

## Water Wheels.

Patented April 8, 1873.

Fig. 4.

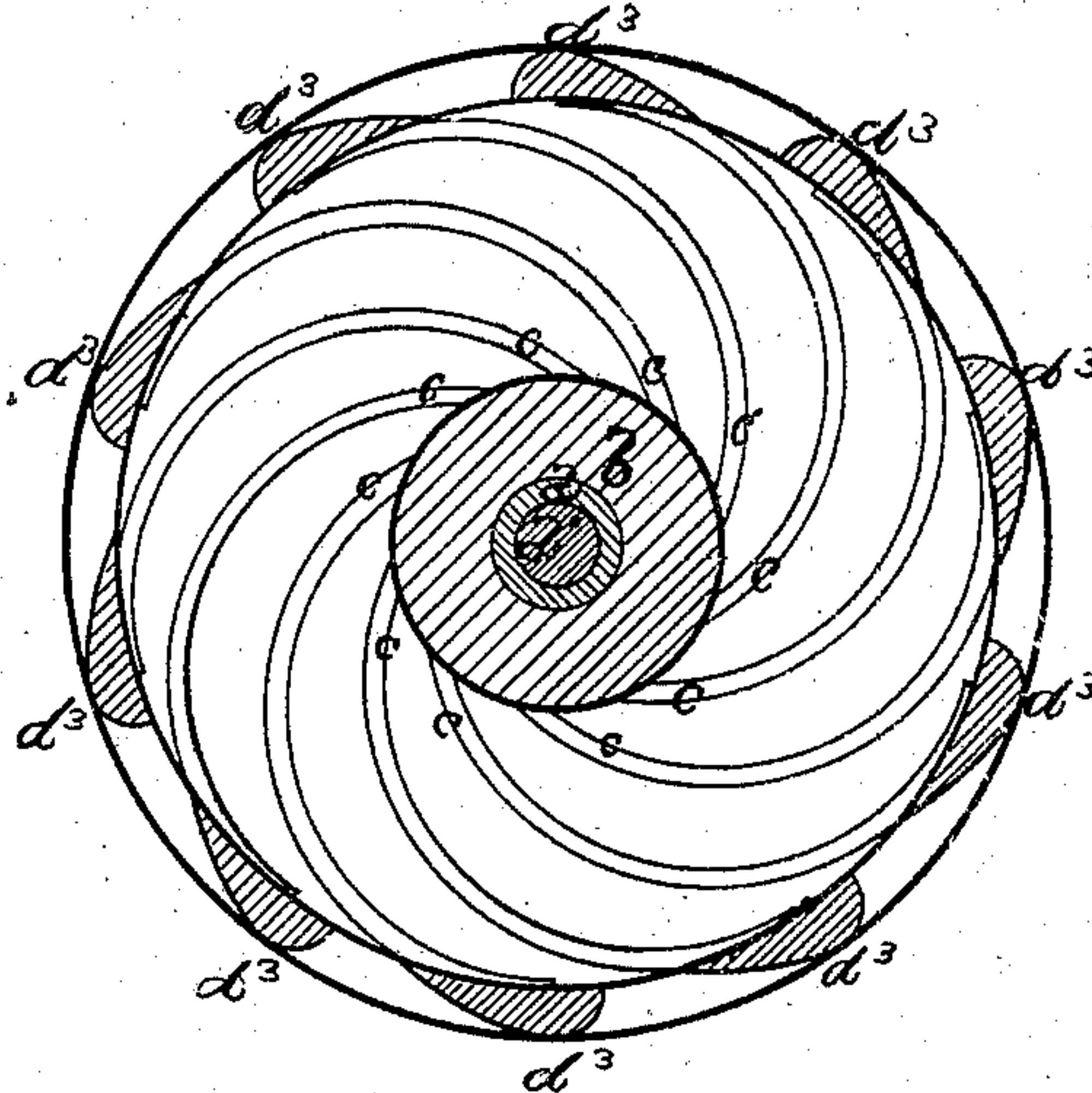
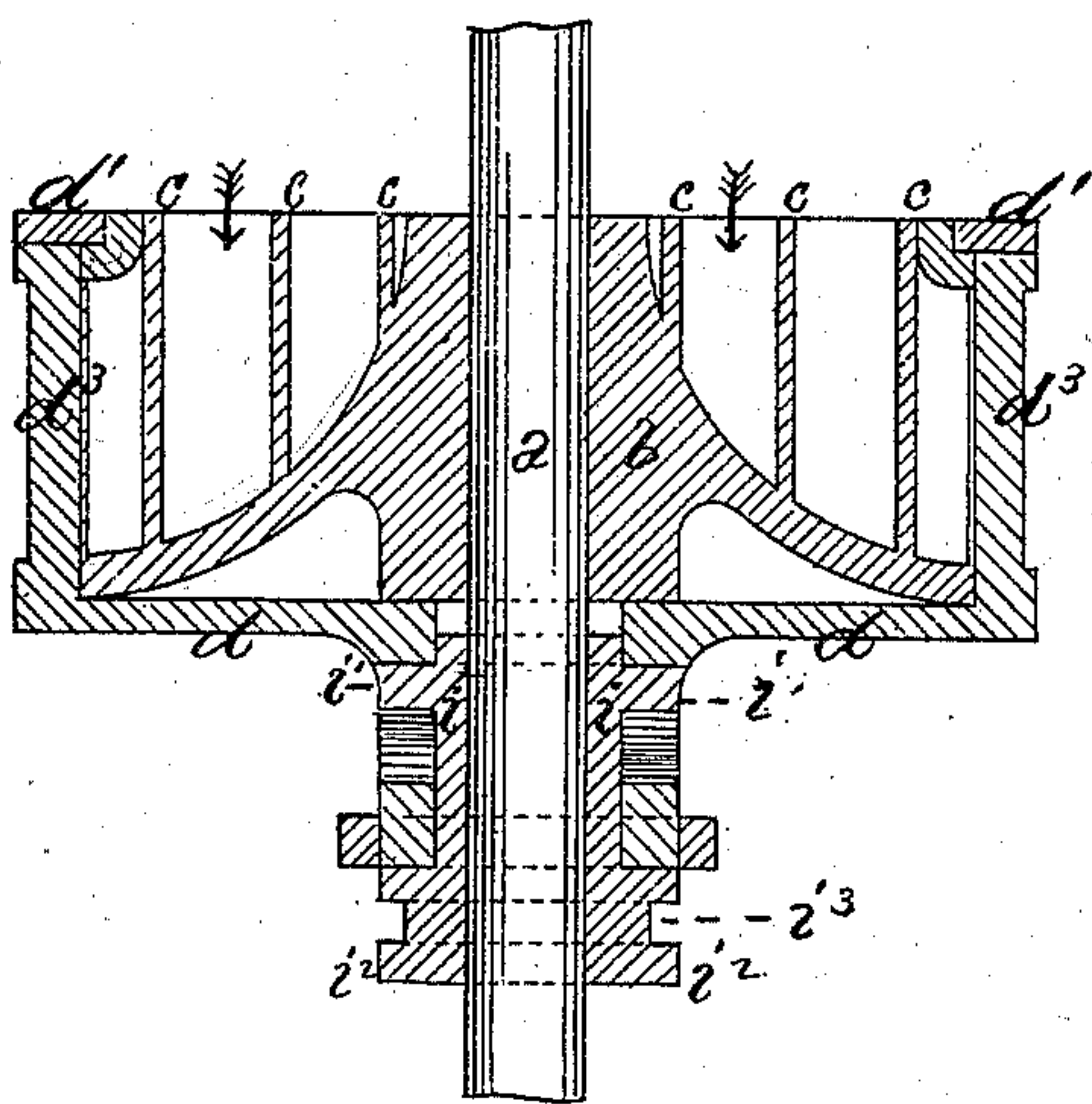


Fig. 1.

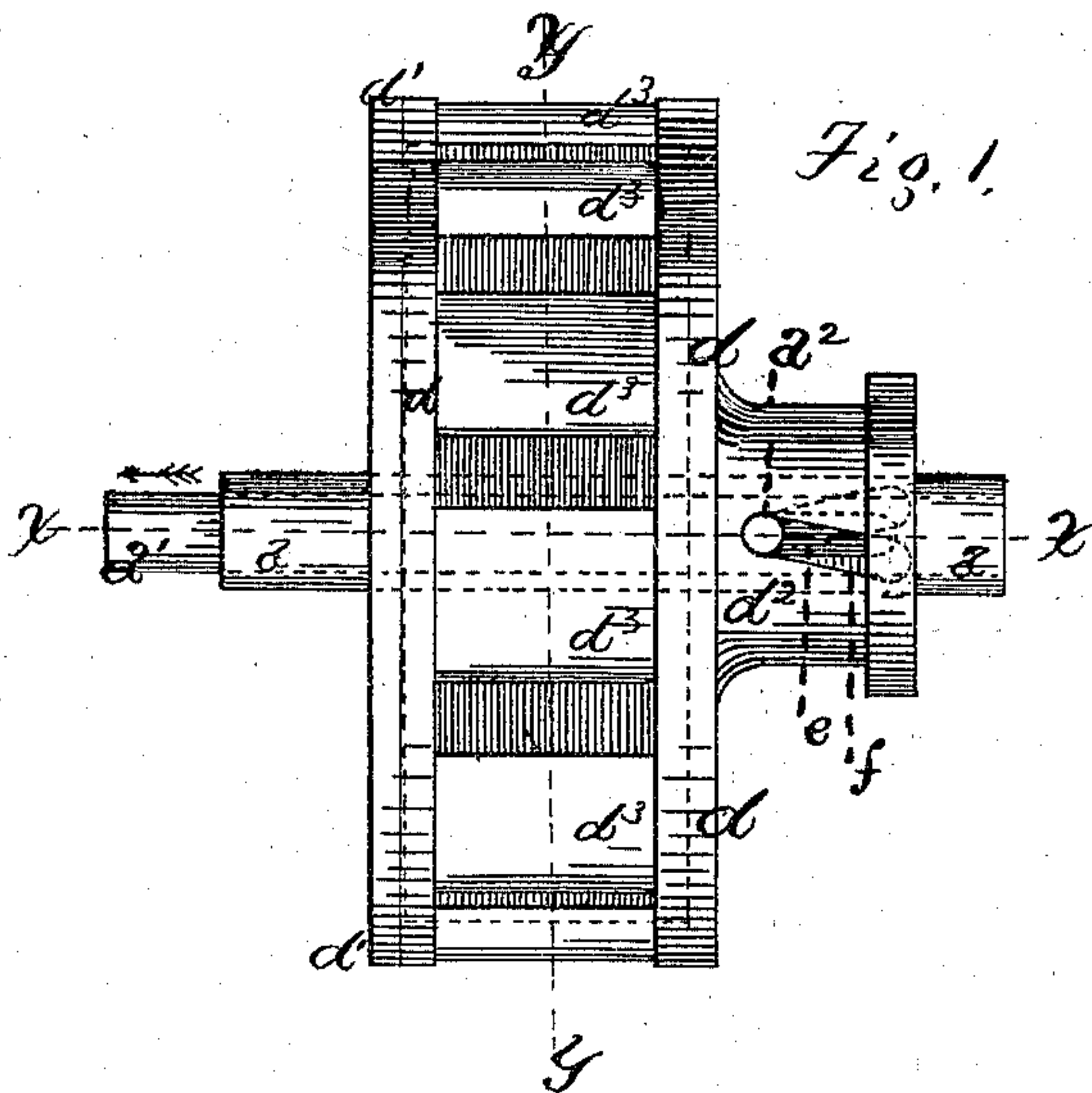
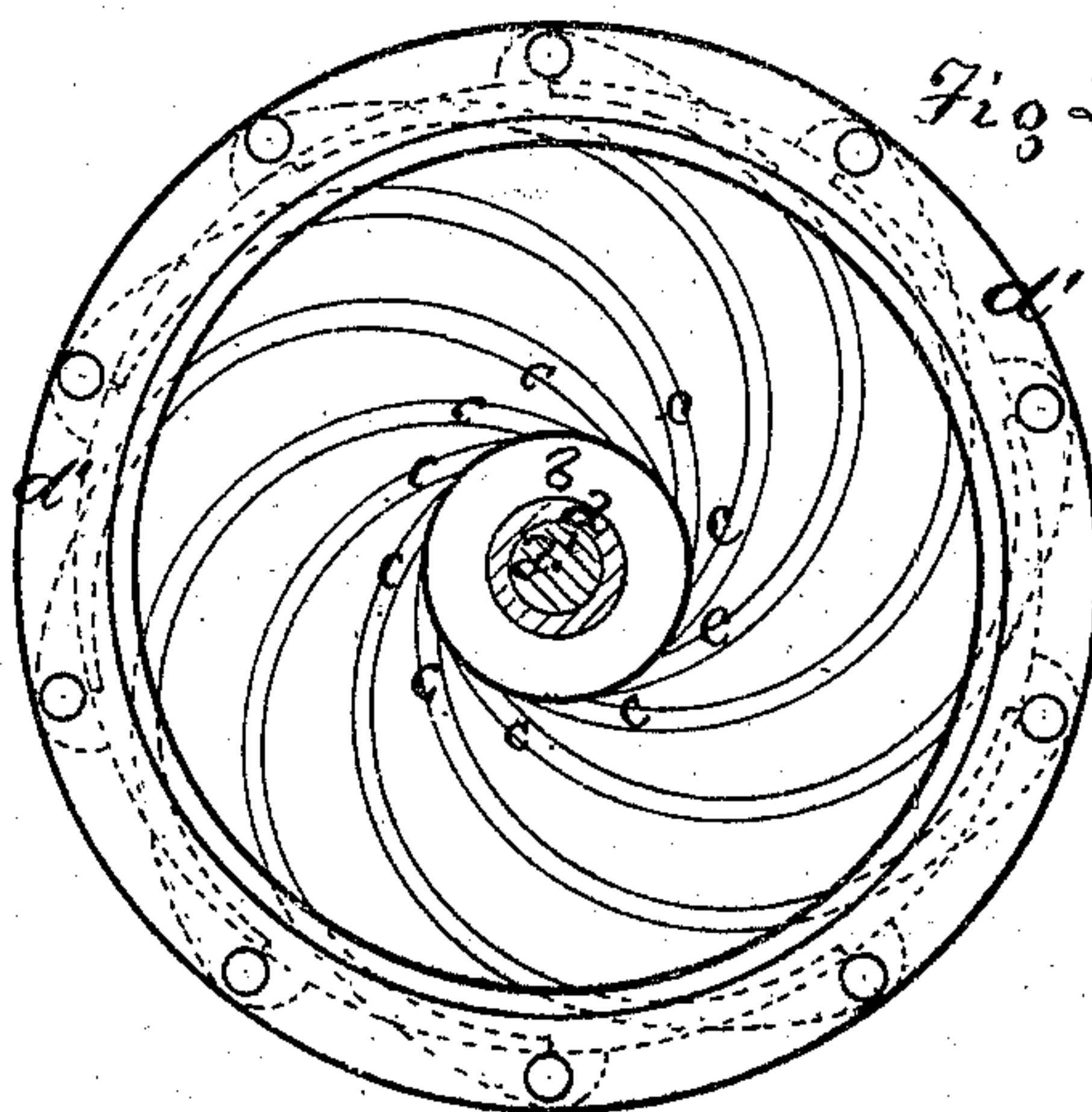


Fig 2



*Witnesses.*

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN WATER-WHEELS.

Specification forming part of Letters Patent No. 137,580, dated April 8, 1873; application filed March 7, 1873.

*To all whom it may concern:*

Be it known that I, HORATIO B. WEAVER, of Hartford, in Hartford county, State of Connecticut, have invented certain new and useful Improvements in Water-Wheels, of which the following is a specification, reference being had to the accompanying drawing, in which—

Figure 1 is an exterior view of the wheel and gate. Fig. 2 is a top view of the same. Fig. 3 is a view of the wheel and gate in central vertical section through the plane indicated by the dotted line  $x x$  in Fig. 1. The apparatus for opening and closing the gate is a modification of that shown in Fig. 1. Fig. 4 is a view of the wheel and gate in cross-section through the plane indicated by the dotted line  $y y$  in Fig. 1.

The wheel is one of that class generally known as turbine, though it may be set upon a horizontal shaft. It is an outward-discharge wheel. The gate is an annular gate upon the outside of the wheel moving with the wheel.

The invention consists in the arrangement or device made use of for opening and closing the gate.

The letter  $a$  indicates the shaft, upon which the wheel is fast.  $b$  is the body of the wheel; and  $c, c, c$ , &c., the chutes or buckets. The water comes in at the top, as indicated by the arrows, and goes out at the side of the wheel. The letter  $d$  indicates the gate of the wheel, fitting upon the wheel like a case; it has an annular rim,  $d^1$ , made separate from the body of the gate, fastened to it at the top of the gate, and jutting over the body of the wheel a little to insure that the gate keeps its place upon the wheel. Through the longitudinal center of the shaft  $a$  runs an inner gate-rod,  $a^1$ , which gate-rod may move longitudinally in the shaft  $a$ . At the proper point there projects from one or both, preferably both, sides of this gate-rod a pin,  $a^2$ , running through a vertical slot,  $e$ , in the shaft  $a$ , and through an oblique slot,  $f$ , in the neck  $d^2$ , which projects from the gate  $d$  and embraces the shaft. This pin  $a^2$  is seen, in Fig. 1, projecting from but one side of the gate-rod; by preference I have it project in the same way from the opposite side of the gate-rod through similar slots in the shaft  $a$  and gate-neck  $d^2$ . This central gate-rod is extended up so as to project above the upper end of the shaft  $a$ , where, by means of a grooved collar (such as

I shall describe when I come to Fig. 3) and a fork taking into the groove of this collar, the gate-rod may be raised or lowered, relatively to the shaft  $a$ , so far as the play of the pin  $a^2$  in the slot  $e$  will permit, at pleasure. By moving the gate-rod upward, the direction indicated by the arrow, the effect of the pin  $a^2$  upon the slot  $f$  is to rotate the gate a short distance upon the wheel, and by moving the gate-rod down again the gate is rotated back again. The upward movement of the gate-rod opens the gate, and the downward movement of the rod closes it.

In Fig. 1 the gate is represented as opened. The gate has vertical plates  $d^3$  answering in number to the buckets of the wheel, which, when the gate-rod is pushed down, are rotated or moved so as to close the mouths of the buckets, and when the gate-rod is moved up these plates uncover the mouths of the buckets.

A modification of my device for operating the gate is shown in Fig. 3. In this case there is no inner gate-rod, but the sleeve  $i$  between the shaft and the neck  $d^2$  takes its place. This sleeve is made to turn with the shaft by means of a spline and feather, but it can move lengthwise on the shaft  $i$ ; it has projecting from it the pin or pins  $i^1 i^1$ , entering into oblique slots in the neck  $d^2$ , the same as in the former case, and the moving of the sleeve up or down opens or closes the gate, as in the other case. The sleeve  $i$  is in this case the gate-rod. On the end of the sleeve, and the same arrangement answers for an inner central gate-rod, is a grooved collar,  $i^2$ . By causing a pronged lever or fork to take into the groove  $i^2$  the sleeve may be raised or lowered at pleasure, while the wheel is still or while it is in motion.

I claim as my invention—

The combination of the wheel, the gate arranged to rotate with the wheel, the shaft upon which the wheel is fast, the gate-rod arranged to rotate with the shaft, but free to move longitudinally, and provided with a pin, (one or more,) or its equivalent, extending laterally into an oblique slot in the gate-neck, all constructed, arranged, and designed to operate substantially as and for the purpose set forth.

HORATIO B. WEAVER.

Witnesses:

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JOHN POLLITT.