No. 750,025. PATENTED JAN. 19, 1904.

T. A. FIDJELAND.

STREAM MOTOR.

APPLICATION FILED MAR. 7, 1902.

NO MODEL.

Fig. 1.

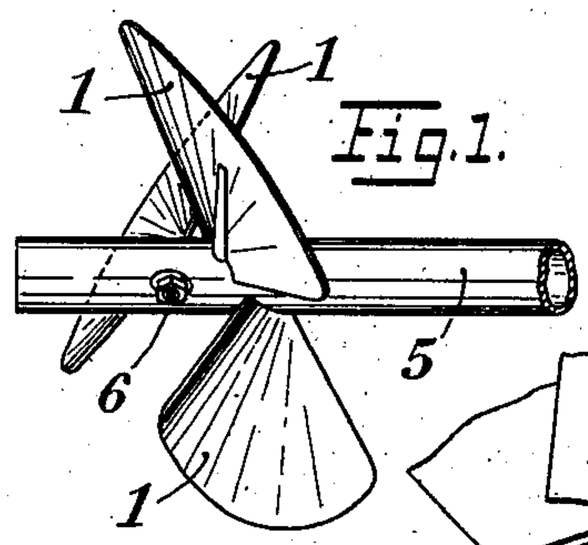


Fig. 2.

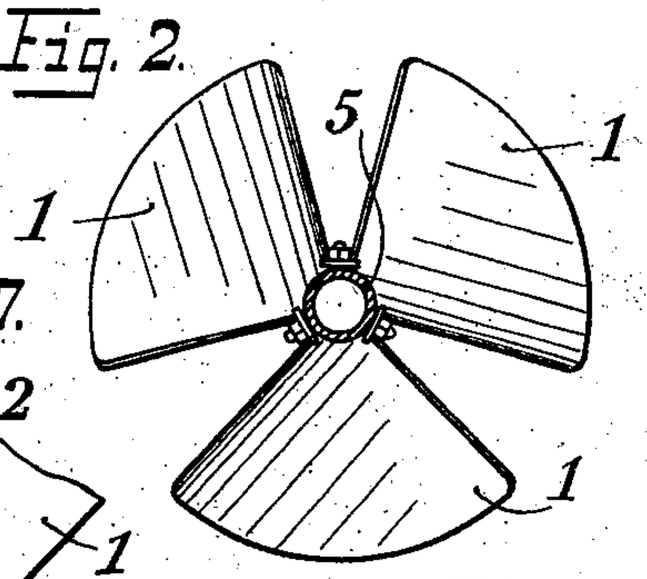


Fig. 7.

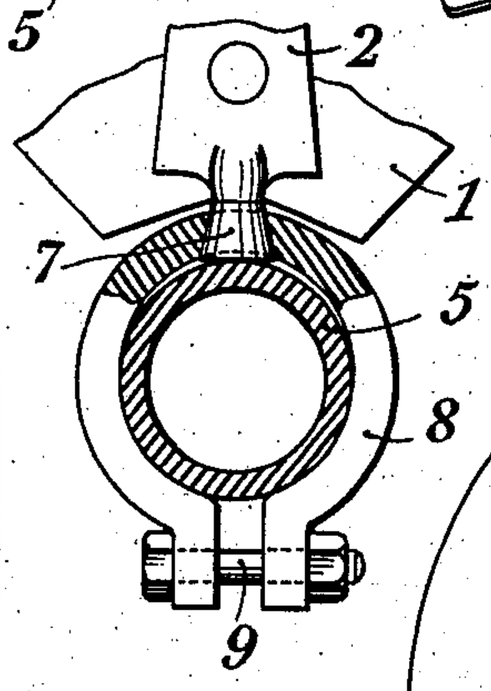


Fig. 9.

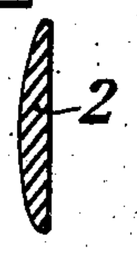


Fig. 5.

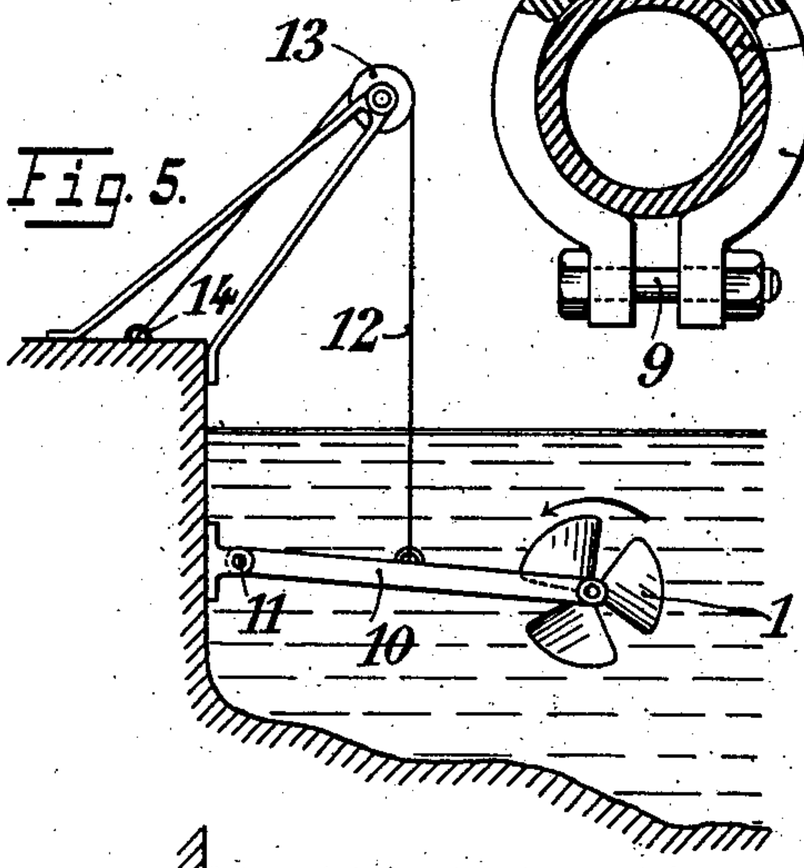


Fig. 3.

Fig. 4.

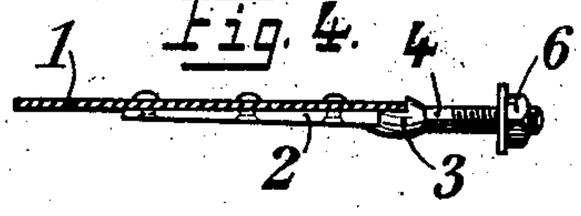


Fig. 6.

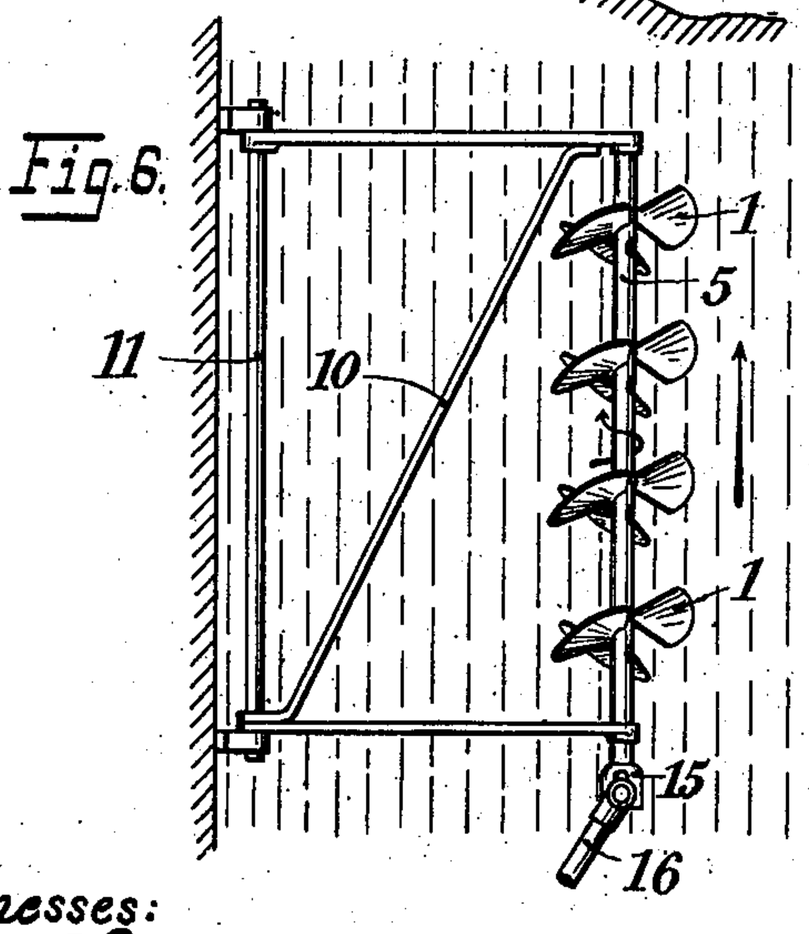
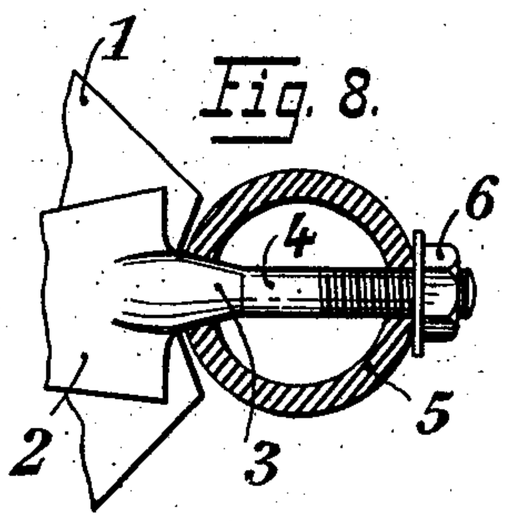


Fig. 8.



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No. 750,025. Patented January 19, 1904.

UNITED STATES PATENT OFFICE.

TERJE AANENSEN FIDJELAND, OF FOSTVEDT IN IVELAND, NEAR CHRISTIANSAND S., NORWAY.

STREAM-MOTOR.

SPECIFICATION forming part of Letters Patent No. 750,025, dated January 19, 1904.

Application filed March 7, 1902. Serial No. 97,209. (No model.)

To all whom it may concern:

Be it known that I, TERJE AANENSEN FIDJELAND, gun-maker, a subject of the King of Sweden and Norway, residing at Fostvedt in Iveland, near Christiansand S., Norway, and whose post-office address is the same, have invented certain new and useful Improvements in Stream-Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The object of the present invention is a water-motor which can easily be employed in any river or brook at small expense without artificial dams or waterfalls where the current is swift enough, or even in the sea—for instance, at the ebb and flow tides. The motor is adapted to be employed at places where the propulsive power of a moving body of water could not otherwise be utilized.

The motor comprises a propeller or screw of cheap and simple construction. Its speed of rotation can be adapted to requirement in an especially-simple manner. If a motor of this kind is connected with driving-shaft, it may with advantage, especially in the country, be used for driving threshing-machines, sawmills, lighting installation, and the like, and can in many cases serve in place of a steam-engine.

A special advantage of this motor consists in its having no severally-movable parts—such, for instance, as paddles and the like; but all parts are rigidly connected with each other and rotate simultaneously without one part moving with relation to another.

The motor preferably is placed beneath the surface of the water, so that it is perfectly independent of ice, rafts, &c., or can also be employed partially immersed in the water.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the group of blades of the motor. Fig. 2 is a front view. Fig. 3 is a side view of a single blade with its mountings. Fig. 4 is a section of Fig. 3. Figs. 5 and 6 illustrate in elevation and plan view, respectively, the motor as employed in a river. Fig. 7 is a detail, and Fig. 8 shows a modification. Fig. 9 is a section of the mount of a blade.

Each group of blades preferably consists of three blades *i*, preferably made of galvanized sheet iron, steel, or brass and in the form of a flat sector subtending an angle of about ninety degrees. (See Fig. 3.) On the blade is a holder 2, having a section of the form illustrated in Fig. 9. This holder terminates at the supported end in a small projection 3, fixed in the screw-shaft 4. There is a corresponding hole in the hollow shaft 5, which in one wall is formed tapering to correspond with the projection 3 of the holder 2 and which in the other wall corresponds with the shaft 4. The holder is prevented from turning by the projection 3, and the blade is therefore firmly secured in position by screwing on the nut 6. The blades of each group are arranged in such a manner that their center lines form a mutual angle of one hundred and twenty degrees when shown from the end of the motor, as in Fig. 2. If the holder 2 is set into a ring 8 with a diverging taper, the blades can be attached to the shaft, so that the latter is not weakened by the bolts 3 and 4 passing through it. Fig. 7 shows this method of attaching the blades. The ring 8 is only of slightly-larger diameter than the shaft, and the cone 7 projects a little within the inner periphery of the ring 8. By firmly clamping the ring 8 by means of a screw 9 the front of the cone 7 is pressed against the outside of the shaft 5, whereby the blade is fixed. A number (in the case shown four) of these groups of blades are placed on the same shaft 5 and the shaft journaled in the frame 10. This frame is formed of flat iron bars riveted together and is pivotally arranged on a bar 11. (See Figs. 5 and 6.) The frame 10 can be raised and lowered conveniently, as it swings on the bar 11, whereby the propeller can be brought nearer to the ground or to the surface of the water for efficiency in working.

Practical experiments have shown that the development of power increases in proportion

to the number of groups of blades. This circumstance is owing to the fact that the current of a river does not act like the moving mass of water in a closed pipe, as the loss of power which must necessarily arise at the first group of blades is compensated for by the force of the water flowing in from the sides. The water acting on the first group of blades thus experiences a check, so that other masses of water instantly flow in from outside with undiminished velocity and, if the distance between the blades is the correct one, with full force on the succeeding group of blades where a similar check occurs, and so on with all the successive groups of blades. Up to eight groups of blades have been employed with advantage, and in this manner a very great development of power obtained in a motor, the diameter of the blades of which was very small, so that the motor could work in shallow water. It will be seen, further, that all the blades can easily swing on the shaft and can be adjusted at the angle which will cause the greatest development of power or at such an angle that the motor runs at a given desired speed. It also may happen, especially with motors with a large number of groups of blades, that the swiftness of current is not the same with all the groups. In this case all the groups would not draw uniformly and the shaft 5 would be exposed to unequal torsional strains. This drawback is very simply avoided by means of the present construction by loosening the screws 4 and 9 for certain groups of blades and by adjusting the blades of these groups at the suitable angle, whereupon the screws are screwed up again. As the speed of the water is not the same in different depths, the speed of the motor can also be varied within the given limits by raising and lowering the motor in the water, the frame 10 being adjusted, for example, by means of a rope 12, which, passing over a pulley 13, can be attached to a post on the edge of the quay.

One end of the shaft 5 is connected by a universal joint 15 with the driving-shaft 16, which transmits the power to the place of operation.

Where there is sufficient width, several of these motors may be advantageously arranged parallel to one another and convey the propulsive force by means of belts, gearing, or the like to a shaft placed, for example, on the bank, which again transmits the power.

In single installations the motor may be journaled in two stakes driven into the bed of the river. In this case the speed can only be regulated by suitably adjusting the blades.

It is obvious that a motor of the hereindescribed construction is extremely easy to make, chiefly because the blades can be made of sheet-iron and are attached separately to the shaft, but also because no special fitting together of the parts is necessary. The motor can likewise be easily controlled and repaired and is of little weight compared to its efficiency. Thus a motor which in a river with a swift central current represented eight-horse power was not heavier than could easily be carried by a man.

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

In a water-motor, the combination of a frame, a shaft turnable therein, a number of blades upon said shaft, arranged in separate groups, a holder for said blades having a cone-shaped end, a ring having an opening for receiving the cone-shaped end of the holder, means for clamping said ring to the shaft and transmitting means connected to the shaft substantially as described.

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

TERJE AANENSEN FIDJELAND.

Witnesses:

A. MAAVETSEN,

C. TORGERSEN.