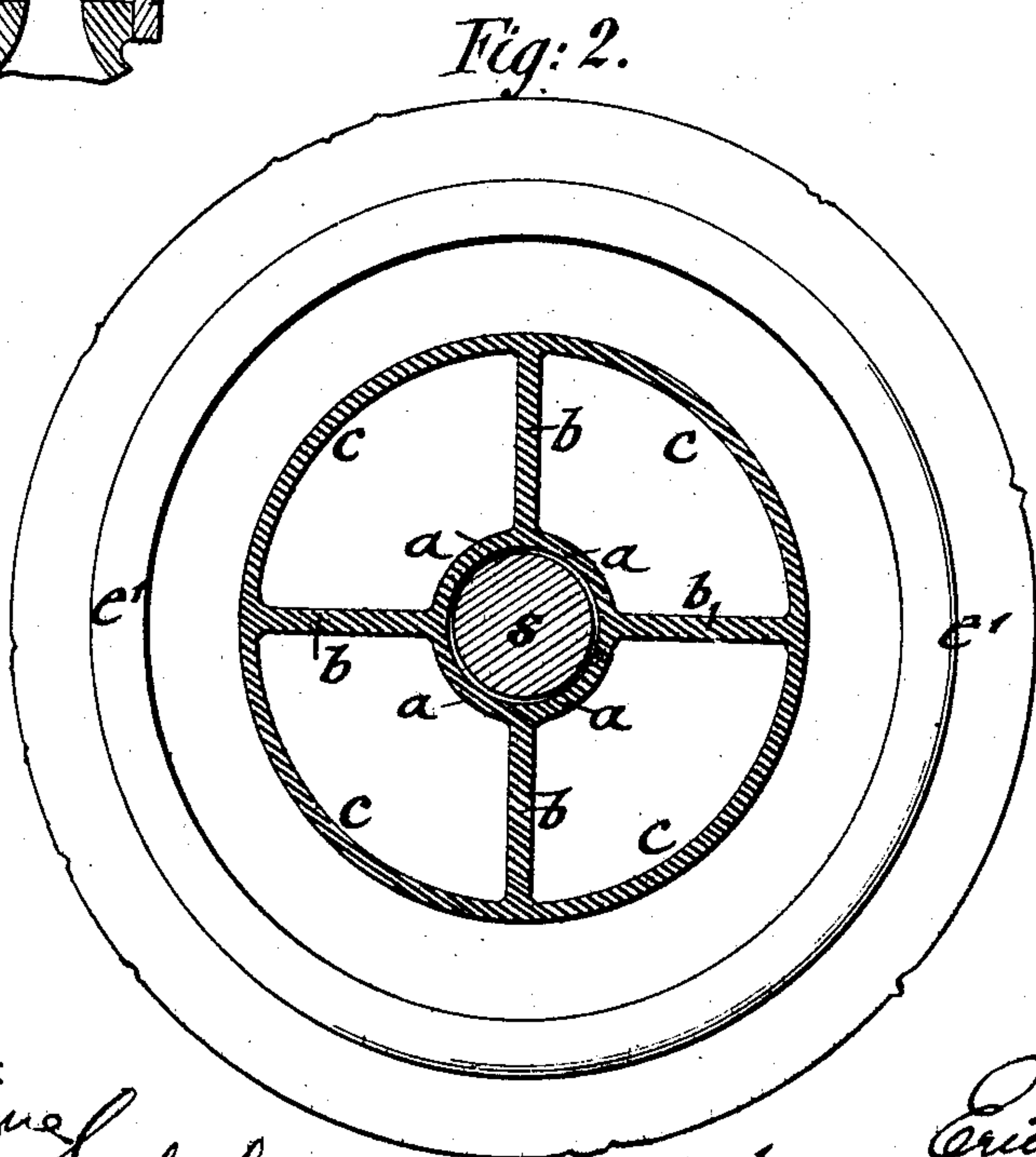
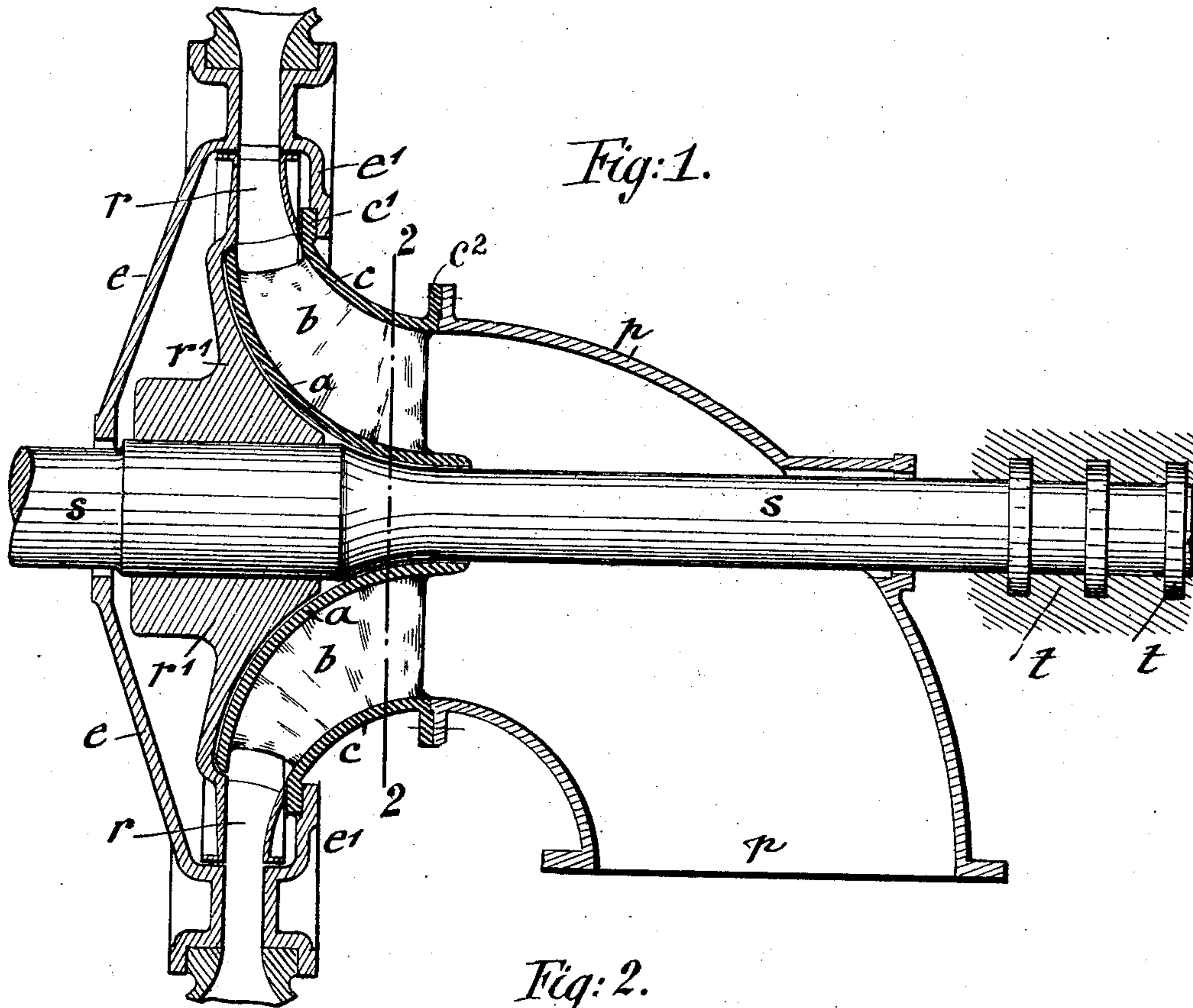


No. 865,863.

PATENTED SEPT. 10, 1907.

E. BÜHLE.
TURBINE.

APPLICATION FILED FEB. 27, 1907.



Witnesses:
Hans Kewig
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UNITED STATES PATENT OFFICE.

ERICH BÜHLE, OF NEW YORK, N. Y., ASSIGNOR TO THE PELTON WATER WHEEL CO., OF
SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

TURBINE.

No. 865,863.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed February 27, 1907. Serial No. 359,588.

To all whom it may concern:

Be it known that I, ERICH BÜHLE, a citizen of the Empire of Germany, residing in New York, borough of Manhattan, in the county and State of New York, have
5 invented certain new and useful Improvements in Turbines, of which the following is a specification.

This invention relates to improvements in radial inward-flow reaction turbines.

In the radial inward-flow reaction turbines as heretofore built the water is conducted from the supply-casing to the suction-pipe and is deflected during this motion on an angle of 90°. According to the laws of hydrodynamics such a change in the direction of motion and velocity exerts considerable pressure on the runner-bottom. The pressure exerted on the runner and runner-bottom is then transmitted by the runner-shaft to the thrust-bearing of the latter and exerts thereby a considerable pressure and friction on the collars of the thrust-bearing so as to unduly heat the same.

20 The object of this invention is to relieve the thrust-bearing from this pressure and prevent the heating up of the same, and for this purpose the invention consists of a turbine in which is interposed between the runner-bottom and suction-pipe a stationary curved conical ring-piece which is provided with radial stiffening ribs connected to the ring-cover which latter takes up the pressure and transmits the same to the casing of the turbine.

30 In the accompanying drawings, Figure 1 represents a vertical longitudinal section of my improved turbine, and Fig. 2 is a vertical transverse section of the same on line 2, 2, Fig. 1.

Similar letters of reference indicate corresponding parts throughout the figures.

35 Referring to the drawings, r represents the runner and r^1 the hub or bottom of the same. The runner-bottom r^1 is provided with a concave face and mounted on the runner-shaft s which passes through the suction-pipe p and turns in thrust-bearing t , as shown clearly in Fig. 1.
40 The runner is inclosed by a casing e , e^1 . The inner section e^1 of the casing is made ring-shaped so as to leave a circular opening in which is inserted a hollow conical ring-piece a , c , which is supported stationary on the section e^1 of the casing, its outer wall or ring-cover c being connected by flange c^1 with the section e^1 and by a flange c^2 with the adjacent flanged end of the suction-pipe p . The runner-bottom is curved adjacent to the inner curved wall of the ring-piece a , c , so as to run freely with the shaft s . The inner wall of the ring-piece a , c , adjacent to the shaft is extended over the shaft and beveled so as to deliver the water passing through the ring-piece with little friction to the suction-pipe. The ring-piece a , c , is gradually enlarged from its outer edge, adjacent to the runner-vanes, towards the central part, which is con-

nected with the suction-pipe. The ring-piece is stiffened by radial walls b , which are tapered at the ends, so as to offer as little resistance as possible to the flow of the water.

The reaction or pressure of the water, instead of being transmitted to the thrust-bearings, is exerted on the inner wall a of the ring-piece a , c , and transmitted by the radial walls to the outer wall c of the same and to the section e^1 of the casing and the discharge-pipe p , so that the thrust-bearing is relieved of pressure and the heating of the same prevented. The outer wall c of the hollow ring forms, in effect, a part of the turbine-casing, and thereby the ring is very firmly supported and the pressure transmitted directly to the casing. In this connection, the suction-pipe p is considered as a section of the casing.

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

1. In a turbine, the combination of a runner, a casing inclosing the same, and a member having a wall which forms a part of the casing and a second pressure-receiving wall in proximity to the runner-bottom.

2. In a turbine, the combination of a runner, a casing inclosing the same and divided into sections, and a hollow pressure-receiving ring having the outer wall thereof interposed between said sections and the inner wall in such relation to the runner as to receive the pressure which would otherwise be exerted on the bottom of the latter.

3. In a turbine, the combination of a runner, a casing divided into sections and comprising a suction-pipe, and a hollow pressure-receiving ring having its outer wall interposed between the suction-pipe and the adjacent casing-section.

4. In a turbine of the radial inward-flow reaction type, the combination of a casing, a runner rotatable therein, a pressure-receiving member consisting of a hollow ring of conical shape having one wall in close proximity to the runner-bottom, and means for supporting said ring from the casing.

5. In a turbine of the radial inward-flow reaction type, the combination of a casing, a runner rotatable therein, and a hollow pressure-receiving ring supported directly from the casing and having radial walls connecting the inner and outer walls thereof.

6. In a turbine of the radial inward-flow reaction type, the combination of a casing divided into sections one of which consists of a suction-pipe, a runner rotatable in said casing and having a curved bottom, a shaft for said runner, a hollow pressure-receiving ring of conical shape having its outer wall interposed between the suction-pipe and the adjacent casing-section and its inner wall curved and embracing the shaft and in close proximity to the runner-bottom, and radial walls connecting the inner and outer walls of said ring.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

ERICH BÜHLE.

Witnesses:

PAUL GOEPEL.

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