

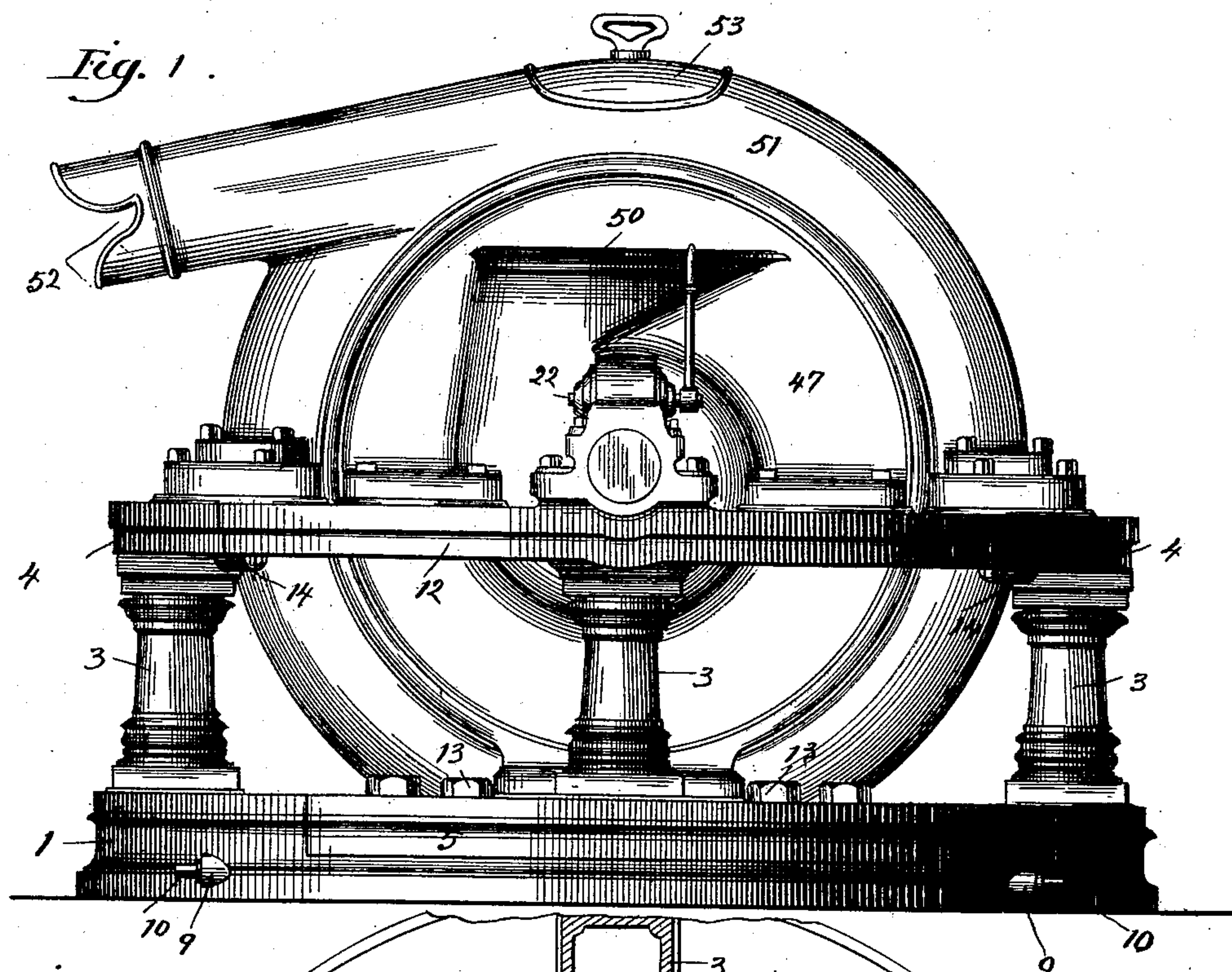
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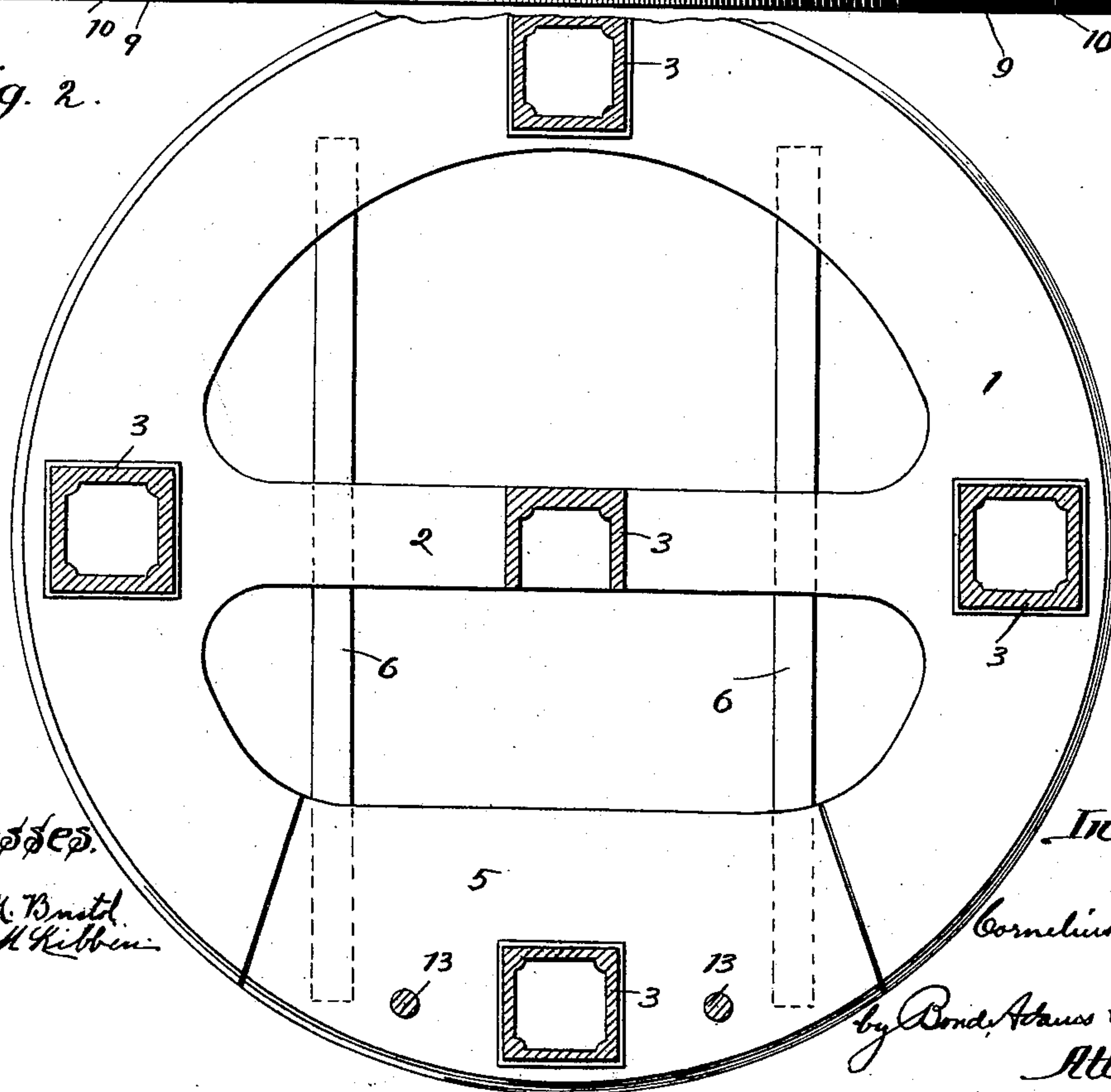
C. KIMPLEN.  
CRUSHING OR GRINDING MACHINE.

No. 507,140.

Patented Oct. 24, 1893.



*Fig. 2.*



*Witnesses.*

*Julia M. Bristol.  
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*Inventor*

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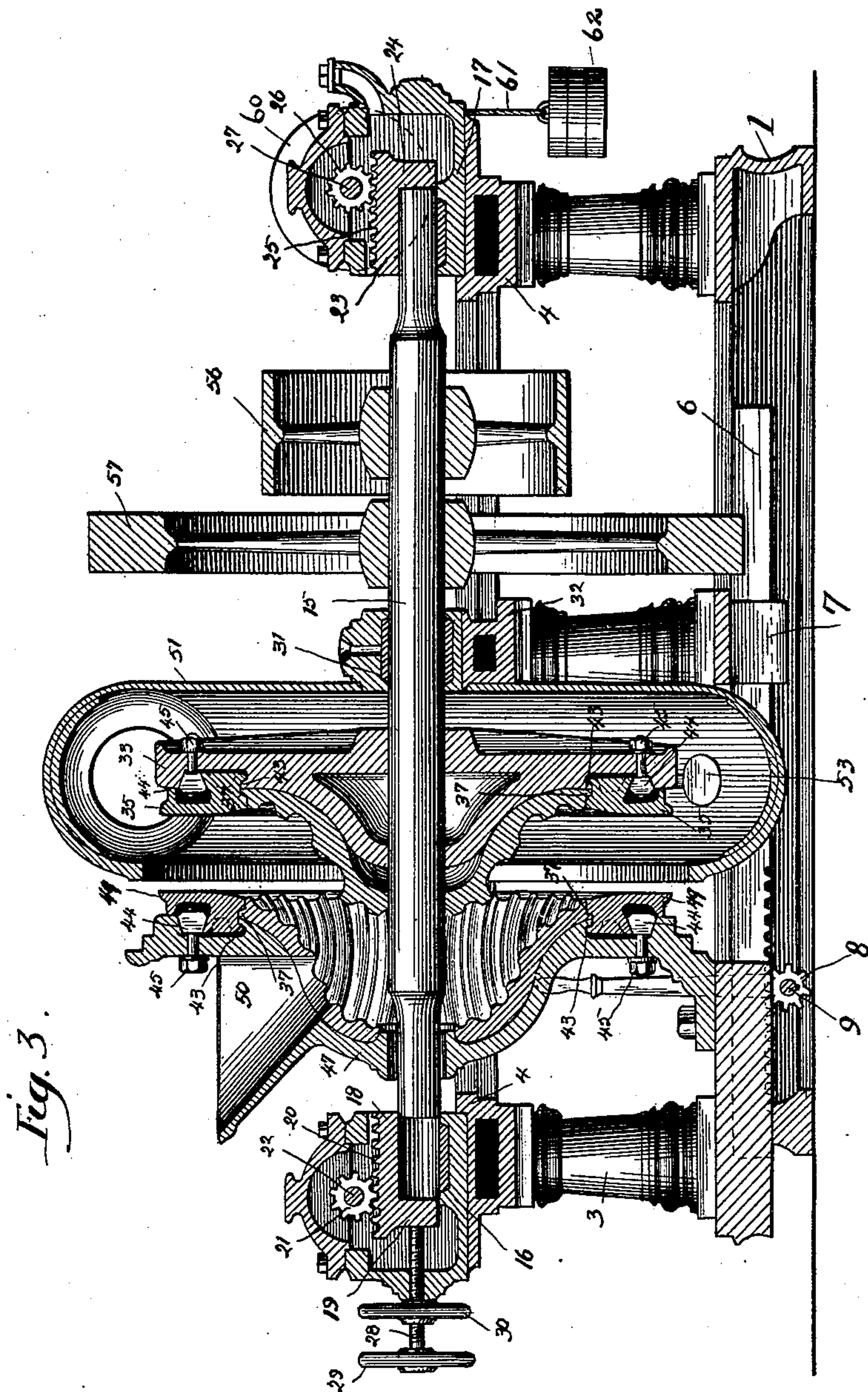
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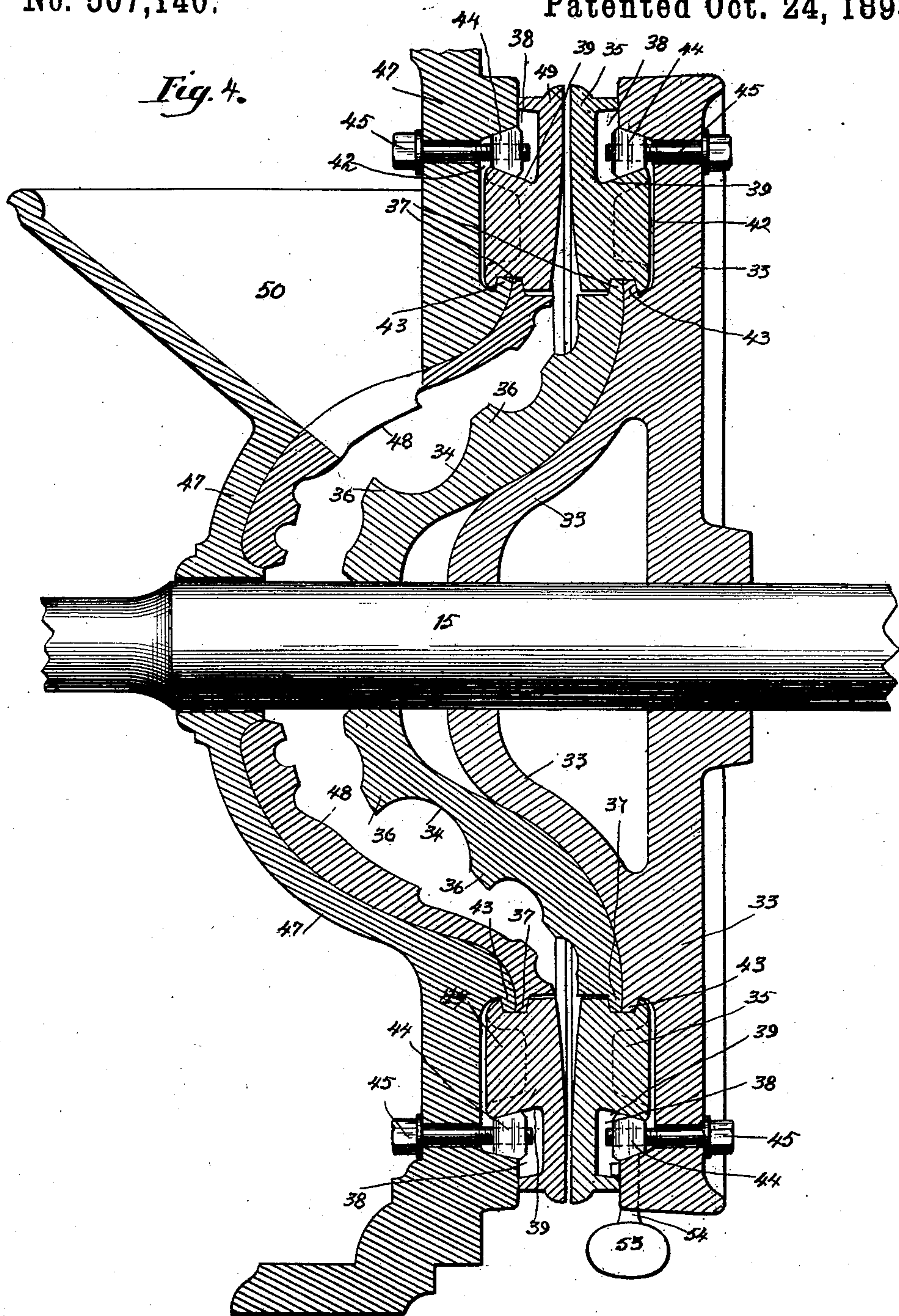
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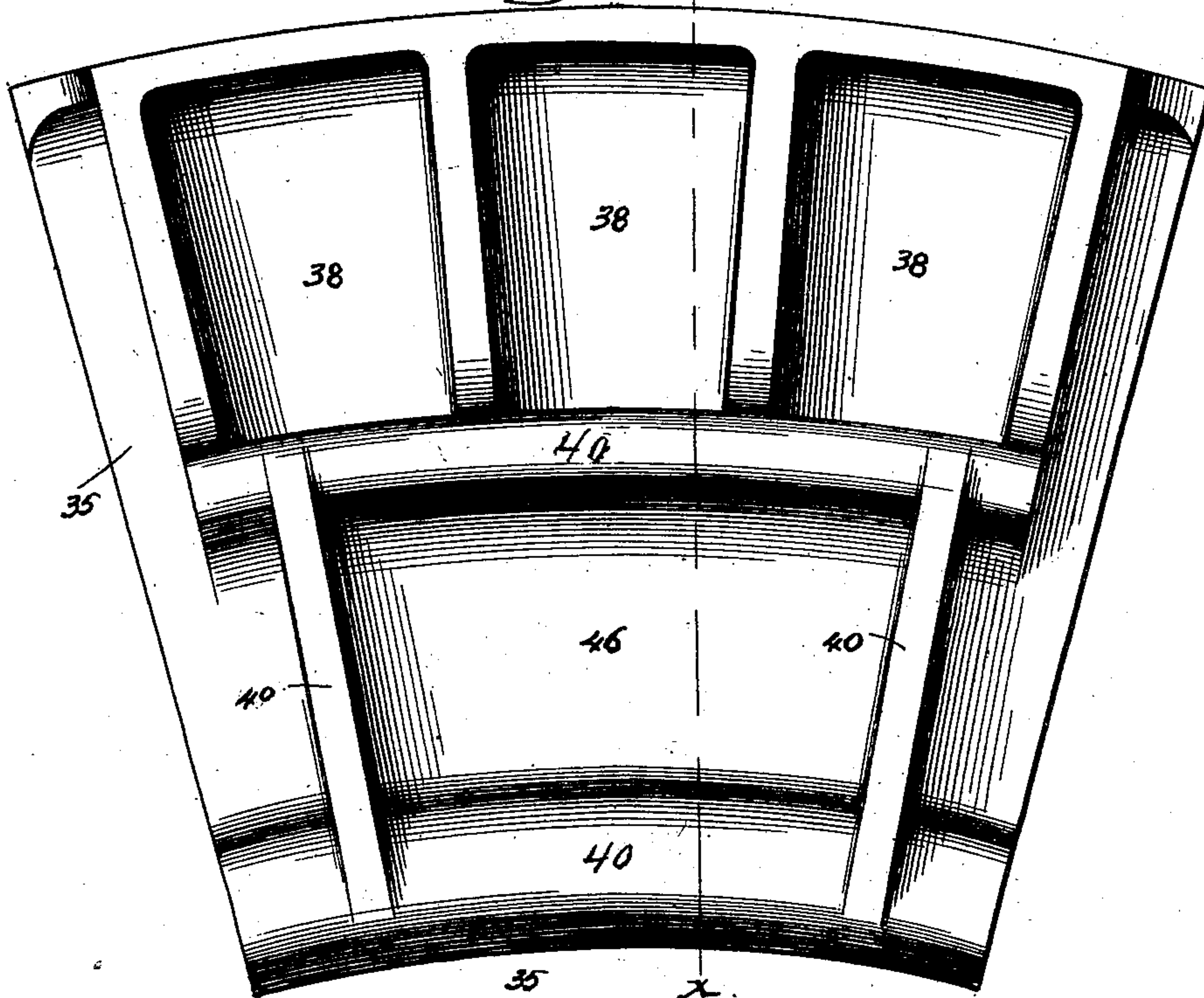
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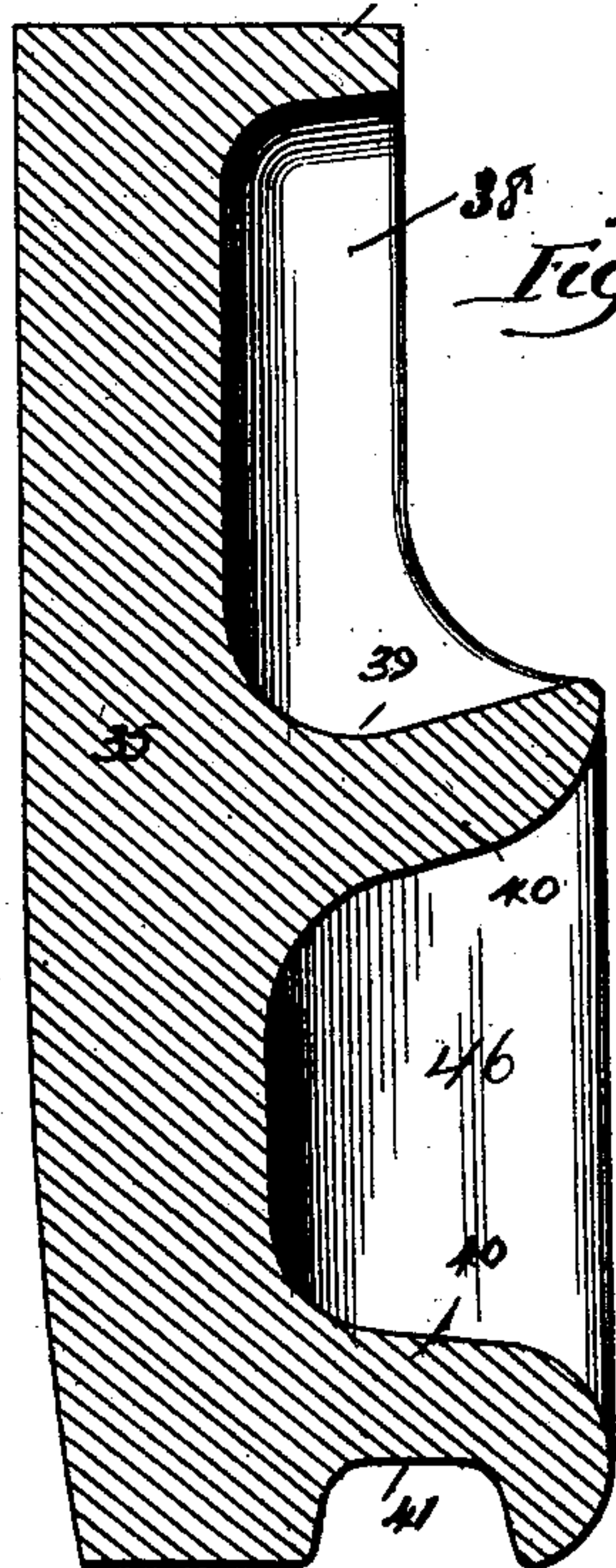
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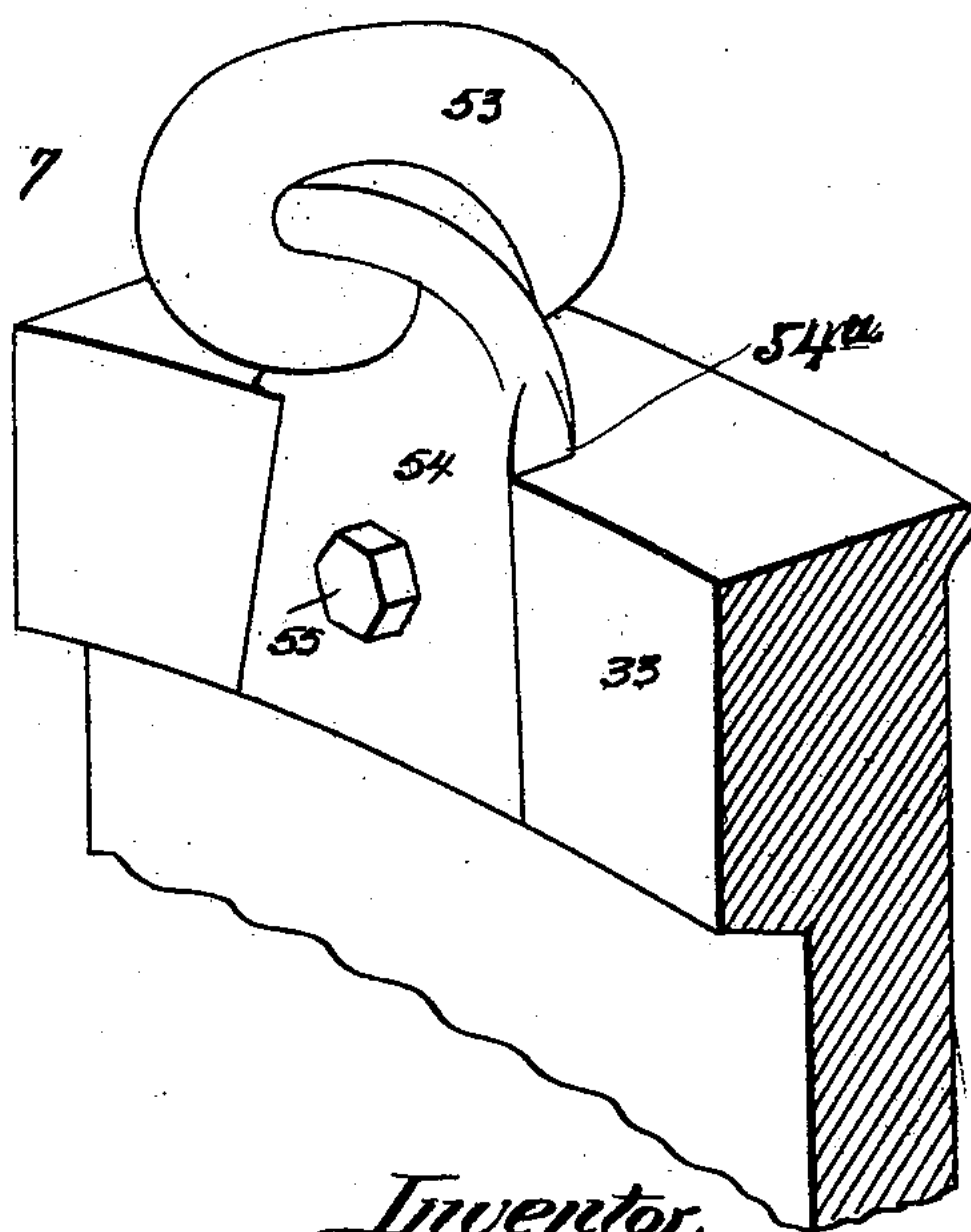
*Fig. 5* x



*Fig. 6*



*Fig. 7*



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# UNITED STATES PATENT OFFICE.

CORNELIUS KIMPLEN, OF CHICAGO, ILLINOIS.

## CRUSHING OR GRINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 507,140, dated October 24, 1893.

Application filed September 27, 1892. Serial No. 447,077. (No model.)

*To all whom it may concern:*

Be it known that I, CORNELIUS KIMPLEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Crushing or Grinding Machines, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation. Fig. 2 is a top or plan view of the lower bed-plate. Fig. 3 is a central longitudinal vertical section. Fig. 4 is an enlarged detail, being a central longitudinal vertical section of the grinding mechanism. Fig. 5 is an enlarged detail, being a back view of one of the grinding sections. Fig. 6 is a cross section on line  $x-x$  of Fig. 5; and Fig. 7 is an enlarged detail, showing one of the spoons and the method of securing it to the running-head of the mill.

My invention relates to machines for crushing or grinding stone, bone, or other similar substances, and is in many respects similar to the mill shown in Patent No. 281,887, granted to me July 24, 1883.

The object of my invention is to improve the construction and operation of mills of the above described class, which object I accomplish as hereinafter specified and as illustrated in the drawings.

That which I regard as new will be pointed out in the claims.

In the drawings,—1, indicates a bed-plate, which supports the various parts of the machine. The bed-plate 1 is annular in shape, and is provided with a central cross bar 2, as best shown in Fig. 2.

3, indicates a number of vertical columns which are placed at suitable points upon the bed-plate 1, and support another bed-plate 4 in a horizontal position, as best shown in Figs. 1 and 3. The columns 3 are preferably five in number, and are arranged as shown in Fig. 2. The bed-plate 1 is provided at a suitable point on its upper surface with a removable segment 5, which is of about half the thickness of the bed-plate.

6, indicates parallel bars, which at one end are secured to the removable segment 5 and extend across the bed-plate, as best shown in Fig. 2, their other ends moving in suitable bearings 7 secured to the under side of the cross piece 2 of the bed-plate 1. By this con-

struction, the segment 5 is adapted to be drawn away from the remainder of the bed-plate in a straight line. In order to move the segment 5 to or from the bed-plate, the ends of the bars 6 adjacent to the segment 5 are cogged on their under sides to form racks, as best shown in Fig. 3.

8, indicates a cogged pinion, two of which are mounted upon a shaft 9 mounted in suitable bearings in the bed-plate 1, and extending across the bed-plate in a direction at right angles to the bars 6. The pinions 8 are so placed that one of them will intermesh with the rack upon each bar 6.

The shaft 9 is made of such length that its ends will project a short distance beyond the periphery of the bed-plate 1, and such projecting ends are squared, as shown at 10 in Fig. 1. By applying a wrench or lever 11 (see Fig. 3) to one or both of the ends of the shaft 9, the shaft may be rotated, thereby moving the segment 5 into or out of its place in the bed-plate 1, as the case may be.

One of the columns 3 is mounted upon the removable segment 5 of the bed-plate, as shown in the drawings, and that portion, 12, of the upper bed-plate 4 immediately over the removable segment 5 is detached from the remainder of the upper bed-plate 4 and rests upon the column 3 upon said segment 5, as best shown in Fig. 1. By this construction, when the segment 5 is moved, the segment 12 of the bed-plate 4 will also be similarly moved. When the machine is being operated, the segment 5 may be rigidly secured in place by means of bolts 13, and the segment 12 may be firmly secured in place by means of bolts which pass through ears 14, cast at suitable points in the bed-plate 4 and segment 12, as shown in Fig. 1.

15, indicates a shaft, which is mounted in suitable bearings 16 and 17, resting upon the upper bed-plate 4. The bearing 16 is located over the column 3 which rests upon the removable segment 5, and the bearing 17 is located at a diametrically opposite point upon the bed-plate 4.

18, indicates a half bearing, which rests upon one end of the shaft 15, and is provided with a depending portion 19 adapted to bear against the adjacent end of the shaft 15. The upper surface of the bearing 18 is cogged to form a rack 20, in which meshes a pinion 21,



mounted upon a shaft 22, suitably journaled in the upper part of the journal box which contains the journal 16. At the other end of the shaft is provided a half bearing 23, similar to the half bearing 18, which bearing 23 is provided with a depending portion 24 and rack 25, in which meshes a pinion 26 mounted upon a shaft 27. Mounted upon each end of the shaft 27, at the side of the journal box which contains the journal 17, is a pulley 60, to which is secured a rope 61 which runs over the pulley and carries a weight 62. By rotating the shaft 22, the shaft 15 may be adjusted longitudinally, substantially as described in my former patent hereinbefore referred to.

28, indicates a screw, provided with a hand-wheel 29 and a stop wheel 30, which passes through one end of the box which carries the journal 16, and bears against the depending portion 19 of the journal 18, as best shown in Fig. 3. By operating the hand-wheel 29, the shaft 15 may be moved longitudinally to regulate the distance between the grinding faces of the mill.

31, indicates a bearing for the shaft 15, which is mounted upon a cross bar 32 extending across the upper bed-plate 4, which cross bar is similar to the cross bar 2 of the lower bed-plate 1.

33, indicates the running-head of the mill, which is somewhat conical in shape, as best shown in Fig. 4, and is mounted upon and keyed to the shaft 15. Secured upon the inclined face of the running-head 33 is the crushing plate 34 and the grinding plates 35.

The crushing plate 34 consists of a conical shell, the outer surface of which is irregular, being provided with projections or ribs 36, which may be of any desired shape suitable for crushing purposes. The outer edge of the crushing plate 34 is provided with a flange 37, which gradually diminishes in thickness as it approaches the edge of the plate 34. The under surface of the plate 34 is adapted to fit closely upon the conical portion of the running-head 33, as best shown in Fig. 4.

The grinding plates 35 consist of segmental sections arranged upon the inner surface of the running-head 33 in the form of a ring being adapted to fit closely together. The ring may be composed of any number of the sections 35, but I prefer to make it of twelve sections. The outer surface of each of the grinding plates 35 is irregular, being provided with gulleys or recesses arranged in maze-like form, in order to form a suitable grinding surface. The under side of each of the sections 35 is provided with a recess 38, having an inclined side 39 and extended portions 40. The inner portion of each of the extensions 40 is provided with a recess 41, as best shown in Fig. 6, the sides of which are inclined outwardly, as shown. The inner surface of the running-head 33 is provided with an annular recess 42, which is of the shape shown in Fig. 4 in cross section, its outer wall

being inclined, as shown, and a flange 43, having an inclined side, being formed on its inner edge.

In securing the crushing plate 34 and grinding sections 35 upon the running-head 33, the crushing plate is first placed upon the conical surface of the running-head, when the flanges 37 and 43 will lie adjacent to each other, as best shown in Fig. 4. The grinding sections 35 are then placed in position, the extensions 40 fitting into the recess 42 and the recesses 41 fitting over the flanges 37 and 43, as shown in Fig. 4. Wedge nuts 44, one of which has been previously placed in each recess 38, are then drawn into the spaces between the outer wall of the recess 42 and the inclined walls 39 of the several recesses 38, by means of bolts 45 inserted from the outside of the running-head 33 through suitable holes. By tightening the bolts 45, the wedge nuts 44 may be drawn tightly into the spaces above referred to, and owing to the inclination of the walls of the recesses 38 and 42, the grinding sections will be forced inward and farther upon the flanges 37 and 43, owing to the inclined sides of the flanges and inclined walls of the recess 41. By this means, the grinding plate 34 may be very tightly secured to the running-head 33, and the grinding sections 35 will also be held very tightly in place, and the admission of dust into the joints will be prevented.

In order to lighten the grinding sections 35, they are hollowed out at 46, as best shown in Figs. 5 and 6.

By securing the crushing and grinding plates upon the running-head 33 in the manner above described, there are no bolt holes upon the crushing and grinding faces of the mill, and the parts are thereby also rendered much more durable.

Secured upon a stationary frame 47, are complementary crushing and grinding sections 48 and 49, which are secured in a manner substantially similar to that above described for the crushing and grinding sections 34 and 35. I have therefore indicated such parts by similar figures of reference.

The surface of the complementary crushing plate 48 is ribbed or provided with projections and indentations arranged in any suitable manner to present a suitable crushing surface.

The stationary frame 47 is secured upon the movable segment 5 of the bed-plate 1, and is provided with a hopper 50 for feeding the stone or other substance into the mill. Such stationary frame 47 is in general circular, in side elevation, and forms one side of a casing 51, which is adapted to inclose the grinding machinery.

When the removable segment 5 is drawn out, as hereinbefore described, the crushing and grinding faces 34, 35, 48, and 49 will be separated, and access may be had to them.

The casing 51 is similar in shape to that described in my former patent hereinbefore re-



ferred to, being somewhat circular. A delivery tube 52 is provided, which opens into the upper part of the casing 51.

53, indicates a cover which fits over a suitable opening in the upper part of the casing, through which access may be had to the interior of the casing. The casing is of somewhat greater diameter than the running-head 33, and is adapted to receive the powdered stone or other substance after it has passed from the grinding sections 35. The powdered substance will then be carried by centrifugal force around the interior of the casing 51 to the outlet tube 52.

15 In order to cause the crushed substance to move more freely around the casing 51 to the outlet tube 52, the running-head 33 is provided on its periphery with spoons 53, which are radially secured in the running head by means of plates 54 which are arranged in mor-  
20 tises 54<sup>a</sup> in the inner face of the running-head, as best shown in Fig. 7. If desired, the spoons 53 and plates 54 may be made separate from each other, but I prefer to make  
25 them integral with each other, as shown in Fig. 7. Besides mortising the plates 54 in the running-head 33, they may be further secured therein by means of bolts 55, as shown.

When the running-head is in operation,  
30 the spoons 53 will aid in carrying the crushed or ground substance around the interior of the casing 51, and will serve to expel any unbroken fragments or pieces which may have passed through the grinding plates without  
35 being crushed. They will also cause a draft through the casing, by which all dust will be carried out.

The shaft 15 is provided with a pulley 56, by means of which it may be rotated, and  
40 with a fly wheel 57, as shown in Fig. 3.

The movable bearing 23 and weight 62 permit the grinding plates to be forced apart, as would be necessary if some extraordinarily hard body should fall into the hopper, to pre-  
45 vent breakage of the mill, substantially as described in my former patent hereinbefore referred to.

That which I claim as new, and desire to secure by Letters Patent, is—

50 1. The combination with a frame 47, an inner crushing plate 48 and an outer grinding ring 49, of a supporting head 33 having a flange 43, an inner crushing plate 34 having a peripheral flange 37, an outer grinding ring  
55 having a recessed part with which interlock the said flanges on the supporting head and crushing plate, and devices for securing the outer grinding ring to the supporting head to clamp the inner crushing plate to said sup-  
60 porting head, substantially as described.

2. The combination with a frame 47, a crushing plate 48 and a grinding ring 49, of a supporting head 33 having a flange 43, an inner crushing plate 34 having a peripheral flange  
65 37, an outer grinding ring having a recessed part with which interlock the said flanges on

the supporting head and crushing plate, and clamping bolts 45 extending through the supporting head 33 and the grinding ring which interlocks with the said flanges on the sup-  
70 porting head and crushing plate, substantially as described.

3. The combination with a frame 47 and a running head 33 each provided with a flange 43, the inner crushing plates 34 and 48 mount-  
75 ed respectively on the running head and frame and each provided with a peripheral flange 37, the outer grinding rings each composed of a series of segments having recesses in their inner edges with which interlock the  
80 said flanges on the running head, the frame and the inner crushing plates, and clamping bolts for clamping the grinding ring sections to the running head and the frame, substan-  
85 tially as described.

4. The combination with a supporting head or plate, having a flange 43 and recess 42 upon its inner face, of a grinding ring consisting of segments 35, each segment having a recess  
90 adapted to fit over the flange 43, and a recess 38, having inclined sides 39, wedge nuts in said recesses 38, and bolts 45 passing through the supporting head and adapted to screw into  
95 said nuts, substantially as described.

5. The combination with a supporting head  
95 or plate, having an annular recess 42 and flange 43, of a crushing plate 34 mounted thereupon, said crushing plate having peripheral flange 37, a grinding ring composed of segments 35, each of said segments having a  
100 recess 41, adapted to clamp the flanges 37 and 43 together, and devices for securing said sections in place, substantially as described.

6. The combination with a supporting head  
105 or plate, having an annular recess 42 and flange 43, of a crushing plate 34 mounted thereupon, said crushing plate having peripheral flange 37, a grinding ring composed of segments 35, said segments having recesses  
110 38 and 41, the recesses 38 having inclined walls 39, a wedge nut 44 in each recess 38, and bolts 45 passing through the supporting head, and screwing into the nuts 44, substantially  
115 as described.

7. The combination with a casing 51, and  
115 a crushing plate 48, of a running head 33 provided with radial mortises 54<sup>a</sup>, and the plates 54 arranged in said mortises and provided with spoons 53 projecting radially from the  
120 running head, substantially as described.

8. The combination with a casing 51, and  
125 a crushing plate 48, of a running head 33 provided with radial mortises 54<sup>a</sup>, the plates 54 arranged in said mortises and provided with spoons 53 projecting radially from the running head, and bolts 45 securing the said plates to the running head, substantially as described.

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