T. H. Russell Sheet 1, 2 Sheets.

Turbine Wheel.

No. 94,916. Patented Sept. 14, 1869.

Fig: 1.

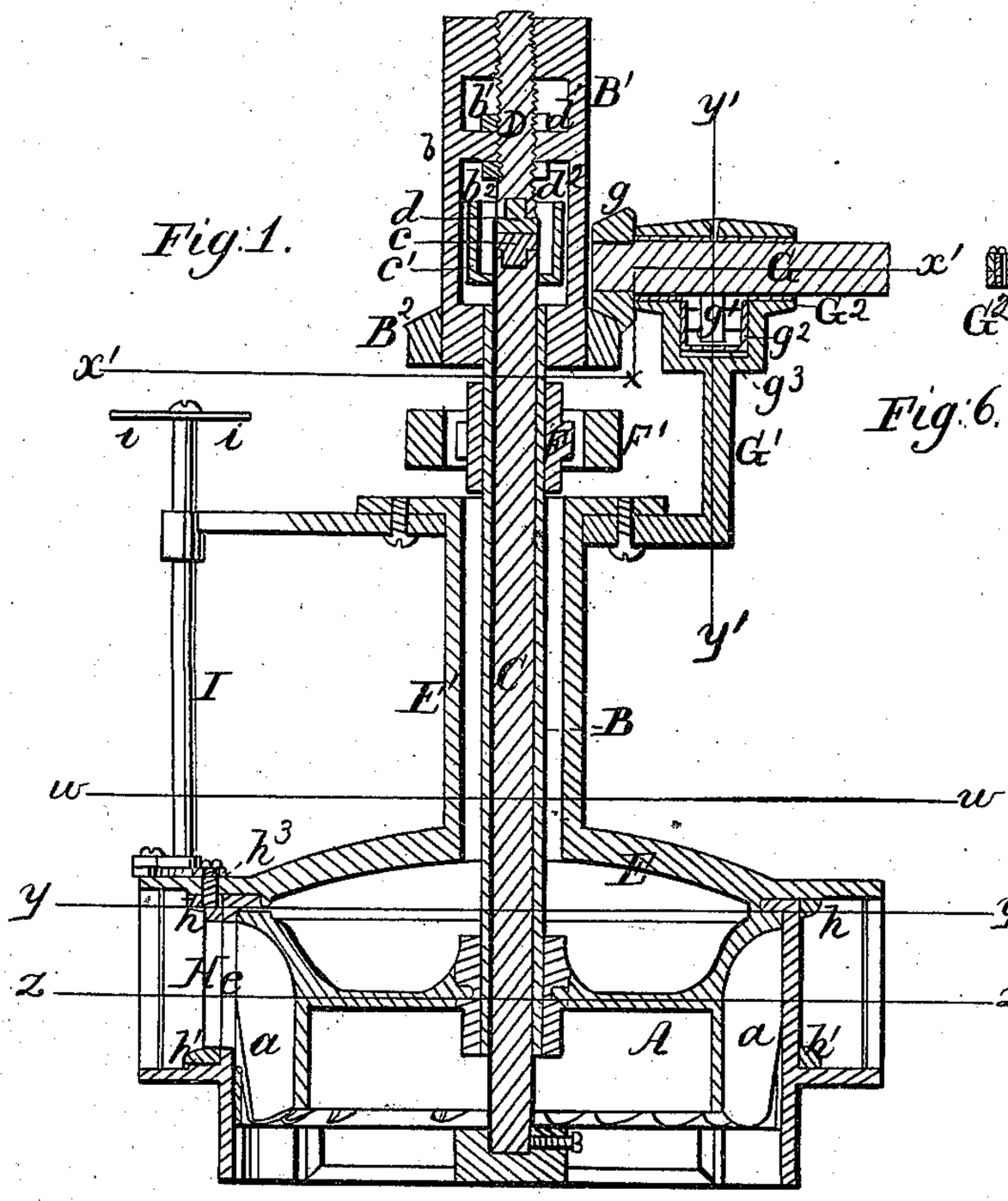


Fig: 6.

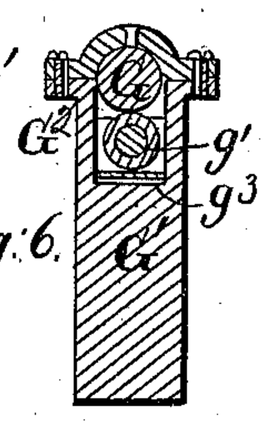
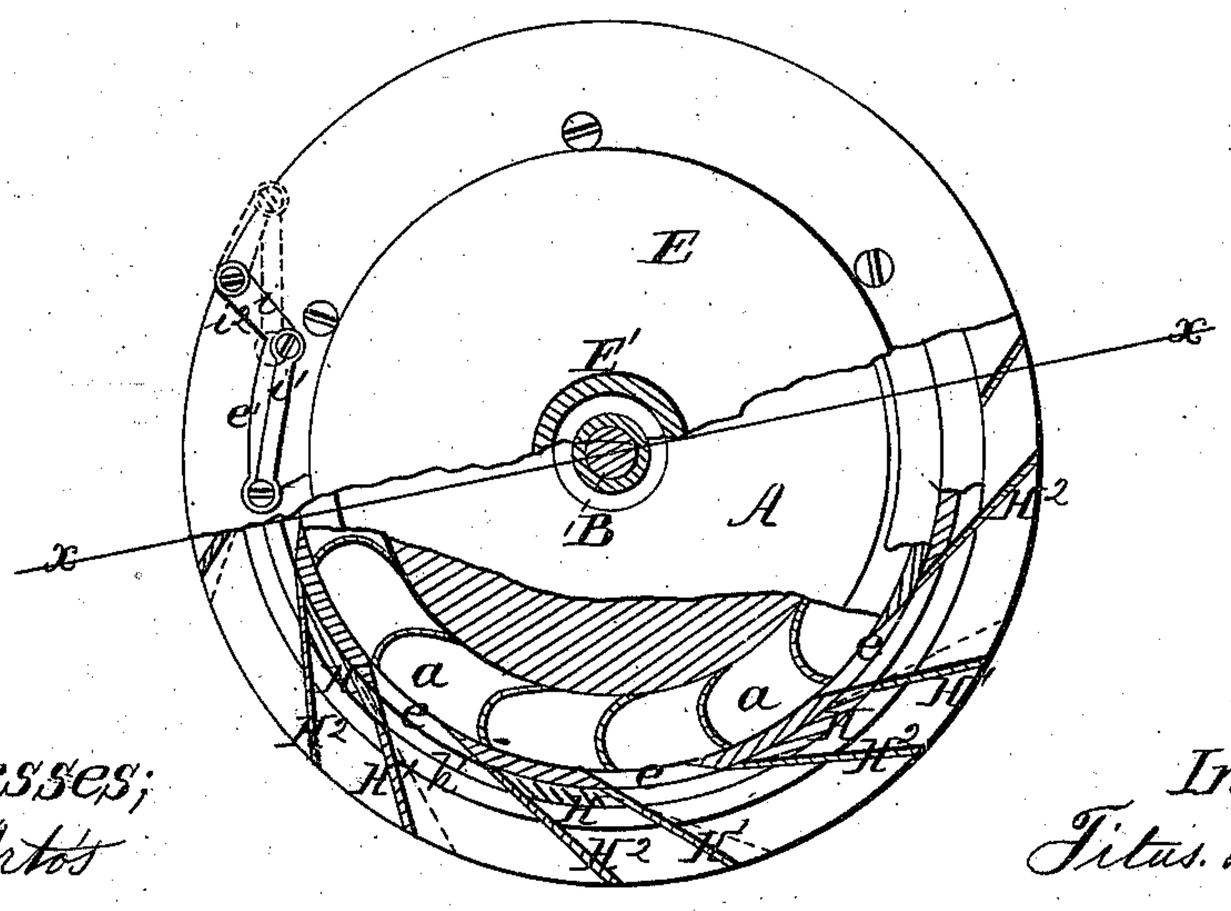


Fig: 2.



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T. H. Russell Sheets, 2 Sheets.

Turbine Wheel.

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Fig. 3.

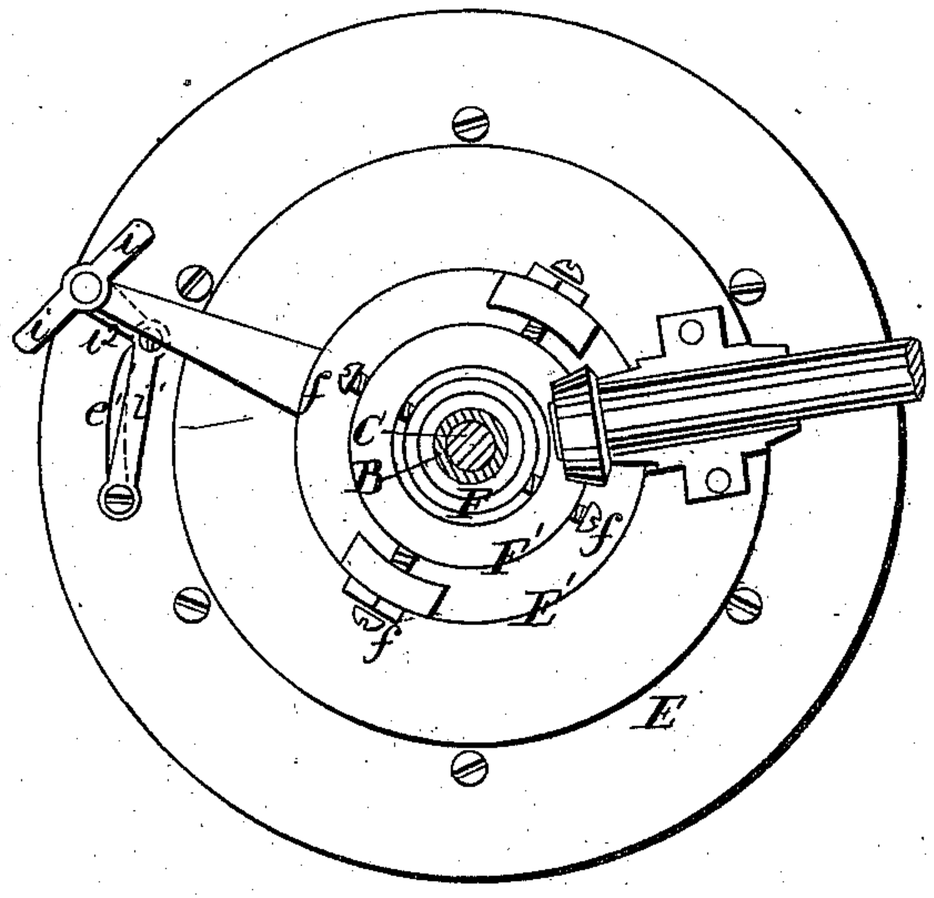


Fig. 5.

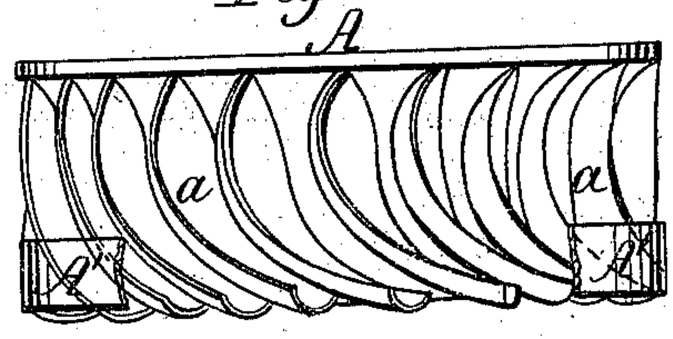
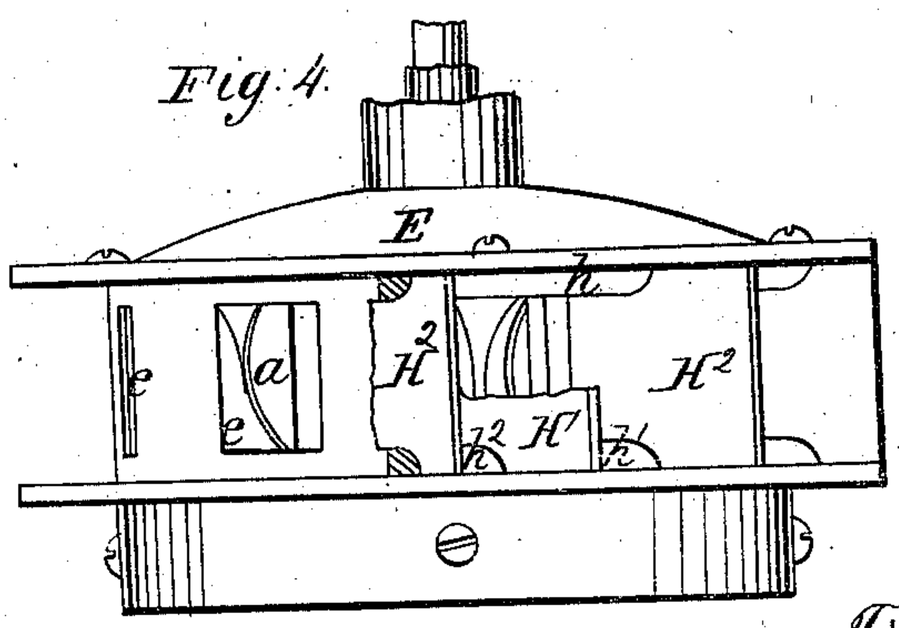


Fig. 4.



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TITUS H. RUSSELL, OF NORTHFIELD, VERMONT.

Letters Patent No. 94,916, *dated September* 14, 1869.

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, TITUS H. RUSSELL, of Northfield, in the county of Washington, and in the State of Vermont, have invented new and useful Improvements in Turbine Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which make part of this specification, and in which—

Figure 1 represents a vertical section of my improved water-wheel and its attachments, at the line *x x* of fig. 2;

Figure 2, a horizontal section of the same, taken at different planes of fig. 1, which are denoted by the lines *w w*, *y y*, and *z z*, respectively;

Figure 3, a similar section of the same, at the line *x' x'* of fig. 1;

Figure 4, a side elevation of the wheel-casing, showing the chutes, movable gates, and guides;

Figure 5, a side elevation of the wheel detached; and

Figure 6, a vertical section, through the countershaft and its bearing, at the line *y' y'* of fig. 1.

The objects of my invention are to provide—

First, an improved method of supporting the wheel and its shaft, whereby the position of the same may be readily and accurately adjusted as required;

Second, a convenient and desirable mode of constructing and operating the gates, by which the supply of water to the wheel is regulated;

Third, an improved construction of the buckets, whereby their strength is increased, and a greater percentage of useful effect realized from the water; and

Fourth, an improved method of oiling the bearings of the countershaft.

To these ends my improvements consist—

First, in supporting the wheel upon a step on the upper end of a stationary shaft, around which the hollow shaft of the wheel revolves, its weight acting on the step through the intermediation of a bearing on the lower end of a short shaft within, and concentric with the wheel-shaft, having a thread cut upon it, and provided with check-nuts, by means of which it can be raised and lowered. The wheel-shaft is maintained in proper vertical position by means of two oscillating collars, within which it rotates, the same being pivoted to each other and to the casing or frame by set-screws, by which their position can be regulated to keep the shaft properly in line.

Second, in a series of movable gates, secured at top and bottom to two rings, which encircle the wheel-case, and are rotated by links connecting them with a vertical shaft, the rings being guided in their movements by recesses in the stationary chutes, through which they pass.

Third, in a friction-roller or gear-wheel, mounted in a support in the bearing of the countershaft, and maintained in gear with the same, or with a similar roller or gear thereon by a spring, so as to supply oil to the bearings of the countershaft during its rotation.

In the accompanying drawings, which show a convenient arrangement of parts for carrying out the objects of my invention,

A represents the wheel, which rotates within a case, E, to which the water is conducted by suitable pipes or channels, and which is substantially constructed, so as to serve as a frame-work for the support of the moving parts.

The wheel is secured upon a tubular shaft, B, connected at top to a larger shaft, B^1, which carries the bevel-gear B^2, through which power is transmitted to the machinery to be driven, by means of the bevel-pinion *g*, on the countershaft G.

Large slots, b^1 b^2, separated by a partition, *b*, are formed in the upper section, B^1, of the wheel-shaft, which bears upon a step, *c*, at the top of the stationary shaft C, by means of a bearing, *d*, on the lower end of a shaft, D, within and concentric with the shaft B^1.

An oil-box, *c'*, surrounds the step and bearing, to afford proper lubrication to the same.

A thread is cut upon the shaft D, which is provided with check-nuts d^1 d^2, above and below the partition *b*, respectively, by which means the wheel can be raised or lowered as required, thus providing an efficient means of vertical adjustment.

A collar, F, encircles the tubular shaft B below the bevel gear B^2, the shaft revolving freely within it.

This collar is hung upon the ends of set-screws *f*, screwed into a second collar, F', which surrounds it, the collar F' being hung in a similar manner on the ends of set-screws *f'*, screwed into lugs on the top of a tubular bearing, E', attached to the case E.

The set-screws *f* and *f'* are placed at right angles to each other.

By this arrangement the wheel-shaft B is maintained in vertical line, and the bearing *d* and step *c* kept in proper position, preventing undue wear of the parts and loss of power, and causing the gears B^2 and *g* to work truly together.

The water is admitted to the wheel through a series of openings, *e e*, in the case E, which can be partially or wholly closed at pleasure, by the gates H.

These gates are secured at top and bottom to rings *h* h^1, which encircle the case concentric with and contiguous to the wheel A, forming, in connection with

the movable chutes H^2, a rotating frame, to which movement is imparted in such manner as to partially or wholly close the openings *e*, by means of a vertical shaft, I, carrying at top a hand-wheel or arms *i i*, and connected, by the links i^1 i^2, with a pin, h^3, secured to the upper ring *h*.

Between the alternate movable chutes H^2 are placed the stationary chutes H^1, in which are formed curved recesses h^2, through which the rings *h* h^1 pass, and which serve as guides to insure the proper movement of the same, and prevent their displacement.

The chutes H^1 H^2 are set at such angles with the radii of the wheel as to direct the water properly upon its buckets, and by the devices just described, it will be seen that the amount of opening for the entrance of water can be easily and conveniently regulated.

Upon the periphery of the wheel A are secured the buckets *a a*, the construction of which is clearly shown in figs. 2 and 5, they being curved both laterally and vertically, in order that the water may act upon them both by impact and reaction, and thereby develop an increased percentage of useful effect, as well as to enable a longer bucket to be used for the same height of wheel.

The buckets are surrounded at bottom by a ring, A′, of such height that when in operation its top shall be below the openings *e*, through which the water enters the buckets.

This ring is secured in suitable manner to the buckets, and acts as a brace or strengthening-piece, to give them greater stiffness, and obviates risk of breakage or displacement.

The countershaft G, through which power is transmitted to the machinery to be driven, rotates in bearings G^2, on a stand, G^1, secured to the top of the case E, or to the tubular stand or bearing E′.

Within the bearings G^2, and beneath the countershaft G, is placed a frame, g^2, in which rotates a friction-roller, g^1, which is pressed up against the countershaft by a spring, g^3.

When the countershaft is in rotation, it imparts rotary movement to the friction-roller g^1, by which a constant supply of oil, with which the chamber in which the latter rotates is partially filled, is afforded to the bearings of the countershaft.

Instead of the friction-roller, two gear-wheels, one upon the countershaft and the other on the frame g^2, may be employed for a similar purpose.

Having thus fully described my invention,

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

1. The threaded shaft D, and check-nuts d^1 d^2, in combination with the shaft B^1, bearing *d*, step *c*, and stationary shaft C, the whole constructed and operating substantially as and for the purpose described.

2. The pivoted collars F F′, in combination with the tubular shaft B, stationary shaft C, and tubular bearing E′, substantially as set forth.

3. The rings *h* h^1, gates H, and movable chutes H^2, in combination with the case E and stationary chutes H^1, constructed and operating substantially as described.

4. A friction-roller or gear-wheel, within the bearing of the countershaft G, and pressed up to the latter by a spring for the purpose of supplying oil to the bearings, substantially as described.

The above specification signed by me, this 28th day of December, 1868.

TITUS H. RUSSELL.

Witnesses:

WILLIE T. RUSSELL,

H. CARPENTER.