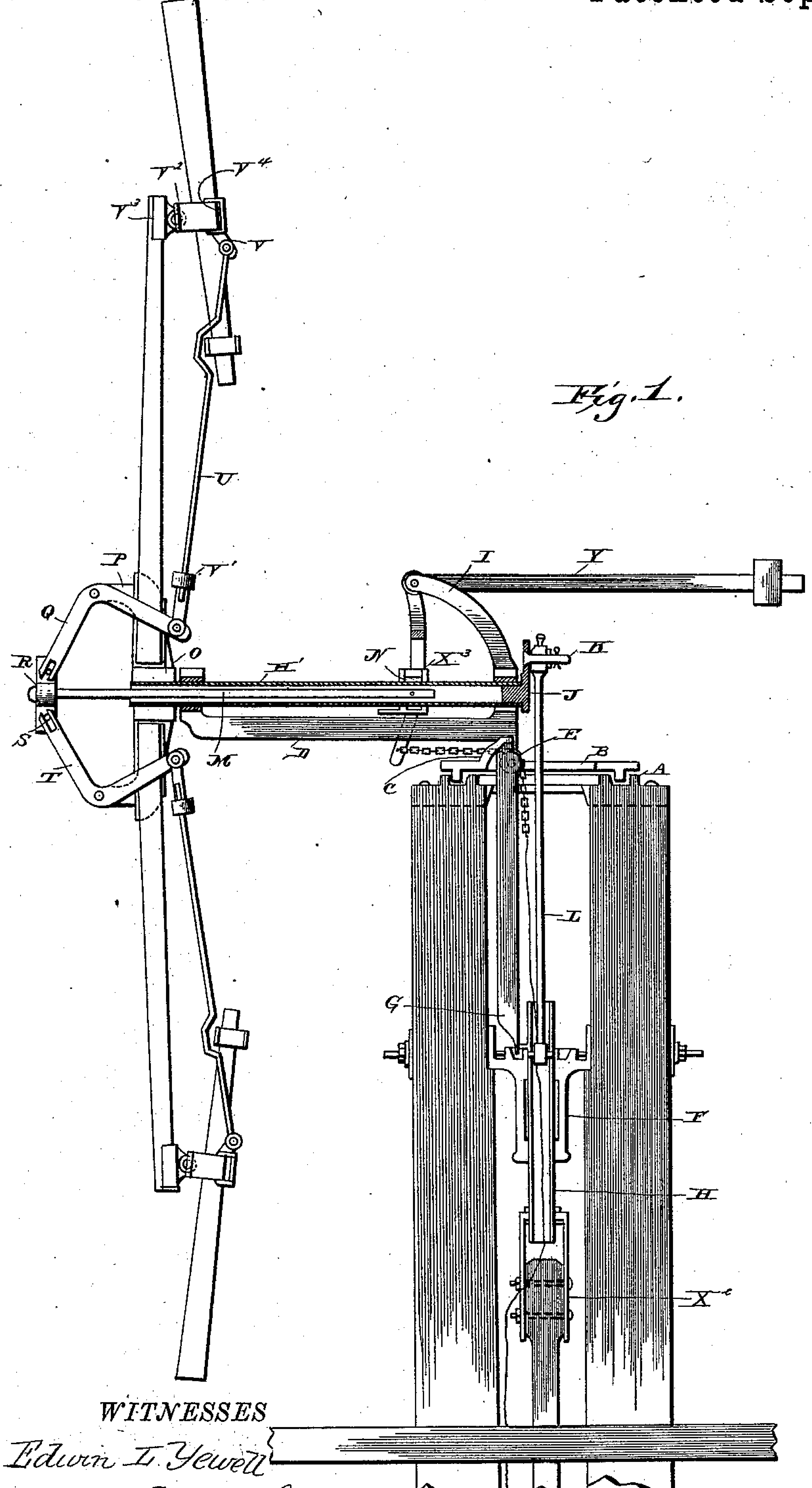
(No Model.) 4 Sheets—Sheet 1.

J. F. KILBURN.

WINDMILL.

No. 389,477. Patented Sept. 11, 1888.

Fig. 1.



WITNESSES

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(No Model.) 4 Sheets—Sheet 2.

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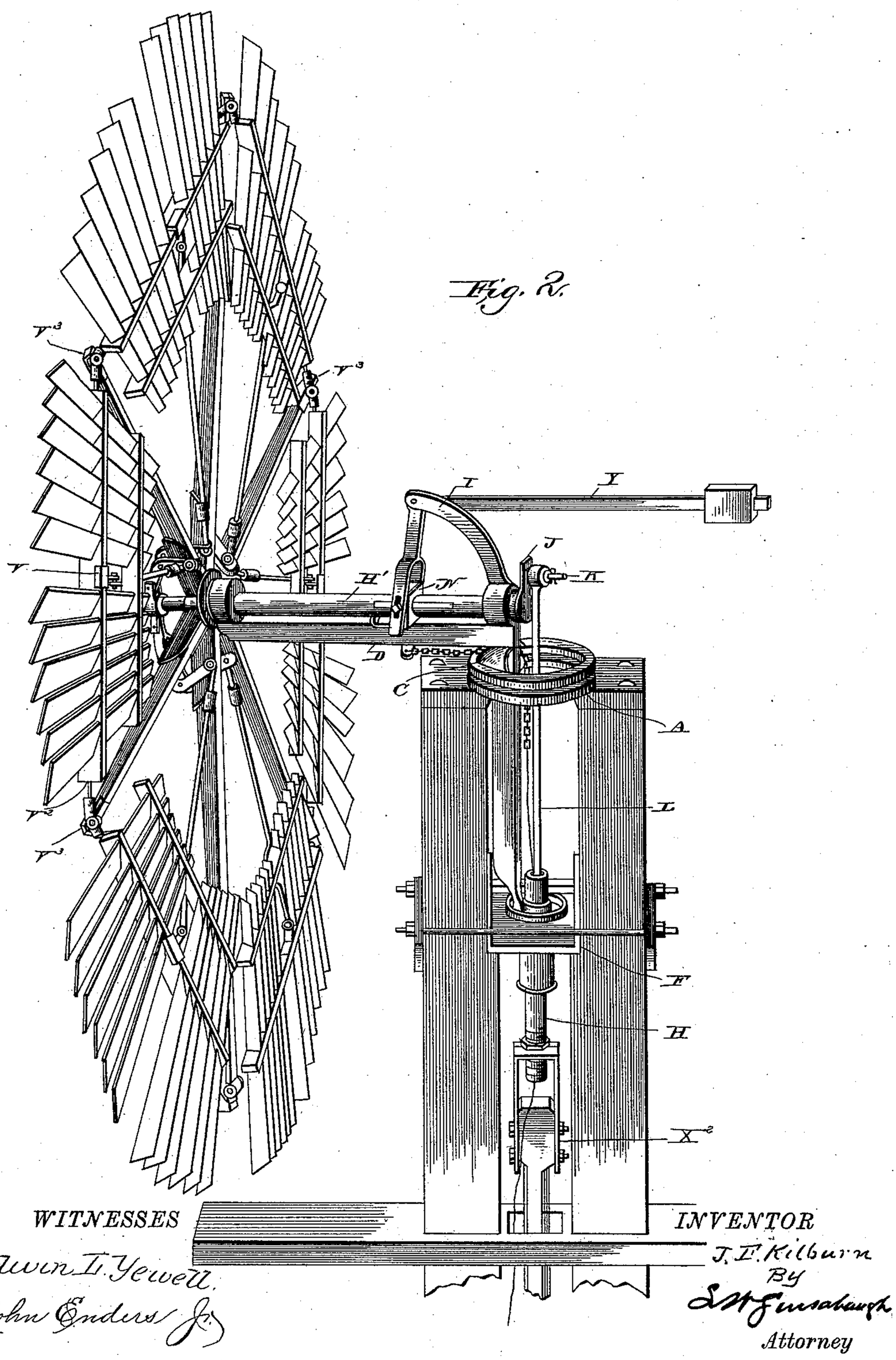
Fig. 2.



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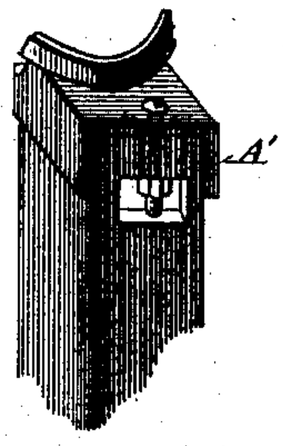


Fig. 3.

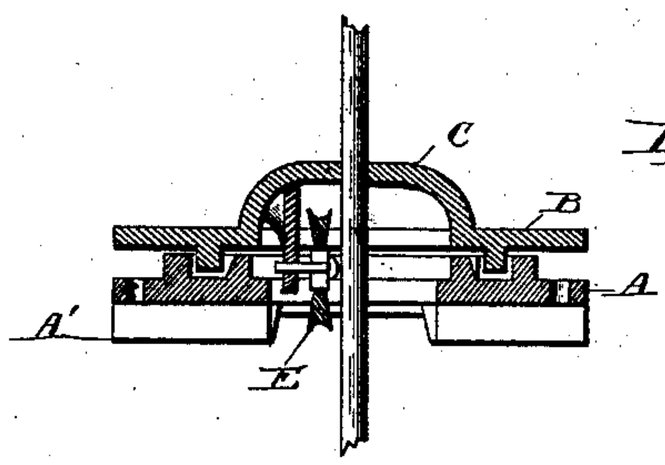


Fig. 4.

Fig. 5.

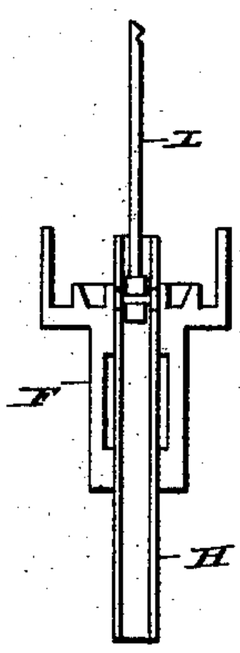
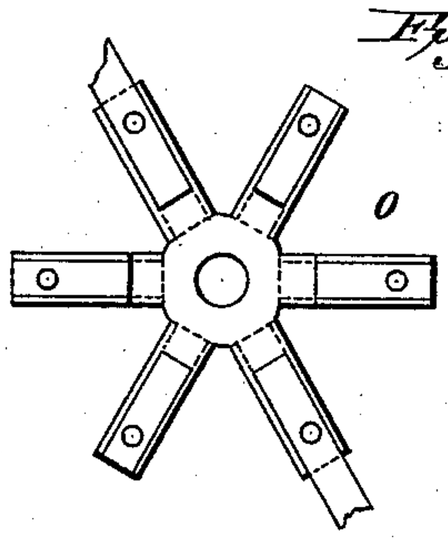


Fig. 6.



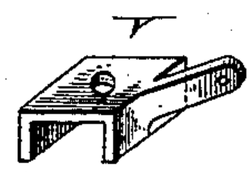
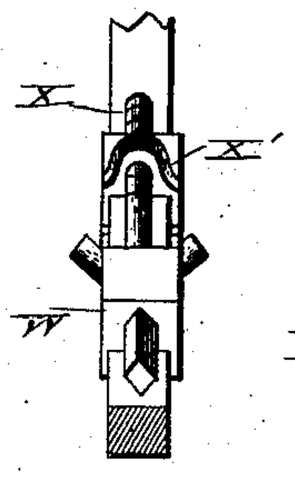


Fig. 7.



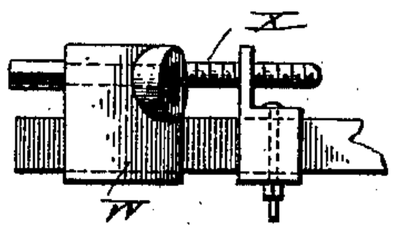


Fig. 8.

Fig. 9.

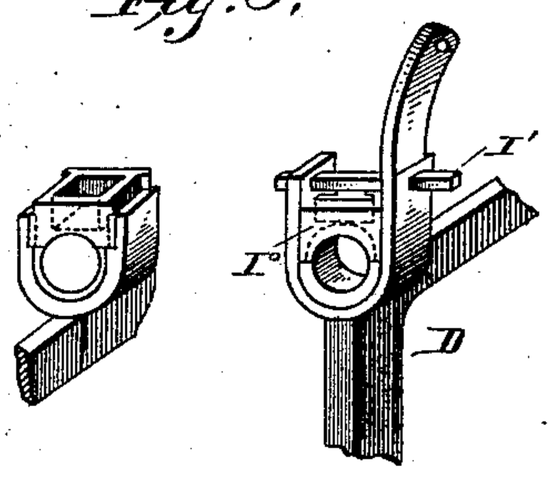


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Fig. 10.

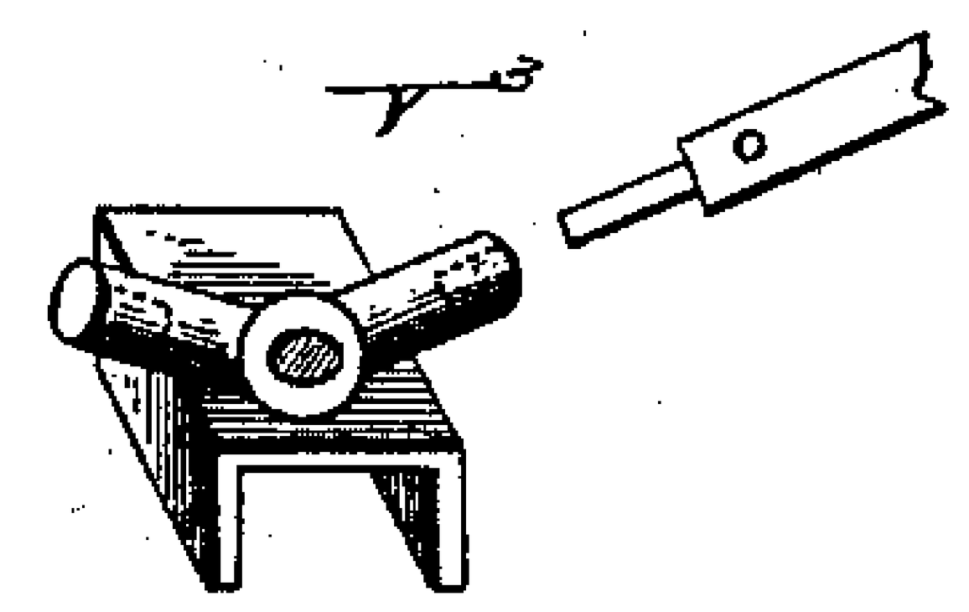


Fig. 11.

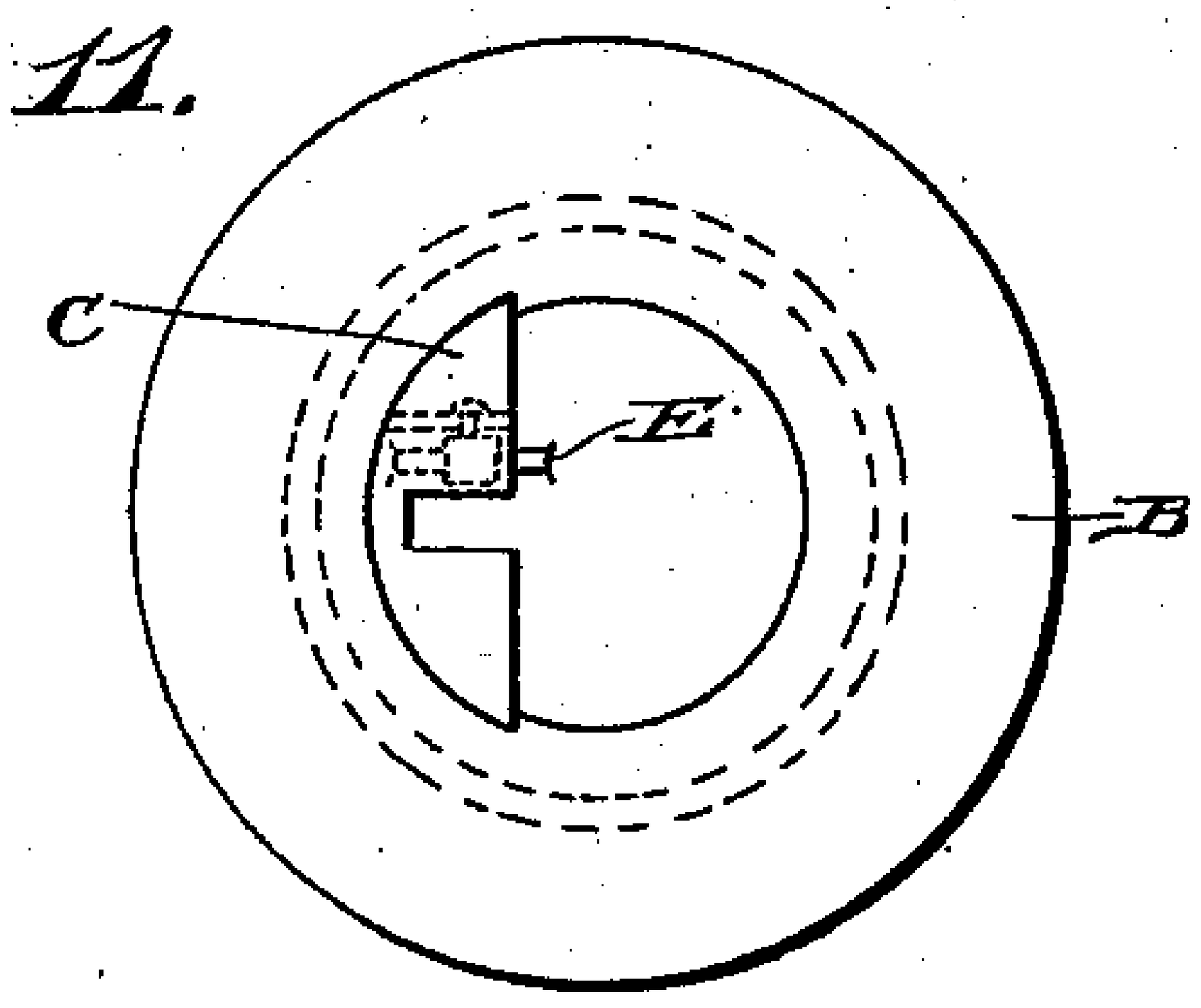


Fig. 12.

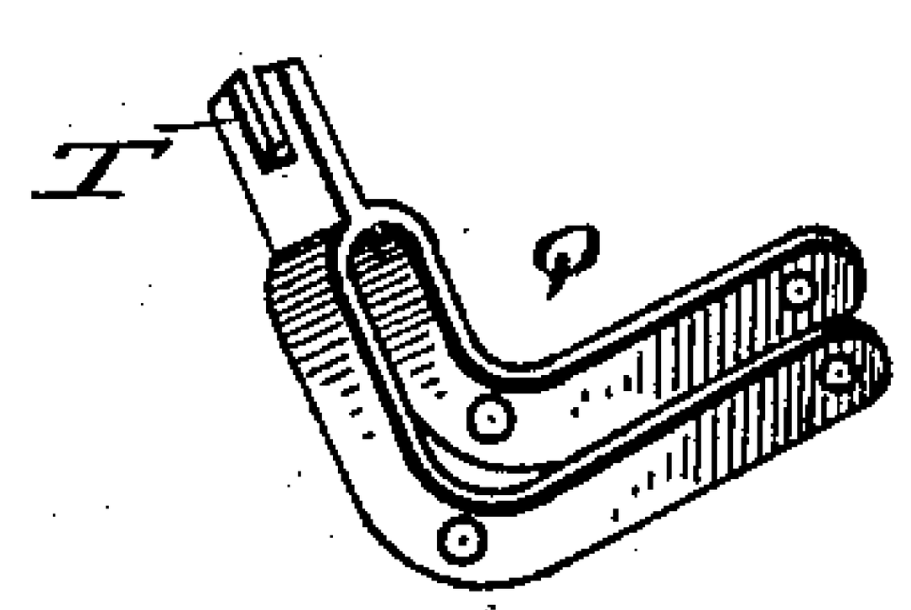


Fig. 13.

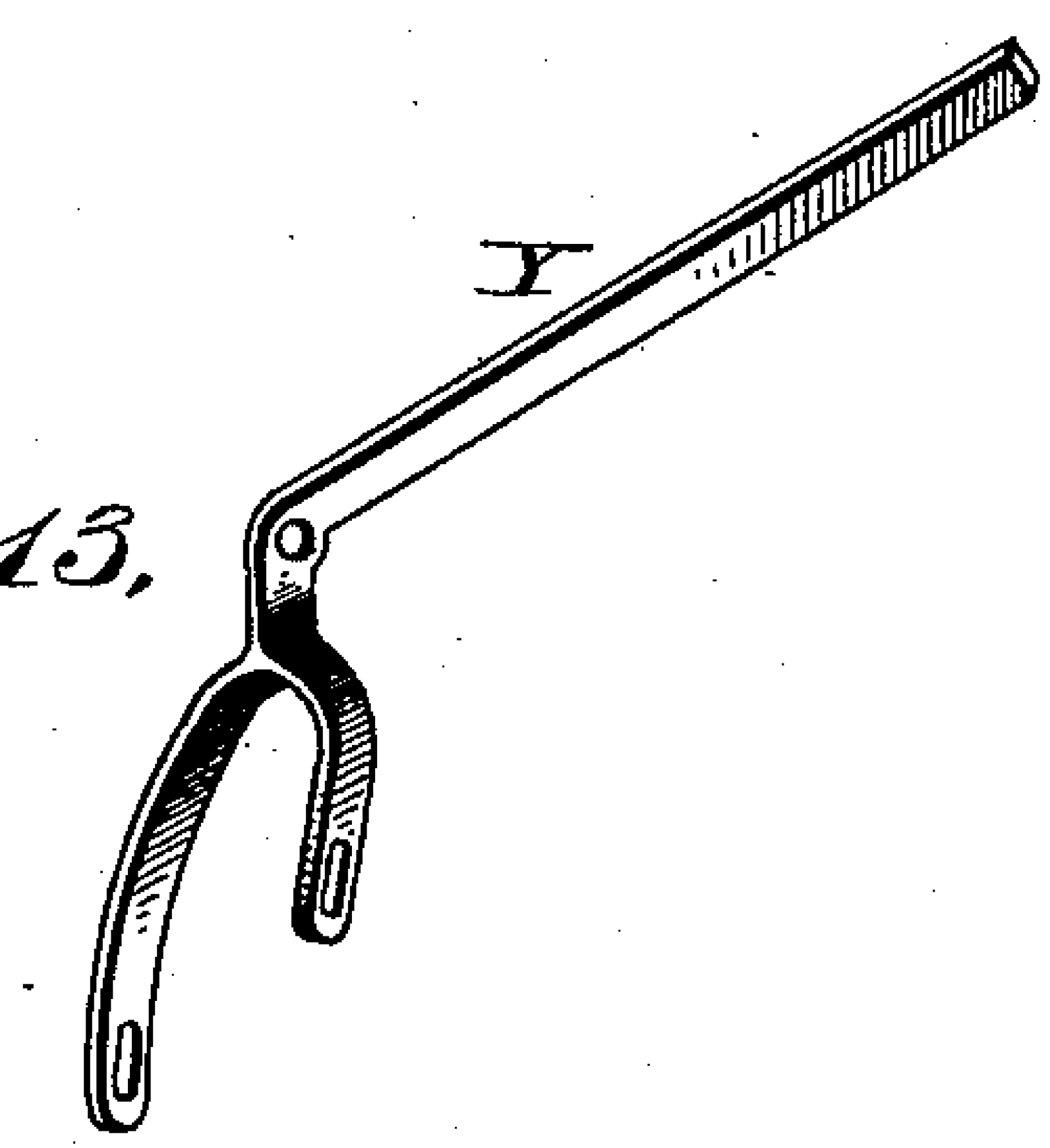


Fig. 14.

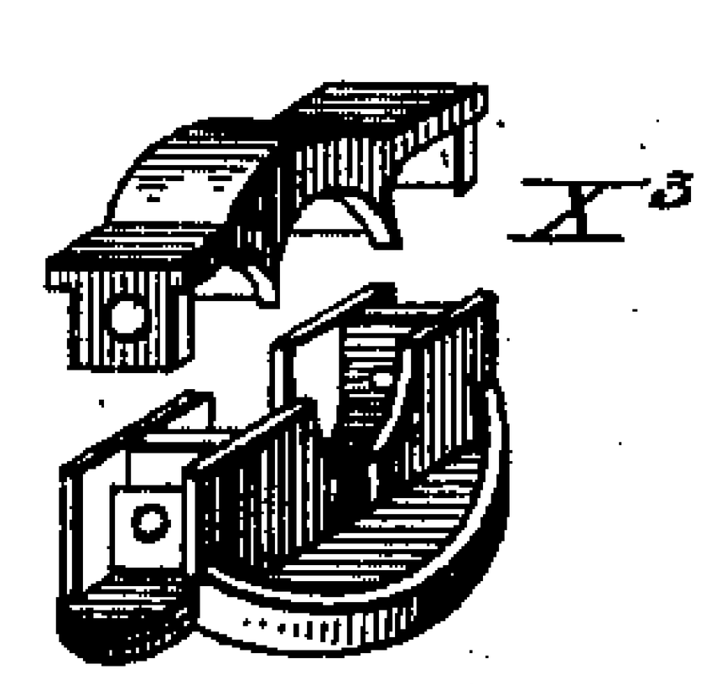


Fig. 15.

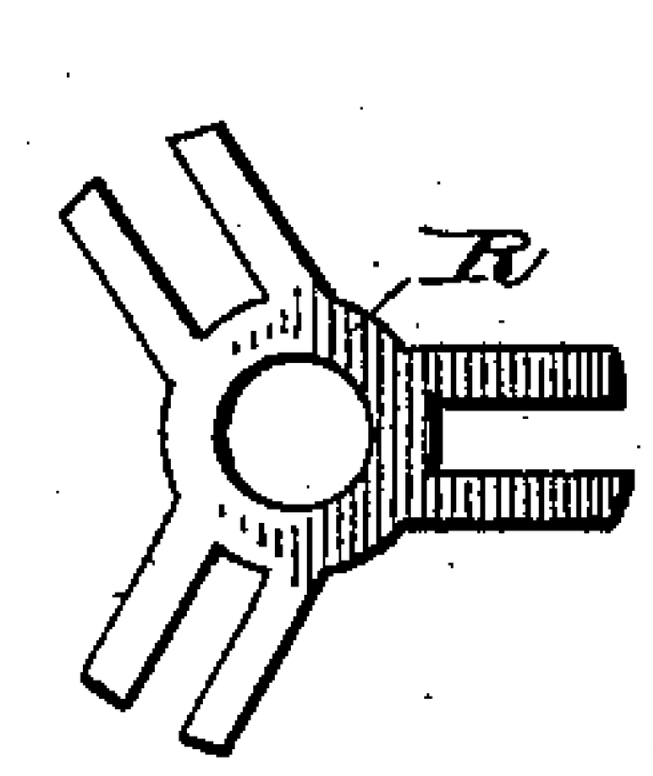


Fig. 16.

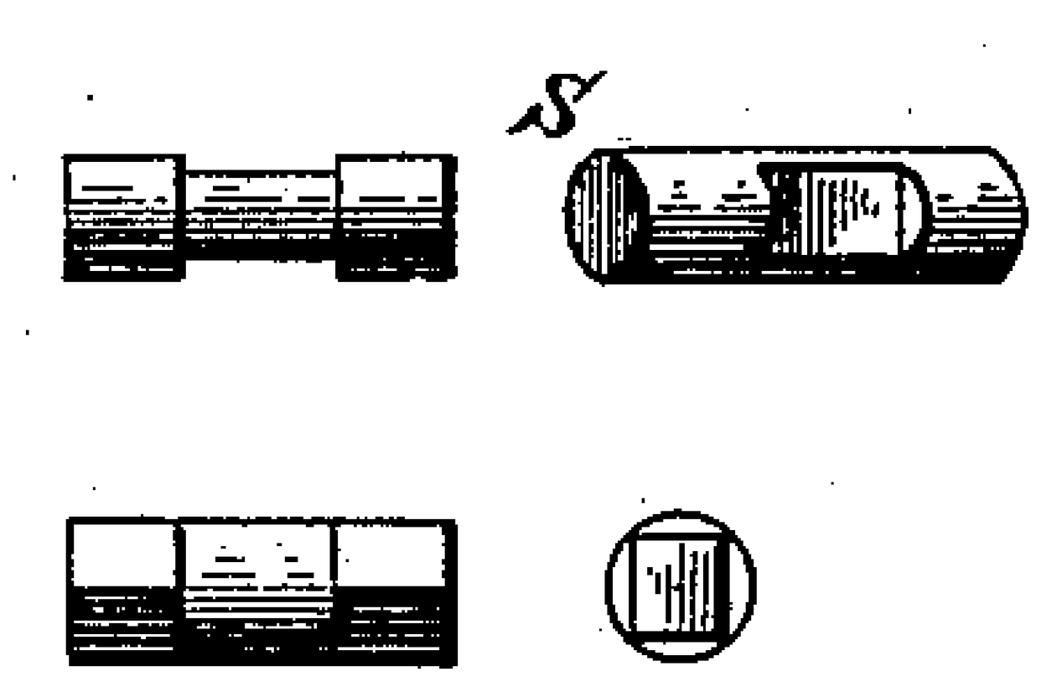
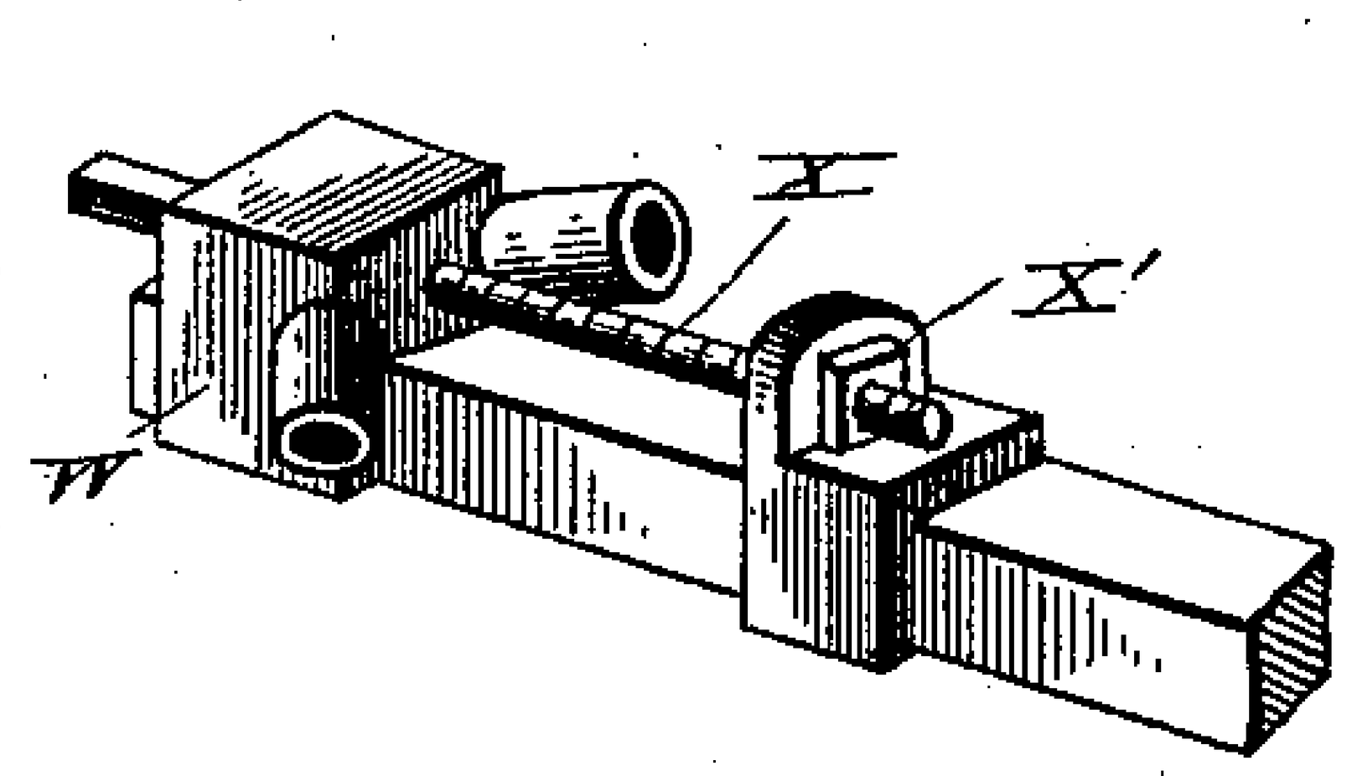


Fig. 17.



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UNITED STATES PATENT OFFICE.

JAMES FREDERICK KILBURN, OF SOUTH YARRA, NEAR MELBOURNE, COUNTY OF BOURKE, VICTORIA.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 389,477, dated September 11, 1888.

Application filed May 16, 1887. Serial No. 238,445. (No model.) Patented in Victoria May 29, 1886, No. 4,549; in New South Wales September 6, 1886, No. 1,915, and in South Australia October 12, 1886, No. 727.

To all whom it may concern:

Be it known that I, JAMES FREDERICK KILBURN, a citizen of Australia, residing at Howitt Street, South Yarra, near Melbourne, in the county of Bourke, in the Colony of Victoria, have invented a new and useful Windmill, to be entitled "The Kilburn Windmill," (for which I have obtained a patent in each of the following places, viz: in Victoria, (Australia,) No. 4,549, bearing date May 29, 1886; in New South Wales, (Australia,) No. 1,915, bearing date September 6, 1886, and in South Australia, No. 727, bearing date October 12, 1886,) of which the following is a specification.

My invention relates to improvements in (vaneless) windmills having oscillating sail-sections, and has been designed for the purpose of economizing labor and cost and increasing their efficiency and durability; and it consists in the reduction and simplification of parts, which are accurately proportioned and so arranged that friction is reduced to a minimum, thereby rendering the mill extremely sensitive in action and materially lessening the possibility of breakage or derangement. I attain these objects by the mechanism illustrated in the four accompanying sheets of drawings, in which—

Figure 1 illustrates a sectional view of the combination, showing the sail sections or fans spread full. Fig. 2 is a perspective view of the windmill. The remaining figures from Fig. 3 to Fig. 17 represent various parts in detail.

Similar letters refer to similar parts throughout the several views.

The standards supporting the mill are of the usual construction, with an upper platform suitably arranged. The bed-plate A is a metallic casting, resting upon and bolted firmly to the top ends of the masts. The end sides of said bed-plate are flanged for the purpose of keeping it in position, as at A′, Fig. 3, and there is also a circular web on the under side for the same purpose. The top face of the bed-plate has a collar, in which an annular groove is recessed to receive the projecting ring on the turn-table, hereinafter mentioned, and serving also as an oil-reservoir to insure perfect lubrication, as at Figs. 1 and 4.

The turn-table B has a projecting ring, as aforesaid, upon its under side, which revolves in the said annular groove. The upper surface has a convexed breast-piece, C, with a central gullet to receive the L-shaped arm D, and also a lug upon its under surface to support the sheave-pulley E, both of which are hereinafter described. The foot-step F (shown at Figs. 1, 2, and 5) has an annular groove formed upon its upper surface, in which the segmental foot G of the arm or bracket D (hereinafter described) revolves, and serving also as a reservoir for oil, thus insuring perfect lubrication. A tubular extension or guide is formed upon the under side of said foot-step F, in order to provide a long slide for the pitman-pipe H, hereinafter described.

The metallic L-shaped arm or bracket D is provided with a segmental foot, G, also with two bearings to receive the hollow shaft H′, hereinafter described, and the horn or extension I. The said bearings may be formed either solid, as at Figs. 1 and 2, or with separate caps, or top bushes having oil-recesses formed in them, as at Fig. 9, the cap I^0 for the crank-bearing being secured in position by means of a cotter, I′. The sail-wheel bearing has a flanged bush or cap, I^2, placed loosely in its position, serving as a covering and lubricator for the bearing.

The hollow shaft H′ (shown at Figs. 1 and 2) revolves within the bearings of the said arm or bracket, and has a crank or throw, J, forged solid or cast upon the inner end. Said crank is provided with one or more taper holes to receive the crank-pin K, the head of which is slightly tapered and driven into the crank from the back, thus enabling said pin K to be firmly secured without the use of nuts or cotters when the pitman-rod L, washer, and split pin are in position, as shown at Figs. 1 and 2. The said shaft H′ has two longitudinal slots, through which passes a pin connecting the inner sliding tube or rod, M, to the sliding collar N, both working freely in their respective positions.

The metallic hub or spider O is affixed on the outer end of the said hollow shaft H′ and differs in construction from all previous similar inventions, inasmuch as the inner side of each arm-box has a continuation of metal or flange from the periphery of the central boss, as at Figs. 1 and 6, thus forming a complete socket, into which the arms or spokes of the wind-wheel are inserted, thereby enabling each arm to be firmly secured by one bolt only, instead of two or more, as heretofore used, and the brackets or cheeks P are cast or affixed to each alternate arm-box of the said spider O, to serve as fulcrums for the bell-cranks Q, hereinafter described.

Fig. 1 shows the mechanism for reefing the sails, and consists, primarily, of a metallic head, R, cast or affixed to the end of the sliding rod M. The pins S, as at Fig. 16, flattened in the middle or at both ends, connect the metallic head R with the bell-cranks Q, which are fulcrumed at the elbows to the said brackets P, and may have slotted ends or jaws T to engage with the said metallic head. I do not confine myself to this exact form of connection, as the cheeks or arms of said metallic head may be formed with slots for the aforesaid pins S to slide in in place of slots T in bell-crank ends. The said bell-cranks are so constructed as to engage two regulating or radial rods, U, so that each crank works two sail-sections. The said regulating or radial rods U each have an eye at the outer end to engage with the flanged sail-levers V, which are bolted to the front side of the outer section-bars, as illustrated at Figs. 1, 2, and 7. The inner ends of said rods U are screwed to fit the links V′, which are tapped to receive the said screwed ends, as at Figs. 1 and 2, for the purpose of adjusting the sail-sections to the proper angle and setting them true with each other. By this method of adjustment the use of separate nuts or set-screws is dispensed with, and when the sail-sections are properly set it is impossible for them to work loose.

The sail-sections are supported or hinged upon the flat bars V^2, as at Figs. 1 and 2, bolted to the back side of the outer section-bars and having reduced ends to fit into the arm-brackets V^3, hereinafter described. A light metallic strip is also bolted to the front side of the said section-bars, thus materially strengthening the sail-sections, reducing friction, and avoiding the complication of parts. By this combination I dispense with the use of weighted section-levers, section-bar castings, loose axle-rods, and nuts.

Fig. 10 illustrates the arm-brackets V^3 before mentioned, which are bolted to the outer ends of the arms or spokes, and are formed with bosses or sockets to receive the reduced ends of the said flat bars V^2, and have flanges at each side, as shown at Fig. 10, in order to clasp the sides of the arm or spoke, and rendering only one bolt necessary to firmly secure each arm-bracket in position, instead of two or more bolts, as hitherto used.

I do not confine myself to the last-mentioned form, as a central web or rib may be used instead of the said flanges and fitted into a suitable recess formed in each arm or spoke. Fig. 8 shows another form of arm-bracket designed for the purpose of taking up the wear of the reduced ends of the bars V^2, and consists of an arm-bracket with bosses or sockets similar to the arm-brackets V^3; but in lieu of the flanges or rib it is provided with a sleeve, W, to slide upon the ends of the arms or spokes of the windmill. An adjusting-screw, X, is passed through a hole or eye midway between the two bosses or sockets thereon, and engages with a flanged nut, X′, which is bolted to the arm. By tightening the adjusting-screw X the diameter, and consequently the circumference, of the sail-wheel is reduced, thus taking up the wear of the sail-axles and effectually preventing the sail-sections from becoming detached. One or more of these adjusting-brackets may be used in each sail-wheel.

The pitman or connecting-rod L has its upper end engaging with the crank-pin K, and its lower end is jointed in the interior of the pitman-pipe, as shown at Figs. 1 and 5. This combination obviates all danger of the pitman-pipe H becoming jammed or buckled in the guide through which it slides in consequence of the side-thrust and pull of the crank when the mill is working a double-action or balanced pump. The lower end of the said pitman-pipe may be attached to the pump-rod by means of a shackle, X^2, and nuts, as shown at Figs. 1 and 2, or in any suitable manner.

The clutch-box X^3 has an annular groove, in which the sliding collar N revolves, and is formed in two parts, the lower half having an oil-reservoir cast or attached to one side, and a slot or opening through the bottom of the adjoining flange, which permits the oil to flow from the reservoir to the bottom of the annular groove, thus insuring perfect lubrication of the said sliding collar N. The upper half (or cap) is secured to the lower part aforesaid by means of one set-screw at each end, which also serve as pivots for the forked end of balance-lever Y. The weight or balance lever Y is fulcrumed at its elbow to the horn I upon the main L-bracket D. Its lower end is formed with a fork and slots to engage with the set-screws in the clutch-box X^3 and sliding collar N, one of the forked ends having an extension, to which is attached a chain or cord passing through an aperture in the breast-piece C of the turn-table B, and thence over a sheave-pulley, E, (shown at Fig. 4,) and descending in a straight line through the pitman-pipe H to the ground for the purpose of stopping and starting the windmill.

The general principle and mode of action of my improved windmill are as follows: The sail-sections, being pivoted in the manner set forth and illustrated, tend to assume a position parallel to the axle or shaft H′ of the wind-wheel when in motion, owing to the influence of centrifugal force, thus presenting a varying sur-

face or area to the wind. This tendency of the sails is restrained or balanced by means of the balance-lever Y and weight, which may be adjusted to vary the speed of the mill. Another important factor in connection with the self-governing power of the windmill, and which is especially valuable in sudden squalls, is the position of the sail-axles, which are so placed that a greater external area is presented to the wind, which tends to force over the sails parallel with the main shaft H′, and thus becomes an important auxiliary to the action of the centrifugal force.

Having fully described my invention and the manner of performing the same, what I desire to claim and secure by Letters Patent is—

1. The combination of the foot-step F, having an annular groove upon its upper surface and the tubular extension or guide upon its lower surface, with the bed-plate A, also having an annular groove upon its upper surface formed with a projecting ring upon its lower surface, a breast-piece, C, having a recess or gullet, and the sheave-pulley, substantially as described.

2. The combination of the bracket or bearer D, the horn or extension I, the clutch-lever Y, fulcrumed on the horn I, the clutch X^3, the chain or cord connected to an arm or extension of the lever, and the sheave-pulley F, substantially as described.

3. The combination, with the blade-sections and the radial arms of the wheel, of the sliding brackets V^3, the stationary collars or brackets, and adjusting-screws connecting said brackets, substantially as shown and described.

4. The combination of the forked balance or clutch lever Y, fulcrumed on the horn I, the clutch X^3, the chain or cord connected to an arm or extension of the lever, and the sheave-pulley F, substantially as described.

JAMES FREDERICK KILBURN.

Witnesses:
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J. H. BUSH.