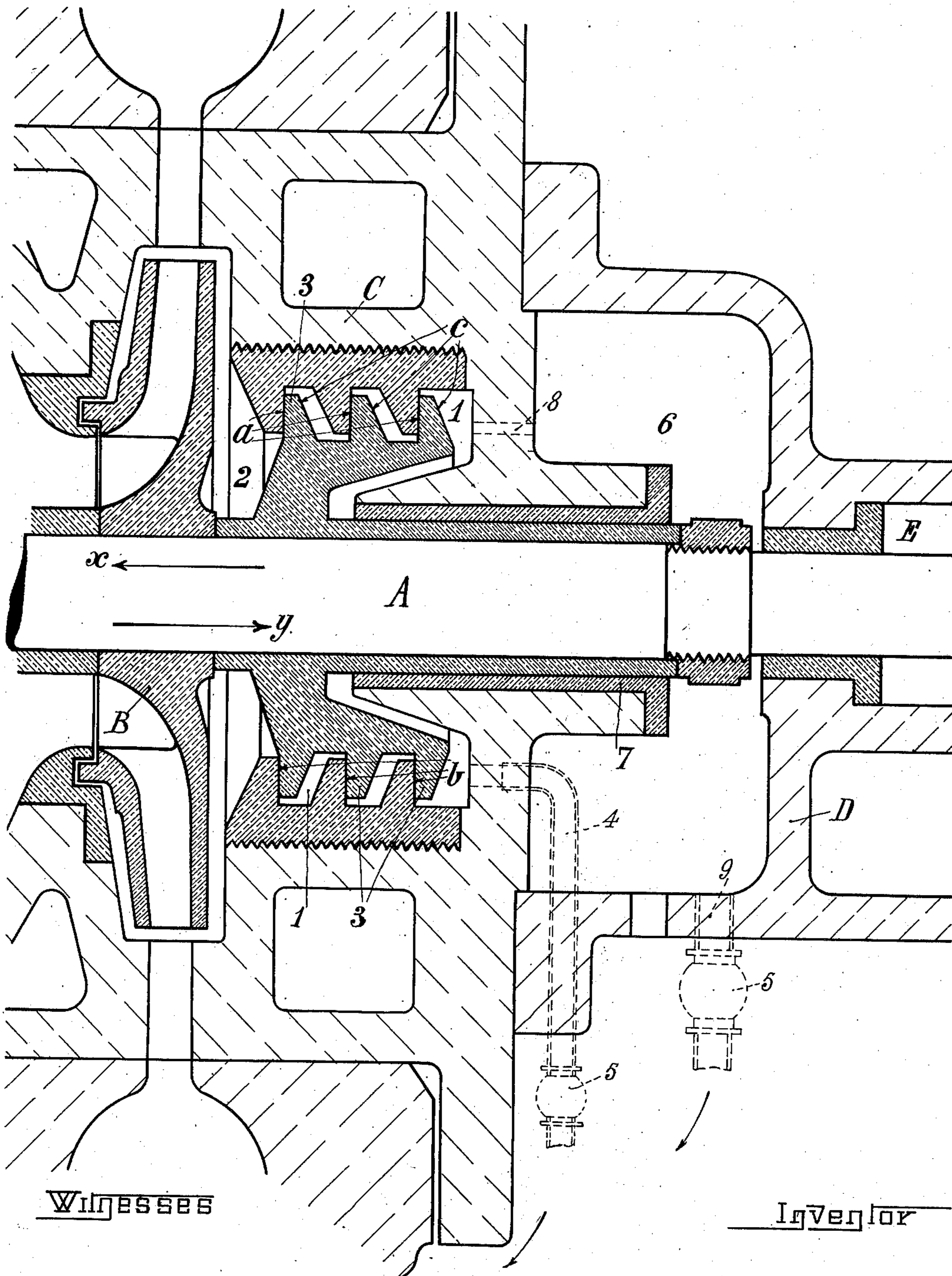


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CENTRIFUGAL PUMP.  
APPLICATION FILED JULY 23, 1909.

963,593

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Witnesses  
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# UNITED STATES PATENT OFFICE.

HENRI LEGROS, OF BRUSSELS, BELGIUM.

## CENTRIFUGAL PUMP.

963,593.

Specification of Letters Patent.

Patented July 3, 1910.

Application filed July 23, 1909. Serial No. 509,091.

*To all whom it may concern:*

Be it known that I, HENRI LEGROS, a subject of the Belgian Kingdom, residing in Brussels, in the Belgian Kingdom, engineer, have invented certain new and useful Improvements in Centrifugal Pumps, for which an application has been made in Belgium July 24 of 1908, No. 209,813; Germany, October 26 of 1908.

This invention relates to improvements in centrifugal pumps, with the view of equilibrating the axial thrust, by employing, for this purpose, a little quantity of the water flowed back by these pumps. This disposition, which is applied to pumps in which the rotary body can have a slight axial displacement, is specially studied for reducing to a minimum the water loss necessary to reach the view pursued, and in order that the proportionality of this loss be sensibly the same, whatever be the pressure of water in the pressure chamber of the pump.

The annexed drawing represents a practical realization of this invention.

A is the pump shaft; B the rotary body; C the pressure chamber bottom; D the plate-bearing, on the pressure chamber side, bearing the stuffing-box E.

On the internal face of the bottom C is adapted, in any convenient way, an auxiliary chamber 1, in which the water contained in the pressure chamber 2 can penetrate. The chamber 1 contains one or several disks 3 (the annexed drawing shows three disks) united to the rotary body B; the internal face *a* of each disk is disposed opposite to the corresponding face *b* of an annular projection forming one part with the wall of the chamber 1. In these conditions, it is seen that, for going from the pressure chamber 2 to the auxiliary chamber 1, the water must, first, flow through the first joint *a b* formed by the disk 3, tending to shut the opening of said chamber 1. The water which fills this chamber 1, can flow outwardly, through a conduct-pipe 4, provided with a regulating valve 5.

When the pump is in service, the axial thrust tends to displace the rotary body B, and with it, the disk or disks 3, in the direction indicated by the arrow *x*; but, the water flowing into the pressure chamber 2, acts upon the first disk 3; which resists to its passage in the auxiliary chamber 1, and equilibrates the axial thrust by forcing back this disk with the rotary body with which

it is united, in the direction indicated by the arrow *y*, so opening a passage to penetrate into the auxiliary chamber 1. In any case, the water entering into the auxiliary chamber flows outwardly through the conduct-pipe 4, and it is understood that, if this flowing is controlled, that is easy to do in any manner whatever, it is sure that the axial thrust is equilibrated.

It is evident that, by acting upon the valve 5, it is possible to reduce the flowing of the water, through the conduct-pipe 4, without injury to the equilibrium; but, if the water, entering the auxiliary chamber 1, cannot freely discharge, a counterpressure is created in said chamber. This counterpressure, varying with the pressure existing in the pressure chamber 1, then acts upon the faces *c* of the disk or disks 3, which are forced back in the same direction *x* as the axial thrust, the effect of this being to reduce the section or sections of passage *a b*. The disposition described can therefore be regulated so as to automatically reduce to a desired minimum the water loss, caused by the equilibrium of the axial thrust, whatever be the water pressure, in the pressure chamber of the pump.

It is important to remark that, along the above description, it has been talked of the utilization of one or several disks 3; it will be understood, in fact, that the number of these disks has no importance in this disposition. A single disk or a multiplicity of such disks can be utilized; but, the use of several disks offers the advantage of reducing the wear, and, consequently, the axial displacement of the rotary body B. Likewise, the disposition of the conduct-pipe 4 can be varied; it is possible, if necessary, to have the water cleared from the auxiliary chamber 1, into a second chamber 6, this water passing either through a leak existing around the rotary body, in 7, or through one or several channels 8, situated in the bottom C. In this case, the valve 5 would naturally be placed upon the pipe 9, leading from the chamber 6. Lastly, the valve 5 can be eliminated if the pipes 4 or 8, or the leak 7, are ascertained for a minimum discharge. The form and dimensions of the constitutive elements of this disposition for equilibrating the axial thrust can be varied, without departing from the broad features of the invention, which can be employed in compressors, steam-turbines, and the like.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a centrifugal pump, means for  
5 equalizing the axial thrust which consists of an auxiliary chamber, disks therein, a rotary body carrying said disks, a chamber containing said disks and having annular projections, the pump body having an auxiliary  
10 chamber with means for automatically regulating the admission of water for the equalizing action, the internal face of each disk being disposed opposite to the corresponding face of each projection.

15 2. In a centrifugal pump, means for equalizing the axial thrust which consists of an auxiliary chamber, disks therein, a rotary body carrying said disks, a chamber containing said disks and having annular projections, the internal face of each disk being  
20 disposed opposite to the corresponding face

of each projection, a pressure chamber, a conduit from said auxiliary chamber, and a regulating valve therein.

3. In a centrifugal pump, means for equal- 25  
izing the axial thrust, which consists of an auxiliary chamber, a disk therein, a rotary body carrying said disk, a chamber containing said disk and having annular projections, the pump body having an auxiliary  
30 chamber with means for automatically regulating the admission of water for the equalizing action, the internal face of the disk being disposed opposite to the corresponding face of an annular projection. 35

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

HENRI LEGROS.

Witnesses:

ALPHONSE MÉJEAN,  
JAMES M. G. FAY.