

No. 614,483.

Patented Nov. 22, 1898.

A. G. MATHER & F. T. SNYDER.

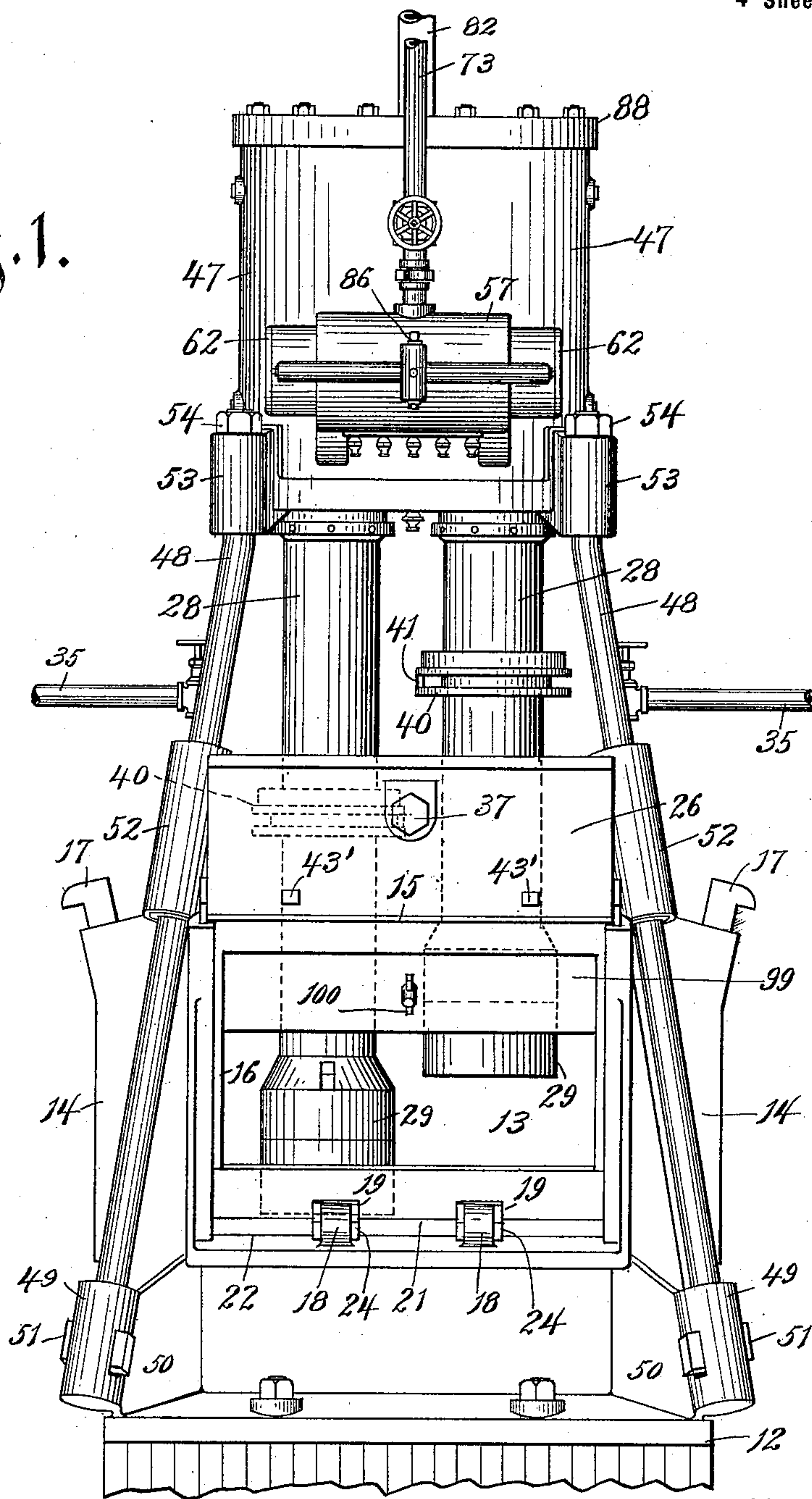
STAMP MILL.

(Application filed July 29, 1897.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.



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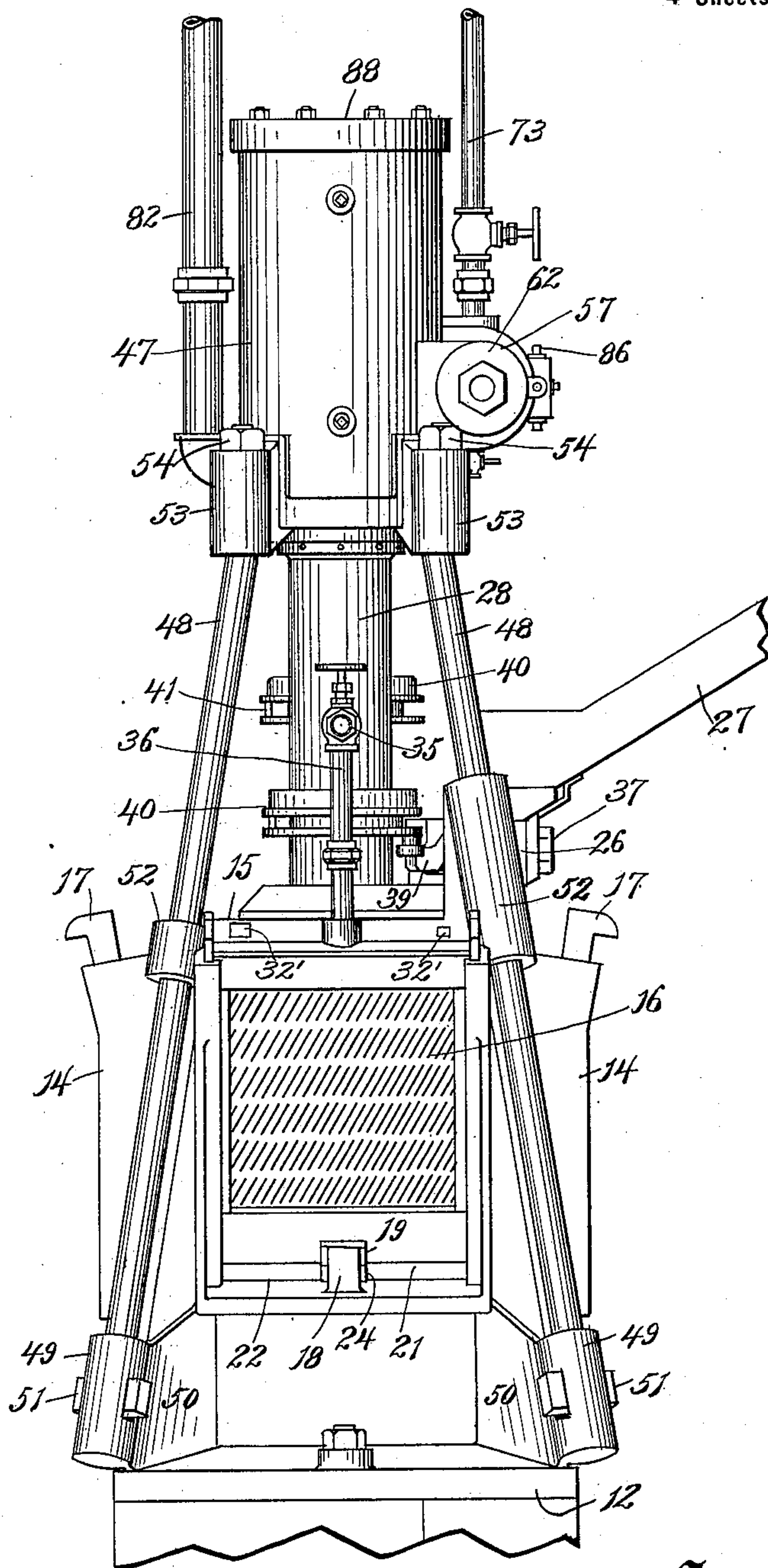
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Fig. 2.



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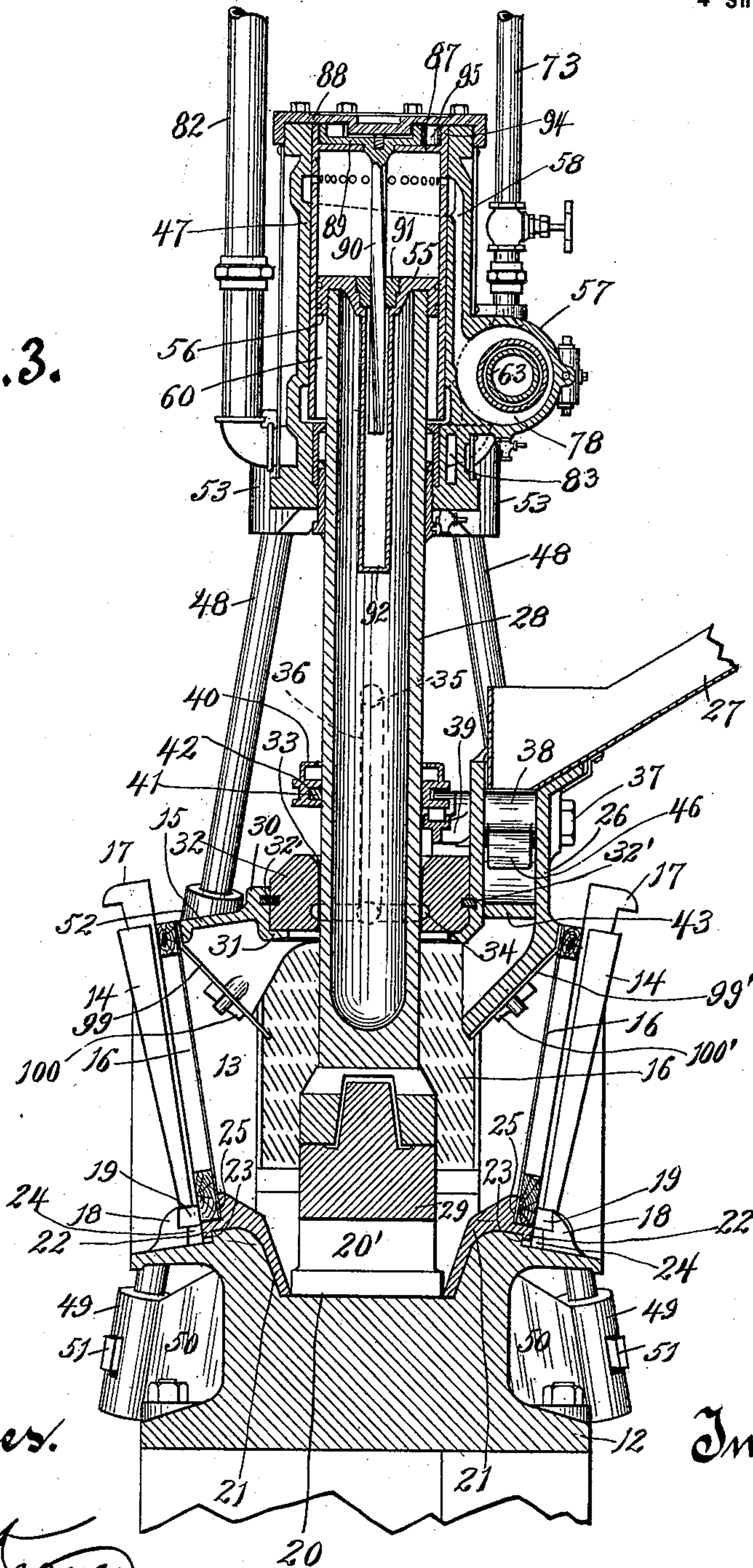
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Fig. 3.



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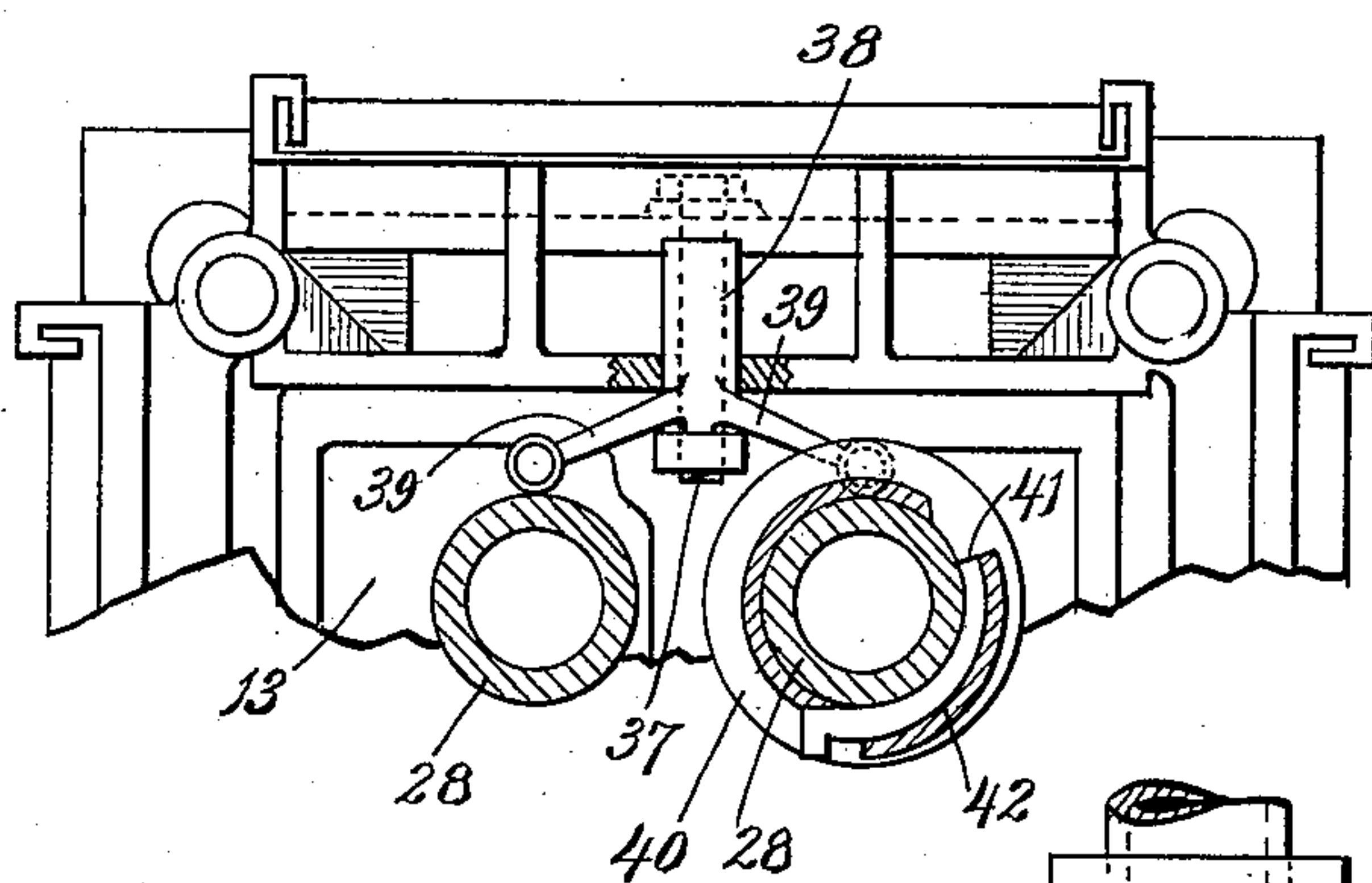
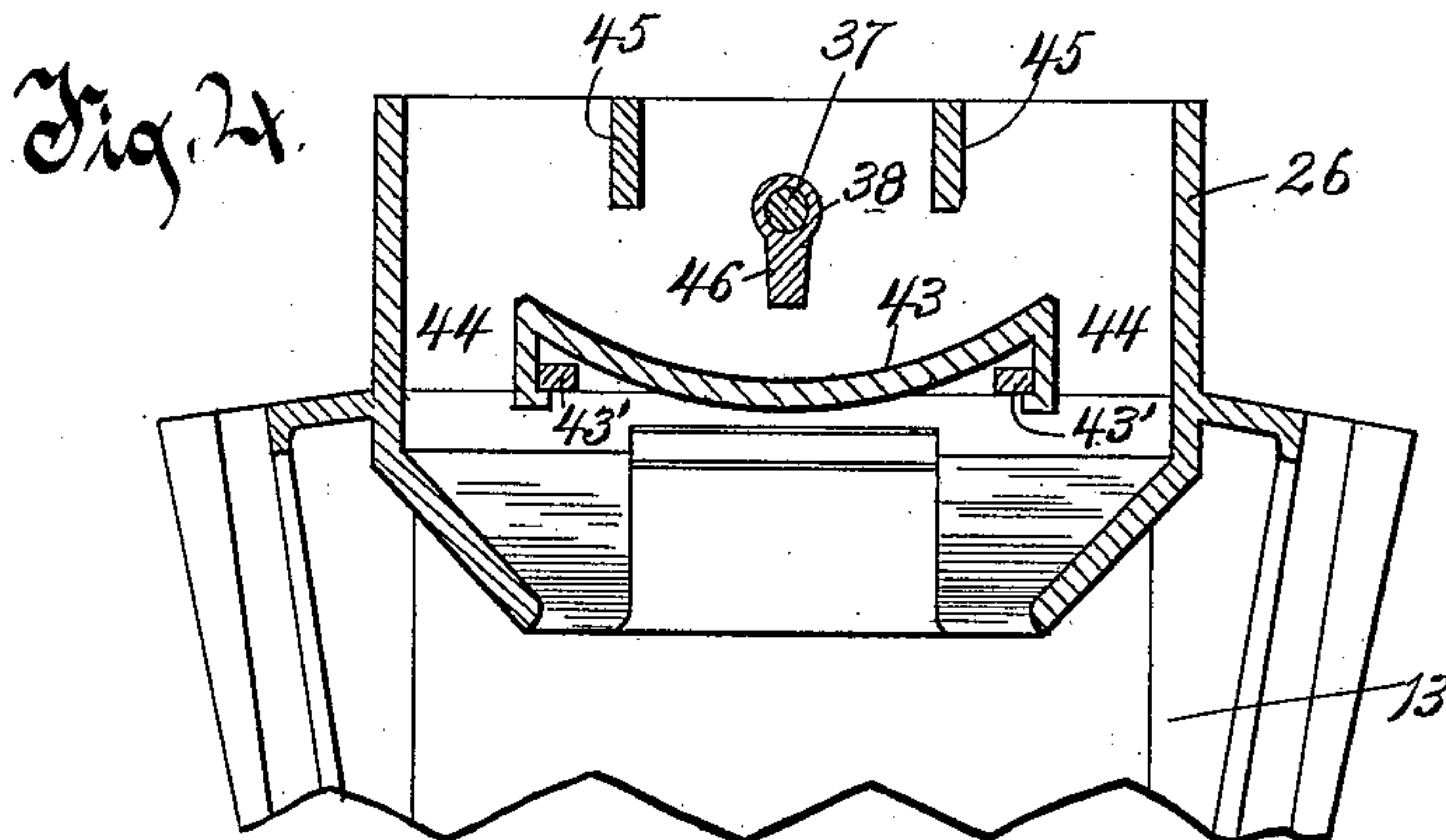
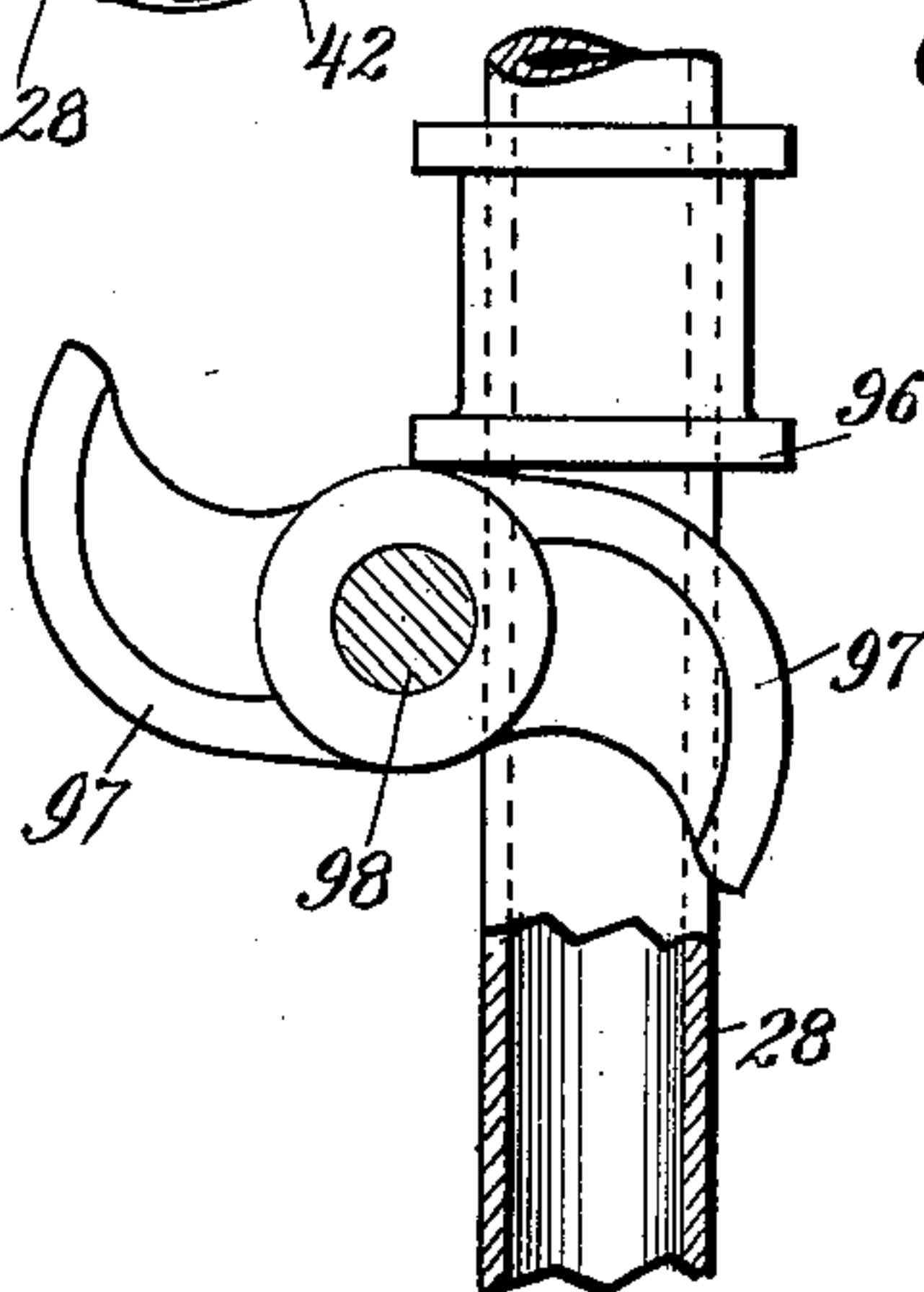
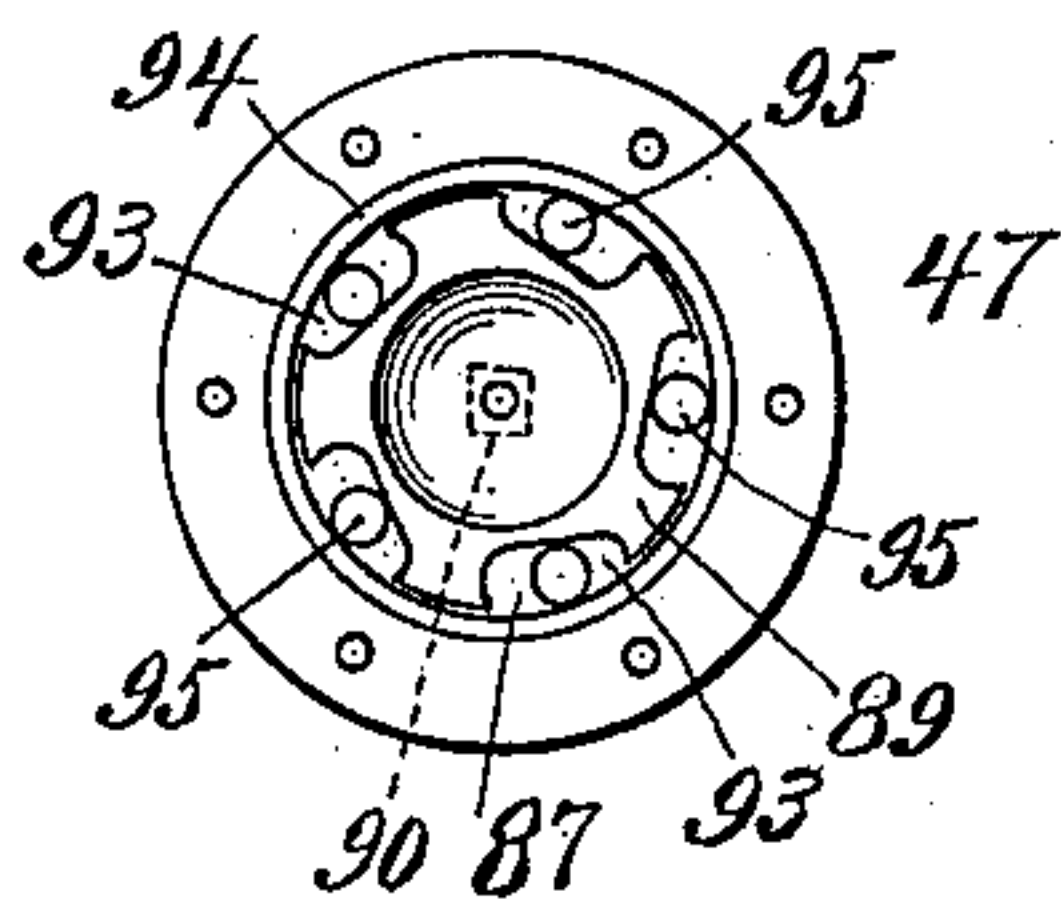


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALLAN G. MATHER AND FREDERICK T. SNYDER, OF MILWAUKEE,
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STAMP-MILL.

SPECIFICATION forming part of Letters Patent No. 614,483, dated November 22, 1898.

Application filed July 29, 1897. Serial No. 646,284. (No model.)

To all whom it may concern:

Be it known that we, ALLAN G. MATHER and FREDERICK T. SNYDER, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Stamp-Mills, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

Our invention has relation to improvements in stamp-mills of that class particularly designed for crushing and pulverizing ores carrying valuable minerals, which require crushing and pulverizing to facilitate the extraction of the valuable mineral from the gangue or rock.

Among the objects of our invention are, first, to provide improved means for preventing the splash from passing up into the space between the stamp-stems and the bordering edges of the openings of the housing; second, to provide improved means for securing an even and automatic feed of the material; third, to provide a construction adapted to prevent uneven wear on the shoe, and, fourth, the invention furthermore comprehends a machine of minimum weight and capable of crushing the maximum amount of ore with the least expenditure of plant and with the least power.

With the above primary and other incidental objects in view the invention consists of the devices and parts or their equivalents, as hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a front elevation of the machine, the screens being removed from their frames. Fig. 2 is an elevation at right angles to Fig. 1. Fig. 3 is a vertical sectional view. Fig. 4 is a sectional view of the feed-spout. Fig. 5 is a plan view of Fig. 8, parts in section. Fig. 6 is a plan view of the stamp-revolving device, and Fig. 7 shows a modification in the means for actuating the tubular stamp-stems.

Referring to the drawings, the numeral 12 indicates the base. Above the base is formed the stamp-box 13, preferably of square or rectangular shape. This stamp-box has four open metallic side frames 14 and a centrally-apertured top piece 15. To the openings of the side frames are adjusted screen-frames

16. Screens are therefore arranged on all four sides, which provides for the pulp being forced out of the mortar in the quickest possible time. These screen-frames are held in place by vertical wedge-keys 17, which are forced down between the inner sides of the metallic frames and the outer sides of the screen-frames. For more securely retaining the screen-frames in place upwardly-extending lugs 18 may be cast on the upper side of the base 12 and horizontal wedge-keys 19 forced between these lugs and the lower strips of the screen-frames.

The top surface of the base 12 forms the bottom of the stamp-box, and this top surface is provided with a recess having sloping side walls, which walls, together with the flat bottom of the recess, form the mortar 20, in which mortar are located the dies 20'. The sloping side walls are provided with metallic linings 21, which at their upper edges are turned over the tops of the sloping walls and are provided at their outer edges with depending lips 22, which engage against shoulders 23, formed on the upper surface of the base 12. Wedges are employed for holding the linings in place. These wedges are indicated by the numerals 24 and are passed between the lower portions of the lugs 18, hereinbefore referred to, and the outer edges of the upper portions of the linings. The linings therefore are held in place by wedges arranged outside of the mortar. The outer edges of the linings are also cut out, as indicated at 25, to form seats for the lower strips of the screen-frames.

The numeral 26 indicates the feed-spout, which forms a part of the casting and extends through the top of the stamp-box, and its wall within the stamp-box is inclined inwardly, so as to direct the material to the bottom or die of the mortar. A removable chute or trough 27 leads to the feed-spout.

The stamp-stems 28 of our improved mill are made tubular or hollow. This tubular formation enables a stamp-stem to be used of the maximum diameter and at the same time of very light weight as compared to a solid stem of the same diameter. A solid stem of the maximum diameter could not be successfully used, owing to the great weight it would

add to the machine. A further point of advantage gained by the employment of a tubular stamp-stem resides in the increased stiffness and strength thereby secured. We have shown two of these stamp-stems in the accompanying illustration of our invention; but a greater number may be employed if found necessary or convenient. To the lower ends of the stems are secured the shoes 29, which are of the usual form and are adapted to act alternately on the dies within the mortar.

The top piece 15 of the stamp-box is provided with the flanged portion 30 and with the horizontal portion 31, extending from the lower edge of the flange 30. The openings in the top 15 are formed in this horizontal portion, and said horizontal portion provides a ledge for supporting a housing 32, said housing being in the nature of a block, advisably of wood, and having openings therethrough for the passage of the stamp-stems. This housing is of considerable thickness, so that it is impossible on the downstroke of the stamp-stems for any splash to pass up into the space between said stamp-stems and the edges of the openings of the housing. In other words, the splash would not have time in the period consumed by the descent of a stamp-stem to travel upwardly a distance equal to that of the thickness of the housing. Of course the same object could be obtained by extending the top of the stamp-box upwardly a greater distance and employing at that point a housing of less thickness. This necessitates, however, the extension of the vertical height of the machine, which of course, from economical and other standpoints, is to be avoided. We therefore accomplish the object desired—that is, the preventing of the upsplashing material from passing upwardly out of the box through the space between the housing and the stamp-stem—by constructing said housing much thicker than has heretofore been the practice and arranging it at a lower point of the frame, whereby we are enabled to employ a frame of minimum height and at the same time avoid the objectionable splashing referred to. For holding the housing in place we prefer to employ horizontal wedge-keys 32', which engage registering recesses in the flanges 30 and the outer edges of the housing. These horizontal keys are an improvement over vertical wedge-keys, owing to the liability of the latter working out of place, and said horizontal wedge-keys also prevent the housing from working up by the friction of the stamp-stems.

The bordering edges of the openings of the housing do not fit closely to the stamp-stems; but a slight space 33 is left therebetween. This space leads to and communicates with annular grooves 34, formed in the edges of the openings of the housing.

The numerals 35 35 indicate the water-supply pipes, which lead from any suitable source

of water-supply and connect at their inner ends with vertical valve-controlled water-pipes 36 36. These pipes 36, at their lower ends, extend through the casting and communicate with the annular grooves 34. The water therefore is conducted to these annular grooves and from thence passes down between the stems and the edges of the openings of the housing into the stamp-box. The water thus passing into the stamp-box is used for the purpose of washing the finely-crushed pulp out through the screens, and it also serves incidentally the purpose of washing off any sand which might travel up and adhere to the stems, thereby always keeping the stems free from clogging accumulations.

The mechanism for securing an even distribution of the material will now be described.

Within the feed-spout is a fixed pin 37. This pin has mounted freely thereon a sleeve 38. The pin and sleeve project through the inner wall of the feed-spout to a position just above the housing, and the inner projecting end of the sleeve is provided with the obliquely-extending arms 39 39, the extremities of said arms being adjacent to the stamp-stems. Mounted on each stamp-stem is a collar 40. Each collar is preferably secured to its stem by means of a curved wedge-key 41 entering a curved slot 42 in the collar. (See Fig. 5.) Within the feed-spout and disposed about centrally thereof is a curved horizontal partition 43. This partition is removable and is held in position by horizontal wedges 43'. This partition does not extend entirely across the spout, so that side passages 44 44 are left, which lead to the discharge-opening of the spout. At its upper edge the spout is divided by partitions 45 45 into three inlet-spaces. The sleeve is provided upon its under side with a depending wing 46, which is located above the center of the partition 43. Ordinarily the material is fed through the central passage between the partitions 45 45 and is deposited upon the curved partition 43. As the stamp-stems alternately reciprocate vertically, the collars 40 thereon alternately engage the obliquely-extending arms 39, whereby the sleeve 38 is caused to be rocked and the depending wing thereof oscillated. This movement of the wing will cause the material deposited on the partition 43 to be acted upon and to be evenly distributed and forced through the passages 44 to the discharge-opening of the spout. By this method it is obvious that an automatic and even distribution of the feed is obtained, as if but a small quantity of material is in the mortar the drop of the stamp-stem is necessarily greater, and consequently the oscillation of the depending wing is correspondingly increased and the feed of the material thereby augmented.

The upper ends of the stamp-stems 28 are herein shown as fitting in cylinders 47 47. In these cylinders steam is adapted to be admitted alternately below and above the ends of the stamp-stems at the proper time for

causing the up and down movements of said stamp-stems. We do not, however, wish to be understood as restricting ourselves to the use of steam as the actuating medium, as it is obvious that any other suitable fluid-actuating agent may be employed; or, for that matter, the stamp-stems may be alternately reciprocated by suitable mechanical means, as hereinafter pointed out. These cylinders are supported by means of vertical rods or standards 48. The lower ends of these rods or standards pass into sockets 49, formed in the outer extremities of arms 50, projecting outwardly from the base 12. The rods or standards are preferably secured in the sockets by means of wedge-keys 51. These rods also pass through sleeves 52, forming part of the top casting of the stamp-box, and their upper converging ends pass through sleeves 53, formed at the lower ends of the cylinders. The upper extremities of the rods project above the upper ends of these sleeves and are threaded to receive jam-nuts 54. The tubular stamp-stems pass into the cylinder and their upper closed ends form pistons or heads. These upper ends of the tubular stems are preferably closed by means of screw-caps 55, the outer annular flanges of said caps bearing against the inner sides of the cylinders. The upper sides of the caps form the surface against which the steam acts to cause the descent of the stamp-stems, while the under edge 56 of the annular flanges of the screw-caps form the surface against which the steam acts to cause the up movement of the stamp-stems.

Heretofore in this class of devices considerable difficulty has been experienced from the liability of the shoe wearing unevenly on its under acting surface, owing to its constant contacting with the die. To obviate this difficulty, we provide a construction whereby on each up movement of the stamp-stem said stem is compelled to partly rotate, with the result that different portions of the surface of the shoe are presented to the fixed surface of the die on each successive contact. This mechanism is shown most clearly in Figs. 3 and 6 of the drawings. At the top of each steam-cylinder we provide a horizontal partition 87. Arranged between this partition and the cap-piece 88 of the cylinder is a disk 89. This disk is provided with a depending stem 90, which is formed with a series of longitudinal twists, as clearly shown. The stem passes through a central nut 91 in the top of piston 55 of the stamp-stem and extends down into a tube 92, said tube having a closed lower end whereby steam from the top of the cylinder is prevented from passing into the bore of the tubular shaft. The nut 91 is provided with grooves which receive the twists of the stem. The disk 89 is formed peripherally with a series of recesses 93. These recesses form spaces between their edges and the annular flange 94, extending upwardly from the partition 87.

In each of these spaces is arranged a roller 95. The inner edge of each recess 93, at one end, inclines outwardly, so that the space between the inner edge of each recess and the annular flange 94 is narrower at one end than at the other. On the up movement of the stamp-stem the grooves in the nut 91, which grooves are engaged by the twists of the stem 90, will cause said stem and its disk 89 to be slightly turned, so as to wedge the rollers 95 in the narrowest portions of the spaces formed by the recesses 93 and the annular flange 94. This will have the effect of holding the disk 89 and its stem 90 rigid, and with the continued up movement of the stamp-stem said stamp-stem will be partially revolved. On the down movement of the stamp-stem, however, a slight initial turn is given to the disk 89, which releases the wedging action between the rollers 95 and the surfaces between which said rollers are confined and permits the rollers to pass into the widest portions of the recesses and allow for free rotation of the disk and its stem. The result is that on the downstroke the stamp-stem will drop without any rotation whatever being imparted thereto. From this it will be seen that on each upstroke a partial turn is given to the stamp-stem, so that on the following downstroke a new surface is presented to the die. While we have shown this mechanism in connection with a stamp-stem adapted to be actuated by steam-pressure and a part of this mechanism disposed in the upper portion of the steam-cylinder, yet we do not wish to be understood as limiting ourselves to this particular adaptation of the mechanism, inasmuch as it is obvious that the mechanism may be used in connection with a stamp-stem reciprocated by any other desired means, it being only necessary that the wedging-disk 89 be so arranged as to provide the spaces for the rollers 95.

In Fig. 11 we have shown the stem as provided with a collar 96, said collar adapted to be acted upon by the cam-arms 97 97, mounted on a shaft 98.

In Fig. 3, 99 99' indicate amalgamated plates suspended inside the stamp-box 13 by keys 100 100'. These plates 99 99' are supported along their upper edges by being clamped between the top rails of the screen-frames 16 16 and the outer edges of the top 15 of the stamp-box 13. It is customary to place these plates in the lower portion of the stamp-box. This unavoidably obstructed the screen discharge on the side where they are located. By placing them, as shown, in the top of the stamp-box adjacent to and inclined inwardly from the top edge of the screen the pulp, as it splashes up against the screen, washes over the plates and the precious metal amalgamated and is retained in the plates.

What we claim as our invention is—

1. In a stamp-mill, the combination, of a stamp-box, a top piece therefor, said top piece having an opening therethrough, and a ver-

tical flange surrounding said opening, the lower edge of said flange formed with an inwardly-extending horizontal flange, a housing seated on the horizontal flange of the top piece, horizontal wedge-keys fitting in registering recesses in the vertical flange of the top piece and in the housing, and a stamp-stem passing through an opening of the housing.

2. In a stamp-mill, the combination, of a base having lugs projecting upwardly therefrom, and also having a recess in its top surface forming a mortar-chamber, a lining for the mortar-chamber, said lining extending over the top edge of said chamber, and provided with a depending lip engaging a shoulder in the top of the base, and horizontal wedge-keys passing between the upwardly-extending lugs and the outer edges of the lining.

3. In a stamp-mill, the combination, of a base having a recess in its top surface forming a mortar-chamber, a lining for the mortar-chamber, said lining extending over the top edge of said chamber, and provided with a cut-away portion forming a seat, a stamp-box above the base and provided with open sides, and screens adjustable to said open sides, the lower edges of the screens fitting the seats formed by the cut-away portion of the lining.

4. In a stamp-mill, the combination, of a stamp-box, a stationary feed-spout leading thereto, said feed-spout provided interiorly with a stationary horizontal partition extending partly thereacross and leaving passage-ways at its ends leading to the discharge-opening of the spout, a rocking part within the feed-spout, said rocking part provided with a depending wing located above the horizontal partition, and said rocking part also provided with a projecting arm, and a stamp-stem provided with a collar or projecting tappet adapted to act on the arm so as to cause a rocking of the rocking part and a consequent oscillation of the depending wing.

5. In a stamp-mill, the combination, of a stamp-box, a stationary feed-spout leading thereto, said feed-spout provided interiorly with a stationary horizontal partition extending partly thereacross, and leaving passage-ways at its opposite ends leading to the discharge-opening of the spout, a rocking part within the feed-spout, said rocking part provided with a depending wing located above the horizontal partition, and said rocking part

also provided with oppositely-projecting arms, and oppositely-reciprocating stamp-stems provided with collars or tappets adapted to act on the respective projecting arms, and thereby effect a rocking of the rocking part, and a consequent oscillation of the wing.

6. In a stamp-mill, the combination, of a mortar, a stamp-stem carrying at its lower end a shoe, a disk located within a closed space, said disk provided peripherally with a series of recesses gradually tapering to a less depth toward one end, and said disk also provided with a depending twisted stem extending through an opening in the top of the stamp-stem, said opening having grooves to receive the twists of the disk-stem, and rollers confined in the spaces between the recesses of the disks and the wall of the closed space within which the disk is located, whereby the stamp-stem is compelled to partly rotate in its up movement, and is permitted to descend without rotation.

7. In a stamp-mill, the combination, of a mortar, a hollow or tubular stamp-stem carrying at its lower end a shoe the upper portion of said stamp-stem forming a piston, and said stamp-stem having a tube extending from its upper end inwardly into the bore of the stamp-stem, the tube having a closed lower end, a cylinder in which the upper end of the stamp-stem reciprocates, means for admitting an actuating agent to the cylinder for actuating the stamp-stem, a disk located within a closed space at the upper end of the cylinder, said disk provided peripherally with a series of recesses, said recesses gradually tapering to a less depth toward one end, and said disk also provided with a depending twisted stem extending through an opening in the top of the stamp-stem, and into the interior tube of said stamp-stem the opening in the top of the stamp-stem having grooves therein to receive the twists of the disk-stem, and rollers confined in the spaces between the recesses of the disk and the wall of the closed space within which the disk is located.

In testimony whereof we affix our signatures in presence of witnesses.

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