A. T. BOON.

Wind-Mills.

No. 142,324. Patented September 2, 1873.

Fig. 6.

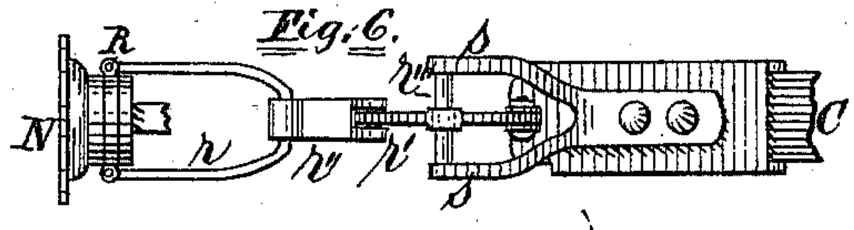


Fig. 2.

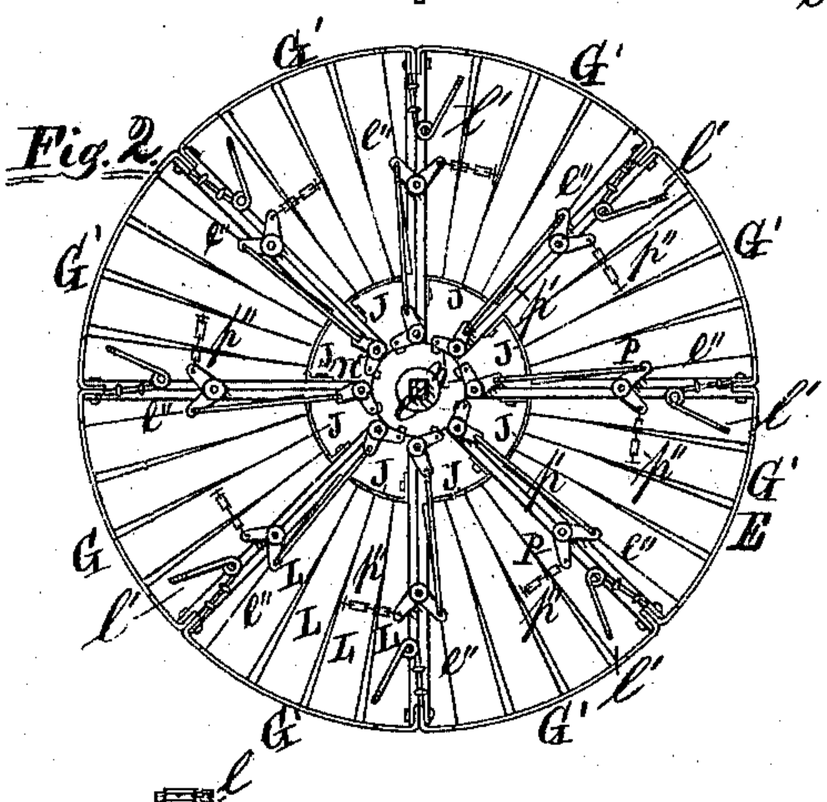


Fig. 3.

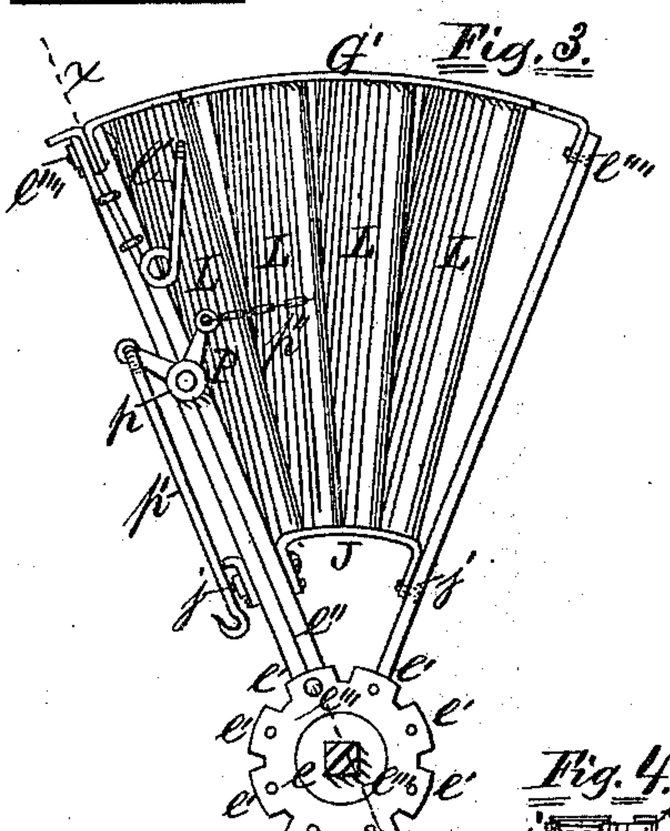


Fig. 4.

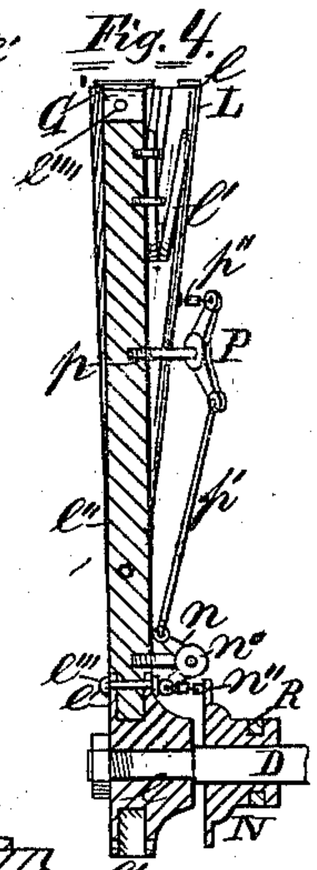


Fig. 1.

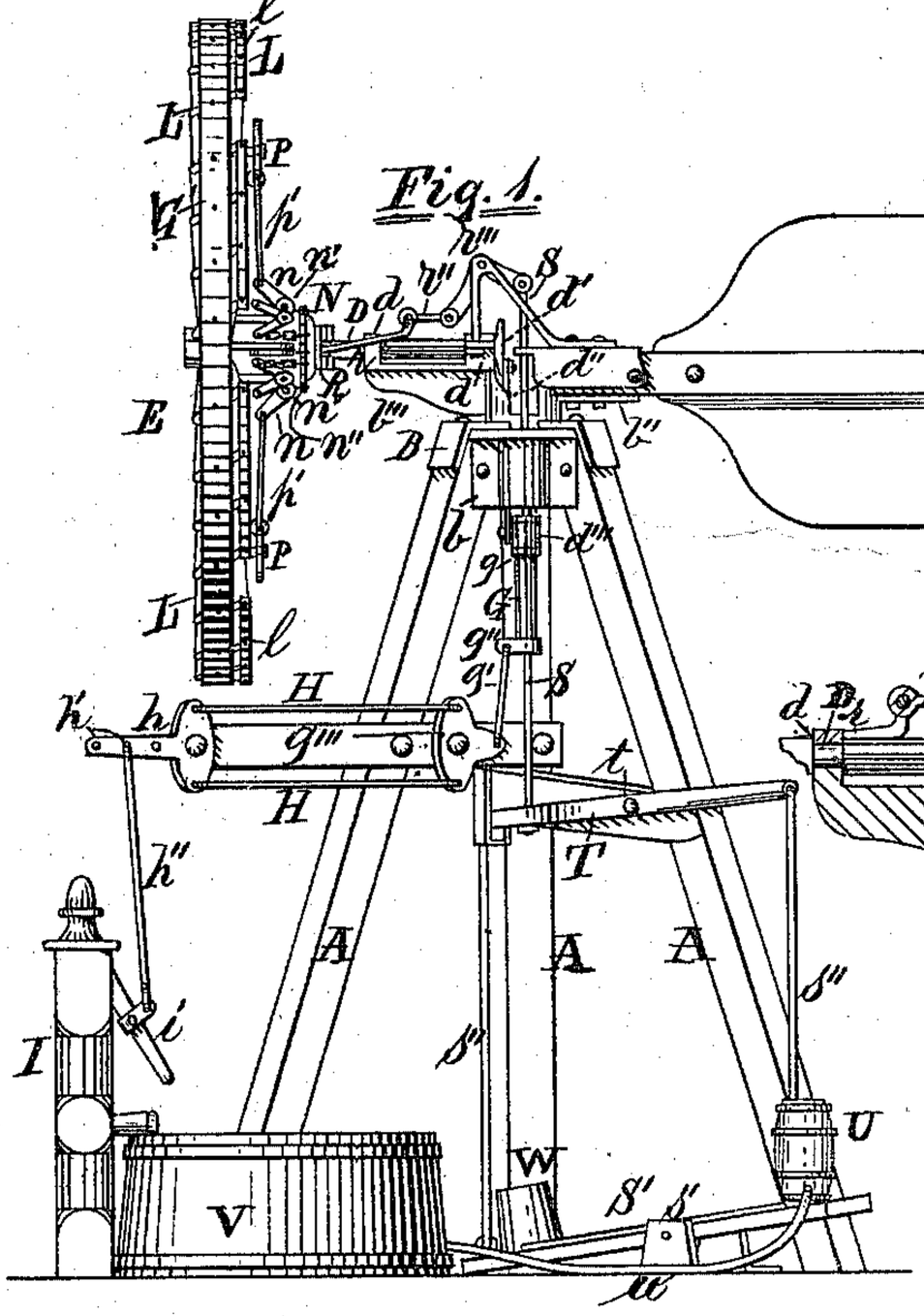


Fig. 5.

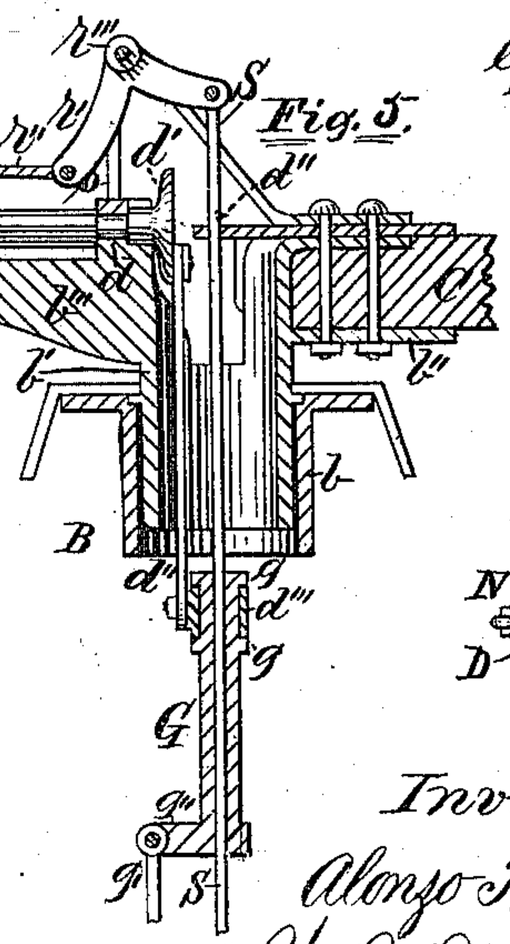
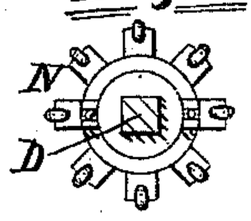


Fig. 7.



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Inventor,
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by A. B. Richards, Atty.

UNITED STATES PATENT OFFICE.

ALONZO T. BOON, OF GALESBURG, ILLINOIS, ASSIGNOR OF ONE-HALF HIS RIGHT TO TRUMAN O. JONES, OF SAME PLACE.

IMPROVEMENT IN WINDMILLS.

Specification forming part of Letters Patent No. **142,324**, dated September 2, 1873; application filed April 4, 1873.

To all whom it may concern:

Be it known that I, ALONZO T. BOON, of Galesburg, county of Knox and State of Illinois, have invented certain Improvements in Windmills, of which the following is a specification:

The nature of my invention relates to improvements in that class of windmills in which the machinery which constitutes the motor proper is rotary around a vertical axis; and the invention consists, first, in the arrangement of a spring with each section of sails for the purpose of regulating the velocity under varying force of wind; secondly, it consists in the arrangement of devices for transmitting motion from the main driving-shaft to any other desired purpose requiring a vertical reciprocating movement; thirdly, it consists in an arrangement of devices for transmitting the aforesaid reciprocating motion to any other desired mechanism at any reasonable distance; and, fourthly, it consists in an arrangement of devices for stopping and starting the wind-wheel, automatically, at any desired time, all as hereinafter fully described.

Figure 1 is a side elevation of a machine embodying my invention. Fig. 2 is a rear elevation of the wind-wheel. Fig. 3 is an enlarged view of one section of Fig. 2. Fig. 4 is a sectional view of Fig. 3 on the line *x x*, and also a sectional view of the sliding sleeve and part of the main driving-shaft. Fig. 5 is a vertical central sectional view of the turn-table and the adjacent parts on a plane parallel with the axis of the main driving-shaft, in position as at Fig. 1. Fig. 6 is a detached top view of devices above the turn-table. Fig. 7 is a rear elevation of the sliding sleeve on the main drive-shaft.

Letters A represent the frame supporting the working devices. B is a turn-table, supported on the frame A, and consists of an outer fixed ring, *b*, and an inner rotating ring, *b'*, secured therein so as to allow it to rotate freely, and at the same time be held securely vertically. *b'' b'''* are upwardly and outwardly projecting arms from the upper end and opposite sides of the ring *b'*. C is the vane or tail attached to and carried on the arm *b''*. D is the main driving-shaft, having suitable bearings, *d d*, on the arm *b'''*, and carrying the wind-wheel E on its outer end, and a crank-wheel, *d'*, on its inner end, and over the opening through the turn-table B. *d''* is a pitman or connecting-rod from the crank-wheel *d'* to a collar, *d'''*, between bearings *g g* on a tubular shaft, G. *g'* is a connecting-rod from a lug, *g''*, on the lower end of the tube G to one arm of a T-shaped crank, *g'''*. H H are rods connecting the opposite arms of the crank *g'''* with the opposite arms of another T-shaped crank, *h*, the foot-arm of which is pierced with holes *h'*.

The crank *g'''* may be pivoted to any suitable part of the frame A, and the crank *h* may be pivoted to an arm projecting therefrom, or to a post or any other suitable device at any reasonable distance therefrom.

h'' is a rod or bar connecting the body-arm of the crank *h* with the handle *i* of an ordinary pump, I, and its upper end may be hooked into either of the series of holes *h'*, to give a greater or less movement to the handle *i*, as desired.

The wind-wheel E is formed as follows: *e* is a metallic hub, with sockets *e'*, for the reception of the inner ends of the radial arms *e''*, which are secured therein by screw-bolts *e'''*. G' represent a series of segmental bands, forming the rim of the wheel E by connecting the outer ends of the arms *e''*, to which they are secured by bolts *e''''*, as plainly shown at Fig. 3. J are also a series of segmental bands secured to the arms *e''* at about one-third of their lengths from the hub *e* by bolts *j*, as shown at Fig. 3. Letters L represent the sails, pivoted at their outer ends in the rim G', and at their inner ends in the bands J, with their axes of rotation nearest their edges, which are shown to the left hand at Fig. 1, and are arranged in sets between the arms *e''*. In the drawings four sails are shown in each set; but more or less may be used. The sails of each set are connected by a bar, *l*, either on their outer ends, as shown, or on their edges, and so attached that the sails of a set may all rotate on their axes, and being so connected will all rotate by the same increments. *l'* are springs, attached one to

each of the arms e'', with their free ends resting against the rear side of an adjacent sail, their pressure against the sail being regulated to hold the set of sails at the most favorable obliquity to the plane of the wind-wheel for the action of the wind, and to maintain the set of sails at a determinate angle of inclination under an ordinary pressure of the atmosphere, and so regulated that under a higher atmospheric pressure the springs by yielding will allow the set of sails to turn on their axes and reduce the amount of surface exposed to the wind in proportion to the excess of pressure, and thus serve to maintain a tolerably uniform rate of rotation. N is a sleeve on the shaft D, arranged to slide freely longitudinally thereon, but held firmly in the direction of rotation, so that it is rotated with the shaft. n are bell-cranks, pivoted on standards n' projecting from the rear side of the arms e'', and connected by chains n'' with projections from the periphery of the sliding sleeve N. P are bell-cranks, pivoted to standards p, also projecting from the rear side of the arms e'', but farther out from their inner ends. p' are rods connecting one arm of the cranks n with one arm of the cranks P, and p'' are chains connecting the other end of the cranks P with one of the sails L. R is a collar, fitted in an annular groove on the sleeve N, remaining stationary while the sleeve N is rotated, but carrying the sleeve with it when drawn in the direction of the axis of the shaft D. r is a yoke connecting the collar R with one arm of a bell-crank, r', by means of a link, r''. The bell-crank r' has an axial shaft, r''', pivoted in standards $s\ s$ projected upward from the vane-shaft and from the bearings for the shaft D. S is a connecting-rod extending from the other end of the crank r', downward through the turn-table B and tubular shaft G, to one end of a lever, T, pivoted to the frame A at t. S′ is a supplemental lever to the lever S, and is pivoted to a base, s', near its central portion, and is connected by rods $s''\ s''$ at its ends with the ends of the lever T. U is a vessel seated on one end of the lever S′, and connected by a pipe, u, with a tank, V, which receives the water from the pump I. W is a weight on the other end of the lever S′, and is arranged to slide longitudinally thereon.

The operation of my invention, so far as not already described, is as follows: The rotation of the wind-wheel E and shaft D will communicate motion to the pump-handle i through the connecting devices, and the collar d'''', turning freely on the tubular shaft G, will allow the connecting-rod d'' to rotate freely with them without rotating the tubular shaft G. The weight W may be adjusted on the lever S′, so that the water rising to any desired height in the tank V will fill the vessel U to overbalance the weight W, and that end of the lever S′ dropping will carry up the rod S, and by means of the crank r', yoke r, and collar R, draw back the sleeve N, and through it and the intervening cranks and chains between it and the sails L turn all of the sails at right angles to the plane of the wheel, and allow the wind to pass through without rotating it until the water in the tank V is used or withdrawn, and the water in the vessel U falling allows the weighted end of the lever S′ to drop and again bring the sails L into working position. The rod S, besides its aforesaid offices, also serves as a guide or stay for the tubular shaft G and its immediately-connected devices. By releasing the rods p' from the bell-cranks n, and by removing the bolts e''', and $e''''\ e''''$, and j, it will be seen that the arms e'' may be taken from the sockets in the hub, and the wheel E taken apart in sections, for convenience of storage or transportation.

I claim—

1. The springs l', when attached to the arms e'', and arranged to operate with a series of two or more sails, L, connected by a bar, l, substantially as described, and for the purpose specified.

2. The tubular shaft G, when arranged to operate with the connecting-rods $d''\ g'$ and crank-wheel d' of a wind-wheel shaft, and with the cranks g''' and h and connecting-rod h'', substantially as described, and for the purpose specified.

3. The three-armed or T-shaped cranks g''' and h, when arranged to operate with the connecting-rod g' and the pump I, substantially as described, and for the purpose specified.

4. The levers T S′, when connected as described, and arranged to operate with the weight W, vessel U, tank V, pump I, and connecting-rod S, substantially as and for the purpose specified.

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Witnesses:
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