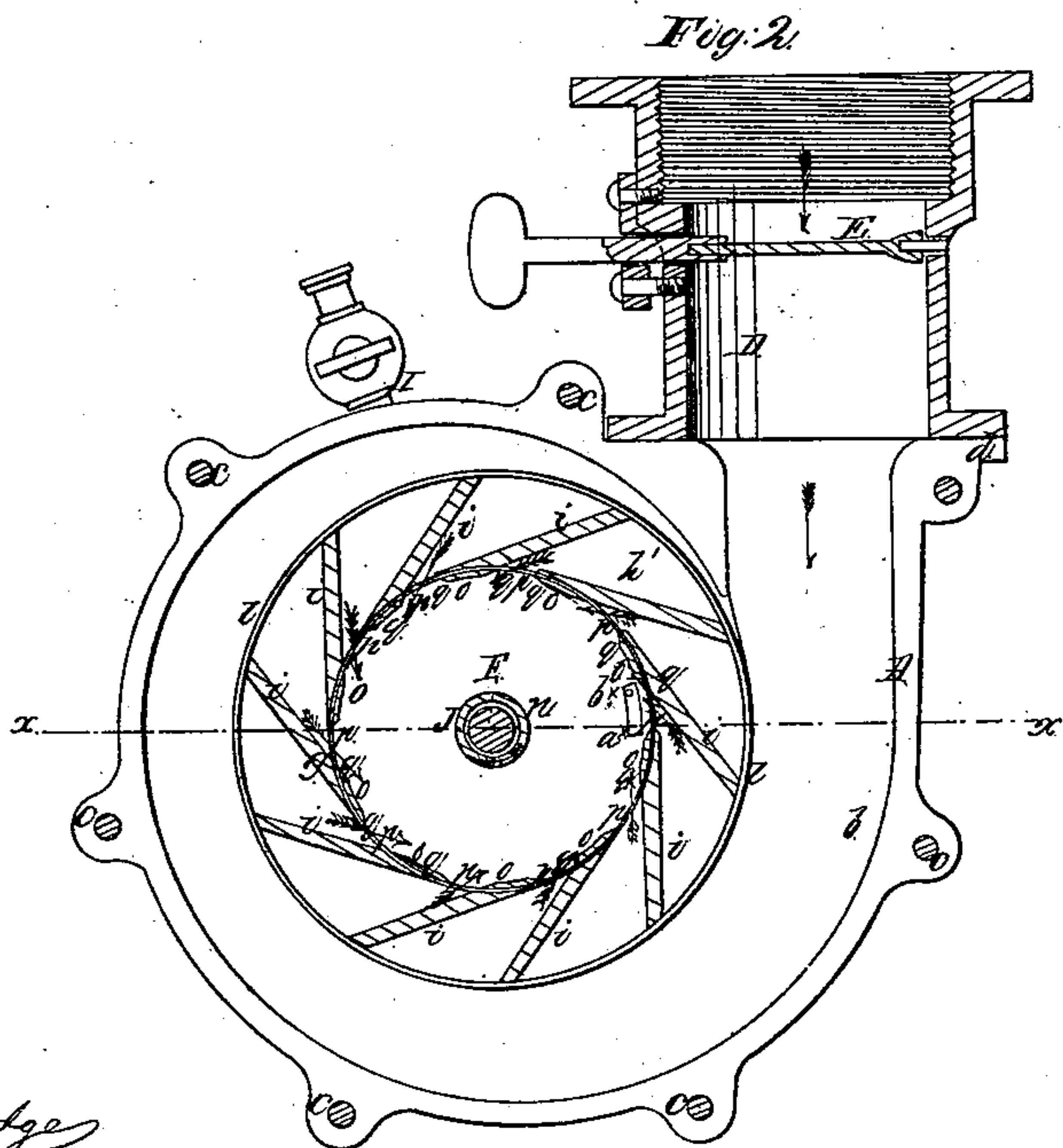
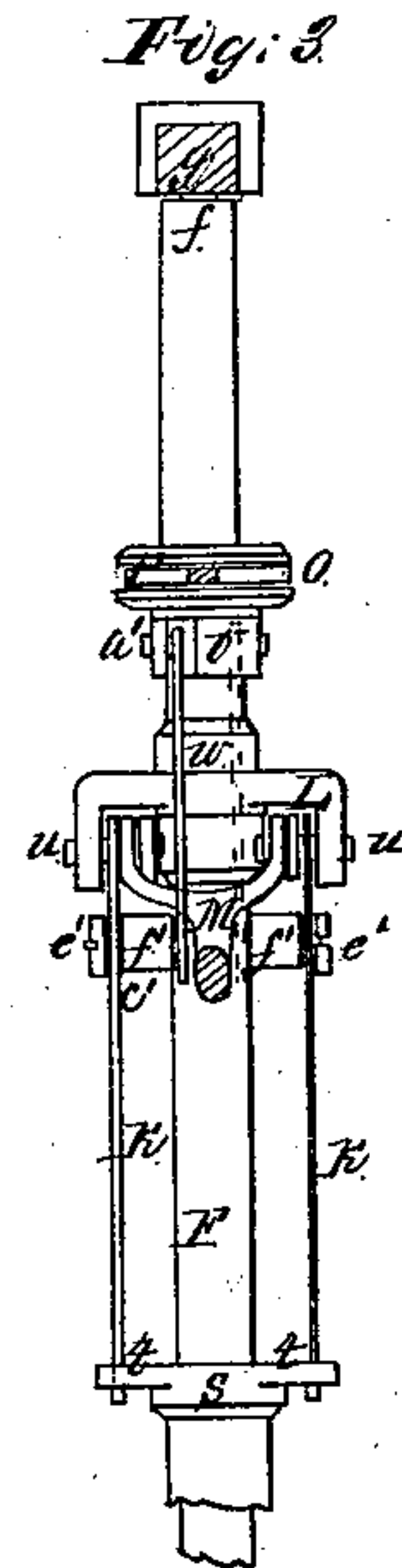
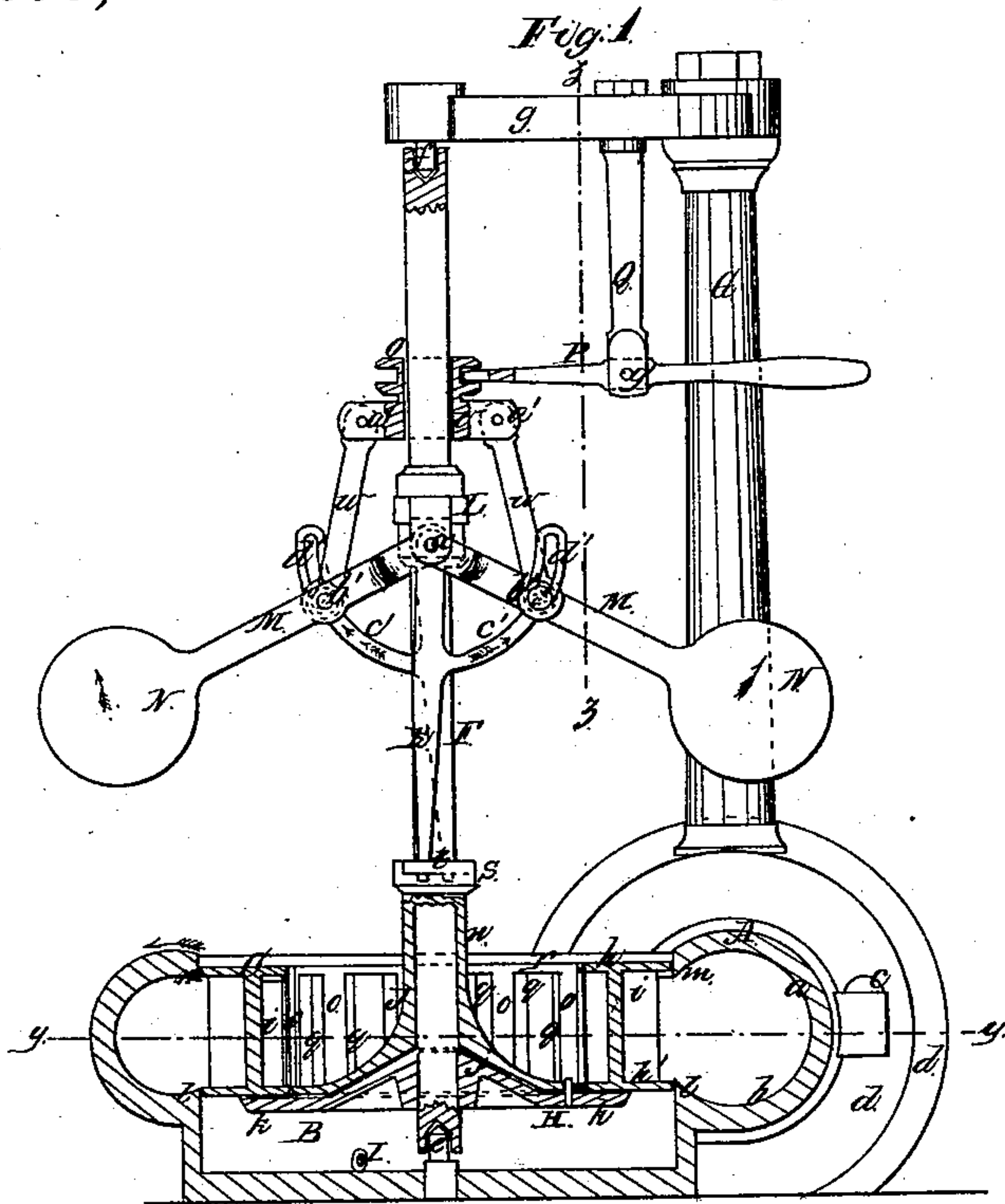


T. D. Lakin

Water Wheel

No. 40,268,

Patented Oct. 13, 1863.



Witnesses:
W. S. Parkidge
Daniel Roberts

Inventor:
Thos. D. Lakin

UNITED STATES PATENT OFFICE.

TAYLOR D. LAKIN, OF HANCOCK, NEW HAMPSHIRE.

IMPROVED WATER-WHEEL.

Specification forming part of Letters Patent No. 40,268, dated October 13, 1863.

To all whom it may concern:

Be it known that I, TAYLOR D. LAKIN, of Hancock, in the county of Hillsborough and State of New Hampshire, have invented certain new and useful Improvements 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 a part of this specification, in which—

Figure 1 is a vertical section of my invention, taken in the line $x x$, Fig. 2; Fig. 2, a horizontal section of the same, taken in the line $y y$, Fig. 1; Fig. 3, a vertical section of a part pertaining to the same, taken in the line $z z$, Fig. 1.

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

This invention relates to certain improvements in water-wheels of that class which are attached to a vertical shaft and are inclosed by a scroll.

The invention consists in a novel manner of applying a gate and a ball-governor to the wheel, whereby the speed of the same may be regulated as desired.

To enable those skilled in the art to fully understand and construct my invention, I will proceed to describe it.

A represents the scroll of the wheel, which is of semicircular form in its transverse section, or it may embrace rather more than a semicircle, as shown in Fig. 1. This scroll is connected or cast with a cylindrical chamber, B, the latter being below the former and equal to the diameter of the wheel C. The scroll A may be cast in two horizontal parts, $a b$, and connected together by bolts c , the chamber B being cast with the lower part, b , of the scroll, or all the aforesaid parts may be cast in one piece. The orifice of the scroll A is provided with a flange, d , to which the flume or induction-pipe D is attached by bolts. The pipe D near its junction with the scroll is provided with a gate, E, which may be arranged in any proper way.

F represents the wheel shaft, the lower end of which is fitted on a point or pin, e , at the center of the bottom of the chamber B, as shown in Fig. 1, the upper end of said shaft having a vertical pin, f , fitted in it, which pin passes through a horizontal arm, g , attached to a vertical post, G. The wheel C is

formed of two annular plates, $h h'$, placed one directly over the other, with buckets i placed tangentially between them at equal distances apart. The buckets i are planes, and have a tangential position with the central opening of the plate $h h'$, as shown clearly in Fig. 2. The lower plate, h' , is secured to plate H, which is firmly keyed or otherwise attached to the shaft F, and the central part, j , of the plate H is of conical form, the outer part, k , to which the plate h' is secured, being a horizontal plane surface. (See Fig. 1.) The plate H, it will be seen, is the means by which the wheel is attached to the shaft. When the wheel is placed in the scroll A, the lower plate, h' , of the former is "flush" with the lower and inner edge, l , of the scroll, and is fitted as snugly within said edge as may be without creating undue friction. The upper plate, h , is fitted in a like manner within the upper and inner edge, m , of the scroll. (See Fig. 1.)

I is a faucet or cock, which is fitted in the lower part of the chamber B.

J is a circular or annular gate, which is formed by a conical tube, u , placed loosely on the wheel-shaft F. The lower internal part of the tube u is of flaring form, corresponding to the conical part j of the plate H, on which it is fitted. To the edge of the lower end of the tube u there are attached a series of vertical plates, o , at equal distances apart. These plates are equal in width to the spaces p , between the inner ends of the buckets, and the edges of said plates are beveled as shown at q , so that when the plates are in line with the buckets i the edges of the same will not offer any obstruction to the water, as the latter passes into the interior of the wheel. (See Fig. 2.) The upper edges of the plates o are connected by a ring, r , which fits snugly within the upper plate, h , of the wheel. This gate, thus formed of the conical tube u , plates o , and ring r , may all be cast in one piece. The plates o work snugly against the inner edges of the buckets i , and it will be noticed that the bevel of the inner ends of the buckets i and the width of the plates o exactly correspond in size, so that when the plates o are open their edges stand in line with the planes of the buckets i , and the said plates o , when thus placed, form, in effect, inward extensions or continuations of the buckets i . This construction permits the flow of the water in the

most direct manner, with the least obstruction.

On the upper end of the conical tube *u* of the gate J there is secured a collar, *s*, having two horizontal arms, *t t*, projecting from it at opposite points, both of which are shown in Fig. 3, and K K are two levers, the lower ends of which are connected to the outer parts of the arms *t t*. The upper ends of the levers K K are fitted loosely on shafts *u u*, which are placed in a cross-head, L, the latter being secured on the wheel-shaft F. On the shafts *u u* there are also fitted loosely two arms, M M, which project from the wheel-shaft F at opposite sides, and have balls N N at their outer ends. On the wheel shaft F there is also placed a sliding collar, O, which has a cross-bar, *v*, attached to its under side. This cross-bar projects horizontally from the collar at equal distances from two opposite points, as shown clearly in Fig. 1. The ball-arms M M are connected to the ends of the cross-bar *v* by two arms, *w w*. These arms are connected to the bar *v* by pivots *a'* and they are connected to the ball-arms M by being fitted on pins *b'*, which project horizontally from the arms M. Each lever K has a curved or segment bar, *c'*, attached to it, and the outer ends of the bar *c'* are slotted or provided with a loop, *d'*. Through these loops, screws *e'* pass into the pins *b'*, and the loops bear against collars *f'*, which are fitted loosely on the pins *b'*. The collar O has a grooved periphery in which the forked end of a lever, P, is fitted, the fulcrum *g'* of the latter being in the lower end of a pendent bar, Q, attached to the arm *g* of post G. (See Fig. 1.)

From the above description it will be seen that when the wheel is at rest the balls N will by their gravity keep the plates *o* of the gate J in line with the buckets *i*, and consequently the spaces or issues *p* between the inner edges of the buckets will be fully open, the ball-arms M M acting upon the gate J in consequence of being connected to the levers K K through the medium of the curved bars *c' c'*, and the levers K K acting upon the arms *t t* of the collar *s* on the upper end of the tube *n* of the gate J. When the wheel is in motion, the balls N, under an undue speed of the wheel, have a tendency to rise, and the ball-arms M will turn or move the gate J, so that the plates *o* will cover more or less of the issues *p*, and by this means a uniform rotation of the wheel is insured. By adjusting the arms M M higher or lower in the loops *d' d'* of the bars *c' c'*, the governor will be made to give out and maintain higher or lower rates of speed of the water-wheel commensurate with the height of the head of water under which the wheel

is placed, for by the adjustment of said arms the plane of the revolution of the balls may be so disposed as to move the gate or open and close the issues, so as to render the rotation of the wheel constant under different rates of speed. This adjustment of the arms is of course only once required, and that is when the wheel is first put up and placed in working order by the millwright. The lever P serves as a means for the operator to raise and lower the balls of the governor, so as to stop the wheel entirely or to cause it to revolve faster than the governor otherwise would permit it to do. This forms a convenient device for temporarily controlling the action of the wheel. The gate E is used when it is necessary to shut off the water from the scroll A. When the wheel is running, a sufficiency of water will leak through into the chamber B between the plate *h'* and edge *l* of the scroll to fill the chamber and press upward against the under side of plate *h'* and the plate H, and this upward pressure relieves the point or pin *e* of the gravity of the wheel. This upward pressure of the water against the plates H *h'* may be regulated as desired by turning the faucet or cock I so that more or less water may escape from the chamber B.

The action of the water on the wheel and its course through the latter is indicated by the arrows in Figs. 1 and 2. It will be seen that the water passes through the issues *p* into the center of the wheel and out over the upper plate, *h*, thereof, and the scroll A and the wheel will operate when submerged. The level of the water, however, should not quite reach the top of the tube *n* of the gate J, as the arms *t t* should not be in contact with the water.

I would remark that the lower part of the tube *n* has a curved slot, *a^x*, made in it to receive a pin, *b^x*, on plate H. This slot and pin serve as a stop to limit the circular movement of the gate J. (See Fig. 2.)

I do not claim, broadly, the employment of ball-governors, sleeves, and adjustable gates in water-wheels; but,

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

The construction and arrangement of the plates *o* and the inner ends of the buckets *i* in the manner herein shown and described, so that the said plates when open will form inward continuations of the buckets, all as set forth.

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Witnesses:

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