(No Model.)

2 Sheets—Sheet 1.

J. HARDER.

WIND ENGINE.

No. 438,251. Patented Oct. 14, 1890.

Fig. 1.

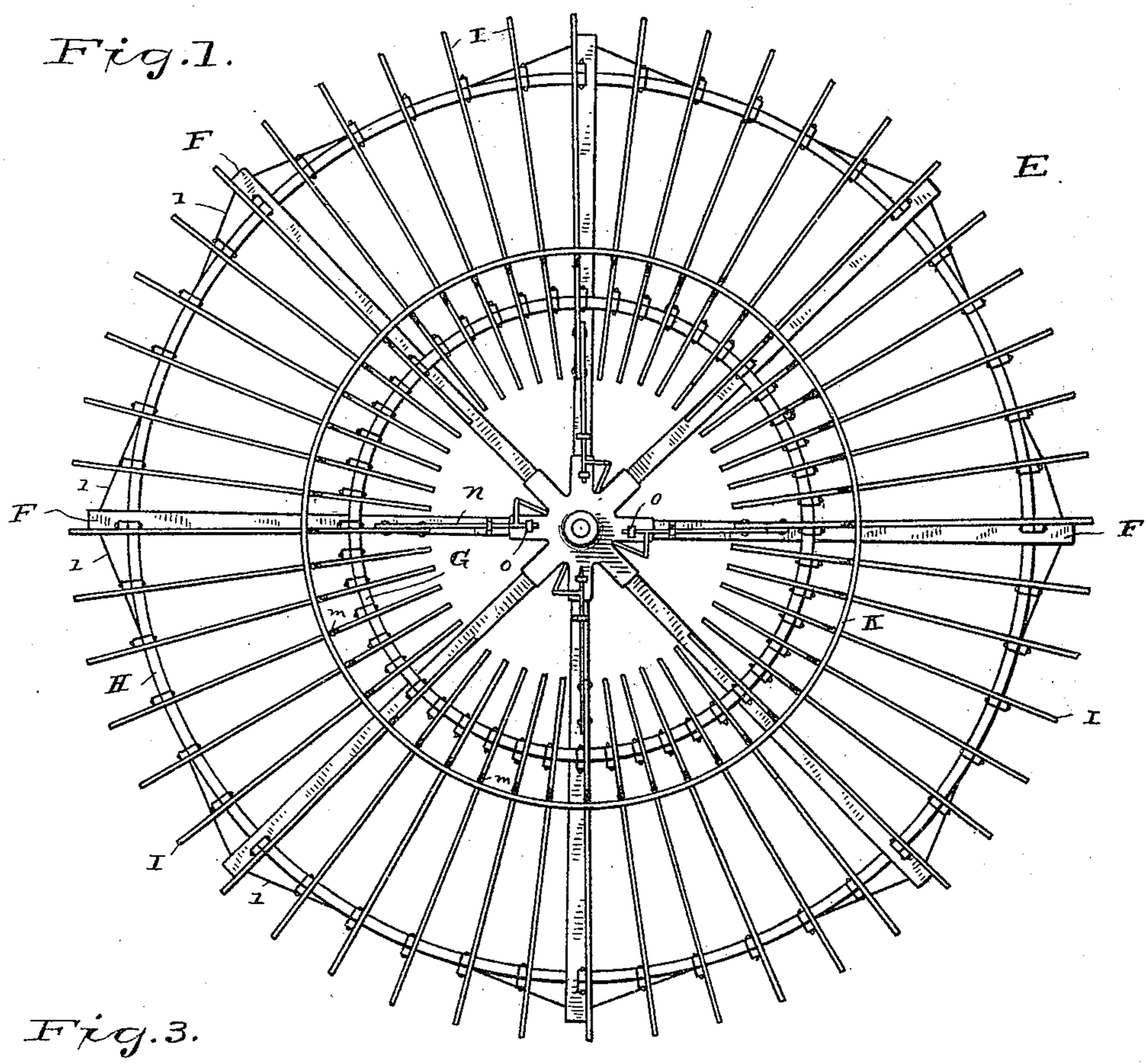


Fig. 3.

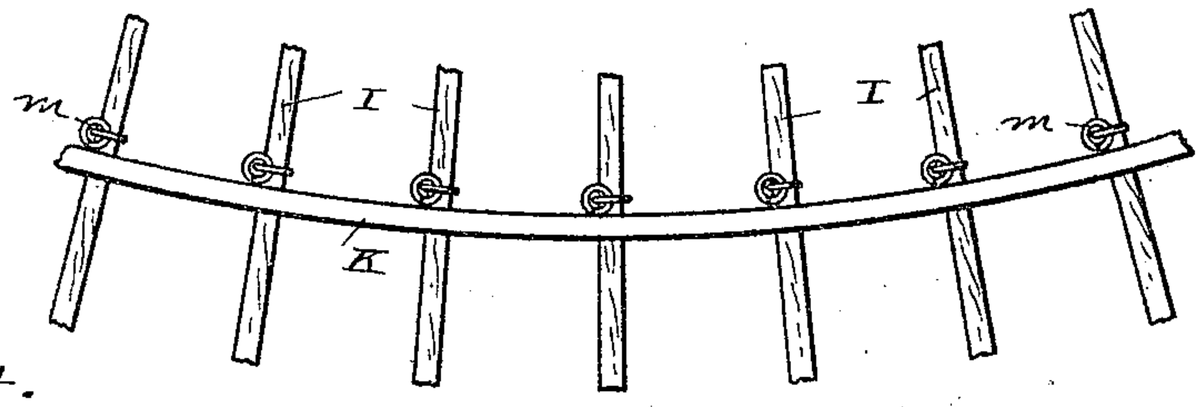
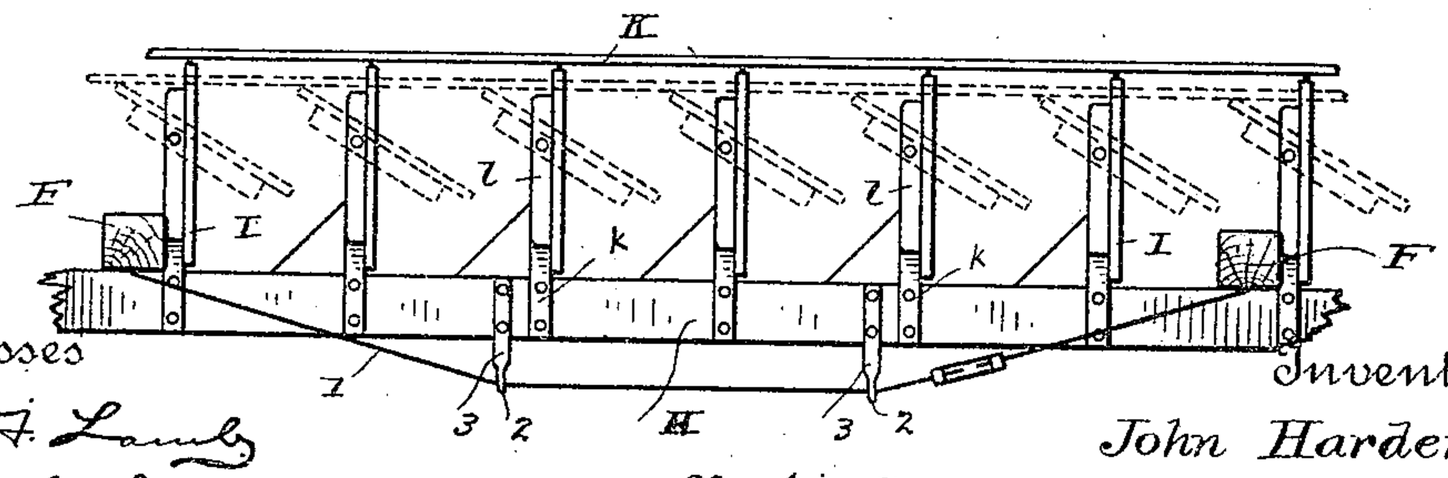


Fig. 4.



Witnesses

H. C. A. Lamb

Chas. L. Stuntevant.

Inventor

John Harder

By his Attorney

J. B. Chamberlain

(No Model.)

2 Sheets—Sheet 2.

J. HARDER.

WIND ENGINE.

No. 438,251. Patented Oct. 14, 1890.

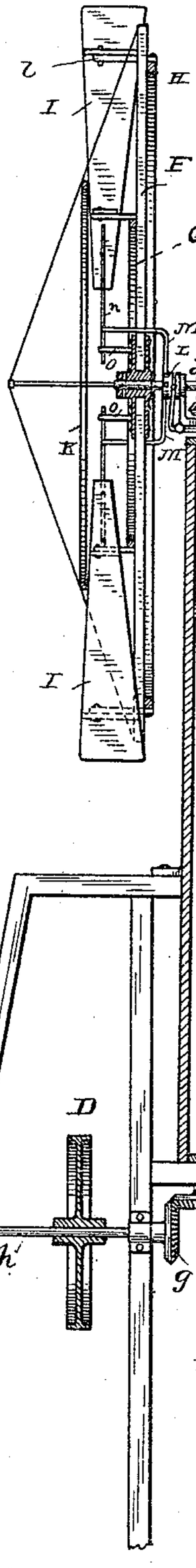


Fig. 2.

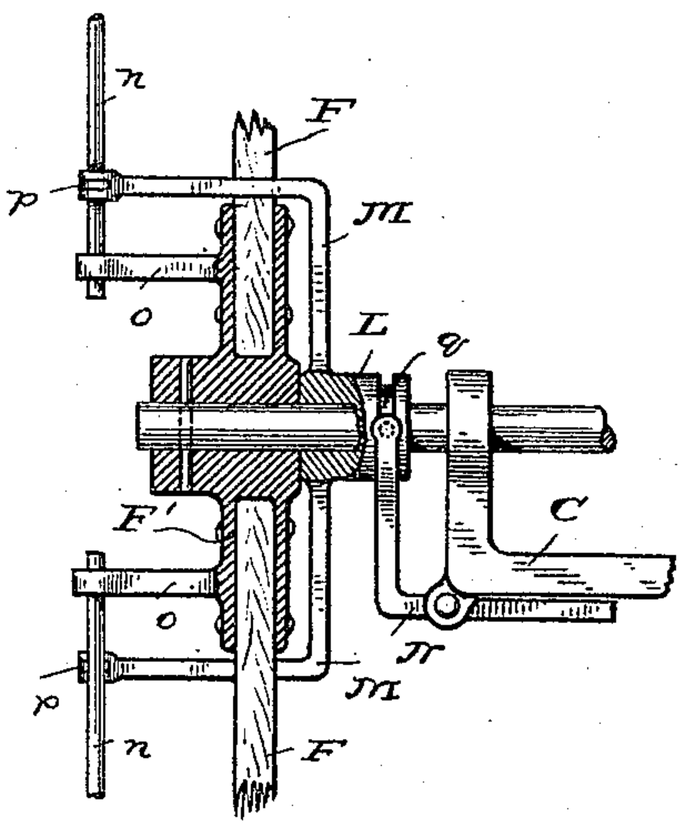


Fig. 5.

Witnesses
H. A. Lamb
Chas. L. Stutevant.

Inventor
John Harder
By his Attorneys
H B Chamberlain

UNITED STATES PATENT OFFICE.

JOHN HARDER, OF SAN FRANCISCO, CALIFORNIA.

WIND-ENGINE.

SPECIFICATION forming part of Letters Patent No. 438,251, dated October 14, 1890.

Application filed January 23, 1890. Serial No. 337,788. (No model.)

To all whom it may concern:

Be it known that I, JOHN HARDER, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Wind-Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to an improvement in wind-engines, and is adapted to be used either for the purpose of pumping water or of driving machinery through suitable intermediate connections.

Heretofore numerous devices for accomplishing the above-mentioned results have been devised; but my invention has for an object to provide a device which shall be composed of a minimum number of parts easily put together, and therefore cheap in construction, but equally effective as any now on the market.

In its broadest sense, the invention consists in a certain novel manner of constructing the wind-wheel.

It consists, secondly, in the combination, with the described wheel, of means for regulating the speed of the same.

It consists, finally, of various details of construction and arrangement of parts, all as hereinafter fully described, and pointed out in the appended claims.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a front view of my improved wheel. Fig. 2 is a side elevation, partly in section, of my apparatus arranged for the purpose of driving machinery. Fig. 3 is an enlarged detail of a portion of Fig. 1. Fig. 4 is a horizontal edge view of the wheel. Fig. 5 is an enlarged detail of a portion of mechanism for operating the wings of the wheel.

As shown most clearly in Fig. 2, the frame for supporting the apparatus is shown at A. Supported by this frame is a tube B. Bearing upon the top of this tube B is a casting C, having a downwardly-extending tubular portion *b*, resting at its lower extremity upon an annular casting *a*, formed in two parts and placed within the tube B. This casting C is provided with suitable horizontally and vertically extending arms, in which latter the wheel-shaft is journaled, and to horizontal extensions of which the vane or tail of the wheel is secured in the manner shown clearly in Fig. 2.

It will be readily seen that by reason of the bearing of the casting upon the top of the tube B and at its lower extremity in the casting *a* the said casting may be rotated, thereby revolving the shaft and wheel horizontally to correspond with the action of the wind in shifting the position of the vane.

Upon the wheel-shaft is secured a beveled gear-wheel *c*, which meshes with a similar wheel *d* upon the upper end of the hollow vertical shaft *e*, said shaft having its upper bearing in the casting C and its lower bearing in the lower end of the tube B, and carrying upon its lower extremity a beveled gear-wheel *f*, in mesh with a similar wheel *g* upon a horizontal shaft *h*, through which power is communicated to the parts to be driven by means of a belt-wheel D and suitable belting.

Carried upon the wheel-shaft in proximity to the wheel *c* is a bevel gear-wheel *i*, meshing with a bevel-gear upon the shaft of an ordinary centrifugal ball-governor, whereby the speed of the wheel may be regulated in the manner hereinafter to be described.

Having described the frame for supporting the apparatus and the various connections between the wheel-shaft and the parts to be driven, I will now proceed to describe in a full and clear manner the parts of my invention which are considered by me to be of paramount importance—namely, the construction of the wheel and the means for regulating the speed.

As shown in Fig. 1, E is the wheel. It consists of a central casting or hub secured on the wheel-shaft and having a number of radial arms, preferably eight, projecting from its periphery and forming sockets, within which are secured beams F, forming the framework of the machine. Upon the front of these beams, and at a point about midway be-

tween the center and circumference of the wheel, is secured a ring G, preferably of wood, while a similar ring H is secured upon the rear face of the beams, near the outer ends thereof. Bolted to these rings are brackets *k*, provided with arms *l l*, extending to the front of the wheel, pivoted to similar pieces secured upon the faces of wings I, which form the surface of the wheel which is acted upon by the wind. These wings are made of any suitable size and shape, but preferably are narrower at their ends near the center of the wheel and wider on one edge as they approach the periphery. These wings are desirably so hinged to the pieces *l* that they have movement through an arc equal to about sixty degrees. The wings are still further pivoted at their edges to a third wooden ring K by means of screw-eyes *m*, whereby when movement is imparted to one of said wings the wooden ring will rotate, thereby imparting movement to all.

As shown in Figs. 1 and 4, the wheel is suitably braced by means of wires 1 1, connecting the beams and passing through eyes 2 2, formed in brackets 3 3, secured at one end to the outside ring. Rods or shafts *n* are bolted or otherwise secured at one end to one face of two or more of the wings and extend inwardly to a point near the center of the wheel, being journaled at their inner ends in bearings formed in the arms *o o*, made integral with the sockets in which the beams are secured, and being journaled at intermediate points in bearing-pieces secured to the beams. Thus it will be seen that by turning these rods in one direction or the other the wings will be opened or closed.

I will now proceed to describe the means devised by me for giving movement to the wings in order to regulate the speed of the wheel. Placed upon the wheel-shaft in proximity to the hub of the wheel is a sliding sleeve L, having angular arms M, (two or more in number) formed integral therewith, the horizontally-extending parts of said arms having pivotal connection at their ends with links *p*, secured to the rods or shafts *n*, respectively. When, therefore, the sleeve L slides upon the wheel-shaft, the rods *n* are turned, thereby shifting the angles at which the wings catch the wind. Upon the inner end of the sliding sleeve is formed a peripheral groove, in which fits a pin *q*, carried upon the end of the short arm of a bent lever N, pivoted at its fulcrum to the casting C and having upon its long arm a movable weight O, which serves to keep the long arm normally depressed and the sleeve away from contact with the hub of the wheel, and consequently, through the connections referred to, the wings normally closed to catch the wind. In order to provide for the positive shifting of the sleeve and opening of the wings when it is desired to stop the mill, I attach one end of a rope P to the long arm of the lever N, passing the same over a pulley on the casting C and down through the hollow shaft *e* to a point within reach of the operator, whereby pulling on the same will open the wings, allow the wind to blow through, and consequently slacken or stop altogether the speed of the mill. Instead, however, of using the positive means just referred to for slackening the speed of the wheel, I prefer to use the automatic management shown in Fig. 2. Upon the shaft of the governor, hereinbefore mentioned, is a sliding sleeve *r*, being connected to the ball-arms of said governor. This sleeve has secured to it the short arm *s* of a bell-crank lever *o'*, pivoted to an arm of the casting C, the longer arm of said lever being pivoted to a rod Q, attached at its opposite end to the sliding weight before referred to. By this construction, when the speed of the shaft becomes too great the weight is moved toward the wheel through its connection with the governor, and therefore, the pressure of the weight being reduced, the wind will blow open the wings and allow some of the wind to escape. As soon, however, as the speed is sufficiently reduced, the governor-balls will fall, the weight slides back to its normal position, and through the consequent depression of the lever and movement of the sliding sleeve the wings will be closed.

I claim—

1. In a wind-engine, in combination with a suitable support, a shaft, a wheel thereon, pivoted wings in said wheel, a sliding sleeve on the shaft, connections between the same and the wings, a pivoted lever, the short arm thereof being in engagement with the sleeve, a weight movable on the long arm of said lever, and automatic means for sliding the weight toward the fulcrum of the lever when the speed of the wheel becomes too great, substantially as described.

2. In combination with a suitable support, a shaft bearing thereon, a wheel on said shaft, comprising a central hub or casting, sockets projecting therefrom, beams secured in said sockets, rings G H, secured on said beams, wings pivoted on their faces to said rings, a movable ring K, to which said rings are also pivoted, a sliding sleeve on the wheel-shaft, connections between the same and the wings, a pivoted lever, the short arm thereof being in engagement with the sleeve, a weight movable on the long arm of said lever, and automatic means for sliding the weight toward the fulcrum of the lever when the speed becomes too great, substantially as described.

3. In a wind-engine, in combination with a suitable support, a shaft, a wheel thereon, rings on said wheel, wings pivoted to said rings, rods *n*, secured to the faces of the wings, a sliding sleeve on the shaft, angular arms M, secured at one end to the sleeve, links *p*, pivoted at one end to the angular arms and at the other end secured to the rods *n*, said arms, links, and rods forming connections between the sliding sleeve and the wings, a pivoted lever, the short arm thereof being in

engagement with the sleeve, a weight movable on the long arm of said lever, and automatic means for sliding the weight toward the fulcrum of the lever when the speed becomes too great, substantially as described.

4. In combination with a suitable support, a rotatable casting, as C, a shaft journaled in said casting, a wheel on said shaft provided with pivoted wings, a sliding sleeve on said shaft, connections between the same and the wings, a lever pivoted to said casting, the short arm thereof being in engagement with said sliding sleeve, and the long arm being provided with a sliding weight, a beveled gear, as *c*, on the wheel-shaft, a horizontal bevel-wheel in mesh therewith, carried by a vertical shaft, a sliding sleeve on said vertical shaft, a ball-governor of ordinary construction in connection therewith, and a bell-crank-lever connection between the sliding sleeve *r* and the weight on the lever, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN HARDER.

Witnesses:
I. D. EBERHARDT,
I. GUTTE.