

No. 773,752.

PATENTED NOV. 1, 1904.

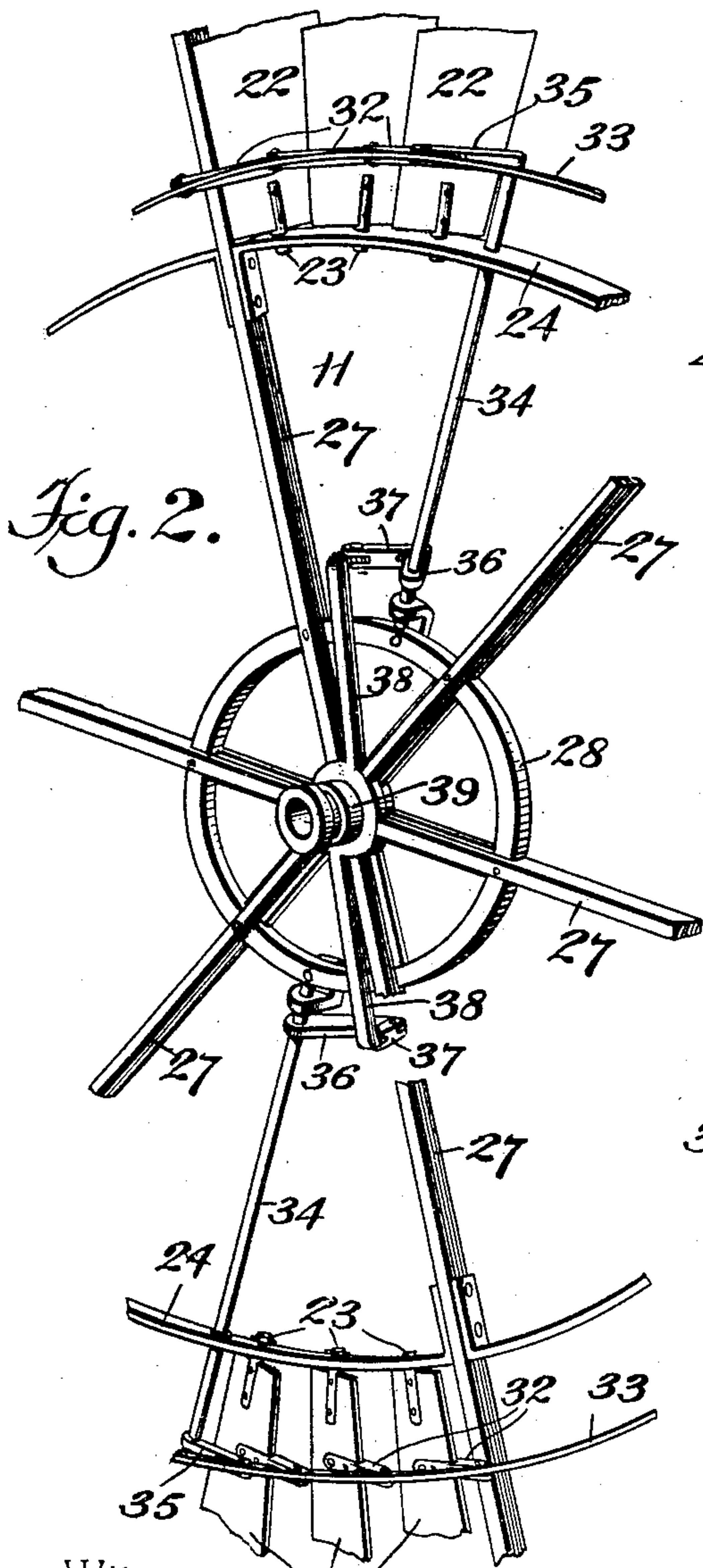
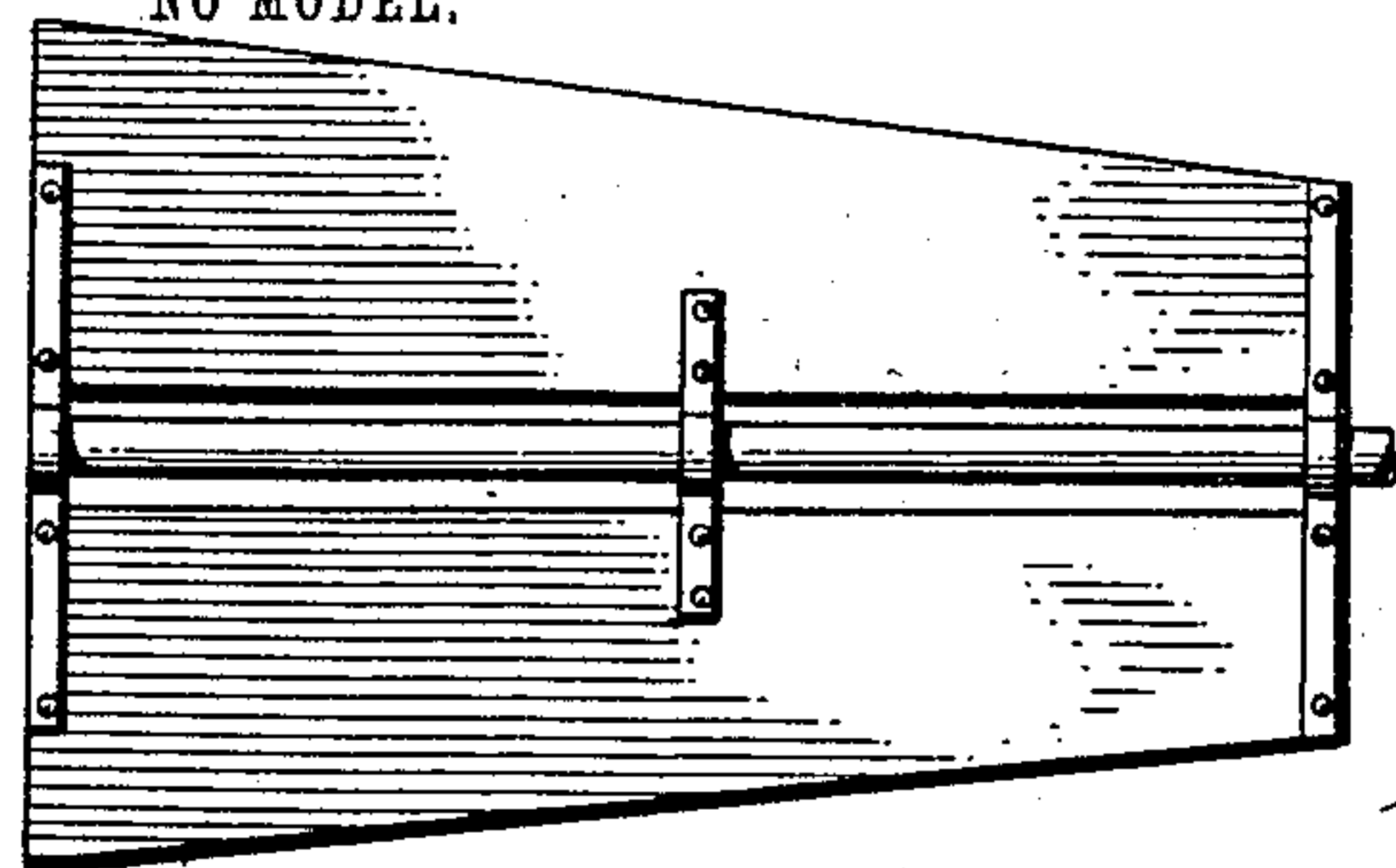
F. J. KEPPLER.

WINDMILL.

APPLICATION FILED MAY 13, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses

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2 SHEETS—SHEET 2.

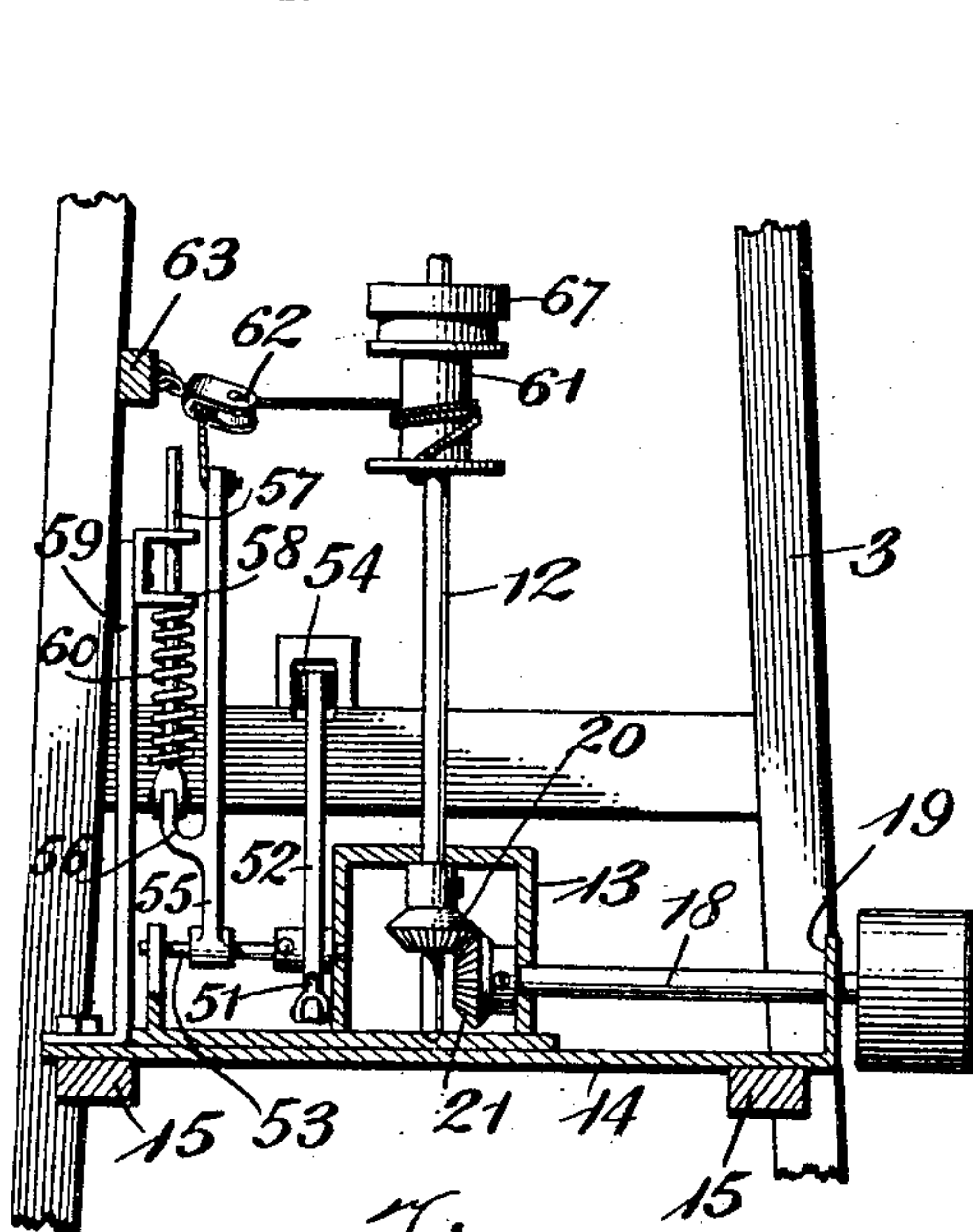


Fig. 3.

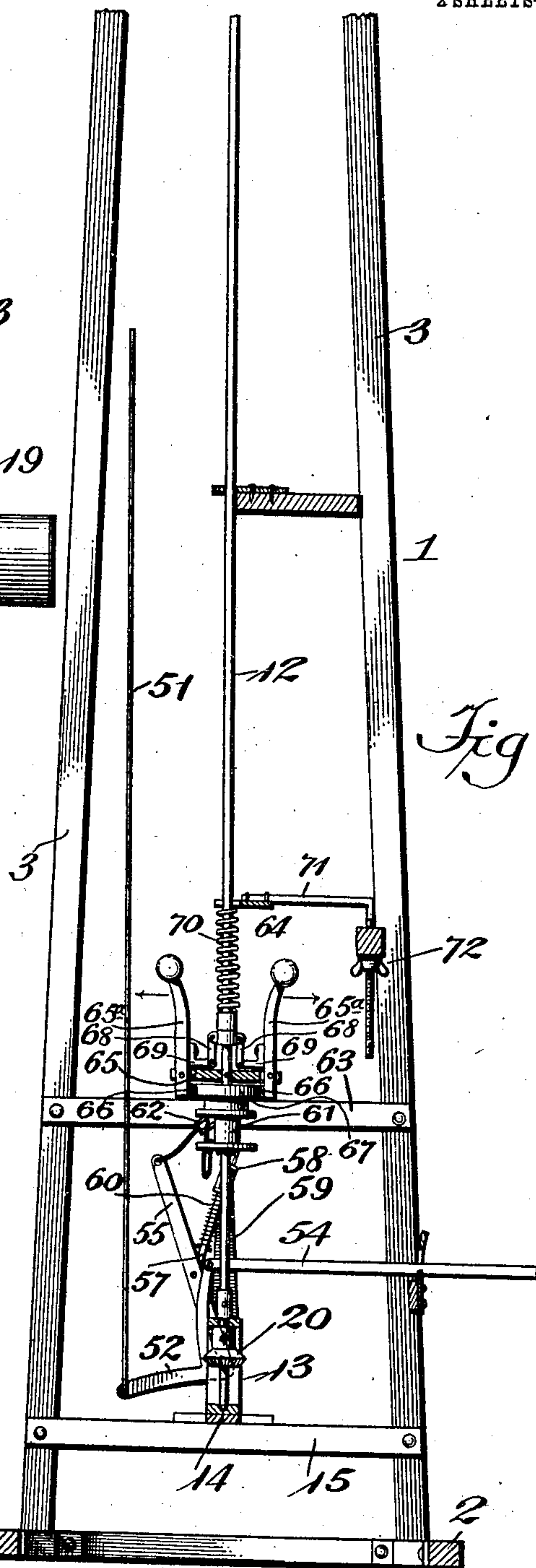


Fig. 1a.

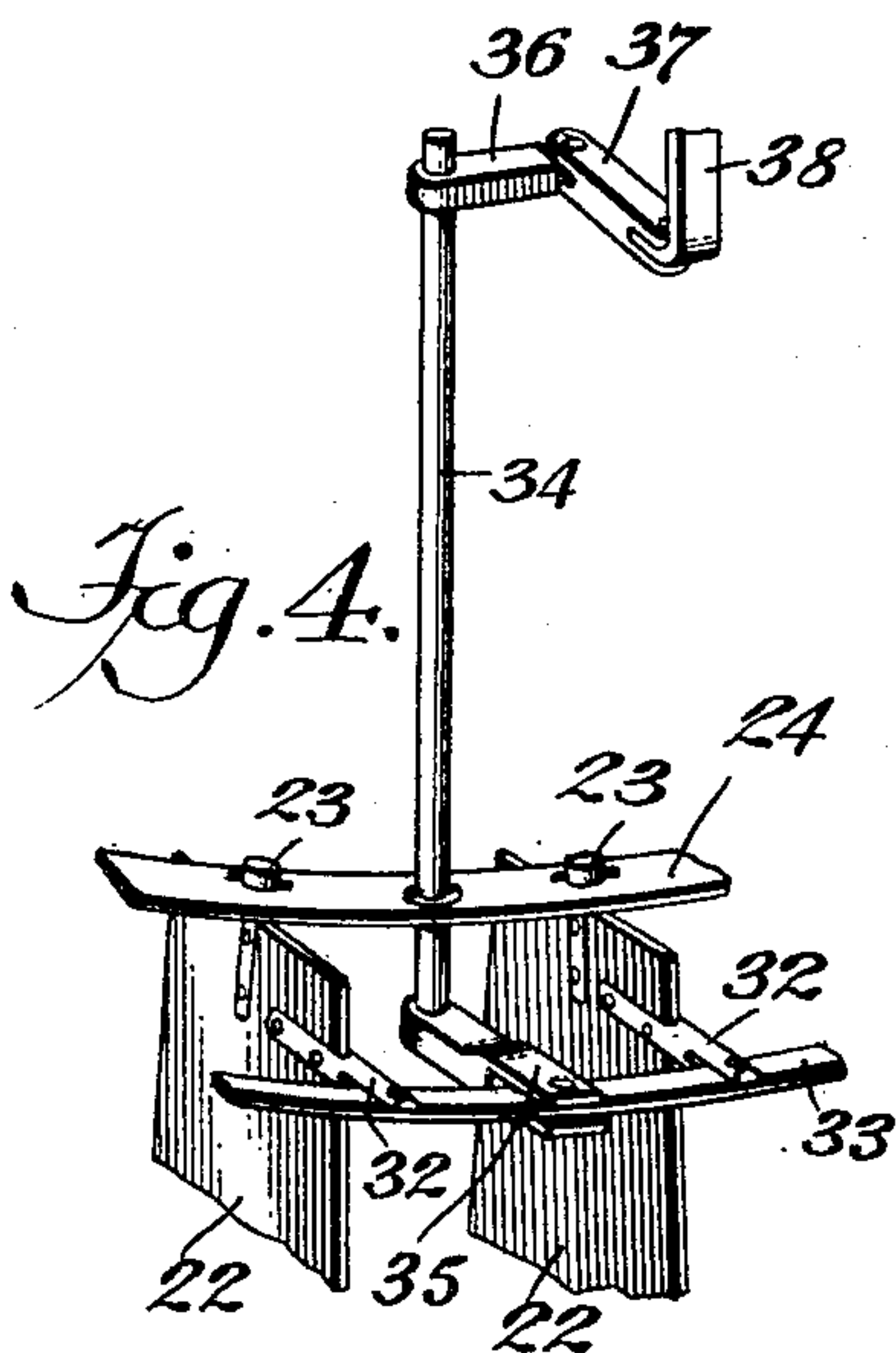


Fig. 4.

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UNITED STATES PATENT OFFICE.

FRED J. KEPPLER, OF STONYRIDGE, OHIO.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 773,752, dated November 1, 1904.

Application filed May 13, 1903. Serial No. 156,988. (No model.)

To all whom it may concern:

Be it known that I, FRED J. KEPPLER, a citizen of the United States, residing at Stonyridge, in the county of Wood and State of Ohio, have invented a new and useful Improvement in Windmills, of which the following is a specification.

My invention relates to windmills, and has for its object to produce a device of this character which will be comparatively simple of construction, efficient in operation, one in which the speed of rotation of the wind-wheel will be automatically regulated according to wind variations, and one in which the driven shaft will have imparted to it a uniform predetermined speed.

To these ends the invention comprises the novel details of construction and combination of parts more fully hereinafter described.

In the accompanying drawings, Figure 1 is a side sectional elevation of the upper end of a windmill constructed in accordance with my invention. Fig. 1^a is a similar view which constitutes a continuation of Fig. 1 and illustrates the lower coöperating mechanism. Fig. 2 is a detail perspective view of a portion of the wind-wheel and blade-operating devices. Fig. 3 is a sectional elevation taken in a vertical plane and at right angles to Fig. 1^a of the lower mechanism. Fig. 4 is a detail perspective of a portion of the wind-wheel, showing the blades in inoperative position.

Referring to the drawings, 1 indicates wind-wheel tower, which preferably consists of a base 2, four substantially vertical standards 3, connected at their lower ends to the base and at their upper ends to a cap-plate 4, provided with a central bearing-opening 5. These parts may be of any suitable or desired construction and material.

6 indicates a vertical rotary bearing-cylinder which is journaled for rotation in the opening 5 of the cap-plate and is further sustained by a bearing-ring 7, which embraces the same near its lower end and is in turn bolted or otherwise secured to the standards 3. The cylinder 6 projects at its upper end above the cap-plate 4 and receives and sustains a head member 8, from which arises integral vertical standards 9, provided at their upper ends

with journal-boxes 10, in which the shaft of the wind-wheel 11 is journaled.

12 indicates a drive-shaft which extends centrally and longitudinally of the tower 1 and is journaled at its upper end concentrically of the head member 8 and at its lower end in a suitable bearing sustained by a U-shaped frame member 13, bolted or otherwise secured to a central transverse beam 14, which in turn is bolted to right-angularly-disposed end beams 15, which are bolted to the standards 3 and connect the same in pairs adjacent to their lower ends. As the wind-wheel 11 rotates it imparts motion to the shaft 12 through the medium of a beveled gear 16, fixedly associated with the wind-wheel shaft and meshing with a beveled pinion 17, fixed to the upper end of the shaft 12. The shaft 12 imparts motion in turn to a driven shaft 18, which has bearing in the frame member 13 and in a standard 19, arising from the transverse beam 14, through the medium of beveled gears 20 and 21, fixedly associated, respectively, with the shaft 12 and shaft 18.

The wind-wheel 11 is provided with pivoted blades or sails 22, provided at their inner ends with bearing-pintles 23, journaled in an inner bearing-ring 24, and at their outer ends with similar pintles 25, journaled in an outer bearing-ring 26. The bearing-rings 24 26 are riveted to and sustained by web-bars 27, which are in turn bolted at their inner ends to the webs of a central wheel or member 28, fixed to the outer end of the wind-wheel shaft. The web-bars 27 are strengthened by braces 29, bolted at their outer ends adjacent to the outer ends of the web-bars and at their inner ends to a common head 30 upon the end of an extension 31 of the wind-wheel shaft.

Secured to each of the blades 22 adjacent to its inner end is a transversely-disposed inwardly-projecting arm 32, which is pivoted to a movable ring 33, which is operable for simultaneously swinging all of the blades 22 into and out of operative position—that is, into and out of the wind influence. The ring 33 is actuated for operating the blades by means of a pair of rock-shafts 34, which are journaled at their inner ends in suitable bearings carried by the wheel or member 28 and

at their outer ends in the inner bearing-ring 24 and are connected to the blade-operating ring each by means of a crank-arm 35, fixed upon the outer end of the shaft and pivoted 5 to the operating-ring. The shafts 34 are each provided at their inner ends with a crank-arm 36, which is connected by a link 37 with an arm 38, attached to and carried by a sliding collar 39, splined upon the wind-wheel 10 shaft for rotation therewith, but freely slidable longitudinally thereof for operating the rock-shafts to actuate the blades 22 in the manner and for the purpose presently explained.

15 40 indicates a block mounted upon the shaft 12 and slidable longitudinally thereof. This block is connected by a link 41 with a vertical rack 42, slidable in suitable bearings bolted to one of the standards 9 and in mesh with a 20 rotary pinion 43, which is in turn in mesh with a horizontally-slidable rack 44, sustained in suitable bearings and connected at its outer end with a ring 45, which encircles and operatively engages the sliding collar 39. When 25 the block 40 is moved upward upon the shaft 12, the vertical rack 42 is similarly moved and rotates the pinion 43 for actuating the rack 44 to shove the collar 39 outward upon the wind-wheel shaft, which action of the 30 parts serves to rock the shafts 34 in the proper direction for throwing the blades 22 into operative position, while of course a reverse movement of the parts swings the blades into inoperative position.

35 46 indicates an arm which is attached to the block 40 and which is mounted for sliding movement to operate the block in a suitable bearing sustained by a transverse beam 47, secured to a pair of the tower-standards 3. 40 The arm 46 is connected by a link 48 with a pivoted locking-lever 49, journaled in a bearing 50, carried by a suitable transverse beam bolted or otherwise secured to a pair of the standards 3. The lever 49 is connected by a 45 link 51 with one arm of a bell-crank lever 52, fixedly associated with a rock-shaft 53, journaled at one end in the frame member 13 and at the other end in a bearing-standard arising from the transverse beam 14. The other 50 arm of the bell-crank lever 52 is pivoted to the inner end of an operating-lever 54, the purpose of which will be presently explained.

55 55 is a lever which is fixed to the shaft 53 for rocking the same. This lever carries a bracket 56, to which is pivoted a plunger 57, the outer end of which is slidable in a bearing 58, secured to a vertical arm or standard 59, the plunger being controlled by a spring 60, which bears at one end upon the bearing 60 58 and at the other end upon a suitable collar formed upon the plunger. The lever 55 is connected by a rope or other suitable flexible connection with a winding-spool 61, which is loose for rotation upon the shaft 12, the flexible 65 connection being extended intermediately

of the lever and spool through a pulley 62, suspended from a beam 63, connected to the standards 3.

64 indicates a clutch member which is carried and operable by the shaft 12. This clutch 70 member comprises a base-plate 65, which is fixed to the shaft 12 and at the outer ends of which are pivoted weighted gravity-arms 65^a, which are disposed vertically and weighted at their upper ends and carry at their lower ends 75 friction-shoes 66, which when the upper ends of the arms swing outward by centrifugal force as usual engage with a head 67, carried by the spool 61 for clutching or releasing the latter for rotation or non-rotation with the 80 shaft 12. In practice when the wheel 11 revolves it drives the shaft through the intermediate mechanism, as above described, and if the rate of speed of said parts be normal the clutch will remain unaffected; but should 85 the rate of speed of the wind-wheel be increased, owing to a stronger current of air, the clutch-arms will of course be at once affected and will actuate the shoes for gripping the spool 61, thus causing the same to rotate 90 with the shaft and wind the flexible connection, thus causing the lever 55 to rock the shaft 53 and actuating the bell-crank lever 52 and through the medium of the intermediate links and the rocking lever 59 actuating the 95 racks and attendant mechanism for moving the sails to inoperative position until the speed of rotation of the wind-wheel has sufficiently decreased to cause the clutch mechanism to release the spool, when the spring 60 upon the 100 plunger 57 will serve to return the lever 55 to normal position, thus reversing the movement of the various intermediate parts and again returning the sails to operative position. When it is desired to throw the device entirely 105 out of operation, the hand-lever 54 is manipulated for rocking the shaft to move the lever 55 past center, which action throws the blades or sails 22 to an entirely inoperative position, and the parts are maintained in this position 110 through the medium of the spring 60, carried by the plunger 57. In order that the clutch may be regulated for action within a predetermined rate of speed, I mount upon the shaft 12 a sliding collar, to which is attached links 68, pivoted 115 to arms 69, carried by the clutch-arms 65^a, and also mount upon the shaft above the sliding collar a tension-spring 70, which is controlled by a lever 71, operable by a thumb-screw 72. When the lever is moved downward by the 120 thumb-screw to compress the spring, the sliding collar is similarly moved and acts through the medium of the links 68 and arms 69 upon the clutch-arms 65^a for moving the friction-shoes out of engagement with the head 67 of 125 the spool 61, thus requiring a higher rate of speed on the part of the wind-wheel for throwing the shoes into engagement with the head 67, as will be readily understood. When, however, the tension upon the spring is re- 130

laxed, a lower rate of speed of the wind-wheel serves to actuate the clutch. Thus it will be seen that the parts may be readily adjusted for obtaining a given rate of speed relative to a given rate of wind-power.

From the foregoing description it will be seen that I produce a device in which the speed transmitted from the drive-shaft to the driven shaft will be automatically regulated to compensate for wind variations, one in which a predetermined speed relative to the wind force may be obtained, and one which in practice will admirably perform its functions, and in attaining these ends it is to be understood that I do not limit or confine myself to the details of construction herein shown and described, inasmuch as various minor changes may be made therein without departing from the spirit or scope of my invention.

Having thus described my invention, what I claim is—

1. In a device of the class described, the combination with a wind-wheel having blades movable to an operative or inoperative position, of a movable blade-operating ring, operative connections between the ring and blades, mechanism for operating the ring to throw the blades simultaneously into or out of operation, a drive-shaft operable by the wheel, a driven shaft actuated from the drive-shaft, and a clutch mechanism controlled by the speed of the drive-shaft for actuating the blade-operating ring to throw the blades into or out of operation and automatically regulate the speed of the driven shaft.

2. In a device of the class described, the combination with a wind-wheel having pivoted blades, of a movable ring operatively connected with the blades, a shaft supporting the wind-wheel, a collar slidable on the shaft and operatively connected with the ring and operable for actuating the latter for moving the blades into and out of operative position, a drive-shaft operable by the wind-wheel, a driven shaft actuated therefrom, a clutch mechanism controlled by the speed of the drive-shaft, and operative connections between the clutch mechanism and sliding collar for operating the latter to throw the blades into and out of operation and automatically regulate the speed of the driven shaft.

3. In a device of the class described, the combination with a wind-wheel having pivoted blades, of a movable ring operatively connected with the blades, a shaft supporting the wind-wheel, a collar slidable on the shaft and operatively connected with the ring, a

rack operatively connected with the collar, a drive-shaft operable by the wind-wheel, a driven shaft actuated from the drive-shaft, a clutch mechanism controlled by the rate of speed of the drive-shaft, and operative connections between the clutch mechanism and rack for actuating the latter through the intermediate connections for throwing the blades into and out of operation to automatically control the speed of the driven shaft.

4. In a device of the class described, the combination with a wind-wheel having pivoted blades, of a movable ring operatively connected with the blades, a drive-shaft operable by the wind-wheel, a driven shaft actuated from the drive-shaft, a rock-shaft journaled in bearings adjacent to the drive-shaft, a lever carried by the rock-shaft, a winding-spool mounted loosely upon the drive-shaft and having a flexible connection with the lever, a clutch mechanism mounted upon and controlled by the speed of the drive-shaft to clutch or release the winding-spool for actuating the lever through the medium of the flexible connection to rock the shaft, and operative connections between the rock-shaft and movable ring for actuating the latter when the shaft is rocked to move the blades into and out of operation and automatically regulate the speed of the driven shaft.

5. In a device of the class described, the combination with a wind-wheel having pivoted blades, of a drive-shaft operable by the wind-wheel, a driven shaft actuated from the drive-shaft, a rock-shaft provided with an operating-lever, a winding-spool mounted loosely upon the drive-shaft, a flexible connection between the spool and lever, a clutch mounted upon the drive-shaft and controlled by the speed thereof for engaging or releasing the winding-spool to cause the latter through the intermediate connections to rock the shaft, operative connections between the rock-shaft and blades for moving the latter into and out of operative position to automatically regulate the speed of the driven shaft, and means for regulating the clutch for operation at a predetermined speed of the drive-shaft.

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

FRED J. KEPPLER.

Witnesses:

E. F. METZGER,
S. E. WAGONER.