

No. 776,472.

PATENTED NOV. 29, 1904.

J. W. H. JAMES.  
LEVIGATING MILL.

APPLICATION FILED MAY 21, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

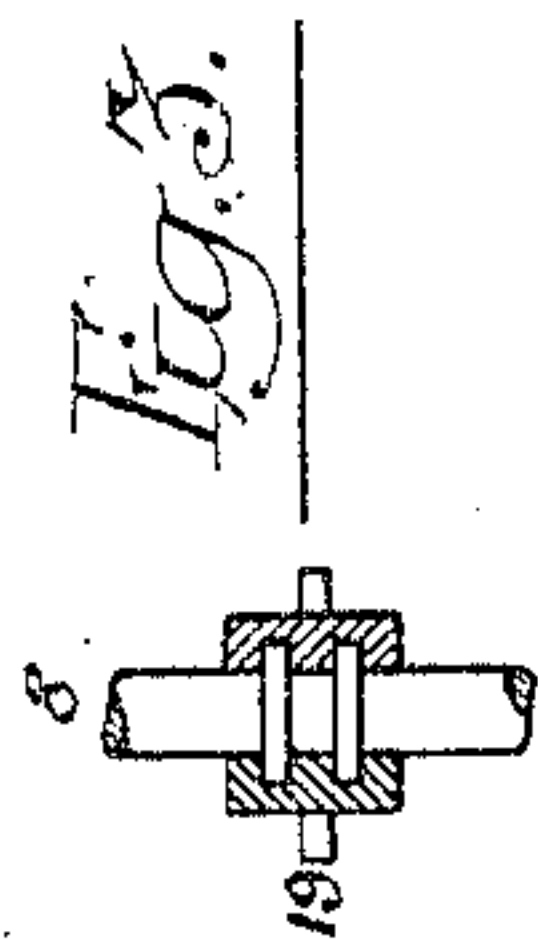
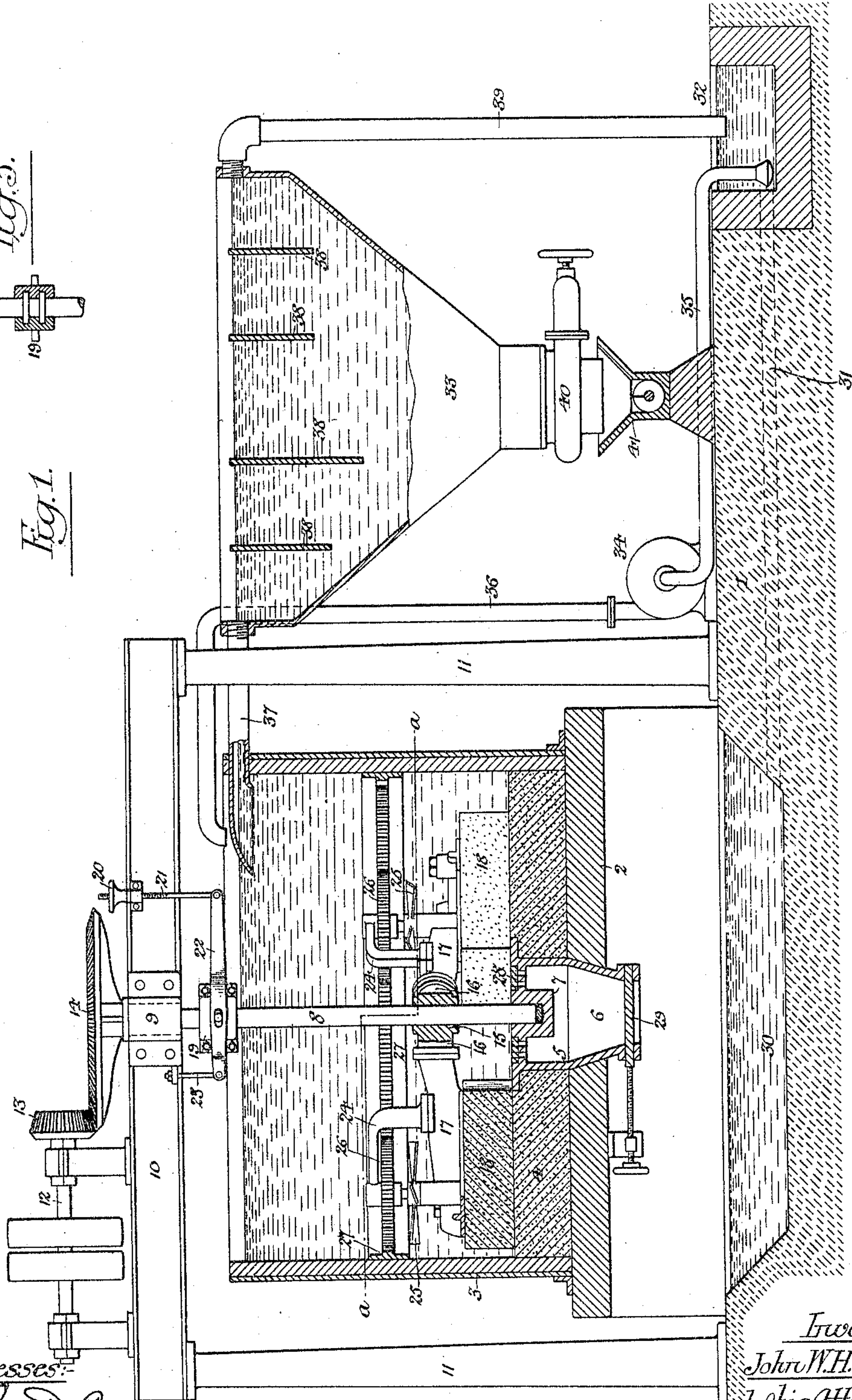


Fig. 1.



Witnesses:

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Herman E. Metcalf.

Inventor:  
John W. H. James  
by his Attorneys:

Howson & Howson

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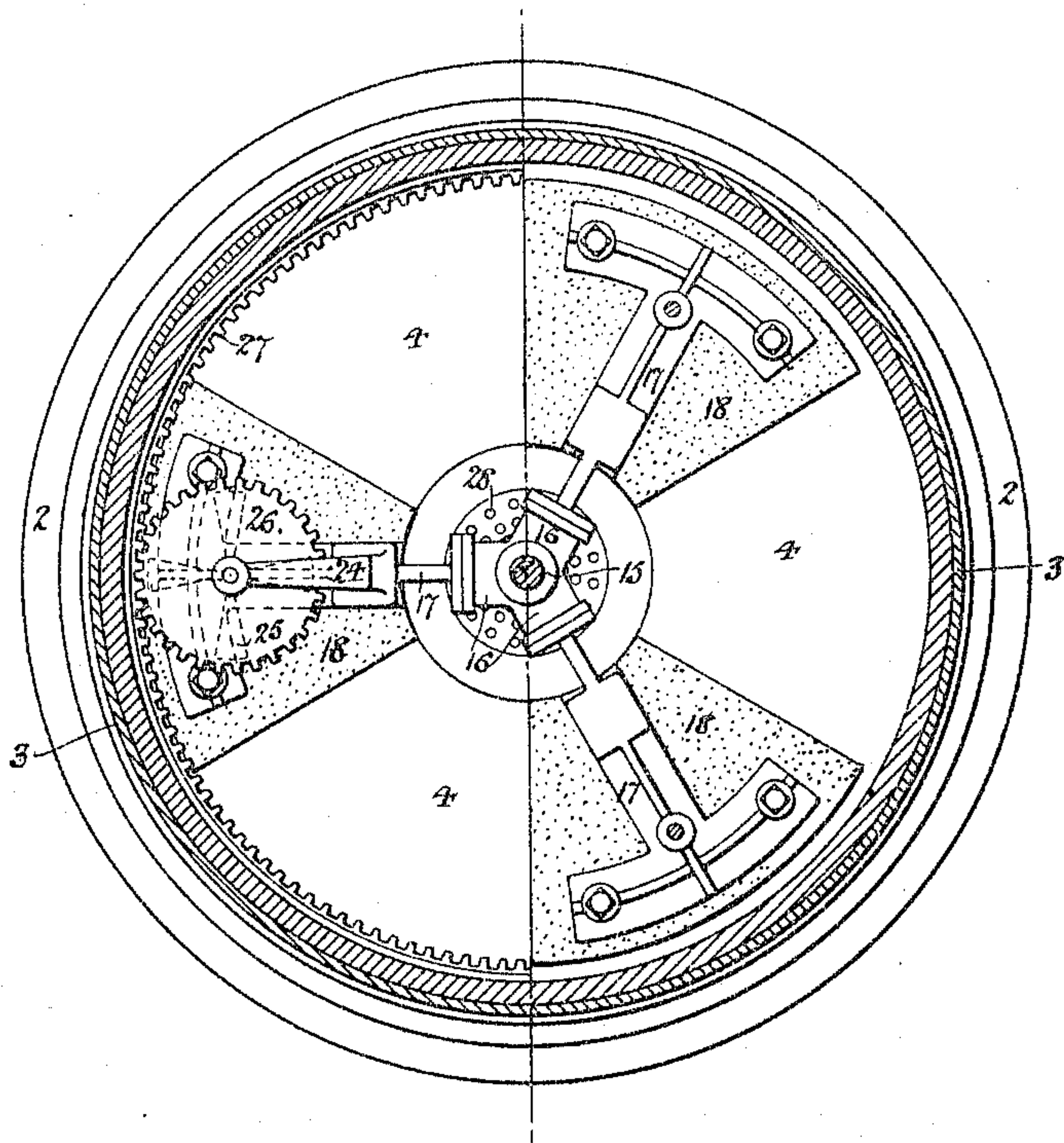
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LEVIGATING MILL.

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NO MODEL.

2 SHEETS—SHEET 2.

*Fig. 2.*



Witnesses:-

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# UNITED STATES PATENT OFFICE.

JOHN W. H. JAMES, OF PHILADELPHIA, PENNSYLVANIA.

## LEVIGATING-MILL.

SPECIFICATION forming part of Letters Patent No. 776,472, dated November 29, 1904.

Application filed May 21, 1902. Serial No. 108,386. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN W. H. JAMES, a subject of the King of Great Britain and Ireland, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Levigating-Mills, of which the following is a specification.

My invention consists of certain improvements in levigating-mills of that type in which rotating grinding-blocks act in conjunction with a fixed grinding-block at the bottom of a tub or tank containing water, the grinding operation being thereby effected under water and the finely-ground material rising to the surface, whence it floats into a settling-tank.

The objects of my invention are to so construct such a levigating-mill as to readily control the relative position of the fixed and movable stones or grinding-surfaces, to provide a positive current for carrying the finely-ground material to the surface of the water in the grinding-tub, to permit ready removal of unground material accumulating in the bottom of the tub, to prevent accumulations of material upon the tops of the movable grinding-surfaces, and generally to so improve the construction and operation of the mill as to render the same more acceptable than such mills as heretofore constructed.

In the accompanying drawings, Figure 1 is a view, partly in elevation and partly in longitudinal section, of a levigating-mill constructed in accordance with my invention. Fig. 2 is a sectional plan view on the line *a a*, Fig. 1; and Fig. 3 is a detached sectional view of part of the mill.

On a suitable bed or foundation 1 is erected a structure 2, upon which is supported the grinding tub or tank 3, the latter being composed, by preference, of an outer metallic shell with wooden lining and having at the bottom a fixed grindstone 4, the central opening or eye of this stone being in the present instance occupied by a casing 5, containing a chamber 6, the top of the casing 5 being perforated and having a central step-bearing 7 for the rotating vertical shaft 8 of the mill. The upper portion of this shaft is adapted to a bearing 9 in a structure 10, which is supported above the grinding-tub upon posts or

columns 11, this upper structure having a counter-shaft 12, which receives the driving-belt, and said counter-shaft being provided with a bevel-pinion 13, which meshes with a bevel-wheel 14, engaging the upper end of the shaft 8, so as to turn the same, the connection being by means of a squared or splined construction of the shaft, so as to permit vertical movement of the latter without deranging the driving connection between the same and the bevel-wheel 14.

Secured to the shaft 8 is a hub 15, with a number of projecting arms 16, three of which are shown in the present instance, and to the outer end of each of these arms is securely bolted another arm, 17, which is secured to one of the rotating grinding-stones 18 of the mill. By raising and lowering the shaft 8; therefore, the vertical position of the stones 18 in respect to the fixed base-stone 4 can be regulated and the mill thus readily adapted to the conditions under which the grinding can best be effected, the adjustment also providing a means for compensating for the wear of the grinding-stones.

In order to effect the vertical adjustment of the shaft 8 and its stones 18, I mount upon the said shaft a sleeve 19, which engages with suitable collars on the shaft, as shown in Fig. 3, so that the latter is free to turn in the sleeve, but must partake of any vertical movement imparted to the latter, such vertical movement being effected by means of a hand-wheel 20, mounted on the structure 10 and engaging with the threaded portion of a rod 21, which is connected to a yoked or forked lever 22, the latter engaging with projections on the sleeve 19 and being fulcrumed upon a bolt 23, which depends from the structure 10, as shown in Fig. 1. The adjusting devices are therefore readily accessible, and the inconvenience arising from the use of an adjusting device acting upon the lower end of the shaft is effectually overcome, a fixed step-bearing being provided for the lower end of said shaft, which bearing is not likely to get out of order and require attention. Hence its comparative inaccessibility is no objection.

The centrifugal action due to the rotating stones 18 causes the water to flow from the



central portion of the tub to the outer portion of the same and to rise in such outer portion, and the current thus created has a natural tendency to cause the finely-ground particles  
 5 of material to rise to the surface of the water; but in order to render this upward current in the outer portion of the tub more positive and certain in its action I mount in a bearing upon each of the arms 17 and in a bracket 24 there-  
 10 on a short vertical shaft carrying a fan or screw 25 and a spur-wheel 26, and on the lining of the tub 3 I mount an annular rack 27, meshing with said spur-wheels 26, whereby as the arms 17 are rotated rotating movement  
 15 will be imparted to the fans 25, the blades of which are so set as to cause the water acted on thereby to rise in the tub. Not only is the flow of the powdered material to the surface of the water in the tub assisted by this action,  
 20 but the increased force of the current flowing over the tops of the stones 18 tends to prevent the accumulation thereon of material which is too heavy to be carried off by a current due solely to centrifugal action. Hence  
 25 the operation of the mill is improved in this respect. In all mills of this class, however, heavy particles have a tendency to collect upon the central portion of the bottom of the tub within the annular path traversed by the stones  
 30 18, and in order to provide for the ready discharge of such accumulations I mount upon the perforated top of the casing 5, which occupies the eye of the fixed lower stone, a perforated valve or damper plate 28, which when  
 35 adjusted so that its openings register with those in the top of the casing will permit the accumulated material in the bottom of the tub to pass into the chamber 6 within the casing 5, from which after closing the valve 28 it  
 40 can be discharged by opening the valve 29, which normally closes the lower end of said casing, the grinding-tub being thus freed of these accumulations without any waste of the water. The accumulations thus discharged  
 45 from the chamber 6 fall into a pit 30 beneath the tub, which pit is filled with water and communicates through a pipe 31 with a well 32, which also receives the overflow from the settling-tank 33 of the mill, a pump 34 return-  
 50 ing the water from the well 32 to the grinding-tub 3 through pipes 35 and 36.

The pipe 37, which carries the overflow from the grinding-tub to the settling-tank 33, communicates with the upper portion of said settling-tank, and in this portion of the latter is  
 55 a series of transverse baffle-plates 38, so that the finely-powdered material carried off from the grinding-tub by the overflow will in its passage across the settling-tank toward the over-  
 60 flow-pipe 39 of the latter come into contact with these baffle-plates and will be arrested thereby and caused to drop into the lower portion of the tank, the accumulations therein being removed at intervals by opening a valve

40 and being thereby permitted to drop into 65 a conveyer 41, whereby they are carried to the point at which they are to be used or further treated.

The mill forming the subject of my invention has been designed especially for grinding 70 lead carbonate in the manufacture of paint; but the invention is applicable to mills for grinding any material in which the lighter particles are separated from the heavier particles by reason of the greater influence ex- 75 erted upon them by the ascending currents of water in the grinding-tub. The opening and closing of the valve or damper plate 28 can be effected at the required intervals by means of a hooked rod or other suitable implement 80 engaging the same and manipulated by the attendant.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination, in a levigating-mill, of 85 the grinding-tub and its fixed stone, having a downwardly-delivering central discharge-orifice, a valve for closing the outlet therefrom, the movable stones, the rotating shaft carrying the same, a sleeve engaging said shaft so 90 as to be capable of lifting the same, and mechanism above the tub for raising and lowering said sleeve, substantially as specified.

2. The combination, in a levigating-mill, of 95 the grinding-tub and its fixed stone, the rotating structure carrying stones which have no operative movement other than that around the central axis of the mill, fans mounted upon the said rotating structure, and means for rotating said fans so as to cause them to 100 induce an upward current in the outer portion of the tub, substantially as specified.

3. The combination, in a levigating-mill, of 105 the grinding-tub, the rotating stones, the fixed stone having in its central portion or eye, a casing inclosing a chamber with valved opening at the bottom of the same, and a valve or damper whereby matter accumulating in the central portion of the tub may be permitted to enter said chamber at intervals, substan- 110 tially as specified.

4. The combination, in a levigating-mill, of 115 the grinding-tub, the settling-tank receiving the overflow from the tub, a well receiving the overflow from the settling-tank, a pit in connection with said well and receiving material discharged from the grinding-tub independ- 120 ently of the overflow, and a circulating device for returning the water from said well to the grinding-tub, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN W. H. JAMES.

Witnesses:

F. E. BECHTOLD,  
 JOS. H. KLEIN.