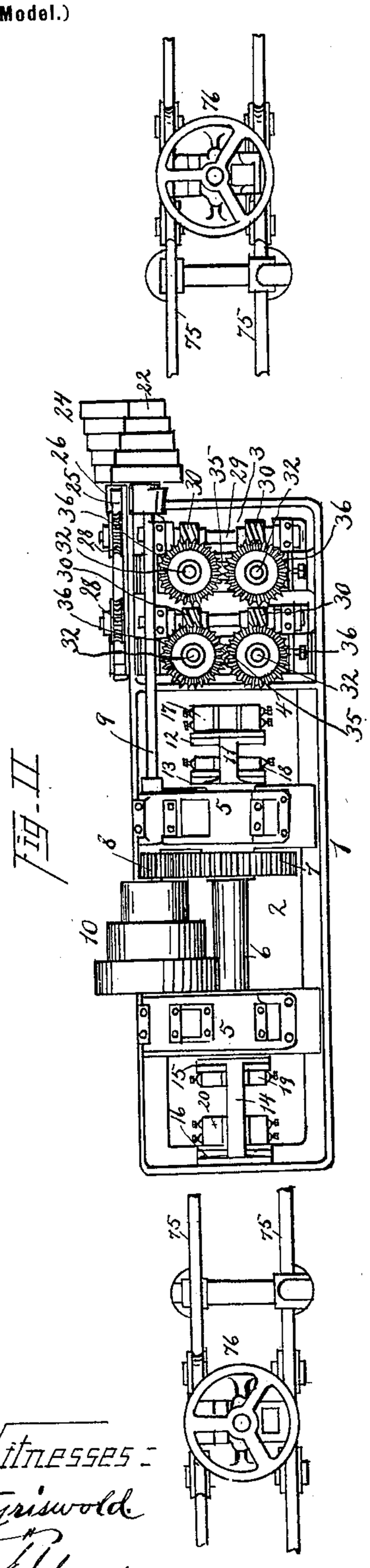
No. 625,922. Patented May 30, 1899.

L. H. BRIGHTMAN.

MACHINE FOR TURNING ROUND BARS.

(Application filed Mar. 14, 1898.)

(No Model.) 5 Sheets—Sheet 1.



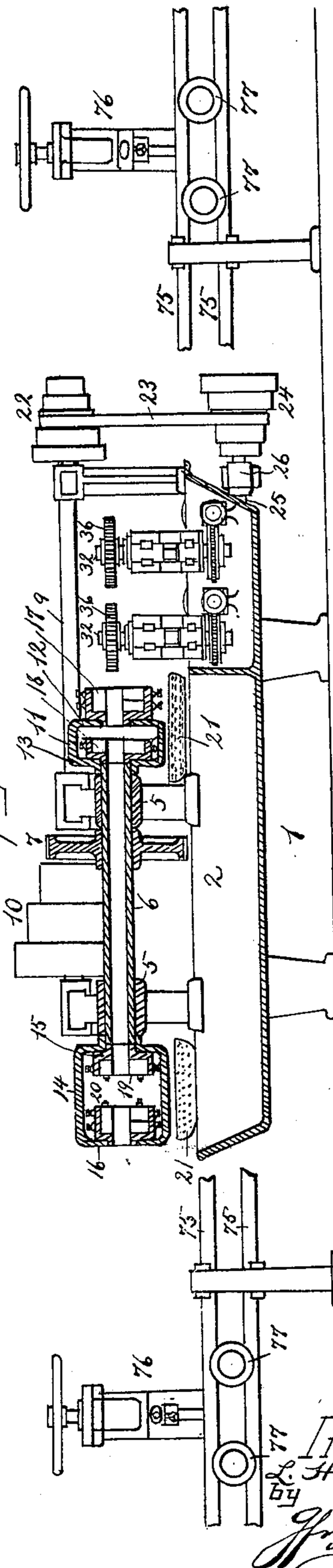


FIG. II.

FIG. I.

Witnesses:
L. L. Griswold.
Chas. E. Johnson.

Inventor:
L. H. Brightman,
by
Jno. Jeckies
Attorney.

No. 625,922. Patented May 30, 1899.

L. H. BRIGHTMAN.

MACHINE FOR TURNING ROUND BARS.

(Application filed Mar. 14, 1898.)

(No Model.) 5 Sheets—Sheet 2.

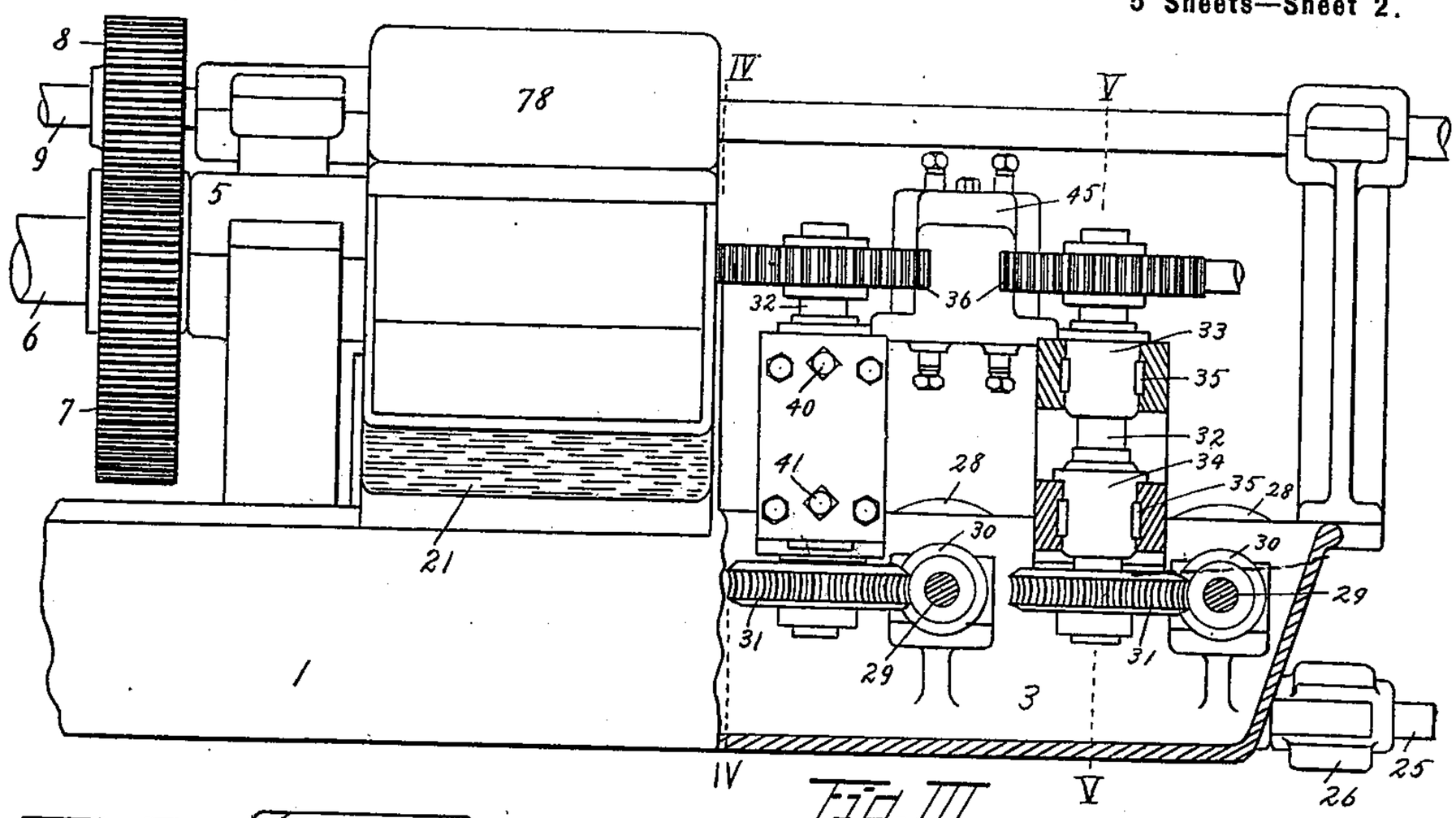


Fig. III.

Fig. IV.

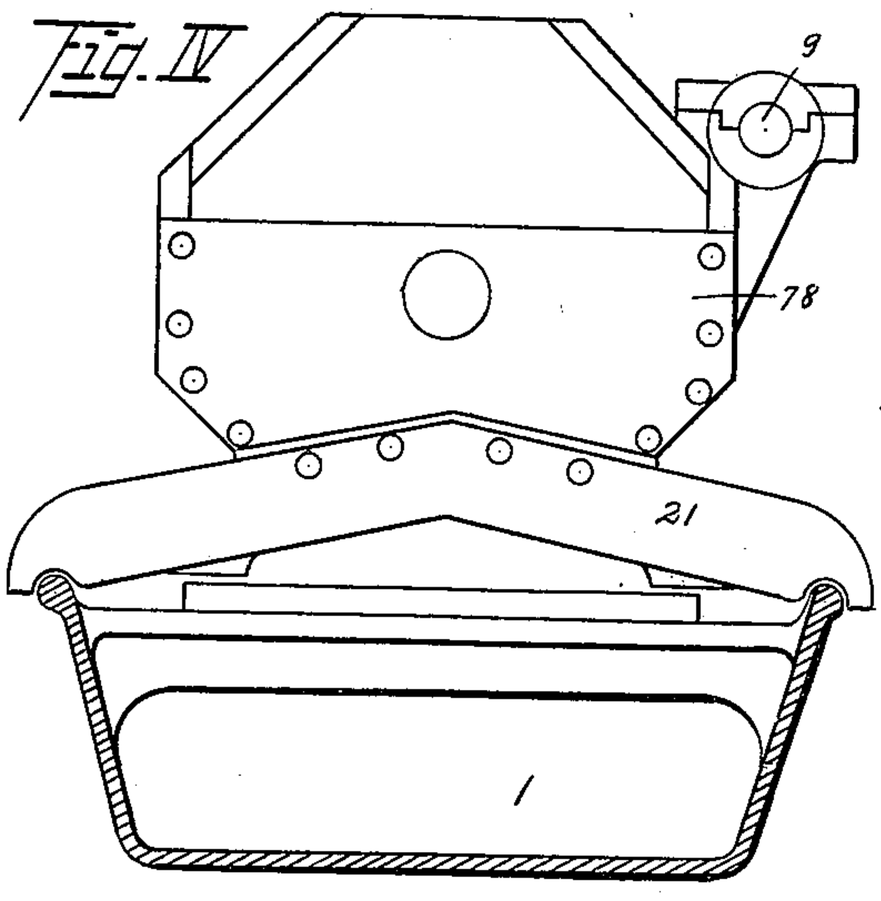


Fig. V.

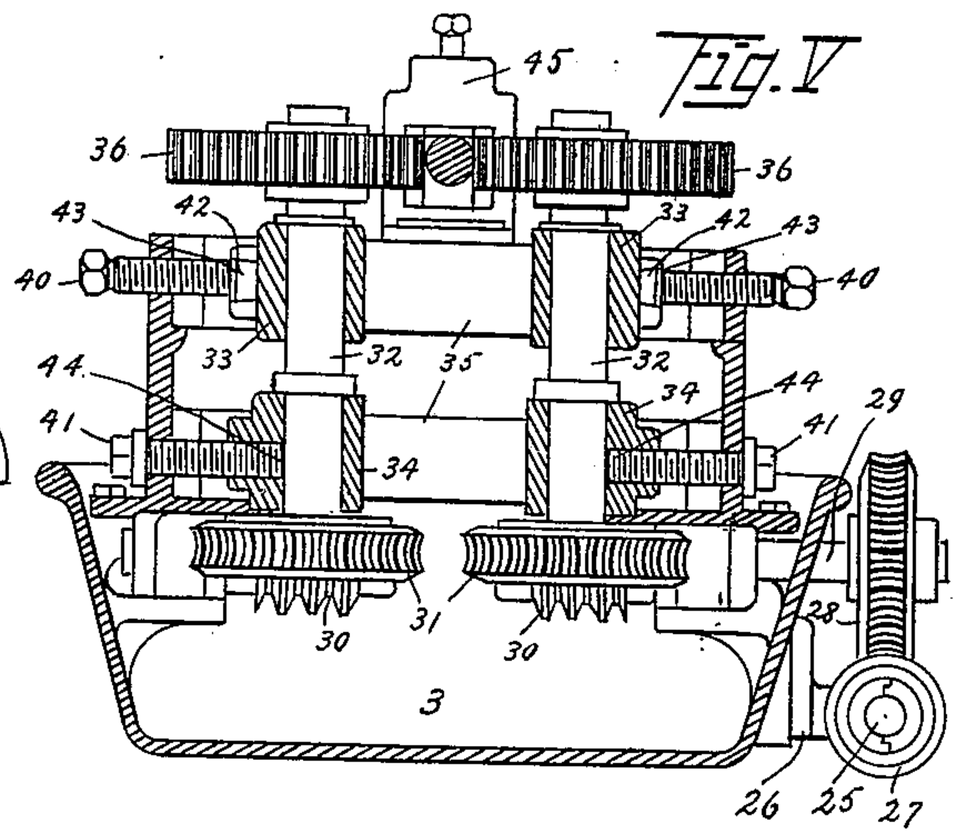


Fig. VI.

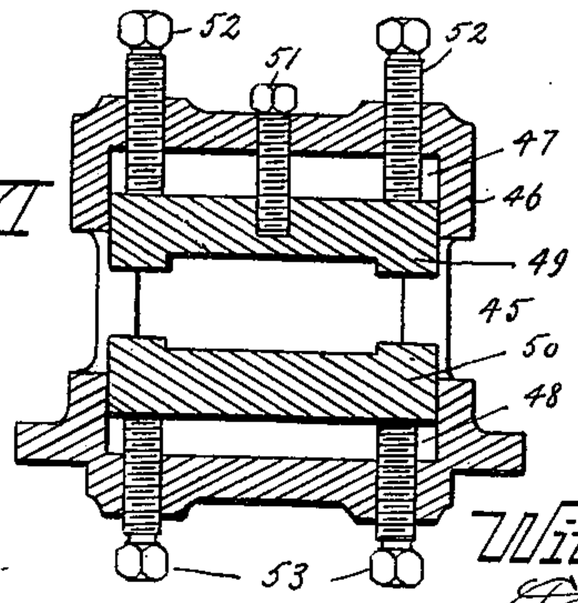
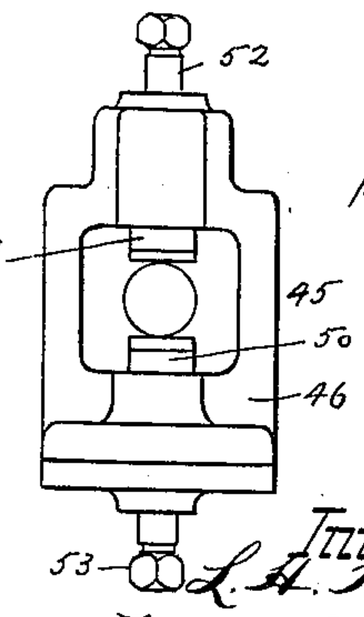


Fig. VII.



Witnesses:
A. Griswold,
Chas. E. Johnson.

Inventor:
L. H. Brightman,
by Wm. C. Fecher
Attorney.

No. 625,922. Patented May 30, 1899.

L. H. BRIGHTMAN.

MACHINE FOR TURNING ROUND BARS.

(Application filed Mar. 14, 1898.)

(No Model.) 5 Sheets—Sheet 3.

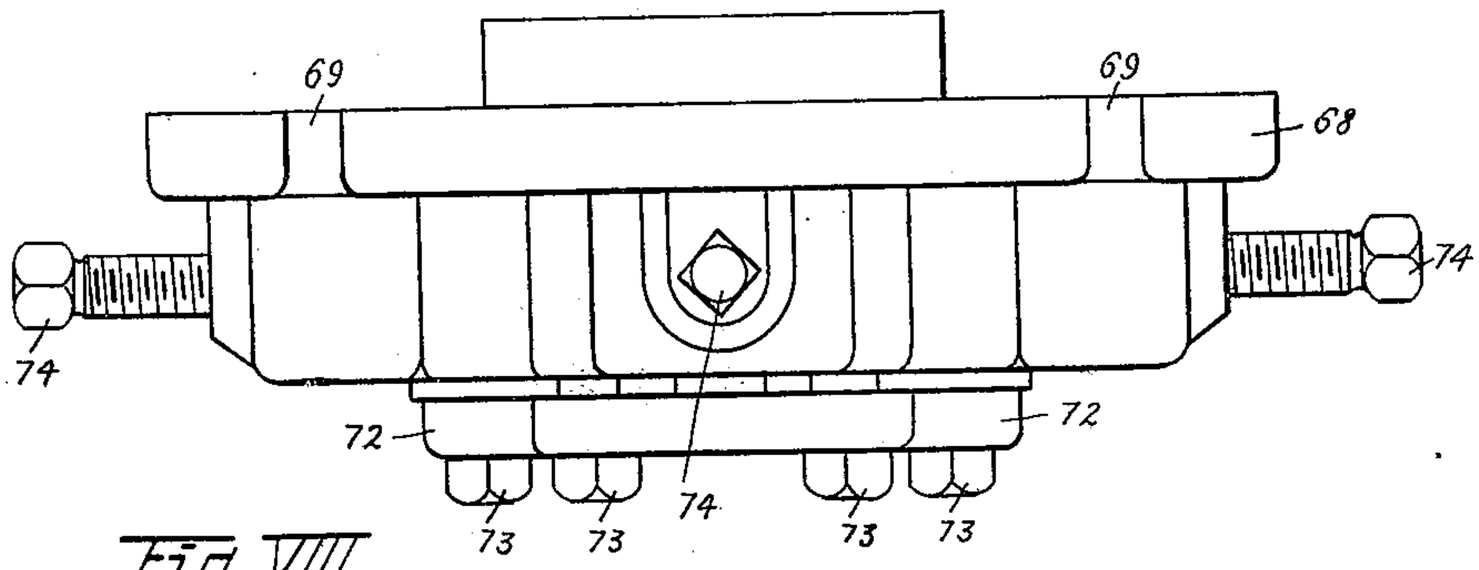


Fig. VIII

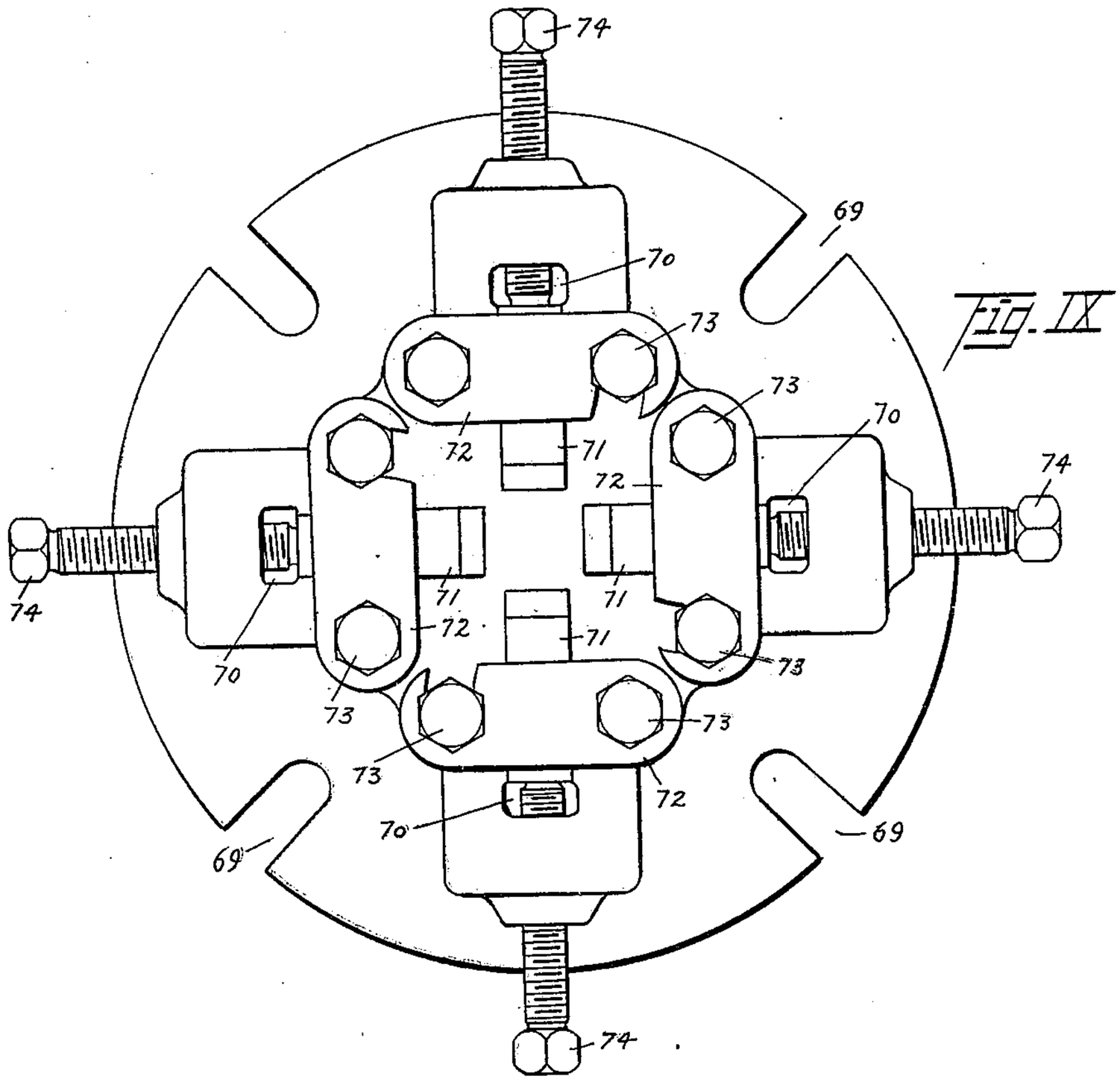


Fig. IX

Witnesses:
H. Griswold
Chas. E. Johnson.

Inventor:
L. H. Brightman,
by Thos. Fisher
Attorney.

No. 625,922. Patented May 30, 1899.

L. H. BRIGHTMAN.

MACHINE FOR TURNING ROUND BARS.

(Application filed Mar. 14, 1898.)

(No Model.) 5 Sheets—Sheet 4.

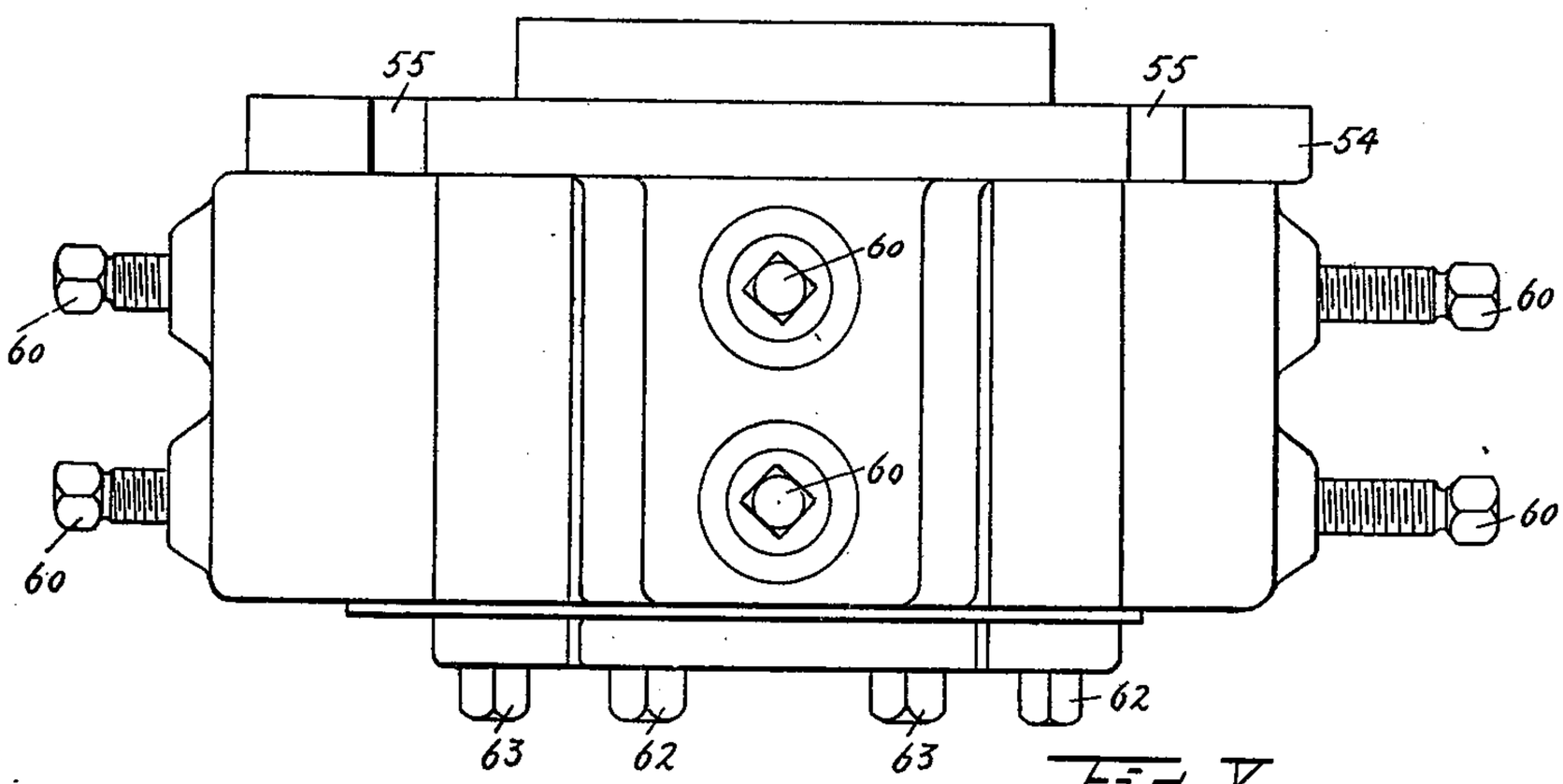


Fig. X

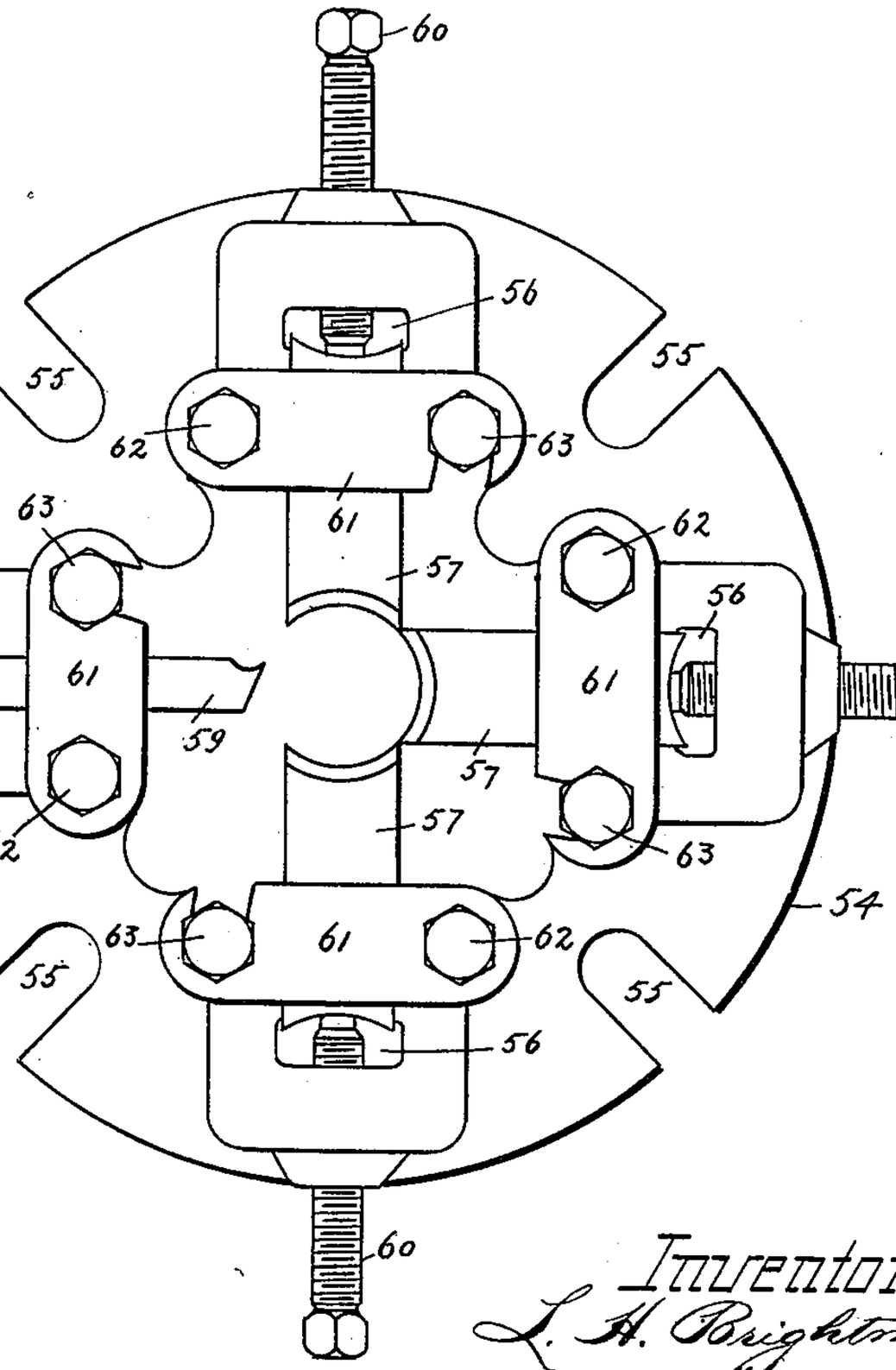


Fig. XI

Witnesses:
H. Griswold.
Chas. G. Johnson.

Inventor:
L. H. Brightman,
by Wm. Fecher
Attorney.

No. 625,922. Patented May 30, 1899.

L. H. BRIGHTMAN.

MACHINE FOR TURNING ROUND BARS.

(Application filed Mar. 14, 1898.)

(No Model.) 5 Sheets—Sheet 5.

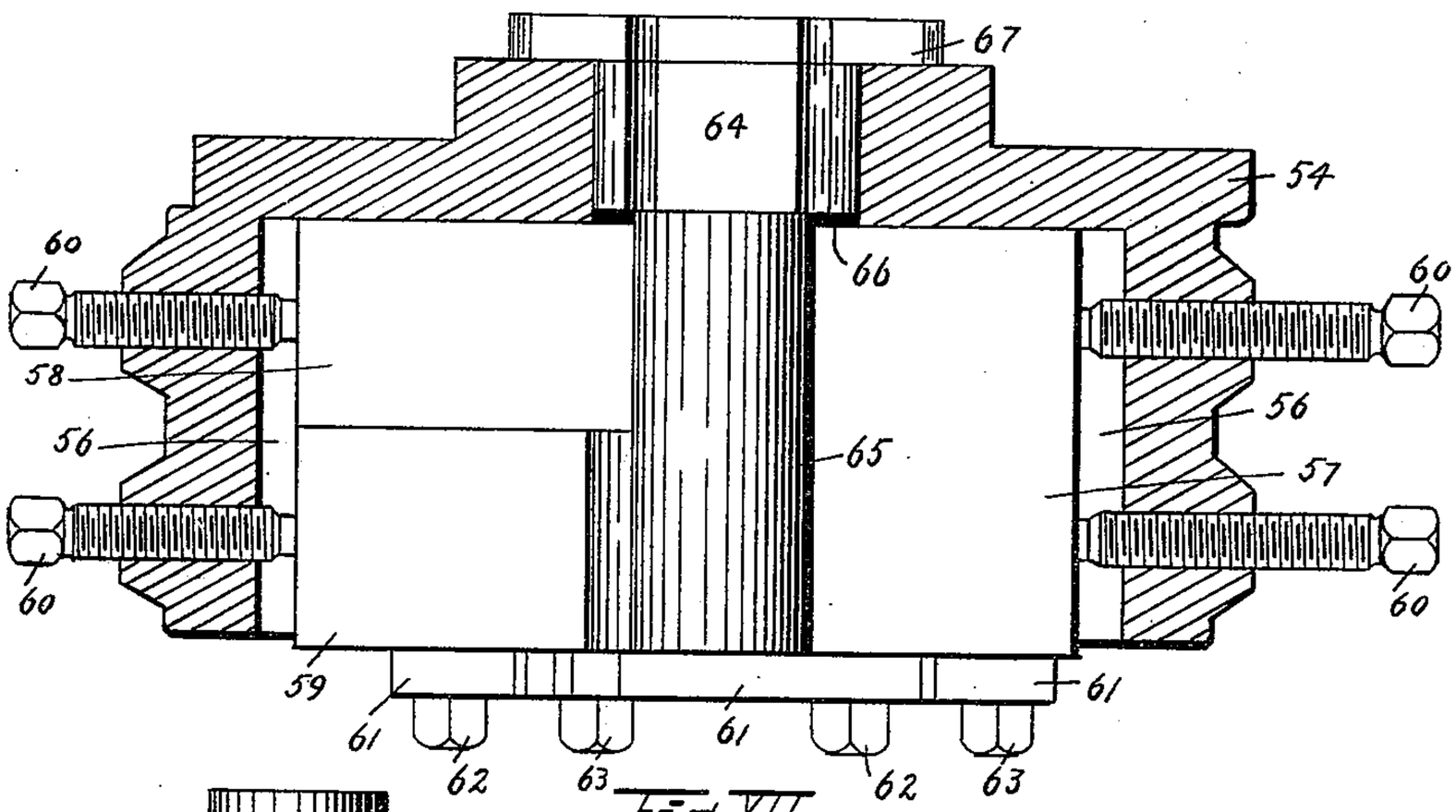


Fig. XII.

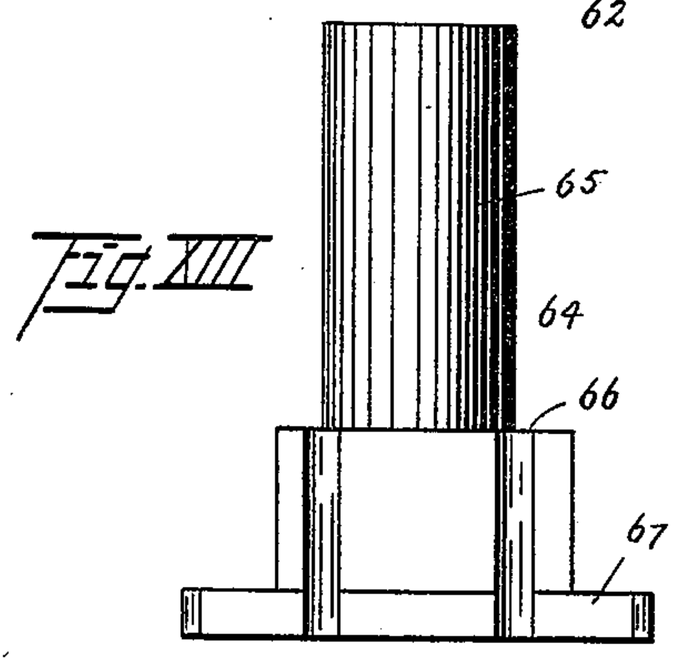


Fig. XIII.

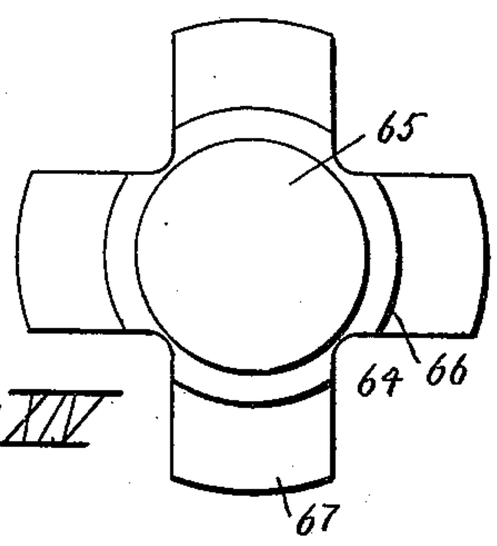


Fig. XIV.

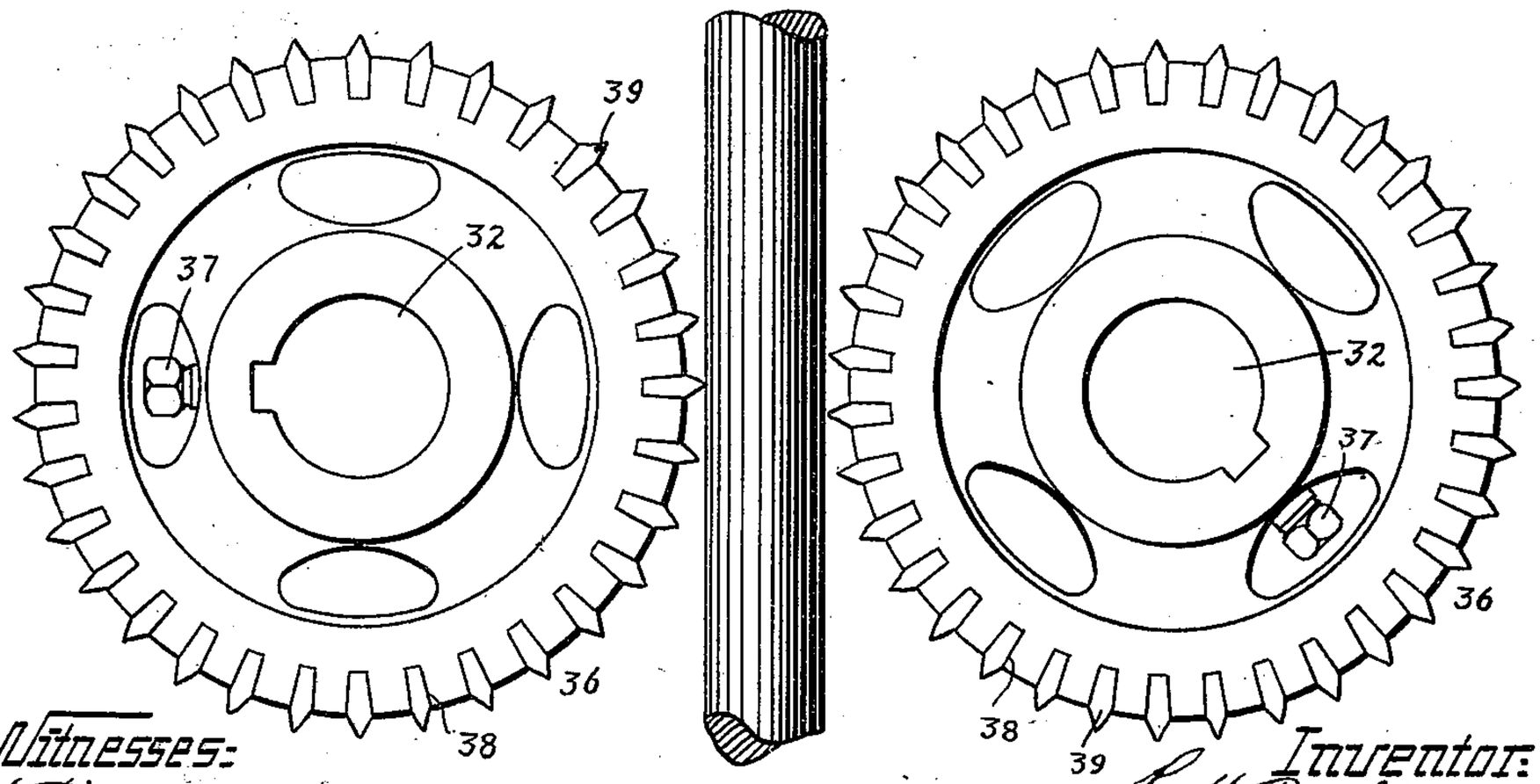


Fig. XV.

Witnesses:
H. Griswold
Thos. E. Johnson.

Inventor:
L. H. Brightman,
by Wm. Fecher
Attorney.

UNITED STATES PATENT OFFICE.

LATHAM H. BRIGHTMAN, OF CLEVELAND, OHIO.

MACHINE FOR TURNING ROUND BARS.

SPECIFICATION forming part of Letters Patent No. 625,922, dated May 30, 1899.

Application filed March 14, 1898. Serial No. 673,756. (No model.)

To all whom it may concern:

Be it known that I, LATHAM H. BRIGHTMAN, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Machines for Turning Round Bars, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle so as to distinguish it from other inventions.

The annexed drawings and the following description set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure I represents a longitudinal section of my improved machine for turning shafts or other round bars; Fig. II, a top plan view of the same; Fig. III, a side view of the receiving end of the machine, illustrating the portion of the base upon which the feed-disks are supported as broken away and showing the supports for one feed-disk shaft in section; Fig. IV, a transverse section on the line IV IV in Fig. III; Fig. V, a transverse section on the line V V in Fig. III; Fig. VI, a longitudinal section of the steady-rest between the feed-disks; Fig. VII, an end view of the same; Figs. VIII and IX, respectively, an edge and a face view of one of the revolving steady-rests; Figs. X and XI, respectively, an edge and a face view of one of the cutter-heads; Fig. XII, an axial section of a cutter-head, illustrating the gage for setting the cutters, in its operative position; Figs. XIII and XIV, a side view and a plan view, respectively, of one of said gages; and Fig. XV, a top plan view of the feed-disks.

The machine has a base 1, formed in the shape of a trough and divided into two compartments 2 and 3 by a partition 4. (Shown in Fig. I.) The larger compartment 2 serves as a receptacle for the lubricating solution applied to the bar at the cutting-point, and the smaller compartment 3 serves as a receptacle for oil, in which the worm-gearing and lower ends of the feed-disk shafts are immersed. Two main bearings 5 are provided above the larger of the two frame-compartments and a tubular spindle 6 is journaled in said bearings. Said spindle has a cog-wheel 7 secured upon it, which cog-wheel meshes with a pinion 8 upon a drive-shaft 9, which is provided with cone-pulley gearing 10 or other means for communicating rotary motion to it from the power source. The spindle has a yoke 11 at its receiving end formed with two annular disks 12 and 13, concentric with the tubular spindle. A yoke 14 is provided at the discharging end of the spindle and is formed with two annular disks 15 and 16, similar to the disks at the receiving end. A cutter-head 17, the detail construction of which will be described later, is secured to the outer face of the first disk 12. A steady-rest head 18 is secured to the outer face of the inner disk, and the detail construction of said head will be described later. A steady-rest head 19 is secured to the outer face of the inner disk 15 at the discharge end, and a cutter-head 20 is secured to the inner face of the outer disk 16 at the discharge end. Said latter steady-rest and cutter heads are similar to the first-mentioned heads, and will be explained hereinafter.

Chutes 21, which incline to both sides from the center line of the machine-frame, are supported across said frame beneath the cutter-heads and steady-rest heads to receive the turnings as they are turned off by the cutter-heads and discharge said turnings at both sides of the machine. The bottoms of said chutes are preferably perforated to admit of the lubricating solution applied to the shaft at the cutter-head to pass through said bottoms into the large compartment in the base-frame, whence it may again be pumped up and be again applied to the shaft in any suitable manner. The end of the drive-shaft at the receiving end of the machine carries a cone-pulley 22, from which rotary motion may be communicated by a belt 23 to a cone-pulley 24, upon a worm-shaft 25, journaled in bearings 26 upon the side of the main frame. Two worms 27 upon said shaft mesh with two worm-wheels 28 upon the ends of two worm-shafts 29, transversely journaled in the main frame of the machine in the smaller compart-

ment of the same and immersed in the oil in the same. Said shafts have worms 30 upon them, which mesh with worm-wheels 31 of the feed-disk shafts 32. Said latter shafts are journaled each in two vertical bearing-blocks 33 and 34, which slide in two sets of longitudinally-slotted frame-bars 35, transversely supported across the main frame. Feed-disks 36 are adjustably secured by set-screws 37 to the upper ends of the feed-disk shafts. The peripheries of the disks are formed with radial notches 38, into which chisel-edged spurs 39 are secured, said spurs serving to grip the bar to be turned and to thus feed it forward as the disks are revolved. The spurs of one disk are so arranged in their relation to the spurs of the opposite disk that the spurs will alternate at the opposed parts of the peripheries of the disks, as illustrated in Fig. XV, and one spur will engage the bar from one side, while one spur at the opposite side is leaving the bar and another spur is engaging the bar. The bearing-blocks are adjustable in the slots, so as to bring the shafts and feed-disks closer together or farther apart, by means of adjusting-screws 40 and 41. The upper adjusting-screws 40 are threaded through the ends of the slotted frame-bars and have their ends bearing against yielding cushions in the bearing-blocks, such cushions being illustrated as rubber blocks 42, faced by metal disks 43. The lower adjusting-screws 41 are supported to rotate in the ends of the slotted frame-bars, having their heads bearing against the outer sides of the latter and have their inner ends threaded into sockets 44 upon the lower bearing-blocks. When properly adjusted, the upper blocks will be held apart by the bar between the feed-disks and the lower blocks will be held apart by the screws, so that there will be no need for any spacing devices between the blocks. A stationary steady-rest 45 is provided between the two pairs of feed-rollers and consists of a frame 46, which straddles the space between the upper slotted frame-bars and which has a longitudinal passage through it. The frame has an upper socket 47 and a lower socket 48, in which two blocks 49 and 50, respectively, fit. A screw 51 enters the middle of the upper block, passing through the frame, and serves to upwardly adjust and to support the upper block. Screws 52 pass through the frame and bear against the block near its ends, serving to downwardly adjust the upper block. Two screws 53 pass through the bottom of the frame and bear against the lower block, serving to adjust the same. The blocks may be adjusted in accordance with the thickness of the bar to be turned by means of the adjusting-screw, so as to truly center the bar for the revolving steady-rests and cutters.

The cutter-heads 17 and 20 are both of the same construction and have each a circular disk 54, having radial slots 55 in its edges for the insertion of bolts, which secure the disk to the face of the annular disk of the yoke. Radial recesses 56 extend from the central opening of the head and are open at the face of the head. Steady-rests 57 are placed in the recesses, excepting in one recess, in which a guide-block 58, preferably of cast-iron, and a cutter 59, preferably of self-hardening tool-steel, are placed. Two set-screws 60 extend through the closed outer ends of each radial recess, so that the steady-rests and guide-block and cutter may be adjusted toward and from the center of the head. Flat hooks 61 are pivoted upon screw-bolts 62, one at one edge of each recess and upon the face of the head, so as to extend across the open sides of the recesses and to engage screw-bolts 63 at the opposite edges of the recesses. The hooks bear against the outer edges of the steady-rests and cutter and may be drawn against the same to firmly clamp them in the recesses by means of the screw-bolts. The hooks may be quickly disengaged and engaged to admit of the removal or insertion of the cutter and steady-rests and of said parts being secured in the head by simply loosening the screw-bolts and swinging the hooks away from across the slots and by again swinging the hooks to engage their screw-bolts after the tools have been inserted or adjusted and thereupon tightening the screw-bolts. A gage 64 is preferably employed for adjusting the tools in the cutter-head, and said gage consists of a cylindrical plug 65, of the diameter of the shaft to be turned, an enlarged cross-shaped shoulder 66, which fits in the axial opening of the cutter-head, and a cross-shaped flange 67, which bears against the rear face of the cutter-head. As many gages as there are sizes of shafts to be turned in the machine are provided, the plug of each gage having the diameter of the shafts to be turned and all of the gages having shoulders of the same diameter as the interior diameter of the axial opening through the cutter-head, so that the gages will all be properly centered. When the gage is in place, the cutter, guide-block, and steady-rests may all be adjusted to have their inner ends at equal distances from the center of the cutter-head, so that the shaft or bar to be turned may be turned to the proper diameter and true cylindrical shape.

The steady-rest heads 18 and 19 are alike and are in all essentials similar to the cutter-heads excepting that the latter are thicker than the former. The steady-rest heads consist of disks 68, having radial slots 69 in their edges for the screw-bolts which secure them to the disks of the revolving yokes. The heads are formed with radiating recesses 70, open at the faces of the heads, and steady-rests 71 are secured in said recesses by flat hooks 72 and screw-bolts 73 and are adjusted by set-screws 74 in exactly the same manner as the steady-rests, cutter, and guide-block are secured and adjusted in the cutter-heads. Two sets of three rails 75 each are provided at the ends of the machine-frame, said rails

being arranged parallel with and on both sides of a line drawn axially through the spindle and heads. Two of each set of said rails are placed one above the other, and the third rail is preferably placed to one side of and in the same horizontal plane as the lower of said two rails. Clamps 76, having jaws which are adjustable to hold round bars of different diameters and with their axes in the axis of the spindle and heads, have rollers 77, with which they travel between and upon said rails, one clamp being provided for each set of rails. The yokes carrying the cutter-heads and steady-rest heads are preferably incased in casings 78, which prevent chips and turnings from flying about.

When the machine is to be employed in practice, the bar to be turned is clamped in the clamp at the receiving end of the machine at the end of the bar farthest from the machine and the other end of the bar is inserted between the feeding-disks. When the machine is started, the feeding-disks will grip the bar and feed it into the first cutter-head 17, where the bar will receive its rough turning. The steady-rest between the feeding-disks and the steady-rest head following the first cutter-head will maintain the bar in position to be properly turned. After the bar has been fed through the first cutter-head and steady-rest head it passes to the second steady-rest head and cutter-head, where it receives its finishing treatment. After the end of the bar has passed from the finishing cutter-head 20 the end of the bar is secured in the clamp at the discharge end of the machine, and will then be carried through the machine until the clamp at the receiving end of the machine arrives at the end of its rails. The bar is then relieved from the last-mentioned clamp and is allowed to pass through the machine, being supported by the stationary steady-rest between the feeding-disks and by the rotary steady-rest heads of the machine until the bar has been entirely turned and has left the last cutter-head. The arrangement of the stationary steady-rest between the feeding-disks and of the rotary steady-rest heads will give the bar a complete support during its entire passage through the machine.

The gage employed for setting the cutter and steady-rests in the cutter-head is also employed for setting the steady-rests in the steady-rest head, the adjustment of said steady-rest being exactly the same as the adjustment of the cutter and steady-rests in the cutter-head.

It is absolutely necessary in a machine of this kind to place the steady-rest heads immediately adjoining the cutter-heads, inasmuch as the shaft or bar to be turned must be guided in the cutter-head close to the same, as otherwise irregularities and curves in the bar would allow the cutter to simply bite into the most eccentric side of the curve or bend in the bar without turning the entire circumference of the same. When the bar is guided at a point close to the cutter-head, the bar is always centered in the same and maintained so, and the cutter in the cutter-head will act upon the entire circumference of the shaft or bar. I have discovered by practical experience that a rotating cutter-head will not have its cutter act entirely around the bar unless a centering-guide, such as the rotating steady-rest head, is provided in close proximity to center all bent or curved portions of the bar into the rotating cutter-head. If such guidance is not provided, the bar will have the convexities of its bends, curves, or other irregularities cut away, but will not be turned to a true cylindrical form to be later straightened by special and separate devices. The rough cutter will prepare the bar to be held and steadied by the first steady-rest head, which at the same time centers the bar for the cutter, and the second steady-rest head will centrally present the bar to the finishing cutter-head and hold the bar for the action of said head.

The adjusting-screws entering the threaded sockets in the lower bearing-blocks for the feed-disk shafts will hold said blocks against the inward movement which the spreading action of the bar between the disks will have a tendency to exert upon said blocks, so that it will not be necessary to employ special means, such as spacing-blocks inserted between said lower bearing-blocks, to keep the latter apart.

Other modes of applying the principles of my invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth respectively in the following claims are employed.

I therefore particularly point out and distinctly claim as my invention—

1. In a machine for turning round bars, the combination of a rotating cutter-head and a rotating steady-rest head arranged in close proximity to each other, with a rotating steady-rest head and a rotating cutter-head arranged in close proximity to each other, said heads arranged in axial alinement and in the order named and with a greater space between the two pairs of heads than between the individual heads of each pair, substantially as set forth.

2. In a machine for turning round bars, the combination of a hollow spindle having means for rotating it, a cutter-head and a steady-rest head supported upon one end of said spindle in close proximity to each other and in axial alinement with the spindle, a steady-rest head and a cutter-head supported upon the other end of the spindle in close proximity to each other and in axial alinement with the spindle, and means for supporting and feeding a bar through said heads and spindle, substantially as set forth.

3. In a machine for turning round bars, the

combination of two pairs of feeding-disks which feed the bar to the cutter-head and arranged at one side of said head with two stationary steady-rest blocks arranged between said pairs of feeding-disks and in alinement with the space between said feeding-disks, substantially as set forth.

4. In a machine for turning round bars, the combination of a steady-rest frame formed with an upper and a lower socket, a block in the upper socket, an adjusting-screw entering said block from above through the top of said socket at the middle of the block, screws threaded through the top of the socket and bearing against said block, a block in the lower socket of said frame, and screws inserted through the bottom of said lower socket and bearing against said lower block, substantially as set forth.

5. In a machine for turning round bars, the combination of a spindle having means for revolving it, a cutter-head and a steady-rest head supported upon the receiving end of said spindle in close proximity to each other and in axial alinement with the spindle, a steady-rest head and a cutter-head supported upon the discharge end of the spindle in close proximity to each other and in axial alinement with the spindle, clamps arranged to travel at both ends of the machine in the axial line of the same, two pairs of feed-disks arranged at opposite sides of the axial feed-line of the machine and at the receiving end of the same, and a stationary steady-rest supported in the line of feed between said pairs of feed-disks, substantially as set forth.

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 12th day of February, A. D. 1897.

LATHAM H. BRIGHTMAN.

Witnesses:
FRANK NOOY,
FRANK CARPENTER.