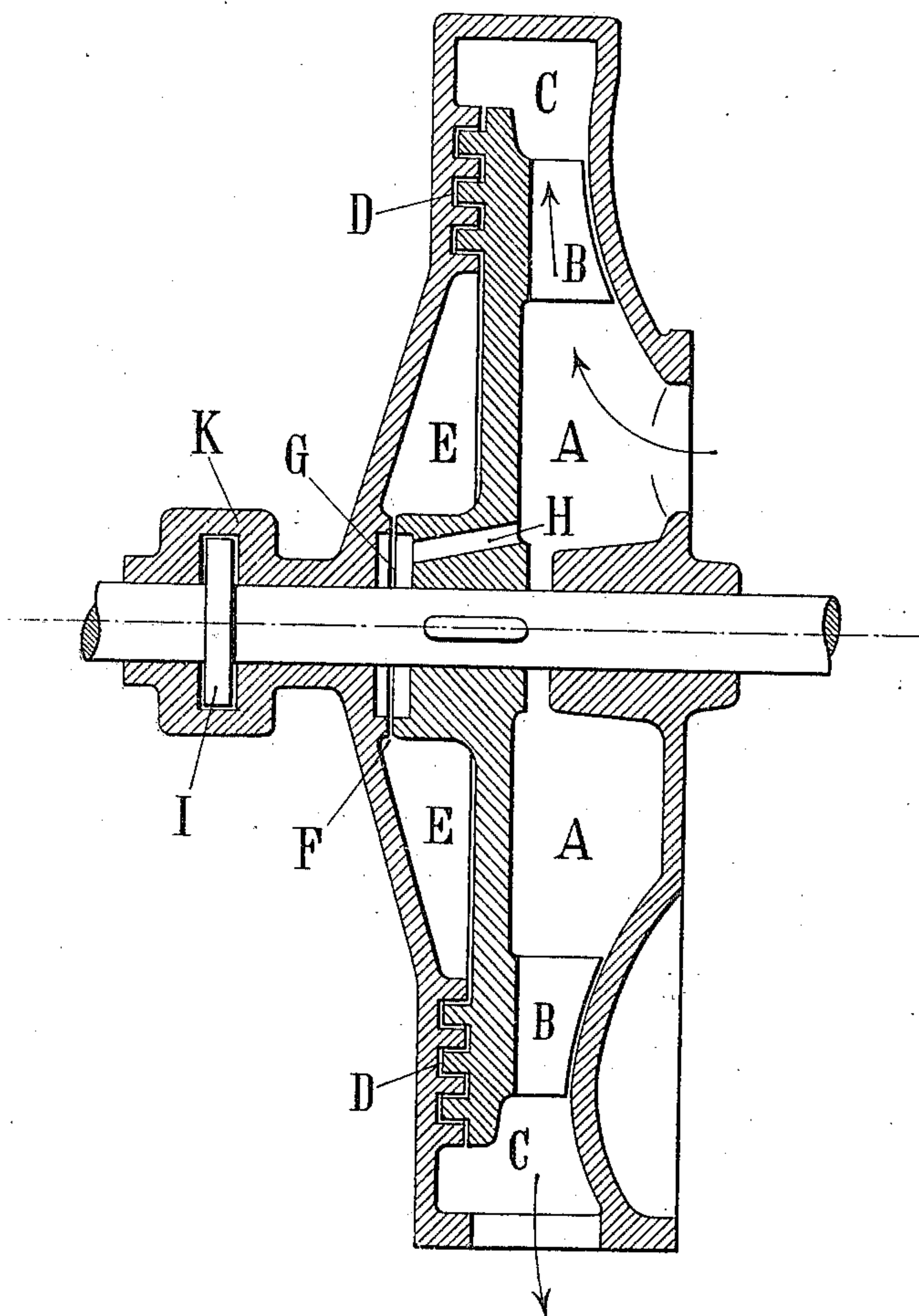


W. H. EYERMANN.
 MEANS FOR BALANCING TURBINES AND PUMPS.
 APPLICATION FILED AUG. 12, 1907.

958,612.

Patented May 17, 1910.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILHELM HEINRICH EYERMANN, OF DEUTSCH-WILMERSDORF, NEAR BERLIN,
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MEANS FOR BALANCING TURBINES AND PUMPS.

958,612.

Specification of Letters Patent.

Patented May 17, 1910.

Application filed August 12, 1907. Serial No. 388,223.

To all whom it may concern:

Be it known that I, WILHELM HEINRICH EYERMANN, a subject of the German Emperor, and resident of Deutsch-Wilmersdorf, near Berlin, Germany, have invented new and useful Means for Balancing Turbines and Pumps, of which the following is a specification.

Rotating bodies driven by a fluid such as water, steam or gas passing through them or which pump or otherwise act on such a fluid in most cases have a tendency to move axially, due to the action of the passing fluid, and therefore varying with the pressure or resistance of the latter. The thrust bearings generally used for taking up this axial pressure may be advantageously replaced by the device hereinafter described and forming the subject of this invention.

The invention comprises one or more surfaces rigidly secured to or formed on the rotating body and constituting the walls of chambers in which a suitable pressure of fluid is automatically maintained by these chambers being connected conveniently by means of narrow passages which alter with the axial movement of the spindle, to two points of the fluid passage way where two different pressures exist.

A centrifugal pump provided with such a device is shown in the accompanying drawing.

The liquid enters from outside the chamber A of the casing, is conveyed by the blades B of the rotating disk into the chamber C and discharged therefrom. The pressure in the chamber A is therefore that of the suction, and in the chamber C that of the discharge. If the fluid were to pass freely from the chamber C to the back of the wheel and could not escape therefrom, this would result in an axial pressure on the wheel or disk and on the spindle toward the right. In order to avoid this, the wheel or disk is provided at D with a labyrinth packing valve or the like which admits only a small quantity of liquid to the chamber E. From the chamber E the fluid can pass through a small slot F formed preferably by annular projections on the disk and the casing, into the chamber G, and thence escape through the passages H into A. If now the pressure for instance toward the left is greater, then the spindle will first move toward the left. That would however reduce

the slot F, so that less liquid would escape from the chamber E than is admitted through the passages of the packing D. Consequently the pressure in E will continue to rise until it balances the original pressure toward the left. If the pressure of the fluid changes, then the pressure in the chamber E will also change automatically as the latter is in communication with the exhaust and discharge chamber, and the pressure in E thus adapts itself to any conditions of working.

Instead of a simple valve or device as above described several such devices or valves could be used through which fluid would pass consecutively and which would be moved simultaneously and in the same direction, in order to strengthen the action.

As the device described takes an appreciable though very short time, before coming into action, sudden axial shocks or changes of pressure might bring the disk into contact with the casing. In order to avoid this there are added two other devices which can be preferably combined in one part, namely a device for limiting the movement of the spindle, and a liquid brake or dash pot for retarding the movement of the same. The said two devices are combined in the construction shown in Figure 1, in the collar I firmly secured to the spindle, and in the chamber K which is secured to the pump casing. The chamber K is filled with oil or some other liquid, and the collar I has only very little clearance in the radial direction, so that in the event of an axial movement of the spindle, the liquid could pass only slowly from one side of the collar to the other. The axial play of the collar in the chamber is calculated in such a manner that while allowing the movement of the spindle required for perfectly balancing the pressure, it makes it impossible for the disk to come into contact with the casing.

The device can be used for pumps, blowers, turbines, for working with water, steam or other fluids. It can be applied to single parts of combined machines of this kind.

I claim—

1. In means for balancing turbines and pumps, the combination of a shell provided with a central cut away portion, a runner provided with a spindle, said casing and runner being provided with a series of interpenetrating rings which coact together,

forming a passage of variable area between the shell and the runner, said runner being provided with a passage leading there-through and with a cut away portion surrounding the spindle on one side of said runner and communicating with said passage, the raised portion of the runner surrounding said cut away portion coacting with the raised portion on the shell to form a passage of variable area, substantially as described.

2. In means for balancing turbines and pumps, the combination of a shell provided with a central cut away portion, a runner provided with a spindle, said casing and runner being provided with a series of interpenetrating rings which coact together, forming a passage of variable area between the shell and the runner, said runner being

provided with a passage leading there-through and with a cut away portion surrounding the spindle on one side of said runner and communicating with said passage, the raised portion of the runner surrounding said cut away portion coacting with the raised portion on the shell to form a passage of variable area, and a dash-pot for preventing too rapid movement of the spindle lengthwise, substantially as described.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this 30th day of July 1907.

WILHELM HEINRICH EYERMANN.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.