

(No Model.)

3 Sheets—Sheet 1.

J. T. SHOUP, Jr.
WIND MACHINE.

No. 479,993.

Patented Aug. 2, 1892.

Fig. 1.

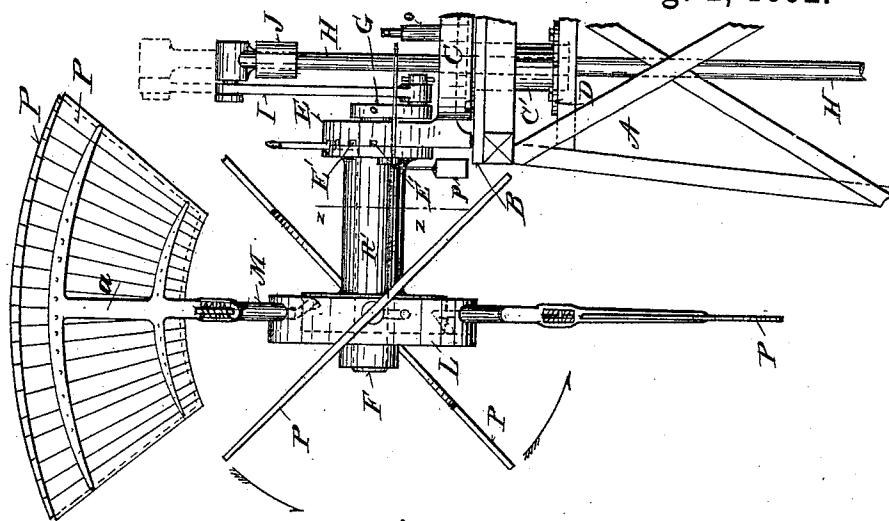
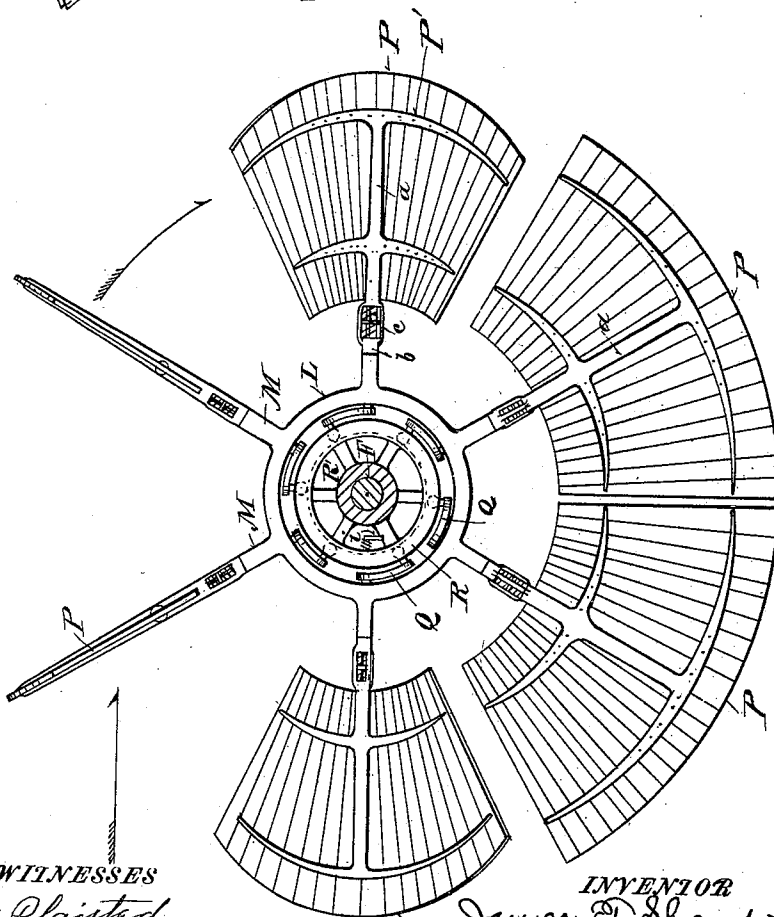


Fig. 2.



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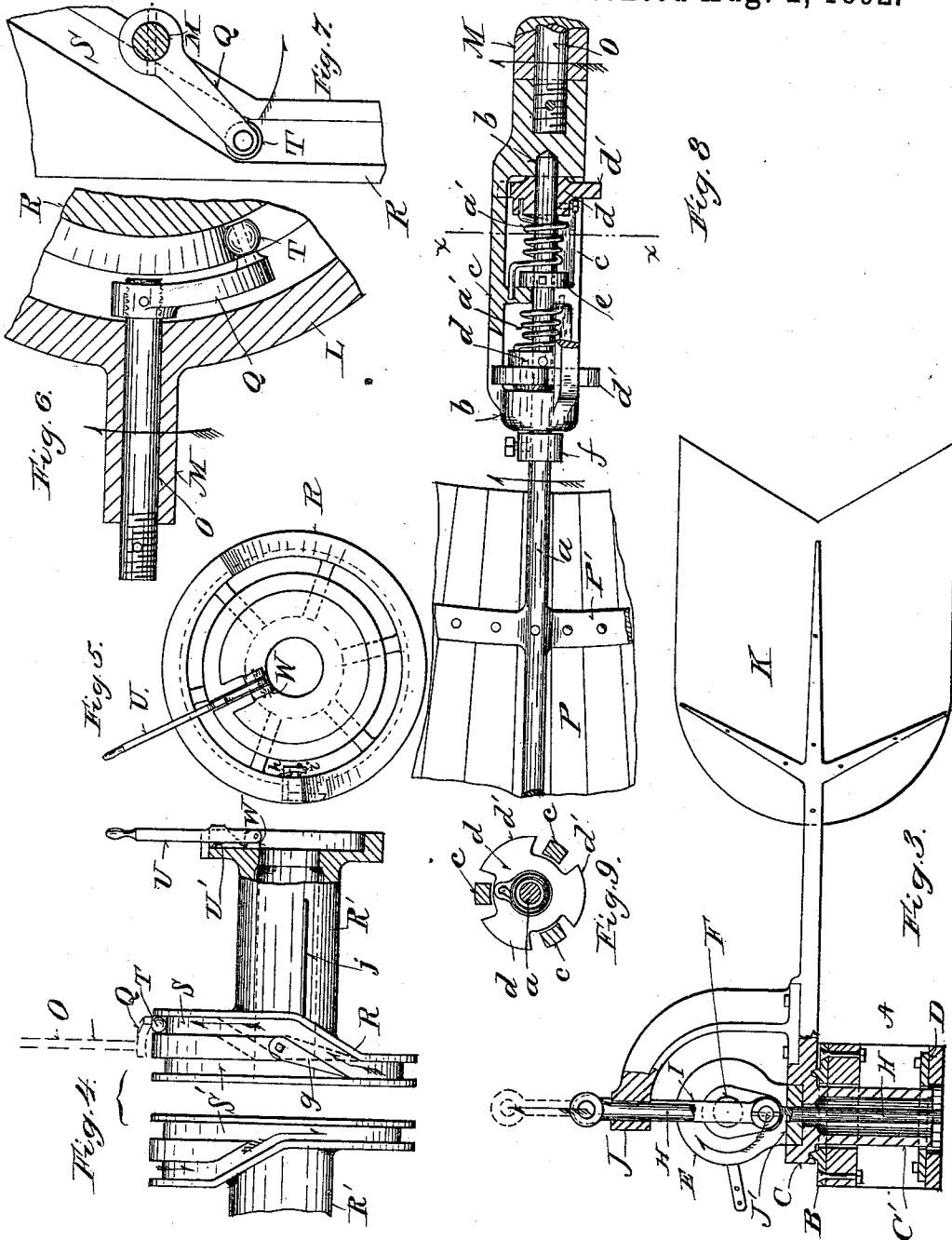
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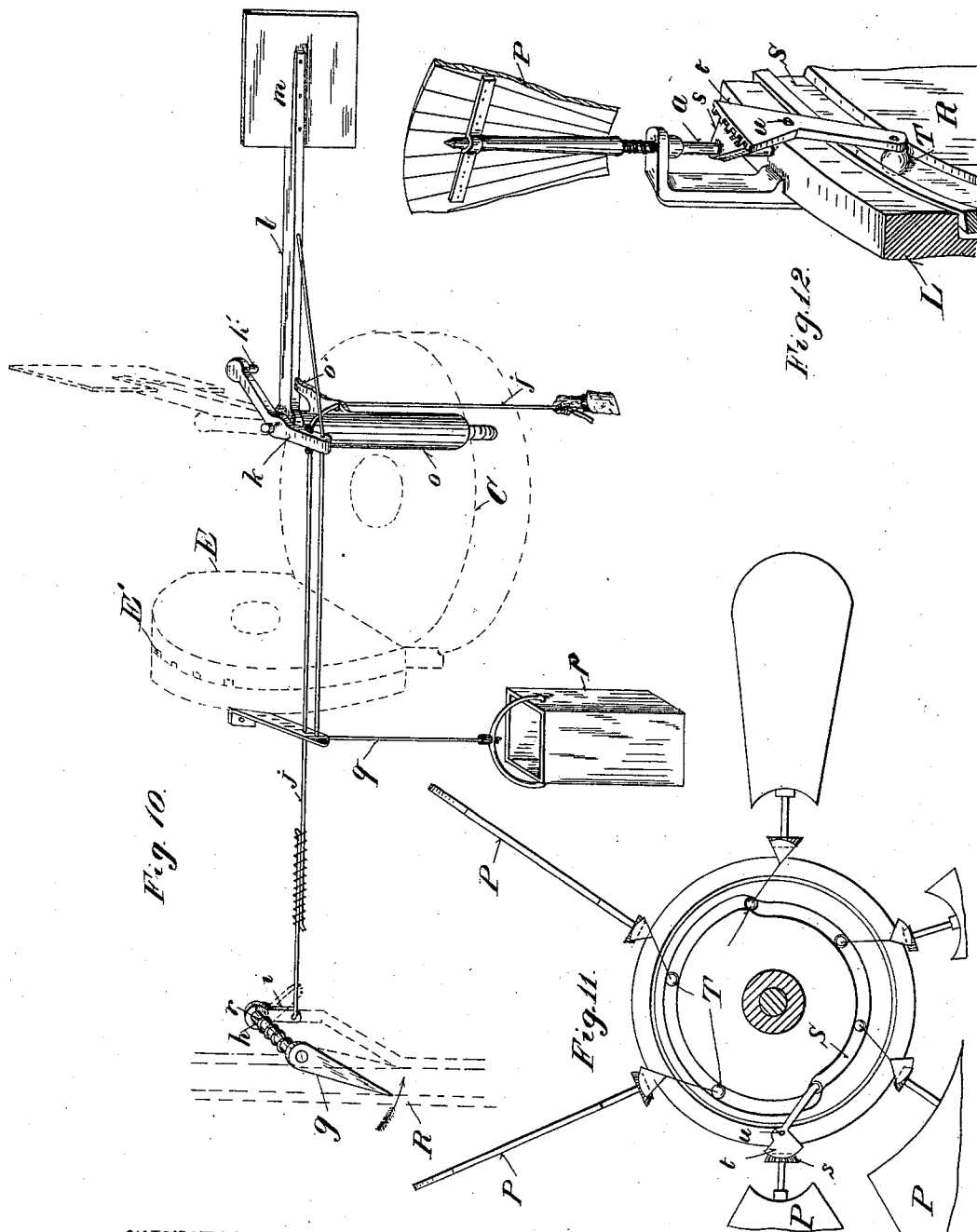
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UNITED STATES PATENT OFFICE.

JAMES T. SHOUP, JR., OF SPRINGFIELD, OHIO.

WIND-MACHINE.

SPECIFICATION forming part of Letters Patent No. 479,993, dated August 2, 1892.

Application filed June 12, 1891. Serial No. 395,993. (No model.)

To all whom it may concern:

Be it known that I, JAMES T. SHOUP, JR., a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Wind-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to certain new and useful improvements in wind-machines, the peculiarities of which will be hereinafter fully described and claimed.

In order to illustrate the use of this wind-wheel, I will now describe it as adapted to be driven and constituting a wind-engine.

In the accompanying drawings, in which like reference-letters indicate corresponding parts, Figure 1 represents an edge view of the wind-wheel and its connection with a turn-table and operative mechanism; Fig. 2, a side view of the wheel and cam, the section being taken on the line zz , Fig. 1; Fig. 3, a vertical section through the center of the turn-table; Fig. 4, an edge view of the preferred form of the cam, its adjusting-lever, and a reverse edge view of the cam; Fig. 5, an end view of Fig. 4; Fig. 6, a section through a portion of the wheel-rim and cam with a shaft and crank mounted therein; Fig. 7, a detail view of the crank and a portion of the operating-cam; Fig. 8, a partial sectional view of the driving cage and springs forming the yielding connection with the blade; Fig. 9, a cross-section on the line xx , Fig. 8; Fig. 10, a perspective view of an automatic operative mechanism for the cam-switch; Fig. 11, another form of cam and pivoted connections to operate the blades, and Fig. 12 a perspective view of one of said blades with the modified form of said cam and operative connection with said blade.

The letter A designates tower of framework or other form, on which is mounted a turn-table for the wind-wheel, consisting of a base B, bolted to the said tower and having annular guides or otherwise adapted to support the rotatable member C, mounted thereon, as shown in Figs. 1 and 3. A lower extension C' is steadied by guiding-ring segments D. The rotatable member is provided with a bearing for the support of the wheel-shaft F, having on one end a crank G, con-

nected to a vertical rod H by a link I, said rod being thus adapted to reciprocate in guides J and J', the former constituting an upward extension from the revoluble member C. A tail-vane K rotates said member of the turn-table C to normally present the shaft F transversely to the wind, and thus allow the rotation of the wind-wheel in the plane of the wind.

The wind-wheel consists of a rim and hub L, keyed or otherwise secured to the shaft F to rotate the same. The said rim is provided with bearings on boxes M, in which are mounted the shafts O, operatively connected with the blades P through a yielding connection hereinafter described, the inner end of which shaft is provided with a crank Q, firmly fixed on said shaft by a screw-and-pin engagement or otherwise, in order to prevent the drawing out of said shaft under the weight of the blade and the centrifugal force while the wheel is rotating. Said wheel-rim is recessed or otherwise adapted to present a bearing-shoulder for the shaft end of the crank, and in said recess is mounted a cam, concentric with said wheel and having a groove S in the edge thereof, Fig. 4, in which travels a roller T, preferably grooved, as shown in Fig. 4, and mounted on the outer end of the said crank, being preferably curved, as shown in Fig. 6, in order to fit snugly within the annular space between the wheel-rim and the said cam. The cam is stationary, but adjustable by means presently to be described, and the rollers on the cranks Q will travel around in the groove S as the wheel rotates. As will be seen from Fig. 4, this groove changes its position or direction from one side to the other of the shafts O, (indicated by dotted lines in this figure,) and this change of direction and position is made at two substantially diametrical points of the cam R, as shown by the two edge views in Fig. 4, whereby the cranks and their shafts will be rotated back and forth at every revolution of the wheel, the amount of said rotation being a quadrant. The shafts O, through their connections with the blades P, will thus operate the latter through a quadrant also, and thereby turn them from operative to inoperative position, and vice versa.

Referring to Figs. 1 and 2, it will be seen that the blades above the wheel-shaft are in their operative position, the blades below the said shaft in their inoperative position, while the blades in a horizontal line are turning into and out of their operative position, respectively. This change is preferably made while the axis of each blade is parallel to the direction of the wind or substantially on the horizontal line, since the wind will have practically no obstructive effect upon said change of position, because of the edgewise position of said blades. If it be desired, however, to make said change when the axis of a blade is in other than a horizontal plane, the cam R may be rotated in order to bring the cross-over portion of the groove S into another position. This may be done by means of the lever U, pivoted in lugs W, or otherwise connected to the hub or sleeve R' of the cam. This hub is conveniently mounted upon the wheel-shaft and circularly adjusted thereon by turning the said lever U into engagement with the various notches or projections E', forming a sector on the hub E, Fig. 1. A spring U' tends to preserve the engagement of the said lever with the desired notch. For instance, if the lever be rotated from its vertical to a horizontal position, and thereby rotate the cam through a quadrant of a circle, the said change of position of the blades will take place at vertically-diametrical points instead of at horizontal points, as above described. It is to be noted that this is of especial importance when the wheel is used as a blast-fan, since the blades can thus act on the air, at any part of the rotation of the wheel, vertically, horizontally, or at intermediate points.

I will now describe the yielding or spring action between the blade-shafts O and their respective blades. The object of this connection is this: The sudden change of position of the blades by the cam mechanism above described is liable to cause injury to the blades on account of the sudden starting and stopping in the rotary motion. To obviate this, I provide a yielding connection between the said blade and its shaft O. One form of each I will now describe.

The blade P is formed of strips of wood or other suitable material secured by a framework or cross-bars P' and a central spoke a, forming the axis of the blade and extending into bearings b, formed in a driving-cage consisting of a number of bars c, connecting said bearings b and inclosing a portion of said spoke a, on which are mounted springs a', preferably coiled about the same, as shown in Fig. 8, one end of which spring is engaged with a stop-piece d, secured by pins or otherwise to said spoke a and having wing portions d', having a slight play between the bars c, as indicated in Fig. 9. The inner end of the said cage is adapted to receive the outer end of the shaft O, preferably by means

of a screw-thread and pin engagement, as shown in Fig. 8. The rotation of the shaft O in either direction will first act immediately on the cage and then with a yielding action on the blade-spoke a through the coil-spring, forming the yielding connection between said spoke and cage. The stiffness of these springs is preferably such as to take off substantially all the jar of the contact between the stops d and the bars c. For instance, when the crank shown in Fig. 7 is rotated in the direction of the arrow by means of the cross-over portion of the cam-slot S the shaft O, Figs. 6 and 8, will rotate in the direction of the arrow and produce a tension on the inner coil-spring, which will be connected to the blade through the stop-piece d at the other end of said inner spring. When the shaft is rotated in the reverse direction, the outer spring exerts its rotative effect through its respective stop on the outer end thereof. In order to preserve the position of spoke a in its bearings, a collar e is secured thereto, which bears against projecting portions of the bars c or otherwise, and thus assists the outer stop-piece d in resisting an outward force. Another collar f may be fixed to the stop outside of the said cage. The cage preferably is provided with three of said bars c, and the stop-pieces d have a corresponding number of wings d'. More or less number of bars may be used. I do not wish to limit myself to the exact form of the yielding connection above described.

Referring to Fig. 4, it will be seen that the cam-groove S is provided with a branch groove S', shut off by a switch consisting of the pivotal piece g, mounted between said grooves. If this switch be moved to the dotted position, it will close the cross-over portion of the groove S at one side of the cam and cause the crank-rollers T to travel in one plane without rotating the cranks and their blades connected thereto. In this case the blades will be in their inoperative position, as is indicated by the dotted position of the cranks in Fig. 1, with regard to the blades. This switch may be automatically rotated by mounting it on a shaft h, Fig. 10, extending through the rim of said cam, as shown in Fig. 5, and provided with a crank i, having a yielding connection through a spring-coupled wire j with a double lever or crank k, the opposite end of which is adapted to be engaged by the arm l of the storm-vane m to throw the switch into the dotted position in the direction of the arrow, Fig. 10, when the said vane is turned into its dotted position by the pressure of the air or wind. The lever k and arm l are mounted on a stud o, screwed or otherwise secured to the rotatable member C of the turn-table, and a weight-box p acts through a cord q on the storm-vane to bring it to its former position against a stop o' on the said stud or otherwise. A spring r acts to throw the switch g into the normal position shown by full lines.

The switch may be operated by hand through a downward extension *j*, as shown in Figs. 11 and 12, in which the cam-groove *S* is in the face of the cam instead of on the edge thereof, as previously described. The blade-spoke *a* in this case is provided with a bevel pinion or segment *s*, which is rotated by a matching-lever segment *t*, pivoted at *u* to the rim of the wheel and provided with a roller *T*, whereby the rotary action is given to the blade by operating the segment back and forth as the roller *T* on the opposite end of the lever travels around the groove in the face of the cam, as shown in Fig. 11. I do not wish to limit myself to the exact form of cam illustrated nor the connection between said cam and blade.

As before mentioned, my wind-wheel is adapted to be driven or to serve as a driver. It is evident that it may drive the air, and thus constitute a blast-fan, for instance, or it may act on water in the form of a water wheel or motor. The rotatable blades and operative means therefor allow of totally submerging the wheel within the water without effecting its proper action as a motor. It is one of the special features of my device that it may be adapted to be thus used for a variety of purposes and to act upon or be acted on by different elements. I wish to be understood as laying claim, broadly, thereto.

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

1. In a wind-machine, the combination, with a turn-table head and a wind-wheel shaft carried by said head, of wind-wheels having rotatable blades, shafts connected to said blades, crank-pieces on said shafts, rollers on the inner ends of said cranks and fitting in a groove in said cam, whereby the blades are rotated according to the direction of said groove, and a lever pivoted to said cam and adjustable in notches in said head, whereby the cam may be rotated to adjust the grooves to different positions and change the points at which said rotatable blades are operated.

2. In a wind-machine, the combination, with a head and an adjustable cam mounted thereon having guiding-grooves, of a wind-wheel mounted on said shaft, rotatable blades forming the wings of said wind-wheel and provided with axial spokes, blade-shafts, crank-pieces connecting said shafts with said cam-grooves, and a yielding driving mechanism between each blade and its respective blade-shaft, the same consisting of a driving-cage mounted on the blade-shaft and having bearings for the said spoke and provided with a plurality of bars connecting said bearings, stop-pieces having wings adapted to engage with said bars and fixed to said spoke, and a pair of coil-springs, each engaged at one end with its respective stop-piece and at the other end with said cage.

3. In a wind-machine, the combination, with a wheel-rim, rotatable blades therefor having axial spokes on which they rotate, blade-shafts rotatably mounted in said rim, and means to rotate them, of a driving extension or cage from each blade-shaft, having bearings for its respective blade-spoke, and a spring connection between each spoke and said driving extension or cage, consisting of a pair of springs mounted on said blade-spoke and acting reversely thereon, one end of each spring being connected with the driving extension or cage and the other end of each spring with the blade-spoke, whereby the rotative influence of the blade-shaft will be exerted on the respective spoke through one spring and the reaction of the blade in stopping will be exerted through the other spring.

4. In a wind-machine, the combination, with a wind-wheel, its shaft, rotatable blades for said wheel, blade-shafts mounted in the rim of said wind-wheel, and a yielding connection between each blade and blade-shaft, respectively, of a cam having grooves and adjustably mounted adjacent to said wind-wheel, crank-pieces forming the operative connection between each blade-shaft and said cam, each crank-piece having a gear-segment, a segment on each blade-shaft meshing with said crank-piece, whereby the cam-groove will rotate the crank-pieces and the respective blades, and a cam-switch consisting of a deflecting pivoted piece mounted on said cam and adapted to guide the crank-pieces from one groove to another, according to its adjusted position as a switch, and means to operate said cam-switch to vary the influence of the cam on said blades.

5. In a wind-machine, a wind-wheel having rotatable blades, shafts, and cranks for said blades, a cam having grooves on its periphery, substantially as described, rollers mounted on said cranks and adapted to travel in said grooves, a switch to open one or another portion of said cam-grooves, and means to operate said switch.

6. In a wind-machine, the combination, with a wheel-rim, rotatable blades therefor having axial spokes, blade-shafts rotatably mounted in said rim, and means to rotate said shafts, of a yielding mechanism between each spoke and shaft, consisting of spoke-bearings connected by a plurality of bars forming a cage and mounted on said shaft to rotate therewith, stop-pieces fixed to said spoke and having wings extending out between said bars, and springs connected at one end to their respective stop-piece and at the other end to said driving-cage, whereby the rotative impulse is mainly transmitted to said blades before the said stop-wings are in contact with said bars.

7. The herein-described yielding driving mechanism between two rotatable shafts, the

same consisting of a driving-cage mounted on the driving-shaft and having bearings for the driven shaft and provided with a plurality of bars connecting said bearings, stop-
5 pieces having wings adapted to engage with said bars and fixed to said driven shaft, and a pair of coil-springs, each engaged at one end with its respective stop-piece and at the

other end with said cage, substantially as shown and described. 10

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

JAMES T. SHOUP, JR.

Witnesses:

OLIVER H. MILLER,
H. M. PLAISTED.