

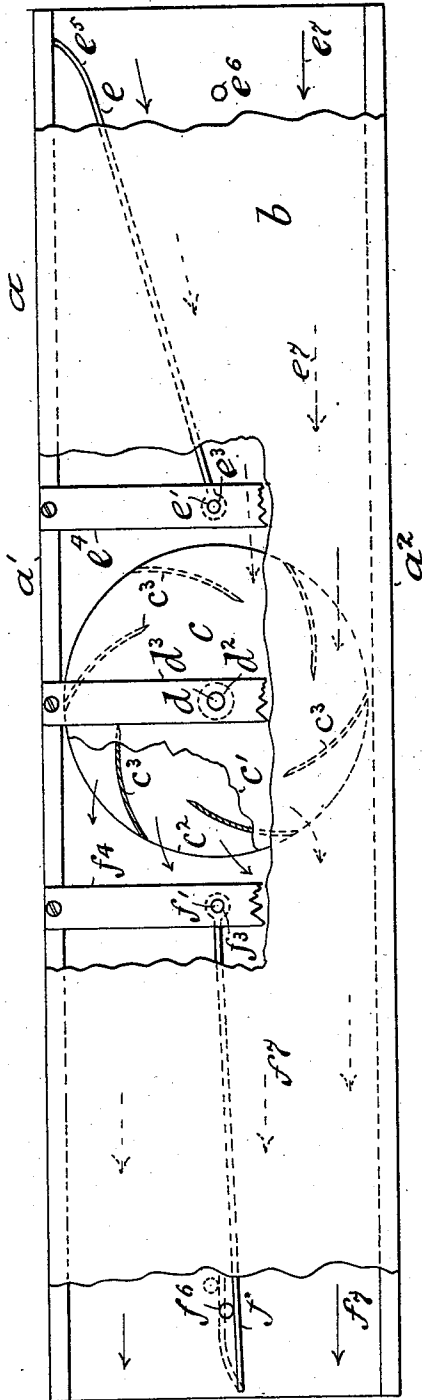
(No Model.)

W. E. BOORAEM.
TIDAL WHEEL.

No. 568,330.

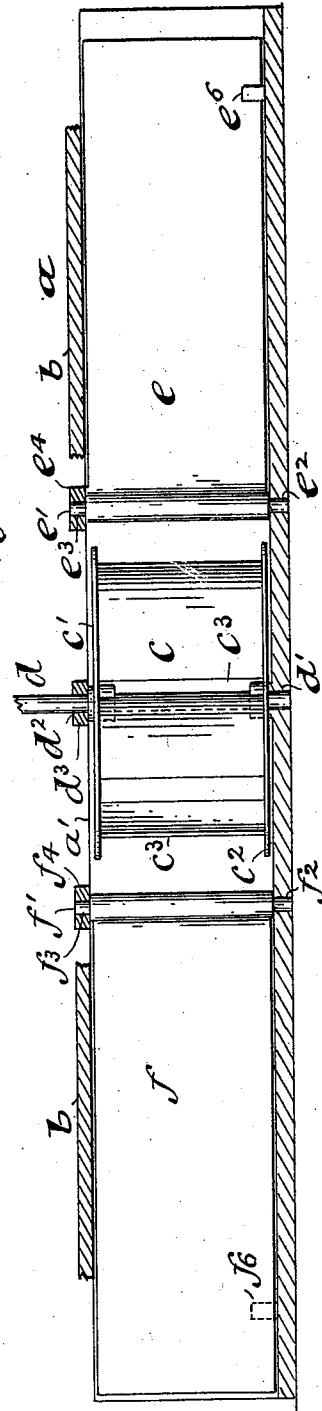
Patented Sept. 29, 1896.

Fig. 1



Witnesses
Geo. Wadman
E. Hatterer

Fig. 2



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UNITED STATES PATENT OFFICE.

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TIDAL WHEEL.

SPECIFICATION forming part of Letters Patent No. 568,330, dated September 29, 1896.

Application filed December 20, 1895. Serial No. 572,748. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. BOORAEM, of Brooklyn, New York, have invented a certain Improvement in Tidal Wheels, of which the following is a specification.

This invention consists of a water-wheel, preferably of the turbine type, mounted upon a vertical shaft in the middle of a horizontal trunk open at its ends and provided on each side of the wheel with a deflecting-plate swinging upon a vertical axis which is adjacent to the periphery of the wheel in the central longitudinal plane of the trunk. The trunk is intended to be submerged in a tidal current. Each deflecting-plate has a range of swinging motion extending from one side of the trunk to a stop which arrests the plate when its free extremity has reached a point not quite half-way across the trunk, so that by a current flowing into either end of the trunk the deflecting-plate at that end is swung over against the side of the trunk, and is thereby caused to direct the entire current against one side of the wheel. The plate in the end of the trunk from which the current flows outward is forced to swing away from the side of the trunk against which its free end previously bore, and is made to occupy a position in which it is substantially parallel with the outgoing current. Thus the cross-area of the space afforded for the outflow of water from the wheel is at least twice the cross-area of the current supplied to the wheel. As the deflecting-plate at one end of the trunk directs the flood-tidal current against one side of the wheel and the deflecting-plate at the other end of the trunk deflects the ebb-tidal current against the other side of the wheel, the direction of rotation of the wheel is the same during both tides.

The accompanying drawings of a horizontal trunk containing a turbine wheel and provided with deflecting-plates on either side of the wheel are as follows:

Figure 1 is a top view with portions of the cover removed to show the interior construction. Fig. 2 is a central longitudinal vertical section.

The drawings represent a horizontal trunk *a*, which will usually be provided with a cover *b*. Midway between the ends of the trunk is a water-wheel *c*, preferably of the turbine

type and composed of the parallel horizontal disks *c'* *c''*, between which is the system *c'''* of curved paddles. The disks *c'* *c''* are secured to the vertical shaft *d*, the lower end of which is suitably stepped in a bearing *d'* at the bottom of the trunk, and which is also provided with a bearing *d''* in the top or cover of the trunk, or, if the trunk is not covered, in a cross-timber *d'''*, bolted at its opposite ends to the side walls *a'* *a''* of the trunk.

On one side of the wheel is a deflecting-plate *e*, affixed to the vertical rock-shaft *e'*, provided at its lower end with the bearing *e''* at the bottom of the trunk and at its upper end with the bearing *e'''* in the top of the trunk, or in the cross-timber *e''''*, bolted at its opposite ends to the side walls *a'* *a''* of the trunk if the cover is omitted. The free end of the plate *e* may be formed with the curve *e''''*, presenting its convex side to the current flowing into the end of the trunk in which the plate *e* is located, as represented in solid lines in Fig. 1; or the curve *e''''* may be omitted if the stop *e''''''* be so placed as to prevent the free extremity of the plate *e* from quite reaching the middle of the trunk. In either case, by the effect of the inflowing current, the direction of which is indicated by the system *e''''''''* of arrows on Fig. 1, the free end of the plate *e* is swung laterally against the side wall *a'* of the trunk.

The deflecting-plate *f* on the other side of the wheel is affixed to the vertical rock-shaft *f'*, provided at its lower end with the bearing *f''* at the bottom of the trunk, and provided at its upper end with the bearing *f'''* in the top of the trunk, or otherwise in the cross-timber *f''''*, affixed at its opposite ends to the side walls *a'* *a''* of the trunk. The free end of the plate *f* may also be formed with a curve, as represented in dotted lines in Fig. 1; or, if the plate *f* is flat, as represented in solid lines in Fig. 1, the stop *f''''* is so located as to prevent the free extremity of the plate *f* from quite reaching the middle of the trunk, so that in either case the effect of inward currents will be to swing the free end of the plate *f* against the side wall *a''* of the trunk.

In Fig. 1 the plate *f* is represented in the position which it is made to assume by the outflowing current from the wheel, the di-

rection of which is indicated by the system f^7 of arrows. By the outward current the plate f is thrown against the stop f^6 . Similarly, when the direction of the current is reversed from that shown in Fig. 1, the plate e is thrown against the stop e^6 . Whether the deflecting-plates are flat from end to end or provided with the curved portions shown, the stops e^6 and f^6 serve to arrest the swinging motions of the plates before their free extremities reach the middle of the trunk, so that in either case the inflowing current strikes against the whole or some part of the surface of the deflecting-plate at an acute angle, and hence rocks the plate away from its stop and against the adjacent wall of the trunk.

The wheel is rotated by the pressure upon its paddles of the current flowing through it. It will be seen that by the operation of the deflecting-plates the cross-area of the space afforded for the outflow of water from the wheel is substantially double the cross-area of the current discharged into the wheel, which secures the most efficient action of the current in effecting the rotation of the wheel.

In Fig. 1 the current is represented by the system of arrows as flowing from right to left, and it will of course be perceived that a current flowing in the opposite direction, that is, from left to right, will simply reverse the position of the deflecting-plates, and that hence the wheel will always be rotated in the same direction, irrespectively of the direction of the current.

It is not essential that the trunk shall be covered, and it is to be understood that a horizontal sluice, open at its top and its ends and provided with the necessary cross-timbers, is the equivalent of the trunk.

What is claimed as the invention is—

1. A horizontal trunk open at its ends and adapted for submergence in a tideway; a water-wheel within the trunk mounted upon a vertical shaft extending upwardly above the top of the trunk for transmitting the power due to the rotation of the wheel, and two deflecting-plates, one mounted upon a vertical rock-shaft midway between the sides of the trunk and in proximity to one side of the water-wheel, and extending from the said rock-shaft outwardly toward one end of the trunk, and the other mounted in like manner upon a vertical rock-shaft midway between the sides of the trunk and in proximity to the other side of the wheel, and extending outwardly from the said rock-shaft toward the other end of the trunk, substantially as described.

2. A water-wheel mounted upon a vertical shaft; a horizontal trunk in which said water-wheel is contained; deflecting-plates swinging on vertical axes in proximity to the opposite sides of the wheel, the said axes lying in the central vertical longitudinal plane of the trunk, two stops, the one on one side of one deflecting-plate, and the other on the other side of the other deflecting-plate, for so limiting the range of movement of said deflecting-plates as to prevent either of their free extremities from reaching the central longitudinal plane of the trunk, whereby the cross-area of the current delivered to the wheel is approximately only one-half of the cross-area of the space afforded by the outflowing current from the wheel irrespectively of the direction of the current flowing through the trunk.

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