(No Model.) 3 Sheets—Sheet 1.

G. C. FLAGG.

WINDMILL.

No. 567,339. Patented Sept. 8, 1896.

FIG. 1.

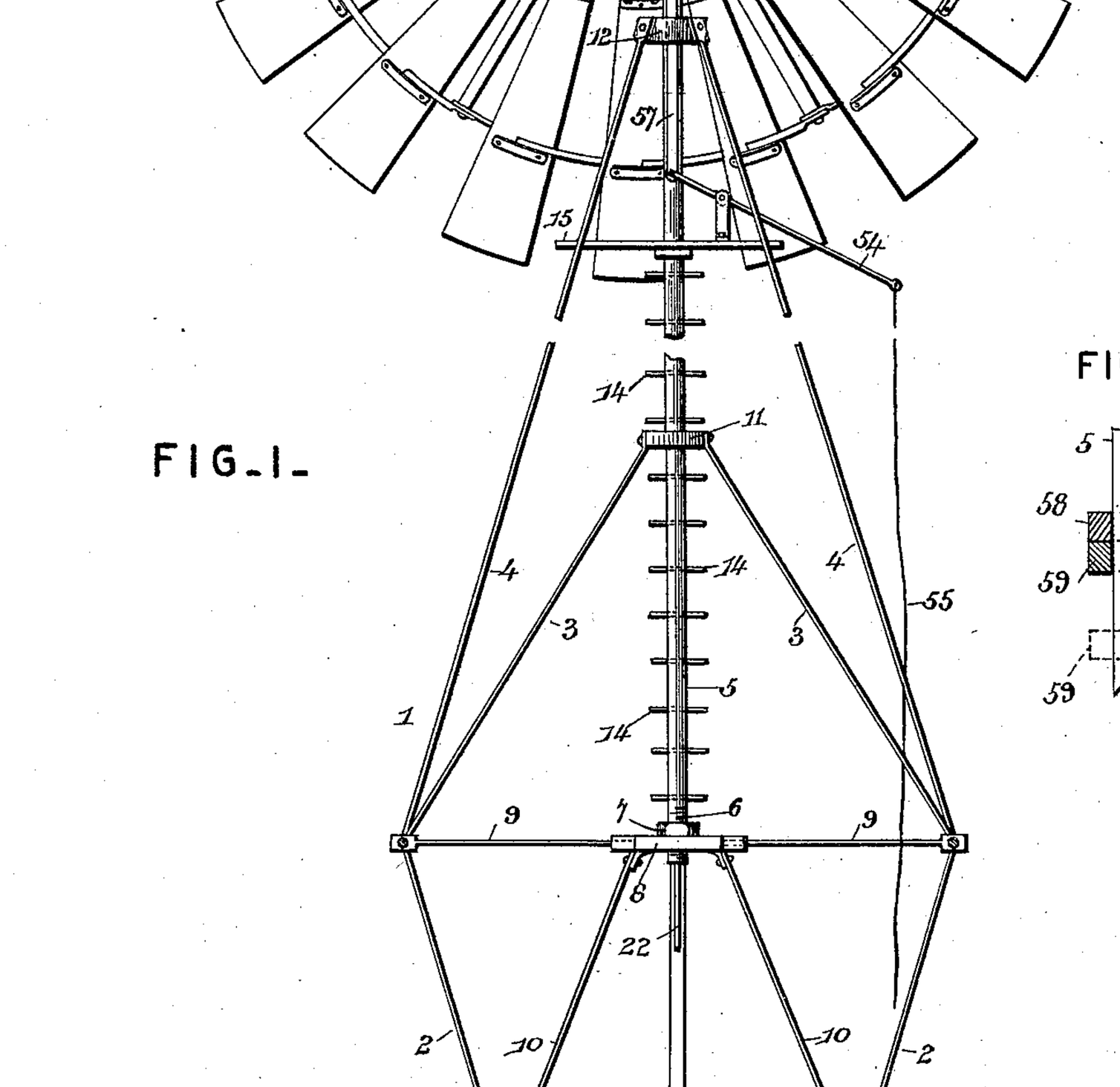
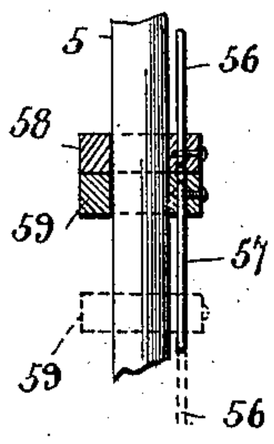


FIG. 9.



Inventor

Witnesses

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(No Model.) 3 Sheets—Sheet 2.

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FIG. 2.

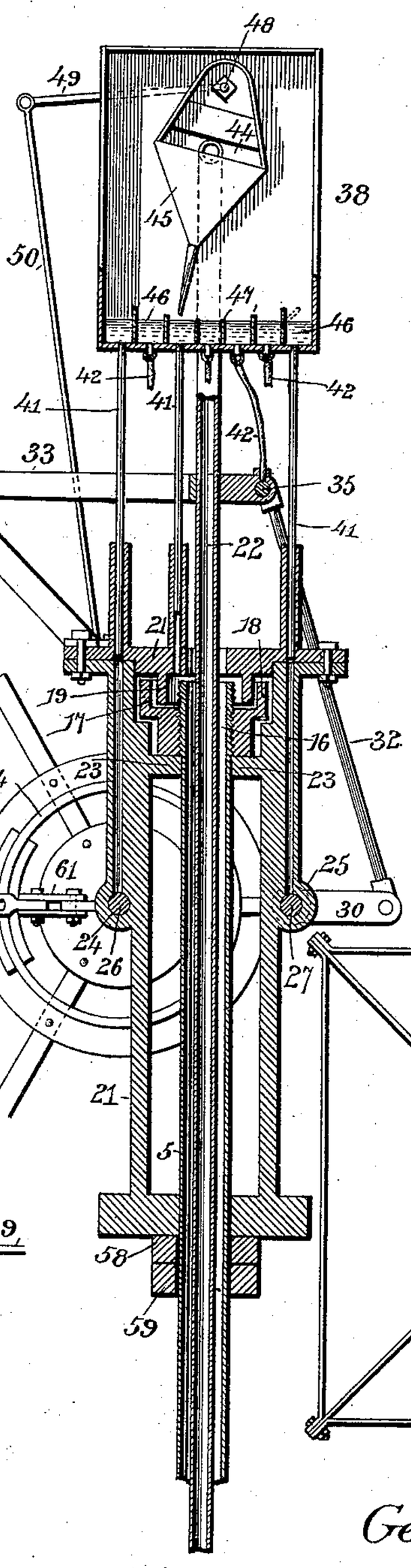


FIG. 6.

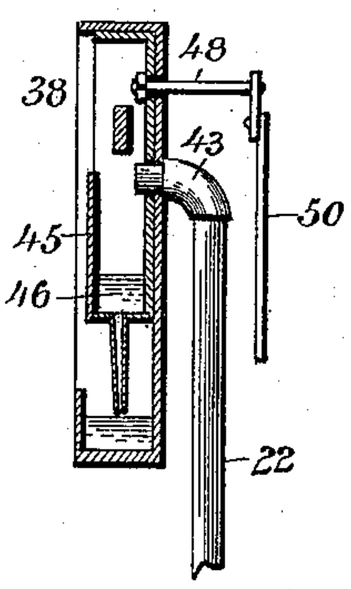


FIG. 8.

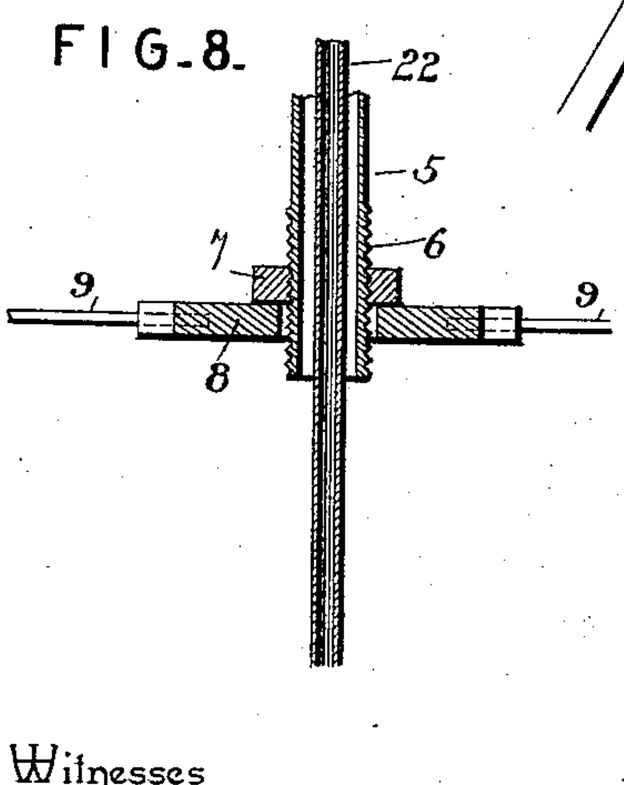
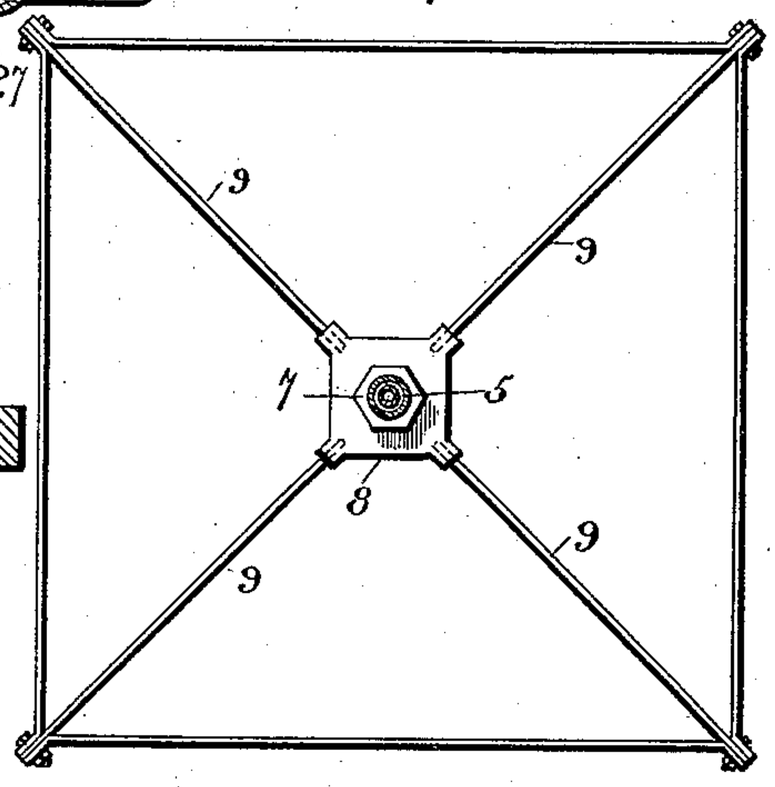


FIG. 7.



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(No Model.) 3 Sheets—Sheet 3.

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FIG. 3.

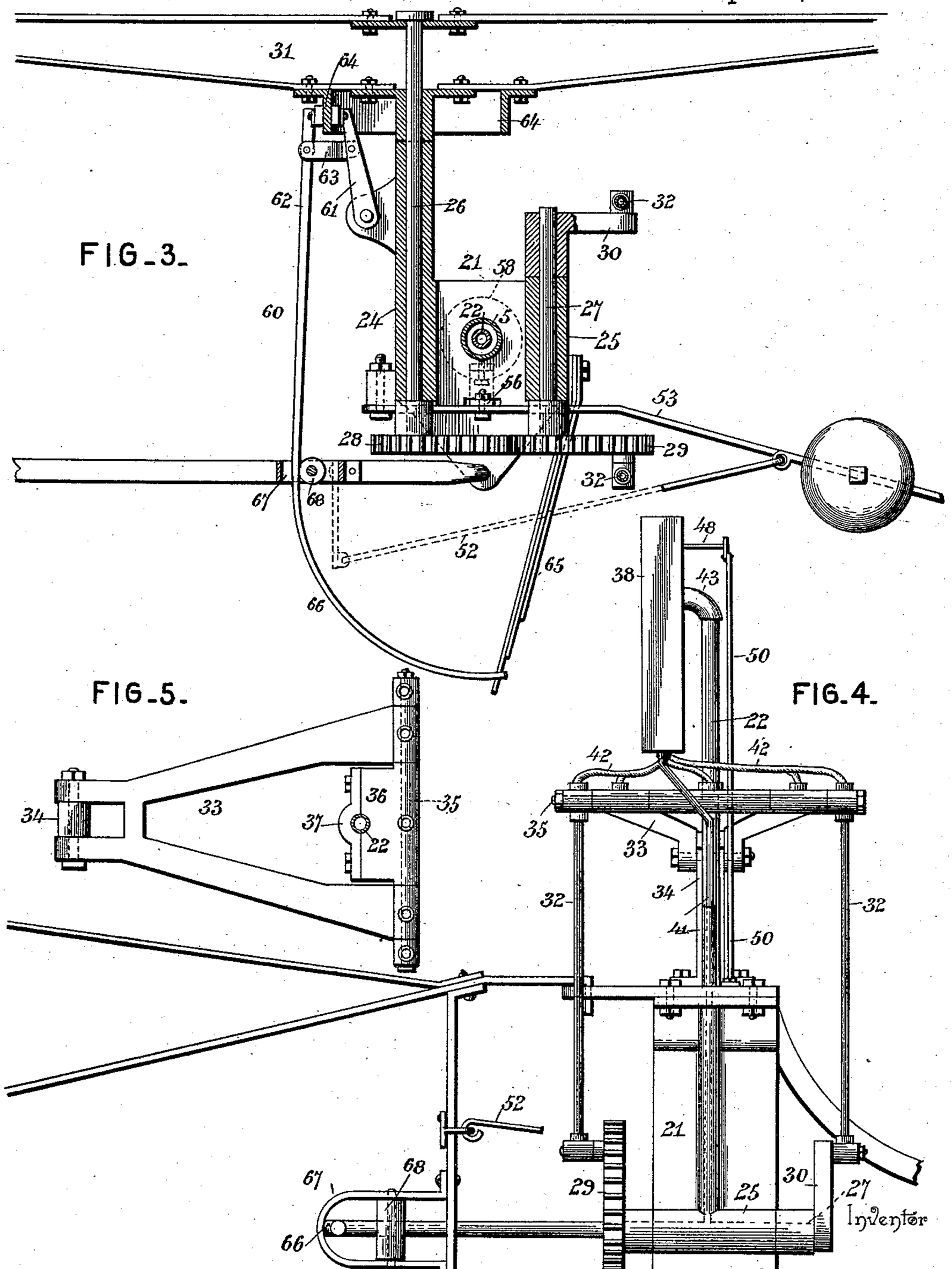

FIG. 5.

FIG. 4.

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UNITED STATES PATENT OFFICE.

GEORGE C. FLAGG, OF LEWISTOWN, ILLINOIS.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 567,339, dated September 8, 1896.

Application filed May 31, 1895. Serial No. 551,253. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. FLAGG, a citizen of the United States, residing at Lewistown, in the county of Fulton and State of Illinois, have invented a new and useful Windmill, of which the following is a specification.

The invention relates to improvements in windmills.

The object of the present invention is to improve the construction of windmills, to increase their strength, durability, and efficiency, and to enable them to be constructed with a minimum amount of material.

A further object of the invention is to enable the power of the windmill to be expended to the greatest advantage in the operation of pumps and to give to the pump-rod a short quick downstroke when but little force is required and to exert on the pump-rod a strong steady upward pull or reciprocation at a time when the greatest power is required to produce the desired elevation of the water.

Another object of the invention is to enable the bearings of the windmill to be oiled automatically, without necessitating a person ascending the tower, and to provide means for throwing the wind-wheel out of the wind having a minimum amount of friction on its parts during the operation of the windmill, and to provide an efficient brake for locking the wind-wheel against rotation when thrown out of the wind.

The invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended.

In the drawings, Figure 1 is an elevation of a windmill constructed in accordance with this invention. Fig. 2 is a vertical sectional view of the upper portion. Fig. 3 is a horizontal sectional view. Fig. 4 is a detail end elevation of the upper portion of the windmill. Fig. 5 is a detail view of the oscillating guide-arm. Fig. 6 is a detail sectional view of the oil-receptacle. Fig. 7 is a horizontal sectional view of the tower. Fig. 8 is a detail sectional view of a portion of the tower, illustrating the manner of mounting the lower end of the tubular standard of the tower. Fig. 9 is a detail view of the separable collars of the connection between the operating-lever and the weighted lever.

Like numerals of reference indicate corresponding parts in all the figures of the drawings.

1 designates a tower, rectangular in horizontal section, and provided at the corners with bottom outwardly-inclined supporting-bars and upper inner and outer inwardly-inclined guy-rods 3 and 4, secured at their lower ends to the upper terminals of the supporting-bars 2 and connected, respectively, at their upper ends at different elevations to a central tubular standard 5. The lower end of the tubular standard is threaded at 6 and receives a nut 7, and passes loosely through an opening in a horizontal support 8, which is connected with the adjacent terminals of the guy-rods 3 and 4 and the supporting-bars 2 by horizontal struts or braces 9, and which is connected with the lower terminals of the supporting-bars 2 by inwardly-inclined braces 10. The lower terminals of the supporting-bars 2 and the inclined braces 10 are connected by horizontal bars 2^a, located at the base of the tower adjacent to anchors 13. This construction prevents the parts from spreading at the base of the tower.

The support 8 is substantially rectangular, and the struts or bars 9 are diagonally disposed, and the bars and rods may be constructed of any suitable material, such as flanged or channel metal or tubular metal, as such is preferable to solid bars for the reason that the lightness of the tower will be increased without diminishing its strength.

The upper ends of the guy-rods 3 and 4 are secured to the tubular standard by means of annular flanges or collars 11 and 12, and the parts of the tower by the arrangement described form a truss framework, and the tension of all the parts may be increased and regulated by means of the nut 7 at the lower end of the tubular standard. The lower terminals of the supporting-bars 2 and the inwardly-inclined braces 10 are secured to the anchors 13, designed to be embedded in a

suitable foundation, in order to form a firm support for the tower and to obtain the necessary hold.

Horizontally-disposed rungs or pieces 14 are designed to be clipped or otherwise secured to the vertical tubular standard and are arranged at intervals to form a ladder to enable a person to readily ascend the tower to a platform 15, composed of a suitable framework.

The upper end 16 of the tubular standard is threaded and has arranged on it a cup-shaped nut 17, composed of a lower body portion, having a threaded opening and screwing on the threaded portion of the top of the standard, and an annular flange 18, extending upward from the bottom or body portion of the nut and arranged parallel with the upper extremity of the tubular standard, which projects above the bottom of the nut and has its upper edge arranged flush or in the same horizontal plane as the upper edge of the flange 18. The flange of the nut 17 and the upper extremity of the tubular standard form an annular groove or recess to receive a depending annular flange 19 of a top plate 20 of a rotary frame or turn-table 21.

The rotary frame or turn-table is composed of opposite sides and top and bottom plates or portions connecting the sides and completing the frame, and provided with central openings for the reception of the tubular standard, and a pump-rod 22. The cup-shaped nut and the depending flange 19 of the top plate 20 of the rotary frame or turn-table form a bearing for the turn-table, and the main weight of the latter lies below the cup, and lugs 23 are provided on the frame or turn-table and are located below the nut 17 and prevent the flange from becoming disengaged from the annular recess or groove of the nut.

The rotary frame or turn-table is provided at opposite sides with tubular bearings 24 and 25, disposed horizontally and receiving, respectively, a wind-wheel shaft 26 and a crank-shaft 27, which are connected by elliptical gear-wheels 28 and 29 of the same size, and provided with the same number of peripheral teeth. The shafts 26 and 27, which are arranged in the same horizontal plane, are disposed at opposite sides of the rotary frame and extend entirely across the same, and a long bearing is thus provided for the main or wind-wheel shaft.

The crank-shaft has a crank 30 at one end and is connected, by means hereinafter described, with the pump-rod 22, which reciprocates vertically in the usual manner. The elliptical gear-wheels 28 and 29 are provided for the purpose of expending the energy of the windmill to the greatest advantage for the reciprocation of the pump-rod, which, in its vertical movements, requires but little power on the downstroke and most of the power on the upstroke. With the ordinary crank mechanism, which makes no provision for this peculiarity of the pump-rod, the same energy is expended on the upstroke as on the down, resulting in the usual jerky motion incident to windmills, and retarding the speed of the wind-wheel and the other movable parts at one time—viz., the upward reciprocation of the pump-rod—and suddenly freeing on the downward reciprocation. The elliptical gear-wheels provide for a sudden quick downward movement of the pump-rod to produce the necessary rapidity of the reciprocation and cause a steady powerful lift to be given to the pump-rod without interfering with the steady continuous rotation of the gearing. Thus it will be seen that the operation of the mechanism of the windmill is rendered steady and continuous, and is relieved of the sudden jerking movement incident to the ordinary construction of windmills, and that the pump-rod is caused to reciprocate rapidly downward, but is given a steady upward lift when it requires the power of the windmill and when the power is expended to positive advantage, and is not unnecessarily expended on a downward stroke of the pump-rod.

The shaft 26 carries at its outer end a wind-wheel 31, which may be of any desired construction.

The gear-wheel 29 is provided with a wrist-pin, and the crank 30 has a similar arm or wrist-pin, which is located the same distance from the shaft 27 as the wrist-pin of the gear-wheel 29, and is disposed directly opposite the same. The crank 30 and the gear-wheel 29 are connected by similar parallel rods 32 with a substantially horizontally-disposed oscillating guide-arm or lever-frame 33, fulcrumed on a bracket arm or support 34 of the rotary frame or turn-table and connected with the pump-rod 22, and parallel rods form a double pitman connection and are located at opposite sides of the rotary frame or turn-table.

The arm or support 34 of the rotary turn-table or frame inclines outward, as clearly shown in Fig. 2 of the accompanying drawings, and the outer end of the oscillating guide-arm is bifurcated and pivoted to the upper end of the support or arm 34. The oscillating guide-arm is composed of two slightly-diverging sides, provided at their inner ends with bearings, and receiving a transverse pin 35, which has its ends projecting laterally from the sides of the oscillating arm, and connected to the upper terminals of the rods 32. A hinged block 36 is provided with a bearing-opening and is located between the sides of the oscillating arm 33, and is mounted on the pin 35, and has the pump-rod 22 secured to it. The block 36 is provided with a removable plate 37 for clamping the pump-rod 22 to it, and the hinging of the block 36 to the oscillating guide-arm 33 enables the latter to oscillate without interfering with the vertical reciprocation of the pump-rod.

By arranging the shafts 26 and 27 in the same horizontal plane at the opposite sides of the pump-rod, and by disposing the wind-

wheel at one side of the rotary frame and the gearing at the other side of the same, the rotary frame is balanced, friction is reduced, and the windmill is enabled to respond readily to the wind, thereby greatly facilitating the operation of governing the windmill. The double crank-shaft has an even square lift at opposite sides of the rotary frame, thereby preventing any twisting frictional movement, and, if desired, the elliptical gear-wheel may be duplicated in order to arrange a pair at opposite sides of the rotary frame.

The pump-rod 22 is hollow and is designed to serve as a conduit for a lubricant, or, in other words, to serve as an oil-pipe to convey a lubricant from the base of the tower to an oil-receptacle 38, which communicates by oil-distributing tubes 41 and 42 with the bearings of the windmill. The oil-distributing tubes 41 are three in number, and communicate with the bearings 24 and 25 of the rotary frame or turn-table and with the cup-shaped nut 17; and these distributing-tubes are composed of two telescoping sections capable of sliding on each other to conform to the reciprocation of the pump-rod 22. The other distributing pipes or tubes 42 communicate with the bearings of the sides of the oscillating guide-arm 33, the bearing of the block 36, and the connecting-rod 32, which are hollow or tubular, and serve as the means for lubricating the wrist-pins of the elliptical gear-wheel 29 and the crank 30. As there is comparatively little movement of the inner end of the oscillating arm relative to the reciprocating oil-receptacle 38, it is not necessary for the distributing-oil tube 42 to be constructed of telescoping sections.

Any suitable construction of oil-pump may be provided at the base of the tower for forcing oil through the tubular pump-rod, and the upper end of the latter is provided with an elbow extension 43, passing through an opening in the back of the oil-receptacle and extending through a transverse slot or opening 44 of an oscillating oil-distributer 45. The oscillating oil-distributer is pivoted at its upper end in the oil-receptacle and is provided with a tapering funnel-shaped lower portion having a discharge tube or neck and a bowl. The bottom of the oil-receptacle 38 is provided with a series of oil-cells 46, formed by partitions 47 and each communicating with one of the oil-distributing tubes. The upper portions of the partitions 47 are free and are adapted to be bent toward the adjacent partitions to contract the mouth of a cell or enlarge the same to regulate the supply of oil for any particular bearing. As the distributer 45 is oscillated back and forth within the oil-receptacle 38 the oil discharged from the neck or spout falls into the oil-cells, and the wider the upper portion or mouth of the cell the greater will be the oil dropped into the same, as will be readily understood.

The pivot 48 of the oscillating distributer has fixed to it an arm 49, extending substantially horizontally from the pivot and projecting beyond one side of the oil-receptacle and pivotally connected to the upper end of a stationary or fixed supporting-rod 50, which is mounted on the rotary frame or turn-table, whereby, when the pump-rod and the oil-receptacle 38, which is carried by the same, are vertically reciprocated, the oil-distributer 45 will be oscillated within the oil-receptacle.

Instead of forcing the oil upward through the hollow pump-rod the receptacle 38 may be supplied with oil from any other source, such as by mounting a tank on the tower or other portion of the windmill. An indicator may also be provided to enable a person at the base of the tower, when the windmill is thrown out of the wind, to locate the position of the oscillating distributer, in order that any particular bearing may be supplied with oil.

The wind-wheel is held in the wind by a vane 51, hinged to the extreme top and bottom of the rotary frame or turn-table to avoid interfering with the gearing, and the vane is connected by a link-rod 52 with a weighted lever 53, which is adapted to maintain the vane in a position at right angles to the wind-wheel, and the weight of the lever 53 is adjustable, in order to regulate the tower of the windmill, as will be readily understood.

The vane is provided with upper and lower rods 51^a and 51^b, which are supported by an inclined bracing-rod 51^c and by a vertical supporting-rod 51^d. The inclined bracing-rod extends from the inner end of the lower rod 51^b to the inner end of the upper rod 1^a, and the vertical supporting-rod 51^d is arranged at the outer ends of the rods. The inner terminals of the lower rod 51^b and the inclined bracing-rod 51^c are extended, forming arms and provided with vertical pintles, which are arranged in suitable eyes at the top and bottom of the rotary frame.

The windmill is thrown out of the wind by an operating-lever 54, fulcrumed intermediate of its ends on a support of the platform 15, and connected at its outer end to an operating rope or wire 55. The inner end of the operating-lever is connected with a weighted lever 53 by upper and lower rods 56 and 57, pivoted, respectively, to the said levers at their outer ends, and provided at their adjacent ends with collars 58 and 59, and these collars are rigidly secured to their respective rods. The collars 58 and 59 are separated and out of contact when the windmill is in operation, and the lower one remains stationary with the tower, while the upper one is adapted to rotate with the turn-table or rotary frame. When it is desired to throw the wind-wheel out of the wind, the lower rod 57 is moved upward by the operating-lever, carrying its collar 59 into contact with the collar 58 and forcing the weighted lever upward to cause the vane to swing in a plane parallel with that of the wind-wheel, as illustrated in Fig. 1 of the accompanying drawings.

The wind-wheel, when thrown out of the wind, is locked against rotation by a brake 60, composed of a pair of levers 61 and 62, connected by a link 63, and provided at their adjacent ends with brake blocks or shoes, located at the inner and outer peripheries of an annular flange 64, carried by the wind-wheel. The lever 61 is fulcrumed on a bracket or support of the rotary frame or turn-table, and the other lever 62 is fulcrumed on the outer end of the link 63. The adjacent ends of the levers are out of contact with the annular flange 64 when the wind-wheel is in operation, and is in contact with a resilient arm or stop 65, mounted on the turn-table or rotary frame, and consisting, preferably, of a leaf-spring, and arranged to receive the vane when thrown into the wind and adapted to prevent injury to the same by cushioning the vane.

The lever 62 is provided in the path of the vane with a curved cam portion 66, which passes through a guide 67 of the vane, and which, when the vane is thrown out of the wind, is engaged by a roller 68, and is carried outward by the same, whereby the adjacent ends of the levers are caused to clamp the annular brake-flange of the wind-wheel to stop the rotation of the same. The guide 67 is substantially U-shaped, and is mounted on a transverse bar of the vane, and the roller is arranged vertically between the sides of the guide 67. As the vane swings to its position at right angles to the wind-wheel the levers 61 and 62 automatically release the brake-flange 64.

It will be seen that the windmill is simple and inexpensive in construction, that it is adapted to run at a uniform speed, producing a steady movement of its parts, devoid of sudden jerks, and that the expenditure of the power of the windmill is peculiarly adapted for reciprocating pump-rods, as it permits a sudden rapid downward movement of the pump-rod and provides for a long steady powerful lift of the same, without interfering with the continuous uniform rotation of the gearing and shafting and the other working parts of the windmill.

It will also be apparent that the bearings of the windmill may be supplied with oil and the various parts lubricated without ascending the tower, and that the distribution of the lubricant may be regulated according to the quantity of oil required by the different bearings.

The windmill may be readily thrown into and out of the wind, and the operating mechanism is subjected to a minimum amount of friction, resulting from the operation of the windmill, and when the latter is not in operation the wind-wheel is locked against rotation. The tower possesses the requisite strength and durability, and at the same time is light and requires a minimum amount of material in its construction, and the arrangement of the parts of the tower is such that a truss frame is formed, and the parts may, after being set up, be readily strained to the desired tension by simply rotating the nut at the base of the tubular standard.

Changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

What I claim is—

1. In a windmill, the combination of a central standard, having its lower end threaded, a support having an opening receiving loosely the lower end of the standard, rods connected with the support and the standard and completing the tower, and a nut arranged on the threaded portion of the standard and engaging the support, and adapted to strain the tower to the desired tension, substantially as described.

2. In a windmill, the combination of a central vertical standard, a support receiving the lower end of the standard, horizontal rods extending outward from the support, the inwardly-inclined upwardly-extending guy-rods, connected with the upper portion of the standard and with the horizontal rods, the outwardly-inclined supporting-bars 2, the inwardly-inclined braces 10 extending from the bottoms of the bars 2 to the support, and a nut arranged on the standard and engaging the support, substantially as described.

3. In a windmill, the combination of a central tubular standard, a support arranged at the lower end of the same, horizontal rods extending outward from the support, guy-rods arranged at an inclination and extending upward from the horizontal rods to the standard, supporting-bars extending upward from the base of the tower and connected with the adjacent ends of the said rods, and braces extending from the bottoms of the supporting-bars to the support, substantially as described.

4. In a windmill, the combination of a tubular standard having a threaded upper portion, a cup-shaped nut arranged on the threaded portion of the standard and having its upwardly-extending flange parallel with the upper extremity of the standard, and a substantially rectangular rotary frame or turn-table having a removable top provided with a depending annular flange fitting in the recess of the cup-shaped nut, said frame being provided with inwardly-extending lugs 23 engaging under the nut, substantially as described.

5. In a windmill, the combination of a rotary frame, a reciprocating pump-rod, the wind-wheel, and the crank-shafts extending entirely across the frame and located in the same horizontal plane at opposite sides of the pump-rod, a wind-wheel mounted at one side of the frame on the wind-wheel shaft, gearing located at the opposite side of the frame, connecting said shafts to assist in counterbalancing the wind-wheel, the oscillating lever-frame fulcrumed at one end on the ro-

tary frame, having sides and receiving the pump-rod, means for connecting the pump-rod with the lever-frame, and rods located at opposite sides of the rotary frame and connecting the sides of the lever-frame with the ends of the crank-shaft, whereby an even lift is effected at both sides of the windmill, substantially as described.

6. In a windmill, the combination of a rotary frame, a pump-rod, the wind-wheel and crank-shafts extending entirely across the rotary frame and located in the same horizontal plane at opposite sides of the pump-rod, a wind-wheel mounted on the wind-wheel shaft and located at one side of the rotary frame, gear-wheels located at the opposite side of the rotary frame and connecting the shafts, a wrist-pin mounted on the gear-wheel of the crank-shaft, a crank located at the other end of the crank-shaft, an oscillating lever-frame fulcrumed at one end of the rotary frame and having sides and receiving the pump-rod between them, a block secured to the pump-rod and arranged between the sides of the lever-frame and connected with them, and a pair of rods located at opposite sides of the rotary frame, connected at their upper terminals with the oscillating lever-frame and at their other ends with the crank and the wrist-pin, substantially as described.

7. In a windmill, the combination of a frame provided with bearings, a tubular pump-rod forming an oil-supply tube, an oil-receptacle mounted on the pump-rod and carried by the same, and communicating therewith, and a series of supply-tubes extending from the oil-receptacle to the bearings, substantially as described.

8. In a windmill, the combination of a frame provided with bearings, an oil-receptacle provided at its bottom with a series of cells, supply-tubes extending from the cells to the bearings, a movable oil-distributer mounted above the cells and adapted to supply the same with oil, and means for operating the distributer, substantially as described.

9. In a windmill, the combination of a frame provided with bearings, a reciprocating pump-rod, a receptacle mounted on the pump-rod and carried by the same, and adapted to receive a lubricant, and telescoping oil-distributer tubes extending from the receptacle to the bearings of the frame, and adapted to conform to the reciprocation of the pump-rod, substantially as described.

10. In a windmill, the combination of a receptacle provided at its bottom with cells, oil-distributing tubes leading from the cells, an oscillating oil-distributer mounted in the receptacle and located above the cells, and means for supplying the distributer with oil, substantially as described.

11. In a windmill, the combination of a frame, a reciprocating pump-rod, a receptacle mounted on and carried by the pump-rod and provided at its bottom with cells, distributing-tubes leading from the cells, an oscillating oil-distributer pivoted in the receptacle and located above the cells, an arm fixed to the pivot of the oscillating distributer, and connections between the arm and the frame, whereby when the pump-rod is reciprocated the distributer will be oscillated, substantially as described.

12. In a windmill, the combination of a receptacle, provided with partitions forming oil-receptacles, and having adjustable upper portions, whereby the mouths of the cells may be contracted and increased in size, and a movable oil-distributer located above the cells, substantially as described.

13. In a windmill, the combination of a frame, a wind-wheel having an annular flange or collar, a lever fulcrumed on the frame and arranged to engage one face of the flange or collar, an operating-lever connected with the other lever, and arranged to engage the opposite face of the flange or collar, and a vane connected with the operating-lever, substantially as described.

14. In a windmill, the combination of a frame, a wind-wheel provided with a flange or collar, a lever 61 fulcrumed on the frame and arranged to engage one face of the flange or collar, the lever 62 connected with the lever 61, and arranged to engage the opposite face of the flange or collar, and provided with a curved portion, and a vane arranged to engage the curved portion of the lever 62, substantially as described.

15. In a windmill, the combination of a frame, a wind-wheel provided with an annular flange, the lever 61 fulcrumed on the frame and engaging the inner face of the flange, the lever 62 engaging the outer face of the flange and provided with a curved portion, a link connecting the levers, and a vane having a guide to receive the curved portion of the lever 62, and provided with a roller for engaging the same, substantially as described.

16. In a windmill, the combination of a tower, a rotary frame or turn-table mounted on the tower, a vane, a weighted lever connected with the vane, an upper rod connected with the weighted lever and depending therefrom, and having its lower end arranged to rotate on the tower, and a lower rod mounted on the tower and arranged normally out of contact with the upper rod, and adapted to lift the same to throw the vane in position to stop the wind-wheel, substantially as described.

17. In a windmill, the combination of a frame, a tower having a standard supporting the frame, the vane mounted on the frame, a weighted lever fulcrumed on the frame and connected with the vane, an upper rod depending from the weighted lever and provided at its lower end with a collar arranged on the standard of the tower, a lower rod provided at its upper end with a similar collar mounted on the standard and arranged normally out of contact with the said collar,

and means for lifting the lower rod for throwing the wind-wheel out of the wind, substantially as described.

18. In a windmill, the combination of a frame provided with bearings, the tubular pump-rod arranged vertically throughout the windmill and forming an oil-supply tube, an oil-receptacle mounted at the top of the windmill and communicating with and receiving its supply of oil from the pump-rod, and a series of tubes extending from the oil-receptacle to the bearings, substantially as described.

19. In a windmill, the combination of a rotary frame or turn-table, a pump-rod, the horizontal shafts 26 and 27 extending entirely across the rotary frame and located in the same horizontal plane at opposite sides of the pump-rod, a wind-wheel located at one side of the rotary frame and mounted on the shaft 26, gearing located at the opposite side of the rotary frame and connecting the shafts, and a double crank connection between the ends of the shaft 27 and the pump-rod, whereby an even square lift will be effected at opposite sides of the rotary frame, substantially as and for the purpose described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

GEORGE C. FLAGG.

Witnesses:

M. WALKER,

ROBERT HARBUR.