

J. KENNEDY.
UNIVERSAL MILL.
APPLICATION FILED MAY 31, 1902.

6 SHEETS—SHEET 1.

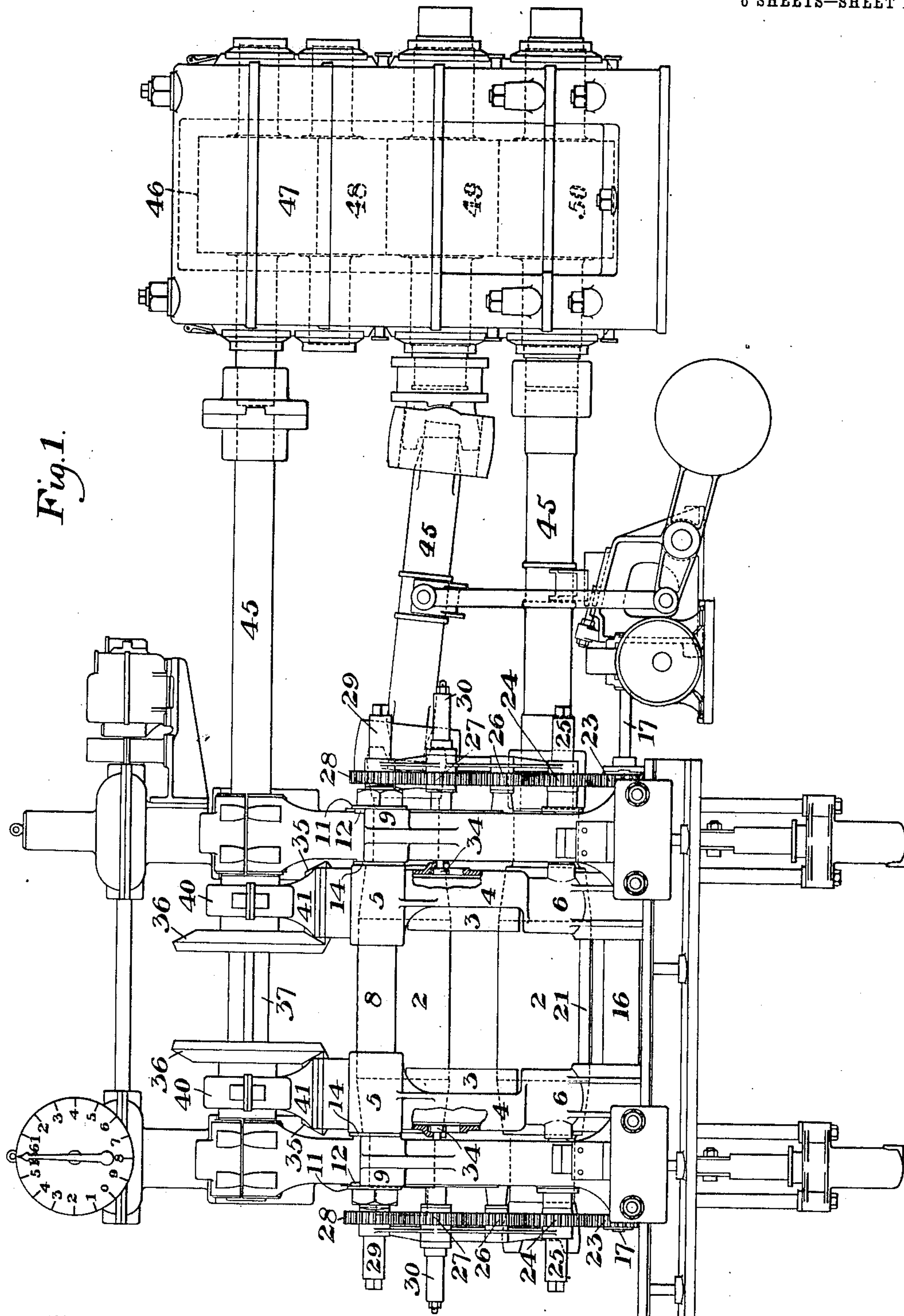


Fig. 1.

WITNESSES

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INVENTOR

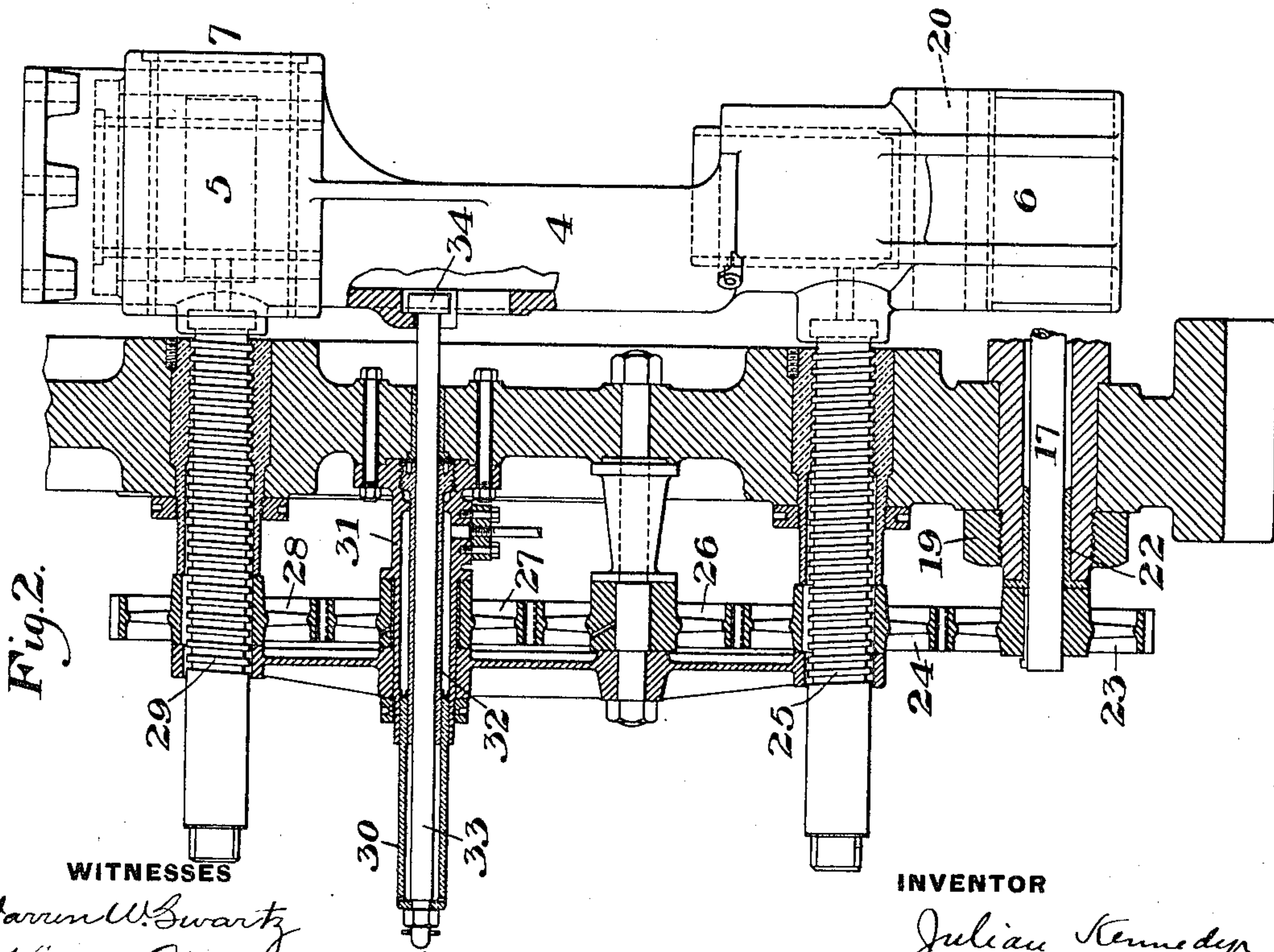
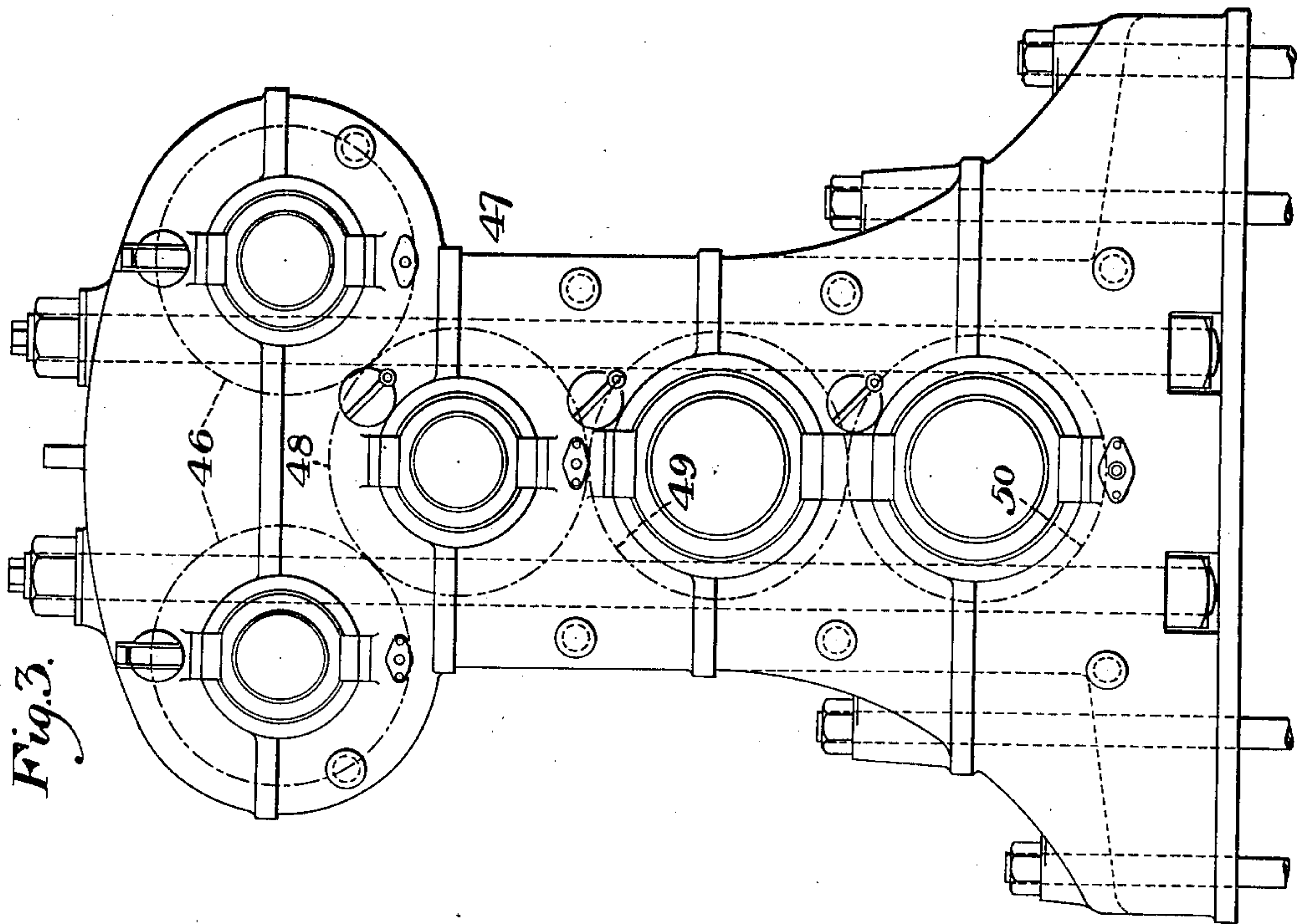
Julian Kennedy
by Barlow & Byrnes
his attys.

No. 825,657.

PATENTED JULY 10, 1906.

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6 SHEETS—SHEET 2.



WITNESSES

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6 SHEETS—SHEET 3.

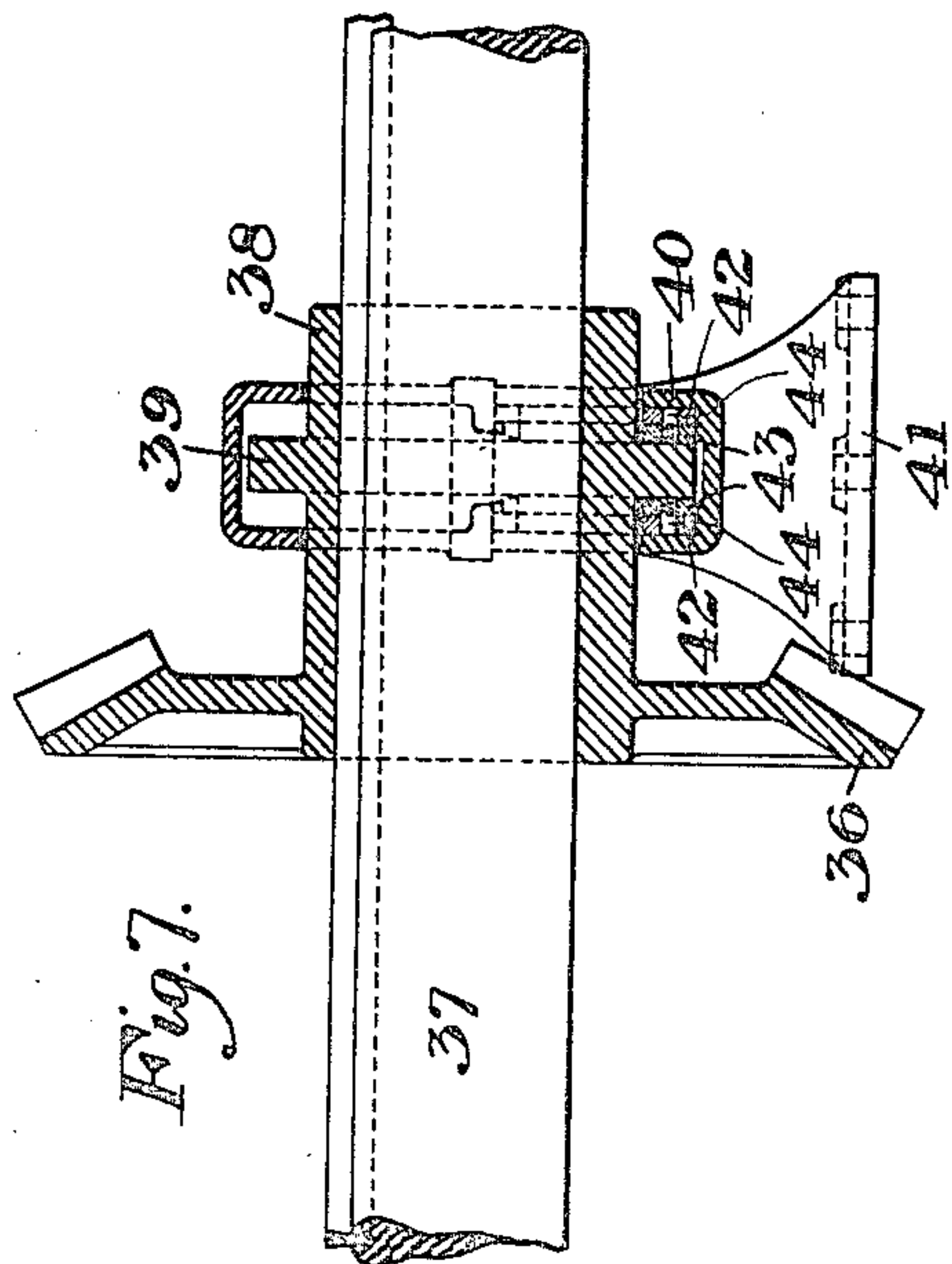


Fig. 7.

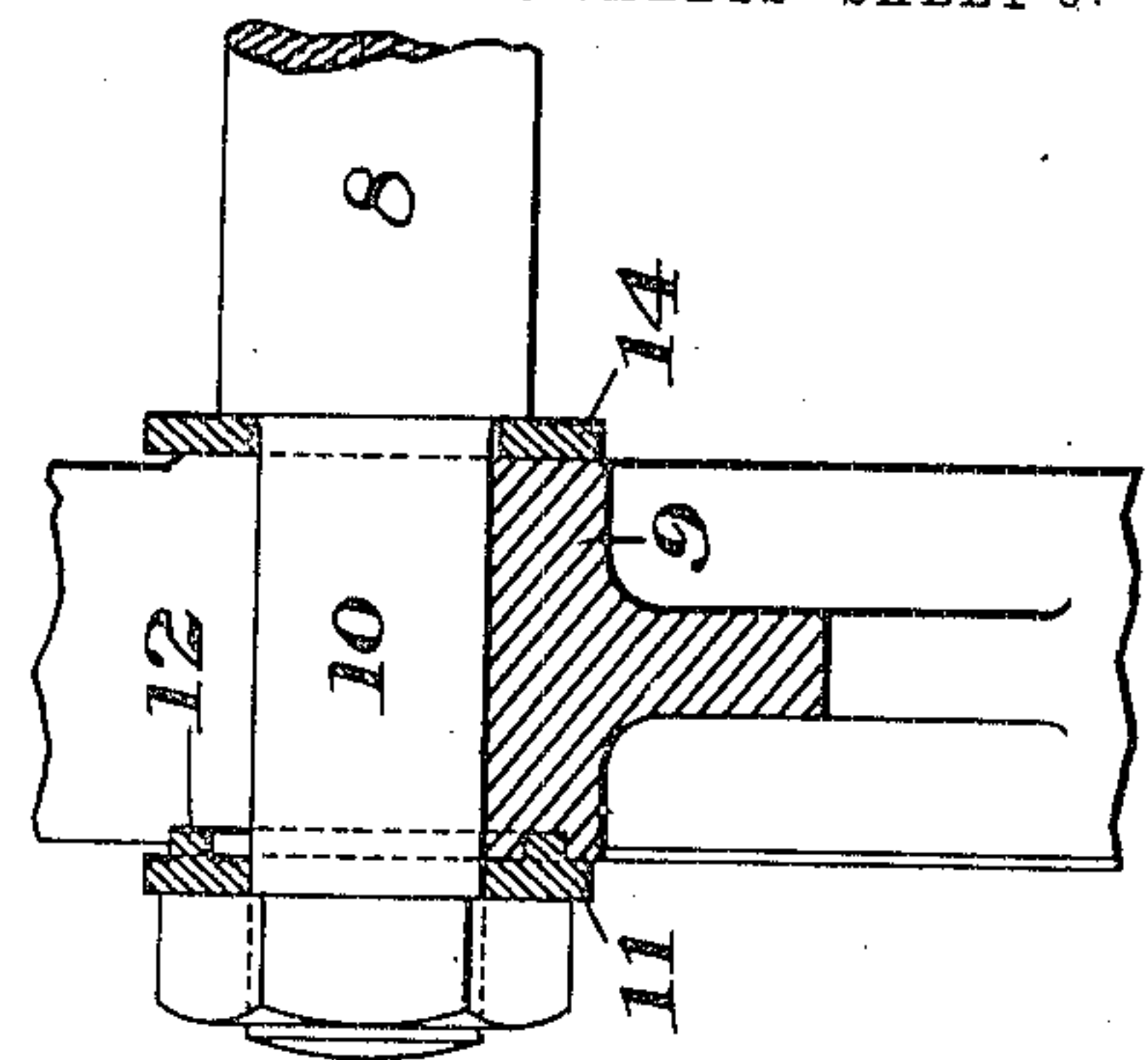


Fig. 6.

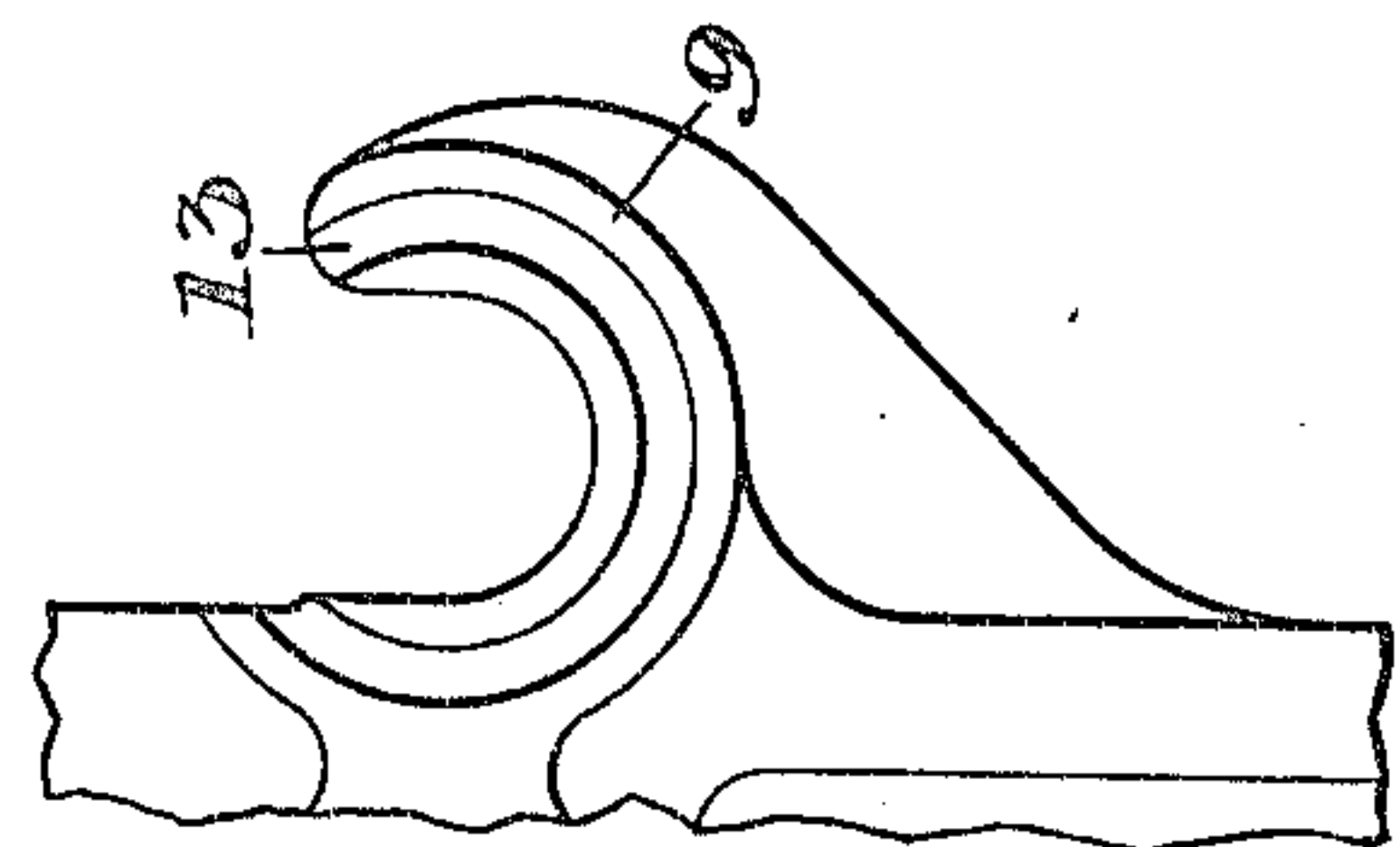


Fig. 5.

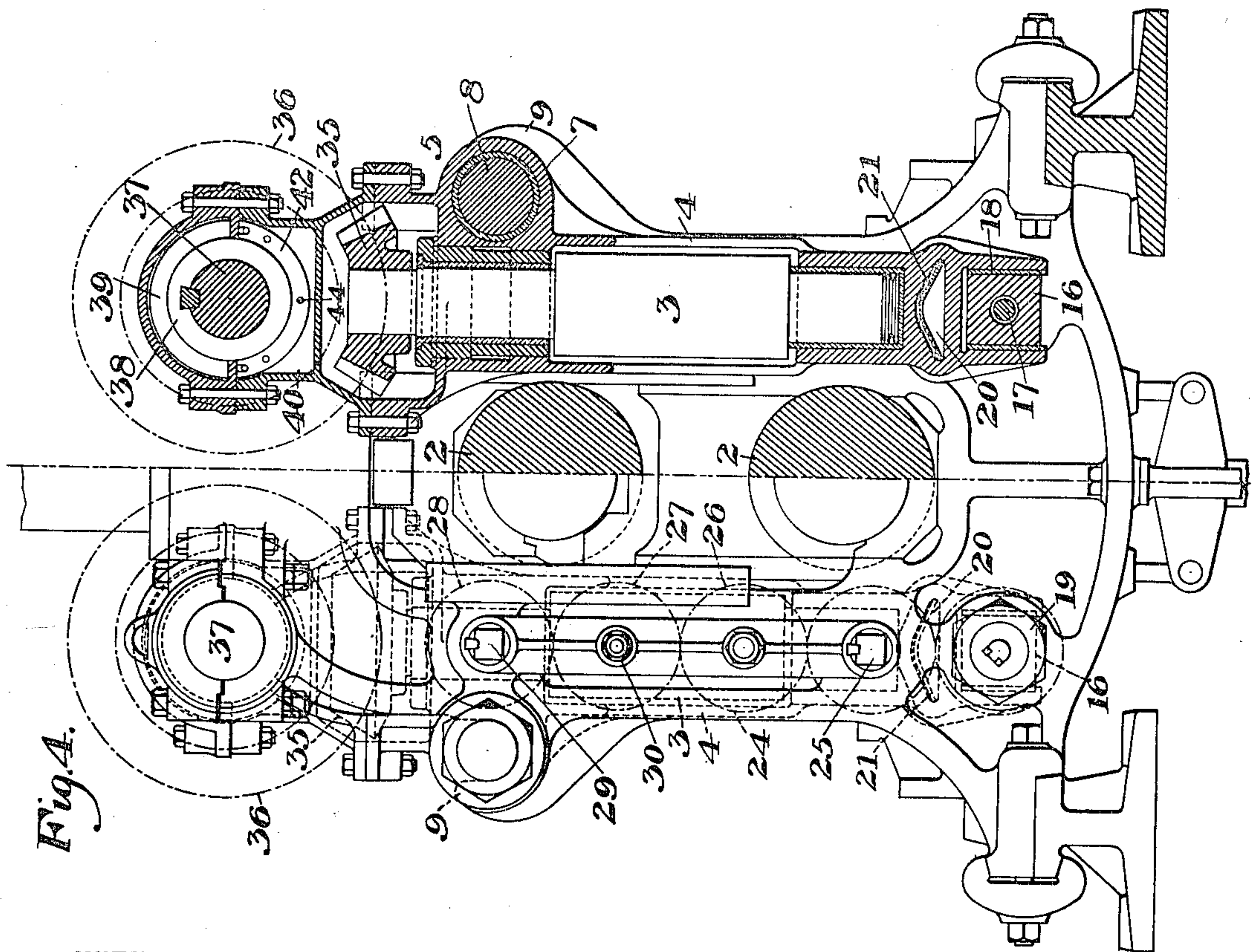


Fig. 4.

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6 SHEETS—SHEET 4.

Fig. 8.

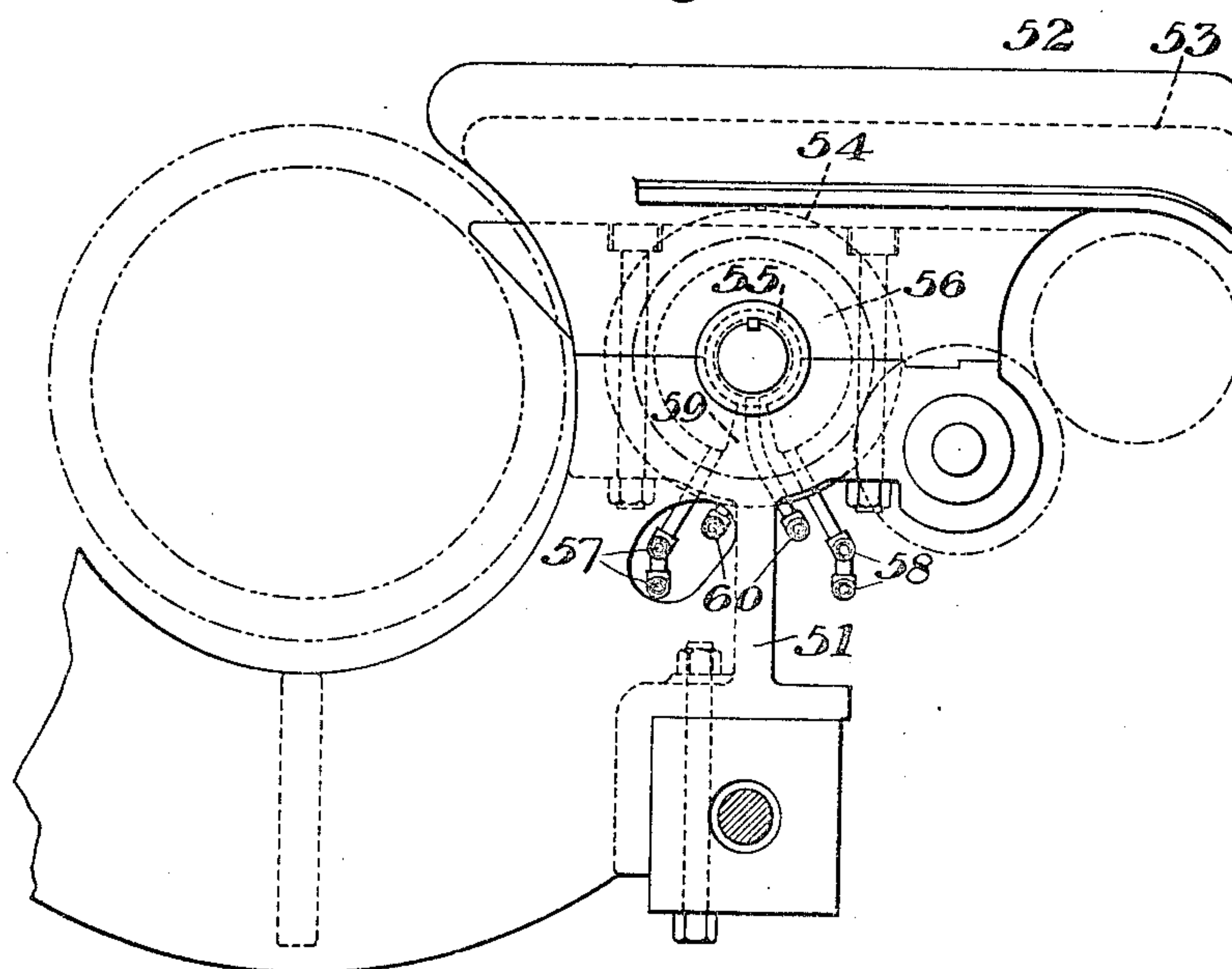
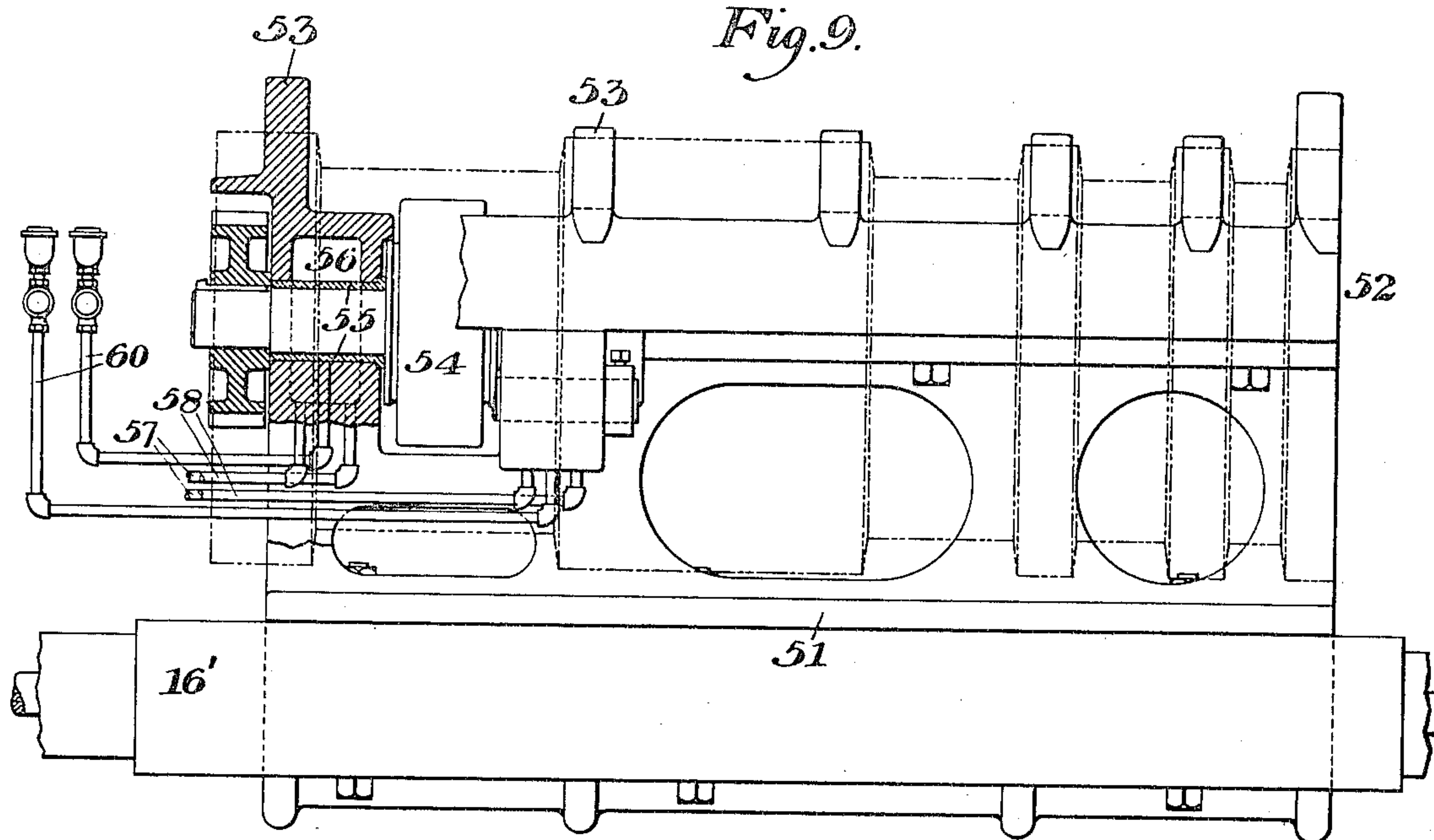


Fig. 9.



WITNESSES

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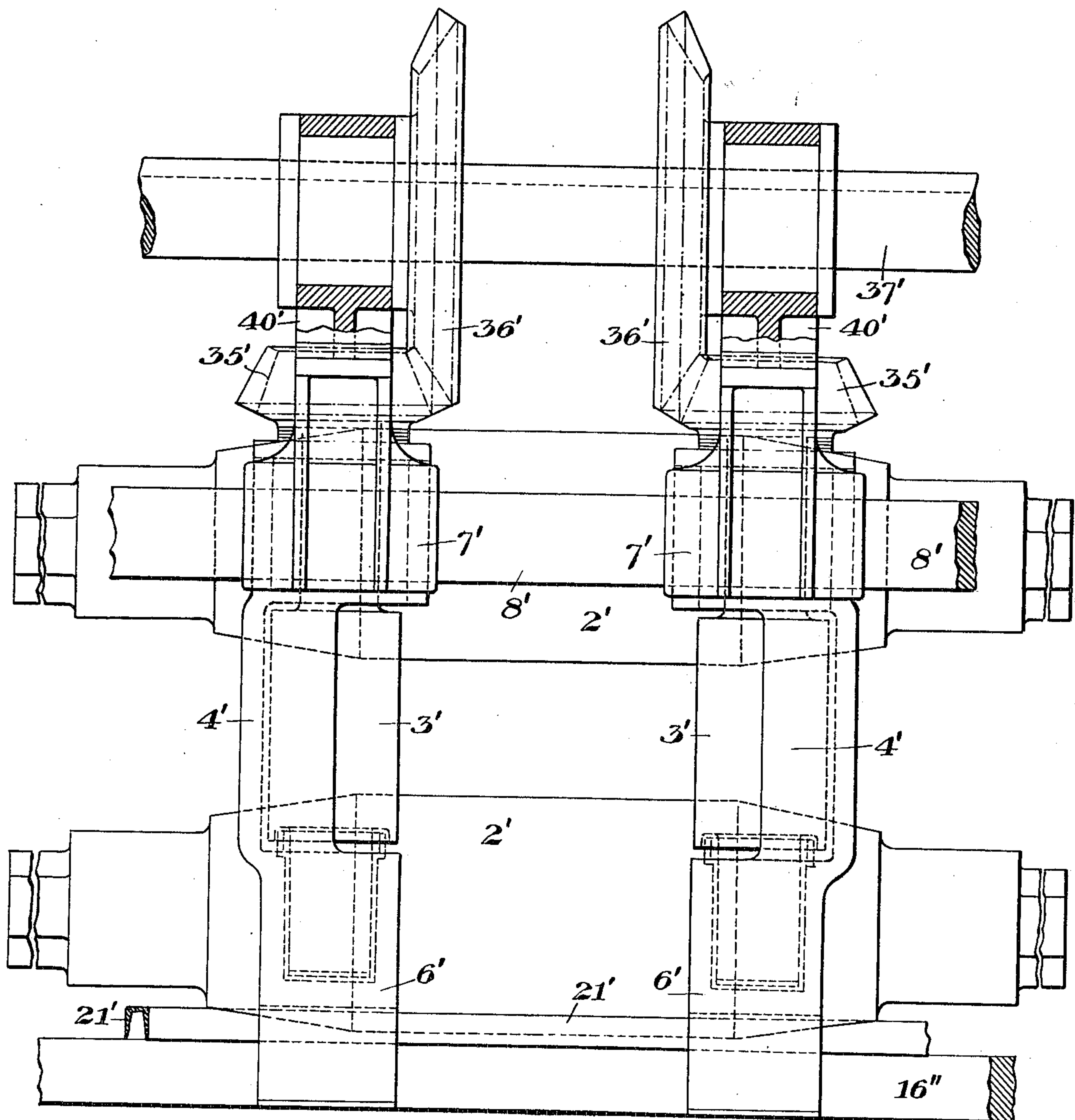
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Fig. 10.



WITNESSES

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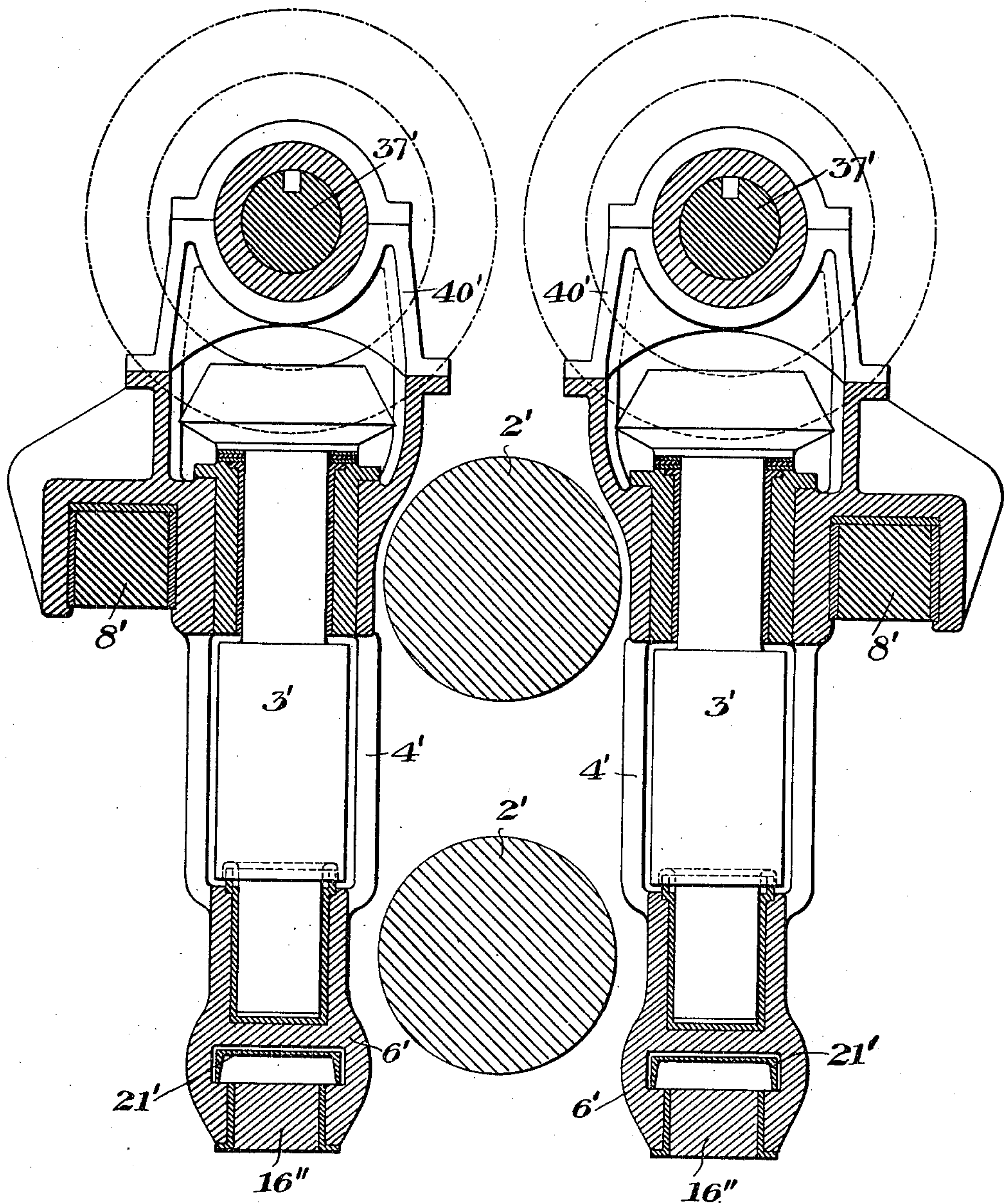
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APPLICATION FILED MAY 31, 1902.

6 SHEETS—SHEET 6.

Fig. 11.

WITNESSES

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UNITED STATES PATENT OFFICE.

JULIAN KENNEDY, OF PITTSBURG, PENNSYLVANIA.

UNIVERSAL MILL.

No. 825,657.

Specification of Letters Patent.

Patented July 10, 1906.

Application filed May 31, 1902. Serial No. 109,743.

To all whom it may concern:

Be it known that I, JULIAN KENNEDY, of Pittsburgh, Allegheny county, Pennsylvania, have invented a new and useful Universal Mill, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation, partly broken away, of a universal mill constructed in accordance with my invention. Fig. 2 is a partial sectional front elevation on a larger scale, showing the support and connections of the hangers for the vertical rolls. Fig. 3 is an end elevation of the pinion-housing which I prefer to employ. Fig. 4 is an end elevation, partly in section, of the universal mill. Figs. 5, 6, and 7 are detail views of construction, hereinafter referred to. Fig. 8 is an end elevation showing the guide and roller system which I prefer to use when the vertical rolls are removed and the device used as a two-high mill. Fig. 9 is a front elevation, partly in section, of Fig. 8; and Figs. 10 and 11 are respectively a partial front elevation and longitudinal vertical section, showing a modified simple form of the invention.

My invention relates to the class of universal mills, and particularly to the mechanism for supporting, adjusting, and driving the vertical rolls and also the pinion-housing arrangement. It is designed to strengthen and improve the supports for the vertical rolls, to provide for easy and quick removal of these rolls, and to improve the form of the pinion-housing.

In the drawings, 2 2 represent the horizontal rolls of the universal mill, and 3 3 its vertical rolls. Each of the vertical rolls is carried in a removable housing 4 of semicylindrical form in its body portion, while the upper part 5 and the lower part 6 contain the vertical bearings for the upper and lower shafts of the roll. The upper parts 5 are provided with lateral portions 7, through which extend the shaft 8, constituting an upper supporting-shaft for both vertical rolls. This shaft rests in hook-shaped bearings 9, which project forwardly from the main housings. The reduced end portions 10 of the shaft fit neatly within these hook-shaped brackets, and the shaft is held from rising by end washers 11, having inner annular lips 12, arranged to fit in the curved or annular grooves 13 of the brackets. A plain washer 14 is preferably used on the inner side of the bracket, and

when the nut 15 is screwed home upon the outer screw-threaded end of the part 10 the lip portion of the washer will engage the groove 13 and will hold the shaft firmly in place, while the shaft may be easily detached by unscrewing the end nuts and withdrawing the washers from their recesses. These washers are preferably made of steel, and the construction just described is shown in Figs. 5 and 6.

The housings 4 are forked at their lower ends to fit over a squared shaft 16, which is bored out longitudinally to receive a connecting-shaft 17 for the roll-adjusting mechanism. Lining-pieces 18 are preferably used between the shaft and the forked sides of the housing-foot, and the ends of the squared shafts extend through the main housings and are secured by nuts 19, Figs. 2 and 4.

To protect the shaft 16 from falling scale, &c., I form recesses 20 in the lower parts of the housings, which receive the ends of a curved cover-plate 21. This cover extends parallel with the horizontal rolls and between the housings and is preferably wider than the shaft.

The connecting-shaft 17 is carried in end bushings 22 in the squared shaft and is provided at each end with a pinion 23, intermeshing with a pinion 24, having a screw-threaded hub engaging the adjusting-screw 25 for the lower part of the vertical-roll housing. Pinions 26 and 27 connect the pinion 24 to a similar upper pinion 28, engaging the adjusting-screw 29 for the upper part of the vertical roll.

To hold the vertical housing against its adjusting-screws, I provide a movable pull-back cylinder 30, having a cup-leather at its inner end and movable between an outer casing 31 and an inner stationary sleeve 32, which surrounds the rod 33. The outer end of the rod extends through the cylinder and is fastened to its outer closed end, while the inner end is provided with an enlargement 34, which enters a hole or recess in the housing 4. This hole is internally enlarged vertically, so that when the housing 4 is lifted slightly the bolt or rod 33 may be pulled out and the housing can then be lifted free.

The upper part 5 of the vertical-roll housing has a bore of sufficient diameter to allow the roll 3 to be pulled out upwardly through it when the upper bearing-blocks or brasses are removed. The upper journal of each vertical roll is provided with a bevel-wheel 35,

and these bevel-wheels intermesh with bevel-wheels 36 upon a horizontal driving-shaft 37. The wheels 36 are splined to this shaft and each is provided with an elongated hub 38, having a projecting annular ring 39 fitting within a closed case 40. The case 40 is supported upon a bracket 41, which is bolted to the top of each vertical-roll housing. The top half of the case is removable and within the lower semicylindrical portion are bearings consisting of semicircular rings on each side of the ring 39. Each ring consists of an outer semicircular steel ring 42 and an inner semicircular brass ring 43. Brass screws 44 are screwed into holes in each brass ring and have plain stubs extending within registering holes in the steel ring. In assembling the parts the doubled rings are fitted together and dropped into place in the case. The wheel-hub is then inserted and the upper or cover part of the case bolted to the lower part. The bolts, which secure the two parts of the case together, are made of sufficient strength to carry the weight of the vertical roll and its housing. The steel ring has slots at the top which lead to holes in the brass rings, so that by removing the case-cover and inserting a hook the double rings may be pulled out around the shaft and hub-sleeve. The rings may then be pulled apart, spacers of sheet iron or other suitable substance put between them, and they may then be pushed back into place around the hub. I thus provide for a simple means for taking up wear consequent upon end thrust of the shaft 37.

The shafts 37 are connected by spindles 45 with the projecting journals of a pair of driving-pinions 46. I have shown these pinions as mounted in a cruciform housing 47, built up of horizontally-divided parts, as shown in Fig. 3. The pinions 46 intermesh with an idler 48, which intermeshes with the driving-pinion 49 for the upper horizontal roll. The pinion 49 intermeshes with pinion 50, having the usual driving connections with the lower horizontal roll. The peculiar shape of this pinion-housing is of importance as it is self-contained and symmetrical, giving great strength.

When the mill is converted into a two-high blooming-mill by removing the vertical rolls and housings, I preferably drop over the squared shaft 16 the lower bracket portion 51 of the support for guide 52. This guide has projecting ribs 53 to guide the entering metal, and at the first pass where the ingot would be too short to be forced in by the roller-table I provide in the guide a roller 54 to support and feed the entering metal. Collars 55 surround the necks of this roller and extend through cavities 56, into which water is fed through pipe 57 and taken off by pipe 58. The intermediate partition 59, Fig. 8, compels the circulation of the water through the chamber. I also provide oil-pipes 60,

through which oil is supplied to the necks within the collars. The journals are thus kept cool and lubricated. The bracket 51 may be bolted to the shaft 16, as indicated in Fig. 8.

In the form of Figs 10 and 11 I show a simpler construction of my improved mill. In this form the upper part of each housing 4' is provided with a bracket portion 7', which is arranged to fit over a square supporting-bar 8'. This bar 8' takes the place of the shaft 8 of the first form and extends transversely between the main housings. The lower square guide-bar 16'' extends through the lower ends of the housing-foot, and the cover-plate 21' is shown as formed of an inverted channel.

When the vertical rolls are to be removed, the bearings of the upper driving-shaft 37' are separated and the shaft lifted by an overhead crane, carrying with it the housings and the vertical rolls, the housings being lifted away from both of the supporting-bars. In this form, as in the previous form, the weight of the vertical rolls is mainly carried upon the upper supporting-shaft 8'. The lower squared shaft beneath the foot of the vertical-roll housing operates as a guide bar and holder, and the weight is supported upon the driving-shaft only when the rolls are being inserted or removed.

The advantages of my invention result from the new construction of the vertical-roll supports. These vertical rolls, which may be used on either or both sides of the horizontal roll, may be quickly and easily removed by disconnecting and lifting the driving-shaft by an overhead crane. The shaft will lift the hangers or vertical-roll housings, and thus take away the vertical rolls, with their attachments, leaving an ordinary two-high mill. The adjusting connections for the vertical rolls are simple and compact. The guiding-supports enable the housings to be lifted vertically, and the system is simple for the work done. The pinion housing gives a cheap, strong, and effective construction. The guide, which may be used on either side of a mill when the vertical rolls are removed, will guide and support the metal and also feed it in at the first pass. The position of the supporting and guiding bars keeps the rolls in alinement and insures accuracy in rolling.

Many variations may be made in the form and arrangement of the mill and its parts without departing from my invention.

I claim—

1. A universal mill having vertical rolls supported in housings, said housings having vertically-opening socket engagement with supports arranged to allow said housings to be lifted vertically therefrom, and driving connections for said vertical rolls; substantially as described.

2. A universal mill having main housings,

in combination with vertical rolls supported in other housings, mechanism for driving said rolls, a transverse bar engaging the lower parts of the vertical-roll housings and having vertically-open socket engagement with the vertical-roll housings, and an upper transverse bar attached to one of said housings, and having vertically-open socket engagement with the other housings to allow said housings to be lifted vertically; substantially as described.

3. A universal mill having an upper transverse driving-shaft, housings below said shaft, each carrying a vertical roll, and an upper and lower guiding support having vertically-opening socket engagement with the housings arranged to allow them to be lifted vertically; substantially as described.

4. A universal mill having vertical rolls supported in housings, upper and lower guiding-supports for the vertical-roll housings having vertically-opening socket engagement therewith to allow them to be lifted vertically, and an upper transverse driving-shaft for the vertical rolls having connections with the roll-housings whereby the vertical rolls and their housings may be lifted with the transverse shaft; substantially as described.

5. A universal mill having vertical rolls supported in housings, upper and lower guiding-supports for said housings, one of said supports being arranged to be lifted vertically with the housings, and the other support having an open engagement with the housings to permit such lifting; substantially as described.

6. A universal mill having vertical rolls supported in housings, an upper transverse support arranged to support said housings, a lower guiding-support for said housings, and from which the housings can be lifted vertically, and an upper transverse driving-shaft having connections arranged to lift the housings and the upper transverse supports; substantially as described.

7. A universal mill having an upper transverse driving-shaft, housings having separable bearings surrounding said shaft, vertical rolls carried in the housings, and upper and lower supporting bars or shafts for the housings having vertically-opening socket engagement with said housings arranged to allow the driving-shaft to be lifted vertically with the housings depending from it; substantially as described.

8. A universal mill having an upper transverse driving-shaft, housings depending therefrom, each housing containing an upper and lower bearing to receive the journals of a vertical roll, and a pair of guide-bars for said housings having vertically-opening socket engagement therewith to allow the housings to be lifted vertically with the driving-shaft; substantially as described.

9. A universal mill having vertical rolls

and a transverse bar located below and in line with the rolls and engaging their lower bearings or supports, said transverse bar having cylindrical end portions extending through the housings and provided with securing-nuts; substantially as described.

10. A universal mill having an upper transverse driving-shaft, removable housings having upper portions surrounding said shaft arranged to support the housings in lifting, each housing containing a vertical roll with its axis intersecting the axis of the driving-shaft, and a transverse supporting-bar engaging the housings; substantially as described.

11. A universal mill having an upper transverse driving-shaft, a pair of vertical rolls below said shaft and having their axes intersecting the axis of said driving-shaft, and housings for the vertical rolls, each having an upper supporting portion extending around the driving-shaft and arranged to be lifted by it; together with supporting means engaging the said housings, substantially as described.

12. A universal mill having a pair of vertical rolls, housings therefor, an upper transverse guiding-bar for the housings, and upwardly-open socket-supports on the main housings for said upper guiding-bar arranged to allow the bar to be lifted vertically with the vertical-roll housings; substantially as described.

13. A universal mill having a pair of vertical rolls, removable housings for said rolls having an upper supporting-shaft, hook-shaped bearings receiving said shaft, and clamping mechanism to retain the shaft in the bearings; substantially as described.

14. A universal mill having a pair of vertical rolls, removable housings for said rolls, a lower stationary guide-bar interfitting with the lower ends of said housings a rotary shaft extending longitudinally through said bar, and adjusting mechanism for the vertical rolls connected with said rotary shaft; substantially as described.

15. A universal mill having vertical rolls supported in housings, upper and lower transverse supports for said housings, the latter having open-socket engagement with the lower support and removable with the upper support, and a shield member carried by the said housings and covering the transverse lower support; substantially as described.

16. A universal mill having vertical rolls, vertically-movable housings for said rolls, adjusting-screws for the vertical-roll housings, and a pull-back cylinder arranged to hold the housing against said screws, said cylinder having a lug-and-slot connection arranged to uncouple on lifting; substantially as described.

17. A universal mill having adjusting

mechanism for the vertical roll, a vertically-movable housing for said roll, pull-back cylinders arranged to hold the roll-housings against the adjusting mechanism, and a separable lug-and-slot connection between the pull-back cylinder and the housing; substantially as described.

In testimony whereof I have hereunto set my hand.

JULIAN KENNEDY.

Witnesses:

GEO. B. BLEMING,
H. M. CORWIN