No. 616,469. Patented Dec. 27, 1898.

J. R. JONES.

GRIST MILL.

(Application filed July 30, 1897.)

(No Model.) 3 Sheets—Sheet 1.

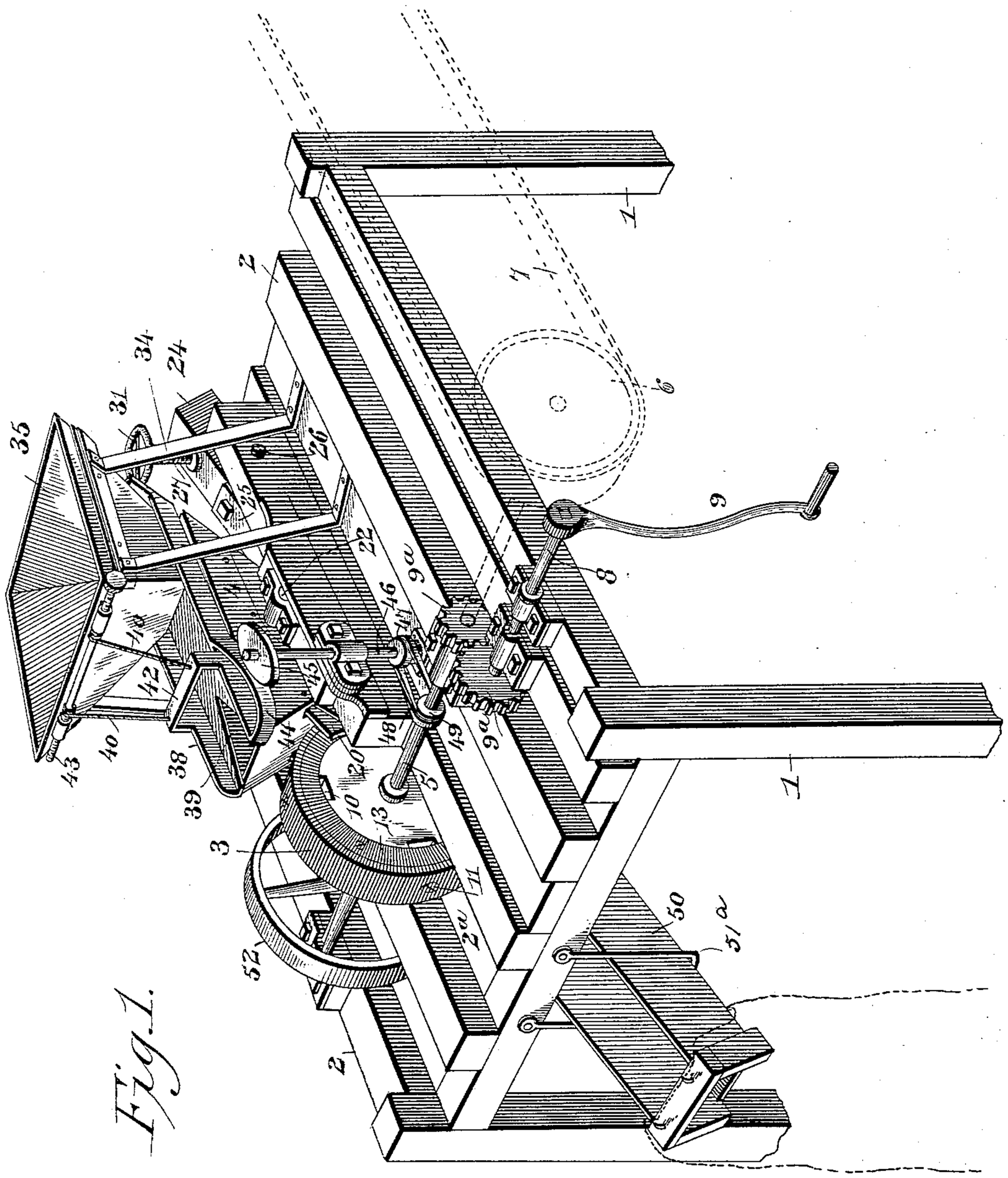

Fig. 1.

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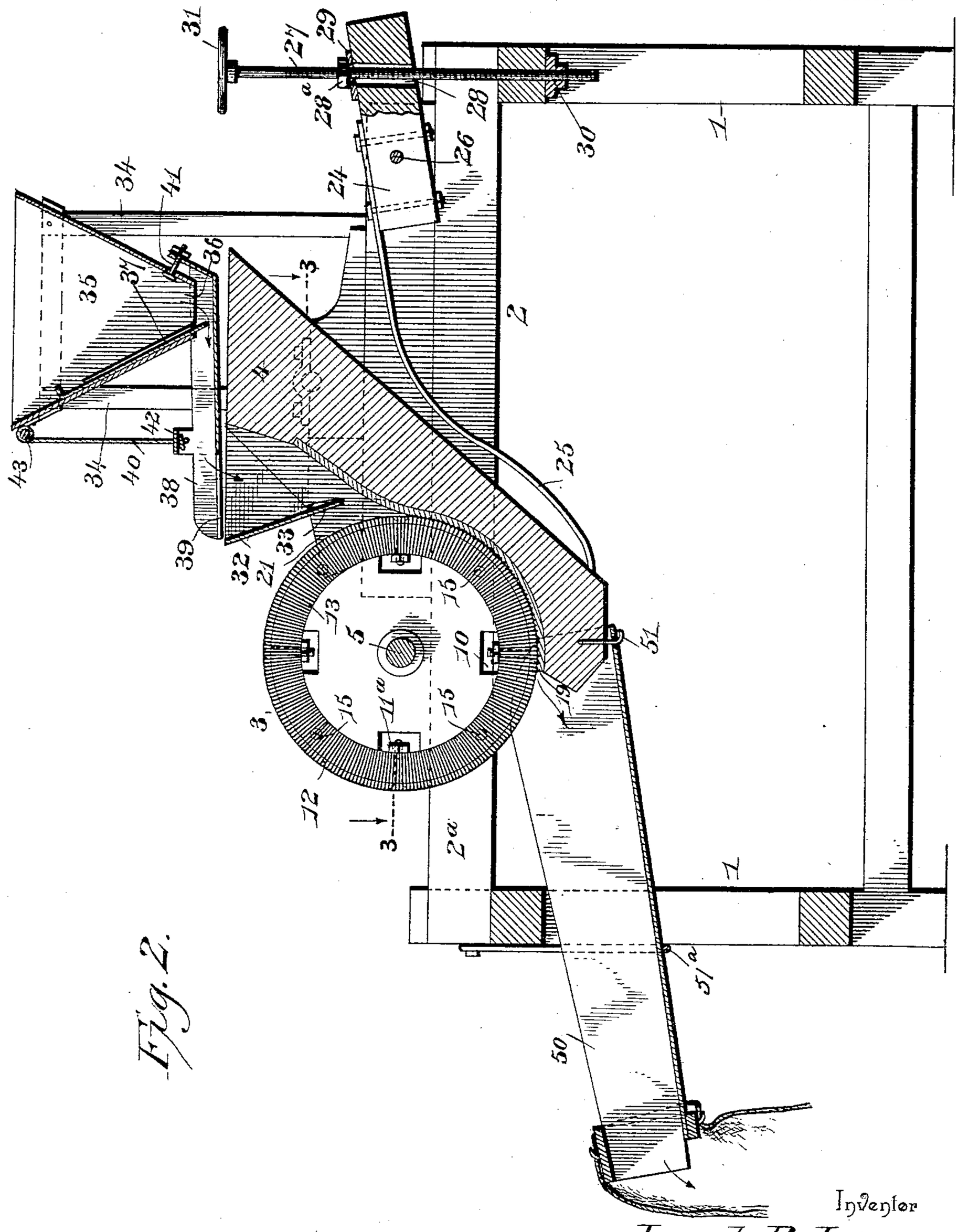

Fig. 2.

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Fig. 4.

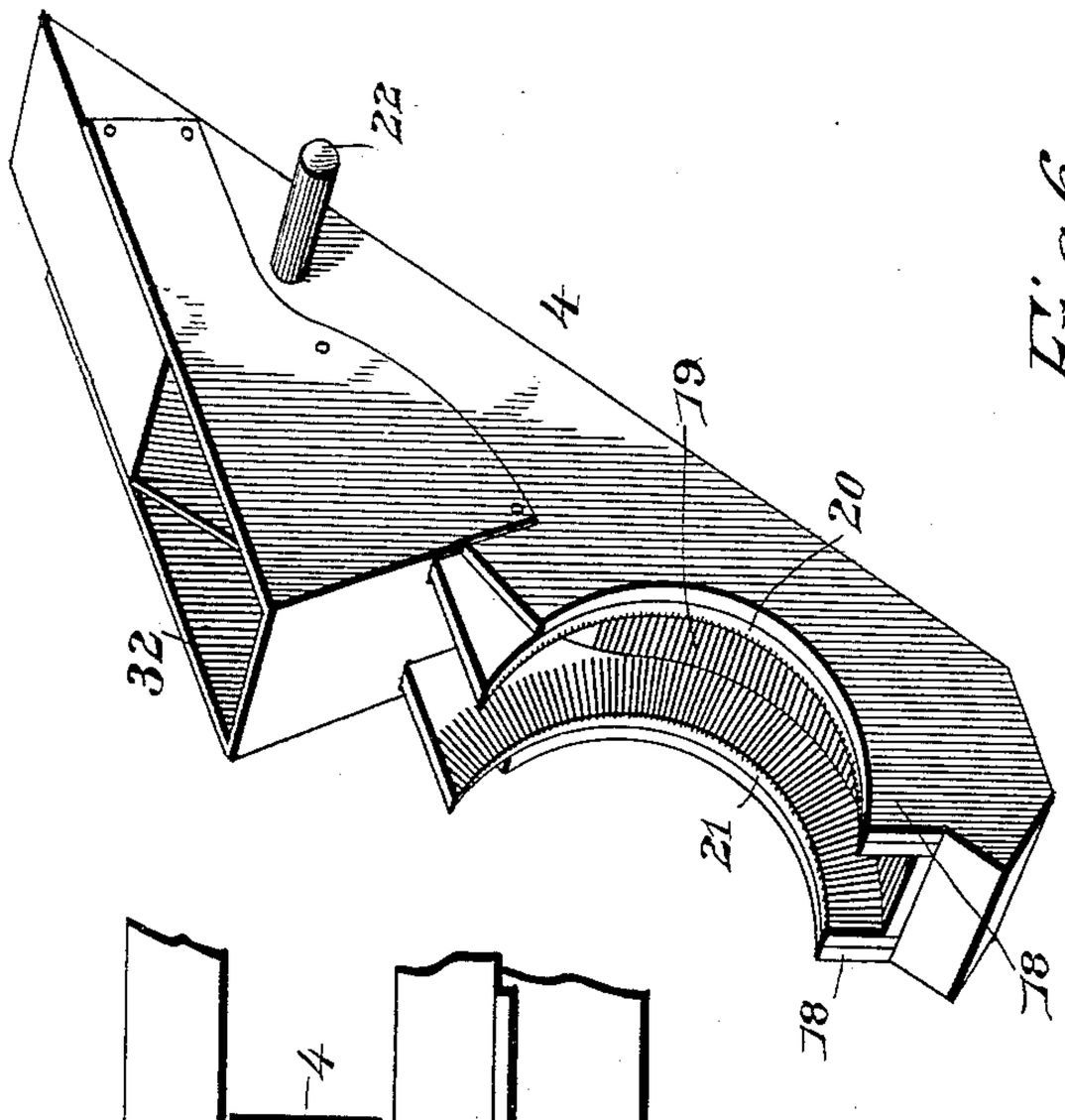


Fig. 6.

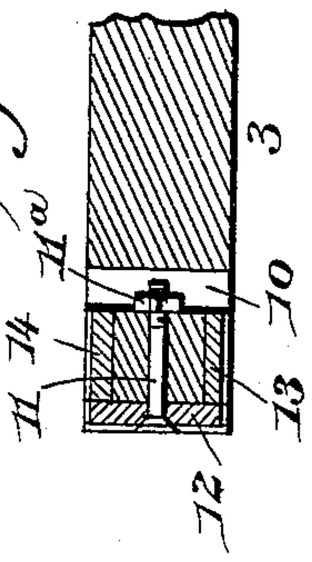


Fig. 3.

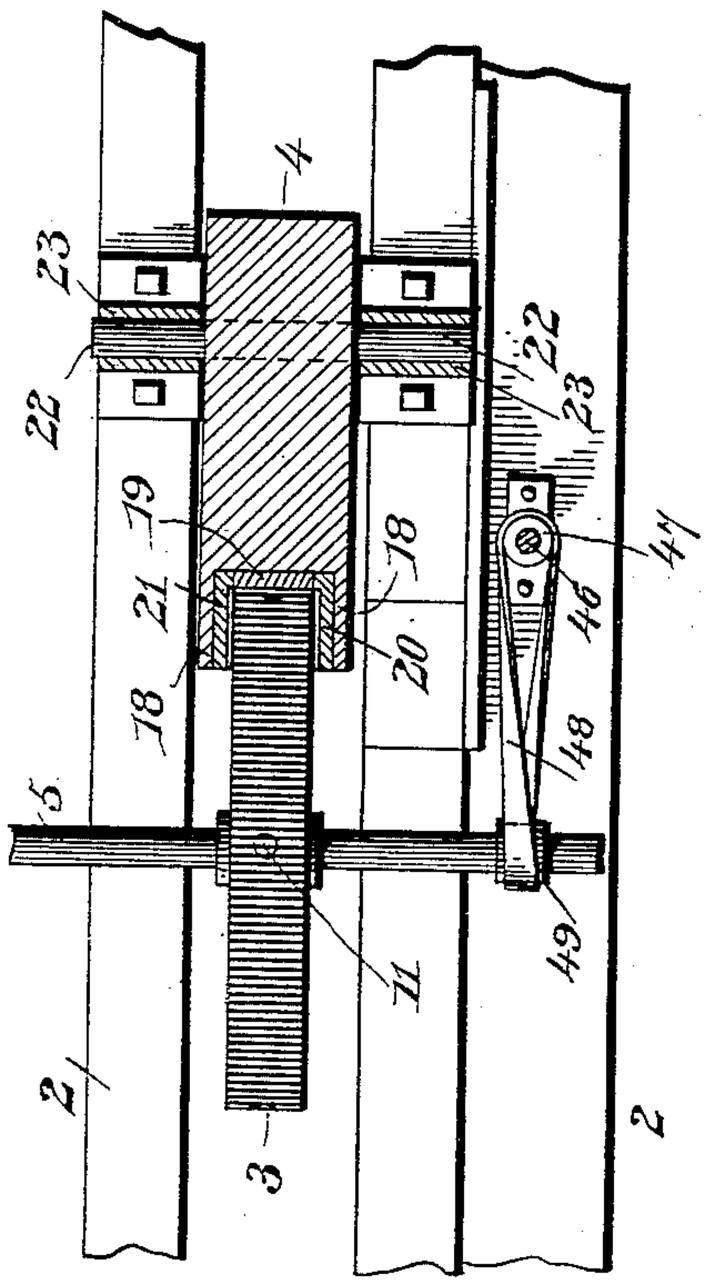
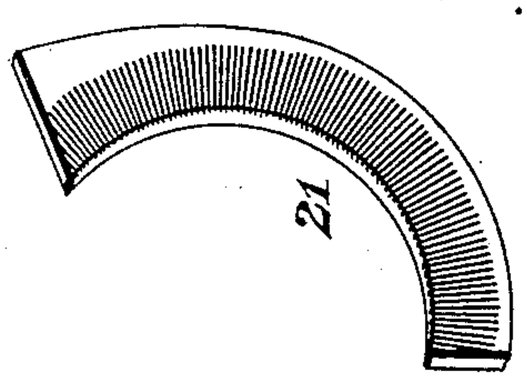


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOSEPH R. JONES, OF CORNWALL, VERMONT, ASSIGNOR OF ONE-HALF TO LEWIS A. BALDWIN, OF SAME PLACE.

GRIST-MILL.

SPECIFICATION forming part of Letters Patent No. 616,469, dated December 27, 1898.

Application filed July 30, 1897. Serial No. 646,524. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH R. JONES, a citizen of the United States, residing at Cornwall, in the county of Addison and State of Vermont, have invented a new and useful Grist-Mill, of which the following is a specification.

My invention relates to improvements in grist-mills of that class wherein a rotary disk and an adjustable concave are employed; and the object that I have in view is to provide an improved grinding mechanism in which the rotary disk has lateral grinding-surfaces on its faces, as well as a peripheral grinding-surface, which grinding-surfaces coöperate with similar surfaces on the adjustable concave, thus producing a large area of working surface for reducing the grain to a granular condition.

A further object of my invention is to provide an improved mechanism for feeding grain from the hopper to the grinding mechanism in a positive manner to insure a full supply of grain to the grinding mechanism.

A further object of the invention is to provide an improved mechanism for adjusting the concave with relation to the grinding-disk so as to insure the proper relation of the grinding-surfaces and to press the concave with more or less force against the grinding-disk; and a further object of the invention is to provide an improved mill which may be driven either by hand or by power appliances which shall be simple and durable in construction and efficient in operation.

With these ends in view my invention consists in the novel combinations of devices and in the construction and arrangement of parts, which will be hereinafter fully described and claimed.

To enable others to understand my invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a perspective view of a grist-mill constructed in accordance with my invention. Fig. 2 is a vertical sectional elevation on a plane cutting through the grinding mechanism. Fig. 3 is a horizontal sectional view on the plane indicated by the dotted line 3 3 of Fig. 2. Fig. 4 is a detail perspective view of the adjustable concave. Fig. 5 is a detail perspective view of one of the lateral grinding-segments to be carried by the concave. Fig. 6 is a fragmentary detail sectional view through a part of the grinding-disk to show the removable peripheral grinding-ring and the lateral or side grinding-rings thereof.

Like numerals of reference denote corresponding parts in all the figures of the drawings, referring to which—

1 designates a suitable supporting-frame, which may be of any preferred construction, and in the table 2, on top of this frame, is provided a longitudinal slot 2^a to accommodate the grinding-disk 3 and the concave 4.

The grinding-disk 3 is carried by a power-shaft 5, which is journaled in suitable bearings on the frame 1. If the machine is to be driven by power—as, for instance, by a water-wheel, an engine or motor, or by horse-power—I provide the shaft 5 with a driving-pulley 6, around which may pass the driving-belt 7, as indicated by dotted lines in Fig. 1. The mill, however, may be driven by hand-power, and in this embodiment of the invention I provide a counter-shaft 8, which is mounted in suitable bearings on the frame 1. Said counter-shaft is equipped with a hand-crank 9 for its convenient operation, and the said counter-shaft is operatively connected with the power-shaft 5 through the intermeshing gears 9^a. (Clearly shown by Fig. 1.) In case the mill is equipped with the hand-power devices and it is desired to change the motive power the pinion or gear on the counter-shaft 8 should be detached and the driving-pulley or other power appliance should be attached to the power-shaft 5, as is obvious.

The grinding-disk 3 of my improved mill is of novel construction to provide a large area or surface, and this requires a novel form of the concave, the peculiar construction of which I will now proceed to describe. The disk proper, 3, is provided at suitable intervals with radial apertures, which open into transverse slots 10, and through the radial apertures pass the bolts 11, that serve to attach the peripheral grinding-ring 12 to the edge of the disk 3. The heads of these bolts are

countersunk in the peripheral grinding-ring, and on the other ends of the bolts are fitted the nuts 11ª, which lie in the transverse openings 10 of the disk 3, thus providing for ready access to the bolts and nuts should it be necessary to remove the peripheral grinding-ring from the disk 3. This peripheral grinding-ring 12 may be made in a continuous piece of metal or in sections, and it is of a diameter proper to fit snugly to the peripheral edge of the disk 3. The edges of this peripheral ring 12, as well as the exposed annular surface thereof, are roughened or corrugated in any suitable manner familiar to or preferred by those skilled in the art to which my invention relates. The faces of the disk 3, adjacent to the peripheral grinding-ring, are recessed to accommodate the lateral grinding-rings 13 14, which are fitted snugly in said recesses and are held therein by transverse bolts 15. (Shown by Figs. 1 and 2.) These lateral grinding-rings 13 14 are arranged parallel to each other and concentric to the disk 3 and to the peripheral grinding-ring 12, and said lateral grinding-rings 13 14 are arranged to abut at their peripheral edges against the inner face of the peripheral grinding-ring 12, as shown by Fig. 6. The exposed faces of these lateral grinding-rings 13 14 are corrugated or roughened by lines radial to the axis of the disk 3, and by the provision of the lateral and peripheral grinding-rings I am enabled to provide the disk with a large grinding-surface to operate efficiently and economically in reducing the grain.

The concave 4 is cast in a single piece of metal in the form shown more clearly by Figs. 2 and 4 of the drawings. The concave is arranged in an inclined position within the slotted frame 1 and in juxtaposition to the grinding-cylinder. The face of the concave opposed to the periphery of the grinding-cylinder is curved to conform substantially to the disk, and this curved part of the concave is flanged to provide a channel in which works a part of the grinding-disk and its grinding-rings 12 13 14. The flanges 18 of the concave are arranged to embrace the lateral sides or faces of the grinding-disk for a part of its circumference, and the channeled part of the concave is made of such cross-sectional area that the concave is adapted to receive or contain the segmental grinding-plates 19 20 21, which are removably fitted in the channeled part of the concave to enable them to be repaired or replaced. The segmental grinding-plate 19 is made of concavo-convex cross-section to fit closely to the bottom of the channeled face of the concave, and the upper exposed face of this bottom grinding-plate 19 is roughened or ribbed transversely to enable the said plate 19 to coact with the roughened surface of the peripheral grinding-ring 12 of the disk 3. The grinding-segments 20 21 are adjusted in the channeled concave on opposite sides of the bottom grinding-segment 19 and so as to bear against the flanges 18 of said concave 4, and all these grinding-segments 19 20 21 are secured in position within the channeled part of the concave in any suitable manner. The grinding-segments 20 21 are positioned within the concave to coöperate with the lateral grinding-rings 13 14 of the disk 3, and to this end I provide corrugations or roughened surfaces on the inner or opposing faces of the grinding-segments 20 21, as shown by Fig. 4.

The described construction of the grinding mechanism provides for the ready removal of either or all of the grinding-surfaces and for easy access thereto for the purposes of such removal, thus enabling any worn rings or segments to be replaced by other rings or segments. The grinding mechanism also embraces a large area of working surface, which serves efficiently in the rapid grinding of the grain fed to the mill.

The concave is adjustably supported in operative relation to the grinding-disk. In the preferred embodiment of the invention I pivotally support the adjustable concave in the frame 1 by providing a transverse shaft or bolt 22, which is rigidly attached to the concave near or at its upper end, and this shaft or bolt is fitted in suitable bearings or blocks 23, fastened to the frame 1. (See Fig. 1 and dotted lines in Fig. 2.) For the purpose of holding the concave in yielding engagement with the grinding-disk I have provided the pressure-lever 24 and the pressure-spring 25, the latter arranged to bear directly against the rear or neutral side of the concave 4, as shown by Fig. 2. The pressure-lever 24 is hung or fulcrumed, at an intermediate point of its length, in the frame 1 on the pivotal bolt 26, which passes through said lever and is supported in the frame 1, and to the forward end of this lever 24 is rigidly attached the heel of the spring 25. This spring 25 preferably consists of a curved plate or bar of spring metal, and it is situated in rear of and substantially below the concave 4. The pressure-spring is thus carried by the lever, and it is arranged in operative relation to the concave to hold the latter in yielding contact with the grinding-disk. The pressure-lever 24 is controlled by an adjusting-screw 27, which passes loosely through a vertical slot 28, provided in the lever 24 on the opposite side of its fulcrum to the point of attachment of the pressure-spring 25, and this screw has a fixed nut or collar 28, which bears upon a wear-plate 29, attached to the upper face of the lever 24, as shown by Fig. 2. The lower end of the adjusting-screw 27 works in a fixed nut or threaded bearing 30 on the frame 1, and the upper end of said screw has a hand-wheel 31 or other suitable appliance for conveniently rotating said screw. It will be observed that the screw provides convenient means for adjusting the lever to vary the pressure of the spring 25, and thus the mill may

be regulated to grind the grain coarse or fine, as may be desired, and the mill may also be adjusted to grind different kinds of grain.

The concave carries a spout 32, which is detachably fastened to the upper end thereof, over the channeled face of said concave, and this spout 32 has its front wall extended downwardly, as at 33, to provide a tongue for properly directing the grain between the grinding-disk and the working surface of the concave.

To the frame 1 of the machine is attached suitable posts or uprights 34, which sustain the hopper 35 in a raised or elevated position above the grinding mechanism. This hopper 35 may be of the usual or any preferred construction, and the hopper has an opening in its bottom, as at 36, the area of which may be varied by an adjustable slide 37, suitably attached to the hopper and serving the purpose of a regulator to control the quantity of grain which may be fed to the grinding mechanism.

The grain from the hopper is deposited upon a vibratory feeder 38, which is suspended between the hopper and the grinding mechanism and which has positive motion imparted thereto for the purpose of feeding the grain to the grinding mechanism in a continuous stream without interruption thereto. This feeder 38 is in the form of a tray, with an opening in its bottom at the front end thereof, as at 39, and said front end of the feeder is arranged immediately over the spout 32 of the concave to discharge the grain directly into the same. This vibratory feeder 38 is suspended loosely between the hopper and the grinding mechanism, and, as shown in the drawings, I have provided the suspension-cords 40 at the front end and the loose connection 41 between the hopper and the rear end of the feeder. The suspension-cords or other flexible connections 40 are attached to a bail 42 of the tray-like feeder, and they are wound on or attached to a shaft or screw 43 on the front side of the hopper. The loose connection 41 between the rear end of the feeder and the hopper consists of a fixed pin or bolt attached to the hopper and playing loosely in an enlarged opening or slot in the upturned rear end of the feeder, said fixed bolt having a nut or enlarged end to prevent the accidental separation of the feeder from the hopper. The feeder is vibrated transversely, or from side to side, by positive mechanical connections with the power-shaft 5 of the mill. The feeder 38 is provided on one side, at the front end thereof, with a laterally-extending cam-surface 44, against which rides a rotating cam 45, which is attached to the upper end of the upright shaft 46. This upright shaft is journaled in suitable bearings on the mill-framing, and at or near its lower end the shaft is provided with a driving-pulley 47, around which passes a driving-belt 48, which is driven by a similar pulley 49 on the power-shaft 5.

The grist from the mill is discharged from the grinding mechanism to a chute 50, by which it may be conducted to a bag or other suitable receptacle. This chute is attached to the lower end of the concave 4 at 51, and it passes loosely through a loop or hanger 51^a, which is fastened to the mill-frame 1.

The power-shaft 5 should be provided with a balance-wheel 52 to insure steady running of the grinding-mill.

This being the construction of my improved grist-mill, the operation may be described, briefly, as follows: The grain is deposited in the hopper and the power-shaft 5 is set in motion to rotate the grinding-disk. As the shaft is turned it drives the upright shaft, which, through its cam, gives to the feeder a lateral shaking or vibrating motion, and the grain is fed in a continuous stream from the hopper to the grinding mechanism. The grain is reduced to a granular condition by the coöperating grinding-rings on the disk and the grinding-segments on the concave, and the grist is discharged to the chute 50, by which it is conveyed to the bag or other suitable receptacle. The concave is held in proper engagement with relation to the grinding-disk by the pressure-spring, and by adjusting the screw the lever is moved to vary the pressure of the spring, thus adapting the mill to grind the grain either coarse or fine or to grind different kinds of grain.

It is evident that changes in the form and proportion of parts and in the details of construction of the mechanisms herein shown and described as the preferred embodiment of my invention may be made by a skilled mechanic without departing from the spirit or sacrificing the advantages of my invention. I therefore reserve the right to make such changes and alterations as fairly fall within the scope of the invention.

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

1. In a grist-mill, the grinding-disk having the transverse slots and the radial-bolt openings, the continuous peripheral grinding-ring, the radial bolts sunk flush with said peripheral grinding-ring and having their nuts fitting in the recesses of said disk, and the lateral grinding-rings fitted against the faces of the disk between the peripheral grinding-ring thereon and the slots therein to expose the ends of said slots, combined with a channeled concave carrying the grinding-segments which are opposed to the working faces of the peripheral and lateral grinding-rings of the disk, substantially as described.

2. A grist-mill comprising a suitable framework, a vertically-disposed concave yieldably supported within said frame and having at its lower end a single concave channel, the grinding-segments in the bottom and sides of the concave channel and with the working faces of the side segments arranged radially to the working face of the bottom segment, a horizontal power-shaft journaled on said frame, and a rotary grinding-disk secured to

said shaft in the vertical plane of the concave to have its edge embraced partially by the channeled concave and provided with grinding-rings which are secured removably to the circumferential edge and the side faces of the grinding-disk; said lateral grinding-rings lying within the edges, and secured to the disk independently, of the circumferential grinding-ring and having their working faces arranged radially to the working face of the circumferential grinding-ring, substantially as described.

3. A grist-mill comprising a frame, a horizontal shaft carrying a grinding-disk, a vertically-inclined concave yieldably supported within the frame in operative relation to the grinding-disk, a delivery-chute attached to the discharge end of the concave and movable with the latter in its adjustment in relation to the grinding-disk, a keeper within which said chute is movably supported, a lever mounted in the frame and carrying a leaf-spring which bears against the rear side of the concave at a point adjacent to the attachment of the chute thereto, and means connected with the lever for regulating the tension of the spring, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of witnesses.

JOSEPH R. JONES.

Witnesses:
JAMES M. SLAD,
RUFUS WAINWRIGHT,
JOHN W. STEWART.