J. P. CATHCART.

WIND-MILL.

No. 182,103. Patented Sept. 12, 1876.

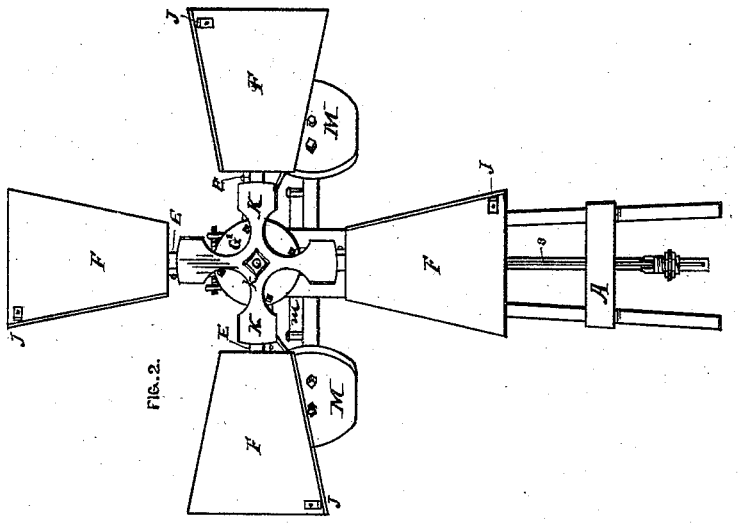

FIG. 2.

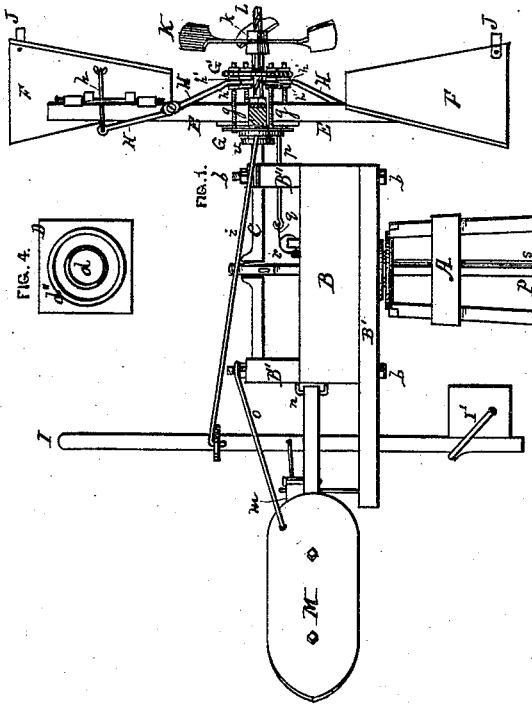

FIG. 1.

FIG. 4.

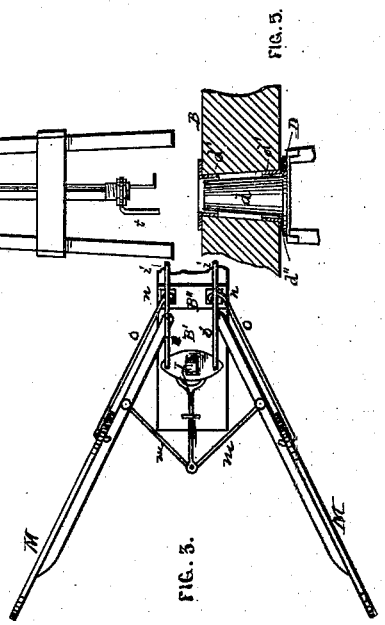

FIG. 3.

FIG. 5.

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UNITED STATES PATENT OFFICE.

JOHN P. CATHCART, OF LA PORTE, INDIANA.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **182,103**, dated September 12, 1876; application filed June 12, 1876.

To all whom it may concern:

Be it known that I, JOHN P. CATHCART, of La Porte, in the county of La Porte and State of Indiana, have invented certain Improvements in Windmills, of which the following is a specification:

The following description of my invention will be sufficiently full, clear, and exact to enable those skilled in the art to practice the same, reference being made to the accompanying drawing, which forms a part of this specification, and in which—

Figure 1 is a side view of the mill. Fig. 2 is a front view of the same. Fig. 3 is a top or plan view of a collapsible vane. Fig. 4 is a top view of the bearing at the top of the tower. Fig. 5 is a fragmentary section of the said bearing, &c.

Like letters of reference made use of in the same figures indicate like parts wherever used.

In the said drawing, A represents the tower which sustains the revolving carriage upon which is mounted the wind-wheel and its appliances. This carriage I prefer to make of the form shown in the drawing, where cheapness is desired. To the central block or timber B is fitted a base-piece, B′, projecting to the rear, to afford a support for the weight-lever, &c., and at each end, upon the upper surface of the timber B, are fitted the bearing or pillow blocks B″ B″, which afford bearings for the main shaft C. These several parts—the timbers B and B′ and the pillow-blocks B″,—are all held together by four through-bolts, *b*, which also serve to fasten the caps upon the shaft-bearings. These bolts *b*, it will be seen, pass entirely through from the caps to the under surface of the base-piece B′. Upon the top of the tower is affixed a bearing-plate, D, which is provided with the hollow pivot *d*, upon which the carriage turns. The carriage is furnished with bushing-tubes *d′* at points of contact with the pivot, and the bearing-plate is furnished with a rim, *d″*, which, at a short distance from the pivot, encircles the same, whereby a chamber is produced for containing the lubricating material, thus insuring the constant lubrication of the pivotal joint, and preventing the waste of the oil.

The wind-wheel consists of the radius-arms or masts E E E E, affixed rigidly to the shaft C. To these masts are hinged the sails F F F F, the same being hinged in the median or central line of each sail, so that the sail is in a measure balanced to the wind, and free to swing in or out of the breeze, without great resistance. A sliding head is fitted to the shaft, and it consists of two plates, G G′, one of which, G, is fitted to the shaft in the rear of the masts, and the other G′ in front of the masts; and the two plates are connected together by screw-bolts *g*—one bolt for each sail.

Pivoted to the masts are the levers H H H H, for operating the sails, the outer end of the lever being connected, by a rod, *h*, to an eyebolt in the edge of the sail, while the inner end of the lever has an eye or socket which surrounds one of the screw-bolts *g*, and is secured thereto by a lock-nut, *h′ h′*, at each side, by the use of which the lever may be set forward or back, to adjust the position of the sail to the wind.

It will be seen that, by reason of these levers H, a forward motion of the sliding head will, operating through the levers, throw the sails' edge to or out of the wind, while a motion to the rear will be attended with the opposite effect.

Attached to the rear plate of this sliding head are rods *i*, which connect to the pendulum or vertical lever I, fulcrumed in the base B′ and provided with a weight, I′, the tendency of which is, by the connnections just described, to keep the sails full in the wind.

To the advanced edge of the sail I apply a vane, J, which is intended to assist in the government of the mill. These vanes, standing out across the line of motion of the sails, meet the resistance of the air, and tend to assist in throwing the sails out of the wind—that is to say, when the sails are fully in the wind these vanes are carried with their broadside against the body of air in the revolution of the wheel, and, as a consequence, exert a tendency to swing the sails out of the wind, and at the same time, and by the same impulse, to swing themselves into line with the motion.

In the absence of any other governor, these vanes, acting in conjunction with the weight,

will govern the mill with more or less accuracy.

As an additional governor, acting in conjunction with the vanes just described, or which may act in the absence of the vanes, I apply to the front of the shaft a small wind-wheel, K, having the normal plane of its vanes at the opposite angle to that of the large wheel. This small wheel is mounted upon a hub, *k*, which revolves upon a prolongation of the main shaft, said prolongation L being cut with a spiral groove or screw-thread of long pitch, so that, as the small wheel is turned by the wind, it travels back upon the shaft, and drives back the sliding head, thus turning the sails of the large wheel out of the wind. This force of the small wheel is, of course, exerted against the weight I′, and this weight, acting through the sliding head, will, as the wind dies down, set the small wheel out again by the pressure of the sliding head and set the sails of the large wheel again into the wind. The small wheel, of course, will only turn when the wind is strong enough to overcome and raise the weight, which is the measure of the government.

Acting in conjunction with each and both of the above governing contrivances, and capable also of acting in the absence of either or both, as might be necessary in case the others get out of order, as an additional assistance to the government of the mill, I make the tail-vane of the mill in two parts, or, in other words, make two separate similar tail-vanes, M M, which are pivoted by arms to the carriage, and are connected to each other by a toggle-lever, *m*, the center of which is attached to the pendulum or weight-lever I. These tail-vanes stand at an angle to the wind at each side, and, as the breeze rises, it compresses them together, raising thereby the weight, and throwing back the sliding head, which relieves the sails. The weight acts to return the vanes to their spread position as the wind dies away. The weight-lever being, as before stated, connected to the sliding head, the effect of the compression of the vanes is to operate the sails, and govern their position in the wind.

It will thus be seen that there are in this mill three different governing contrivances, which all act jointly to govern the sails, any one of which, however, may act alone in the absence or disability of the others.

The vanes M are suspended upon the hinge *n* and the guy-rods *o*, the latter being connected from a point on the vane to the bolts *b*. By setting the hinges *n* nearer together, so that the weight of the vane acting upon the guy-rods will have a tendency to swing them apart, the weight I′ may be lessened, or, if sufficient power is thus gained, dispensed with.

From the rear plate of the sliding head projects toward the tower a rod, *p*, which, passing through and finding a bearing in one of the pillow-blocks B″, is connected by a short chain, *q*, which passes over a pulley, *r*, to the vertical wire or rod *s*, which descends side by side with the pitman P, and plays through a hole cut through the screw-threaded portion thereof, by the means of which the pump-rod splice-piece is attached to said pitman. This arrangement centers the rod *s* and prevents it from twisting around the pitman as the mill swings around to face the wind. By means of this rod the sails may be thrown into and out of the wind by hand.

The splice-piece *t* swivels on the pitman, and is held by a nut above and below. The screw-threaded part, which receives this swiveling-piece, is pierced as above stated. This affords a very simple and inexpensive method of centering the rod *s*.

The main shaft C I make square, forging it of a square bar, and only round the bearing-points. This affords a sure means of mounting the sliding head, so that the rear plate thereof will be held from turning the collar *u*, by which it is connected to the rods *i*. The collar *u* slides upon a square portion of the shaft.

Having thus described the construction and operation of my improved windmill, that which I claim as new, and desire to secure by Letters Patent, is—

1. The small governor-wheel mounted on a screw-shaft in line with the main shaft, and connected to the sails of the mill, in the manner specified.

2. The combination, with the sliding head, consisting of two separate plates placed one at each side of the hub of the main wheel, of screw-rods running from plate to plate, and of the eyebolt-rods for controlling the sails which are threaded upon the screw-rods, and also the lock-nuts on said screw-rods for locking the said controlling-rods in position, as specified.

3. The combination with the sails, of the small vanes placed at the edge thereof, and standing broadside to the line of rotation, whereby the motion of the mill is caused to act as a governor, substantially as specified.

4. The means employed to throw the sails out of gear, consisting of a rod which passes straight back from the sliding head, and a flexible chain connected to said rod and passing over a pulley, below which it is attached to the vertical hand-rod, substantially as specified.

5. The means employed for centering and supporting the vertical hand-rod, consisting of the combination of said rod with the pitman, said pitman being provided with the enlarged perforated screw-threaded portion, through which said rod is threaded, and which sustains the swiveling pump-rod connection, substantially as specified.

6. The carriage, composed of the timbers B and B′, and the pillow-blocks B″, all held together by the through-bolts *b*, substantially as specified.

7. The combination, with the carriage, and

with the conical bearing or pivot upon which the carriage turns at the tower-top, of a raised lip or rim on the flat bearing or base encircling said pivot-cone at a little distance therefrom, as and for the purpose specified.

8. The combination of the sails, the masts, and the sail-operating levers, the latter pivoted directly to the masts, substantially as specified.

9. The combination of the small governor-wheel, the large wheel, and sails, with the vanes placed upon the edge thereof, the collapsible tail-vane, the weighted lever, the sliding head, and its connections, whereby the united effect of three governors acting in conjunction is produced upon the mill, substantially as specified.

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Witnesses:
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