

(No Model.)

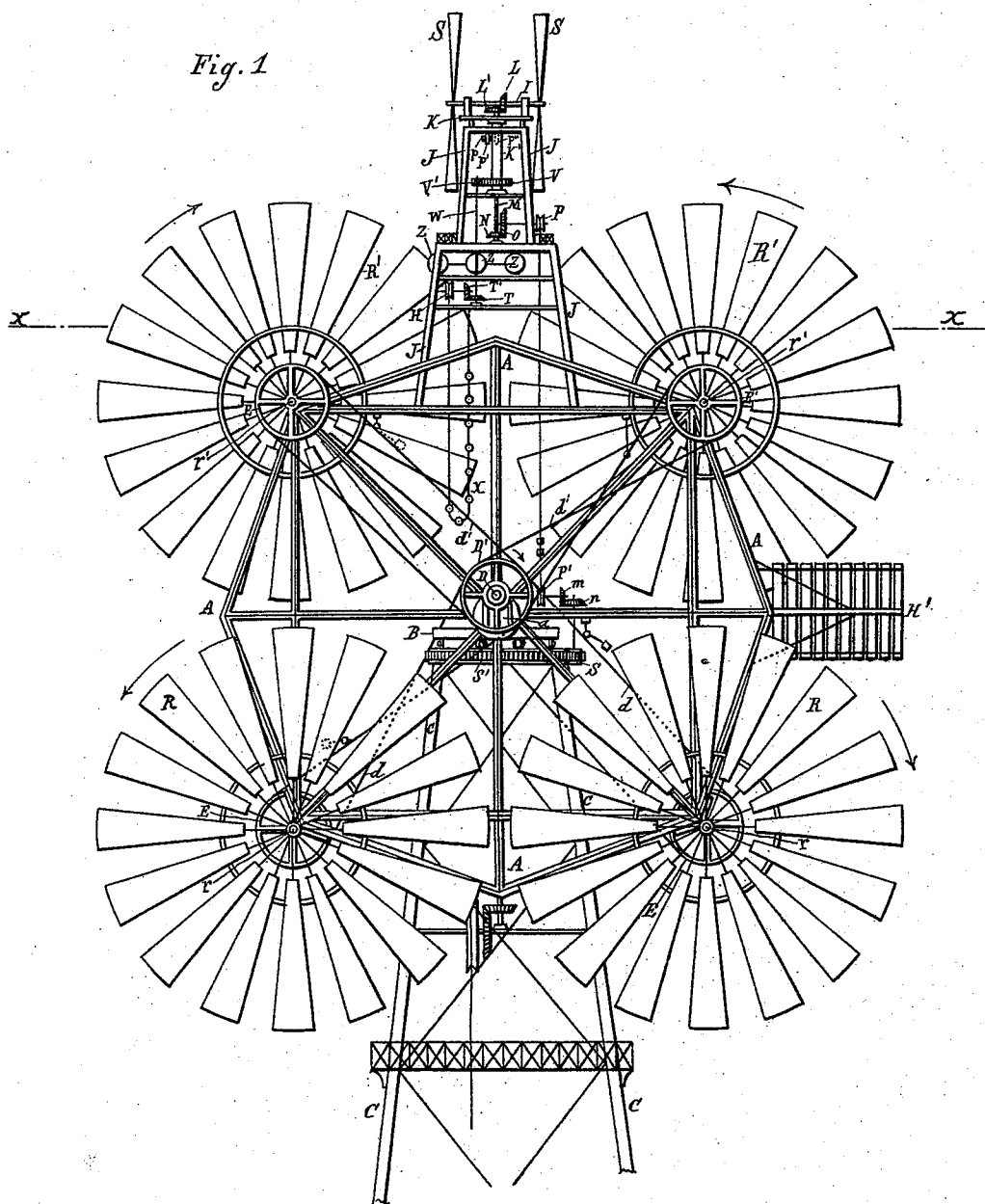
2 Sheets—Sheet 1.

E. C. B. TOUZELIN.
WINDMILL.

No. 527,738.

Patented Oct. 16, 1894.

Fig. 1



Witnesses
William Miller
Chas. E. Pensen.

Inventor
Emmanuel C. B. Touzelin
by *Hauß & Hauß*
His Attorneys

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UNITED STATES PATENT OFFICE.

EMMANUEL CHARLES BORROMÉE TOUZELIN, OF ARGENTEUIL, FRANCE.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 527,738, dated October 16, 1894.

Application filed March 8, 1894. Serial No. 502,885. (No model.)

To all whom it may concern:

Be it known that I, EMMANUEL CHARLES BORROMÉE TOUZELIN, a citizen of the Republic of France, and a resident of Argenteuil, France, have invented a new or Improved Windmill, of which the following is a specification.

My invention has for its object to construct windmills having any desired winged surface, being at the same time very movable and very strong, self-trimming and capable when it is desirable, automatically to moderate the pressure of the wind.

In order that my invention may be clearly understood, I refer to the annexed drawings, in which—

Figure 1 illustrates an elevation of a four wheel mill. Fig. 2 is a plan view of my invention upon the line x, x , Fig. 1. Fig. 3 is a section of the top of the main tower on which the platform of the polygonal frame rotates. Fig. 4 is a diagram of a model of a mill with more than four wheels.

In all the figures the same letters of reference indicate corresponding parts.

My machine must have no less than four wheels to catch the wind but it may have any multiple of four wheels (see Fig. 4) of any size and pattern.

In the annexed drawings R and R' indicate the wind wheels. The shafts r and r' of all these wheels are placed on a polygonal or circular frame A A A A constructed like a water wheel. The central piece of this frame A A A A is a sheet iron beam or iron lattice-work a, a embodied with a pierced platform B carried by wheels and having a vertical tube b fixed in its middle. These flanged wheels turn upon a circular rail placed on the top of the iron tower C, C, C, C. The tube descends into this tower where it is maintained by collars, the last one of which has the shape of an annular socket b' . The result of these arrangements is that the frame A A A A is allowed to pivot around a vertical axis which is the imaginary axis of the tower C, C, C, C and that it cannot have any other motion.

Half the number of the wheels R and R' are placed in front and at the base of the frame of the mill; the other half at the back part and at the top. The letter R indicates

the fore wheels and the letter R' the hind ones. The consequence of this arrangement is that the center of gravity and the center of pressure of the whole of the four wheels, lie exactly on the axis itself around which the mill is pivoted and very little above the fulcrums of the mill. It will further be seen how this system of wheels catches the wind automatically.

It is seen in the drawings that two of the wheels, a front one and a hind one revolve in the same direction and the two others in the opposite direction; but it is to be observed that they may be disposed so as all to revolve in the same direction.

The shafts r and r' are provided with grooved pulleys E and E' on which are placed endless ropes d, d and d', d' catching pulleys D' keyed on a central shaft D. The said central shaft D borne by the frame and shown as revolving from left to right bears a bevel wheel or a pinion g gearing with another wheel or with a pinion g' keyed upon the head of a vertical shaft G. This latter is placed inside the tube b on the axis of the tower and stands on its point in a socket g'' fixed on the tower (see Fig. 3) and held under the pinion g' by a collar fixed to the platform B or to the tube b . The motion of this shaft G may be then used for any purpose.

On the right side of the frame A A A A is a wing H' parallel to the wheels R and R'. It is intended to prevent the mill from coming out of the wind through the resistance opposed to the motive power by the shaft G. In fact as the shaft D is placed on mobile bearings, being of one piece with the mobile frame A A A A, the pinion g might come out of its place by turning around the pinion g' instead of imparting to it its motion. The frame A A A A would then pivot with the pinion g from left to right and the mill would thus lose the wind (except the effect produced by two wheels S, S, mentioned farther on). By means of the wing H' this inconvenience is avoided, as it receives a pressure opposed to the shifting just mentioned which keeps the mill to the wind, so that the shaft G is compelled to revolve under the impulse of the pinion g . This wing H' is made of vertical blades fixed slantingly on horizontal arms and can be of any suitable size.

After having struck these blades the air is allowed to escape through their intermediary spaces. (See Fig. 2.) My mill catches the wind automatically by means of two wheels 5 S of equal size, seen at the top of the machine and freely exposed to the wind in a direction perpendicular to the wheels R and R'. They are disposed as follows:—The frame A A A A is crowned by a two storied 10 turret, both stories being of unequal width and embodied with said frame and having its top crowned by a circular rail. On the top there is a platform similar to the platform B held in the same manner by flanged 15 wheels and also maintained in its middle by a vertical tube K'. This tube descends inside the turret and is secured there by collars like the tube in the tower C, C, C, C, in such a manner that this combination of the 20 platform and of the tube is enabled to rotate around the imaginary axis of the turret; but under ordinary circumstances the tube is held fast by a stay in the position shown on Fig. 1 and cannot move unless under a 25 strong wind as will be explained farther on. The platform K holds on bearings a horizontal shaft I at the ends of which are symmetrically keyed the two driving wheels S already mentioned. The motion of these wheels S is 30 imparted by a pinion L to a bevel wheel L' keyed on a vertical shaft M placed inside the tube K' as is the case for the shaft G inside the tube b. The shaft M also imparts the motion by a pinion N gearing with a bevel 35 wheel O to a horizontal shaft having a grooved pulley P. An endless rope encircles this pulley and another similar one P' keyed on another horizontal shaft and is kept in tension by a roller. This shaft also bears a pinion 40 m gearing with a bevel wheel n keyed on a last vertical shaft which latter bears a last pinion s gearing with a circular rack s' fixed on the tower. It is now seen that the wind cannot perceptibly alter its direction without 45 the mill's pivoting automatically; but the mill must also be forced to turn in the same direction as the wind. Now it is easy to see that it suffices to produce this result that the pinion s should revolve on itself from left to 50 right when the direction of the wind has shifted toward the right, and reversely in the contrary case. This result is easily obtained by simply crossing or not crossing the endless ropes of the pulleys P, P'. Such result being obtained, the two wheels R will al- 55 ways be at the front of the mill while working. In fact it will be seen with a little attention that if the wind blew in a contrary direction to that of the arrow, the mill being 60 placed as in Fig. 2 and if the wheels S were to revolve, they will not stop before having imparted half a revolution to the mill, which would bring forward again both wheels R.

I shall now describe the apparatus by means 65 of which the platform K and the tube K' are kept motionless, and explain how the mill automatically regulates the action of the wind

and the speed of the wheels R and R' by means of that apparatus. The tube K' has an arm p and a toothed wheel V. The arm p 70 p strikes against a stay p' fixed to the turret. The toothed wheel V gears with a pinion V' keyed on a vertical shaft W and is in such relation with that pinion that it can only effect a quarter of a revolution or a little more, while 75 the pinion U' and the shaft W effect one or several revolutions at will. The said shaft W is provided with horizontal arms bearing at their ends hollow hemispheres Z Z, all placed in the same direction. This arrange- 80 ment constitutes a wind mill with a vertical axis constantly catching the wind, and rotating from right to left. The said shaft W bears in its lower part a bevel wheel T gearing with another one exactly similar T' keyed 85 on a horizontal shaft, which shaft bears a deeply grooved pulley H upon which is fixed the end of a rope. The other end of the same rope is fastened to a set of balls X suspended close to the pulley. Usually a small part 90 only of this set weighs on the rope, but it is clear that if the shaft W happens to rotate the rope coiling in the groove of the pulley H will bear a weight more and more heavy 95 so as to increase resistance. The result of this arrangement is that the tube K' together with the platform K, the auxiliary mill with hemispheres Z and the shaft W, are dependent on each other and that the whole is maintained motionless as much by the stays p' as 100 by the weight upon the rope.

The action of this apparatus as well as that of the wheels S with their transmission may now be very easily understood. In ordinary winds both wheels S remain in their position 105 on the turret J J and rotate only when the wind changes direction, in which case, as has been described their motion is transmitted to the pinion s. The rotation of the said pinion on the fixed rack s' causes the mill to turn 110 so as to catch the wind with greater or less speed according to the relation established by the gearings between the pinions s and the wheels S. If the wind blows stronger and if its pressure on the concavity of the hemispheres Z Z causes the shaft W to rotate in spite of the resistance of the weighted rope, 115 the said shaft W by means of the gearing aforesaid causes the platform K to turn at an angle corresponding to the force of the wind. 120 Consequently the wheels S take a slanting position to the direction of the wind and begin to rotate till they become parallel again to the said direction. Their rotation causes the mill to turn at an angle equal or almost 125 equal to that at which the platform K has rotated. The mill is then partly out of the wind and consequently less affected by it. If the force of the wind still increases and surpasses the increasing resistance opposed by the set 130 of balls, the shaft W continues to turn, the platform K rotates again and consequently the wheels S begin again to place the mill out of the wind. This evolution may be con-

tinued until the platform has made a quarter of a circle or a little more. The wheels R and R' are then parallel to the direction of the wind or nearly so. When the force of the wind has decreased, the weight of the balls causes the mill provided with hemispheres Z to revolve in the opposite direction and the platform K with the wheels S also. These wheels being again in a slanting position to the wind begin to rotate thus bringing back the main mill to its regular position.

I may remark that the platform K and the two wheels S may be replaced by a frame provided with four wheels disposed like the mill itself and placed at right angles to it. All the transmissions shown in my drawings are only given as examples and may be altered if necessary;—and the turret J J is crowned at the first floor with a gallery of which a small part only is seen, to avoid unnecessary details in the drawings.

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

1. The combination of a system of wheels, being multiples of four, of a surface of any desirable extent, one half in front and at the bottom of the mill and the other half at the

back and at the top and in such a manner that the center of pressure as well as of gravity of the whole system are situated on the axis of the tower and close to the plane of suspension with a frame A A A A in the shape of a water wheel pivoted around a vertical axis, as above substantially described and illustrated in the annexed drawings.

2. The combination with a frame A, of a rolling platform K, having a tube K', a shaft I mounted on the platform and having the wheels S secured thereto, the wheels R, R', mounted on the frame, the pinion N driven by the shaft I, the toothed wheel O, the pulleys P, P', the endless belt connecting said pulleys, the pinion *m*, the toothed wheel *n*, the pinion *s*, the rack *s'*, the stops *p*, *p'*, the vertical shaft W, the hollow hemispheres Z, the pinion V', the toothed wheel V, the beveled wheels T, T', the pulley H, and a rope suspended from the latter and provided with weights X, substantially as and for the purposes described.

EMMANUEL CHARLES BORROMÉE TOUZELIN.

Witnesses:

LOMBARD TOUNEVILLI,
E. DAMORTIER.