W. R. MACKLIND.

SLIP MILL.

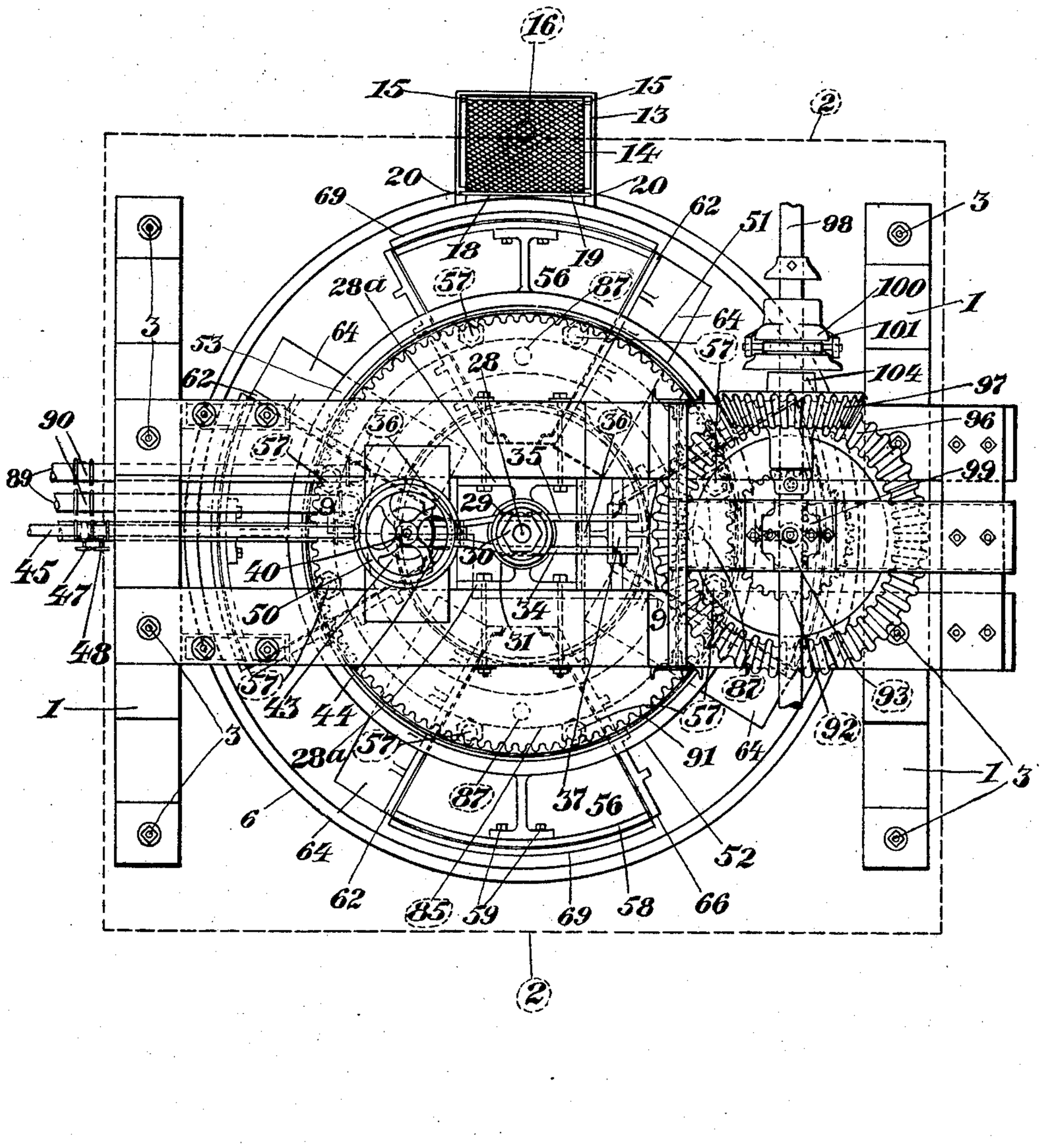
APPLICATION FILED SEPT. 13, 1909.

967,801.

Patented Aug. 16, 1910.

6 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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George G. Anderson.

Inventor:

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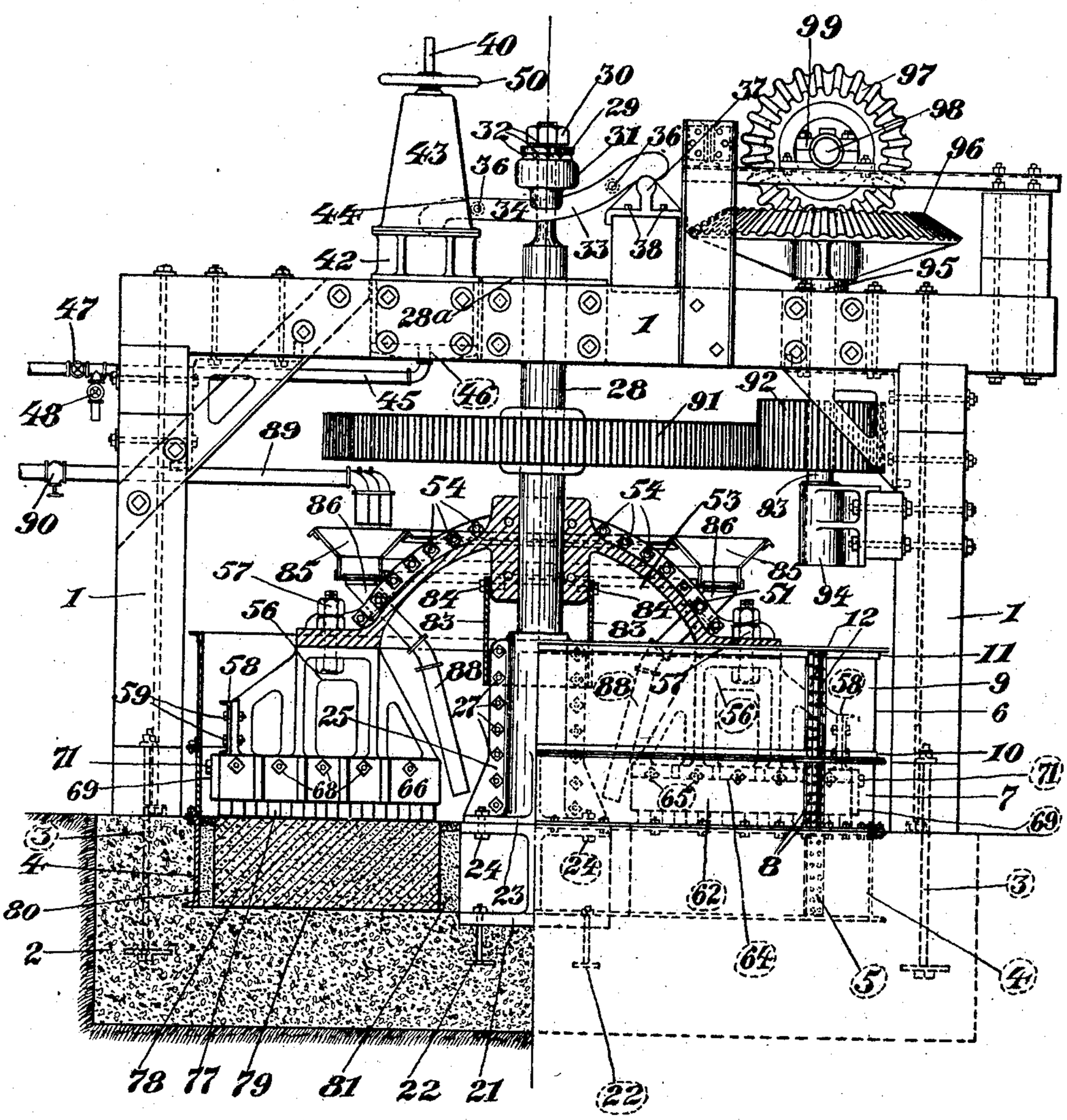
6 SHEETS—SHEET 2.

Fig. 2.



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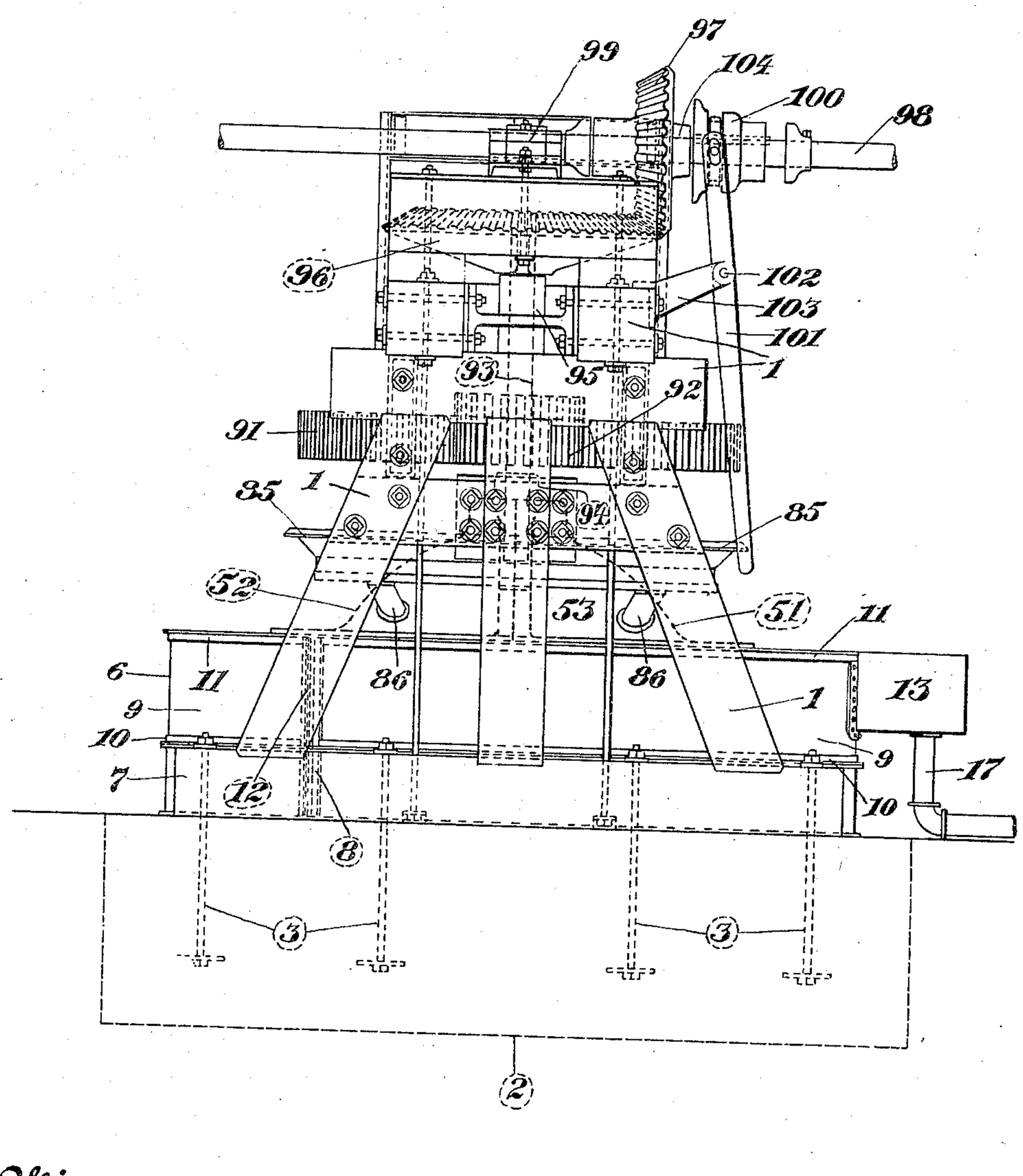
6 SHEETS—SHEET 3.

Fig. 3.



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6 SHEETS—SHEET 4.

Fig. 4.

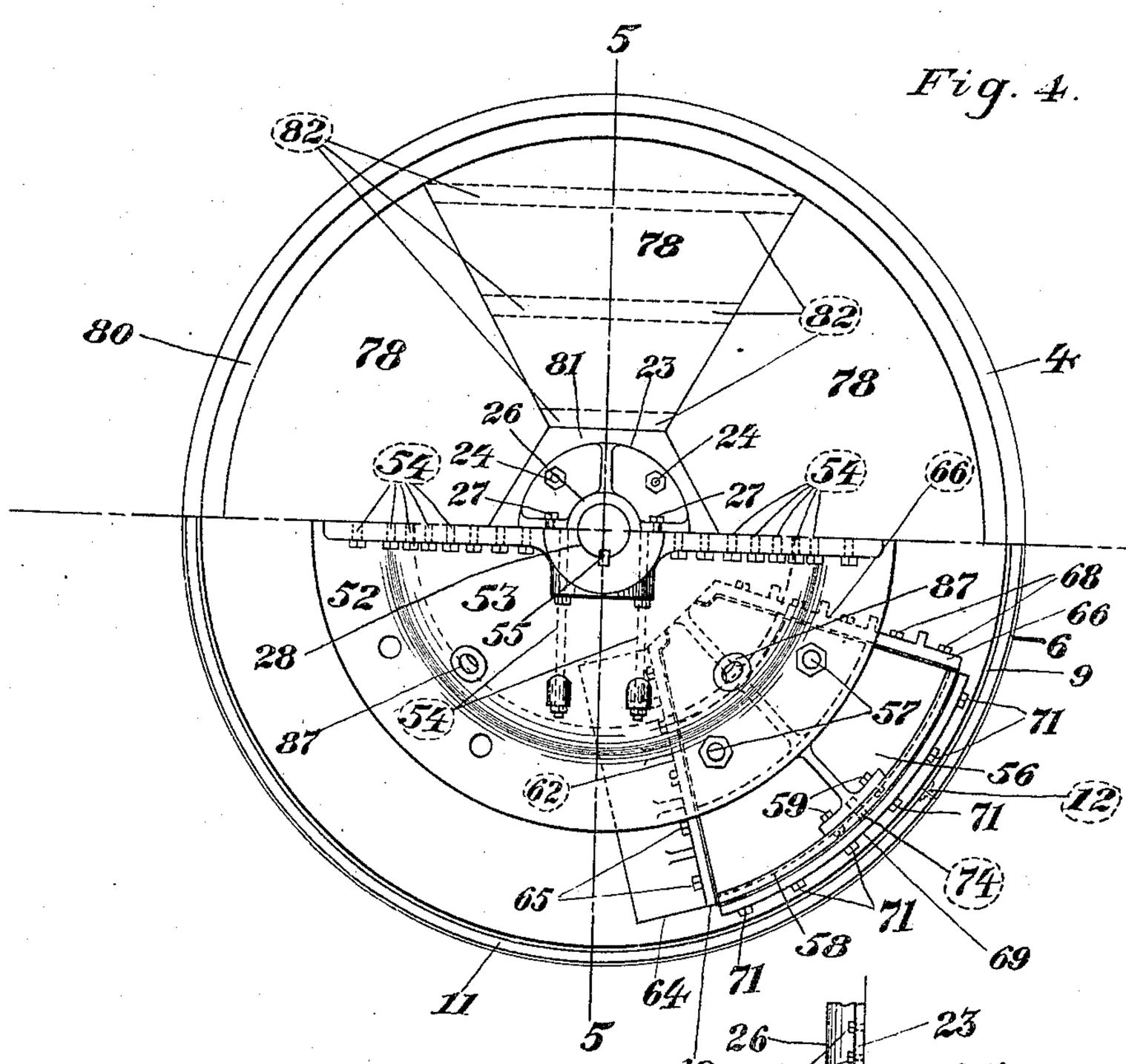
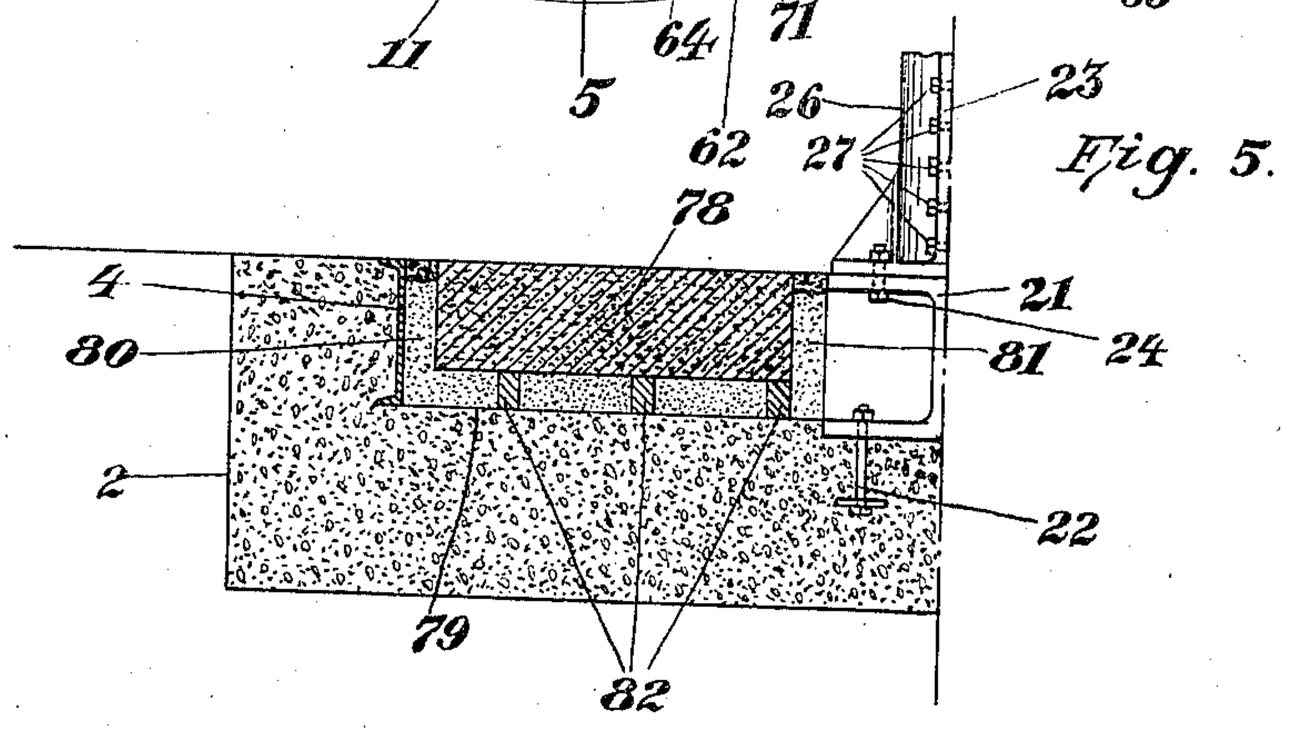


Fig. 5.



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6 SHEETS—SHEET 5.

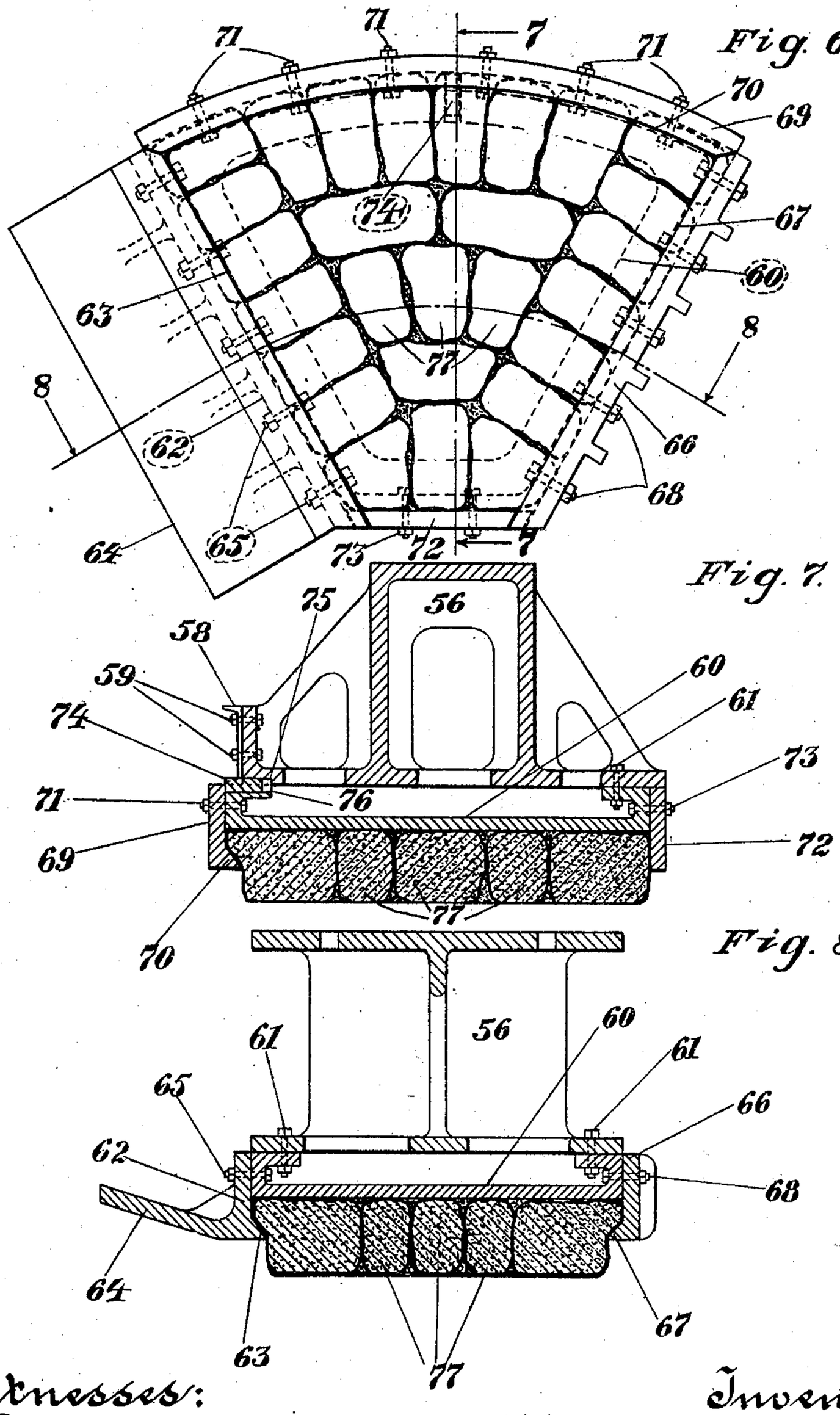

Fig. 6.

Fig. 7.

Fig. 8

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6 SHEETS—SHEET 6.

Fig. 9.

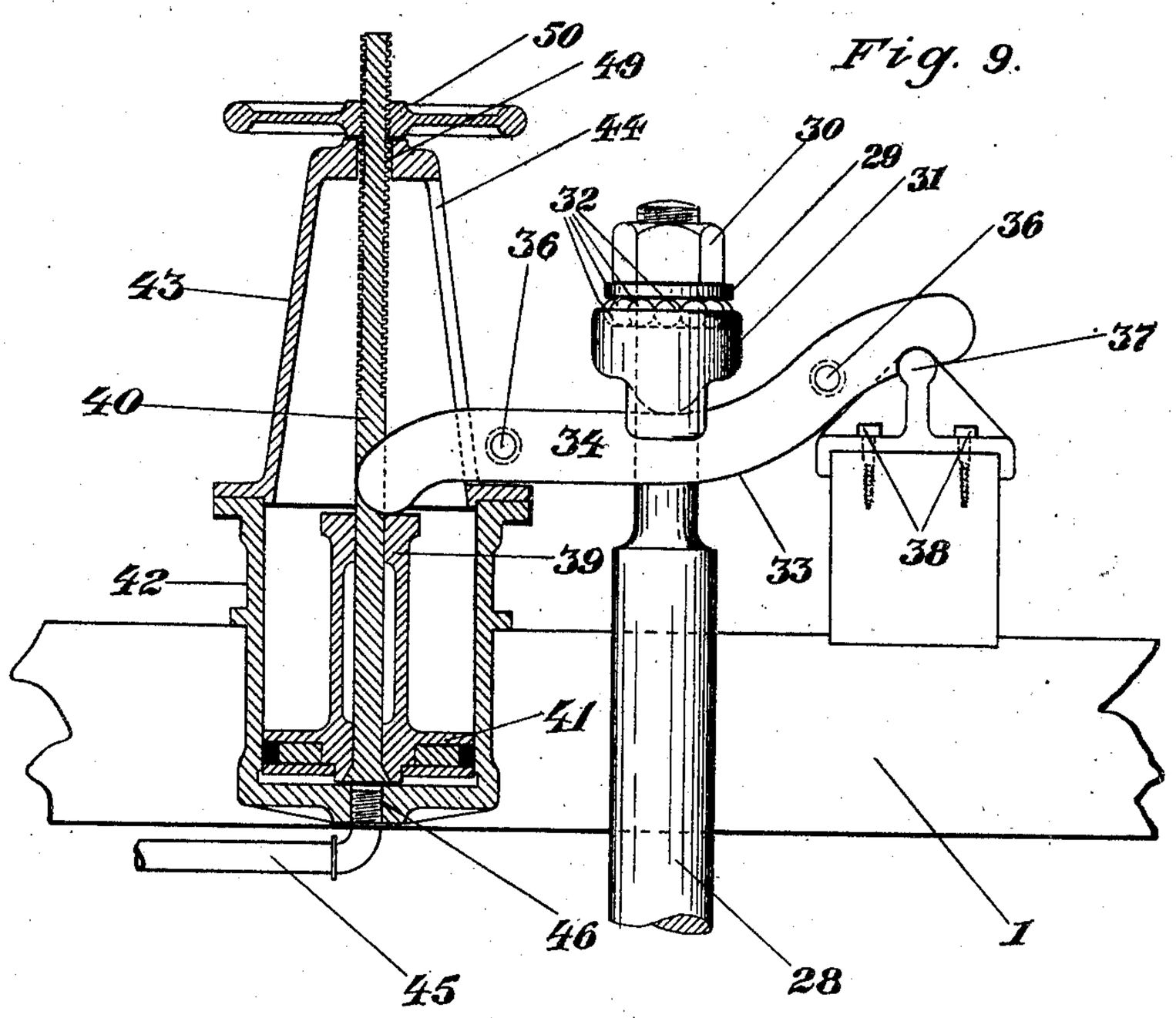
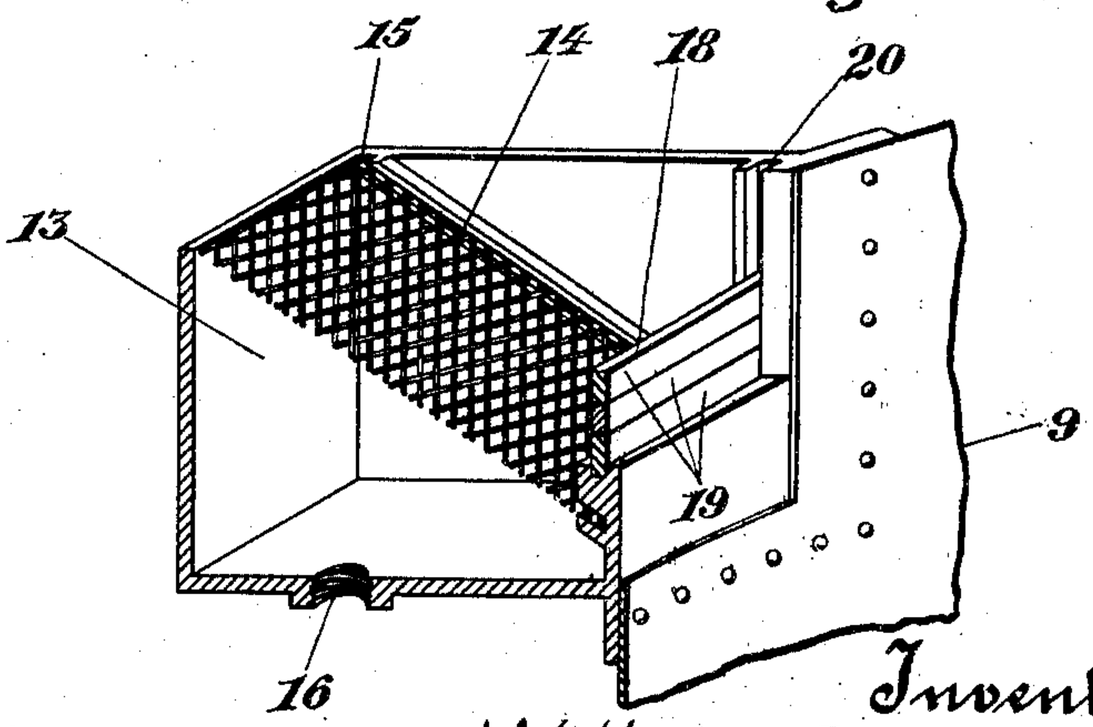


Fig. 10.



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UNITED STATES PATENT OFFICE.

WILLIAM R. MACKLIND, OF MINERAL POINT, MISSOURI.

SLIP-MILL.

967,801. Specification of Letters Patent. Patented Aug. 16, 1910.

Application filed September 13, 1909. Serial No. 517,484.

To all whom it may concern:

Be it known that I, WILLIAM R. MACKLIND, a citizen of the United States, residing at Mineral Point, in the county of Washington and State of Missouri, have invented certain new and useful Improvements in Slip-Mills, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention comprises certain novel improvements on the slip mill disclosed in my United States Letters Patent No. 789,983, granted May 16, 1905.

The object of this invention is to provide a machine, of the above-mentioned class, with certain novel changes in the construction and arrangement of parts which simplify and improve the machine, and which will be hereinafter more fully described and pointed out in the claims.

In the drawings forming part of this specification, in which like numbers of reference denote like parts wherever they occur, Figure 1 is a plan view of the mill, Fig. 2 is a side elevation, partly in section, Fig. 3 is an end elevation, Fig. 4 is a plan view of the casing, showing some of the parts therein, Fig. 5 is a sectional view on the line 5—5, Fig. 4, Fig. 6 is a bottom plan view of a shoe, Fig. 7 is a sectional view on the line 7—7, Fig. 6, Fig. 8 is a sectional view on the line 8—8, Fig. 6, Fig. 9 is a sectional view on the line 9—9, Fig. 1, on a larger scale, and Fig. 10 is a partial isometric view of the overflow box.

The framework 1, of the mill, is built upon the foundation 2, which is preferably concrete, and is secured to said foundation by the anchor-bolts 3. The channel-iron 4, is embedded in said foundation, and the abutting ends thereof are secured together by the plate 5. The casing 6, in which all joints are made water-tight, is constructed of the channel-iron 7, which is secured to the upper flange of channel-iron 4, and the abutting ends of said channel-iron 7, are secured together by the angle-irons 8. The plate 9, which forms part of said casing, is secured by angle-irons 10, along its bottom edge to the top flange of said channel-iron 7, and is reinforced along its top edge by the angle-iron 11. Angle-irons 12 secure the ends of said plate together. The discharge box 13, is secured to said casing and is provided with a screen 14, which is slidable in grooves 15, and with an outlet 16 in which the drain pipe 17 is secured. The gate 18 of the dam portion of said discharge box, is formed of a plurality of strips 19, which are slidable in grooves 20 and regulate the height at which the liquid in said casing will overflow into said discharge box. In the center of said casing and set in said foundation, is the casting 21, which is held therein by the anchor-bolts 22. The foot bearing 23, which is secured to said casting by the bolts 24, is made in halves 25 and 26, which are held firmly together by the bolts 27, and forms a rigid bearing for the shaft 28 which runs therein. The upper end of said shaft is journaled in the box 28^a which is rigidly secured to said framework, and is provided with a ring or washer 29, which fits over the end of said shaft and held thereon by the nut 30. The cup bearing 31, is loosely mounted on said shaft and is provided with the balls 32 upon which said ring rests. The lever 33, is formed of the two pieces 34 and 35 which straddle said shaft and are secured together by the rivets 36, or other suitable means. Said cup bearing and with it shaft 28 are supported by said lever, one end of which is fulcrumed on the pivot-block 37, which is secured to said framework by the lag-screws 38, and the other end of which is supported by the sleeve 39 on the piston-stem 40 of the piston 41. Said piston operates in cylinder 42, which is supported by said framework, and is provided with the dome 43, into which lever 33 extends through slot 44. Pipe 45, which is secured in aperture 46 in said cylinder, is provided with the inlet valve 47 and the exhaust valve 48. The upper end of said piston-stem 40 which protrudes through aperture 49 in said dome, is threaded and receives the wheel 50 which controls the height of said piston in said cylinder and regulates the proximity of the grinding surfaces. The halves 51 and 52 of the spider 53 are secured together on said shaft by bolts 54, said spider being rigidly secured to said shaft by spline 55 so as to rotate therewith. Said spider is provided with a plurality of cast iron removable shoes 56, each of which is secured thereto by the bolts 57. Each of said shoes is provided with a locking channel-iron 58, which is secured thereto by the bolts 59, and with the base 60, which is held thereto by bolts

61. The locking plate 62, which is provided with the projection 63 and the toe plate 64, is secured to one side of said base by the bolts 65, and the locking plate 66, which is provided with the projection 67, is secured to other side of said base by the bolts 68. The radial locking plate 69 which is provided with projection 70, is secured to the outer end of said base by the bolts 71, and the end locking plate 72 is secured to the inner end of said base by bolts 73. The key 74, which is inserted into the grooves 75 and 76 in the shoe 56 and the base 60, respectively, prevents the shearing-stress that would obviously be exerted on the bolts 61 if said key were not provided. A plurality of blocks 77, which are preferably granite and are of a uniform thickness, is set in the space between said locking plates and against said base, and the ones, that are adjacent said projections, are cut so as to fit over said projections, which hold same therein. Grout is poured between said blocks and allowed to set which holds same firmly in place and forms therewith a unitary grinding block, which can be readily renewed when necessary.

The floor or surface upon which the material is placed to be ground, is formed of a plurality of segmental blocks of stone 78, which are preferably granite and set in the recess 79 in said foundation surrounding casting 21. The space 80, adjacent channel-iron 4, surrounding said blocks 78, and space 81, adjacent said blocks, surrounding casting 21, are filled with sand nearly to the level of the top surface of said blocks. The remaining spaces on top of said sand are filled with grout to the level of the top surfaces of said blocks and the joints between said blocks are, also, filled with grout which sets and holds said blocks rigidly in place forming a solid grinding floor. When the blocks 78, become worn on the top surfaces so as to form an uneven grinding surface, it is necessary to raise each worn block. This is accomplished by breaking the grout surrounding said block, which is then removed and blocks or pieces of wood 82, of the necessary thickness to bring the top surface of said worn block on the floor level, are placed in said recess in the space occupied by said block, and sand placed in said space around said pieces of wood to the level of their top surfaces. Said block is then reset in its space on top of said pieces of wood and grouted as before. By using said pieces of wood in the above-described manner, a floor can be formed with a plurality of segmental blocks of stone which differ in thickness.

Surrounding the upper end of the foot bearing 23, is the metal shield 83, which is secured to spider 51, by the bolts 84. The trough 85, which encircles said spider is secured to same by a plurality of castings 86, each of which is provided with an outlet 87. Each of said outlets is provided with a pipe 88, which extends downwardly toward the base of foot bearing 23. Water is delivered to the trough through the pipes 89, each of same being provided with a valve 90.

Mounted on shaft 28 so as to rotate therewith is the gear 91 which meshes with the wide-faced pinion 92 mounted on shaft 93. The lower end of said shaft 93, is journaled in the box 94, which is supported by framework 1, and the upper end of said shaft is journaled in box 95, also, supported by said framework. The beveled gear 96 is rigidly mounted on said shaft 93, and is driven by the beveled gear 97 which is loosely mounted on drive shaft 98, journaled in the box 99. The clutch 100, is slidably mounted on said shaft 98, and adapted to rotate therewith. Lever 101, fulcrumed at 102 to bracket 103, is adapted to shift said clutch into and out of engagement with projection 104 on beveled gear 97.

The operation of the machine is as follows: The material to be ground is placed on the stone floor within casing 6. Power is applied in any ordinary manner to shaft 98 which rotates clutch 100. Lever 101 is moved so as to cause said clutch to engage projection 104 on beveled gear 97, which is rotated thereby. The rotation of said beveled gear 97, causes beveled gear 96 to rotate and with it shaft 93 and pinion 92, which revolves gear 91 and shaft 28. The rotation of shaft 28, causes spider 53 to rotate and with it the shoes 56. The material is guided underneath said shoes by the toe plates 64 and is ground between the block 77 in said shoes and the blocks 78 in said floor. The rigidity of the journals for said shaft 28, produces a level wear on the blocks 77 in said shoes and the blocks 78 in said floor, instead of extra wear on the periphery thereof. Water is introduced into the trough 85 through pipes 89 and delivered therefrom to the center and bottom of the mill through the pipes 88. As the peripheral action throws the water and the clogged material toward the rim of casing 6, said water becomes saturated with the ground material. When the water in said casing reaches a level above the top of gate 18, the water adjacent said rim having been thoroughly saturated with the ground material flows over said gate and into discharge box 13. The screen 14 prevents the passing of large particles of the material therethrough and clogging pipe 17, which draws the saturated water from said discharge box to a suitable reservoir.

Some materials are harder to grind than others, and it is desirable sometimes to grind some materials finely and some coarsely, which is accomplished by regulating the

proximity of the grinding surfaces. Pressure in the form of steam, air, or water is admitted under piston 41 through pipe 45, and said piston is forced upwardly in said cylinder 42, whereby lever 33 is raised and with it the shaft 28 and, also, said shoes 56. The grinding surfaces of said shoes are thus raised from engagement with the grinding floor and can be maintained at any desired level above said floor by the adjusting wheel 50 on the piston-stem 40, which supports said piston when the steam, air, or water pressure is released from said cylinder.

I claim:

1. In a slip mill, the combination of a shoe having a base, a toe-plate secured to one side of said base and provided with a projection, a heel-plate secured to the opposite side of said base and provided with a projection, a radial locking-plate having a projection and secured to the outer end of said base, a locking-plate secured to the inner end of said base, a plurality of granite blocks adapted to be held between all of said plates and against said base, each of said blocks adjacent either of said projections being adapted to overlap same, and means for holding all of said blocks together.

2. In a slip mill, the combination of a foundation having a recess therein, a casting secured thereto and set therein, a granite floor surrounding said casting and set in said recess, a radial channel-iron surrounding said floor and set in said foundation, and means for holding said floor rigidly in place.

3. In a slip mill, the combination of a foundation having a recess therein, a casting set in said recess and secured to said foundation, a plurality of segmental granite blocks surrounding said casting and set in said recess, a radial channel-iron surrounding said granite blocks and set in said foundation, and means for holding said blocks together and rigidly in place.

4. In a slip mill, the combination of a foundation having a recess, a floor set in said recess and comprising a plurality of segmental granite blocks, means for registering the top surfaces of said blocks in the same plane, and means for holding said blocks together and rigidly in place.

5. In a slip mill, the combination of a foundation having a recess, a floor set in said recess and comprising a plurality of segmental granite blocks, a plurality of wooden blocks adapted to support said granite blocks and register the top surfaces thereof in the same plane, and means for holding said blocks together and rigidly in place.

6. In a slip mill, the combination of a lever, a cup-bearing supported by said lever, a shaft revoluble in said cup-bearing and supported thereby, a pivot-block adapted to support one end of said lever, a cylinder, a piston slidably mounted in said cylinder, and a piston-stem adapted to support and adjust said piston, said piston being adapted to support the other end of said lever.

7. In a slip mill, the combination of a lever, a cup-bearing supported by said lever, a shaft revoluble in said cup-bearing and supported thereby, a pivot-block adapted to support one end of said lever, a cylinder, a piston-stem adjustably mounted in said cylinder, a piston slidably mounted on said piston-stem and adapted to be supported thereby, said piston being adapted to support the other end of said lever, and means for adjusting said piston-stem.

8. In a slip mill, the combination of a lever having a pair of arms, a cup-bearing having a plurality of balls therein, said arms of said lever being adapted to straddle said cup-bearing and support same, a shaft revoluble in said cup-bearing and supported thereby, a pivot-block adapted to support one end of said lever, a cylinder, a dome secured to said cylinder and having an opening, a piston-stem adjustably mounted in said cylinder and extending through the top of said dome, a piston slidably mounted on said piston-stem and adapted to be supported thereby, said piston being provided with a sleeve, the other end of said lever being adapted to extend through said opening in said cylinder and to be supported by said sleeve, a wheel in threaded engagement with said piston-stem, said wheel being adapted to longitudinally adjust said piston-stem whereby said other end of said lever is adjusted and with it said shaft, and means for raising said piston.

9. In a slip mill, the combination of a lever, a bearing supported thereby, a shaft revoluble in said bearing, a spider secured to said shaft, grinding means borne by said spider, a floor upon which said grinding means are adapted to be rotated, a pivot-block adapted to support one end of said lever, a cylinder, a piston adjustably mounted in said cylinder and adapted to support the other end of said lever, means for supporting the piston in its adjusted position, whereby the proximity of said grinding means and said floor is controlled

10. In a slip mill, the combination of a shoe, a base secured thereto, a locking plate secured to each edge of said base, one of said plates having a lateral extension constituting a toe plate, and a grinding member held between said locking plates and against said base.

11. In a slip mill, the combination of a lever, a bearing carried thereby, a shaft revolubly supported in said bearing, a pivot block adapted to support one end of said lever, a cylinder, a piston longitudinally adjustable therein and having its upper portion threaded, a piston slidably mounted on said stem and adapted to be supported by

the same, said piston being adapted to support the other end of said shaft, means for raising said piston, and a wheel engaged with the threaded portion of said stem for adjusting said stem.

12. In a slip mill, the combination of a shaft, a lever for adjusting the same, a pivot block for supporting one end of the lever, a cylinder, a piston stem adjustable longitudinally therein, a piston slidably mounted on said stem and adapted to support the other end of the lever, means for raising said piston, and means independent of the raising means for effecting the adjustment of said stem.

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

WILLIAM R. MACKLIND.

Witnesses:
FRANK E. GOFF,
D. P. LANDRIGAN.