

(No Model.)

F. M. BOOKWALTER.  
WATER WHEEL.

2 Sheets—Sheet 1.

No. 445,844.

Patented Feb. 3, 1891.

Fig. 2.

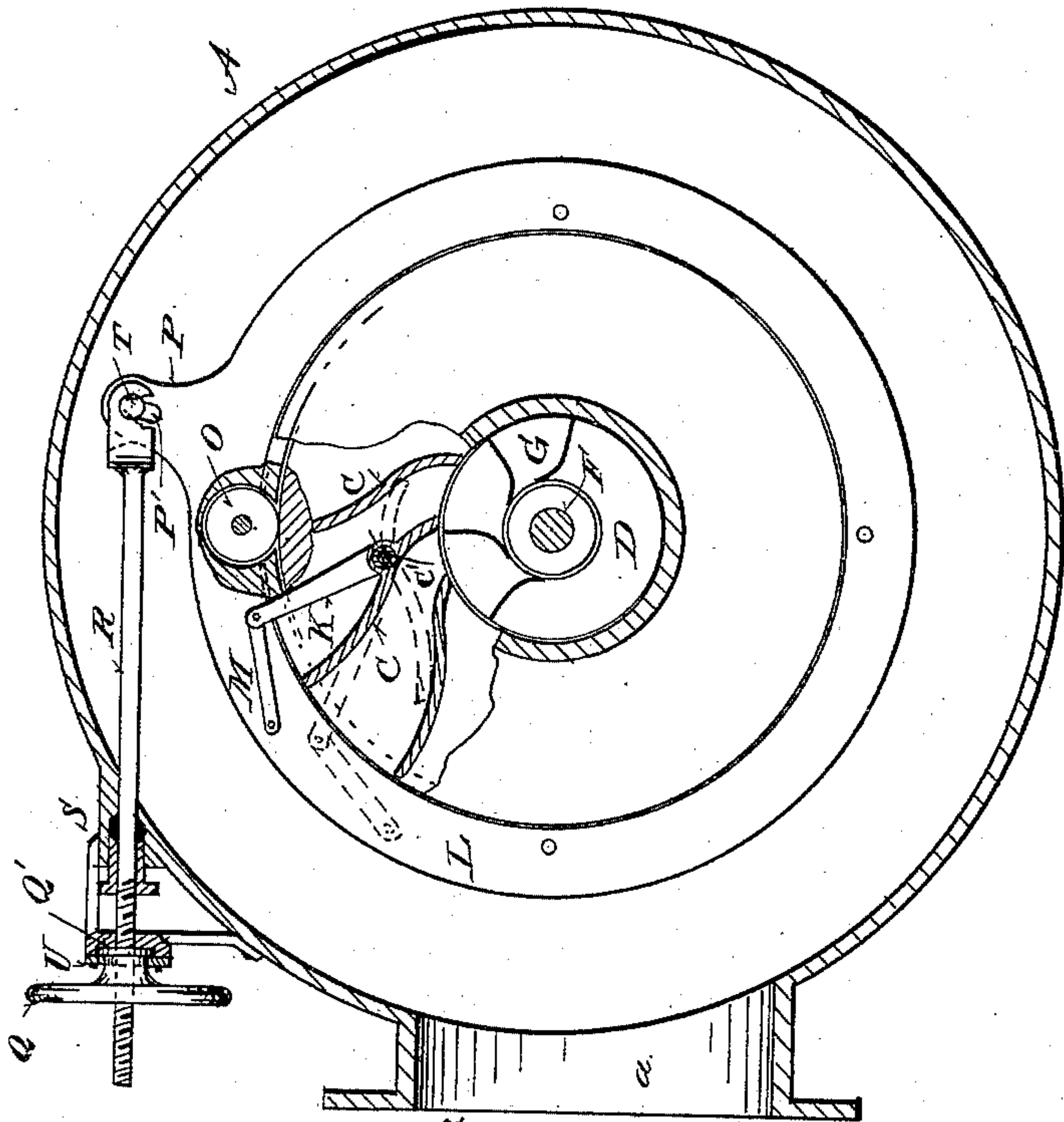
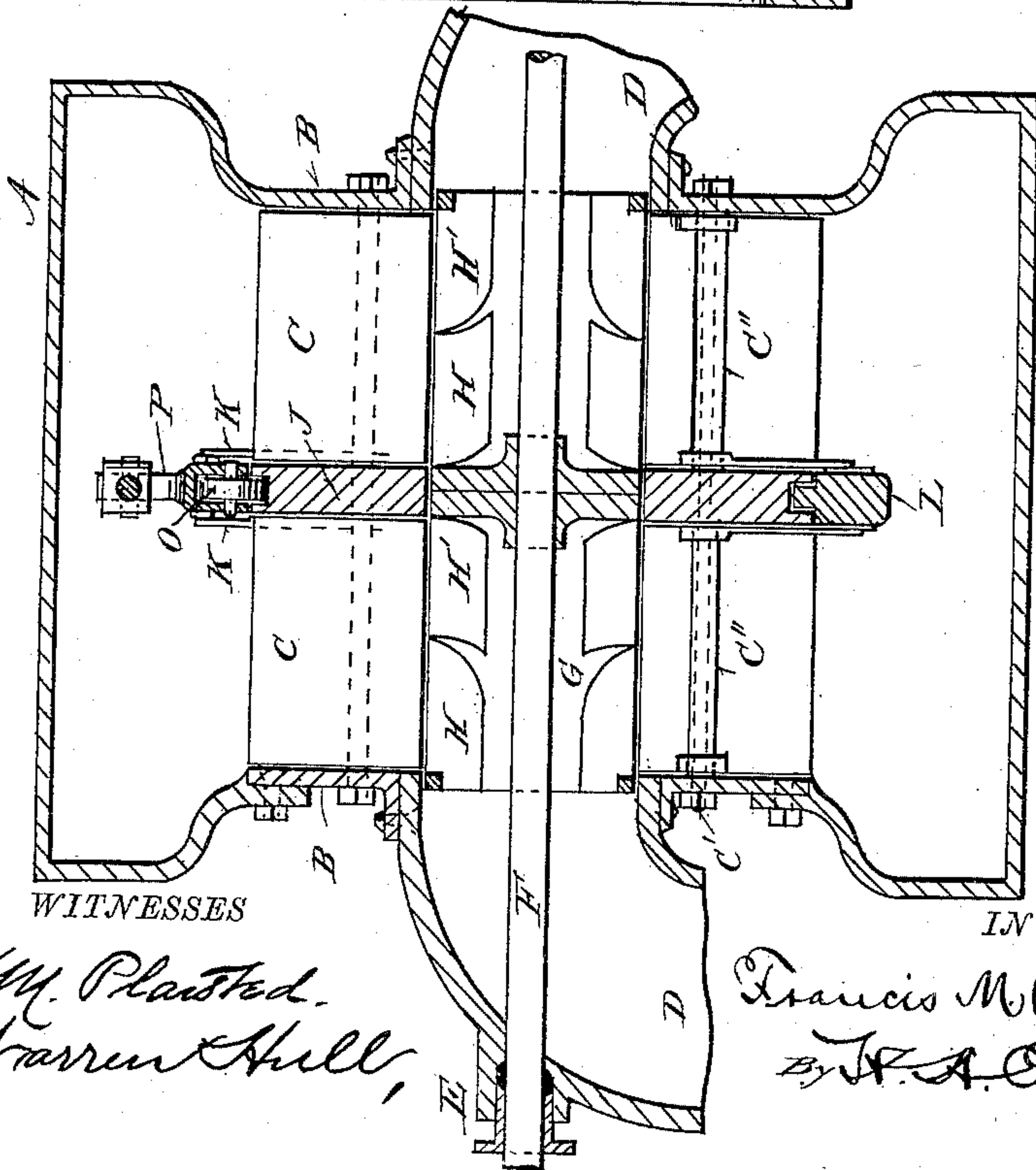


Fig. 1.



WITNESSES

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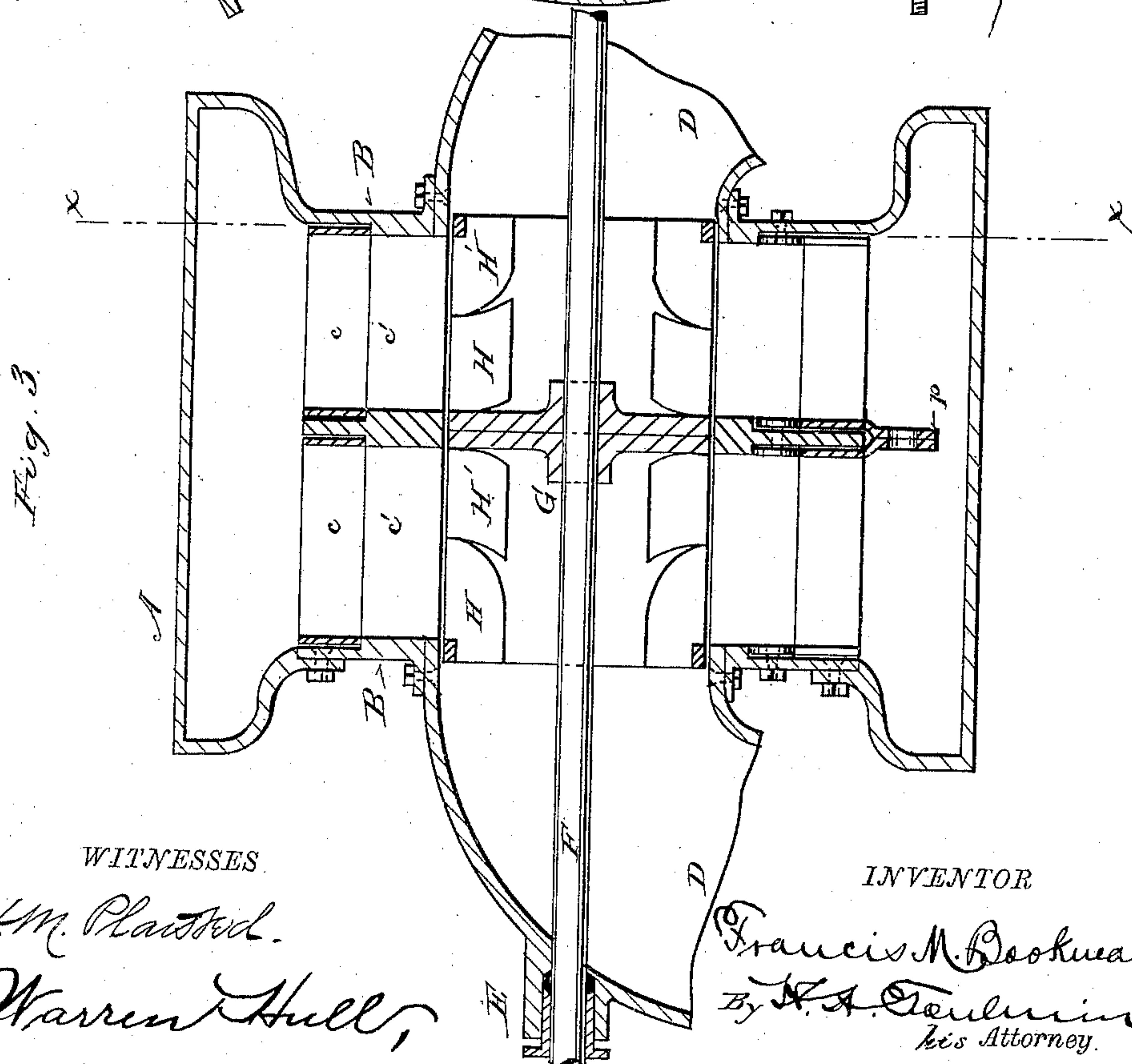
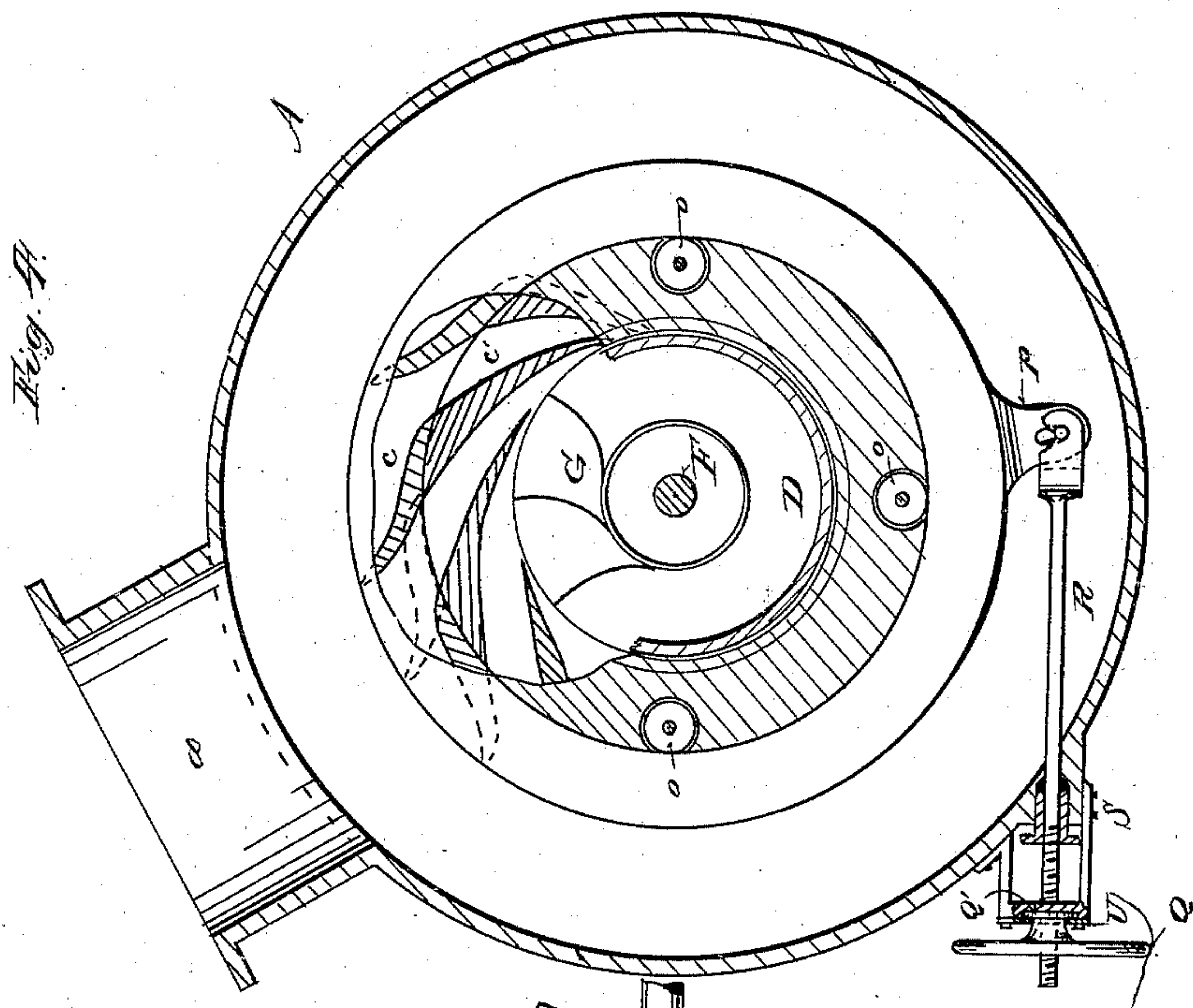
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WITNESSES

H. M. Planted.  
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# UNITED STATES PATENT OFFICE.

FRANCIS M. BOOKWALTER, OF SPRINGFIELD, OHIO.

## WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 445,844, dated February 3, 1891.

Application filed July 29, 1890. Serial No. 360,258. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS M. BOOKWALTER, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Water-Wheels, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to certain new and useful improvements in water-wheels; and the objects are, first, to constitute the side plates of the wheel-gates of the sides of the inclosing case; secondly, without diminishing the amount of water delivered to the wheel to bring the sides of the case and the attached draft-tubes nearer together at the center, and thus diminish the distance between the bearings of the shaft, thereby giving greater steadiness to the wheel mounted thereon, and, thirdly, to operate both gates of a divided gate-opening by one adjusting mechanism, thereby simplifying the parts of the machine and diminishing the obstruction to the inflowing water.

In the accompanying drawings, forming a part of this specification, and on which like reference-letters indicate corresponding parts, Figure 1 represents a central section parallel to the shaft of the inclosing case with the interior parts in elevation; Fig. 2, a transverse section of the same; Fig. 3, a view similar to Fig. 1, with my adjusting mechanism applied to register-gates; and Fig. 4, a view similar to Fig. 2 on the line *xx* of Fig. 3, and register-gates therein.

The letter A designates an inclosing case of any suitable material or shape, having the central portion turned inward to bring the sides nearer together, as shown in Figs. 1 and 3, while the outer rim of the case preserves its normal width and delivers the same amount of water to the wheel as when the sides are straight across. The sides thus turned in either form the side plates B of the gates C, as shown at the right hand of Figs. 1 and 3, or said intumed portion is bolted or otherwise secured to said side plates, as shown on the left hand of said figures. Thus the extra side plate is done away with, the construction simplified, and the cost lessened. To these plates B are bolted or otherwise se-

cured draft tubes or flumes D, having bearings E, in which is mounted the shaft F, carrying the wheel G, of any convenient type, but preferably of the Leffel style, in which there is both a lateral discharge H and an inward central discharge H', as indicated in Figs. 1 and 3. Either a single wheel may be used, or a double compound wheel, in which two of these wheels are secured back to back to form one double wheel, discharging in opposite directions. These require a wide gate-opening, and it being impractical to operate in the usual way a gate of extreme width in one piece I divide it into gates C by a partition J, and adjust both gates by the mechanism now to be described. Each gate has arms K extending therefrom and connected to an annular ring L by means of links M, pivoted thereto, as shown in Fig. 2. To permit the easy circular action of the said ring, rollers O are preferably mounted therein, and roll on said partition J. The ring is also tongued into the corresponding groove in the said partition, or otherwise matched, and the roller is preferably of such width as to also roll therein, as indicated in Fig. 1. An extension P on said ring is connected to a hand-wheel Q outside of the inclosing case by means of a threaded rod R, mounted in bearings S on said case. The pivot T, connecting the rod R to the said extension, has a slight play in a slotted opening P' to compensate for the circular movement of the ring. The hand-wheel Q is mounted in suitable bearings, preferably consisting of a socket to which a shoulder Q' is held by a plate U, and thus allowing of adjusting the said rod back and forth, whereby the gates C are operated to take the closed position indicated by the dotted lines in Fig. 2. The gates may be either alternately or otherwise pivoted. The partition J is preferably supported on the pivotal gate-bolts C', passing through the bracing-columns C'', the nuts being accessible from the outside of the case. The arms K on both series of gates are connected to the central ring L, and thus both series are operated by the same ring. Any other form of adjusting mechanism may be used so long as it operates both series of gates by the one mechanism.

Figs. 3 and 4 represent register-gates, to



which my improvements are applied. In this form the gate is made in outer and inner sections *c c'*, located between the two sets of annular plates, the outer set being preferably movable about the inner set by the above-described adjusting mechanism, so that when the outer portions are rotated to assume the position indicated by dotted lines in Fig. 4 the openings between the alternate gates will be closed and the inflow of water shut off. These gates may be supported on rollers *o*, which may be carried by the central partition *j* or otherwise. To rotate these outer portions of the gates thus mounted, adjusting mechanism may be used similar to that already described, the extensions *p* being preferably fitted together and slotted, as shown in Fig. 3, and engaged with the rod *R*. Thus it will be observed that while the same amount of water may be delivered to the wheel yet the wheel-shaft is supported in bearings which are nearer together than in the usual form of case whereby the wheel runs steadier and a smaller shaft may be employed; also, the side plates are simplified in construction and allow of access to the pivotal bolts from the outside of the inclosing casing, improving the facility of repairing and setting up the same. Again, the matching of the partition with the ring is such that no obstruction is made to the inflowing water by projecting lugs or other connection between the ring and the partition. The curves of the side plates produced by drawing inward the central side parts of the case assist in the delivery of the water to the gates and promote the action of the same on the wheels.

While I have shown and described a wide-breasted wheel, a correspondingly wide gate-opening, an annular partition in the latter, and gates on either side of said partition, I do not claim the same broadly in this application, as they are so claimed in my application, Serial No. 358,669, filed July 14, 1890.

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

1. In a water-wheel, the combination of a casing having an inlet-opening for the water, and draft-tubes having shaft-bearings and secured directly to the sides of said case, each of the said sides being recessed or bent

inward in an annulus about said tubes and connected to the outwardly-flared rim portion and adapted to guide the water inward, gates mounted between said recessed annular portions of the sides to receive the water from the rim portion, and mechanism to operate said gates.

2. In a water-wheel, the combination, with a casing having an inlet-opening for the water, and draft-tubes having shaft-bearings and secured directly to the sides of said case, each of the said sides being recessed or bent inward in an annulus about said tubes and connected to the outwardly-flared rim portions of the case to guide the water inward, of an intermediate partition between and supported by said annular portions of the case, gates mounted, respectively, between said partition and said annular sides, a rotatable ring connected to said gates, and an adjusting-rod connected to both series of gates through said ring and extending outside of the case.

3. The combination, with a water-wheel and inclosing case provided with an inlet-opening and outlet-flumes for the water, of an intermediate partition supported in the gate-opening, gates mounted between said partition and the corresponding side of said case, a ring rotatably mounted on said partition and matched with the same by tongue and groove to form a smooth face for the entrance of the water, rollers between said ring and partition, whereby it may be easily rotated, connecting mechanism between the ring and said gates for operating the latter, and adjusting means for said ring, whereby both series of gates are centrally operated by one mechanism.

4. The combination, with a water-wheel and an inclosing case provided with an annular opening and outlet-flumes for the water, of an intermediate partition and side plates, and gates mounted, respectively, between said partition and said side plates, a rotatable ring connected to said gates, and an adjusting-rod connected to both series of gates through said ring and passing outside of the case.

In testimony whereof I affix my signature in presence of two witnesses.

FRANCIS M. BOOKWALTER.

Witnesses:

W. H. LINN,

A. N. SUMMERS.