(No Model.)

2 Sheets—Sheet 1.

N. JOHNSON.

WINDMILL.

No. 547,437. Patented Oct. 8, 1895.

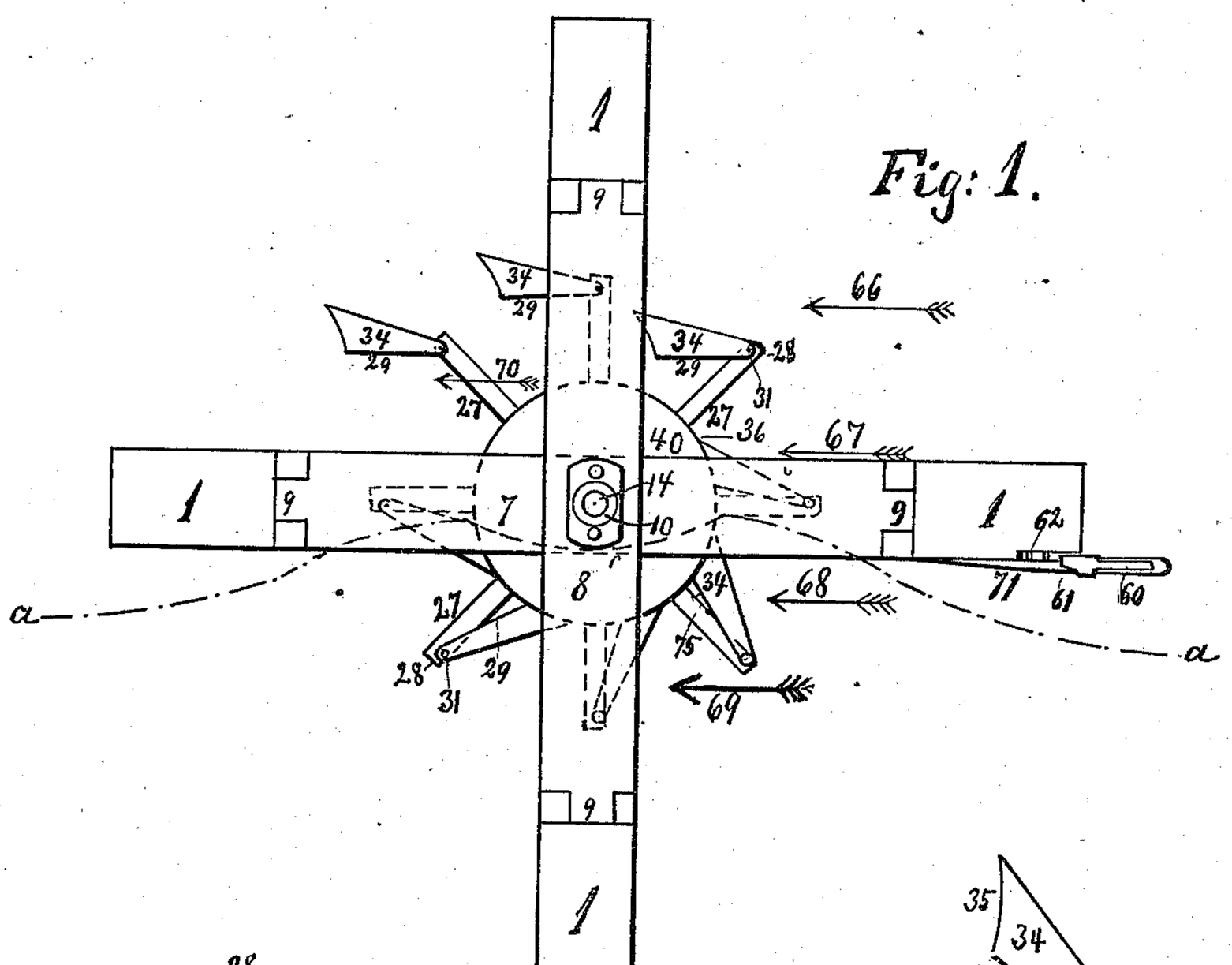

Fig: 1.

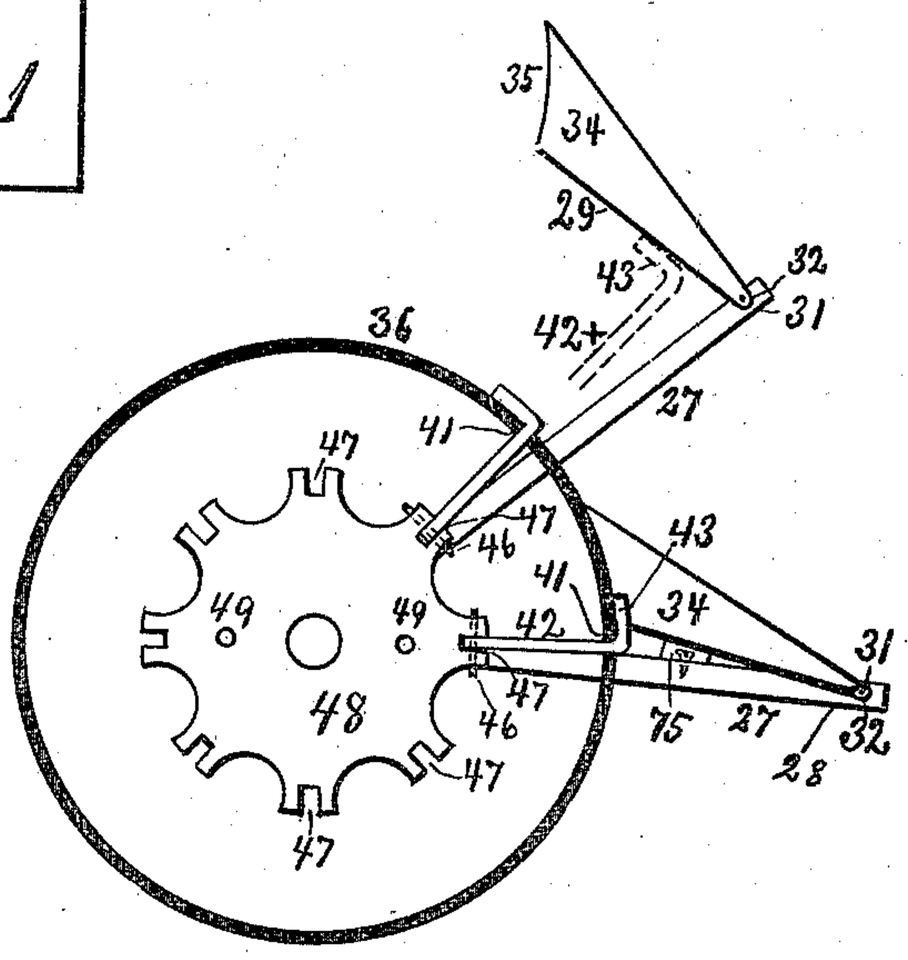

Fig: 6.

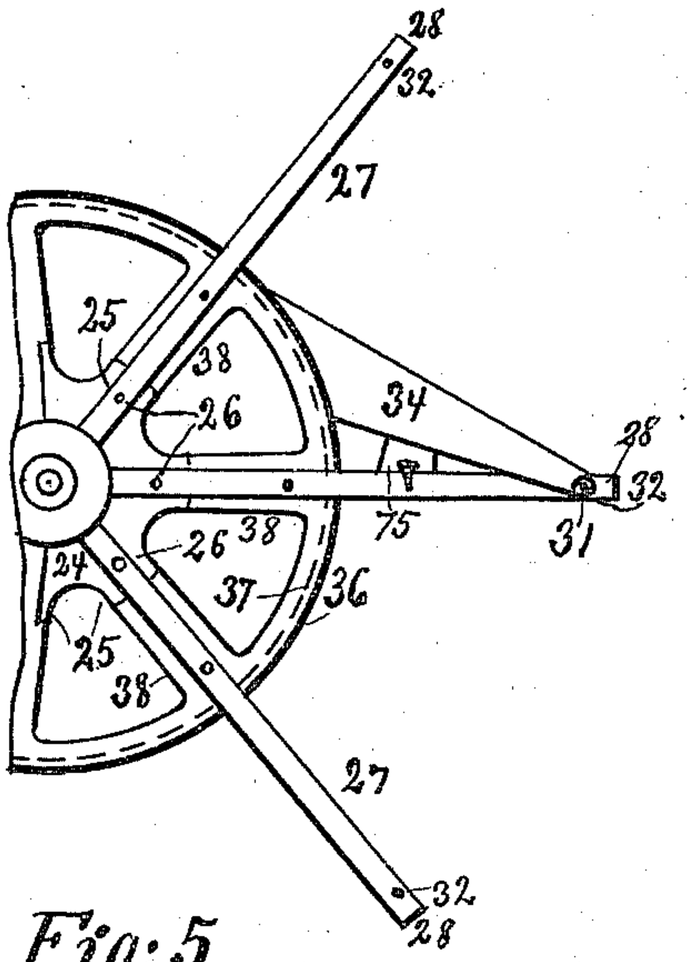

Fig: 5.

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(No Model.)

2 Sheets—Sheet 2.

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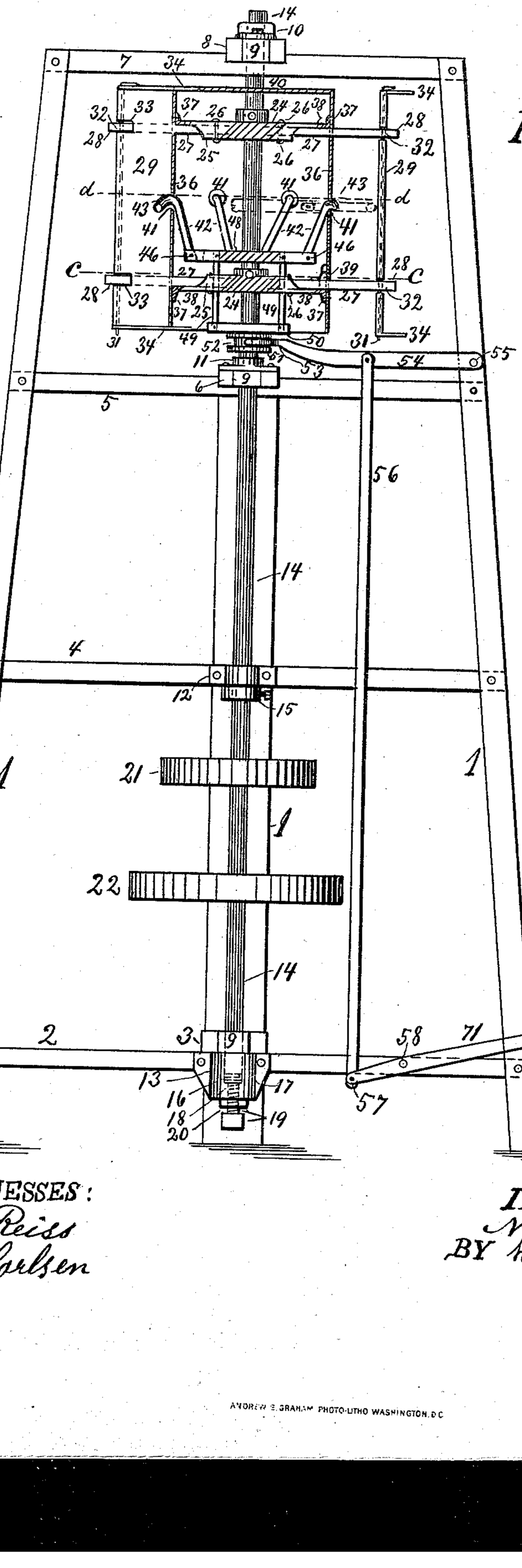

Fig: 2.

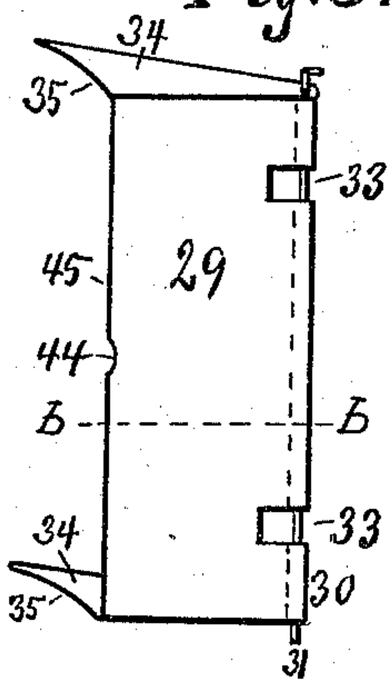

Fig: 3.

Fig: 4.

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UNITED STATES PATENT OFFICE.

NELS JOHNSON, OF SOUTH SHORE, SOUTH DAKOTA.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 547,437, dated October 8, 1895.

Application filed October 12, 1894. Serial No. 525,735. (No model.)

To all whom it may concern:

Be it known that I, NELS JOHNSON, a citizen of the United States, residing at South Shore, in the county of Codington and State of South Dakota, have invented certain new and useful Improvements in Windmills; and I do 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in windmills of the class in which an upright shaft is provided with arms and sails secured thereto and revolving in a horizontal plane.

The main object of my invention is to provide a windmill of a very inexpensive and still effective and durable construction.

With this and other objects in view my invention consists in the novel construction and arrangement of parts illustrated in the accompanying drawings, in which—

Figure 1 is a plan or top end view of my complete mill or motor. Fig. 2 is a side elevation of the machine, with one of the uprights of the tower removed and with the wind-wheel in section about as on the line *a a* in Fig. 1, except that the two wings shown in Fig. 2 are viewed in the direction of the wind. Fig. 3 is a perspective view of one of the wings or sails unhinged from the machine, but with the hinge-pin in it. Fig. 4 is a sectional end view on the line *b b* in Fig. 3. Fig. 5 is an enlarged sectional top or plan view of a portion of the wind-wheel, as on the line *c c* in Fig. 2. Fig. 6 is an enlarged sectional plan view of another portion of the wind-wheel, as on the line *d d* in Fig. 2.

Referring to the drawings by reference-numerals, the machinery proper is mounted in a suitable frame or tower consisting of the four uprights 1 and the cross-timbers 2, 3, 4, 5, 6, 7, and 8, of which the timbers 2 and 3 are secured together at their crossing in the center of the tower, as are also the timbers 5 and 6 and the top timbers 7 and 8.

In Fig. 2, 9 are the tenoned ends from which the upright is removed. Substantially in the center of the tower the cross-timbers are provided with the journal-boxes 10, 11, 12, and 13, in which is journaled the upright shaft 14, which is secured against upward motion by the set-screwed collar 15 and against downward motion by having its bottom end resting upon a series of friction-disks 16, placed in the journal-box 13, which for that purpose is provided with a pocket-like extension 17, having a bottom 18, through which is screw-threaded the adjustment-screw 19, having the jam-nut 20, and by which the wear of the bottom end of the shaft and the disks 16 may be taken up.

In order to prevent wearing and heating or cutting of the disks 16, they are made of very hard steel and are of a considerably large number, so that when one of them gets heated enough by the friction to make it turn with the shaft it will turn on the next disk, and when that gets hot it turns the third one, and so on till the bottom disk may be reached, and by that time or sooner the upper disks are cooled off and will work again. This process of frictional operation may start from the lowest disk, resting on the screw 20 and work upward.

21 and 22 are pulleys secured upon the main shaft 14 for the purpose of transmitting power by belts to other machinery when the shaft is revolved by the wind-wheel, which will now be described.

Secured upon the upper portion of the shaft 14 are the two spiders 24, which are provided with sockets, as 25, in which are secured by the bolts 26 the inner ends of the radial arms 27, to the outer ends 28 of which are pivotally secured the wings 29, which are preferably made of sheet metal and of the shape clearly shown in Figs. 3 and 4—namely, with the hinge-shaped front edge 30—for receiving the hinge-pin or wire 31, which passes through holes 32 in the ends 28 of the arms after the latter are inserted in the notches 33 in the wings.

34 are horizontally-bent end portions of the wings, of which the edges 35 are cut segmentally, so as to fit the outer surface of the sheet-metallic cylinder or drum 36, which is secured upon the circular ribs 37, cast in one piece with the thin arms or spokes 38, and the rest of the spiders 24. This metallic cylinder may also be fastened to the radial arms 27, pro-

jecting through its sides by angular brackets, like 39, (shown in Fig. 2,) and the arms 38 and flange or rib 37 dispensed with.

40 is a cover on the top of the cylinder 36 for keeping snow and rain out of the interior mechanism, which will now be described.

About half way up in the cylinder I provide in its walls a circular row of holes 41, corresponding in number to the number of the wings of the wheel. Through these holes are slidingly inserted the arms 42, of which the outer ends are bent into angular hooks 43, so as to lay close against the outer surface of the cylinder, and each wing is provided with a notch, as 44, (see Fig. 3,) fitting over the said hooks 43, so as to allow the free edge 35 45 to fold close against the cylinder. The inner ends of the arms or push-bars 42 are pivotally secured at 46 in notches 47 in the outer edge of a spider or runner 48, which is journaled upon the main shaft 14, and by means of the arms 49, extending down between the sockets 25 of the lower spider 24, is secured to the flange 50 of a sliding-collar 51, provided with an annular groove 52, in which a fork 53 takes hold for moving the collar up and down on the shaft 14. The shank of the fork 53 is extended as a lever 54 over to the framework of the tower, where its end is pivotally secured at 55. From the forked lever 54 is pivotally suspended the rod 56, of which the lower end is pivoted at 57 to the end of a hand-lever 71, fulcrumed to the framework at 58 and having its free end or handle 59 provided with a spring-held thumb-latch 60, of which the front end or nose 61 is adapted to engage alternately the notches 62 and 63 of a segmental-shaped bracket 64, secured at 65 to the framework of the tower.

75 are rubber cushions secured upon the sides of the arms 27 for the purpose of reducing the jarring and noise of the wings when they are thrown into their active position resting against said cushions.

In operation, if the wind blows, for instance, in the direction of the arrows 66, 67, 68, 69, and 70, (as shown in Fig. 1,) the wind 66 has hardly any effect on the sails coming edgewise up against it, while the wind 67 folds each sail against the cylinder 36, which, together with the main surface of the sail or wing and its angular end portions 34, form a pocket or cavity in which the wind has great effect, as at 68 and 69, and thus turns the wheel and shaft. The wings thus folded may retain their position until the wind at the arrow 70 touches the opposite side of the wings and throws them open and edgewise to the wind.

When it is desired to stop the mill, the lever 71 is swung downward, so that the latch 60 engages the lower notch 63. This motion causes the forked lever 54 to move the runner 51 49 48 upward until the arms 42 assume a substantially horizontal position, and with their outer ends prevent the wings from closing into an active position, as shown in dotted lines to the right of Fig. 2, and in Fig. 6, where 42 represents the retracted or lowered arm with the sail folded and $42^{\times}$ represents the horizontal position of the arm, as when it holds the wing in an inactive position.

It will be observed that this windmill or wind-motor has no vane to guide it. The wind may blow upon it from any direction, and when the wings are held out, as by the arm $42^{\times}$, only those few of the wings that move nearest to the wind will assume that position and thus balance one another and prevent the wheel from turning. The rest of the wings are free to swing, so as to turn their hinged edge toward the wind, and do not swing in far enough to touch the hooks 43 of the arms 42.

In order to start the mill, the hand-lever 71 is moved to the upper notch 62, whereby the runner 58 29 50 is lowered, the arms 42 retracted into the drum 36, and the wings are at once by the wind folded into an active position, as already above described. The notches 76 in the bracket 64 serve to hold the lever 71, the runner, and the arms 42 in a partially raised position, thereby allowing the wings to close only partly, thus allowing the wind to escape more or less between the wings and the cylinder. In this way the speed and power of the mill may be regulated by the hand-lever 71 by which the mill is stopped and started. It will also be observed that the pocket or cavity formed by the main wing 29, its angular end pieces 34, and the surface of the drum or cylinder 36, affords an extraordinary good hold for the wind to act against, as the air striking the wing has no chance to spread, and my wind-wheel is therefore a very powerful one in proportion to its size.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a wind mill or wind motor and mounted in a suitable tower, the combination of the upright revoluble shaft 14, the spiders 24, secured upon the upper portion of the shaft, a drum or cylinder as 36, concentrically encircling the spiders, the spokes or radial arms 27, secured to said spiders and extending out through the sides of the cylinder, the sails 29, being hinged or pivotally secured to the outer ends of said spokes, and being adapted to fold with their free edge 45, inward against the face of the cylinder, the cushions 75, and means for setting the sails in a more or less active as well as in an inactive position, and means for transmitting the power from the main shaft to other machinery, substantially as shown and described.

2. In a wind mill or wind motor and mounted in a suitable frame work or tower, the combination of a revoluble shaft, spiders secured thereon, a sheet metallic cylinder secured around the spiders, spokes or radial arms secured to the spiders, and extending beyond the cylinder, the sails 29 hinged to the outer ends of the spokes, and having the wind-guards 34, with the curved edges 35, which, together with the free edge 45, are adapted to

fit against the outer face of the cylinder, and thus form a cavity for the wind to blow into, and means for throwing said sails into more or less active positions, substantially as shown and described.

3. In a wind mill or wind motor and mounted in a suitable frame or tower, the combination of the revoluble shaft 14, the spiders 24, the sheet metallic cylinder 36, having the holes 41, spokes or radial arms 27, secured to said spiders, the hinged sails 29, having the wind guards 34, the notch 44, and the free edge 35, 45, adapted to fold and fit against the outer side of the cylinder, with the runner consisting of the annularly grooved collar 51, the arms or rods 49, the sliding spider 48, and the pivoted arms 42, extending and sliding through the holes 41, in the cylinder and being adapted to hold the wings more or less away from the cylinder, according to the amount of the force of the wind it is desired to utilize, and to be retracted into the cylinder when the wings are to work, said arms 42, having their outer ends, 43, bent into an angular shape adapted to take hold of the edge 45, of the wing in pushing against it and to be straddled by the notch 44, in the wing when the runner is lowered, and the arms 42, retracted, the forked lever 54, rod 56, lever 71, latch 60, 61, and notched segmental bracket 64, for stopping, starting and regulating the mill, substantially as shown and described.

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

NELS JOHNSON.

Witnesses:

AUGUST A. HALLBERG,

JOHN J. FAUSET.