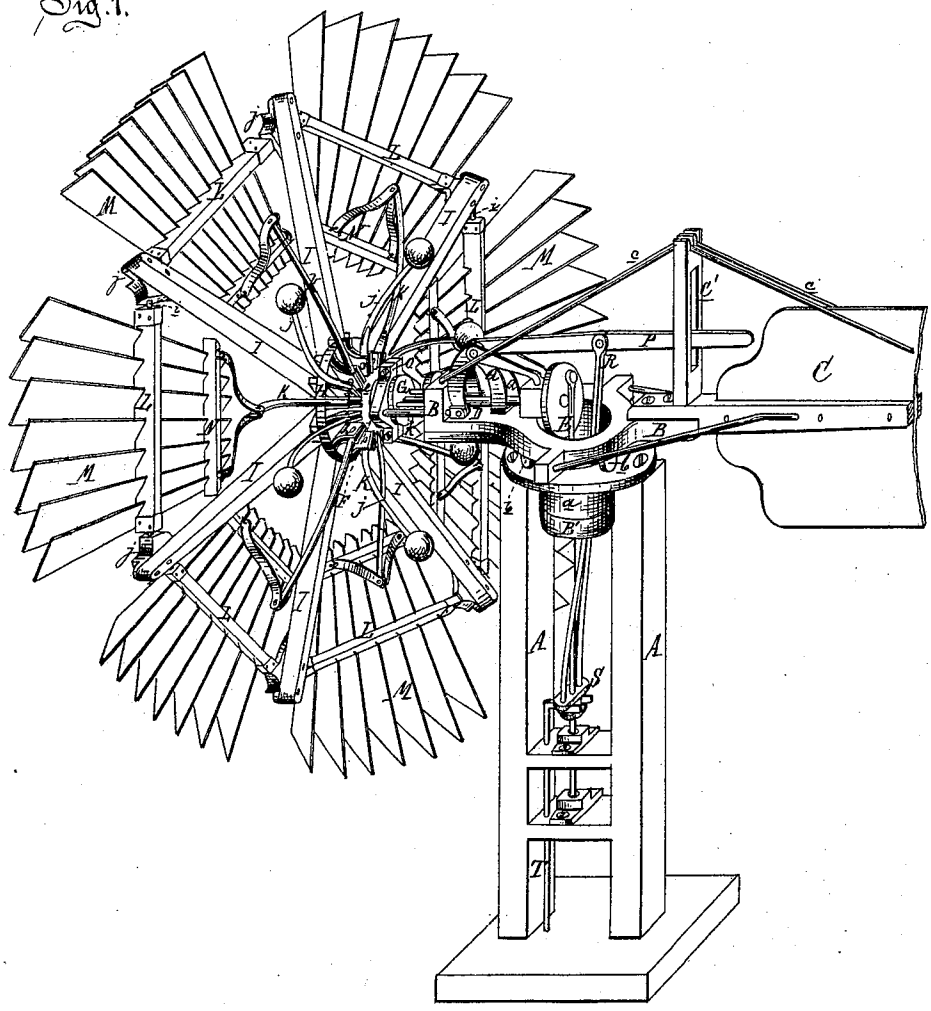
2 Sheets--Sheet 1.

J. A. ALLEN.

Wind-Mill.

No. 167,724. Patented Sept. 14, 1875.

Fig. 1.



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2 Sheets--Sheet 2.

J. A. ALLEN.

Wind-Mill.

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Fig. 2.

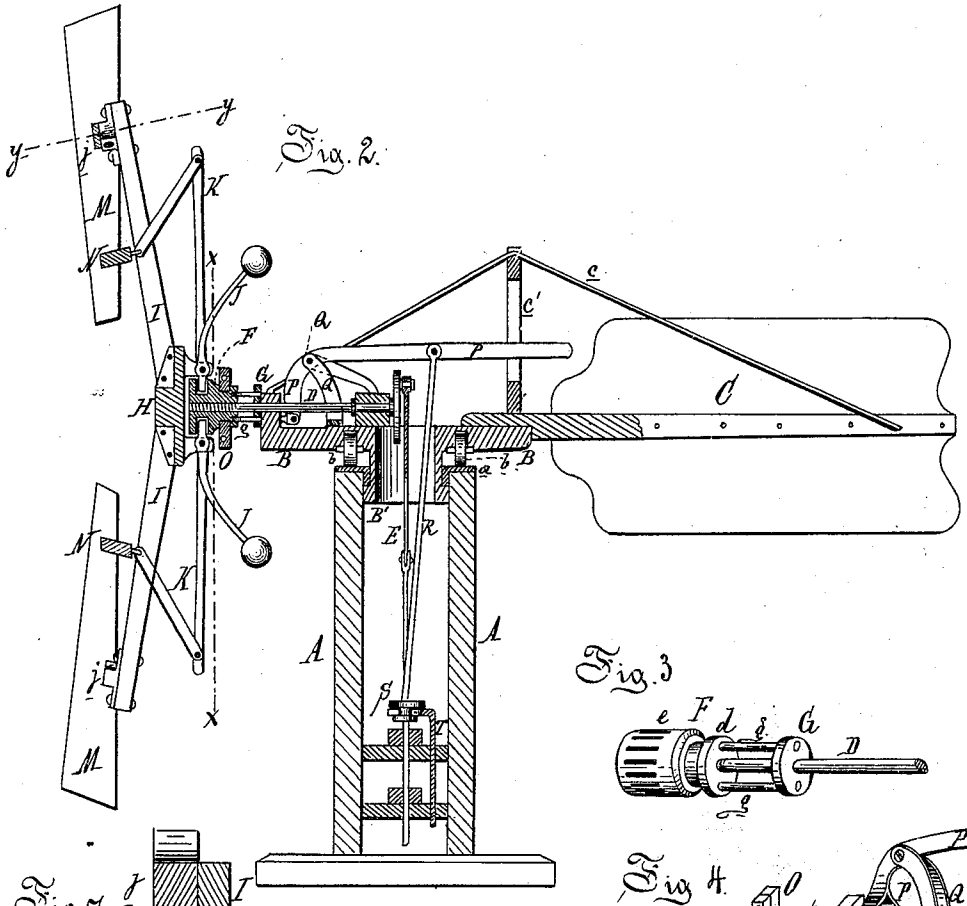


Fig. 3

Fig. 4

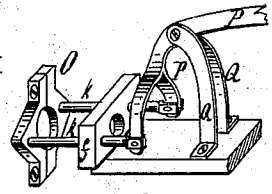


Fig. 7

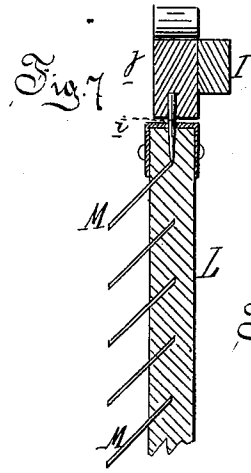


Fig. 5.

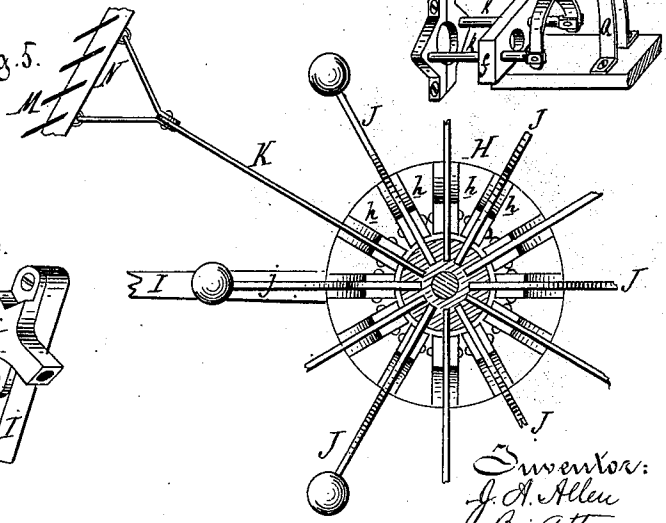
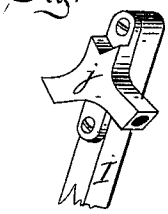


Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES A. ALLEN, OF ALBION, ASSIGNOR TO HIMSELF AND HENRY OSBORN, OF SHERIDAN, MICHIGAN.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **167,724**, dated September 14, 1875; application filed May 4, 1875.

To all whom it may concern:

Be it known that I, JAMES A. ALLEN, of Albion, in the county of Calhoun and State of Michigan, have invented an Improved Windmill, of which the following is a specification:

The nature of my invention relates to an improvement in windmills of that class which are provided with a governor for turning the sails more or less out of the wind as the latter increases in force, thereby regulating and limiting the speed of the wind-wheel, and insuring its safety in high winds.

The invention consists, essentially, in the application of the centrifugal governor to a sliding head carrying the wheel-arms, and rotating with a hub at the end of the wheel-shaft. The centrifugal force of the weighted arms slides the head upon the hub, and, through a system of levers, shifts the angles of the sails.

Figure 1, Sheet 1, is a perspective view. Fig. 2, Sheet 2, is a longitudinal vertical section. Fig. 3 is a perspective view of the sliding hub at the end of the wheel-shaft. Fig. 4 is a similar view of the lever and collar for sliding the hub by hand through a rod reaching to the ground. Fig. 5 is a sectional elevation of the head and hub, the section being taken across them on the line *x x*, Fig. 2. Fig. 6 is a perspective view of the angular socket-casting at the outer end of each wheel-arm. Fig. 7 is a cross-section at *y y*.

In the drawing, A represents a tower surmounted by an annular cap-plate, *a*, in which is inserted the sleeve B′ of a turn-table, B, whose weight is carried on a series of rollers or wheels, *b*, interposed between it and the plate *a*. C is the vane, projecting from the rear end of the turn-table, and is supported by a truss-rod, *c*, carried over a truss-post, *c′*. D is the wheel-shaft, journaled through bearings on the turn-table, with a face-plate and wrist at its inner end for reciprocating the connecting-rod E. F is a hub, sleeved on the outer end of the shaft. A groove, *d*, is turned in its inner end, and its outer end is longitudinally mortised, as at *e*. G is a collar, keyed on the shaft next to the outer bearing *f* of the turn-table. Two rods, *g g*, project forward into sockets in the back end of the hub, which slides onto them, so as the hub is turned the shaft turns with it. H is the head or spider for the wheel, flanged radially on its outer face to receive the wheel-arms I, and cast with as many radial lugs *h* on the back as there are mortises *e* in the hub. These lugs are slotted to receive, in every second one, a curved governor-arm, J, pivoted therein by a pin. The inner end of each arm J projects into a slot, *e*, while the outer end is weighted, as shown. In the slot of each intermediate lug *h* a lever, K, is pivoted, its inner and shorter arm being also stepped in a mortise of the hub. L are the sail-shafts, one of which is placed between the outer ends of every contiguous pair of arms I. Its ends are prevented from splitting by metal caps, through each of which is inserted a pivot-pin, *i*, which is pivoted in a socket in a Λ-shaped casting, *j*, bolted to the end of the wheel-arm, thus pivoting each sail-shaft on its axis. M are the sails, radially secured in slots obliquely sawed into the edge of each shaft L, their inner ends being a little longer than the outer arms, and are let into a girt, N, to the rear edge of which the outer end of a lever, K, is connected by a pair of diverging links, K′.

By reason of the greater leverage of the inner arms of the sails the latter are, by the force of the wind, turned (with their shafts) fairly to it—that is to say, they are perpendicular to the axis of the wheel-shaft, while the head will be moved inwardly on the hub, and the governor-arms inwardly and toward the wheel-shaft, like the ribs of a half-closed umbrella. The head is held immovable upon the wheel-shaft by mechanism hereinafter to be described. Now, if the wind increase in force, thereby increasing the speed of the wheel beyond a given limit, which it is not intended to exceed, the centrifugal force of the weighted governor-arms will begin to move them outwardly, spreading apart, thereby moving the head toward or against the wind, and, through the levers and links, turning the sails partly out of the wind, so as to present a lesser surface to its action, thus regulating the speed of the mill.

A yoke, O, embraces the neck of the hub in the groove *d*. From the yoke two rods, *k*, extend back through the bearing *f*, and are con-

nected to the ends of a forked lever, P, pivoted to a standard, Q, on the turn-table. A pair of links, R, are pivoted at their upper ends to this lever, and pass down through the sleeve B′ of the turn-table at each side of the connecting-rod, terminating in a collar, S, sleeved thereon, which collar may be raised or lowered and locked in position by a clutch-yoke or forked bar, T, raising or lowering the long arm of the lever P, by means of which the hub may be kept immovable upon the shaft when it is desired to have the mill operated by the wind.

When it is desired to stop the mill entirely the long arm of the lever P is raised up to draw back the hub, and thus turn the sails so that they will present their inner ends to the wind.

What I claim as my invention is—

The combination of the spider H, flanged on its outer face for the reception of the wheel-arms, and having a set of lugs on its inner face, with the sliding hub F, having the mortise *e* and the governor-arms J and levers K, the said governor-arms and levers being pivoted in the said lugs on the inner face of said spider, and having their ends project into the mortise in the sliding hub.

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