(No Model.)

S. A. ROUSE.

WINDMILL.

No. 537,234. Patented Apr. 9, 1895.

Fig. 1

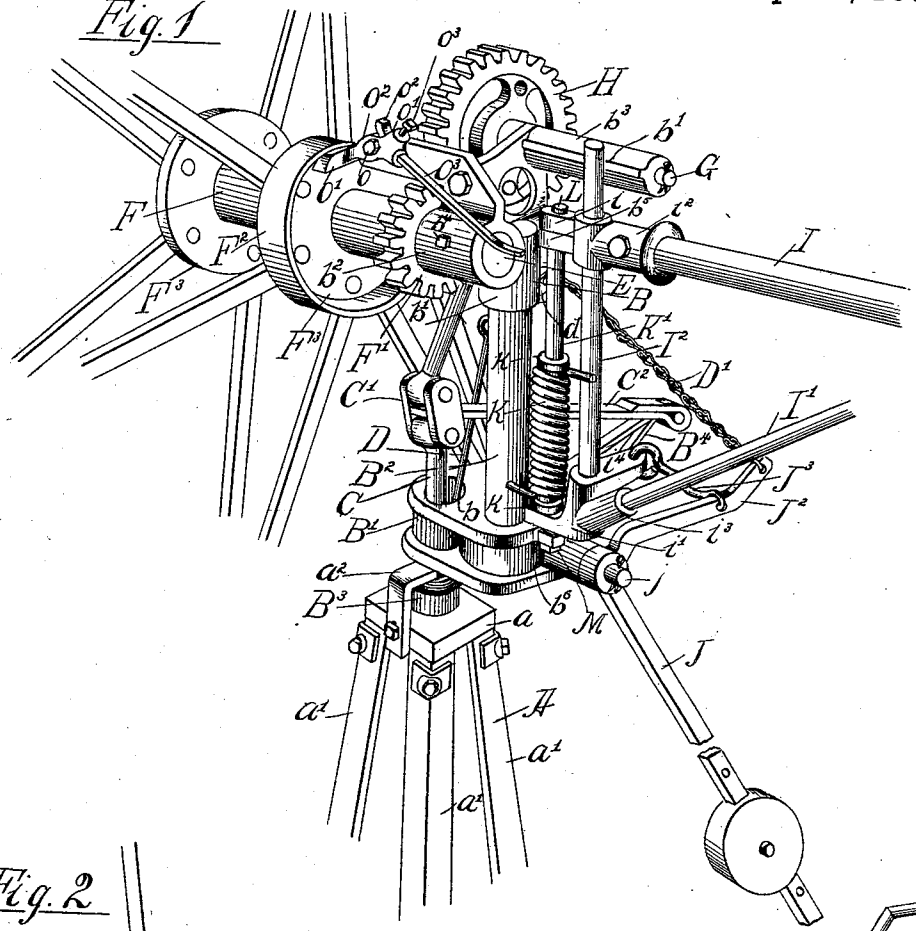
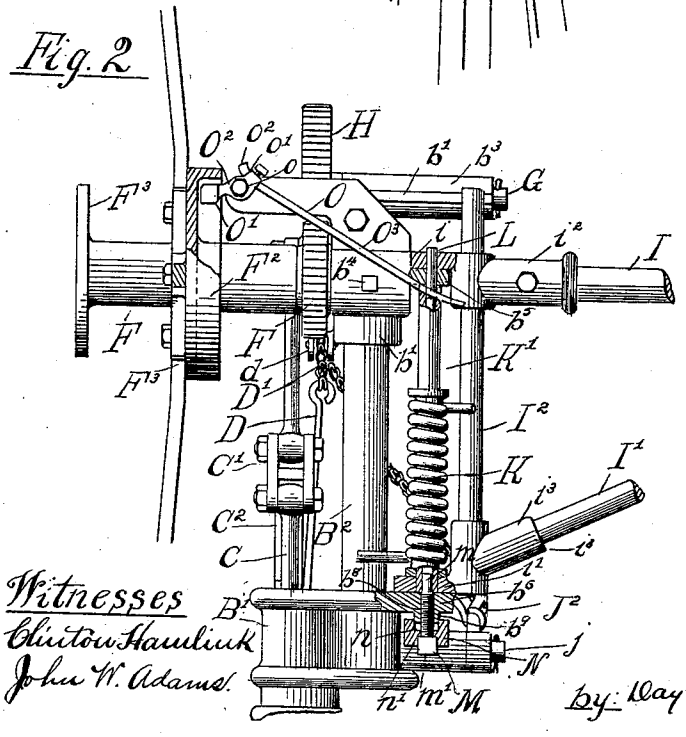
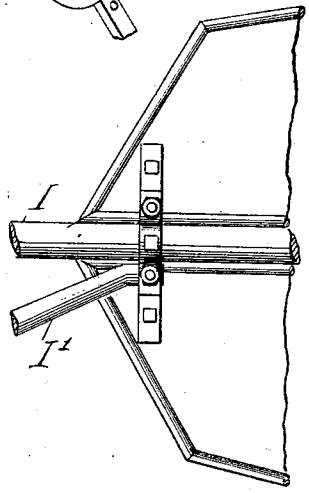


Fig. 2





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UNITED STATES PATENT OFFICE.

SEYMOUR A. ROUSE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE FAIRBANKS, MORSE & COMPANY, OF SAME PLACE.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 537,234, dated April 9, 1895.

Application filed December 17, 1894. Serial No. 532,047. (No model.)

To all whom it may concern:

Be it known that I, SEYMOUR A. ROUSE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Windmills; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to self-governing windmills of that class in which the windmill is pivoted on an axis located at a short distance at one side of the pivotal axis of the windmill head, and in which a tail vane is pivoted to the head and is held normally in position to keep the wheel in the wind by a weighted lever, which is adapted to yield to allow the vane to swing on its pivot and approach a position parallel with the plane of the wheel in case of excessive wind pressure.

The invention embraces certain improvements in the details of construction in windmills of the character described, as will hereinafter appear.

In the accompanying drawings, which illustrate my invention: Figure 1 is a perspective view of a windmill head and parts of the mill adjacent thereto. Fig. 2 is a view in side elevation of the same.

As shown in said drawings, A indicates the upper part of the windmill tower, the same comprising a top casting or collar a and four corner posts a' a'. The main frame of the mill, which is pivotally mounted on the tower, and on which the several parts of the mill are mounted, consists of a main casting or head B, a base casting B′, a vertical connecting standard or tube B^2, and a tubular pivot B^3, by which the frame is pivotally mounted on the tower. The base casting is provided with an orifice b which forms a continuation of the hollow interior of the tabular pivot B^3, and through which passes the power transmitting, or piston, rod C and the regulating or controlling rod D of the mill. The pivot B^3 passes through and is adapted to turn in the collar a of the tower, said pivot being engaged at its lower end with a suitable step, not shown. The pivot is held in place by means of an L-shaped collar clip a^2 which is bolted to the collar and is engaged at its inwardly bent upper end with a groove formed in the base casting just above the tower collar. In the head B is secured a horizontal bearing pin or wheel shaft E on which is mounted the hub F of the windmill, and a second bearing pin or shaft on which is mounted a gear wheel H which intermeshes with a gear pinion F′ on the wheel hub, and which is provided with a crank pin which is connected with the upper end of the piston rod C by means of a pitman C′ in a familiar manner. A bracket B^4 is attached to the base casting B′ and extends laterally therefrom, to the outer end of which bracket is pivoted a rocker arm C^2 which is connected with the upper end of the piston rod to guide the latter in its vertical movement, as heretofore common. The head B is provided at its lower part with a tubular socket b' to receive the top of the standard B^2, and at its upper part with a horizontal sleeve b^2 to receive the wheel shaft E and a similar sleeve b^3 which forms a bearing for the gear shaft G. The wheel shaft E is rigidly secured in the sleeve b^2, preferably by means of a set screw b^4 as shown, but the gear shaft is rigidly attached to the gear wheel and turns in the sleeve b^3, being held therein by a cotter pin, as shown, or otherwise.

I is the vane arm or bar to which the vane is attached, and I′ the vane brace bar. These are rigidly attached to a vertical bar I^2 and form with the latter the rigid head frame or gate by which the vane is supported and through the medium of which it is pivotally connected with the windmill frame. Pivotal connection of the vane frame or gate with the windmill frame is formed by means of two lugs i i' on the said gate, one near the top and the other near the bottom of the rod I^2, which lugs are pivotally connected, one, i, with a lug b^5 on the head B, and the other i' with a lug b^6 on the base casting B′. Preferably, and as a convenient and economical construction, the rod I^2 consists of a piece of pipe, and the vane bar I and brace bar I′ are secured thereto by means of sockets i^2 i^3 cast around the rod and in which the vane bar and brace bar are secured by set screws or otherwise. To further simplify the construction of the parts, the hinge or pivot lugs i and i' are cast inte-

gral with the said sockets i^2 and i^3. The rod I^2 is extended above the vane bar I and is adapted to strike against the sleeve b' which forms the bearing for the gear wheel shaft when the vane stands in a position at right angles with the face of the wind wheel, the said sleeve thus forming a stop to limit the pivotal movement of the vane relatively to the frame in one direction.

J is the weighted lever which acts to keep the vane normally at right angles to the face of the wind wheel, and to thereby maintain the wheel face to the wind, or in the wind under ordinary circumstances, or when the wind is not violent. The lever J is provided with a weight J′ adjustably secured thereto, and said lever is pivoted to the lower or base casting B′ conveniently by means of a bearing pin or shaft j which is secured in the base casting and on which the lever is mounted, the same being held thereon by a cotter pin, as shown, or otherwise. The lever J is provided with a rigid arm J^2 which extends upwardly and outwardly from its pivotal point. To the free end of said arm J^2 is attached a chain D′ which passes over a guide pulley d on the head B, and is attached to the upper end of the regulating or controlling rod D, and to said arm, at a point between its outer end and its pivot, is connected one end of a pitman J^3 the opposite end of which is connected with the frame or gate of the vane outside of the pivotal axis of the latter, so that when the wind wheel is swung or turned by the force of the wind into an angular position relatively to the vane, the said arm J^2 will be drawn upwardly and inwardly, and the weighted lever J thereby lifted. The weighted lever tends, as in other similar mills, to keep the vane normally at right angles with the plane of the wind wheel, while the pressure of the wind on the wheel, owing to the fact that it is set slightly at one side of the axis of rotation of the windmill head, tends to force the wheel out of the wind, or throw it into an angular position relatively to the same against or in opposition to the action of the weighted lever.

The regulator rod D and chain D′ enable the wheel to be thrown out of the wind at any time desired, by drawing downwardly thereon so as to lift the end of the arm J^2, and thereby swing or carry the vane into a position parallel with the wheel. Said rod D may be attached to and operated by an automatic regulating device by which the supply of water lifted by a pump is controlled, or it may be actuated by hand only, as heretofore common. The pitman J^3 is shown as connected with the vane by means of a lug i^4 cast on the socket i^3 by which the vane brace rod is attached to the rod I^2. The weighted lever J exerts a constant strain on the vane tending to turn or swing it on its pivot, but movement of the vane past a position at right angles to the face of the wind wheel, under the action of said weighted arm, is prevented by the upwardly extending end of the rod I^2 which strikes the sleeve b^3 of the head, as hereinbefore explained. A rib or projection b^7 may be cast on the sleeve b^3 in case the surface of the latter is not exactly in place to afford a proper stop for contact with the rod I^2, as is the case in the construction shown.

K is a spring which is applied for the purpose of resisting the movement of the vane on its pivot when the wheel is thrown out of the wind, and which for this purpose acts on the vane to move the latter in the same direction that it is moved by the action of the weighted lever J. Said spring, therefore, supplements the action of the lever J, but is so arranged as to exert little resistance to the movement of the vane when the latter is at right angles to the wheel, but to afford gradually increasing resistance to the swinging of the vane as the latter approaches a position parallel with the wheel, thereby tending to quickly return the wheel into the wind when the regulating rod is released or when the wheel has been thrown out of the wind by excessive wind pressure. Said spring K is of coiled form and is mounted on a rod K′ arranged in alignment with the pivots which connect the vane with the windmill frame, one end of the spring extending outwardly and acting against the rod I^2 of the vane, while the other end extends outwardly and bears against the standard B′ of the frame. The said spring, which is somewhat larger in diameter than the rod K, is held in place thereon by means of two short, flanged sleeves or thimbles k k, as clearly shown in the drawings.

Devices are provided for removably securing in place the rod K′ and at the same time for pivotally connecting the vane with the windmill frame, as follows: The rod K′ is preferably made of a pipe or tube, but the same result may be secured by providing axial bearing recesses in its ends. A pivot pin L passes vertically through the lugs i^2 b^6 of the vane and head, and is secured in one of said parts, so that its lower end extends below the same and engages the upper end of the rod K′ so as to hold the same from lateral movement, preferably by entering a central recess or bore in the rod, as clearly shown in the drawings, Fig. 2. Said pivot pin L thus forms the upper pivot of the vane, and at the same time serves to hold in position the upper end of the spring supporting rod K′. Through a screw threaded vertical aperture b^8 in the lug b^6 of the base casting B′ is inserted a screw stud M having a smooth or cylindric upper part m and a square or flat sided head m' at its lower end. The smooth upper end of the stud M passes through a smooth aperture in the lug i' and thus forms the lower pivot of the vane. Said upper end of the stud M also extends above the top surface of the said lug i' and engages the lower end of the spring holding rod K′, preferably by entering a recess in the same, as in the case of the upper pivot. Said stud M, hav-

ing screw threaded connection with the lug b^6, may be turned backwardly or downwardly therein until its upper end is free from the rod K′, in which case the lower end of the said rod will be released and may be moved sidewise and the rod then dropped until free from the upper pivot L, when the rod and spring may both be removed from place without disturbing other parts. If the screw stud is turned still farther backward until its upper end is below the top of the lug b^6, then the lower lug i' of the vane will be free therefrom and the vane may be removed bodily. When the rod K′ is in place lifting of the vane so as to free the upper lug from the stud L′ or said stud from the lug i, will be prevented by contact of the lower lug i' with the end of the said rod, but when said rod is removed then the vane may be lifted to free both lugs i and i' from the pivot pins L and M at one time.

The construction described, by which the spring K may be removed without disturbing other parts, is of great value, because such springs are often broken or give out and require renewal, and such construction enables this to be done without taking off the vane or disturbing any of the other parts. The spring being of simple coiled form and having projecting ends which merely press against the parts of the frame and vane, requires no labor to insert in place, but it may be quickly slipped in place on the rod K′ and will be in readiness for use without other work.

As a means of locking the screw stud M so as to prevent it from turning back from the jarring action of the mill or other causes, I provide a square, depending projection b^9 on the lower surface of the lug b^6, and I apply between the head of the stud M and said projection b^9 a sliding or telescopic lock nut N having an upper square recess n fitting the projection b^9 and a lower square recess n' fitting the head of the stud M. The nut N may be slid upwardly on the projection b^9 until clear of the stud head when the latter may be turned, but when the nut is dropped it engages the said head and, being itself held from turning by the square projection, will in turn hold the stud from rotation.

As a further and separate improvement, I have provided a brake device for stopping the rotation of the wheel when it is thrown out of the wind, the same being constructed as follows: The wind wheel is provided at its side nearest the frame with an annular bearing ring F^2, the same, in the instance shown, being formed by means of a flange on the innermost of two disks F^3 F^3 which are cast on the wheel hub or sleeve F and to which the radial members or arms of the wheel are attached at their inner ends.

O is a brake lever which is pivoted to the head B at a point above the wheel shaft E by means of a horizontal pivot stud o affixed in the said head B. Said brake lever is pivoted at a point between its ends, and carries at its end nearest the wind wheel a brake shoe O′ located in position for contact with the inner face of the annular bearing F^2 in such manner that it will be pressed upwardly against the ring when the opposite end of the brake lever is depressed. Such opposite end of the brake lever extends downwardly and rearwardly in an inclined position, and is located in the path of a horizontal member of the vane, conveniently the bar I thereof, so that it will be depressed by the action of the same when the latter is swung around toward the wheel in throwing the latter out of the wind. I preferably so arrange the arm of the lever O that it will be struck by the socket i^2 of the bar I^2, but this is not essential.

As a further improvement, I propose to make the brake lever O in two parts, namely, a casting O^2 through which the pivot o is inserted and of which the brake shoe O′ forms a part, and a wrought metal bar O^3 which is adjustably attached to the part O^2 and which forms the downwardly inclined part of the lever which is acted on by the vane. To provide such adjustable attachment of the bar O^3 to the casting O^2 I provide the latter with a curved socket o' and construct the bar O^3 with a curved end o^3 adapted to enter the socket, the curvature of the bar being such that when the curved part of the bar is slid or moved endwise in the socket, the free or outer end of the bar will be elevated or depressed. A set screw o^3 enables the bar to be held in a desired position in the socket of the casting O^2. The bar O^3 is preferably made of steel or other spring metal so far as to give a desirable degree of elasticity in the brake lever as a whole. Such elastic character of the brake lever affords a yielding and therefore a more uniform action of the brake, notwithstanding slight irregularities or inaccuracies in the form or adjustment of the parts.

I claim as my invention—

1. The combination, with a windmill frame and vane, of a spring of coiled form applied to move the vane relatively to the frame, and an upright supporting rod for the spring which is separate from, but detachably supported in alignment with the pivots of the vane, substantially as described.

2. The combination, with a windmill frame and vane, of a spring of coiled form, an upright supporting rod passing through the spring, the pivotal joint between the vane and frame heing formed by two pivot pins which engage opposite ends of the said supporting rod for holding the same in place, and one of which is vertically movable to permit the removal of the said rod and the spring thereon, substantially as described.

3. The combination, with a windmill frame and a vane, of a spring of coiled form, an upright supporting rod for the spring, lugs on the frame and vane, and pivot pins inserted through said lugs to form the pivotal connection between the frame and vane, said studs being constructed to engage bearing recesses in the ends of said supporting rod, and

one of said studs having screw-threaded engagement with the lug on the frame through which it is inserted, whereby it may be moved endwise to disengage it from the said supporting rod, substantially as described.

4. The combination, with a windmill frame and a vane pivoted thereto by means of upper and lower overlapping lugs on the frame and vane and pivot pins inserted through said lugs, of a spring of coiled form, and a supporting rod for the spring engaged at its ends with said pivot studs, the lowermost of said pivot pins having screw-threaded connection with the frame and being provided with a flat sided head for turning the same, and means for locking the pin from turning, consisting of a flat sided projection on the frame, and a vertically movable sleeve having upper and lower flat sided recesses fitting the projection on the frame and the head of the stud, substantially as described.

5. The combination, with a windmill frame, of a vane hinged to the frame and consisting of an upright rod, two bars which are connected with and support the vane, and castings secured to the upright rod and which are provided with sockets to receive the said bars and with lugs for forming the hinged connection between the vane and frame, substantially as described.

6. The combination, with a windmill frame, of a vane hinged to the frame and consisting of an upright rod, two vane supporting bars, and castings secured to the upright rod and provided with sockets to receive the said bars, and with lugs for forming hinged connection between the vane and the windmill frame, the said upright rod being extended above the upper supporting bar of the vane, and the frame being provided with a horizontal part located in the path of and forming a stop for said upper end of the rod, substantially as described.

7. The combination, with a windmill frame and a vane hinged to the frame and consisting of an upright rod, two vane supporting bars, and castings attached to the upright rod and forming sockets for the bars, and hinged joints between the said vane and the frame consisting of overlapping lugs on the said frame and on the said castings, pivot pins inserted through said overlapping lugs, a spring supporting rod located in alignment with and supported by engagement with the said pivot pins, and a coiled spring placed around said supporting bar and having its opposite ends projecting outwardly and engaging the said upright rod of the vane and an adjacent part of the windmill frame, substantially as described.

8. The combination, with a windmill frame, a wind-wheel, and a vane, of an annular bearing ring on the wind-wheel, and a pivoted brake-lever consisting of a casting provided with a brake-shoe and with a curved lever-arm socket, a lever-arm provided with a curved end adapted to slide in said socket, and means for clamping the said arm in the socket, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

SEYMOUR A. ROUSE.

Witnesses:

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WILLIAM L. HALL.