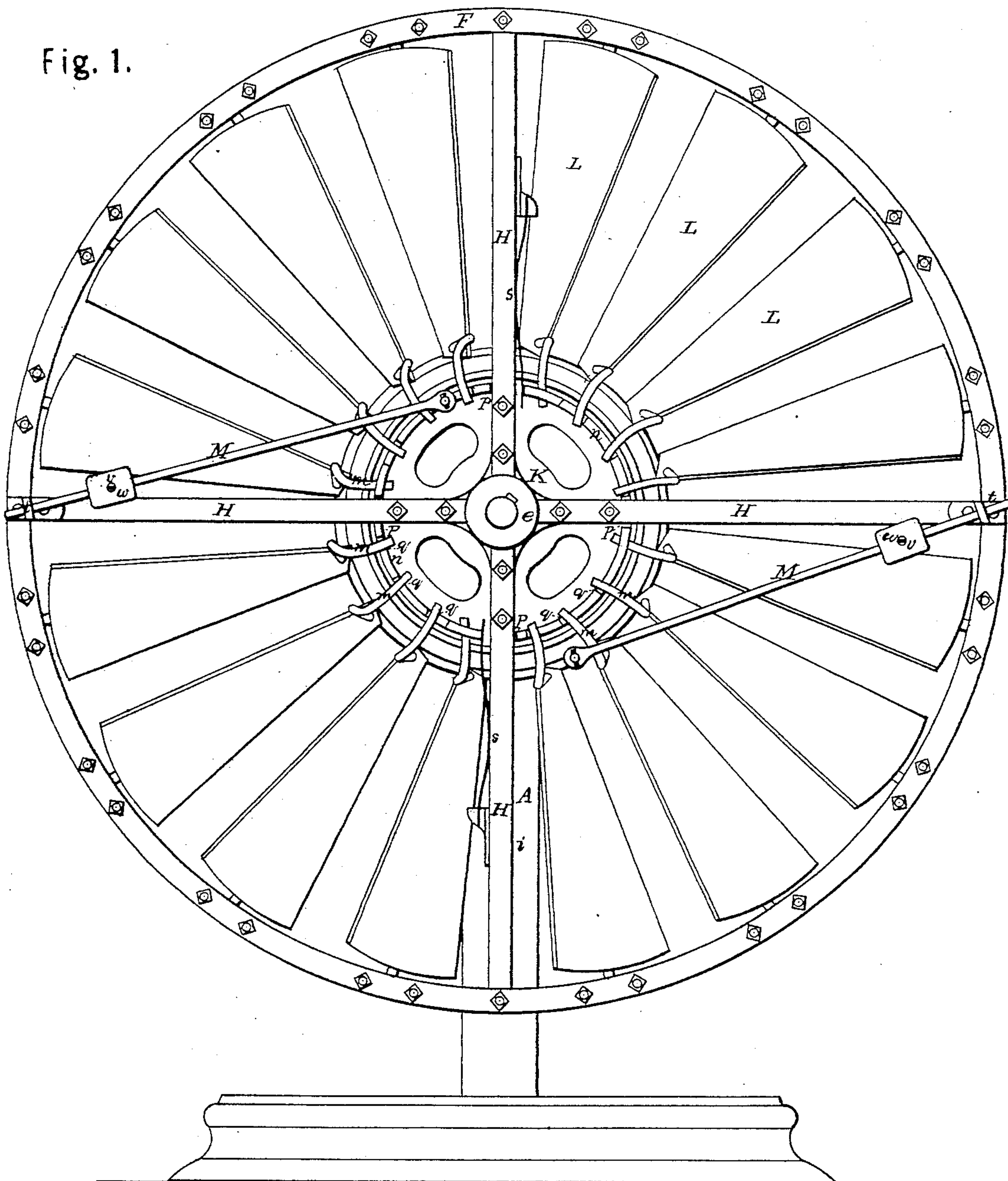


D. HALLADAY.
Wind-Wheels.

No. 138,648.

Patented May 6, 1873.

Fig. 1.



WITNESSES.

E. A. Bates.

Villette Anderson

INVENTOR.

Daniel Halladay.

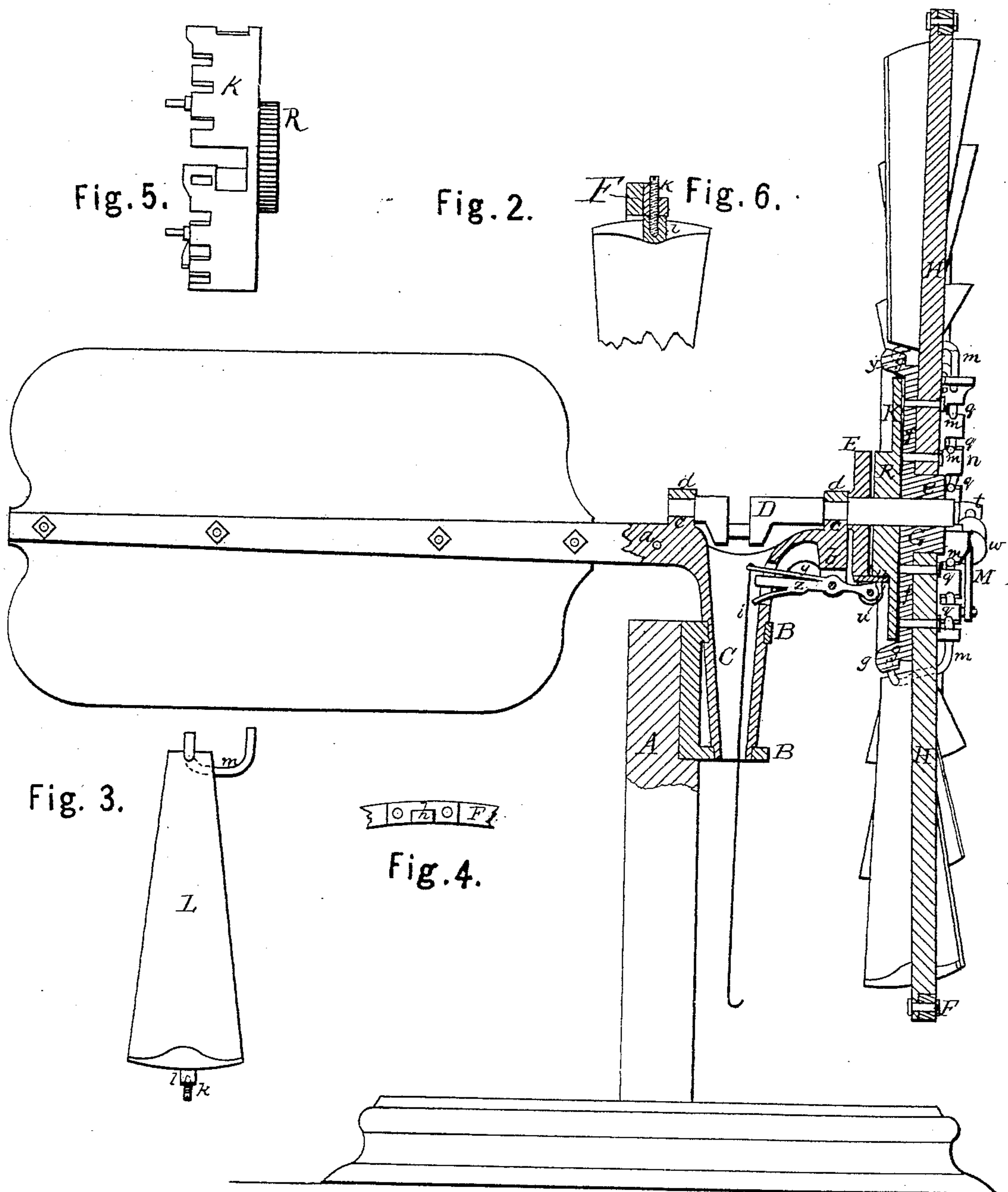
Chipman Hooper & Co

Attorneys.

D. HALLADAY.
Wind-Wheels.

No. 138,648.

Patented May 6, 1873.



WITNESSES.
E. A. Bates.
Villette Anderson.

INVENTOR.
Daniel Halladay.
Chipman Hasmer of
Attys.

UNITED STATES PATENT OFFICE.

DANIEL HALLADAY, OF BATAVIA, ILLINOIS.

IMPROVEMENT IN WIND-WHEELS.

Specification forming part of Letters Patent No. **138,648**, dated May 6, 1873; application filed December 24, 1872.

To all whom it may concern:

Be it known that I, DANIEL HALLADAY, of Batavia, in the county of Kane and State of Illinois, have invented a new and valuable Improvement in Wind-Wheel; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawing is a front view of my wind-wheel. Fig. 2 is a transverse section of same. Figs. 3, 4, and 6 are details of same.

This invention has relation to the improvement of wind-mills, with regard to their governing mechanism; and it consists in the construction and novel arrangement of the central regulating-disk, having upon its front face an annular series of slotted projections, and upon its rear face a circular friction-wheel. It also consists in the arrangement of the central hub and cross-bars of the wheel-frame, of the reacting springs, of the brake, and the fast friction-wheel upon the crank-shaft. The object of this invention is to provide compact and strong mechanism, by which the motion of the wind-wheel will be automatically regulated to a uniform rate of speed under wind-currents of varying velocities. It is also designed to effect the stoppage of the wind-wheel by the momentum of the wheel itself, and the conjoint action of a suitable friction-brake. The momentum of the wheel carries it forward, when the friction-brake is applied sufficiently to turn the sails edgewise to the wind.

In the accompanying drawing, the letter A designates the standard or post, provided with bearings B for the hollow pintle C. This pintle is provided with an extension, *a*, in rear, to which the vane is secured, and in front it has a bracket, *b*, to which is pivoted the shoe lever or brake which operates in connection with the friction-wheels of the crank-shaft and regulating disk. The upper portion of the hollow pintle is provided with journal-seats *c* and caps *d* for the journals of the crank-shaft D. E designates a friction-wheel keyed upon the crank-shaft, to the forward end of which is secured the hub of the wheel-frame. The

wheel-frame consists of the peripheral ring F, the hub G, and the spokes H connecting said ring and said hub. The hub G consists of a central box, *e*, of metal, having arms *f* connecting the box with a ring, *g*, to which are pivoted the inner ends of the sails. To the arms *f* the spokes H are firmly secured by bolts, or otherwise, and rest upon the forward edge of the ring *g*, in such a manner as to be inclined slightly forward and outward, thus giving the wind-wheel a dish. To the outer or peripheral ring F are secured metallic lugs *h*, internally threaded for the passage of the adjustable screw-pivots *k*, the points of which are seated in hollow bearings *l*, in or attached to the cross-bars of the sails at their outer ends. Check-nuts are usually placed on the screw-pivots to prevent them from becoming loose in their seats on account of the working of the sails. Whenever the bearings of the fans become worn or loose in any manner, they are readily tightened up by means of these adjusting screw-pivots. The inner ends of the sails L are secured to the bent levers *m*, which are usually rods of malleable cast-iron, bent at right angles to the sail, and then bent inward at one end to form the inner pivot or journal of the sail, which is seated in a suitable bearing in the outer rim or ring *g* of the hub. The other end of each lever *m* is carried forward along the edge of the inner end of the sail, and then bent laterally and inwardly, its end being inserted into a slot of the regulating-disk. The regulating-disk K consists usually of a metal plate pivoted upon the crank-shaft between the hub G and the friction-wheel E, and provided in front with a peripheral flange or rim, *n*, which extends forward, and is slotted and divided in such a manner as to separate it into parts usually in the following manner: If four spokes, H, are used in the formation of the frame, the flange *n* is divided into four portions by the same number of elbow-shaped slots *p*, through the open ends of which the spokes are passed in putting the parts together, and in the closed or rear ends of which, said spokes lie, the play of the regulating-disk being limited by the contact of said spokes with the ends of the rear or closed branches of the elbow-shaped slots. In the annular flange *n*, or the parts

thereof, are formed smaller slots q , in which the ends of the bent levers m play, the motion of the sails upon their pivots being kept thereby in unison. S-shaped springs s , formed of flat steel, are attached to the spokes H , and bear against the flange n at certain points, in such a manner as to turn the sails to the wind.

In consequence of the shape of the springs, and the manner in which they are arranged on the side of the spoke, the springs are not only shortened between their bearings, as they are brought into increased action by a rising wind, but are also brought against the surface of the spoke. Therefore, as the sails are turned out of the wind, the power of the springs to replace the sails in the wind increases.

As it is preferred to make the rear wing of each sail somewhat broader than the forward wing, the arrangement above described will be sufficient to effect the automatic regulation of the sails. To insure this action when the wings of the sails are equal, the centrifugal slide-rods M are employed. These rods are pivoted to the flange of the regulating-disk, and their outer ends are arranged to slide in bearings t secured to the ring F , or outer part of the wheel-frame. The action of these centrifugal slides is governed and regulated by means of the weights w , usually made cylindrical in form, and adjustable on the rods M . After adjustment, the weights are fixed in position by keys v , or other suitable devices. The regulating-disk K is also provided on its rear face with a concentric friction-wheel, R , of equal diameter with the friction-wheel E , above described as being fixed upon the crank-shaft D . These friction-wheels are adjacent to each other on the crank-shaft, and engage with the pivoted shoe u of the brake-lever z , above described as pivoted to the bracket b of the pintle. The arm y of the brake-lever, to which the operating cord or rod i is attached, is made somewhat flexible or elastic, in order to allow the friction-wheel E , which is fast to the crank-shaft, to slip or

move on the face of the pivoted shoe when the momentum of the wheel carries it forward. At the same time the action of the shoe upon the perimeter of the friction-wheel R arrests the movement of the regulating-disk K , and the wheel being carried forward by its momentum, the sails are turned by the bent levers, which engage with the slots of the regulating-disk edgewise to the wind, whereupon the movement of the wheel ceases. The shoespanning the perimeters of both friction-wheels locks them together, when forced up by the action of the brake-lever, and thus prevents the oscillations of the wheel in the wind when the machinery is required to be at rest.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the regulating-disk K and sails L , of the friction-wheel R and brake u , substantially as specified.

2. The combination, with the regulating-disk K and the eccentrically pivoted sails L , of the radial spokes H of the wheel-frame and the reacting springs s , substantially as specified.

3. The combination, with the sails L , regulating-disk K , and friction-wheel R , of the crank-shaft D , friction-wheel E , and brake or brakes, substantially as specified.

4. The combination, with the regulating-disk K , of a wind-wheel, and the shaft D of the friction-wheels E R , and the brake-lever z having an elastic arm, y , substantially as specified.

5. The regulating-disk K placed loosely on the wheel-shaft D , provided with the slotted flange n in front, and the friction-disk R in rear, substantially as specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

DANIEL HALLADAY.

Witnesses:

PHIL. C. MASI,
JOS. B. LOOMIS.