No. 854,012. PATENTED MAY 21, 1907.

N. W. AKIMOFF.

RUNNER FOR TURBINES AND FLUID PUMPS.

APPLICATION FILED FEB. 12, 1907.

Fig. 1.

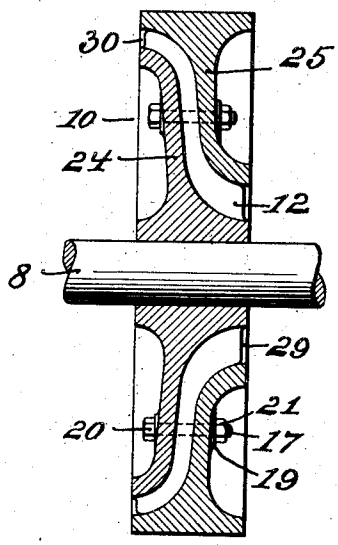


Fig. 2.

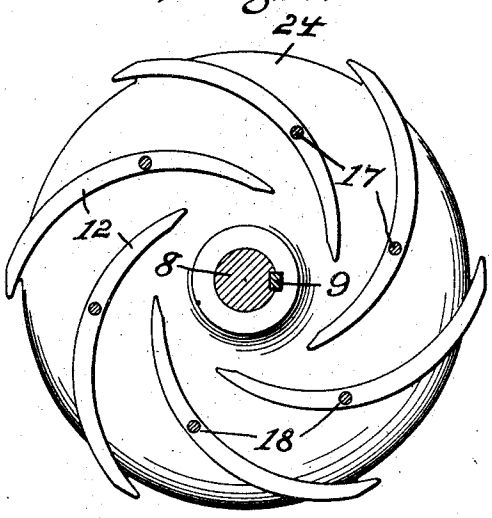
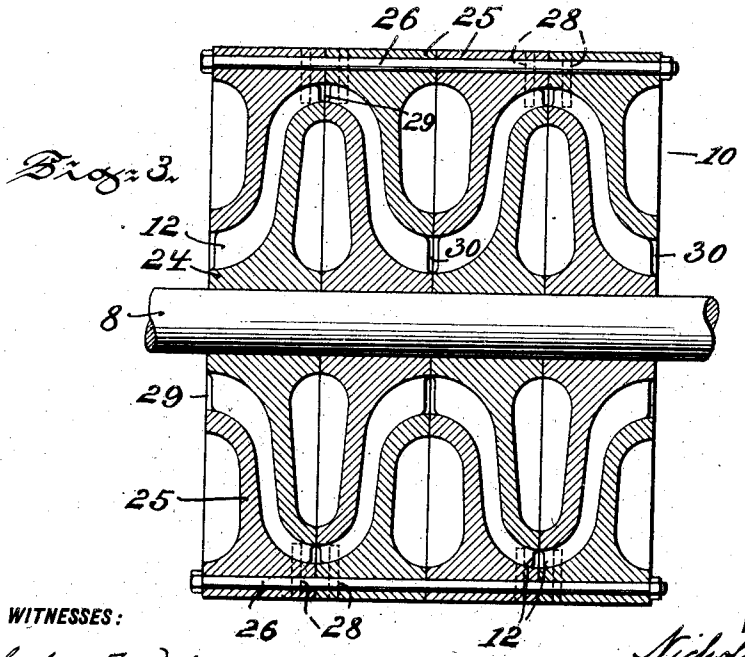


Fig. 3.



WITNESSES:

Wilhelm Voigt

Thomas M. Smith.

INVENTOR

Nicholas W. Akimoff.

BY

J. Walter Douglas

ATTORNEY.

UNITED STATES PATENT OFFICE.

NICHOLAS W. AKIMOFF, OF WEST LYNN, MASSACHUSETTS.

RUNNER FOR TURBINES AND FLUID-PUMPS.

No. 854,012. Specification of Letters Patent. Patented May 21, 1907.

Application filed February 12, 1907. Serial No. 357,045.

To all whom it may concern:

Be it known that I, NICHOLAS W. AKIMOFF, a subject of the Czar of Russia, but now residing at West Lynn, in the county of Essex and the State of Massachusetts, have invented certain new and useful Improvements in Runners for Turbines and Fluid-Pumps, of which the following is a specification.

My invention has relation to runners for turbines and fluid pumps such as described and claimed in the Letters Patent, No. 846,971 granted to me under date of March 12th, 1907; and in such connection it relates more particularly to the construction and arrangement of the runners therefor.

The principal objects of my invention are first; to form the runners of sections and to removably connect the sections with each other; second, to obviate by dividing the runners into sections the coring of the mold otherwise necessary in the solid casting of the runners; third, to connect the runner sections by bolts and to so arrange the same as to not interfere with the passage of the fluid through the runners.

The nature and scope of my invention will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof, in which

Figures 1 and 2 are views, illustrating respectively, partly in section and partly in elevation, a runner having an inlet and outlet formed by two sections, and bolts passing through the vanes of one section for removably connecting the sections with each other, embodying main features of my invention; and Fig. 3 is a view, illustrating partly in section and partly in elevation, a series of sectional runners and a modified form of connecting the outer and inner sections with each other.

Referring to the drawings with reference to Figs: 1 and 2 thereof, 8 is a shaft to which by means of a key 9, is rigidly secured the section 24, of a sectional runner 10, provided with curved vanes or wings 12, formed integral therewith. The section 24, by means of the vanes or wings 12, supports the section 25, which when connected fit snugly upon the vanes 12. The sections 24 and 25, when assembled form a complete runner 10. The preferred means for removably connecting the sections 24 and 25, with each other, consist of bolts 17, which pass through openings 18, arranged in the vanes 12. A boss 19, formed at each side of the sections 24 and 25, of the runner 10, permits of the proper engagement of the head 20, and nut 21, of the bolts 17 therewith. Instead of forming the wings or vanes integral with the section 24, the same may be formed integral with the section 25. However, by forming the same integral with one of the sections, the vanes 12, are more readily accessible and may be given the proper curvature, if not properly casted and also a smooth surface to offer less friction to the passage of fluid through the runner. By dividing the runner 10, into sections, the coring of the mold, as is required, in the solid casting of the same, is obviated.

The type of runner, shown in Figs: 1 and 2, is suitable for use in multistage turbo-pumps of special construction. As shown in Fig: 3, in such type of pump, the fluid in passing through the runners, is confined until reaching the outlet of the pump, not shown. The sections 24 and 25 forming the runner may be connected by bolts 17, in the manner shown in Figs: 1 and 2; or all the outer sections 25, when the runners are assembled in a turbo-pump, not shown, may be directly connected with each other by long bolts 26, as shown in Fig: 3. In this instance the inner sections 24, secured to the shaft 8, are connected with the outer sections 25, by bolts or dowel pins 28, terminating in the vanes or wings 12, of the runner 10. In this manner the inner and outer sections 24 and 25, are rigidly connected with each other, and can be readily separated by the removal of the bolts 26 and 28. The inlets 29 and 30, of this type of runner are located at opposite sides of the same and are arranged alternately near the shaft 8, and periphery thereof, as shown in Fig: 3.

Having thus described the nature and objects of my invention, what I claim and desire to secure by Letters Patent is:—

1. A runner, consisting of sections, whereof one is provided with vanes formed integral therewith and both sections in conjunction with the vanes arranged to form passages for fluid, means passing through said sections and vanes for connecting the sections with each other without obstructing the passage of fluid therethrough and means introduced in said outer sections adapted to removably connect such sections with each other.

2. A runner, having a series of runners,

each consisting of sections whereof one is provided with vanes formed integral therewith and having openings, each of the outer sections having communicating openings, bolts passing through the openings of said outer sections and adapted to removably connect said sections with each other, and bolts passing through the outer sections and into the openings of the vanes of said inner sections to connect each of said inner sections with the respective outer sections.

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

NICHOLAS W. AKIMOFF.

Witnesses:

ALBERT S. N. HICKFORD,

J. WALTER DOUGLASS.