(No Model.)

T. O. PERRY.

WINDMILL.

No. 492,104. Patented Feb. 21, 1893.

Fig. 1.

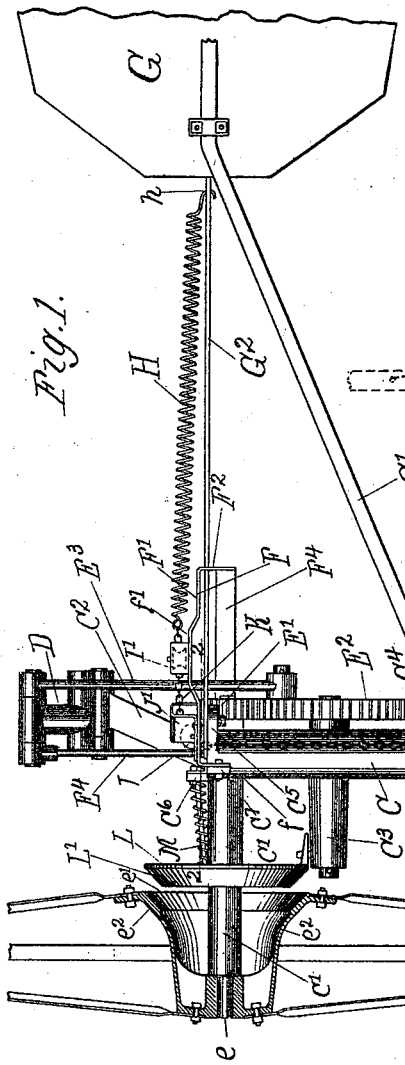
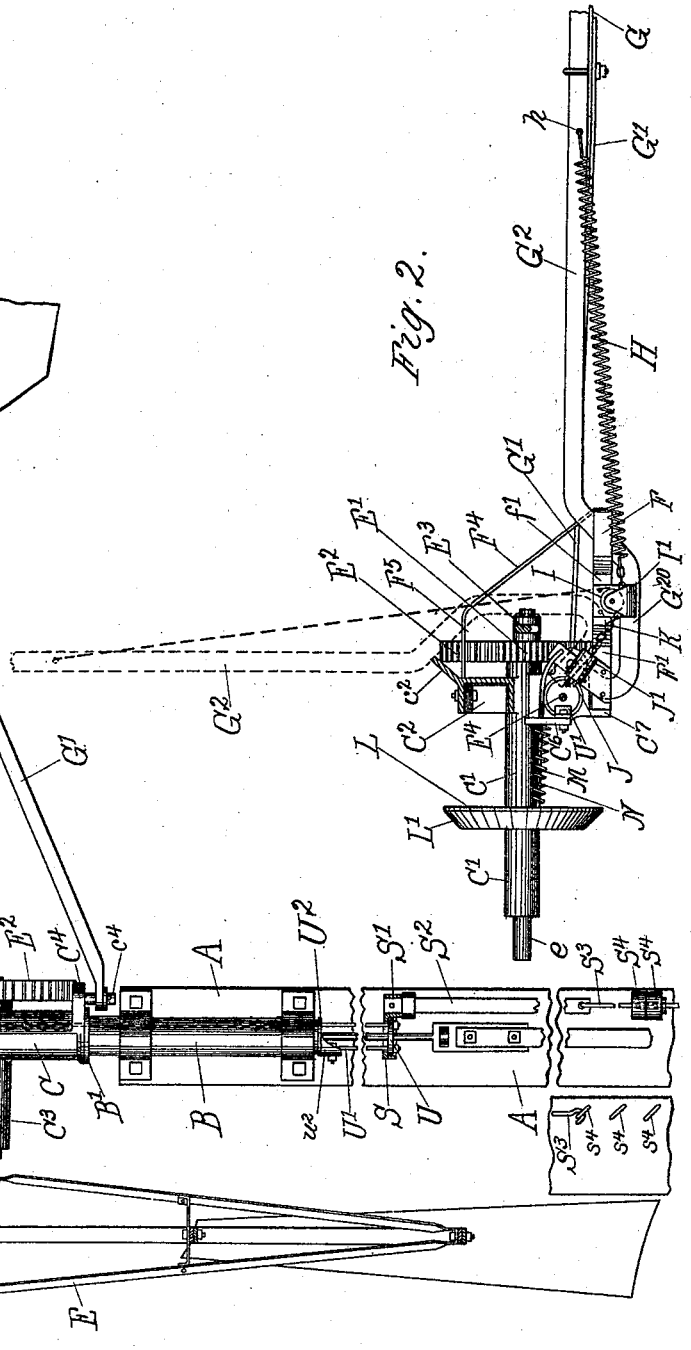


Fig. 2.



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UNITED STATES PATENT OFFICE.

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WINDMILL.

SPECIFICATION forming part of Letters Patent No. 492,104, dated February 21, 1893.

Application filed May 7, 1892. Serial No. 432,131. (No model.)

To all whom it may concern:

Be it known that I, THOMAS O. PERRY, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Windmills, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates to improvements in the mechanism for regulating the speed of windmills and throwing them into and out of the wind, both automatically and at will.

In the drawings,—Figure 1 is a side elevation of a windmill and its supporting turn-table, and mechanism by which it operates a pump rod, and having my improvements embodied in it; the general style and form being such as is shown in my patent, No. 431,851, dated July 8, 1890, and the parts of the mechanism not concerned in the improvements herein to be described may be understood by reference to that patent without particular description here, and such parts will only be referred to in this description in so far as is necessary to locate and explain the action of the parts embodying the improvement. Fig. 2 is a sectional plan of the mechanism concerned in the automatic regulation of the mill, section being made through the standard of the rocking beam and the pitman and pump rods at the plane indicated by the line 2—2 on Fig. 1.

A represents the upper end of the tower which supports the turn-table and the mill thereon.

B is the piece of pipe which is bound rigidly to the upper end of the tower, and constitutes its upper terminal and the support on which the turn-table rests and revolves. Said turn-table comprises the vertical tubular trunk C, which is passed onto the upper end of the tower terminal B, and stopped by a suitable flange B′ on the latter. It comprises also the horizontal bearings C′ for the windmill shaft, and suitable arms, lugs and projections to afford support and bearing for other parts of the mechanism, for example, the arm C^2 extending obliquely upward to afford the pivot for the rocking beam D, which is actuated by the pitman and actuates the pump rod.

E is the wind wheel; *e*, its shaft, journaled, as stated, in the arm C′ of the turn-table, and having the pinion E′ at the rear end, which meshes with the gear wheel E^2, whose shaft is journaled in the bearing C^3 on the turn-table, and which actuates the pitman E^3, and thereby, as stated, the rocking beam D, and the pump rod E^4. So much of the mechanism as is thus far described is substantially the same as that shown in my said former patent, No. 431,851. The parts which relate to this invention I will now describe more particularly.

G is the vane of the tail which controls the position of the wheel in respect to the direction of the wind. The tail-bone or stem comprises the flatwise bar G^2, extending horizontally from the vane G, and the vertically edgewise brace bar G′, extending obliquely downward from the vane. The upper bar G^2 is pivotally connected to the turn-table at the lug C^5 at the upper end of the trunk of the latter, and the lower or brace bar G′ is pivoted on the stud c^4 which projects downward from the lug C^4 at the lower end of the turn-table. The two pivots are slightly out of line, the lower being a little farther from the vertical axis of the turn-table than the upper, which gives the tail a little tendency to fall around toward a position parallel to the plane of the wheel, this position being shown in dotted lines in Fig. 2, and being the position toward which the tail passes as the wheel is thrown out of wind, either by the automatic action of the devices or at the will of the operator, as hereinafter explained. The upper part G^2 of the tail-bone is deflected at the part G^{20} to afford space for the mechanism by which the wheel operates the pump rod, as seen in Fig. 2, when the vane is thus swung aside. To the lug C^7, which projects from the upper end of the trunk C of the turn-table, and to the outer side of the arm C^2, the ends, respectively, of the yoke or frame F are made fast. Said yoke is made of flat iron bar bent and forged into the shape illustrated, having one end *f* bent downward and bolted to the lug C^7, and having, extending thence horizontally and rearward parallel to the plane of the shaft-bearing C, and above the deflected portion G^{20} of the bar G^2 of the tail-bone, the portion F′, with an up-raise *f*′, and being bent downward

at the part F^2 past the edge of the bar G^2, at a distance rearward from the axis of the turn-table, and then under the bar G^2, edgewise obliquely forward and toward the opposite side of the turn-table in the part F^4, and finally, directly forward in the part F^5, being secured, as stated, at the end, to the arm C^2 of the turn-table.

As a means of holding the tail or rudder G in position approximately at right angles to the plane of the wheel, and thereby holding the latter facing the wind, I provide the coiled spring H, which is connected at one end to the tail-bone at *h*, and extends thence to a guide whose support is rigid with the turn-table, and out of line from the point *h* to the pivot of the tail to the turn-table. This guide is the pulley I, which is mounted in a suitable bracket I′, secured upon the upraise *f′* of the yoke or frame F. For certain purposes of the construction, the spring H might be considered as fixed at the guide I, and it is so fixed in fact, except while the tension of the spring is being adjusted by the means hereinafter described, but for certain purposes of adjustment, it is desirable to adopt the construction which will be further described, comprising the cable or chain K, connected to the free end of the spring H, extending around the guide pulley I horizontally, and thence around a guide pulley J, which is mounted in the stirrup J′, secured to the horizontal portion F′ of the yoke F, in such position that the chain, running over said pulley, passes down through the tubular terminal B of the tower, and hence within the tubular trunk C of the turn-table, which is supported outside of said terminal B. The chain is connected at its lower end below the terminal B to the circular plate U, which is guided vertically and carried with the turn-table in its rotation by the bar U′, which extends up through the terminal B, and, emerging at the top, is secured to the turn-table at the lug C^6, as seen in Fig. 2; a collar U^2 being also provided seated within the terminal B, at the lower end of the latter, to which the bar U′ is made fast at the projecting lug u^2. The plate U is seated in the collar S, which is secured by means of its lateral lug S′ to the upper end of the flat bar S^2, which is suitably guided on the tower A, and has connected to it a rod S^3, which extends down to a point where it may be operated and latched, as hereinafter explained. The construction of the collar S, and the connections by which it is guided and reciprocated are substantially the same as those shown in my said patent, No. 431,851. On the lower end of the rod S^3, there may be lodged weights S^4 S^4 to any desired degree, according to the tension which it is desired to give the spring H, or, in lieu thereof, the rod may be pulled down and latched at any one of the several points s^4 s^4, for the same purpose.

The operation of this structure, as far as described, is that when the desired degree of tension has been imparted to the spring H by either of the methods described through the rod S^3 and its connections to the chain K, the wheel will be held facing the wind so long as the force of the wind on the wheel (whose horizontal axis extends one side of the vertical axis of the turn-table, so that it tends to swing around with the pressure of the wind in a familiar manner) is insufficient to overcome the tension of the spring and fold the tail around toward the position shown by dotted line in Fig. 2, and, as the wind increases and folds the tail, the wheel area presented to the wind diminishes, and thereby the speed of the wheel is measurably regulated according to familiar principles. But the advantage of this construction over others which have heretofore been employed, is that in the ordinary action of the wheel in such automatic regulation by variation of the angle at which it is presented to the wind, there is no movement of the chain which connects the spring to the fastening or weight at the lower end of the tower, but the spring operates precisely as if it were fast at the guide I. It will be easily understood that if the action caused the chain to pass back and forth over its guides with every change of position of the tail, the sensitiveness of the wheel to changes of wind, and the promptness with which it would be shifted and caused to automatically regulate its speed would be greatly impaired. When it is desired to set the wheel out of the wind, the rod S^3 will be released from the pin or relieved from the weight which holds it, and the slightest breeze will then fold the vane to a position parallel to the wheel, or, more correctly speaking, swing the wheel to a position parallel with the vane; and even in a perfect calm, the vane will tend to swing to a position parallel with the wheel by reason of the fact that its lower pivot is out of vertical line with the upper pivot, as above explained. The position of the guide I is such that the tension of the spring, exerted in a direct line between said guide and the point of attachment of the spring to the vane, shall be aside from the plane of the axis of the tail-bone pivot, and thereby tend to swing the tail toward a position at right angles with the wheel, both when the tail stands at the opposite position,—that is, parallel with the wheel,—and when it stands in position approximately at right angles to it. This determines its location as being on the opposite side from the wheel shaft of a vertical plane through the tail pivot, parallel with said shaft and on the opposite side from the wheel of a vertical plane through the pivot at right angles to the wheel shaft. And in order that the leverage favoring the action of the spring shall be greatest at the point where it is most needed, viz: where it is to act to start the wheel from the position of rest parallel with the vane, toward the position of action at right angles thereto, the distance of said guide from

the vertical plane at right angles to the wheel is greater than its distance from the other plane through the tail of the pivot, parallel to said shaft.

Another feature of this invention relates to the brake. The hub e^2 of the wheel E has the conical brake surface e', flaring at the end toward the turn-table, being open on that side; and on the bearing C′, which is overhung by the hub, I mount the brake L, which has the conical surface L′, facing the brake surface e', and adapted to seat thereon when the brake is moved axially toward the wheel. To the heel of the upper bar G^2 of the tail-bone, there is connected the rod M, which passes through and is guided in the lug C^6 on the upper end of the turn-table, said rod being connected at the forward end to the brake disk L, at the hub of the latter close to its bearing on the shaft bearing C′.

N is a spring coiled around the rod M, and reacting between the lug C^6 at the one end and the brake disk L at the other end, tends to force the latter toward the wheel E, and seat it on the brake seat e'. When the vane is in the position shown in full line in the drawings, or in any position in which the wheel E is operative under the action of the wind, the brake disk L is held away from the brake seat e' by the rod M, notwithstanding the tension of the spring N, tending to seat the brake, but as the wheel swings around so that the vane occupies relatively to it the position shown in dotted lines in Fig. 2, the brake approaches the seat, and will reach it just before the bar G^2 collides with the flange c^2 which is provided on the arm C^2 of the turn-table, for the purpose of arresting it at a position substantially parallel with the wheel. The friction of the brake will thereby be applied to the wheel tending to arrest its motion, by the same action which carries it out of the wind; and in order that, notwithstanding the brake reaches its seat before the arm G^2 reaches its stop, the said arm shall be permitted to reach the stop, the rod is loosely connected to the brake, so that it may have a little longitudinal movement after the seating of the brake, which will be effected by the reaction of the spring N, before it will itself be stopped by the brake, and in that little movement, the bar G^2 comes to its stop. This spring N, it will be observed, is exerting its tension upon the tail through the medium of the rod M, at all times until the brake is seated, and most strongly when the tail is projecting from the wheel, as in the position shown in the drawings. This spring, therefore, serves to start the tail away from that position toward the position shown in dotted lines, whenever the shut-off rod S^3 is released, so that the spring H is relaxed, and it therefore operates to set the wheel in inoperative position when there is no wind to assist, by causing the vane to swing when released from the tension of the tail spring H. It supplements, therefore, the action of gravity which tends to the same result, due to the position of the lower pivot of the tail, as above explained.

I claim—

1. In a windmill, in combination with a vertically pivoted turn-table, and the horizontally journaled wheel thereon, the tail vane vertically pivoted to the turn-table and provided with stops to limit its horizontal swing between a position at right angles and a position parallel to the wheel shaft; and a tail spring strained directly between a point on the tail remote from its vertical pivot, and a point on the turn-table which is outside of the angle between the two extreme positions of the tail, and on the opposite side from the wheel of a vertical plane through the tail pivot at right angles to the wheel shaft: substantially as set forth.

2. In a windmill, in combination with a vertically pivoted turn-table and a horizontally journaled wheel thereon, the tail vane vertically pivoted to the turn-table and provided with stops to limit its horizontal swing between a position at right angles and a position parallel to the wheel shaft; a tail spring connected to the tail at a point remote from its pivot, and the guide on the turn-table outside of the angle between the two extreme positions of the tail and on the opposite side from the wheel of a vertical plane through the tail-pivot at right angles to the wheel shaft; and connections from the spring passing over such guide and adapted to be secured and released at will; whereby the spring may at will be strained and secured under tension or left slack between its connection on the tail and such guide: substantially as set forth.

3. In a windmill, in combination with a vertically pivoted turn-table and the horizontally journaled wheel thereon, the tail vane vertically pivoted to the turn-table and provided with stops to limit its horizontal swing between a position at right angles and a position parallel to the wheel shaft; an extensible tail spring attached to the tail at a point remote from its pivot, and a flexible connection from the opposite end of the spring passing over a guide on the turn-table located outside the angle between the extreme positions of the tail and on the opposite side from the wheel of a vertical plane through the tail pivot at right angles to the wheel, and thence over suitable guides vertically; and suitable means for fixing the lower end of the vertically extending portion, whereby the spring may be stretched to any desired tension and secured, and when so stretched, operate as if attached to the first-mentioned guide: substantially as set forth.

4. In a windmill, in combination with the vertically pivoted turn-table and the horizontally journaled wheel thereon, the tail vane vertically pivoted to the turn-table and adapted to swing horizontally between a position at right angles and a position parallel to the

wheel shaft; a friction brake supported on the turn-table; a spring reacting between the turn-table and brake, tending to force the latter against the wheel; a link extending from the brake to the tail and connected to the latter at a point situated relatively to the tail pivot, so that the movement of the tail toward a position parallel with the wheel shaft withdraws the brake from the wheel and puts the spring under tension: substantially as set forth.

5. In a windmill, in combination with a vertically pivoted turn-table and the horizontally journaled wheel thereon; the tail vertically pivoted to the turn-table and provided with a stop to limit its horizontal swing in one direction at a position approximately parallel to the wheel; a friction brake supported on the turn-table, and a spring reacting between the turn-table and such brake, tending to force the latter against the wheel; a link connecting the brake to the tail at a point on the latter such that the movement of the tail toward a position parallel with the wheel, permits the brake to move toward the wheel, the connections of the link being sufficiently loose to permit the tail to reach its said stop after the brake is seated on the wheel: substantially as set forth.

6. In a windmill, in combination with the vertically pivoted turn-table and the horizontally journaled wheel thereon; the tail vane vertically pivoted to the turn-table and adapted to swing toward a position approximately parallel with the wheel; a spring connected to the tail and to the turn-table and tending, when under tension, to hold the tail toward a position parallel with the wheel shaft; connections from said spring whereby it may be put under tension and released at will; and a supplemental spring N, reacting between the turn-table and suitable connection from the tail tending to swing the latter toward a position parallel with the wheel; whereby, when the first spring is released, the second tends to set the wheel and tail parallel: substantially as set forth.

Signed at Chicago, Illinois, April 28, 1892.

THOMAS O. PERRY.

In presence of—

CHAS. S. BURTON,

JEAN ELLIOTT.