No. 614,233. Patented Nov. 15, 1898.

LA VERNE W. NOYES.

WINDMILL.

(Application filed Oct. 18, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

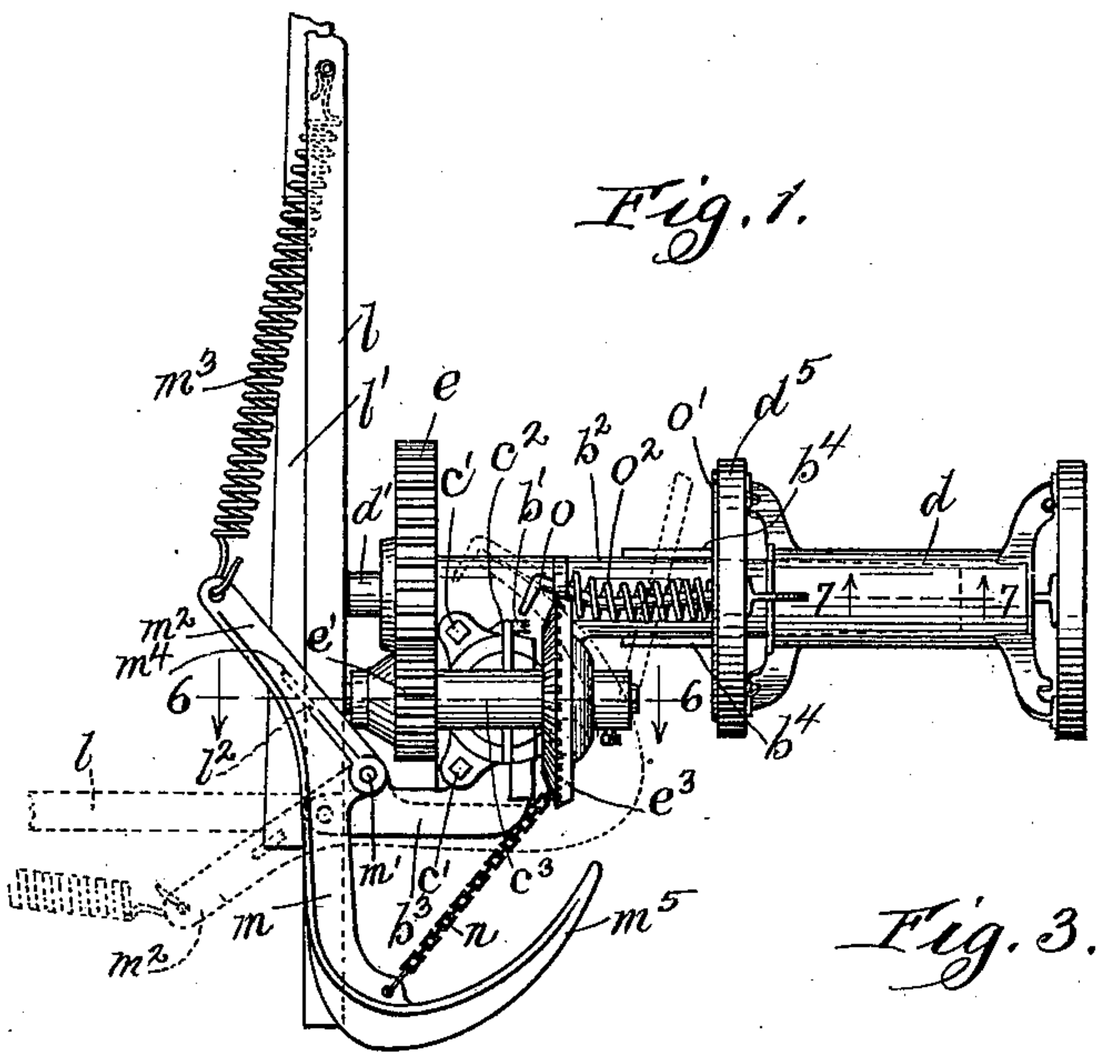


Fig. 4.

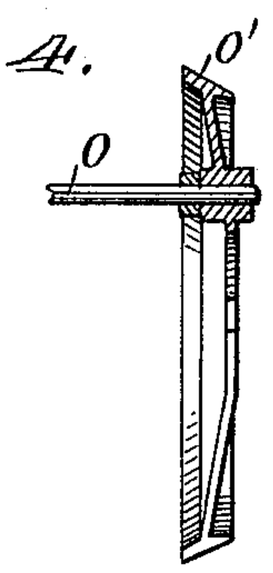


Fig. 3.

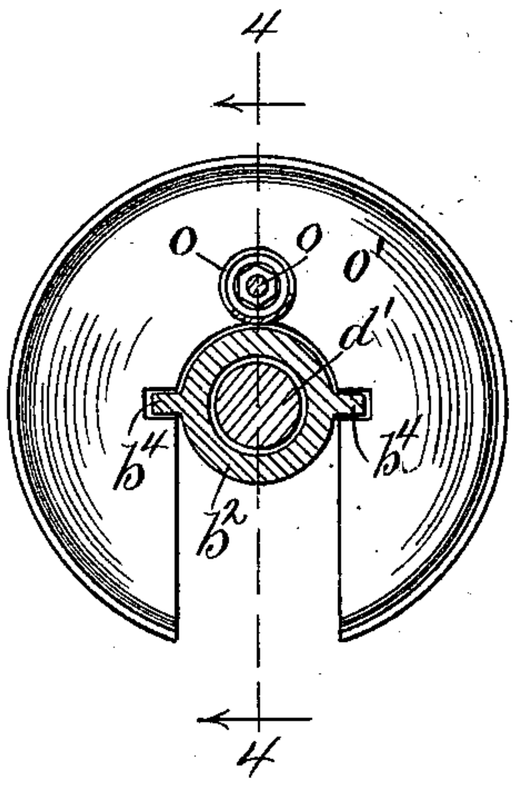


Fig. 2.

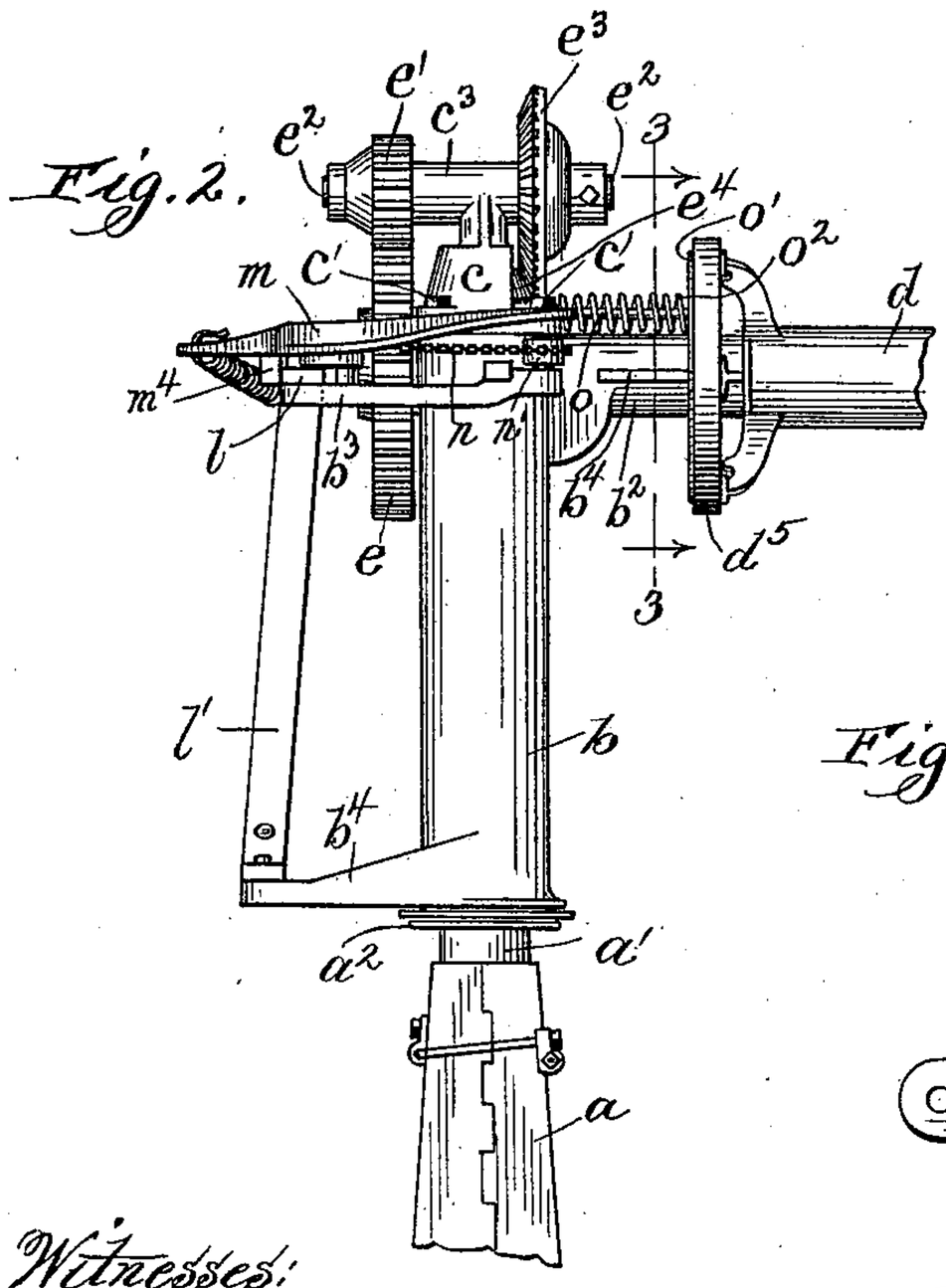
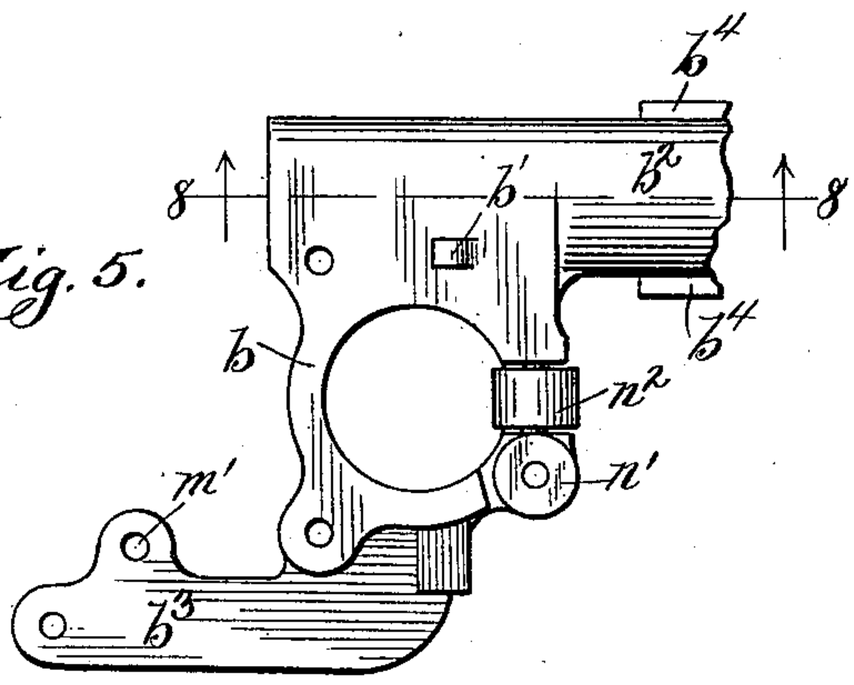


Fig. 5.



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(No Model.) 2 Sheets—Sheet 2.

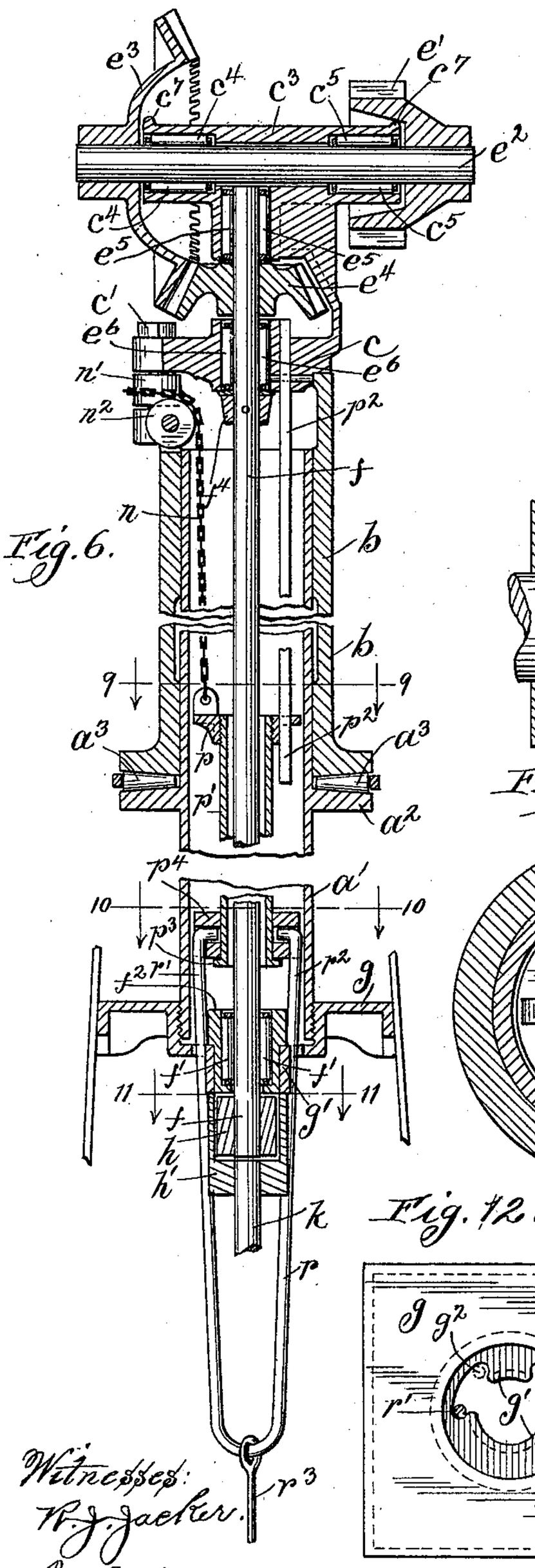


Fig. 6.

Fig. 7.

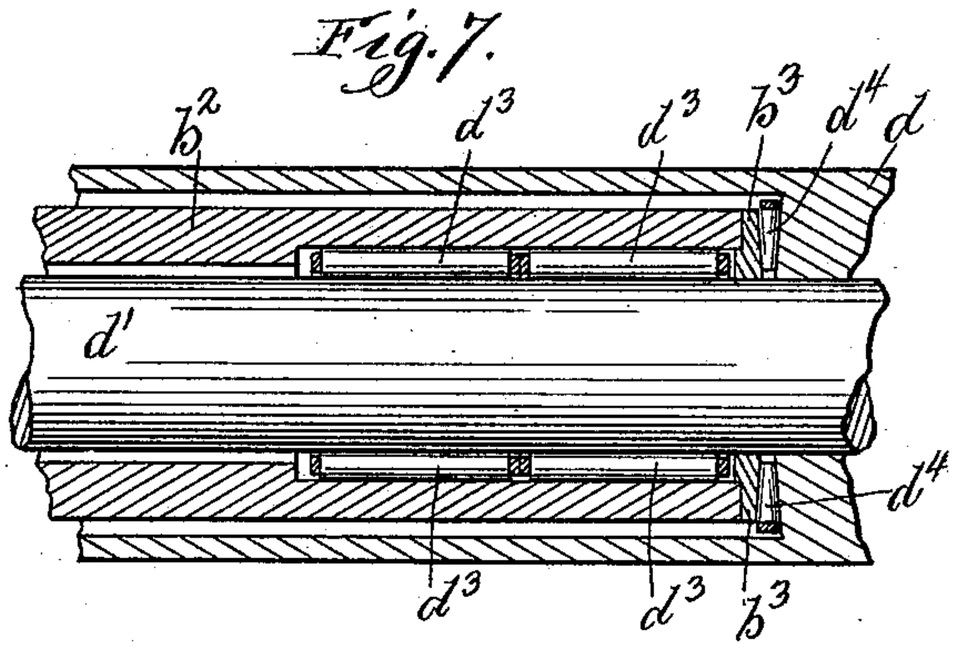


Fig. 8.

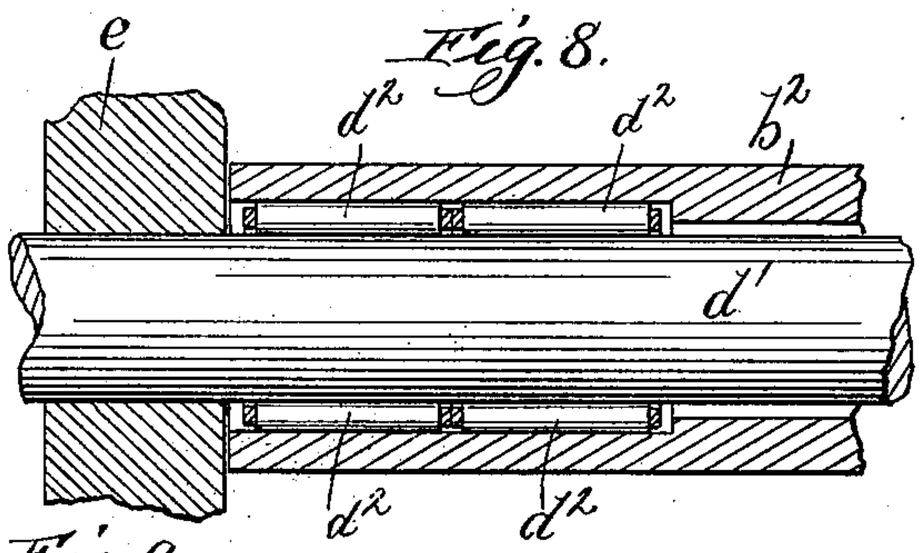


Fig. 9.

Fig. 10.

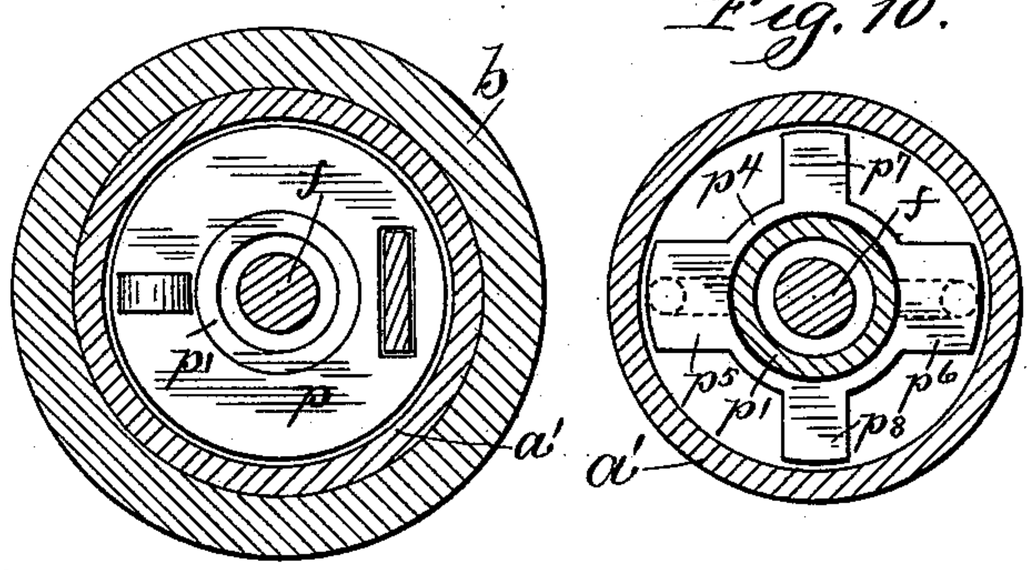
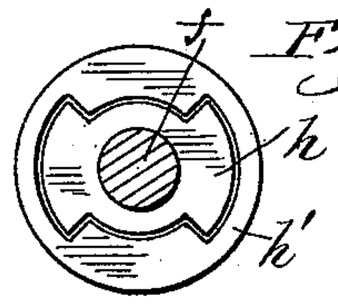


Fig. 12.

Fig. 11.



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UNITED STATES PATENT OFFICE.

LA VERNE W. NOYES, OF CHICAGO, ILLINOIS.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 614,233, dated November 15, 1898.

Application filed October 18, 1897. Serial No. 655,514. (No model.)

To all whom it may concern:

Be it known that I, LA VERNE W. NOYES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Windmills, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to a windmill, my object being to provide an improved form of mill whereby the construction may be greatly simplified and whereby the operation of the mill may be improved and rendered more effective.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 is a plan view of the mill of my invention. Fig. 2 is a view thereof in elevation. Fig. 3 is a sectional view on line 3 3, Fig. 2. Fig. 4 is a sectional view on line 4 4, Fig. 3. Fig. 5 is a plan view of the turn-table or barrel of the mill. Fig. 6 is a sectional view on line 6 6, Fig. 1. Fig. 7 is a sectional view on line 7 7, Fig. 1. Fig. 8 is a sectional view on line 8 8, Fig. 5, showing the wheel-shaft in position. Fig. 9 is a sectional view on line 9 9, Fig. 6. Fig. 10 is a sectional view on line 10 10, Fig. 6. Fig. 11 is a sectional view on line 11 11, Fig. 6. Fig. 12 is a plan view of the casting carried upon the tower for supporting the barrel of the mill.

Like letters refer to like parts in the several figures.

Upon the upper end of the tower a is carried the supporting-barrel a', which carries a shoulder a^2, which forms a bearing-surface for the rollers a^3 a^3, upon which the turn-table or barrel b rests. Upon the upper end of the barrel b is carried the detachable frame or support c, which is secured in position by means of the bolts c' c' c'. In order to remove the strain from the bolts due to the tendency of the casting c to rotate during the operation of the mill, a lug b' is provided upon the casting b, with which a lug c^2, carried upon the casting c, is adapted to engage, to thus withstand any tendency of the casting c to rotate.

Journaled in the sleeve b^2 of the casting b is the wheel-shaft d', upon the end of which is mounted the spider d of the wind-wheel. A roller-bearing formed by the rollers d^2 d^2, Fig. 8, is formed between the sleeve b^2 and the wheel-shaft d'. A similar roller-bearing is formed by means of the rollers d^3 d^3 between the forward end of the sleeve b^2 and the wheel-shaft d', Fig. 7. In order to take up the thrust of the wheel, rollers d^4 d^4 are provided between the end of the sleeve b^2 and the spider d, Fig. 7. To afford a bearing-surface upon the end of the sleeve b^2, I preferably provide a ring b^3, which is secured to the end of the sleeve b^2 and extends inwardly to closely surround the shaft d', and thus provide an extended bearing-surface for the rollers d^4. Upon the end of the wheel-shaft d' is mounted the gear-wheel e, which meshes with the pinion e', mounted upon the shaft e^2, journaled in the sleeve c^3 of the casting c by means of the rollers c^4 c^5 at the opposite ends of said sleeve. Upon the opposite end of the shaft e^2 is mounted the bevel-gear e^3, which meshes with the bevel-pinion e^4, carried upon the vertical shaft f, said shaft being journaled between the rollers e^5 above the pinion and between the rollers e^6 below the same, said rollers being mounted within the casting c. Upon the ends of the sleeve c^3 are provided the beads or raised ridges c^7 c^7, and the overhanging gears e' and e^3 overhang the same to prevent water from passing to the bearings between the shaft and the sleeve.

A collar f^4 surrounds the shaft f just beneath the casting c and serves as a support and bearing-face for the cage carrying the rollers e^6. The lower end of the shaft f is journaled between the rollers f', which rest within the box f^2, having a shoulder which rests upon the cylindrical portion g' of the supporting-casting g, to which the lower end of the barrel a' is screwed. Upon the lower end of the shaft f is carried the inner member h of a coupling, the outer member h' of which is carried upon the upper end of the shaft k, which extends downward and imparts motion to the machinery to be driven by the windmill. The form of the members of the coupling is illustrated in Fig. 11, the inner coupling h being oblong and fitted within a corresponding recess or opening in the member h', whereby the members of the coupling rotate together, while at the same time they may be separated by moving the

same longitudinally relatively to each other. The upper end of the member h' is limited in its upward movement by the lower end of the cylinder g' of the casting g, and a space is left between the lower end of the member h and the upper end of the member h', whereby any upward thrust of the shaft k will be resisted by the casting g and will not impart an upward thrust to the shaft f to endanger or break the gears of the driving-train.

The barrel or casting b carries arms b^3 and b^4, to which the bone l and brace l' of the tail are respectively pivoted, the pivots being so arranged that the tail has a tendency to assume the position wherein it is parallel to the wheel. The furl-lever m is pivoted at m' and carries an arm m^2, which is connected by a coiled spring m^3 with the bone l of the tail. Upon the lower face of the furl-lever is provided a lug m^4, which engages the edge of the bone l of the tail to start the same out of the wind and which is adapted to engage a notch l^2 in the edge of the bone l when the tail is parallel to the wheel to lock the tail in the inactive position. To the furl-lever is attached the furl-chain n, by means of which the furl-lever may be rocked to swing the tail into its perpendicular position, as shown by dotted lines in Fig. 1. The furl-lever carries an arm m^5, which is adapted to encircle the driving mechanism of the mill when the tail is in the perpendicular position and is adapted to engage the brake-pin o, which is secured to the brake-disk o', and to retract the same against the tension of the coiled spring o^2 to move the brake-disk out of engagement with the flange d^5 of the spider. The furl-lever thus serves to throw off the brake at the same time that the wheel is thrown into the wind. The brake-disk o' slides back and forth on the bearing-sleeve b^2, a pair of longitudinal ridges b^4 b^4 being provided on the sides thereof to prevent the rotation of the disk. When the mill is out of the wind, the tail-bone l, Fig. 1, rests against the end of the wheel-shaft d', which thus forms a limiting stop.

The furling-chain n, connected with the furl-lever, passes around the vertical roller n' and the horizontal roller n^2 and is secured at the lower end to the ring p, into which is screwed the upper end of the pipe p', which surrounds the shaft f. A flat bar p^2, secured at the upper end of the casting c, passes through the slot in the ring p to cause the ring to rotate with the casting c and the turn-table or barrel b, upon which said casting is carried. The pipe p' carries at the lower end a flange p^3, upon which rests the swivel-ring p^4, carrying four radially-extending arms p^5 p^6 p^7 p^8, which are preferably of such length as to engage the inner wall of the barrel a' and prevent the pipe p' from coming into contact with the rotating shaft f. The arms p^5 p^6 carry openings, within which are hinged the inturned ends of the bail r, the members r' r^2 of which pass downward through slots g^2 g^2, pivoted in the lower wall of the casting g. To the lower end of the bail r is attached the furling chain or wire r^3, which preferably extends down one of the posts of the tower and is connected with any suitable handle, whereby the mill may be thrown into and out of operation. The bail due to the oblique pull thereon will partake of a lateral movement as the same is moved up and down, and the slots g^2 are made of sufficient length to accommodate this lateral movement. The engagement of the members of the bail with the slots g^2 prevents the rotation of the bail, and consequently holds the swivel-ring p^4 against rotation, while permitting the pipe p' to rotate within the swivel-ring.

The operation of my invention is as follows: Motion from the wind-wheel is transmitted by the gear-wheel e to the pinion e' and from the bevel-gear e^3 to the pinion e^4, thus rotating the vertical shaft f and through the engagement of the coupling h h' rotating the shaft k to drive the driving mechanism or other machinery, as desired. When the mill is in operation, the tail occupies the perpendicular position illustrated in dotted lines in Fig. 1, and in this position the arm m^4 of the furl-lever engages the rod o to maintain the brake-shoe out of engagement with the spider of the wheel. In Fig. 1 the position of the tail when the wheel is out of the wind is illustrated in full lines, in which case the tail-bone rests against the end of the wheel-shaft l' as a stop. In throwing the wheel into the wind the bail r, Fig. 6, is pulled down, carrying with it the swivel-ring p^3 and the pipe p', carrying at the upper end the ring p, to which the furling-chain is attached, and the furl-lever is rocked to the dotted position shown in Fig. 1, thus locking the tail through the agency of the coiled spring m^3. So long as the bail r remains in the lower position the wheel is held in the wind, and upon the release of the bail the tail swings out of the wind and carries the arm m^4 of the furl-lever out of engagement with the brake mechanism to permit the setting of the brake, and the lug l^2 on the furl-lever moves into engagement with the notch of the bone l of the tail to lock the tail in position. Any change in the direction of the wind during the running of the mill causes the turn-table or barrel b to rotate, and the flat bar p^2, engaging the slot in the ring p of the furling device, causes the pipe p' to rotate with the barrel.

When it is desired to remove the driving mechanism for repair or other purpose, the bolts c' c' c' may be removed and the casting raised vertically to withdraw the shaft f from the barrel. In raising the shaft f the coupling h upon the end thereof engages the lower end of the box f^2, carrying the roller-bearing, and raises the same out of its seat. As the raising of the shaft continues the box f^2 engages the lower end of the pipe p', thus raising the same with the remainder of the furling mechanism. By detaching the furling-chain n

from the ring *p* or from the furl-lever the furling-pipe, the swivel-ring, and the bail may be removed from the barrel with the shaft, the loop of the bail passing through the opening of the casting as the bail is raised.

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

1. A main frame upon which the wind-wheel is journaled, a detachable frame or support mounted thereon and carrying a horizontal bearing-sleeve, a counter-shaft journaled therein, and a vertical driven shaft geared with said counter-shaft, the end of said shaft terminating beneath and being covered by said horizontal sleeve, substantially as described.

2. A main frame upon which the wind-wheel is journaled, a detachable frame or support thereon and carrying a horizontal bearing-sleeve, a counter-shaft journaled therein, a vertical driven shaft having two bearings in said detachable frame, and a gear-wheel mounted on said vertical shaft between the two bearings and geared with said counter-shaft, substantially as described.

3. A main frame upon which the wind-wheel is journaled, a detachable frame or support mounted thereon and carrying a horizontal bearing-sleeve, a counter-shaft journaled at the upper end in said detachable frame, a gear-wheel mounted thereon, said detachable frame having a wall surrounding said gear-wheel except upon one side of the periphery thereof, and a gear-wheel on said counter-shaft meshing therewith, substantially as described.

4. A main frame and a wind-wheel journaled thereon, a detachable frame or support and a driving-train thereon, a driven shaft journaled at the upper end in said detachable frame, a coupling on said shaft and connections between said detachable frame and the upper part of said driven shaft permitting the removal of the upper part of said driven shaft with the detachable frame, substantially as described.

5. A main frame and a wind-wheel journaled thereon, a detachable frame or support and a driving-train thereon, a vertical driven shaft journaled at the upper end in said detachable frame and a lower journal-box for said shaft arranged to be removed with the shaft, substantially as described.

6. A main frame and a wind-wheel journaled thereon, a detachable frame or support and a driving-train thereon, a vertical driven shaft journaled at the upper end in said detachable frame a lower journal-box for said shaft removable with the shaft and a coupling below said lower journal-box, substantially as described.

7. The combination with the wind-wheel and the upper vertical shaft driven thereby through a driving-train, of a lower vertical shaft in line but not in endwise engagement with the upper shaft, a coupling connecting the opposed ends of said shafts, and a support carried on the windmill-tower with which the lower shaft engages to limit the upward movement thereof and prevent the transmission of longitudinal thrusts to the upper shaft and the driving-train, substantially as described.

8. The combination with the supporting-barrel *a*, of the turn-table or barrel *b* rotating thereon, and carrying the wind-wheel, the detachable frame or support *c* carrying the driving-train, the vertical driven shaft journaled at the upper end in said detachable frame, a removable journal-box for the lower end supported in said supporting-barrel, and a coupling below said box, substantially as described.

9. In a windmill, the supporting-barrel and the turn-table or barrel rotating thereon, a detachable train-carrying frame carried thereon, a vertical driven shaft journaled in said detachable frame, a swivel furling device within said supporting-barrel and connections between the furling device and the shaft to render the furling device removable with said shaft, substantially as described.

10. In a windmill, the combination with the supporting-barrel, of the turn-table or barrel, the vertical driven shaft, the furl-ring surrounding the same, the guide-bar passing therethrough and mounted on the turn-table, the pipe depending from said furl-ring, the swivel-ring rotating upon the lower end of said pipe, and the bail connected to said swivel-ring, substantially as described.

11. In a windmill, the combination with the vertical driven shaft, of the swivel furling device surrounding the same and guided to move longitudinally and a bail having the ends hinged to the lower end of said furling device, whereby the lower end of the bail may partake of a lateral movement, substantially as described.

12. In a windmill, the combination with the vertical driven shaft, of the furling device surrounding the same and guided at the upper and lower ends, a chain, or similar device connected with the upper end of the furling device, a swivel-ring provided at the lower end of the furling device, and a bail hinged at the opposite ends to the swivel-ring, substantially as described.

13. In a windmill, the combination with the vertical driven shaft and a swivel furling device surrounding the same, of the laterally-moving bail attached to said furling device and passing through openings in the supporting-frame permitting the lateral movement of said bail, substantially as described.

14. In a windmill, the combination with the frame carrying the driving-train, of a brake mechanism, a furl-lever pivoted on the opposite side of the driving-train from said brake mechanism, and an arm carried on said furl-lever and arranged to extend around said

driving-train and engage said brake mechanism to throw off the brake, substantially as described.

15. In a windmill, a main frame carrying the wind-wheel, a train-carrying detachable frame mounted thereon, a vertical shaft journaled at the upper end between roller-bearings in said detachable frame, and a collar carried upon said shaft upon which said roller-bearing rests, substantially as described.

16. In a windmill, a supporting-barrel, a turn-table or barrel mounted thereon, a detachable train-carrying frame on said turn-table carrying a horizontal sleeve at the upper end, a shaft journaled therein, and a vertical shaft having the upper end journaled in said detachable frame and beneath said sleeve whereby the upper end of the vertical shaft is sealed to prevent the entrance of water, substantially as described.

17. In a windmill, a supporting-barrel, a turn-table or barrel mounted thereon, a detachable train-carrying frame on said turn-table, a vertical shaft journaled at the upper end in said detachable frame, and an opening in said frame for the journaled end of said shaft extending upward from beneath and closed at the upper end by a laterally-extending portion of said detachable frame, substantially as described.

18. In a windmill, a turn-table or barrel closed at the upper end and carrying a shaft journaled in a horizontal sleeve thereon, a bead or raised ridge upon each end of said sleeve, and an overhanging gear-wheel mounted on each end of said shaft overhanging said respective beads or raised ridges, substantially as described.

In witness whereof I have hereunto subscribed my name in the presence of two witnesses.

LA VERNE W. NOYES.

Witnesses:
J. H. TAYLOR,
W. CLYDE JONES.