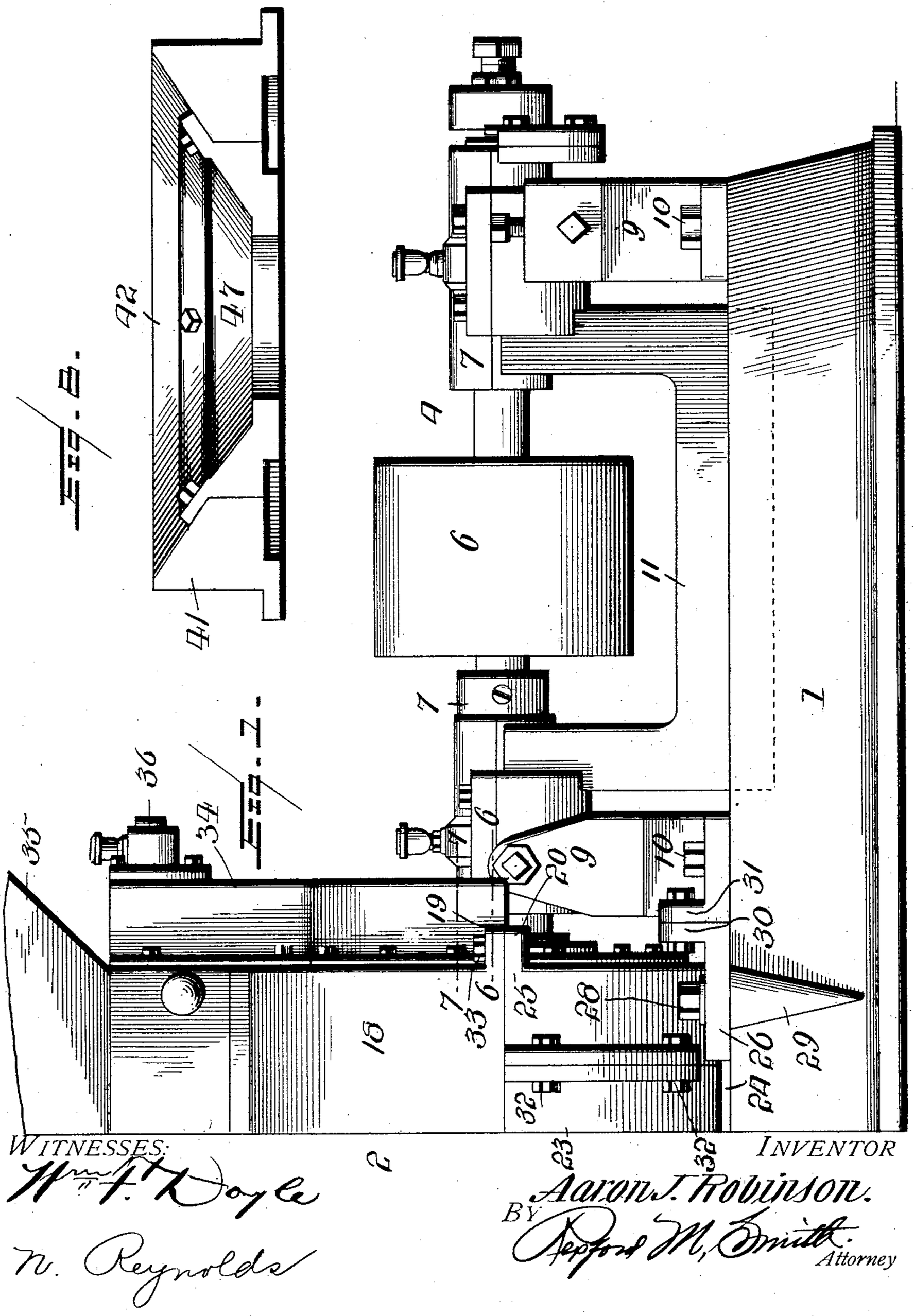
No. 750,701. PATENTED JAN. 26, 1904.

A. J. ROBINSON.

GRINDING MILL.

APPLICATION FILED MAR. 13, 1903.

NO MODEL. 7 SHEETS—SHEET 1.



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Attorney

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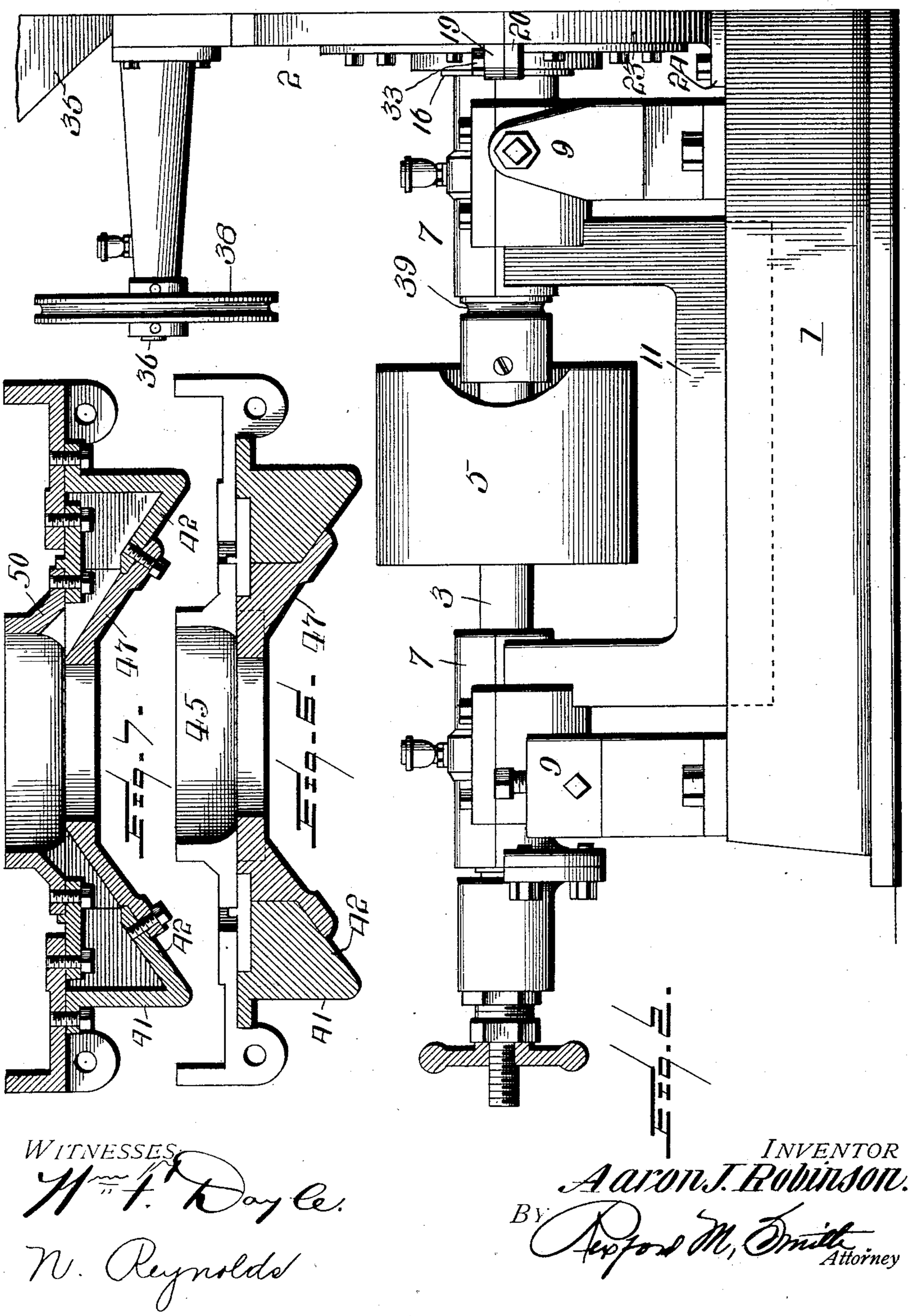
NO MODEL. 7 SHEETS—SHEET 2.



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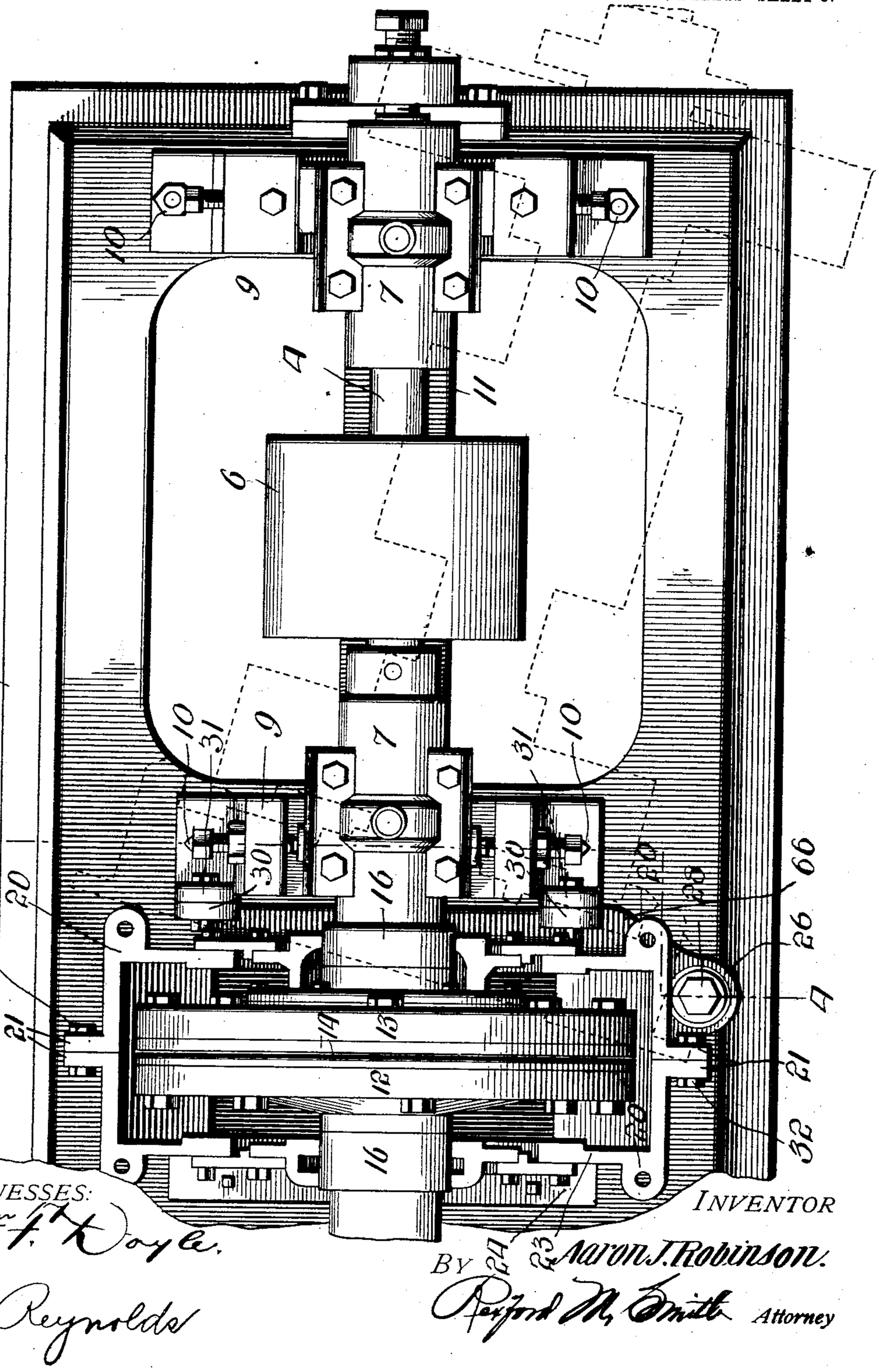
NO MODEL. 7 SHEETS—SHEET 3.



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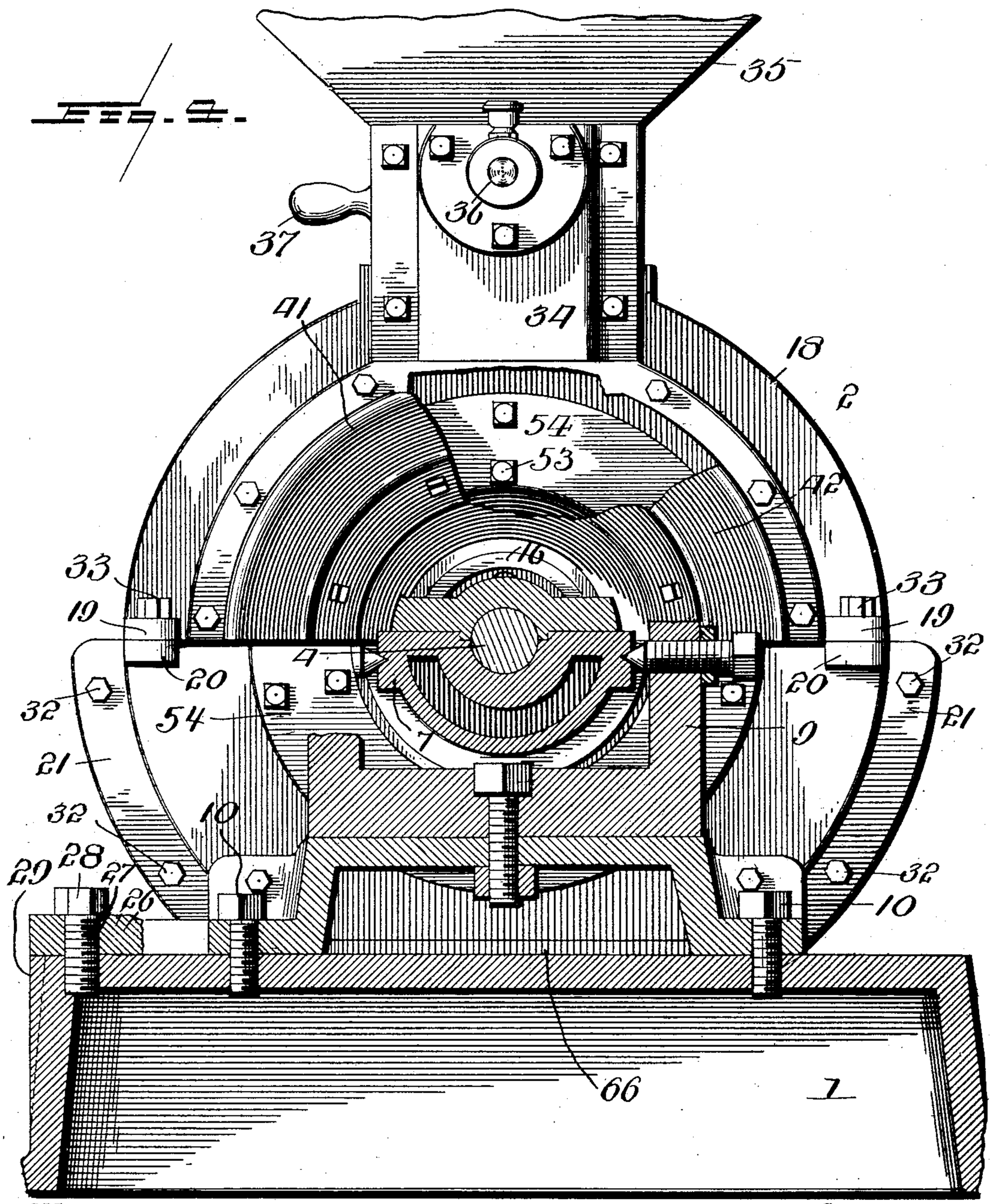
NO MODEL. 7 SHEETS—SHEET 4.

Fig. 2.



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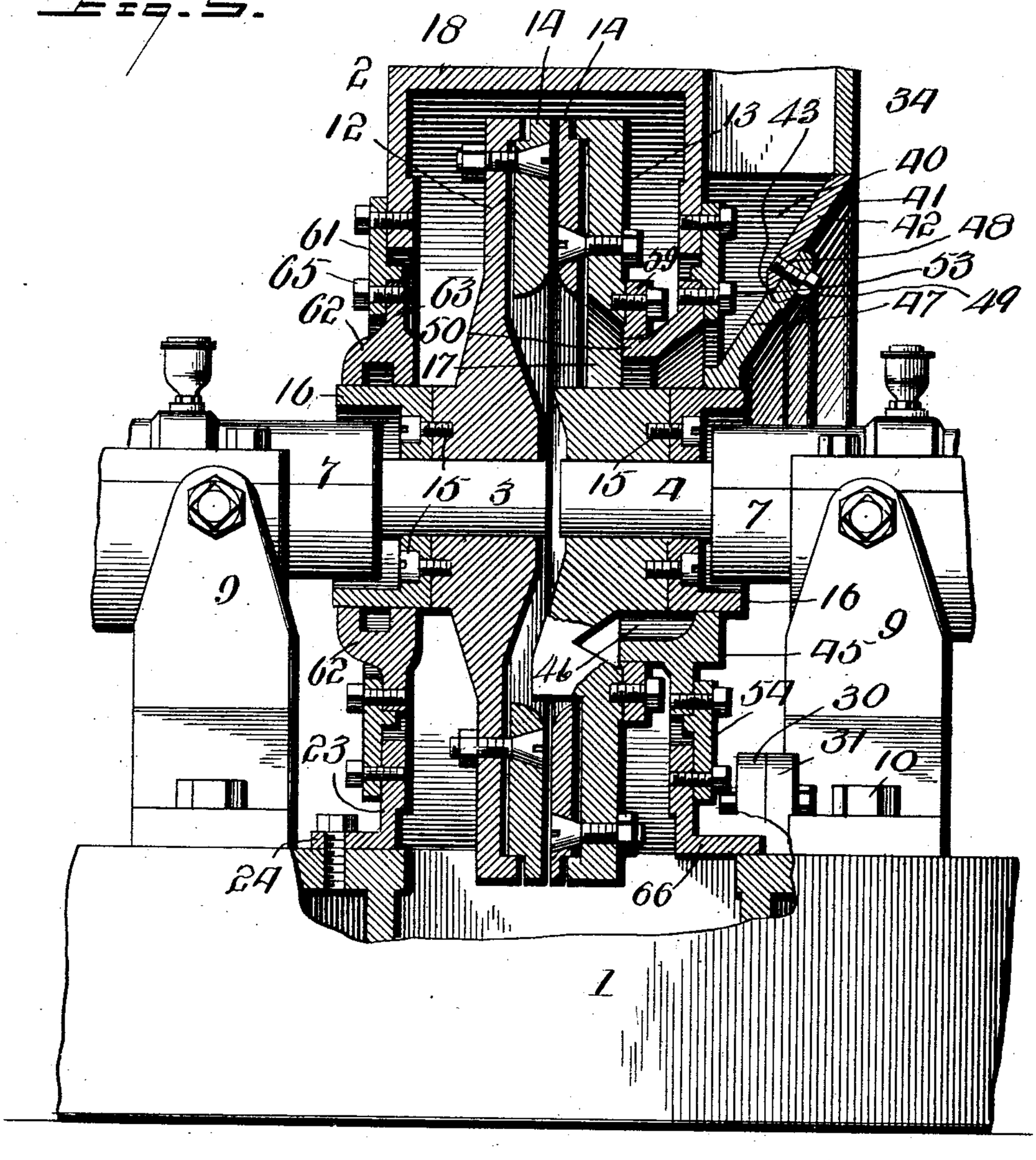
APPLICATION FILED MAR. 13, 1903.

NO MODEL. 7 SHEETS—SHEET 5.

Fig. 5.



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APPLICATION FILED MAR. 13, 1903.

NO MODEL. 7 SHEETS—SHEET 6.

FIG. 5.

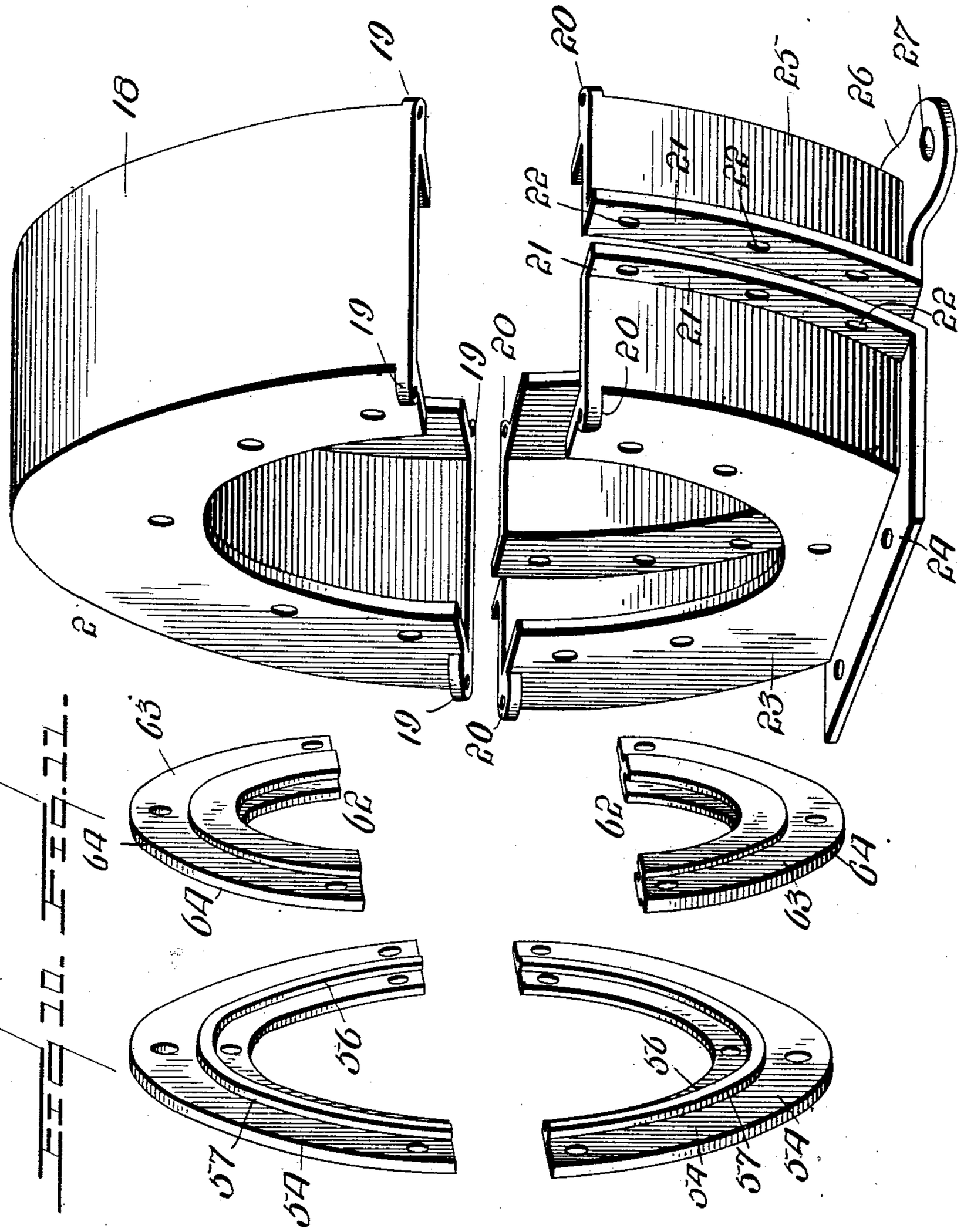

FIG. 10. FIG. 11.

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APPLICATION FILED MAR. 13, 1903.

NO MODEL. 7 SHEETS—SHEET 7.

FIG. 12.

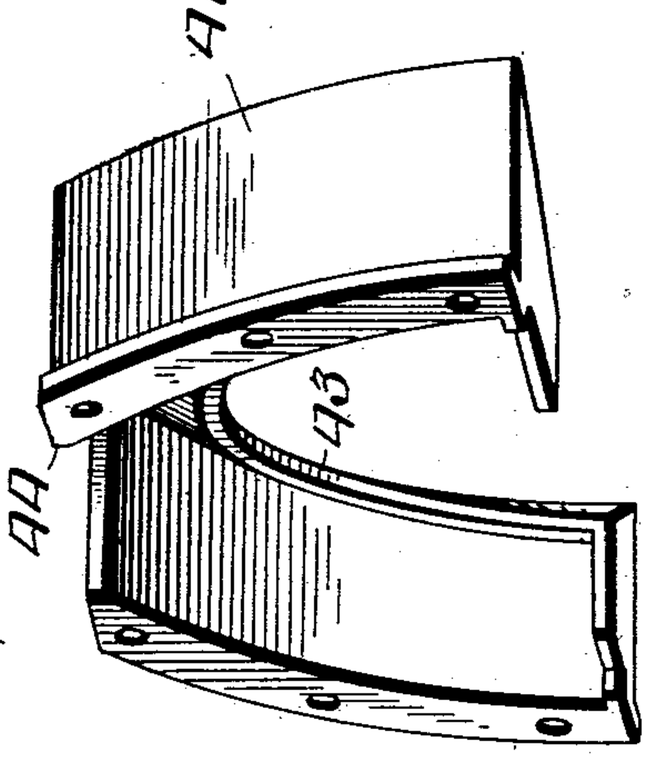


FIG. 14.

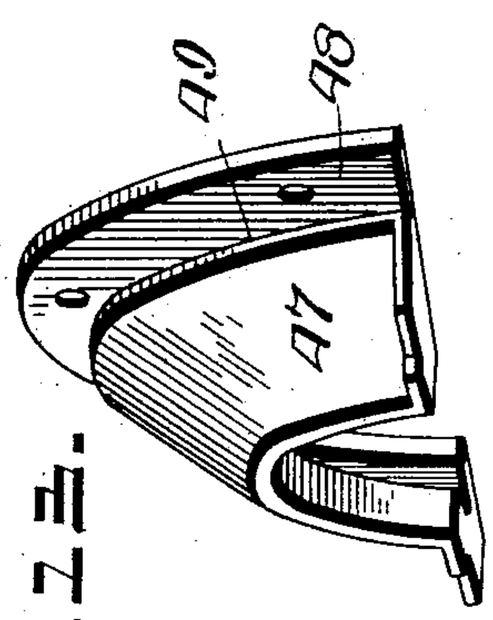


FIG. 13.

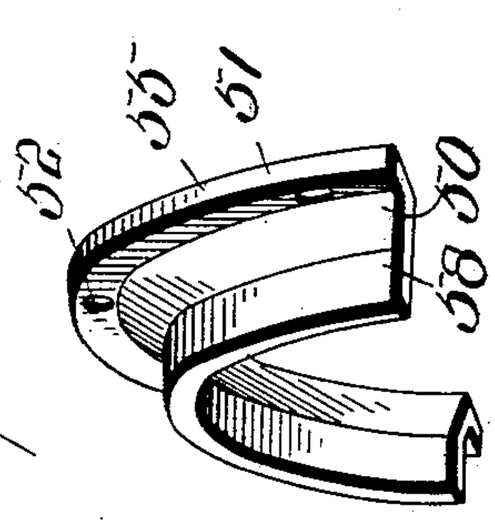
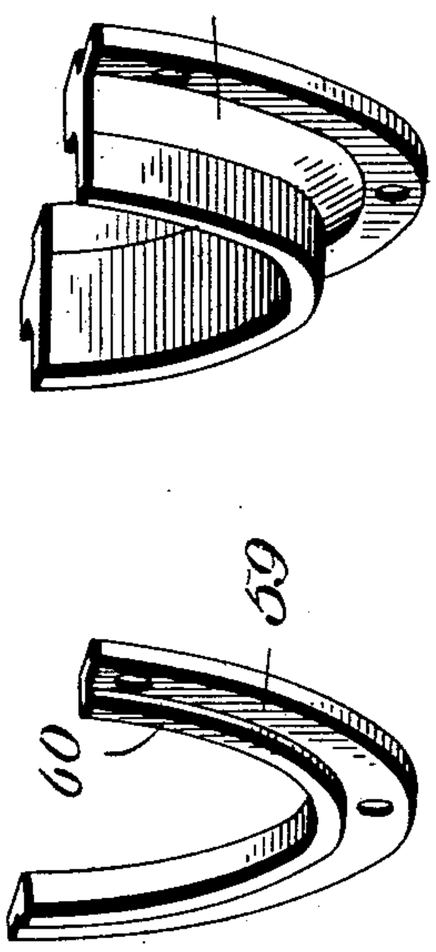


FIG. 15.

FIG. 16.



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No. 750,701. Patented January 26, 1904.

UNITED STATES PATENT OFFICE.

AARON J. ROBINSON, OF FREMONT, NEW HAMPSHIRE.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 750,701, dated January 26, 1904.

Application filed March 13, 1903. Serial No. 147,637. (No model.)

To all whom it may concern:

Be it known that I, AARON J. ROBINSON, a citizen of the United States, residing at Fremont, in the county of Rockingham and State of New Hampshire, have invented a certain new and useful Grinding-Mill, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to grinding-mills of the type employing oppositely-arranged grinding-disks mounted on the adjacent ends of the sections of a divided shaft and operating within a casing to which the material is fed through a feed-throat from a hopper, the casing, together with the other parts of the mill, being mounted upon a suitable base.

In grinding-mills of the class above referred to great difficulty and inconvenience have been experienced in getting access to the interior of the casing and the grinding-disks for the purpose of renewing the hard-metal grinding-plates which are fastened to the opposing faces of the disks, it being necessary in mills of the ordinary construction now in use to practically dismantle or take down the mill in order to perform the work above referred to. On account of the construction heretofore employed it has also been a matter of considerable expense and difficulty to renew parts of the mill, and especially the parts of the casing adjacent to the hubs of the grinding-disks. By the present invention duplicate parts can be furnished to replace those pieces which are subject to wear, and such duplicate parts can be easily fitted in place, restoring the casing and its attached parts to practically their original condition.

The object of this invention is to overcome the difficulties referred to, and for that purpose the casing, together with the main bearings, supporting-chairs, and yoke, and one section of the main shaft are so constructed, arranged, and disposed with relation to each other that by removing one portion only of the casing, together with a few bolts, the casing may be opened up by swinging one section of the shaft and the parts immediately associated therewith, together with a portion of the casing, to one side. This can be accomplished in a few minutes, and then the faces of both of the grinding-disks and parts connected therewith are fully exposed to the operator, who may readily renew the grinding-plates. The construction of the casing and the parts contiguous thereto, together with the hubs of the grinding-disks, is such that those parts of the casing, disks, and hubs of the disks and also the parts of the feed-throat which are subject to wear may be readily renewed or replaced by similar new parts, thereby avoiding the expense of an entire new casing. In this way the mill may be kept in thorough working order for years at a trifling expense.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination, and arrangement of parts, as hereinafter fully described, illustrated, and claimed.

In the accompanying drawings, Figure 1 is a side elevation of one half or a grinding-mill, and Fig. 2 is a similar view of the other half of a grinding-mill, constructed in accordance with the present invention. Fig. 3 is a plan view of that half or portion of the mill shown in Fig. 1 with the upper portion of the casing removed preparatory to swinging one section of the shaft and the disk carried thereby to one side for giving access to the casing and disks, also showing by dotted lines the position of the parts when swung to one side. Fig. 4 is a vertical transverse section through the mill, taken on the line 4 4 of Fig. 3, the feed-throat also being partly broken away. Fig. 5 is a vertical longitudinal section taken through the casing and grinding-disks, feed-throat, &c., in line with the divided main shaft, the latter being shown in elevation. Fig. 6 is a horizontal section through the upper and outer portion of the feed-throat, taken on the line 6 6 of Fig. 1 looking downward. Fig. 7 is a similar section taken on the line 7 7 of Fig. 1. Fig. 8 is a bottom plan view of the feed-throat. Fig. 9 is an enlarged perspective view of the casing for the grinding-disks, showing the hood lifted off the lower separable sections and the casing-ring

sections removed. Fig. 10 is a detail perspective view of the sectional casing-ring which forms a permanent part of the casing. Fig. 11 is a similar view of one of the removable sectional sleeves or collars detached from the casing. Fig. 12 is a detail perspective view of a portion of the feed-throat which forms a permanent part of the casing. Fig. 13 is a similar view of the removable upper and outer feed-throat section. Fig. 14 is a detail perspective view of the upper and inner removable feed-throat section and the removable lower feed-throat section. Fig. 15 is a similar view of the grinding-disk ring.

Similar numerals of reference designate corresponding parts in all the figures of the drawings.

In the complete machine illustrated in Figs. 1 and 2 one-half of the machine in each figure comprises a base or bed piece 1, a centrally-arranged casing 2 for the grinding-disks, and a main disk-operating shaft which is divided about centrally within the casing 2 and comprises sections 3 and 4, which are located exactly in alinement with each other, but which operate simultaneously in opposite directions, the sections 3 and 4 being for that purpose provided with pulleys 5 and 6, respectively, to which motion is imparted by driving-belts from one or more counter-shafts located at convenient points.

Each of the shaft-sections 3 and 4 is journaled in bearings 7, supported by means of chairs 9, interposed between the bearings and the base and bolted or otherwise secured, as at 10, to the base or bed piece 1. The bearings 7 on each side of the grinding-disk casing are connected by means of yokes 11, which serve to keep the bearings in perfect alinement with each other. It will be understood that two of said yokes 11 are employed—one at each side of the center of the machine—and each yoke carrying at its opposite ends the bearings 7.

Mounted fast upon the inner ends of the shaft-sections 3 and 4 are the grinding-disks 12 and 13, which rotate with the shaft-sections and turn in opposite directions, said disks having bolted to their opposing inner adjacent faces grinding-plates 14, between which the corn or other grain or material is ground. The hub of each grinding-disk has detachably applied thereto by means of screws or bolts 15 a removable hub-section 16, said section 16 comprising that portion of the hub which is exposed to wear, as will hereinafter appear, so that when worn out the hub-sections 16 may be removed and replaced by new ones without the necessity of renewing the disks as a whole.

One of the grinding-disks is made solid throughout, while the other grinding-disk is provided with a central opening 17, so as to allow the material from the hopper to pass from the feed-throat through said disk into the grinding-space between the two disks, as illustrated in Fig. 5.

The upper portion of the casing 2 is in the form of a semicylindrical hood 18, the same being provided at its lower edge with lugs 19, having openings to receive bolts by means of which said hood is connected to similar lugs 20 on the lower portion of the casing. (See Fig. 9.) The lower portion of the casing is also substantially semicylindrical in shape, but is divided longitudinally and provided along the meeting edges of the sections with twin flanges 21, provided at suitable intervals with holes 22 to receive bolts or other fasteners, whereby said sections of the lower portion of the casing are firmly bolted together. One of the lower sections (indicated at 23) is provided with a base-flange 24, which is permanently connected to the base or bed piece 1 of the machine, said section being therefore stationary. The other section, 25, is provided to one side of its meeting face with an offstanding pivot-lug 26, the same being provided with an opening 27 to receive a pivot bolt or screw 28, which passes through the lug down into a boss 29, formed on the base or bed piece 1, as shown in Figs. 1 and 4. The section 25 is also provided with a base-flange 66, on the outer edge of which are upwardly-projecting lugs or ears 30, which are bolted or otherwise securely connected to the lugs or ears 31, forming part of the adjacent chairs 9.

It will be observed that the shaft-section 4, the pulley 6 thereon, the grinding-disk 13, the yoke 11, chairs 9, bearings 7, and adjacent section 25 of the lower portion of the grinding-case are all connected to each other and adapted to swing on the pivot 28 as a center. In order to do this, it is first necessary to remove the bolts 10, the bolts 32, which pass through the holes 22, above referred to, and also the bolts 33, which connect the upper and lower portions of the casing in which the grinding-disks are located. The hood 18 is first removed by taking out the bolts 33, and then, after removing the bolts 32 and 10, the section 4 of the shaft, together with the parts connected therewith, and the bearings, chairs, and yoke, together with the adjacent portion of the casing and grinding-disk, are swung laterally to one side from the full-line position of Fig. 3 to the dotted-line position thereof. This gives access to the inner faces of the grinding-disks and enables the hard-metal grinding-plates to be removed from the disks proper and be repaired or replaced by new ones. In returning the parts to their normal positions the pivot 28 brings the disks into exact and proper working relation, thus doing away with the necessity of adjusting any of the parts of the machine. After replacing the bolts, screws, or other fasteners employed the machine is again in readiness for use.

Arranged at one side of the casing 18 and secured thereto is a vertical feed-spout 34, which extends from the hopper 35 downward and terminates in a feed-throat leading to the space between the grinding-disks. Extending across and through the upper portion of the feed-spout 34 is a feeder-shaft 36, which carries the feeder by means of which the material is conducted from the hopper into the feed-spout, 37 designating the operating-handle of a feed-regulator for governing the amount of material fed into the machine. Upon the feeder-shaft 36 is mounted a pulley 38, adapted to receive a driving-band from a small pulley 39 on one of the sections 3 of the divided main shaft of the machine, motion being transmitted in this way to the feeder.

The feed-spout 34 empties at its lower end into the feed-throat 40, which is of sectional construction, 41 designating the main body and extreme upper portion of the feed-throat and having an inclined and inwardly-converging outer wall 42, the lower edge 43 of which is "machined" to a standard size. By "machined" I mean that said edge 43 is turned in the arc of a true circle upon a lathe in order that the contiguous part may fit properly against the same. The section 41 of the feed-throat is illustrated in detail in Fig. 12, wherein it will be observed that the upper portion of said section is left open, as shown at 44, to receive the feed-spout 34.

The feed-throat extends entirely around the hub of the adjacent grinding-disk, as shown in Fig. 5, and comprises several parts in the form of removable sectional sleeves or collars, two extending over and above the hub of the grinding-disk and one beneath said hub. 45 designates the removable lower feed-throat section, which encircles the lower half of the hub of the adjacent grinding-disk, the same being hollowed out, as shown at 46, to allow the material to pass around the hub of the disk and through the opening 17 into the grinding-space. 47 designates the removable upper and outer feed-throat section, which extends over and half-way surrounds the hub of the disk and is pitched at the same inclination as the wall 42 of the section 41 of the feed-throat, the section 47 being rabbeted, as shown at 48, and also machined at 49 to receive the machined edge 43 of the section 41, thus securing an accurate fit of said parts whenever it is necessary to renew part 47, which may be done without the necessity of renewing the part 41.

50 designates the upper and inner feed-throat section, which, like section 47, extends over the upper half of the hub of the adjacent disk, as shown in Fig. 5. The section 50 forms the inner inclined wall of the feed-throat and is provided at its upper edge with a circumferential flange 51, which is provided with openings 52 to receive bolts or screws 53, by means of which it is connected to a casing-ring 54, bolted or otherwise permanently connected to one side of the casing, as shown in Fig. 5. The outer edge 55 of the section 50 is machined to fit the corresponding machined face 56 of the casing-ring 54, the said ring being provided with an inwardly-extending annular flange 57, as shown in Figs. 5 and 10, the inner surface of which is machined, as above stated. The upper and inner feed-throat section 50 is also provided at its inner edge with a horizontally-projecting flange 58, which is also turned or machined on its outer side, so as to form an accurate fit with the inner machined edge of a disk-ring 59, (shown in detail in Fig. 15,) the same being bolted or otherwise detachably secured to the outer side of the disk next to the feed-throat and provided with an exteriorly-machined inwardly-projecting annular flange 60, which fits within the opening 17 of the adjacent grinding-disk.

From the foregoing it will be understood that that portion of the feed-throat which extends immediately around the hub adjacent to the grinding-disk is composed of three pieces, a single piece 45 extending around and embracing the lower half of the hub and two pieces 47 and 50 extending around and embracing the upper half of the hub and meeting with the lower piece or section 45.

At the opposite side of the casing there is arranged another casing-ring 61, similar in all respects to that, 54, hereinabove described and forming the attaching means for a sleeve or bushing 62, which extends around the hub of the remaining disk and is provided with a circumferential flange 63, the outer edge 64 of which is machined to fit against the machined face 56 of the casing-ring, the flange 63 being also provided with openings to receive bolts, screws, or other fasteners 65.

When wear takes place in the bearings 7, the hubs of the grinding-disks wear at their lower sides against the parts 45 and 63, and when the wear, which is largely contributed to by grit or dirt on the material being ground, amounts to considerable said parts, together with the bearings, must necessarily be renewed. As the sections 3 and 4 move downward the disk-ring 59 also wears against the flange 58 of the inner and upper feed-throat section, thus necessitating compensation for wear at that point. Wear also comes upon the removable hub-sections 16. Heretofore the wearing away of such parts of the casing and mechanism has involved considerable expense in restoring the mill to good working condition, so as to prevent the escape of material therefrom. By means of the invention hereinabove described, however, the parts 45, 47, 50, 59, 62, and 16 may be easily detached and replaced by duplicate new parts, and said parts fit accurately in place, the said parts being interchangeable, so as to fit any mill, no matter how much the same may be

worn. Furthermore, renewable parts of the mill may be shipped from the factory to the user, thereby avoiding the necessity of shipping the mill as a whole to the factory for repair, any good mechanic being able to replace the parts which have become worn out. In this way the life of the mill may be indefinitely extended.

Having thus described the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A grinding-mill comprising a divided main shaft, grinding-disks thereon rotating in opposition to each other, a supporting-base, a casing inclosing the grinding-disks and embodying a removable semicylindrical hood, longitudinally-divided separable lower sections one of which is stationary and the other pivotally connected to the base so as to swing horizontally, and a bearing-yoke for one of the shaft-sections rigidly connected with the pivoted section of the casing and adapted to swing therewith.

2. A grinding-mill comprising a divided main shaft, grinding-disks thereon rotating in opposition to each other, removable grinding-plates secured to said disks, a supporting-base, a casing inclosing the grinding-disks and embodying a removable semicylindrical hood, longitudinally-separable lower sections, one of which is stationary and the other pivotally connected to the base so as to swing horizontally, and yoke-connected bearings for one of the shaft-sections rigidly connected with the divided section of the casing and adapted to swing therewith.

3. A grinding-mill comprising a divided main shaft, grinding-disks thereon rotating in opposition to each other, a supporting-base, a casing inclosing the grinding-disks and embodying a removable semicylindrical hood, longitudinal separable lower sections, one of which is stationary and the other pivotally connected to the base so as to swing horizontally, yoke-connected bearings for one of the shaft-sections, rigidly connected with the pivoted section of the casing and adapted to swing therewith, and means for securing the pivoted and horizontally-swinging section of the casing to the base and to the stationary section.

4. A grinding-mill comprising a divided main shaft, grinding-disks thereon rotating in opposition to each other, a supporting-base, a casing inclosing the grinding-disks and embodying a removable semicylindrical hood, longitudinally-separable lower sections one of which is stationary and the other pivotally connected to the base so as to swing horizontally, and yoke-connected bearings for one of the shaft-sections rigidly connected with the pivoted section of the casing and adapted to swing therewith, the pivoted section of the casing being provided with an offstanding pivot-lug to one side of its inner abutting surface.

5. A grinding-mill comprising a divided main shaft, grinding-disks thereon rotating in opposition to each other, a supporting-base, a casing inclosing the grinding-disks and embodying a removable semicylindrical hood, and a longitudinally-divided semicylindrical lower portion, the divided portions of which are relatively movable toward and away from each other, sectional casing-rings secured to opposite sides of the casing, and sectional collars detachably secured to said rings and extending around the hub portions of the disks, one of said collars forming a portion of the feed-throat leading to the grinding-space.

6. A grinding-mill comprising a divided main shaft, grinding-disks thereon rotating in opposition to each other, a supporting-base, a casing inclosing the grinding-disks and embodying a removable semicylindrical hood, and a longitudinally-divided semicylindrical lower portion, the sections of which are relatively movable one toward and away from the other, sectional casing-rings permanently secured to opposite sides of the casing, sectional sleeves or collars removably secured to said rings and extending around the hub portions of the disks, one of said sleeves or collars forming a portion of the feed-throat leading to the grinding-space, a feed-throat arranged at one side of the casing, and removable upper, outer and lower feed-throat sections secured thereto and extending around the hub of one of the disks, substantially as described.

7. A grinding-mill comprising a divided main shaft, grinding-disks thereon rotating in opposition to each other, a supporting-base, a casing inclosing the grinding-disks and embodying a removable semicylindrical hood, and a longitudinally-divided semicylindrical lower portion, the sections of which are relatively movable one toward and away from the other, sectional casing-rings permanently secured to opposite sides of the casing, sectional sleeves or collars removably secured to said rings and extending around the hub portions of the disks, one of said sleeves or collars forming a portion of the feed-throat leading to the grinding-space, a feed-throat arranged at one side of the casing, removable inner and outer feed-throat sections removably secured thereto and extending over the hub of one of the disks, and a lower feed-throat section removably secured thereto and extending beneath said hub with the upper feed-throat sections resting thereon, substantially as described.

8. A grinding-mill comprising a divided main shaft, grinding-disks thereon rotating in opposition to each other, a supporting-base, a casing inclosing the grinding-disks and embodying a removable semicylindrical hood,

and a longitudinally-divided semicylindrical lower portion, the sections of which are relatively movable one toward and away from the other, sectional casing-rings permanently secured to opposite sides of the casing, sectional sleeves or collars removably secured to said rings and extending around the hubs of the disks, and hub-sections detachably connected with the hubs of the grinding-disks and lying within said sleeves or collars, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

AARON J. ROBINSON.

Witnesses:
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