

W. VAN SCOTER.
WATER WHEEL.

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1,008,396.

Patented Nov. 14, 1911.

2 SHEETS-SHEET ..

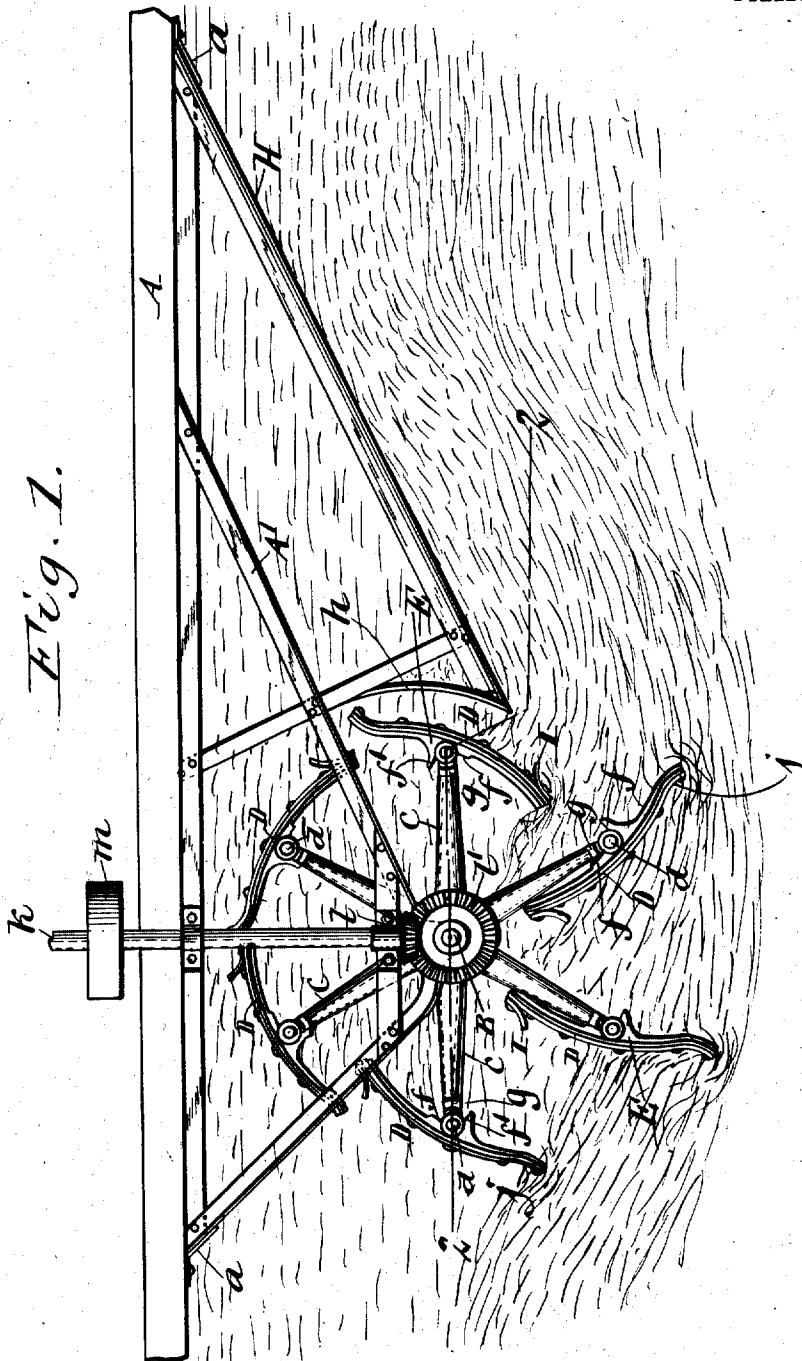


Fig. 1.

Witnesses:-
John H. Stormaker
Richard Sommer

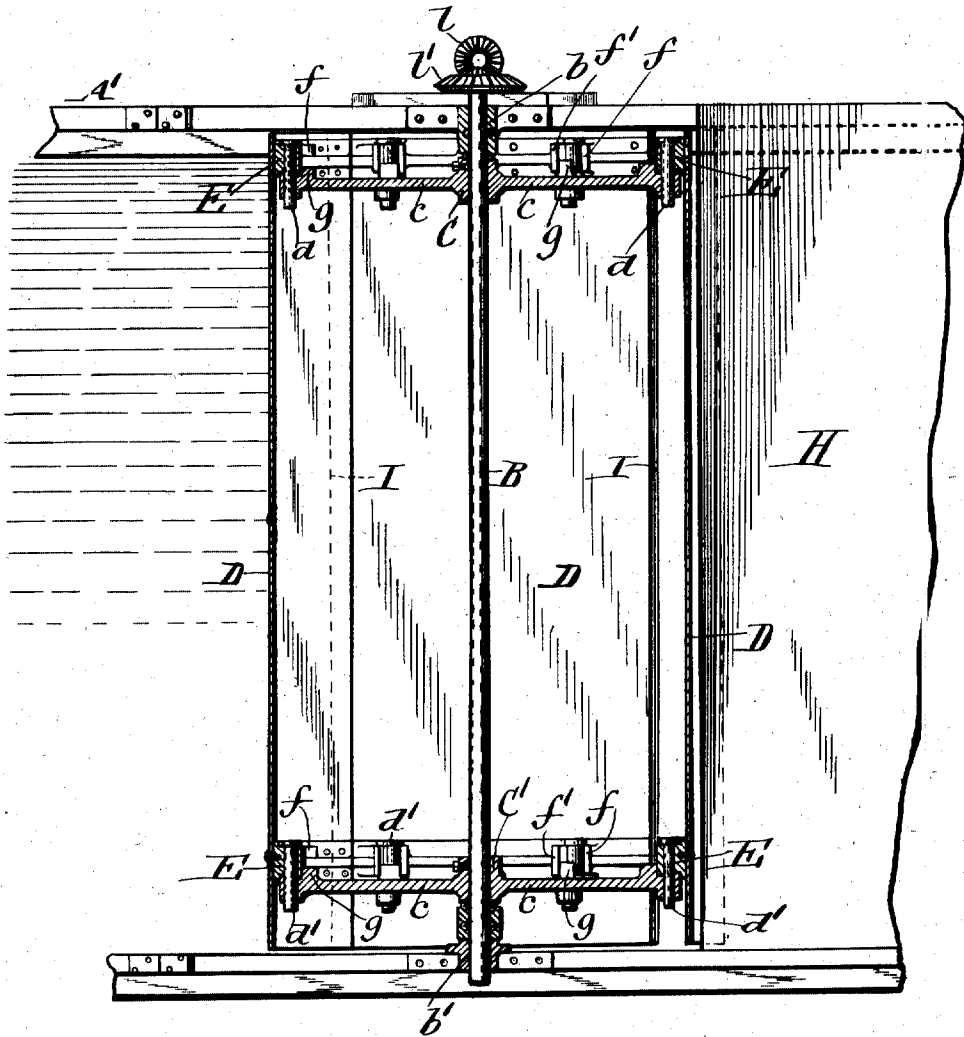
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM VAN SCOTER, OF BUFFALO, NEW YORK, ASSIGNOR TO VAN SCOTER CURRENT WATER POWER COMPANY, OF BUFFALO, NEW YORK, A CORPORATION OF ARIZONA TERRITORY.

WATER-WHEEL.

1,008,396.

Specification of Letters Patent. Patented Nov. 14 1911.

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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 new and useful Improvements in Water-Wheels, of which the following is a specification.

This invention relates to that class of water wheels which are more particularly designed for utilizing the power of flowing rivers or streams and which consists generally of an upright body rotatable about a vertical axis, a plurality of wings, buckets or blades pivoted vertically in an annular row on the periphery of said body and adapted to unfold or present their flat sides to the action of a flowing stream of water on one side of the wheel and to unfold or present their edges to the stream of water on the returning side of the wheel, and an inclined deflector whereby the stream is directed toward the side of the wheel on which the wings or blades are unfolded.

It is the object of this invention to produce a water wheel of this character which is so constructed that the wings or blades are opened or unfolded more rapidly and retained in this position during a larger part of their rotary movement with the wheel on the operative side thereof and to close more promptly on the returning side of the wheel, thereby enabling a greater amount of power to be derived from the stream and reducing the resistance or negative effect of the wings or blades on the inoperative side of the wheel to a minimum.

In the accompanying drawings consisting of 2 sheets: Figure 1 represents a top plan view of my improved water wheel. Fig. 2 is a vertical longitudinal section of the same in line 2—2, Fig. 1.

Similar letters of reference indicate corresponding parts in both figures.

The main frame which supports the water wheel in the stream may be of any suitable construction, but preferably consists of a stationary part A which is preferably mounted on the bank or side of the stream and a vertical movable part A¹ which carries the wheel proper and which is guided in vertical ways a on the stationary part so that the movable part may be lowered together with the wheel into the stream for

the purpose of deriving power therefrom or the same may be raised together with the wheel out of the water for the purpose of inspecting or repairing the same, or for avoiding the destructive effects of floating ice at some seasons of the year.

In its general organization, my improved water wheel comprises a body composed of a main upright shaft B which is journaled at its upper and lower ends in bearings b, b¹ on the vertically-movable part A¹ of the frame, and upper and lower heads or spiders C, C¹ secured to the upper and lower parts of the shaft and each preferably provided with a plurality of radial arms c, the arms of one spider or head being vertically in line or corresponding with the arms of the other head or spider. A plurality of upright blades, wings or buckets D are arranged in an annular row about the main upright shaft and the spiders, each blade being pivoted near its upper and lower ends by means of vertical pins d, d¹ passing through brackets E arranged on the inner side of the respective blade and the outer ends of the corresponding pair of arms of both spiders. Each of the blades is preferably curved so that in its closed or folded position the same is substantially concentric with the axis of the main wheel and each blade is of such width that in its closed position its front and rear edges are arranged close to the rear and front edges of adjacent blades on the returning side of the wheel. In its unfolded position each blade is arranged with its substantially flat side in a substantially radial position relative to the axis of the main shaft and thereby presents its fullest area to the pressure of the stream of water which impinges against the same. Any suitable means may be provided for limiting the opening or unfolding and the closing or folding movement of the blades, the means for this purpose shown in the drawings being simple and durable and comprising front and rear stop lugs or faces f, f¹ arranged on each bracket on opposite sides of the adjacent pivot pin and adapted to engage alternately with the front and rear sides of a stop lug or projection g arranged on the adjacent arm of one of the heads or spiders near the respective pivot pin.

The water of the river or flowing stream is directed from the returning or inoperative side of the wheel toward the advancing or operative side thereof by means of an upright inclined deflector *H* which is preferably mounted upon the movable part of the frame so as to rise and fall therewith. Adjacent to the rear end of this deflector the same is provided with an upright curved guard *h* extending from the rear edge of the deflector laterally toward the inoperative side of the wheel, so as to prevent the formation of eddies around the rear edge of the deflector which otherwise would interfere with the opening or unfolding of the blades as they approach the operative side of the wheel. The pivots of each blade are preferably located slightly outward of the central part of each blade between its inner edge and its outer edge. By this means the inner part of each blade presents a larger area to the stream of water upon passing from the inoperative to the operative side of the wheel than that which is presented to the same by the outer part of the blade, thereby causing the blade upon reaching the active part of the stream of water at the rear end of the deflector to be quickly shifted from its folded or concentric position to its unfolded or radial position, whereby the power of the stream or river begins to act sooner upon the blade for rotating the wheel as a whole. This unfolding or opening of the blade is further quickened by providing the same on the outer side of its advancing edge with a rearwardly and outwardly projecting flange *I* extending the full length or height thereof and forming a pocket, recess or shoulder which catches the stream of water and causes the pressure of the same to operate more effectively and promptly against the advancing part of the blade for turning the same into its open or unfolded position, so that immediately thereafter its inner side is fully presented to the pressure of the stream and the maximum propelling effect of the latter is obtained for turning the wheel. As an additional means for quickening and completing the opening or unfolding of each blade into its working position on the operative side of the wheel, the rear or trailing edge of each blade is curved slightly outward throughout the full length or height thereof, as shown at *j* in Fig. 1, thereby causing the flowing stream upon engaging the inner side of the curved rear edge of the blade to deflect the same and turn the blade quickly into its open position. Although each blade while in its open or radial position on the operative side of the wheel presents a greater area on its inner portion to the pressure of the water than on its outer portion, the blade nevertheless remains in a substantially radial position with refer-

ence to the axis of the wheel and receives the full propelling effect of the stream and the latter is able to exert a greater thrust against the outer part of the blade than against the inner part thereof, thereby compensating for the difference in the pressure areas of the blade at this time and permitting the same to remain fully in its unfolded position during the principal part of its travel on the operative side of the wheel. As the blade approaches the returning or inoperative side of the wheel, the outer side of its rear curved portion *j* by pressing against the comparatively quiet body of water in rear of the deflector *H* operates to turn the blade from its unfolded radial position to its folded or concentric position, this returning of the blade to its inoperative position being effected quickly after the blade has passed beyond the active part of the stream on the operative side of the wheel. Owing to this construction of the blades, a wheel having six blades, as shown in Fig. 1, at all times presents at least two blades in a fully unfolded position and two blades in a partially unfolded position to the pressure of the water while only two of them are completely folded and exerting a negative effect. It is therefore possible to obtain a greater amount of power from a flowing stream by a wheel of a given size which is constructed in accordance with my invention than has been possible heretofore, thereby rendering the wheel more efficient and profitable, and also reducing the amount of space which it is necessary to occupy in the river for a given amount of power derived therefrom.

The power may be transmitted from the wheel to the place of consumption by any suitable means, those shown in the drawings being suitable for the purpose and comprising a horizontal transverse shaft *k* journaled in bearings at the upper end of the movable part of the frame and connected at one end by intermeshing bevel gear wheels *l*, *l'* with the upper end of the main shaft and provided at its opposite end with a pulley *m* adapted to receive a transmitting belt.

I claim as my invention:

1. A water wheel comprising a horizontally rotatable body, and an annular row of blades each of which is pivoted vertically on said body and outwardly of a line midway between its inner and outer edges, and each blade having a flange on its outer side at its inner edge, and a deflector for directing the stream toward the operative side of the wheel.

2. A water wheel comprising a horizontally rotatable body, and an annular row of blades each of which is pivoted vertically on the body and outwardly of a line midway between the inner and outer edges of the blade, and each blade having an outwardly

projecting flange on its outer side at its inner edge.

3. A water wheel comprising a horizontally rotatable body, and an annular row of blades each of which is pivoted vertically on the body outwardly of a line midway between the inner and outer edges of the blade and each blade having its outer edge turned

outwardly and its inner edge provided with an outwardly projecting flange.

Witness my hand this 17th day of November, 1909.

WILLIAM VAN SCOTER.

Witnesses:

THEO. L. POPP,
ANNA HEIGIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."