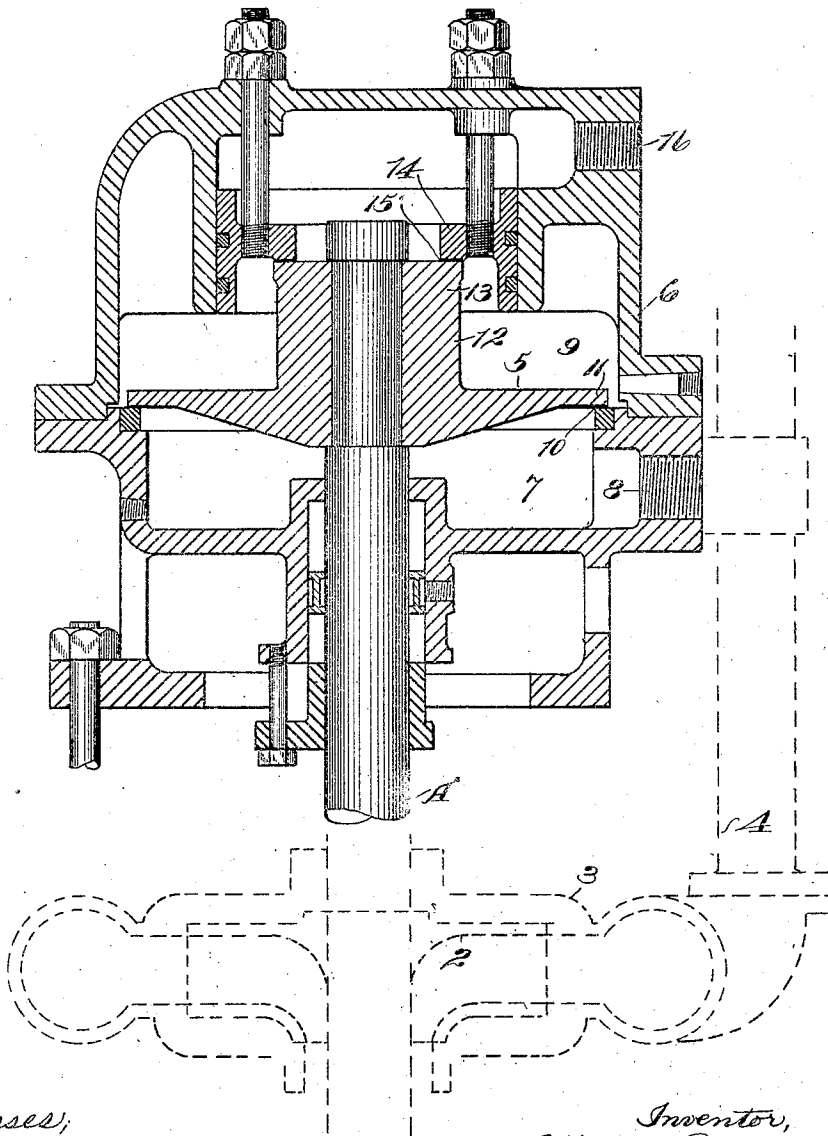


A. C. PAULSMEIER.
 AUTOMATIC END THRUST COUNTERBALANCE.
 APPLICATION FILED APR. 8, 1912.

1,057,007.

Patented Mar. 25, 1913.



Witnesses,
 F. E. Maynard.
 E. B. Bru.

Inventor,
 Albert C. Paulsmeier,
 By G. H. Strong.
 his atty.

UNITED STATES PATENT OFFICE.

ALBERT C. PAULSMEIER, OF ALAMEDA, CALIFORNIA, ASSIGNOR TO BYRON JACKSON
IRON WORKS, OF WEST BERKELEY, CALIFORNIA, A CORPORATION OF CALIFORNIA.

AUTOMATIC END-THRUST COUNTERBALANCE.

1,057,007.

Specification of Letters Patent.

Patented Mar. 25, 1913.

Application filed April 8, 1912. Serial No. 689,117.

To all whom it may concern:

Be it known that I, ALBERT C. PAULSMEIER, citizen of the United States, residing at Alameda, in the county of Alameda and State of California, have invented new and useful Improvements in Automatic End-Thrust Counterbalances, of which the following is a specification.

The present invention relates to hydraulic means for automatically balancing or overcoming the end thrust on the shafts of centrifugal pumps, water turbines, or other apparatus needing a thrust bearing.

The invention consists of the parts and the combination and construction of parts as hereinafter more fully described and claimed, having reference to the accompanying drawing, in which the drawing is a detail in section illustrating the invention.

A represents a shaft which for the purpose of illustration, is shown as the shaft of a centrifugal pump, in which 2 is the impeller; 3 the impeller case and 4 the discharge column. Heretofore it has been proposed to effect an automatic hydraulic counterbalance of impeller shafts by a specially designed form of impeller and case. In the present invention an automatic counterbalance is effected entirely outside the pump case and is applicable to the shafting at any desired point in its length.

The invention comprises a ring plate 5 keyed, or otherwise suitably secured to the shaft A, and revolving in a stationary housing or case 6, which latter is divided by the ring plate 5 into two chambers, one a pressure chamber 7 subject to the uncontrolled pressure of the pump discharge, or other source of supply through a suitable inlet 8; the other chamber being a variable pressure chamber 9 receiving leakage water from the chamber 7 and discharging it under predetermined conditions controlled by the endwise shifting of the shaft A.

The ring plate 5 has a running joint 10 formed by the annular rim portion 11 of plate 5 with an opposite annular ledge or shoulder on the fixed housing 6; this running joint 10 being normal to the axis of shaft A.

The hub 12 of the ring plate 5 on that side opposite from the chamber 7 is also constructed and arranged to provide a part 13 having a surface normal to shaft A, adapted

to co-act with a movable annular plug 14 to form a running joint 15. The leakage water escaping from the running joint 15 is released at 16 as waste water. It is by means of these two running joints 10—15 normal to the shaft and the lengthwise shifting of the shaft A to carry the parts 11—13 toward and from their respective opposed surfaces that the desired counterbalance or counterthrust is brought about.

In operation the water under full discharge head, or any other head of desired pressure is admitted freely to chamber 7 on the under-side of plate 5. This water in chamber 7 creates an up-thrust; it being understood that the diameter of the plate 5 and the area exposed to this high pressure in chamber 7 is such as would result in the thrust movement described. Under normal working conditions however, of the invention a certain amount of water leaks through the running joint 10 into the variable pressure chamber 9. In this chamber pressure accumulates until it creates a counter-pressure sufficient to bring the parts into equilibrium and the annulus 14 can then be adjusted so as to regulate the size of the running joint 15 with respect to the running joint 10, and thereby maintain the equilibrium under working conditions of maximum efficiency.

Under practical working conditions there is a film of water between the two surfaces constituting each joint; these films separating the metal sufficiently so as to carry a load with a minimum amount of friction. The ring plug 14 is made adjustable so as to regulate the amount of endwise shift of the plate 5 and shafting, and also regulating the amount of water used for balancing to most economical advantage.

Practice shows that there is only a very slight waste of water, and the revolving disk 5 is held between the two surfaces in absolute equilibrium.

While I have shown this form of balance applied to centrifugal pumps, it is manifest that it can be used for balancing any apparatus where there is an end thrust in one direction, or the other, either vertical or horizontal. It is also manifest that the details of construction may be varied without departing in any way from the principle of the invention.

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

1. In an automatic hydraulic counterbalance, the combination of a shaft, a source of water pressure, a differential piston on said shaft, a casing in which said piston operates, said piston partitioning the casing into two chambers, one chamber of uncontrolled pressure and the other a variable pressure chamber, the first of said chambers being in communication with said source of water pressure, the variable pressure chamber having communication with the first chamber by means of a running joint formed between the piston and casing, and said variable pressure chamber having a relief to an area of lower pressure through a second running joint formed between said piston and casing, said second running joint including a movable plug for varying the range of lengthwise movement of the shaft.

2. A counter-balance for shafting consisting in the combination with a shaft of a disk secured thereon, and a housing for the disk, said disk partitioning the interior of the housing into two chambers, one a chamber of high pressure and the other a variable pressure chamber, the disk having means cooperating with the housing to form two running joints, both of which are normal to the shaft, one of said running joints

being between the chamber of high pressure and the variable pressure chamber, and the other of said running joints forming the outlet for the variable pressure chamber, and means for varying the distance between said running joints and the amount of leakage water therethrough.

3. A counter-balance for shafting consisting in the combination with a shaft of a disk secured thereon, and a housing for the disk, said disk partitioning the interior of the housing into two chambers, one a chamber of high pressure and the other a variable pressure chamber, the disk having means cooperating with the housing to form two running joints, both of which are normal to the shaft, one of said running joints being between the chamber of high pressure and the variable pressure chamber, and the other of said running joints forming the outlet for the variable pressure chamber, and means for varying the distance between said running joints and the amount of leakage water therethrough, said last-named means including a movable annulus.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ALBERT C. PAULSMEIER.

Witnesses:

F. S. HOFFMANN,

G. H. POWEL.