

2 Sheets—Sheet 1.

WINDMILL.

Patented Aug. 22, 1882.

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(No Model.)

2 Sheets—Sheet 2.

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WINDMILL.

No. 263,113.

Patented Aug. 22, 1882.

Fig. 2.

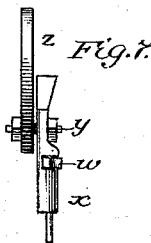
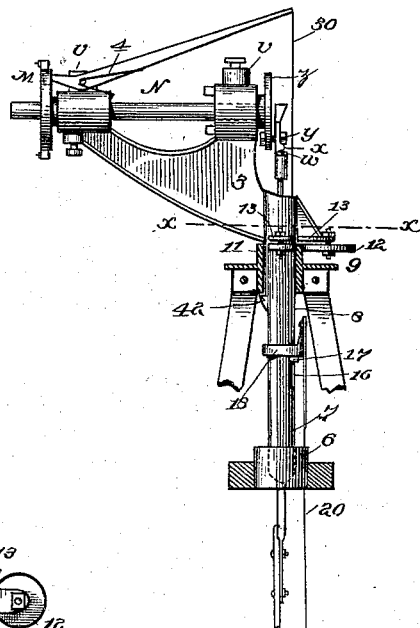


Fig. 3.

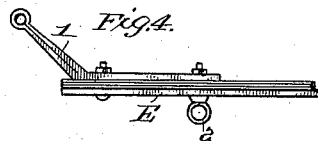
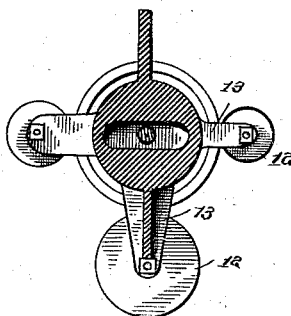


Fig. 6.

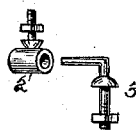


Fig. 8.

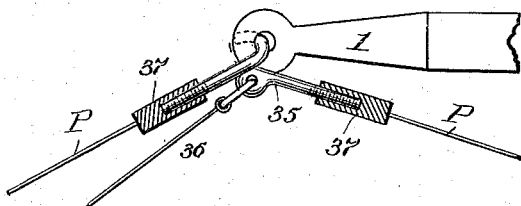
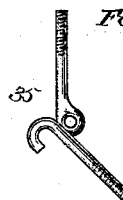


Fig. 5.



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UNITED STATES PATENT OFFICE.

ORVILLE T. CHAMBERLAIN AND SAMUEL D. STRAW, OF ELKHART, IND.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 263,113, dated August 22, 1882.

Application filed June 17, 1882. (No model.)

To all whom it may concern:

Be it known that we, ORVILLE T. CHAMBERLAIN and SAMUEL D. STRAW, of Elkhart, in the county of Elkhart and State of Indiana, have invented a new and useful Improvement in Windmills; and we do hereby declare that the following is a full, clear, and exact description of the same.

Our invention relates to improvements in the construction of windmills, and particularly to that class of windmills described in patents granted to us February 8, 1881, June 28, 1881, and February 28, 1882. These windmills consist essentially of a wheel mounted upon a driving-shaft carried by a casting, which casting is mounted in bearings in a tower or derrick so as to adjust itself to wind-currents from the rear. The wind-wheel is composed of independently-pivoted fans automatically adjustable on their pivots to variable pressure and under external control by a brake mechanism and suitable connections, adapted to throw all the fans simultaneously wholly or partly out of the wind.

This invention consists in various improved details of construction, and in the novel construction and combinations of the operative parts, as fully hereinafter explained.

The invention is illustrated in the accompanying drawings, in which Figure 1 is a rear view of the wind-wheel; Fig. 2, a side elevation of the driving-shaft supporting casting and brake mechanism; Fig. 3, a section on line *xx*, Fig. 2. Figs. 4, 5, 6, 7, and 8 represent details.

Referring to Fig. 1, the wind-wheel is composed of a hub, A, having radial sockets, in which are bolted the arms B B. These arms, as shown in Fig. 1 of the drawings, are six in number; but their number may be changed according to circumstances and size, location, and purpose of the wheel. They are strengthened by braces C C, secured to them by dowelpins, as indicated in dotted lines. It will be understood that the hub of the wheel is mounted upon and secured rigidly to a horizontal shaft, which runs in suitable bearings, and permits the wheel to turn freely.

The fans are composed of closely-set strips D D, bolted at top and bottom to battens E. Each fan is pivoted to one of the radial arms

B by the hinge-joint 2 3. (Shown in detail in Fig. 6.) A pintle, 3, having a threaded bolt, is secured at the end of the arm B and at a point about midway of such arm, and is held in place by a nut on the threaded bolt jammed against the arm B. An eyebolt, 2, is attached to each of the battens of the fan-section in the same way, the parts, when connected, forming a hinge-joint, which permits the fan-section to turn freely into and out of the wind, the pintles for each fan being turned in opposite directions, as shown. In their normal position the fans are pivoted on their centers at an angle to the plane of rotation of the wheel. It will be understood that all the fans thus hinged on the arms are moved simultaneously into and out of the wind; but in Fig. 1 we have, for convenience of illustration, represented three of the fans as in the wind and the other three as out.

Pivoted to two of the braces C C, on opposite sides of the wheel M, are bell-crank levers F F. These levers form the means for connecting the fan-sections to the wheel M on the main shaft of the windmill. The wheel M consists of a hub, 5, fitted closely to the shaft, and adapted to turn with it, but also capable of independent rotation on such shaft, and a circular rim or flange, 26. On the periphery of the flange 26 is a lug, 31, to which is connected the inner end of a pitman, H, the outer end of such pitman being bent to a right angle and passed through the inner arm of the bell-crank lever F. It will be understood that there are two of these lugs opposite each other, each of which is connected by a pitman of similar construction to the opposite bell-crank lever. These bell-crank levers may be either formed of one piece of metal, or they may be provided with a socket in which is secured an arm, 32, extending out nearly to the end of the fan-section. Each of these bell-cranks is connected to a fan or series of fans, and we have devised a novel means of connecting the fans of each series, as represented in Fig. 1. Upon the inner side of each of the fan-sections, secured by bolts to the lower batten of each section, is an angular casting, 1. The inner bolt which secures this casting to the fan may be the bolt 2 of the hinge which supports the fan upon the arm B.

The end of the casting is bent away from the fan, at a point near the edge of the fan, at an angle of about forty-five degrees, and is provided at its extremity with an eye or ring, as shown in detail in Fig. 4. To this ring is connected the hooked end of connecting-rod P, the other end of which is secured to the casting 1 on the next fan by the adjustable device to be described, reference being made to Fig. 5 of the drawings, in which 35 is a coupling device made in one piece, and having a ring or eye, a hook, and two threaded extremities. These extremities are used to connect the adjustable connecting-rods P P together, and also to be secured to the pitman 36, attached to the arm 32 of the bell-crank lever. It will be seen that the rods P P are connected to the threaded extremity of 35 by an ordinary coupling or threaded sleeve, and that the hook on 35 engages with the ring on casting, while the ring on 35 is connected to a hook on the end of pitman 36. It will thus be seen that this simple form of casting affords means for connecting four separate independent parts. The couplings or threaded sleeves 37 38 permit the adjustment of the rods 36, and allow them to be taken apart for convenience in transportation. The bell-crank levers F are preferably pivoted upon long bearings attached to the brace O, and are strengthened by braces 14 14, as shown.

The fans are held normally in the wind by a spring, O, connected to the short arm of one of the bell-cranks by a chain, R. The pressure of these springs draws the bell-crank toward the center of the mill, thus moving the three fans connected to it, and this tension may be increased or diminished by adjusting the spring to different chain-links. It will be understood that the opposite bell-crank is operated by the tension of the same spring O through its pitman H and the drum M.

On the wooden arm 32 of the bell-crank F are bolted governing-fans 43 44, having their edges to the wind. These fans serve as governors for the windmill, being brought near the wind-fans when they are in the wind and at an angle thereto. Should a sudden gust strike the wind-fan the reflection of the wind strikes the governing-fan, throwing the arms of the bell-crank backward and moving the fan-sections more or less out of the wind, and permitting the wind to pass through the opened mill until, as its force abates, the spring O is permitted to return the fans to a normal position. After the arms of the bell-cranks are thrown backward to a certain distance, the angles of the wind-fans being changed, the air reflected from such fans no longer strikes the governing-fan; but such fans receive the direct pressure of the wind, and as the speed of the windmill increases the governing-fans will be forced back, moving the bell-crank and throwing the wind-fans more or less out of the wind. The speed at which the mill is permitted to run will of course be changed by changing the tension of the spring O.

The wind-wheel shaft N is mounted in adjustable bearings on the casting 3, which in turn is mounted upon the derrick post or tower. A coned bearing-socket, 6, is bolted through its flanges to the derrick-posts, in which coned bearing-socket turns the coned lower end of the tubular part 7.

In our former patents, Nos. 243,508 and 254,405, the bearing was secured to a length of gas-pipe, which was in turn rigidly attached to the casting 3. We now, however, form the main casting 3, tubular portion 8, and bearing 7 at one operation and in one piece. Upon the top of the derrick is a cap, 9, having a vertical ring, 11, and the parts are so adjusted that when the pivot is in position to turn in its bearing-socket 6 no portion of the main casting will bear on the ring 11. The tubular part is provided with a lug, 42, which, should the wheel be forcibly lifted by wind or gusts of great violence, would bear on the lower edge of the ring 11 and retain the casting in place.

Secured to lugs 13, attached to the casting, are friction-rollers 12, which travel on the periphery of the ring 11. Three of these rollers are provided in order to balance the movement and render it perfectly uniform. On the end of the shaft N is a disk, Z, to which the pump-rod is connected by a wrist-pin, Y. On this wrist is secured the casting X, having an oil-cup at the top and bored out at its lower end for the reception of the pitman or pump-rod, which is secured by a nut, W, as shown. This casting and the pitman thus secured form a swivel, permitting the pump-rod to rotate freely. The brake-lever is pivoted to one of the oil-cups V V, which admit oil to the bearings. The short arm of this brake-lever has the ordinary brake-shoe adapted to bear, when the long arm is depressed, on the inside of the flange or rim 26 of the wheel M, it being ordinarily prevented from bearing on such flange by the spring 4. The brake-lever is connected with the ground by an iron rod, 30, which passes down through the tubular casting, and is secured at its lower end to a block, 17, working in the slot 16 in the tubular casting. The block is pulled down by the cord 20, attached to the band 18, which encircles the tubular casting above the block and permits it to turn without moving the band, and consequently without twisting the cord. The operation of the brake-lever in its relation to the fan-section will be readily understood. When the shoe bears on the flange 26 the movement of the wheel M ceases, while the wind-wheel shaft continues to revolve.

Through the pitman H the bell-crank levers are forcibly thrown backward until the lug 31 strikes against pin 41 on the arm B, sufficient motion having been allowed to throw the wind-fans entirely out of the wind by means of the connecting device heretofore described. The brake being released, the spring O retracts the bell-crank, as before described, and returns the fan into the wind.

From this description it will be observed that by means of the governing-fans described such fans are instantly, simultaneously, and automatically adjusted to the force of varying wind-currents. At the same time, by means of the mechanism described and its connection, the whole wheel is placed under external control, and the fans may be thrown entirely out of the wind at pleasure under all circumstances.

Having thus described our invention, what we claim is—

1. In a wind-wheel mounted off its center, so as to adjust itself to wind-currents from the rear, and composed of a series of pivoted fans, one or more bell-crank levers pivoted to the frame-work of the wheel and connected to the fans, and a corresponding number of governing-fans mounted on said bell-crank levers in rear of the main fan-sections and at an angle thereto, whereby the currents of wind which strike the main fans from the rear are reflected and strike the governing-fans, substantially as described and shown.
2. In a wind-wheel mounted off its center, so as to be self-adjusting to wind-currents from the rear, the combination of, first, the pivoted fan-sections mounted on rigid arms of the wind-wheel frame; secondly, the bell-crank levers pivoted to the said frame and connected to the fan-sections; thirdly, a governing-fan mounted upon each of said bell-crank levers at an angle to one of the main fans; and, fourthly, a spring, O, connected to the inner end of said bell-crank, the parts being so constructed and arranged that the wind-currents reflected from the main fan strike the governing-fan and swing the main fans out of the wind, whence they are adapted to be retracted by the said spring O.
3. In combination with the fan-sections, the castings 1, of angular form, bolted to such

sections, and having eyes at their extremities, and the connecting-rods, whereby two or more fans are secured together and adapted to be moved simultaneously, substantially as described.

4. In a windmill, a coupling device, 35, formed in one piece, and having threaded extremities and oppositely-placed hook and eye between such extremities, substantially as and for the purpose set forth.

5. The wheel M on the main shaft, having lugs 31, and connected to the fan-sections, in combination with the brake mechanism and with stops 39 41.

6. In a windmill, the combination of the derrick having the coned bearing-socket 6, the casting 3, having the integrally-formed cylindrical projection 8, terminating in a cone-bearing, the stationary rim or flange 11, and the rollers 12, journaled in bearings in the casting and adapted to bear on the periphery of said stationary ring, substantially as described.

7. The combination of the shaft N, having the disk Z, of the swiveled pump-rod secured to the casting X by the nut W, and the wrist-pin Y, which connects said casting to the disk Z, all substantially as described and shown.

8. The combination, with the derrick having the ring 11 secured thereto, of the bearing-socket 8, having the integral stop 42 cast therewith and adapted to turn in or nearly in contact with the lower edge of the said ring, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ORVILLE T. CHAMBERLAIN.
SAMUEL D. STRAW.

Witnesses:

CHARLES S. HENDERSON,
PERRY L. TURNER.