No. 649,712. Patented May 15, 1900.

O. WHEELER.

WIND WHEEL REGULATOR.

(Application filed July 25, 1899.)

(No Model.) 2 Sheets—Sheet 1

Fig. 1.

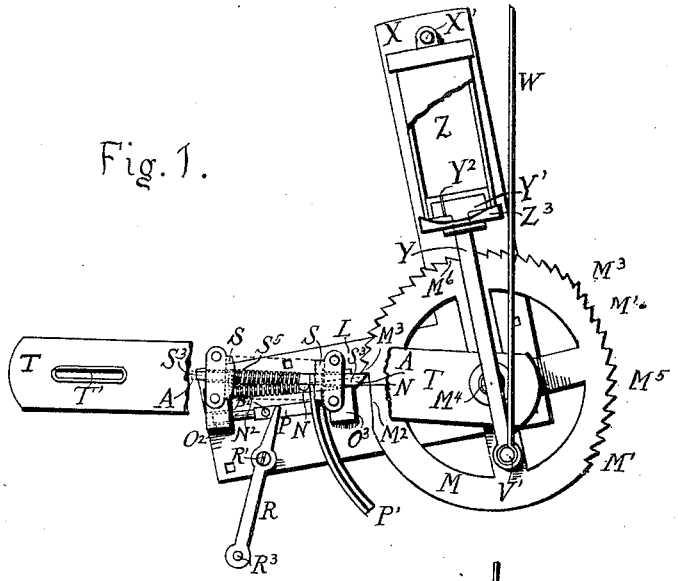
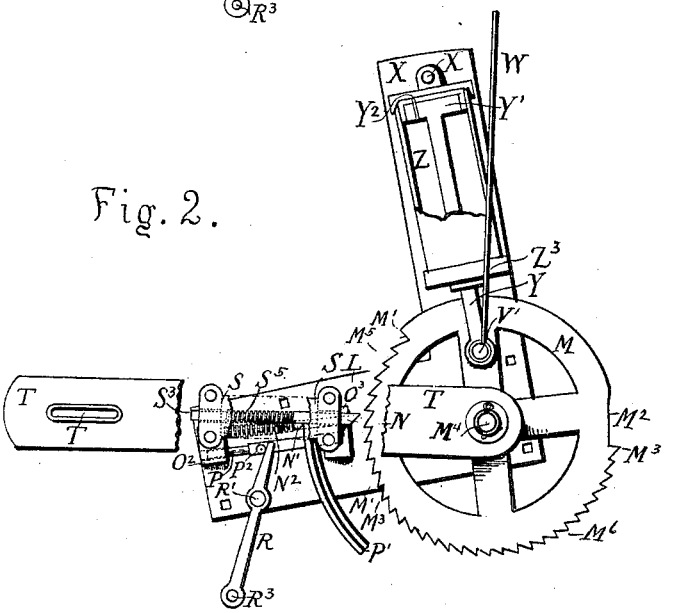


Fig. 2.



WITNESSES:

G. H. Sumner,

H. W. Hanson.

Orville Wheeler
INVENTOR

BY

G. C. Kennedy.
ATTORNEY.

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Fig. 3.

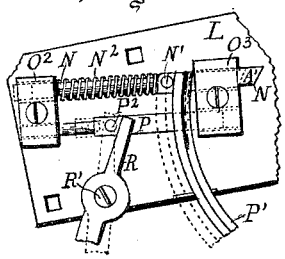


Fig. 4.

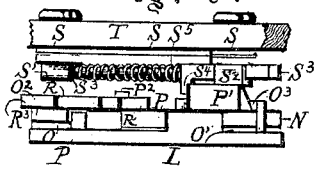
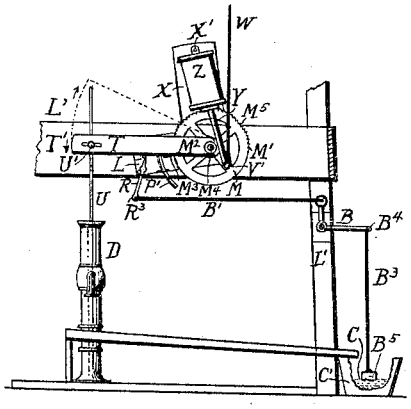


Fig. 5.



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ATTORNEY.

UNITED STATES PATENT OFFICE.

ORVILLE WHEELER, OF WAVERLY, IOWA.

WIND-WHEEL REGULATOR.

SPECIFICATION forming part of Letters Patent No. 649,712, dated May 15, 1900.

Application filed July 25, 1899. Serial No. 725,038. (No model.)

To all whom it may concern:

Be it known that I, ORVILLE WHEELER, a citizen of the United States of America, and a resident of Waverly, Bremer county, Iowa, have invented certain new and useful Improvements in Windmill-Regulators, of which the following is a specification.

The object of my invention is to improve windmill-regulators by preventing the sudden clashing and jarring of the windmill when it is thrown out of gear; and the invention consists of such new and useful features of construction and combinations of parts as are hereinafter shown and claimed.

In the accompanying drawings, Figure 1 represents a side elevation of a pawl-and-ratchet regulating mechanism provided with a pneumatic brake device in combination, parts of both being broken away to show the construction and connection of the parts located behind the same. Fig. 2 is a like view of the same, except that the ratchet-wheel thereof is turned a half-revolution from the position shown in Fig. 1. Fig. 3 is an under side view of the more intricate parts of the machine in operative position and relation. Fig. 4 is a back side view of the pallet and middle portion of the driving-arm and their respective connections. Fig. 5 is a view of my improved windmill-regulator mounted on a tower and operatively connected with a windmill, (not shown,) a pump, and a water-tank.

Like letters of reference indicate corresponding parts throughout the several views.

L is the base-plate of the machine.

M is a ratchet-wheel having a portion of its teeth, as those included between the letters M′, depressed below the remainder thereof, as indicated by the dotted circle in Fig. 1, and being provided with a peripheral depression M^2 at the outer termination of the more prominent teeth, (those included between the letters M^3.) About one-third of the periphery of the ratchet-wheel is unprovided with teeth. The wheel M is mounted on the horizontal bearing M^4, which is rigidly connected with the base-plate L.

N is a longitudinally-reciprocating detent adapted to engage with the teeth M^5 M^6 of the ratchet-wheel M and prevent the same from revolving in one direction, and this detent is mounted in slideways O O′, which are covered with caps O^2 O^3. N′ is a stud projecting from the outside of the detent N. N^2 is a detent-actuating spring coiled about the detent N and included between the end of the slideway and cap O O^2 and stud N′. P is a longitudinally-reciprocating bar also mounted in the slideways O O′ and serving intermediately to connect the detent N with a pallet S^3, to be described hereinafter.

P′ is a cross-piece integral or rigidly connected with the bar P and curved in the form of a segment of a circle to serve as a guide for the pallet-stud, to be described hereinafter.

P^2 is a stud projecting transversely and horizontally from the outside of the bar P.

R is a lever engaging with the stud P^2 for simultaneously disengaging the detent N and pallet, to be described, from the ratchet-wheel M, if desired, and this lever is mounted on the pivot R′.

S is a bearing-plate, from which project the pallet-bearings S′ S^2.

S^3 is a longitudinally-reciprocating pallet adapted to engage with the teeth M^5 M^6 of the ratchet-wheel M and revolve the same in a direction opposite to that prevented by the detent N.

S^4 is a stud projecting from the outside of the pallet S^3.

S^5 is a pallet-actuating spring coiled about the pallet S^3 and included between the bearing S′ and stud S^4.

T is a driving-arm whereto the bearing-plate S is firmly secured, and this arm is pivotally connected with the bearing M^1 and the pumping-rod U through the media of the horizontal slot T′ therein and the pin U′.

Y is an ungearing-arm pivoted at one end thereof to the ratchet-wheel M. This arm forms a piston-rod, as described below.

W is an ungearing-wire, one end whereof is connected with the arm Y at the point V′.

B is a bell-crank mounted in the ordinary way on the tower L′.

B′ is a wire connecting the upper end of the bell-crank B with the lower end of the lever R by means of a hole R^3 therein.

B^3 is a wire depending from the hole B^4 in the bell-crank B.

B^5 is a float, of wood or other suitable material, attached to the lower end of the wire B^3 and supported by water C in the tank C'.

D is a pump in connection through the pumping-rod U with the arm T.

X is a portion of the base-plate L.

Z is a pneumatic cylinder suspended from the base-plate X on the pivot X' and is adapted to oscillate freely thereon to accommodate the varying positions of the piston Y' and piston-rod Y, caused by the revolution of the ratchet-wheel M. The piston Y' is within the cylinder Z, and the piston-rod Y passes through the head Z^3 and forms an ungearing-arm, connected to the ungearing-wire W by means of the pivot V', as above described.

Y^2 is a hole of minute diameter passing through the piston Y'.

Fig. 1 shows the machine with the parts in the position they assume when the same is at rest, the tank filled, and the windmill (not shown) out of gear.

Considering the machine as shown in Fig. 1 as the starting-point, its operation is as follows: Whenever any considerable amount of water is withdrawn from the tank C' by the drinking of animals or otherwise, the float B^5 descends and, through the media of the wire B^3, bell-crank B, wire B', lever R, reciprocating bar P, and cross-piece P', forces back and disengages the detent N and pallet S^3 from the ratchet-wheel M and retains them in the position indicated by dotted lines in Figs. 1 and 3, whereupon a weight (not shown) held in suspension by the wire W while taut descends and throws the windmill into gear and at the same time draws the wire W upward, thereby carrying the arm Y and revolving the ratchet-wheel M to the position shown in Fig. 2. The mill having swung into the wind and being now in gear commences and continues to revolve and drive the pumping-rod U until the tank C' is filled, when the float B^5 is lifted by the water in the tank, thereby releasing the lever R and allowing the detent N and pallet S^3 to reëngage with the ratchet-wheel M. The mill will continue to revolve and to reciprocate the pumping-rod U, which reciprocates the driving-arm T (as indicated by the double arrows and dotted lines) and with it the pallet S^3, which engages with the teeth of the ratchet-wheel M and revolves it, together with the arm Y, to the position shown in Fig. 1, thereby through the wire W throwing the mill out of gear and leaving the machine and its connections in precisely the same positions as at the outset. As the pallet S^3 descends with each stroke of the driving-arm T, the detent N prevents the ratchet-wheel M from being revolved downward by the action of the pallet and weight (not shown) operating upon the arm Y through the medium of the wire W. Obviously the detent N does not prevent the pallet S' from revolving the ratchet-wheel M and the arm Y upward or in a direction opposite of that just mentioned. The wire W remains slack while the mill is pumping, the ratchet-wheel M being in the position shown in Fig. 2 and the detent N and pallet S' being held out of engagement therewith, as indicated by the dotted lines A A' in Figs. 1 and 3, until the float B^5 rises and through the intermediate connections forces the lever R to release the detent N and pallet S^3, when the springs N^2 S^5 will cause their points to reëngage with the teeth M^5 of the ratchet-wheel M, as shown in Fig. 2. The effect of the first few strokes of the driving-arm T, detent N, and pallet S^3, after the two latter come into engagement with the depressed teeth M^5 in Fig. 2, is simply to take up the slack of the wire W preparatory to throwing the mill out of gear. During the operation of taking up the slack of the wire W, to which reference has just been made, the ratchet-wheel M oscillates on its bearing sufficiently to cause the points of the detent N and the pallet S^3 and the teeth of the ratchet-wheel M, when the teeth thereof are all of the same length, to grind against each other and wear the points of the detent, pallet, and teeth. These depressed teeth and the peripheral depression M^2 obviate the wearing away of the points of the detent, pallet, and teeth. When the ratchet-wheel, driven by the pallet S^3, begins to enter upon its revolution, the piston Y' is, by means of the piston-rod Y, pushed upward within the cylinder Z. The air confined within the upper end of the cylinder is compressed by the piston; but the small orifice Y^2 in the piston permits the escape of enough air to allow sufficient elasticity to the air confined, thus rendering easier the reverse movement of the piston. The air-cushion in the space above the piston forms a brake which prevents any sudden jar to the windmill at the time it becomes ungeared through the action of the regulator, which is when the detent N arrives at the point N^3 in the ratchet-wheel M. The pneumatic cylinder Z is suspended with the piston-head downward in order to prevent rain or sleet obtaining entrance to its interior and obstructing its operation. By combining this pneumatic brake with the other parts of the regulator, I have perfectly adapted it to work noiselessly and without injury to the windmill through sudden jarring or slamming caused by force of the wind at the moment of ungearing.

What is claimed as new is—

1. In combination, in a windmill-regulating mechanism, a ratchet-wheel having a portion of its teeth depressed below the remainder thereof and provided with a peripheral depression at the outer termination of the more prominent teeth, a detent adapted to engage therewith and prevent the same from revolving in one direction, a pallet arranged to engage with said ratchet-wheel and revolve the same in a direction opposite to that prevented by said detent, a vertically-reciprocating driving-arm whereon the said pallet is mounted and whereby it is operated, a bar connecting said detent and pallet, a lever for operat-

ing said bar and the parts connected therewith, a pneumatic cylinder provided with a piston having a small perforation, a piston-rod attached to said piston and to said ratchet-wheel, a suitable base-plate, and proper bearings for uniting and supporting all of said parts in operative position and relation, substantially as shown and described.

2. In combination, in a windmill-regulating mechanism, a rachet-wheel, a detent adapted to engage therewith and prevent the same from revolving in one direction, a pallet arranged to engage with said ratchet-wheel and revolve the same in a direction opposite to that prevented by said detent, a bar connecting said detent and pallet, a lever for operating said bar and the parts connected therewith, a pneumatic cylinder provided with a piston having a small perforation, a piston-rod attached to said piston and to said ratchet-wheel, a suitable base-plate, and proper bearings for uniting and supporting all of said parts in operative position and relation, substantially as shown and described.

3. In combination, in a windmill-regulating mechanism, a ratchet-wheel, a detent adapted to engage therewith and prevent the same from revolving in one direction, a pallet arranged to engage with said ratchet-wheel and revolve the same in a direction opposite to that prevented by said detent, means for operating said detent and pallet and the parts connected therewith, a pneumatic cylinder hung pivotally from the end opposite its piston-head and provided with a piston having a small perforation, and a piston-rod attached to said piston and to said ratchet-wheel, all substantially as shown and described.

Signed by me at Waterloo, Iowa, this 17th day of July, 1899.

ORVILLE WHEELER.

Witnesses:
H. W. HANSON,
A. Q. BRECKENRIDGE.