid and thus at the high speed of rotation have practically no opportunity of rising at all. It has also been tried to arrange a liquid reservoir above the 35 pump, which reservoir communicated with the suction or return chamber, and from which the liquid should enter into the suction chamber forcing out the air; but also this attempt has failed. When the motor 40 coupled to the pump is stopped, the secondary motor coupled with the driving wheels of the automobile or with any other mechanism under influence of the momentum of masses will work as a pump; in consequence thereof suction chamber and delivery 45 chamber are exchanged. With consideration of this fact a return valve had to be arranged in the communication pipe leading into the container. This valve had to be loaded to such an extent, that it would 50 generally remain open, so that liquid could at any time enter into the suction chamber, whereas it would close as soon as the suction chamber became delivery chamber. 55 This however, necessitated a very narrow

passage gap, which again rendered impossible the rising of the air bubbles, which was already impeded by the counter current of the sinking liquid.

Considering these facts according to the present invention a double communication 60 between the reservoir and the suction or return space of the hydraulic gear is provided, in the one of which communications the air bubbles will rise, while through the 65 other supply-liquid enters the return space.

In the accompanying drawing a constructional form of the present invention is diagrammatically shown.

The secondary motor M communicates 70 through the force pipe *d* and the suction or return pipe *s* with the pump P driven by the primary motor not shown in the drawing. From the highest point of the return chamber S of pump P a pipe *l* with valve *v*, and 75 from the lowest point a pipe *l'* with valve *v'* leads to the liquid reservoir B, the contents of which is intended to automatically replenish at any time losses occurring in the driving medium. The two valves *v* and *v'* 80 close in an upward direction. They are held either by slight springs or by their own weight in such a position, that they are generally lifted from their seats. If now air enters into the oil, so that the latter com- 85 mences to foam, the foam will rise in pipe *l* and in consequence of the overbalance of the liquid column in pipe *l'*, a circulation in the direction B, *l'*, S, *l*, B will be produced. In the tank B the liquid will come to rest so 90 far, that the air bubbles can separate by rising to the surface. The current during such circulation is not sufficiently great to close the valve *v*. When, however, after the primary motor has been stopped, the secondary 95 motor under the influence of the momentum of masses works as a pump, and the pump P as a motor, so that pipe *s* becomes force pipe and return chamber S supply chamber, the valves *v* and *v'* will close under such pressure and it is thus prevented that large 100 quantities of oil can escape from the interior system of the gear. In order to allow of replenishing also the small quantity of oil escaping, a further communication between 105 the reservoir B and the delivery chamber D or delivery pipe *d*, as shown by dotted lines, may be provided, by means of a pipe *n*, in which pipe a valve is arranged likewise opening in a downward direction. This 110

valve is thus during normal service closed by the pressure of the driving medium, will however be opened when an under-pressure is created in the force pipe *d*, so that liquid
5 will flow through it from the reservoir B into the system of vessels as substitute for the liquid escaping through valves *v* and *v*¹.

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

10 1. Means for removing air from the driving liquid in hydraulic transmission gear, consisting of a liquid reservoir in communication with and arranged above a chamber
15 of the return space of the gear, said communication being formed by two conduits, and a return valve arranged in each conduit.

20 2. Means for removing air from the driving liquid in hydraulic transmission gear, consisting of a liquid reservoir in communication with and arranged above the suction chamber of the force pump of the gear, said
25 communication being formed by two conduits, and a return valve arranged in each conduit.

30 3. Means for removing air from the driving liquid in hydraulic transmission gear, consisting of a liquid reservoir in communication with and arranged above a chamber

of the return space of the gear, said communication being formed by two conduits connected to said chamber at different levels, and a return valve arranged in each conduit.

35 4. Means for removing air from the driving liquid in hydraulic transmission gear, consisting of a liquid reservoir arranged above and in communication with a chamber of the return space of the gear, said
40 communication being formed by two conduits, one of which is connected to the highest point of said chamber, and a return valve arranged in each conduit.

45 5. Means for removing air from the driving liquid in hydraulic transmission gear, consisting of a liquid reservoir arranged above and communicating with a chamber of the return space of the gear by two
50 conduits, said reservoir communicating by a third conduit with the pressure space of the gear, and a return valve arranged in each conduit.

In testimony that I claim the foregoing as my invention, I have signed my name
55 in presence of two subscribing witnesses.

RUDOLF EISERMANN.

Witnesses:

AUGUST TRAUTMANN,
WOLDEMAR HAUPT.