

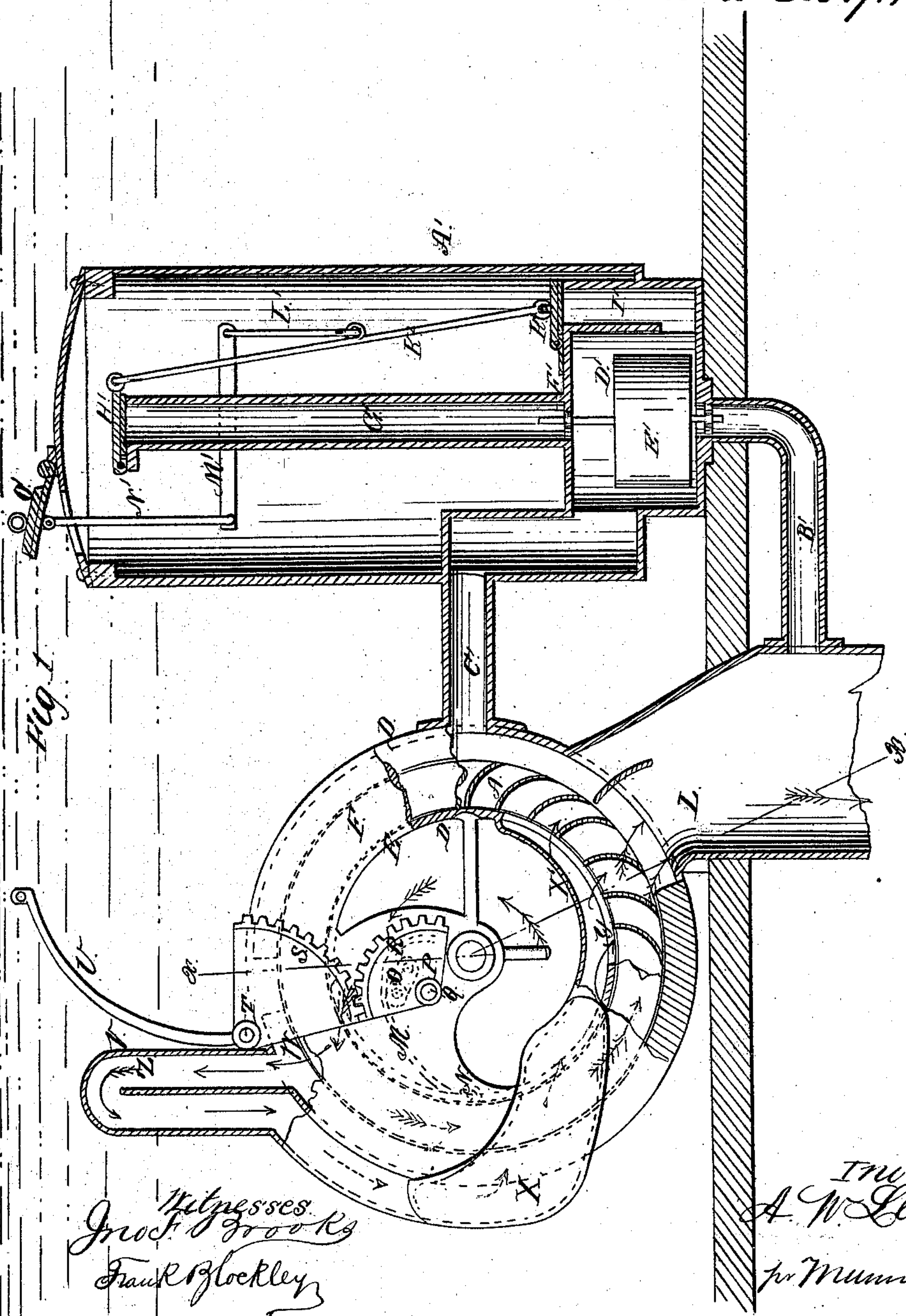
2. Sheets. Sheet. 1.

A. W. Lloyd,

Water Wheel.

No. 97,658.

Patented Dec. 7. 1869.



Witnesses
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A. W. LLOYD, OF NORTH ADAMS, MASSACHUSETTS.

Letters Patent No. 97,658, dated December 7, 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, A. W. LLOYD, of North Adams, in the county of Berkshire, and State of Massachusetts, have invented a new and useful Improvement in Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to improvement in water-wheels, such as are used with a draught-tube; and has for its object to provide certain improvements in the construction of the same; also, a draught-regulating apparatus, for keeping the draught-tube full of water, whether running or not, to compensate for the loss of water in the said tube, by reason of leaking and accumulation of air therein, set free from the water, which lowers the level of the water therein, and, consequently, the efficiency of the wheel.

Figure 1 represents an end elevation of my improved wheel, partly sectioned, also a section of the draught-regulating apparatus;

Figure 2 represents a section of the wheel, taken on the line *xx* of fig. 1; and

Figure 3 represents a plan view.

Similar letters of reference indicate corresponding parts.

A represents the buckets, which are curved similarly to those of other wheels, receiving the water at the centre, and discharging it at the periphery.

They are supported upon the arms B (see fig. 2, Sheet II,) of the shaft C, at about the centre of their length, and work between the exterior case D and the interior cases E, made separately, and fitted in from each end of the exterior case D, and connected thereto by the flanges F, which form the end casings for the wheel, the said flanges being fitted and bolted to the end of the said case D. The buckets are designed to be turned off with exactness on the both edges, to fit as closely as possible between these cases, at the place where the action of the water takes place.

The cases E are recessed from the ends inward, the said recesses extending to the arms B of the wheel, where H represents the bottom walls thereof, to which sleeves I are provided for the shaft, projecting outward, and supported at the ends of the case by radial braces K. Suitable packing is interposed at the outer ends of the sleeves, thereby preventing water passing through them into the interior of the cases.

L represents the suction-tube.

M represents the gates, which are curved sections of the inner casings, hinged at N, and swinging toward the centre of the wheel, when opening, to admit the water to the inner edges of the buckets from the recesses in the said interior cases.

They are connected by links O to arms P, by short rock-arms, Q, one in each recess, having at their outer ends sector-wheels, R, gearing with other similar wheels, S, on a rock-shaft, T, above the case, and provided with an operating-arm, U, to be worked in any suitable way, for opening and closing the gates.

V represents air-passages, attached to the exterior of the case, one for each part of the wheel, having communication with the said wheel near the top, or opposite to where the water is admitted, and also at the bottom, or where the water discharges, as shown at W and Y.

The said passages are arranged so as to rise considerably, or at least a little above the level of the water over the case, as shown at Z, and then down through the conduits X to the spaces Y, under the lower parts of the interior cases, which are here raised to provide the said spaces, as shown at X.

This wheel is immersed in the water of the flume, as shown in fig. 1, resting on the bottom, through which the draught-tube projects below. The water passes in from the recesses in the ends, through the gates M, and acts upon the buckets.

The office of the air-tubes is to receive the air contained in the bucket-space, together with the air set free from the water, which, being lighter than the water, and exposed to the draught upward through the said air-passages, will, at the moment the water enters at the gates, be taken up, leaving the water more compact and effective while in action on the buckets. The greater part of this air so received is given up again to the water-wheel, at the space Y, above the discharge from the wheel, and, to some extent, passes off with the water; but it has a tendency to remain in the spaces formed between the buckets, thus taking the place of the water, and preventing the wheel from exercising its full measure of efficiency.

It is necessary, in order to obtain the best results, that no air-space be left or formed in the wheel or draught-tube L; still, from various causes, the draught-tube will alway leak more or less, whereby the water-level in it is reduced, and the space filled with air.

I have, therefore, in connection with this arrangement for receiving the air, provided an automatic air-escape and water-supplying apparatus, for taking the air away, and filling the draught to the required extent, to compensate for the said leakages and accumulations of air, the said apparatus being as follows:

A hollow tank, A', is immersed in the water in the flume, by the side of the wheel, and resting on the floor thereof, and having a pipe-connection, B', with the draught-tube below the wheel, also an air-pipe connection, C', with the wheel, a short distance above the discharge.

Both of these connections open into a float-chamber, D', in the bottom of the vessel A', wherein is a

float, E', arranged to open or close an air-valve, F', leading into the vertical tube G', at the top of which is a valve, H', opening upward.

From the float-chamber D' another passage, I', leads to the space above, also provided with a valve, K', opening upward, and connected by a rod, K², to the valve H'.

This rod is connected, by a link, L', to a lever, M', pivoted at its centre, and connected at the other end by a link, N', to the valve O', at the top of the tank.

The said valve O' is provided with any suitable means for operating it, and is raised from time to time to allow it to fill with water, after which it is closed.

By the act of closing it, the valves H' and K' are opened, and the water will flow through the passage I' into the draught-tube L, filling until the water rises in the float-chamber, on a level with the bottom of the wheel, raising the float sufficiently to close the valve F'. While the said float is down, and the water flowing into the draught-tube, the air is escaping from the wheel, through the tubes C' and G', to the space above the water in the tank, since the valves F' and H' are then open, when the water in the draught-tube rises, so as to set back in the float-chamber, forcing the float E' upward, and thus closing the valve F', and preventing the further flow of water from the tank, by preventing the passage of the air, through the pipe G', into the upper portion of the same.

This apparatus acts equally, whether the wheel be running or not, and adds materially to the efficiency of the same, especially when being set in motion, for,

owing to the leaks, which cannot practically be wholly prevented, the water would run out of the draught-tube entirely, when the wheel stands a long time, and would require the tube to be filled, or nearly so, before it would have power to set any considerable amount of machinery in motion.

Having thus described my invention,

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

1. The combination, with the wheel, constructed as described, and the exterior case D, of the interior cases E, made in two recessed parts, and provided with gates M, operating substantially as specified.

2. The combination, with the wheel and case D, of the air-conducting tubes or passages V, when arranged substantially as specified.

3. The combination, with the water-wheel, arranged for operation substantially as herein described, of a water-regulating device, for governing the level of the water in the draught-tube, consisting of passage I', valves K' H' O', substantially as herein shown and specified.

4. The combination, with the vessel A', connected to the wheel-case and draught-tube, of the float E', air-tube G', valve F', water-tube I', valves K', H', and O', when arranged for operation substantially as specified.

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Witnesses:

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