

(No Model.)

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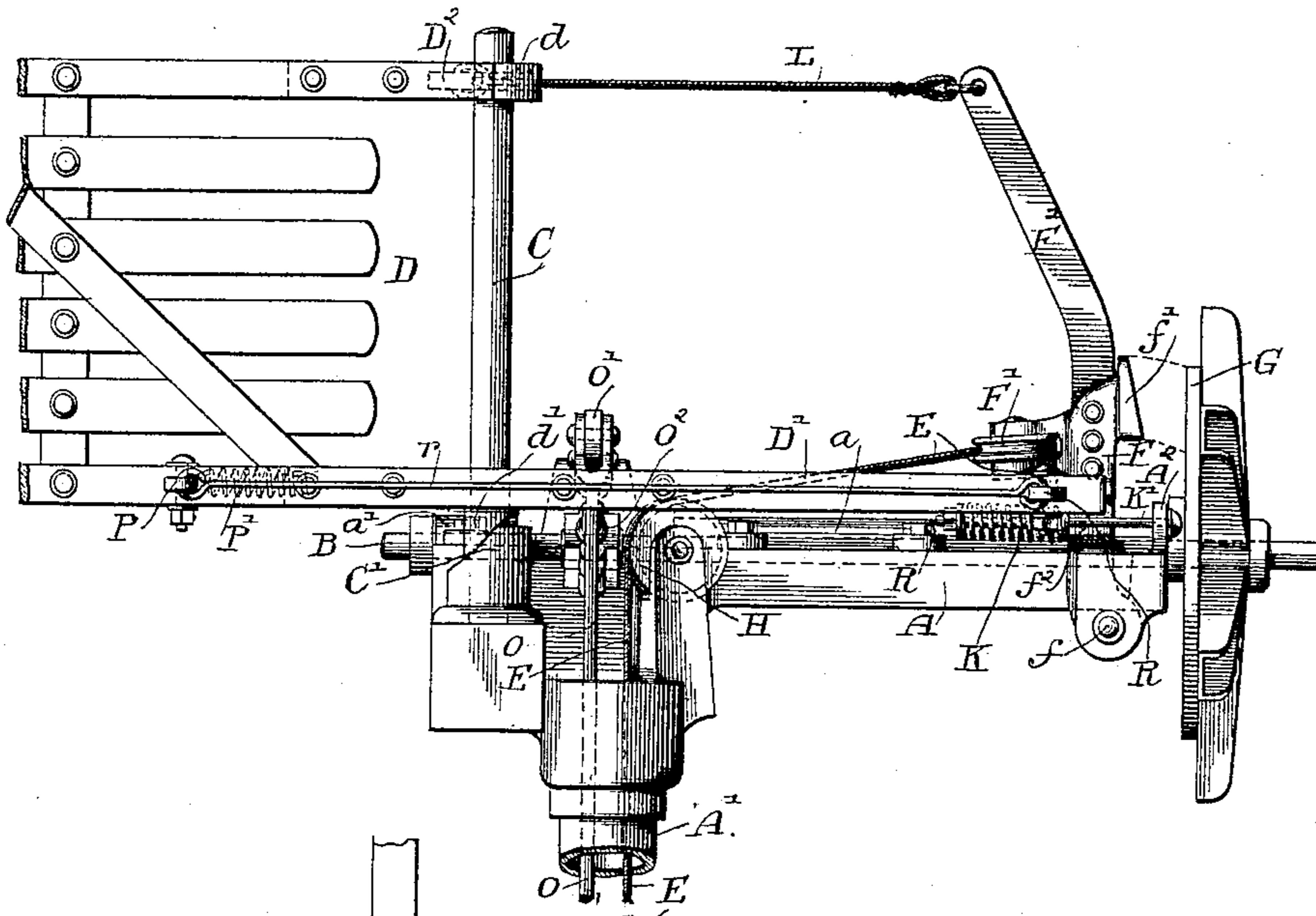
A. R. & C. B. DEMPSTER.

WINDMILL.

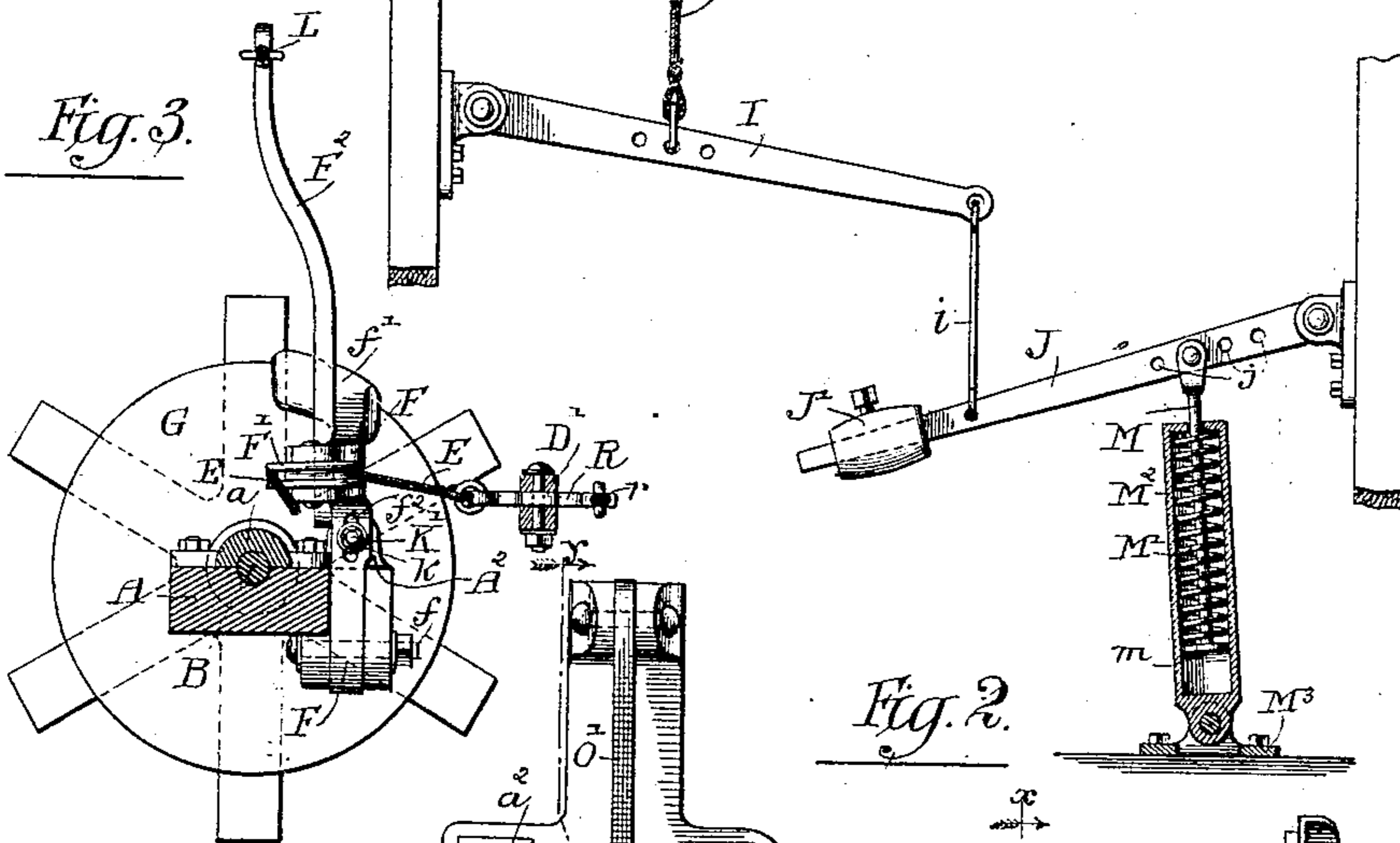
No. 390,009.

Patented Sept. 25, 1888.

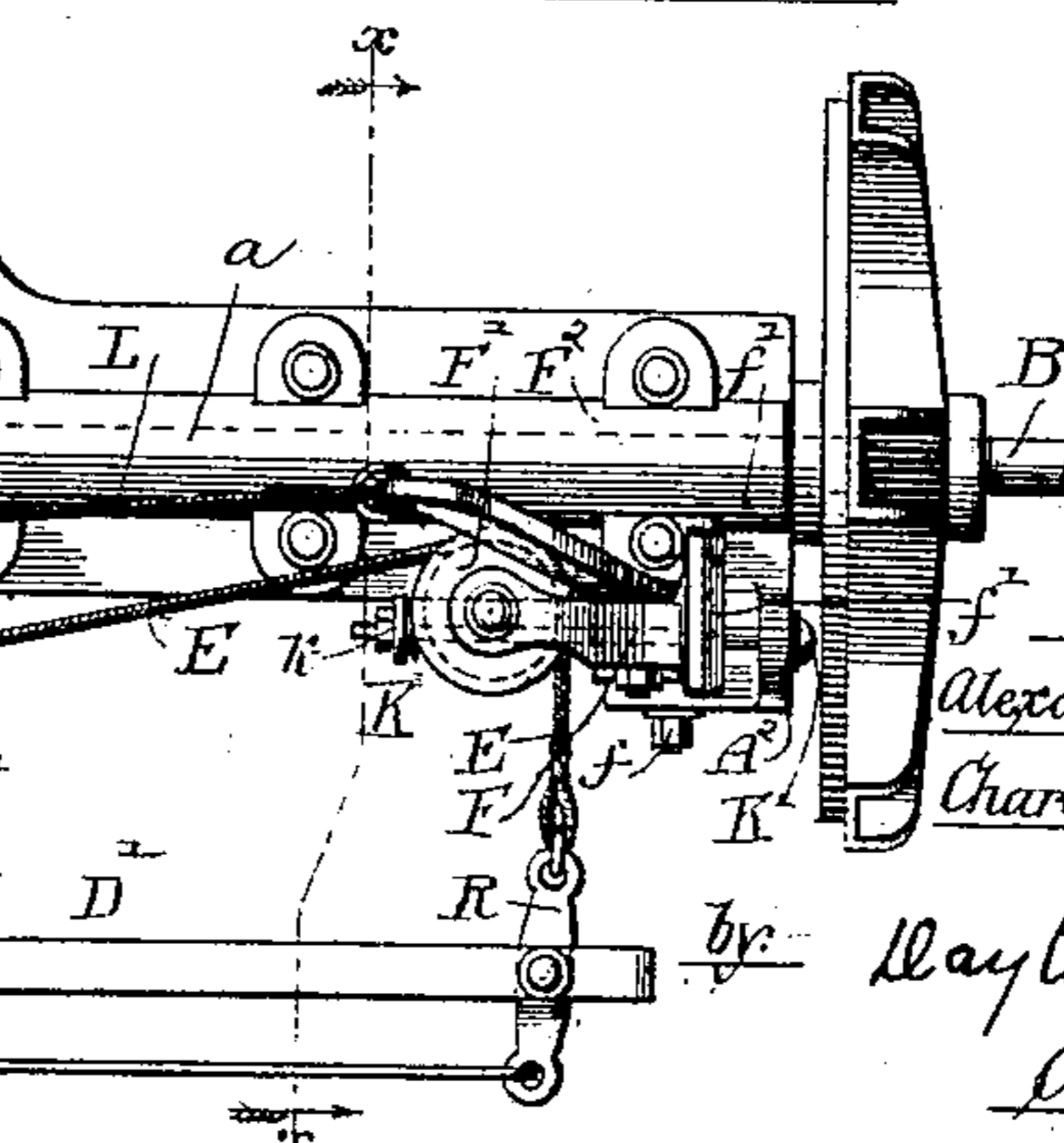
*Fig. 1.*



*Fig. 3.*



*Fig. 2.*



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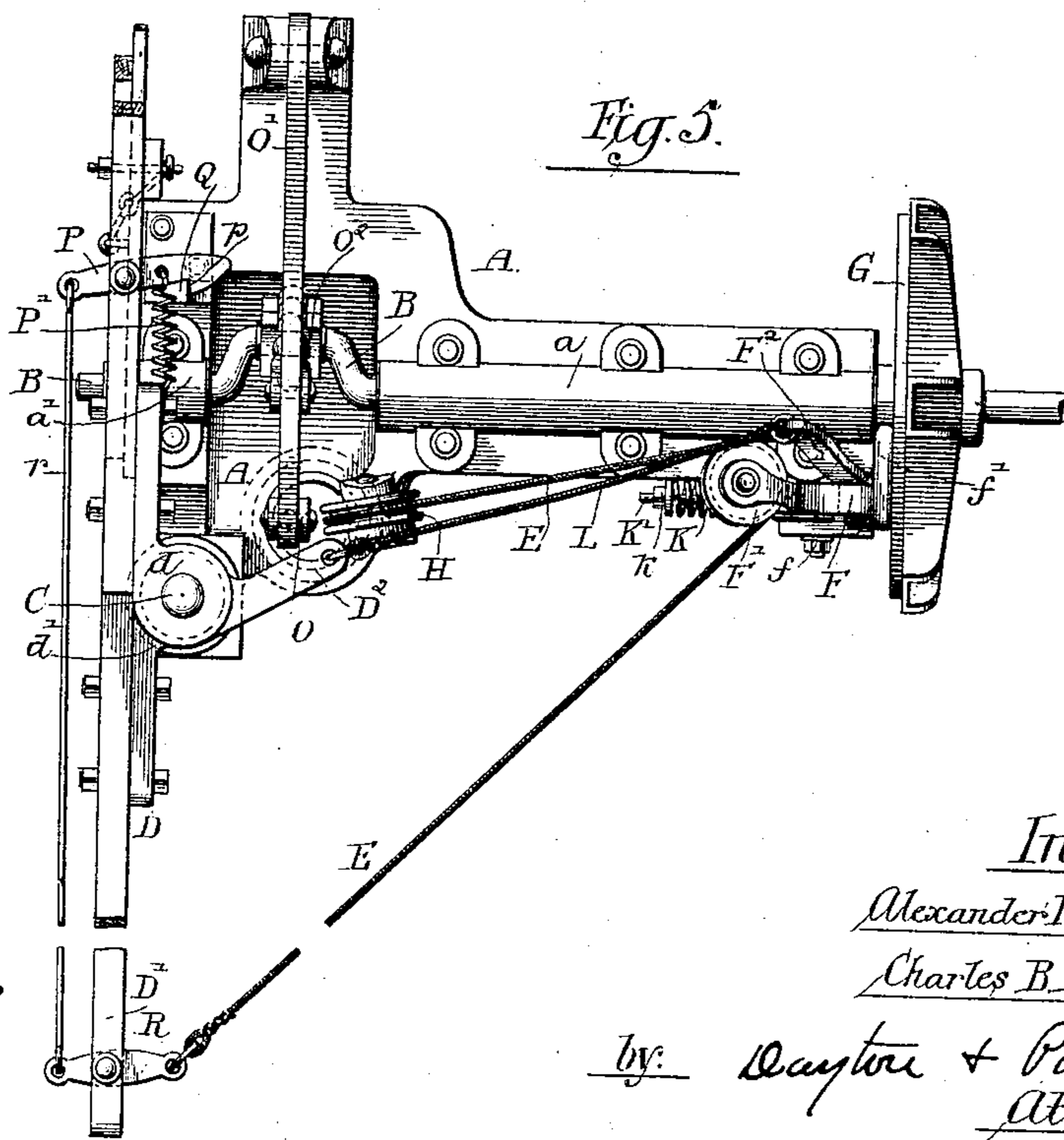
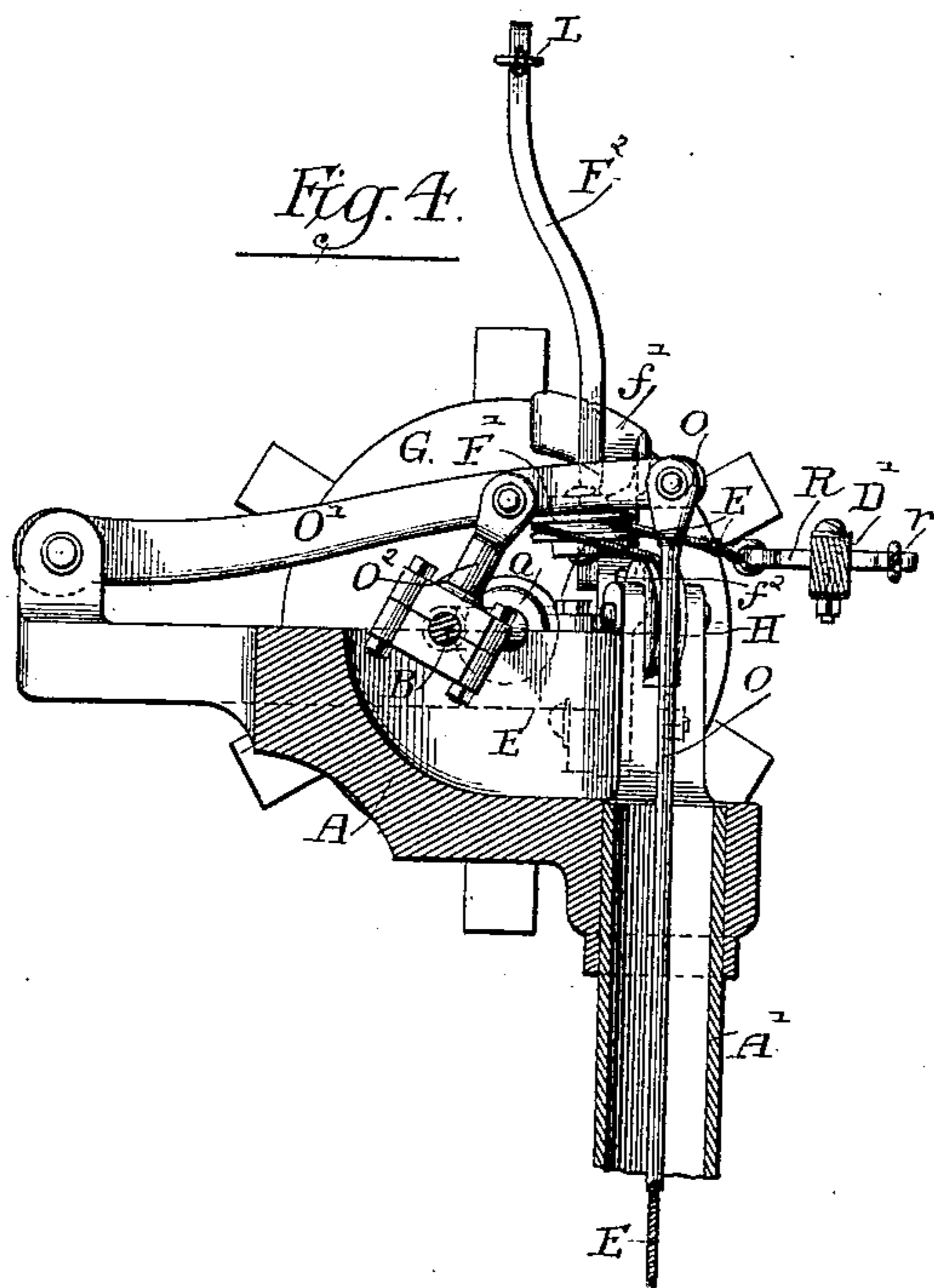
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*Witnesses:*

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# UNITED STATES PATENT OFFICE.

ALEXANDER R. DEMPSTER AND CHARLES B. DEMPSTER, OF BEATRICE,  
NEBRASKA.

## WINDMILL.

SPECIFICATION forming part of Letters Patent No. 390,009, dated September 25, 1888.

Application filed July 26, 1887. Serial No. 245,310. (No model.)

*To all whom it may concern:*

Be it known that we, ALEXANDER R. DEMPSTER and CHARLES B. DEMPSTER, of Beatrice, in the county of Gage and State of Nebraska, have invented certain new and useful Improvements in Windmills; and we 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 that class of solid-wheel windmills in which the wheel is constructed to swing automatically more or less out of the wind and to thereby adjust itself to the force of the latter.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

The invention may be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a side view of the principal working parts of a mill constructed in accordance with our invention. Fig. 2 is a plan view of the same. Fig. 3 is a vertical cross-section taken upon line *xx* of Fig. 2, looking toward the wind-wheel. Fig. 4 is a detail sectional view taken upon the vertical plane indicated by the line *yy* of Fig. 2. Fig. 5 is a fragmentary plan view of the mill, illustrating the changed position of the wind-vane.

As shown in said drawings, A is the turn-table, which is attached to the top of a hollow rotating shaft, A', which latter is mounted in suitable bearings in the windmill-tower in a familiar manner.

Upon the top of the turn-table A bearings *a* and *a'* are provided for the horizontal wheel-shaft B, the axis of the wheel being located slightly at one side of the vertical axis of the turn-table, so that the pressure of the wind upon the wheel will tend to rotate the latter, so as to bring it edgewise to the wind in a well-known manner.

A vertical cylindric rod or stake, C, is fixed in the turn-table, and extends upwardly therefrom to form a support for a rotating vane, D. The said rod C is located upon the turn-table at a point somewhat in the rear of its axis and at some distance laterally therefrom, these

parts being arranged in a manner heretofore common and well known.

D is the wind-vane, which is pivoted to the stake C by bearings *d* *d'*. Said bearings are made to rotate freely and also to slide vertically upon said stake. The rotary motion of the vane on its pivot is limited when it is turned to throw the wheel out of the wind by an arm or bracket, *a*<sup>2</sup>, bolted to the turn-table, and in the opposite direction by a chain or coupled rods, *a*<sup>3</sup>.

The vane D is supported and given vertical movement by means of an annular casting or sleeve, C', surrounding the lower part of the stake C, and provided with a cam shaped upper edge made of inclined or spiral form, and engaging the lower bearing, *d'*, of the vane in such manner that when the turn-table is swung around to bring the wheel into the wind the vane will be lifted, and when the force is withdrawn the weight of the vane will cause the turn-table to rotate back to its former position, these parts being constructed and arranged to operate in the same manner as the similar parts shown in a prior patent, No. 324,092, granted to us upon the 11th day of August, 1885.

The turn-table is rotated in a direction to bring the wheel into the wind, (or, in other words, with its flat face to the wind,) in opposition to the tendency of the weight of the vane acting upon the inclined support of the latter to throw the wheel out of the wind, by means of a chain or cable, E, which is attached to the extremity of a rigid arm, D', which is rigidly attached to the vane and extends forward from the axis to the latter, or in a direction from said axis opposite to that in which the vane extends.

In the said prior patent a chain is shown which operates in the same manner and for the same purpose as the chain E. In the device shown in the said patent, however, the chain is arranged to pass from the end of the arm directly to a guide-pulley upon the table, and thence over another guide-pulley downwardly to the ground. The mill herein shown embraces a brake device controlled by the said chain and constructed to automatically check the motion of the wind-wheel when the latter is thrown edgewise to the wind by the slacken-

ing of the chain. Such brake device as herein shown is made as follows:

F is a vertically-arranged brake-lever, which is pivoted at  $f$  to the turn-table at a point adjacent to the wind-wheel, and is provided with a bearing-surface or brake-shoe,  $f'$ , arranged to act against a bearing-ring, G, which is attached to the wind-wheel concentrically with the shaft of the latter, preferably by being bolted to the arms thereof in the manner shown in the drawings. Upon the upper part of said brake-lever is mounted a pulley, F'. The chain or cable E, which is attached to the arm D', passes from the said arm over the said pulley F', and thence over a guide-pulley, H, which is located adjacent to the hollow shaft A', and is so arranged as to guide the chain downwardly through the said hollow shaft.

The brake-lever F may be thrown toward and held in contact with the bearing G upon the wheel by any suitably-arranged spring, applied to move the brake-lever in the manner described. In the particular construction herein illustrated a coiled spring, K, is employed for this purpose. Said spring K is placed about a rod, K', which is secured at one end in a lug or projection, A<sup>2</sup>, located upon the turn-table at a point between the lever and the wind-wheel, and is extended through a slot,  $f^2$ , in the brake-lever F, the spring K being placed between a head or nut,  $k$ , upon the said rod K' and the rear surface of the brake-lever, or that remote from the wheel, so that said spring tends to throw the free or upper end of the lever toward the bearing-ring. The head  $k$  upon the rod K' is preferably screw-threaded and adapted to engage a screw-thread upon the rod in order to enable the pressure of the spring to be adjusted when desired. When in this construction the chain is drawn downwardly to bring the wind-vane parallel with the wind-wheel shaft and to thereby swing the wheel into the wind, the brake will be pulled back from engagement with the wheel and the latter allowed to turn freely. When, however, the chain is released and the vane thereby allowed to swing about its pivot and the turn-table to swing around to bring the wheel edge-wise to the wind, the brake will be released and will act upon the wheel and hold the latter from turning.

In windmills of the general character described, in which the wind-vane and the turn-table are held in position to keep the wheel in the wind by a chain, an automatically-acting regulating or controlling device or governor has heretofore been provided by connecting with the lower end of the chain a weight or weights adapted to hold the wheel-face to the wind in ordinary winds, but to yield upwardly and allow the wheel to swing more or less out of the wind as the latter increases in force. The present invention embraces a spring connected with the chain to yieldingly hold the wheel in the wind, such spring being capable of use either with or without a weight, as will hereinafter more fully appear.

In the particular construction of the regulating devices shown in the drawings the chain E is attached at a convenient height above the ground to a lever, I, which lever is pivoted to a convenient part of the frame or tower. The free end of the lever I is connected with a second lever, J, preferably by means of a rod or chain,  $i$ , and the said lever J is provided with an adjustable weight, J', which weight is movable longitudinally upon the lever, whereby the resistance to the movement of the wheel out of the wind may be varied in the same manner as by the employment of the similar weight shown in said prior patent. As shown in said patent, however, a series of weights are attached to said lever in such manner as to commonly rest upon a suitable support, and said weights are lifted successively as the wheel turns away from the wind, so as to maintain a constantly-increasing force, acting to retard the wheel when moving in that direction. As herein shown, a spring is located between the lever J and the adjacent stationary part of the mill, said spring acting with a continually-increasing resistance to the movement of the lever as the latter is lifted by the action of the chain. In the particular construction illustrated the said spring and its connections are made as follows:

M is a rod, which is connected at its upper end with the lever J, and is provided at its lower end with a head,  $m$ .

M' is a spiral spring, which is placed around the rod M between the head  $m$  and the upper end wall of a tubular casing, M<sup>2</sup>, in which tubular casing the said rod and disk are constructed to slide. The lower end of said casing M<sup>2</sup> is pivoted to a bracket, M<sup>3</sup>, attached to the floor or a suitable support. The lever J is desirably provided with several holes  $j$ , in either of which the pivot connecting the rod M thereto may be secured, so that the spring may act with greater or less force upon the lever, as desired.

When the mill is running, the brake F is held free from the wheel and the vane parallel with the wind-wheel shaft by the connection of the chain with the weighted lever J. The wheel may be stopped by disconnecting the chain E from the lever I, or by detaching the said lever I from the lever J, or by lifting the lever J and fastening it in an elevated position. In either case the wheel will turn out of the wind and remain inoperative, while at the same time the brake will be released and thrown against the wheel by the spring which actuates it.

As a further and special improvement in windmills of the character above set forth, we have provided the brake-lever F with an upward prolongation or arm, F<sup>2</sup>, which is connected by means of a chain, L, with an arm, D<sup>2</sup>, attached to the upper bearing,  $d$ , of the vane at right angles with the latter. The chain L is made of such length that when the wheel is face to the wind and the brake-lever disengaged from the wheel said chain will be

taut, so that the movement of the free end of the brake-lever toward the bearing-ring G will immediately throw the vane into position to swing the wheel out of the wind. By this construction will be insured the prompt swinging of the vane, so as to throw the wheel quickly out of the wind at the time the chain is released.

In a windmill operating in the general manner described the wind-wheel shaft may have operative connection with the plunger-rod by any suitable connecting devices. As illustrated in the accompanying drawings, the crank-shaft B is connected to the plunger-rod O by means of an oscillating lever, O', which is pivotally connected at one end with the turn-table, and is connected with the crank of the shaft by means of a pitman, O<sup>2</sup>.

As a further improvement in windmills, we have provided in the mill shown means for holding the vane locked against the turn-table when the wind-wheel is swung out of or edgewise to the wind, thus preventing the wind-wheel from jerking or slamming in unsteady or whirling winds. Said device comprises a detent or catch adapted for connecting the wind-vane with the turn-table when the wheel is out of the wind, together with means whereby the said detent or catch may be actuated from the ground. In the particular embodiment of this part of the invention shown in the accompanying drawings, P is a detent-lever, which is pivoted to the vane near the lower part of the latter, and is provided with a hooked end, p, constructed to engage an upwardly-projecting part or lug, Q, upon the top of the turn-table. Near the free end of the arm D' of the vane is located a lever, R, which is pivoted at its ends to the arm, and connected at its upper end with the detent-lever P by means of a rod, r. The rope or chain E, by which the wheel is turned in the wind, is in this instance, instead of being attached directly to the arm D', secured to the inner end of the lever R, or that nearest the turn-table. The detent-lever P is held by means of a spring, P', in position for its hook to engage the projection Q, so that when the rope E is released and the turn-table allowed to swing about its pivot the detent-lever will (when the vane is parallel with the face of the wheel) engage the projection and remain engaged therewith during the time the wheel is out of operation. When, however, the rope or chain E is drawn downwardly for pulling the wheel into the wind, the rope will act first to draw the inner end of the lever R in a direction to release the hook of the detent-lever from the projection Q. After the release of the vane is accomplished the chain is pulled down until the vane is brought parallel with the wheel axis.

It is entirely obvious that the catch or connection between the vane and the turn-table may be located otherwise than in the particular place shown, and that means for disconnecting the parts may be attached and operated in a different manner than herein illus-

trated. The accompanying broad claim upon the said catch or detent therefor is not limited to the particular means shown for actuating the catch or detent or to the exact construction herein illustrated in said catch or detent.

One of the principal features of novelty in our invention is comprised in a construction embracing a brake applied to control the motion of the wind-wheel and means for actuating the brake, whereby the brake may be applied when the wind-wheel is thrown out of the wind. As far as this broad feature of the invention is concerned, the brake may either be operated automatically, so that it will be applied to the wheel in the act of turning the wheel out of the wind, as occurs in the construction shown, by the action of the chain which operates both the vane and the brake, or by a device which is independent of the other operative parts of the apparatus.

Inasmuch as an automatically-acting brake is novel and has important advantages in point of convenience and economy, such automatically-acting brake is herein broadly claimed as part of our invention, without restriction to the exact mechanism shown in the brake itself or in the devices for actuating it—as, for instance, the brake may be arranged to act against some rotating part connected and turning with the wheel other than the ring G shown.

The use, in connection with a chain or rope for drawing the wheel into the wind, of a spring holding the chain or rope yieldingly, so that the wheel may swing more or less out of the wind, according to the force of the latter, is also new with us, and herein broadly claimed, without restriction to its use in connection with levers or a weight or weights.

We claim as our invention—

1. The combination, with a turn-table and a wind-wheel and vane mounted thereon, of a brake arranged to act upon a rotating part connected with the wind-wheel, a spring applied to throw the brake into operative position, and means for holding the brake free from the said rotating part, constructed to release the brake when the wheel is thrown out of the wind, substantially as described.

2. The combination, with a turn-table and a wind-wheel and vane mounted thereon, of a brake constructed to act upon a rotating part connected with the wind-wheel, a spring applied to throw the brake into engagement with the said rotating part, and a chain connected with the vane and the brake, whereby the wheel may be drawn and held out of the wind and the brake released from the wind-wheel, substantially as described.

3. The combination, with a turn-table, a wind-wheel, and a vane pivoted to the turn-table, of a brake mounted upon the turn-table and acting upon a rotating part connected with the wind-wheel, a pulley connected with said brake, a spring applied to throw the brake into contact with the wind-wheel, and a chain connected with the vane and passing

around the said pulley, substantially as described.

4. The combination, with a turn-table, a wind-wheel mounted thereon, and a vane piv-  
5 oted to said turn-table, of a brake-lever piv-  
oted to the turn-table and acting upon a rotat-  
ing part connected with the wind-wheel, a  
chain connected with the vane and passing  
over a pulley upon the said brake-lever, means  
10 connected with said chain for holding the vane  
in position to bring the wheel face to the wind,  
a spring applied to the brake-lever to throw  
the latter toward the said rotating part con-  
nected with the wind-wheel, and a chain or  
15 rod connecting the said brake-lever with an  
arm upon the vane, whereby, when the brake-  
lever is thrown toward the wind-wheel, the  
vane will be carried into position to throw the  
wheel out of the wind, substantially as de-  
20 scribed.

5. The combination, with a turn-table and  
a wind-wheel and vane mounted thereon, of  
a brake mounted upon the turn-table and con-  
structed to act upon a rotating part connected  
with the wind-wheel, a spring for actuating 25  
said brake, a pulley upon the brake, a spring-  
catch upon the vane engaging a projection  
upon the turn-table, and a chain connected  
with the vane and passing around said pulley  
upon the brake, said chain being also con- 30  
nected with the spring catch, substantially as  
described.

In testimony that we claim the foregoing as  
our invention we affix our signatures in pres-  
ence of two witnesses.

ALEXANDER R. DEMPSTER.

CHARLES B. DEMPSTER.

Witnesses:

CHARLES E. WHITE,  
JOHN HENDERSON.