Sheet 1-2 Sheets.

M. J. Colbourn.

Water Wheel.

No. 83,604. Patented Nov. 3, 1868.

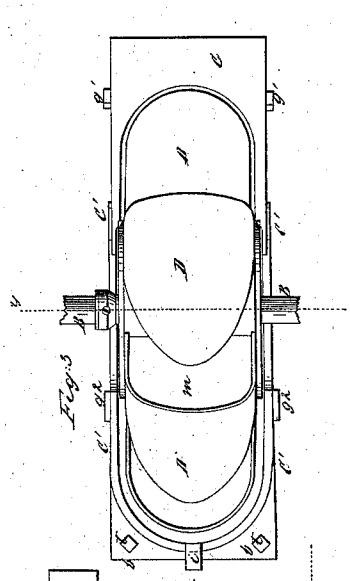

Fig. 3.

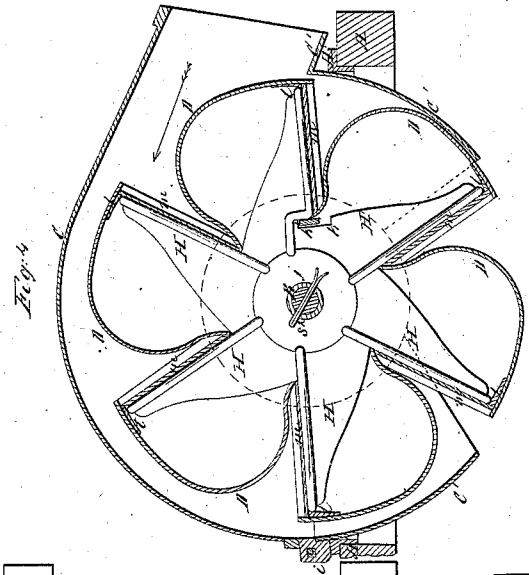

Fig. 4.

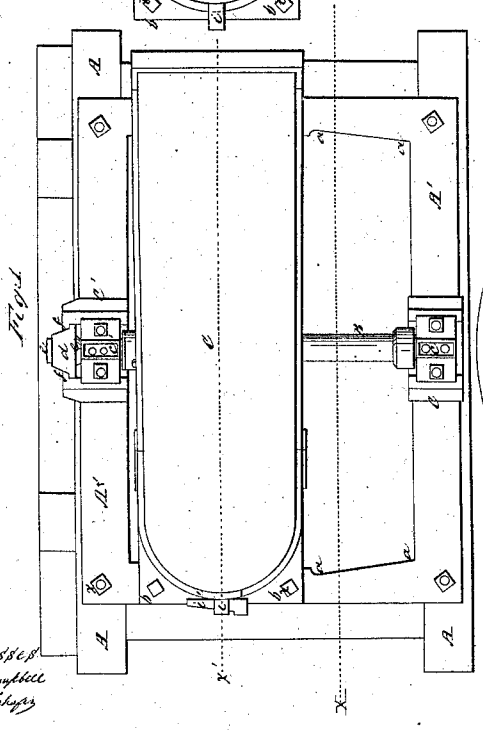

Fig. 1.

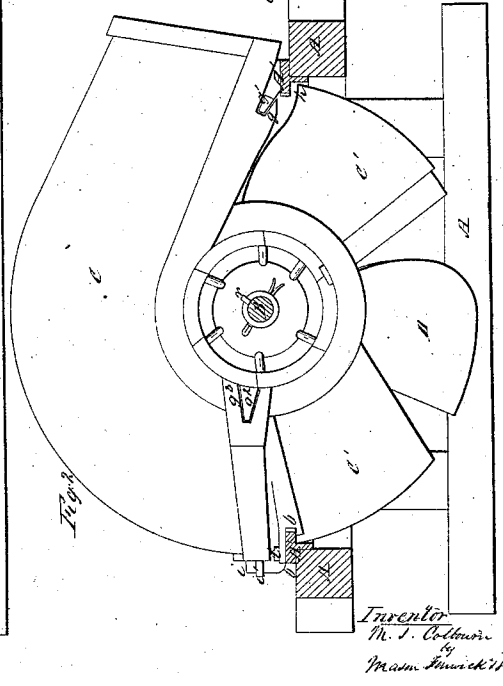

Fig. 2.

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Sheet 2-2 Sheets.

M. J. Colbourn

Water Wheel,

No. 83,604. Patented Nov. 3, 1868.

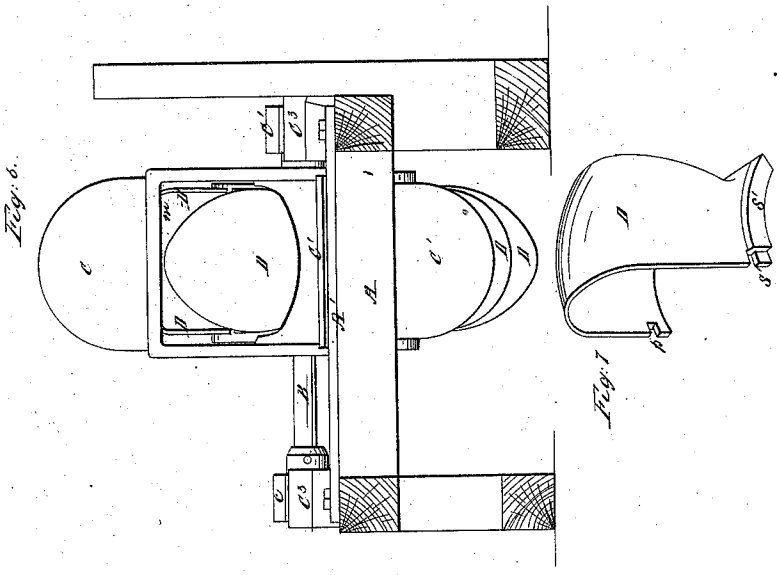

Fig. 6.

Fig. 7

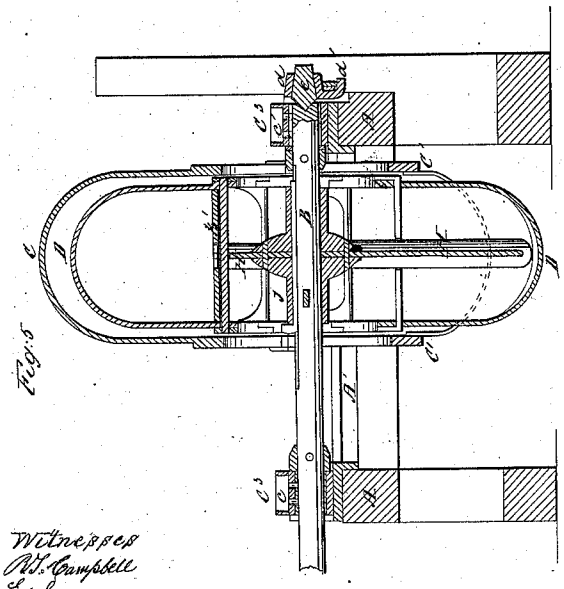

Fig. 5

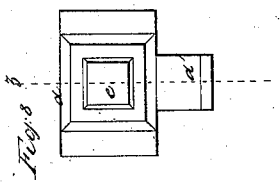

Fig. 8

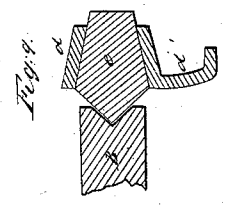

Fig. 9

Witnesses
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United States Patent Office.

MARK J. COLBOURN, OF KARTHAUS, PENNSYLVANIA.

Letters Patent No. 83,604, *dated November* 3, 1868.

IMPROVEMENT IN 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, MARK J. COLBOURN, of Karthaus, in the county of Clearfield, and State of Pennsylvania, have invented a new and improved Water-Wheel; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1, sheet 1, is a plan view of the wheel-case, enclosing the wheel and its frame.

Figure 2 is a side elevation of the same, as seen by making a longitudinal section through the frame, in the vertical plane indicated by red line *x* in fig. 1.

Figure 3 is a top view of the wheel, as seen by removing the upper section of its case.

Figure 4 is a longitudinal section through the wheel, its case, and frame, taken in the vertical plane indicated by red line *x'* in fig. 1.

Figure 5, sheet 2, is a transverse section, taken in a vertical plane through the centre of the wheel, its case, and frame.

Figure 6, sheet 2, is a front elevation of the improved wheel, its case, and frame.

Figure 7 is a perspective view of one of the bucket-shields.

Figures 8 and 9 are views showing the construction of the removable step and its bearing-box.

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

This invention relates to certain novel improvements on water-wheels, from which motion and power can be obtained for driving various kinds of machinery.

The invention provides for so constructing such wheels that they can be practically used either in vertical or horizontal positions, and either wholly or partially submerged in water, as the circumstances of the case may require.

The nature of my invention consists, mainly, in providing the radial buckets or floats of water-wheels which are enclosed within cases, with hoods or shields, so shaped that, while they will allow the water to enter the cases of the wheels freely, they will prevent the water, after acting upon the buckets, from rebounding or reacting against the surfaces of the succeeding buckets, as will be hereinafter described.

The invention further consists in a sectional convolute case for my water-wheel, which is constructed of two sections, and provided with tongue-and-groove fastenings, in combination with a device which will lock the sections securely together, whereby a water-tight and rigid case is produced, which will allow free access to the water-wheel contained in it at any time, and without removing the wheel from its bearings, as will be hereinafter explained.

It also consists in providing the case of my water-wheel with a frame, which will serve as the support for the shaft of this wheel, such frame being so constructed that one section of the case of the wheel can be secured to it by tongues and grooves, together with bolt-fastenings, so as to effect a rigid attachment, which will admit of the ready removal of the said section-frame at pleasure, as will be hereinafter explained.

It further consists in combining a removable step-bearing, for supporting the shaft of the water-wheel, when arranged in a vertical position, with bearings which are adapted for sustaining said shaft when it is arranged in a horizontal position, as will be hereinafter described.

It also consists in constructing the shields, for the several floats or buckets of my wheel, with segments, having tongues and grooves formed in their ends, in combination with a locking-key, and with flanges, which are formed upon the backs of the floats, for the purpose of securing said shields in place around the axis of the shaft of the wheel, so that these shields can be separately formed, and made very light and portable, as will be hereinafter explained.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

In the accompanying drawings, A represents a frame-work, which is adapted for sustaining my improved water-wheel and its metallic frame, and the wheel-case of the wheel. This frame A may be constructed in any suitable manner, for supporting the water-wheel either in a horizontal position or in a vertical position, as circumstances may require.

The drawings represent the water-wheel arranged in a vertical position, and, while I shall refer to the several parts as being arranged in accordance therewith, I do not wish to be understood as confining myself to a vertical wheel, as my improvements enable me to arrange the wheel in any position which I may desire, and have it operate successfully.

On top of the frame A, and securely bolted thereon, is a metallic rectangular open frame, A', which is constructed with flanches, that fit within the supporting-rails of frame A, and prevent any liability of displacement of the wheel and case when properly adjusted in place for operation. The frame A' is adapted for receiving, between the inner parallel edges of its transverse bars, the bottom section, C', of the case enclosing the water-wheel, and also for allowing this section C' to be removed from its frame when desired.

The section C is constructed with notches or recesses in its front and rear ends, forming jaws, *b h*, as shown in fig. 2, which receive the said inner parallel edges of the frame A, and thus form a strong attachment for the section to its frame. With this attachment, and two bolts applied to the jaw *b*, as shown in fig. 1, the section will be held rigidly in place, and, by removing said bolts, the section can be detached from its frame, by simply sliding its ends laterally between those portions of the frame which are cut out, as shown at *a a*.

Upon the longitudinal bars of frame A', grooved standards, C^2 C^3, are formed, for receiving bearing-boxes, *c c'*, which boxes may be secured in their places

in any suitable manner, so as to afford bearings for the shaft B of the water-wheel, and allow of the removal of this shaft and its wheel from frame A' whenever desired.

The standard C^3, which receives the bearing-boxes c', is constructed with a recess, and with jaws, $f\,f$, at its outer end, for receiving a tapering rectangular box, d, and a hooked tongue-piece, d', formed on this box, as shown in figs. 5, 8, and 9. This box d is adapted for receiving a wooden step-block, e, for sustaining the lower end of the shaft B when this shaft is arranged in a vertical plane. When the shaft B is arranged in a horizontal plane, as shown in the drawings, the step-block e is not used. The box d fits snugly in its recess in the box c', and is held in place therein by the hook d', as shown clearly in fig. 5.

The case, which partly encloses the buckets of the wheel, and which serves as a guide for directing the water from the forebay upon the several buckets of the wheel, is of a convolute form, that is to say, the water-passage is gradually contracted as it approaches the discharge-opening, which is made through the section C^1, directly beneath the axis of the wheel, as shown in figs. 2 and 4.

The upper portion, C, of the said case, is removable, and can be taken from section C^1 at any time, without disturbing the other parts. The upper section, C, is constructed with overlapping flanges along those edges which rest upon the section C^1, which will make, practically, a water-tight joint. This upper section C is also constructed with jaws, $g\,g^3$, near its front and rear ends, which are adapted for receiving lugs or tenons, $g^1\,g^2$, formed on the sides of the lower case, C^1, as shown in fig. 2. These jaws and tenons will secure the upper section, C, down firmly in place upon the lower section, C^1, and serve, in conjunction with the tongue i, and split-key fastening i', to prevent said section C from becoming casually detached from its lower section, and at the same time allow the upper section to be removed, when desired, by simply withdrawing the key i', and slipping this section backward.

When section C and the bearing-boxes of the shaft B are detached, the wheel can be removed bodily out of its place.

The water-wheel consists of any required number of floats, arranged at equal distances apart around the axis of the shaft B, as shown in fig. 4; and these floats are also arranged in planes radiating from the axis of said shaft. The floats are flat or concave plates, m, with rounded outer edges, which are permanently secured centrally to the edges of radial flanges or arms, H. Each one of these floats m is provided with a convex hood or shield, D, upon its back, which are designed to prevent the water striking the buckets at the mouth of the case from reacting against the succeeding buckets, as will be hereinafter further explained.

These shields are made hollow, so as to be very light, and each shield is constructed with segments, S, upon its edge nearest the axis of the shaft B, the ends of which segments are provided with tongues, S', as shown in fig. 7.

The shields are also constructed with shoulders, l, upon their inner surfaces, which are set back a little from their front openings, to receive against them the outer edges of the float-plates m, as shown in fig. 4.

The shields, thus constructed, are fitted together around the axis of the wheel, and secured rigidly in their places by means of their interlocking segmental portions and a transverse key, k', which passes through notches p, made through segments S' of two of the shields D, and also through a slot which is made through the web of the wheel. When the shields D are all arranged around the axis of the wheel, the key k' will lock them all in place. The flanches H are formed around a hub, j, which is slipped upon the shaft B, and secured in place by means of keys, as shown, or in any other suitable manner.

I have thus described a mode of constructing the water-wheel which will admit of the construction of the shields D separate from the floats of the wheel, and also allow these shields to be secured rigidly in place to their respective floats. In practice, the wheel may be constructed in this manner; but I believe that the entire wheel may be cast in one piece, with hollow shields, to secure lightness.

It will be seen, by reference to figs. 3, 4, 6, and 7, that the shields, which are placed at the backs of the several floats or percussion-plates m, are so shaped that they will allow water entering at the mouth of the sectional wheel-case, to flow unobstructed over and around them, and strike against the floats m, as these latter successively pass said mouth; and it will also be seen that these shields or hoods D are so shaped that they will not offer any considerable resistance to the water, which rebounds immediately after its first impact against the floats.

The floats m may be made slightly concave, and, if desirable, the edges of the shields D may project from their faces, so as to prevent loss of power by a too free lateral flow of the water after striking the floats.

It will be seen that my improved wheel may be readily removed from its frame A', together with its sectional case, and adjusted so as to turn either toward the right or the left, as may be required.

It will also be seen that the wheel can be arranged to work either in a horizontal plane or in a vertical plane, and that it will operate, whether partly or wholly submerged in water.

The shields prevent the water from striking the back surfaces of the float-plates m after striking the front faces of these floats, and afford rounded deflecting surface, which will relieve the floats from sudden impact of back-water.

The bearing-boxes of the shaft of the wheel are accessible at all times for oiling and adjusting, and, if desirable, these boxes may be provided with Babbit metal, so as to allow the shaft to turn freely, without rapid wear of its journals.

Having described my invention,

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

1. The hoods or shields D, constructed of the form substantially as described, upon the backs of radial floats m, substantially in the manner and for the purposes described.

2. The shields D, constructed with interlocking segments S' and shoulders l, in combination with the float-plates m, flanches H, and a locking-key, k', substantially as described.

3. The convolute case, enclosing the water-wheel of two sections, C C^1, constructed and connected together by the devices as shown, so as to be detachable, substantially as described.

4. The combination of the sectional frames A A', the sectional water-wheel case, and the tongue-and-groove and bolt-fastenings, all constructed and arranged substantially in the manner and for the purpose described.

5. The removable box d, provided with hooked fastening d', adapted for use with a standard, C^3, substantially as and for the purpose described.

MARK J. COLBOURN.

Witnesses:

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J. C. MCCLOSKEY.