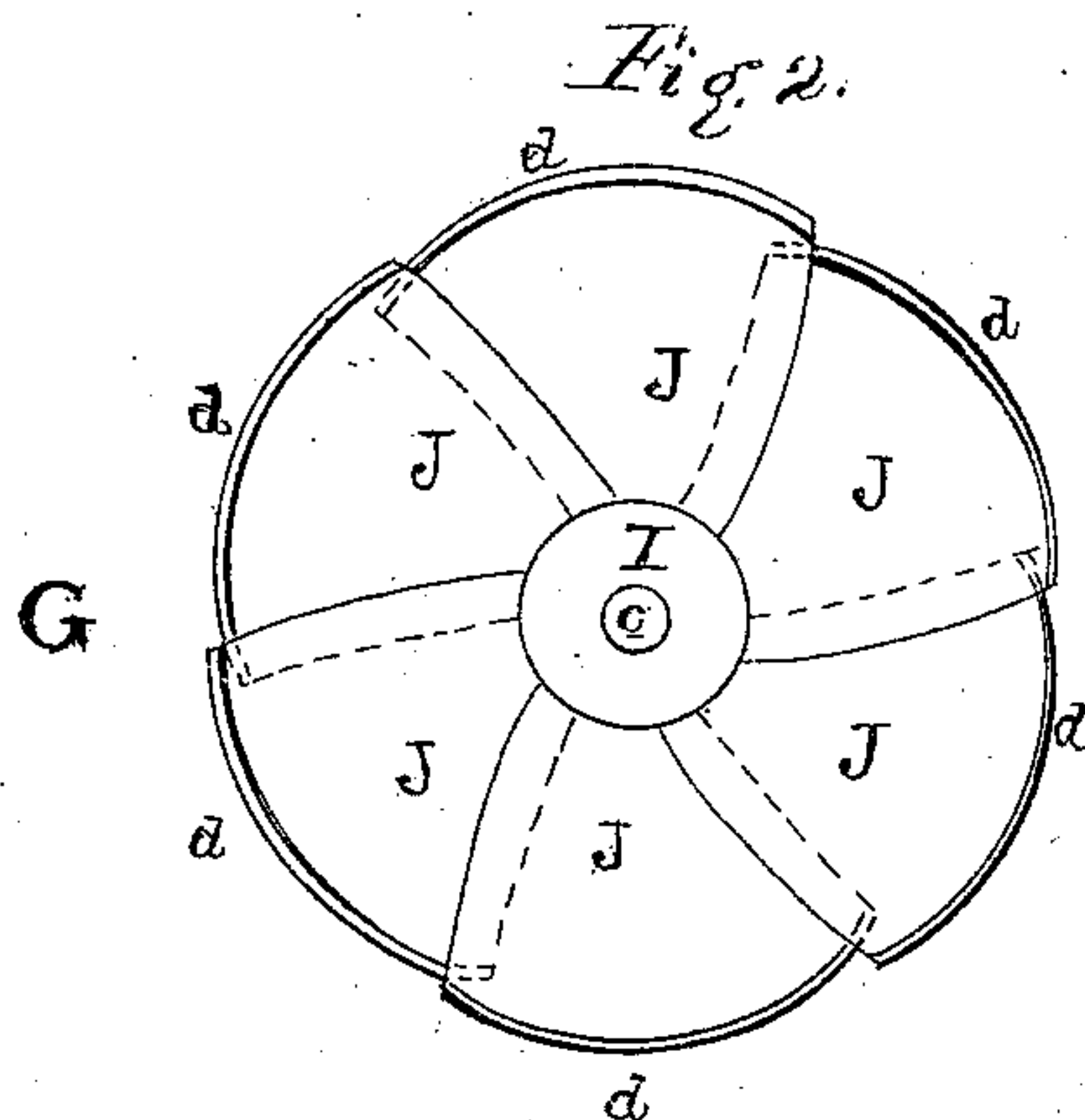
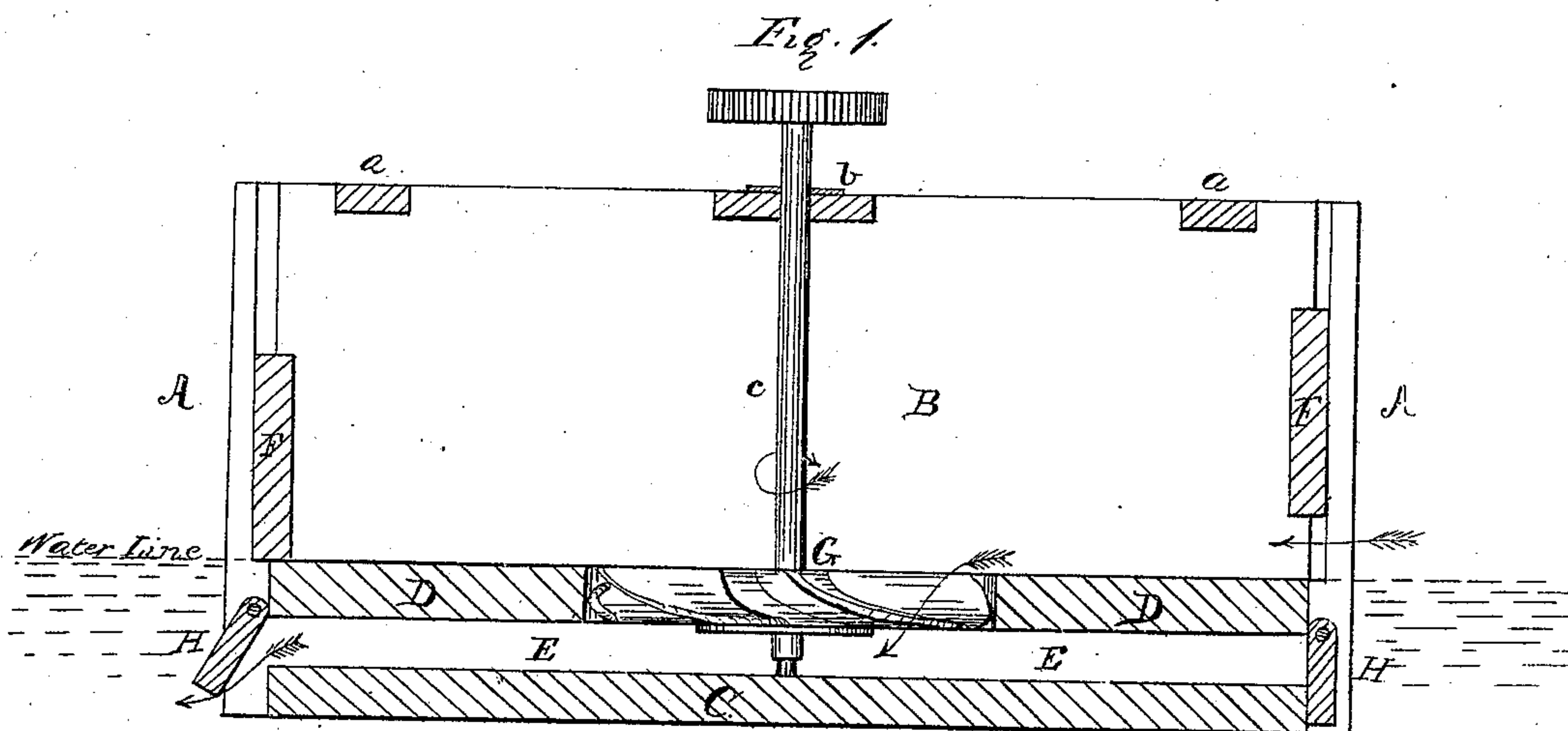


P. W. Varrell,
Tide Water Wheel.

No. 33,392.

Patented Aug. 31/869.



Witnesses:
Phil. F. Lerner,
Geo. Prothwell

Inventor:
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By [Signature]
Attorneys.

United States Patent Office.

P. W. YARRELL, OF LITTLETON, NORTH CAROLINA.

Letters Patent No. 93,392, dated August 3, 1869.

IMPROVEMENT IN TIDE-WATER WHEELS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, P. W. YARRELL, of Littleton, in the county of Halifax, and State of North Carolina, have invented a new and useful Improvement in Water-Wheels; and I do hereby declare the following to be a full, clear, and exact description of the same, sufficient to enable others skilled in the art to which my invention appertains to fully understand, make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central vertical longitudinal section of the device, illustrating my invention.

Figure 2 is a top or plan view of the wheel.

Similar letters of reference indicate corresponding parts in the two figures.

The subject of this invention is a water-wheel of peculiar construction, and is intended more particularly to be operated by the rising and falling of tides, but generally by any flow or fall of water.

In the drawings—

A represents the casing, which is open at both ends, and consists of side pieces B, and a bottom, C, which parts are connected together in any suitable manner, and retained by top cross-pieces *a*, or otherwise.

D is the wheel-floor, which consists of a flat board, or piece of other material, arranged parallel above the bottom C, so as to leave a space, E, between the two parts, which space is likewise open at both ends.

The side pieces B of the casing are grooved or channelled to receive sliding gates F, which have a vertical motion from the wheel-floor D, and adapted to be raised to a height equal to the surface of the water or steam.

Swinging or other gates may be employed, their object being to admit, cut off, and regulate the flow of water to the wheel at all times.

An opening is made in the floor-case D, and in this opening the wheel G, has its rotation, the wheel being secured to a shaft, *c*, which rests on a suitable step on the bottom C, and is retained and guided by a top cross-bar *b*, or by any other proper means.

H are valves, which are hinged in a suitable manner to the ends of the side pieces B, or the wheel-floor D, so that their lower ends are free, whereby said valves are adapted to swing freely.

They are arranged at the ends of the spaces E, so as to open or close them, as seen in fig. 1.

The wheel G is constructed with the usual hub I, to which the shaft *c* is connected, and from which extend the buckets J.

Each bucket consists of a flat plate, which is curved downwardly, and has formed on its outer side a similarly-curved flange, *d*.

The lower end of each bucket is underneath its adjacent bucket, as seen in dotted lines, fig. 2.

When the wheel is in position, the upper end of the buckets should be in line with the face of the wheel-floor D, as seen in fig. 1.

The operation is as follows:

The case is placed in position in a cove, or elsewhere, at a proper distance from the shore, that is, with one of the free ends facing in the direction of the sea, and the other end in that of the shore.

Embankments are then made from the sides of the casing to the shore, which lie on those sides, so that the water must flow through the casing.

The wheel-floor D should be at such a height that the lowest water at ebb-tide will always flow to the wheel, or the said floor shall be so placed that even the lowest surface of a stream will operate the wheel.

Figure 1 is intended to represent the wheel in use, while the tide is rising.

The gate toward the sea is opened and the other closed. The water now rushes in the casing in the sea end, and acts on the buckets and turns the wheel.

It must be observed that the valve, at the sea end, is kept closed by the pressure of water against its outer side, but the valve at the other end is opened, and kept opened by the water, which flows from the wheel through the space E.

A continual current is thus produced, which may be regulated or cut off by the open gate, hitherto described.

As the water rises, so its power on the wheel increases, and continues to act thus on the wheel until flood tide, or high water.

So soon as the tide begins to fall, then the gate on the sea side must be closed, and that on the shore be opened.

The valve on the shore side now closes, while that toward the sea is opened by the water from the wheel, in a manner similar to what has been previously described.

The wheel thus turns in the same direction, and operates equally well on the rising as well as the falling of the tide.

Should both valves be opened, there will be no rotation of the wheel, in consequence of the water flowing through the space E and seeking its level.

The motion of the wheel may be further prevented by rigidly securing the valves against opening, or by closing the space E, whereby there is no circulation of water through said space, and consequently no operation of the wheel.

The wheel, as constructed, is readily operated. There is but little friction and suction, owing to the sharp ends of the buckets, while the simplicity of the wheel is such as to make an efficient motor, and one which is within the reach of the humblest miller.

Should the wheel be desired when there is a high head of water, or take the place of over-shot wheel, the buckets must be reversed on the shaft, that is to

say, what is the bottom of the wheel, in fig. 1, must be made the top.

In this case the flume will connect with the space E, in lieu of one valve, the other valve being permanently closed.

The water runs into the space E up through the wheel, and out of the casing at the side opposite to its entrance.

Having thus described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. The wheel G, constructed of the buckets J, of

the curved form, as stated, and having their lower ends beneath each other, substantially as and for the purpose described.

2. The provision for operating a water-wheel in the same direction, by the rise and fall of tides, substantially as described.

The above signed by me, this 16th day of December, 1868.

P. W. YARRELL.

Witnesses:

JOHN A. WIEDERSHEIM,

PHIL. F. LARNER.