Oct. 25, 1927.

E. K. INNES

1,646,405

VERTICAL HYDRAULIC TURBINE

Filed Dec. 28, 1925

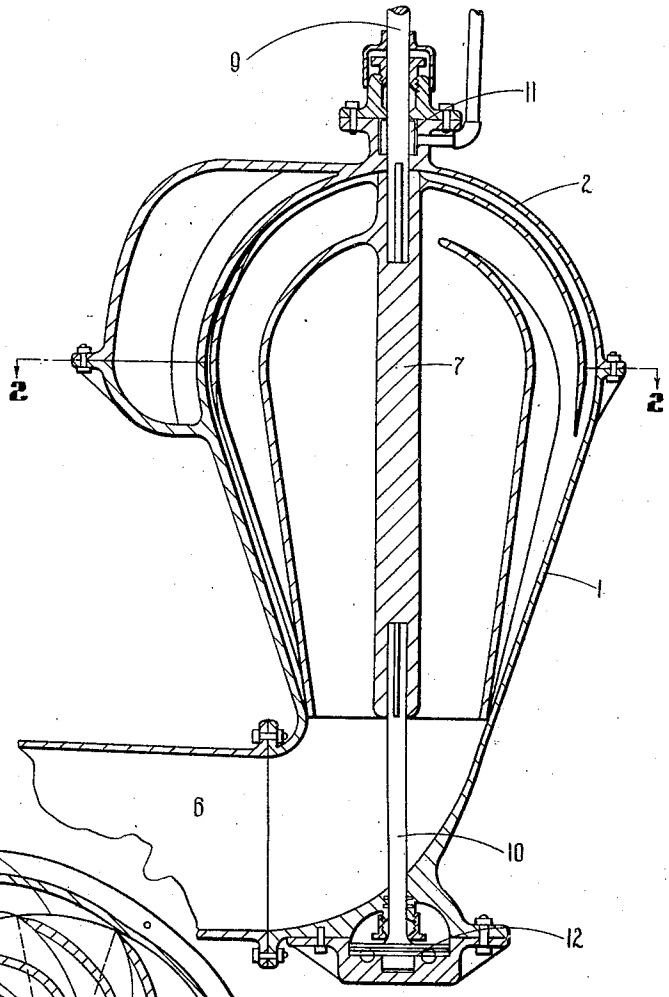


Fig. 1.

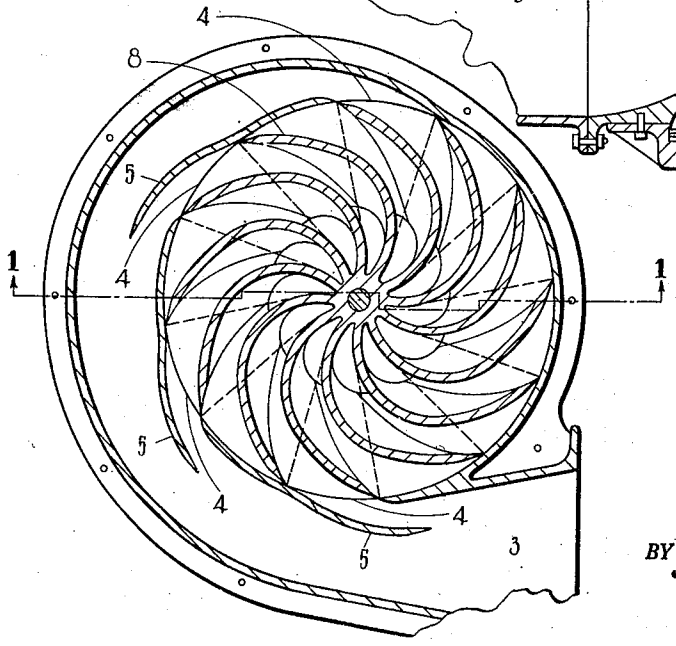


Fig. 2.

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VERTICAL HYDRAULIC TURBINE.

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My present invention appertains generally to improvements in turbines and specifically to a hydraulic turbine of the vertical type, as described in the present specification and illustrated in the accompanying drawings.

The invention consists essentially of the novel features pointed out broadly and specifically in the claims for novelty following a description containing an explanation in detail of an acceptable form of the invention.

This invention comprehends the provision of a turbine adapted for use above a dam, a fall, rapids or such other location where the water descends a distance equivalent to or greater than the descent of water through the turbine.

More specifically, the invention comprises an impeller, the upper portion of which is semi-spherical, while the lower portion is substantially the simulation of a frustrum of a cone in shape, including a multiplicity of vanes of curved formation, connected to a common hub. A casing of similar shape surrounds said impeller and a water inlet channel extends partially above the upper portion of said casing and is provided with vanes which will direct the inflowing water against the upper portions of said impeller vanes. The area of the water outlet is smaller than the inlet, and in consequence will necessitate an increase in the velocity of the flow of egressing water, thereby creating strong suction and impelling the ingressing water with considerable force against the impeller vanes.

Cognizant of the above, my invention has for its principal object the provision of a turbine adapted for use in slow flowing bodies of water in which a dam may be built or in which the turbine may be located to permit water flowing therethrough to egress substantially unrestricted to obviate back pressure.

Another object of my invention is to provide a turbine of this character in which the ingressing water is so directed that forces corresponding with the natural phenomena of a whirlpool are set up to create flow of water through the turbine at a very high velocity in comparison with the velocity of the flow of ingressing water, to generate considerable power in comparison with water wheels and analogous apparatus.

Other objects and advantages will be apparent ensuing a perusal of the following specification read in conjunction with the enclosed drawings, in which

Fig. 1 is a medial vertical transverse section of a turbine constructed in accordance with an acceptable form of the invention, the section lying in the plane designated by the line 1—1 on Fig. 2.

Fig. 2 is a horizontal section as it would appear when taken on the plane designated by the line 2—2 on Fig. 1.

The invention includes a hollow casing 1, the lower portion of which corresponds in shape with a frustrum of a cone. The upper portion 2, is substantially semispherical. 3 designates the water inlet which extends around the greater portion of the upper part of the casing referred to. A number of openings 4 are provided in the wall of said casing and vanes 5 are provided in the water inlet 3 to direct the ingressing water in through said openings 4 on to the vanes of the impeller which I will later describe. 6 designates a conduit or pipe which is employed to direct the water egressing from the turbine.

The impeller comprises a central hub 7 carrying a multiplicity of curved vanes 8 which conform with the contour of the casing described. The upper portions of said vanes are convexed to form what may be termed pockets for the water to present a larger area against which the ingressing water may impinge. The formation of the upper portions of the vanes will be clearly understood by reference to Fig. 2 in which the forward edges of the upper portions thereof have been indicated in dotted lines, the walls of the vanes extending forwardly to these lines.

The impeller is mounted on shafts 9 and 10 journaled in bearings 11 and 12 of any approved design.

As premised, the turbine is adapted for location in a body of water such as a river above a fall, rapids or dam or some other natural or artificial site by which the water may egress from the turbine below the fall, rapids or dam through the outlet conduit, substantially unrestricted. The water flows into the inlet 3 and is guided about the upper portion of the impeller casing, flowing through the openings 4, being directed by the vanes 5, on to the impeller vanes 8 with considerable velocity due to suction created by restriction of the egressing water flowing through the outlet of the impeller casing.

At the same time, centrifugal forces are created which tend to throw the water from off the impeller vanes and these forces acting in conjunction with the force of suction referred to causes the ingressing water to impinge against the impeller vanes with considerable velocity, which force is maintained as the water flows about the impeller casing against the full length of the impeller vanes until discharge therefrom.

From the foregoing it will be apparent that my invention may be utilized in comparatively slow flowing bodies of water now considered of little use for power generating purposes. In addition, very little head is required, thereby obviating the necessity of building a dam to create a strong head such as is required with types of turbines now in use.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can by applying current knowledge, readily adapt it to various applications without omitting certain features that from the standpoint of the prior art fairly constitute essential characteristics of the generic or specific aspects of this invention and therefore such adaptations would and are intended to be comprehended within the meaning and range of equivalency of the following claims.

What I claim as new is:

1. A hydraulic turbine including a casing, the lower portion of which corresponds in shape with an inverted frustrum of a cone, having a substantially semi-spherical upper portion, a vertical impeller in said casing carrying impeller vanes the peripheries of which correspond in shape with said casing, a water inlet channel about the upper portion of said casing for directing water thereinto, and a water discharge outlet for said casing beneath said impeller.

2. A hydraulic turbine including a casing, the lower portion of which corresponds in shape with an inverted frustrum of a cone, having a substantially semi-spherical upper portion, a vertical impeller in said casing carrying a multiplicity of curved vanes having convex upper portions corresponding in shape with the upper portion of said casing; a water inlet channel about the upper portion of said casing for directing water thereinto, and a water discharge outlet for said casing beneath said impeller.

3. A hydraulic turbine including a casing, the lower portion of which corresponds in shape with an inverted frustrum of a cone, having a substantially semi-spherical upper portion, a vertical impeller in said casing carrying a multiplicity of curved impeller vanes, the upper portions of which are convex, corresponding in shape with the upper portion of said casing, a water inlet channel extending about a portion of the upper portion of said casing, openings in said casing, vanes in said water inlet channel for directing the ingressing water through said openings in said casing on to said impeller vanes and a water discharge outlet in said casing at the lower end of said impeller.

In testimony whereof, I affix my signature.

EDITH K. INNES.