W. VAN SCOTER.

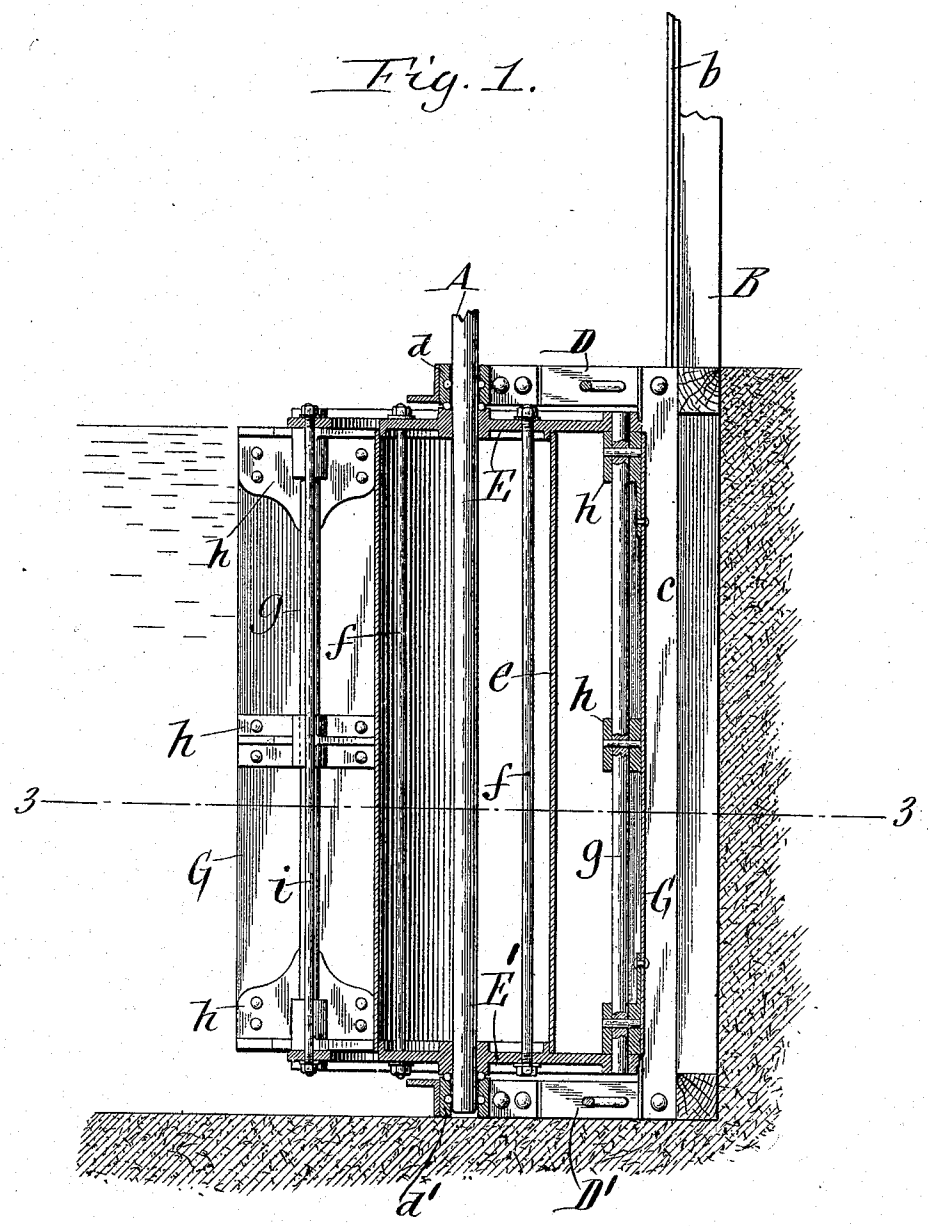
WATER WHEEL.

APPLICATION FILED MAY 6, 1907.

941,474. Patented Nov. 30, 1909.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
Richard Sommer.
Gustav W. Hove.

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3 SHEETS—SHEET 2.

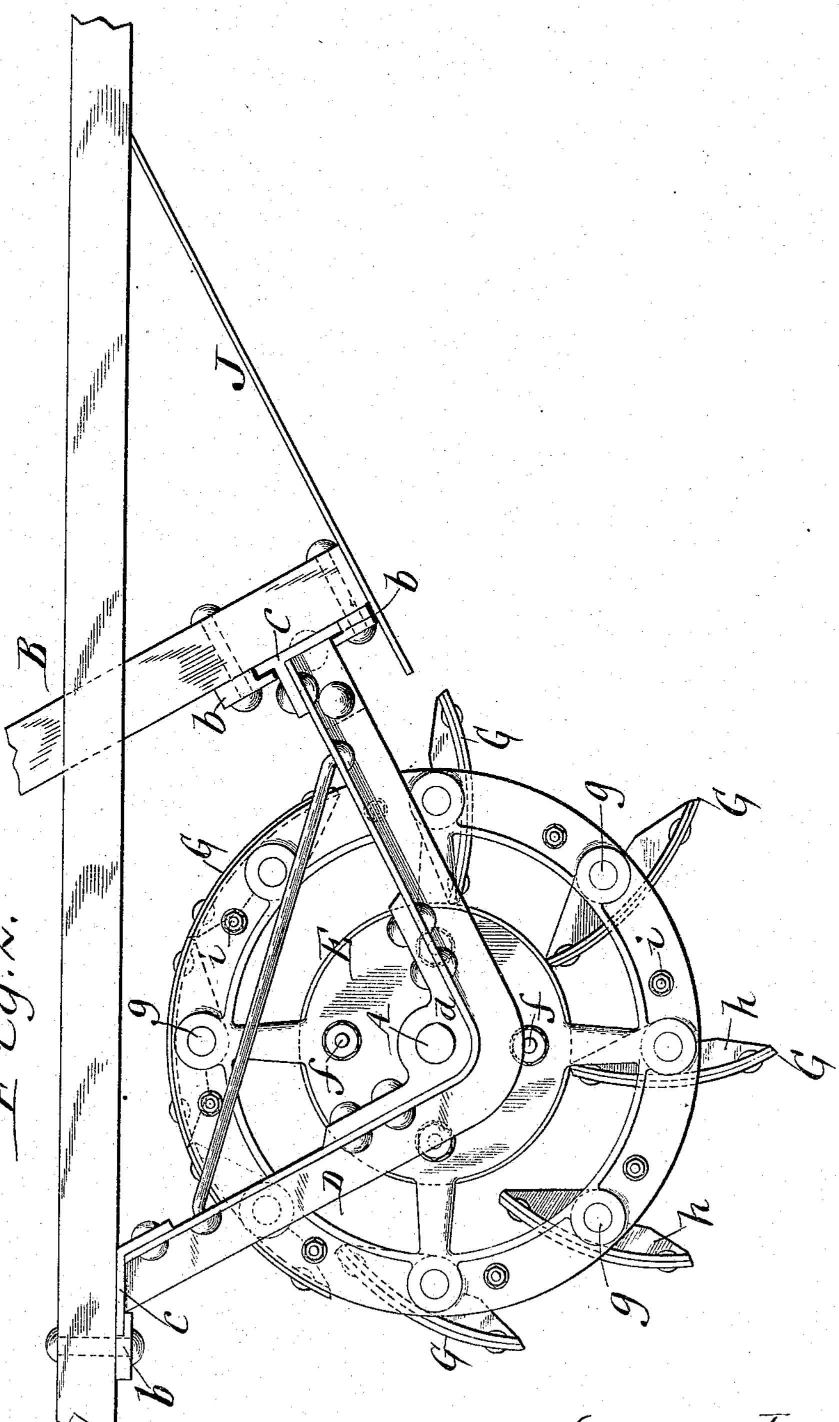

Fig. 2.

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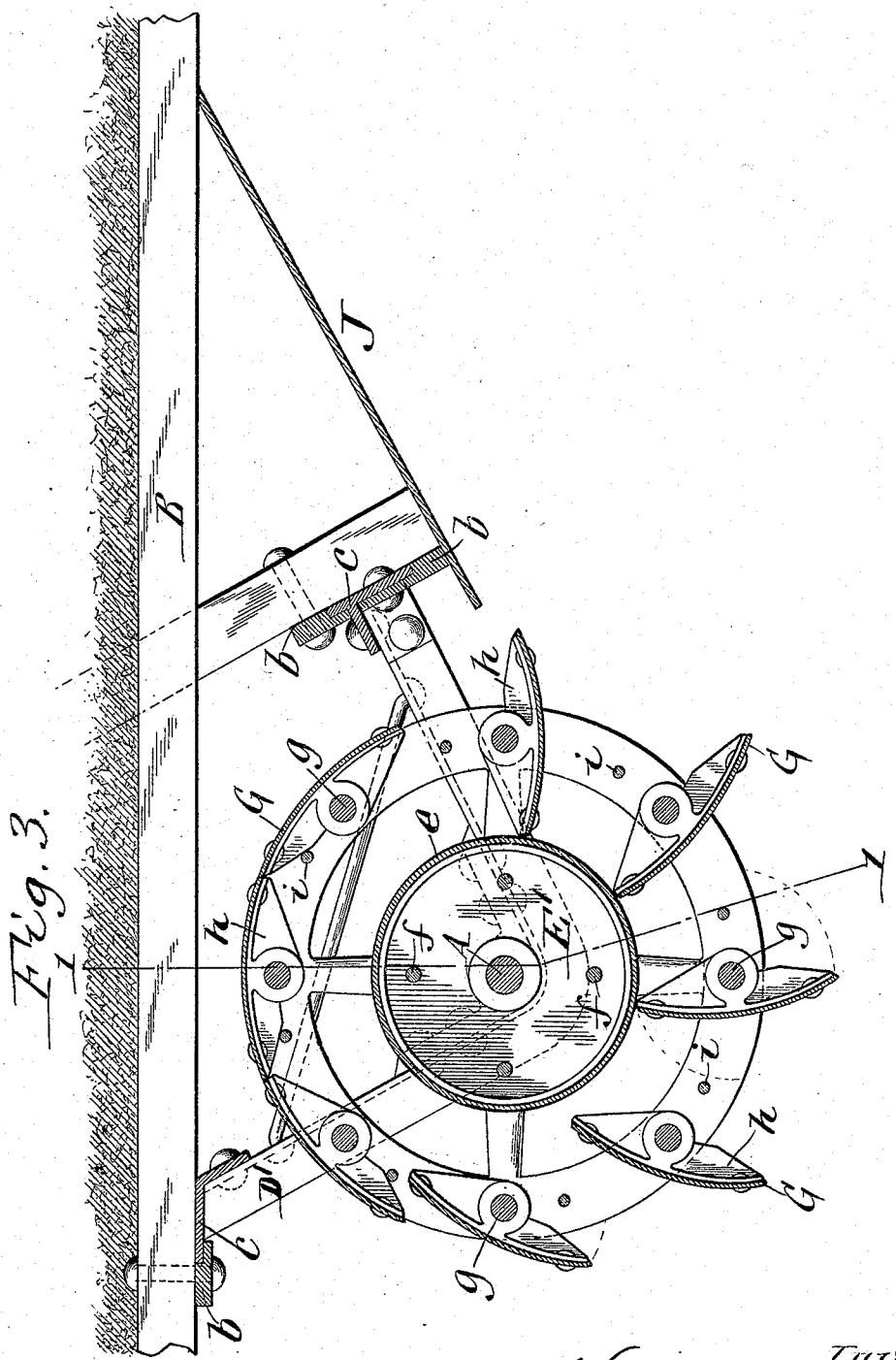

Fig. 3.

Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM VAN SCOTER, OF BUFFALO, NEW YORK.

WATER-WHEEL.

941,474. Specification of Letters Patent. **Patented Nov. 30, 1909.**

Application filed May 6, 1907. Serial No. 372,274.

To all whom it may concern:

Be it known that I, WILLIAM VAN SCOTER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Water-Wheels, of which the following is a specification.

This invention relates to that class of current motors or water wheels for utilizing the power of rivers and streams comprising a horizontally rotatable body and blades, wings or buckets pivoted on said body so as to be capable of being opened and closed.

The object of this invention is to produce a motor of this character which is strong and durable in construction so as to be able to resist the hard usage to which the same is subjected and which is so constructed that the blades are shifted promptly into an open operative position and when closed offer the least resistance to the movement of the water thus permitting of obtaining the maximum power from the river for a given size of wheel.

In the accompanying drawings consisting of 3 sheets: Figure 1 is a vertical cross section of my improved motor, on a reduced scale, taken in line 1—1, Fig. 3. Fig. 2 is a top plan view thereof on an enlarged scale. Fig. 3 is a horizontal section, on the same scale, taken in line 3—3, Fig. 1.

Similar letters of reference indicate corresponding parts throughout the several views.

A represents the upright driving shaft of the water wheel or motor which is mounted in a vertically movable frame at the side of the stream so as to be capable of being raised out of the water or lowered into the water together with the operative parts mounted thereon for stopping or running the motor. This vertically movable frame and the means for guiding the same may be variously constructed.

As shown in the drawings a stationary frame B is erected at the shore or in any other available part of the stream and the same is provided with a plurality of upright guide ways or rails *b*. In these guide ways are mounted two vertically sliding bars *c* which are connected at their upper and lower ends by triangular brackets D, D^1. At their outermost or front parts these brackets are provided with bearings *d*, d^1 in which the upright or main shaft A is journaled. Secured to the upper and lower parts of the main shaft are heads E, E^1 and arranged between the central parts of these heads is a cylindrical concentric drum *e*. These heads are held against opposite ends of this drum by vertical tie rods *f* connecting the heads within the drum. Those portions of the heads at the ends of the drum are solid or imperforate so that the drum together with the heads forms an air tight compartment which operates as a float or buoy which assists in lifting the wheel out of the water when desired. The shaft and the heads constitute the main parts of the rotatable body of the wheel.

At the periphery of the heads E, E^1 are mounted an annular row of buckets, blades or wings G each of which is curved or constructed in the form of a segment of a circle. These segmental blades are of uniform width and extend vertically from one head of the wheel to the other. Each of these blades is pivoted on the wheel heads midway between its vertical edges or the extremities of its concavity and outside of a line connecting said extremities so that it can swing horizontally into an open operative position or into a closed inoperative position. The means for thus pivoting each blade consists of an upright shaft, pintle or rod *g* journaled at its upper and lower ends in bearings on the upper and lower heads, respectively, and a plurality of brackets *h* connecting the inner or concave side of the blade with the adjacent companion rod or shaft *g*. The width of the blades and the distance between their several pivots are such that when the blades are in a closed position their opposing vertical edges meet edge to edge and form a continuous cylindrical surface about the body of the wheel. The blades assume this completely closed position upon the return or inoperative side of the wheel, as shown in the upper part of Figs. 2 and 3. The inward or closing movement of the blades is arrested when they reach this concentric position, the means for this purpose consisting preferably of a vertical stop or rod *i* mounted on the upper and lower heads of the wheel in position to be engaged by the front parts of the brackets on the blades, as shown in the upper part of Fig. 3. The opening movement of the blades is arrested when the same are arranged substantially in a radial position relatively to the body in which position they present the greatest effective area to the flowing water.

This outward or opening movement of the blades is preferably effected by arranging the pivots thereof so close to the drum that the distance between the same is less than the width of the front or inner portion of the blades, whereby the inner edge of each wing is caused to engage with the periphery of the drum. By this means the latter operates as a stop for the blades whereby their opening movement is limited. Furthermore this arrangement of the pivot of each blade and the means which limit the opening movement thereof cause the pressure against the blade on opposite sides of its pivot to be balanced and hold the same in an open position on the operative side of the wheel. The drum in coöperation with the blades also forms a plurality of water pockets which receive the water and compel it to expend its full force before it can escape from the blades.

Arranged in front of the water wheel and extending obliquely or at an angle from the shore out into the stream to a point adjacent to the path of the blades and tangentially relatively to the axis of the wheel is an upright deflector J which preferably consists of a sheet of metal secured to the stationary frame or support upon which the current wheel is mounted.

During the operation of the water wheel the blades move backwardly on the return side of the wheel in a folded or closed position and as the advancing edge of each blade passes beyond the deflector J the water strikes the blade in front of its pivot and turns the same from the folded or inoperative position shown at the top of Figs. 2 and 3 to the unfolded or operative position shown at the bottom of said figures. When the blade has been thus opened the water strikes the inner or rear side thereof causing the wheel to be moved forwardly on the advancing side of the same. As the blades move out of the path of the current of water on the return side of the wheel they again close up. Inasmuch as the blades when closed are arranged concentrically relatively to the axis of the body and drum and meet edge to edge they offer the least resistance to the movement of the wheel and thus enable the maximum amount of power to be obtained from the flowing water.

The blades are thus caused to move into a closed concentric position on the return or inoperative side of the wheel because the outer parts of the blades travel faster than the inner parts thereof and when moving through the water the preponderating resistance of the latter against the outer parts of the blades causes the same to be turned gradually into their closed position.

It will be noted that in my improved water wheel at least half of the blades are in full working condition at all times on the operative side of the body while the remaining inoperative blades are arranged in a concentric closed position and offer a minimum resistance to the rotation of the wheel, thereby enabling the maximum power to be derived from the stream by the wheel.

I claim as my invention:

A water wheel comprising a horizontally rotatable frame, an annular row of curved blades each of which is pivoted vertically on said frame and adapted when closed to be arranged concentrically relatively to the axis of the drum and to meet adjacent blades edge to edge, the pivot of each blade being on its concave side and midway between its vertical edges and in front or outside of a line connecting said edges, stops for limiting the opening and closing of the blades, and a deflector whereby the water is directed toward that side of the wheel on which the blades open.

Witness my hand this 24th day of April, 1907.

WILLIAM VAN SCOTER.

Witnesses:

THEO. L. POPP,

E. M. GRAHAM.