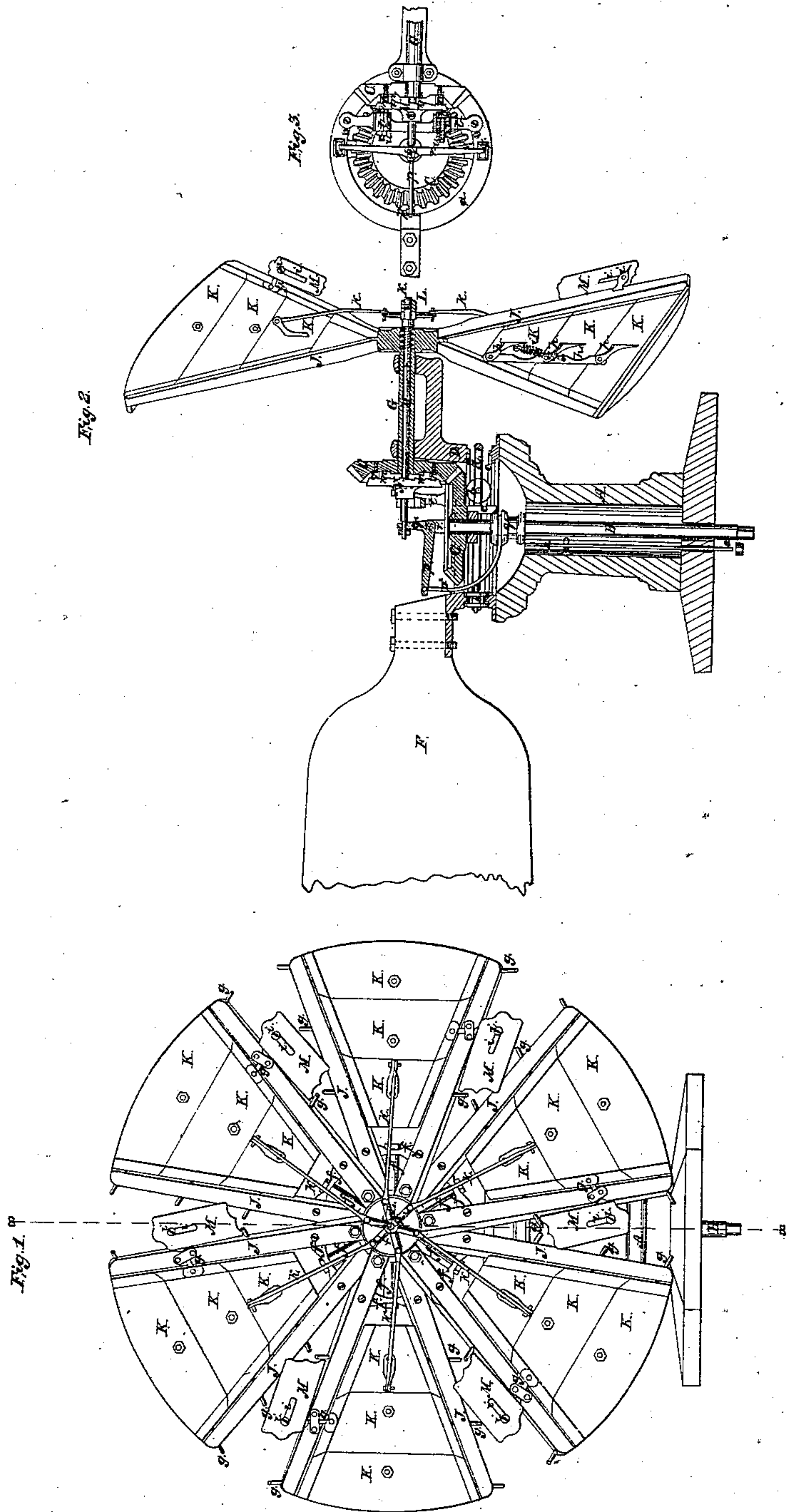


*H. Glover,*

*Wind Wheel,*

*N<sup>o</sup> 36,610.*

*Patented Oct. 7, 1862.*



*Attest:*  
*J. W. Corbitt*  
*Sw. Arch*



# UNITED STATES PATENT OFFICE.

HENRY GLOVER, OF OXFORD, MASSACHUSETTS.

## IMPROVEMENT IN WIND-WHEELS.

Specification forming part of Letters Patent No. 36,610, dated October 7, 1862.

*To all whom it may concern:*

Be it known that I, HENRY GLOVER, of Oxford, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Windmills; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a front elevation of my invention. Fig. 2 is a longitudinal vertical section of the same, taken in the plane indicated by the line *xx*, Fig. 1. Fig. 3 is a sectional plan of the mechanism for operating the shutters.

Similar letters of reference indicate corresponding parts in the several figures.

This invention is intended as an improvement on that class of windmills for which Letters Patent were granted to me bearing date July 10, 1860; and it consists in the arrangement of a spider connecting by suitable rods with the lowest slats or shutters of each sail, in combination with spring slat-bars attached to the rear side of the several shutters in such a manner that by the action of the spider and slat-bars the several shutters are combined, so that by opening one the rest are also opened, and at the same time the slat-bars are so attached to the shutters that the centrifugal force of said bars causes the shutters to open whenever the velocity of the wheel exceeds a certain point, and that the centrifugal force increases as the bars move from the center, thereby counteracting the increasing force of the springs, and that said bars and standards are thus the principal points in governing the speed of the wheel.

It consists, further, in combining with the shutters of each sail an adjustable vane in such a manner that if a sudden gust of wind strikes the wheel, or if the force of the wind exceeds a certain limit, the shutters are thrown open by the action of the wind on said vanes, and damage to the wheel is prevented.

It consists, finally, in the arrangement of a serrated disk attached to the solid shaft which carries the spider, in combination with one or more teeth projecting from the side of the bevel-wheel on the hollow shaft which carries the wind-wheel, and with spring-pads and suitable levers, in such a manner that by the action of said levers, serrated disk, and spring-pads the slats can be opened at any moment and

kept open by the action of the teeth projecting from the bevel-wheel, and thereby the motion of the wind-wheel can be stopped whenever desired.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation with reference to the drawings.

A represents a hollow pedestal or standard, up through which passes a spindle, B, carrying on its top a bevel-wheel, C.

D is a horizontal frame for supporting the wind-sails, vane, and mechanism for operating the slats or shutters of the wind-sails. This frame D is provided with a flanged ring, *a*, that rests on grooved wheels *b*, which run on a circular track, *c*, on the top of the pedestal A. Said grooved wheels *b* are connected by a ring, *d*, and the frame D is held down by hooks *e* catching under the edge of the circular track *c*. By these means the frame D, with the wind-sails, is allowed to travel round quite freely as the vane F is affected by the wind. The bevel-wheel C engages with a similar wheel, C', that is fitted to one end of a hollow horizontal shaft, G, having suitable bearings in the frame D. Said shaft receives on the other end the hub of the wind-sails J J, which is keyed securely to it. The sails J J are composed of radial arms arranged around the hub in pairs, and braced by studs *f*, extending from the hub between each pair of arms, and by cross-bars *f'*, as clearly shown in Fig. 1 of the drawings. These arms form the bearings for the tenons or pivots *g* of the slats or shutters K, which are placed transversely to said arms, and which overlap each other, so that they will open in one direction only and that they close up tight.

To the rear side of each shutter a standard, *h*, is firmly secured, and the several standards of the shutters in each sail are connected by a slat-bar, *h'*, so that all the shutters in the same sail open and close simultaneously. Springs *i* are applied to the sails, so as to keep the shutters closed, and the power of these springs is so regulated that the centrifugal force of the slat-bars will overcome said power and throw the shutters open, if the velocity of the wind-wheel exceeds a certain limit, and the increasing power of the springs is counteracted by the increasing centrifugal force of said bars. This object is obtained by attaching said bars or weights on the shutters of the



sails, having an increasing radial force to turn the shutters as the same turn their edges to the action of the wind and the tension of the springs increases. The speed of said wheel is thereby kept uniformly the same, whether the wind be very high or moderate. The lowest slats of each sail are connected by means of rods  $k$  to a spider,  $L$ , which is placed loosely on the front end of a solid shaft,  $M$ , passing through the hollow shaft  $G$ , and which is prevented from moving on said shaft in a longitudinal direction by a shoulder on the shaft behind, and by a nut,  $k'$ , in front. The nut  $k'$  is provided on its inner face with an inclined plane and projecting tooth corresponding to a similar inclined plane and tooth on the outer face of the hub of the spider, so that said spider turns freely on the shaft  $M$  in the direction of the arrow marked on the same in Fig. 1, but it is prevented from turning in the opposite direction.

By the employment of the spider  $L$  and rods  $k$ , together with the slat-bars  $h'$ , the shutters of the several sails are connected, so that by opening one shutter all the shutters are opened simultaneously, and thereby the position of the shutters is uniform, and the strain on the several parts of the wheel is equalized.

Each sail is provided with a regulating-vane,  $M'$ , which is secured to the end of one of the tenons of the middle or any other shutter in these several sails. When the shutters are closed, the vanes run parallel to the arms  $J J$ , or in a radial direction, and they are secured to the tenons of the several shutters by means of screws  $l$ , passing through slots  $l'$ , so that they are adjustable in a radial direction. If a sudden gust of wind strikes the wind-wheel, the vanes  $M'$  cause the shutters to open and the motion of the wheel remains uniform.

The shaft  $M$ , which bears on its outer end the spider  $L$ , extends through the entire length of the hollow shaft  $G$ , and on that part of the same which is beyond the bevel-wheel  $C'$  a disk,  $N$ , is firmly secured. The inner face of this disk is provided with a series of ratchet-teeth,  $m$ , and if the disk  $N$  is moved up toward the bevel-wheel  $C'$  said teeth engage with projections  $n$  on the inner side of the wheel  $C'$ , so that the shaft  $M$  is compelled to rotate with the hollow shaft  $G$  and with the wind-wheel.

In order to keep the disk  $N$  in gear with the projections  $n$  on the wheel  $C'$ , a spiral spring,  $o$ , is arranged in the interior of the hollow shaft  $G$  and around the shaft  $M$ , pressing against suitable shoulders on either shaft, so that it forces the shaft  $M$  in the direction of the arrow marked upon it in Fig. 2 of the drawings.

If it is desired to throw the disk  $N$  out of gear with the projections on the wheel  $C'$ , the shaft  $M$  has to be moved in the direction opposite to the said arrow, and this object is effected by an elbow-lever,  $p q$ , which is fulcrated on a rock-shaft,  $v$ , that has its bearings in lugs  $r$  rising from the frame  $D$ . The arm  $q$  of the elbow-lever  $p q$  is connected to the

end of the shaft  $M$ , and the other arm,  $p$ , of said lever connects by a link,  $p'$ , with a sleeve,  $q'$ , which slides up and down on the spindle  $B$ , which is operated by a rod,  $s$ , extending down on the side of said spindle through the hollow pedestal  $A$ , so that it can be conveniently reached by the attendant. The inner surface of the disk  $N$  is perfectly flat, and if the shaft  $M$  is moved in the direction opposite to the arrow marked thereon in Fig. 2, said inner surface comes in contact with two friction-pads,  $t t$ , which are secured in standards  $t'$ , rising from the frame  $D$ , and which are adjusted by means of small springs  $u$  and nuts  $u'$ . If the disk is forced against these pads, the friction between them and the inner surface of the disk retards the rotary motion of the latter, together with the shaft  $G$ , and if by these means the motion of the wind-sails  $J J$  become faster than that of the spider  $L$  the shutters  $K$  are thrown open, and the motion of the wind-wheel is stopped. After the shutters have been opened by the friction between the disk  $N$  and friction-pads they may be kept open by throwing the teeth  $m$  on said disk in gear with the projections  $n$  on the wheel  $C'$  without permitting said disk to turn back to its original position. By a skillful manipulation the disk can be thrown in gear with the projections  $n$ , so that the shutters are kept open without any further aid of the attendant. By these means the motion of the wind-wheel cannot only be entirely stopped, but the force of the wheel can be regulated by throwing the shutters open more or less. For instance, if it is desired to use only one-half of the power of the wheel, the shutters may be half opened, or placed at angles of forty-five degrees. From this description it will be seen that my wind-wheel is self-regulating by the action of the centrifugal force of the slat-bars  $h'$  and regulating-vanes  $M'$ , and it can also be regulated at pleasure by the attendant by means of the serrated disk  $N$  and friction-pads  $t$ .

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

1. The arrangement of the spider  $L$ , rods  $k$ , and shutters  $K$ , in combination with the spring slat-bars  $h'$ , connecting the several shutters of each sail, and secured to the rear side of said shutters, substantially as and for the purpose described.

2. The arrangement of the adjustable vanes  $M'$ , in combination with the shutters  $K$  of the wind-sails  $J J$ , constructed and operating in the manner and for the purpose specified.

3. The arrangement of the serrated disk  $N$ , sliding shaft  $M$ , projections  $n$ , and spring-pads  $t$ , in combination with the spider  $L$  and shutters  $K$  of the wind-sails  $J J$ , constructed and operating substantially as and for the purpose set forth.

HENRY GLOVER.

Witnesses:

LEWIS STOCKWELL,  
EMERSON EDDY.