

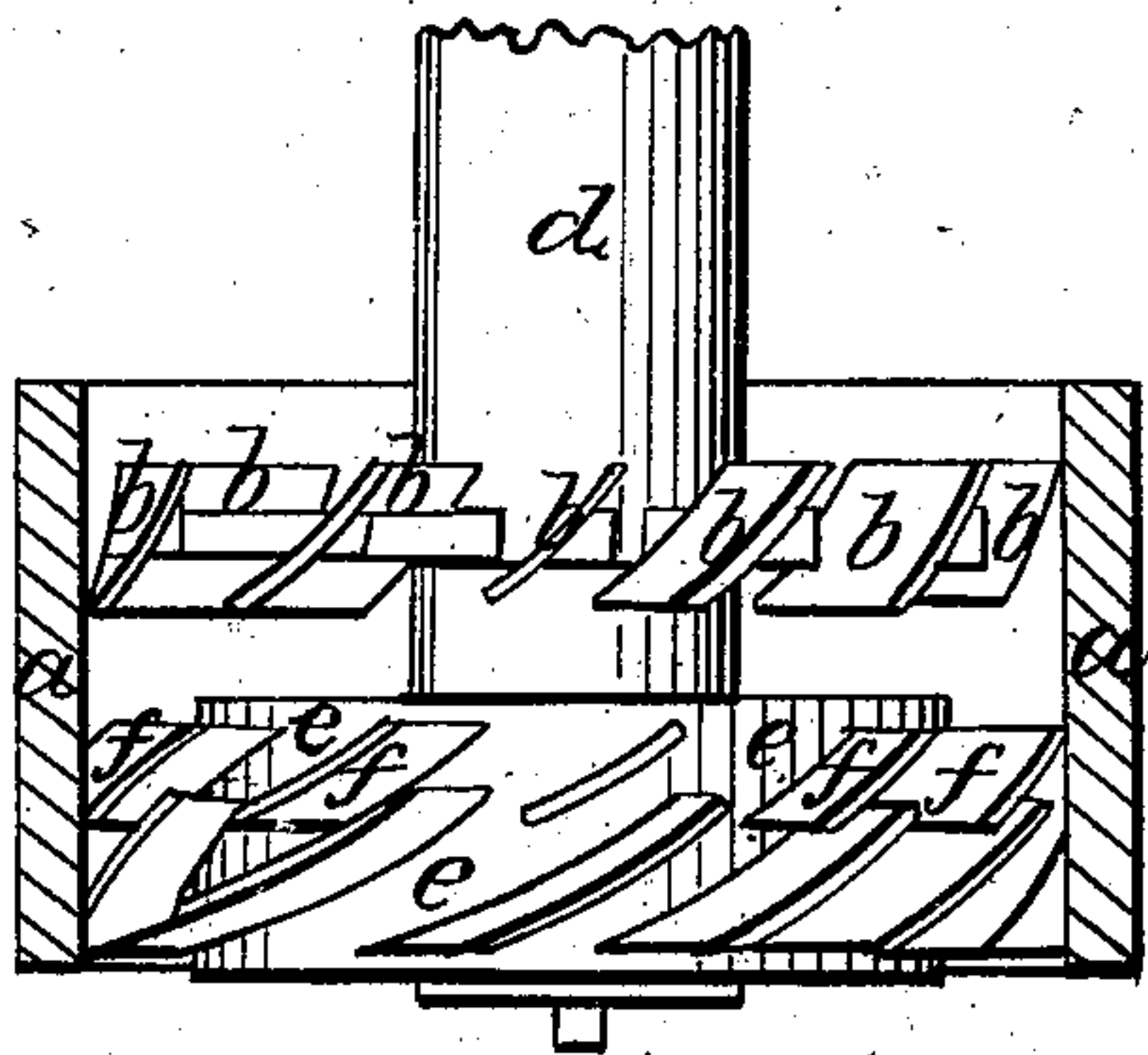
*A. Woodward,*

*Water Wheel,*

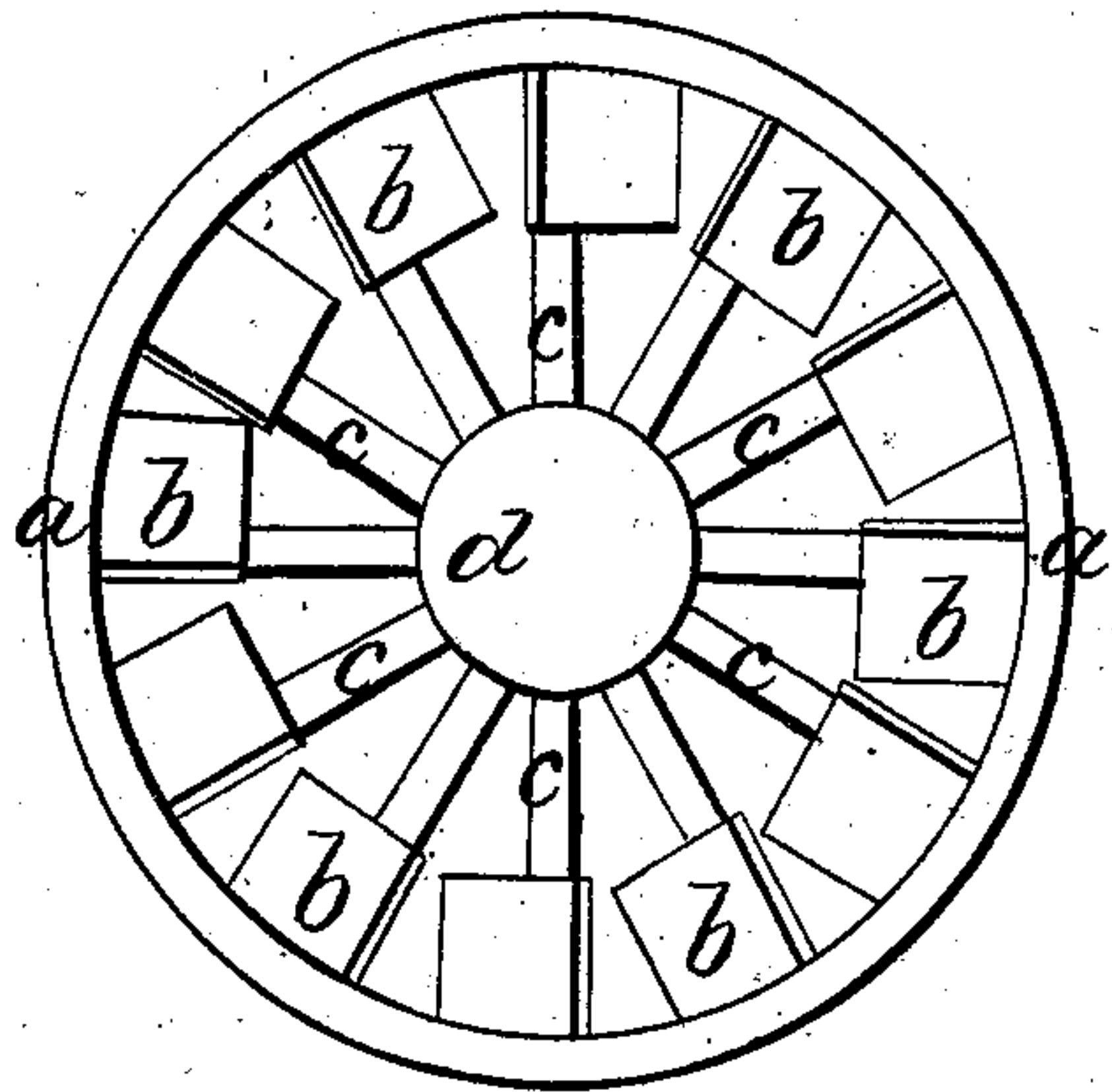
*No. 1,589.*

*Patented May 8, 1840.*

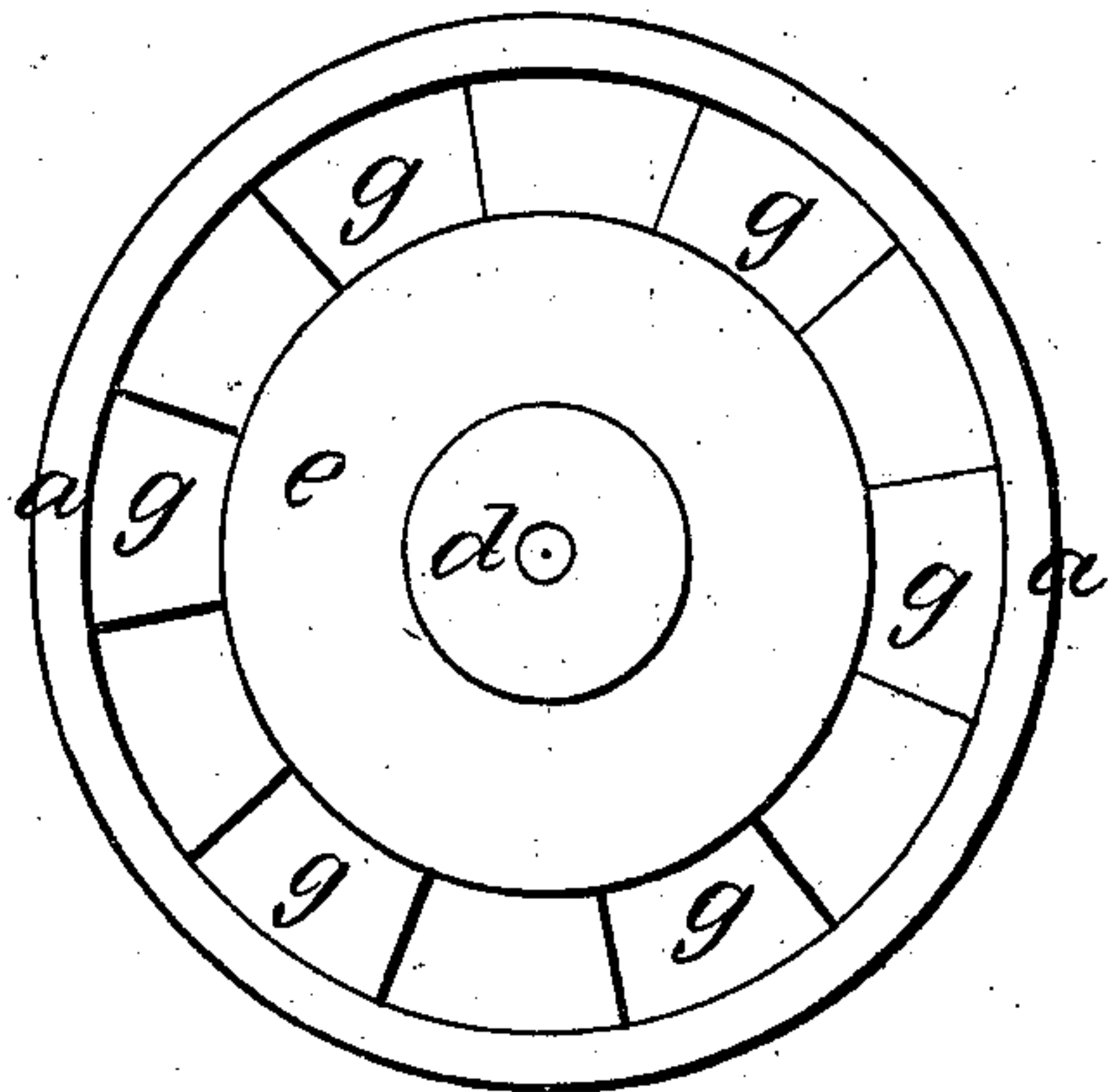
*Fig: 1.*



*Fig: 2.*



*Fig: 3.*



# UNITED STATES PATENT OFFICE.

ABIJAH WOODARD, OF ATHOL, MASSACHUSETTS.

## IMPROVEMENT IN TUB WATER-WHEELS.

Specification forming part of Letters Patent No. 1,589, dated May 8, 1840.

*To all whom it may concern:*

Be it known that I, ABIJAH WOODARD, of Athol, in the county of Worcester, in the State of Massachusetts, have invented an Improvement in the Manner of Constructing that Kind of Water-Wheel Usually Denominated the Tub-Wheel; and I do hereby declare that the following is a full and exact description thereof.

In the accompanying drawings, Figure 1 is a side view of my improved wheel, one-half of the rim or tub being removed for the purpose of showing the arrangement of the buckets and the shaft. Fig. 2 is a top, and Fig. 3 a bottom, view of this wheel.

Like parts in each of these figures are designated by the same letters of reference.

In the common tub-wheel there is but one row of buckets. In my improved wheel there are three rows, and to admit these the tub part *a a* of the wheel is made about three times as deep as in the ordinary tub-wheel. The upper row of buckets *b b b* receive the water in the same manner as those of the common tub-wheel, which they may be considered as representing. They may be made of cast or of sheet iron, or other material. They are supported at their outer edges by being attached to the interior of the tub, and they are connected by the arms *c c* to the shaft *d*.

The main improvement in this wheel consists in the placing two additional rows of buckets upon a drum or enlargement of the shaft below the upper row. This drum or enlargement is shown at *e e*. In a wheel of the ordinary size it may be about a foot in depth, and the circular space or interval between it and the interior of the tub from three to five inches. It may be made solid, or it may be hollow and inclosed, as preferred. Upon the periphery of the upper portion of this drum are affixed the buckets *f f f*, which are of such width as to fill the space between the drum and the rim, and they should be about one-third longer than they are wide and be placed from three to five inches apart.

They may be flat or slightly curved and are to stand like the row *b b* at an angle of about forty-five degrees with the shaft. These buckets are best made of cast-iron about three-eighths of an inch thick, and they are to be secured in place by passing their edges into slots or mortises in the drum and tub. The lower row of buckets *g g* are of the same width with the upper, and are confined in place in the same way; but they are made about three inches longer and are curved, so that the water may be delivered from them at their lower edges in a direction more nearly horizontal than it is delivered from the upper buckets. The upper edges of the lower row of buckets may be even with or rise a little above the lower edges of the middle row, and they are to stand intermediately, occupying the middle of the space between them.

The water let onto this wheel operates upon the upper row of buckets as on the ordinary tub-wheel. It then falls upon the buckets of the second row, and passing between them falls upon the buckets of the lower row, pressing by its weight successively upon the respective series until it escapes at the bottom, producing an effect much greater than would be produced by the use of continuous buckets of the same depth, as the water does not in its descent acquire that whirling motion which is given to it in such continuous buckets.

Having thus fully described the construction of my improved tub water-wheel, what I claim therein as constituting my invention, and desire to secure by Letters Patent, is—

The enlarging of the lower end of the shaft of such a wheel by surrounding the same with a drum, upon which drum I place two rows of buckets in addition to and in combination with the row of buckets used in the ordinary tub-wheel, the whole being constructed and operating substantially as herein set forth.

ABIJAH WOODARD.

Witnesses:

WM. H. WILLIAMS,  
JOHN H. WILLIAMS.