E. Roberts,

Water Wheel,

No. 10,726. Patented Apr. 4, 1854.

Fig. 1.

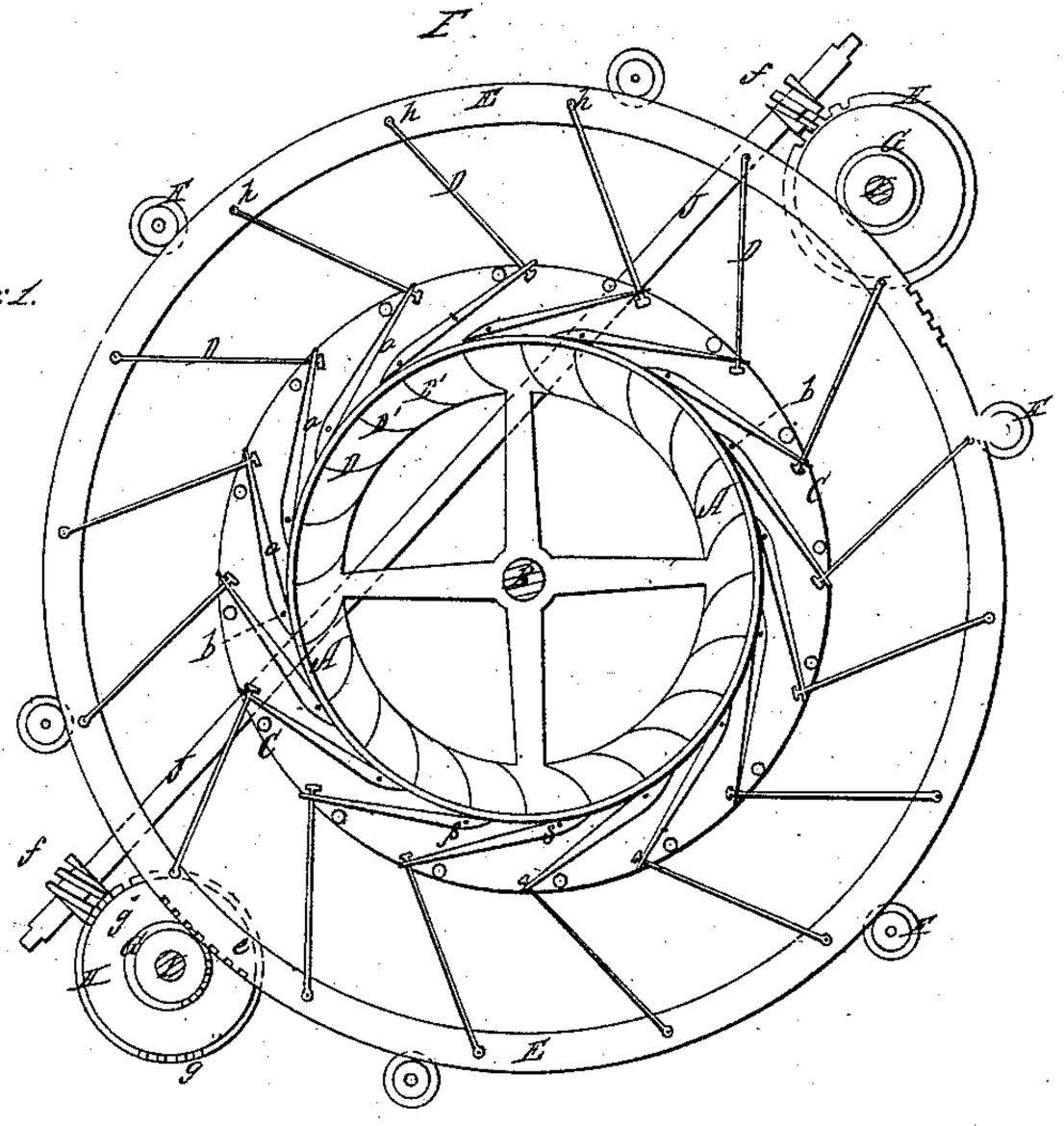
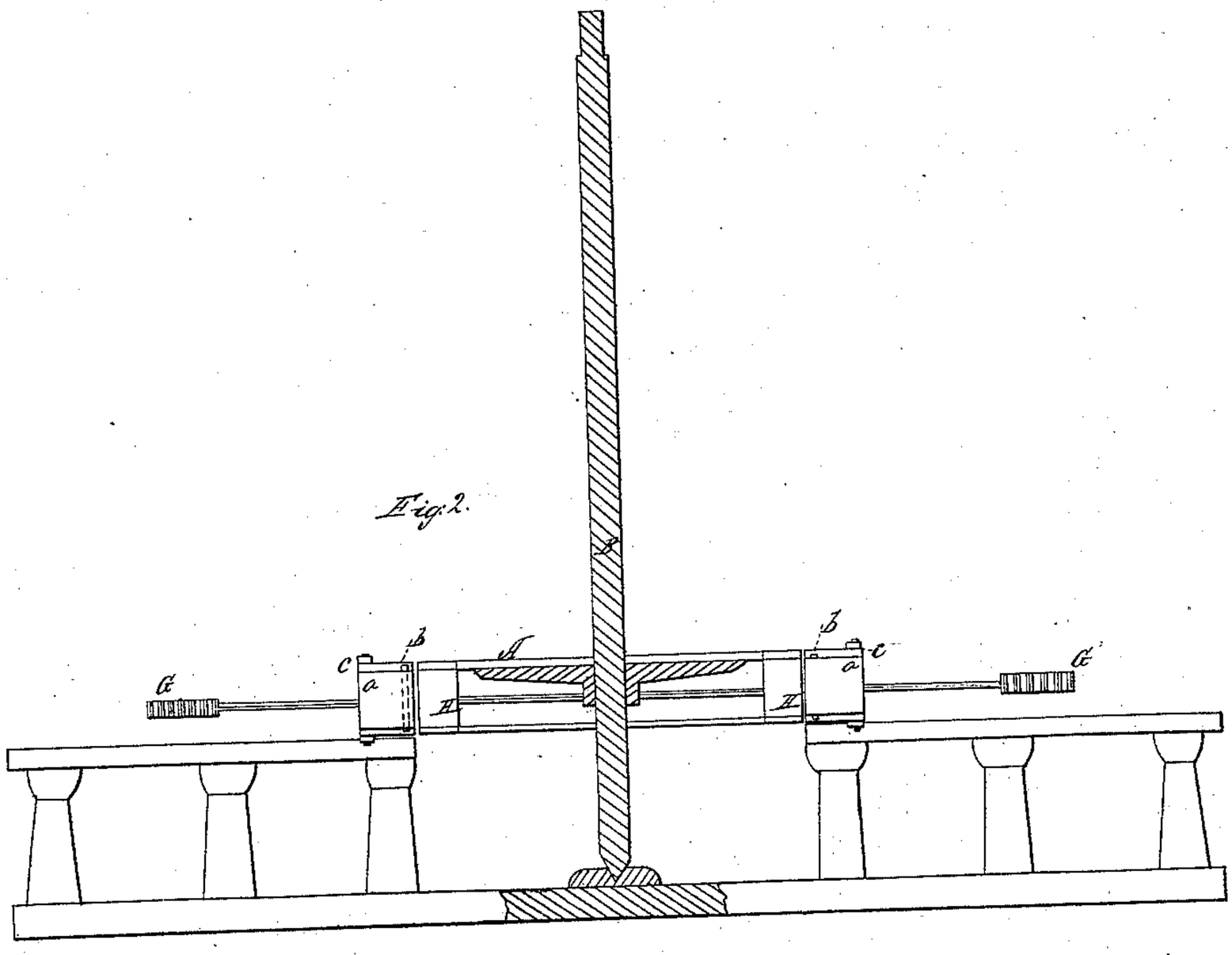


Fig. 2.



UNITED STATES PATENT OFFICE.

ELIJAH ROBERTS, OF ROCHESTER, NEW HAMPSHIRE.

IMPROVEMENT IN GATES FOR WATER-WHEELS.

Specification forming part of Letters Patent No. **10,726,** dated April 4, 1854.

To all whom it may concern:

Be it known that I, ELIJAH ROBERTS, of Rochester, in the county of Strafford and State of New Hampshire, have invented a new and Improved Water-Wheel with the Adjustable Safety-Chute; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and letters of reference thereon, making a part of this specification.

I am aware it is no new thing the attempt by various devices to regulate and advantageously control the water when applied to the periphery of wheels on a vertical shaft; but hitherto practical difficulties have developed themselves in the prosecution of my business as a millwright for the past twenty years, to which I will briefly advert. In those where the flow of water has been regulated by rising and falling gates there is a manifestly improper change effected in the change of form of the sheet of water when applied to the vane or wings serving as buckets of the wheel, as, instead of being introduced in a vertical sheet, by which its percussion would not be effected, it is thrown on the vanes in a flat or horizontal direction and changes its form, spending part of its force in froth or foam. In those inventions apparently conflicting more directly with my improvement, although this evil is avoided by preserving the vertical sheet of water, yet, from an oversight in avoiding liability of accident from either change of form of the rim carrying the several chutes or from the great liability of obstruction from small sticks or stones passing the gate at all times, or of pieces of ice formed in the curb or reservoir, which in passing through the chutes become lodged or jammed in any one of them, it necessarily keeps all open; or if one chute is closed when thus obstructed by violence it is done at the expense of breakage of the mechanism actuating the whole set of chutes or divisions.

By my improvement in the construction of the wheel, by placing the curved vanes in intimate relation to the direction of the water from the chute, I have a decided advantage even in this respect over those adverted to, as in mine the direct action is obtained; but more so when it is taken into consideration that all liability of accident to the control and regulation of water on the wheel is unaffected. This at first glance might seem a matter of little consequence; but when the advantage is thought of, of being at all times and under all circumstances able to control the quantity of water admitted on the wheel, it is an important consideration if the work or power of the wheel is thought of, and therefore the avoidance of accident to the major number of the chutes will be appreciated. Thus in factories where the work varies fifty per cent., and at times when it is desirable to economize the water, as in dry seasons, the loss of water by obstructions to the closing of the chutes is a serious matter. By the means I have now presented the mill has not to be stopped, the water drawn from the curb, or the obstruction removed before the difficulty will be abated.

The nature of my invention consists in the arrangement of the devices by which the water has an advantageous direction given it in passing through the adjustable chute, combined with the sliding rods for opening the chutes or the divisions constituting the chute; also in the mode of hanging these divisions on a fixed rod passing loosely through the chutes, by which means the clamping of them is avoided when the bolts holding the rims together are tightened; and, furthermore, in the device for simultaneously opening these chutes by an annular ring, gear, &c. It is to be understood there is no difficulty of the chutes closing. The water will do that when free from obstruction.

Figure 1 represents a bird's-eye view of the wheel, chutes, &c., with the upper rim removed; Fig. 2, a vertical cross-section.

To enable others skilled in the art to construct the wheel and adjust the vanes, &c., I will proceed to describe it, as follows:

In the drawings, A A represent a wheel of the usual form, only observing that the curved vanes D′ D′ D′ should be so placed as to receive the direct action of the water from the chutes introduced on the periphery of the wheel. The wheel being a center vent, of course the under side is open and the upper closed with a stationary cover, thus avoiding the weight of the water on the wheel.

B is a vertical shaft; *c c*, rims sufficiently wide to retain the divisions or chutes *a a* between their edges. These chutes are perfo-

rated with a free hole through their thickness, in which the vertical rods *b b* pass (see Fig. 2) and upon which they freely turn.

E E is an annular ring provided with cogs *e e* upon its outer periphery only on its opposite sides, as seen at Fig. 1. In other parts of the ring E E it is supported in position by entering grooves in the edges of rollers F F, being thus free to be actuated by a suitable pinion G, meshing into the cogs *e e*. These pinions G G are on vertical shafts I I, upon the head of which is placed pinions H H.

J J is a horizontal shaft crossing the curb above the water-line, having near its ends the screw-gear *f f*, meshing into cogs *g g* of the upper pinion H′ H′.

D D D are the rods furnished with a bolt-hole at one end for dropping on pins *h h*, inserted in the rim E E, the other end thereof furnished either with a head or screw-nut constituting a head, the rod itself passing freely through a hole in the outer end of the chute *a a*, the intention being to allow freedom of remaining open when any one chute is obstructed, as these rods only operate on the opening of the chute, the water closing them when the rods are moved inward by the rim.

The introduction of the water into the curb is common to this wheel, as others; but its action on the chute and after passing through is essentially different, as has been set forth, and the mode of controlling the quantity of water admitted through the chutes is an important practical consideration.

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

The arrangement of the rods D D, which are made to slide through the chutes or gates *a a*, so that all of the gates or chutes may be opened simultaneously or allowed to close by the pressure of the water when not obstructed by foreign obstacles, in the manner and for the purpose set forth.

In testimony whereof I have signed my name hereunto before two subscribing witnesses.

ELIJAH ROBERTS.

Witnesses:
I. W. PRAY,
DANIEL J. PARSONS.