

No. 60,408.

PATENTED DEC. 11, 1866.

H. G. NELSON.
WATER WHEEL.

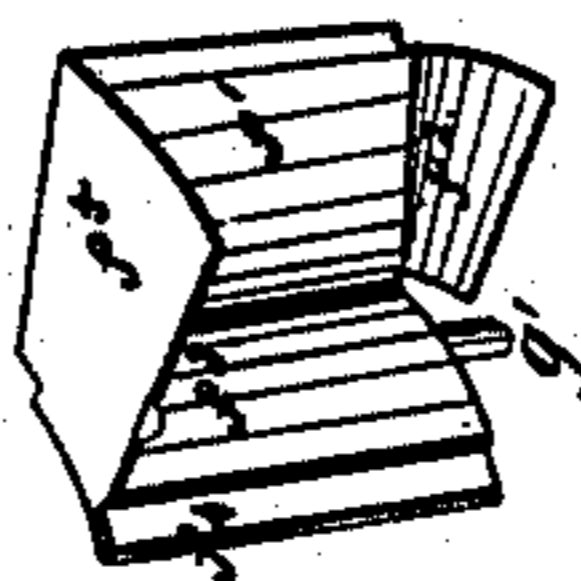
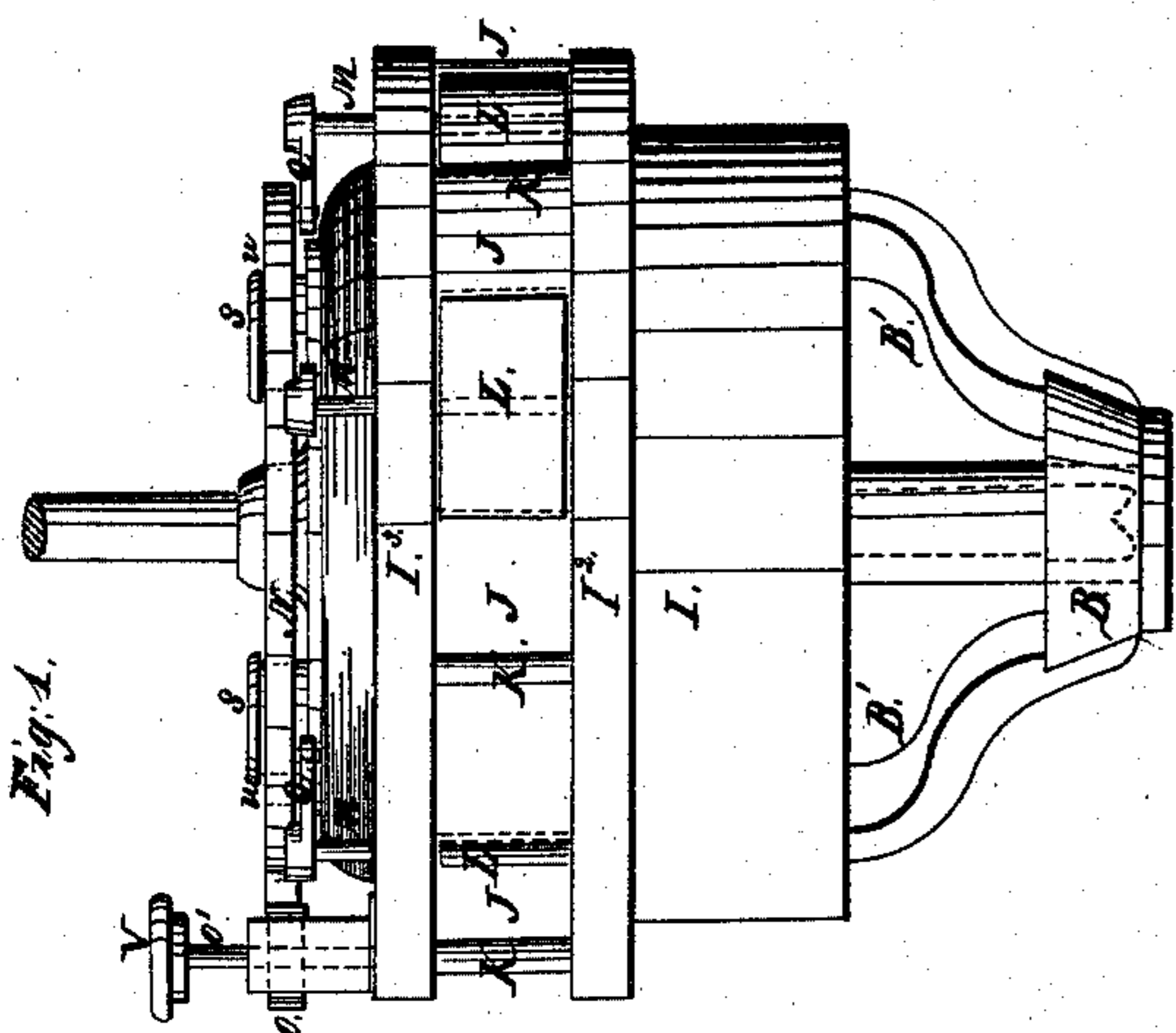
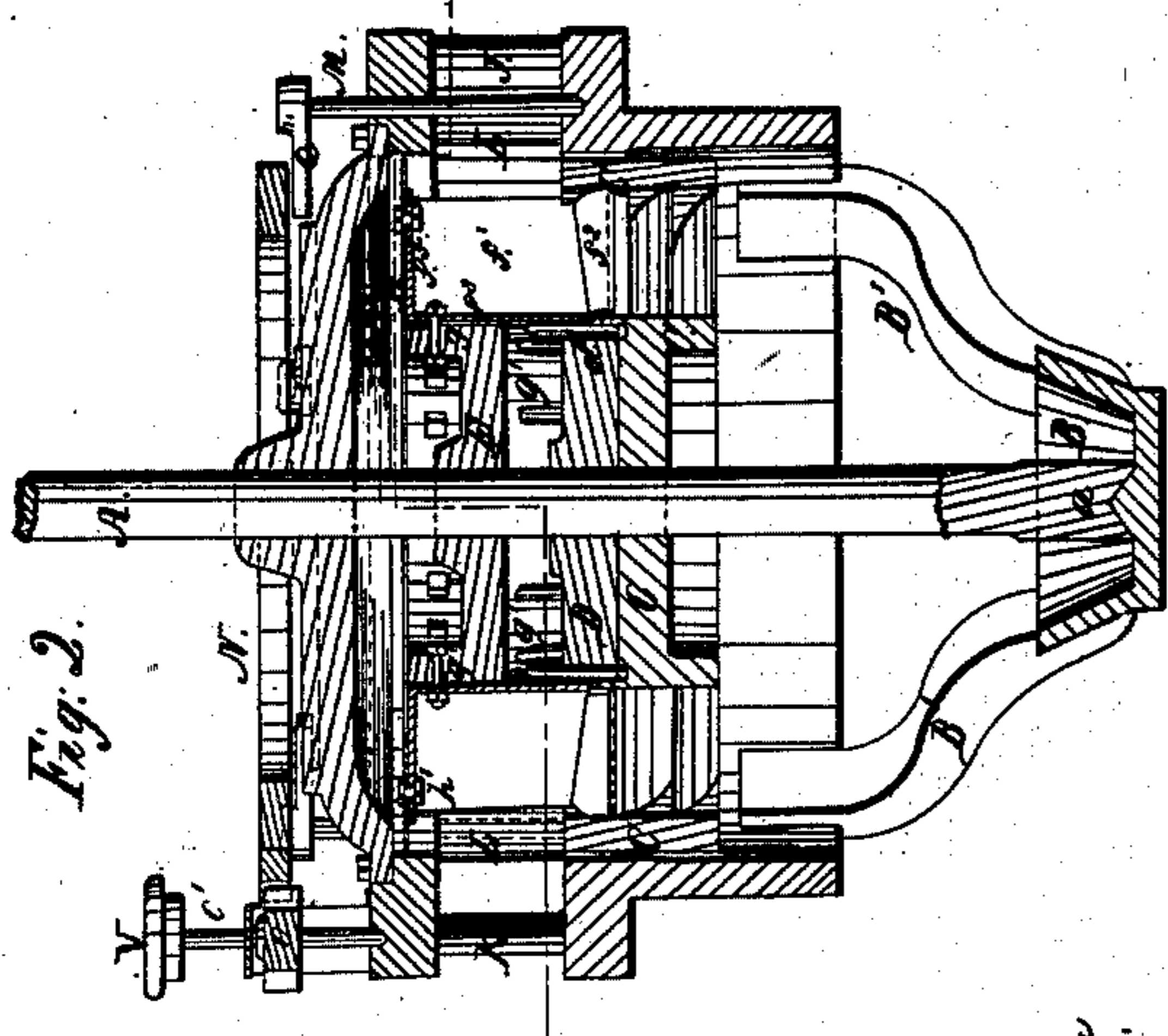


Fig. 4

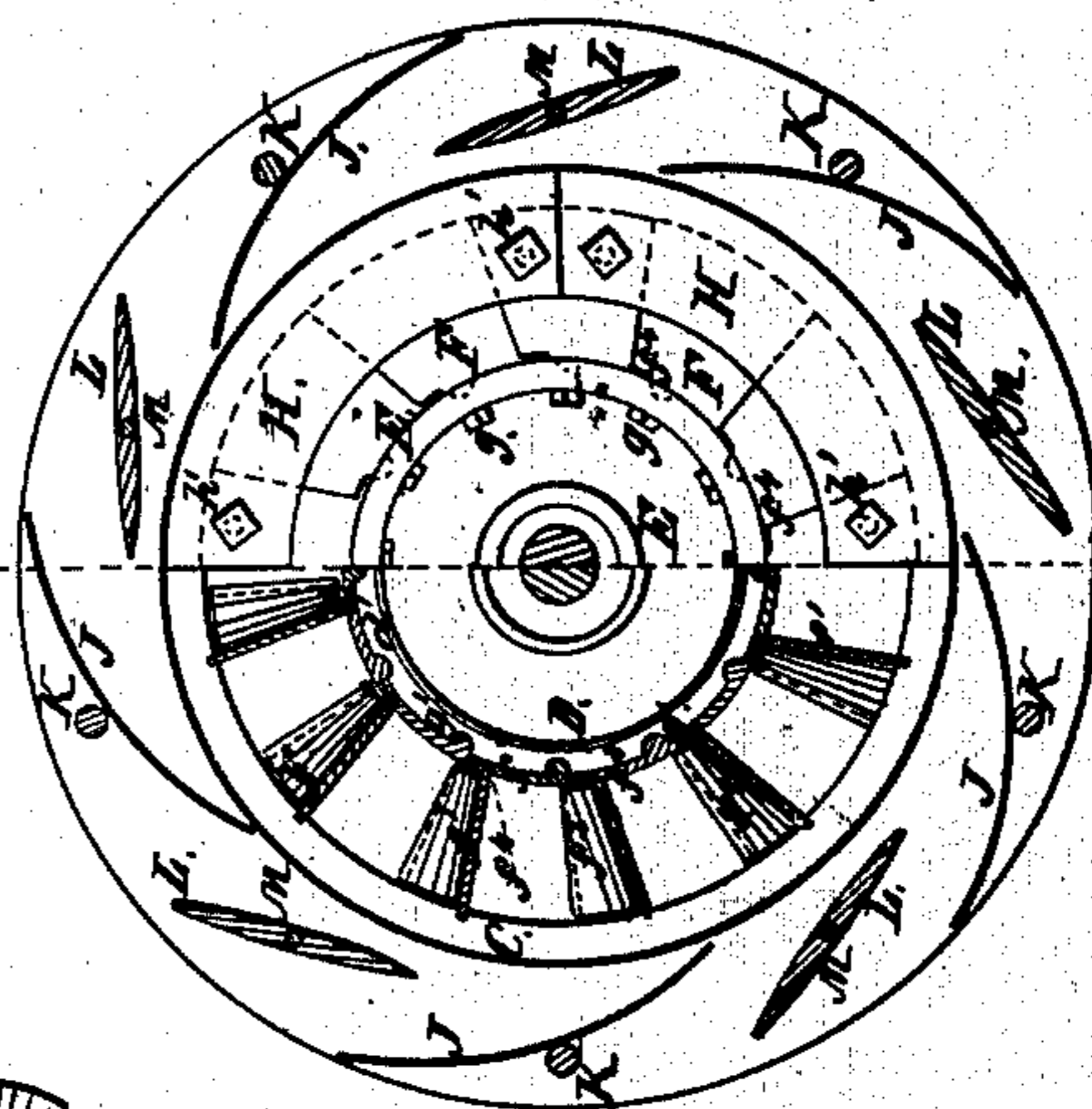
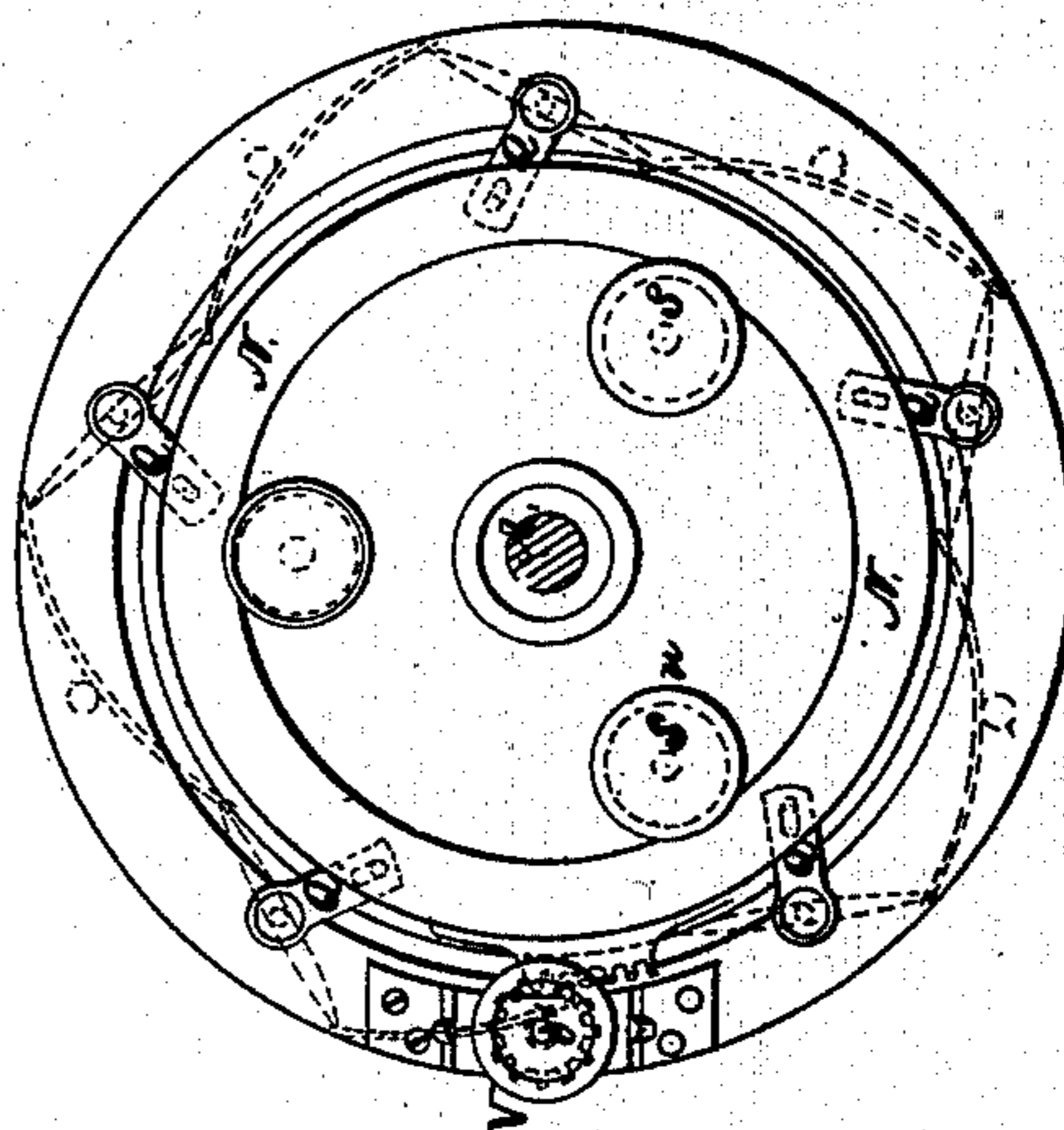


Fig. 3



Witnesses:
E. B. Forbush
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IMPROVEMENT IN WATER WHEELS.

HENRY G. NELSON, OF LOCKPORT, NEW YORK.

Letters Patent No. 60,408, dated December 11, 1866.

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, HENRY G. NELSON, of Lockport, in the county of Niagara, and State of New York, have invented new and useful improvements in Water-Wheels; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is an elevation.

Figure 2, a vertical section.

Figure 3, a top plan view.

Figure 4, a transverse section on line *a b* of fig. 2.

Figure 5 is a perspective of the bucket.

The nature of this invention consists of several distinct features, as set forth in the claims.

Letters of like name and kind refer to like parts in each of the figures.

The lower part of the bridge tree or basin which contains the step *a* is shown at B. The arms of the bridge tree, which take hold of and support the wheel case, are shown at B'. These arms are made concave or grooved upon the inside, as shown, for the purpose of conducting water into the basin for lubricating the bearing of the shaft A. The lower half of the wheel which contains the reacting buckets is represented at C. This part is like the common and well known turbine wheel, and need not, therefore, be more particularly described. The upper part of the wheel, which embraces more particularly my improvement, has two rims or hubs for supporting the direct-acting buckets. The lower one of these is shown at D. It is contiguous to and rests upon the top of the turbine. It is keyed or fastened to the wheel-shaft, and has on its outer periphery vertical sockets for receiving the pin cast on the lower edge of the direct-acting bucket, as shown at *d'*. The upper rim or hub is shown at E. This is keyed to the wheel shaft in a manner to make it adjustable thereon, so that it may be raised or lowered, and placed at any desirable point on the shaft, so that it may be accommodated to any length or size of bucket. My improved direct-acting bucket is shown in perspective in fig. 5. *f*¹ represents the vertical or direct-acting part of the bucket, and *f*² the reacting or standing part. This part overlaps or connects with the turbine, bucket, and, together with the turbine, forms the reacting buckets. The body of the bucket is shown at *f*³. A bolt or screw *g* passes through this part and into the upper rim or hub, as shown in fig. 2. On the lower edge of this is cast a pin *g'*, which enters the socket *d'*. When the buckets are put on to the hubs the contiguous edges of the vertical or body part are halved, and overlap each other, as shown at *f*⁴, fig. 4, so that by this overlapping, and with the bolts or screws *g* and pins *g'*, the buckets are held securely in place. There is also a top-piece *f*⁵, which projects at right angles, or nearly so, from the body of the bucket, and overhangs, as represented in fig. 5. This bucket is cast as a whole in one piece. When the buckets are put on to the wheel as described, a circular metallic rim H is put over them, which projects a little beyond the buckets, and exactly fills the cylindrical space within the wheel case, so that the water cannot escape upwardly from the buckets. This rim is made in sections, and by means of slotted holes, through which the screws or bolts *h'* pass in order to fasten it on to the buckets, it is adjustable, so as to insure a perfect fit to the case to prevent the escape of water upwardly. The gates and scrolls, which, together, form the chutes or water passages to the wheel, are placed in the wheel case I, and between the rims I² I³. These together have a peculiar character and construction. The rigid scrolls J are made stationary between the rims, and are held firmly in place by the rims and the screw bolts K. They are placed at an angle and at a proper distance apart to direct the water upon the wheel. The gates L are placed midway between the scrolls, and are hung upon the vertical shaft M. They are made of a proper length to reach from one scroll to another, so that when turned sufficiently they will shut off the water entirely from the wheel. When opened they form, in combination with the scrolls J, a full scroll or chute to direct the water to the wheel. They may be opened and set at any point in their movement so as to admit a greater or less quantity of water to the wheel, as may be desired. These gates are operated by means of the segment ring N, pinion O, pinion-shaft O', and slotted arms Q. The slotted arms Q are fitted each to the top of the gate-shaft M, and there is a pin projecting from the under side of the segment ring, which drops into the slot in each arm for the purpose of communicating motion from the ring to the arms, and thence to the gates. Friction rollers S are placed inside of the ring, which have a flange *u*, which overlaps the ring slightly and holds it down in its proper place. Now it will be seen that the combination and arrange-

ment of these parts is such that, by turning the hand-wheel V, a simultaneous movement will be communicated to each and all of the gates, and that the gates will be held in any required position as placed. The operator at the hand-wheel has perfect control over all of the gates, to give each and all an equal movement, and thereby insure an equal quantity of water to be discharged through each scroll, and hence an equal quantity of water upon each side of the wheel.

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

1. Making the arms of the bridge tree grooved, for the purpose of conducting water into the step for lubrication, substantially as described.
2. The adjustable hub E in combination with the hub D for the purpose, and substantially as described.
3. A water-wheel bucket, having the parts f^1 , f^2 , f^3 , and f^5 in combination, substantially as set forth.
4. The stationary scrolls J and horizontally moving gates L, when arranged with a segment ring N, operating gear and arms Q, and friction rollers S as a means of opening and closing the gates L, substantially as described.

HENRY G. NELSON.

Witnesses:

P. E. ATCHINSON,
E. B. FORBUSH.