S. HAZEN.
Wind-Engine.

No. 205,798. Patented July 9, 1878.

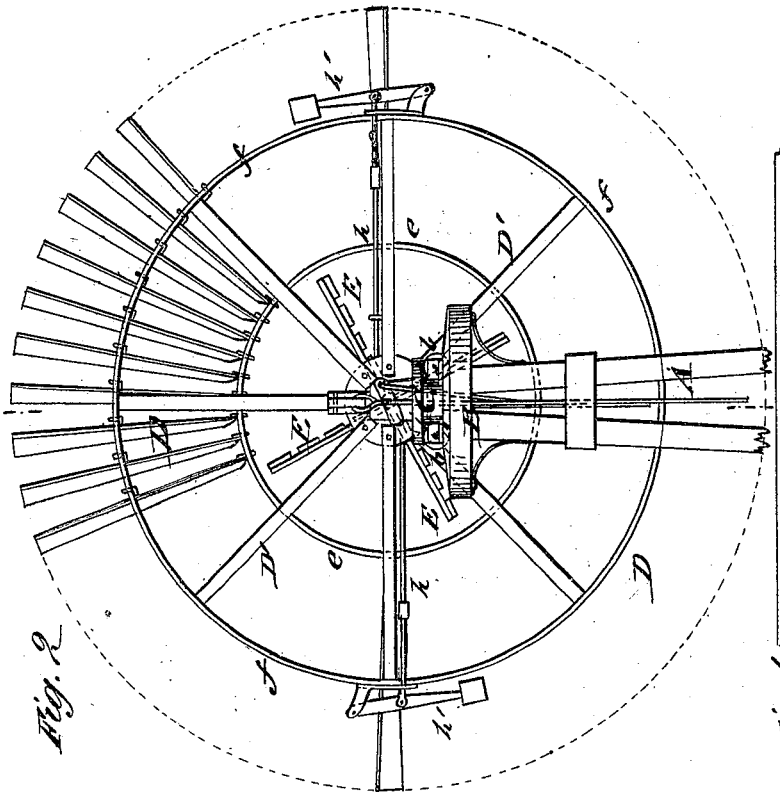

Fig. 2

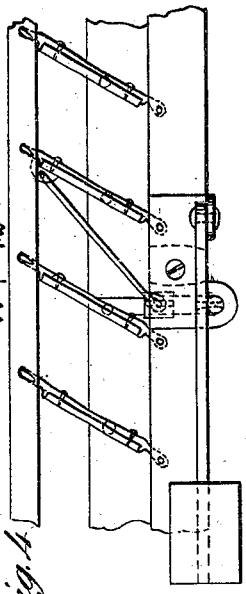

Fig. 4

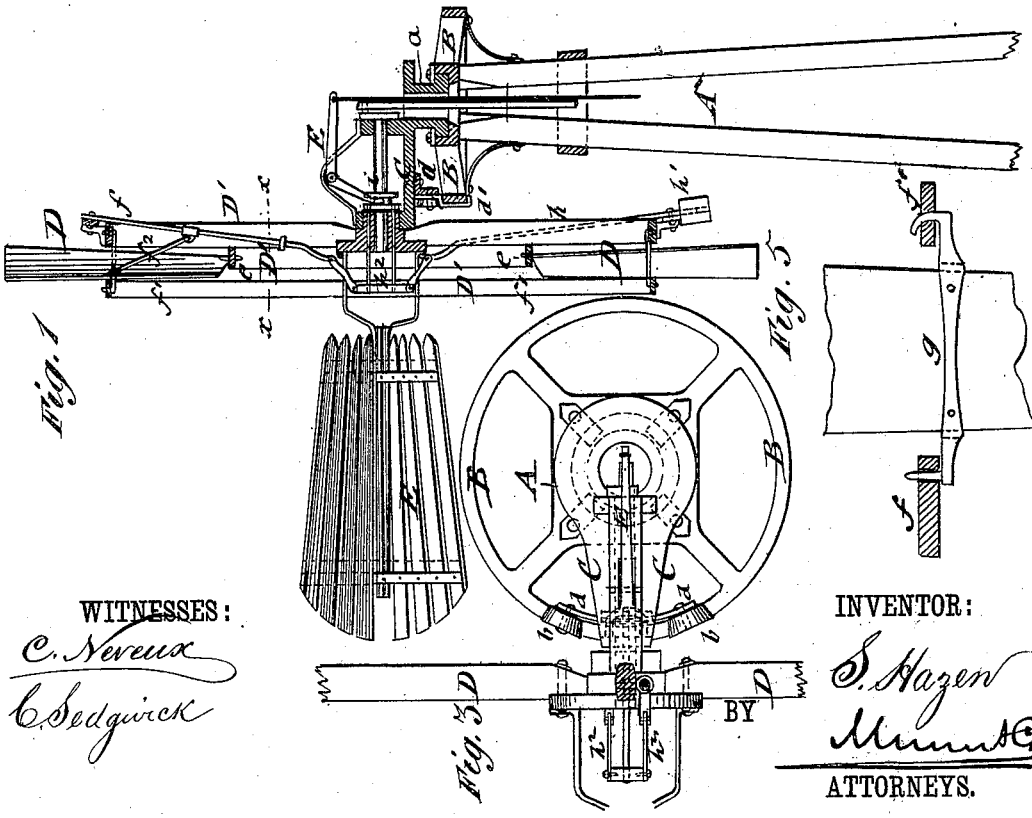

Fig. 1

Fig. 5

Fig. 3

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UNITED STATES PATENT OFFICE.

SANFORD HAZEN, OF RIPON, WISCONSIN.

IMPROVEMENT IN WIND-ENGINES.

Specification forming part of Letters Patent No. **205,798**, dated July 9, 1878; application filed April 26, 1878.

To all whom it may concern:

Be it known that I, SANFORD HAZEN, of Ripon, in the county of Fond du Lac and State of Wisconsin, have invented a new and Improved Windmill, of which the following is a specification:

In the accompanying drawing, Figure 1 represents a side elevation of my improved windmill, partly in section; Fig. 2, a front elevation; Fig. 3, a top view of the same, partly in section, on line *x x*, Fig. 1. Fig. 4 is a detail end view of some of the wings of the wheel, with governing attachment; and Fig. 5 is a detailed side view of the strap connecting the wings of the wheel, with a fixed supporting and an adjustable regulating ring.

Similar letters of reference indicate corresponding parts.

This invention relates to an improved construction of windmills in which the vane is placed in such position to the wheel and tower that the mill may not be wrecked by the reaction of the wind, and in which the speed of the wheel may be regulated automatically or to any desired degree, the wheel being so constructed that any wing of the same may be readily removed and replaced with great facility for repairing or other purposes.

The invention consists of a revolving windwheel having a fixed vane that revolves therewith, the wheel and vane being placed at one side of the tower, and revolving by a traversing carriage and yoke on a fixed circular table at the top of the tower.

The wings of the wheel are set by inner end pins into a fixed ring of the wheel-frame, and pivoted by cross-straps to a fixed outer ring of the frame, and to an adjustable ring at the other side thereof, which is governed by link-connection with centrifugal governor-balls, that are regulated by suitable connections from the base of the tower.

Referring to the drawing, A represents a supporting-tower of the usual construction, which carries at the top part a circular table, B, to which is applied, by a flanged center sleeve, *a*, and outer traversing-wheels *b*, the yoke C of the shaft of the wheel D. The shaft of the wheel D turns in suitable bearings of the yoke and transmits, by a crank and connecting-rod, the power in the usual manner in windmills.

The traversing-wheels are applied to an arc-shaped carriage, *d*, of the yoke, the carriage corresponding in curvature to the circle of the table, and being provided with a central safety-hook, *d'*, that passes from the carriage downward and underneath the outer circle of the table, so as to secure the wheels securely to the table and prevent the yoke from being lifted from the tower by the action of the wind.

The yoke traverses by means of the center sleeve *a*, that is retained by guide-flanges on the center part of the table, and by means of the carriage and safety-hook, clear around the table B, forming a permanent support for the wheel, and admitting the ready adjusting of the same to the direction of the wind.

The wheel B is interposed between the tower and its vane E, which is rigidly attached to the center of the wheel D and provided with radial wings that intersect each other at right angles. The vane revolves with the wheel D and keeps the same continually in the wind. As the vane is behind the wheel, and both at one side of the tower, there is no possibility of breaking the wheel by the reaction of the wind, and wrecking thereby the mill.

The wheel D is constructed of a strong spider-frame, D', having a fixed inner ring, *e*, into which the inner ends of the wings of the wheel are set, while a second outer ring, *f*, serves to attach the cross-straps *g* of the wings, the cross-straps being securely attached across the wings and set by straightened pins into the fixed outer ring *f*, and, by hooks at the opposite end, into an adjustable ring, f^1, as shown in detail in Fig. 5.

The adjustable ring f^1 is connected, by pivot-links f^2, with the lever-rods *h*, that extend from the levers of the governing weights or balls h^1 toward the center of the wheel, and are there connected by pivot-links with a brace-piece of the shifting-rods, h^2, that pass through guide perforations of the solid hub of the wheel to the front part thereof, and are there connected to a grooved sleeve, *i*, that is moved along the shaft of the wheel by the action of the forked end of an elbow lever, E, that is operated by a suitable handle-rod from the lower part of the tower. By raising the elbow-lever E the governing-weights are thrown out at a greater distance from the revolving shaft, as the wheel, and thereby the wings of the same,

are swung by the adjustable ring nearly into the direction of the wind, so as to reduce thereby the speed of the wheel, or bring the same entirely to a point of rest.

When all the wings are in the direction of the wind, the wind passes through them without revolving the wheel; but as soon as the wings are thrown in the direction of the fixed front ring, so as to assume an angle toward the direction of the wind, the mill is revolved, the speed being in proportion to the velocity of the wind and the angle at which the wings are placed.

The governing-balls form an automatic regulating device for the wheel as they are thrown by centrifugal force to the outside, so as to decrease the angle at which the wings are placed toward the wind, and reduce thereby the speed or throw the wings against the wind and increase the speed of the wheel in proportion to the velocity of the wind, so that a uniform speed is kept up.

The strap-connection of the wings to the fixed and adjustable rings permits the convenient putting in or taking out of one or more of the same by loosening the outer fixed ring and slipping out the inner end pins and cross-straps out of the rings. The wings may thus be readily taken off and replaced again by reinserting the inner pins and the cross-straps into the fixed and movable rings.

In this manner every part of the wheel may be conveniently repaired, and a windmill obtained that is always held to the wind and revolved at a uniform speed at varying velocities of the same.

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

1. In a windmill, the combination, with the circular table at the top of the tower, of a wheel-supporting yoke, traversing by a flanged center sleeve and by a wheeled carriage with safety-hook on the same, substantially as and for the purpose described.

2. The combination of the fixed table at the top of the tower and of a wheel-supporting yoke traversing thereon with a wheel having fixed and radially-winged vane, the wheel being interposed between the tower and the vane, substantially as specified.

3. The combination of the spider-frame of the wheel, having fixed inner and outer rings, with the swinging wings, adjusted by a movable ring and centrifugal governor-balls, substantially as set forth.

4. In a windmill, the combination of the wings of the wheel, having cross-straps with straight pins at one end and hooks at the opposite end, with a fixed outer ring of the supporting spider-frame and with a movable ring adjusted by centrifugal governors, substantially as described.

5. The combination of the swinging wings of the wheel with the fixed inner and outer rings of the supporting spider-frame, a movable connecting-ring, and with connecting and shifting rods and centrifugal governing-balls regulated from base of the tower, substantially as specified.

SANFORD HAZEN.

Witnesses:
E. MANVILLE,
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