No. 816,524. PATENTED MAR. 27, 1906.

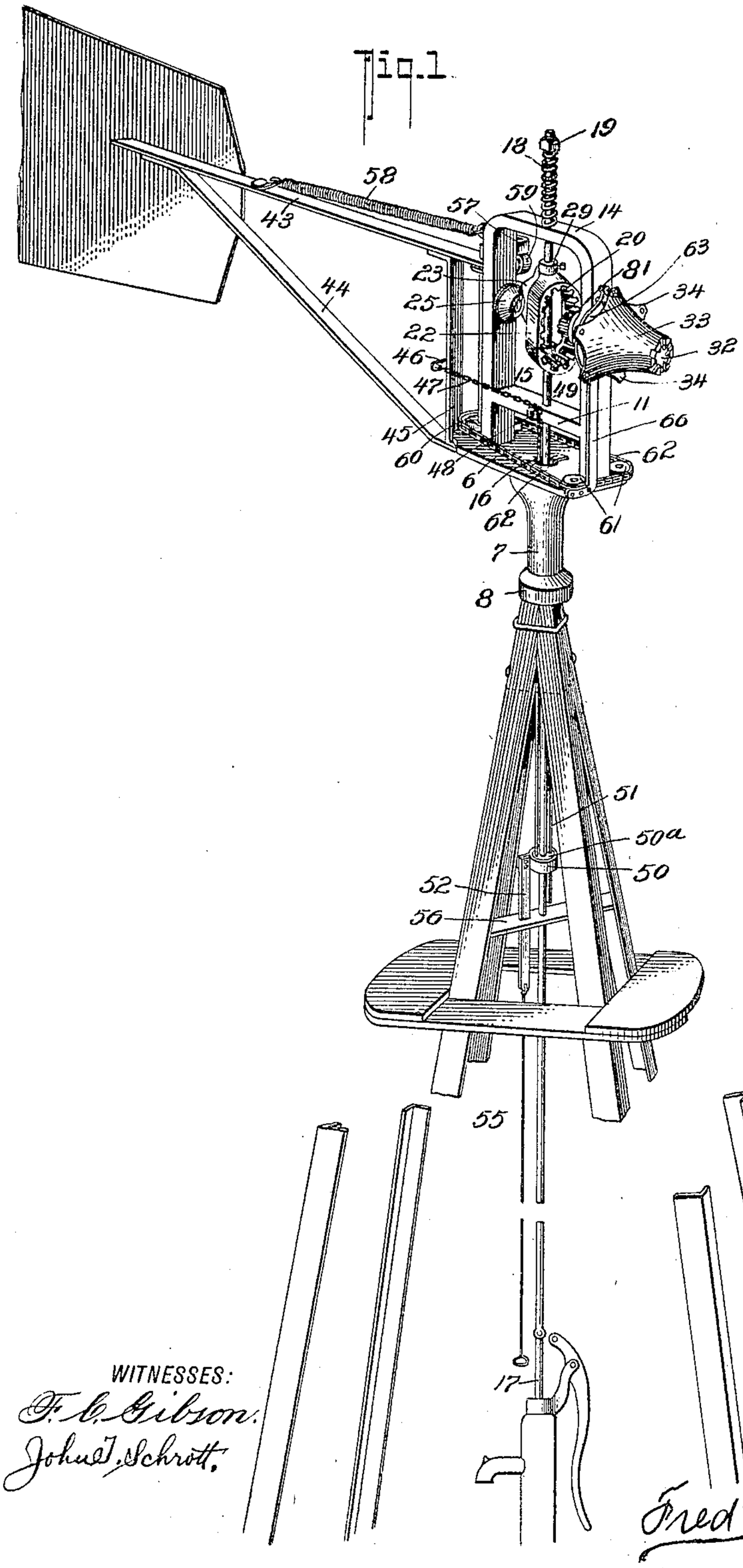
J. C. ZIEGLER.

WIND MOTOR.

APPLICATION FILED JUNE 27, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

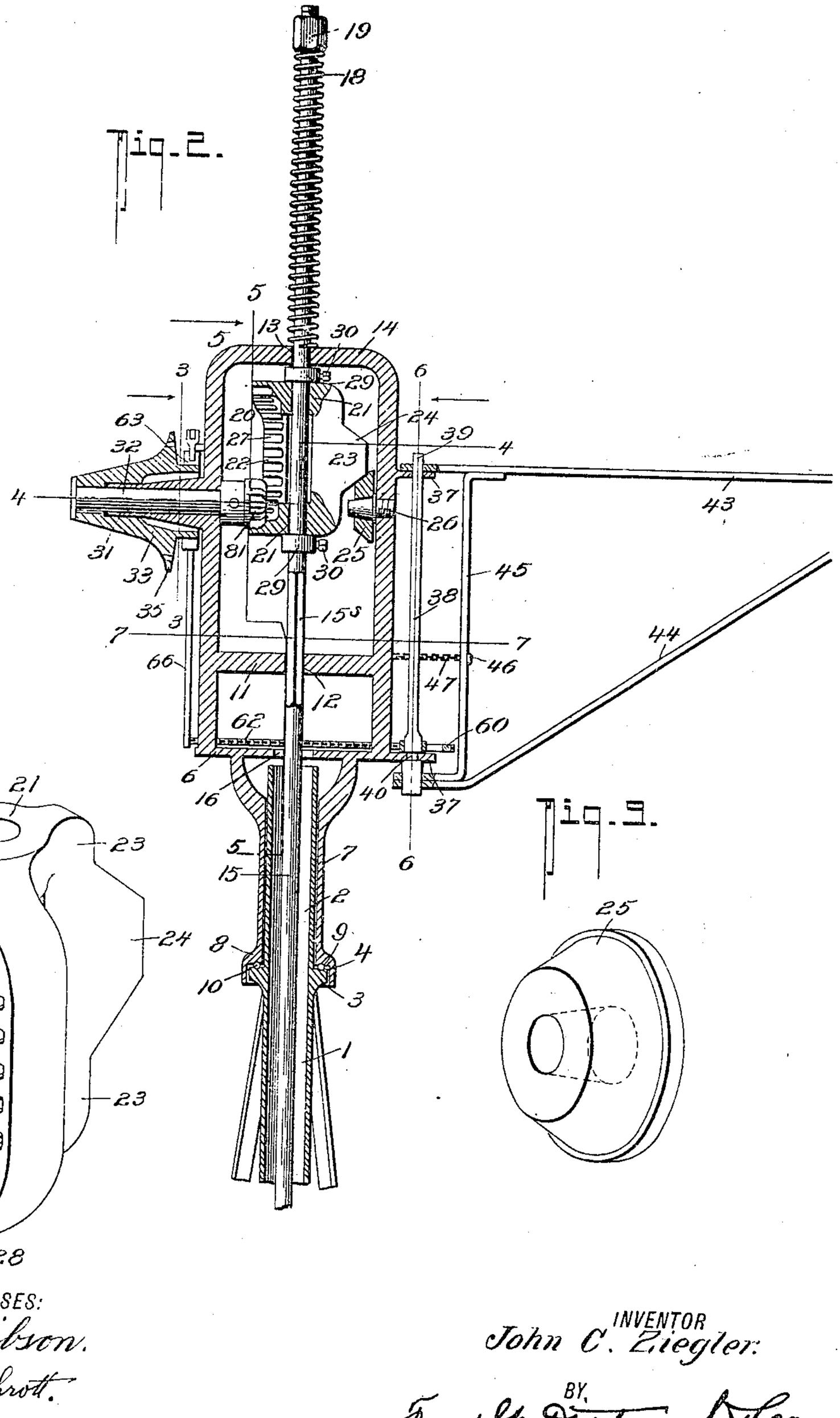

Fig. 8.

Fig. 9.

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3 SHEETS—SHEET 3.

Fig. 3.

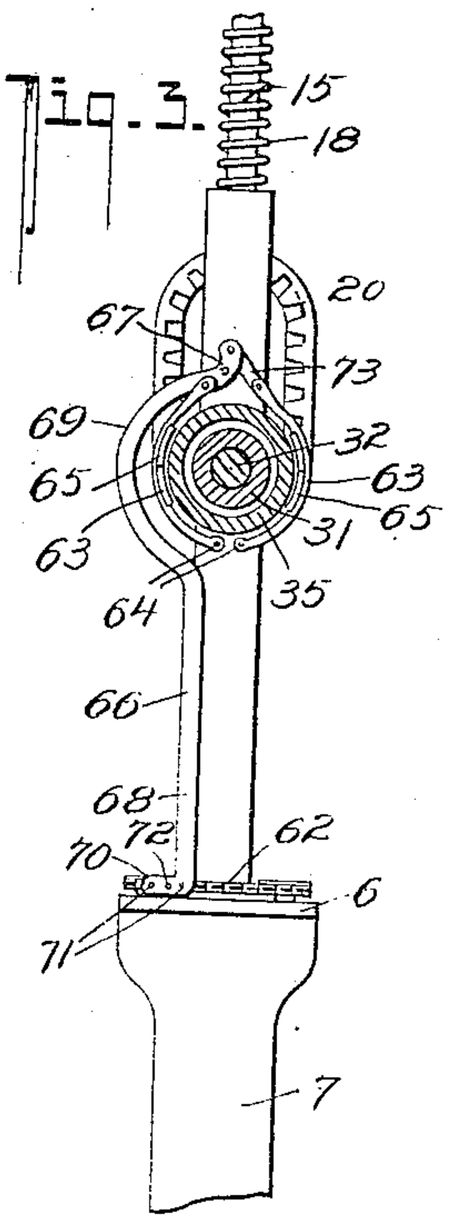


Fig. 5.

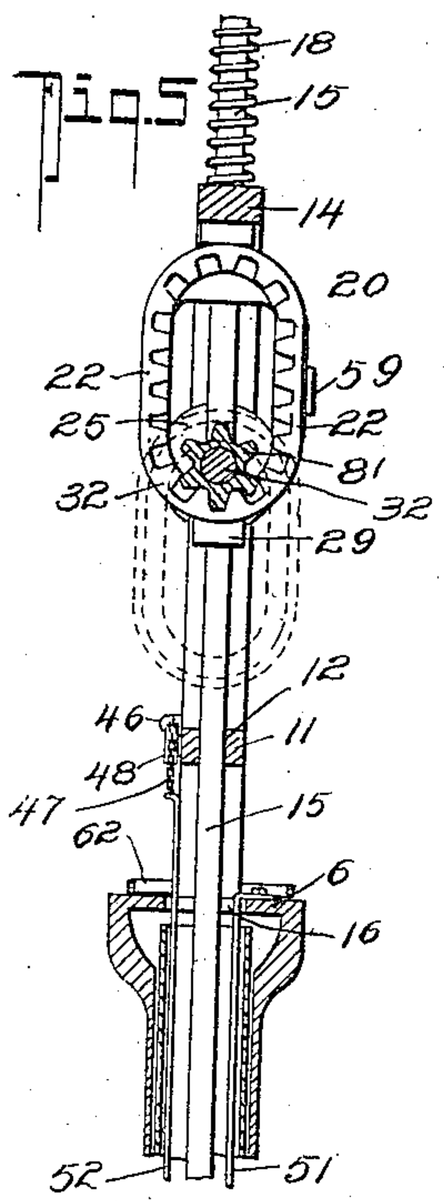


Fig. 6.

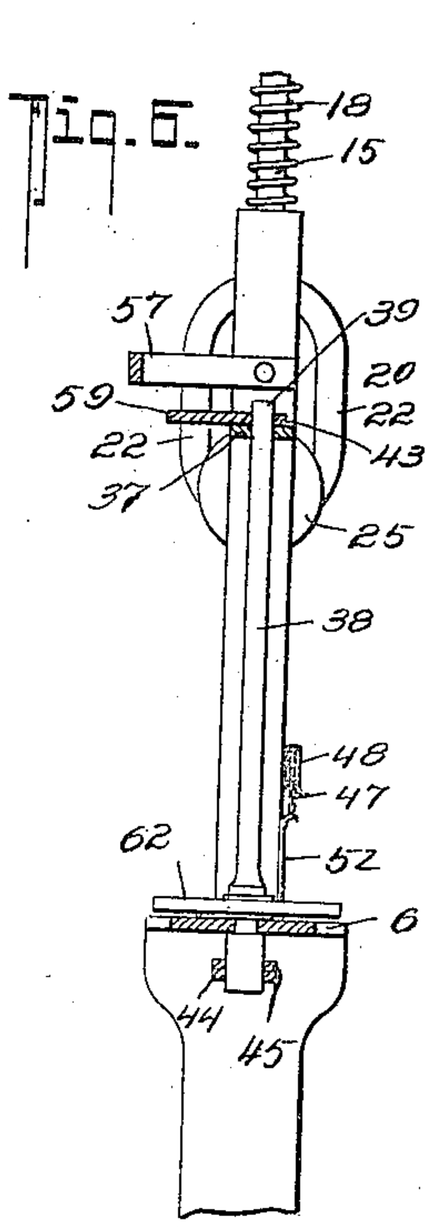


Fig. 4.

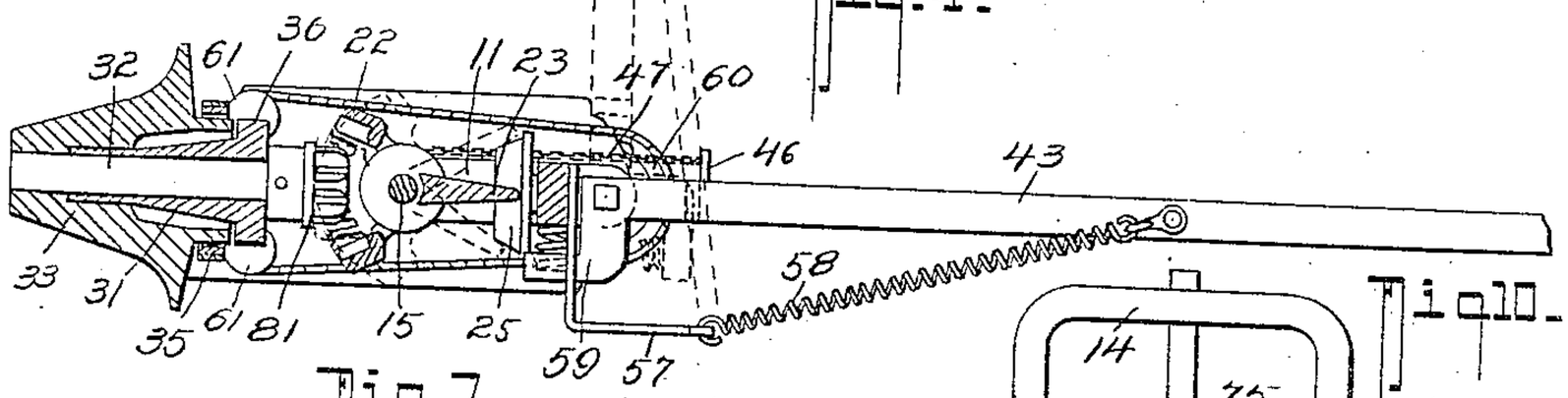


Fig. 7.

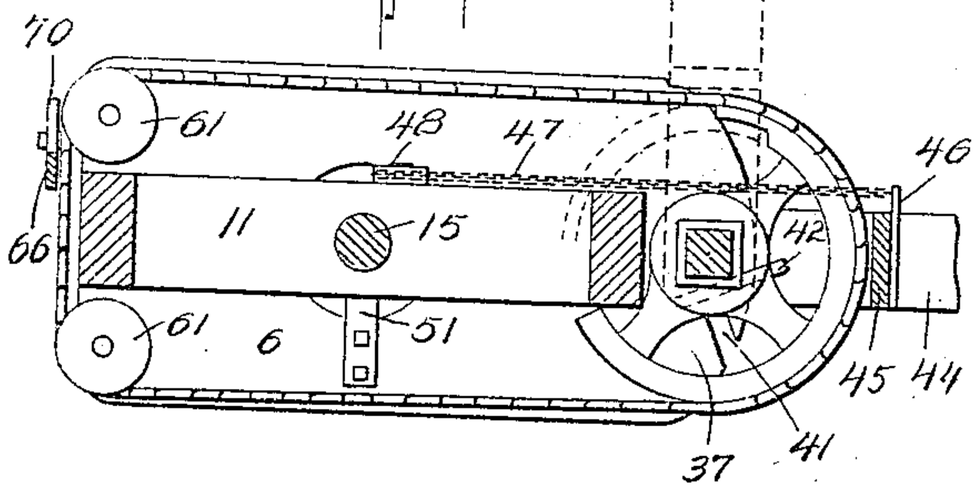
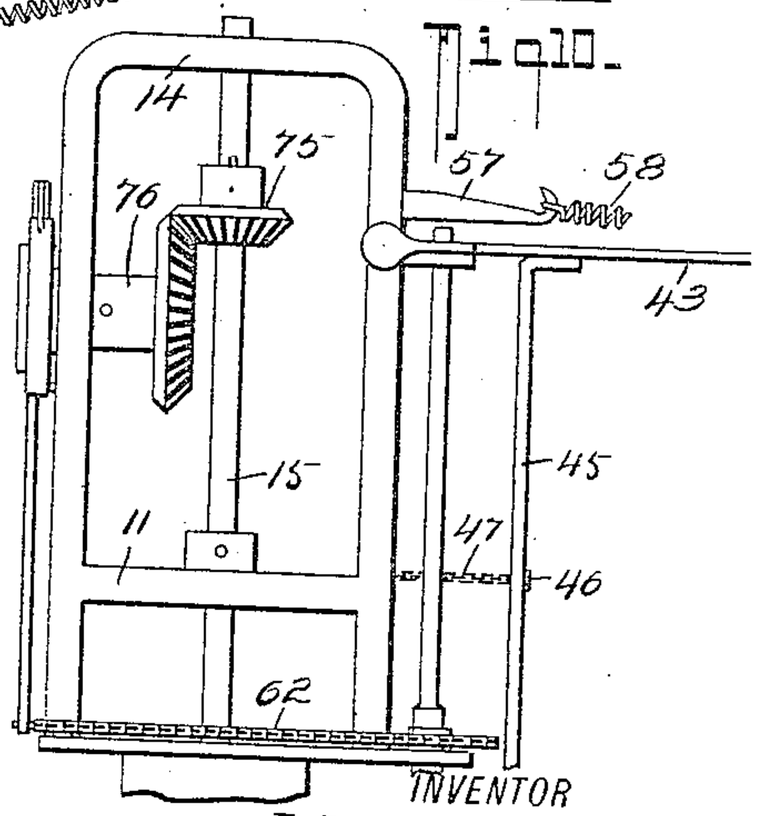


Fig. 10.



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UNITED STATES PATENT OFFICE.

JOHN C. ZIEGLER, OF SEYMOUR, TEXAS.

WIND-MOTOR.

No. 816,524. Specification of Letters Patent. Patented March 27, 1906.

Application filed June 27, 1905. Serial No. 267,234.

To all whom it may concern:

Be it known that I, JOHN C. ZIEGLER, residing at Seymour, in the county of Baylor and State of Texas, have invented certain new and useful Improvements in Wind-Motors, of which the following is a specification.

My invention relates to certain new and useful improvements in wind-motors, and it particularly seeks to provide a motor of this character of a very simple construction which will effectively and readily serve its intended purposes and which is more particularly adapted to be used as a pumping-motor in connection with any suitable pumping mechanism to which it is adapted to be joined, but so constructed that by the substitution of certain parts for others the same can be readily changed into a power-motor for any use, if desired.

Generically my invention comprises a motor of this type comprising a wind-wheel and a power-transmitting shaft, a particular and novel form of gear connection between said wind-wheel and power-transmitting shaft whereby the rotary motion of the wind-wheel shaft is transformed into reciprocating motion in the power-shaft, a novel means for maintaining the several parts of the gear connection always in operative engagement with one another, and an equalizing device for the wheel to prevent racing thereof, as well as to aid the same in lifting the load during certain parts of its operation. Again, my invention seeks to produce, in connection with a motor of this character, an improved form of brake mechanism for the wind-wheel which is automatic in its operation and which is controlled by the movement of the vane. In its generic nature the brake mechanism comprises a band clutch-brake adapted to be applied to the wheel-hub and an endless chain-drive cooperatively connected with a brake-band clutch and with the tail-bone fulcrum-shaft, whereby the motion of the vane imparts motion to the endless chain, which in turn applies the brake to the wheel-hub an amount in proportion to the movement of the vane.

With other objects in view than have heretofore been enumerated the invention comprises certain novel construction, combination, arrangement, and details of parts, all of which will be first described in detail and then be specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective of my invention. Fig. 2 is a vertical longitudinal section thereof. Fig. 3 is a vertical cross-section taken on the line 3 3 of Fig. 2. Fig. 4 is a horizontal section taken on the line 4 4 of Fig. 2. Fig. 5 is a vertical cross-section taken on the line 5 5 of Fig. 2. Fig. 6 is a vertical cross-section on the line 6 6 of Fig. 2, the shaft 38 and the sprocket-segment carried thereby being shown in side elevation. Fig. 7 is a horizontal section on the line 7 7 of Fig. 2. Fig. 8 is a detail perspective view of the gear member carried by the reciprocating shaft. Fig. 9 is a detail perspective view of the cam-wheel which maintains the gears in their correlative positions at all times. Fig. 10 is a side elevation of a modified form of my invention.

Referring now to the accompanying drawings, in which like numerals of reference indicate like parts in all of the figures, 1 designates the pipe-base for the tower, which base is adapted to be secured to the tower at its top in any approved manner. Rigidly secured to the base 1 is a pipe-section 2, having a bearing 3, provided with a ball-race 4, as shown.

5 designates a supporting-frame for the motor mechanism, which includes a base 6, from which a pipe-section 7 projects downwardly and terminates in a bearing 8, having a ball-race 9, and the pipe-section 7 fits over the pipe-section 2 with its bearing 8 over the bearing 3, and the bearings 8 and 3 receive balls 10 between them in their respective ball-races. This arrangement of parts constitutes the turn-table and permits the frame 5 to turn freely on a vertical axis in a manner and for the purposes presently more fully understood. The frame 5 also includes a cross-brace 11, having a central vertical squared bearing-aperture 12, which coöperates with the central bearing-aperture 13 of the upper cross-bar 14 of the frame 5 to permit passage of the vertically-held power rod or shaft 15, which also passes through an aperture 16 on the base 6 of the frame 5 through the pipes 1 and 7 and is rigidly connected with the pump-rod 17, as clearly shown in Fig. 2. Thus the frame 5 can turn freely on its vertical axis, while the rod 15 is held from turning by reason of its connection with the non-rotatable pump-rod 17 or in any other suitable manner desired. The rod 15 may also be held from turning by forming the said rod square in cross-section where it passes through either the bearing 13 or the bearing 12. The rod 15 has a squared portion 15^s to coöperate

with the squared aperture 12. The rod 15 projects upwardly beyond the frame 5 and receives a coil-spring 18, which is held in position by the check-nut 19, threaded on the end of the rod 15, as clearly shown in Fig. 1, or secured by any other suitable means. The spring 18 serves to equalize the work performed by the wind-wheel for the motor in a manner as will be more clearly explained later.

Mounted on the rod 15 between the upper cross-bar 14 and the cross-brace 11 of the frame 5 is what I term the "rod-gear member" 20, which comprises the bearings 21 21, which are joined together by the oblate gear 22 on one side of the rod 15, while the bearings 21 21 are joined by the integrally-formed web 23 on the other side of the rod 15, diagonally opposite to the median line of the gear 22. The web 23 has a wing 24, which coöperates with the cam-wheel 25, and the cam-wheel 25 is loosely mounted to turn on a stud 26 on the frame 5. The gear portion 22 of the gear member 20 has internal rack-teeth 27, arranged in parallel vertical rows facing each other and connected together at the top and bottom by the curved gear portions 28, which project forwardly from the plane containing the vertical teeth 27 and merge with said teeth 27 on a curved line having its center at the axial line of the gear member 20 to permit said member 20 to turn freely on the rod 15. The rod-gear member 20 is held in position on the rod 15 by collars 29 and set-screws 30.

31 designates a tubular bearing projecting outwardly from the front of the frame 5, in which the wheel-shaft 32 is mounted. The shaft 32 projects into the frame 5 toward the gear 20 and carries a pinion 81 at its end, which meshes with the gear-teeth of the gear member 20, as clearly shown in the drawings. The hub of the wheel is in the nature of a bell-shaped spider 33, which is secured to and turns with the shaft 32 and projects over the bearing 31. The spider 33 has the usual radial arms 34, to which the sail-arms may be secured, and the spider 33 also has a brake-rim 35 integrally formed therewith at the end adjacent the frame 5. Where the bearing 31 is formed on the frame 5 the said frame 5 is thickened, as at 36, to add strength thereto. On the inner side of the frame, opposite the bearing 31, is an inwardly-projecting stud 26, upon which the circumferentially-beveled idler cam-wheel 25 is mounted, and the wheel 25 coöperates with the wing 24, as before indicated, to hold the gear-teeth of the gear member 20 always in mesh with the pinion 81. On the outer side opposite the bearing 31 the frame 5 is provided with a pair of outwardly-projecting bearing-brackets 37 37, in which the tail-bone-turning fulcrum-shaft 38 is mounted, and the said shaft 38 is preferably square in cross-section and formed with a cylindrical bearing portion 39 at its upper end and a similarly-formed bearing portion 40 near its lower end. The lower bracket-bearing 37, which coöperates with the bearing portion 40 of the shaft 38, is slotted, as at 41, to permit the shaft 38 being slipped into place, it being held in its normal position by a pin 42, as shown. The tail-bone 43, which may be of any approved construction, has the usual brace-bars 44 and 45, the bar 45 having a projection 46, to which the furl-chain 47 is secured. The chain 47 passes over the idler-pulley 48, mounted on a stud 49 on the cross-brace 11 of the frame 5. At a point about two inches below the idler-pulley a rod is connected to the chain 47 and passes downwardly through the pipes 1 and 7 and connects with the furl-disk 50^a of the furl-swivel 50, to which the tie-bar 51 is also secured in any approved manner. A furl-bar 52 connects with the swivel 50 and the furl-wire 55, as shown, a guide 56 being provided for the furl-bar 52.

Secured at one end to a bracket portion 57 on the frame 5 is a coil-spring 58, whose other end is secured to the tail-bone 43 to hold the vane in its normal position, a stop-arm 59 being secured to the tail-bone brace to limit the action of the spring 58 and to hold said tail-bone at a right angle with the wind-wheel when the mill is at work, the lower end of the bar 45 striking against the base of the frame 5 to hold the tail-bone in a parallel position with the wind-wheel when the mill is at rest.

Secured to the shaft 38 near the base of the frame 5 is a segmental sprocket 60, the movement of which is limited by the adjacent upright of the frame 5, and around this sprocket-wheel 60 and around idler-pulleys 61 61 at the opposite end of the base an endless chain or cable 62 passes.

The brake devices comprise a pair of curved bands 63 63, fulcrumed at 64 64 to the frame 5, one on each side of the brake-rim 35 of the spider 33, and each band 63 has a brake-shoe 65, as shown. One of the bands 63 has its free end pivotally connected with the operating-lever 66, which is also fulcrumed at 67 to the frame 5 and which has a downwardly-projecting arm 68, having a curved portion 69 to pass the brake-rim, and terminates in an angled foot 70, having a plurality of pin-receiving apertures 71 to receive the pin 72, which is carried by the chain 62. The other lever 63 has its free end pivotally connected to the lever 66 through a link 73, as shown.

From the foregoing description it will be seen that when the wind-wheel is in operation a reciprocal motion will be imparted to the power-transmitting shaft, the equalizing-spring serving to prevent racing of the wheel on the downstroke thereof, thus forming an automatic speed-equalizer for the wheel. As the vane swings on its pivotal shaft, due to the action of the wind or when drawn over by the furl devices, the motion thereof will be impart-

ed to the wheel 60, which causes the endless chain or cable 62 to be moved, carrying with it the pin 72, and thus swinging the brake-operating lever 66 and applying the brake to the brake-rim 35, it being understood that the amount of braking power applied to the frame varies with the position of the vane, being greatest when the vane is in the position shown in dotted lines in Fig. 7. As the gear member 20 ascends or descends with the movement of the rod 15 the wing 24 of the gear member 20, whose upper and lower edges are beveled to correspond with the slant of the beveled idler cam-wheel 25, is brought in contact with said idler cam-wheel, and as the wing slides over the beveled surface of the cam-wheel it is made to rotate on the stud 26, thus changing the position of the wing from right to left with each stroke of the power-rod 15 and at the same time changing the position of the gear portion 22 of the gear member 20 in the opposite direction from that of the wing 24, and thus keeping the internal rack-teeth 27 of the gear member 20 always in mesh with the pinion 81.

It will be noted that this construction requires but little power to impart motion to the power-shaft, as the resistance to be overcome is reduced to a minimum on account of the peculiar construction of the gearing employed. Attention is also called to the fact that no more wind-power is required for a long stroke than is necessary for a short stroke, except for the additional weight of water to be lifted in the case of the long stroke, it only requiring more time to make the long stroke. Again, the tendency to "hammer," due to the wear caused by the change of the stroke in all mills having a pitman connection and swivel on the end of the power-rod, is entirely eliminated in this construction. Furthermore, owing to the action of the equalizing-spring on the upper end of the power-rod 15 the wear due to friction on the rack-teeth 27 and on the cogs of the pinion 81 is changed from one side of the teeth to the other with each change of stroke of the power-rod, thus prolonging the life of each of these members.

In Fig. 10 I have shown a slightly-modified form of my invention in which the equalizing-spring is eliminated and in which the gear member 20 is removed, a bevel-pinion 75 being secured to the rod 15 in lieu thereof, which pinion 75 meshes with a master-gear 76 on the wind-wheel shaft, as shown, thus transforming my apparatus into an ordinary power-motor, by which the rotary motion of the wind-wheel is transmitted as rotary motion to the rod 15.

From the foregoing description, taken in connection with the accompanying drawings, it is thought that the complete construction, operation, and many advantages of my invention will be readily understood by those skilled in the art to which it appertains.

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

1. A motor of the class described, comprising in combination with a pipe-base adapted to be rigidly secured to a tower, and a standard connected to said pipe-base, of a pivotally-mounted frame comprising a base portion, a pipe-section secured thereto to fit over the pipe-standard, a yoke-shaped standard to said frame-base, a wind-wheel having a shaft mounted in a bearing in said yoke-shaped standard, a rod mounted in said frame and projecting into said pipe-standard, means for holding said rod from rotation, a rod-gear pivotally mounted on said rod and comprising bearing portions, a gear member connecting said bearing portions together at one side, a web connecting said bearing portions together at the other side, a pinion on the wheel-shaft for engaging said gear member whereby the rotary motion of the wheel-shaft will transmit a reciprocal motion to said rod, said web having a wing and a loosely-mounted cam-wheel pivotally mounted on the yoke-shaped frame for coöperating with said wing to hold the gear in connection with said pinion, said wind-wheel including a hub having a brake-rim, a brake mounted on the yoke-shaped standard for engaging said brake-frame, a vane pivotally secured to the yoke-shaped standard, means for holding the vane in its normal position, said vane adapted to be moved out of its normal position by the action of the wind, means mounted on the frame-base and connected with the brake and the frame for applying the brake as the vane leaves its normal position substantially as shown and described.

2. In a motor of the class described, a supporting-frame, a wind-wheel mounted thereon, a power-shaft geared with said wind-wheel, said wind-wheel having a hub provided with a brake-rim, a pair of brake-levers mounted on said frame and having brake-shoes, for engaging said brake-hub, a vane pivotally mounted on said frame and having a pivot-shaft, a gear-section mounted on said vane-shaft, an endless chain passing over said gear-section, said endless chain being connected with said supplemental brake-lever, all being arranged so that when the vane is moved on its pivot, the motion thereof will be imparted to the brake to operate the same as shown and described.

3. In a motor of the class described, a supporting-frame, a wind-wheel mounted thereon, a power-shaft geared with said wind-wheel, said wind-wheel having a hub provided with a brake-rim, a pair of brake-bands mounted on said frame, for engaging said brake-hub, a supplemental lever for operating said brake-bands, said brake-bands having brake-shoes, a vane pivotally mounted on said frame and having a pivot-shaft, a gear-

section mounted on said pivot-shaft, an endless chain secured to said supplemental brake-lever and connected with said vane-shaft, all being arranged so that when the vane is moved on its pivot, the motion thereof will be imparted to the brake to operate the same, means for holding said vane in its normal position, said vane being arranged to be moved out of its normal position by wind-power, and a supplemental means connected with said vane for moving the same out of its normal position at all times, substantially as shown and described.

4. A motor of the class described comprising a supporting-frame, consisting of a base, a ∩-shaped vertical standard projecting upwardly from said base, a pipe-section projecting downwardly from said base, a support, a means for pivotally securing said pipe-section to said support, a power-rod passing through said support and said pipe-section, said ∩-shaped standard having a cross-brace provided with a bearing-aperture and having its upper portion provided with a bearing-aperture to permit passage of said power-rod, an oblate gear on said power-rod between said bearing portions, means for holding said oblate gear from lengthwise movement on said rod, a wind-wheel shaft mounted in a bearing in said ∩-shaped standard, a pinion on said wind-wheel shaft for meshing with said oblate gear, means on said ∩-shaped standard for coöperating with said oblate gear to hold the same in mesh with said pinion at all times, said power-rod projecting through said ∩-shaped frame above the same, a coil-spring on said rod above said ∩-shaped frame, means carried by the rod for adjustably securing the spring in position and to regulate its tension, brake devices carried by said ∩-shaped standard for coöperating with the wind-wheel, a vane-shaft pivotally mounted on said supporting-frame in the plane containing the ∩-shaped standard, a vane secured to said vane-shaft, idler-gears mounted on said supporting-frame base, a gear-section on said vane-shaft, an endless chain passing around said gear-section and said idler-gears and connected to said brake devices, said brake devices adapted to be operated by said vane when moved out of its normal position, means for holding said vane in its normal position, and independent means for moving said vane out of its normal position, substantially as shown and described.

5. A motor of the class described, comprising in combination with a pipe-base adapted to be rigidly secured to a tower, and including a pipe-standard projecting up from said pipe-base, of a pivotally-mounted rectangular frame comprising a base portion, a pipe connection secured thereto to fit over the pipe-standard, a yoke-shaped standard secured to said base portion, a wind-wheel having a shaft mounted in bearings in said yoke-shaped standard, a rod mounted in said frame and projecting into said pipe-standard, said rod and its bearing in the standard having provisions in virtue of which the rod is non-rotatable, an oblate rod-gear pivotally mounted on said rod, and consisting of bearing portions, a gear member connecting the bearing portions together at one side and a web connecting the bearing portions together at the other side, a pinion on the wheel-shaft for meshing with the gear member, said web having a wing and a loosely-mounted cam-wheel rotatably mounted on the yoke-frame for coöperating with the wing to hold the gear in connection with the pinion and an equalizing device on said rod above said pivotally-mounted frame, substantially as shown and described.

6. A motor of the class described, comprising in combination with a pipe-base adapted to be rigidly secured to a tower and including a pipe-standard projecting up from said base-pipe, of a pivotally-mounted rectangular frame comprising a base portion, a pipe connection secured thereto to fit over the pipe-standard, a yoke-shaped standard secured to said base portion, a wind-wheel having a shaft mounted in bearings in said yoke-shaped standard, a rod mounted in said frame and projecting in said pipe-standard, said rod and its bearing in the standard having provisions in virtue of which the rod is non-rotatable, an oblate rod-gear pivotally mounted on said rod, and consisting of bearing portions, a gear member connecting the bearing portions together at one side and a web connecting the bearing portions together at the other side, a pinion on the wheel-shaft for meshing with the gear member, said web having a wing and a loosely-mounted cam-wheel rotatably mounted on the yoke-frame for coöperating with the wing to hold the gear in connection with the pinion, an equalizing device on said rod above said pivotally-mounted frame, and a vane pivotally mounted to said frame, a brake device for the wind-wheel shaft controlled by the movement of said vane, substantially as shown and described.

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