

No. 641,985.

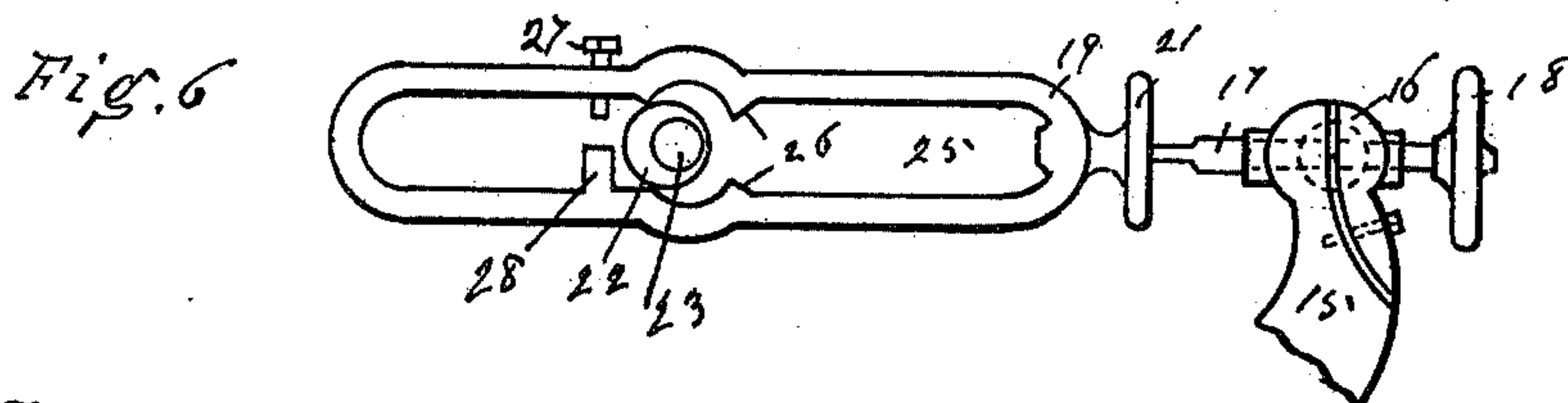
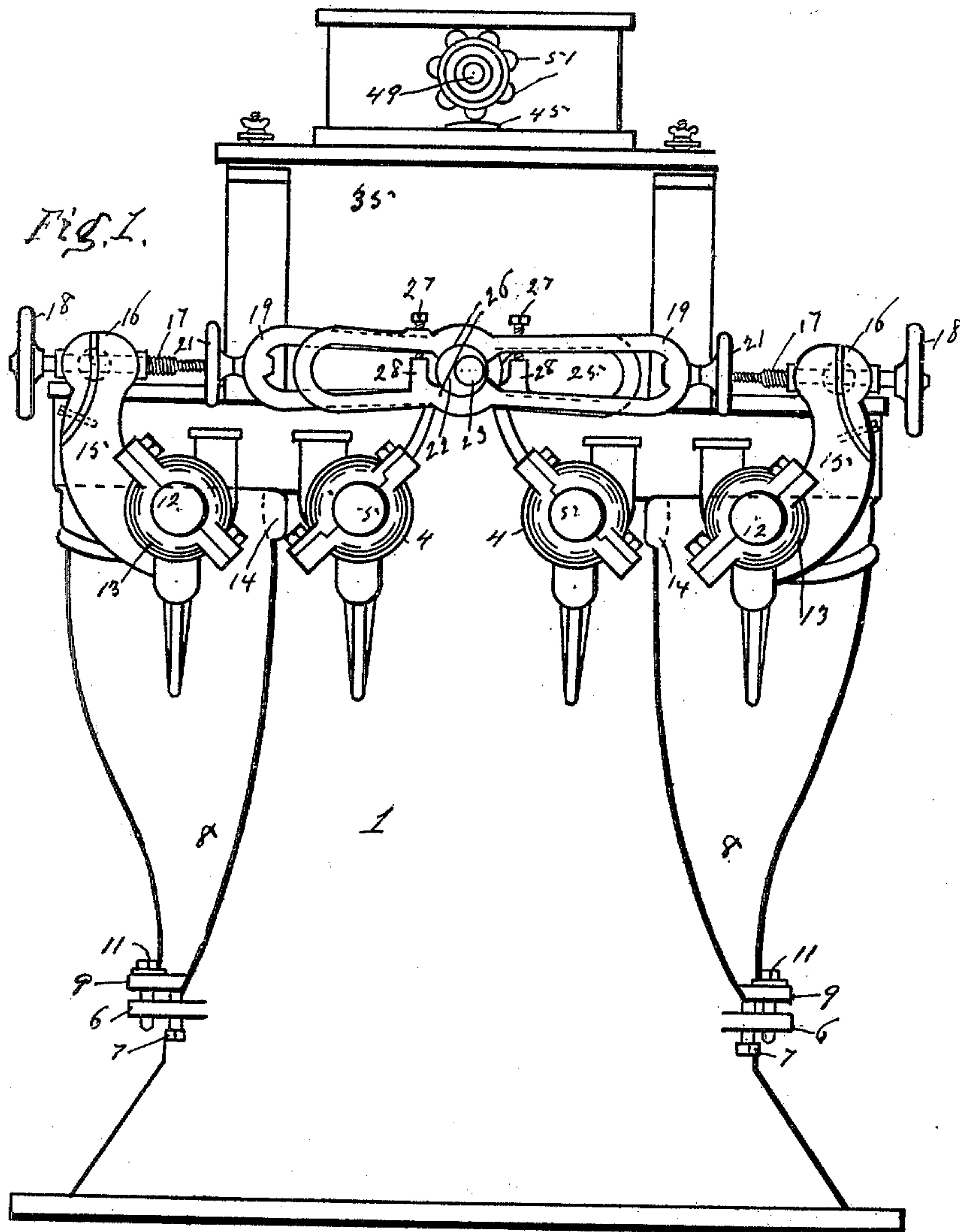
Patented Jan. 23, 1900.

J. A. McANULTY.
ROLLER GRINDING MILL.

(Application filed Dec. 8, 1897.)

(No Model.)

5 Sheets—Sheet 1.



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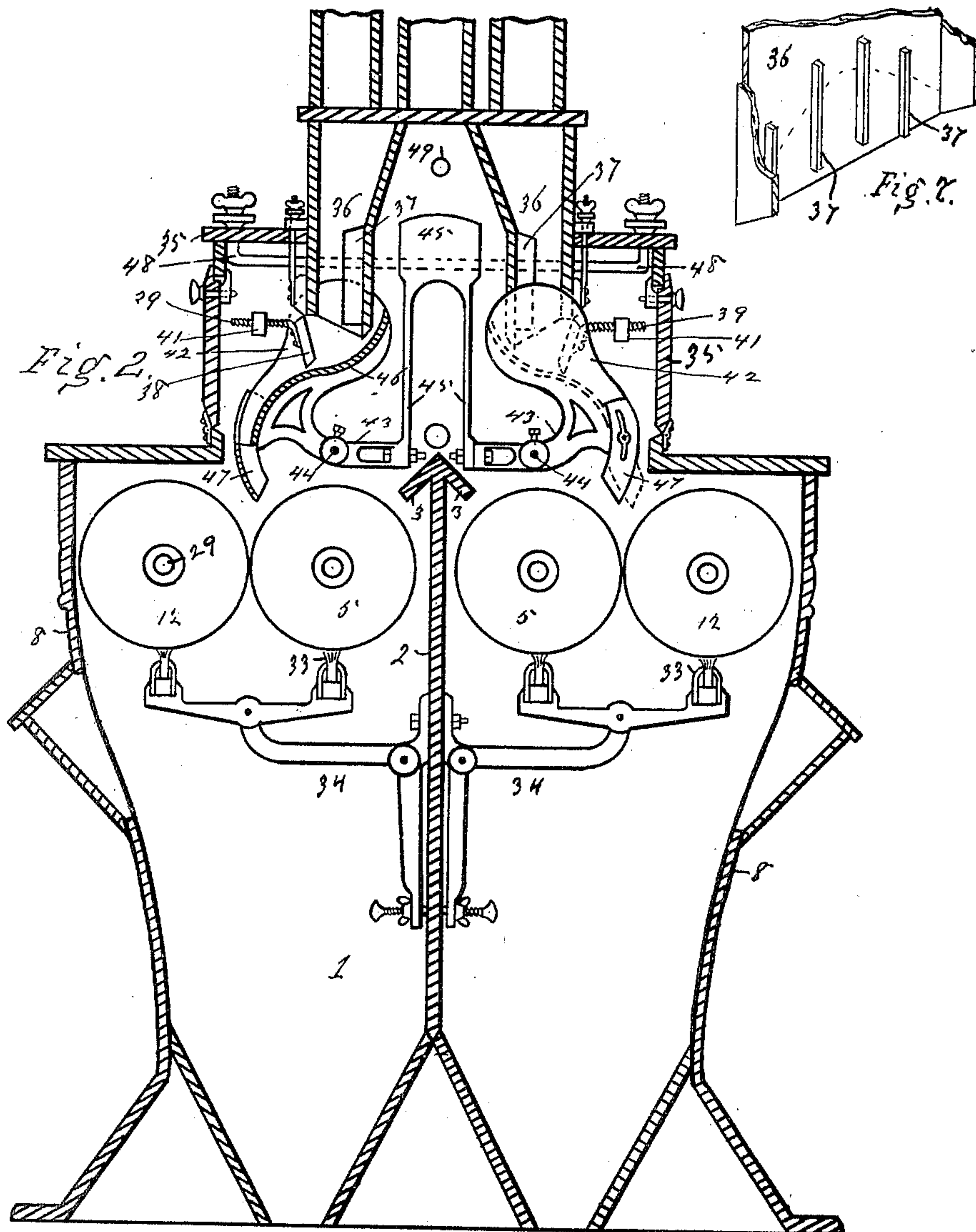
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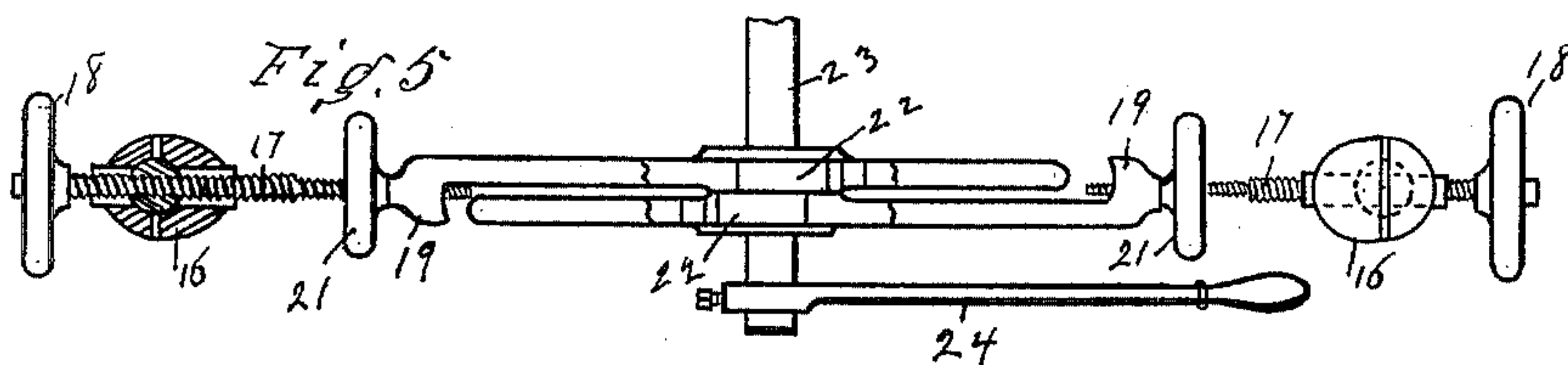
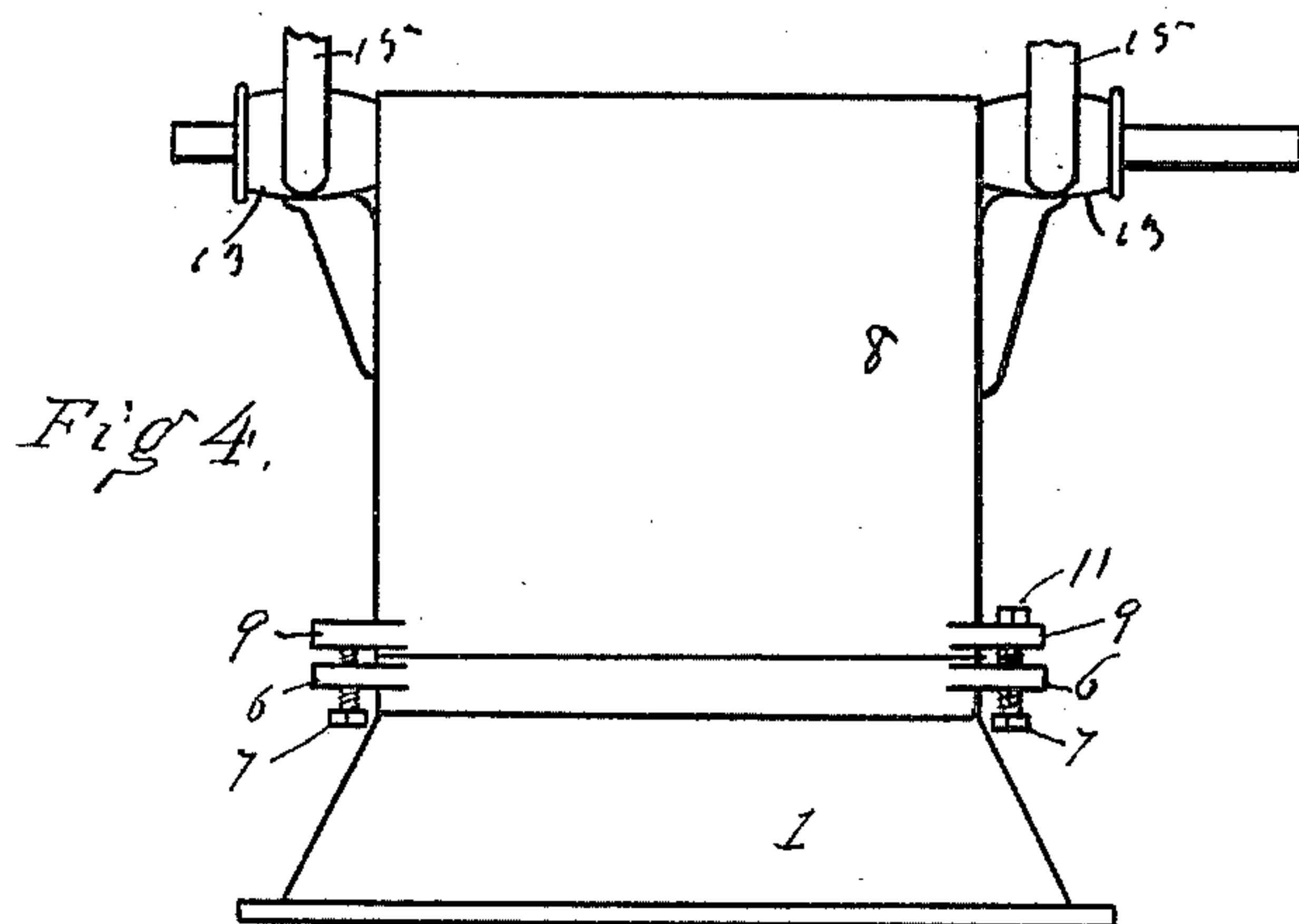
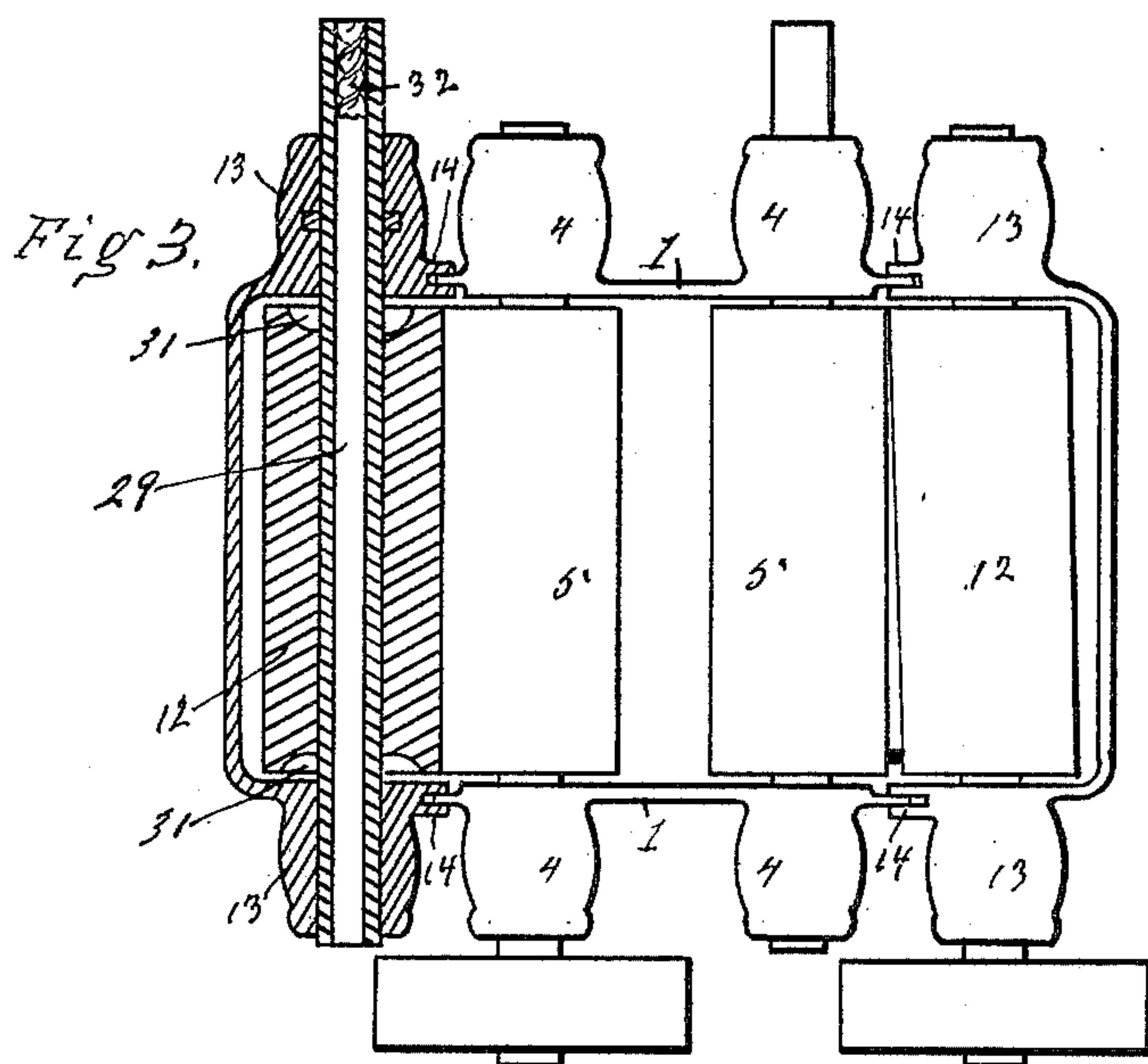
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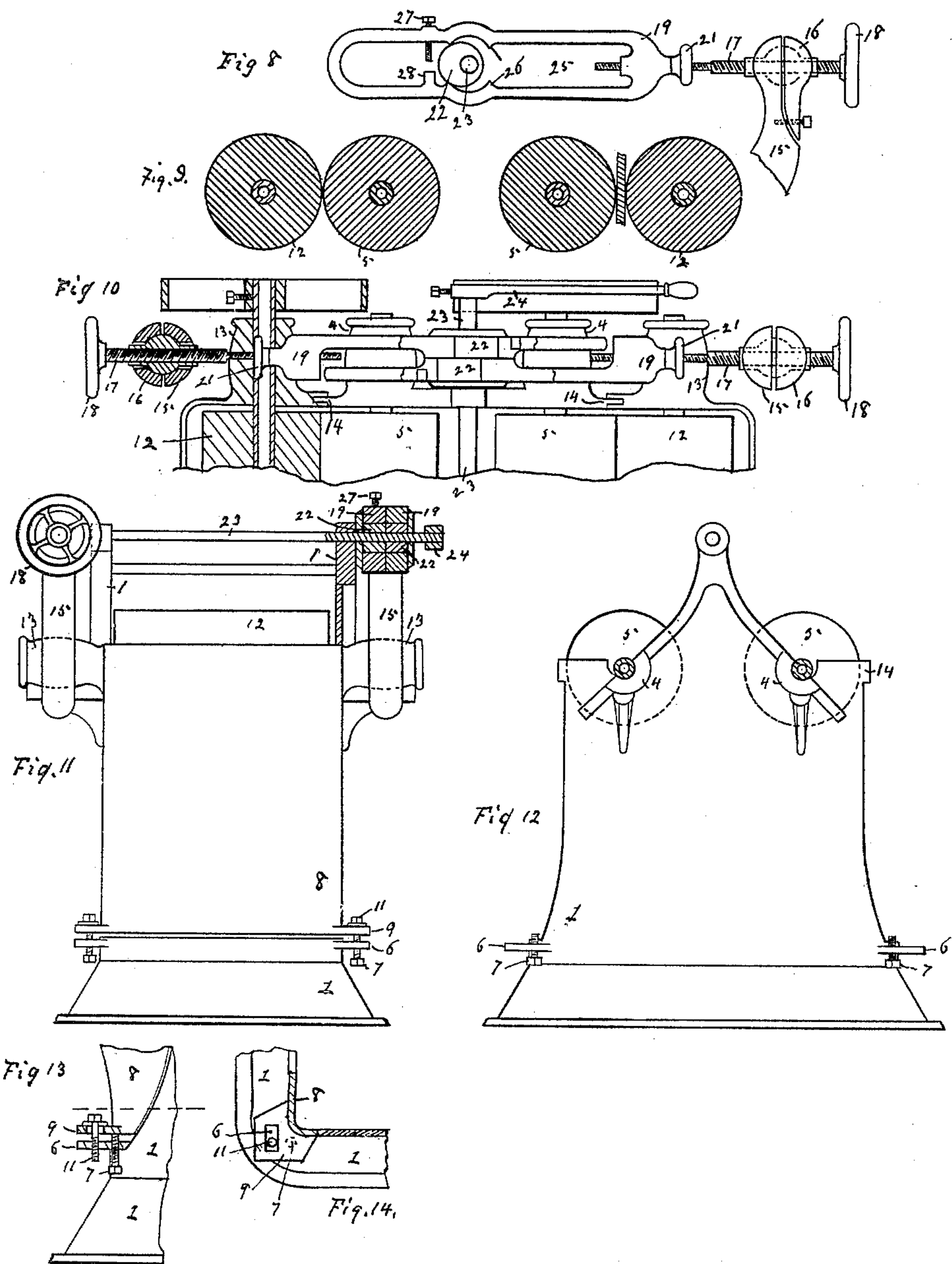
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(No Model.)

5 Sheets—Sheet 4.



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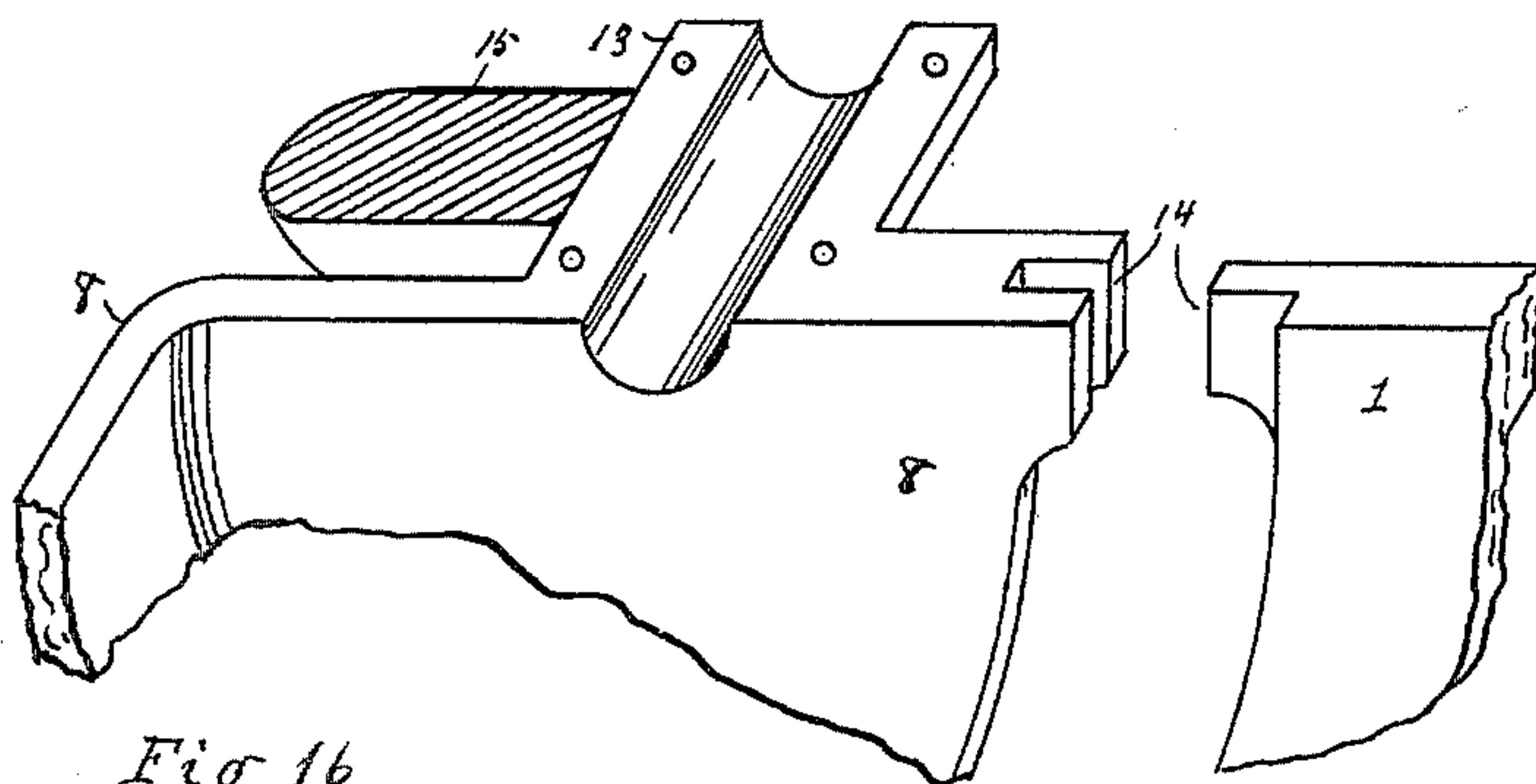
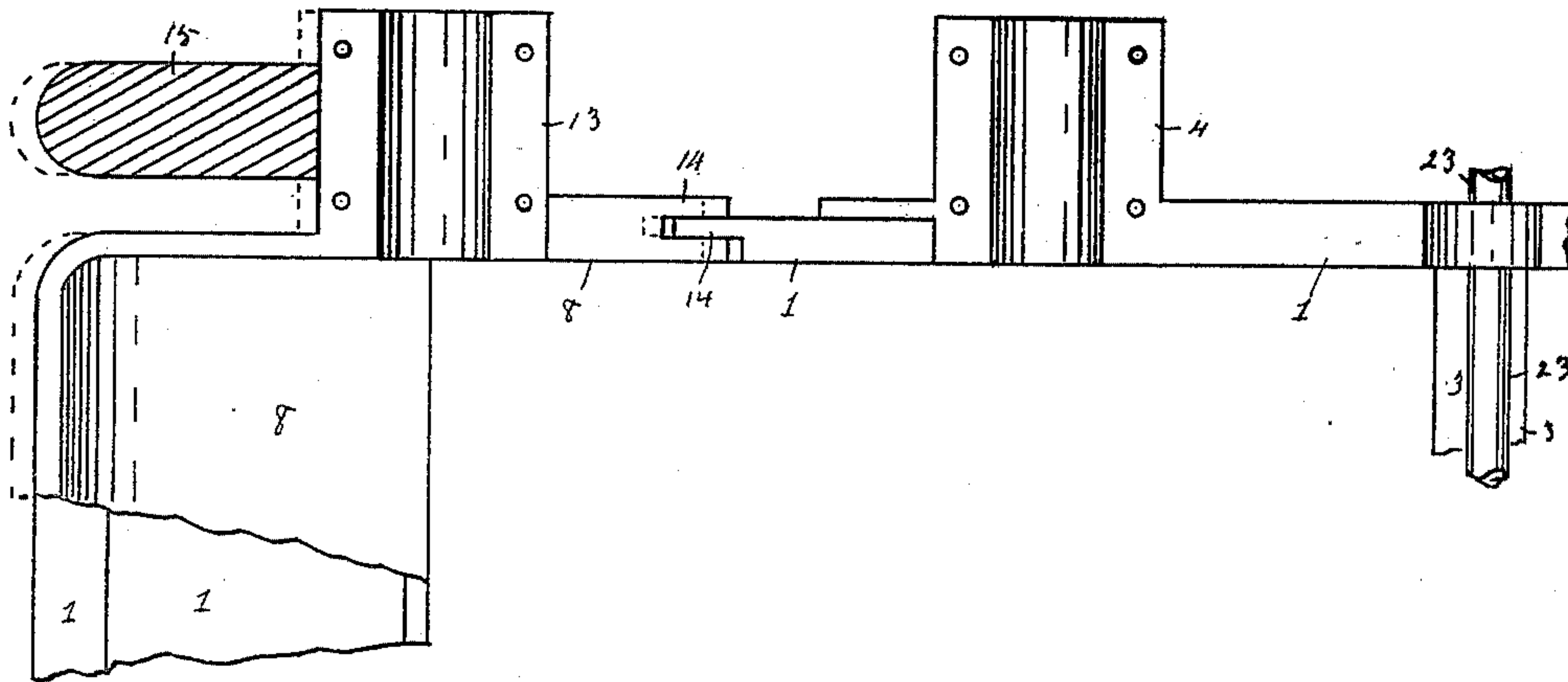
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By Robert S. Carr, Atty.

UNITED STATES PATENT OFFICE.

JOHN A. McANULTY, OF HAMILTON, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WALTER MORRIS, OF SHANDON, OHIO.

ROLLER GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 641,985, dated January 23, 1900.

Application filed December 8, 1897. Serial No. 661,130. (No model.)

To all whom it may concern:

Be it known that I, JOHN ARMSTRONG McANULTY, a citizen of the United States, residing at Hamilton, in the county of Butler and State of Ohio, have invented certain new and useful Improvements in Roller Grinding-Mills, of which the following is a specification.

My invention relates to roller grinding-mills; and the objects of my improvement are to provide more efficient feeding mechanism, to better adjust the grinding-rolls, to maintain the rolls in proper grinding contact, to provide for the separation of the rolls by the passage of hard substances between them without endangering the parts, and to cause the rolls to automatically resume their normal grinding position. These objects are attained in the following-described manner, as illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation; Fig. 2, a side elevation with parts shown in section; Fig. 3, a plan with parts shown in section of the mill with feeder removed; Fig. 4, a side elevation of the base with bracket thereon; Fig. 5, a plan of the yokes and connections with parts in section; Fig. 6, a side elevation of a yoke as connected to portions of the arm; Fig. 7, a perspective view of the vertical guides on the interior of a hopper-leg; Fig. 8, the link displaced on the eccentric; Fig. 9, a vertical transverse section of the grinding-rolls in grinding contact and displaced by foreign substance; Fig. 10, a plan, with parts in section, of the end portion of the mill with feeder removed; Fig. 11, a side elevation, with parts in vertical section, with feeder removed; Fig. 12, an end elevation of the base and stationary grinding-rolls; Fig. 13, an elevation, with parts in section, of portions of the end of the base and bracket thereon; Fig. 14, a sectional plan on the dotted line in Fig. 13; Fig. 15, a plan, with parts in section, of portions of the base and the bracket, showing the tongue-and-groove construction; Fig. 16, a perspective view from the interior, with parts in section, of portions of the base and bracket, showing the tongue-and-groove construction as disconnected.

In the drawings, 1 represents the base, formed hollow and with open fronts on op-

posite sides, as shown in Figs. 1, 12, and 13. Transverse partition 2 therein forms a support for certain parts and increases the rigidity of the base to resist the pull of the belts. Ribs 3 are extended downward and outward in opposite directions from the top edge of the partition. Bearings 4, formed on opposite ends of the base, support the stationary grinding-rolls 5, journaled therein. Supports or lugs 6 project from the respective corners of the base and are each provided with a tramming or adjusting bolt 7. Brackets 8, adapted in form to close the open fronts of the base, are constructed with transversely-slotted feet 9 to correspond or register with the respective front supports on the base. Said brackets are movably mounted on the base and vertically adjustable thereon by said tramming-bolts. Binding-bolts 11, movable in the slots in the feet, adjustably engage with the supports on the base. Said binding-bolts preferably intersect a line parallel with the front of the base and farther therefrom than the tramming-bolts. Movable grinding-rolls 12 are mounted in bearings 13, formed on opposite sides of the respective brackets and directly above tramming-bolts. The top portion of the brackets engages with the contiguous portions of the base by means of a tongue-and-groove construction 14 and in a manner to permit movement of the top of the brackets vertically and to or from the base and prevent any lateral movement of said top portion thereof. The bottom portion of the brackets, however, may be laterally adjusted on the tramming-bolts to the extent of the slots in the feet thereof, that the axes of the movable grinding-rolls may be adjusted or tipped to coincide with the plane of the axes of the respective stationary grinding-rolls mounted on the base. The lateral movement of its bottom portion tips the bracket out of perpendicular that its feet may rest on the points of the tramming-bolts when one of said bolts is adjusted in a higher plane than the other. The tongue-and-groove construction prevents lateral displacement of the top of the bracket. The tramming-bolts being wide apart and under the bearings 13 form a rigid support for the movable grinding-rolls against the pull of the belt.

The binding-bolts being situated in a line farther from the base use the tramping-bolts as fulcrums on which to tip and maintain the top of the bracket outwardly and the grinding-rolls apart in their adjusted position of grinding contact that they may not chatter or vary grinding contact under any unevenness in the material being ground. Arms 15 are formed integral with and extend above opposite sides of the respective brackets and each terminates in a ball-and-socket joint 16. Hand-screws 17, provided with hand-wheels 18, are adjustably threaded in the ball member of the respective joints 16. The end portions of said hand-screws are reduced in size and are adjustably threaded in the end of the respective closed links or yokes 19 by a finer thread than that portion in the balls. This provision of differential threads on the hand-screws permits delicate and precise adjustment of the grinding contact of the grinding-rolls and at either end thereof independently of the other. Lock-nuts 21 in the form of hand-wheels secure the parts in adjustment. Any lost motion in the hand-screw and link adjustment due to wear is taken up by the outward pull of the top of the bracket by the binding-bolts 11. Said links or yokes 19 are movably engaged with the respective eccentrics 22, mounted on opposite ends of throw-out bar 23. Said bar is journaled in bearings on the base and actuated by lever 24 thereon. By means of the bar and its connections with the brackets a uniform and simultaneous adjustment may be effected of both ends of the respective movable grinding-rolls in relation to the corresponding stationary grinding-rolls and independently of the adjustment of the same parts as provided for by the hand-screws. This adjustment by the throw-out bar may be used to compensate for possible expansion of the grinding-rolls due to heat or to change of fineness of the chop or meal and to better control the action of the mill during its operation. The said links are extended the same distance in opposite directions beyond the eccentrics and each formed with a longitudinal slot 25 therein and with curved surfaces 26 to engage with a corresponding eccentric on the throw-out bar. The respective curved surfaces are formed on the inner surface of the middle portion of opposite sides of the link and facing each other. The curved surfaces are formed or bored while the opposite sides of the links are forced apart, which causes them when released to forcibly approach each other and immovably grip the eccentrics. Adjusting-screws 27 in one side of the links engage with stops 28, projecting inwardly from the opposite side thereof and a short distance in the rear of the curved surfaces, to expand the links until the desired adjustment of the curved surfaces on the eccentric is obtained and until they resist further expansion under the normal strain of the rolls. The further expansibility of the links provides for a sudden forward jerk of either link

independently of the others in the emergency of foreign hard substances being passed between the grinding-rolls. This movement (shown in Fig. 8) partially displaces seats 26 from the eccentric or until limited by the contact of the eccentric with one of stops 28 and quickly and automatically resumes its normal position when the emergency is past by reason of the exertion of the clamping force of the sides of the link toward the eccentric between them being sufficient to pull and retain the respective movable grinding-roll in its normal grinding contact with the stationary roll.

The grinding-rolls are each formed hollow or with an axial opening 29 therethrough for the passage of cold air to better dissipate the heat generated by their action and to lessen the expansion of the ends of the rolls, due to overheating. For the same purpose the ends of the grinding-rolls are formed with concave recesses 31 to permit the air to circulate therein and around the journals between the ends of the rolls and their respective bearings. A ventilator 32 in the form of a spiral partition may be inserted in the axial opening of the respective grinding-rolls to cause a current of air to be passed rapidly therethrough by the speed of the rolls. Roll-cleaning devices provided with brushes 33 are mounted within the base and on lever mechanism 34, attached to partition 2, and adjustable by means of the usual thumb-screws and lock-nuts.

Feeder-case 35 is removably mounted on the top of the base 1. Hopper legs or spouts 36, corresponding in length with the grinding-rolls, depend through the top of and within the case. A series of vertical guides 37, formed therein, serve to prevent the separation of the lighter from the heavier particles of the mass in its passage therethrough and to maintain a substantially uniform gravity consistency thereof throughout the extent of its discharge. This provision prevents the lighter particles of the mass becoming separated from the heavier and gravitated toward the ends of grinding contact between the rolls. Gates 38 are hinged on the front of each hopper-leg to a block that is vertically adjustable by means of bolts extending therefrom and without the top of the case. Arms 39 on the respective gates project perpendicularly therefrom and in an approximately horizontal direction, as shown in Figs. 2 and 15. Weights 41 are adjustable on each arm to prevent the gates being opened too easily or remaining open, and to regulate the passage thereunder of the grain. Feeder-shoes 42 are formed with rearwardly-projecting heels 43 and pivotally mounted by pivots 44 within the feeder-case and on a line directly beneath its respective hopper-legs. The heels extend beyond the pivots and each terminates in engagement with a pitman 45. Flanges raised on the rear portion and ends of the shoes inclose the lower portion of the corresponding parts of the hopper-legs. The top surface of that portion of

the apron or bottom 46 of the shoes directly under the hopper-legs is formed concave, while the forward portion of the shoe-aprons, movable directly under gates 38 and terminating without the line of the hopper-legs, presents a convex upper surface formed on the line of an arc described from the axis of the pivots 44 to discharge a continuous stream of material on the line of grinding contact between the rolls. Supplemental aprons or lips 47, formed with the same curve as the convex portion of the apron of the shoes, are adjustably secured to the end flanges raised on the respective shoes to interrupt and change the course of the grain in its descent from the shoe toward either of the grinding-rolls and on a line more or less distant from and parallel to the line of grinding contact between them.

A forked or bifurcated pitman 45, with flexible depending legs, is rigidly secured to each of the horizontal spring-bars 48. One of said bars is secured by its ends on each side and to the top of the feeder-case and is vertically adjustable thereon. The extremities of the legs of the pitmen are rigidly secured to the extremities of the corresponding shoe-heels. Feeder-shaft 49, journaled in bearings on the feeder-case, carries an annular series of cams or knockers 51 on each of its ends to simultaneously and successively engage with the respective pitmen 45. The action of the cams on the pitmen and the yielding reaction of the spring-bars impart intermittent vertical motion to the pitmen, that is transmitted by them to the shoes in the form of radial vibratory motion on their respective pivots 44. This motion of the shoes causes their concave rear portions to agitate the contents of the hopper-legs to act and react against the gates and become more rapidly and evenly distributed throughout the length of the gate-openings. The motion of the convex portion of the shoe carries the grain or stock toward the grinding-rolls in the arc of vibration and tends to dissipate any unevenness due to its intermittent passage under the gates and to deposit it in even and continuous sheets on the lips 47, that thence distribute it in like condition to the grinding-rolls.

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

1. The combination with a base formed with an open front, with tongues projecting forwardly from the top portion of its respective sides and with supports projecting forwardly from the lower portion of its front corners and tramming-bolts threaded in the supports of a

bracket formed with grooves in the top portion of its edges adapted to movably engage with the tongues on the base and with slotted feet on the lower portion of its corners to correspond with the supports on the base, said bracket being mounted on the tramming-bolts and arranged to close the open front and binding-bolts threaded in the supports and adjustably engaging with the feet through the slots therein.

2. The combination with a base provided with a grinding-roll and formed with an open front and with supports projecting from its opposite front corners, tramming-bolts threaded in the supports, a bracket adapted to close the open front of the base and formed with bearings wherein a grinding-roll is journaled, slotted feet projecting from the base of the bracket under the bearings and movably engaging with the tramming-bolts of binding-bolts adjustable in the slots in the feet and threaded in the supports and nearer the ends thereof than the tramming-bolts, whereby the adjustment of the grinding contact of the rolls is maintained.

3. In a roller grinding-mill, the combination with a movable roll of an expansible link formed with curved seats on the middle portion of its sides and adapted to engage with an eccentric, a stop projecting inwardly from the rear portion of one of its sides to limit the extent of displacement of the seats on the eccentric an adjusting-screw in the other side to engage with the stop to separate and maintain the seats in proper engagement with the eccentric and differential adjusting mechanism connected with the roll-bearing and engaging with the front end of the link to regulate the grinding contact of the rolls.

4. The combination with a movable roll and its bearing, of a closed link having its opposite sides formed with a tendency to spring together or forcibly approach each other, and having curved seats on their adjacent faces facing each other to movably engage with an eccentric, a stop projecting inwardly from one side of the link to limit the extent of the displacement permitted of the seats on the eccentric an adjustable screw in the other side of the link and detachably engaging with the stop to relieve the eccentric of the clamping pressure of the seats, to resist their further separation under normal duty.

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Witnesses:

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