No. 778,483. PATENTED DEC. 27, 1904.

H. J. FLOOD.

BRICK MACHINE.

APPLICATION FILED MAY 20, 1904.

7 SHEETS—SHEET 1.

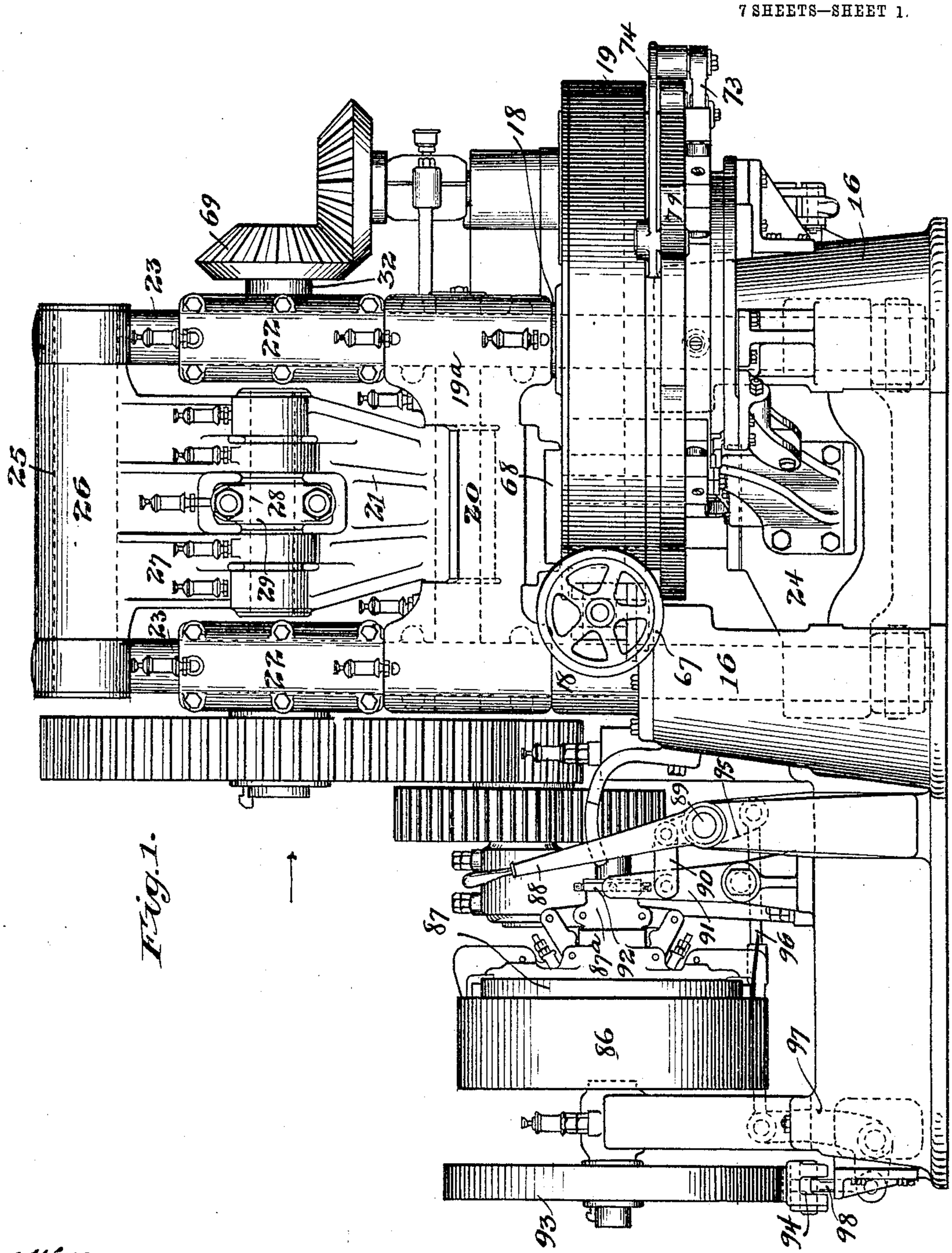

Fig. 1.

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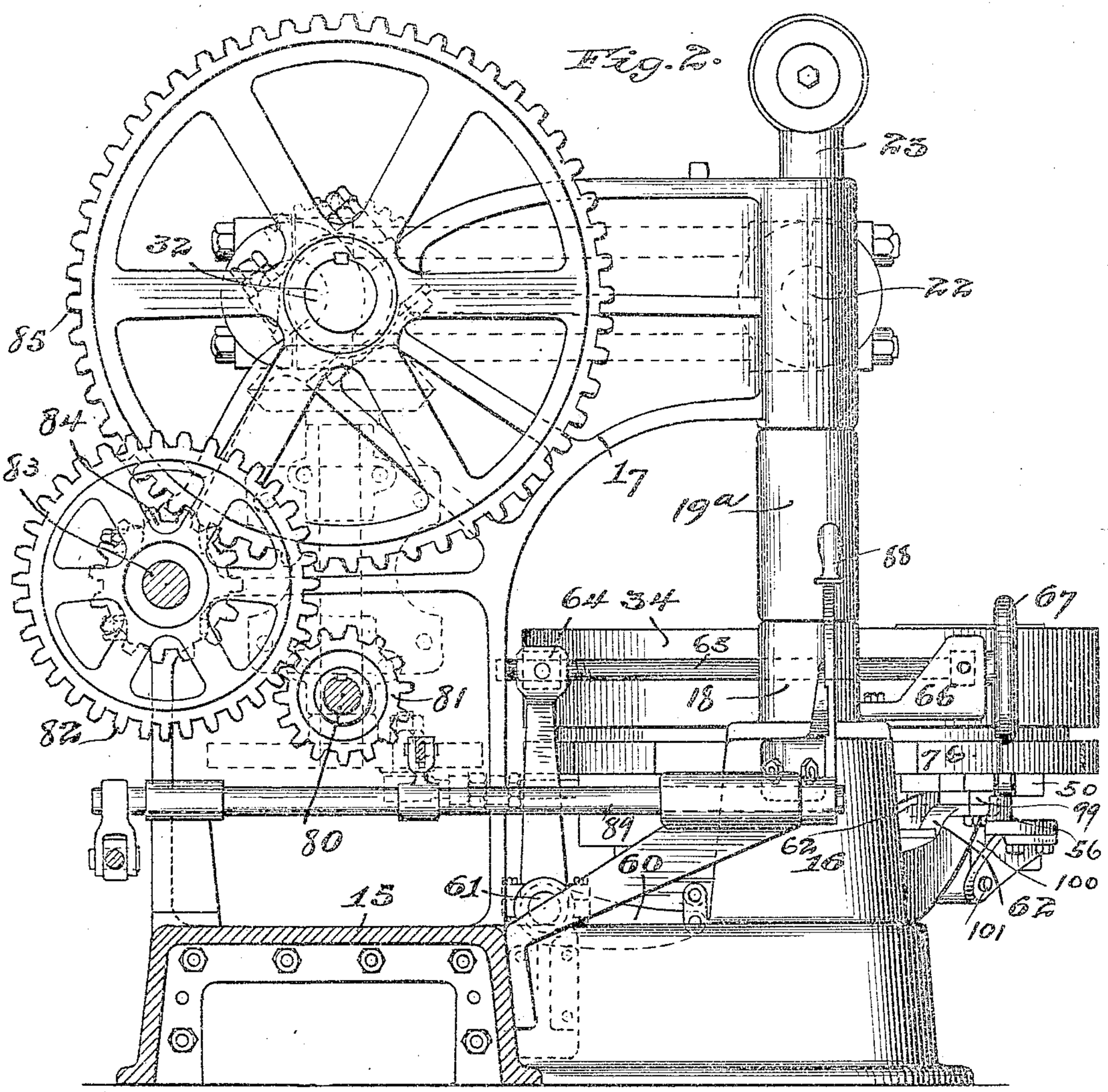
7 SHEETS—SHEET 2.

Fig. 2.



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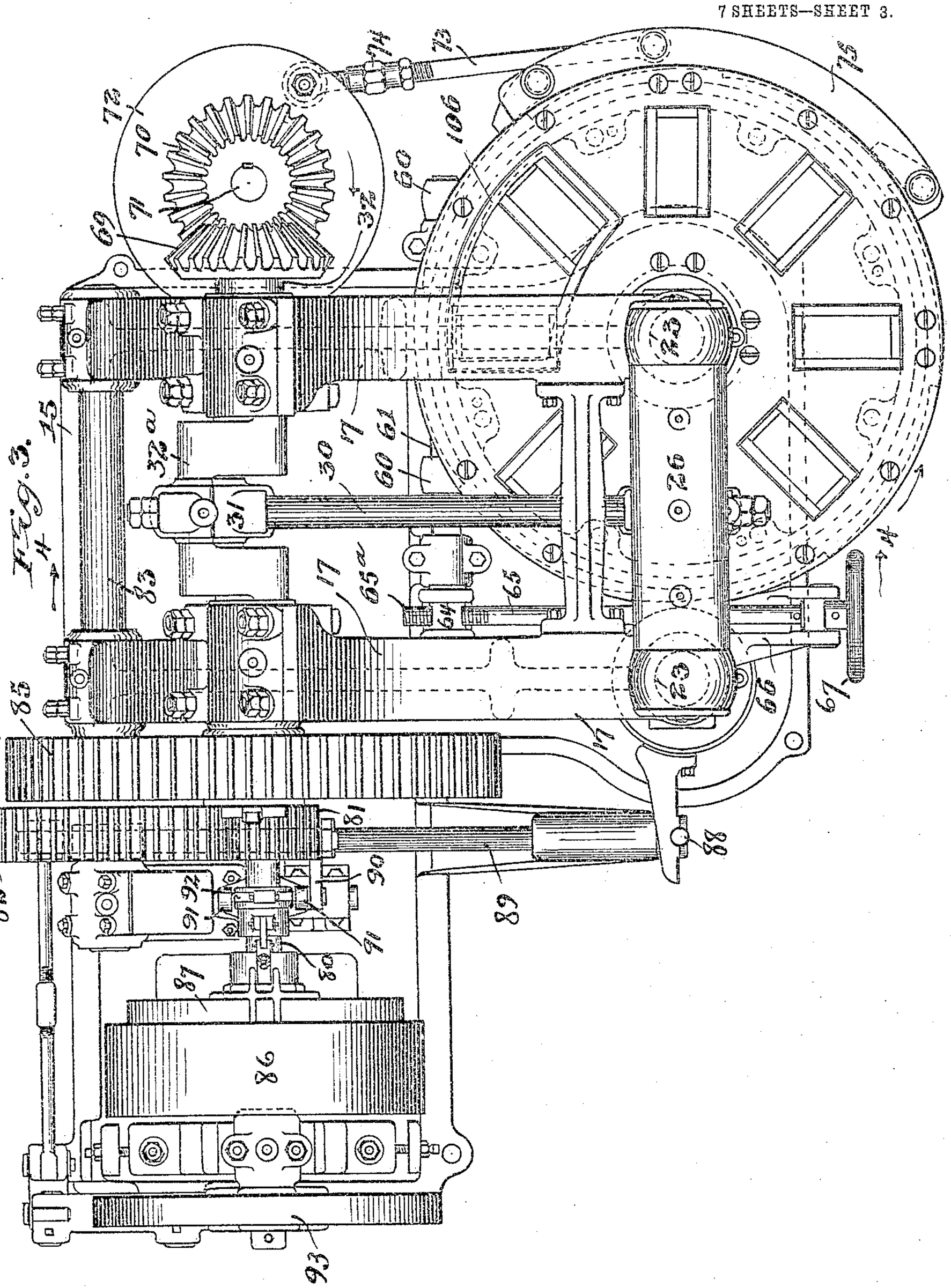

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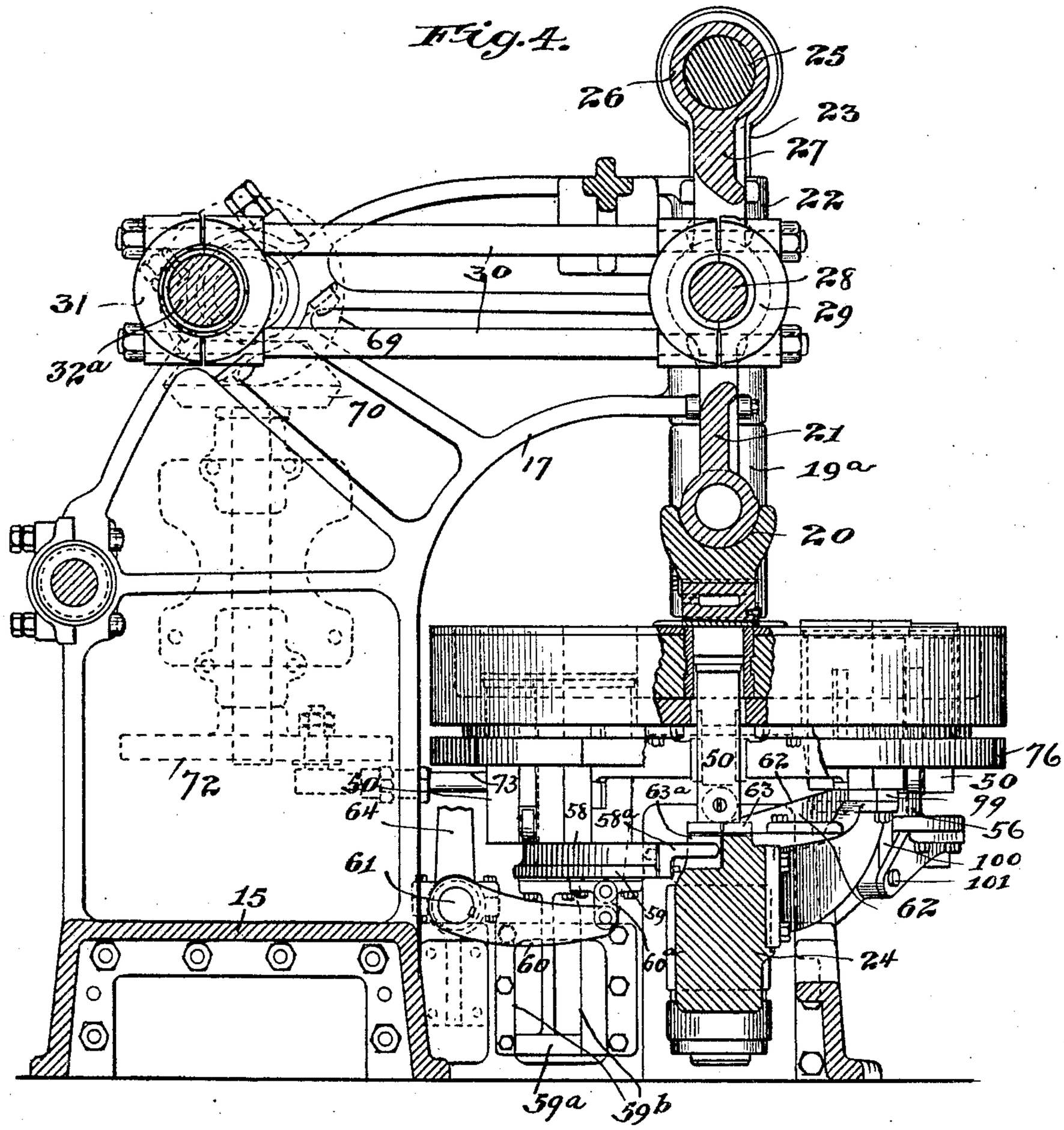
Fig. 4.



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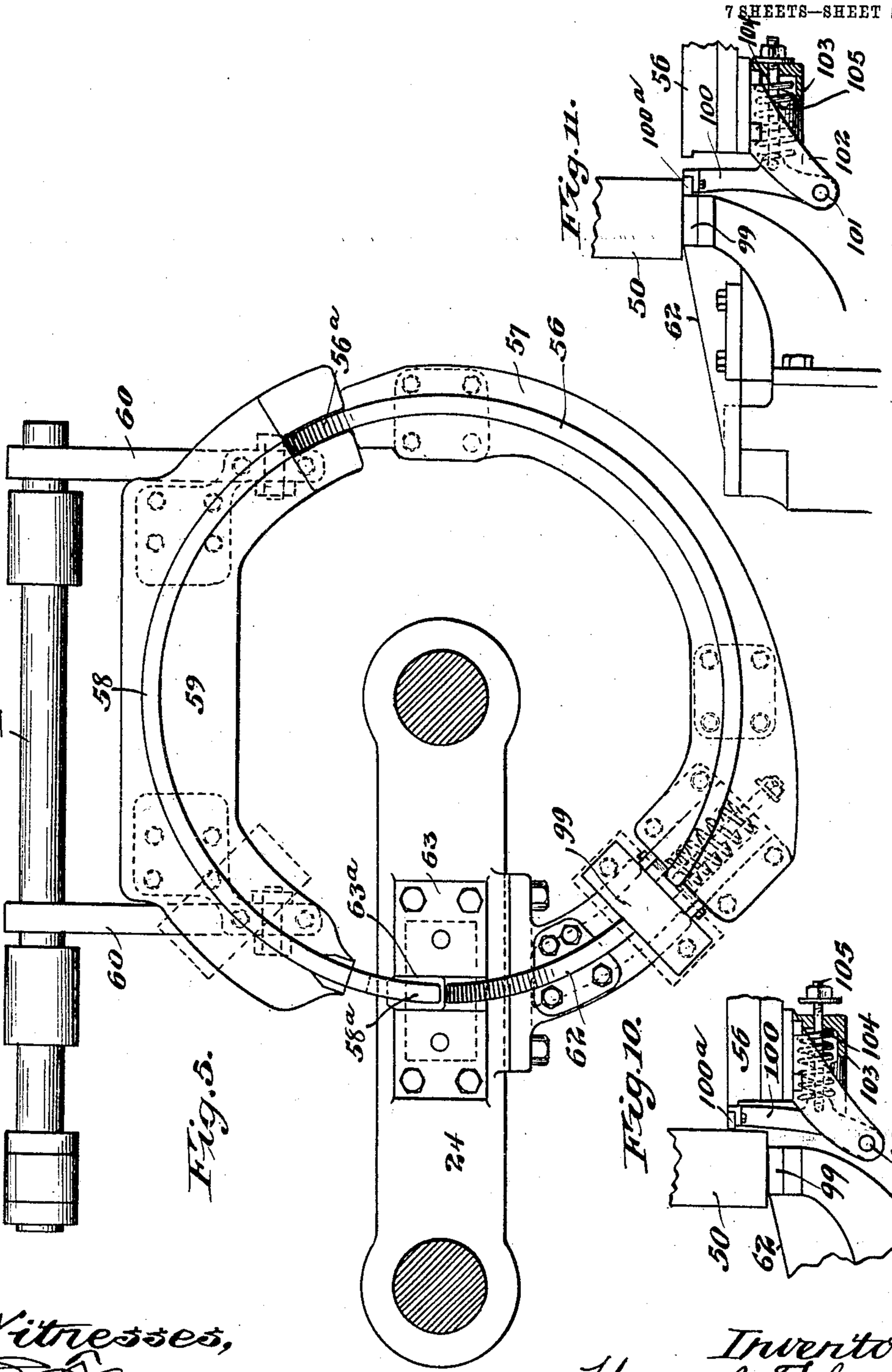

Fig. 5.

Fig. 11.

Fig. 10.

Witnesses,
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7 SHEETS—SHEET 6.

Fig. 6.

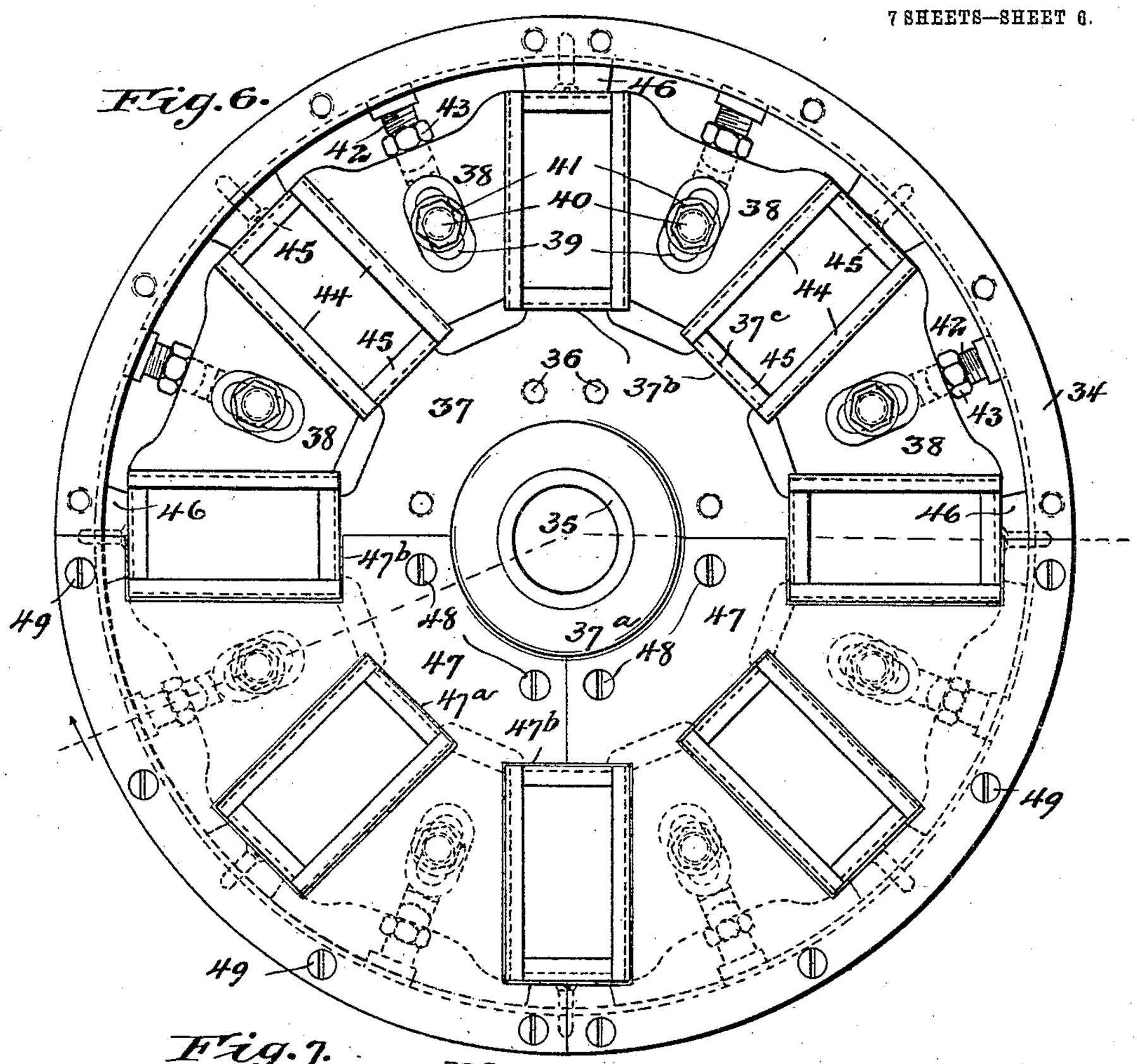
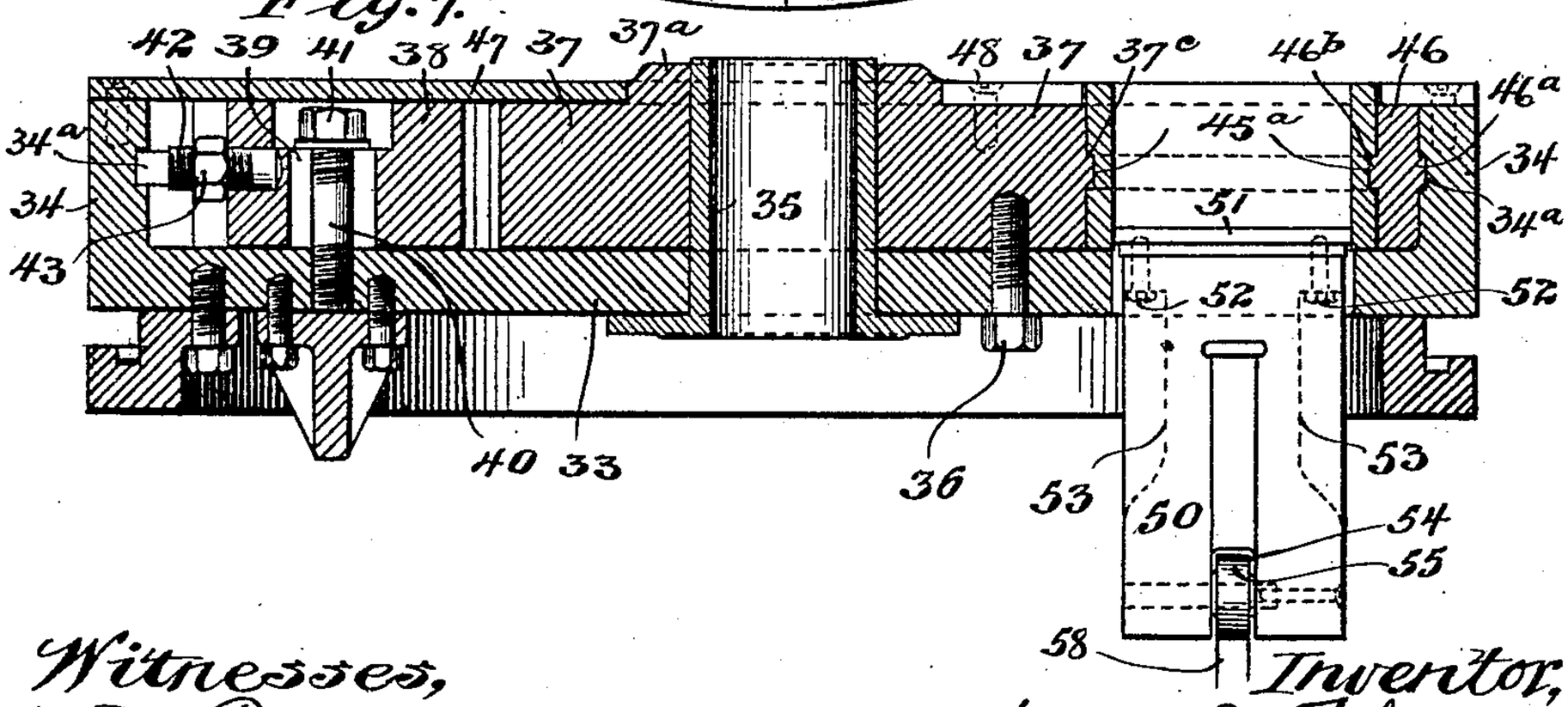


Fig. 7.



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7 SHEETS—SHEET 7.

Fig. 8.

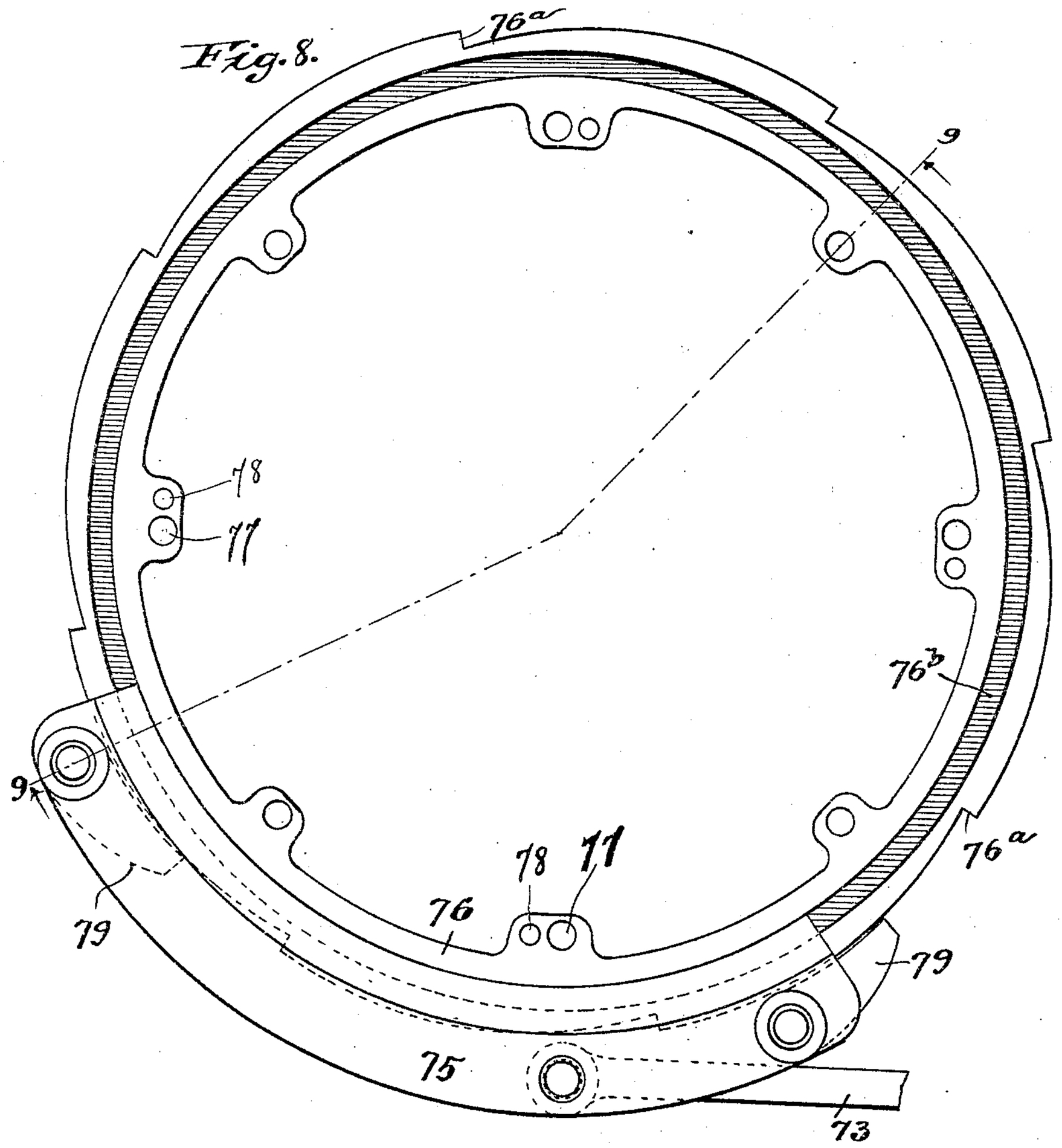
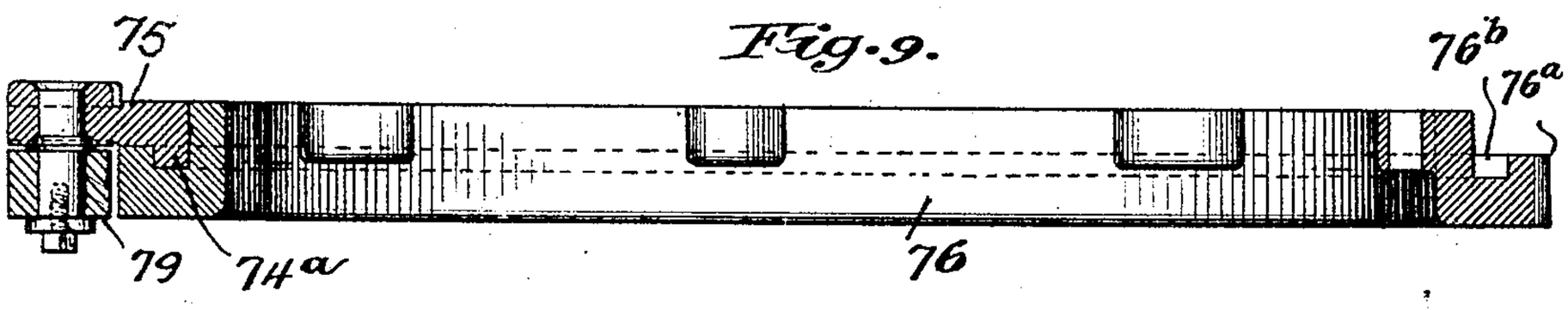


Fig. 9.



Witnesses,
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No. 778,483. Patented December 27, 1904.

UNITED STATES PATENT OFFICE.

HARRY J. FLOOD, OF CHICAGO, ILLINOIS.

BRICK-MACHINE.

SPECIFICATION forming part of Letters Patent No. 778,483, dated December 27, 1904.

Application filed May 20, 1904. Serial No. 208,858.

To all whom it may concern:

Be it known that I, HARRY J. FLOOD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Brick-Machines, of which the following is a specification.

My invention relates to machines for the manufacture of pressed brick, and has reference more particularly to that type of machine employing a rotary mold-table having a series of radially-disposed molds in association with one or more vertically-movable rams or plungers for compressing the material in the molds.

My invention has for its general object to increase the efficiency and capacity of brick-machines of this type; and my present improvements are directed in part to the construction of the mold-disk and its actuating devices, in part to the compressing and ejecting mechanism, in part to a means for regulating the amount of material charged into the mold-chambers prior to the compressing operation, in part to a novel construction of track underlying the mold-table and supporting the plungers in various positions relative to the molds, and in part to other minor features of construction which will be hereinafter more particularly described, and pointed out in the claims.

In the accompanying drawings I have illustrated a brick-machine built in accordance with my invention and embodying the latter in the best mechanical form which I have as yet devised.

Referring to the drawings, Figure 1 shows in front elevation the complete machine, including the parts to which the driving power is applied. Fig. 2 is a side elevational view looking at the left of Fig. 1, as indicated by the arrow, with the driving-pulley and its immediately-associated parts omitted for the sake of greater clearness. Fig. 3 is a top plan view of the complete machine. Fig. 4 is a vertical sectional view substantially on the line 4 4 of Fig. 3 looking in the direction of the arrow. Fig. 5 is a top plan view of the circular track underlying the mold-table and supporting the compressing rams or plungers. Figs. 6 and 7 are respectively top plan and central vertical sectional views of the mold-table. Figs. 8 and 9 are respectively top plan and vertical sectional views, the latter on the line 9 9 of the former, of a grooved ratchet-ring and pawl carrier which is secured to the under side of the mold-table and constitutes a part of the mold-table-actuating mechanism; and Figs. 10 and 11 are detail elevational views, partly in section, illustrating a mechanism for supporting the plungers after they have been raised to ejecting position and immediately prior to their introduction to the stationary portion of the supporting-track, Fig. 10 showing the plunger partly raised and Fig. 11 showing the same fully raised.

The stationary supporting-frame of the machine comprises, essentially, a horizontal connection-piece 15, lying between and rigidly bolted at its ends to a pair of parallel side-frame uprights, each of the latter consisting of a single casting, including a front pedestal 16 and an upwardly and forwardly turned side-frame member 17, the former supporting the immediate overlying plunger-actuating mechanism and the latter supporting certain parts of the driving mechanism.

Secured to the tops of the pedestals 16 are a pair of sleeves 18, one of which constitutes a bushing on which is rotatably mounted and supported the mold disk or table 19. Superposed upon the sleeves 18 and extending between them is a yoke 19^a, the end portions of which constitute hollow vertical extensions of the sleeves 18, while its intermediate portion constitutes a seat 20 for the lower end or knuckle of a toggle-arm 21. Above and upon the tubular ends of the yoke 19^a rest the tubular inner extremities 22 of the inwardly-extending side-frame members 17 of the machine-frame.

Slidably mounted in the hollow vertically-alined parts 16, 18, 19^a, and 22 are a pair of side bars 23, which at their lower ends support between them a presser-head 24. In and between the upper ends of the bars 23, on a pivot-shaft 25, is hung from a wide bearing-sleeve 26 the toggle-arm 27, constituting a companion to the arm 21, the meeting ends

of said arms being connected by a pivot-shaft 28, on which is journaled by a suitable separable bearing-block 29 one end of a skeleton connecting-rod 30, the opposite end of which carries a corresponding divided bearing-block 31, journaled on an eccentric or cranked portion 32[a] of a shaft 32, itself journaled in and between the main parallel upright 17 of the machine-frame.

Considering now the particular construction of the mold-table and its plungers, with which my present improvements are to a considerable extent concerned, and referring more particularly to Figs. 6 and 7 of the drawings, 33 designates a circular plate having an upstanding marginal flange 34, preferably formed integral therewith. The plate 33 is centrally apertured to receive a bearing sleeve or bushing 35 for the vertical axle by which it is mounted on the pedestal 16, and surrounding said sleeve and secured to the plate 33, as by screw-bolts 36, is a disk center-block 37, having a central annular boss 37[a]. The periphery of the ~~center~~ block 37 has a series of equally-spaced short projecting bosses 37[b], the ends of which are squared and provided with horizontal tongues 37[c], Fig. 7. Around the center block are positioned a series of equally-spaced keys in the form of wedge-blocks 38, the noses of which point inwardly opposite the several spaces between the bosses 37[b]. Each wedge-block is provided with a countersunk elongated vertical slot 39, which receives a clamping stud-bolt 40, the nut 41 of which lies within the countersink of the slot. The outer faces of the wedge-blocks 38 are drilled to receive screw-threaded pins 42, the outer ends of which are squared and lie in an annular groove 34[a] of the rim or flange 34. Each of the threaded pins 42 is provided with a nut 43, which has a face bearing against the rear wall of the wedge-block. Between each adjacent pair of wedge-blocks is located a mold-box, and this latter is formed by removable side and end plates 44 and 45, respectively. Each of the outer end plates 45 is backed by a filling-block 46, having on its opposite faces horizontal tongues 46[a] and 46[b], the former of which interlocks with the groove 34[a], while the latter interlocks with a corresponding groove 45[a], formed across the outer face of the outer end plate 45. The inclined sides of the wedge-blocks 38 and the outer faces of the side walls 44 are provided with corresponding horizontal interlocking tongues and grooves, as indicated by dotted lines in Fig. 6, while the outer face of the inner end block 45 has a similar groove 45[a], interlocking with the tongue 37[c], such construction serving to prevent vertical displacement of the side and end wall plates of the mold-box. Surmounting and constituting a cover for the interlocking parts of the mold-table as thus described are a series of quadrant-plates 47, bolted to the center block 37 and to the rim 34 by tap-screws 48 and 49, respectively. The quadrant covering-plates 47 are provided each with a central rectangular opening 47[a] and semirectangular cut-outs or notches 47[b] in its opposite straight edges, which provide openings for the upper ends of the walls of the several mold-boxes, as clearly shown in the lower half of Fig. 6. This construction of mold-table provides a very rigid and strong series of mold-boxes which can be very readily assembled and removed and when assembled are as uniform and secure against distortion or displacement as if cored in a solid block. In taking down the boxes or preliminary to setting them up the wedge-blocks 38 are retracted by loosening the nuts 41 on the stud-bolts 40 and loosening nuts 43 and when properly positioned are tightly interlocked by first turning up the nuts 43 to force the wedge-blocks inwardly and laterally compress the side walls of the boxes, after which the wedge-blocks are secured in adjusted position by screwing down the nuts 41.

Each of the mold-boxes contains a plunger or ram 50, consisting, substantially, of a solid metal block carrying on its upper surface a wear-plate 51, having a sliding fit in the mold-box and secured to the plunger by any suitable means, such as the screws 52, inserted from beneath by means of longitudinal grooves 53 in the front and rear edges of the plunger. The plunger is also provided at its lower end with a vertical transverse slot 54, in which is journaled an antifriction-roller 55, the lowest peripheral point of which is substantially flush with the lower end of the plunger. This roller is designed to ride over an underlying circular track and coöperate with the latter in effecting in part the vertical movements of the plunger in the mold-box. Referring to Fig. 5, which shows a top plan view of the complete track, it will be seen that the latter is formed in several sections, as follows: 56 designates a stationary section comprising approximately one-half of the complete track, rising from an arc-shaped base-plate or support 57, suitably secured to portions of the main supporting-frame. This is the highest portion of the track, being designed to support the plungers in their highest elevated position, in which their upper surfaces lie substantially flush with or a shade above the upper surface of the mold-table. The left-hand end of this track-section, as shown in Fig. 5, is of full height and formed with a vertical end wall, as shown in Fig. 11, while the right-hand end is downwardly inclined, as indicated at 56[a], to the level of the next successive track-section 58, which latter is formed integrally on a supporting-plate 59. This latter is carried on the inwardly-extending ends of a pair of arms 60, mounted on a horizontal rock-shaft 61, suitably journaled in the main supporting-frame, the plate 59 being supported on the ends of the arms 60 through the interposition

of pivoted links 60ª, Fig. 4, in order to transmit to the plate a true vertical movement from the arc-shaped movement to the ends of the supporting-arms, the plate 59 being guided in its vertical movements by depending guides 59ª engaging stationary guideways 59ᵇ. Between the separated ends of the track-sections 58 and 56 (shown at the left in Fig. 5) is interposed a short inclined track-section 62, carried by and extending laterally from the vertically-reciprocable cross-head 24. The lower end of the inclined trackway 62 starts flush with the upper surface of a wear-plate 63, secured to the top surface of the presser-head 24, which wear-plate, together with the upper portion of the presser-head, is vertically recessed or socketed, as shown at 63ª, (see Fig. 4,) in a transverse direction and directly behind the lower end of the track 62 to receive the inwardly-projecting end 58ª of the adjustable track 58. Keyed fast on the inner end of the shaft 61 is an upwardly-extending arm 64, the upper end of which is provided with an internally-threaded eye receiving the threaded end 65ª of an adjusting-rod 65, Fig. 3, the opposite end of which is journaled in a forwardly-projecting bracket 66, carried by the main frame and provided on its end with a hand-wheel 67. Obviously by turning the latter the shaft 61 will be rocked in one direction or the other, and the track-section 58, supported on the inner ends of the arms 60, will be adjusted up or down accordingly, according to the depth of mold desired.

Referring next to the mechanism for intermittently rotating the mold-table to bring the mold-boxes thereof and their plungers successively into vertical alinement with and between the presser-head 24 and a pressure-plate 68, secured on the under side of the yoke 19ª, 69 designates a bevel-gear on one overhanging end of the shaft 32, which meshes with a similar gear 70 on the upper end of a vertical shaft 71, journaled alongside one of the main uprights 17 of the machine and having fast on its lower end a disk 72, to the under side of which near its periphery is pivotally connected a link 73, rendered adjustable longitudinally by an interposed turnbuckle 74. The opposite end of link 73 is similarly pivoted to the under side of a quadrant-bar 75, (see Figs. 8 and 9,) which bar is mounted to reciprocate over the periphery of a ratchet-ring 76, that is secured to the under side of the mold-table 19, as by means of screws and dowel-pins passed upwardly through the holes 77 and 78, respectively. The outer periphery of the ratchet-ring 76 has a series of ratchet-teeth 76ª corresponding in number to the mold-boxes carried by the table, and it has also formed in its upper surface an annular groove or channel 76ᵇ, constituting a guideway for a depending tongue 74ª, Fig. 9, on the reciprocating quadrant-bar 75. To the opposite ends of the bar 74 and on its under side are pivotally mounted a pair of spring-pressed pawls 79, the noses of which coöperate with the ratchet-teeth 76ª to effect the intermittent rotation of the mold-table from the continuous rotation of the actuating-disk 72. The shaft 32 is continuously driven from the main drive-shaft 80 of the machine through a series of speed-reducing pinions and gears which, as herein shown, consist of a pinion 81 on the drive-shaft 80, meshing with a gear 82, carried on a counter-shaft 83, this latter having a pinion 84 meshing with a large gear 85 on the overhanging end of the shaft 32. The main driving-shaft 80 has a driving-pulley 86 loosely mounted thereon and adapted to be engaged therewith through the agency of any usual form of clutch mechanism, such as is shown at 87, operable by a hand-lever 88, mounted on a rock-shaft 89 and connected with the clutch by suitable mechanism, such as a link 90, operating a pair of pivoted arms 91, engaging between them a ring or collar 92, swiveled on an inwardly-projecting neck or sleeve 87ª of the clutch. The driving-shaft 80 carries on its outer end a brake-disk 93, which is operatively engaged by a brake-shoe 94 when the lever 88 is swung to release the clutch, the connections for this purpose, as herein shown, consisting of a depending arm 95 on the shaft 89, an extensible link 96, leading therefrom to the upwardly-extending arm of a bell-crank lever 97, the horizontally-extending arm of which carries an upwardly-extending link 98, supporting the brake-shoe 94.

Referring once more to the short inclined track-section 62, carried by the presser-head 24, this track constitutes a support for the compressing-plungers after the compressing operation and while the mold-table is moving to carry the plungers thus raised to the fixed track 56. As soon as the plungers are brought adjacent to the end of the fixed track 56 they are still further elevated on the next rise of the presser-head to eject the compresed brick, in which position the plungers rest on a wear-plate 99, Figs. 10 and 11, mounted on the outer end of the ejecting-arm carrying the track 62 and flush with the highest point of the latter. It is necessary to provide some means for catching and supporting the plunger when thus raised to its highest position in the ejecting operation preliminary to its subsequent onward travel onto the fixed track 56, and a simple device for this purpose is herein shown as consisting of a vertical finger 100, Figs. 10 and 11, pivoted at its lower end at 101 in a bracket 102 and having at its upper end a hard-metal insert or wear-plate 100ª. Supported by the bracket 102 is a cylinder 103, containing a coil-spring 104, mounted on a guide-rod 105, slidable through the outer head of the cylinder at one end and at its other end pivoted to the back of the finger 100, the spring thus normally thrusting the finger

forward to the position shown in Fig. 11, in which position it engages the mold-plunger 50 beneath its forward edge and constitutes a vertical support therefor when the presser-head descends, for which purpose the seat formed by the wear-plate 99 is made somewhat narrower than the bottom of the plunger, as shown.

The general operation of the machine may be briefly summarized as follows: The direction of intermittent rotation of the mold-table being that indicated by the arrow in the plan view, Fig. 3, charges of the material to be compacted are introduced to the successive mold-boxes in a comparatively loose and dry condition by hand or through any suitable feed-hopper, such a hopper being indicated at 106 in Fig. 3. Considering the successive operations with respect to a single one of the mold-boxes (the same operations occurring in connection with all the others in the same sequence, but earlier or later) the mold-box is charged just as the mold-disk stops when still about a quarter-turn from the compressing mechanism, at which time the plunger is resting on and about the center of the adjustable track-section 58. By the time the mold-table has made two consecutive rotary movements from this position the filled mold-box is brought to rest on the upper face of the presser-head 24 at a time when the toggle-arms 21 and 27 are bent and the presser-head is in its lowest position. Thereupon and while the mold-table-actuating mechanism is returning to reëngaging position with the mold-table the toggle-arms are drawn to the straight position, (shown in Fig. 4,) which elevates the plunger and compresses the charge against the pressure-plate 68. The next partial rotation of the mold-table begins simultaneously with the beginning of the descending movement of the presser-head, and the two movements occur simultaneously and end simultaneously and are so timed that while the plunger is traveling over the inclined track 62 the latter is descending at such a rate as serves to just hold the plunger stationary vertically until it reaches the wear-plate 99 at the upper end of the track 62. As this position is reached the advancing side of the plunger contacts the upper end of the finger 100 and throws it backwardly against its actuating-spring, as clearly shown in Fig. 10. On the next upward movement of the presser-head the plunger is moved entirely through the mold-box, and preferably very slightly above the upper surface of the latter, as indicated in Fig. 4, thus insuring the complete ejection of the compressed brick, and when the plunger has reached this elevated position the finger 100 snaps beneath the same, as shown in Fig. 11, and on the next forward movement of the mold-table the plunger is carried to a position of support on the stationary track 56. This track extends through a distance preferably somewhat exceeding a quarter-circle in order to afford ample time for the attendants to remove the ejected bricks, and when the plunger reaches the descending inclined portion 56ª of the track it rides down the latter onto the adjustable track 58, returning once more to charging position. From the foregoing it will be observed that when one plunger is compressing, the plunger in the next preceding mold-box is simultaneously ejecting the previously-compressed brick, and during each of the intermittent rotative movements imparted to the mold-table one of the plungers is traveling from the compressor to the ejector at the same time that the immediately-following plunger is traveling onto the compressor and the immediately-preceding plunger is passing off the ejecting-arm and onto the stationary track, all the other mold-boxes and plungers at the same time advancing one step around the track. The vertical adjustability of the track-section 58 is of importance, since it determines the depth to which the several mold-boxes are filled with loose material, and consequently the density of the finished article, which will vary with different characters and conditions of material operated upon. The machine may be operated continuously and with considerable rapidity so long as the material is fed to the mold-boxes. The described construction of the mold-table and mold-boxes enables the parts to be readily disassociated and assembled when necessary for purposes of adjustment, repairs, or renewals, while the wedge-blocks interposed radially between adjacent mold-boxes and forced inwardly by screw action render said mold-boxes exceedingly strong and rigid to resist the high pressures to which they are subjected.

It is evident that numerous changes and modifications in respect to specific details of construction and relative arrangement of the elements of the machine as hereinabove described would readily suggest themselves to the mechanic skilled in this art upon acquaintance with my invention as herein presented without at all departing from the spirit and principle of the invention or sacrificing any of the advantages and benefits thereof, and hence I do not limit the invention to the precise form and construction of the machine and the exact relative arrangements of its coöperating parts as herein shown and described, except to the extent that such features are made the subject of specific claims. It is also evident that the apparatus of my invention is equally capable of use in the manufacture of other articles of the same general nature as pressed brick, and hence while described as a brick-press and chiefly designed as such the invention is by no means limited to that particular use.

I claim—

1. In a machine of the character described,

the combination with a supporting-frame, of a mold-table rotatably mounted therein, said mold-table having a series of radially-disposed mold-boxes, a plunger carried by each of said boxes, means for actuating two of said plungers simultaneously, one for compressing the material and the other for ejecting the compressed material, a circular track underlying said mold-boxes, one section of said track being rigid and supporting the plungers in their highest position and the other section being vertically adjustable and supporting the plungers in the charging positions of the mold-boxes, substantially as described.

2. In a machine of the character described, the combination with a supporting-frame, of a mold-disk rotatably mounted therein, said mold-disk having a series of radially-disposed mold-boxes, a plunger carried by each of said boxes, a circular track underlying said mold-boxes, one section of said track being elevated and supporting the plungers in their highest position and the other section being depressed and supporting the plungers in the charging positions of the mold-boxes, a vertically-reciprocable plunger-actuating device disposed between contiguous ends of said track-sections and provided with an arm supporting an inclined track, and means for simultaneously rotating the mold-disk and lowering said plunger-actuating device at such relative rates of speed as serve to maintain the plunger vertically stationary as it travels over said inclined track-section, substantially as described.

3. In a machine of the character described, the combination with a supporting-frame, of a mold-disk rotatably mounted therein, said mold-disk having a series of radially-disposed mold-boxes, a plunger carried by each of said boxes, a circular track underlying said mold-boxes, one section of said track being elevated and supporting the plungers in their highest position and the other section being depressed and supporting the plungers in their lowest position, a vertically-reciprocable plunger-actuating device disposed between contiguous ends of said track-sections and carrying an inclined track which terminates at its lower end in a support for the plunger in its compressing operation and at its upper end in a support for the plunger in its ejecting operation, means for simultaneously rotating the mold-disk and lowering said plunger-actuating device at such relative rates of speed as serve to maintain the plunger vertically stationary at the completion of its compressing movement as it travels over said inclined track-section, and a spring-actuated catch disposed adjacent to the receiving end of the elevated track-section arranged to engage and support the plunger when raised to the limit of its ejecting movement, substantially as described.

4. In a machine of the character described, a rotary mold-table having formed therein a series of radially-disposed mold-boxes provided with separable side and end wall plates, and means for rigidly uniting the latter, substantially as described.

5. In a machine of the character described, a rotary mold-table having formed therein a series of radially-disposed mold-boxes provided with separable side and end wall plates, and a series of wedge-blocks interposed between adjacent mold-boxes and serving to key them rigidly in position, substantially as described.

6. In a machine of the character described, a rotary mold-table comprising a centrally-apertured disk having an upstanding marginal flange, a centrally-apertured disk center block, a series of radially-arranged mold-boxes disposed between said flange and disk center block having end-wall plates backed thereby and side-wall plates abutting against the ends of said end-wall plates, and wedge-shaped keys between adjacent mold-boxes, substantially as described.

7. In a machine of the character described, a rotary mold-table comprising a centrally-apertured disk having an upstanding marginal flange, a centrally-apertured disk center block, a series of radially-arranged mold-boxes disposed between said flange and disk center block having removable end-wall plates backed thereby and removable side-wall plates abutting against the ends of said end-wall plates, wedge-shaped keys inserted between adjacent mold-boxes, means for forcing said keys inwardly radially of the disk, and means for securing said keys in adjusted position, substantially as described.

8. In a machine of the character described, a rotary mold-table comprising a centrally-apertured disk having an upstanding marginal flange, a centrally-apertured disk center block, a series of radially-arranged mold-boxes disposed between said flange and disk center block having removable end-wall plates backed thereby and removable side-wall plates abutting against the ends of said end-wall plates, wedge-shaped keys inserted between adjacent mold-boxes, tongue-and-groove connections between the outer faces of said wall-plates and the parts contacted thereby to lock the former against vertical displacement, and means for forcing said keys inwardly radially of the disk and for securing them in adjusted position, substantially as described.

9. In a machine of the character described, the combination with a supporting-frame and a mold-table rotatably mounted therein, said mold-table having a series of radially-disposed mold-boxes each carrying a plunger, of a circular plunger-supporting track beneath said mold-boxes, a rigidly-supported pressure-plate directly above the path of said mold-boxes, and a vertically-reciprocable presser-head interposed in said circular track and carrying a support for one plunger when in its

compressing operation and a support for another plunger when in its ejecting operation, substantially as described.

10. In a machine of the character described, the combination with a supporting-frame and a rotatable mold-table mounted therein, said mold-table having a series of radially-disposed mold-boxes each carrying a plunger, of a plunger-actuating presser-head located beneath said mold-table, a toggle mechanism mounted above said mold-table, tension-bars connecting said toggle mechanism with said presser-head, and mechanism for imparting intermittent rotary movements to said mold-table between the upward or compressing movements of said presser-head, substantially as described.

11. In a machine of the character described, the combination with a supporting-frame and a rotatable mold-table mounted therein, said mold-table having a series of radially-disposed mold-boxes each carrying a plunger, of a vertically-reciprocable plunger-actuating presser-head located beneath said mold-table, a crank-shaft journaled in said supporting-frame above and in rear of said mold-table, a toggle-joint lifting mechanism above said mold-table, connections between the latter and said crank-shaft and presser-head, respectively, and driving connections including a pawl-and-ratchet driving-gear between said crank-shaft and said mold-table, substantially as described.

12. In a machine of the character described, the combination with a mold-table having a series of mold-boxes therein, of plungers in said mold-boxes, a cross-head reciprocable relatively to said mold-table and carrying a support for one plunger when in its compressing operation and a support for another plunger when in its ejecting operation, substantially as described.

13. In a machine of the character described, the combination with a rotary mold-table having a series of radially-disposed mold-boxes therein, of plungers in said mold-boxes, a cross-head reciprocable relatively to said mold-table and carrying a support for one plunger when in its compressing operation and a support for an adjacent plunger when in its ejecting operation, and a common operating mechanism simultaneously actuating said plunger-supports, substantially as described.

14. In a machine of the character described, the combination with a rotary mold-table having a series of radially-disposed mold-boxes therein, of plungers in said mold-boxes, a vertically-reciprocable cross-head beneath said mold-table serving to actuate the plungers successively in their compressing operation, said cross-head carrying a rigid arm constituting a support for the plungers successively in their ejecting operations, and means for reciprocating said cross-head, substantially as described.

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