

No. 652,774.

Patented July 3, 1900.

W. T. HOFFMAN, Dec'd.

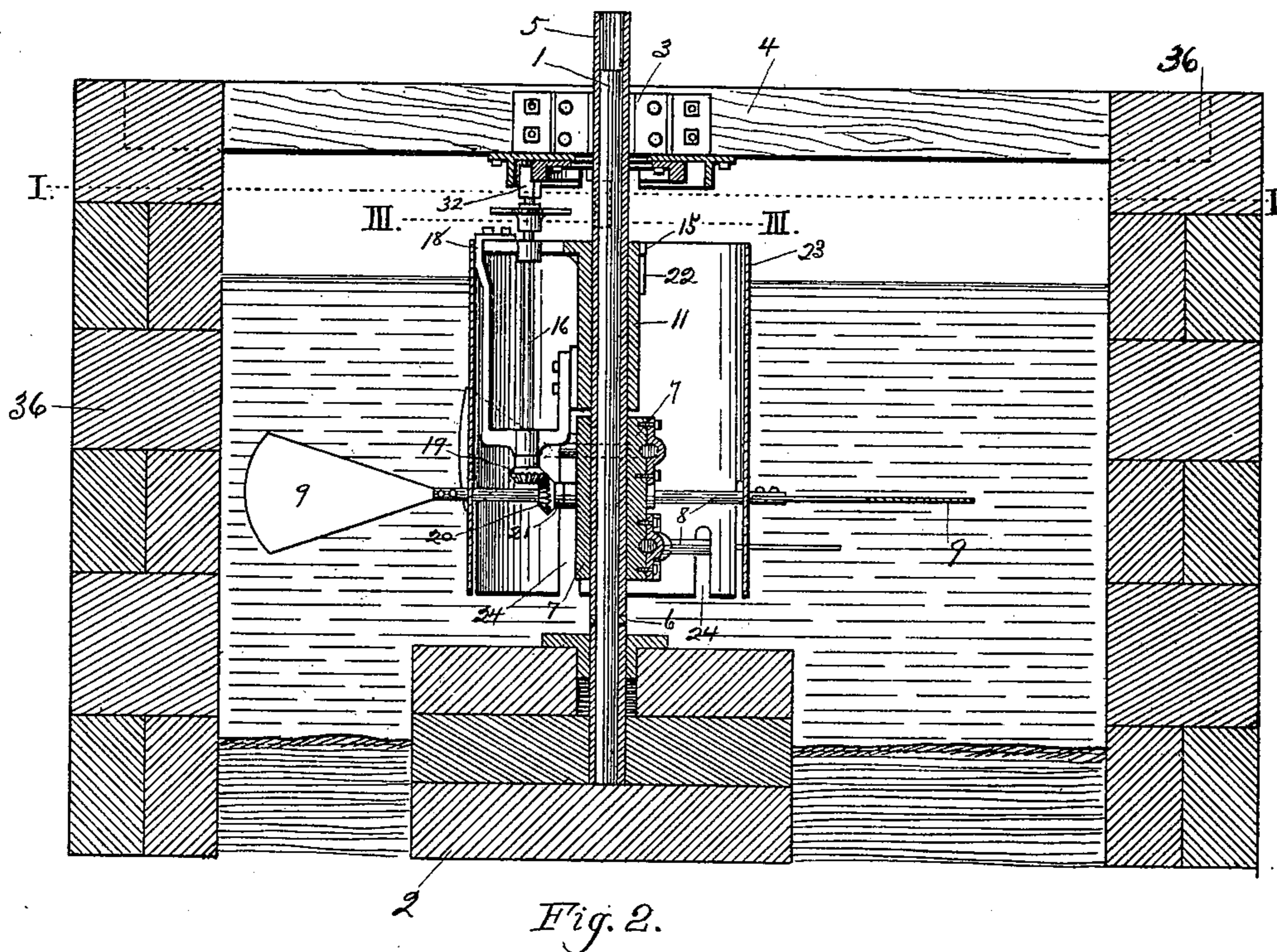
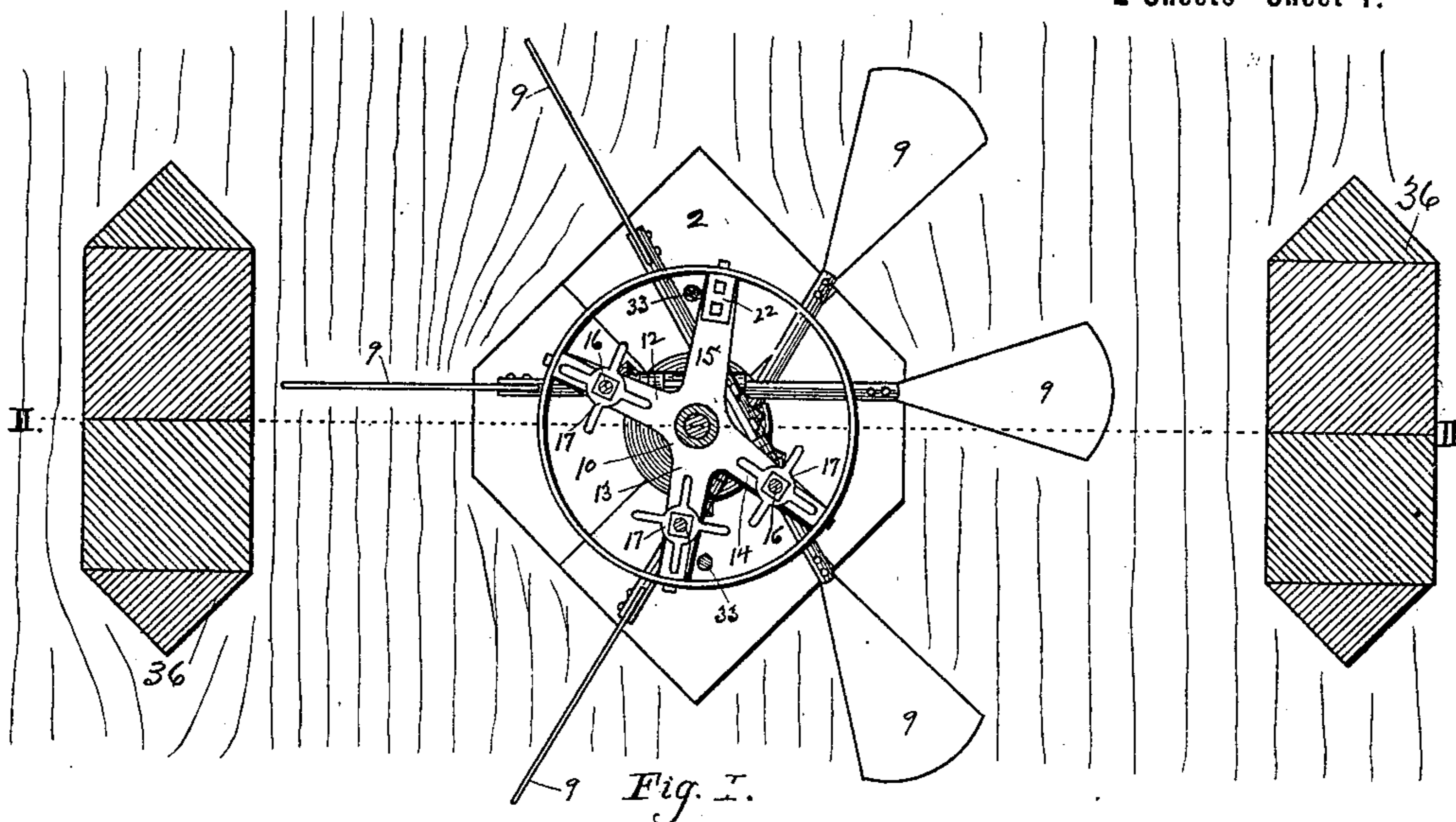
J. E. HIGDON, Administrator.

WATER WHEEL.

(Application filed Dec. 26, 1899.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES,

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F. A. Spruance.

INVENTOR,

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No. 652,774.

Patented July 3, 1900.

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WATER WHEEL.

(Application filed Dec. 28, 1899.)

(No Model.)

2 Sheets—Sheet 2.

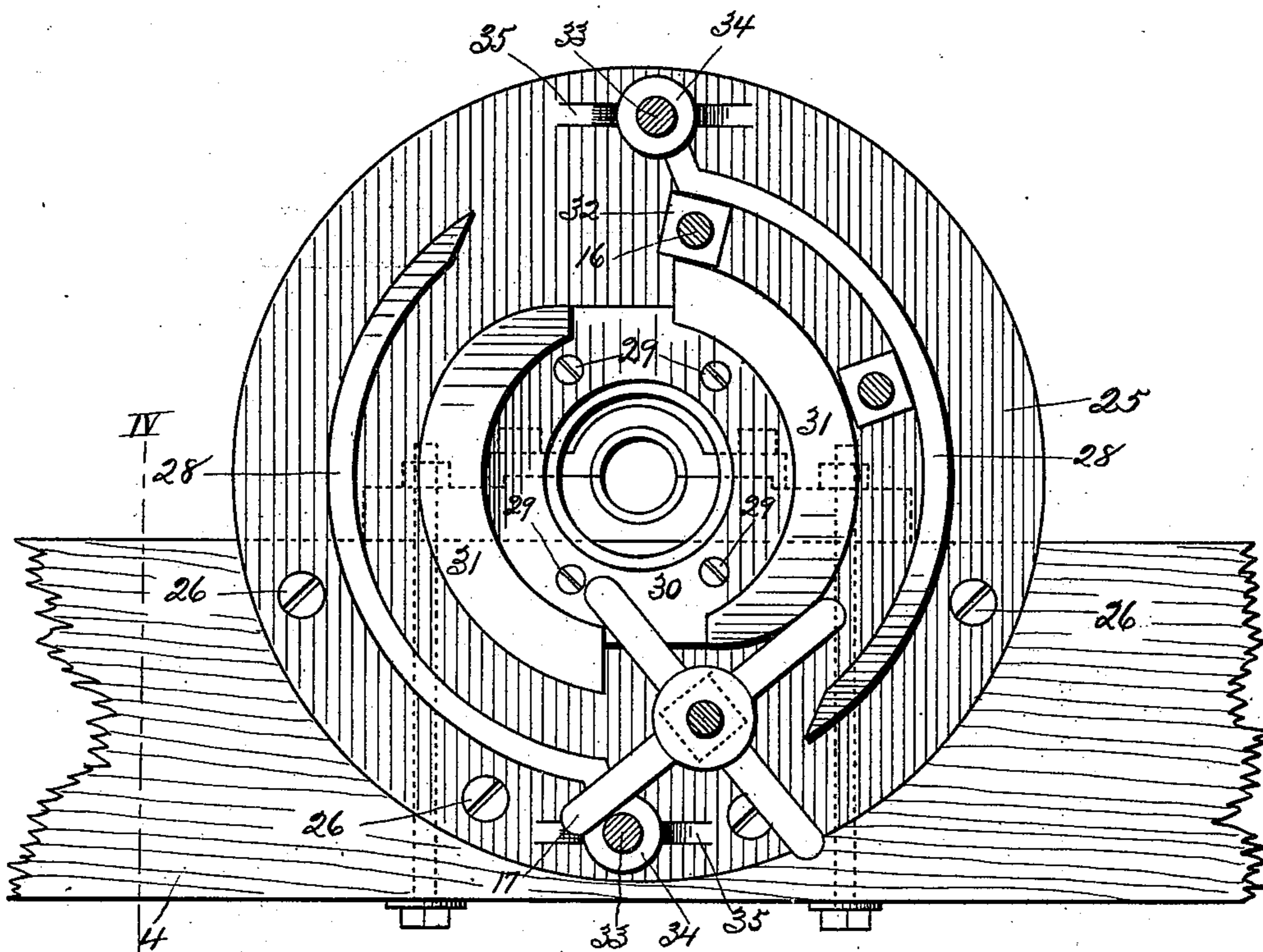


Fig. 3.

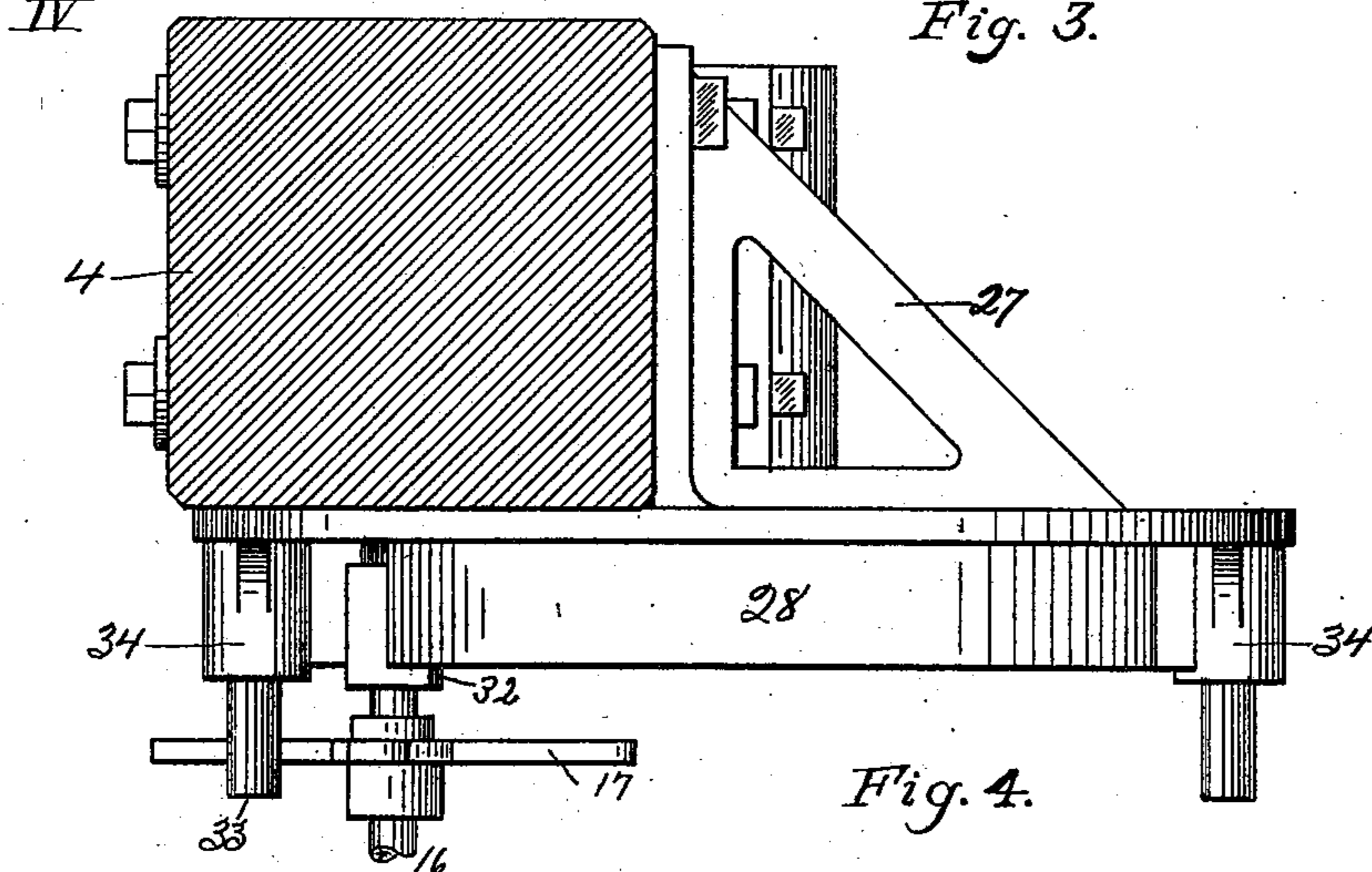


Fig. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM THOMAS HOFFMAN, OF KANSAS CITY, MISSOURI; JOHN E. HIGDON
ADMINISTRATOR OF SAID HOFFMAN, DECEASED.

WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 652,774, dated July 3, 1900.

Application filed December 26, 1899. Serial No. 741,664. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM THOMAS HOFFMAN, of Kansas City, Jackson county, Missouri, have invented certain new and useful
5 Improvements in Water-Wheels, of which the following is a specification.

My invention relates to a water-wheel consisting of a series of rotatable blades or vanes mounted horizontally on a vertical shaft, the
10 same being designed to be set in a flowing stream or raceway; and my invention relates particularly to devices for "feathering" the rotating blades both at the beginning and end of each stroke, or, in other words, at the be-
15 ginning and end of the downstream motion of each blade, so that while moving downstream each blade shall present its full face to the current to be acted on thereby and while moving upstream shall present its edge
20 to the current in a horizontal plane, so as to pass through the same with the least possible resistance.

In the accompanying drawings, Figure 1 is a top plan view on the line I I of Fig. 2.
25 Fig. 2 is a vertical section on the line II II of Fig. 1. Fig. 3 is a plan view looking upward on the line III III of Fig. 2. Fig. 4 is a view, partially in vertical section, on the line IV IV of Fig. 3.

30 In Figs. 1 and 2, 1 designates a central stationary shaft set vertically upon a pier of masonry 2 or other suitable base in the bed of the stream or raceway and supported at the top in bearings 3 on a cross-beam 4, resting on piers 36. Upon said shaft is mounted
35 a rotating sleeve 5, which bears at the bottom upon an interposed ring 6 and is connected at the top, above the cross-beam, to suitable gearing (not shown) for running a
40 mill or other machinery. Upon the lower portion of the sleeve 5 is secured a casing 7, and in bearings in or on said casing are mounted horizontal shafts 8, preferably three
45 in number, rotatable in said bearings and carrying at their outer ends actuating-blades 9, secured to the ends of the shafts 8 in any suitable manner.

10 designates a spider consisting of a cylindrical body portion 11, secured on the ro-
50 tating sleeve 5, and four radial legs 12 13 14 15, preferably integral therewith, extending

outward horizontally therefrom, three of which, 12 13 14, at points in a vertical plane with blade-shafts 8 contain near their outer ends bearings to receive vertical shafts 16, 55 which carry above the legs 12 13 14 horizontally-mounted rotatable star-wheels 17. To the outer end of each of said legs 12 13 14 is secured the upper end of a bracket 18, which extends downwardly and contains a bearing 60 for the lower end of a star-wheel shaft 16 and has its lower terminal secured on the spider-body 11. The lower end of each star-wheel shaft carries below bracket 18 a bevel-gear 19, which meshes with a bevel-gear 20, 65 fixed on a blade-shaft 8. A loosely-mounted antifriction-collar 21 is interposed between each of the gears 20 and the journal-box through which the blade-shaft passes. The fourth leg 15 of the spider 10 not carrying 70 any star-wheel or related parts is provided with a simple brace 22, Fig. 2, supporting it on the body 11 instead of a bracket 18. A cylindrical drum or fender 23, open at the top and bottom, is suspended from the ends of the 75 legs 12 13 14 15 and is provided at its lower edge with vertical slots 24, so that it may be slipped over the blade-shafts 8. The function of said fender is to deflect floating matter upon the surface of the water, sediment, 80 &c., from the mechanism contained within, and the parts are so proportioned and mounted that said star-wheels, spider, and the upper end of said fender will be above high-water mark. The means for actuating said 85 star-wheels, and thereby feathering the blades, will now be described.

An annular plate 25, through the center of which shaft 1 and sleeve 5 pass, is secured on the under side of the cross-beam 4 by screws 90 26 and is further secured by two brackets 27, one of which is shown in Fig. 4. Integral with or secured on said plate are curved depending flanges 28, whose inner surfaces are concentric with shaft 1. Said flanges are 95 not continuous all the way around, but have a break or interval at opposite sides of the plate, the purpose of which will be explained. Attached to said plate 25 by screws 29 is a second annular plate 30, through which the 100 shaft 1 and sleeve 5 pass, also provided with curved depending flanges 31, whose outer

faces are concentric with shaft 1 and parallel with the inner faces of flanges 28. Said flanges 31 also have a break in their continuity at points nearly coinciding with the breaks in flanges 28. Upon the upper end of each of the star-wheel shafts 16, above the wheel, is rigidly mounted an approximately-cubical block 32, and as said wheels are carried around the shaft 1 by the rotation of the blades 9 around said shaft the blocks 32 traverse the channels or tracks formed between flanges 28 and 31, which tracks are wide enough to permit said blocks to pass through them, but not to rotate in them, except at the points where the breaks in the flanges 28 31 occur, at which points each star-wheel is caused to make a partial revolution by contact of one of its spokes with one of the vertical pins 33, which depend from plate 25 into the path of said spokes, which in turn rotates shafts 16 and causes the blades geared to the star-wheels being operated to make a quarter-revolution. Said pins 33 are supported in sockets 34, integral with bracing-ribs 35, integral with plate 25, and are so located as to cause the rotation of the blade-shafts successively at the point where each of said shafts is in alignment with the current. The blades on the opposite ends of each of said shafts being set in planes at right angles to each other, it follows that when the blade which is upstream or at the beginning of its stroke is rotated from inactive or feathered position to active position the blade which is downstream or at the end of its stroke will be rotated from active to feathered position. The blocks 32 and the cooperating parts prevent the rotation of the blades except at the proper points in their circuit.

The apparatus described embodies a simple and inexpensive but effectual means of utilizing water-power either on a small or large scale.

I claim as my invention and desire to secure by Letters Patent—

1. In a water-wheel, the combination of a vertical rotating shaft, horizontal rotating blade-shafts mounted on said vertical shaft and carrying at their opposite ends actuating-

blades set in planes at right angles to each other, a series of short vertical shafts parallel with and mounted in bearings carried by the main shaft and located in the vertical plane of said blade-shafts, gears on said short shafts meshing with gears on said blade-shafts, and means actuated by the revolution of the wheel for rotating said short shafts and said blade-shafts, substantially as set forth.

2. In a water-wheel, the combination of a vertical rotating shaft, horizontal rotating blade-shafts mounted on said vertical shaft and carrying at their opposite ends actuating-blades set in planes at right angles to each other, a spider mounted on said vertical shaft having horizontally-extending legs, a series of short vertical shafts mounted in bearings in said legs and in the vertical plane of said blade-shafts and geared to said blade-shafts, star-wheels mounted horizontally on said short shafts above said legs, and stationary pins projecting vertically from the frame into the path of the spokes of said wheels, whereby said wheels are actuated and said blade-shafts partially rotated at each contact of said spokes with said pins, substantially as set forth.

3. In a water-wheel, the combination of a vertical rotating shaft, horizontal rotating blade-shafts mounted on said vertical shaft, a spider on said vertical shaft having horizontally-extending legs, a series of short vertical shafts mounted in bearings in said legs and geared to said blade-shafts, star-wheels on said short shafts, above said legs, vertical projections from the frame for actuating said star-wheels, angular blocks fixed on the star-wheel shafts above said star-wheels, and curved guide-flanges on the stationary frame, above said wheels, adapted to receive said blocks, said flanges having openings or breaks to permit said blocks to rotate simultaneously with said wheels, substantially as set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM THOMAS HOFFMAN.

Witnesses:

F. A. SPENCER,
M. L. LANGE.