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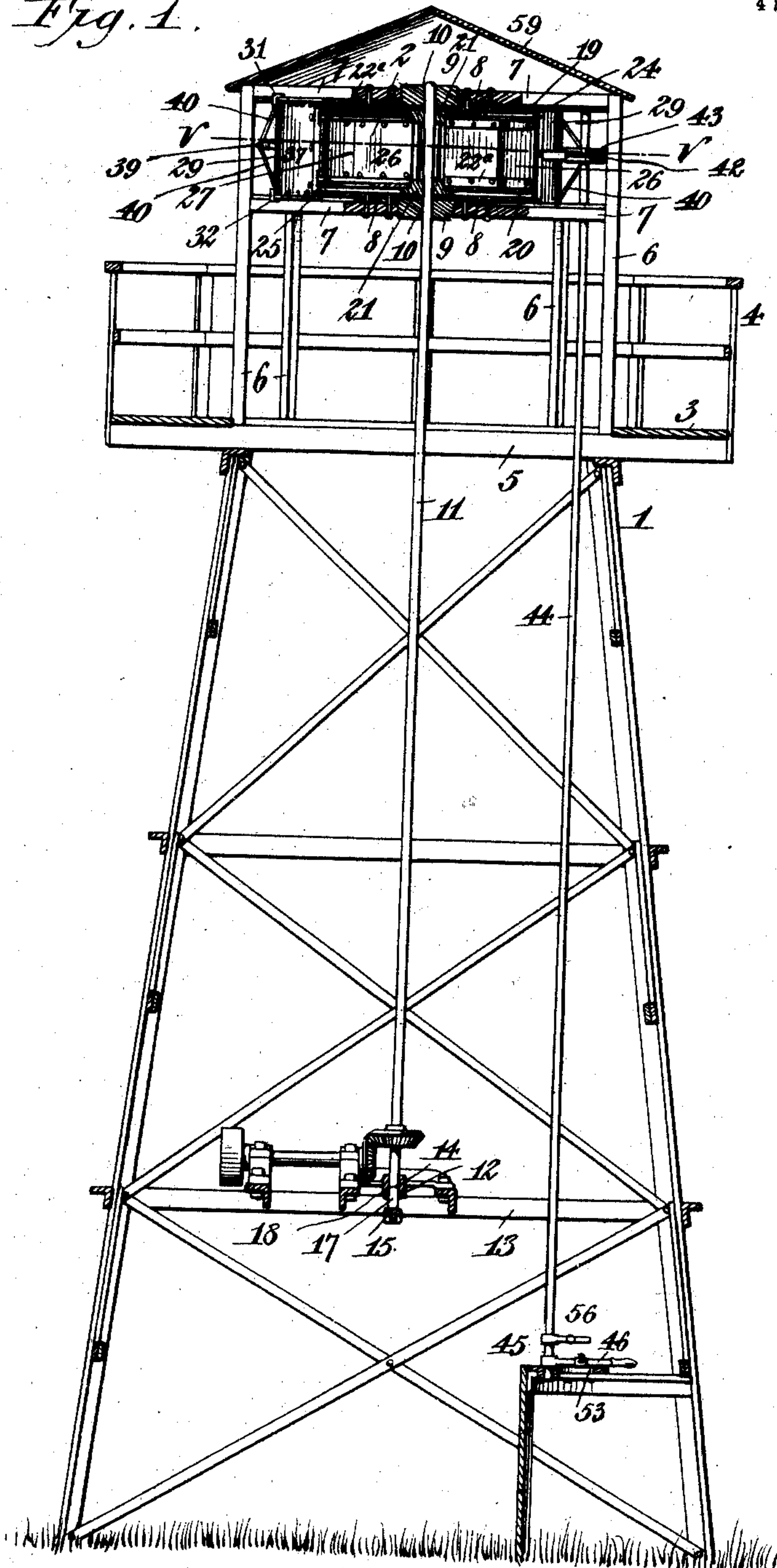
PATENTED SEPT. 3, 1907.

W. J. KICKBUSH.
WINDMILL.

APPLICATION FILED FEB. 27, 1907.

4 SHEETS—SHEET 1.

Fig. 1.



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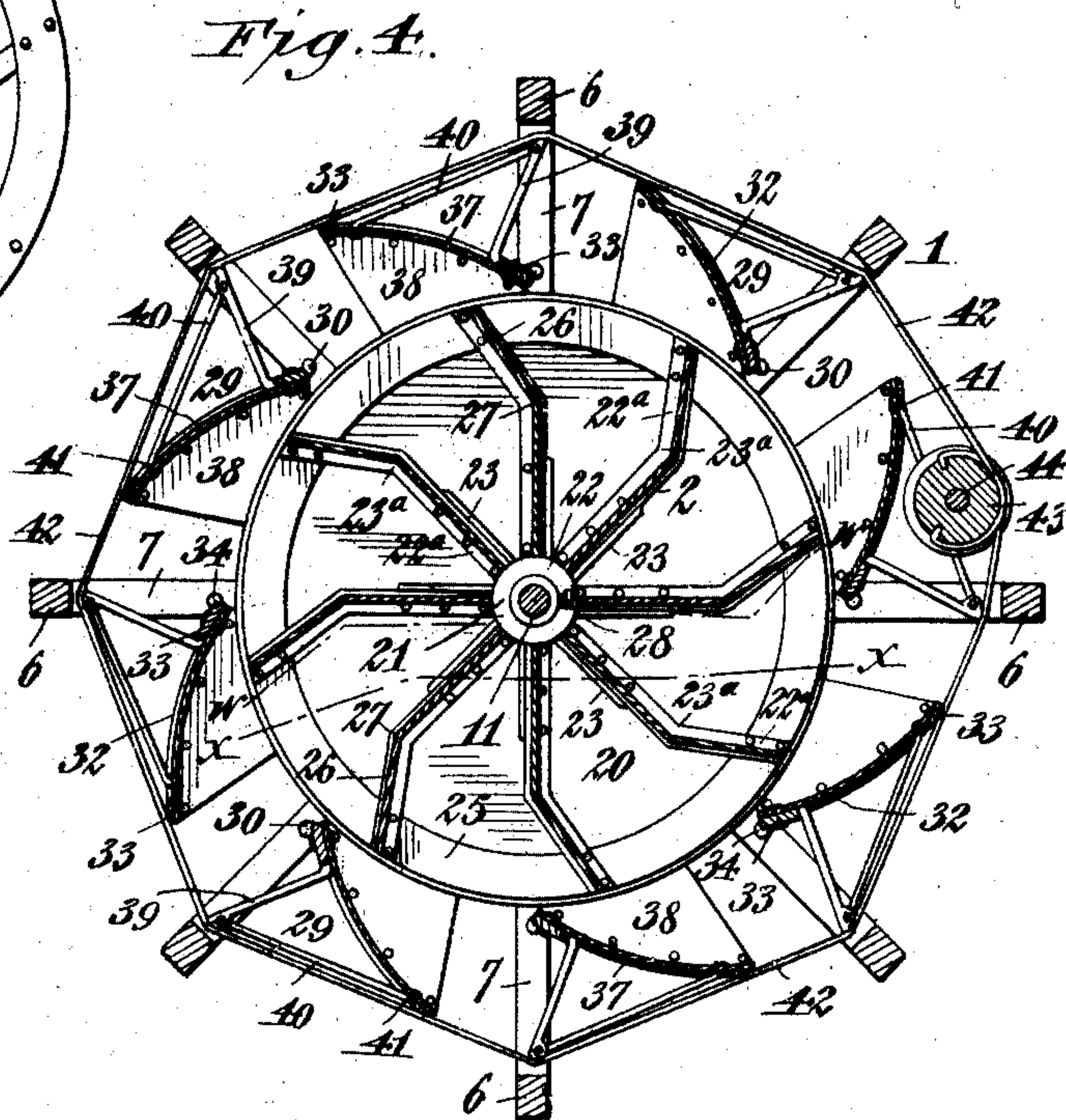
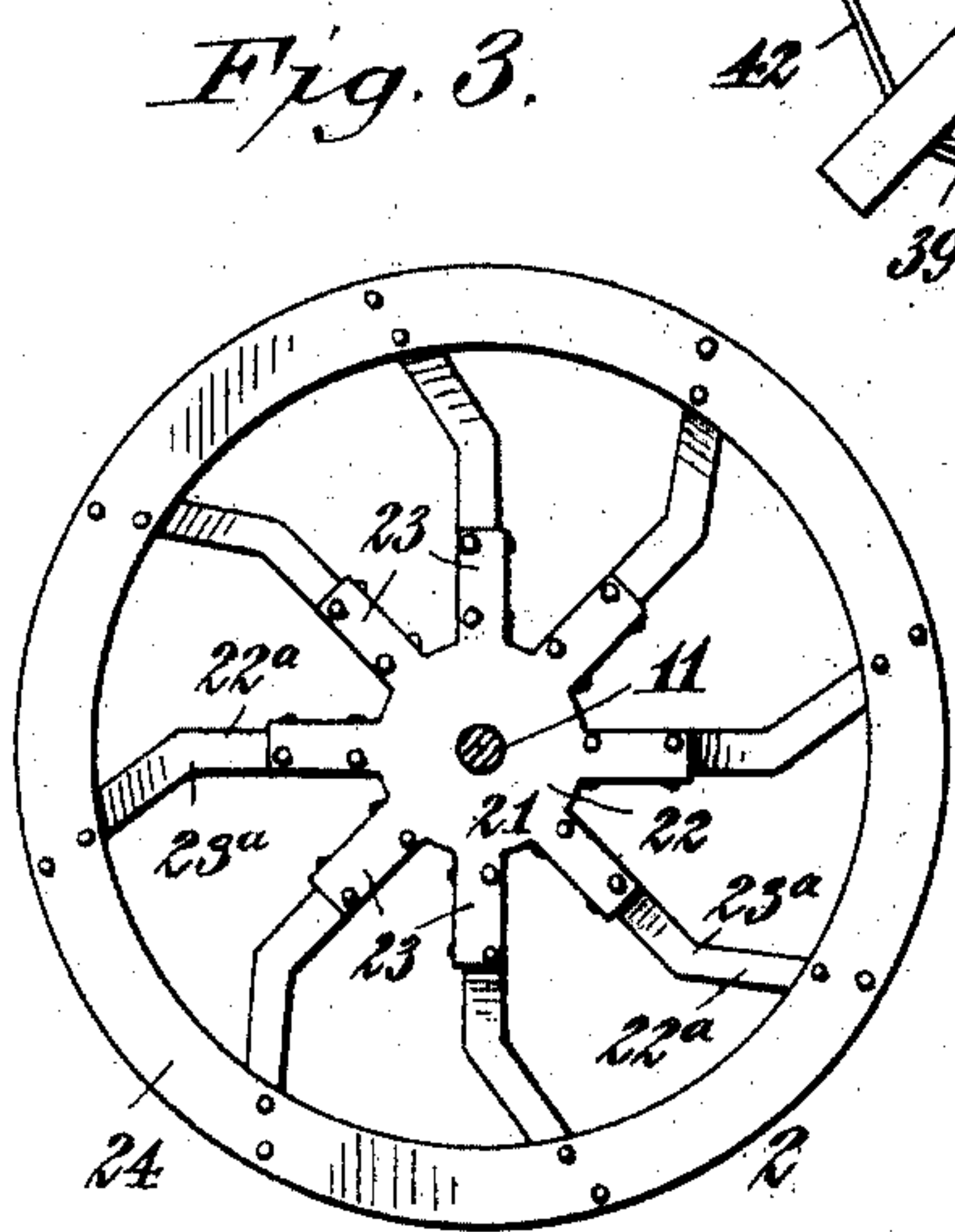
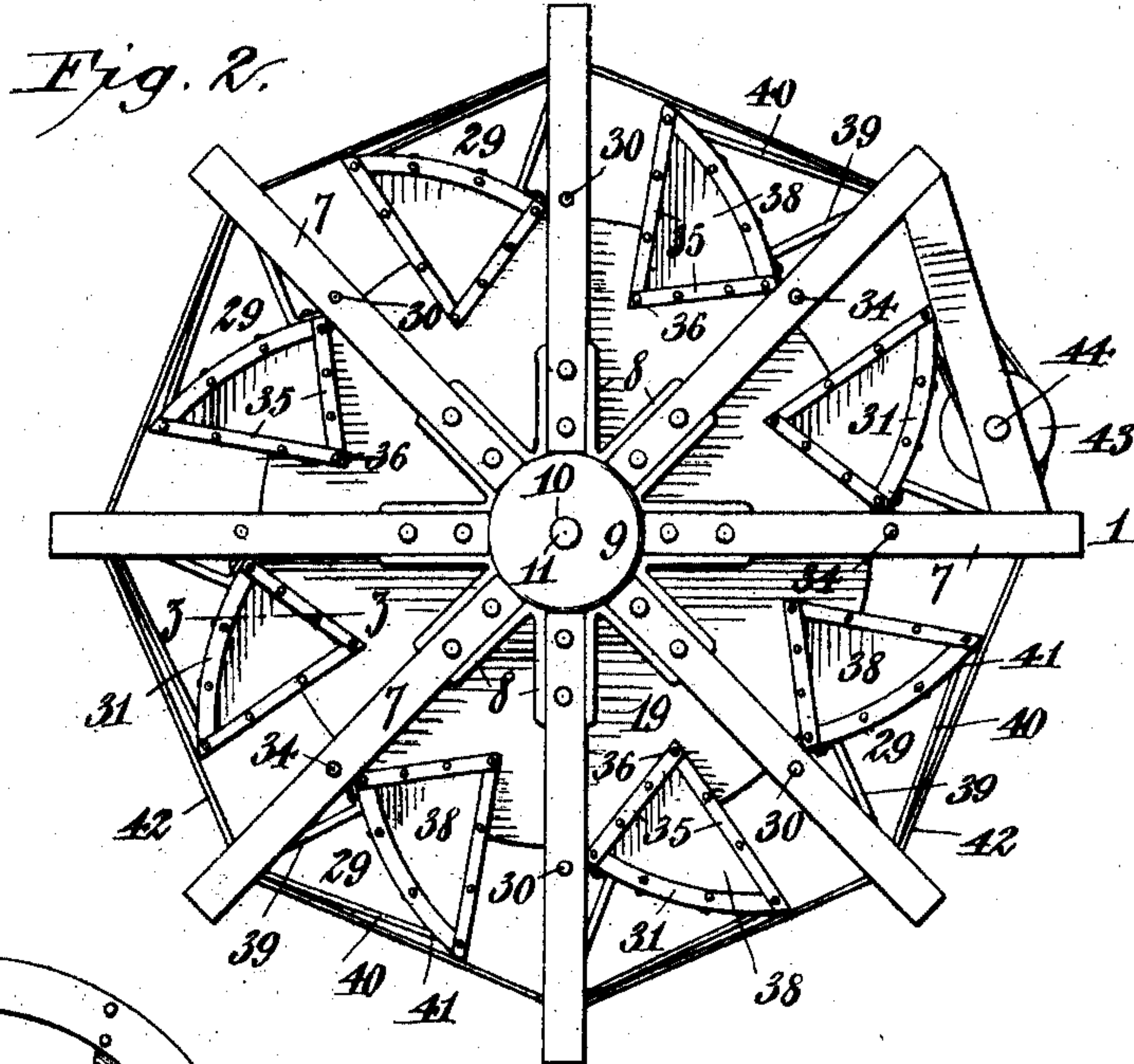
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 5.

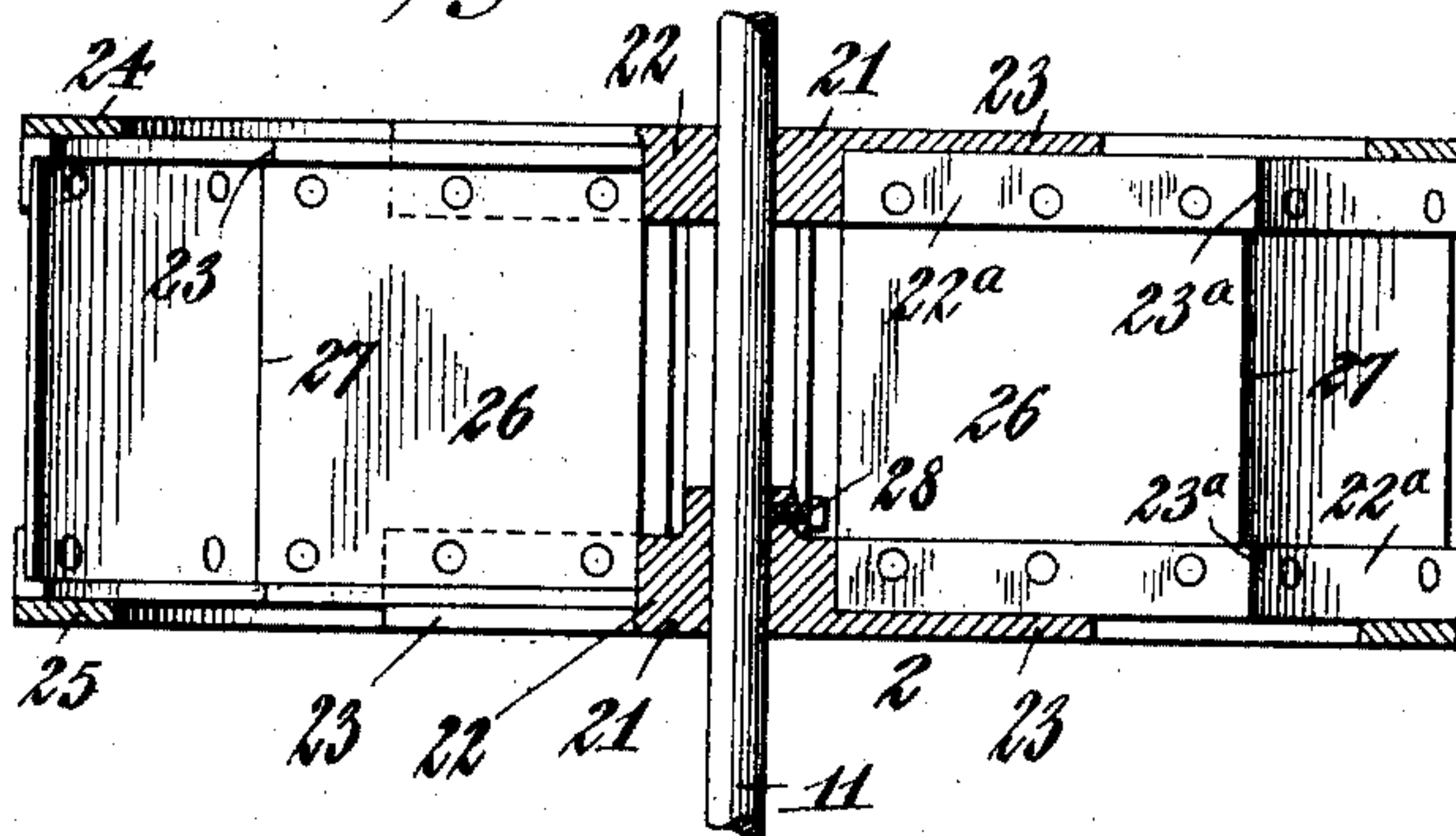


Fig. 6.

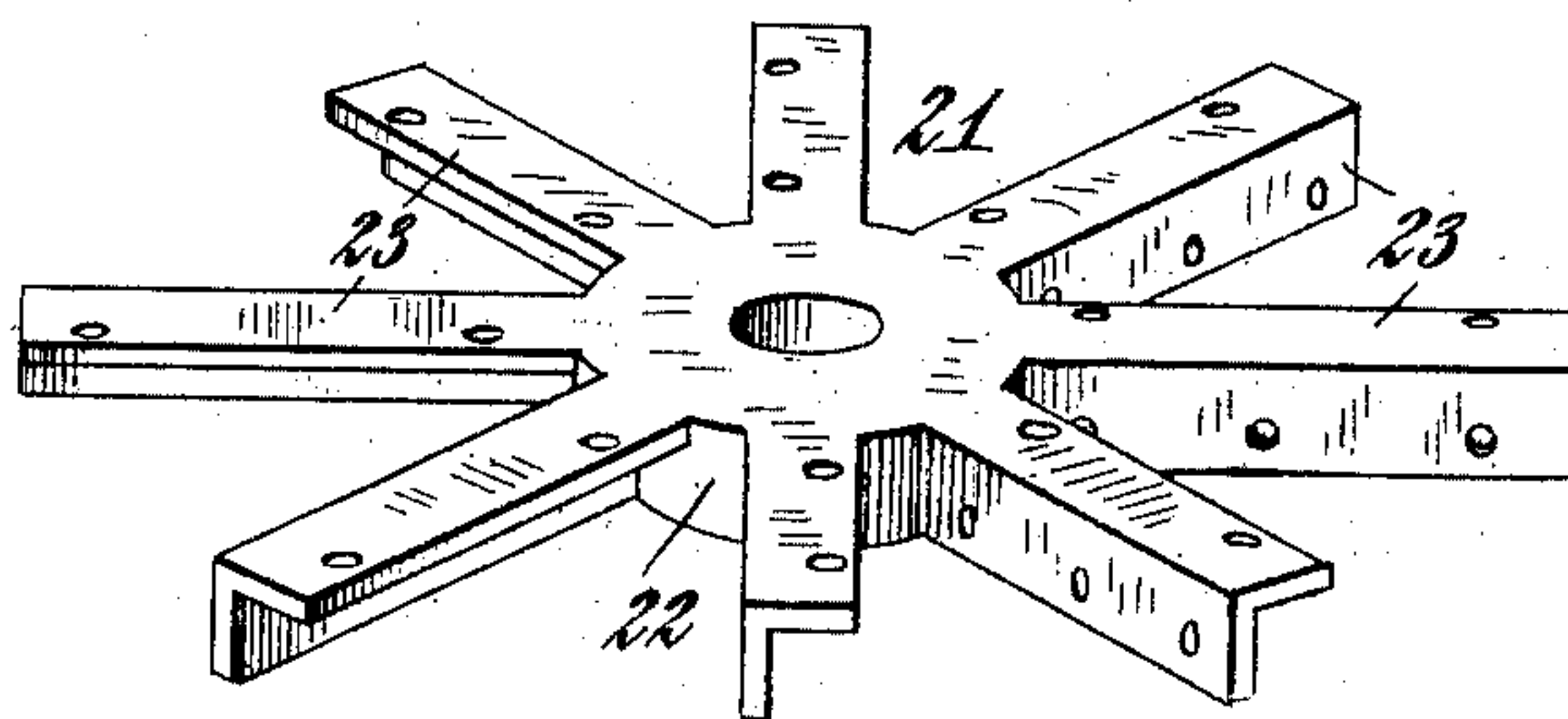
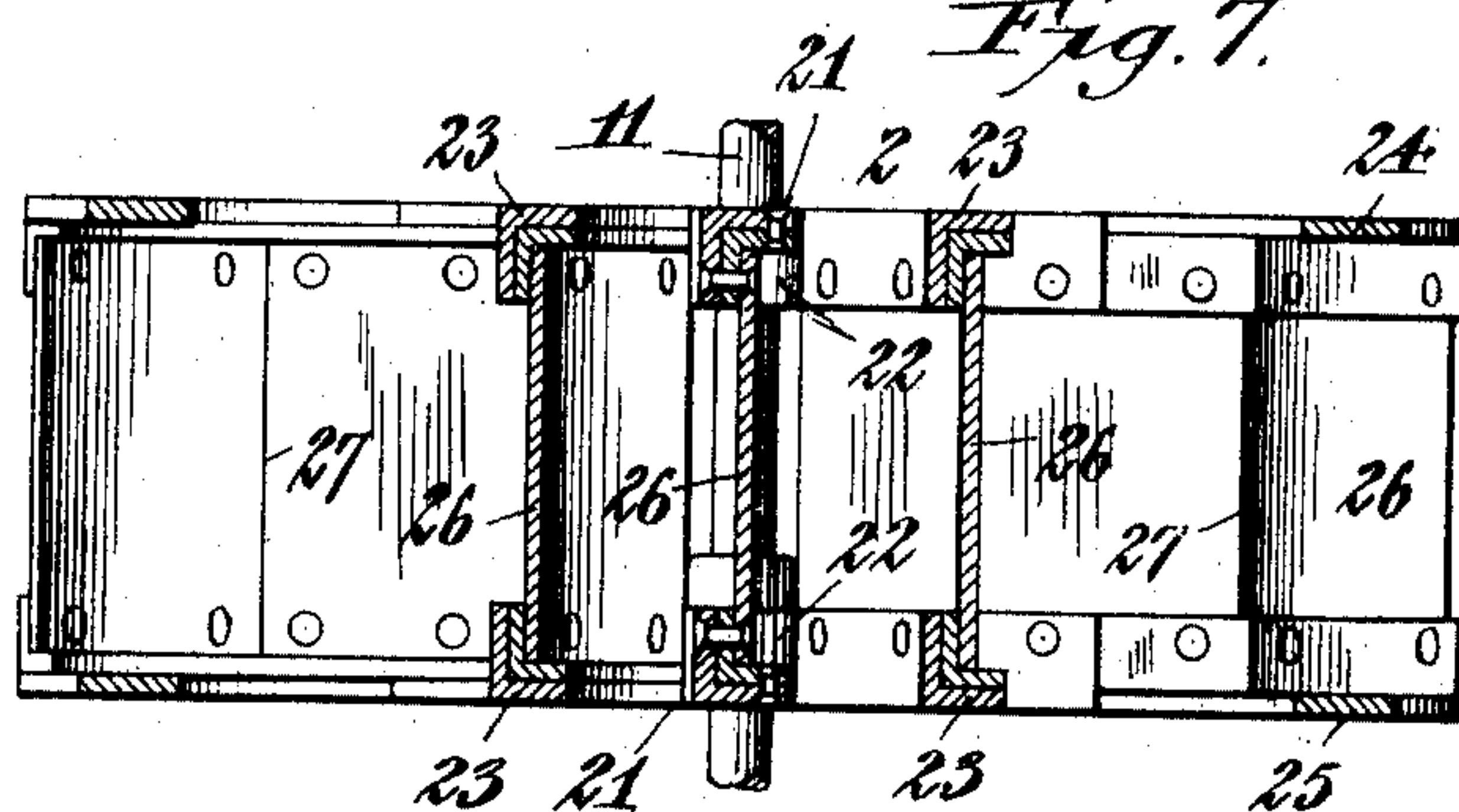


Fig. 7.



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4 SHEETS—SHEET 4.

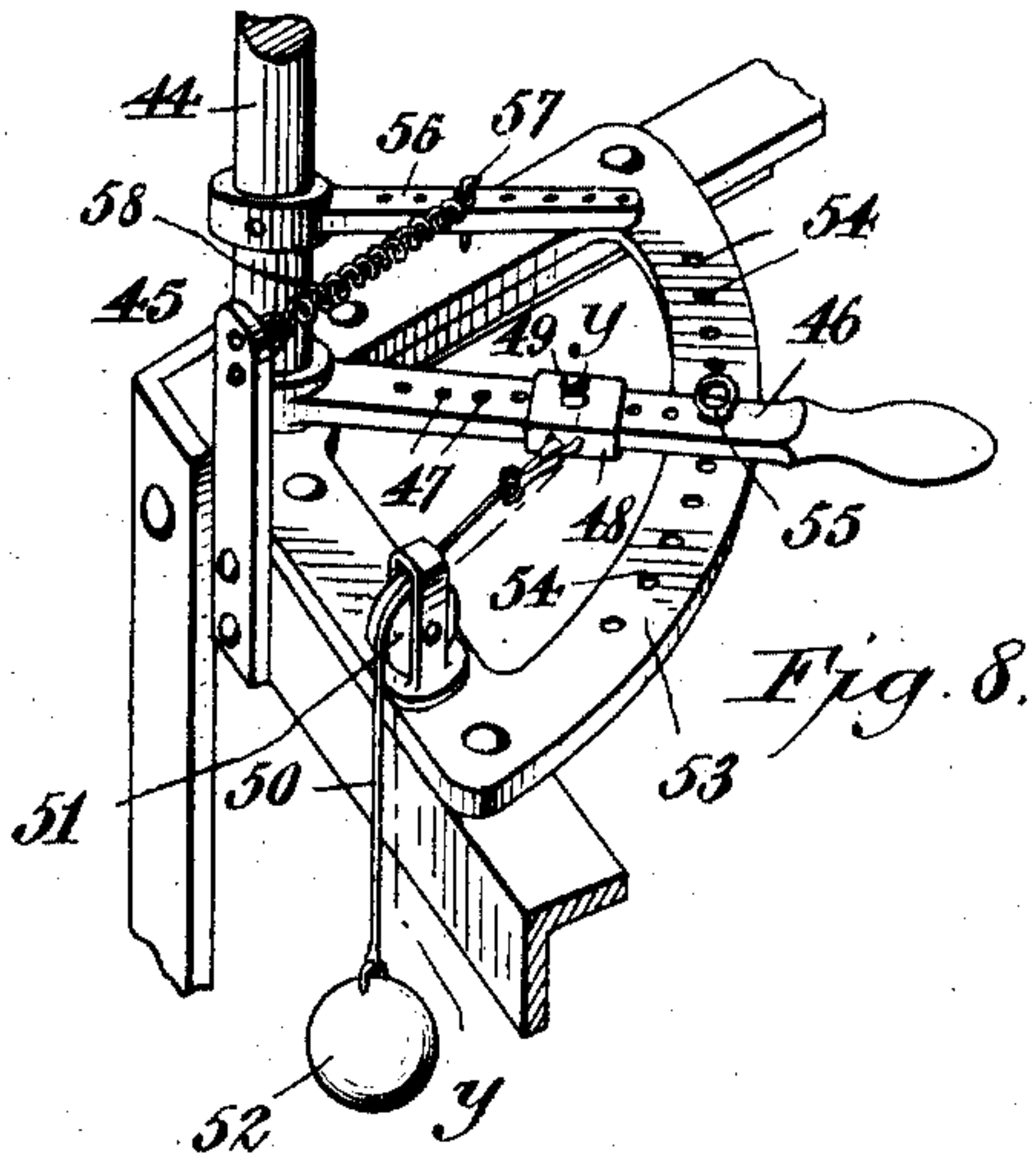


Fig. 8.

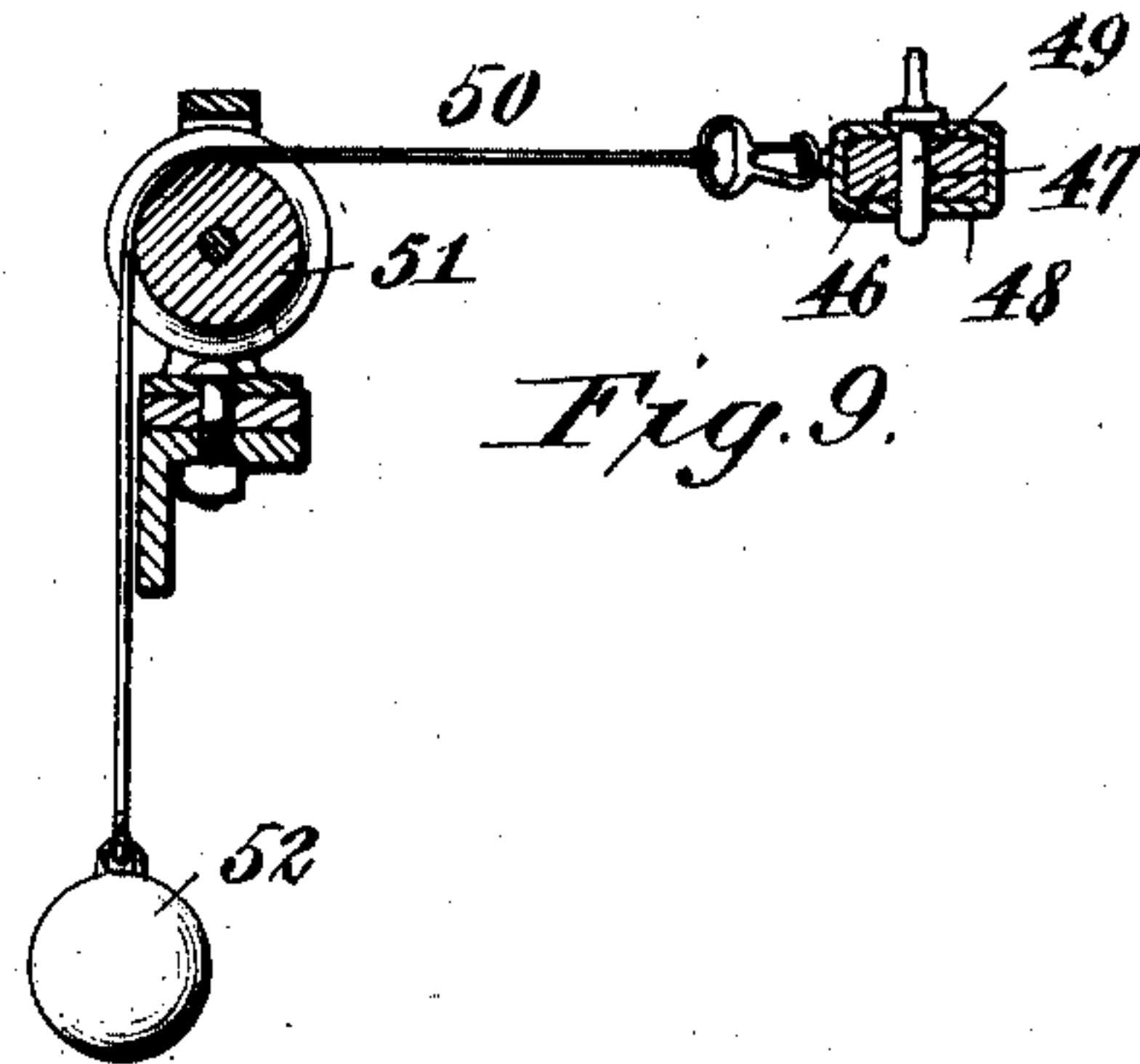


Fig. 9.

Fig. 10.

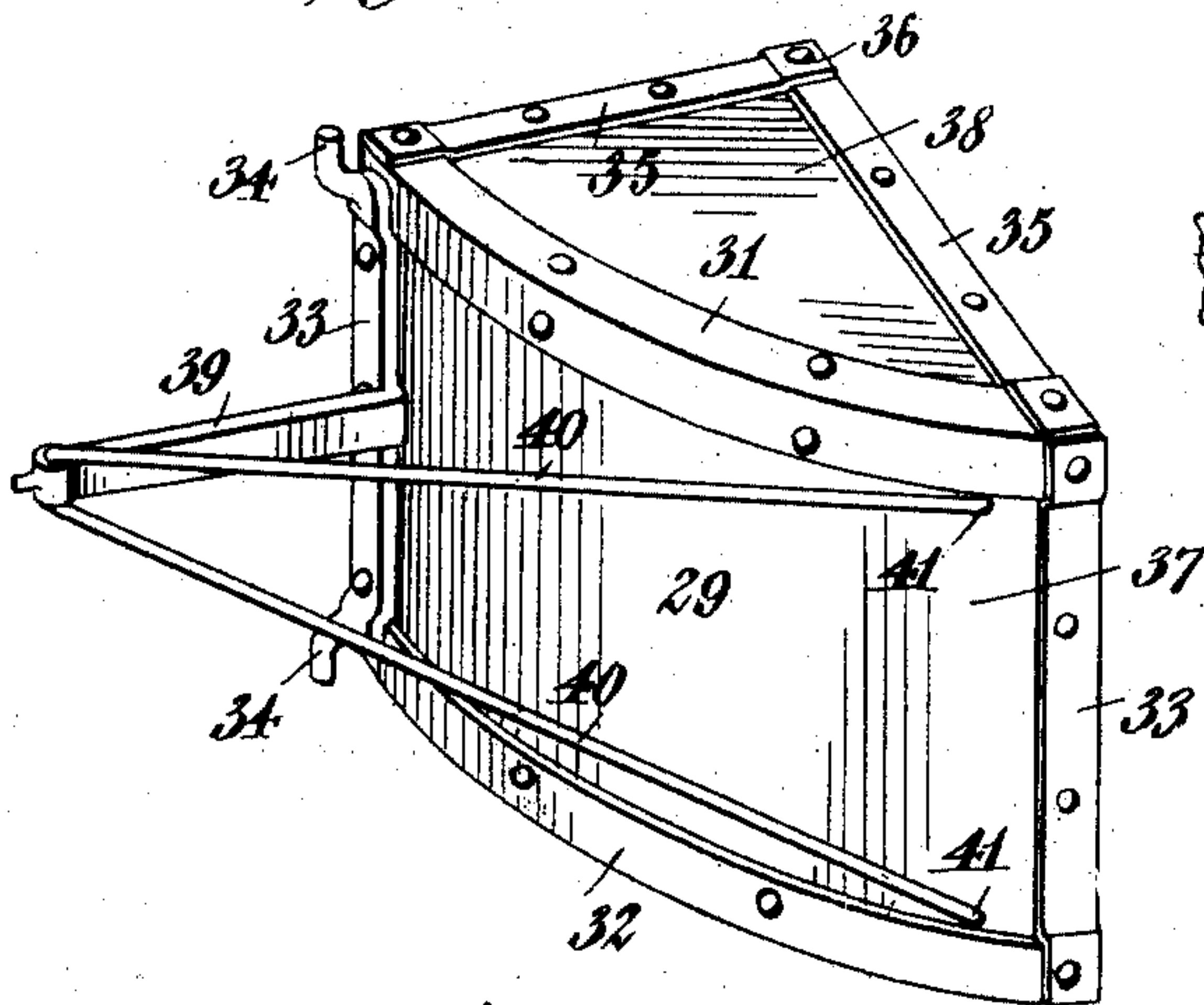


Fig. 12.

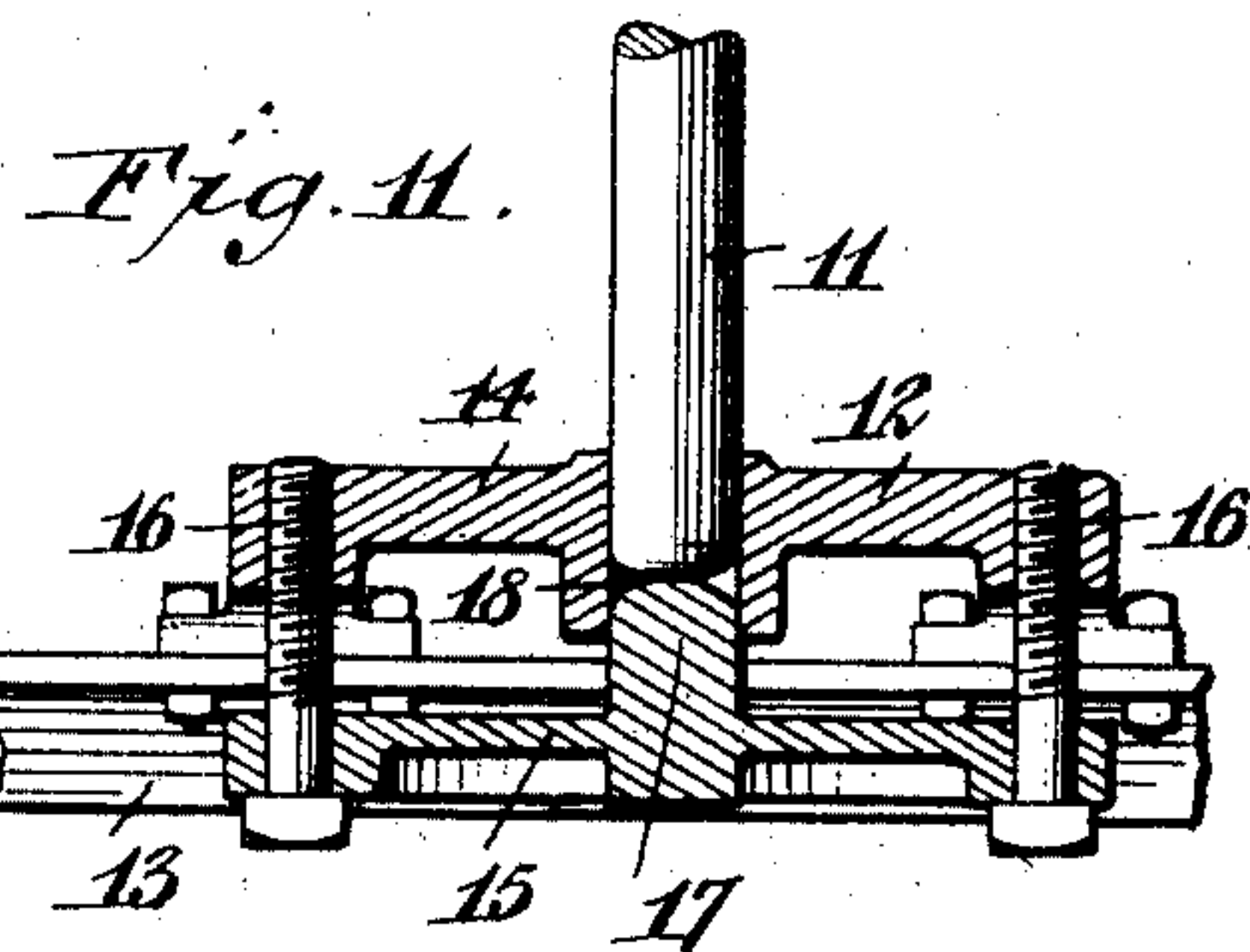
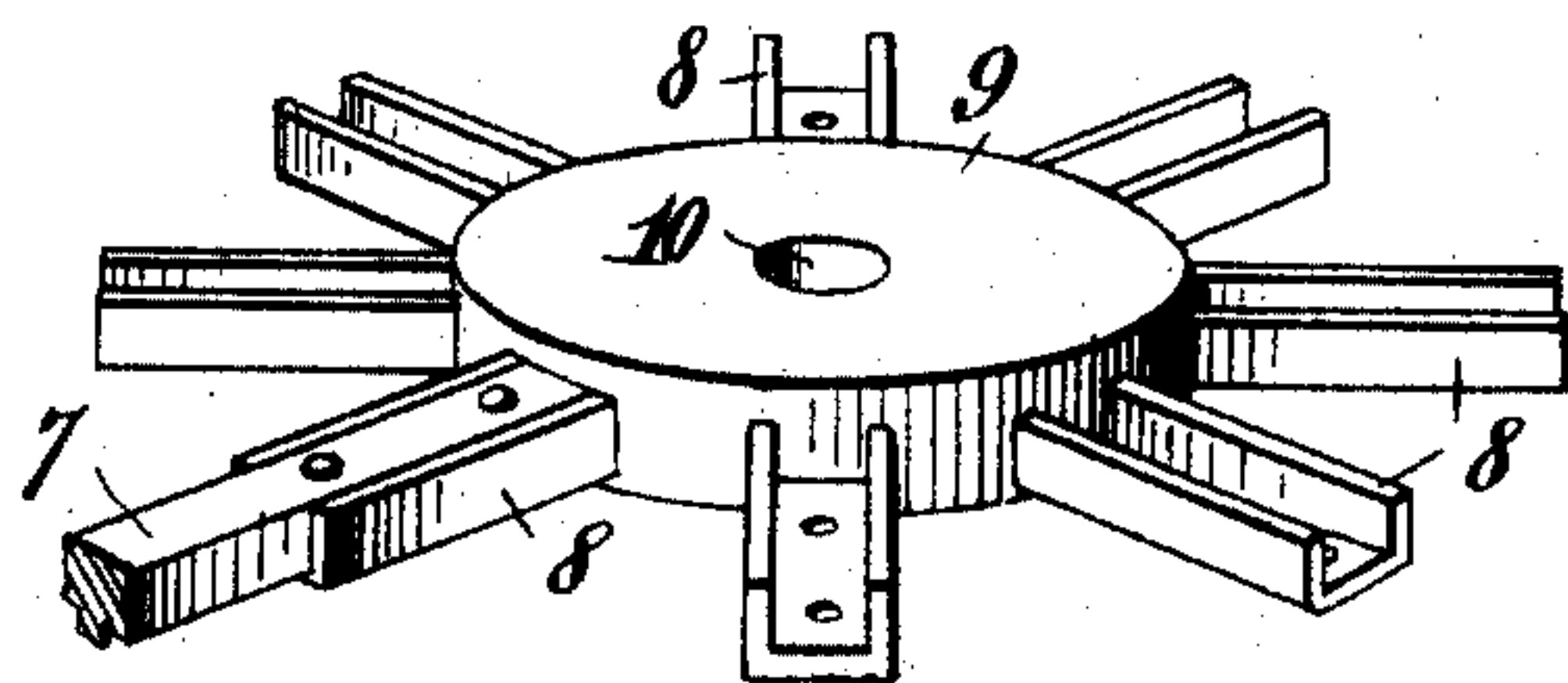


Fig. 11.

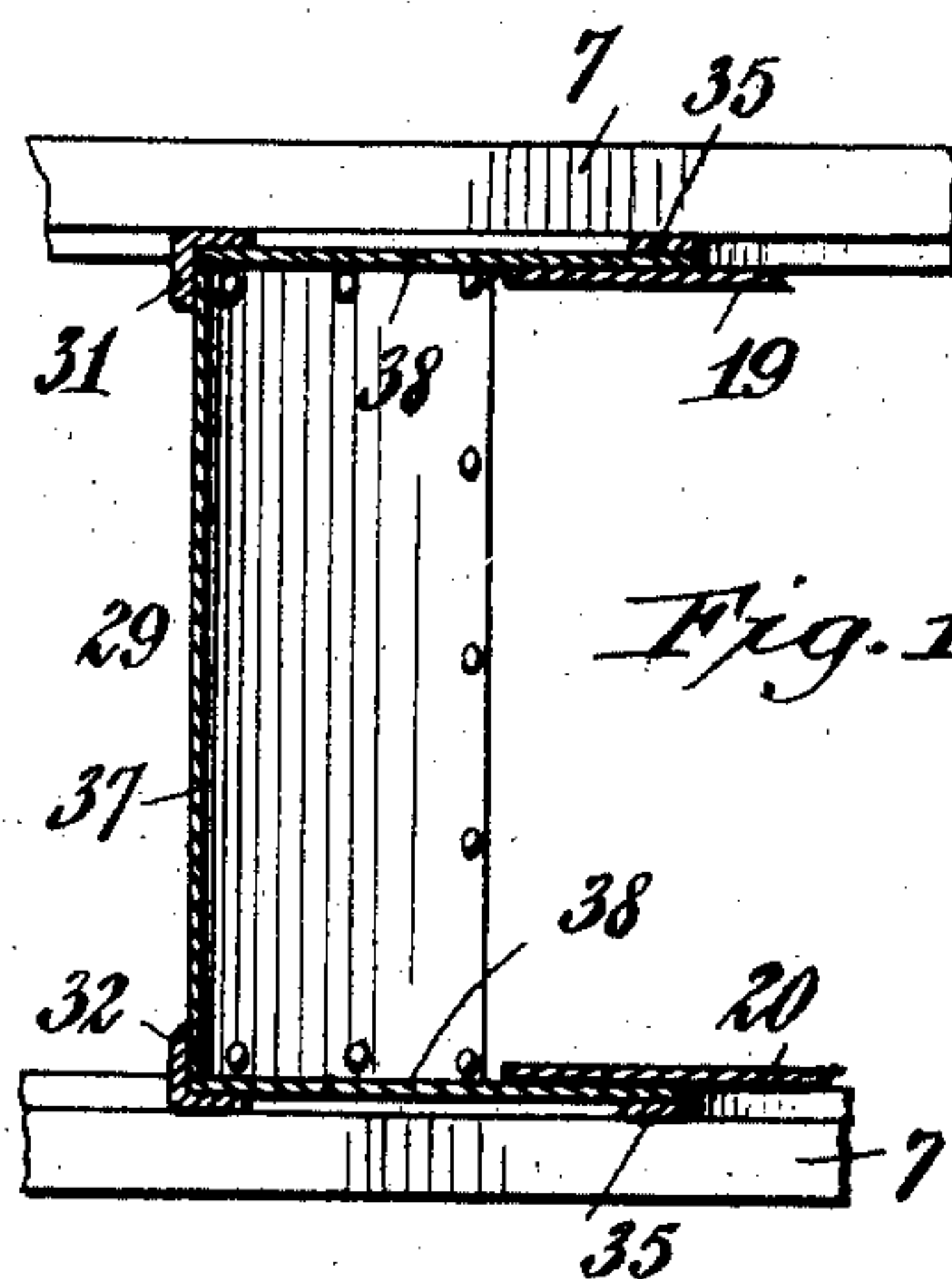


Fig. 13.

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UNITED STATES PATENT OFFICE.

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WINDMILL.

No. 864,789.

Specification of Letters Patent.

Patented Sept. 3, 1907.

Application filed February 27, 1907. Serial No. 359,636.

To all whom it may concern:

Be it known that I, WILLIAM J. KICKBUSH, a citizen of the United States, and a resident of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Windmills, of which the following is a specification.

My invention relates to improvements in windmills; and its objects are, the production of a simple, durable and effective apparatus in which improved means are embodied to regulate and govern the speed of the wind-wheel, and to provide simple and effective means to exclude the wind from the wind-wheel so as to guard against injuries or destruction by high-winds or storms; to provide means for automatically or manually regulating the speed of the wind-wheel; and to otherwise improve on machines of this type now in use.

The invention consists in the construction, arrangement, and combination of parts to be hereinafter described and more particularly pointed out in the appended claims.

In the drawings,—Figure 1 is a central vertical section of a wind mill constructed according to my invention. Fig. 2 is an enlarged plan view of the upper portion of the apparatus with the roof and the platform removed. Fig. 3 is a plan view of the wind-wheel or motor. Fig. 4 is an enlarged horizontal section taken on line *v—v*, Fig. 1. Fig. 5 is an enlarged vertical section taken on line *w—w*, Fig. 4. Fig. 6 is an enlarged detached perspective view of one of the cast-iron spiders to which the vanes of the wind-wheel are secured. Fig. 7 is an enlarged vertical section taken on line *x—x*, Fig. 4. Fig. 8 is a perspective view of the governing-mechanism and a part of the derrick or tower supporting the same. Fig. 9 is an enlarged vertical section taken on line *y—y*, Fig. 8. Fig. 10 is a detached perspective view of one of the wind scoops or closures, shown on an enlarged scale. Fig. 11 is an enlarged vertical section of the step-bearing for the power shaft. Fig. 12 is a perspective view of one of the metallic-heads or spiders to which are secured the radial beams above and below the wind-wheel. Fig. 13 is an enlarged vertical section taken on line *z—z*, Fig. 2.

Referring to the drawings in detail, like numerals of reference refer to like parts in the several figures.

The numeral 1 designates a derrick or tower in the upper end of which is mounted to revolve, a wind-wheel 2. The lower portion of the derrick or tower may be of any desired construction; while the upper portion is provided with a platform 3 having a railing 4, secured to the beams 5 of said platform. Uprights 6 are secured to the beams of said platform and have the outer ends of two sets of radial bars 7 secured thereto; the inner ends of each set of said bars being secured in the channeled arms 8 of a center casting or spider 9, by means of which said ends are rigidly connected. Said

casting is provided with a center bore 10, in which the power shaft 11 of the apparatus is journaled. The lower end of said shaft is stepped in a bearing 12 affixed to cross-bars 13 secured to the derrick or tower; and it comprises a journal-member 14 bolted to said cross-bar, and a supporting-member 15 adjustably held to said journal-member by screw bolts 16 (Fig. 11), having their threaded ends adjustable in the journal-member and their heads supporting the supporting-member. The latter has a cylindrical stud or shank 17 entering the bore 18 in said journal-member, and supporting the power shaft 11. By loosening or drawing-up the screw-bolts 16, the shank is raised or lowered within its receiving bore and consequently raises or lowers the power shaft supported thereon. Secured to the underside of the upper set of radial bars 7 is a circular plate 19, and a similar plate 20 is secured to the upper side of the lower set of radial bars.

The wind-wheel 2 is secured to the power-shaft between plates 19 and 20, and it comprises two spiders 21 consisting of a hub 22 and radial arms 23 of angle formation in cross-section; two series of angle-bars 22^a bent between their ends, as at 23^a, and secured at their inner ends to the radial arms 23; a ring 24 connecting the outer ends of the upper set of angle bars; a ring 25 connecting the outer ends of the lower set of angle bars; and vanes or blades 26 bent at 27 to conform to the angle-bars and secured to the latter. The hub of one of the spiders 21 has a set-screw 28 which impinges against the power shaft and serves to secure the wind-wheel to said shaft. The height of the wind-wheel is somewhat less than the height of the space between plates 19 and 20 above and below said wheel so that the latter is free to revolve, and when the lower end of the shaft becomes worn, the supporting-member of bearing 12 is adjusted so that the wind-wheel will not bear against plate 20 and retard the action of said wheel.

Wind-scoops or gates 29 serve in conjunction with the plates 19 and 20, to entirely inclose the wind-wheel, so as to prevent the wind or air currents coming in contact therewith. These gates or scoops are of an improved form and construction, and are pivotally secured to the radial bars 7, as at 30; a circular series of scoops being provided to form a circumferential wall whereby the wind-wheel is inclosed at the sides.

Each wind-scoop or gate comprises a metallic frame formed of an upper curved angle-bar 31, a similar lower curved angle-bar 32, vertical bars 33 connecting the ends of said curved bars, one of which has trunnions 34 at its ends, and horizontal converging bars 35 secured to the ends of said curved bars and meeting at 36 where they are riveted together. Said trunnions serve as the pivots for the gates and enter openings in the radial bars 7. Secured to the vertical webs of said scoop curved angle bars and to the vertical bars 33 of each scoop is a curved

plate 37 forming the side of the wind-scoop or gate and secured to the horizontal webs of said curved bars and to the horizontal converging bars 35 are triangular plates 38 which form the top and bottom of the scoop. Extending outward from the curved wall of each scoop at its pivoted end is an arm 39, to the free end of which is secured diverging inwardly directed brace rods 40 secured to the scoop at its outer or free end, as at 41. By means of this construction, light and durable scoops are provided which have their curved walls braced to guard against buckling or destruction by high winds. The tops of the several scoops lie over the upper plate 19 of the wheel-housing, while the bottom thereof lie beneath the lower plate 20. When the scoops are opened, the tops and bottoms of the same practically form continuations of plates 19 and 20, and with the aid of the latter and the curved outer walls of the scoops receive and confine the wind currents to direct them to the wind-wheel. The curved outer walls also serve to deflect the wind currents when they strike the convex outer sides thereof, thus reducing to a minimum the tendency to close the wind scoops, and also tending to direct the air-currents against the concaved inner sides of the adjacent scoop whereby they are deflected against the wind-wheel. The wind scoops are connected by a chain 42 or other flexible device so that they move in unison, said chain being secured to the outer ends of the arms 39 and having its ends passed over a pulley 43 in opposite directions and secured thereto. Said pulley is affixed to a governor-shaft 44 arranged vertically and suitably journaled in the tower or derrick with its lower end terminating at a point within convenient reach from the grounds.

A suitable governing device 45 is applied to the lower end of shaft 44, which may be manually actuated and set, or arranged for automatic action, as desired. A lever 46 is secured to said shaft and has a series of apertures 47 arranged lengthwise thereon and a slide-block 48 provided with a lock-pin 49 adapted to enter any one of said apertures to lock said slide-block at the desired point on said lever.

A rope, chain, or other flexible device 50 has one end detachably connected to said slide-block and passes over a pulley 51 swiveled in the frame of the derrick; the other end of said chain having a weight 52 secured thereto for the purpose of drawing the lever 46 toward the swiveled pulley. A sector 53 over which said lever moves is secured to the derrick and has numerous apertures 54 into any one of which a lock-pin 55 passing through the outermost aperture in lever 46 may be thrust. If desired the lock-pin 55 may be placed in any one of the apertures of the sector between said lever and the swiveled pulley without being passed through said lever, and when so used, it serves as a stop to limit the movement of said lever. Manifestly, the movement of said lever causes a corresponding rotation of the shaft 44, which in turn, through the action of the pulley 43 and chain 42, causes the wind-scoops to be opened to any extent desired, or entirely closed. A second lever 56 is affixed to shaft 44, and like lever 46, it also has a series of apertures arranged lengthwise therein, in any one of which a pin or stud 57 is placed to which is attached one end of a retractile spring 58 whose opposite end is attached to a portion of the frame work constituting the tower or derrick. By moving

the pin or stud 57 toward or from shaft 44, the force of the spring power to be overcome is increased or diminished, as may be found necessary.

The wind-scoops may be closed and retained in a closed position, by moving lever 46 to the extreme right of its range of movement, and then placing pin 55 in the last aperture of the series in the sector.

In order to obtain a steady motion of the power-shaft, the governing-device may be set for automatic action. This may be done, under ordinary conditions, by the use of either the spring 58 or the weight 52; but in such cases, pin 55 is placed into an aperture 54 between lever 46 and pulley 51.

As clearly shown in Fig. 4, a greater number of the scoops have their outer convex sides exposed to the wind currents than have their inner concave sides exposed, resulting in a tendency to close the scoops. To avoid such action, pin 55 is placed in the desired opening on sector 53 so that the scoops cannot close beyond the desired extent, depending on the velocity of the wind. In high winds the extent of opening is comparatively small, and under normal conditions the scoops may be opened to their full extent.

For some purposes, such as cutting feed, or pumping water, no steady motion is required, and the wind scoops may be opened to the extent thought proper, and lever 46 locked to the sector. For grinding feed, and many other purposes, a steady motion is very desirable, and in such cases, lever 46 is permitted to oscillate on the sector within certain limits, depending on the force of the wind against the wind-wheel; the extent of movement of said lever governing the extent to which the wind-scoops are opened, and consequently governing the wind force against the wind-wheel. The automatic governing of the wind-scoops is very desirable in variable winds, the scoops closing in proportion to the force of the wind thereagainst; the spring 58 and weight 52 serving to counteract the tendency to close the scoops.

I have found that, in brisk winds, either the spring or the weight 52 will be sufficient to counteract the tendency of the wind-currents to close the wind-scoops, and a considerable variation in degree of resistance can be effected by changing the point of attachment of said spring to lever 56; or the rope of the weight 52 to lever 46, but when the apparatus is to be governed automatically during high winds, both the spring and the weight are found to be necessary to resist closing of the scoops.

The top of the tower or derrick is covered with a roof so that the top-plate of the wind-wheel housing is protected against snow and sleet. This assures free action of the wind-scoops, as snow or sleet cannot lodge on the top-plate of said housing and act as an obstruction to the top of the scoops sliding thereon.

Having thus described my invention, what I claim is,—

1. The combination with a derrick, a shaft revoluble therein, and a wind-wheel secured to said shaft, of plates above and below said wind-wheel, wind-scoops arranged around said derrick and pivotally secured at one of their ends, each scoop comprising a curved side-plate and flat top and bottom plates lying respectively above and below the plates arranged above and below the wind-wheel, and means to cause said wind-scoops to move in unison.

2. In a windmill, wind-scoops each comprising an upper

angular curved bar, a lower angular curved bar, vertical bars connecting said curved bars at their ends, converging bars at the top and bottom connected together and having their separated ends connected to said curved bars, a curved plate secured to said curved bars, and flat plates secured to said converging bars.

3. In a windmill, wind-scoops, each comprising a curved side, a flat top and a flat bottom, a bar secured to one end of said curved side and provided with trunnions serving as pivots, an outstanding arm at said end of the curved side, and brace-rods connected to the outer end of said arm and diverging toward the opposite end of said curved side and having connection therewith.

4. In a windmill, a tower comprising uprights, two spiders having channeled radial arms, two series of radial bars secured at their inner ends in said channeled arms and connected at their outer ends to said uprights, combined with a shaft rotatable in said spiders, and a wind-wheel affixed to said shaft between the two series of radial arms.

5. In a windmill, a tower comprising uprights, two spiders having channeled radial arms, two series of radial bars secured at their inner ends in said channeled arms and connected at their outer ends to said uprights, combined with a shaft rotatable in said spiders, a wind-wheel affixed to said shaft between the two series of radial arms, plates secured to the series of radial bars above and below the windmill, and wind-scoops around the wind-wheel and pivotally attached between the two series of radial bars.

6. The combination with a derrick, of a shaft rotatable in said derrick, a wind-wheel secured to said shaft, and a step bearing comprising a journal member secured to the derrick and having an opening to receive the lower end of said shaft, and a supporting-member adjustably held to the journal-member and having a stud entering the opening in said journal-member, said stud serving to support said shaft.

7. The combination with a derrick, of a shaft mounted to revolve in said derrick, a wind-wheel affixed to said shaft, wind-scoops pivotally affixed around said wind-wheel, a flexible connection for said wind-scoops to cause them to move in unison, a governor shaft to which said flexible connection is operatively connected, a lever secured to said governor-shaft, and a spring having one end connected to a fixed point and its other end connected to said lever.

8. The combination with a derrick, of a shaft mounted to revolve in said derrick, a wind-wheel affixed to said shaft, wind-scoops pivotally affixed around said wind-wheel, a flexible connection for said wind-scoops to cause them to move in unison, a governor-shaft to which said flexible connection is operatively connected, a lever secured to said governor-shaft and having a series of openings therein, a pin adapted to be thrust into any one of said openings, and a retractile spring having one end connected to a fixed point and its other end connected to said lever.

9. The combination with a derrick, of a shaft mounted to revolve in said derrick, a wind-wheel affixed to said shaft, wind-scoops pivotally affixed around said wind-wheel, a flexible connection for said wind-scoops to cause them to move in unison, a governor-shaft to which said flexible connection is operatively connected a lever secured to said governor-shaft, and a spring adjustably attached at one end to said lever and having its other end connected to a fixed point.

10. The combination with a derrick, of a shaft mounted to revolve in said derrick, a wind-wheel affixed to said shaft, wind-scoops pivotally affixed around said wind-wheel, a flexible connection for said wind-scoops to cause them to move in unison, a governor-shaft to which said flexible connection is operatively connected, a lever secured to said governor-shaft, a weight, a flexible device connecting said weight with said lever, and a pulley over which said flexible device is passed.

11. The combination with a derrick, of a shaft mounted to revolve in said derrick, a wind-wheel affixed to said shaft, wind-scoops pivotally affixed around said wind-wheel, a flexible connection for said wind-scoops to cause them to move in unison, a governor-shaft to which said flexible connection is operatively connected, a lever secured to said governor-shaft, a weight, a chain having one end adjustably attached to said lever and its other end secured to said weight, and a pulley over which said chain is passed.

12. The combination with a derrick, of a shaft mounted to revolve in said derrick, a wind-wheel affixed to said shaft, wind-scoops pivotally affixed around said wind-wheel, a flexible connection for said wind-scoops to cause them to move in unison, a governor-shaft to which said flexible connection is operatively connected, a lever secured to said governor-shaft, a slide-block on said lever, a chain detachably connected at one end to said slide-block, a pulley over which said chain is passed, and a weight secured to the other end of said chain.

13. The combination with a derrick, of a shaft mounted to revolve in said derrick, a wind-wheel affixed to said shaft, wind-scoops pivotally affixed around said wind-wheel a flexible connection for said wind-scoops to cause them to move in unison, a governor-shaft to which said flexible connection is operatively connected, a lever secured to said governor-shaft, a spring attached at one end to said lever and having its other end connected to a fixed point, a second lever secured to said shaft, a chain secured at one end to said lever, a pulley over which said chain is passed, and a weight secured to the other end of said chain.

In testimony whereof I, have affixed my signature in the presence of two subscribing witnesses.

WILLIAM J. KICKBUSH.

Witnesses:

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CHRIST FEINLE.