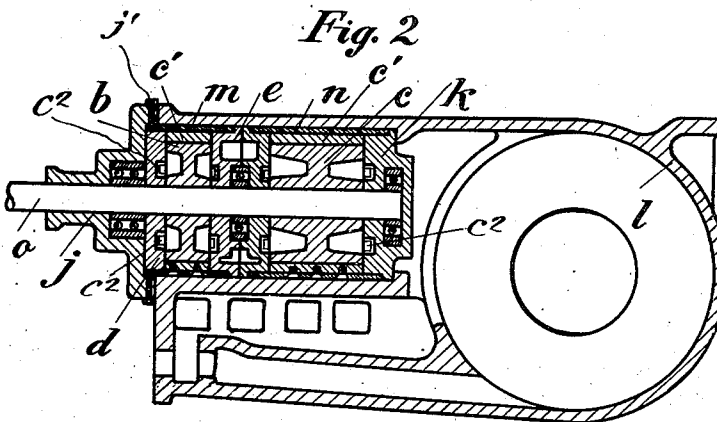
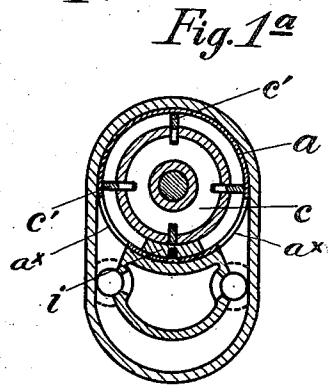
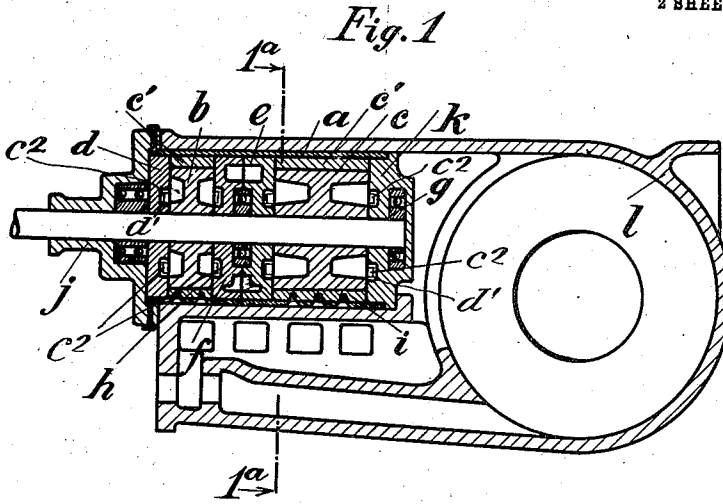


H. LENTZ.
PUMP FOR LIQUID GEARS.
APPLICATION FILED NOV. 21, 1911.

1,054,574.

Patented Feb. 25, 1913.

2 SHEETS—SHEET 1.



WITNESSES

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INVENTOR

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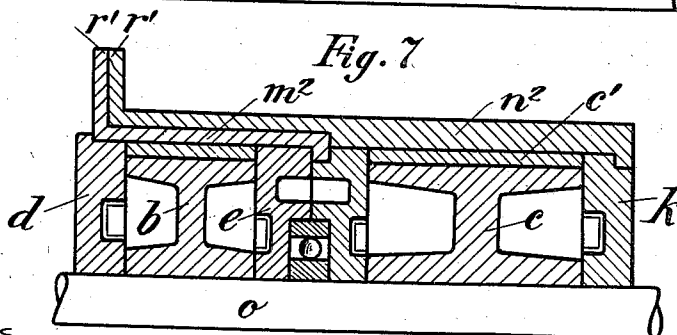
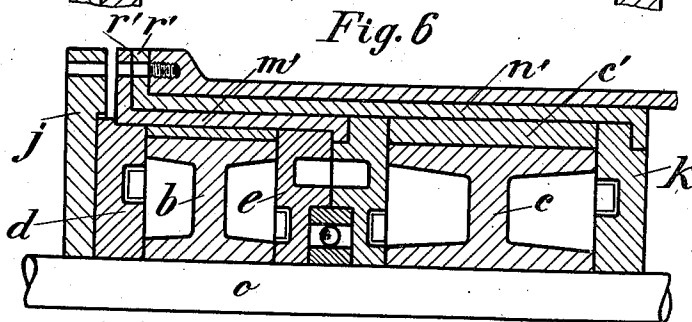
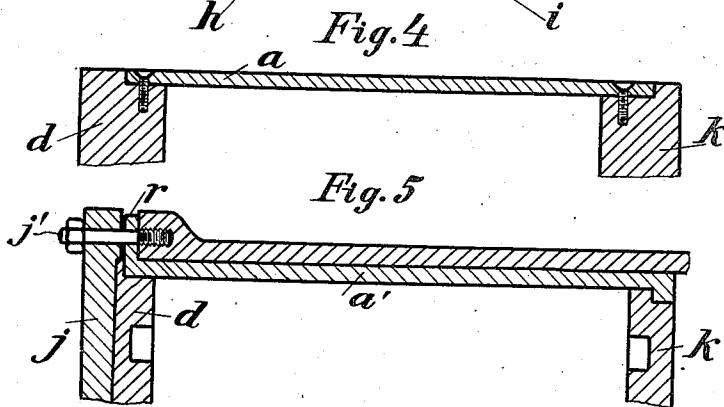
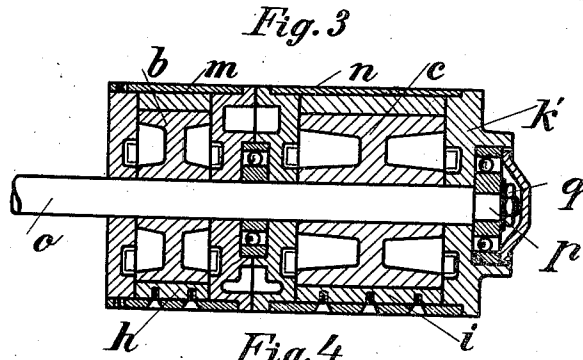
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

HUGO LENTZ, OF GRUNEWALD, NEAR BERLIN, GERMANY.

PUMP FOR LIQUID-GEARS.

1,054,574.

Specification of Letters Patent.

Patented Feb. 25, 1913.

Application filed November 21, 1911. Serial No. 661,524.

To all whom it may concern:

Be it known that I, HUGO LENTZ, a subject of the German Emperor, residing at Grunewald, near Berlin, Germany, have invented a new and useful Improvement in Pumps for Liquid-Gears; and I do hereby declare the following to be a full, clear, and exact description of the same.

In liquid gears for power vehicles which work upon the principle of piston blades slidable in radial recesses in rotatable drums and movable in said recesses by means of projections engaging in cam slots, it has hitherto been impossible to effect, speedily and with certainty, changes in the transmission conditions by changing the sets of pistons of the gear. Formerly in such cases it was necessary to remove successively the piston, the cams, the ball-bearings, etc., and then to insert the new parts in similar fashion, so that a tedious task consuming hours was necessary before the actual driving could again take place. A change in the transmission conditions could therefore only be effected with great difficulty, even taking into consideration the fact that, as is well-known, the liquid gear is disposed horizontally in the chassis of the vehicle, so that the removal of the separate parts from the casing is very inconvenient. But the easy alteration of the transmission conditions (*i. e.*, substitution of a different set of pistons, the pistons of which have for example, a greater or smaller blade throw or breadth differing from the original set, whereby with the same number of revolutions of the power motor the delivery and therefore the speed is different) is in motor vehicles of the very greatest importance, because correct transmission conditions under which the motor is used to the best advantage under all circumstances can only be discovered by time and by experiment.

By the subject matter of the present invention it is made possible to remove all in one the set of pistons to be changed and just as quickly to insert the substituted set.

The invention consists of the fact that the valveless pump with all appurtenant parts is built ready for use in a pipe-like shell, or sleeve which together with the entire set can be immediately exchanged for another. Therefore the very entrails, as it were, of the liquid gear can be changed as a whole, which was formerly impossible, but which is most desirable upon the breaking of any

part. It also avoids the difficulty of mounting the parts inside the casing, since now the parts can be easily mounted in the pipe-like sleeve or shell in the work shop, and then the whole can be inserted in the vehicle. The abutments in the pump, which formerly were fastened by screws passing through the casing, can now be fastened to the pipe-like sleeve, so that the casing need no longer be pierced, whereby the loss of oil which took place at high pressures through the riveted screw holes is avoided. With pipe-like sleeves of a plurality of parts one is in a position to change single ready mounted parts. The substitute parts no longer need first to be inserted in the vehicle, they can be previously inserted in the pipe-like sleeve in the work shop, and in the vehicle can be inserted an already mounted set, so that the vehicle can at once commence its journey under the best conditions.

One form of carrying out the invention is shown in the drawing, in which a plurality of pressure pumps is adopted.

Figure 1 shows in section a casing of a liquid gear for power vehicles, fitted with the new device. Fig. 1^a shows a transverse section taken on the line 1^a—1^a of Fig. 1. Fig. 2 shows in similar fashion an arrangement in which the pipe-like sleeve consists of two parts. Fig. 3, also in section, shows a set of pumps consisting of two divisions ready to be built into the casing. Figs. 4 to 7 show fragmental sections of separate forms of the pipe-like sleeve.

The new arrangement consists of a pipe or sleeve *a*, having the passing openings *a'* and within which are mounted the rotatable drums *b c*, the cams pieces *d e*, the ball-bearings *f g*, the abutments *h i*, and the piston blades *c'* provided with projections *c''* engaging in the cam grooves *d'*. The grooves *d'* in the cam pieces *d, e* serve to move the vanes in radial direction, the vanes, upon rotation of the pistons being forced to advance and withdraw radially by means of the projections engaging in said grooves. The pipe-like shell or sleeve *a* can now be connected with the cover *j* of the pump casing by screws *j'* so that it can be withdrawn from the casing *l* by means of the cover *j*, or the sleeve *a* can (see Fig. 4) be attached by means of small screws to the two outer parts of the set of pumps (cam-piece *d* and rear cover *k*). Further the sleeve *a'* (see Fig. 5) can be provided

with a perforated rim r , by which it may be removably bolted to the casing, so that it can be withdrawn from the casing independent of the cover j .

5 The sleeve a need not consist of one piece, but can if necessary be formed of several pieces. In Figs. 2 and 3 an arrangement is shown in which 2 sleeve parts m n are employed. In Fig. 3 the shaft o passes
10 through the rear cover k' and terminates in a screw bolt p , the nut g of which rests, by means of a collar on the ball-bearing in the cover k' . In this arrangement a pull on the shaft o is all that is necessary to draw the
15 entire set of pumps from the casing. The two sleeve parts m' and n' , (Fig. 6) and m^2 n^2 , (Fig. 7) can also be provided with rims r' , and they can have different diameters as the parts m' n' Fig. 6, or the same diameter
20 as the parts m^2 , n^2 , Fig. 7.

The invention is in nowise altered if a simple pump and compound liquid motor are employed. It is also immaterial to the invention whether it is employed on pumps
25 or liquid motors of a single or compound type.

I claim—

1. In liquid gears, the combination of a casing having a bore for the gear pumps; a
30 pipe like sleeve removably placed in said bore; end covers placed in and supported by said sleeve; a shaft mounted in said end pieces; and movable pump parts carried on said shaft.

35 2. In liquid gears, the combination of a casing; a pipe like sleeve in said casing; end covers placed in and supported by said sleeve; and movable pump parts supported by said end covers.

3. In liquid gears, the combination of a casing; a pipe like sleeve in said casing; end covers supported by said sleeve; and movable pump parts supported by the end covers.

4. In liquid gears, the combination of a casing; a pipe like sleeve in said casing; end covers supported by said sleeve; a shaft mounted in the end covers; and movable pump parts carried by the shaft; said sleeve, covers, shaft and parts forming a
50 whole adapted to be withdrawn by means of the shaft.

5. In liquid gears, the combination of a casing having a bore for the gear pumps; a pipe like sleeve removably placed in said
55 bore; end covers placed in and supported by said sleeve; a shaft mounted in said end pieces; movable pump parts carried on said shaft, and means engaging the extreme outer end of the end of the sleeve for holding the same in place.

6. In liquid gears, the combination of a casing having a bore for the gear pumps; a pipe like sleeve removably placed in said
65 bore; end covers placed in and supported by said sleeve; a shaft mounted in said end pieces; movable pump parts carried on said shaft, and means for holding said sleeve in place, said casing being free from external perforations between said end covers.

70 In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

HUGO LENTZ.

Witnesses:

JACOB KRAUS,
A. O. TITTMANN.