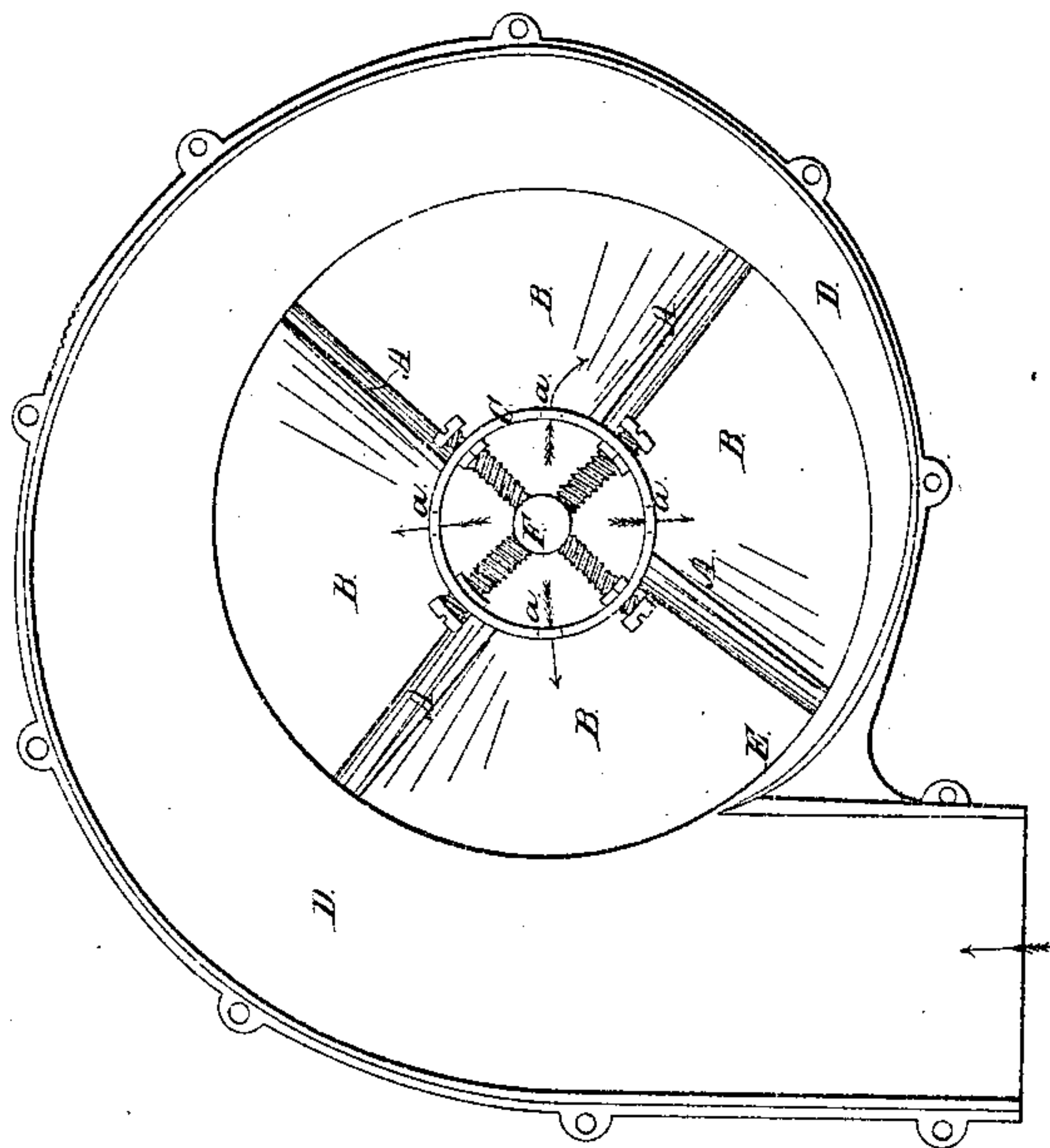


*F. Smith,*  
*Water Wheel,*

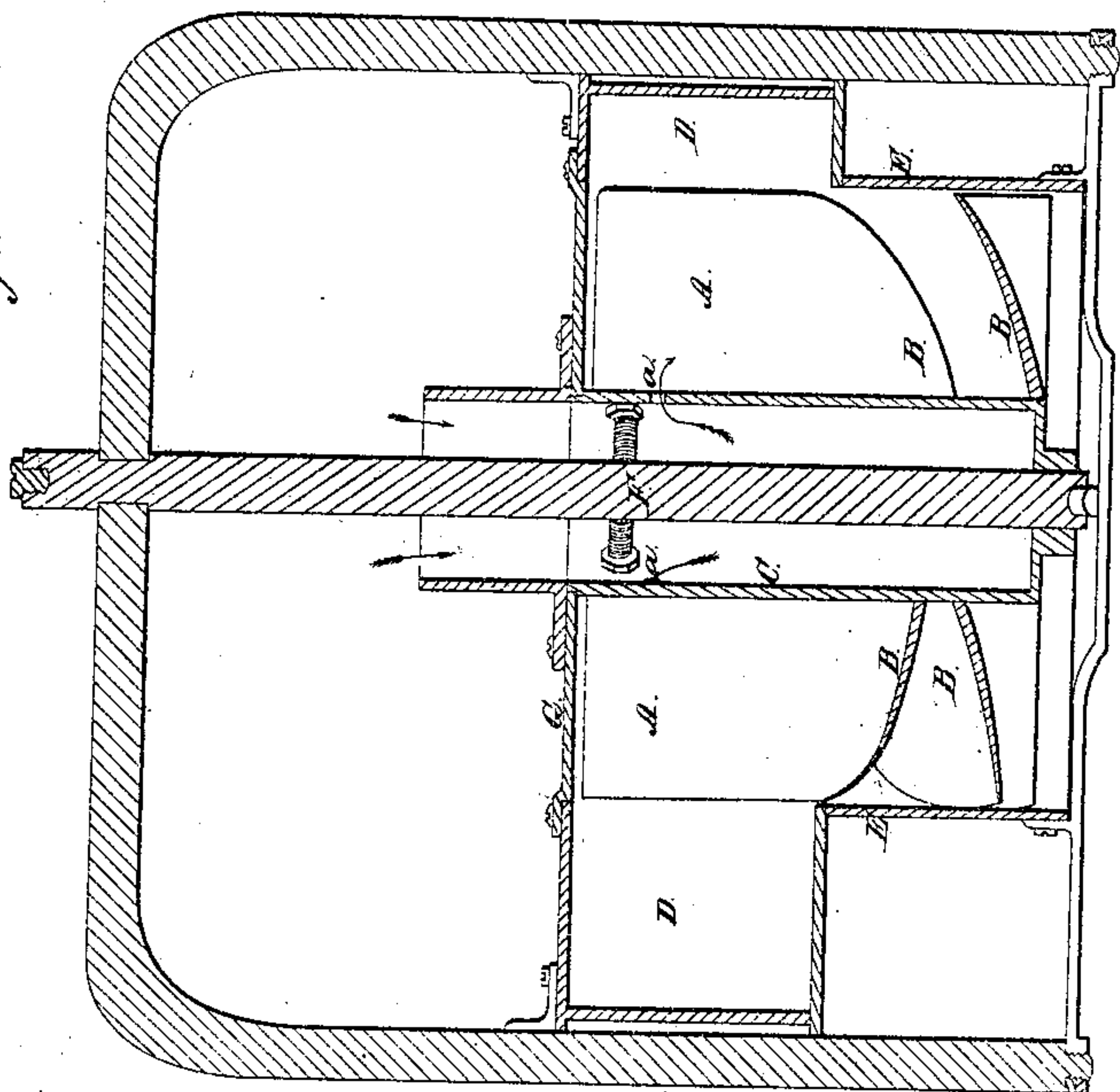
*No 19,214.*

*Patented Jan. 26, 1858.*

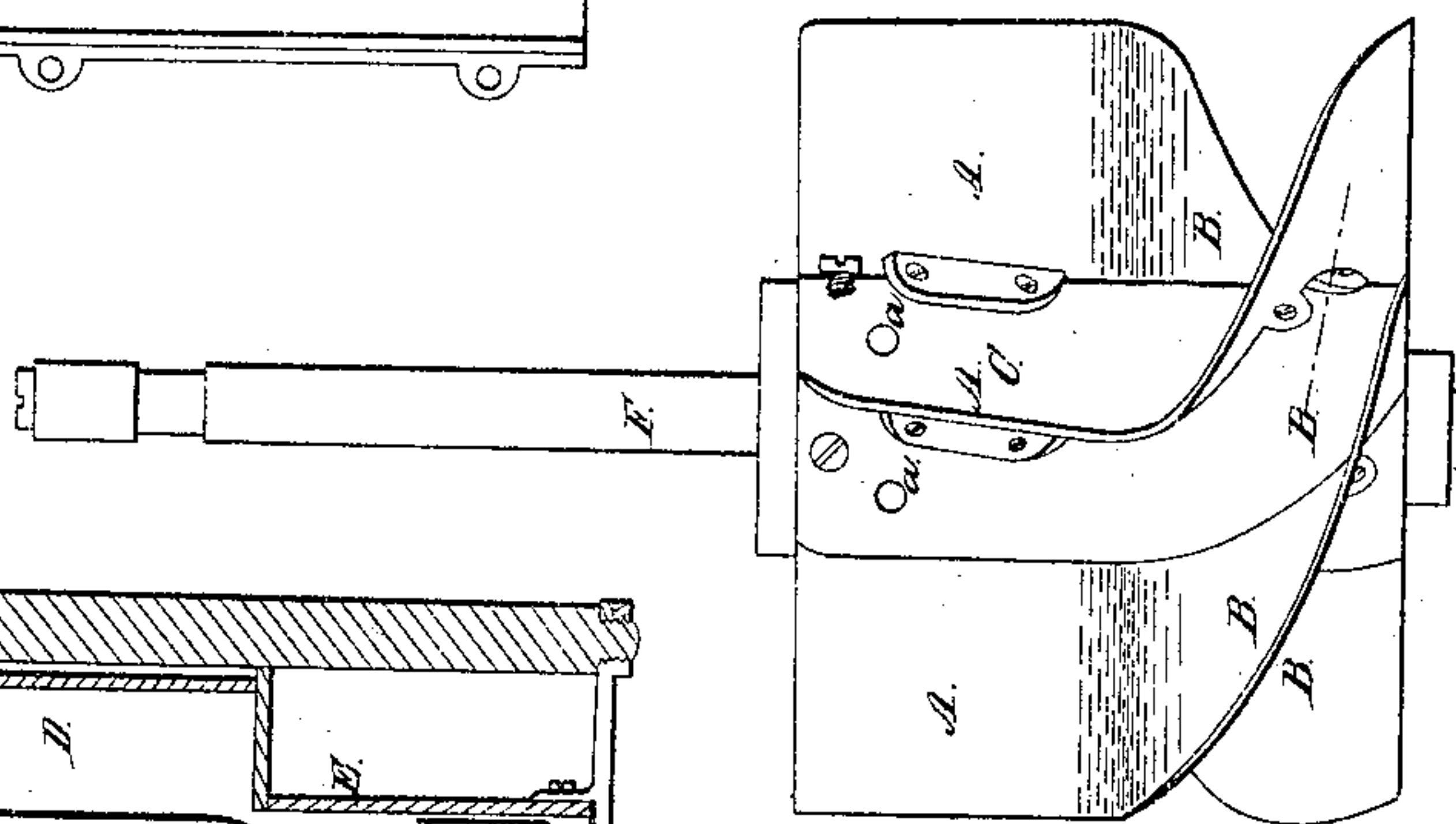
*Fig. 2.*



*Fig. 1.*



*Fig. 3.*





# UNITED STATES PATENT OFFICE.

FREDERICK SMITH, OF BUFFALO, NEW YORK.

## IMPROVED WATER-WHEEL.

Specification forming part of Letters Patent No. 19,214, dated January 26, 1858.

*To all whom it may concern:*

Be it known that I, FREDERICK SMITH, of Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Water-Wheels; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical central section of a water-wheel with my improvements applied to it. Fig. 2 is a top view of the same, the cap or upper plate of the case being removed. Fig. 3 is a side view of the shaft of buckets detached from the case.

Similar letters of reference in each of the several figures indicate corresponding parts.

My invention consists in a peculiar arrangement and combination of parts, which are peculiarly constructed, whereby the two actions of the water—to wit, the full percussion and the full reaction—are employed in the same wheel without one interfering with the other, and whereby, also, a continuous draft of air is admitted into the bucket-case above the water, so as to fill the vacuum between the water and the hollow perforated shaft, and the force and gravity of the water in its reaction thereby greatly increased and a free discharge secured.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A B represent two distinct sets of buckets arranged upon a perpendicular hollow shaft C, which is situated centrally in the combined scroll and cylindrical bucket-case D E and fastened to a perpendicular axis F. Each of the buckets A stands radial to the hollow shaft C, while each of those B gradually takes a curved form from the lower edge of those A and winds spirally in rear of the radial bucket round the hollow shaft in such a manner as to encircle it for one-quarter of its circumference, and then terminate at its lower extremity. By thus shaping and arranging the buckets B one necessarily overhangs another, and yet a free and uniform or undiminishing discharge is secured, and, beside this, while the full percussion action of the water is obtained the full reaction is employed without any loss from back action, as the water is discharged from the spiral or in-

clined-plane buckets B very readily, and while discharging its weight is made effective for driving the wheel.

By examining the drawings it will be seen that the case is made with two chambers D E, the chamber D forming a scroll and serving for containing the buckets A and for receiving the water, while the chamber E forms a cylinder of smaller diameter than the scroll and serves for containing the buckets B B and discharging the water at its lower end. It is quite important that this construction should be adhered to in connection with the radial and spiral buckets combined and the hollow perforated central shaft, because it is necessary for the buckets A B to be completely surrounded in order to insure the admission of a continuous draft of air through the openings *a a* of the hollow shaft and down through the bucket-case. It is also quite important that the buckets be continued spirally round quarter the circumference of the hollow shaft and to the base of the same, so that the draft shall be continuous and unbroken, and thus it rendered available for filling the vacuum between the water and perforated shaft, and consequently preventing the filling of said space with water, which would interfere with the full percussion-stroke of water on the radial buckets and gravity of the water for driving the wheel.

G is a cap screwed to the top of the scroll immediately over the buckets. This cap is removable, so that the cap may be got at and repaired or adjusted when necessary without the necessity of taking the scroll apart.

The water enters the scroll, as illustrated by the arrow, and acts with its full percussion force upon about one-fourth the outer surface of the radial buckets A, thus leaving a space between the water and the hollow perforated shaft to be filled with air. It then glides smoothly onto the buckets B and gives a full reaction force, aided by pressure of air admitted above it through the hollow shaft into the vacuum between the water and perforated shaft. The water, having performed its full duty, discharges through the bottom of the cylinder without having had its course reversed after it gave the first stroke, which result I believe has never been attained perfectly, owing to the fact, as I believe, that in all instances, so far as my knowledge extends,



where the two actions are combined the buckets are more contracted at the point of discharge than at the entrance, which defective construction tends to kill the percussion-stroke by causing the water to strike into a solid body, and thence to force itself through the contracted part of the buckets.

I do not claim, broadly, admitting air into the bucket-case to secure the full percussion, reaction, and free discharge of the water, irrespective of the peculiar manner in which the air is introduced and the peculiar construction of wheel in connection with which this principle is employed; but

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

The peculiar construction, arrangement, and combination of the hollow perforated ver-

tical shaft C, radial and spiral buckets A B, and scroll and cylindrical case D E, whereby the two actions of the water—to wit, the full percussion and the full reaction—are employed in the same wheel without one interfering with the other, and whereby, also, a continuous draft of air is admitted into the bucket-case above the water, so as to fill the vacuum or space between the water and perforated shaft, and the force and gravity of the water in its reaction thereby greatly increased and a free discharge secured, substantially as set forth.

FREDERICK SMITH.

Witnesses:

G. YORKE AT LEE,  
ROBT. W. FENWICK.