

(No Model.)

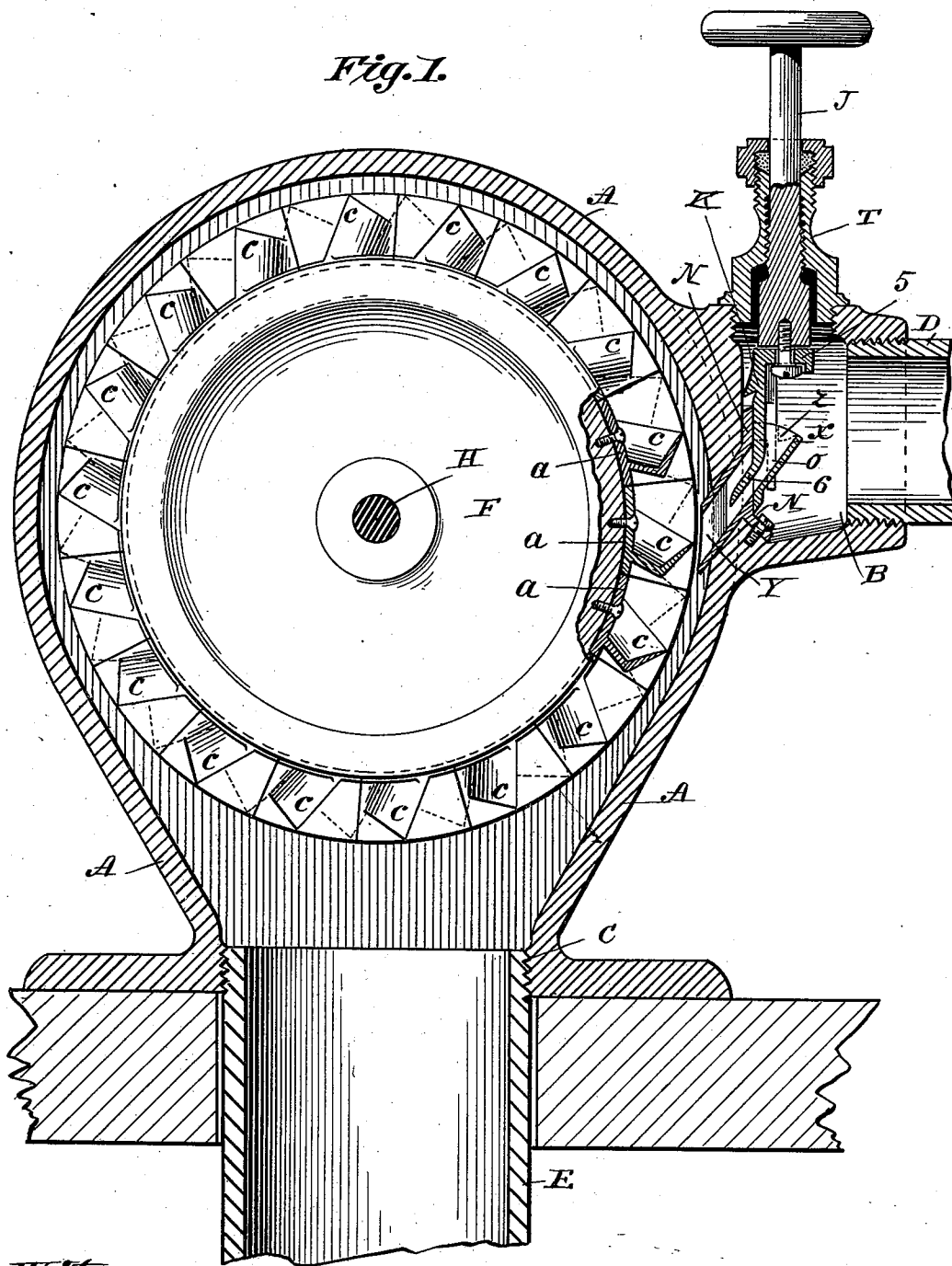
2 Sheets—Sheet 1.

E. E. COLEMAN.
WATER WHEEL AND GATE THEREFOR.

No. 568,603.

Patented Sept. 29, 1896.

Fig. 1.



Witnesses:

J. W. Gayfield
Wm. H. Chapin

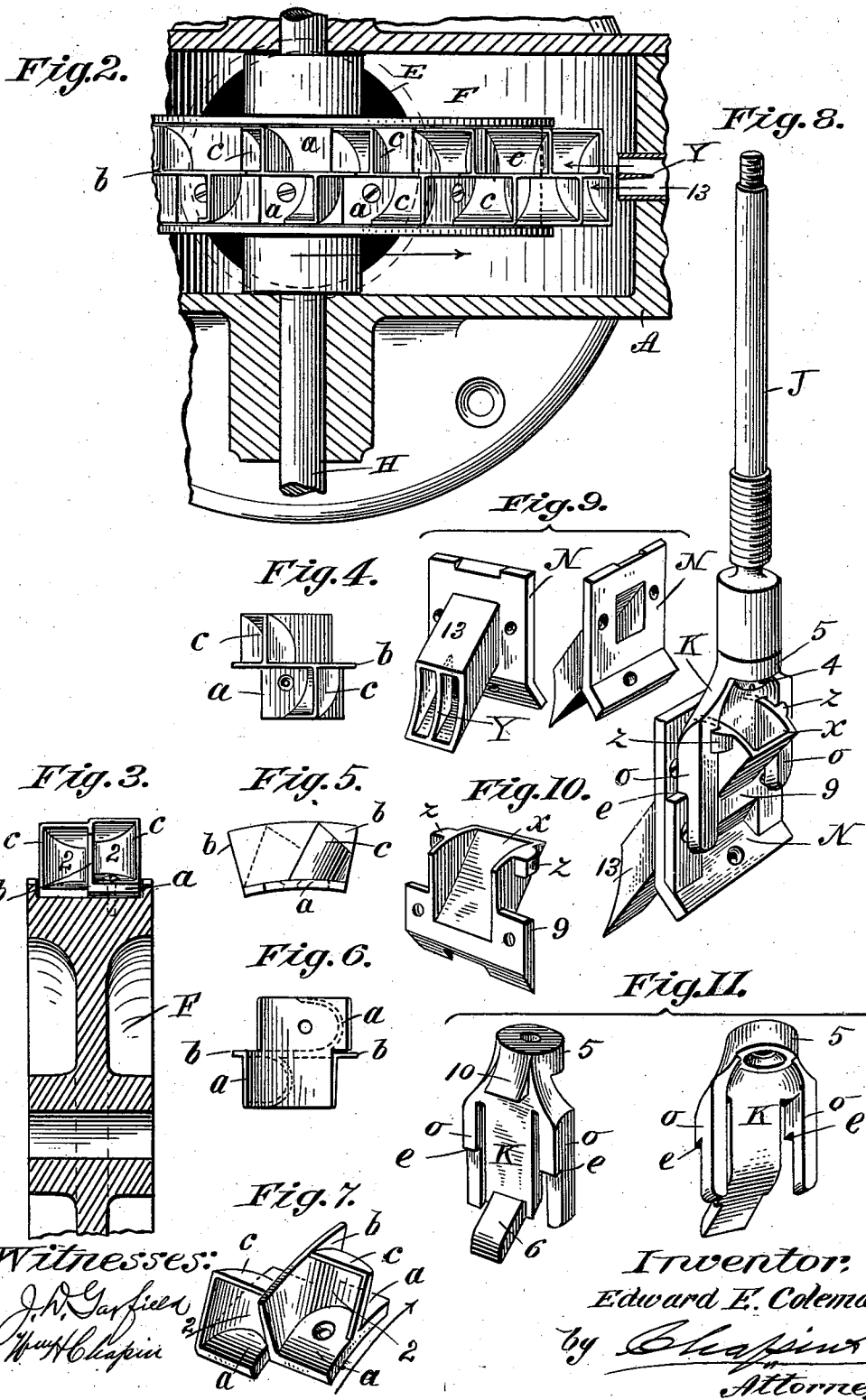
Inventor,
Edward E. Coleman

by *Chapin & Co.*
Attorneys

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UNITED STATES PATENT OFFICE.

EDWARD E. COLEMAN, OF EASTHAMPTON, MASSACHUSETTS.

WATER-WHEEL AND GATE THEREFOR.

SPECIFICATION forming part of Letters Patent No. 568,603, dated September 29, 1896.

Application filed October 23, 1895. Serial No. 566,579. (No model.)

To all whom it may concern:

Be it known that I, EDWARD E. COLEMAN, a citizen of the United States, residing at Easthampton, in the county of Hampshire and State of Massachusetts, have invented new and useful Improvements in Water-Wheels and Gates Therefor, of which the following is a specification.

This invention relates to water-wheels, the object being to provide a water-gate of improved construction adapted to be used in connection with impact water-wheels; and the invention consists in the novel construction and arrangement of the said gate, all as hereinafter fully set forth, and more particularly pointed out in the claim.

In the drawings forming part of this specification, Figure 1 is a side elevation, partly in section, of a water-wheel and a water-gate therefor constructed according to my invention, this figure showing also the wheel-case and its inlet and discharge pipes and gate-operating devices in section. Fig. 2 is a plan view of a portion of the periphery of the wheel and of a section of the wheel-case. Fig. 3 is a sectional view of a portion of the wheel at right angles to the axis thereof and a front elevation of one of the buckets thereon. Fig. 4 is a top plan, Fig. 5 a side elevation, Fig. 6 an inverted plan, and Fig. 7 a perspective view, of one of the buckets of the wheel. Fig. 8 is a perspective view of the gate and its operating-spindle. Fig. 9 is a front and rear view, respectively, of the discharge-tube of the gate. Figs. 10 and 11 are perspective views of the gate-case, hereinafter described.

In the drawings, A indicates the wheel-case, of which B is the inlet and C the discharge opening.

D and E indicate, respectively, the feed and discharge pipes of said case. The body F of the wheel consists of a metal disk of suitable diameter and thickness of periphery for the reception of the buckets of the wheel and is supported to rotate within the said case on the shaft H, to which it is fixed, which has its bearings in the opposite sides of the latter.

The buckets *c* of the within-described water-wheel are preferably made of cast metal in sections of two buckets each, each bucket-section consisting of a base *a* of segmental form, a centrally-located bucket-dividing

wall *b*, rising perpendicularly to the surface of said base, and of two buckets located on opposite sides of said wall. Said buckets are arranged in such relative positions that the wall 2 of each bucket, which receives the impact of the water, is substantially midway between the like walls of two of the buckets on the opposite side of said wall *b* when the said bucket-sections are arranged on the periphery of the wheel, as shown in Figs. 1 and 2. The direction of movement of said bucket-sections when the wheel rotates is indicated by the arrows in Figs. 1 and 2.

The periphery of the wheel-body F is preferably provided with a circumferential groove for receiving said bucket-sections, as shown in Fig. 3. Said bucket-sections are secured to the periphery of the wheel-body F by screws, as shown, or by other suitable means. Thus two groups of buckets are provided on the face of the wheel, which are separated by a continuous circumferential wall therebetween, consisting of the united wall-sections *b* of the said several bucket-sections shown in Fig. 7 and elsewhere. The said two separated groups or rows of buckets arranged as described on the wheel, on the opposite sides of a dividing-wall, are adapted to be operated, preferably, by means of two separate streams of water, each directed solely against one of said rows of buckets on one side of said division-wall *b*, or by a single stream of water divided into two delivered portions by a central partition in the discharge-aperture of the water-gate, as shown herein.

It is found in practice that by providing means for conducting equal portions of a stream of water against two separated series of buckets on the periphery of a water-wheel, arranged as above described, a better development of power is obtained than by directing said water in a single stream against buckets arranged as heretofore, all in one row on a wheel, each behind the other.

The water-gate herein provided for use with the said water-wheel is illustrated in complete form in Fig. 8, connected with an operating-spindle J, the latter having a swiveling connection with the gate proper, K, by means of a screw 4, passing through the head 5 of said gate K into the lower end of said

spindle. (See Fig. 1.) Said spindle is operated in a hub T of ordinary construction, screwed to the case A, by a hand-wheel, whereby said gate is raised and lowered.

5 The said gate construction comprises said gate K, constructed as shown in Fig. 11, having extending from its lower end the inclined water-guiding tongue 6 and the borders o o, which engage with other parts, below described, to guide the gate in its opening and closing movements.

The above-referred-to gate devices are secured to the wheel-case in the position shown in Fig. 1 at the junction of the feed-pipe D with said case. A plate 9, having a hopper-like formation x, and the lugs z, on the opposite sides of said hopper, is secured, as shown in said Fig. 8, onto the conduit-plate N, after placing said gate K thereon, in the position shown in Figs. 1 and 8, and when so placed the said borders o o of said gate have a sliding engagement between said lugs z z on hopper x, and the outside of the hopper-plate below said lugs, as shown in Fig. 8. Shoulders

25 e e, on said borders o o of gate K, serve to arrest the downward movement of said gate by striking the upper edge of said hopper-plate 9, and the boss 10 on said gate, arranged to abut against the upper end of the plate N, contributes to the same end. The conduit-tube 13 on said plate N is preferably of rectangular form in cross-section and has the partition y therein centrally between its sides. The operative position of said partition is one directly opposite the outer edge of said wall b, (see Fig. 1,) between the said rows of buckets on the water-wheel. The extremity of said conduit-tube adjoining the periphery of said water-wheel is of concave form to a degree corresponding to the circumferential line of said wheel, to the end that the said extremity of the conduit may be fixed close to the buckets of the wheel, for the purpose hereinafter set forth. Referring to the said gate K, having the tongue 6 in the lower end thereof, and to the conduit 13, it is found in practice that a gate for such conduit which operates in a line directly across the body of water which flows through said conduit, when operated to reduce the volume thereof passing therethrough, seems to interfere with the solid flow of the water between the gate and the wheel, but that when a gate like said gate K, having the tongue 6 thereon, is arranged to act on such a water-current,

the latter is delivered to the wheel in a more solid body; or, in other words, the cross-sectional area of the conduit 13 is variable according to any reduction of quantity of water flowing through the conduit below that permitted by a full-open gate. The gate and said tongue, in said last-named figure, are shown in about a half-open position. At full-open said tongue is held closely against the upper wall of the conduit 13.

It will be noted that the above-described water-gate is located as near the buckets of the wheel as is practicable, instead of being, as is commonly practiced, placed in a pipe or conduit at some distance from said buckets. The said gate location is preferable from the fact that it is found in practice that a water-wheel of this construction develops more power under the action of a comparatively small stream, such as can flow through the conduit 13, governed by said gate, under high pressure, than it does under the action of a larger stream under such reduced pressure, as would be the result of cutting off or governing the flow thereof by a gate located some distance away from the wheel, where the flow is more or less retarded from frictional causes. The feed-pipe D brings the water supply unimpeded directly to the gate K through the hopper x, and thence through the conduit 13, wherein the same is divided, and emerges therefrom in two separate streams by reason of the position of said partition y, each of which streams acts independently of the other against the row or series of buckets directly opposite each of the discharge-openings of said conduit.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

The combination with a water-wheel of the class herein described, of water-gate devices comprising the plate N, having the conduit 13, provided with the partition y, the plate 9, having the hopper x, thereon, the gate K, having the tongue 6, extending into said conduit, the spindle J, connected to said gate, and the hub T, with which said spindle has a screw engagement, substantially as set forth.

EDWARD E. COLEMAN.

Witnesses:

H. A. CHAPIN,
K. I. CLEMONS.