E. A. NILSEN.

WATER TURBINE.

APPLICATION FILED SEPT. 2, 1909.

958,670. **Patented May 17, 1910.**

Fig. 1.

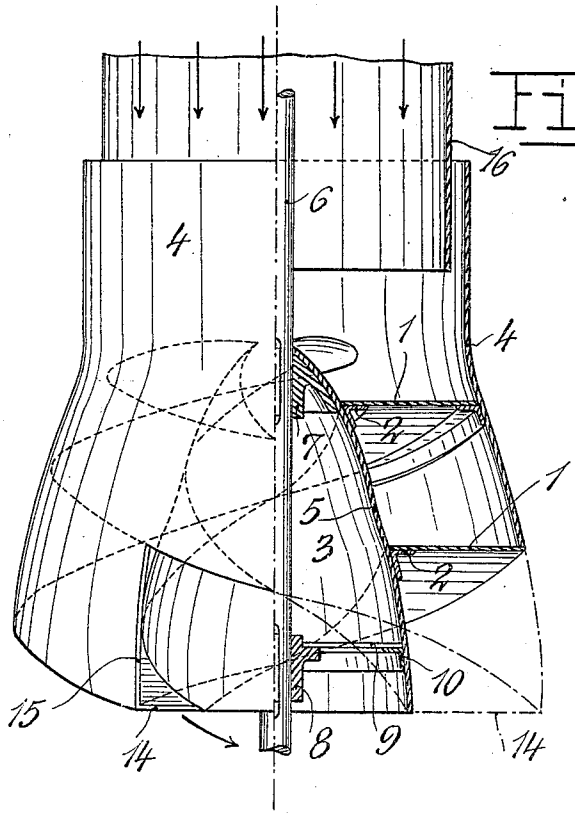
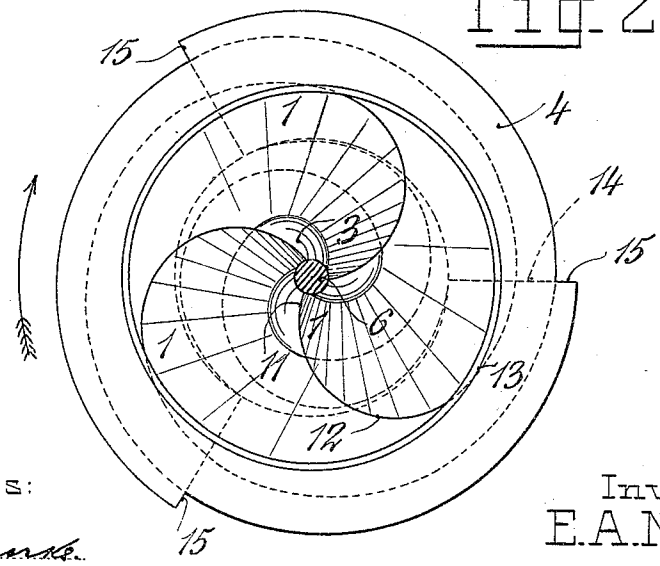


Fig. 2.



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WATER-TURBINE.

958,670. Specification of Letters Patent. Patented May 17, 1910.

Application filed September 2, 1909. Serial No. 515,913.

To all whom it may concern:

Be it known that I, ERNST ALFRED NILSEN, engineer, a citizen of Norway, residing at the city of Christiania, Norway, have invented new and useful Improvements in Water-Turbines, of which the following is a specification.

The present water turbine is provided with helically and spirally arranged blades and receives the water without the use of any guiding apparatus.

The invention is illustrated in the accompanying drawing, in which:—

Figure 1 is an elevation of the turbine partly in section. Fig. 2 is a corresponding plan view.

The whole turbine is made of steel plates. The blades —1— are attached at their inner edge, preferably by means of angle irons —2—, to an inner core —3— and at their outer edge to a cylindrical cap or casing —4—. The core —3— has nearly paraboloidic shape, but it has been found advantageous to slightly narrow the core at the portion —5— about at the middle of its height, and the lower edge portion of the core should be directed vertically downward as shown in Fig. 1. The core is keyed to the shaft —6— by means of two hubs —7— and —8—, of which the upper one is located inside the core at its top and is riveted to the plate material, while the lower hub —8— is connected with the core material through arms —9— and angle irons —10—.

The casing is formed at its upper part as a vertical cylinder. Its lower part is somewhat flared nearly corresponding to the shape of the lower part of the core.

Each blade —1— preferably makes one complete encircling around the core commencing at the top and ending at the lower edge of the casing. The outer blade edge lies free on about the upper fourth of the encircling (see the edge part 11—12—13, Fig. 2). At the point —13— the edge meets together with the inner wall of the casing and is thereafter connected with the same all down to the slipping edge —14—. The angle of inclination is all over essentially constant.

At the slipping edge —14— of each blade the casing is cut directly upward (see line 15) to the overlying blade, then the cut follows the underside of the overlying blade down to its slipping edge. The purpose of this cut is to provide for the water a free outlet, so that it cannot have a retarding frictional effect against the inner wall of the casing, nor be trained around with the same after having thereby lost its velocity.

On account of the shape of the core and the essentially constant pitch the blade channel is highest at the lower part, where the water will not fill the channel up to the underside of the overlying blade and therefore also the water will not have any unnecessary friction against said underside. But at the upper part of the blade channel the water fills the same until it has received the correct direction and velocity on the blades.

The water is supplied through a tube —16— which projects vertically down into the upper cylindrical end of the casing —4—, so that the tube overlaps the casing edge for preventing the water from partly passing by the turbine.

The described water motor has proved to utilize the power well. A special advantage resides in the same machine working with high efficiency by great and small water quantities and by varying height of fall.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A water turbine, the helically and spirally formed blades of which are attached to a central core, characterized by the fact, that the core has nearly paraboloidic shape and is connected with the blades along their inner edge throughout, said blades having essentially constant pitch and having their outer edge free for about one fourth of an encircling but at the rest thereof connected with a surrounding casing, in the upper extension of which the water supply tube projects down.

2. A water turbine comprising a core of

nearly paraboloidic shape, blades connected to said core, an outer casing, said casing being of a shape corresponding to the shape of the core, and having a portion at the slipping edge of each blade cut away up to the overlying blade, the cut then following the underside of the blade down to the slipping edge of the said overlying blade.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ERNST ALFRED NILSEN.

Witnesses:
RICHARD STOKKE,
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