

(No Model.)

2 Sheets—Sheet 1.

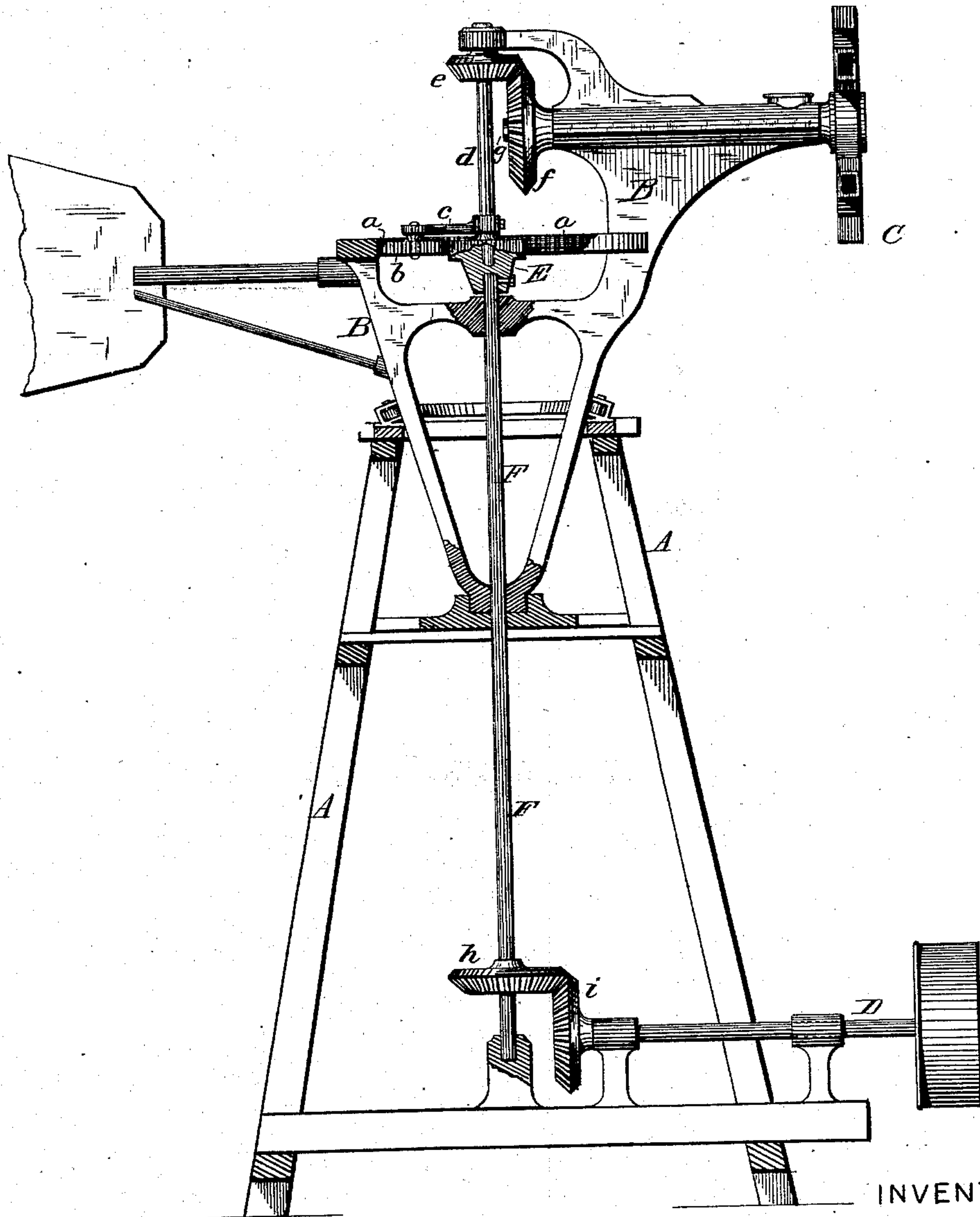
W. H. & C. A. HOLCOMBE.

GEARED WINDMILL.

No. 283,109.

Patented Aug. 14, 1883.

Fig. 1.



WITNESSES.

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(No Model.)

2 Sheets—Sheet 2.

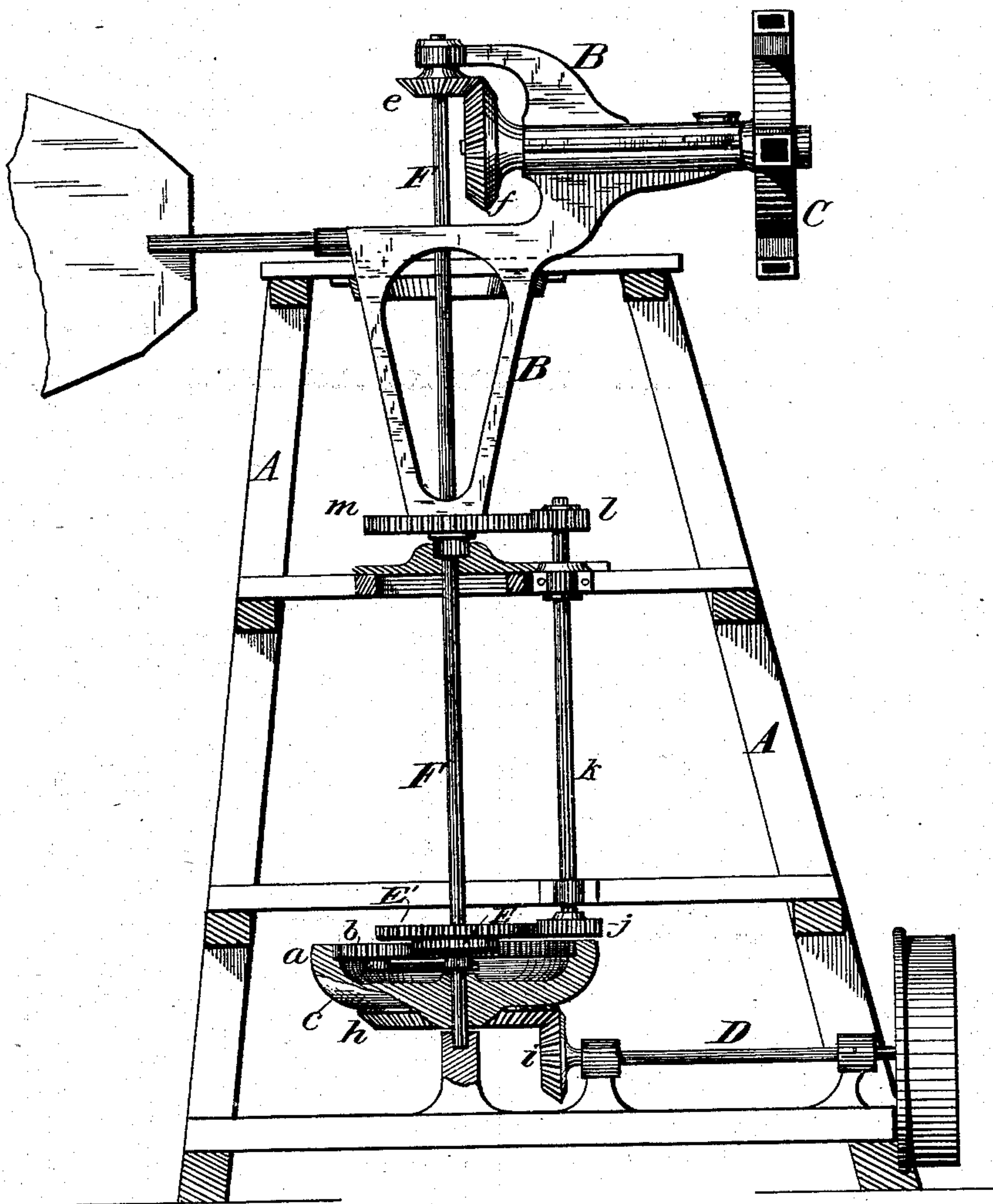
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Fig. 2.



WITNESSES.

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UNITED STATES PATENT OFFICE.

WILLIAM H. HOLCOMBE AND CLIFFORD A. HOLCOMBE, OF BELOIT, WIS.

GEARED WINDMILL.

SPECIFICATION forming part of Letters Patent No. 283,109, dated August 14, 1883.

Application filed January 22, 1883. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. HOLCOMBE and CLIFFORD A. HOLCOMBE, of Beloit, in the county of Rock and State of Wisconsin, have invented certain Improvements in Geared Windmills, of which the following is a specification.

Our invention relates to geared windmills; and it consists in a novel arrangement of parts for overcoming the tendency of the wheel to swing or turn out of the wind when a considerable resistance is offered by the machinery driven or operated by the power of the wind-wheel.

In the accompanying drawings, Figure 1 represents a side elevation of our improved mill, partly in section, and Fig. 2 a slightly-modified arrangement of the parts thereof.

The present invention is designed as a modification of and improvement upon that for which we filed application for patent on the 10th day of July, 1882.

A represents the usual tower or frame; B, the head or turn-table of the mill; C, the wind-wheel; and D the shaft to be driven, and from which power and motion may be transmitted to other machinery.

Figure 1 represents the preferred form of our mill, the head B of which is there represented as formed with an internal gear-ring, *a*, with which a pinion, *b*, meshes, said pinion being carried by an arm, *c*, rigidly secured to a short shaft, *d*, suitably supported in a vertical position at the center of the head B, and carrying a bevel-pinion, *e*, which receives motion from a similar pinion, *f*, secured upon the wind-wheel shaft *g*.

E represents a gear wheel or pinion secured to the upper end of a vertical shaft, F, directly in line with but terminating below shaft *d*, the lower end of said upper shaft, *d*, being loosely stepped and free to rotate in a socket or bearing in the center of gear wheel or pinion E, which latter meshes with pinion *b*.

The shaft F carries a bevel gear-wheel, *h*, which gives motion to a like wheel, *i*, keyed fast upon the shaft D to be driven, and being free to rotate independently of head B. The action of the mill is as follows: The wheel C, being turned by the wind, transmits its motion through pinions *e f* to shaft *d*, causing the arm

c of said shaft to travel around therewith, carrying with it the pinion *b*. This pinion, meshing with the stationary gear-ring *a* of head B, is caused to rotate about its own axis, the fixed gear-ring forming a fulcrum, so to speak, for the pinion, which, being thereby turned, and meshing with gear or pinion E, gives motion to the latter and to its shaft F, and thence through gear-wheels *h i* to the shaft D. This action continues until an unusual or excessive resistance is brought upon shaft D, the turn-table or head being held practically fixed by a tail vane or other usual means; but when such resistance occurs the shaft F and its gear-wheel E, being thereby prevented from rotating, said wheel E becomes the fulcrum or fixed body, and the pinion *b*, traveling around the wheel E while the latter is thus standing still, will be rotated in a backward direction, or in a direction the reverse of that which it receives when the head B is still and the gear E rotating. Being thus turned, the pinion *b*, acting upon gear-ring *a* of head B, tends to turn the head bodily in the direction in which arm *c* is traveling and counteracts the tendency of the head to turn in the opposite direction and carry the wheel out of the wind, as would occur if the shaft F were extended upward to take the place of shaft *d* and the power and motion of the wheel were given to the shaft directly through pinions *e* and *f*.

In Fig. 2 an equivalent but slightly modified arrangement is shown. In this the internally-toothed gear-ring *a*, instead of being formed in the head B, is formed upon or firmly secured to bevel-gear *h*, and both the gear-wheel *h* and ring thus united are loose upon shaft F, which carries an arm, *c*, provided with a pinion, *b*, to mesh with and impart motion to the gear-ring *a* and bevel-wheel *h*, the pinion *b* also meshing with a gear-wheel, E, loose upon shaft F, and formed with or firmly attached to a second gear-wheel, E', which meshes with a pinion, *j*, on a shaft, *k*, carrying at its upper end a pinion, *l*, which in turn meshes with a gear-wheel, *m*, formed or attached to the head B. Under this arrangement the action is merely the reverse of that first described. The head being held practically fixed by a rudder, vane, or otherwise, and the wheel A being turned by the wind, shaft F is rotated through the action of

pinions *e f*, and arm *c* travels about the shaft, carrying the pinion *b* with it, and said pinion gearing with gear-wheel *E* (which latter is held stationary through the agency of gear *E'*, pinion *j*, shaft *k*, pinion *l*, and gear *m*) is caused to rotate about its own axis and to give motion to ring *a* and wheel *h*, whence it is transmitted to shaft *D* as before. If, however, the resistance of shaft *D* exceeds the power of the wheel, in which case, with the common arrangement of gearing, the wheel would travel around out of the wind, the gear-ring *a* is held stationary and forms a fulcrum or a fixed rack, against which pinion *b* acts, and, being thereby rotated in a reverse direction from that in which it usually turns, gives motion to wheel *E*, which, acting through wheel *E'*, pinion *j*, shaft *k*, pinion *l*, and gear *m*, turns the head *B* and draws the wheel back into the wind, or counteracts its tendency to turn out of the wind. The principle of operation is the same in both, the details of arrangement only being slightly modified, as will be seen.

We are aware that in a geared windmill two sets of mechanism somewhat similar to ours in construction, one applied to the horizontal wheel-shaft and the other to the vertical driven shaft, and each working in connection with and dependent upon the other, have been used to enable the wheel to shift readily to the wind without straining the windmill or the machinery driven thereby; but the principle of operation was wholly dissimilar. The purpose of our arrangement is to prevent the wheel from riding out of the wind when the machinery offers an unusual resistance, and to accomplish this result it is essential that the mechanism should operate upon the revolving head or turn-table, whereas in the device referred to the turn-table or head is entirely free from and independent of the action of the mechanism referred to.

Having thus described our invention, what we claim is—

45 1. In a geared windmill, the combination of

a vertical shaft driven by gearing from the wind-wheel, and provided with a radial arm carrying a pinion, a central gear-wheel free to rotate independently of said shaft and meshing with said pinion, and an annular internally-toothed gear also meshing with said pinion, the central gear and annular gear or ring being connected, one with the turn-table or head of the mill, and the other with a wheel which gives motion to the machinery or shaft to be driven, all substantially as described and shown, whereby the wheel is prevented from turning out of the wind when the resistance is increased.

2. The combination, substantially as herein described and shown, of revolving head *B*, carrying wheel *C*, and provided with gear-ring *a*, shafts *d g*, the former provided with arm *c*, carrying pinion *b*, bevel-pinions *e f*, center-gear *E*, secured upon shaft *F*, and pinion *h*, likewise secured upon said shaft, and serving to give motion to other machinery.

3. In a geared windmill, the combination of an annular gear-ring, a central gear or pinion, one of said parts rigidly secured to the revolving head or turn-table of the mill, and a pinion carried by an arm rigidly attached to the vertical driven shaft, and serving to connect the center pinion and the annular gear, substantially as described.

4. In combination with a vertical shaft driven by direct gear from the wind-wheel shaft, a center gear adapted to rotate independently of said vertical shaft, an annular gear-ring connected directly or indirectly with the revolving mill-head, and a pinion carried by an arm rigidly attached to the vertical shaft and meshing with the center gear and with the annular gear, substantially as and for the purpose specified.

WILLIAM H. HOLCOMBE.

CLIFFORD A. HOLCOMBE.

Witnesses:

CHARLES NEWBURGH;

WILSON R. SMITH.