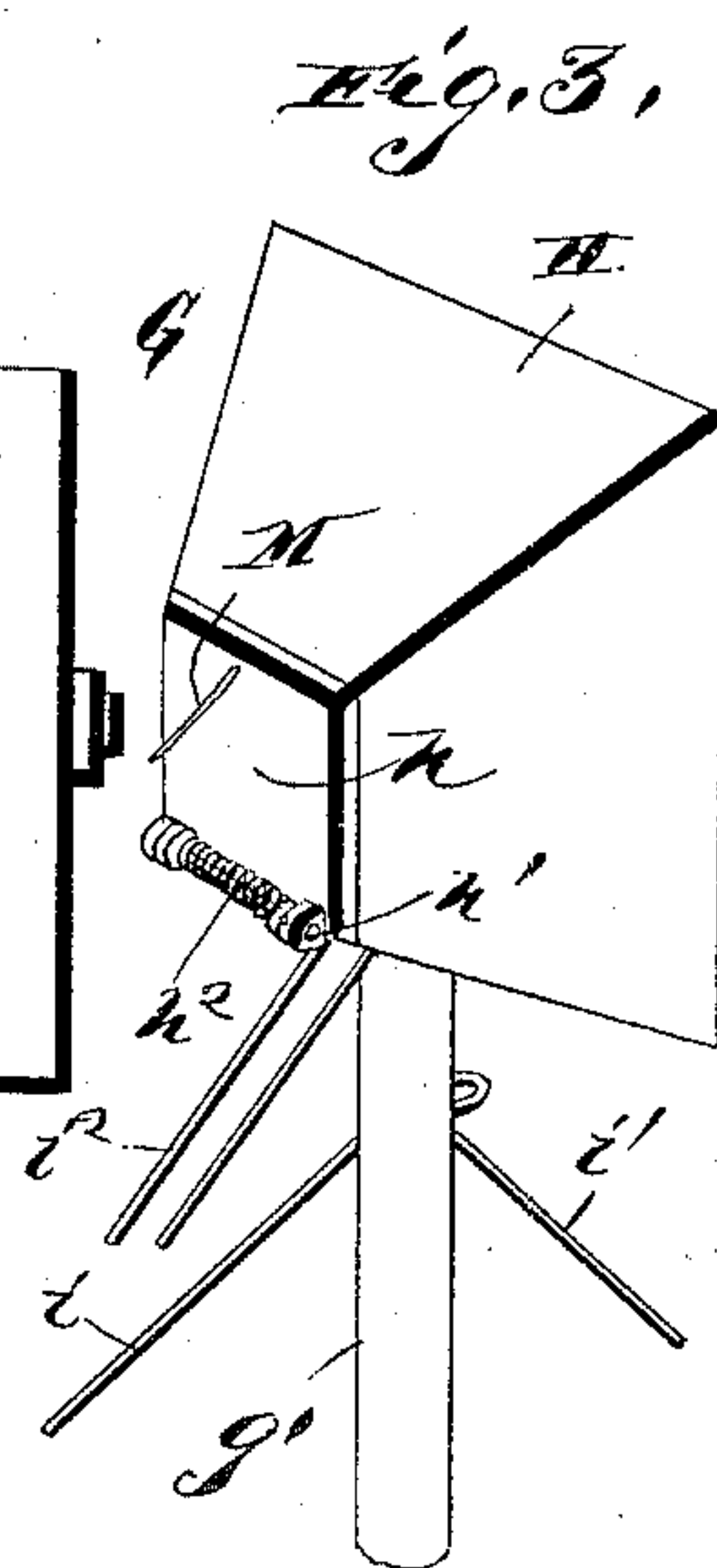
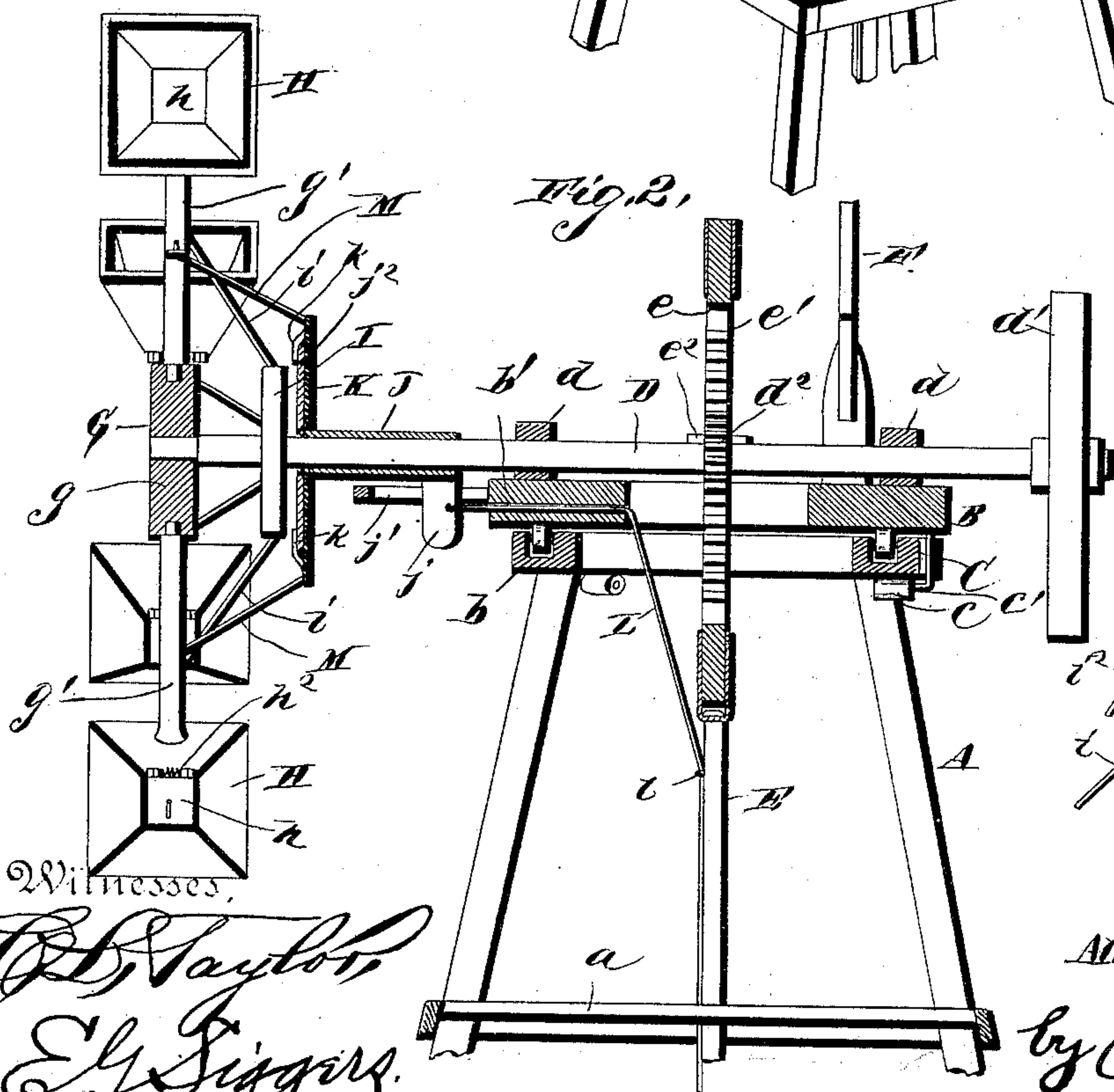
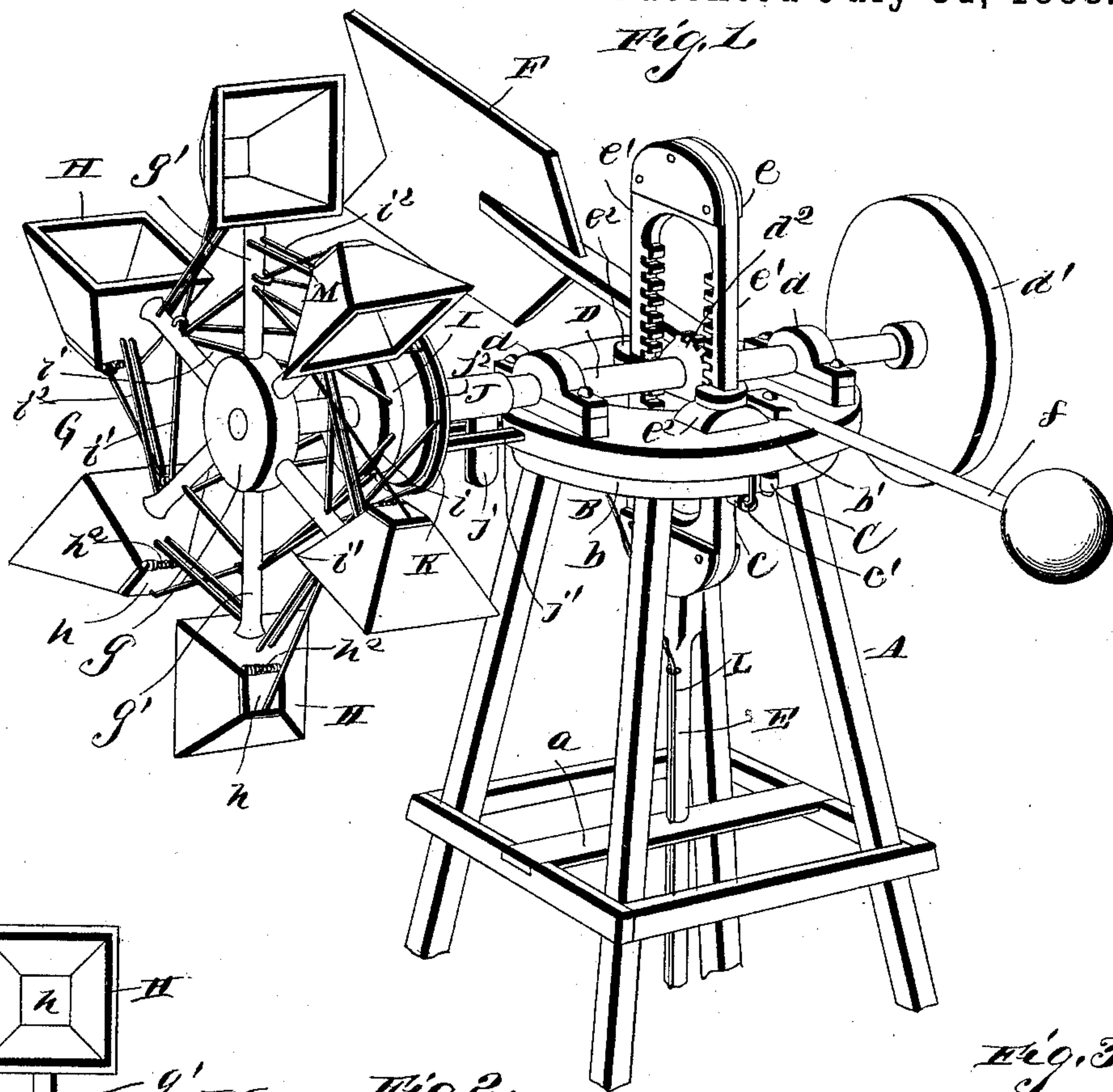


(No Model.)

A. G. NAGEL.  
WINDMILL.

No. 387,102.

Patented July 31, 1888.



Witnesses,  
*O. B. Taylor,*  
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Inventor,  
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Attorneys.



# UNITED STATES PATENT OFFICE.

ALBERT G. NAGEL, OF FORMAN, DAKOTA TERRITORY.

## WINDMILL.

SPECIFICATION forming part of Letters Patent No. 387,102, dated July 31, 1888.

Application filed March 7, 1888. Serial No. 266,439. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT G. NAGEL, a citizen of the United States, residing at Forman, in the county of Sargent and Territory of Dakota, have invented a new and useful Improvement in Windmills, of which the following is a specification.

The invention relates to improvements in windmills, being of the class in which the vanes or sails are box-shaped or bucket-shaped; and it consists in the construction and novel combination of parts hereinafter described, illustrated in the drawings, and pointed out in the claims.

In the drawings, Figure 1 is a perspective view of a windmill embodying the invention. Fig. 2 is a central vertical section of the same, showing the side opposite the wind-wheel. Fig. 3 is a perspective view of one of the vanes or buckets detached.

Referring to the drawings by letter, A designates the support-frame, having the usual pyramidal shape and provided with the central cross-beam, *a*.

B is a turn-table composed of the two annular plates or rings *b b'*, the former of which is secured to the top of the frame, the latter turning upon it, but not journaled thereon.

C C are anti-friction rollers turning on rods depending from the ring *b'* and resting against the periphery of the plate *b*, which is of less diameter than the plate *b'* and has a larger central opening than said plate; and *c c* are anti-friction rollers bearing on the under surface of the ring *b* and turning on the inwardly-bent horizontal arms of rods *c'*, depending from the lower surface of the ring *b'*. The said anti-friction rollers prevent the rings of the turn-table from separating and keep them vertically aligned.

D is the wind-wheel shaft journaled in the boxes *d*, secured to the upper plate, *b'*, and having the wind-wheel and the balance-wheel *d'* at opposite ends, as shown.

*d'* is a segmental gear-wheel on the shaft D, situated centrally within the turn-table.

E is the vertical reciprocating drive-rod for attachment to a pump or other machine, which rod passes through a suitable guide-opening in the beam *a*, and has pivoted to its upper end the rack-frame *e*, composed of the two vertical racks *e'*, having their teeth on their

inner edges, and end pieces connecting said racks. The outer edges of the racks reciprocate vertically in grooves in the blocks *e''*, secured at diametrically opposite points on the plate *b'* on a line at right angles to the shaft D, and the racks engage the segmental gear-wheel *d'*, so that when the shaft D rotates, the said segmental gear-wheel, by alternately engaging the racks, will reciprocate the rack-frame and consequently the drive-rod.

F is the directing vane or sail, secured to the plate *b'* by its stem at right angles to the wind-wheel shaft, and *f* is a weighted arm secured to the opposite side of said plate, to balance the directing-vane.

G is the wind-wheel, composed of the hub *g*, the arms or spokes *g'*, and the bucket-like vanes H on the end of said arms. The said buckets are pyramidal in shape and have their apices cut off, so that they are provided with central rectangular openings, as shown. These openings are closed by doors *h*, hinged at their inner edges to the buckets, the ears of the hinges being at the ends or corners of said edges, and the pintle-rod *h'* being surrounded by the strong coiled spring *h''*, attached at one end to the buckets and at the other end to the doors, in order to close the latter against the force of the wind.

I is a disk secured to the shaft D near the wind-wheel, and having its periphery secured to the arms *g'* by the brace-rods *i*. The arms are connected together by the brace-rods *i'*, and the top portions are each stayed and braced by the two rods or braces *i'' i''*.

J is a sleeve sliding on the shaft D, on the inner side of the disk I, and having a depending plate *j*, which moves in a longitudinal slot in the arm *j'*, secured to the periphery of the ring *b'*, and prevents the sliding sleeve from turning on the shaft.

*j''* is a disk secured to the outer end of said sleeve, and K is a disk of larger diameter turning on the sleeve, and held close to the disk *j''* by the lips or points *k*, projecting from its surface and extending over the edge of said disk *j''*.

L is a rope or chain secured to the inner end of the sliding sleeve, passing thence through an opening in the plate *b'*, and thence downward through a loop or sleeve, *l*, secured to the drive-rod E, to a point within reach of the op-



erator, so that he can slide the sleeve inward on the shaft D.

M M are ropes or chains, each attached in an opening or staple near the edge of the disk K, extending thence through a staple secured to one of the arms  $g'$ , and having its outer end secured to the door  $h$  of the bucket on the arm adjacent to that to which the staple is secured, the rope or chain being secured to the door near the free edge thereof. The operator can thus by sliding the sleeve inward open the doors of the buckets and slacken or stop the wind-wheel.

When the wind is very high, the doors  $h$  will be opened thereby against the springs, which will again close them when the wind moderates. By these means the mill is automatically regulated and will run steadily and evenly and without jar or liability of breakage.

I do not desire to limit myself to the precise construction and combination of devices hereinbefore described, as modifications may be made therein without departing from the spirit of my invention.

Having described my invention, I claim—

1. In a windmill, the combination, with the wind-wheel composed of a central hub, the arms standing outward therefrom, and the bottomless pyramidal buckets secured to the ends of the arms, of the doors hinged by their inner edges over the smaller openings of the buckets, and the coiled spring surrounding the pintles of the hinges, and each having one end attached to a door and the other end to the corresponding bucket, for the purpose of closing the door against the wind when the latter is not too strong, substantially as specified.

2. In a windmill, the combination, with the bottomless buckets or vanes, doors hinged over the rear openings of said buckets, and springs closing the doors against the wind, of means, substantially as described, whereby the doors can be opened simultaneously from the ground, substantially as specified.

3. In a windmill, the combination, with the bottomless pyramidal buckets, the doors hinged at their inner edges over the smaller rear openings in the buckets, and the coiled springs surrounding the pintles of the hinges and closing the doors against the wind, of the sleeve sliding on the shaft of the wind-wheel and having a disk attached to its outer end, the disk turning on the sleeve, and of larger diameter than the disk secured thereto, the ropes or chains connecting the edge of the stationary disk with the doors near their outer edges, and the rope or chain secured to the inner end of the sleeve, passing thence through an opening in the rotating plate of the turntable of the mill, and thence downward through a staple or sleeve secured to the reciprocating drive rod of said mill, substantially as specified.

4. In a windmill, the combination, with the wind-wheel composed of the central hub, the radial arms, and the bottomless pyramidal buckets attached to said arms, the doors  $h$ , hinged to the rear ends of said buckets, and the coiled springs  $h^2$ , surrounding the pintles  $h'$  of the hinges, of the sliding sleeve J, having the depending guide-plate  $j$  and disk  $j^2$ , the arm  $j'$ , secured to the ring  $b'$ , and having a longitudinal guide slot to receive said depending plate, the disk K, having the lips or joints  $k$ , the ropes M, connecting the doors  $h$  and disk K and passing through the staples  $m$ , secured to the arms of the wind-wheel, and the rope L, passing inward through an opening in the ring  $b'$  and downward through a staple or sleeve,  $l$ , secured to the drive-rod B, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

ALBERT G. NAGEL.

Witnesses:

WILLIAM HUDSON,  
T. C. LAUDER.