No. 889,290. PATENTED JUNE 2, 1908.

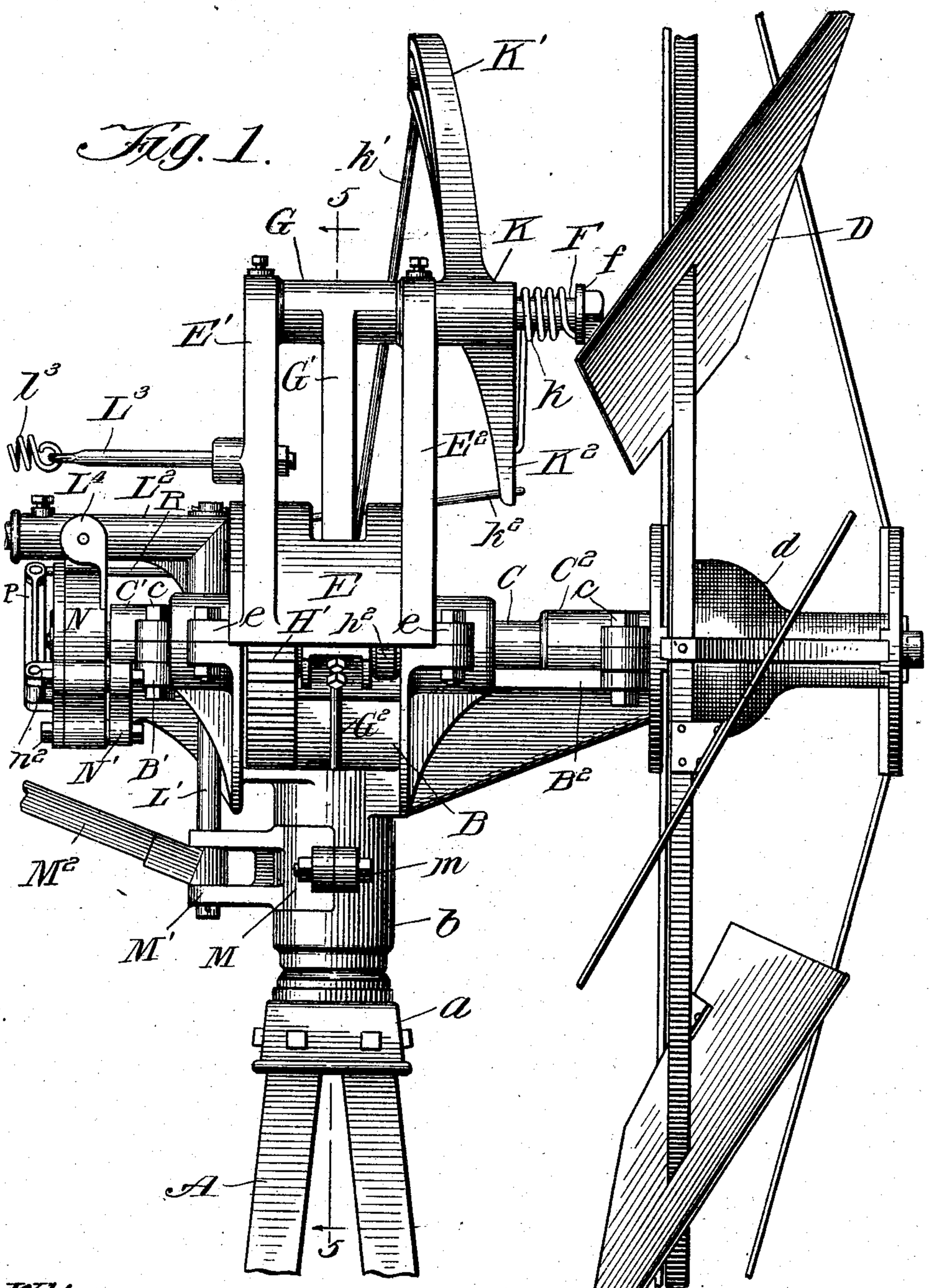
A. J. ANDERSON.

WINDMILL.

APPLICATION FILED NOV. 24, 1906.

6 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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Ruby V. Nash

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5 SHEETS—SHEET 2.

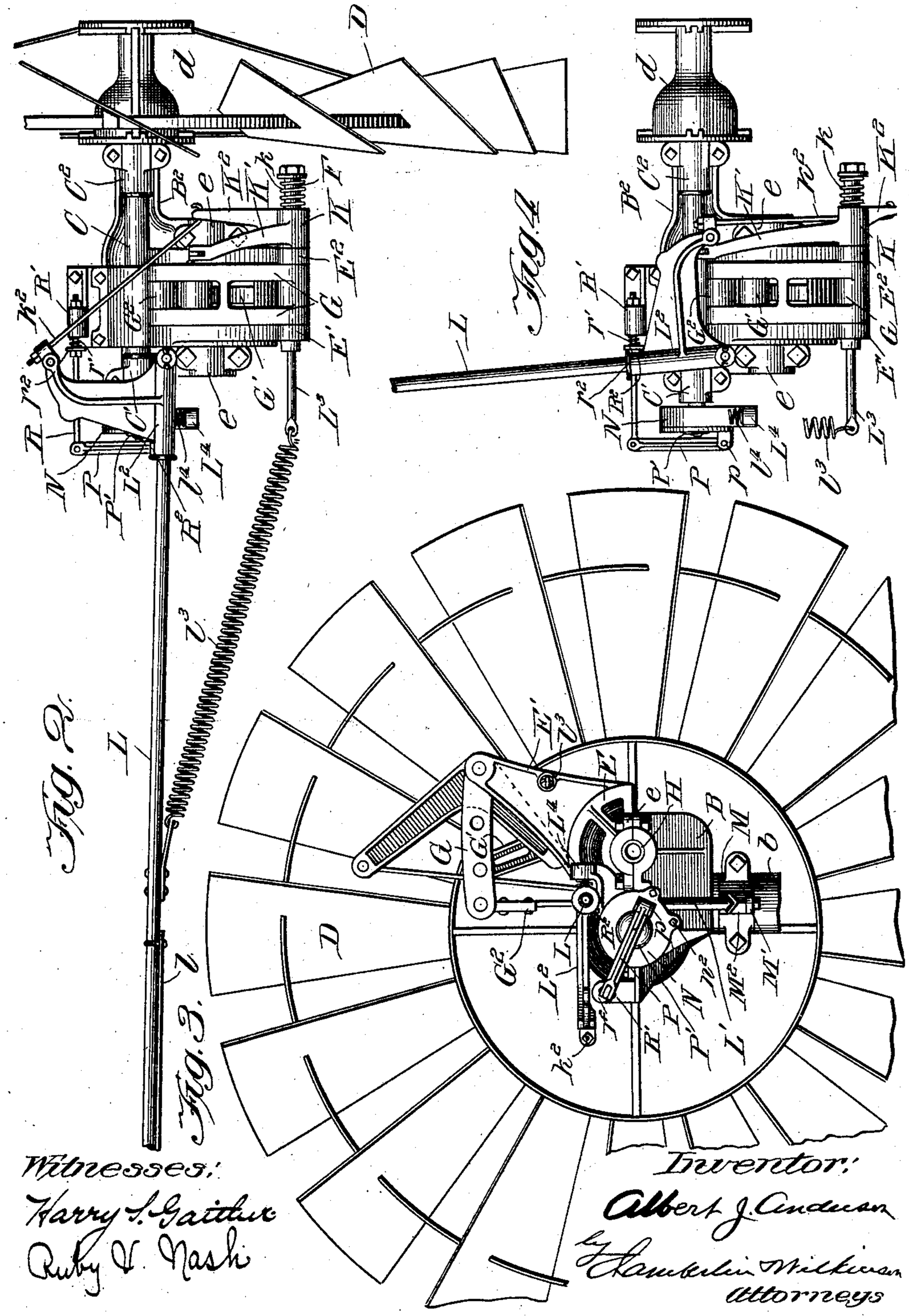

Fig. 4.

Fig. 3.

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5 SHEETS—SHEET 3.

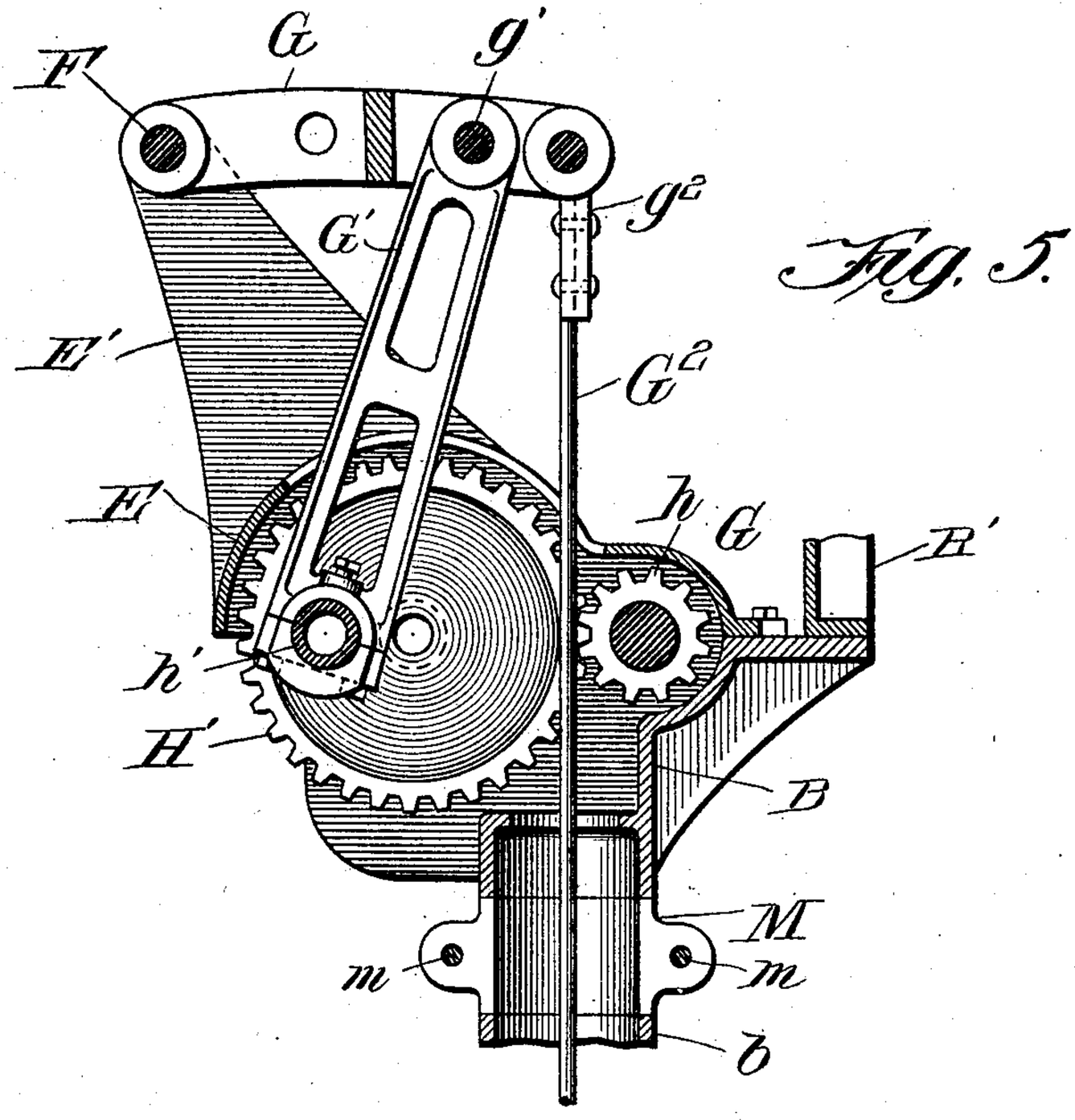

Fig. 5.

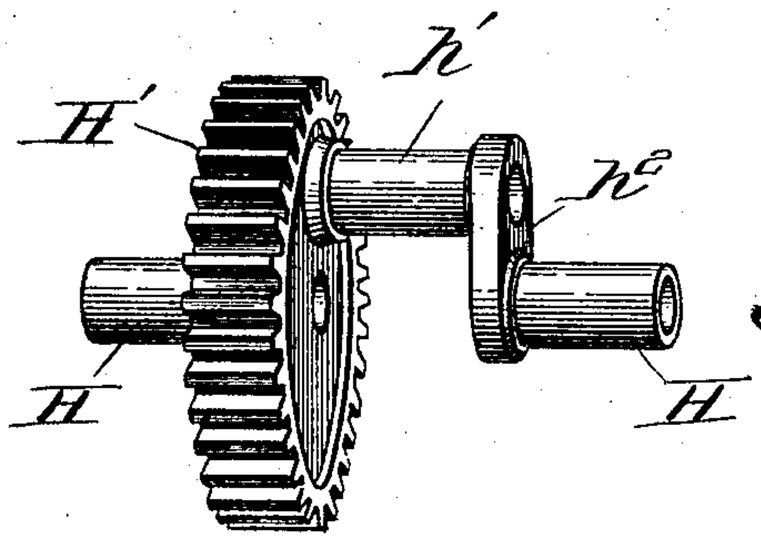

Fig. 6.

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5 SHEETS—SHEET 4.

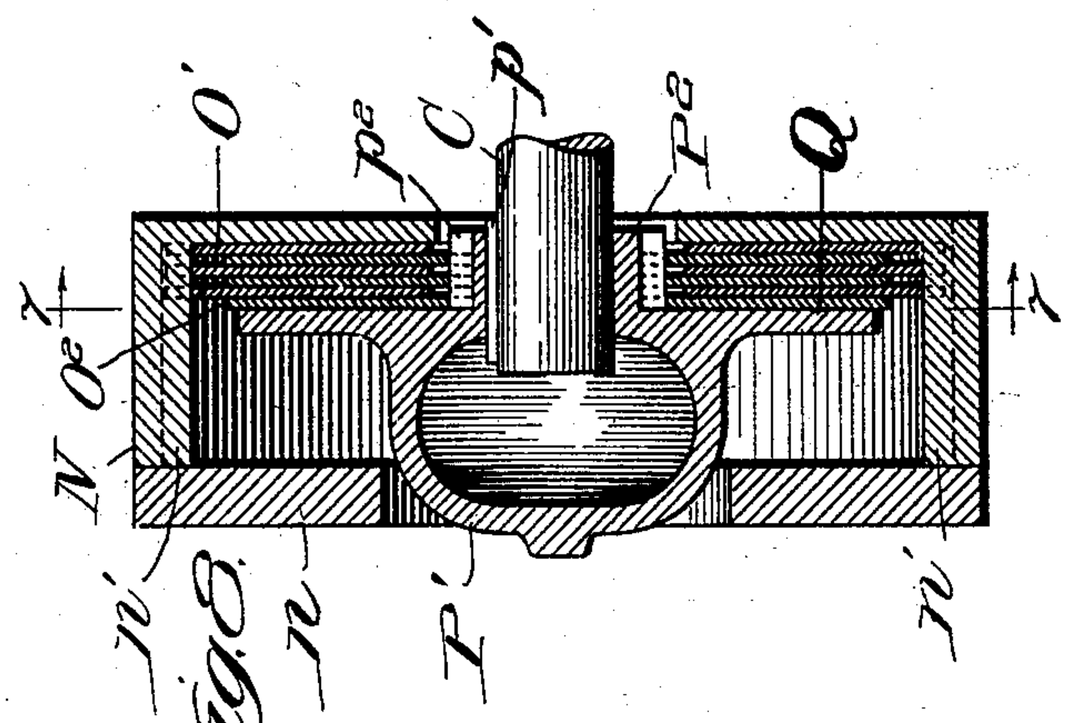

Fig. 8.

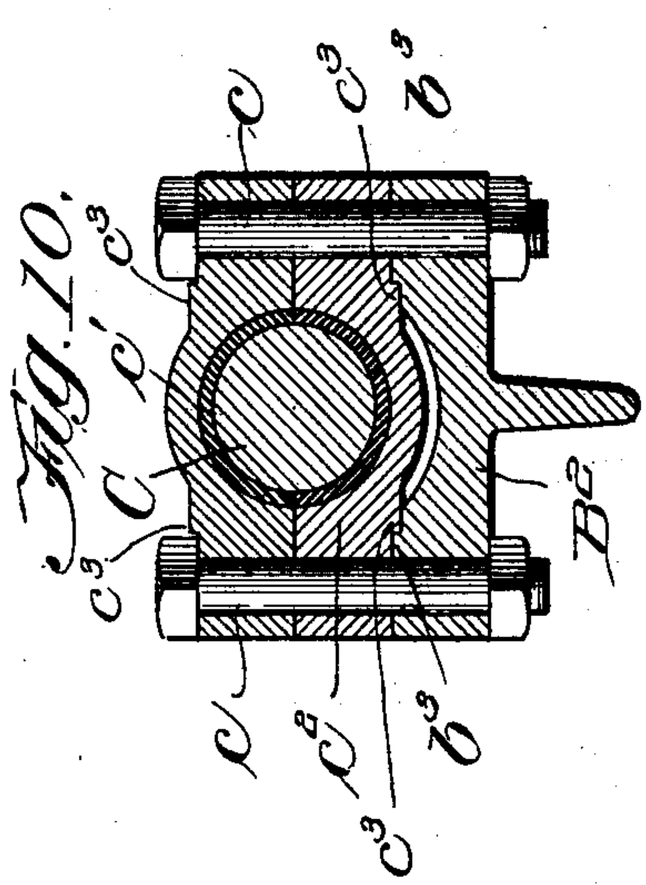

Fig. 10.

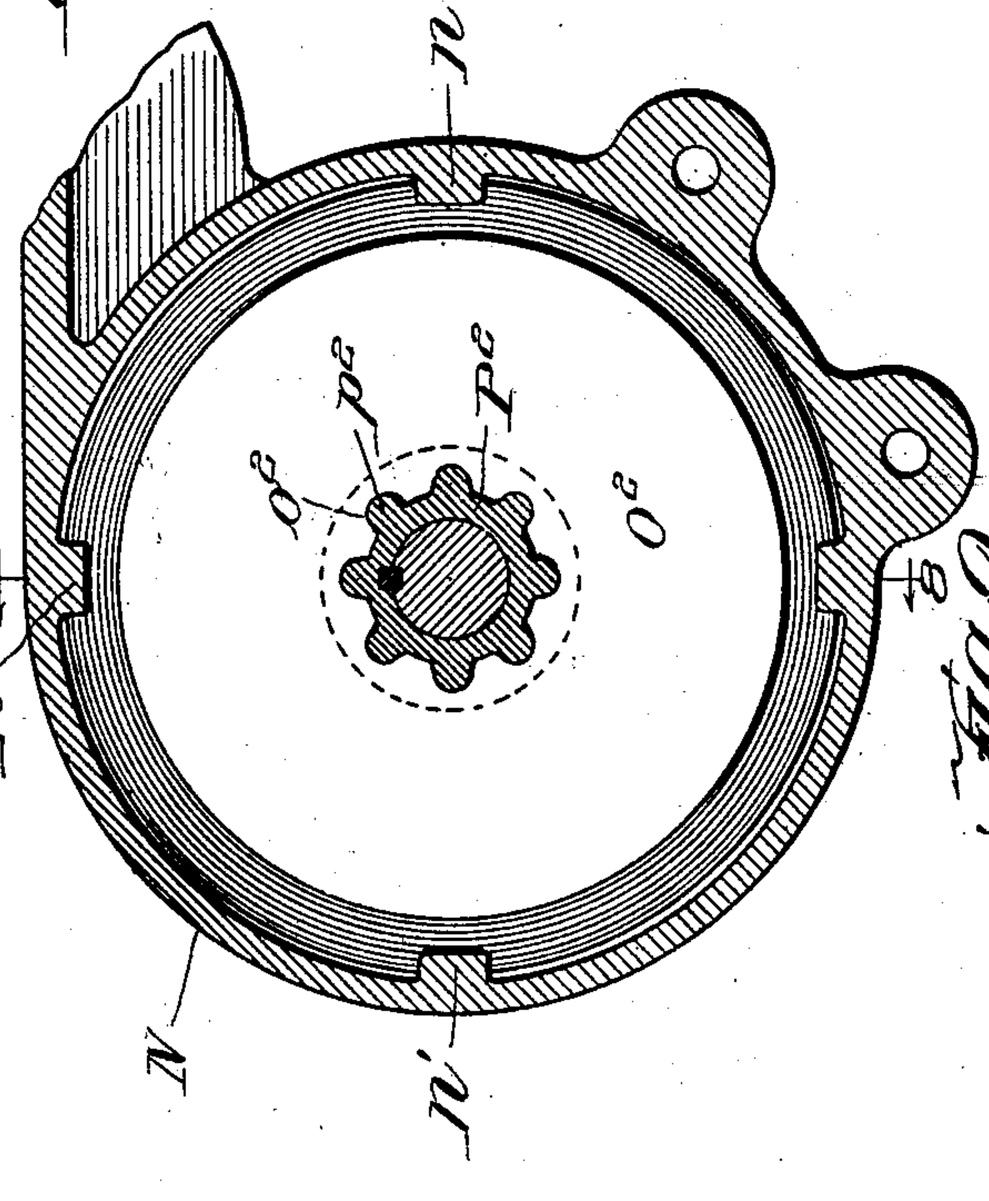

Fig. 7.

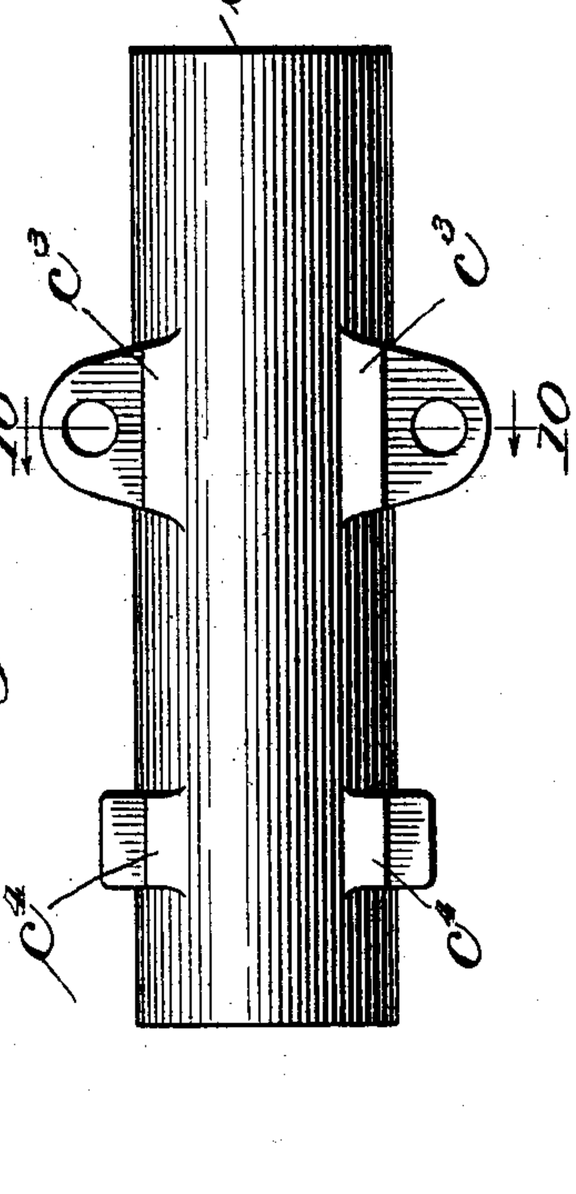

Fig. 9.

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5 SHEETS—SHEET 5.

Fig. 11.

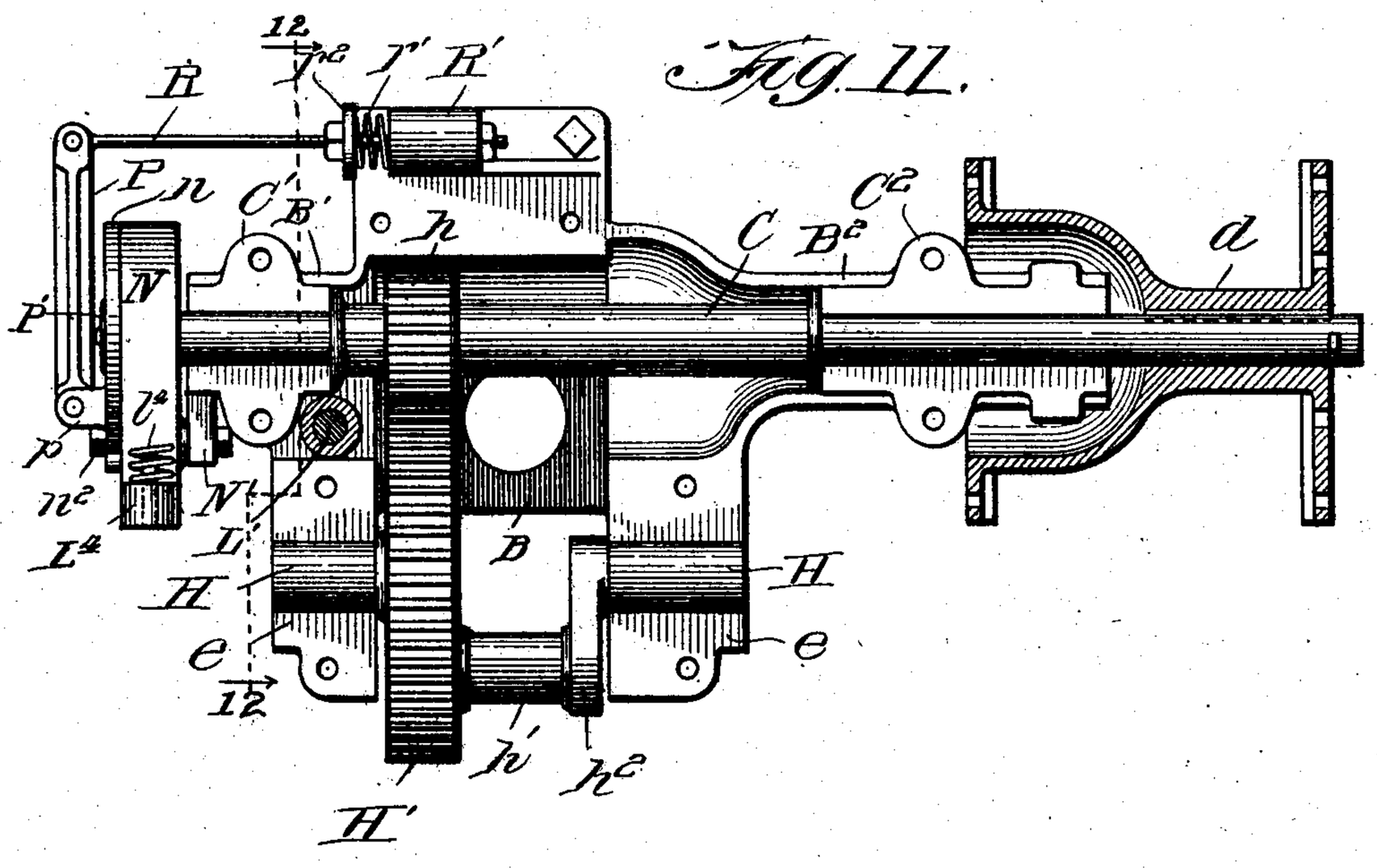
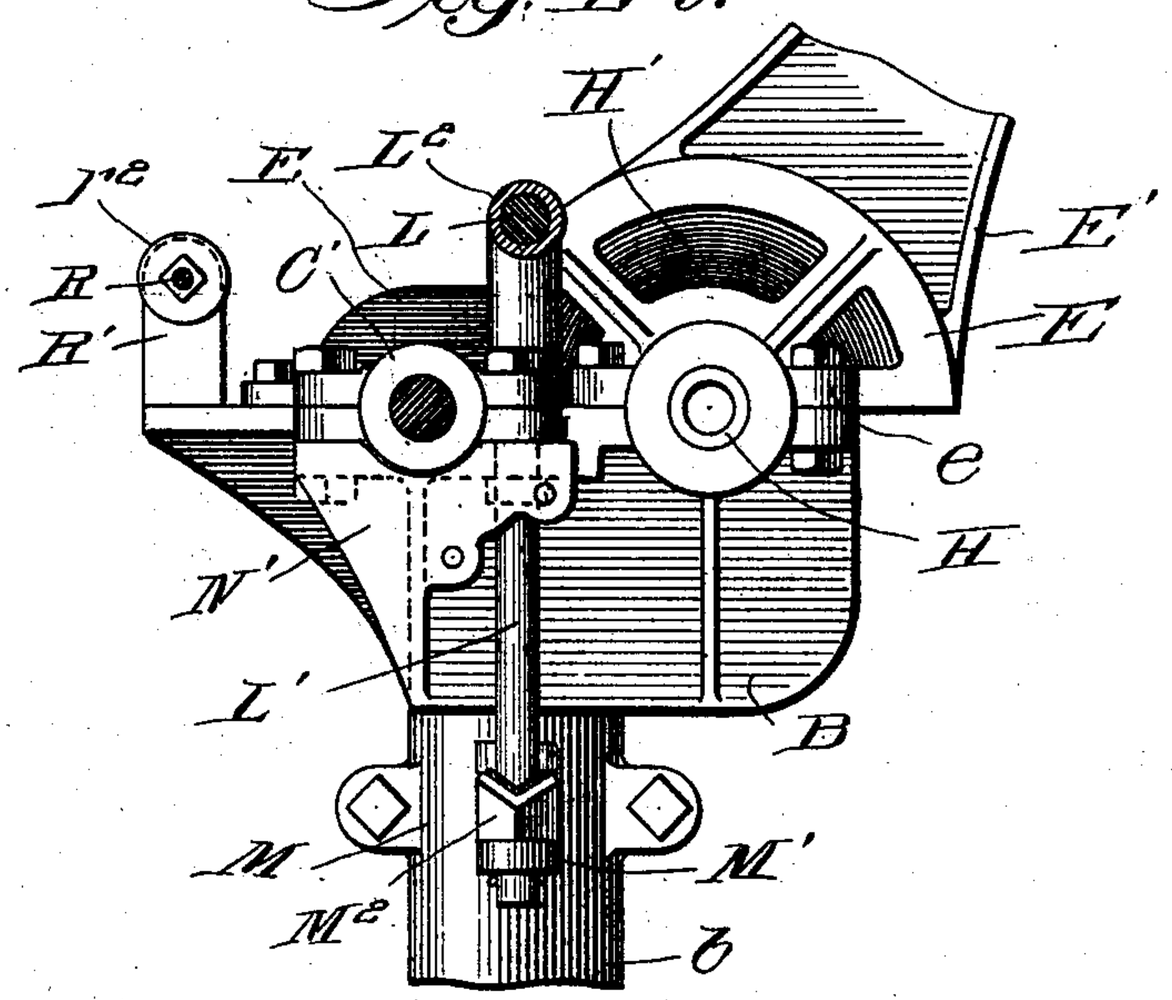


Fig. 12.



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UNITED STATES PATENT OFFICE.

ALBERT J. ANDERSON, OF BATAVIA, ILLINOIS, ASSIGNOR TO U. S. WIND ENGINE & PUMP COMPANY, OF BATAVIA, ILLINOIS, A CORPORATION OF ILLINOIS.

WINDMILL.

No. 889,290. Specification of Letters Patent. Patented June 2, 1908.

Application filed November 24, 1906. Serial No. 344,991.

To all whom it may concern:

Be it known that I, ALBERT J. ANDERSON, a citizen of the United States, residing at Batavia, county of Kane, State of Illinois, have invented a certain new and useful Improvement in Windmills, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates in general to wind mills and more particularly to certain structural improvements therein.

One of the objects of my invention is to provide in a wind mill an improved brake for effectively stopping the rotation of the wheel when the vane is swung into a plane substantially parallel with the plane of rotation of the wheel.

A further object of my invention is to provide improved bearings for the wheel shaft of a wind mill which may be reversed when worn by the tilting tendency of the shaft, so that the bearings upon which the main wear is imposed may be replaced by the unworn coöperating bearings.

A further object of my invention is to provide in a wind mill an improved connecting mechanism intermediate of the wheel shaft and the vertically reciprocating pump rod, comprising a rocker-arm from which the pump rod depends and which is connected by a pitman with a crank shaft geared to the wheel shaft.

A still further object of my invention is to provide an improved windmill which will be comparatively simple in construction, strong and durable in use and efficient in operation.

My invention will be more fully described hereinafter with reference to the accompanying drawings in which the same is illustrated as embodied in a convenient and practical form, and in which

Figure 1 is an elevational view; Fig. 2 a plan view; Fig. 3 an elevational view looking from the left in Fig. 1, the plane of which is indicated by line 3—3 Fig. 2; Fig. 4 a view similar to Fig. 2 showing the vane in position to discontinue the operation of the wind mill; Fig. 5 a sectional view on line 5—5 Fig. 1; Fig. 6 a perspective view of the integrally cast crank shaft and gear; Fig. 7 a sectional view on line 7—7 Fig. 8 showing the brake; Fig. 8 a sectional view on line 8—8 Fig. 7; Fig. 9 a plan view of one of the bearings for the wheel shaft; Fig. 10 a sectional view on line 10—10 Fig. 9; Fig. 11 a plan view with the housing removed; and Fig. 12 a sectional view on line 12—12 Fig. 11.

The same reference characters are used to designate the same parts in the several figures of the drawings.

Reference letter A indicates the upper end of the supporting structure upon which the wind mill is mounted.

a designates a cap fixed to the upper end of the supporting structure A and upon which the wind mill is rotatably mounted.

B indicates a supporting base preferably made in a single casting upon which the wind mill is carried and which is rotatably mounted upon the supporting structure A.

b indicates a tubular support beneath the base B and which is rotatably mounted upon the cap *a*.

C designates the wheel shaft which is journaled upon the base B and has fixed thereto the wind wheel D. The wind wheel may be of any suitable construction having a hub *d* fixed to one end of the shaft C. The shaft C is surrounded adjacent its ends by pairs of bearings C′ and C² detachably secured to the supporting base B. As the weight of the wheel is supported by one end of the shaft C there is a tendency for the shaft to tilt, consequently the wear imposed upon the under part c^2 of the bearing C² is greater than the wear imposed upon the upper part c' of the bearing C², while the upper part of the bearing C′ assumes more wear than the underpart thereof. I therefore make the two parts of each of the bearings reversible so that the parts upon which the wear is imposed may be replaced by the parts which are unworn. The bearings are shown in detail in Figs. 9 and 10 by reference to which will be seen that the interchangeable parts c' and c^2 of each bearing are provided with laterally projecting ears having holes therethrough which register with holes through the under-lying supporting bracket B² of the base B. Bolts *c*, *c*, extend through the registering holes in the two parts of the bearing and through the registering holes in the under-lying bracket. Each part of the bearing is provided with two pairs of shoulders c^3, c^3, and c^4, c^4. These shoulders on the lower part

of the bearing engage within seats such as indicated at b^3, b^3, thereby securely retaining the bearing concentrically around the shaft C. When one of the parts of the bearing becomes worn the bolts c are removed and the parts of the bearings interchanged so that the un-worn part is located in position to assume the wear. The bolts c are then inserted through the alined openings in the parts of the bearing and underlying bracket thereby rigidly securing the parts of the bearing to the bracket.

The bracket B^2, underlies and supports the bearing C^2 adjacent the end of the shaft upon which the wheel is fixed, while B′ designates a bracket on the opposite side of the base B upon which the parts of the bearing C′ are supported. The parts comprising the two bearings are of the same construction and are removably secured to the supporting bracket in the same manner.

E designates a housing secured upon the base B in any suitable manner, as by means of bolts extending through holes in ears e on the housing E and through holes in underlying ears on the base B. The housing E is provided with upwardly projecting arms E′ and E^2 which support at their upper ends the shaft F. A walking beam G is fulcrumed upon the portion of the shaft F intermediate of the arms E′ and E^2. A vertically reciprocating rod G^2 depends from the end of the walking beam opposite its fulcrum and is secured thereto in any suitable manner, as by means of an eye bracket g^2. The pitman G′ is pivotally connected to the rocker-arm by means of a pin g' adjacent its outer end. The opposite end of the pitman G′ is pivotally connected to a crank h' of a crank shaft H. The ends of the crank shaft H extend between bearings formed upon the base B and under surface of the housing E as clearly shown in Fig. 3. A gear wheel H′ is carried by the crank shaft H and meshes with a small gear wheel h fixed upon the wheel shaft C whereby the crank shaft is rotated. The crank h' is supported at one side by being directly connected to the gear wheel H′ and at its other side by a crank arm h^2. The crank shaft, crank, crank-arm h^2, and gear wheel H′ are preferably formed integrally thereby securing simplicity and economy in construction.

As is usual in the construction of wind mills a horizontally swinging vane is provided which is shown as comprising a vane arm L carrying at its outer end the vane proper l. The inner end of the vane arm is secured within a socket in a bracket L^2. The bracket L^2 is mounted to oscillate about a vertical axis by means of a rod L′ supported at its lower end by a bracket M detachably secured to the tubular portion b of the supporting base B. The bracket M is secured to the base by means of bolts m extending through registering holes in ears on the bracket and on the adjacent portion of the tubular support b. A brace M^2 is supported at its lower end upon the ear M′ of the bracket and loosely surrounds the portion of the rod L′ adjacent the bracket M. The brace M^2 extends in a slightly upwardly inclined direction to the underside of the vane arm L. The outer end of the bracket L^2 is pivotally connected to a rod k^2 the opposite end of which is loosely connected with the end of an arm K^2 of the bell-crank lever K. The bell-crank lever is fulcrumed upon the portion of the rod F extending beyond the arm E^2. The opposite arm K′ of the bell-crank lever is provided with a depending rod k' by means of which the bell-crank lever is oscillated and the vane thereby swung from the position shown in Fig. 2 to a plane substantially parallel with the plane of the wheel, as shown in Fig. 4. A spring k is provided for normally retaining the bell-crank lever in position to permit the vane to project in alinement with the axis of rotation of the wheel as shown in Fig. 2. The spring k surrounds the shaft F and is secured at one end to a collar f fixed to the shaft and at its lower end to the arm K^2 of the bell-crank lever. When the bell-crank lever is oscillated to swing the vane into the position shown in Fig. 4 the spring F is placed under tension so as to return the bell-crank to its normal position when the pull upon the rod k' is discontinued.

A spring l^3 is interposed between the vane arm L and the rod L^3 secured to the arm E′. The tension of such spring normally retains the vane arm in the position shown in Fig. 2, and returns the vane to such position when the pull upon the rod k' is discontinued. A buffer spring l^4 is carried by a bracket L^4 and is located in position to cushion the bracket L^2 when the spring l^3 swings the vane into the position shown in Fig. 2. The bracket L^4 may be conveniently formed integrally with a casing N in which a bracket is inclosed.

The brake casing N surrounds the opposite end of the wheel shaft C from the wheel D and may be secured to the supporting base B in any suitable manner, as by means of bolts N^2 which pass through a bracket N′ projecting laterally from the base as clearly shown in Fig. 3. The casing N is provided with one or more ribs n' on its inner surface. A plurality of friction disks O′ are located within the casing N and are provided with notches o' in their peripheries engaging the ribs n' so that the disks will be held against rotation, but may move longitudinally within the casing. Intermediate of the disks O′ are other friction disks O^2 which are smaller than the disks O′ so that their peripheries do not extend to the ribs n'. The disks O^2 surround a hub P^2 splined upon the shaft C by a feather p'. The disks O^2 are provided with notches o^2 through which pass ribs p^2 on the hub P^2.

A follower plate Q is secured to the hub P^2 and engages the adjacent one of the friction disks O^2. The follower is provided with a projecting portion P′ which extends through an opening in the cover *n* of the casing N. P designates a lever fulcrumed at one end between ears *p* projecting from the cover *n* of the casing N. The lever P extends across the casing and engages the portion P′ of the follower which extends through the casing. The end of the lever P opposite its fulcrum is pivotally connected to a rod R, such rod extending through a guiding sleeve R′, as clearly shown in Figs. 2 and 4. A spring *r*′ surrounds the rod R and is interposed between one end of the fixed sleeve R′ and a collar r^2 is fixed upon the rod. The tension of such spring oscillates the lever P to move the same away from the portion P′ of the follower. A lug R^2 is carried by the socket in which the vane arm L is supported, and extends downwardly into the plane of the collar r^2 on the rod R so that when the vane arm is swung from the position shown in Fig. 2 to that shown in Fig. 4 the rod R will be forced against the tension of the spring *r*′ and the lever P oscillated against the portion P′ of the follower.

It will be seen that the friction disks carried by the shaft of the wind mill are engaged on opposite sides by members carried directly from the fixed base, the amount of braking action depending upon the axial thrust between the friction members. This thrust is borne wholly by the fixed base, and the shaft and bearing members are entirely relieved from axial pressure due to the braking effort.

The operation of my improved wind mill is as follows: When the parts are in the position shown in Figs. 1, 2, and 3 the vane automatically rotates the base B and the mechanism supported thereon so that the wind wheel occupies a plane at right angle to the direction of the wind. The rotation of the wheel rotates the shaft C which in turn rotates the crank shaft H through the interposed meshed gear wheels *h* and H′ and thereby oscillates the rocker-arm G. The rod G^2 is thereby vertically reciprocated operating a pump or any other mechanism connected therewith. When it is desired to discontinue the operation of the wind mill a downward pull is applied to the rod *k*′ which oscillates the bell-crank lever K and through the connecting rod k^2 swings the vane into a plane substantially parallel with the plane of the wheel. The action of the wind upon the vane then swings the wheel into a plane parallel with the direction of the wind. When the vane is swung into such position to render the wind mill inoperative, the lug R^2 on the bracket L^2 engages the collar r^2 on the rod R and thereby swings the lever P against the projection P′ of the follower so that the follower is forced inwardly and the friction disks in the two series pressed together so as to lock the shaft C against rotation. This action is due to the fact that alternate friction disks are held against rotation with the shaft while the intermediate friction disks rotate with the shaft. When it is desired to again put the wind mill into operation the rod *k*′ is released thereby permitting the spring F to return the bell-crank lever K to its normal position in which the tension on the rod k^2 is discontinued and the spring L^3 permitted to swing the vane into alinement with the direction of the wind. Immediately upon the vane swinging into such position the brake is released owing to the lug R^2 being disengaged from the collar r^2 and the spring *r*′ forcing the rod R in a direction to swing the lever P out of contact with the follower in the brake casing.

From the foregoing description it will be observed that I have invented certain improvements in wind mills consisting in providing an efficient brake for stopping the rotation of the wheel shaft immediately upon the vane arm being swung into inoperative position; consisting in providing reversible bearings for the wheel shaft; consisting in an improved connecting mechanism for transmitting rotary motion of the wheel shaft to the reciprocating pump rod; and consisting in a simple and economical form of crank shaft.

While I have described more or less precisely the details of construction, I do not wish to be understood as limiting myself thereto, as I contemplate changes in form, the proportion of parts and the substitution of equivalents, as circumstances may suggest, or render expedient without departing from the spirit of my invention.

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

1. In a wind mill, the combination with a wind wheel, of a shaft on which said wheel is fixed, a supporting base upon which said shaft is journaled, a brake comprising movable friction disks surrounding said shaft for stopping the rotation thereof, means for imposing the axial thrust of said disks in both directions directly upon said base, a vane normally extending at right angles to the plane of said wheel, means for swinging said vane into a plane substantially parallel to that of said wheel, and means for automatically applying said brake when the vane is swung into position to discontinue the operation of the mill.

2. In a wind mill, the combination with a wind wheel, of a shaft upon which said wheel is fixed, a supporting member for said shaft, a brake for said shaft consisting of members movable relatively axially of the shaft, means for imposing the axial thrust of said brake in

both directions directly upon said supporting member, a vane normally extending at right angles to the plane of said wheel, means for swinging said vane into a plane substantially parallel to that of said wheel, and means for automatically applying said brake when the vane is swung into position to discontinue the operation of said mill.

3. In a wind mill, the combination with a wind wheel, of a shaft on which said wheel is fixed, a supporting member for said shaft, a brake for said shaft consisting of members movable relatively axially of the shaft, means for imposing the axial thrust of the brake in both directions directly on said supporting member, a vane normally extending at right angles to the plane of said wheel, means for swinging said vane into a position substantially parallel to said wheel to discontinue the operation of said wheel, and brake-actuating means controlled by the movement of said vane.

4. In a wind mill, the combination with a wind wheel, of a shaft upon one end of which said wheel is fixed, a brake applied to the opposite end of said shaft, a vane normally extending at right angles to the plane of said wheel, means for swinging said vane into a position substantially parallel to the position of said wheel to discontinue the operation of said wheel, a lever for applying said brake, a rod pivotally connected to said lever, a collar fixed to said rod, a lug projecting from said vane adapted to engage said collar, and thereby oscillate said lever to apply the brake, and a spring for releasing said brake when the vane is swung into position for the mill to operate.

5. In a wind mill, the combination with a wind wheel, of a shaft upon which said wheel is fixed, a supporting member for said shaft, a brake for said shaft consisting of members movable relatively axially of the shaft, means for imposing the axial thrust of said brake in both directions directly upon said supporting member, a vane normally extending at right angles to the plane of said wheel, means for swinging said vane into a plane substantially parallel to that of said wheel, a brake lever, and means controlled by said vane for operating said brake lever to apply the brake when the vane is swung into position to discontinue the operation of said mill.

In testimony whereof, I sign this specification in the presence of two witnesses.

ALBERT J. ANDERSON.

Witnesses:
GEO. L. WILKINSON,
HARRY S. GAITHER.