

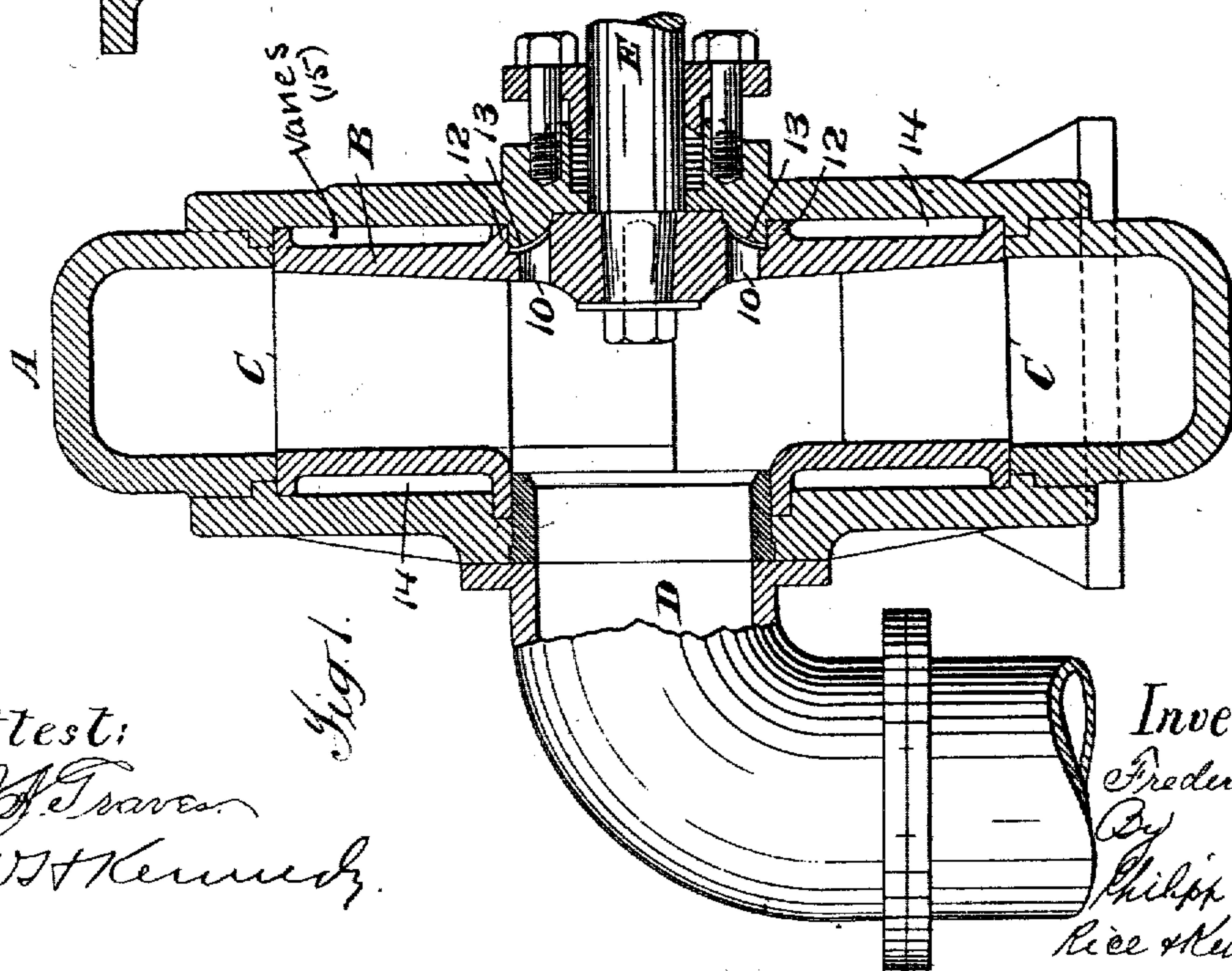
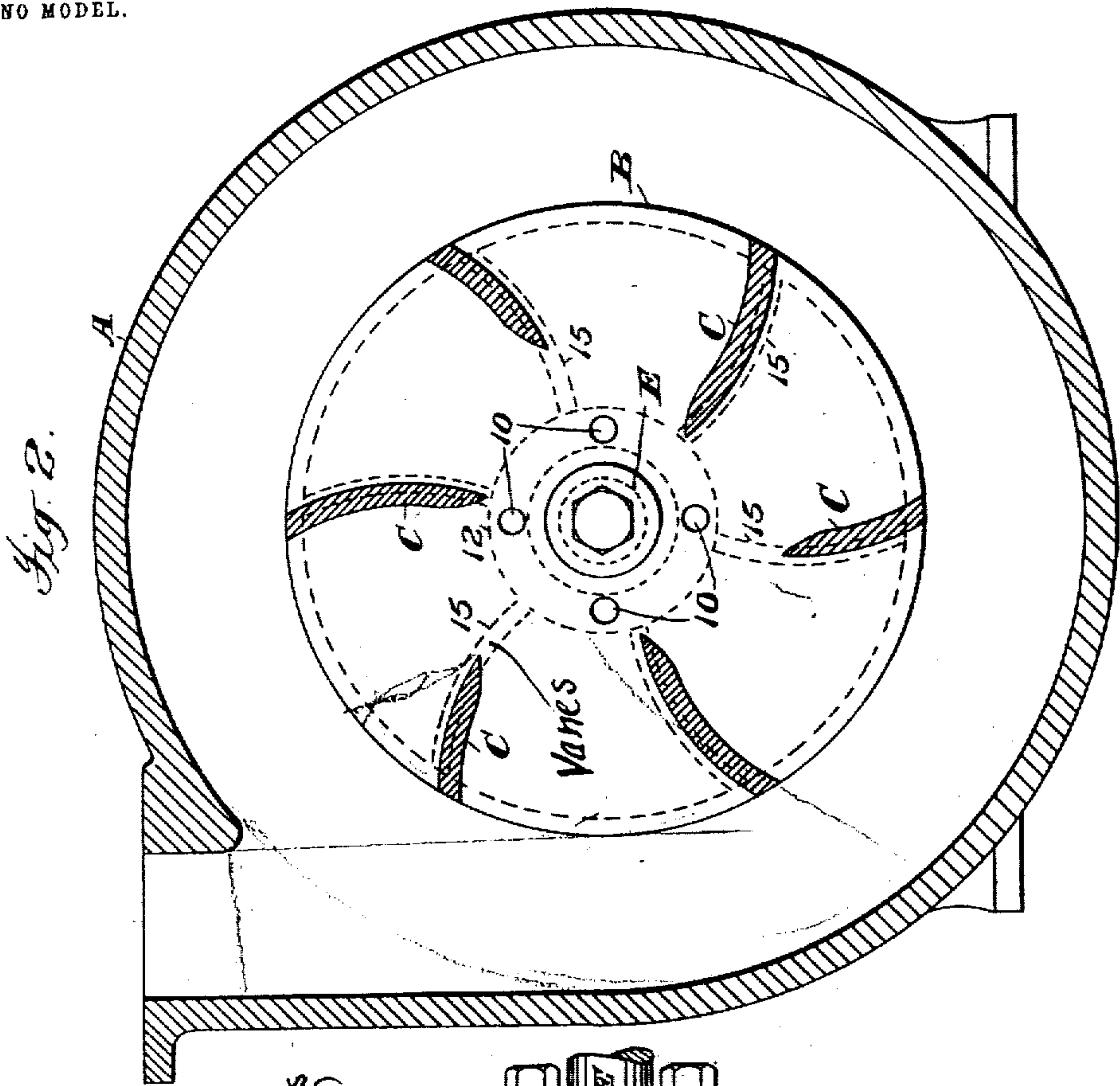
No. 772,532.

PATENTED OCT. 18, 1904.

F. RAY.
CENTRIFUGAL OR SIMILAR PUMP.

APPLICATION FILED OCT. 1, 1903.

NO MODEL.



Attest:
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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL OR SIMILAR PUMP.

SPECIFICATION forming part of Letters Patent No. 772,532, dated October 18, 1904.

Application filed October 1, 1903. Serial No. 175,266. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK RAY, a citizen of the United States, residing at East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Centrifugal or Similar Pumps, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates particularly to that class of centrifugal or similar pumps in which the suction is on one side of the rotary impeller, the especial object of the invention being to provide efficient and convenient means for balancing the impeller and avoiding leakage.

The invention consists in a balancing construction at the hub of the impeller with the suction fluid admitted to the back of the impeller, in combination with exterior vanes on the impeller, by which the pressure toward the center is reduced and the leakage which would otherwise occur in connection with the balancing construction is avoided.

The invention will now be described in connection with the accompanying drawings, showing the invention applied in its preferred form to a common type of centrifugal pump, and the features forming the invention will then be specifically pointed out in the claims.

In the drawings, Figure 1 is a central section of the pump, taken longitudinally of the axis. Fig. 2 is a central section through the impeller transversely to the axis.

Referring to the drawings, A is the pump-casing, B the impeller shown as having the usual curved vanes C, and D is the suction-passage at the hub of the impeller on one side. On the opposite or rear side of the impeller the hub is provided with holes 10, through which the suction fluid may pass to the rear side of the impeller, and the impeller and casing are provided, respectively, with rings 12 13, forming a running joint on the rear of the impeller outside the openings 10. At each side of the impeller B are cham-

bers 14, preferably closed to the impeller-chamber, in which chambers run vanes 15, carried by the impeller B, which are shown as extending from the end of the impeller to the ring 12 on one side of the impeller and to the suction-nozzle of the impeller on the opposite side. The length of these vanes may be varied, however. The impeller B is shown as carried by the shaft E and mounted in the usual manner. The fluid passing through the holes 10 to the rear of the impeller produces a pressure on the rear surface of the impeller-hub within the running joint formed by the rings 12 13, which pressure substantially counterbalances the pressure on the front side of the impeller opposite the suction-passage D. The pressure within the impeller outside the suction-passage is balanced by the equal inward pressure against the opposite side walls of the impeller, so that with the balancing of the pressure opposite the suction-passage the impeller is fully balanced. It is found in practice that the combination of the vanes 15 with the balancing construction at the hub secures a very efficient balance of the impeller for different running conditions without special construction of the vanes 15 for different running conditions, while at the same time the reduction of the pressure toward the center by the vanes 15 avoids the leakage at the joint between the rings 12 13, which otherwise would occur.

The balancing-ring construction may be used in connection with vanes 15 on only the rear or balancing side of the impeller, and such a construction is included in the invention, considered broadly; but the construction shown is preferred and is specifically claimed. It will be understood, also, that the invention is not limited to the particular type of pump shown nor to the specific form of the balancing devices, but that modifications may be made in the construction illustrated while retaining the invention defined by the claims. It will be understood, also, that the invention is applicable to multistage

pumps—that is, pumps having a series of impellers—as well as to single-stage pumps, each impeller being balanced in the same manner.

What is claimed is—

5 1. In a centrifugal or similar pump, the combination with the rotary impeller having its suction at the hub on one side, of openings at the impeller-hub for admitting fluid to the back of the impeller, a running joint on the
10 back of the impeller outside said openings, a chamber on the back of the impeller outside said joint, and vanes carried by the impeller running in said chamber.

15 2. In a centrifugal or similar pump, the combination with the rotary impeller having its suction at the hub on one side, of openings at the impeller-hub for admitting fluid to the back of the impeller, a running joint on the back of the impeller outside said openings, a

chamber on the back of the impeller outside 20 said joint, a chamber on the opposite side of the impeller, and vanes carried by the impeller running in said chambers.

3. The combination with the inclosed impeller B, having suction-opening D at the hub 25 on one side, of rings 12, 13 on the back of the impeller and the casing forming a running joint, openings 10 through the back of the impeller within said joint, chamber 14 on the rear side of the impeller, and vanes 15 car- 30 ried by the impeller in said chamber.

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

FREDERICK RAY.

Witnesses:

C. J. SAWYER,
W. H. KENNEDY.