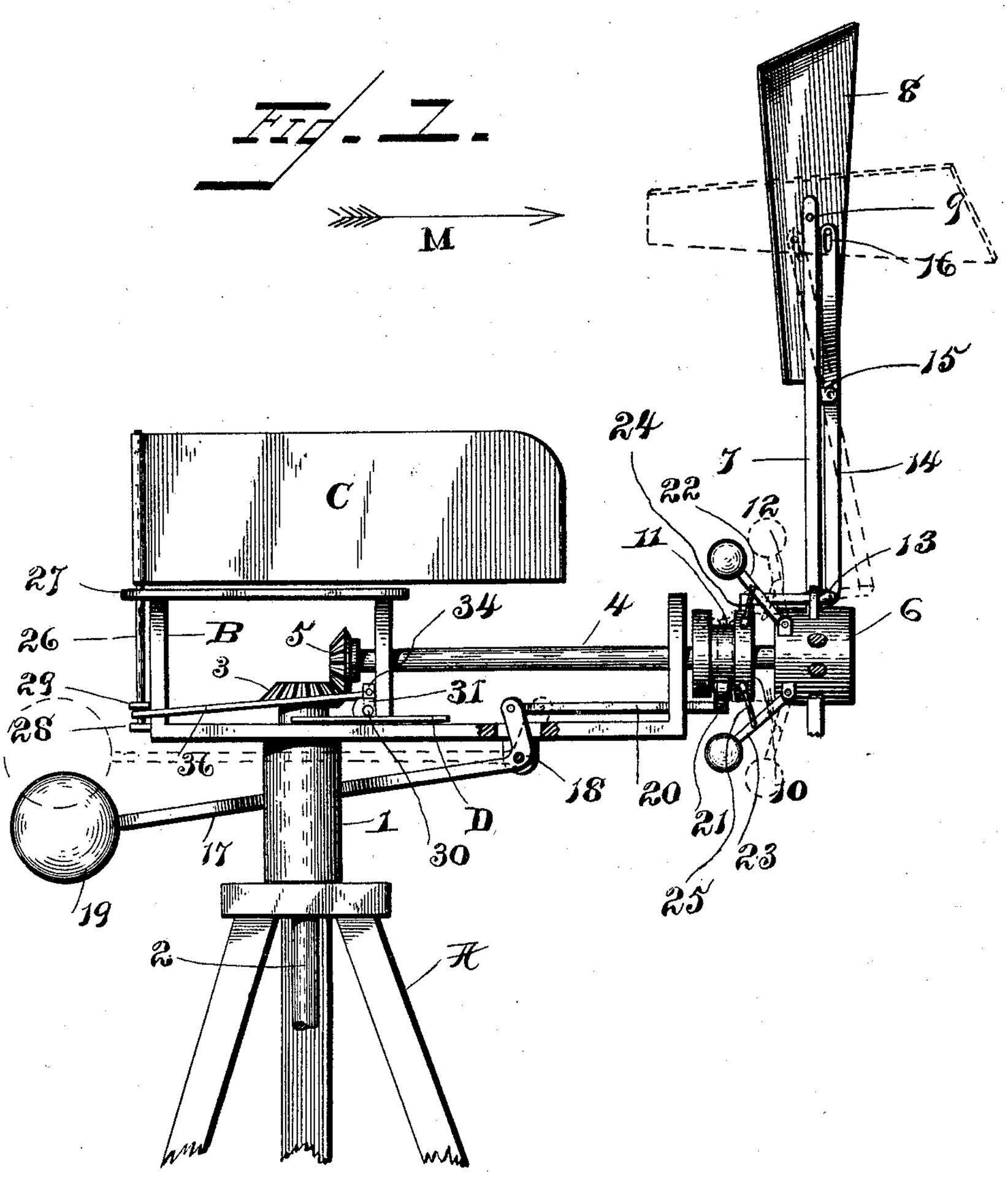
(No Model.) 2 Sheets—Sheet 1.

A. ZWIEBEL.

WINDMILL.

No. 603,806. Patented May 10, 1898.

Fig. 1.



WITNESSES

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Attorney

(No Model.)

2 Sheets—Sheet 2.

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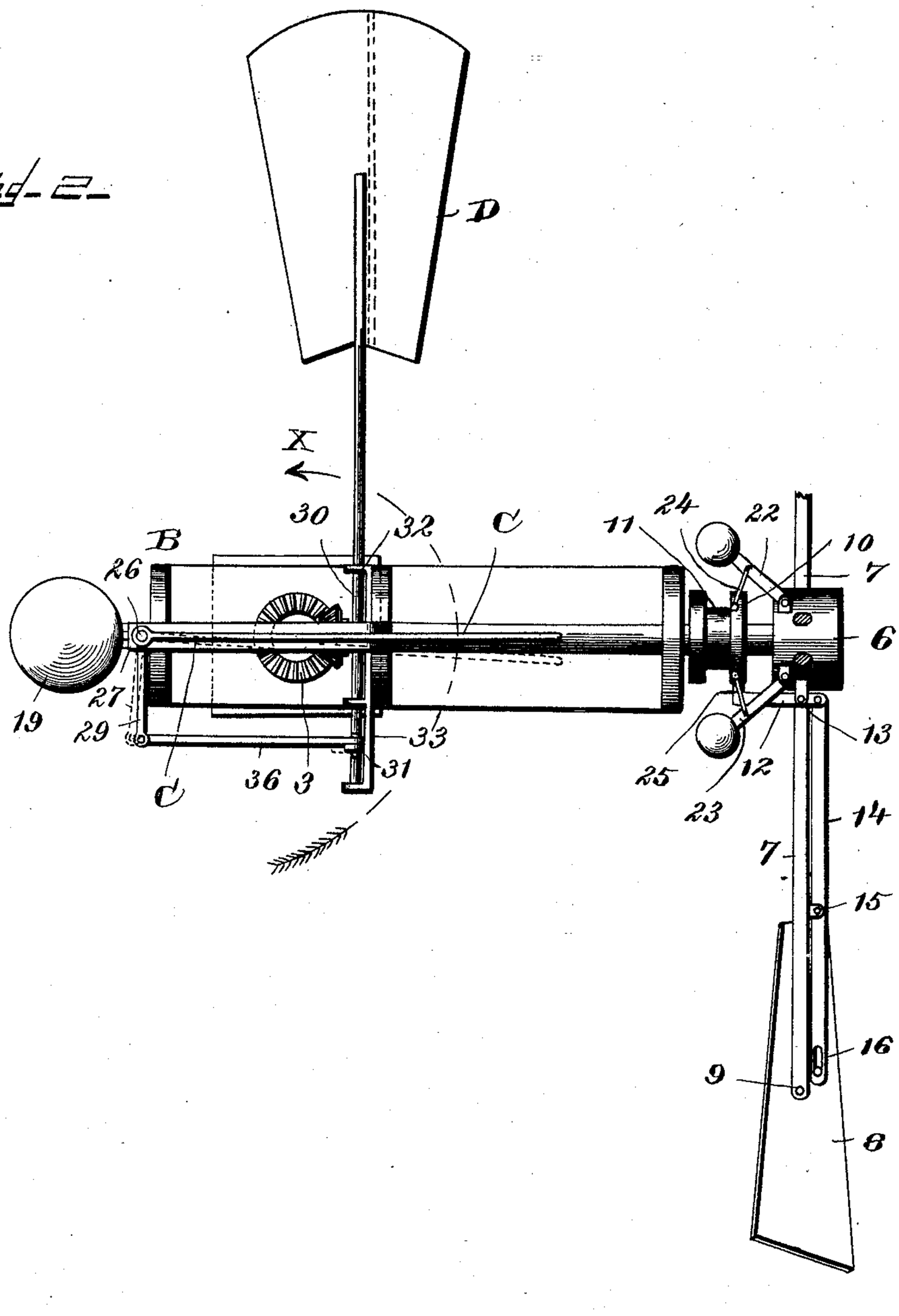
Fig. 2.



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UNITED STATES PATENT OFFICE.

ANTON ZWIEBEL, OF BURLINGTON, WISCONSIN.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 603,806, dated May 10, 1898.

Application filed June 12, 1896. Serial No. 595,335. (No model.)

To all whom it may concern:

Be it known that I, ANTON ZWIEBEL, a citizen of the United States, residing at Burlington, in the county of Racine and State of Wisconsin, have invented certain new and useful Improvements in Windmills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to windmills.

The chief difficulty incident to those windmills which are provided with a vertical rotary shaft and gearing interposed between the shaft and the wind-wheel spindle is that the wheel exerts a tendency to rotate the turn-table and throw itself out of line with the direction in which the wind is blowing when the wheel is operating under load. The most common expedient employed to overcome this trouble is to provide mechanism for locking the turn-table in position when once the wheel is in alinement with the direction in which the wind is blowing. Such an arrangement has many disadvantages, however, among the chief of which are that in a strong gale unless the table be unlocked the wheel and connections are liable to be demolished, and, furthermore, when the wind shifts the wheel has to be unlocked and then locked when again in proper position. My object is to obviate this difficulty and annoyance, and I accomplish this by employing a peculiar and novel arrangement of vanes which serve to correct disadvantageous rotation of the turn-table, but also to allow the same to swing around as the wind shifts, so that the wind-wheel will properly receive the wind.

In the accompanying drawings, Figure 1 is a side view of my improved windmill, showing the position of the vanes when the wheel is in line with the wind; and Fig. 2 is a plan view, full lines showing the vanes in normal position and dotted lines showing them when in position to be acted upon by the wind.

A designates the upper portion of a windmill-tower, and B the turn-table. The turn-table is provided with a sleeve 1, through which projects the drive or power shaft 2, which carries the usual bevel-gear 3 on its upper end.

The numeral 4 designates the wind-wheel spindle, which, as usual, is revolubly mounted in bearings in the turn-table and has a bevel-gear 5 carried on its inner end, said bevel-gear meshing with gear 3. The frame of the wind-wheel carried on the outer end of spindle 4 consists of a hub 6, securely connected to the spindle, and eight radial arms 7. The blades 8 of the wheel are arranged in sets, each set being connected to a spindle 9, which is revolubly mounted in the ends of two of the arms.

The numeral 10 designates a sleeve which is provided with a peripheral recess 11 and is loose on spindle 4 and adapted for sliding movement thereon between the turn-table and the hub of the wind-wheel. The collar is provided with a series of outwardly-extending short arms 12, one being provided for each pair of radial arms of the wind-wheel, and the short arm is guided by a lug 13, projecting from the hub, and by one of the radial arms. A lever 14, fulcrumed at 15 to one radial arm, has its inner end connected to arm 12 and its outer end pivoted to one of the blades 8 by a slot-and-stop connection 16. A lever is of course provided for each section of the wind-wheel. As the sleeve slides on the wind-wheel spindle the respective sections of the wind-wheel are moved either to receive all the wind or only part thereof.

The numeral 17 designates a bell-crank lever which is fulcrumed to the turn-table at 18. On the extremity of the long arm of this lever is located a ball-weight 19, while the short arm of the lever is connected to the sliding sleeve on the wind-wheel spindle by a link 20, which is pivoted at one end to the short arm of the lever and carries on its outer end a semicircular arm 21, which straddles the sleeve and rests in the groove therein.

The mechanism just described exerts a tendency to hold the blades of the wind-wheel normally vertical.

The numerals 22 and 23 designate weighted governor-arms, which have their inner ends pivoted to the hub of the wind-wheel, and these arms are connected to the sleeve on the wind-wheel spindle by respective links 24 and 25. As the wheel begins to attain too high a rate of rotation the governor acts in the well-known manner and draws the sleeve outward,

which in turn causes the blades of the wind-wheel to be inclined, as shown in dotted lines.

I will now proceed to a description of my improved mechanism for preventing unnecessary and disadvantageous rotation of the turn-table.

C designates what I shall term a "main" vane. This vane is carried on the upper end of a short shaft 26, which is mounted in brackets 27 and 28, and this vane is adapted either to lie at right angles to the plane of the wind-wheel or at a small angle thereto, and said vane extends inward toward the wind-wheel. The lower end of the shaft 26 is provided with an arm 29, which abuts on the end of the turn-table and prevents the vane from swinging in one direction past a position at right angles to the plane of the wind-wheel.

D designates the auxiliary vane, and this vane is carried on the extremity of a horizontal shaft 30, which is revolubly mounted in arms 31 and 32 of a bracket 33, which is connected to the turn-table. This shaft is provided with stops 34 and 35, which are adapted to abut on the bracket and prevent the vane from turning farther than through a quadrant's distance. The upper stop 34 is pivotally connected to arm 29 by a link 36.

I have already described the operation of the wind-wheel and governor mechanism, and I will now give a description of the manner in which the vanes operate to keep the turn-table from turning unnecessarily.

The construction is such that the end of the turn-table opposite that to which the wind-wheel is attached is always toward the wind and the pressure upon the wheel tends to maintain the parts in this position. I prevent the injurious turning or "creeping" of the turn-table by reason of the operation of the gearing connecting the wheel and the vertical shafts by the following instrumentalities.

C designates what may be termed the "main" vane. This vane is carried on the upper end of a short vertical shaft 26, which is mounted in suitable bearings 27 28 at the end of the turn-table opposite the wind-wheel. This vane normally lies longitudinally of the turn-table in true alinement with the wheel-shaft. The lower end of the shaft 26 is provided with an arm 29, extending at a right angle to the vane C. An auxiliary vane D is mounted on a horizontal shaft 30, extending at right angles to the wheel-shaft, and this vane normally lies horizontally with one edge to the wind. The shaft 30 is mounted in suitable bearings on the turn-table and is provided with a crank-arm 31, and this crank-arm is connected with the arm 29 of shaft 26 by a link 36.

The "creep" of the turn-table when the wheel-mill is in operation is in the direction of the arrow X, Fig. 2. Any considerable movement in this direction will cause the wind to press with increased force upon the side of the main vane toward the auxiliary vane D, tending to throw the vane into the position shown in dotted lines in Fig. 2. Should the force of the wind upon the vane turn it in the direction indicated, the arm 29, acting through link 36, will turn the shaft 30 substantially a quarter-revolution, bringing the auxiliary vane with its face to the wind, the force of which will turn the turn-table in the opposite direction and return it to its proper position. The arm 29 of the main vane abuts against the end of the turn-table, and should the turn-table turn beyond the direct-line position desired the pressure of the wind upon the main vane will tend to move the turn-table toward the position sought. This action of the main vane, together with the creep of the turn-table under the influence of the gearing, can always be relied upon to prevent an excess of movement under the influence of vane D.

It is to be understood that I do not limit myself to the precise construction herein shown and described, but consider myself entitled to all such variations as come within the spirit and scope of the invention.

Having thus described the invention, what is claimed as new is—

1. In a windmill having its wheel-shaft geared with a vertical operating-shaft, the combination with the turn-table, of a vane extending at right angles to the wheel-shaft with its edge to the wind, and means whereby the "creeping" of the turn-table will turn said vane-face to the wind, substantially as described.

2. In a windmill having its wheel-shaft geared with a vertical operating-shaft, the combination with a pivoted main vane lying normally in alinement with the wheel-shaft, of an auxiliary vane at right angles thereto edgewise to the wind, and connections between the two vanes for causing pressure on one side of the main vane to turn the auxiliary-vane face to the wind, substantially as described.

3. In a windmill having its wheel-shaft geared with a vertical operating-shaft, the combination with the pivoted main vane normally in alinement with the wheel-shaft, of an auxiliary vane at right angles thereto with its edge to the wind, crank-arms on the shafts of said vanes and link connecting them whereby undue wind-pressure on one side of the main vane will turn the auxiliary-vane face to the wind, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ANTON ZWIEBEL.

Witnesses:
EDWARD E. MILLS,
WILLIAM W. ALDERSON.