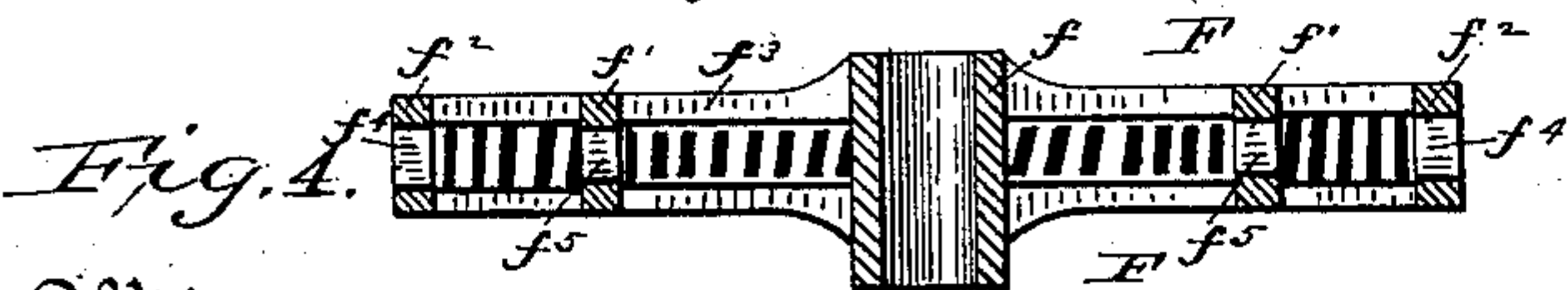
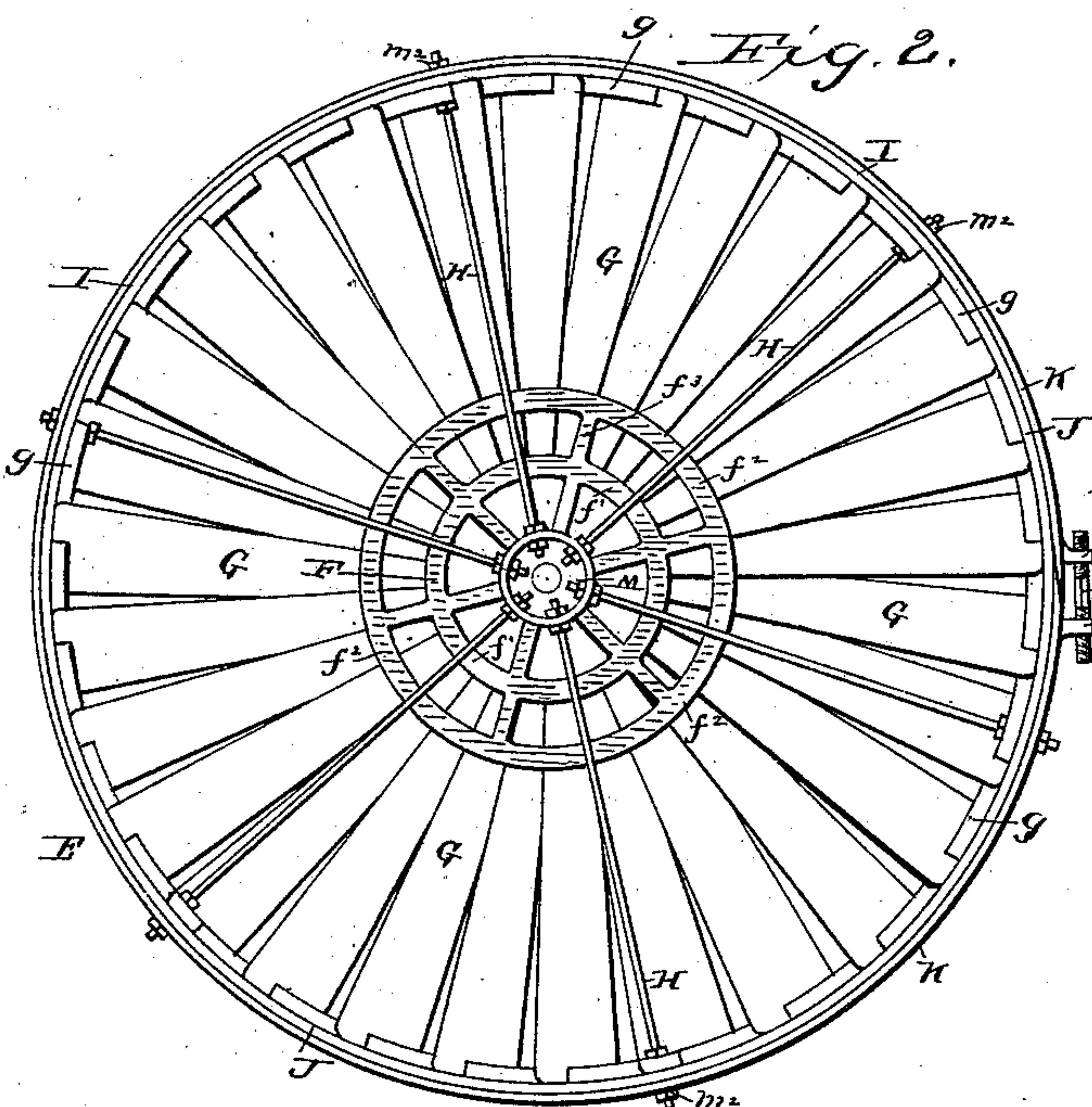
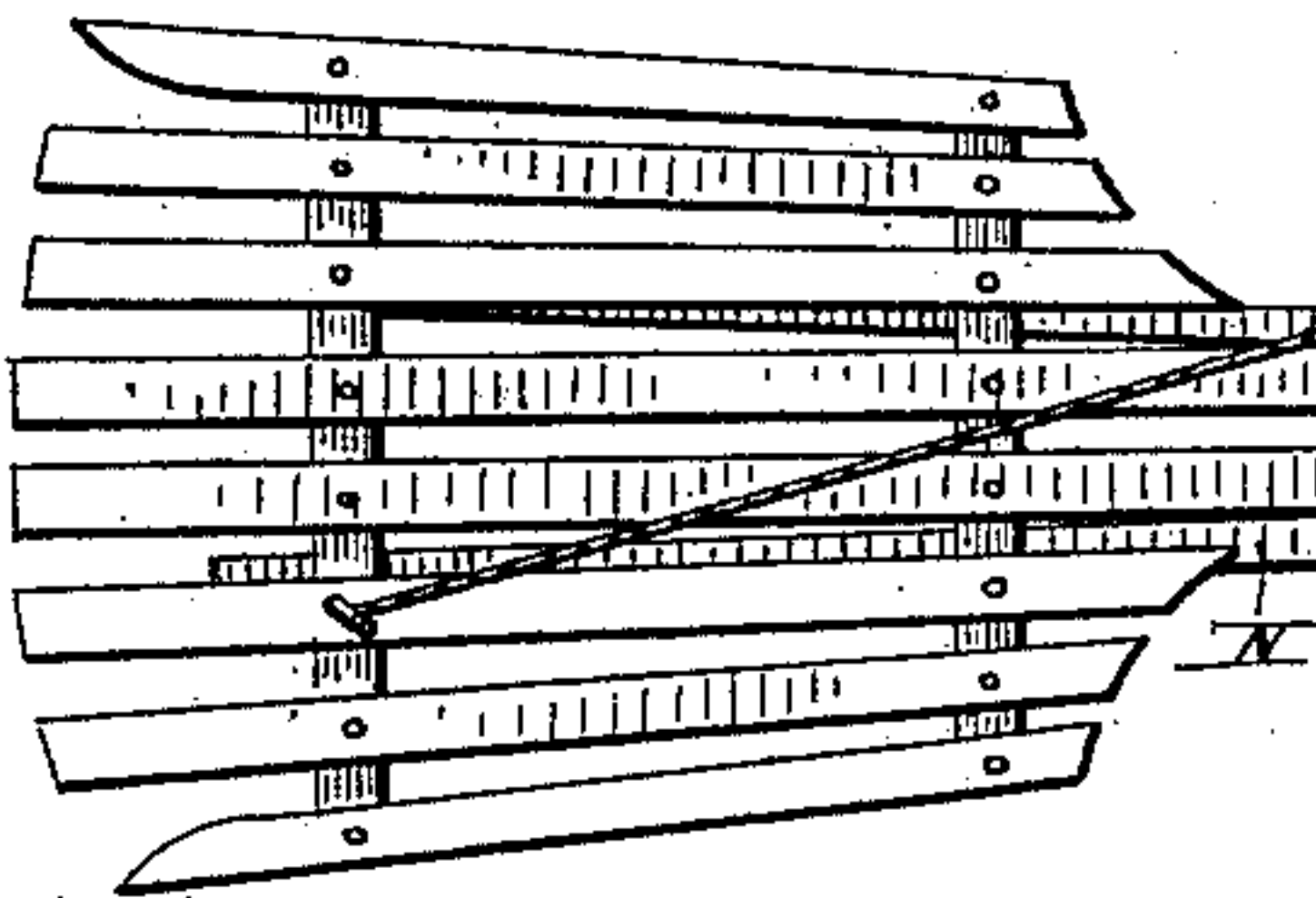
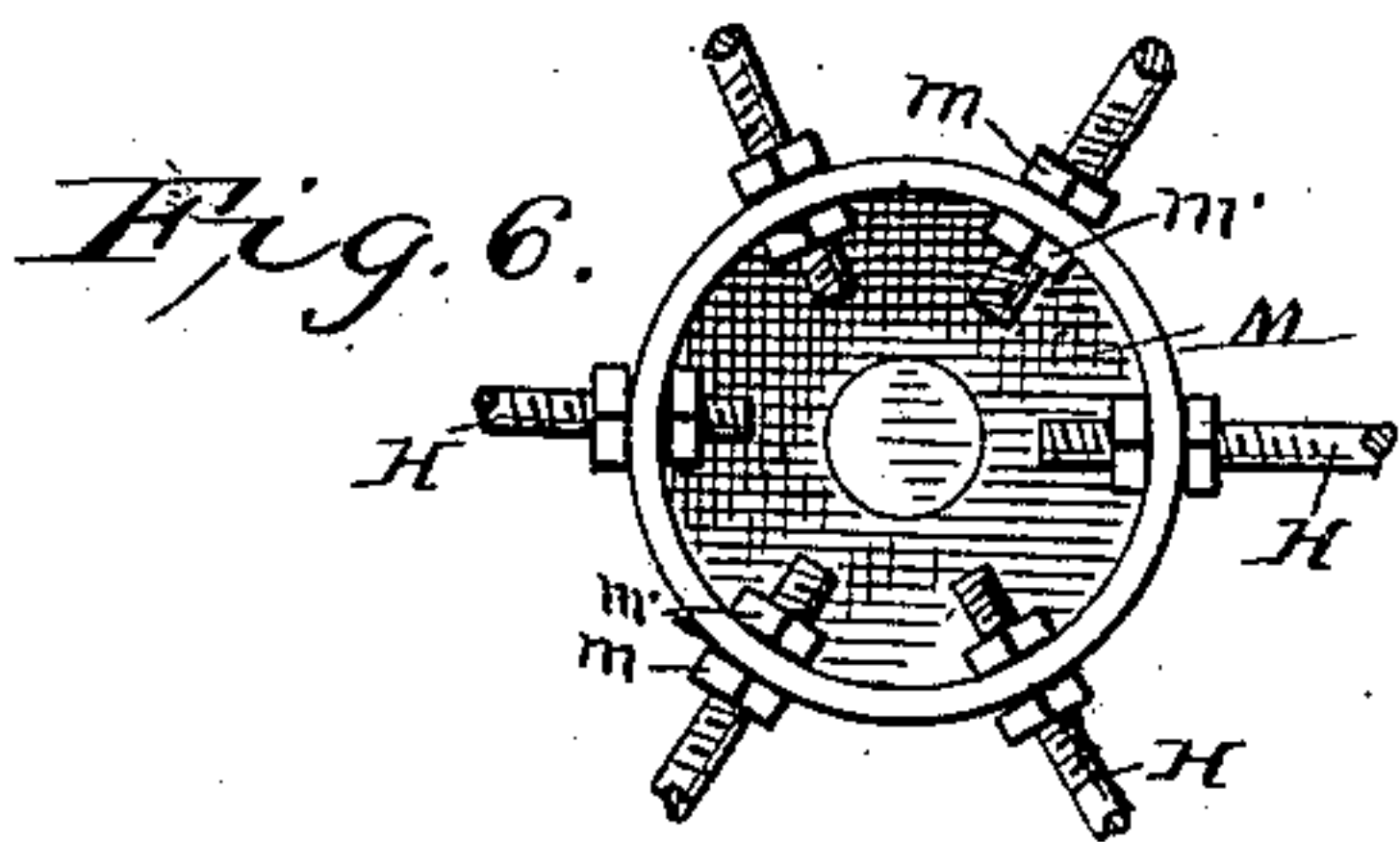


(No Model.)

S. H. HEATWOLE.
WIND WHEEL.

No. 359,443.

Patented Mar^m 15, 1887.

Witnesses

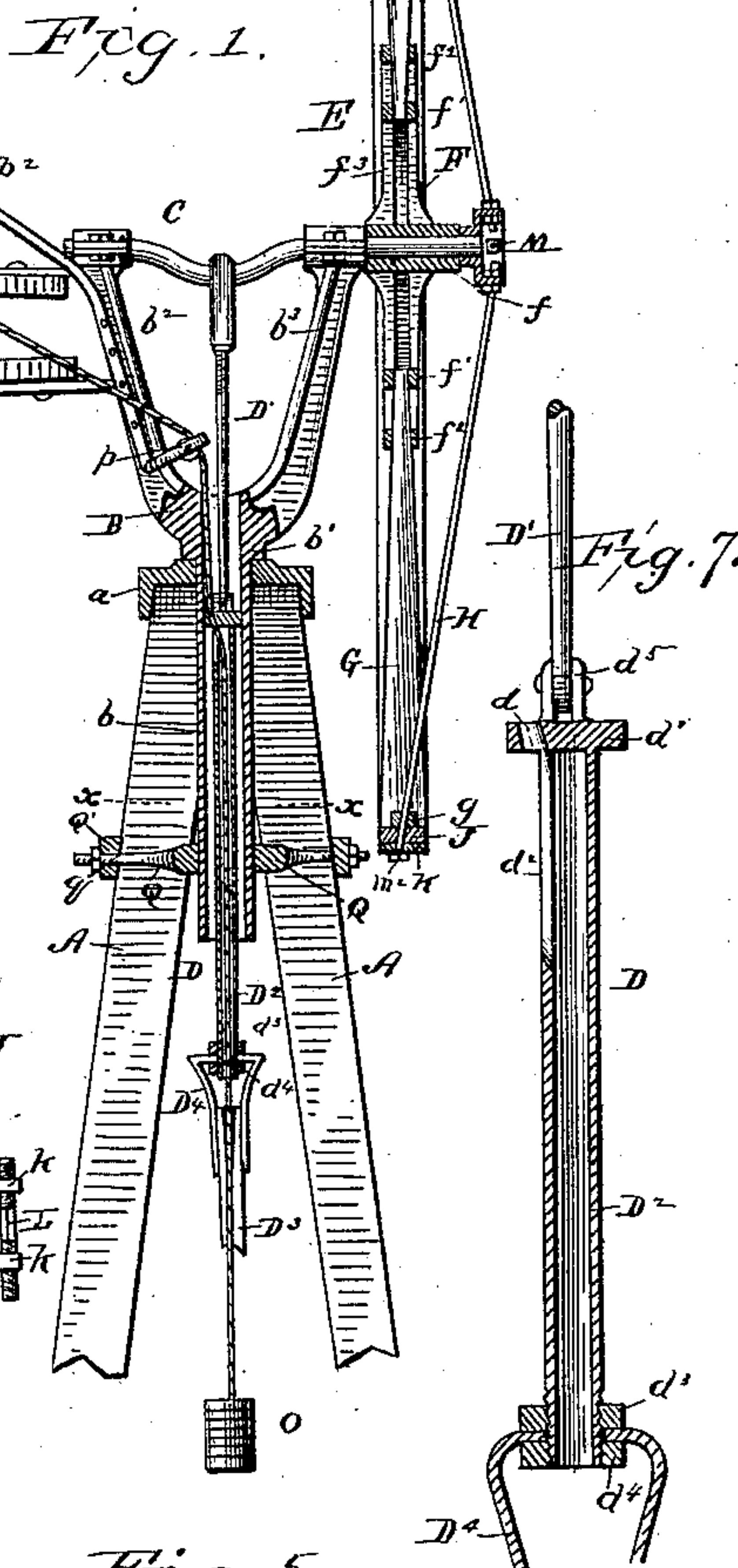
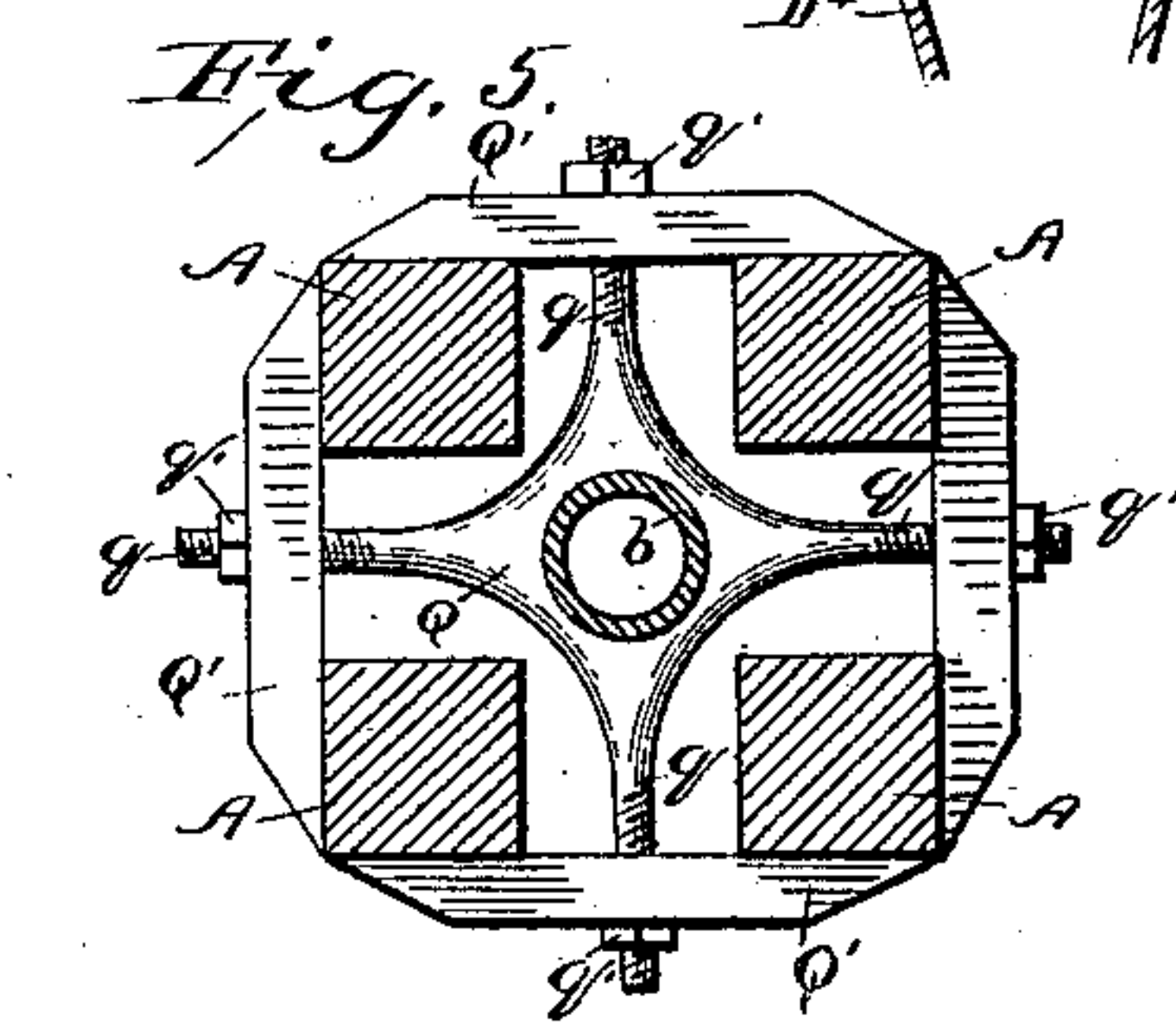
Witnesses
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UNITED STATES PATENT OFFICE.

SIMEON H. HEATWOLE, OF HINTON, VIRGINIA.

WIND-WHEEL.

SPECIFICATION forming part of Letters Patent No. 359,443, dated March 15, 1887.

Application filed December 2, 1886. Serial No. 220,428. (No model.)

To all whom it may concern:

Be it known that I, SIMEON H. HEATWOLE, a citizen of the United States, residing at Hinton, in the county of Rockingham and State of Virginia, have invented certain new and useful Improvements in Wind-Wheels, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to wind-engines of that type commonly known as "vertical solid wheel."

The invention has for its object to simplify and improve the general construction of the device, whereby its efficiency and durability are increased in an eminent degree, and it aims particularly to improve the construction of the wheel *per se*, so that it is better adapted to withstand the action of the wind when blowing a gale.

The improvement consists in the novel features more fully hereinafter set forth and claimed, and shown in the annexed drawings, in which—

Figure 1 is a side view, parts broken away, of a wind-engine embodying my improvements; Fig. 2, a front view of the wheel; Fig. 3, an edge view of the wheel-hub on an enlarged scale; Fig. 4, a longitudinal central sectional view of the wheel-hub; Fig. 5, a sectional view on the line X X of Fig. 1 on an enlarged scale; Fig. 6, a detail view showing the cap on the spindle of the wheel-shaft and the manner of securing the wheel stays or braces thereto; and Fig. 7, a detailed view, on an enlarged scale, of a portion of the pump-rod, showing the swivel-connection and the tubular section which works through the spindle of the wheel-supporting casting.

The tower, which may be of any approved form and construction, is in the present instance composed of four corner-posts, A, united at their upper ends by the centrally-apertured cap *a*, through which the spindle *b* of the wheel-casting B passes. The spindle has a bearing in said cap, and is limited in its downward movement by the shoulder *b'*, extending beyond the aperture and resting upon the top of the cap. The casting projects upward, and is bifurcated from the shoulder *b'*, forming the two limbs *b²* and *b³*, which form bearings at their upper ends for the wheel-

shaft C, which has that portion between said limbs *b²* *b³* bent out of line, forming a crank, which in the operation of the engine actuates the pump-rod D. That portion of the wheel-shaft projecting beyond the limb *b³* has the wind-wheel E keyed thereon in any well-known manner.

The wind-wheel comprises the hub F, the sails G, the stay-rods H, and the rim I.

The hub consists of the central portion, *f*, the inner and outer rings, *f'* and *f²*, and the spokes *f³*, uniting the three parts together, forming a light and strong support for the inner ends of the sails, which ends pass through slots *f⁴* and *f⁵*, formed diagonally across and through the outer and inner rings, *f²* *f'*, respectively. The slots *f⁵* in the inner ring coincide with the slots *f⁴* in the outer ring, *f²*, and are preferably smaller to correspond with the reduced ends of the sails. The several parts, *f*, *f'*, *f²*, and *f³*, composing the hub may, if desired, be made separate and secured together in any well-known manner, or they may be formed integrally. The latter construction is preferred, in that it may be formed of a single casting in an economical manner, and there will be no joints to break loose. The inclination of the slots corresponds with the desired pitch of the sails, so that the latter, when driven home, will assume their proper slant relative to the axis of the wheel.

The sails are of an equal length and have notches formed in their outer ends a sufficient depth to receive the ring *g*, which is seated therein and comes flush with the ends. This ring performs the office of holding the outer ends of the sails in the same plane, and prevents any lateral displacement thereof. The band J, which may be of any suitable material, wood being preferred, owing to its cheapness and elastic properties, encircles the sails, and is confined between their ends and the clamping-band K, surrounding it. The proximate ends of the band K are scarfed, so as not to leave an open joint, and are drawn together by the bolt L, passing through the lugs *k*, projecting therefrom. The opposite ends of the bolt L are threaded, the one end being provided with a right-hand thread, and the other end with a left-hand thread, and the lugs are correspondingly threaded, so that a turning of

the bolt in one direction will tighten the band about the wheel and a turning of the bolt in a reverse direction will loosen the band. By this means the sails are forced into the rings of the hub, and the yielding or flexible band J is forced upon the ends of the sails, so that when once adjusted they will maintain them in a fixed relative position.

The wheel is stayed by the brace-rods H, which have their outer ends passed through the rim and their inner ends passed through the sides of the cap M, secured to the outer end of the wheel-shaft. The outer ends of the brace-rods may be enlarged, to prevent their slipping through the ring, and their inner ends are threaded and provided with nuts m and m' , between which the flange or side of the cap M is located. The tension on said brace-rods may be regulated by adjusting the nuts m' and then screwing up the jam-nut m , to prevent any slipping or slackening of said rods when once adjusted. If desired, the outer ends may be threaded and provided with nuts m^2 .

The tail-vane N is pivotally supported at its inner end between the arms n , secured to and projecting laterally from the limb b^2 , and is held in the wind by the weight O, secured to the lower end of the cord or chain P, connected at its upper end with said tail-vane. The cord P is deflected in its course by the sheave p , secured to the wind-wheel casting, and the sheave p' , depending from the bracket p^2 , fastened to the limb b^2 .

The weight O is adjustable, so that the engine may be held in the wind according to the work to be performed and the velocity of the wind.

The spindle b is tubular, and the pump-rod and cord pass therethrough. Its lower end passes through a centering device, by which the engine is plumbed in case the tower should vary from a perpendicular line, either from setting the engine at first or afterward in case the tower should settle. This centering device consists, essentially, of the apertured plate Q, having threaded arms q projecting radially therefrom, extending beyond the sides of the tower and passing through the blocks Q', which rest against the corner-posts, as shown. The nuts q' , screwed upon the outer ends of the arms and bearing upon the blocks Q', serve

to adjust the plate and hold it when adjusted. To adjust the plate, slacken one of the nuts and tighten up the nut diametrically opposite, and the plate will receive a sidewise movement.

The pump-rod is made in sections, D', D², and D³. The section D² is tubular, and is adapted to work through the spindle b . Its upper end is enlarged to fit the interior of said spindle and steady the movement thereof. The opening d , formed through the enlargement or head d' , communicates with the interior of said section through the slot d^2 . The lower end is threaded and receives nuts d^3 d^4 , between which the yoke D⁴ is held, forming a swivel-connection between the section D² and the section D³. The section D' is connected at its upper end with the crank of the wheel-shaft, and at its lower end with the section D², by being pivotally held between the lugs d^5 , projecting from the head d' of the section D².

By the construction of the pump-rod above described the upper portion can turn with the wheel when accommodating itself to the currents of the wind, and the lower portion may remain fixed relative to the pump, and the cord or chain which passes through the spindle b can pass for a portion of its length through the tubular section D², which preserves it from frictional contact with the interior of said spindle and prevents it wrapping about the pump-rod.

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

The combination, in a wind-wheel, of the hub constructed with two concentric annuli or rings having oblique coincident slots, the vanes fitted in said slots, the slots in the central ring forming a seat for the vanes and those in the outer ring bracing the vanes, the surrounding rim embracing the notched ends of the vanes, and the securing-band surrounding the periphery of the wheel, substantially as specified.

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

SIMEON H. HEATWOLE.

Witnesses:

C. S. HEATWOLE,
J. W. POINTS.