

No. 704,724.

Patented July 15, 1902.

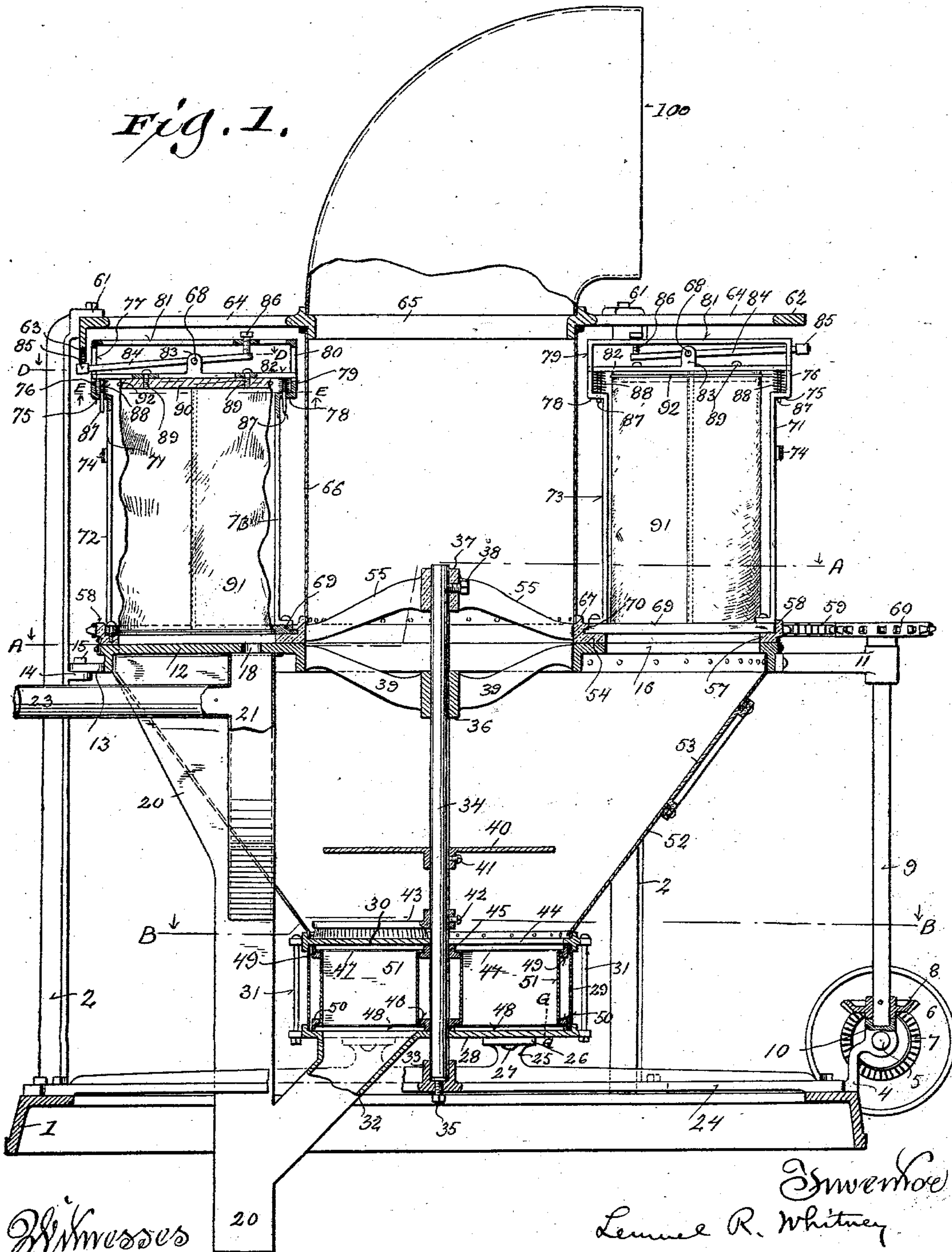
L. R. WHITNEY.
DUST COLLECTOR.

(Application filed Oct. 16, 1901.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



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3. Sheets—Sheet 2.

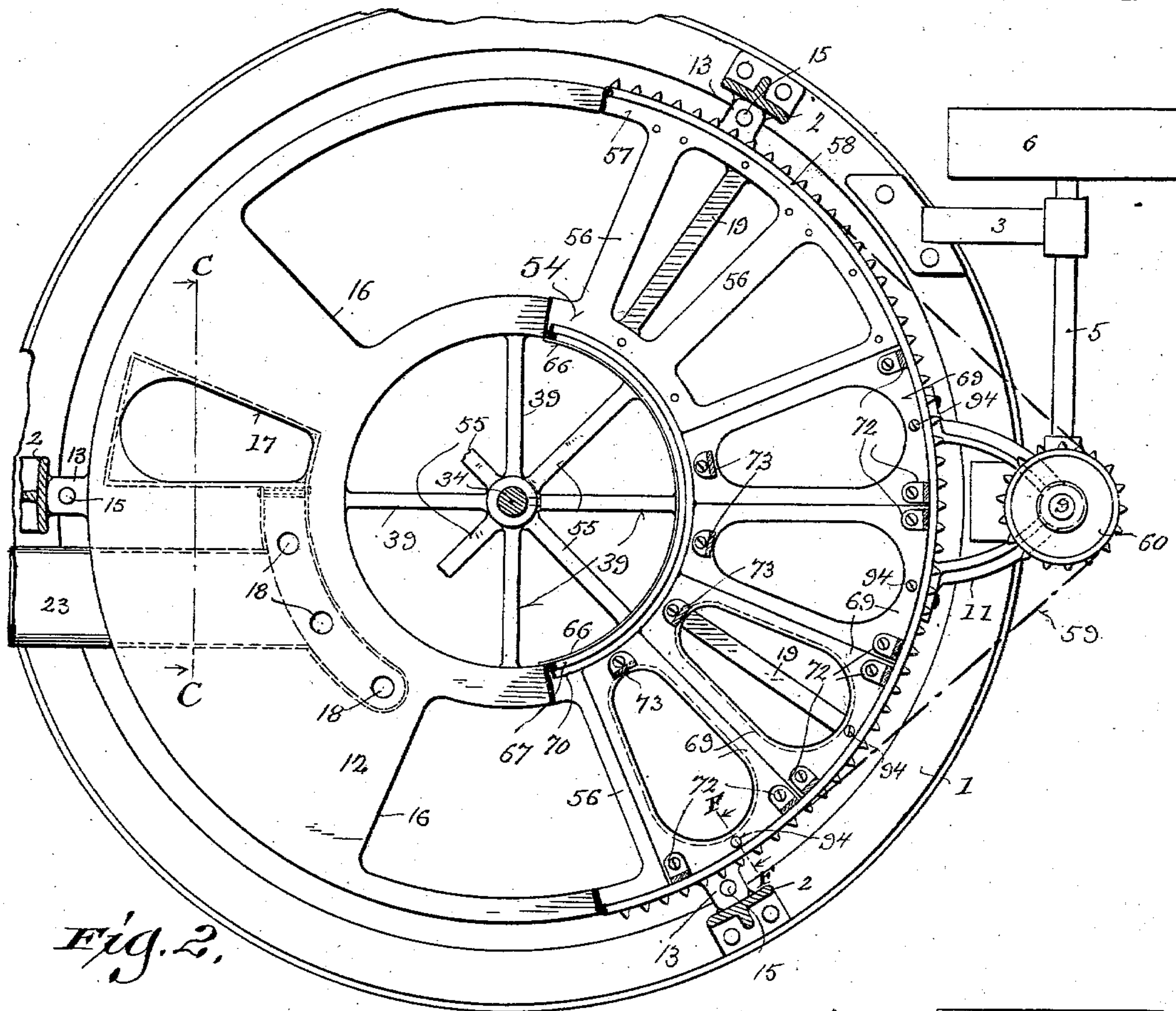


Fig. 2.

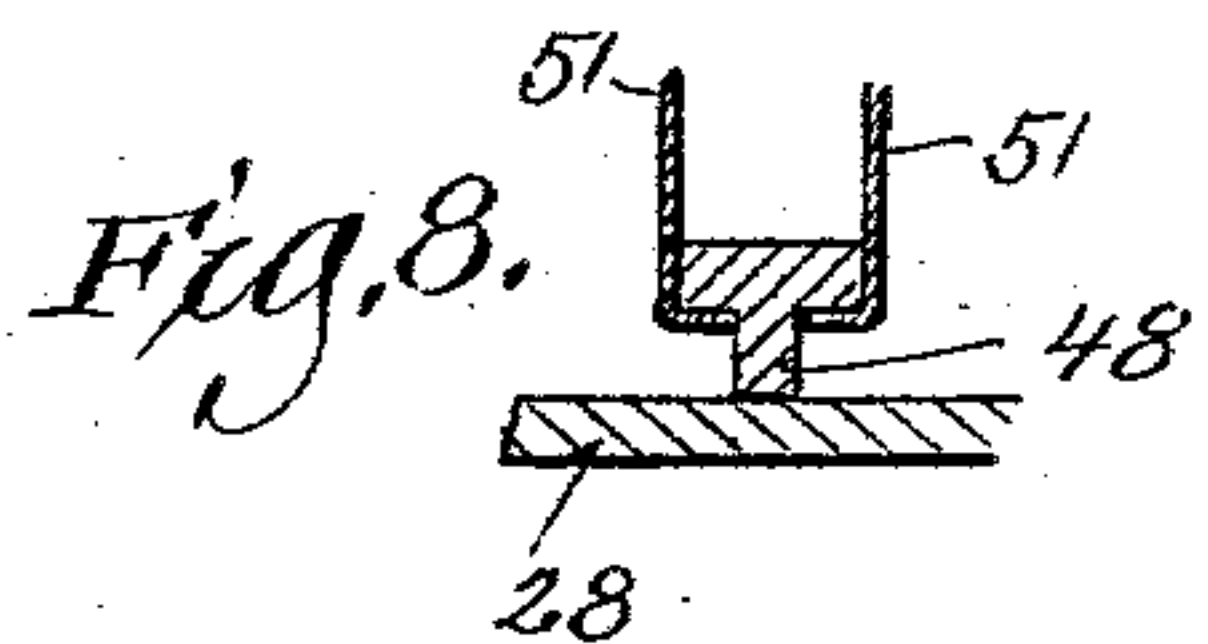
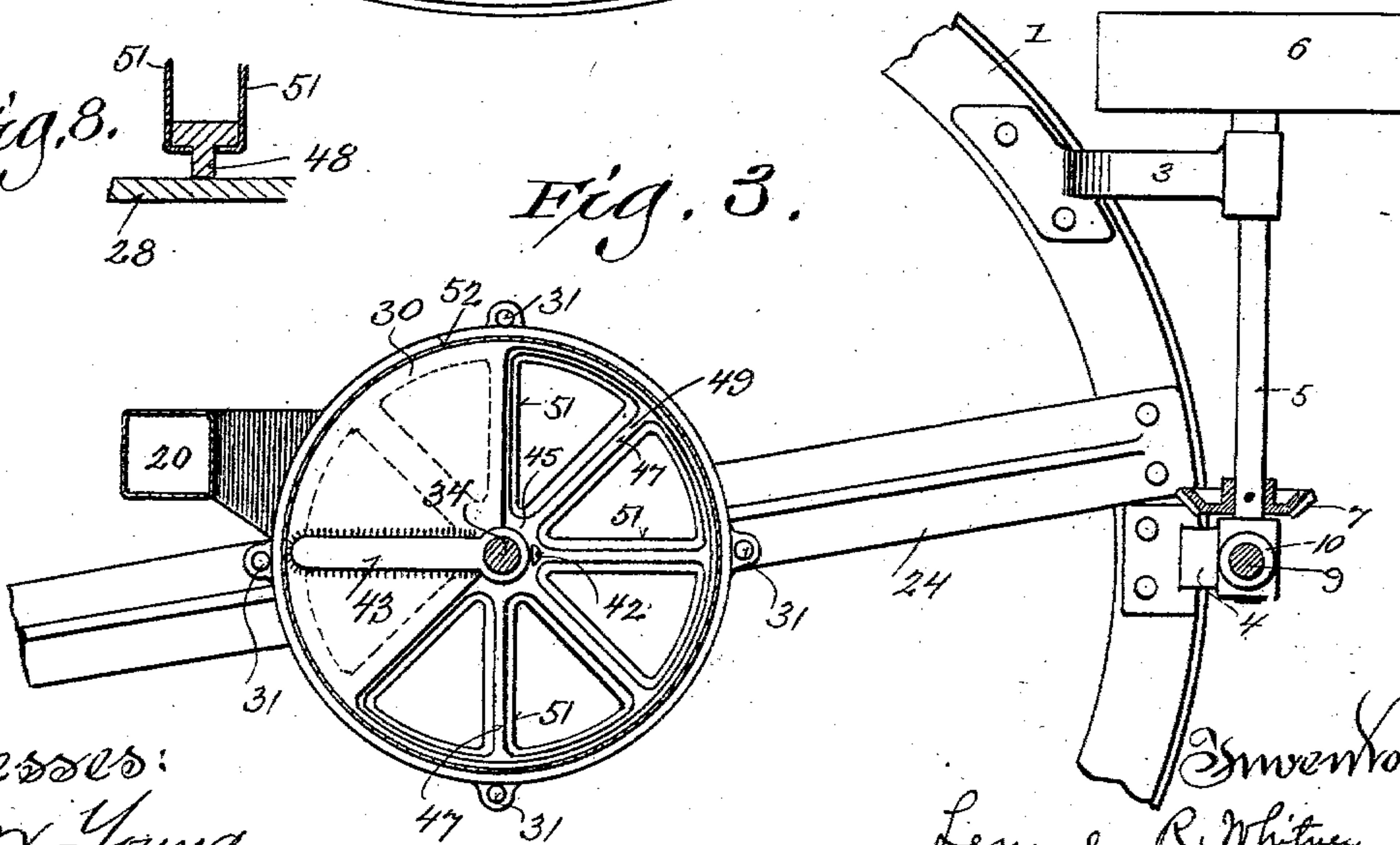


Fig. 3.



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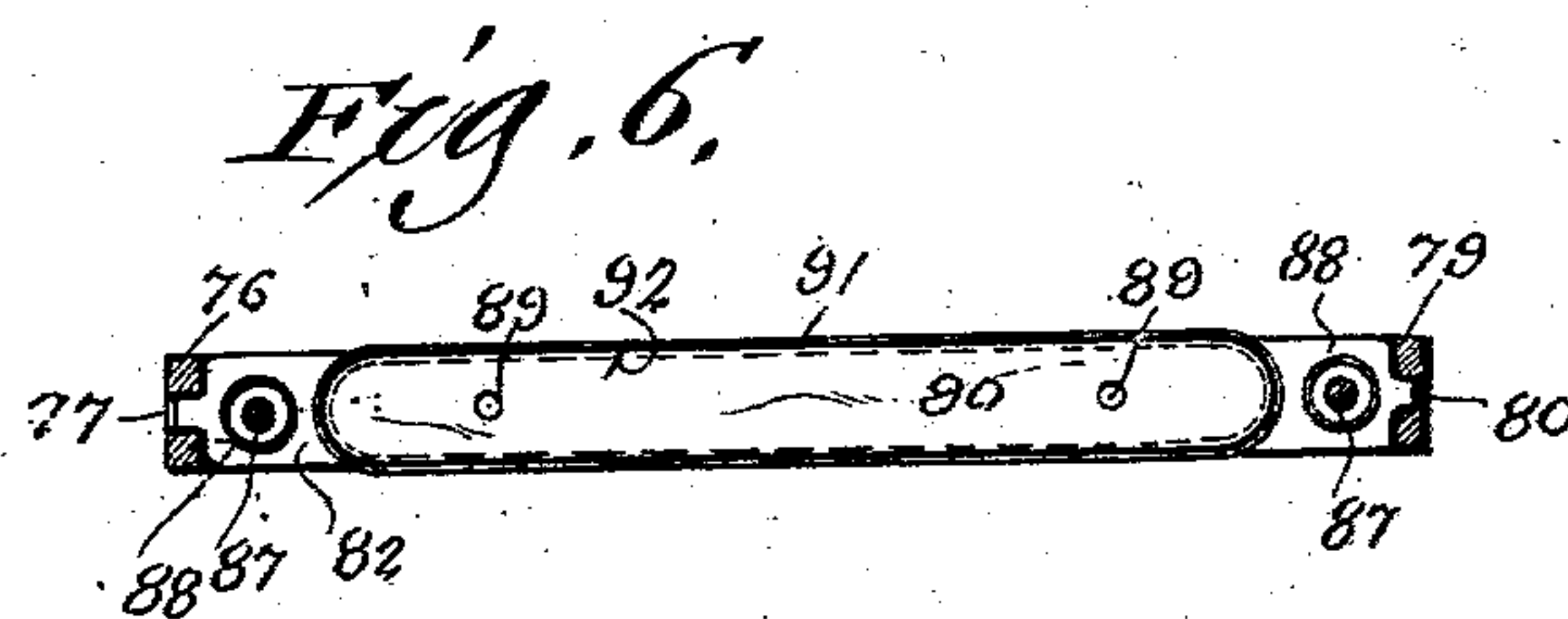
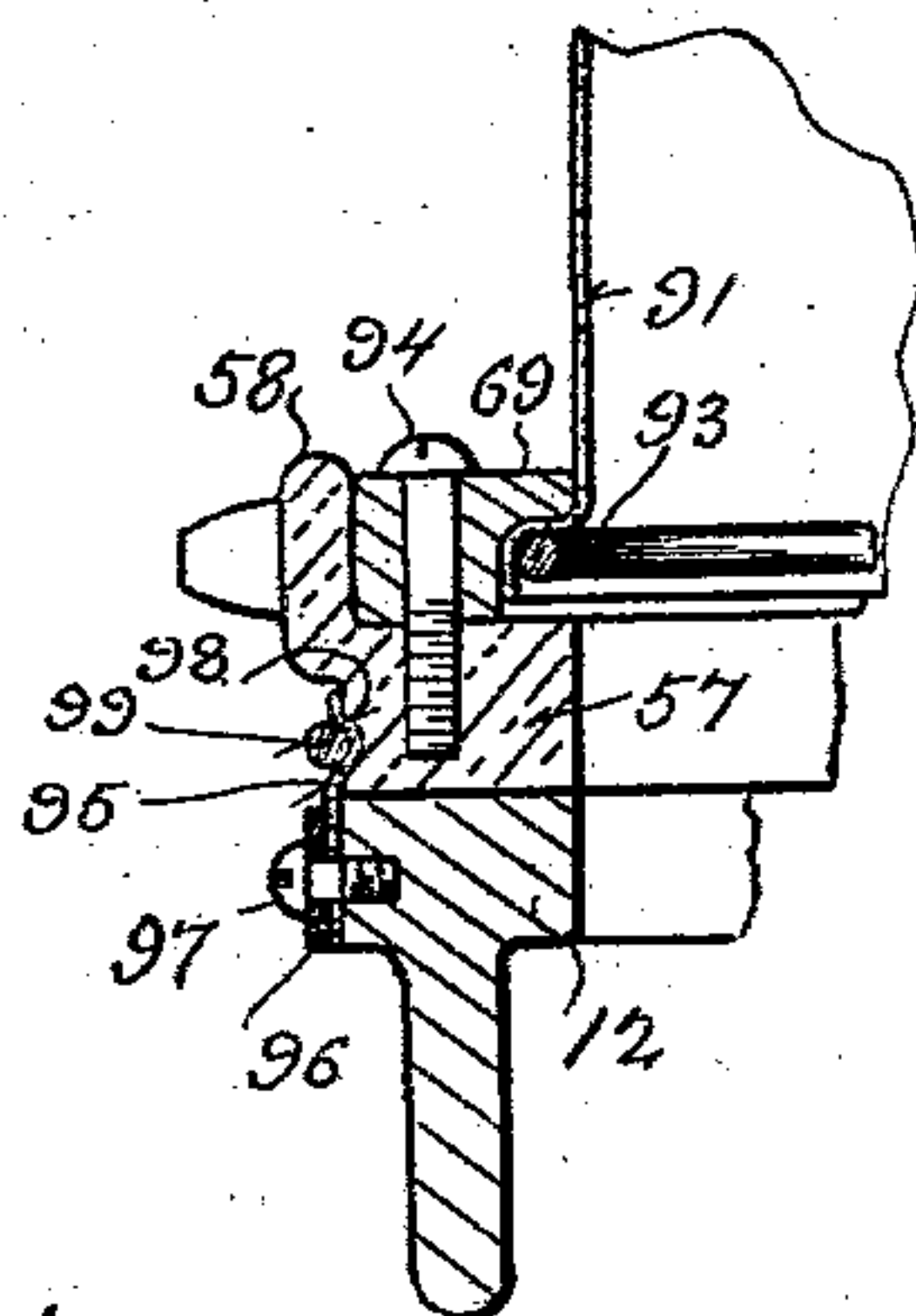
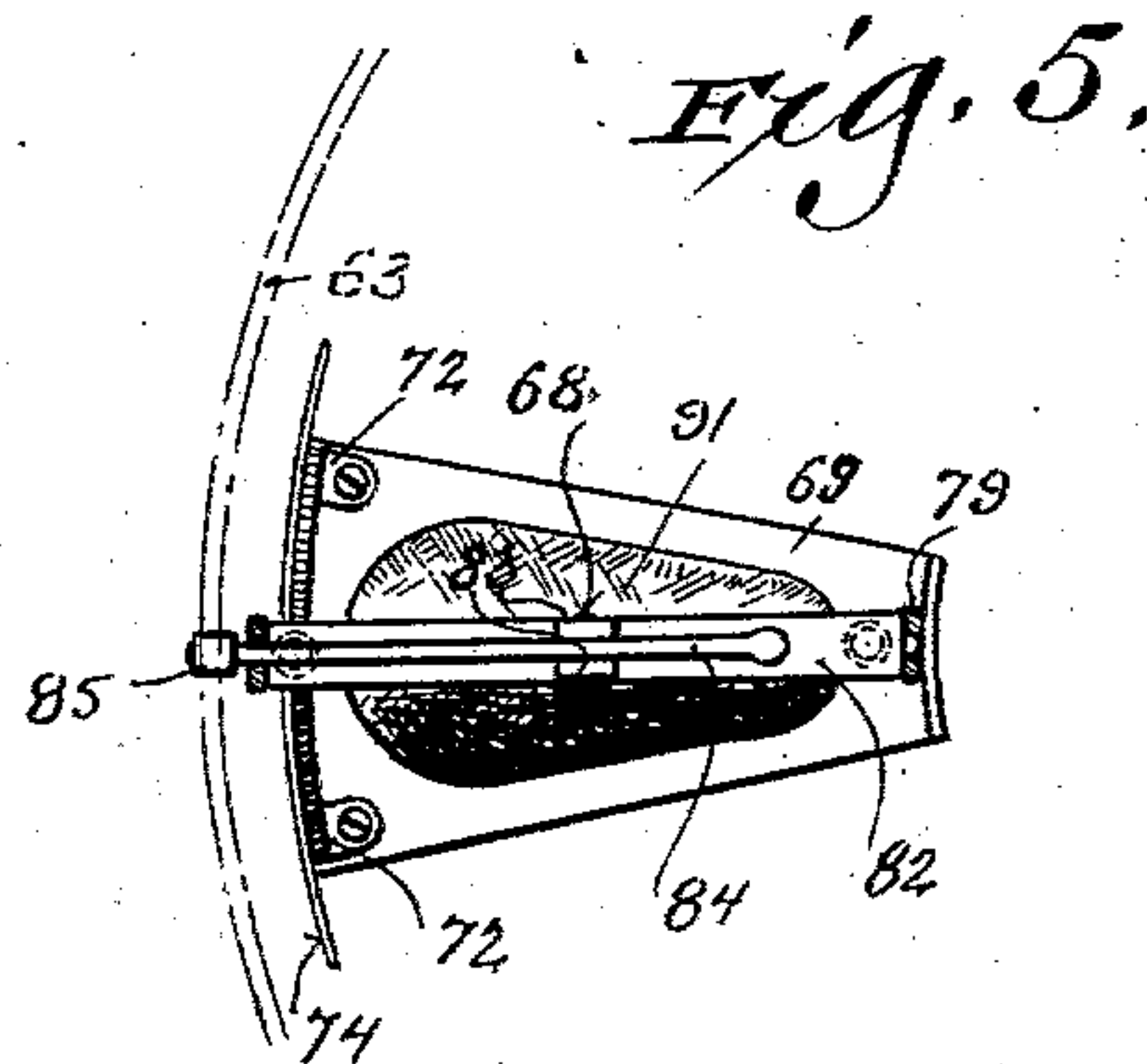
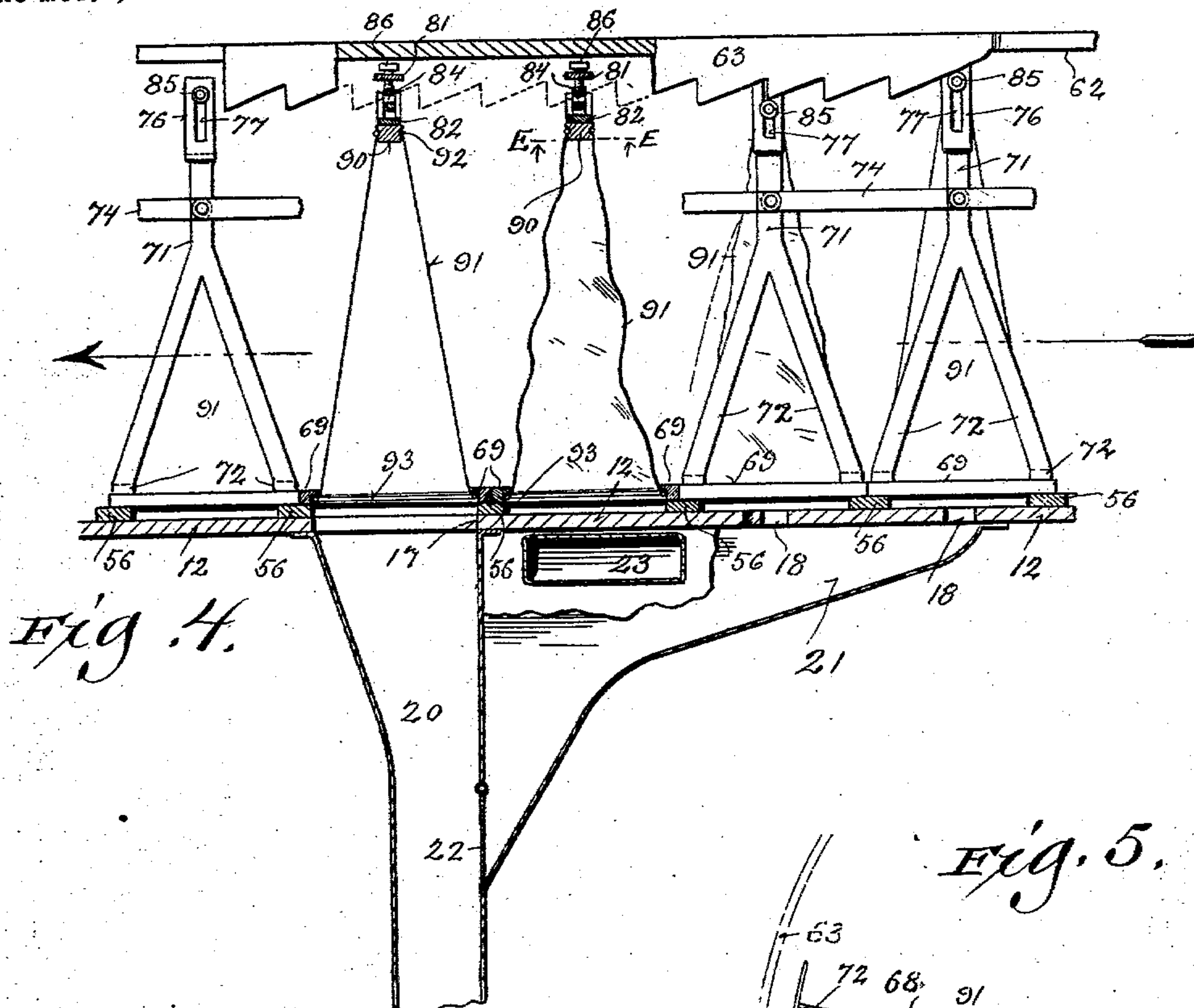
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

LEMUEL R. WHITNEY, OF MILWAUKEE, WISCONSIN.

DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 704,724, dated July 15, 1902.

Application filed October 16, 1901. Serial No. 78,771. (No model.)

To all whom it may concern:

Be it known that I, LEMUEL R. WHITNEY, a citizen of the United States, and a resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Dust-Collectors; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention has especial reference to dust-collectors designed for use in flour-mills; and it consists in certain peculiarities of construction and combination of parts, as will be fully set forth hereinafter in connection with the accompanying drawings and subsequently claimed.

In the said drawings, Figure 1 is a vertical central sectional view through a device embodying my present invention with portions broken away to better illustrate certain details of construction. Figs. 2 and 3 are horizontal sectional views taken on the planes indicated by the lines A A and B B, respectively, in Fig. 1. Fig. 4 is a detail sectional view taken on the plane indicated by the line C C in Fig. 2. Fig. 5 is a detail sectional view on the line D D of Fig. 1 looking downward. Fig. 6 is a detail sectional view on the line E E in Figs. 1 and 4, drawn to an enlarged scale, looking upward. Fig. 7 is a detail sectional view illustrating the joint between the upper revolving plate and adjacent lower stationary plate, taken at the point indicated by the line F F in Fig. 2 and drawn to a greatly-enlarged scale; and Fig. 8 is a detail sectional view on the line G G in Fig. 1.

Referring to the drawings, the numeral 1 represents the base or platform of the dust-collector, and 2 2 designate the standards or uprights secured to and rising therefrom.

3 4 represent bracket-arms secured to and projecting upwardly and outwardly from the base 1, said arms terminating in transverse bearings for the reception and support of the horizontal shaft 5, carrying the power-pulley 6 at its outer end for the reception of belting (not shown) from any convenient source of power. The shaft 5 has fast thereon a gear-wheel 7, which meshes with a like wheel 8, fast on a vertical shaft 9, whose lower end is stepped in a vertical bearing 10 on the upper end of the arm 4 just above the transverse bearing for the shaft 5, the upper end of said

vertical shaft 9 being supported by a bearing 11, projecting from the annular flange of a stationary plate 12, which flange is provided with a number of outwardly-projecting perforated lugs 13 13, which rest upon lugs 14 14, that project inwardly from the standards or uprights 2 2 and have vertical pins 15 15 for engagement with the perforations in the plate-lugs 13 13, just named, whereby the said plate 12 is kept stationary. The plate 12 is an annular plate or flat ring formed with circumferential openings 16 16, which extend around about two-thirds of the plate and which are continuous, save for narrow strips 19 19, left to strengthen the plate, the same being a solid plate for the balance, except for one large opening 17 and a series of small openings 18 18 18. Just below the opening 17 is a discharge-pipe 20, leading downward to a convenient point of delivery for the dust to be collected by the machine, as hereinafter explained, and beneath the small holes 18 18 there is a closed chamber 21, whose wall is joined to the discharge-pipe 20, the adjacent wall of the pipe 20 being formed with a swing-valve 22, as shown in Fig. 4, so as to close or open communication between the said pipe 20 and chamber 21, and a suction-pipe 23 leads from the said closed chamber 21, all as hereinafter set forth.

Extending across and secured to the base or platform 1 is a bar 24, said cross-bar having an upper web or flange from which rise arms 25, terminating in flat supporting-plates 26, to which is bolted, as shown at 27, the lower plate 28 of a stationary drum or casing having an upper plate 30, the said upper and lower plates being formed with projecting perforated ears, whereby they are held together against the edges of the intervening vertically-disposed annular band 29 by bolts 31 and nuts, as best shown in Fig. 1. The said lower plate 28 of the stationary drum or casing is formed with an opening therein, from which a branch discharge-pipe 32 extends to and communicates with the hereinbefore-named main discharge-pipe 20.

The described cross-bar 24 is centrally provided with a vertical bearing 33 on its upper side for the reception of the lower end of a vertical spindle 34, rendered adjustable by screw 35, said spindle passing through the

described stationary drum or casing and through the hub of a revolving drum within the said stationary drum or casing, as hereinafter described, and up through a central bearing 36 of the stationary plate 12 and through the hub 37 of an upper revolving annular plate, hereinafter described, the spindle 34 being secured to said hub 37 by set-screw 38, the bearing 36 being supported by arms 39 39 from the inner periphery of the annular stationary plate 12, so as to merely form a guide for the spindle 34, which revolves freely within said bearing 36. Below this point and above the described stationary drum or casing the spindle 34 carries a circular deflecting-disk 40, whose hub is secured to said spindle by set-screw 41, and below the disk there is secured to said spindle by set-screw 42 a brush 43, which thus revolves with the spindle 34 and sweeps the top of the upper plate 30 of the stationary drum or casing, said plate 30 being cut away for something more than half its area to form the opening 44, through which the dust is swept by said brush 43 from the solid portion of the said plate 30 into the revolving drum below, now to be described. The said revolving drum is formed of upper and lower wheels having hubs 45 46, held to the vertical spindle 34 in any suitable manner and having spokes 47 48 radiating therefrom to their respective rims 49 50, the spokes and rim of the upper wheel being connected to the spokes and rim of the lower wheel by metallic plates 51 51, so as to form an annular series of triangular buckets open at top and bottom. The said spokes are shouldered on each side, as best shown in Fig. 8, and the hubs and rims are shouldered on one side, so that the metal plates 51, which form the open buckets, are bent over and secured to the shouldered surfaces of the rims, spokes, and hubs, this construction leaving a central longitudinal rib on the outer surfaces of the said spokes, the ribs on the underside of the lower wheel-spokes 48 forming scrapers which bear upon the upper surface of the lower plate 28 of the stationary drum or casing in the movement of the described revolving open bucket-drum. A hopper-shaped chamber formed of conical walls 52 extends from the upper plate 30 of the said stationary drum or casing to the lower outer annular flange of the hereinbefore-described stationary plate 12, said walls being provided with a hand-hole for access to the interior of the said chamber, the opening being closed by a removable plate 53. Resting on the said stationary plate 12 is an annular revolving plate comprising a central ring 54, connected by spokes 55 55 to the hereinbefore-named hub 37 and by radial flat arms 56 56 to an outer ring 57, the latter having a vertical annular flange 58, formed with projecting sprocket-teeth for engagement with a sprocket-chain 59, which also passes around a sprocket-wheel 60, fast on the upper end of the described vertical shaft 9, whereby the

said annular revolving plate is driven from the power-pulley 6, hereinbefore named.

Supported by bolts 61, extending through the inwardly-inclined upper ends of the described standards or uprights 2 2, is a ring 62, which for a portion of its circumference is formed with a downward-depending flange 63, having notches formed with oblique upper walls in its under side, the said ring 62 having inward-extending arms 64 for the support of a central ring 65, formed with upper and lower annular flanges, and a cylinder 66 has loose fit at its upper end with the downward flange of said ring 65, the lower end of said cylinder 66 being riveted to an upward-extending annular flange 67 on the described central ring 54 of the annular revolving plate. Resting on the said annular revolving plate is a continuous series of sector-plates 69, each with a longitudinal oval opening there-through, said plates being secured to the said revolving plate and occupying the entire space between its outer and inner upper annular flanges 58 67, the side walls of the oval openings corresponding substantially with the edges of the flat radial plate-arms 56 beneath and the inner and narrow ends of the sector-plate 69 being shouldered or rabbeted, so as to fit in under an outward annular flange 70 on the hereinbefore-named upward annular flange 67 on the central ring 54 of the said annular revolving plate.

Rising from the sector-plate 69 are series of outer standards 71 with forked feet 72 72, bolted to the sector-plates, and series of inner standards 73, similarly bolted to said plates, the outer standards being connected together by strengthening-strips 74, bolted to the standards, so as to make a continuous band, and above the plane of this band the said standards 71 are offset outwardly, so as to have horizontal portions 75 and thence vertical continuations 76 with vertical slots 77 therein. The inner standards 73 are similarly offset, but in an opposite direction, so as to have horizontal portions 78 with vertical continuations 79, formed with vertical slots 80 therein; and the upper ends of the said outer and inner standards are united by cross-bars 81. 82 82 designate vertically-movable cross-bars, whose ends have play within the said slots 77 80 of the described standard continuations 76 79. These movable cross-bars 82 have central upward-projecting ears 83 and bolts 68, to which are pivotally secured levers 84, whose long ends extend outwardly through the described slots 77 and carry at their outer ends rollers 85 for engagement with the notched lower surface of the hereinbefore-named downward-depending flange 63 of the ring 62, the short inner ends of said levers 84 being in contact with the lower ends of adjusting-screws 86, passed downwardly through the stationary cross-bars 81 above. The movable cross-bars 82 are provided with depending pins 87 87, one adjacent to each end, which project through

holes in the described horizontal portions 75 78 of the outer and inner standards, spiral springs 88 88 surrounding said pins between the said horizontal portions of the standards and the said cross-bars 82. Secured to the under sides of the movable cross-bars 82, as by screws 89 89, are longitudinal blocks 90 with grooved edges, against which are placed the upper edges of bag-screens 91, formed of suitable fabric secured in place by wires 92. The lower edges of said bag-screens are spread out to correspond with the shape of the described oval openings in the sector-plates 69, which are undercut all around said openings, as best shown in Fig. 7, and the said lower ends of the bag-screens 91 secured in place thereto by oval wire frames 93, after which the inner reduced ends of said sector-plates 69 are slipped under the described outward annular flange 70 on the upward flange 67 of the central ring 54 of the annular revolving plate and the outer ends of said sector-plates are secured by screws 94 to the outer ring 57 of said revolving plate.

It is essential that there should be an airtight joint between the stationary plate 12 and the annular revolving plate which rests thereon, which is accomplished by the construction best shown in Fig. 7. An annular strip 95 of suitable flexible material vertically disposed is wound around the two plates and secured by a retaining-band 96 and screws 97 to the edge of the lower or stationary plate 12, and the outer ring 57 of the upper plate is formed with an outer circumferential groove 98 and the flexible strip 95 held to this groove by the wire ring 99, whereby the escape of air is prevented and the upper annular plate permitted to freely revolve.

100 represents an elbow-pipe, whose lower end fits within the hereinbefore-named upper annular flange on the described upper central ring 65 of the machine, and to the outward end of this elbow-pipe a line of pipe may be attached to any suitable blower-fan, which I have not deemed necessary to illustrate, the said elbow-pipe 100 being capable of being turned around in any direction to accommodate the machine to the location of the blower.

The operation of my device will be readily understood from the foregoing description of its construction, taken in connection with the accompanying drawings. Dust-laden air is blown into the elbow-pipe 100 and power is applied to the power-pulley 6, whereby the movable parts of the machine are put into operation. The cylinder 66 and conical walled chamber below being closed, the only outlet for the air is up through the openings in the stationary and revolving plates and through the bag-screens 91, which latter permit the air to escape, but free it from the dust, some of which drops down and the balance adheres to the inner surfaces of the said bag-screens. Of the dust that falls down some passes through the open buckets formed

by the plates 51 of the lower revolving drum and other dust falls upon the closed portion of the upper plate 30 of the stationary drum or casing, from whence it is swept by the revolving brush 43 into the said open-ended buckets, all of said dust that passes through said buckets falling upon the lower plate 28 of the stationary drum or casing, and as the inner drum revolves the lower spokes 48 thereof act as scrapers and force the dust into the branch discharge-pipe 32, from whence it passes to the main discharge-pipe 20 and out at the lower end of said pipe. In use the inner surfaces of the bag-screens 91 become coated with dust, and it becomes necessary to dislodge same, and therefore as the upper plate, which carries the bag-screens, revolves it passes under the notched flange 63 of the upper ring 62, and the inclined upper walls of said notches, engaging with the rollers 85 at the ends of the levers 84, depress the movable cross-bars 82, to which the blocks 90 are secured, and thereby depress and collapse the bag-screens 91, whose upper ends are fast to said blocks 90, as the rollers 85 encounter the lowest points of the described notch-walls, and as these points are passed in the continued revolution of the said upper plate the springs 88 88 force the cross-bars 82 suddenly upward, carrying them and the attached upper ends of the bag-screens from the position shown at the left in Fig. 1 to the positions shown at the right in said figure with a sudden shock or jar, which dislodges the dust from the bag-screens and permits it to fall down upon the stationary plate 12 below, some of the dust falling directly through the opening 17 into the discharge-pipe 20 below and some falling upon the solid portion of said plate 12, whence it is swept by the arms 56 of the revolving plate down through the said opening 17 as said arms pass over the plate 12 in close contact therewith. As the dust is blown against the inner surfaces of the bag-screens the finer particles clog the meshes of the fabric of which said screens are formed, and under the influence of the described shock and jar to which the bag-screens are subjected there is a tendency for such finer particles to be shaken outside of the screens, and to guard against this I have employed the hereinbefore-named pipe 23, leading from the closed chamber 21, said pipe being connected to a suction-fan and the stationary plate 12 above said closed chamber being provided with a series of small openings 18 18, as already stated, and hence at the same time that the ratchet rapping operation of the ratchet-toothed flange 63 takes place the bag-screens 91 are over these small openings and the suction from the pipe 23 draws this fine dust inward away from the meshes of the bag-screens as the latter are collapsed and jarred and down through the openings 18 18 into the closed chamber 21, thus obviating the danger referred to, and when any considerable quantity of this fine dust has collected

in said chamber the mass will press against the swing-valve 22 and open it, so that said dust will fall out into the main discharge-pipe by gravity, the suction in the said chamber otherwise keeping the said swing-valve closed.

The deflecting-disk 40 serves to prevent the direct impingement of the dust-laden air as it is blown into the machine upon the drums or casings below and aids in directing the currents of air against the walls 52 of the conical chamber and thence up through the openings below the bag-screens, thereby preventing the dust upon the stationary drum or casing or in the buckets of the revolving drum from being blown away therefrom.

While I have illustrated the preferred construction of my device, I do not limit myself to the precise mechanical details herein shown and described, as same may be varied within the scope of my claims without departing from the essence of my invention.

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

1. In a dust-collector, the combination with a revoluble support, of a series of yielding screens supported thereby, and having pivotally-attached levers at their upper ends, and a suitable frame provided with a ring formed with a downward-depending flange having oblique-walled notches in its under side, in engagement with said levers, for depressing and collapsing said screens as they reach given points, and for restoring them to their normal positions after passing such points.

2. In a dust-collector, the combination with a suitable frame, of a revoluble plate supported thereby, and formed with an annular series of openings; an annular series of outer and inner supports rising from said plate, having offset slotted upper continuations; spring-actuated cross-bars movable in said slots; a flange having oblique-walled notches in its under side secured to said frame; levers pivotally attached to said movable cross-bars for engagement with said notched flange; and yielding bag-screens secured to said movable cross-bars, and to the revolving plate at the lines of the openings therein.

3. In a dust-collector, the combination with a suitable frame, of a revoluble plate supported thereby, and formed with a series

of openings; a series of dust-collecting screens carried by said revoluble plate and communicating with said openings; a stationary drum or casing below said revolving plate having openings in its upper and lower plates; a vertical revoluble spindle extending through said drum or casing and secured to said revoluble plate; a revoluble drum secured to said spindle within said stationary drum or casing, and formed with an annular series of open-ended buckets; an air-tight wall forming a closed chamber around the vertical spindle, between the revoluble plate and the stationary drum or casing; a brush secured to said spindle and in sweeping engagement with the upper plate of the stationary drum or casing; and a dust-discharge pipe leading from the opening in the lower plate of said drum or casing.

4. In a dust-collector, the combination with a suitable frame, of an annular stationary plate supported thereby said plate having a solid portion with a dust-discharge opening and a series of small openings there-through, and the balance of said plate having a series of large air-inlet openings there-through; a dust-discharge pipe leading from the dust-discharge opening in the solid portion of said plate, and a closed chamber beneath the small openings therein, adjacent to the dust-discharge pipe and having a swing-valve communication therewith; a suction-pipe leading from said closed chamber; an upper annular plate resting and revoluble on said stationary plate, and formed with an annular series of openings; an annular series of yielding bag-screens, supported on said annular revoluble plate and communicating with the openings therein; a closed chamber beneath the air-inlet openings in said stationary plate; an inlet for dust-laden air leading to said last-named closed chamber; and means for depressing and collapsing said screens as they reach given points, and for restoring them to their normal positions after passing such points.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

LEMUEL R. WHITNEY.

Witnesses:

H. G. UNDERWOOD,
B. C. ROLOFF.