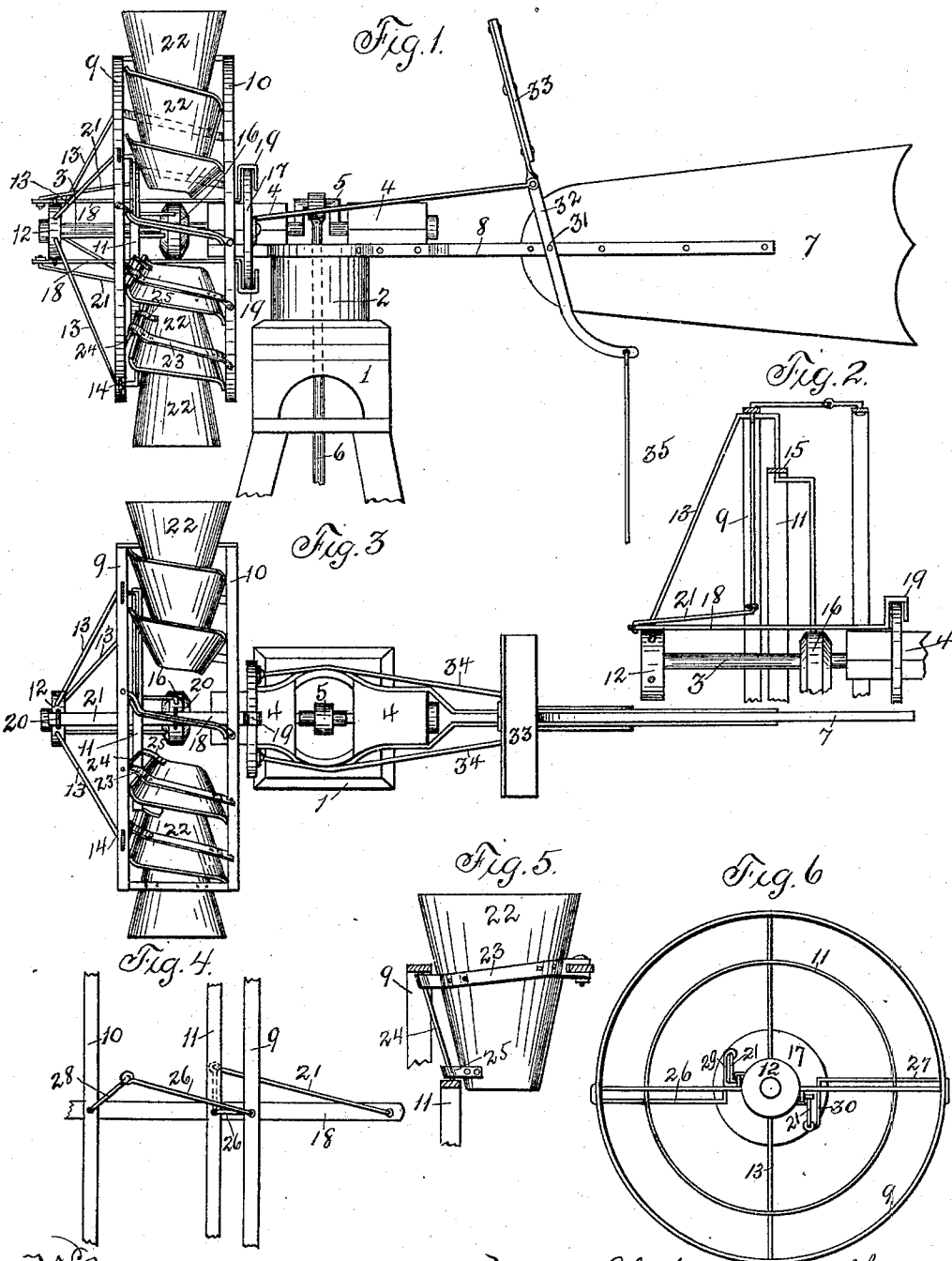


(No Model.)

E. S. & K. T. SHEFFIELD.
WINDMILL.

No. 469,343.

Patented Feb. 23, 1892.



Witnesses:

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UNITED STATES PATENT OFFICE.

ELISHA S. SHEFFIELD AND KIRBY T. SHEFFIELD, OF WOODWARD, IOWA.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 469,343, dated February 23, 1892.

Application filed October 31, 1890. Serial No. 369,985. (No model.)

To all whom it may concern:

Be it known that we, ELISHA S. SHEFFIELD and KIRBY T. SHEFFIELD, both citizens of the United States of America, and residents of Woodward, in the county of Dallas and State of Iowa, have invented a new and useful Windmill, of which the following is a specification.

Our invention has for its object the provision of means by which the blades of the wind-wheel may be either mechanically or automatically feathered in order to reduce the speed of the wheel or to diminish the pressure of the wind thereon, and also in such a construction of the blades of the said wind-wheel as to best adapt them to catch and utilize the force of wind.

Our invention consists in a wind-wheel made up of a pair of circular frames between which the blades are pivotally secured, a central inner hub-piece secured to the axle of the wheel, which axle also constitutes and performs the function of an actuating-shaft, said hub having spokes secured thereto and radiating therefrom and fixed to the outer one of the two circular frames and continuing secured at their other ends to an outer hub-piece fixed on said axle, which latter is extended beyond the face of the wind-wheel, and projecting and sliding arms which are angularly bent at one of their ends to adapt them to grasp a sliding disk and having secured to their other ends a series of rods connecting said arms with one of said circular frames, so that said frame may be drawn toward or away from the other circular frame, which is fixed in a stationary position, automatically by the action of the wind on a wind-board pivotally connected with the sliding disk or mechanically by means of a rod connected in like manner adapted to be actuated by the operator.

Our invention consists, further, in certain details of construction hereinafter more fully described.

Our invention consists, further, in the construction of the blades by bending each of their edges in opposite directions.

Our invention consists, further, in certain details of construction hereinafter more fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the top of a windmill, showing my form of wind-wheel and connections. Fig. 2 is a plan view thereof. Fig. 3 is a face view of the outer circular frame, the blades being removed in order to more clearly show the rod connections. Fig. 4 is a detail enlarged view of one of the wheel-blades. Fig. 5 is a side view of the circular frames, the wheel-blades being removed. Fig. 6 is a front view of the wind-wheel with the fan-blades removed, showing the relative position of the frames, crank-arms, and other parts.

1 designates the top of the mill-tower, on the upper end of which is the pivotal bearing 2 of the usual form of construction.

3 is the horizontal actuating-shaft within the bearings 4 4 and formed into a crank-arm at 5, to which the pump-rod 6 is coupled, the extremity of the said horizontal actuating-shaft 3 terminating in advance of the outer face of the wind-wheel.

7 is the tail-board, of common form, connected to the pivotal bearing 2 by the arm 8.

9 and 10 respectively designate outer and inner circular frames, and 11, Fig. 3, a smaller circular frame disposed concentrically approximately within the outer circular frame 9.

To the outer hub-piece 12, which latter is fixed rigidly to the shaft 3, are secured rods 13, which, after being secured to the outer circular frame 9 at 14, are bent and upwardly continued and passed through or secured to the concentric frame 11 at 15, Fig. 2, after which they are angularly bent and finally secured to the inner hub-piece 16, which latter is also rigidly fixed to the shaft 3.

17 designates a disk which has a square hole in its central portion, which adapts said disk to be mounted on the forward end of the two bearing-boxes 4 4, and also to freely travel backward and forward thereon.

18 18 are reciprocated sliding pieces, which at their rear ends are so angularly bent as to grasp the perimeter of the disk 17, as shown at 19 19, said slides 18 18 being guided in staples secured to the two hub-pieces 12 and 16, as shown at 20 20 in Fig. 2. Respectively to each of the outer ends of the slides 18 18 are pivotally secured the rods 21 21, which actuate the inner circular frame 10. The wheel-blades 22 22, which are formed by bend-

ing their edges in opposite directions, are secured pivotally between the inner and outer circular frames 9 and 10 by the hinges 23 23, secured on the outer edge of the wheel-blades, 5 and the rods 24 24, which are secured at their ends to the circular frame 9 and the concentric frame 11, the other edge of the blades being held to the inner circular frame 11 by the hinge 25. The inner ends of the rods 21 10 21 are respectively pivotally connected to the rods 26 and 27, which latter are journaled within the two frames 9 and 11, (shown clearly in Fig. 3,) and after being passed through the frame 9 are bent so as to extend partially 15 across the space between the frames 9 and 10, their ends being pivotally connected to one of the ends of the coupling-rods 28 28, the other ends of which latter are secured to the inner frame 10. The rods 26 27 are bent so 20 as to form the crank-arms 29 30, the arm 29 of rod 26 being extended in one direction and the arm 30 of the rod 27 in the opposite direction.

Pivoted at 31 to the rod 8 of tail-board 7 is 25 the double actuating-lever 32, having fixed to its upper end the wind-board 33.

34 34 are rods secured to the disk 17 and to the lever 31 above the rod 8, the latter having its lower portion bent rearwardly and its 30 end connected with the operating-rod 35.

The operation of our improved wind-wheel is as follows: Assuming the blades 22 to be presenting the whole of their surface to the wind, the circular frames 9 and 10 would then 35 be in close proximity to each other, and in the event of the wind increasing in force to such an extent as to make it desirable to decrease the pressure on the wind-wheel the wind acts upon the wind-board 33 to move the rod 32 40 upon its pivot, drawing upon the rods 34 34, disk 17, sliding pieces 18 18, and rods 21 21 rearwardly, and, through the medium of the crank-arms 29 30, the rods 26 27, and the coupling-rods 28 28, withdrawing partially or 45 entirely the circular moving frame 10 from the frame 9, and, since the blades 22 are pivoted between them, feathering said blades. By this means in a heavy wind the wheel may be automatically feathered and entirely or 50 partially stopped in its movement, as desired. By means of the rod 35 the blades may be again brought into position or the wheel may be entirely or partially stopped by the rod. It is also apparent that our form of wheel is 55 of great strength by reason of the extension of the actuating-shaft and the bracing-rods 14, which serve to bind and hold the wheel together against the centrifugal force. The form of blades is of such a character as to 60 readily catch and utilize the force of the wind, which after being used on each blade is freed without forming dead-air spaces.

Having thus described our invention, what we claim as new therein, and desire to secure 65 by Letters Patent, is—

1. A wind-wheel frame for windmills, consisting of an outer circular frame, an inner

circular frame of lesser diameter, a central axial shaft projected beyond the face of the wheel, and a series of stay-rods radiating 70 from said shaft, at the outer end connected to the outer frame and the inner frame, their remaining ends secured to the said shaft at points in the rear of the outer end thereof, as and for the purposes set forth. 75

2. The combination, in a windmill, of two circular frames and a smaller frame in the forward one thereof, having a series of blades pivoted between them by means of a strap 80 extending transversely across the said blades, having hinged connections with the said circular frames at both edges and with the said smaller frame at their inside forward edges in such a manner as to adjust the blades relative to the wind when the circular frames are 85 contracted or separated, substantially as set forth.

3. The combination, in a windmill, of a frame consisting of an outer circular band and a concentric smaller one fixed therein, 90 having a series of radial bars connecting them, approximately S-shaped blades hinged to the said radial bars approximately at their outer and inner ends, and a circular band at the rear edges of the said blades and having a hinged 95 connection therewith, the whole firmly attached to an axial shaft by means of supporting-rods fixed to the forward frame, to be operated in the manner set forth, for the purposes stated. 100

4. Means for feathering the blades of windmills, comprising a reciprocable non-rotatable disk on the axial shaft of the wind-wheel, two or more rods fixed thereto, extending rearward, and having a pivotal connection with 105 the parallel supporting-bars of an approximately vertical vane which extends at right angles to the longitudinal plane of the device and normally inclines forward, thereby holding the disk forward by its weight, a cord or 110 wire attached to the curved lower end of the said parallel supporting-bars, by which the said disk may be manually operated, two or more bars extending forward beyond the vertical plane of the wind-wheel, having a longitudinally-sliding connection with its axis, 115 having their rear ends formed in a loop overlapping the edges of the said disk, and being freely rotatable thereon, and rods having bearings in the forward circular frame of the wind-wheel and having crank-arms at both their 120 ends attached to the said sliding bars and to the rear circular frame of the wind-wheel in such a manner that the said sliding bar on being moved backward will separate the said 125 circular frames and thereby feather the blades thereof, substantially as set forth.

5. An improved windmill consisting of a supporting device, turn-table, and tail-board of common form, a wind-wheel composed of 130 two frames, the forward one having an outer circular band, a smaller concentric one fixed therein, and a series of radial bars connecting them, a circular band in the rear thereof

having metal straps hinged thereto and to the said radial bars and having approximately S-shaped blades fastened thereto, means for automatically or manually operating the said blades, consisting of a vane which is pivoted to the said tail-board and normally inclines forward and situated in such a manner as to be automatically moved backward when the wind is too strong and having its lower end curved and a rope or wire connected thereto by which it may be manually adjusted, two or more bars pivotally connected to the said vane and firmly fixed to a reciprocable non-rotatable disk on the axial rod of the wheel, longitudinally-sliding rods on the axle of the wheel, extended beyond the vertical plane of the forward end thereof and attached to the said disk in such a manner as to be freely rotatable thereon, and a series of rods pivoted in the forward frame of the wheel, having crank-arms at their both ends attached to the said sliding rods and to the rear circular frame of the wind-wheel in such a manner as to move the said rear frame backward and thereby feather the blades when the wind operates the said vane or when it is manually operated, to be constructed and combined substantially as shown and described, to operate in the manner set forth.

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