(No Model.)

O. E. WINGER.

WINDMILL.

No. 293,834. Patented Feb. 19, 1884.

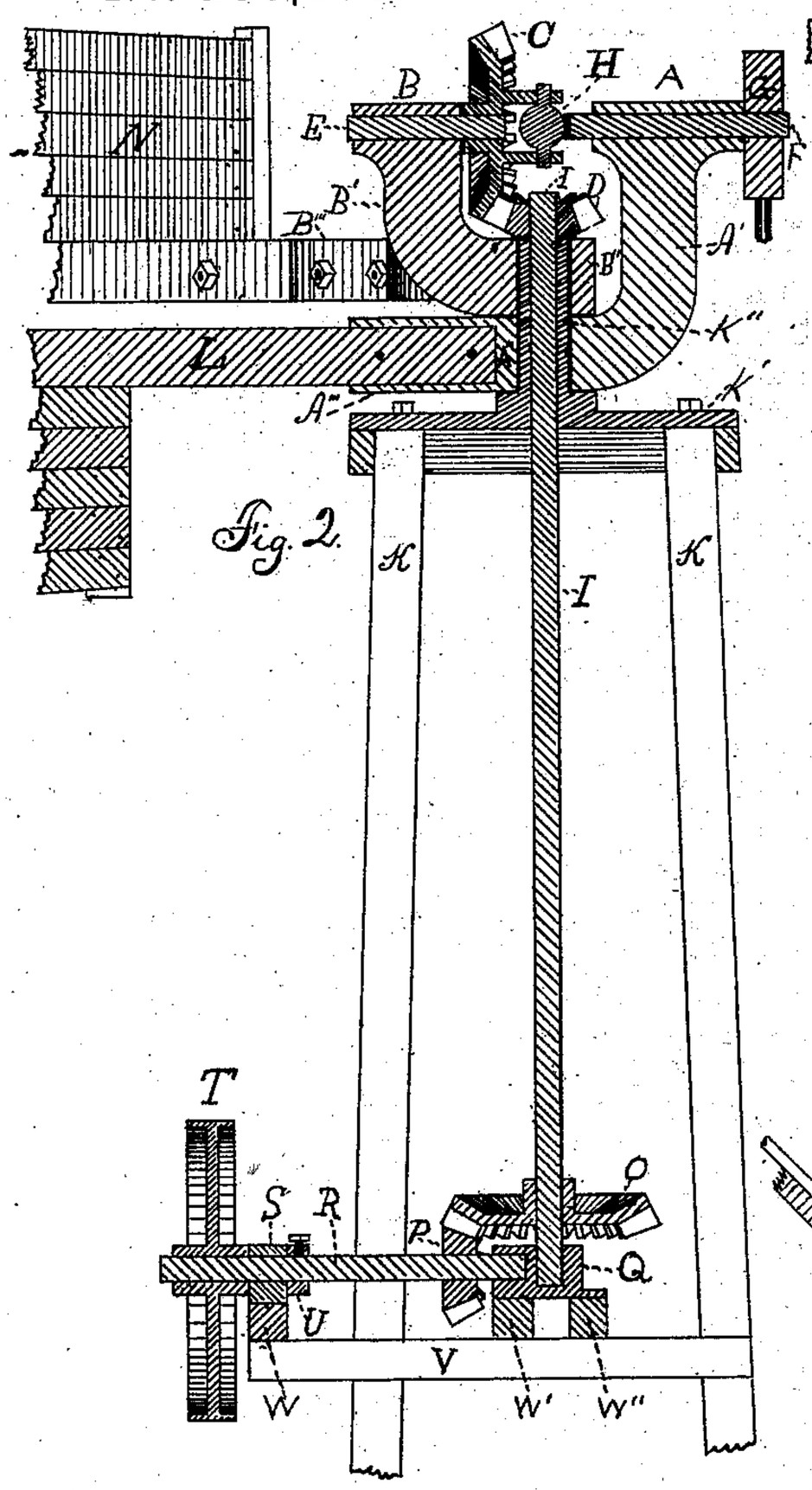

Fig. 2.

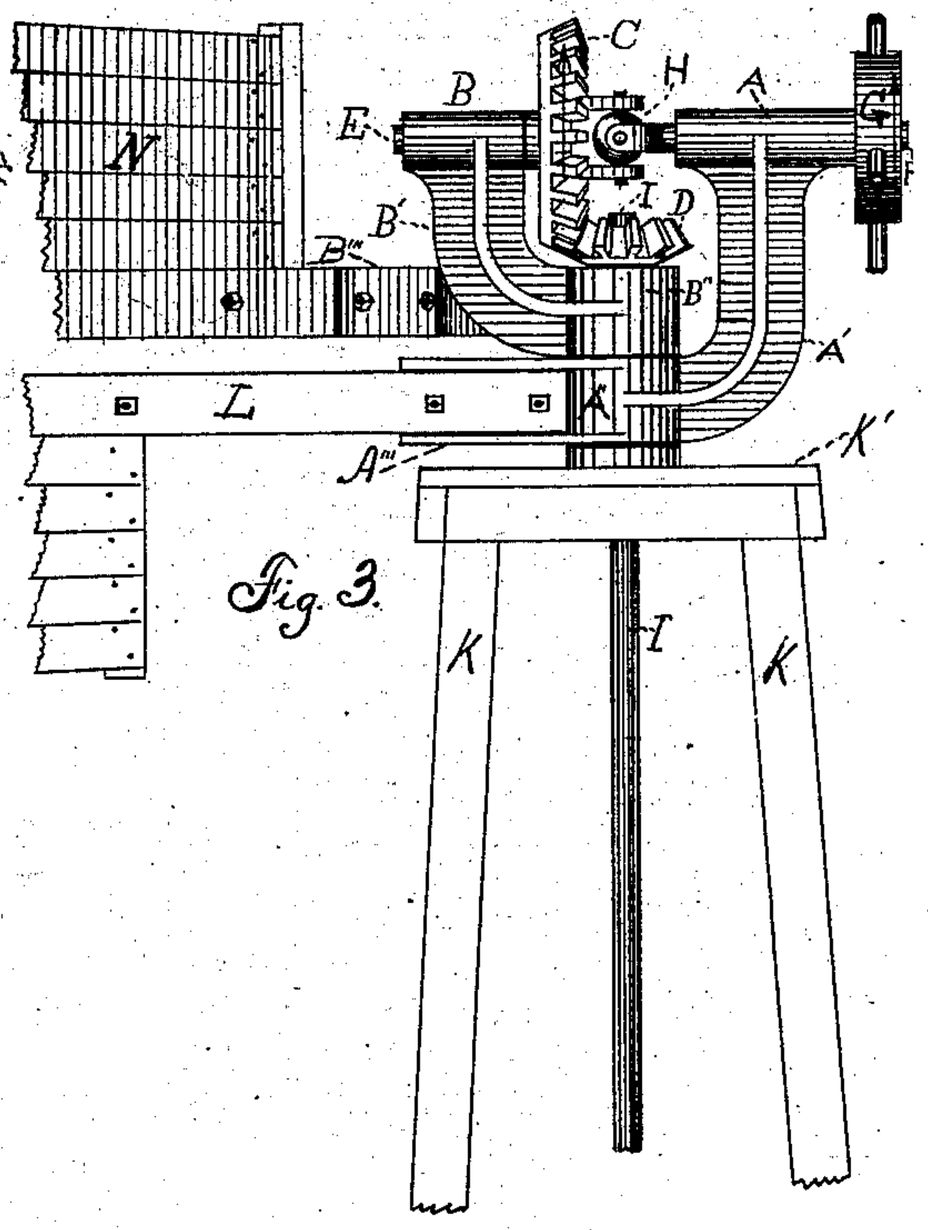

Fig. 3.

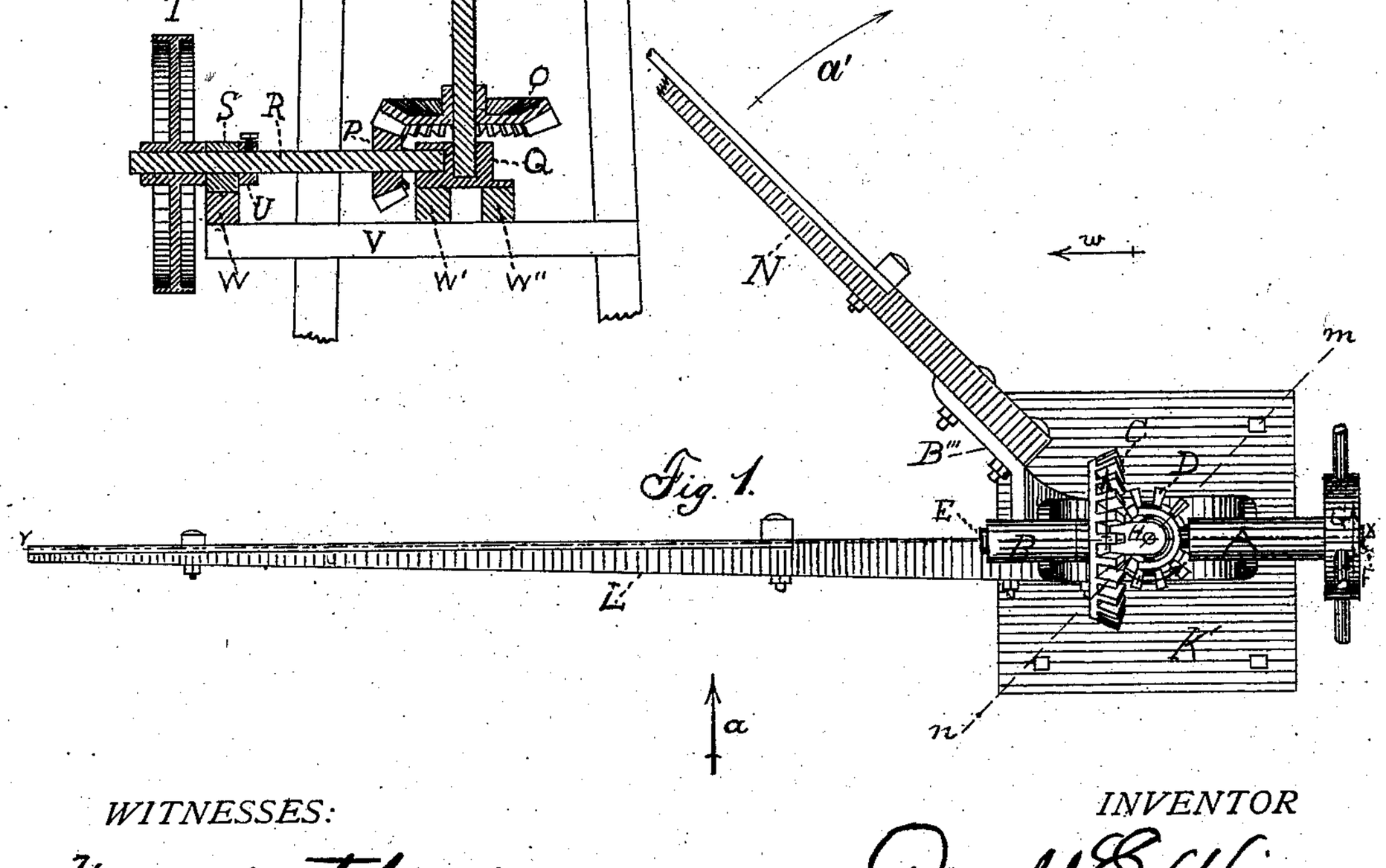

Fig. 1.

WITNESSES:

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OSWALD E. WINGER, OF FREEPORT, ILLINOIS, ASSIGNOR OF ONE-HALF TO ELAM B. WINGER, OF SAME PLACE.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 293,834, dated February 19, 1884.

Application filed August 27, 1883. (No model.)

To all whom it may concern:

Be it known that I, OSWALD E. WINGER, a resident of Freeport, in the county of Stephenson and State of Illinois, 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 pertains to make and use the same.

My invention is an improvement in windmills of that class in which the power of the wind-wheel is applied to the rotation of a vertical shaft, and which are known as "power-mills," as distinguished from pumping-mills.

The invention is fully described, explained, and claimed in the following specification, and shown in the accompanying drawings, in which—

Figure 1 is a plan of the mill; Fig. 2, a vertical section thereof through the line *x y*, Fig. 1; and Fig. 3, a side elevation thereof, the view in both Figs. 2 and 3 being in the direction indicated by the arrow *a*, Fig. 1.

In these views, K is a tower of ordinary form; K′, an iron plate forming the top of the tower, and K″ a vertical cylindrical sleeve formed integrally with the plate K′. About the sleeve K″ rotates freely a collar, A″, which supports, by means of an intermediate arm, A′, the horizontal bearing A, within which is journaled the horizontal shaft F of an ordinary wind-wheel, G. The bearing A and arm A′ are formed integrally with the collar A″, as is also a suitable projection, A‴, which supports the main vane L of the mill, the vane L and bearing A being in the same vertical plane, but on opposite sides of the collar A″. Above the collar A″ is another collar, B″, which rotates freely about the sleeve K″, and supports an integrally-formed arm, B′, and horizontal bearing B, and also an integrally-formed projecting flange, B‴, which carries an auxiliary vane, N. In the bearing B is journaled a horizontal shaft, E, which is in the same horizontal plane with the shaft F of the wind-wheel, and is connected with said shaft by a universal-joint coupling, H. By means of this connection the rotation of the shaft F in its bearing is transmitted directly and positively to the shaft E; but the two shafts and their bearings A B have an independent motion about the vertical axis of the mill. The shafts E F may, in fact, be regarded as forming a single flexible wind-wheel shaft, or a shaft divided into two parts united by a flexible connection, and having a uniform motion of rotation throughout its entire length. On the shaft E is rigidly mounted a beveled gear, C, engaging with a beveled gear, D, mounted on the vertical shaft I, which is journaled in the sleeve K″ and in a stationary bearing, Q, at the foot of the tower. The motion of the flexible shaft E F is transmitted through the gearing C D to the shaft I. A beveled gear, O, mounted on the lower end of the shaft I, engages with a beveled gear, P, mounted on the shaft R of a pulley, T, Fig. 2. The rotation of the shaft I is transmitted through the gears O P to the shaft R and pulley T, and may be applied to any suitable mechanism by means of a belt from the pulley. The auxiliary vane N, heretofore mentioned, is rigidly attached to the flange B‴ of the collar B″, and is in a vertical plane at an angle of forty-five degrees to the vertical plane passing through the shaft E. The angle of the two planes may be any acute angle, but, for the reasons hereinafter set forth, the angle of forty-five degrees is preferable to any other.

From the foregoing description it is evident that if the wind-wheel be rotated from left to right, or in the direction indicated by arrows on its periphery in Figs. 1 and 3, the gear C must rotate in the same direction, as indicated by arrows in Figs. 1 and 3, and the beveled gear D must turn in the direction indicated by the arrow on its face in Fig. 1, the shaft I turning with it. If, now, no resistance be offered to the rotation of the shaft I—that is, if the mill has no work to do—the pressure of the wind in the direction indicated by the arrow *w*, Fig. 1, will force the vane N backward until it is in the line of the wind and in the same vertical plane with the main vane L, and the entire casting to which the vane N is attached will swing with it, until, when the vane N reaches the vertical plane of the vane L, the shaft E will be in a vertical plane passing through the line *m n*, Fig. 1, and at an angle of forty-five degrees to the position in which it is shown in Fig. 1. As soon, however, as the mill is called upon to do any work,

a certain resistance is offered to the rotation of the shaft I and gear D, the amount of such resistance varying with the power required to do the work, and a necessary result of this resistance is a tendency of the gear C to roll around the periphery of the gear D, instead of rotating the latter, the direction in which the gear C tends to roll being opposite to the direction of rotation of the shaft I—that is, the direction indicated by the arrow *a'*, Fig. 1. As the gear C rolls around the periphery of the gear D, it carries with it the bearing B, and the entire casting of which the bearing forms a part, and also the vane N, which is rigidly attached to said casting. As the vane moves in the direction indicated by the arrow *a'*, the force of the wind on its surface (which is zero when the two vanes lie in the same plane) gradually increases, and the motion of the vane continues until the force of the wind upon its surface becomes equal to the resistance offered by the work to the rotation of the vertical shaft I. The vane and its gear C then come to rest and remain stationary so long as the elements of work and wind remain constant. If the work increase or the wind diminish, the vane will move still farther in the direction indicated by the arrow *a'*, whereas, if the work decrease or the wind increase, the vane will move back toward the main vane L. In every position of the vane N, however, the force of the wind upon its surface balances the resistance offered by the work, and entirely prevents any tendency of the wind-wheel to move out of the wind in consequence of such resistance.

The coupling H has a working-range of ninety degrees, and the vane N is placed at an angle of forty-five degrees to the shaft E, in order to utilize the entire range of the joint. When the vane N is in the plane of the vane L, the shaft E is in the line *m n*, and the shafts E F being then at an angle of forty-five degrees, the coupling is at one of the limits of its working-range. When the vanes L N are at an angle of forty-five degrees, the shafts E F are in a straight line, and when the vane N is at right angles to the vane L, the shaft E is at right angles to the line *m n*, and at an angle of forty-five degrees to the shaft F, and the coupling is at its opposite limit. As the pressure of the wind on the vane L is zero when the two vanes lie in the same plane, and is greatest when they are at right angles, it will be seen that by placing the vane as shown the limits of least and greatest wind-pressure on the vane N are reached simultaneously with the limits of working-range of the joint, and thus the entire capacity of both the vane and the coupling are made available. Another reason for placing the vane at an angle to the shaft E, as shown, is that by making the vane N of such size that when at an angle of forty-five degrees the wind-pressure on its surface balances the resistance of the work to the rotation of the vertical shaft, the vane will ordinarily stand in the position in which it is shown in Fig. 1, and the coupling H will ordinarily be in a straight line, thus avoiding the added friction consequent upon working at an angle.

No means are shown for regulating the speed of revolution of the wind-wheel; but the connection between the wind-wheel and the main vane L may be made flexible, and any well-known device for swinging the wheel in toward the vane may be made use of.

Having now described my invention and explained its operation, what I claim as new, and desire to secure by Letters Patent, is—

1. In a windmill of the class described, the combination of a horizontal wind-wheel shaft consisting of two independently-journaled parts, rotating uniformly in their bearings, but having independent rotation about the vertical axis of the mill, a wind-wheel mounted on one of said parts, gearing connecting the other of said parts with the vertical shaft of the mill, and a vane rigidly attached to the bearing of the part so geared to the vertical shaft, substantially as and for the purpose set forth.

2. In a windmill of the class described, the combination of two horizontal shafts lying in the same horizontal plane, and journaled in independent bearings rotating freely about the vertical axis of the mill, a flexible coupling connecting said shafts and adapted to secure their uniform rotation in their bearings, but at the same time to permit independent rotation of said bearings about the vertical axis, a wind-wheel mounted on one of said shafts, gearing connecting the other with the vertical shaft of the mill, and a vane rigidly attached to the bearing of said last-named horizontal shaft, substantially as and for the purpose set forth.

3. The combination of the sleeve K″, independent collars B″ A″, rotating freely about said sleeve, bearings B A, formed integrally with said collars, respectively, shafts E F, rotating in said bearings, respectively, universal coupling H, connecting said shafts, and vane N, rigidly attached to said bearing, and collar B B″, substantially as shown and described, and for the purpose set forth.

4. The combination of the bearings A B, shafts F E, rotating in said bearings, respectively, coupling H, connecting said shafts, and vane N, rigidly attached to the bearing B at an acute angle to the vertical plane of the shaft E, substantially as shown and described, and for the purpose set forth.

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

OSWALD E. WINGER.

Witnesses:
H. M. MONTETIUS,
OSCAR TAYLOR.