

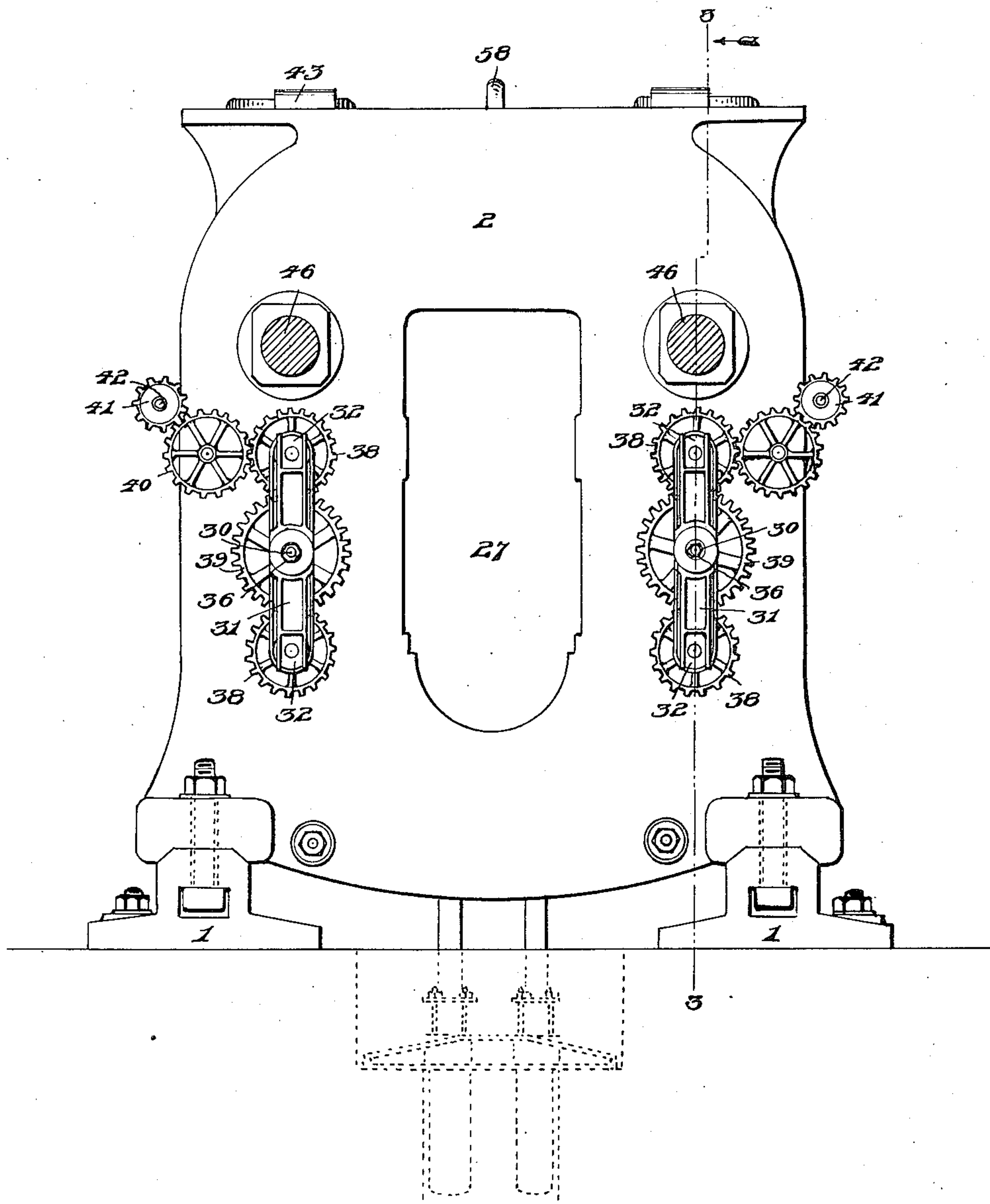
No. 846,825.

PATENTED MAR. 12, 1907.

V. CHARTENER.
UNIVERSAL ROLLING MILL.
APPLICATION FILED OCT. 28, 1903.

5 SHEETS—SHEET 1.

FIG. 1.



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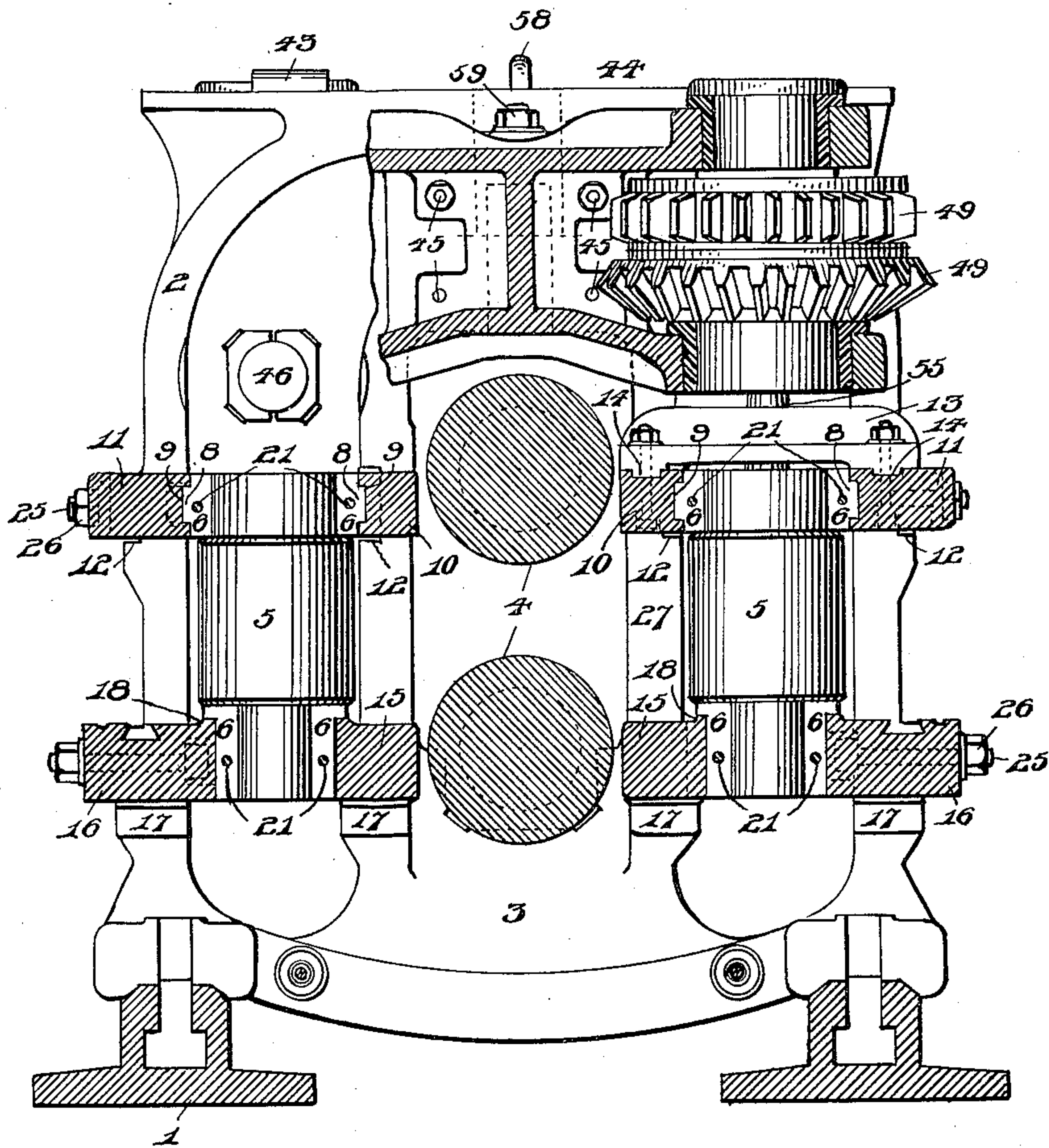
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5 SHEETS—SHEET 2.

Fig. 2.



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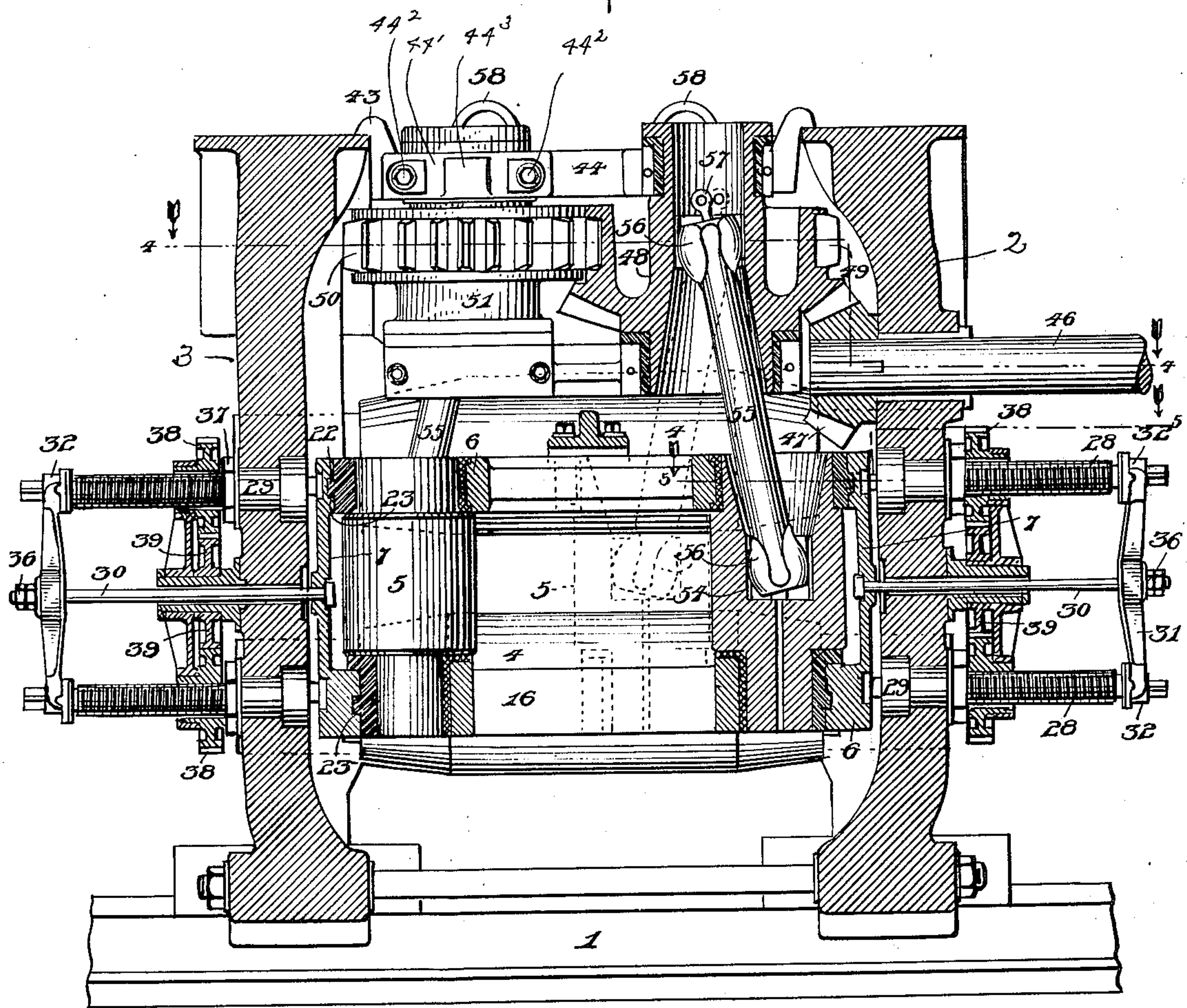
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5 SHEETS—SHEET 3.

Fig. 3.



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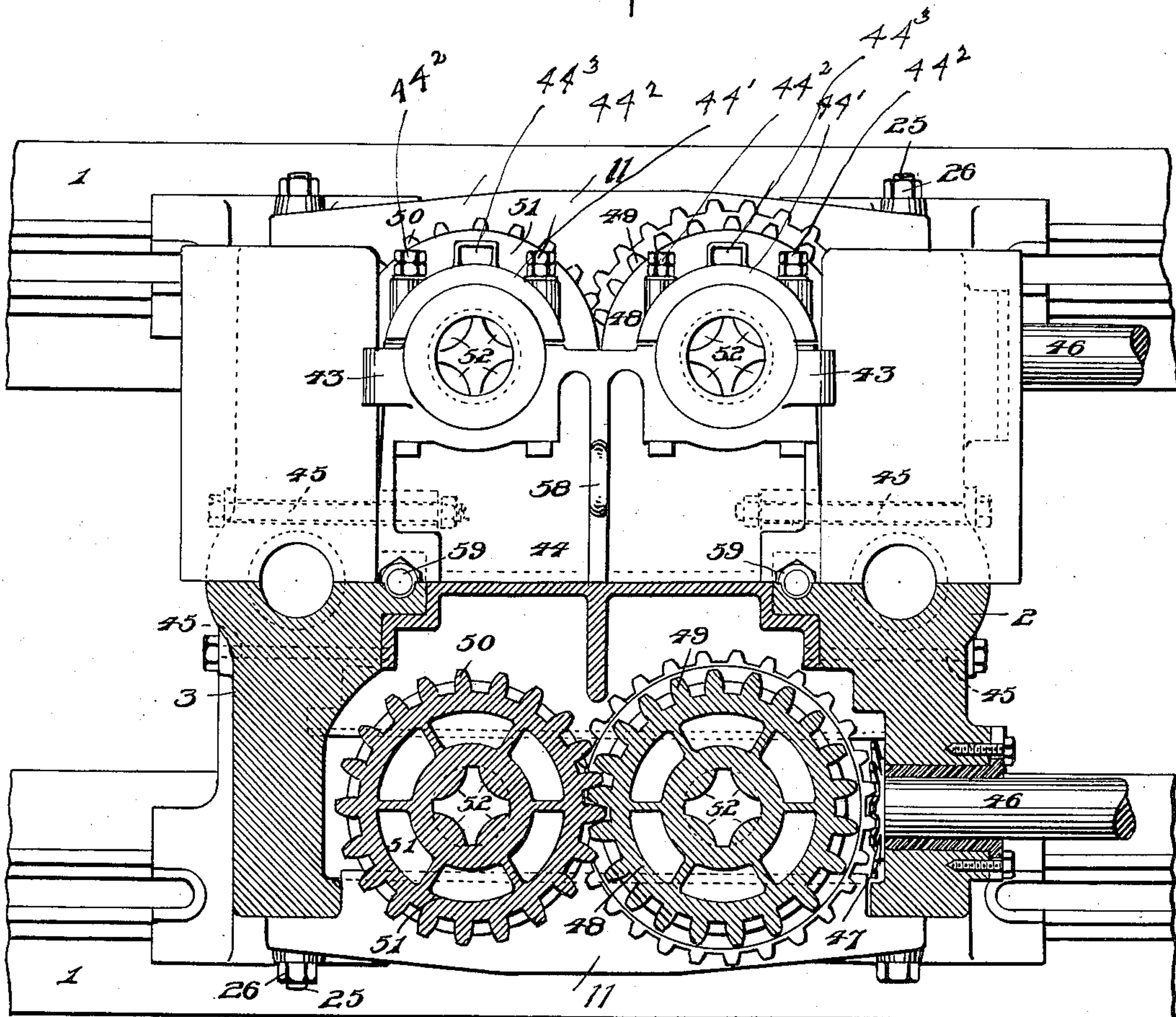
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5 SHEETS—SHEET 4.

Fig. 4.



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5 SHEETS—SHEET 5.

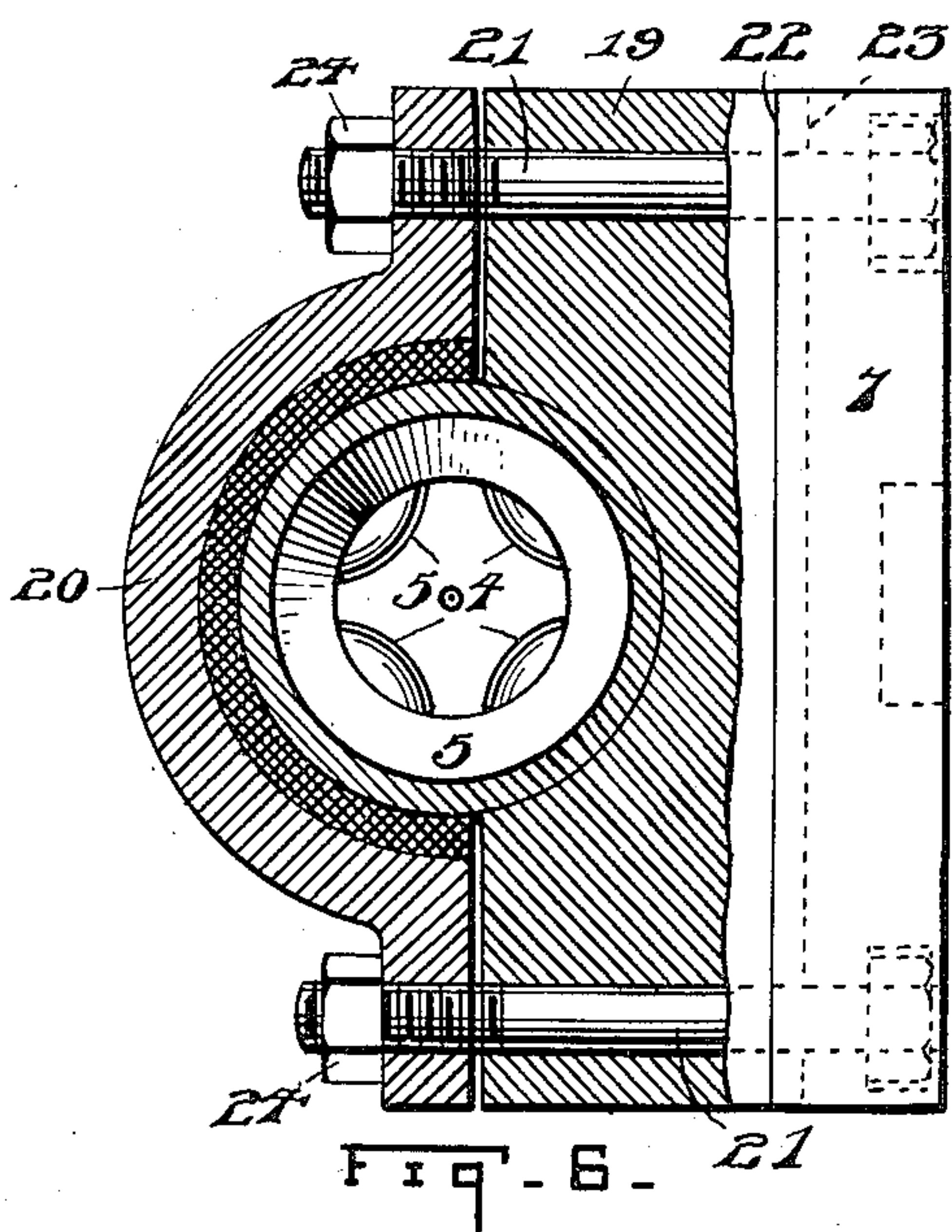


Fig. 6.

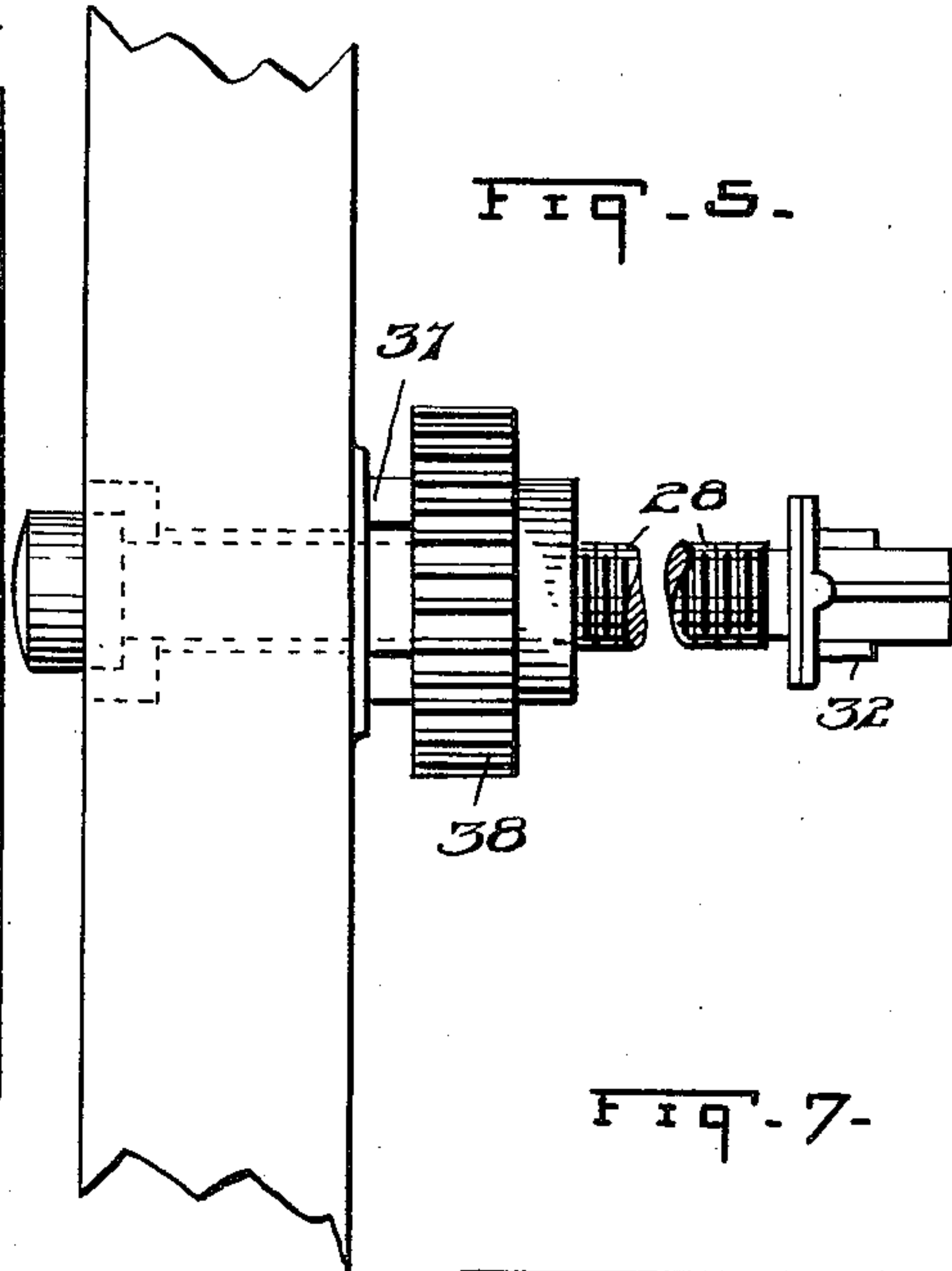


Fig. 5.

Fig. 7.

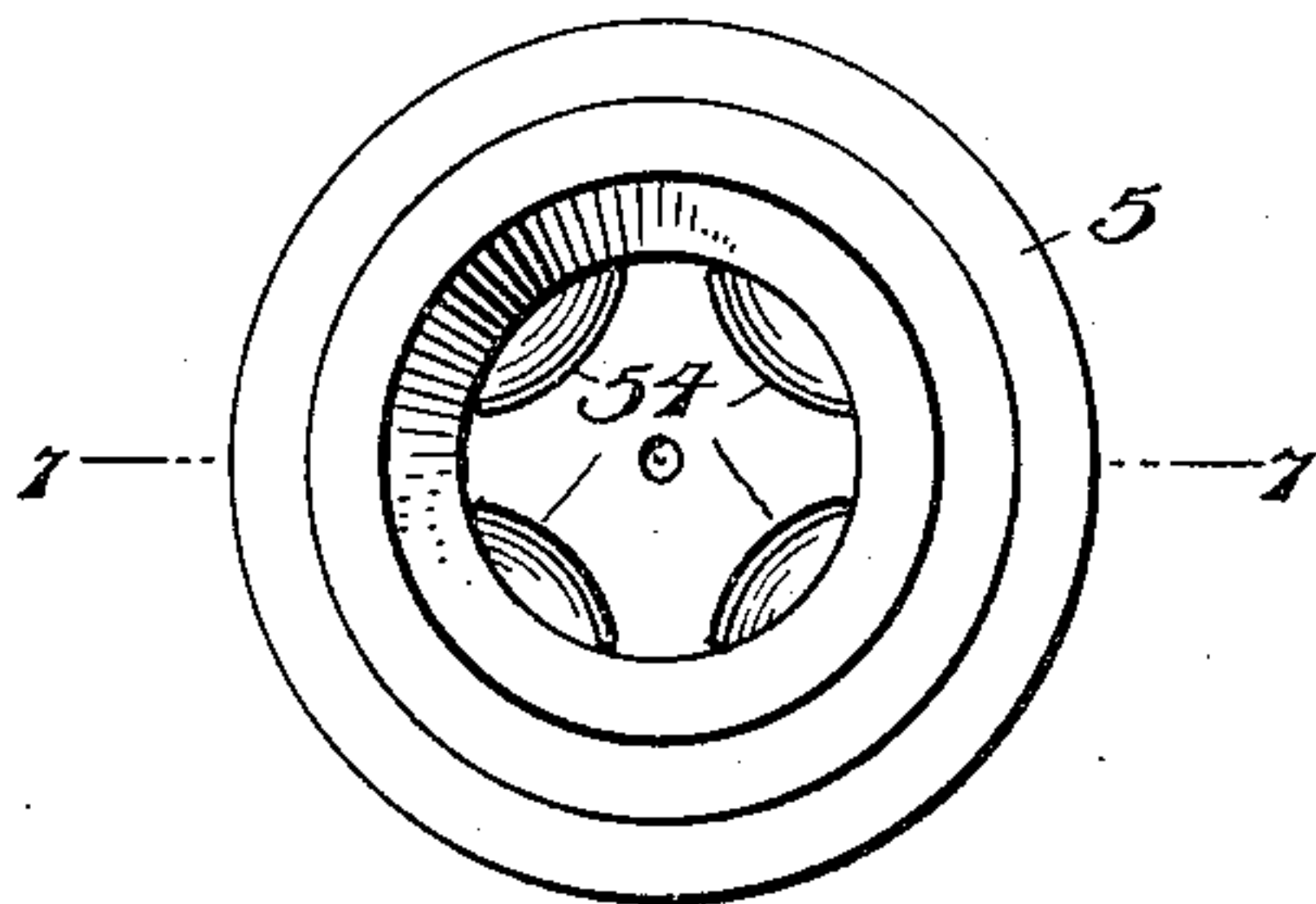


Fig. 8.

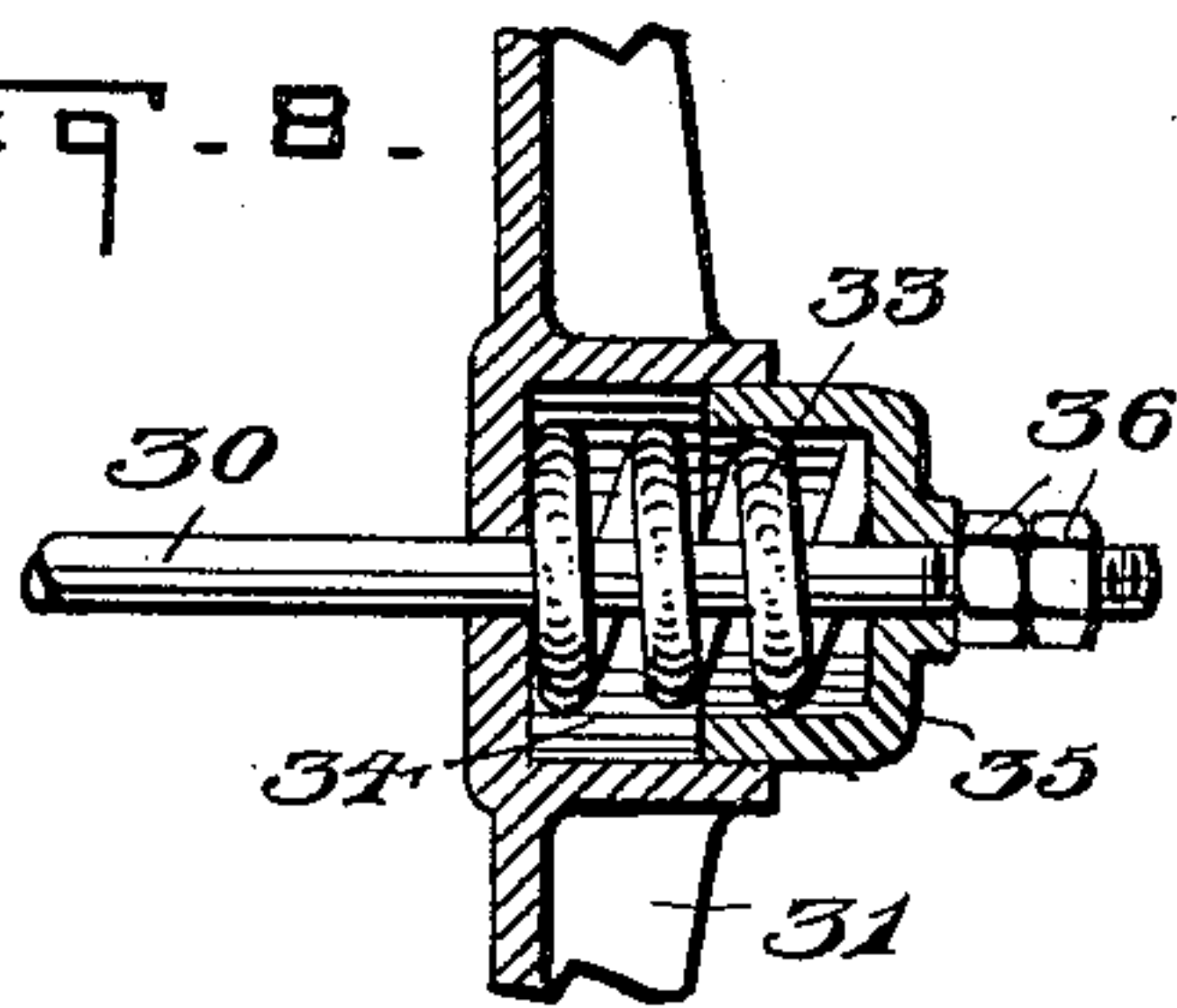


Fig. 9.

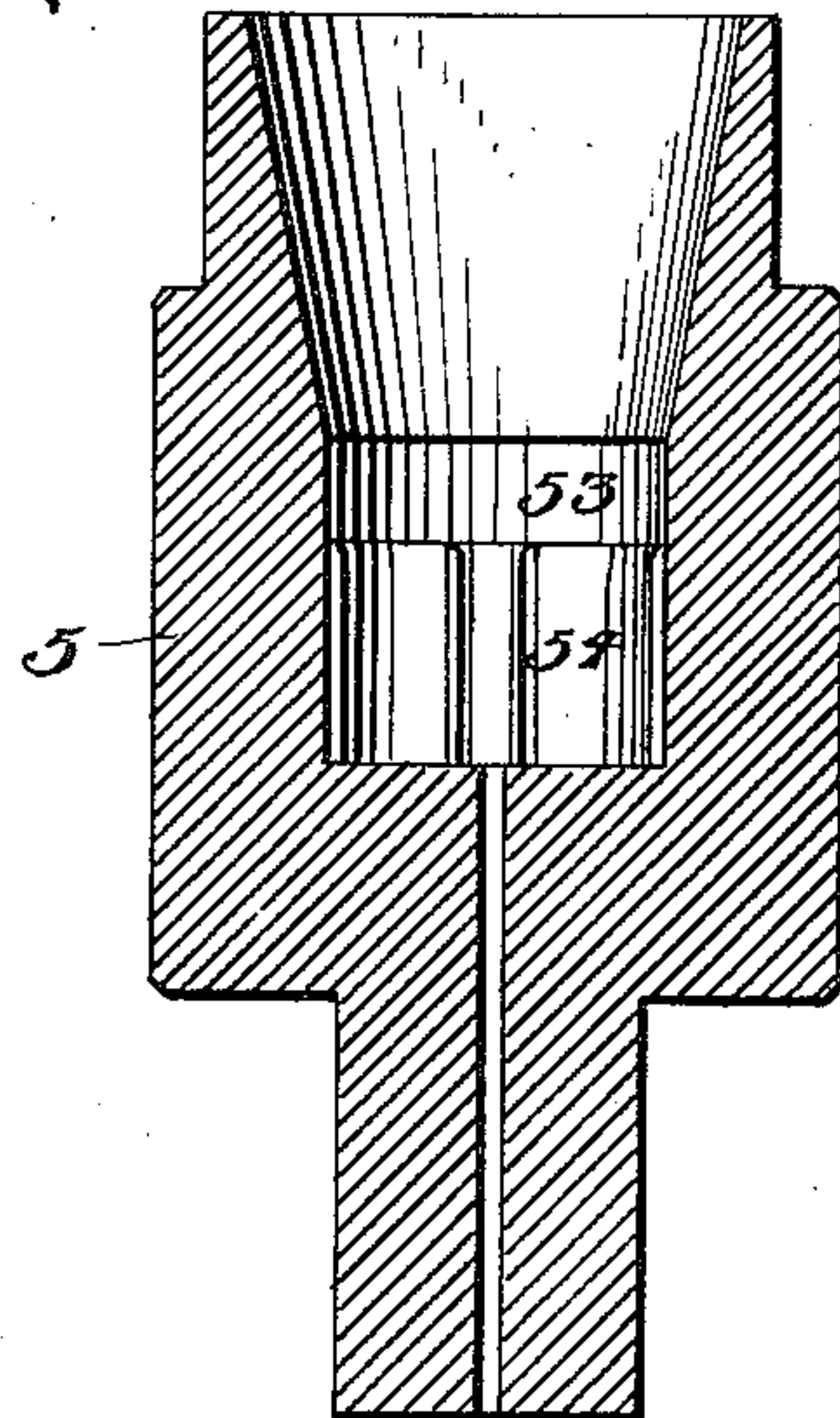
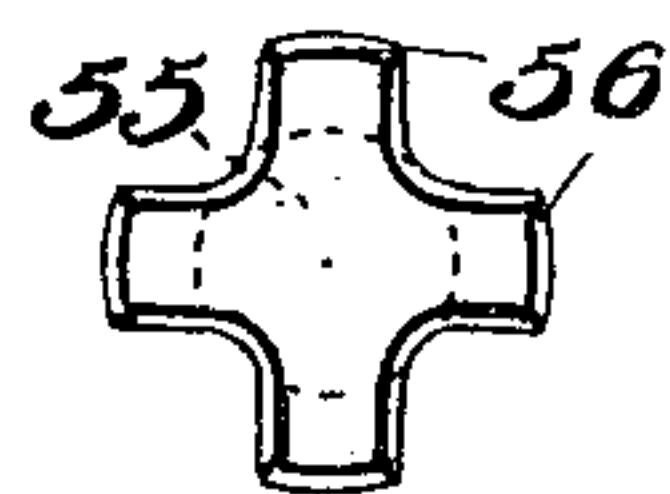


Fig. 10.

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UNITED STATES PATENT OFFICE.

VICTOR CHARTENER, OF PITTSBURG, PENNSYLVANIA.

UNIVERSAL ROLLING-MILL.

No. 846,825.

Specification of Letters Patent.

Patented March 12, 1907.

Application filed October 28, 1903. Serial No. 178,952.

To all whom it may concern:

Be it known that I, VICTOR CHARTENER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered new and useful Improvements in Universal Rolling-Mills, of which the following is a specification.

My invention relates to universal mills.

10 In universal mills it is common to drive the vertical rolls by means of bevel gear-wheels mounted movably on horizontal shafts reaching from one housing to the other. With bevel gear-wheels on the tops of the
15 vertical rolls it is found in practice that the wheels must be so large that they will not permit the rolls to approach each other closely, as small wheels are subject to frequent breakage. In some instances in order to obviate
20 this difficulty a roll has been inserted between the two rolls so geared, the intermediate roll being frictionally driven from one of the geared rolls. This introduces an additional element of considerable expense and
25 complication. In other cases the gearing for one of the rolls has been placed below that roll; but this arrangement has not been satisfactory, as the gearing becomes clogged and cut by scale and is not easy of access.

30 It is among the objects of my invention to provide a rolling-mill whose vertical rolls may be positively driven without the use of bevel-gearing thereon and without the employment of the intermediate or third roll.
35 Another object thereof is to provide a universal mill whose rolls, both vertical and horizontal, may be readily removed with a minimum loss of time.

Referring to the drawings, Figure 1 is an
40 end view of a rolling-mill which includes my invention, the horizontal rolls being omitted; Fig. 2, a vertical transverse section of the mill, taken through the bearings of a pair of vertical rolls on opposite sides of the horizontal
45 rolls, the vertical rolls and one corner of the housing 2 being shown in elevation; Fig. 3, a longitudinal section of the mill, taken on the line 3 3 of Fig. 1, parts being shown in elevation; Fig. 4, a view half in plan and half in
50 horizontal section, the section being taken on the line 4 4 of Fig. 3 and the horizontal rolls being omitted; Fig. 5, a view partly in plan and partly in horizontal section, the section being taken on line 5 5 of Fig. 3; Fig. 6, a top
55 plan view of one of the vertical rolls; Fig. 7, a vertical section of one of the vertical rolls,

taken on the line 7 7 of Fig. 6; Fig. 8, a section of the means for taking up the wear between the screws and the frame carrying the vertical rolls; Fig. 9, a side elevation of the means for driving the vertical rolls, and Fig. 10 and end view of Fig. 9.

On the drawings I show a pair of shoes 1 of ordinary construction, on which are mounted end standards or housings 2 and 3. 65 Mounted centrally in the housings are the two horizontal rolls 4, one above the other. On each side of said rolls are a pair of vertical rolls 5, whose necks are mounted in the horizontal arms 6 of the frames or carriers 7. 70 The upper arms 6 are provided at their ends with tongues 8, which fit in the horizontal grooves 9 in the upper guiding and supporting bars 10 and 11 for the rolls 5. The bars 10 and 11 are supported on the lugs or 75 shoulders 12 on the housings 2 and 3, one pair of rolls 5 being guided by one pair of bars 10 and 11 and the other pair of rolls 5 being guided by the remaining pair of bars 10 and 11. The two bars 10 and 11 of each 80 pair are held properly spaced by the yoke, tie, or cross piece 13, which is bridged across and bolted to the bars and has a tenon-and-mortise connection 14 therewith, as shown in Fig. 2.

85 It has been the practice in many instances to place a tie-piece directly between the guide-bars; but when this is done the rolls when constructed with the body, necks, and housings of practical proportions prevent 90 the contact of the rolls or their close approach for rolling very thin material and prevent the passing of one roll beyond the transverse center of the guide-bars. In Fig. 3 I show in dotted line the right-hand roll 95 with portions to the left of the said center of the guide-bars and under the tie or yoke 13. These are distinct advantages which have not heretofore been recognized by any of the highly-skilled inventors in the art of 100 rolling-mills.

The lower arms 6 of the frame 7 are guided between the pairs of guiding and supporting bars 15 and 16 for the rolls 5, the bars resting on the lugs 17 on the inner faces of the housings 2 and 3. The arms 6 have shoulders 18, which rest on said bars. 105

The arms 6 constitute journal-boxes for the rolls 5 and are composed of the brass blocks 19 and the caps 20, secured together by bolts 110 21, as shown in Fig. 6. The blocks 19 have tenons or tongues 22, seated in correspond-

ing mortises or grooves 23 in the body portion of the frames 7. The caps are clamped in place on the bolts by means of the nuts 24.

The ends of the bars 11 and 16 overlap the housings 2 and 3 and are secured thereto by the bolts 25, having the nuts 26.

When it is desired to remove the vertical rolls, the nuts 26 are unscrewed and the yokes or cross-pieces 13, the bars 11 and 16, the nuts 24, and caps 20 are removed. The rolls 5 may then be moved toward the interior of the machine to free them from the blocks 19, whence they may be taken out at the sides of the machine between the two standards or housings. The blocks 19 will remain in place by reason of bolts 21 and the tongues 22 and grooves 23.

The rolls 4 may be removed endwise through the openings 27 in the housings 2 and 3.

The vertical rolls are each moved horizontally when in use by means of a pair of screws 28, slidable in the nuts 29, fixed in the housings. The inner ends of the screws bear against the outer faces of the frames 7, and bolts 30, passing through the housings 2 and 3, connect the frames 7 to the yokes 31, whose ends rest pivotally on collars 32 on the outer ends of the screws. Each rod is surrounded by the spring 33, seated in the socket 34 in a yoke 31. A cap-piece 35 rests on the outer end of each spring 33, which is compressed by nuts 36, turned up against the outer face of the cap 35, in order to keep each frame 7 in constant contact with the ends of the screws 28. As the ends of the screws 28 or their bearings on the frames 7 wear the springs 33 will expand and automatically take up the slack or wear. The screws are moved lengthwise by means of geared nuts 37, splined thereon and provided with gear-wheels 38, which are connected by the intermediate gear-wheel 39. The upper wheels 38 mesh with the wheels 40, which are driven by the gear-wheels 41 on the shafts 42, rotated by any suitable means.

I make no claim herein to the roll-adjusting mechanism just described, as it forms no part of the subject-matter of the present invention.

Lying between the upper ends of the housings 2 and 3 and supported thereon by the lugs 43 is a frame 44, secured to the said housings by the bolts 45. This frame ties the upper ends of said housings together and forms a housing for several gear-wheels presently to be described.

Supported in the housing 2 on each side of the opening 27 are two shafts 46 in the same vertical planes as the vertical rolls 5. These shafts extend through only one housing and have at their inner ends bevel gear-wheels 47, which intermesh with vertical hollow gear-wheels 48, journaled in the frame 44 and

lie against or near the inner face of one of the housings, as 2. The shaft 46 does not extend across the whole space between the housings, but extends into the space between the housings sufficiently far to support the gear-wheels 47. By having the shaft extending through one housing only the space between the housings is left free for the removal upwardly of the mechanism thereto between and for facilitating access to the interior of the mechanism for repairs and other purposes. The gear-wheels 48 have thereon a set of spur gear-teeth 49, which mesh with corresponding teeth 50 on the hollow gear-wheel 51, the latter being journaled in the frame 44 and having its axis vertical.

The gear-wheels 48 and 51 are held in place in the frame 44 as shown in Figs. 3 and 4, where the bearings for the wheels are each in two parts each recessed to fit the neck or journal of the wheel. One of the parts 44' is secured to the other or main part of the frame by the bolts 44². Handles 44³ are provided for the removable parts of the bearings.

The interior of the gear-wheels 48 and 51 are provided with inwardly-projecting gear-teeth 52, whose ends or faces are arcs of circles, as shown on Fig. 4. The rolls 5 have a deep recess 53 extending from their tops down into the body thereof, the bottom of the recesses having gear-teeth 54 like the internal teeth in wheels 48 and 51.

A vibrating or gear spindle 55 rests on the bottom of each recess 53 and extends up into a recess in the bottom of the wheel 48 or 51 which corresponds with and drives the roll. Each spindle has its ends provided with gear-teeth 56, which mesh with the teeth 52 and 54. The tops of the rolls 5 and the bottoms of the gears 48 and 51 are made flaring in their interiors in order to allow the rolls 5 to move horizontally in their guides 10, 11, 15, and 16 beneath their corresponding driving-wheels 48 and 51 while still intergeared. The recesses in the wheels 48 and 51 are extended up through the tops thereof and are large enough to permit the driving-spindles to be drawn up through or into them. The teeth on the spindles are curved both longitudinally and transversely in order to allow the same to rotate while inclined or connecting members not in a vertical line. The upper ends of the spindles have eyes 57, by which they may be pulled up through the extensions of the recesses in the wheels 48 and 51.

The bottoms of the wheels 48 and 51 are sufficiently far above the tops of the vertical rolls so as not to interfere with the removal of the latter after the bars 12 and 16 have been taken off. All that it is necessary to do to remove the vertical rolls laterally from the mill is to take off the bars 12 and 16 and pull the spindles up through the wheels 48 and 51

so that the spindles shall be clear of the rolls. This easy removal of the vertical rolls cannot be accomplished with the usual rolling-mill, where the rolls are provided with bevel-gears meshing with bevel-gears on a horizontal shaft. In the latter case the bearings for the bevel-gears must be secured together, so that the bevel-gearing will remain in mesh during the lateral movement of the rolls. It is therefore in such case necessary to remove the said shaft in order to get the bevel-gearing out of mesh, since the rolls cannot be moved sidewise out of the mill with the said gearing intermeshed. This process is very slow, causing long delays in all of the mill departments depending on the continuous action of the mill. By my mill there need be no delay worth mentioning caused by the disconnection of the rolls and their immediate driving connections, as the spindles can be pulled out by an overhead crane or otherwise within a very few minutes.

The frame 44 is provided with eyes or loops 58, by which it may be lifted out of the machine after the bolts 45 and the top clamping-nuts 59 have been removed, so that the rolls 4 or 5 and the interior of the machine may become accessible for any purpose. Before the frame 44 can be lifted the sections 44' of the bearings of the wheels 48 and 51 and the said wheels must be removed. This is an easy matter. The said sections will be readily removed by the handles 44³ after the nuts have been screwed off from the bolts 44².

I do not desire to be restricted to the precise details of my invention shown and described, but such protection on all such modifications as may fairly come within the scope thereof.

I would not be restricted to a construction which requires the driving-shaft to extend through one housing only except where this is specifically claimed, as the other features of my invention may be retained while the wheels 48 and 51 are driven otherwise.

Having described my invention, what I claim is—

1. In a rolling-mill, a pair of housings, a pair of vertical rolls, a driving-shaft extending through and terminating near one of the

housings, stationary roll-driving wheels operatively connected to said shaft and rolls and located above the rolls, and means for adjusting the rolls transversely of their axes.

2. In a rolling-mill, a pair of housings, a pair of vertical rolls, a driving-shaft extending through and terminating near one of the housings, stationary roll-driving wheels operatively connected to said shaft and located above the rolls, means for adjusting the rolls transversely of their axes, and wabblers connections between the rolls and the wheels.

3. In a rolling-mill, a pair of vertical rolls adjustable transversely of their axes, a pair of driving-wheels located above the rolls and driving connections between the rolls and wheels, one of the parts connected by the driving connections having an opening through which the latter may be withdrawn.

4. In a rolling-mill, a roll having an opening provided with gear-teeth, a driving-wheel having an opening extending through it and provided with gear-teeth and a roll-driving spindle seated in the openings in said roll and wheel and having teeth gearing with the teeth in said roll and wheel, the opening in the wheel being sufficiently large to permit the withdrawal of the spindle therethrough to disconnect the roll and wheel.

5. In a rolling-mill, a pair of housings, a set of vertical rolls journaled therein, means for driving the same readily detachable therefrom, and a removable frame carrying said driving means and located above the rolls and between the housings.

6. In a rolling-mill, a housing, a pair of vertical rolls supported thereby, means for adjusting the rolls toward or away from each other, stationary gearing for driving said rolls, wabble connections between the rolls and the driving-gearing, and a single frame removably secured to the mill-housing and serving as a housing for said gearing.

Signed at Pittsburg this 20th day of October, 1903.

VICTOR CHARTENER.

Witnesses:

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A. M. STEEN.