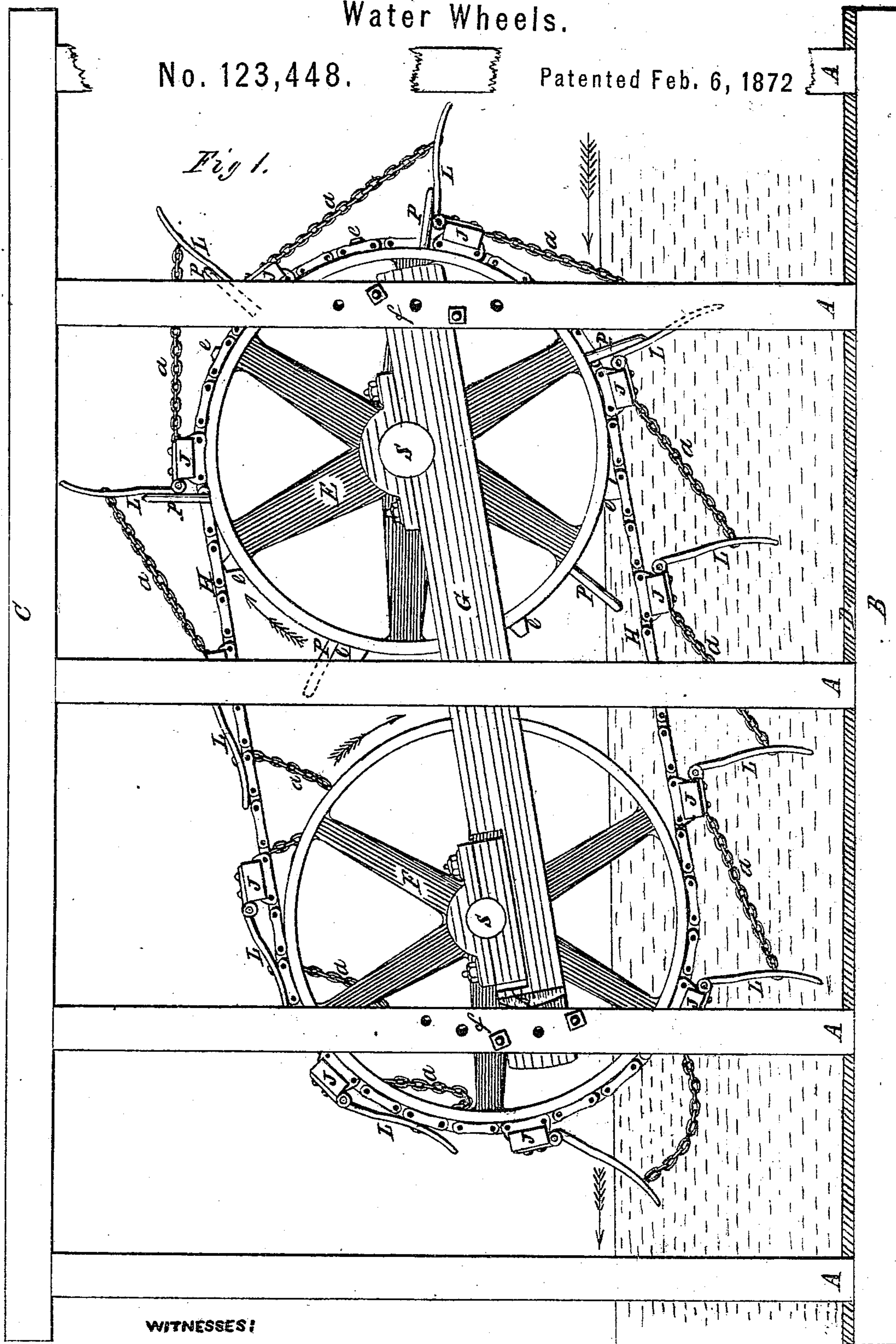


CHARLES E. BROOKS.

Water Wheels.

No. 123,448.

Patented Feb. 6, 1872



WITNESSES:

Otto Leo Johnson.

L. E. Gallie

INVENTOR:

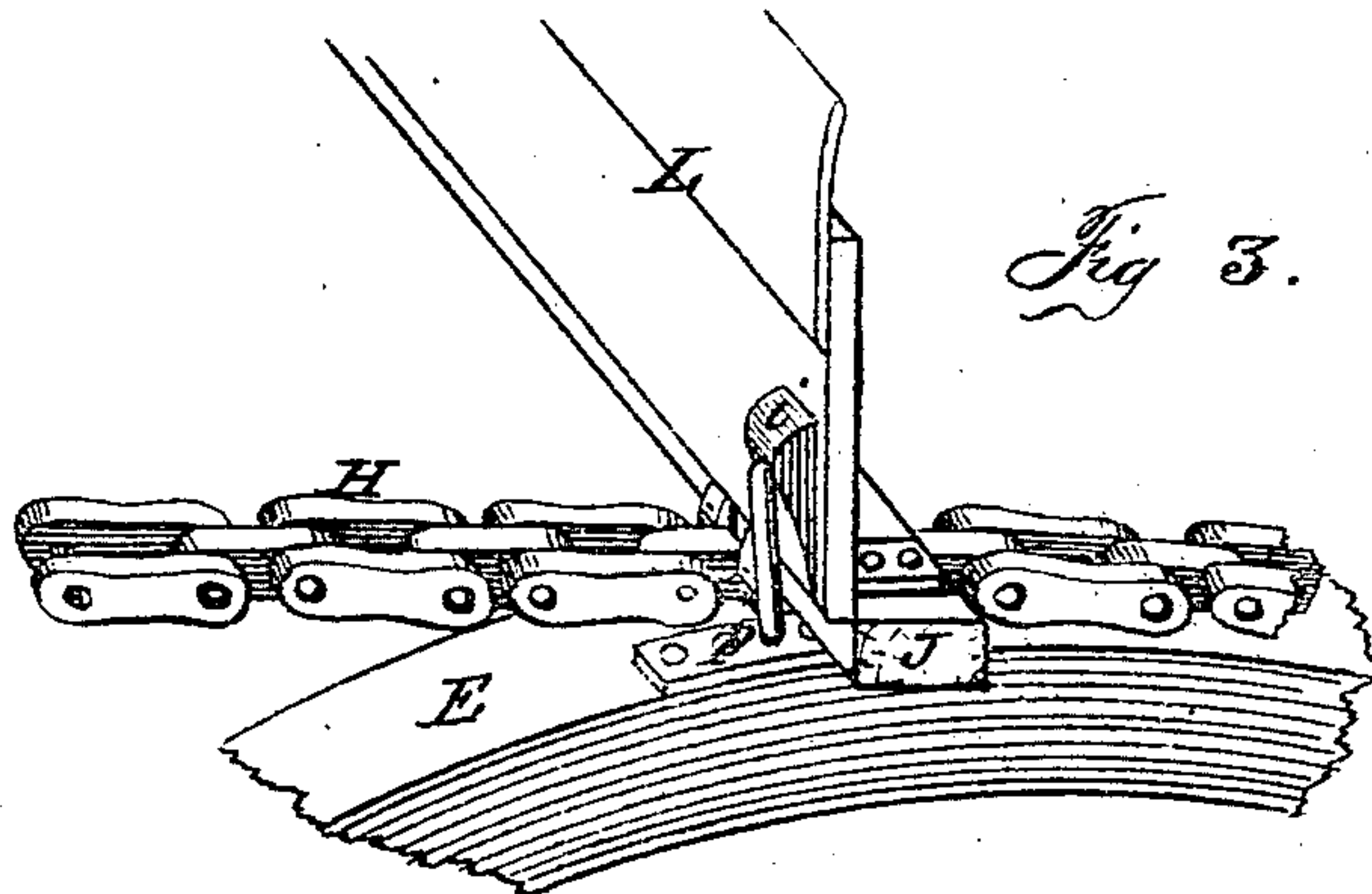
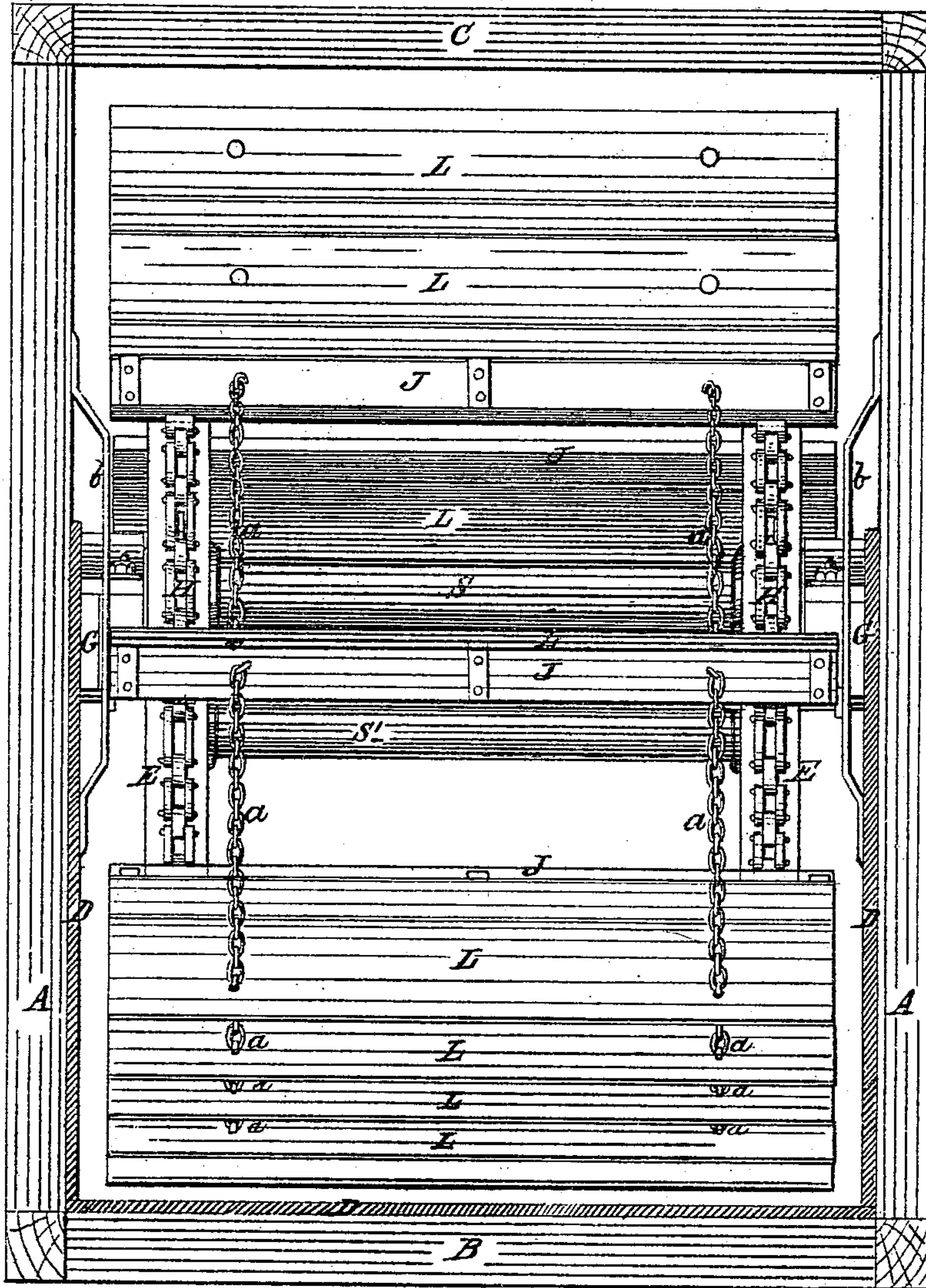
Charles E. Proctor

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2 Sheets--Sheet 2.

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WITNESSES:

Otto L. Johnson.
L. E. Gallup.

INVENTOR:

Charles E. Brooks

UNITED STATES PATENT OFFICE.

CHARLES E. BROOKS, OF MARSHALL, MICHIGAN, ASSIGNOR OF TWO-THIRDS OF HIS RIGHT TO CHARLES S. CRANE AND PARKER P. HAMILTON, OF SAME PLACE.

IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. 123,448, dated February 6, 1872.

Specification describing certain Improvements in Undershot Water-Wheels for Natural Currents or Low Heads of Water, invented by CHARLES E. BROOKS, of the city of Marshall, in the county of Calhoun and State of Michigan.

My invention relates to the arrangement of two horizontal shafts, each carrying a pair of wheels and hung in line with each other across a flume frame, through which the water is conducted; and to the combination with said hung shafts and wheels of a pair of endless driving-gear chains, having a series of transverse cross-bars attached, which bars carry hinged driving-floats and stay-chains, all forming an endless belt of floats which enter and leave the water in vertical planes; the object being to subject continuously, and under the most favorable conditions, a much greater number of floats or buckets, and consequently a larger collective area of surface to the direct action of the moving water than can be subjected by the known undershot or current-wheels in use, thereby better utilizing the moving force of the water, either in a natural water current or when aided by artificial means. My invention further relates to a combination, with the forward wheels, of tappets to lift up the folded-down floats into a driving position before passing the vertical center, and so avoid the shock of falling by their own gravity; and also to a means of adjusting the float-belt by combining with the flume frame independent adjustable hanger-beams to enable the submerged line of floats to be presented to the water at a suitable height and angle of elevation.

In the accompanying drawing, in two Sheets, Figure 1 is a side elevation of a water-motor embodying my invention. Fig. 2 is an end view of the same. Fig. 3 is a broken section of the wheel and float-belt, enlarged.

A represents the posts; B, the sills; C, the girts; and D, the linings of the flume-frame, within which the wheels and endless float-belt operate—the side linings not being shown in Fig. 1, so as to better exhibit the interior. E is one of the forward, and F one of the hind-wheels, both of the forward wheels having spurs *e e*, &c., around their peripheries to gear with any suitable given number of the links in the endless driving-chains H H. These

wheels may be cast entire when not too large, but in general I prefer to build them of oak in the usual way, the arms being framed in or bolted to a cast-iron hub-spider. The rims, being constructed in oak segments, will necessitate the bolting on of cast ring sections carrying the chain spurs, and perhaps of guide sections around the hind wheels F to carry the chains. Each pair of wheels is secured, one at each end, on a shaft, S; said shafts being hung, in bearing-boxes, on girts forming part of the frame, or on adjustable hanger-beams G G, to be further described; but, however, the shafts may be hung, the hind boxes should have means for longitudinal adjustment to keep the driving-chains at the proper tension. The endless gear-chains H H pass respectively over the wheels E F, and may be made as shown more clearly in Fig. 3, or in any other suitable and well-known way, due regard being had to the necessary strength for transmitting the power. J J, &c., are the cross-bars (usually of oak) which extend, at a uniform distance apart, across the chains, to which they are firmly secured by suitable staple or other bolts, and, for additional security, the links of the chain the bars are fastened to may be formed with a recessed seat, as shown, in which said bars may be snugly fitted. L L L, &c., are the driving-floats or buckets, which may be made of wood, iron, or both combined, and may be made flat, but, if curved in cross-section somewhat, as shown, will dip more promptly in a high stage of water. These floats are strongly hinged to the cross-bars, so as to fold back against the chains after leaving the water, as shown. *a a a*, &c., are the stay-chains, which connect each float with the cross-bar immediately behind it in such positions as will subject the floats, when unfolded and submerged, to the most effective impact of the water. P P, &c., are the tappets or lifters, being simply rods or bars, secured to the rim of one or each of the forward wheels E at such points, and having such projection as to impinge on and lift up each float successively as it approaches on the upper line of belt, to the vertical center of the wheel, thus averting the shock which would occur if the floats were allowed to open by their own gravity while descending past the

horizontal center. As the tappets must be limited in length to enable them to rise clear and free from the floats, as they leave the wheel below, triangular or cam-shaped blocks, as at *i*, may be fastened on the faces of the floats to make up for any defective length in the tappets. There being no torsional strain on the hind shaft, and its wheels *F F* acting as mere carriers of the float-belt, they may be of much lighter construction than the forward wheels and shaft which transmit the power to the machinery to be driven. The flume-frame, when designed for streams subject to much rise and fall, should be made, of course, with reference thereto, and, in such cases, it is best to hang the wheel-shafts on the cast hanger-beams *G G*, which slide vertically between guide-bars *bb* and the posts. An abuttingshoulder, *s*, will prevent any end motion in the direction of the current, and, by a system of holes through the posts and guide-bars, as at *f*, and bolts that pass under and over the edges of the hanger-beams, as shown, the wheels and belt may not merely be adjusted as to height but perfect freedom will be allowed to adjust them to any desired vertical angle.

The operation will be readily understood without much additional explanation. When the water is admitted, in the usual way, into the flume-frame, in the direction of the arrows, it acts against the faces of the under floats and communicates motion to the wheels and float-belt, as shown by the arrows. As the floats ascend from the water they lay back on the float-belt, as shown, until they reach the forward wheels when they are successively lifted into a driving position by the tappets, as heretofore explained. The moving force of

the water is thus, by my arrangement, applied continuously to a very large collective area of driving surface presented squarely to its flow, so that such force operates in the most direct and effective manner, and free also from the reactive effect produced by the return buckets of float-belts moving in a horizontal plane and set obliquely with the stream, and which waste a large proportion of available power.

The two principal advantages of my invention are due to the hanging of the frame-work in an inclined position, and to the employment of lifting tappets on the forward wheels. By the inclined position of the mechanism the buckets are made to project below each other, and thus a very extended surface is presented to the current. And it will be noticed that the supporting beams are adjustable at each end, so that the mechanism can be placed at different angles of inclination, but raised to different elevations above the water. By the employment of the lifting tappets the buckets are made to assume an upright position by a positive motion, admitting of no failure, and the tappets become supports to the buckets when they are exposed to the current, thus relieving the chains of much strain.

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

The combination of wheels *E F*, carrying a chain of buckets, and tappets *P* with supports *G*, placed at an angle, substantially as shown and described, for the purpose set forth.

Witnesses: CHARLES E. BROOKS.

OTTO L. JOHNSON,

L. E. GALLUP.