(No Model.) 3 Sheets—Sheet 1.

T. ROGERS.

WINDMILL.

No. 557,889. Patented Apr. 7, 1896.

Fig 1.

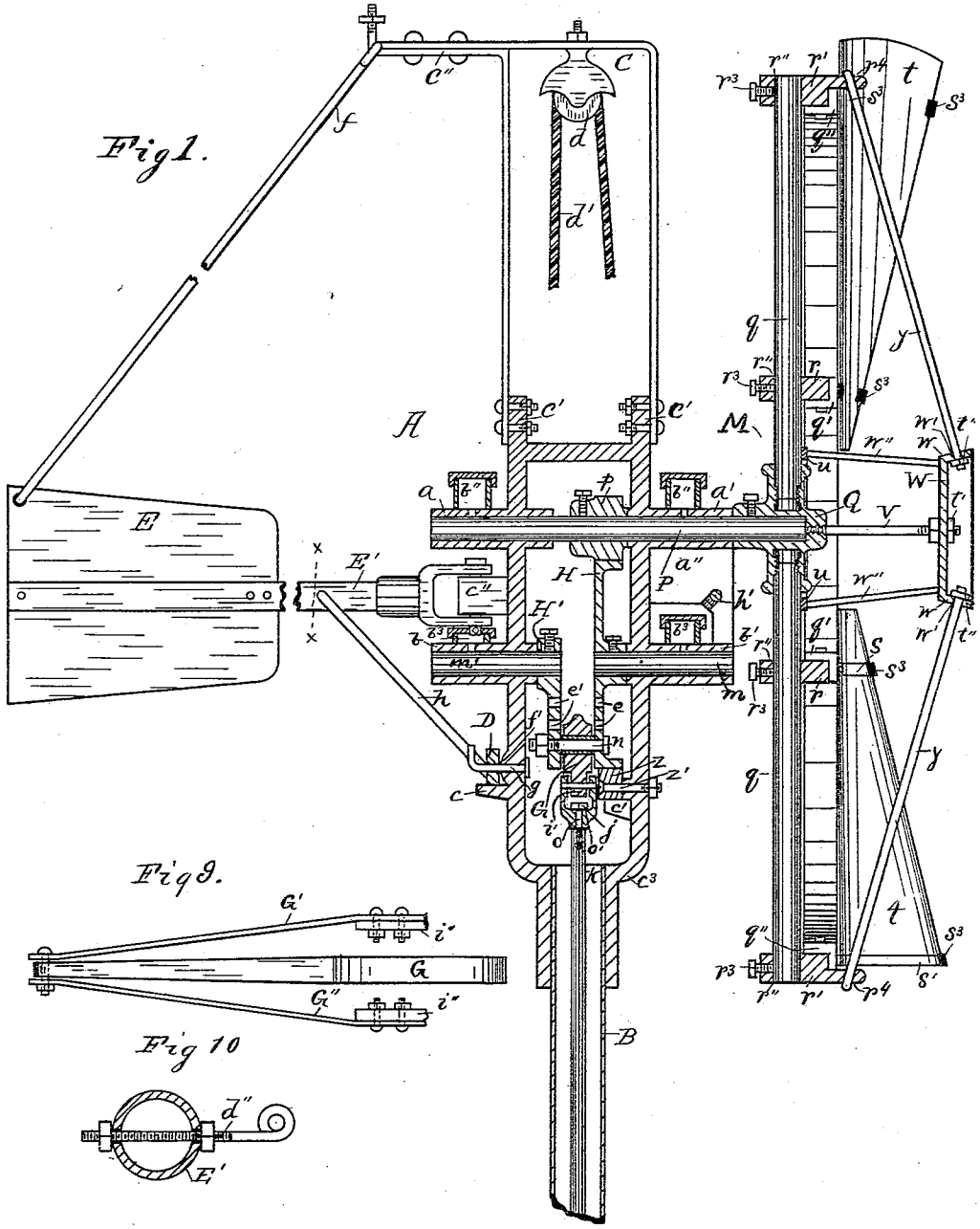

Fig 9.

Fig 10

WITNESSES:

Lester L. Allen.

A. J. Finnin.

INVENTOR

Timothy Rogers.

BY

R. J. McCarty.

ATTORNEY.

(No Model.)

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T. ROGERS.

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Fig 2.

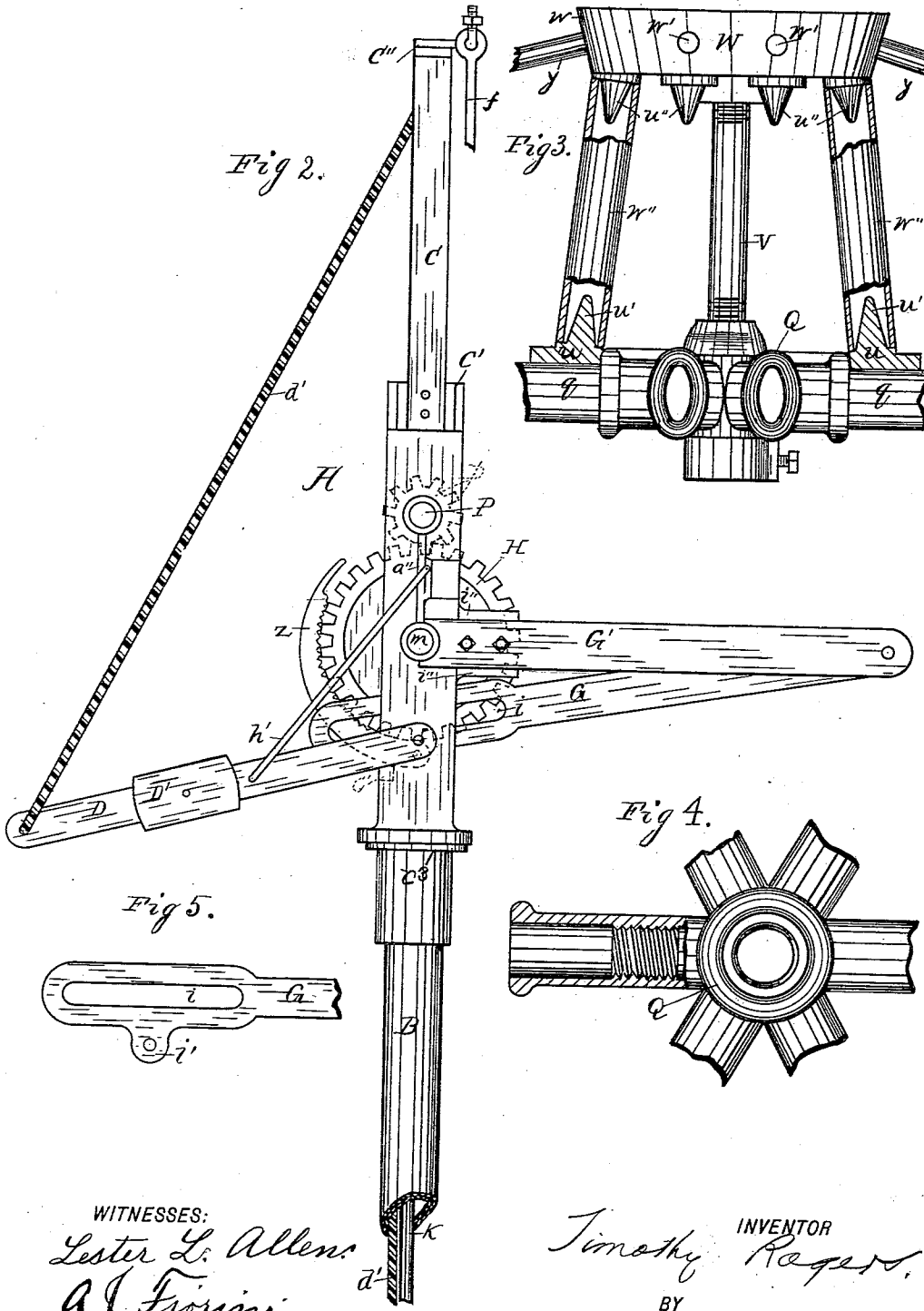

Fig 3.

Fig 4.

Fig 5.

WITNESSES:
Lester L. Allen.
A J Fiorini.

INVENTOR
Timothy Rogers.
BY
R. J. McCarty.
ATTORNEY.

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T. ROGERS.

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Fig 6.

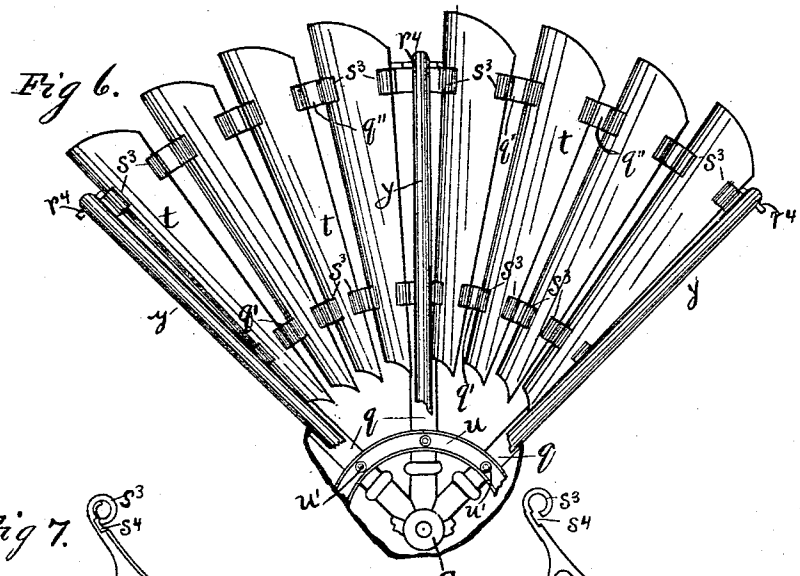


Fig 7.

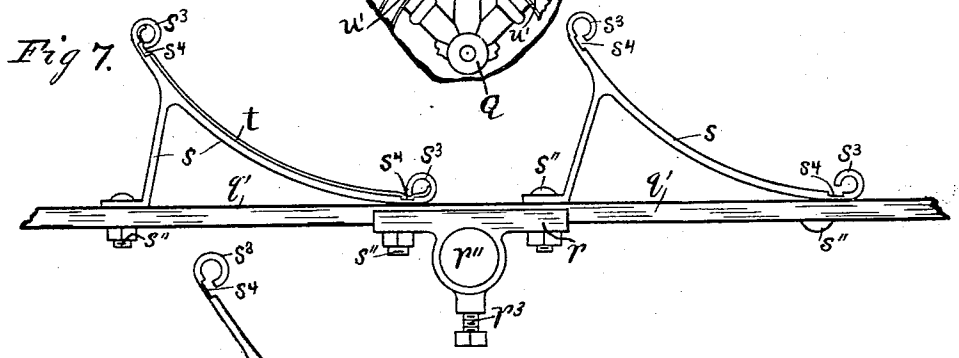
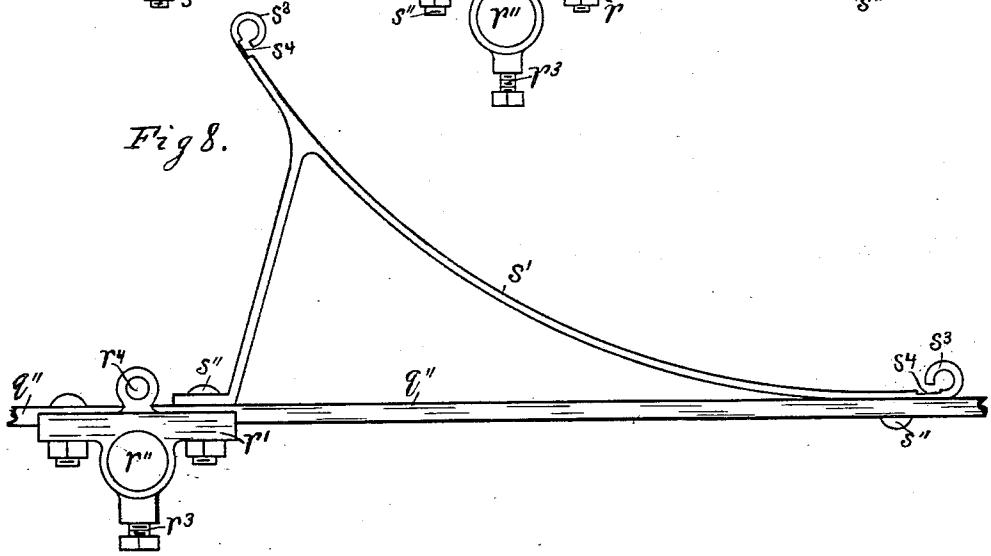


Fig 8.



WITNESSES:

Lester L. Allen.

A. J. Fiouin.

INVENTOR

Timothy Rogers.

BY

R. J. McCarty.

ATTORNEY.

UNITED STATES PATENT OFFICE.

TIMOTHY ROGERS, OF DAYTON, OHIO, ASSIGNOR TO FRANCIS J. McCORMICK, SR., OF SAME PLACE.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 557,889, dated April 7, 1896.

Application filed October 12, 1894. Serial No. 525,720. (No model.)

To all whom it may concern:

Be it known that I, TIMOTHY ROGERS, of Dayton, county of Montgomery, State of Ohio, have invented a new and useful Improvement in Windmills; 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 of reference marked thereon, which form a part of this specification.

My invention relates to improvements in windmills.

The object of the invention is to provide a windmill of light but substantial construction that will run easily.

A further object is to provide a windmill the wheel of which is constructed in sections in order that it may be repaired without removing said wheel from its bearings.

To these ends said improvements have reference to parts that will be fully described in the specification, and set out in the subjoined claims.

Referring to the annexed drawings, forming a part of the specification, and upon which similar letters of reference indicate corresponding parts, Figure 1 is a vertical section through the axes of the mill-head and the wind-wheel; Fig. 2, a front elevation of the mill-head, the wind-wheel being removed; Fig. 3, an enlarged side elevation, partly sectional, of the hub of the wind-wheel; Fig. 4, an enlarged end view of the hub proper of the wind-wheel, the spokes broken away and one shown in section; Fig. 5, a detail side elevation of the slotted pitman, the outer end thereof broken off; Fig. 6, a plan view of two of the segments of the wind-wheel; Fig. 7, an enlarged detail end view showing a segment of the inner concentric ring, one of the clips forming a joint between two of said segments and two of the curved brackets upon which the inner ends of the sails are mounted; Fig. 8, a similar view of portions of two segments of the outer concentric ring and one of the connecting clips, and curved brackets to which the outer ends of the sails are secured; Fig. 9, a detail plan view of the arms to which the outer end of the slotted pitman is pivoted; Fig. 10, a section of the arm of the rudder-vane on the line $x\,x$, showing the adjustable coupling of the rods connecting with the governor-arm.

A designates the mill-head, having journal-bearings $a\,a'\,b\,b'$ projecting laterally from the front and rear sides thereof and a vertical strengthening-web a'' between the bearings a' and b'. b'' and b^3 designate oil-cups having openings registering with the interior of said bearing parts, and $c\,c'\,c''$ designate lugs projecting from the outer and inner sides of the mill-head, the purposes of which will be hereinafter stated.

The parts mentioned in the foregoing description consist of one integral casting or self-containing frame with the shoulder c^3, constituting the turn-table, in the center of said frame, which is equally balanced by the rudder-vane being on one side and the wind-wheel on the other, and in which frame there are no detachable bearings, bolts, oil-cups, or other adjunctive devices to become loose or displaced and thereby render frequent attention necessary.

B designates a tubular frame inclosing the reciprocating rod and the rope which is attached to the governor-arm, of which further mention will be hereinafter made. Upon the upper end of the frame B the mill-head is cast.

C designates a rectangular frame bolted to flanges C′, projecting from the upper terminal of the mill-head, upon which a pulley d is suspended, around which a rope d' is placed, one end of said rope having an attachment with the governor-arm D and the other end passing downward through the tubular frame B, where it is accessible to the hand.

C″ is a horizontal extension of the frame C, to which one end of a rod f is pivoted, the other end of said rod having a pivotal connection with the rudder-vane E, the arm E′ of which is connected by a pivotal bolt to the lug c''. The rod f is connected to the part C″ a little off the line and to one side with reference to the pivot of the arm of the rudder-vane, the result of which is that said vane will be swung around to its normal position by the tension of said rod when released.

D designates a governor-arm having a sliding weight or ballast D′ pivoted to the mill-

head by means of a horizontal angle-bolt *g*. The portion of the mill-head with which the pivotal end of said arm comes in contact has the form of an oval boss *f'*, which facilitates an easy movement thereof, said arm taking a spiral movement when operated to take the wind-wheel "out of the wind." When said wheel is "in the wind," the arm has a rest upon the lug *c*.

It will be noted from the view shown in Fig. 1 that the arm of the rudder-vane is pivoted off the center of gravity. This is desirable, as thereby the wind-wheel is permitted to turn slightly out of the direct line of wind and is enabled to regulate and adjust itself in high winds.

h h' designate connecting-rods attached to the median portion of the governor-arm. One of said rods takes the arm E' of the rudder-vane, to which it is coupled by an adjustable bolt *d''*, (see Fig. 10,) and the other of said rods takes the web *a''* on the front of the mill-head, and is coupled thereto by the same means shown in Fig. 10.

G designates a pitman having an oblong slot *i*, a downwardly-projecting lug *i'*, and a pivotal connection with horizontal arms G' and G'' bolted to projections or lugs *i''* on the front and rear sides of the mill-head.

j is a bifurcated coupling inclosing the lug *i'* and pivoted thereto by a transverse pin. The reciprocating rod *k* is connected to said coupling by means of a vertical bolt *o*, which passes through a vertical opening therein and is made secure to said coupling by means of a nut *o'* or other suitable means. The bolt *o* may be attached to the reciprocating rod by means of horizontal pins passing through said bolt and rod, as shown in Fig. 1, or the coupling may be effected in any suitable way that will insure a swiveling joint between the reciprocating rod *k* and the pitman G.

The letter H designates a toothed crank-wheel rigid on a shaft *m* and having three or more eccentric openings *e* through its face.

H' is an equalizing bearing or arm rigid on a shaft *m'*, and also having eccentric openings *e'* similar to and on a line with those in the crank-wheel.

n is a pin or bolt passing through the oblong slot *i* in the pitman G and through the openings *e e'* in the crank-wheel and arm, respectively, and thus a coupling is effected between said crank-wheel and pitman, through which a reciprocating movement is imparted to the rod *k*. The stroke of the pitman will be longer or shorter, according to its pivotal connection with the crank-wheel, it being understood that if the pivotal connection is made in the opening *e* nearest the axis of the wheel the stroke of the pitman will be shorter than otherwise. By pivoting said pitman at its outer extremity to the arms G' G'' it is given a substantial leverage, which increases when the water is being raised, or on the first half-revolution of the crank-wheel, and decreases when the reciprocating rod is going downward or the pitman is being driven by the last half-revolution of the crank-wheel.

The letter *p* designates a toothed pinion rigid on the shaft P and meshing with the crank-wheel. The shaft P is driven by the wind-wheel M, which is mounted on the outer end thereof.

As the construction of the wind-wheel is a conspicuous element of my invention, its description is now in order.

A common defect in wind-wheels is a weakness about the hub. As a rule, in strong winds the sails and attachments have a tendency to spring back out of the proper position. Therefore the desideratum in wind-wheels is to obtain a maximum degree of strength and rigidity at the axis of the wheel and to tighten the parts from the center to the rim and at the same time have them detachable in case of repairs. These objects are obtained by the following mechanism: The wind-wheel M is formed in six or more segmental parts, two of which are shown in Fig. 6. Q designates the hub proper, having six radial arms or sockets with interior screw-threads, into which a similar number of tubular arms *q* are tapped. *q' q''* designate inner and outer concentric rings. These rings consist of segmental parts (two of which are shown in Fig. 6) joined together by inner and outer clips *r r'*, having eyes *r''*, through which the arms *q* pass, and set-screws *r³*, by means of which the clips and arms are made rigid. *s* and *s'* designate, respectively, inner and outer brackets, which are rigidly mounted on the rings *q' q''* by bolts *s''*. At the joints in the rings the same bolts that secure one end of said brackets also secure the segments forming said rings to the clips *r r'*. These brackets are of a curvilinear form in end elevation, substantially as shown in Figs. 7 and 8.

t designates the wind-vanes or sails, preferably constructed of galvanized iron, each one of which is mounted on its respective pair of brackets *s s'*. The mounting of the sails is effected by first sliding each sail endwise on the outer bracket *s'*, thence onto the inner bracket *s* as far as they can be moderately driven, which is shown in Fig. 6. The sails are then further secured to the brackets by the curved ends *s³* of said brackets being turned over and clamped against the edges of the sails. That portion of the sail is depressed into the recesses *s⁴* in the brackets. (See Fig. 7.) In the event it should become necessary to replace one or more of the sails these clamping ends *s³* may be withdrawn from contact with the sails and said sails removed by driving them outwardly.

In order to obtain an absolutely rigid and durable center to the wheel and to provide a requisite support for the sails I employ the following mechanism: *u* is a concentric ring resting on the inner ends of the arms *q* and encircling the hub Q. The lower surface of this ring where it comes in contact with said arms is recessed in order to enable it to fit

snugly thereon, and from the upper surface of said ring immediately above the arms q there project a series of pintles u'

v is a tubular shaft screwed into the axis of the hub Q, upon the other end of which there is mounted a circular center plate w, made rigid by a screw-threaded engagement therewith. The outer circumference of this plate terminates in an outward inclined flange w, having a series of holes w', and from the inner face of said plate there project a series of pintles u'' similar to those on the ring u. The positions and number of the holes w' and pintles u' u'' are the same with reference to the number and positions of the arms q.

w'' designates a series of tubular spokes between the center plate W and the ring u, the ends of which fit over the pintles u' and u'', respectively. These spokes are made rigid in their positions to such an extent as to make the center plate and the hub practically one entirety or integral part by tightening the nut t' on the tubular shaft v and the nuts t'', hereinafter referred to.

y designates a series of truss or tie rods, one end of which is formed into a hook to take the eye r^4 on the outer clip r', and the other end inserted in the holes w' on the center plate and fitted with nuts t''.

It will be readily seen that the construction set forth in the above description of the wind-wheel is such that enables a most rigid tightening of the truss-rods and the rods between the hub and the center plate, and that a complete truss-work is formed from the center of the wheel to the outer ring q' that can be kept rigid at all times by tightening the nuts t' t''.

It will be borne in mind the radial arms q divide the segments of the wheel and that an entire segment may be removed without disturbing the adjacent parts, or, as hereinbefore stated, the sails alone may be removed and new ones put in.

Referring to another feature of the device, the letter z designates a curved brake pivoted to the inner side of the mill-head, as at z', in the front of and concentric to the crank-wheel H, having its inner face serrated as shown in Fig. 2. This brake-bar normally rests upon a lug c' below its pivotal point, and the function thereof is to prevent unnecessary movement of the crank-wheel after the wind-wheel has been taken out of the wind by the manipulation of the governor-arm. As said arm is swung around to guide the rudder-vane to its proper position for the above purpose, the rod h' turns around in contact with said brake and presses it against the periphery of the crank-wheel.

Having fully described my invention, I desire to claim as new—

1. In a windmill, the combination with the hub, the radial arms, and sections forming inner and outer rings, of clips r and r' each of which consists of one piece to the upper side of which ends of said sections are attached and lie thereon in a common plane, openings in said clips in which the radial arms are inserted and supported, brackets s and s' conforming to the inner and outer cross-sectional diameters of the wind-sails, the said brackets having their ends s^3 turned to clamp the edges of the wind-sails, whereby means are provided for attaching said sails without the use of screws or other separate fastening devices, substantially as herein shown and described.

2. The combination with the sheet-metal sails; of a hub; radial arms mounted in said hub; a series of segmental bands; a series of clips connecting said segments to form concentric rings around the hub, said clips having eyes through which the radial arms pass; a center plate, and rigid connections between said plate and the hub and the outermost concentric ring, substantially as described.

3. The combination with the sheet-metal sails; of a hub; radial arms mounted in said hub; an innermost concentric ring provided with pintles, and encircling the hub; outer concentric rings formed of detachable segments; clips connecting said segments, and upon which the radial arms are supported; a center plate, and truss-rods between said center plate and the clips on the outer ring, and the hub, substantially as described.

In testimony whereof I have hereunto set my hand this 1st day of October, 1894.

TIMOTHY ROGERS.

Witnesses:
R. J. McCARTY,
LESTER L. ALLEN.