

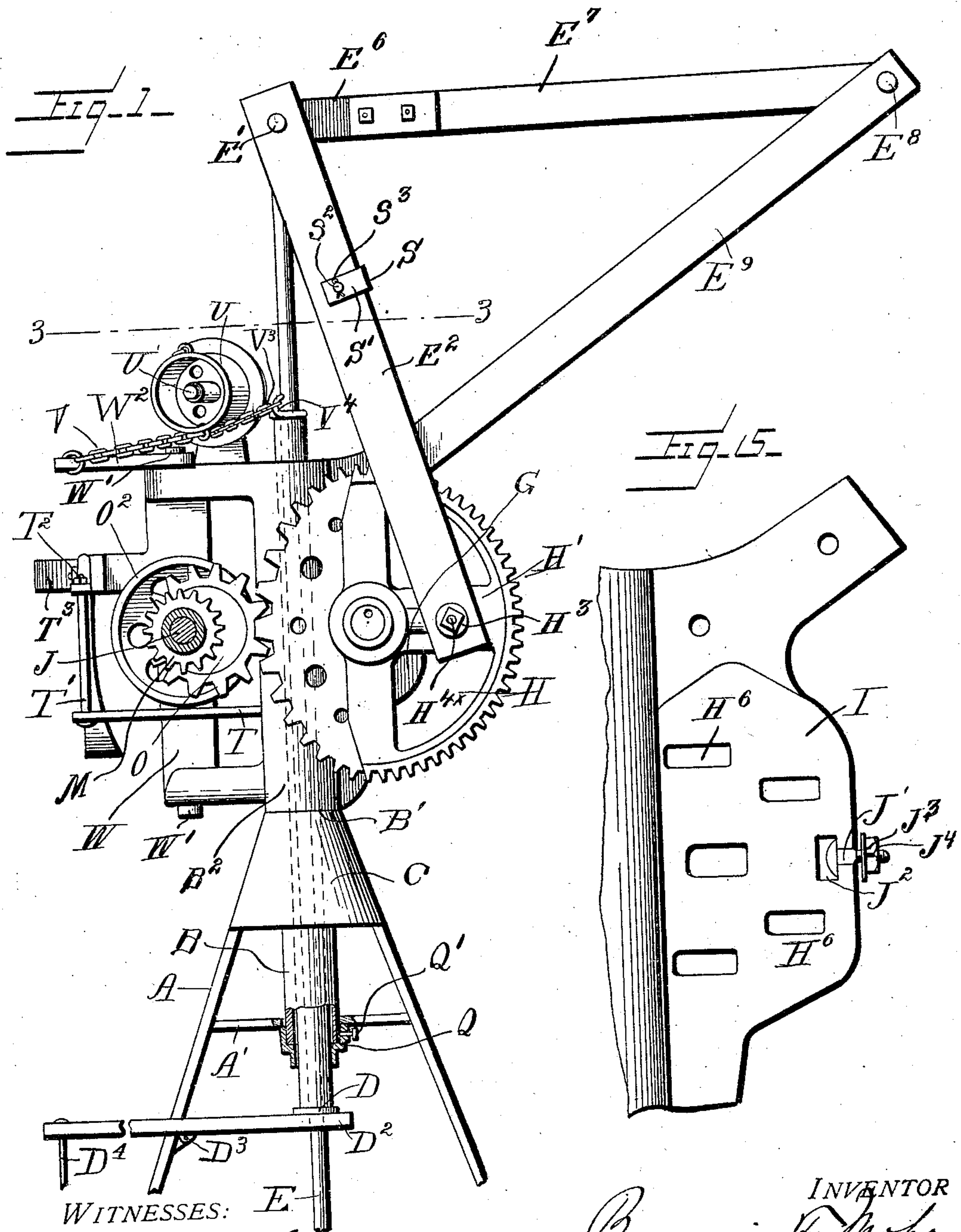
No. 842,103.

PATENTED JAN. 22, 1907.

B. F. MOHR.
WINDMILL.

APPLICATION FILED SEPT. 11, 1908.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

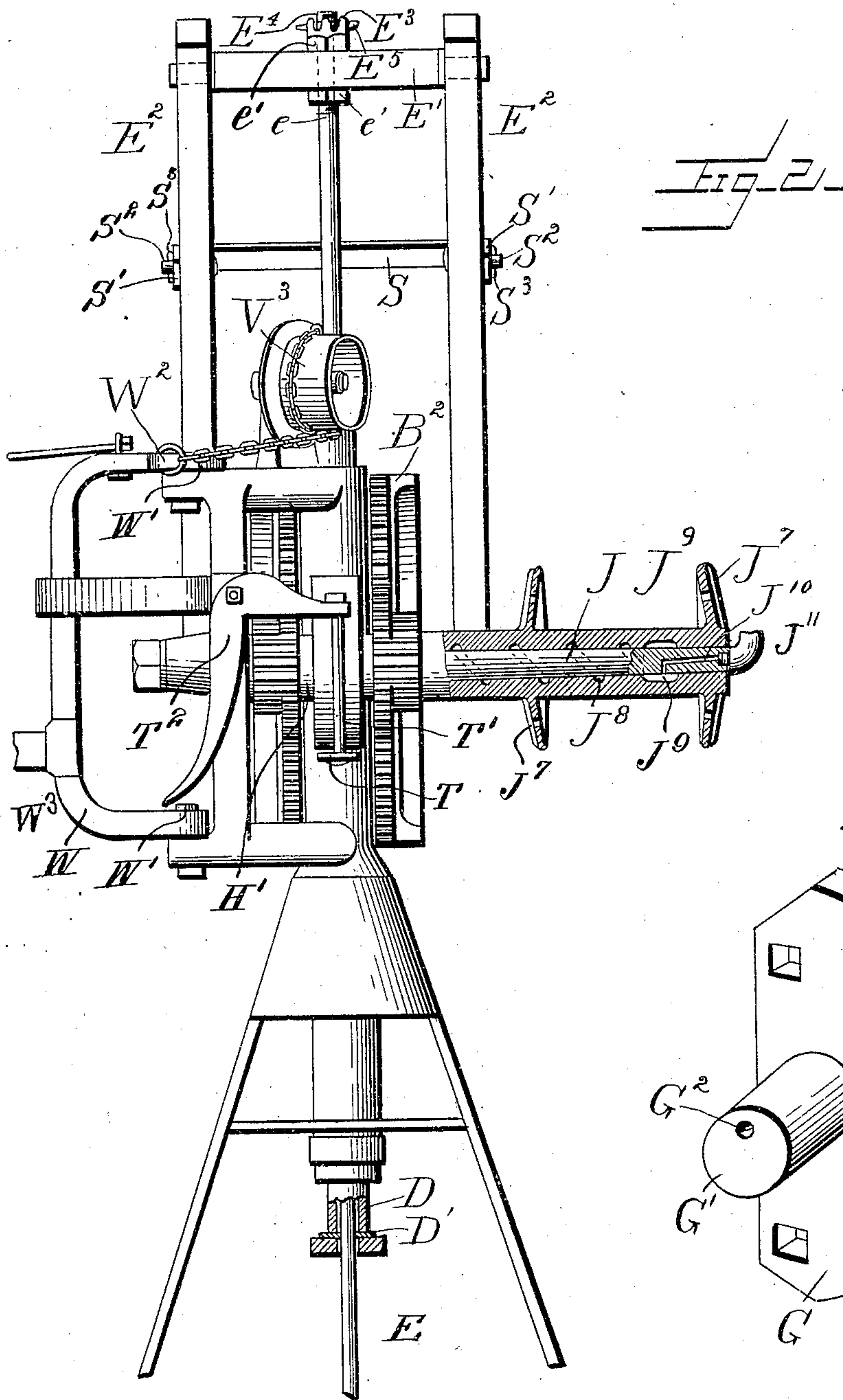
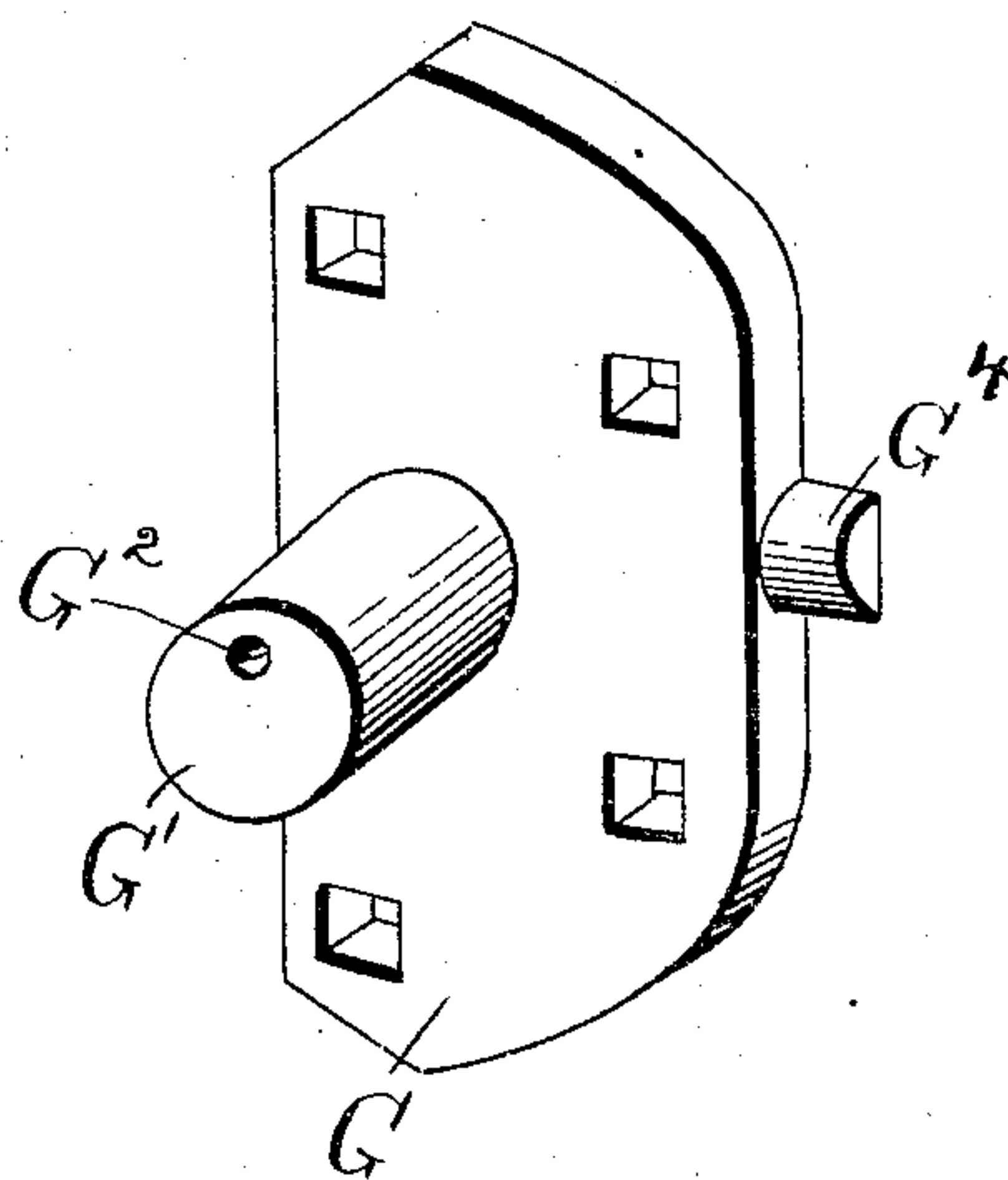


Fig. 2

Fig. 5



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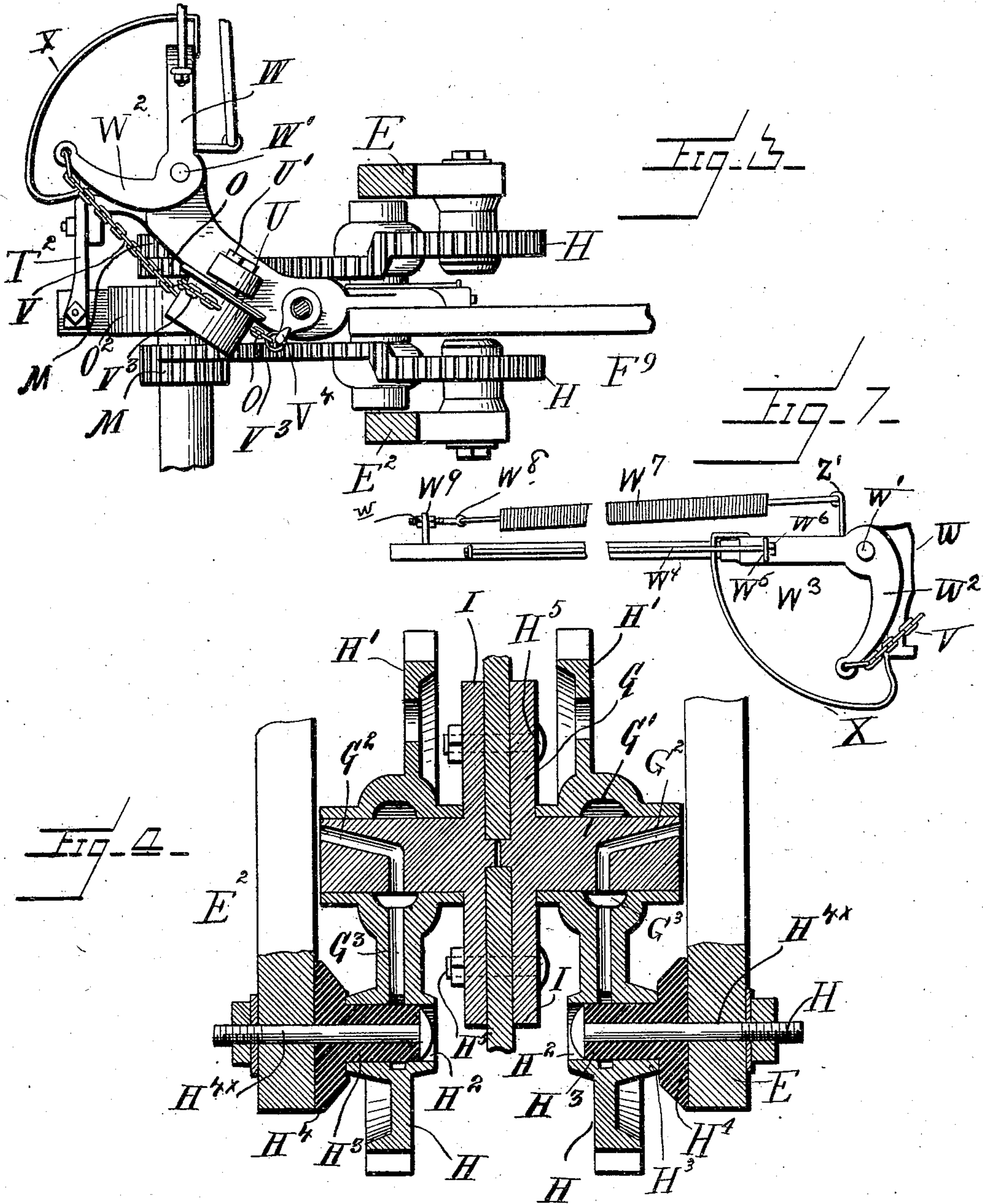
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3 SHEETS—SHEET 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

BENJAMIN F. MOHR, OF MIFFLINBURG, PENNSYLVANIA.

WINDMILL.

No. 842,103.

Specification of Letters Patent.

Patented Jan. 22, 1907.

Application filed September 11, 1906. Serial No. 334,165.

To all whom it may concern:

Be it known that I, BENJAMIN F. MOHR, a citizen of the United States, residing at Mifflinburg, in the county of Union and State of Pennsylvania, have invented certain new and useful Improvements in Windmills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, 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 new and useful improvements in gear mechanism for windmills; and one of the objects of the invention is to produce a means whereby the leverage mechanism for actuating the pump in hoisting water is greatly increased upon the upstroke of the piston and the movement in the downward throw of the piston accelerated.

The invention consists, further, in the provision of suitable flexible connections between the gear mechanism and the cross-head which actuates the pump-rod.

The invention consists, further, in the provision, in connection with the pump-actuating rod, of a hollow pipe through which the rod passes and in the provision of a tilting bar upon which the pipe rests, whereby the latter may be raised for the purpose of throwing the wind-wheel out of gear and simultaneously applying the brake mechanism.

Another feature of the invention consists in the provision of a series of gear-wheels which are formed integral with one another and of a single piece of casting which is hollow and provided with suitable spiral ducts upon the inner surface thereof, whereby oil may be distributed equally to various bearing portions of the shaft upon which the casting is mounted.

The invention consists in various other details of construction and combinations and arrangements of parts, which will be hereinafter fully described and then specifically defined in the appended claims.

I illustrate my invention in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this application, and in which—

Figure 1 is a side elevation of my windmill

apparatus, showing the peculiar shapes of the gear-wheels. Fig. 2 is a view taken on a plane at right angles to that shown in Fig. 1, parts of the invention being illustrated in section. Fig. 3 is a sectional view taken on line 3 3 of Fig. 1 and showing in top plan the windmill apparatus. Fig. 4 is an enlarged detail sectional view through the gear mechanism. Fig. 5 is an enlarged detail view of one of the plates adapted to adjustably hold a trunnion-carrying plate, and Fig. 6 is an enlarged perspective view of one of the trunnions and plate integral therewith. Fig. 7 is a detail view.

Reference now being had to the details of the drawings by letter, A designates a tower which may be of any suitable construction and provided with a cross-piece A', preferably of metal, which has a central opening to receive the lower end of the shell B, which latter is provided with a shoulder B', adapted to rest upon a plate C at the top of the tower and upon which it has a bearing. Projecting through said shell and also through the head B² of said shell is a pipe D, the lower end of which rests upon a washer D', supported upon the inner end of the pivotal bar D², the latter being pivoted at D³ upon one of the legs of the tower and its outer end connected to a wire D⁴, which is adapted to extend down to a convenient location to the ground, whereby said bar may be tilted for the purpose of throwing the wind-wheel into and out of gear in a manner which will be hereinafter fully described.

E designates a pump-actuating rod which passes through an aperture in the bar D² and extends up through the pipe D and projects a distance above the top thereof. The upper end of the rod E passes through an opening in the cross-head E', which is supported in apertures in the upper ends of the pitmen E². Said rod E, it will be noted, has threads *e* at its upper end, and a jam-nut *e'* is fitted upon said threads and adapted to bear against the under edge of the cross-head, while a nut E³ is fitted to the threaded portion of the rod above the cross-head and is adapted to bear against the upper edge of the latter. Upon reference to Fig. 2 of the drawings it will be noted that said nut E³ has recesses E⁴ formed in its upper edge, adapted to receive the ends of a pin E⁵, which passes through an aperture in said rod. The pur-

pose of said pin is to hold the nut from loosening and also providing means whereby the nut may be tightened, if necessary, to take up any wear and held from loosening upon the rod.

Referring to Fig. 6 of the drawings will be seen a plate G, preferably of cast metal, having an integral stub-shaft G' projecting therefrom which is provided with an oil-duct G², (shown clearly in Fig. 4 of the drawings,) which leads through the circumference of the stub-shaft and is adapted to communicate with an annular oil-chamber G³, formed in one of the radial spokes H of the gear-wheel H'. Said spoke H, which is shown clearly in section in Fig. 4 of the drawings, has a cylindrical-outlined opening H² formed therein adapted to receive a wrist-pin H³, having a shoulder H⁴ thereon adapted to bear against the inner face of one of said pitmen E². A bolt H^{4x} passes through said wrist-pin and also the pitmen E² and serves to securely hold the wrist-pin to the pitmen. By the provision of the oil-ducts shown and described it will be noted that a supply of oil will be fed by gravity from the annular oil-chamber G³ in said gear-wheel to the bearing for said wrist-pin, thus keeping the same thoroughly lubricated.

Upon reference to Fig. 4 of the drawings it will be noted that there are two of the plates G, each with an integral stub-shaft, the two being securely held together by means of bolts H⁵, said bolts passing through the slots H⁶, shown in the casting I, which forms a part of the framework of the apparatus. Said slots, it will be noted, are illustrated as being elongated, so that the two plates bearing the stub-shafts may be adjusted horizontally for the purpose of adjusting said gear-wheels, whereby they will each register with gear-wheels mounted upon the main driving-shaft J, to which the wind-wheel is fixed. In order to adjust the two plates horizontally, I provide a bolt J', the head of which is seated in a slot J², formed in the casting I, the shank portion of said screw J' extending through an opening in the edge of the casting I. Each of the plates G, it will be noted, has a semicylindrical lug G⁴ projecting from the outer edge thereof, and J³ designates a washer which is mounted upon the screw J' and is adapted to be forced against the outer ends of the lugs G⁴ by means of the nut J⁴. By this means it will be noted that the two plates G, which carry the gear-wheels H, may be held in proper adjustment with relation to the gear-wheels M and O, which rotate upon the shaft J.

Upon reference to Fig. 1 of the drawings it will be observed that the gear-wheel H has substantially one-half of its periphery formed on the arc of a circle or semicircular, while the balance of the periphery is formed on an ellipse. The gear-wheel O, it will be noted,

is eccentrically mounted upon the shaft J and is adapted to mesh with the teeth upon the elliptical part of the periphery of the gear-wheel H and is idle while the teeth upon the circular-outlined part of the gear-wheel H are in mesh with the teeth of the pinion-wheel M², which is concentrically mounted upon the shaft J. Upon reference to Fig. 3 of the drawings it will be noted that the two series of teeth—the one upon the circular-outlined portion of the periphery of the wheel H and those upon the elliptical portion—are in parallel planes, and the eccentrically-mounted gear-wheel O is in a plane coincident with the portion of the gear-wheel H which has teeth upon its elliptical edge, while the pinion J⁶ is in a plane coincident with that of the gear-wheel H, which has a semicircular outline, whereby as the wheels rotate first one gear O will be thrown into mesh with teeth upon the elliptical portion of the gear-wheel H and then the teeth of the pinion-wheel will be thrown into mesh with the teeth upon the semicircular-outlined portion of said gear-wheel. This mechanical movement, it will be observed, will give an increased leverage upon the upper throw of the pump-actuating rod, while an accelerated motion will be imparted to the latter when the teeth upon the circular-outlined portion of the gear-wheel H are in mesh with the teeth of said pinion.

In order to hold the shell B securely upon the tube D, I provide a shouldered collar Q, (shown clearly in Figs. 1 and 2 of the drawings,) which is held to the lower end of the shell by means of a suitable set-screw Q', the pipe D being allowed to move freely through the contracted end of said collar.

Referring to Figs. 1 and 2 of the drawings will be seen a bar S, the ends S' of which are angled and are adapted to fit over the outer faces of the pitmen E², said bar being provided to hold the pitmen in parallel relation, so that the wrist-pins carried at the lower ends thereof will be held in the bearings in the gear-wheels H, and bolts S² are passed through apertures in the pitmen and also through registering apertures in the angled ends of said bars S. A cotter S³ is passed through the outer end of each bolt S², whereby the latter may be held in place. Said pitmen besides holding the wrist-pins in their bearings serve to hold the wheels H upon their stub-shafts.

Formed integral with the hub J are the flanges J⁷, which are adapted to hold the arms of a wind-wheel, and said hub has a spiral duct J⁸ formed in its inner surface and leading at one end into an oil-reservoir J⁹, into which oil is fed through the port J¹⁰, which has an upwardly-turned pipe J¹¹ communicating with its outer end. Said gear-wheels O and M are formed integral with the hub J, thereby preventing the possibility of

the same rotating independent one of another, and consequently making the apparatus inoperative.

Intermediate the gear-wheels O is a friction-wheel O², which is also integral with the hub, and T designates a brake-bar which is fastened at its inner end to the head B², and its outer end has a rod T' fastened thereto, the upper end of which is adjustably fastened, by means of a nut T², to one end of an angle-lever T³, (shown clearly in Fig. 2 of the drawings,) which lever is positioned in the path of the yoke W, the ends of which are pivoted at W' upon pivot-pins carried by said head. One end of said yoke has an arm W² projecting at an angle from its upper end and has connected at its end a chain V, the other end of which chain passes about a drum U, journaled upon a pin U', supported by a lug or projection on the head. A second chain V³ is also fastened to the circumference of said drum U, and its other end is fastened to a hook V⁴, which is fixed to the pipe D, as clearly shown in Fig. 1 of the drawings. An arm W³ projects from said yoke, and a rod W⁴ is fastened to the outer end of the arm W³, and its inner end passes through an eyebolt W⁵ on said rod, and a nut W⁶ is fitted on the threaded end of said rod, whereby the bar may be kept taut. A spring W⁷ is fastened at one end to an eyebolt W⁸ and passes through an eye W⁹ on said bar W³, and a nut w is mounted upon the threaded end of the eyebolt, which is carried by said bar, thereby regulating the tension of said spring. The inner end of the spring is fastened to an eye Z, formed in the plate Z', which is bolted to the framework which forms an integral part of said head. The office of said spring is to return said bar to its normal position after having been thrown for the purpose of applying the brake and returning the wind-wheel edgewise to the wind. The side of the yoke as it swings laterally is adapted to tilt the angle-lever, which is attached to the brake, and apply the same, while the jar or strain which would come upon the apparatus when the bar returns to its normal position under the tension of said spring is prevented by the resilient arm X, which is fastened at one end to the frame of the head, and the other end is angled and forms a stop against which the side of the yoke contacts as said bar swings back under the action of the spring carried thereby.

Connected to the spindles of the cross-head is a forked member E⁶, fastened to a bar E⁷, which bar at its outer end is pivotally connected at E⁸ to the brace-bar E⁹, which latter is fixed at its lower end to a flange projecting from said head.

The operation of my windmill will be readily understood when taken in connection with the drawings forming a part of this application, and is as follows: When the driv-

ing-hub is in motion, being driven by the wind-wheel, the gear mechanism is so adjusted that on the upper lifting throw of the rod, which raises the piston in the pump, the teeth upon the circular-outlined portion of the periphery of the gear-wheels, one upon either side, will be in mesh with the teeth of the pinions N, thereby increasing the power upon the upper throw of the piston of the pump, and when the piston of the pump reaches its upper limit the teeth upon the elliptical-outlined portions of the gear-wheels will be thrown into mesh with the teeth of the eccentrically-mounted gears, thereby accelerating the movement of the piston upon its downward throw and also lessening the power, which is not required as the piston is forced down in the pump. In the reciprocating movement of the rod which actuates the piston it will be noted that the pitmen will be steadied and held by the peculiar brace-bars shown and described and the angled bar which engages the pitmen will securely hold the same upon their pivots and also will hold the wrist-pins within their bearings and also the gear-wheels, which have the circular-outlined and elliptical peripheries. The adjustment of the connections between the gear-wheels may be regulated by the nut and bolt upon which the same is mounted, which is shown clearly in Fig. 5 of the drawings. In the event of one or the other of the two sets of gear mechanism, one upon either side of the head, not turning in unison the pitmen having pivotal connections at their lower ends with the wrist-pins upon the gear-wheels and their upper ends with the cross-head may have a slight play to compensate for the same. In the event of its being desired to remove the pitmen for any purpose said angle-bar is first removed, after which each pitman may be separated from the apparatus, the wrist-pins being fastened to the lower ends of the pitmen and not to the wheels H, as is commonly the practice where pitmen are connected to wheels. By making the wrist-pins separate from the wheel H the strain coming upon the wrist-pin is better equalized. After the wrist-pins and pitmen have been removed the gear-wheels H may be readily removed, if desired, for any purpose, thus making an apparatus the parts of which may be readily detached for repair or other purposes. When it is desired to throw the mill out of gear and apply the brake mechanism by pulling upon a wire, the pivotal lever D² may be tilted, which will cause the pipe D to rise, and through its chain connection with the drum U the latter may be caused to rotate, and the second chain, also fastened to said drum, will wind upon the latter and throw the spring-actuated bar, which carries the weather-vane, around into the wind. When the yoke upon said bar comes into contact with the brake-bar, the

latter will be thrown frictionally against the friction-wheel of the hub and securely hold the apparatus from operation.

What I claim is—

1. A windmill apparatus comprising a head, a shell projecting therefrom, a piston-hoisting rod passing through said shell and head, a hub mounted upon suitable bearings upon the head and to which a wind-wheel is adapted to be fixed, a pinion and an eccentric gear-wheel fixed to the hub and adjacent to each other, a gear-wheel having a portion of its circumference on the arc of a circle and provided with gear-teeth and the balance of the circumference of the wheel being on the arc of an ellipse and provided with gear-teeth in a plane parallel with the plane in which the teeth of the circular-outlined portion of the wheel are disposed, said teeth in the two planes designed to mesh alternately with said pinion and eccentrically mounted gear-wheel to cause an accelerated movement upon the downward throw of the piston and a slow movement upon the upward movement of the latter, a cross-head to which said piston-actuating rod is adjustably held, pitmen pivotally connected to said cross-head, a wrist-pin carried by the pinion and having a bearing in said gear-wheel which has a portion of its circumference circular outlined and a portion elliptical outlined, and means for holding said pitmen upon the cross-head and the wrist-pin carried thereby in its bearing, as set forth.
2. A windmill apparatus comprising a head, a shell projecting therefrom, a pipe extending through said shell, a piston-rod having a vertical play through said shell and pipe, a cross-head secured to said rod, a gear-wheel mounted in suitable bearings upon the head and provided with a circumference, a portion of which is formed on the arc of a circle and provided with gear-teeth, the remaining circumference of the wheel being upon the arc of an ellipse and provided with teeth at right angles which are in a plane parallel with the plane in which the teeth upon the circular-outlined portion of the gear-wheel are positioned, a hub mounted in suitable bearings and adapted to carry a wind-wheel, a concentric pinion and an eccentrically-mounted gear-wheel rotating with said hub and adapted to alternately mesh, respectively, with the teeth upon the circular-outlined portion of said gear-wheel with the teeth upon the elliptical part of its circumference, a vane-carrying yoke pivotally mounted upon the head, a drum mounted upon said head, chain connections between said yoke and drum and between the latter and said pipe, whereby as the pipe is raised, the drum may be rotated and the yoke turned upon its pivot to throw the wind-wheel edgewise into the wind, as set forth.
3. A windmill apparatus comprising a

head, a shell projecting therefrom, a pipe extending through said shell, a piston-rod having a vertical play through said shell and pipe, a cross-head secured to said rod, a gear-wheel mounted in suitable bearings upon the head and provided with a circumference, a portion of which is formed on the arc of a circle and provided with gear-teeth, the remaining circumference of the wheel being upon the arc of an ellipse and provided with teeth at right angles which are in a plane parallel with the plane in which the teeth upon the circular-outlined portion of the gear-wheel are positioned, a hub mounted in suitable bearings and adapted to carry a wind-wheel, a concentric pinion and an eccentrically-mounted gear-wheel rotating with said hub and adapted to alternately mesh, respectively, with the teeth upon the circular-outlined portion of said gear-wheel with the teeth upon the elliptical part of its circumference, a vane - carrying yoke pivotally mounted upon the head, a drum mounted upon said head, chain connections between said yoke and drum and between the latter and said pipe, whereby as the pipe is raised, the drum may be rotated and the yoke turned upon its pivot to throw the wind-wheel edgewise into the wind, and brake mechanism operated by said yoke, as set forth.

4. A windmill apparatus comprising a head, a shell projecting therefrom, a pipe extending through said shell, a piston-rod having a vertical play through said shell and pipe, a cross-head secured to said rod, a gear-wheel mounted in suitable bearings upon the head and provided with a circumference, a portion of which is formed on the arc of a circle and provided with gear-teeth, the remaining circumference of the wheel being upon the arc of an ellipse and provided with teeth at right angles which are in a plane parallel with the plane in which the teeth upon the circular-outlined portion of the gear-wheel are positioned, a hub mounted in suitable bearings and adapted to carry a wind-wheel, a concentric pinion and an eccentrically-mounted gear-wheel rotating with said hub and adapted to alternately mesh, respectively, with the teeth upon the circular-outlined portion of said gear-wheel with the teeth upon the elliptical part of its circumference, a vane - carrying yoke pivotally mounted upon the head, a drum mounted upon said head, chain connections between said yoke and drum and between the latter and said pipe, whereby as the pipe is raised, the drum may be rotated and the yoke turned upon its pivot to throw the wind-wheel edgewise into the wind, a friction-wheel rotating with the hub, an angle-lever pivoted upon the head, and a brake-bar projecting from the head and connected to said lever, one end of the latter being positioned

in the path of said swinging yoke, as set forth.

5. A windmill apparatus comprising a head, a shell projecting therefrom, a pipe extending through said shell, a piston-rod having a vertical play through said shell and pipe, a cross-head secured to said rod, a gear-wheel mounted in suitable bearings upon the head and provided with a circumference, a portion of which is formed on the arc of a circle and provided with gear-teeth, the remaining circumference of the wheel being upon the arc of an ellipse and provided with teeth at right angles which are in a plane parallel with the plane in which the teeth upon the circular-outlined portion of the gear-wheel are positioned, a hub mounted in suitable bearings and adapted to carry a wind-wheel, a concentric pinion and an eccentrically-mounted gear-wheel rotating with said hub and adapted to alternately mesh, respectively, with the teeth upon the circular-outlined portion of said gear-wheel and with the teeth upon the elliptical part of its circumference, a vane-carrying yoke pivotally mounted upon the head, a drum mounted upon said head, chain connections between said yoke and drum and between the latter and said pipe, whereby as the pipe is raised, the drum may be rotated and the yoke turned upon its pivot to throw the wind-wheel edgewise into the wind, a friction-wheel rotating with the hub, an angle-lever pivoted upon the head, a brake-bar projecting from the head and connected to said lever, one end of the latter being positioned in the path of said swinging yoke, and a spring fastened at one end to the vane-carrying bar and its other end secured to said head and designed to return the vane to its normal position after having been swung to throw the wheel out of gear, as set forth.

6. A windmill apparatus comprising a head, a shell projecting therefrom, a pipe extending through said shell, a piston-rod having a vertical play through said shell and pipe, a cross-head secured to said rod, a gear-wheel mounted in suitable bearings upon the head and provided with a circumference, a portion of which is formed on the arc of a circle and provided with gear-teeth, the remaining circumference of the wheel being upon the arc of an ellipse and provided with teeth at right angles which are in a plane parallel with the plane in which the teeth upon the circular-outlined portion of the gear-wheel are positioned, a hub mounted in suitable bearings and adapted to carry a wind-wheel, a concentric pinion and an eccentrically-mounted gear-wheel rotating with said hub and adapted to alternately mesh, respectively, with the teeth upon the circular-outlined portion of said gear-wheel and with the teeth upon the elliptical part of its circumference, a vane-carrying yoke pivotally mounted upon the head, a drum mounted

upon said head, chain connections between said yoke and drum and between the latter and said pipe, whereby as the pipe is raised, the drum may be rotated and the yoke turned upon its pivot to throw the wind-wheel edgewise into the wind, a friction-wheel rotating with the hub, an angle-lever pivoted upon the head, a brake-bar projecting from the head and connected to said lever, one end of the latter being positioned in the path of said swinging yoke, and yielding means positioned in the path of said yoke and adapted to prevent jar of the same when returning to its normal position under the influence of said spring, as set forth.

7. A windmill apparatus comprising a head, a shell projecting therefrom, a pipe extending through said shell, a piston-rod having a vertical play through said shell and pipe, a cross-head secured to said rod, a gear-wheel mounted in suitable bearings upon the head and provided with a circumference a portion of which is formed on the arc of a circle and provided with gear-teeth, the remaining circumference of the wheel being upon the arc of an ellipse and provided with teeth which are in a plane parallel with the plane in which the teeth upon the circular-outlined portion of the gear-wheel are positioned, a hub mounted in suitable bearings and adapted to carry a wind-wheel, a concentric pinion and an eccentrically-mounted gear-wheel rotating with said hub and adapted to alternately mesh, respectively, with the teeth upon the circular-outlined portion of said gear-wheel and with the teeth upon the elliptical part of its circumference, a vane-carrying yoke pivotally mounted upon the head, a drum mounted upon said head, chain connections between said yoke and drum and between the latter and said pipe, whereby as the pipe is raised, the drum may be rotated and the yoke turned upon its pivot to throw the wind-wheel edgewise into the wind, a friction-wheel rotating with the hub, an angle-lever pivoted upon the head, a brake-bar projecting from the head and connected to said lever, one end of the latter being positioned in the path of said swinging yoke, a spring fastened at one end to the vane-carrying bar and its other end secured to said head and designed to return the vane to its normal position after having been swung to throw the wheel out of gear, and a resilient bar fixed to the head and provided with a hooked end adapted to be positioned in the path of said yoke to take up vibration as the yoke returns under the influence of said spring to its normal position, as set forth.

8. A windmill apparatus comprising a head, a shell projecting therefrom, a pipe extending through said shell, a piston-rod having a vertical play through said shell and pipe, a cross-head secured to said rod, a gear-

wheel mounted in suitable bearings upon the head and provided with a circumference a portion of which is formed on the arc of a circle and provided with gear-teeth, the remaining circumference of the wheel being upon the arc of an ellipse and provided with teeth which are in a plane parallel with the plane in which the teeth upon the circular-outlined portion of the gear-wheel are positioned, a hub mounted in suitable bearings and adapted to carry a wind-wheel, a concentric pinion and an eccentrically-mounted gear-wheel rotating with said hub and adapted to alternately mesh, respectively, with the teeth upon the circular-outlined portion of said gear-wheel and with the teeth upon the elliptical part of its circumference, a vane-carrying yoke pivotally mounted upon the head, a drum mounted upon said head, chain connections between said yoke and drum and between the latter and said pipe, whereby as the pipe is raised, the drum may be rotated and the yoke turned upon its pivot to throw the wind-wheel edgewise into the wind, a friction-wheel rotating with the hub, an angle-lever pivoted upon the head, a brake-bar projecting from the head and connected to said lever, one end of the latter being positioned in the path of said swinging yoke, a spring fastened at one end to the head, an eye upon the bar of the vane, an eyebolt passing through said eye and connected to said spring, and a nut fitted upon the threaded end of said eyebolt, as set forth.

9. A windmill apparatus comprising a head, a shell projecting therefrom, a pipe mounted to have a vertical play through said shell and head, a hook secured to the upper end of said pipe, a piston-rod passing through said pipe, a cross-head secured to the upper end of the rod, a gear-wheel having a portion of its circumference formed on the arc of a circle and provided with teeth, the balance of the circumference of the wheel being on the arc of an ellipse and provided with teeth which are in a plane parallel to the plane on which the teeth upon the circular-outlined portion of the wheel are disposed, a hub mounted in suitable bearings, a concentrically-mounted pinion-wheel and an eccentrically-mounted gear rotating with said hub and adapted to mesh alternately and respectively, with the teeth upon the circular-outlined portion of said wheel and those upon the elliptical portion of the circumference, a vane-carrying yoke pivotally mounted upon said head, a friction-wheel rotating with the hub, a bar adapted to contact with said friction-wheel, an angle-lever pivoted upon the head, connections between said lever and bar, one end of the lever being positioned in the path of said yoke, a drum rotating in suitable bearings upon the head, a chain fastened at one end to said hook upon the pipe and adapted to wind upon said drum to

which its other end is attached, a second chain also fixed to the circumference of the drum and adapted to wind thereon in an opposite direction to said first-mentioned chain and fastened at its other end to a projecting arm of said yoke, and means for raising said pipe, as set forth.

10. A windmill apparatus comprising a head, a shell projecting therefrom, a pipe mounted to have a vertical play through said shell and head, a hook secured to the upper end of said pipe, a piston-rod passing through said pipe, a cross-head secured to the upper end of the rod, a gear-wheel having a portion of its circumference formed on the arc of a circle and provided with teeth, the balance of the circumference of the wheel being on the arc of an ellipse and provided with teeth which are in a plane parallel to the plane on which the teeth upon the circular-outlined portion of the wheel are disposed, a hub mounted in suitable bearings, a concentrically-mounted pinion-wheel and an eccentrically-mounted gear rotating with said hub and adapted to mesh alternately and respectively, with the teeth upon the circular-outlined portion of said wheel and those upon the elliptical portion of the circumference, a vane-carrying yoke pivotally mounted upon said head, a friction-wheel rotating with the hub, a bar adapted to contact with said friction-wheel, an angle-lever pivoted upon the head, connections between said lever and bar, one end of the lever being positioned in the path of said yoke, a drum rotating in suitable bearings upon the head, a chain fastened at one end to said hook upon the pipe and adapted to wind upon said drum to which its other end is attached, a second chain also fixed to the circumference of the drum and adapted to wind thereon in an opposite direction to said first-mentioned chain and fastened at its other end to a projecting arm of said yoke, and a pivotal lever adapted to bear against the lower end of said pipe, as set forth.

11. A windmill apparatus comprising a head, a shell projecting therefrom, a pipe passing through said shell and head, a piston-actuated rod having a vertical play through said pipe, a cross-head in which the upper end of said rod is adjustably held, a plurality of gear-wheels mounted in suitable bearings upon said head, each of said wheels having a portion of its circumference on the arc of a circle and provided with gear-teeth, the balance of the circumference being on the arc of an ellipse and provided with gear-teeth which are in a plane parallel to the plane on which the teeth upon the circular-outlined portion of the circumference are disposed, a hub to which the windmill is adapted to be attached, concentrically-mounted pinion-wheels upon the hub, and eccentrically-mounted gears adapted to mesh respectively,

with the teeth upon the circular-outlined portion of said wheel and those upon the elliptical part of the wheel, pitmen pivotally connected at their upper ends to said cross-head, pitmen carried by the lower ends and adapted to have bearings each in one of said wheels which are provided with the circular and elliptically outlined circumferences, means for holding the pitmen in place, a swinging vane - carrying yoke, a friction-wheel rotating with said hub, a bar, and connections between the same and said yoke, whereby as the vane swings, the brake may be applied, as set forth.

12. A windmill apparatus comprising a head, a shell projecting therefrom, a pipe passing through said shell and head, a piston-actuated rod having a vertical play through said pipe, a cross-head in which the upper end of said rod is adjustably held, a plurality of gear-wheels mounted in suitable bearings upon said head, each of said wheels having a portion of its circumference on the arc of a circle and provided with gear-teeth, the balance of the circumference being on the arc of an ellipse and provided with gear-teeth which are in a plane parallel to the plane on which the teeth upon the circular-outlined portion of the circumference is disposed, a hub to which the wind-wheel is adapted to be attached, concentrically - mounted pinion-wheels upon the hub, and eccentrically-mounted gears adapted to mesh respectively, with the teeth upon the circular-outlined portion of said wheel and those upon the elliptical part of the wheel, pitmen pivotally connected at their upper ends to said cross-head, pitmen carried by the lower ends and adapted to have bearings each in one of said wheels which are provided with the circular and elliptical outlined circumferences, a bar having angled ends which are apertured and adapted to fit over the two pitmen and hold the same in place, a swinging vane-carrying yoke, and means for throwing the wheel edgewise into the wind and applying a brake, as set forth.

13. A windmill apparatus comprising a head, a shell projecting therefrom, a pipe passing through said shell and head, a piston-actuating rod having a vertical play through said pipe, a cross-head in which the upper end of said rod is adjustably held, a plurality of gear - wheels mounted in suitable bearings upon said head, each of said wheels having a portion of its circumference on the arc of a circle and provided with gear-teeth, the balance of the circumference being on the arc of an ellipse and provided with gear - teeth which are in a plane parallel to the plane on which the teeth upon the circular-outlined portion of the circumference is disposed, a hub, to which the wind-wheel is adapted to be attached, concentrically-mounted pinion-wheels upon the hub, and eccentrically-

mounted gears adapted to mesh respectively, with the teeth upon the circular-outlined portion of said wheel and those upon the elliptical part of the wheel, pitmen pivotally connected at their upper ends to said cross-head, pitmen carried by the lower ends and adapted to have bearings each in one of said wheels which are provided with the circular and elliptical outlined circumferences, a bar having angled ends which are apertured and adapted to fit over the two pitmen and hold the same in place, a yoke secured to the ends of the cross-head, and a brace secured to the head and having pivotal connection with said yoke-carrying bar, as set forth.

14. A windmill apparatus comprising a head, a pipe movably mounted within the head, a piston-actuating rod having a play therein, plates adjustably held upon said head, a stub-shaft projecting from each of said plates, a gear-wheel journaled upon each of said stub-shafts, a cross-head connected to said rod, pitmen connections between said head and gear-wheel, a rotatable hub adapted to carry a wind-wheel, gear-wheels upon the hub adapted to mesh with the gear-wheels which are mounted upon said stub-shafts, a vane-carrying yoke, a drum mounted in suitable bearings upon the head, a chain fastened at one end to said pipe and its other end fixed to the drum upon which it winds, a second chain fastened at one end to the circumference of the drum and adapted to wind in the opposite direction from the other chain and connected to said yoke, as set forth.

15. A windmill apparatus comprising a head, a pipe movably mounted therein, a piston-actuating rod passing through said pipe, adjustably-mounted plates upon said head, a stub-shaft projecting from each of said plates, a gear-wheel journaled upon each of said shafts, a hub adapted to carry a wind-wheel, gear-wheels rotating with said hub and in mesh with said gear-wheels upon the stub-shafts, a cross-head fixed to the upper end of said rod, a pitman having bearings upon said cross-head, wrist-pins carried by the lower ends of said pitman and having bearings in said wheels upon the stub-shaft, a swinging vane-carrying yoke mounted upon the head, brake mechanism, and means for throwing the wind-wheel edgewise into the wind as the yoke is swung upon its pivot, and applying said brake mechanism, as set forth.

16. A windmill apparatus comprising a head having a projection with elongated slots therein, a pipe movably mounted therein, a piston-actuating rod passing through said pipe, apertured plates having each a stub-shaft projecting therefrom, bolts passing through registering apertures in said plates and through elongated slots in the projection of said head, a lug projecting from one

of the edges of each of said plates, a bolt having a head seated in a slot in the projecting part of said head and a nut adapted to bear against the ends of said lugs upon the plates,
5 gear-wheels journaled one upon each of said stub-shafts, a hub adapted to carry a wind-wheel, gear-wheels rotating with the hub and in mesh with the gear-wheels upon the stub-shafts, swinging vane-carrying yoke mount-

ed upon the head, and means for swinging said yoke, whereby the wind-wheel may be thrown edgewise with the wind, as set forth.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

BENJAMIN F. MOHR.

Witnesses:

A. L. HOUGH,
N. A. MAYHEW.