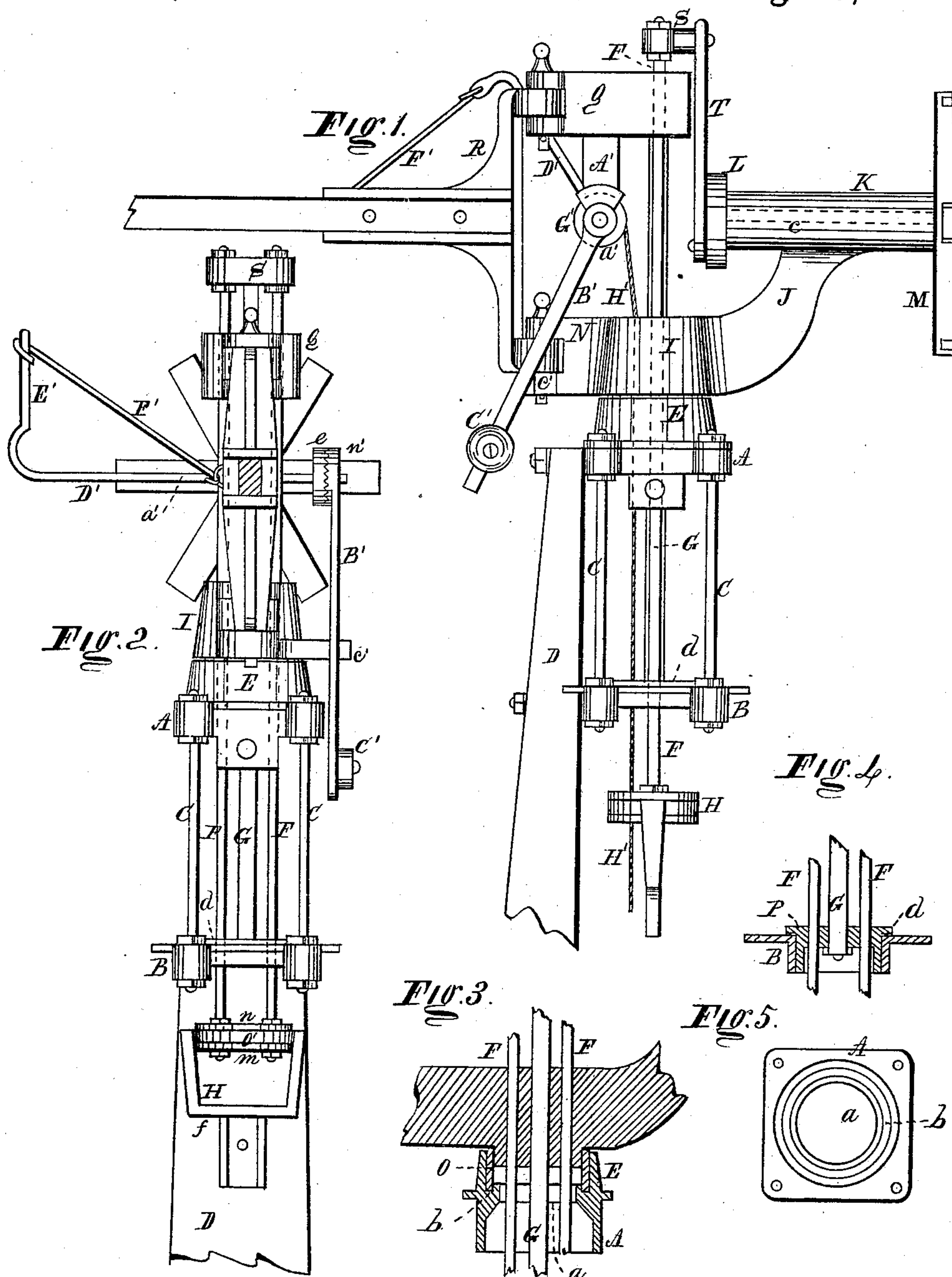


(Model.)

W. H. KING.
WINDMILL.

No. 245,961.

Patented Aug. 23, 1881.



Witnesses.
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UNITED STATES PATENT OFFICE.

WARREN H. KING, OF BERLIN CENTRE, OHIO.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 245,961, dated August 23, 1881.

Application filed April 7, 1881. (Model.)

To all whom it may concern:

Be it known that I, WARREN HENRY KING, of Berlin Centre, in the county of Mahoning and State of Ohio, have invented a certain new and Improved Windmill; and I do hereby declare that the following is a full, clear, and complete description thereof.

The above-said improvement in windmills consists in part of a novel manner of constructing the upper or vane section of the mill for connecting it to the lower part or frame structure.

It also relates to certain pitman-rods connecting the crank of the mill to the works or mechanism to be operated thereby, and to a device for adjusting the vane to the course of the wind, whereby the effective power of the mill is increased or diminished, as may be required.

A more full and complete description of the improvement and the operation of the same are as follows, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side elevation of the mill. Fig. 2 is also a side elevation in direction of the rear end of the vane. Figs. 3, 4, and 5 are detached sections, to which reference will be made.

Like letters of reference refer to like parts in the several views.

The stationary or frame structure of the mill consists of a head-block, A, and a foot-block, B, connected to each other by screw-rods C, and by which head and foot blocks the mill is secured to the post D, and thereby elevated in position above the ground.

The head-block A, above referred to, is provided with a socket, E, having in the bottom thereof an opening, *a*, Figs. 3 and 5, for the passage of the connecting-rods F and shaft G, to which reference will hereinafter be made. Within said socket, immediately surrounding the opening *a*, above alluded to, is an annular channel or groove, *b*, Fig. 5, for a purpose presently shown. In the foot-block is also a central opening to allow the pitman-rods F to pass down through to the swivel H.

On the top of the above-described frame is supported and revolved the vane and wheel section of the mill, substantially as follows:

I is a head, from one side of which projects an arm, J, to the upper end of which is secured a sleeve, K, through which passes a shaft. (Indicated by the dotted line *c*, Fig. 1.) On one end of said shaft is fixed a crank-wheel, L, and on the opposite end is a center, M, in which to secure the arms or wings of the wheel. From the opposite side of the head I, above referred to, projects an arm, N. From the under side of the head I descends a neck, O, Fig. 3, into the socket E, and adapted to fit loosely in the annular groove *b*, upon which neck and the bottom of the groove the upper section of the mill is supported and revolved.

To retain the upper section of the mill in an upright position is the purpose of the shaft G, above alluded to.

The above-said head I is cast on the shaft, which descends therefrom to the foot-block B of the frame, and there terminates in a hub, P, in which it is secured by any suitable means. The hub is fitted to turn freely in the opening of the foot-block. Said hub is provided with a flange, *d*, projecting over the edge of the foot-block B, but not supported thereon, the weight of the shaft and the revolving upper section of the machine being supported upon the neck O and groove above described. The hub is especially intended to prevent swaying of the upper part of the mill, so that it may revolve in a vertical position without cramping. The shaft G extends above the head I, and terminates in an arm, Q, Fig. 1, cast on the shaft, as is the head I. To said arm and to the arm N is hinged the vane R, as seen in the drawings.

To the upper ends of the pitman-rods F F, above described, is secured a cross-head, S, connecting said rods to the connecting-rod or pitman T, whereby they are operated by the crank-wheel L. To the lower end of the pitman-rods is attached the swivel H, whereby the said rods are connected to the mechanism to be operated by the mill. Said swivel consists of the disks *m* and *n*, between which is fitted loosely the ring O' of the yoke *f*.

In the bifurcated hanger A' of the arm Q is journaled a shaft, D', Fig. 2. To one end of said shaft is secured a counter-balance consisting of the arm B' and a movable weight, C'. The opposite end of the shaft terminates

in an arm, E', which is connected to the vane by a link, F'. In the bifurcation of the hanger A', alluded to, is a sheave, G', at or near the point a' of which is secured one end of the rope H'. Said rope passes over the sheave and descends therefrom to the ground, passing through the head I and frame and through the swivel, as shown in Fig. 1.

The practical operation of the above-described windmill is as follows: As shown in the drawings, the wings of the wheel are not shown. The center only is represented, in which to secure the wings. The wings are or may be like those in ordinary use. As the wheel revolves motion is given to the pitman-rods F F by the intervention of the pitman T and crank-wheel.

In having two pitman-rods, instead of one, ordinarily used, the machine works with less labor, as the two rods resist the strain exerted by the wheel more effectually than one rod; hence the mill runs more freely and steadily. In supporting the mill on the neck O, and the neck resting in the groove, as described, and shown in the drawings, the mill revolves more easily, as there is less frictional resistance than if a broad bearing-surface sustained the mill; also, in having the neck lodged in a groove it can be kept supplied with oil by filling the groove or channel, so that the neck will at all times be in a body of oil, thereby requiring but little time and attention to keep the revolving part lubricated.

The purpose of the counterbalance-arm B' and cord, above described, is to adjust the wheel in respect to the wind so that it may act more or less directly upon it in accordance with its force, thereby regulating the speed or power of the mill.

In this class of motors the speed and power thereof are relatively to the effective force of the wind upon the arms or wings of the wheel. In the event of the wind being light the wheel is so adjusted to the direction of the wind as to present the arms thereof at such an angle as to receive the fullest effective force of the wind. Otherwise, when the wind is blowing strongly the wheel is so adjusted as to present the arms at a less angle to the wind, thereby lessening its effect upon them, and, correspondingly, the speed or power of the mill. This changing of the position of the wheel in respect to the direction of the wind is effected by changing the position of the vane in respect to the position of the wheel. As shown in the drawings, the vane of the machine places the wheel in such a position as to receive the direct and most effective force of the wind, the vane being in alignment with the shaft c of the wheel, or at a right angle with the face of the wheel. This position of the wheel is required in a light wind. Should the wind become strong its effect upon the wheel would be to accelerate its speed beyond that required. To check this speed, the arm is drawn more or less from its alignment with the shaft of the wheel, the effect of which will

be to change the position of the wheel in respect to the direction of the wind, giving the arms or wings of the wheel greater or less angle, according to the angle given to the vane in its relation to the wheel. This change in the position of the wheel causes the wind to impinge upon the wings thereof at a less angle, thereby reducing its effective force upon them and causing the wheel to revolve with less speed.

The changing of the position of the vane for the purpose of bringing the face of the wheel more or less out of the course of the wind is done by the cord H, which, on pulling upon the vane, can be drawn laterally more or less for bringing the edge of the wheel more or less in the course of the wind, for the purpose specified. On slackening the cord the counterbalance will reverse the position of the vane and the wheel accordingly.

It will be observed that the arm B' of the counterbalance rests against the stop c', projecting from the side of the arm N. Said stop prevents the vane from turning around to the counterbalance-side of the mill, the vane being required to turn only on the opposite side laterally. The relation of the arm to the stop, as shown in the drawings, permits the vane to come in alignment with the shaft of the wheel, so that the wheel can receive the full effective force of the wind, and thereby obtain the whole working capacity of the mill.

In the event the full working capacity of the mill is not required, it is necessary, to that end, to prevent the vane from swinging so far as to come in a direct line with the shaft of the wheel, thereby preventing the wheel from assuming a full radial face to the wind. To effect this end the arm of the counterbalance is adjusted nearer to a vertical position than that shown in the drawings. As a consequence the arm will impinge against the stop before the vane can come to a right line with the shaft of the wheel, thereby preventing the wheel from coming to a full face in the wind, but remaining at such an angle as the vane in its relation to the wind will allow; hence as the wheel, by virtue of the position of the vane, cannot receive the full effective force of the wind, the speed or power of the mill will be accordingly lessened, more or less, as the arm may be adjusted more or less near to a vertical position.

The face of the hub n' of the counterbalance-arm is serrated. Corresponding serrations or teeth are made in the face of the collar e, in which the teeth of the hub are engaged, as seen in Fig. 2. This engagement of the hub and collar allows the arm to be retained at any desirable angle for the purpose above specified, the engagement being secured by a nut on the end of the shaft. The weight on the arm is adjustable, so that it can be moved upward or downward thereon for the purpose of actuating the vane more or less quickly, according to the position to which the weight may be adjusted on the arm.

The neck O of the head I, above described,

is not an integral part of the said head. The neck consists of a ring cut from the end of a tube adapted to fit on over a boss cast on the under side of the head, to which boss the ring
5 may be secured by any suitable means. This mode of forming the neck is much less expensive than casting a neck on the head, as in that event the neck would need to be turned smoothly and be fitted in the annular groove, whereas
10 the piece cut from a tube is smooth and requires no special fitting to the annular groove.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In windmills, the head I and arms supporting the shaft *c* of the wheel, said head being cast on the central shaft, G, connecting the head to the arm Q, cast thereon, and supporting the said arm and hanger in position, in combination with the frame and vane, substantially as described.
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2. The connecting-rods or pitmen F F, arranged on either side of the central shaft, guided and supported by the head I and arm Q, and connected to the crank-wheel and shaft

by a cross-head and pitman, and provided with a swivel-connection at its lower end for attaching the pitmen to the mechanism to be operated, as set forth. 25

3. In combination with the central shaft extending from the head I, a hub, P, connected to said shaft and fitted to revolve in a foot-block, B, of the frame or lower section of the mill and screw-bolts connecting said block B to the upper block of the frame, substantially as described, and for the purpose set forth. 30 35

4. In windmill structures, a counter-balance consisting of the adjustable weighted arm, having the radial face of the hub thereof serrated or toothed, adapted to engage the corresponding radially-serrated collar *e*, in combination with the shaft D', arm, link, and vane, substantially as herein set forth. 40

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

WARREN HENRY KING.

Witnesses:

J. H. BURRIDGE,
A. L. CHAMPION.