

No. 677,273.

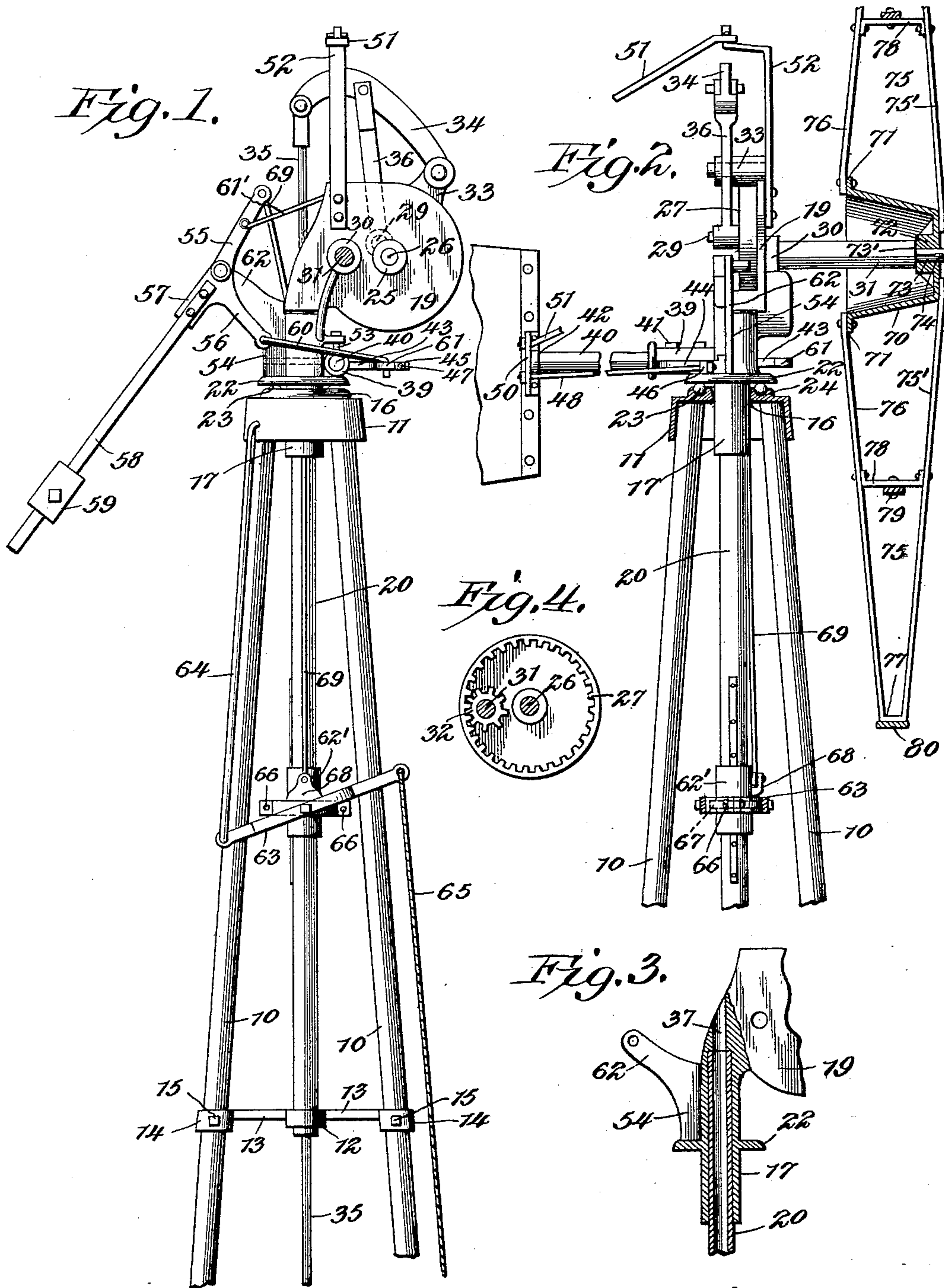
Patented June 25, 1901.

M. C. ROBBINS.  
WINDMILL.

(Application filed Dec. 15, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses  
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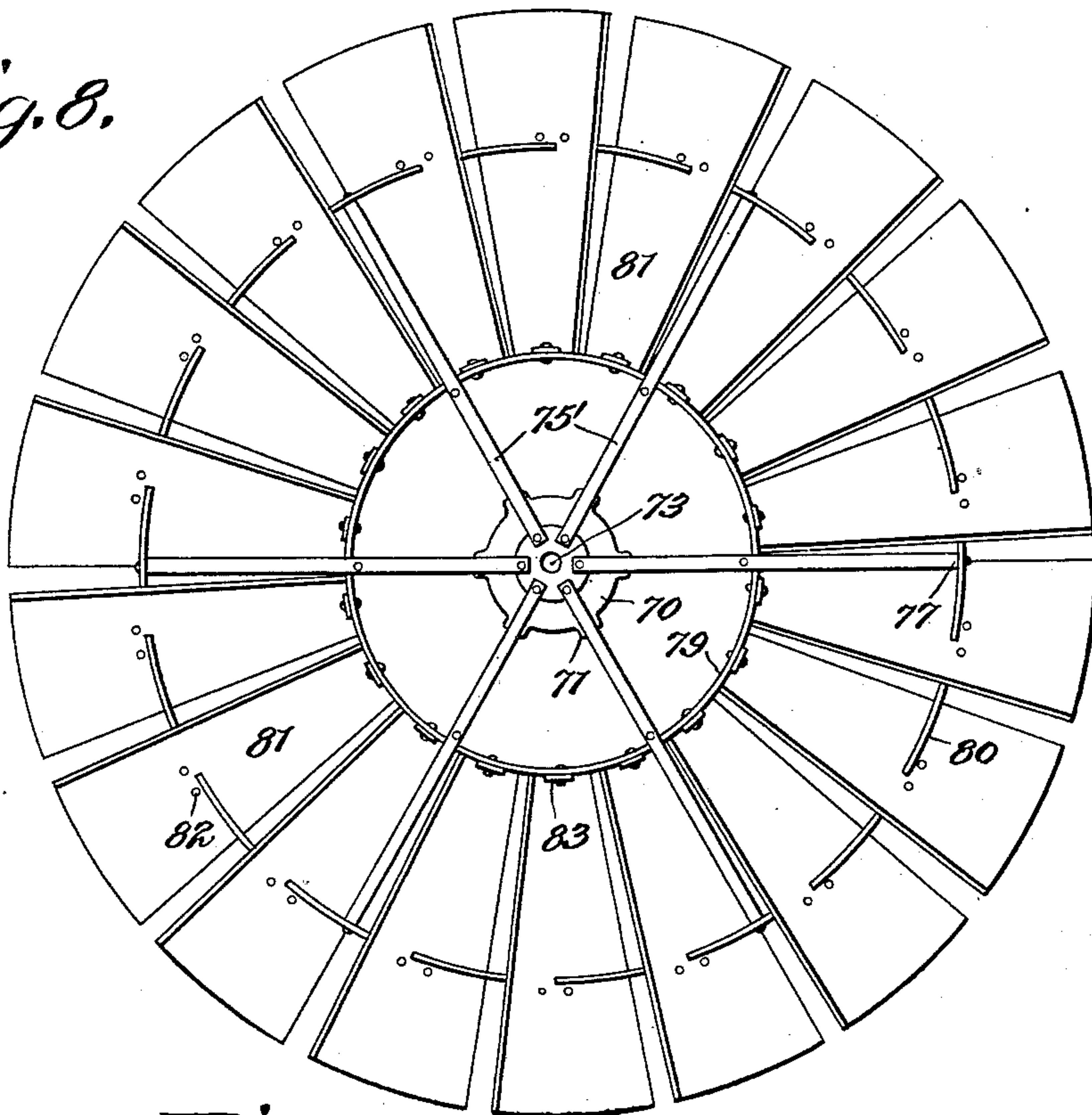
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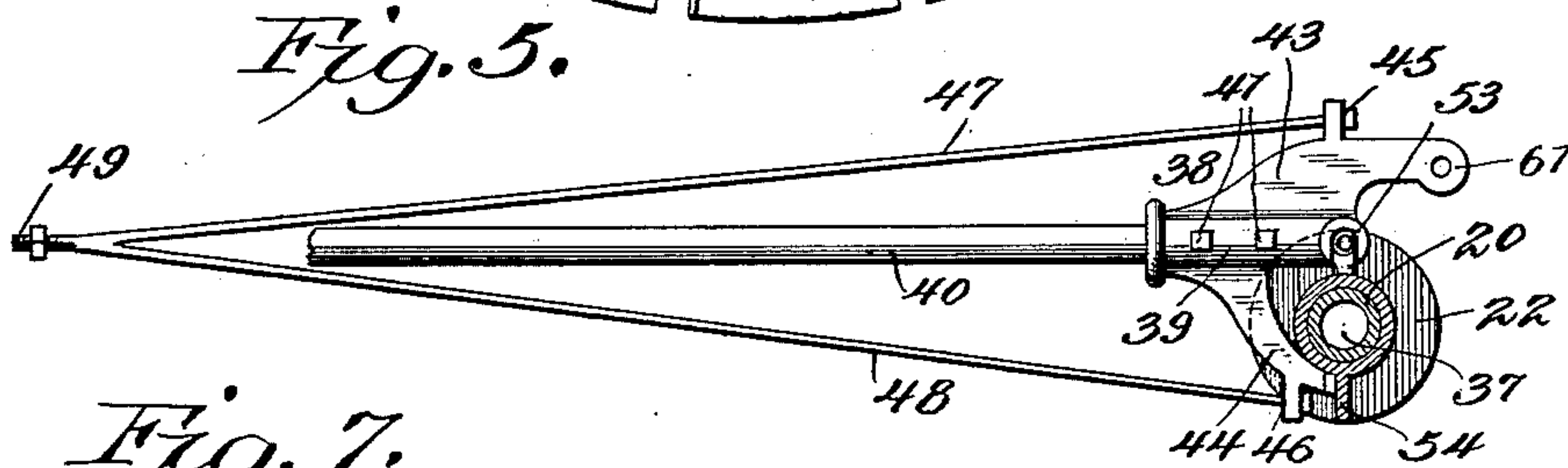
(No Model.)

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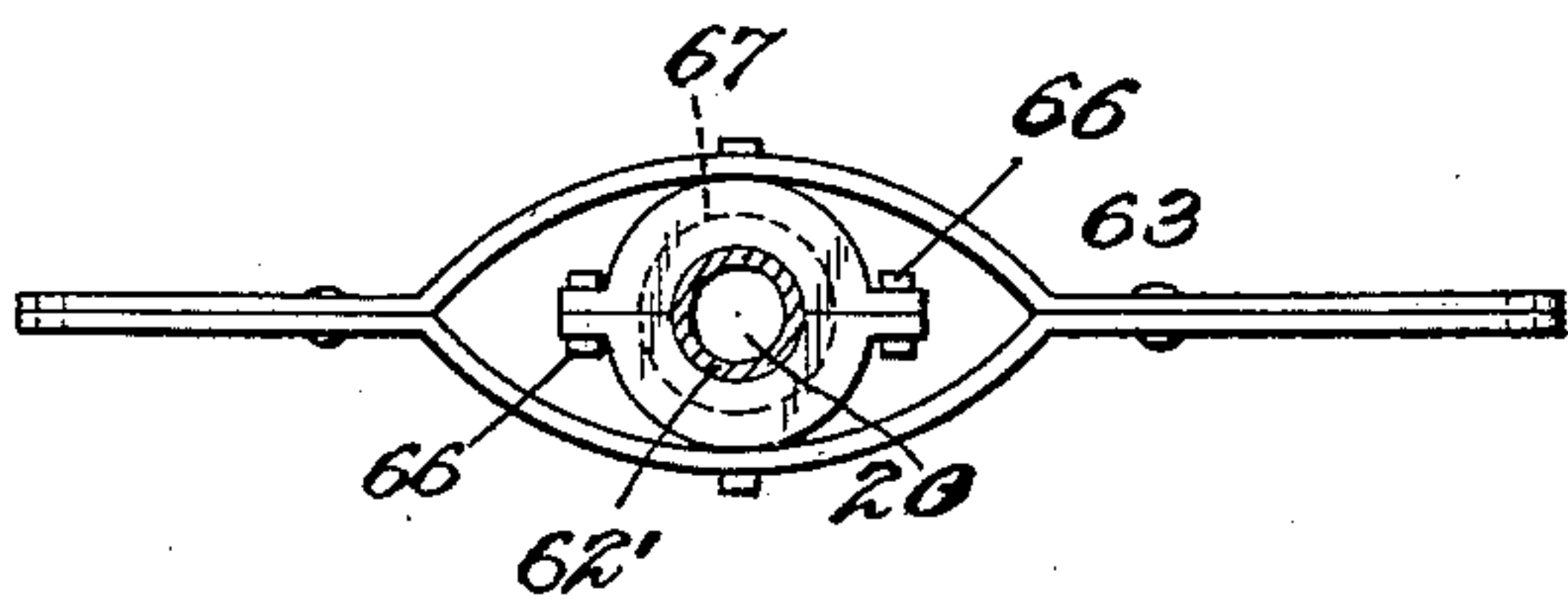
*Fig. 8.*



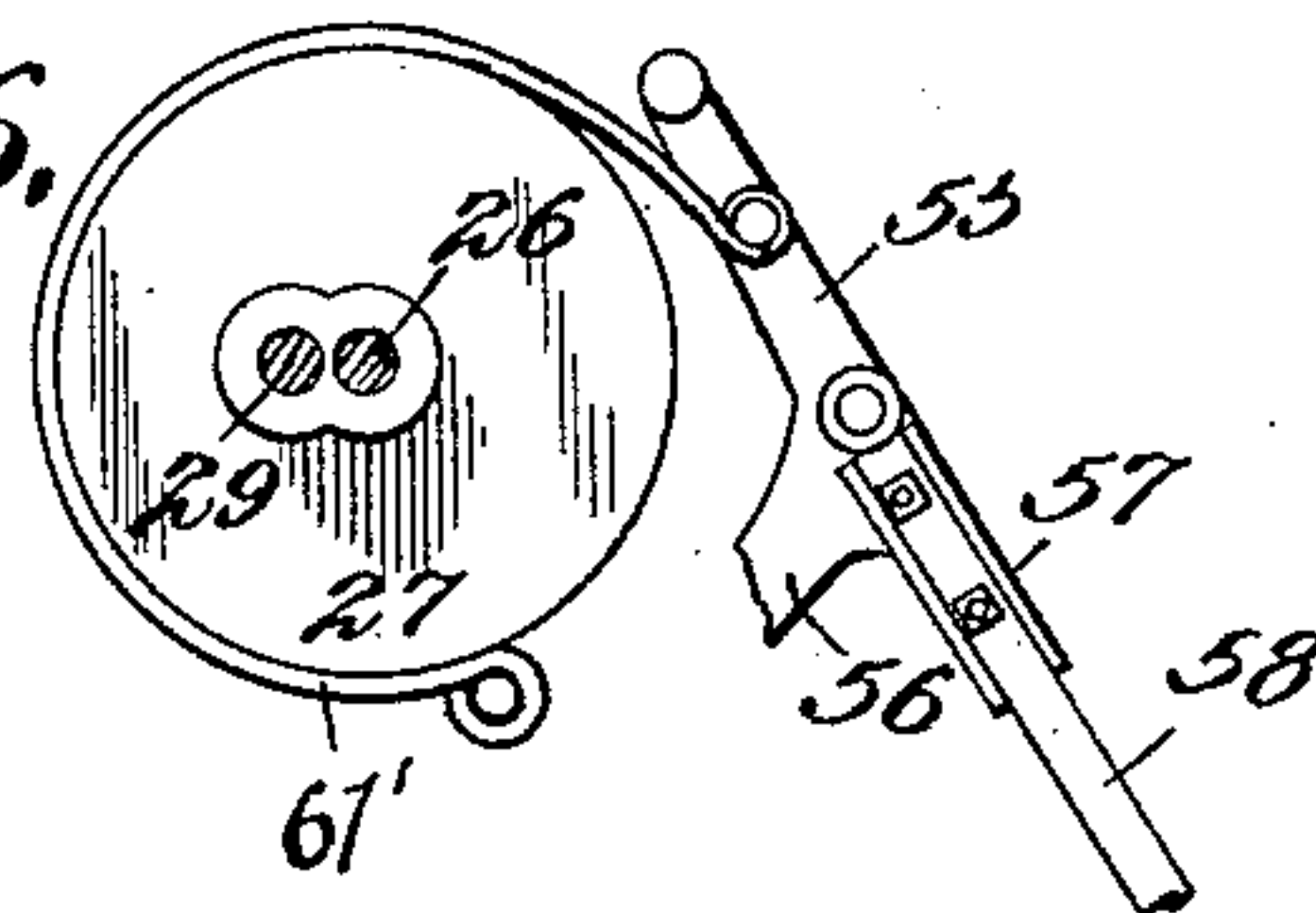
*Fig. 5.*



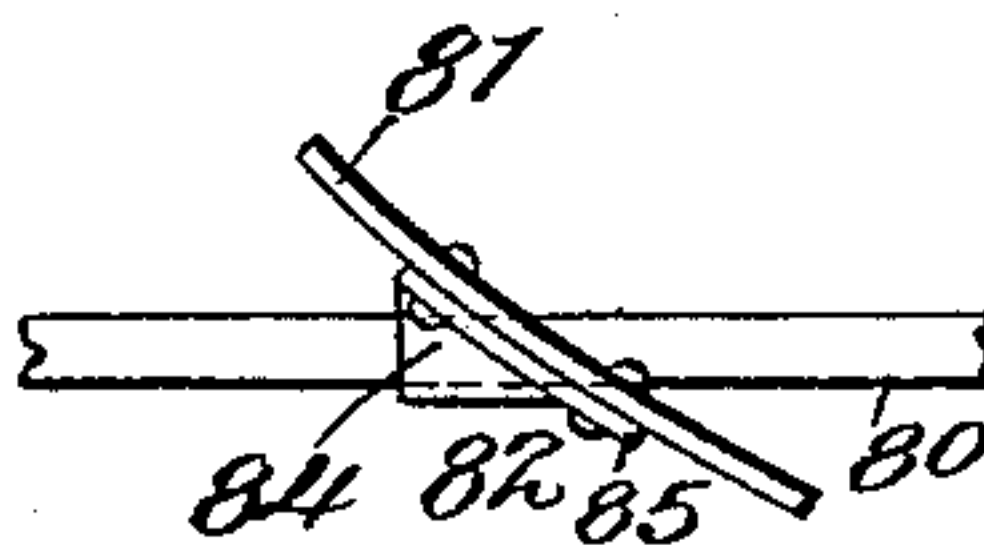
*Fig. 7.*



*Fig. 6.*



*Fig. 9.*



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# UNITED STATES PATENT OFFICE.

MICHAEL C. ROBBINS, OF HARRISONVILLE, MISSOURI, ASSIGNOR OF ONE-HALF TO ANDREW G. DEACON, OF SAME PLACE.

## WINDMILL.

SPECIFICATION forming part of Letters Patent No. 677,273, dated June 25, 1901.

Application filed December 15, 1900. Serial No. 39,993. (No model.)

*To all whom it may concern:*

Be it known that I, MICHAEL C. ROBBINS, a citizen of the United States, residing at Harrisonville, in the county of Cass and State of Missouri, have invented a new and useful Windmill, of which the following is a specification.

This invention relates to windmills; and one object of the invention is to provide an arrangement of parts and a construction of details such as will produce a machine of high efficiency.

A further object of the invention is to provide a compact arrangement of the several parts and a construction and arrangement of governing mechanism which will be most accurate in its operation.

Additional objects of the invention relate to the construction of the wheel, the hanging and bracing of the vane, the starting and stopping mechanism, the gearing, and the automatic brake mechanism.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a front elevation of the mechanism at the upper end of the tower, the vane and the wheel being removed and the wheel-shaft being shown in section, the governor being in the position to hold the vane with the wheel in operative position. Fig. 2 is a side elevation of the structure shown in Fig. 1, a portion of the vane and of the wheel being shown, the cap of the tower and the hub of the wheel being in section. Fig. 3 is a sectional view showing the main casting with the tubular extension cast therein. Fig. 4 is an elevation showing the open face of the closed internal gear and the engaged pinion, the shafts being shown in section. Fig. 5 is a view showing the head and stem of the vane in plan, as also the stem-braces, the stem being partly broken away, and showing also a portion of the main casting with its tubular extension in section. Fig. 6 is an elevation showing the internal gear with the brake mechanism connected therewith. Fig. 7 is a plan view of the yoke-lever with which the governor is connected for throwing the wheel into and out of the wind. Fig. 8 is an elevation showing the wheel. Fig. 9 is a detail

view showing the end of one of the blades of the wheel and illustrating the manner of attaching to one of the rims.

Referring now to the drawings, 10 represents the legs of the tower, and which legs are engaged at their upper ends with a cap 11, while at a point below the cap there is disposed a spider, including a central collar 12, having radiating arms 13, at the ends of which are collars 14, which slidably engage the legs of the tower and are held against displacement by means of set-screws 15, engaged therewith and adapted to impinge the legs 10.

In the cap 11 and centrally thereof to align with the collar 12 there is formed a bearing 16, and mounted in this bearing and extending below the cap is an arm 17 of the main casting. The main casting comprises a plate 19, at one side of which is formed the arm 17, and in the lower end of this arm is formed a socket, in which is cast the upper end of a tubular extension 20, so that the casting and its extension are rigidly connected. The tubular extension has a bearing in the collar 12, through which it projects slightly, as shown.

To prevent the arm 17 from dropping through the bearing 16, an annular flange 22 is formed thereon and rests upon bearing-balls 23, disposed in recesses 24 in the upper face of the cap 11. This connection permits the main casting to turn freely in its bearing while supporting the weight of the wheel, the vane, and other parts of the mechanism.

Centrally of the plate 19 and on the front face thereof there is formed a boss 25, and through this boss is formed a bearing for a short shaft 26, on which is fixed an internal gear 27, the side of the gear adjacent to the rear face of the plate 19 being open, while the rear side of the gear is closed by a web, as shown, which sustains the teeth. On the rear face of the web and eccentric thereto is a crank-pin 29, from which the pump-rod is operated in a manner hereinafter described. At one side of the boss 25 is a second boss 30, in which is formed a bearing which receives the wheel-shaft 31, and on the rear end of this wheel-shaft, which passes through the plate 19, there is disposed a pinion 32, which meshes with the internal gear. Thus when



the wheel-shaft is rotated by rotation of the wheel the internal gear is rotated at a lesser speed and the crank-pin is rotated bodily.

Extending radially from the plate 19 is a stud 33, and pivoted to this stud is one end of a walking-beam 34, the opposite end of said beam having pivotal connection with the pump-rod 35, which latter passes down through the opening 37 in the arm 17 and which opening forms a continuation of the tubular extension 20, said rod being continued down and through said extension and outwardly at the bottom thereof and is connected with a pump in the usual manner therebelow. A connecting-rod 36 connects the crank-pin 29 with the walking-beam at a point between the ends of the latter, and thus as the crank-pin is rotated the pump-rod is reciprocated.

The vane employed in the present construction is pivotally mounted upon the flange 22 to lie at right angles to the plane of the wheel and for movement in one direction from this position to lie parallel with the plane of the wheel. The vane comprises a head 38, having a central socket 39, in which is disposed the end of a tube or rod 40, forming the stem of the vane and held in place by bolts or rivets 41, and the rear end of this stem is engaged with a socket 42 at the front edge of the feather of the vane. Arms 43 and 44 extend laterally from the head 38 and are provided with perforated ears 45 and 46, in which are engaged tie-rods 47 and 48, which converge rearwardly to a common threaded stem 49, engaged with a perforated flange 50 on the feather of the vane, said stem having a nut, as shown, to prevent withdrawal thereof from the perforation of the flange. A third tie-rod 51 connects said flange with a bracket 52, bolted to the main casting and extending thereabove, said rod having an eye engaged with the extremity of this bracket, as shown, and held in place by means of a nut or key.

As above stated, the head of the vane is pivoted to the flange 22, and this pivotal connection is made through the medium of a pivot pin or stud 53 on the flange, which is engaged with a corresponding perforation in the head at the end of the socket in which the stem is mounted. A stop 54 is cast upon the main casting, and against this stop rests the extremity of the arm 44 to prevent movement of the vane in one direction from its position at right angles to the plane of the wheel, while it is free to move in an opposite direction save for the resistance offered by the governor. This governor consists of a rocker including two arms 55 and 56, arranged at an obtuse angle to each other, and in line with the arm 55 and projecting rearwardly therefrom there is a lug 57, to which is bolted the lever 58, on which is slidably mounted a counterbalancing-weight 59, held against movement by means of a set-screw, as shown.

Connected with the outer end of the arm 56 is one end of a link 60, the other end thereof having a hook engaged with a perforation

at the outer end of a lug 61, forming a continuation of the arm 43 of the head of the vane. The rocker is pivoted at the free end of a bracket 62, forming a portion of the main casting, and the lower part of which forms the stop 54, above referred to, the rocker being adapted for movement in a plane parallel with the plane of the wheel of the mill. Under the influence of the counterbalancing-weight the rocker is operated to push upon the link 60 and force the vane around on its pivot to lie at right angles to the plane of the wheel, and when excessive pressure is brought against the wheel the main casting is turned in its bearing 16 by reason of the wheel-shaft being mounted at one side of the said bearing. The feather of the vane, however, prevents it from leaving its position, and in consequence the rocker is moved in the direction of the vane, with the result that the link 60 actuates the rocker to lift the counterbalancing-weight. The weight returns the wheel into the wind when the pressure diminishes, as well understood.

The periphery of the internal gear 27 forms a brake-drum, with which is engaged a brake-strap 61', one end of which is secured to a stud upon the plate 19, while the other end is connected to the arm 55, and as the rocker is moved when the counterbalancing-weight drops the strap is drawn into close frictional contact with the drum and acts to retard the speed of the mechanism.

To provide for throwing the wheel out of the wind manually and for holding it in this position when the mill is to remain at rest, a sleeve 62' is splined upon the tubular extension 20 for sliding movement, and encircling this sleeve is a yoke-lever 63, which is pivoted to the sleeve at diametrically opposite points thereof. One end of the lever is pivoted to a hanger-rod 64, the upper end of which is engaged in a perforation in the cap 11, and at the opposite end of the lever there is attached a cord 65, which is adapted to be drawn down and engaged with a cleat in the usual manner. The lever is not pivoted directly to the sleeve, but to a collar 66', consisting of two semicircular parts connected at their ends by bolts 66, and which parts have a groove formed in their inner faces, which receives a flange 67 on the sleeve. On the sleeve is a perforated ear 68, with which is engaged a rod 69, passed upwardly through the main casting and connected with the free end of the arm 55 of the rocker. Thus when the cord is drawn downwardly this rod is operated to move the rocker and swing the wheel to lie parallel with the vane. When the cord is released, the counterbalancing-weight, which has been raised by this last-named movement of the wheel, drops and swings the wheel to lie at right angles to the vane.

The wheel that is used in the present construction consists of a hollow frusto-conical hub 70, having an outwardly-directed flange



71 at its base. The minor end of the hub is closed, and on the inner side of this closed end is formed a boss 72, through which is formed an opening 73 axially of the hub, and engaged with this opening is the forward reduced end of the wheel-shaft 31, the shoulder 73', formed by reducing the end of the shaft, resting against the end of the hub. The shaft is held in engagement with the hub by means of a key 74.

Radiating from the hub 70 are a series of spokes, arranged in pairs, the elements 75 and 76 of the several pairs being riveted against the front and the flange of the hub, respectively, as illustrated in the drawings. The elements of each pair are formed integral, with a connecting-web 77 at their outer ends, in the direction of which they converge, and the elements of each pair lie in a common plane with the shaft 31.

At points intermediate of the ends of each pair of spokes there is riveted a cross-brace 78, lying parallel with the web at the ends of the spokes, and riveted to these cross-pieces of the several spokes is a circular supporting-rim 79, a second and similar rim 80 being riveted to the webs of the several pairs of spokes. These two rims lie concentric with the wheel-shaft.

The rims 79 and 80 are supporting-rims for the blades 81 of the wheel. Each of the blades rests with its inner narrowed end against the outer face of the inner rim 79, while the outer rim 80 engages through an opening in the blade. The blade is held against displacement from the rims by means of brackets 82 and 83. Each of these brackets consists of a sleeve 84, which is disposed on its respective rim and from which projects a curved flange 85, which lies transversely of and at an acute angle to the rim, and this flange is riveted to the blade, so that each blade is held at an acute angle to the plane of rotation of the wheel in the usual manner, each blade, moreover, being slightly dished on its forward face.

There is thus provided a windmill that is automatic in its operation, simple in construction, and possessing a high efficiency.

What is claimed is—

1. In a windmill, the combination with a support, of a main casting including a sleeve rotatably mounted in the support and a plate extending laterally from the axis of rotation of the sleeve, a wheel having a shaft rotatably mounted in the laterally-extending portion of the plate, a gear provided with a brake-drum and mounted upon the plate in operative engagement with the wheel, said casting having an opening therethrough concentric with its axis of rotation, a pump-rod passed through said opening and operatively connected with the gear for reciprocation thereby, a vane pivoted on the casting at one side of its axis of rotation and below the laterally-extending plate, said vane having an arm projecting therebeyond, a counterbalanced rocker mounted on

the casting at the opposite side of the axis of rotation and movable in a plane at an angle to the operative position of the vane, a connecting-rod between the rocker and vane for holding the wheel yieldably in the wind, and a brake-band in operative relation to the drum and connected with the rocker for operation thereby.

2. A windmill comprising a main casting having a rotatably-mounted hollow arm, a wheel mounted upon the casting at one side of its axis of rotation, a gear operatively connected with the wheel and having a brake-drum, a walking-beam pivoted upon the casting and operatively connected with the gear, a pump-rod passed through the arm and connected with the beam, a vane pivoted on the casting and having an arm projecting therefrom, a rocker mounted upon the casting for movement in a plane parallel with the wheel, connections between the rocker and the arm of the vane, said rocker being mounted at the opposite side of the axis of rotation of the main casting from the arm of the vane, a counterbalance carried by the rocker for holding the vane yieldably at an angle to the wheel, and a brake-band operatively engaged with the brake-drum and connected with the rocker for operation thereby.

3. A vane for windmills comprising a head adapted for pivotal mounting and provided with a socket, a stem engaged in the socket, a feather having a socket in which the rear end of the stem is received, and a forked tie-rod having its stem adjustably connected with the feather, said rod having its arms connected with the head at opposite sides of the socket.

4. In a windmill, the combination with a support, of a main casting including a sleeve rotatably mounted in the support, and a plate extending laterally from the axis of rotation of the sleeve, a wheel having a shaft rotatably mounted in the laterally-extending plate, said casting having an opening therethrough concentric with its axis of rotation, a pump-rod passed through said opening and operatively connected with the wheel for reciprocation thereby, a vane pivoted on the casting at one side of the axis of rotation and below the laterally-extending plate, said vane having an arm projecting therebeyond, a counterbalanced rocker mounted on the casting at the opposite side of the axis of rotation and movable in a plane at an angle to the operative position of the vane, and a connecting-rod between the rocker and vane for holding the wheel yieldably in the wind.

5. A windmill comprising a main casting having a rotatably-mounted hollow arm, a wheel mounted upon the casting at one side of its axis of rotation, a walking-beam pivoted on the casting and operatively connected with the wheel, a pump-rod passed through the arm and connected with the beam, a vane pivoted on the casting and having an arm projecting therebeyond, a rocker mounted on the casting for movement in a plane parallel



with the wheel, connections between the rocker and the arm of the vane, said rocker being mounted at the opposite side of the axis of rotation of the main casting from the  
5 arm of the vane, and a counterbalance carried by the rocker for holding the vane yieldably at an angle to the wheel.

6. A vane for windmills comprising a head provided with a socket and having an arm  
10 projecting at each side thereof and provided with perforated ears, a stem engaged with the socket, a feather provided with a socket in which the stem is received, and a bifurcated tie-rod adjustably connected with the feather  
15 and having its arms engaged with the perforations of the ears, said head having a pivot bearing therein.

7. A windmill comprising a tower including a cap and supporting-legs, said cap having  
20 an opening therethrough and a spider engaged with the legs and having a bearing-

opening alining with the opening of the cap, a main support disposed in the opening of the cap and provided with a tubular extension rotatably engaged with the opening of  
25 the spider, a sleeve splined on said extension and having a peripheral flange, a two-part grooved collar engaged over the flange, a lever pivoted to a supporting-leg and operatively connected with the collar for reciprocating the sleeve, and a starting and stopping  
30 mechanism connected with the sleeve for operation thereby when the sleeve is reciprocated.

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

MICHAEL C. ROBBINS.

Witnesses:

J. S. BRIERLY,  
A. B. BOHON.