(No Model.) 4 Sheets—Sheet 1.

H. MANTEY.

EDGE RUNNER OR VERTICAL MILLSTONE.

No. 487,930. Patented Dec. 13, 1892.

Fig. 1.

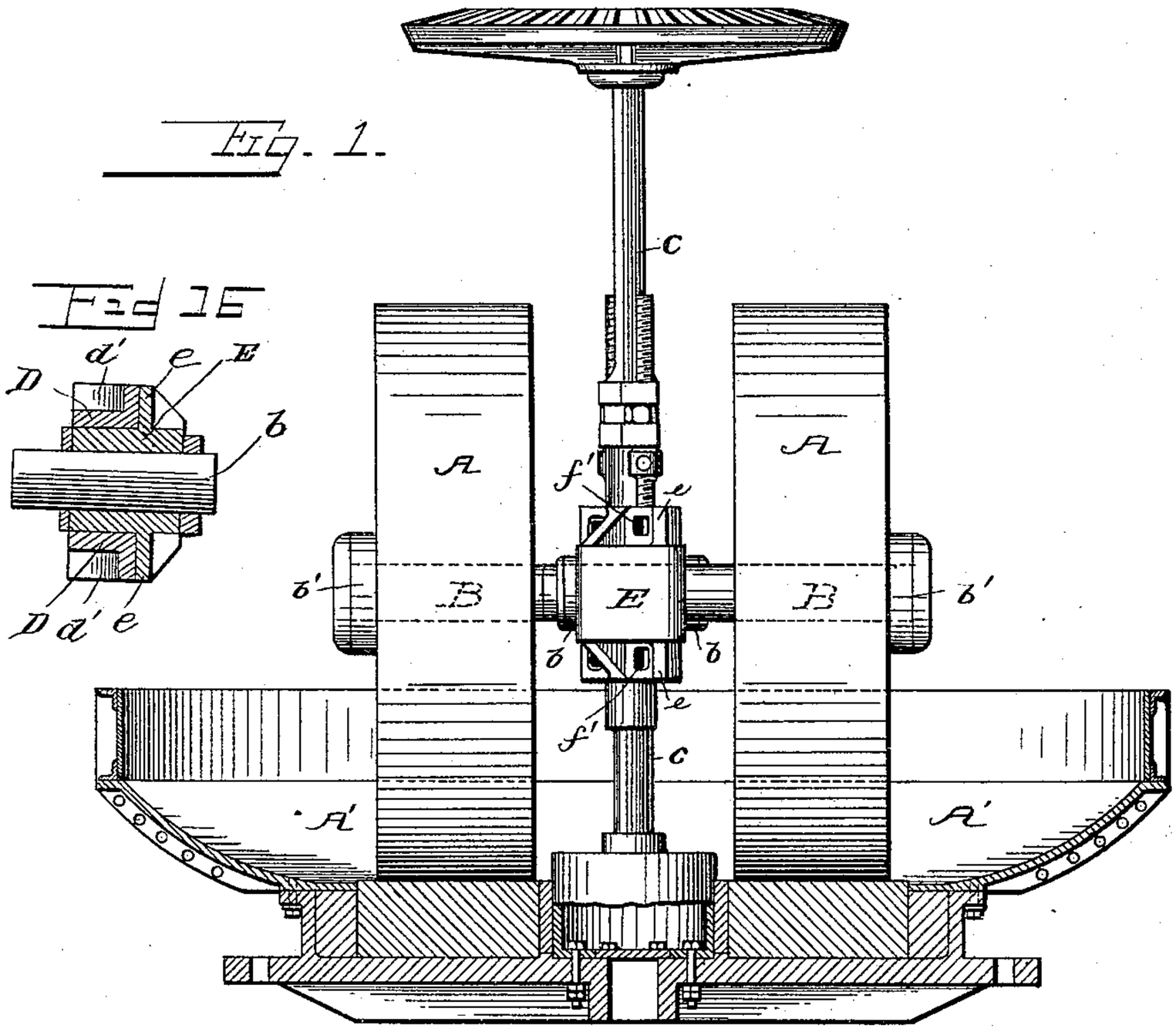
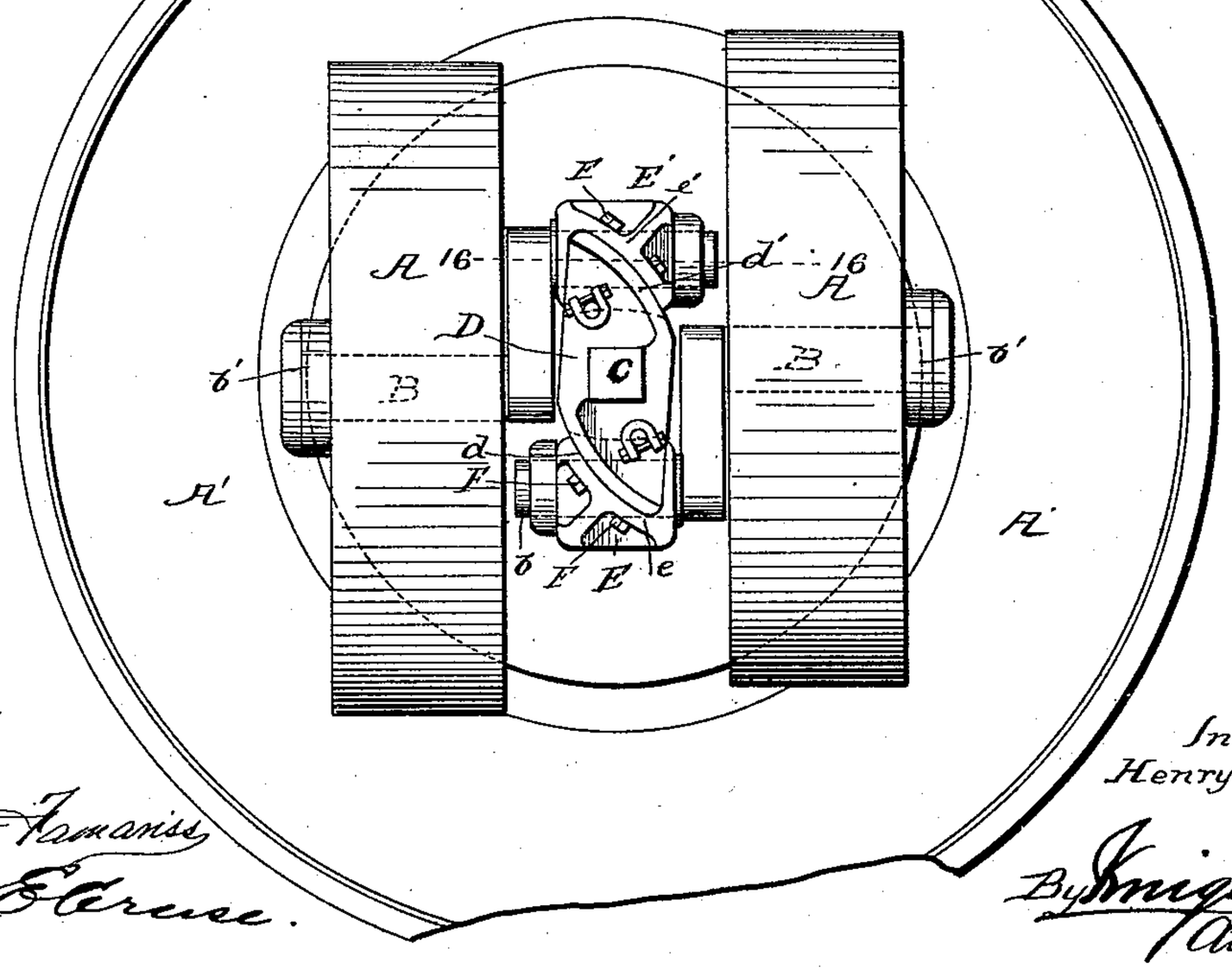


Fig. 16

Fig. 2.



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Geo E Crouse.

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H. MANTEY.

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Fig. 3.

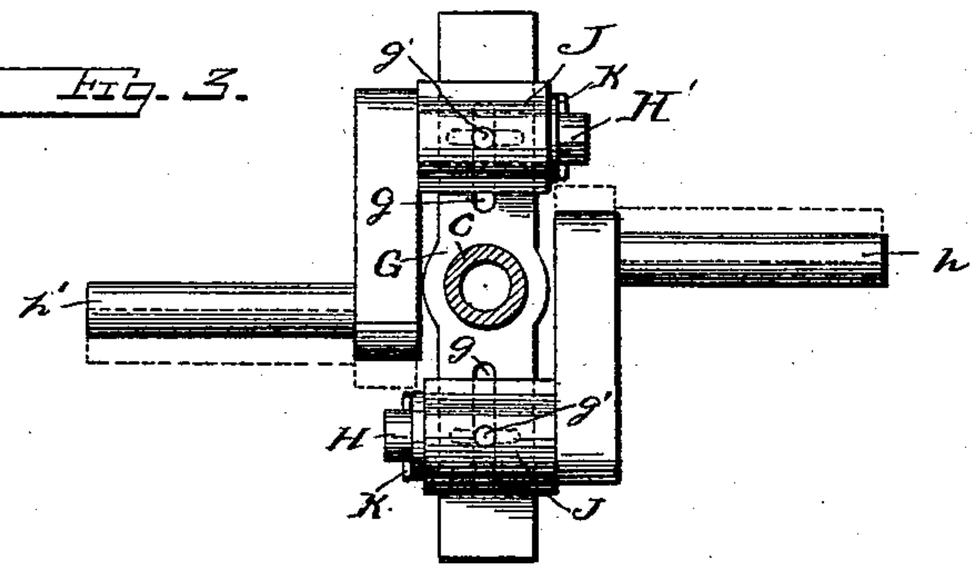


Fig. 4.

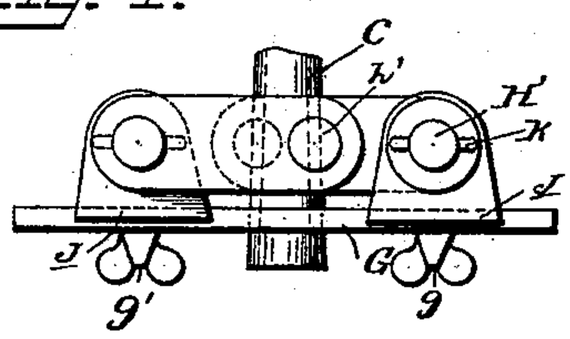


Fig. 5.

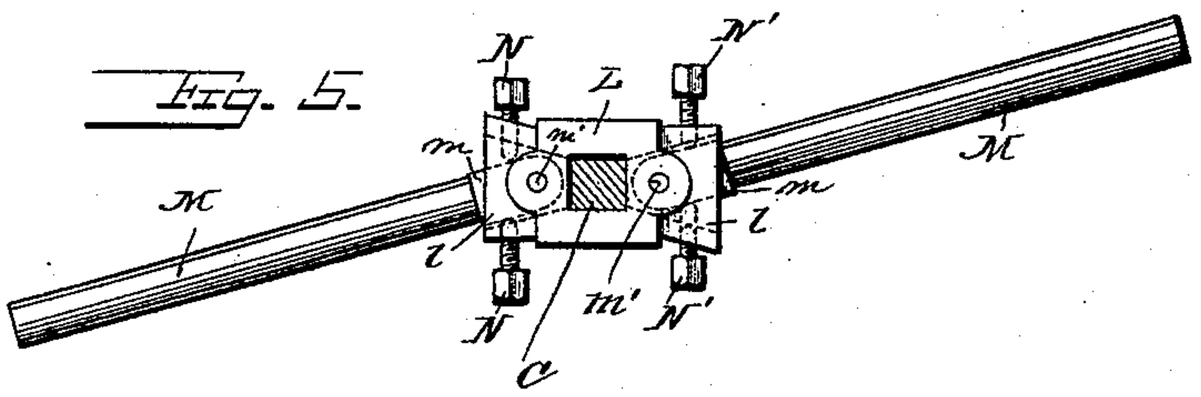


Fig. 6.

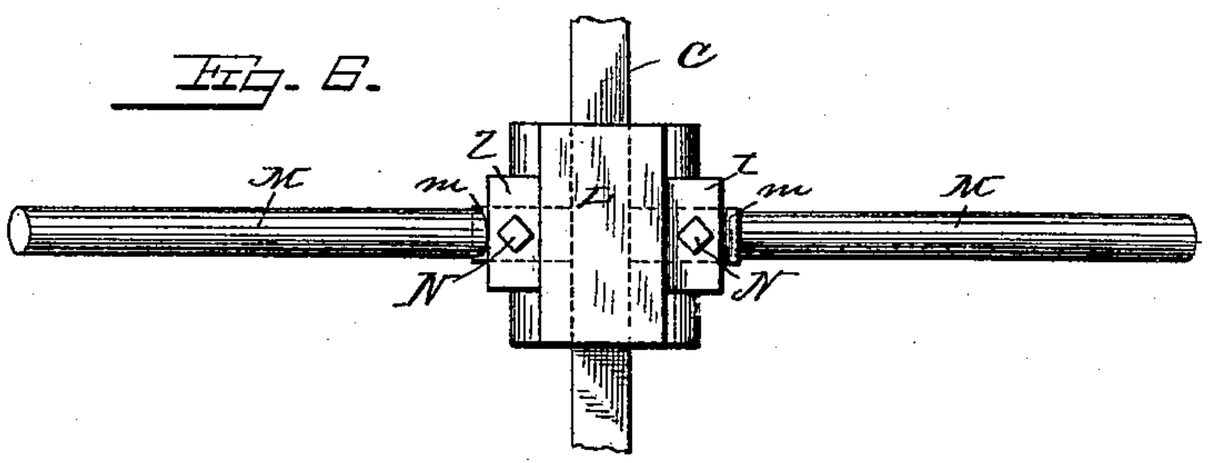
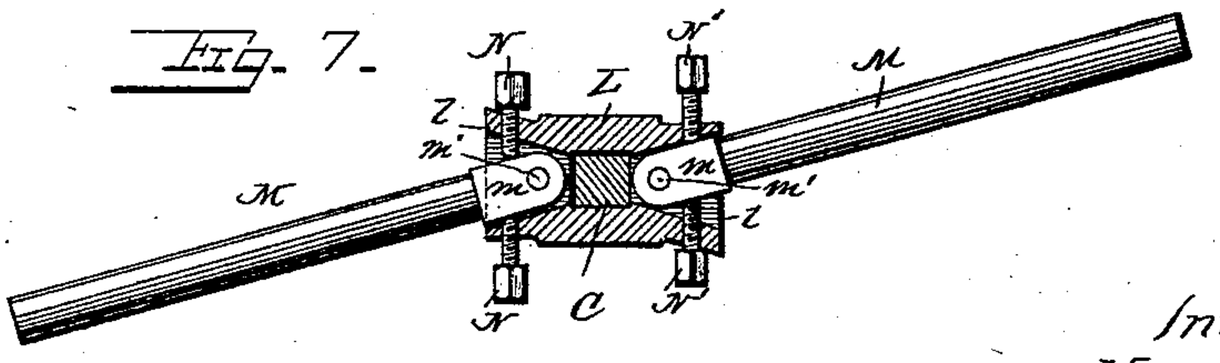


Fig. 7.



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4 Sheets—Sheet 3.

H. MANTEY.

EDGE RUNNER OR VERTICAL MILLSTONE.

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Fig. 8.

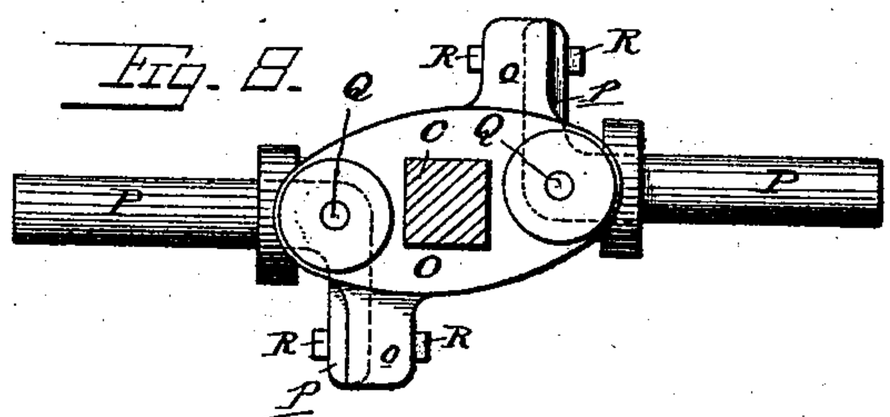


Fig. 9.

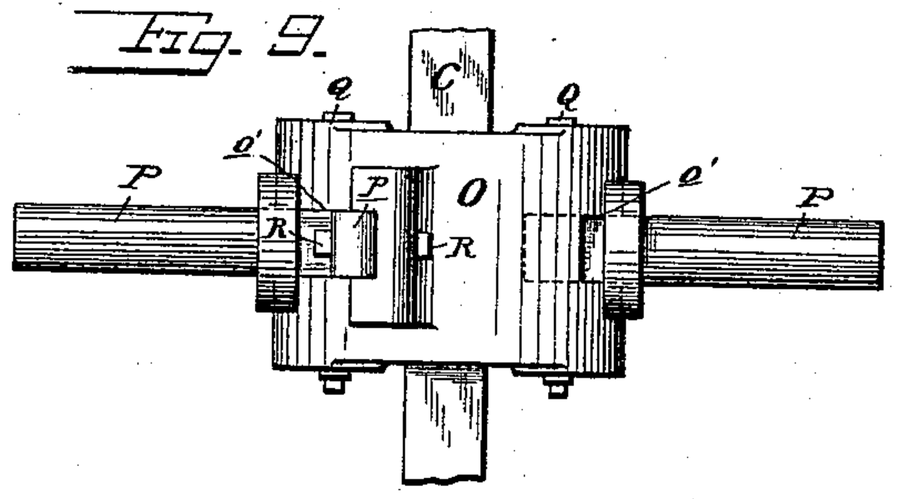


Fig. 12.

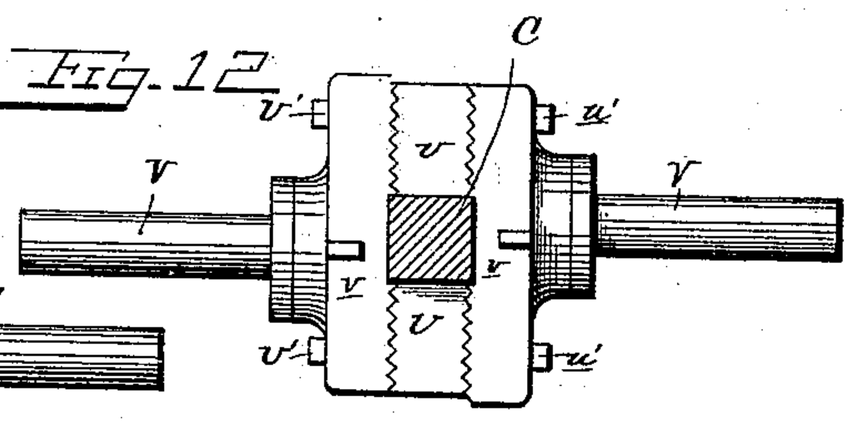


Fig. 10.

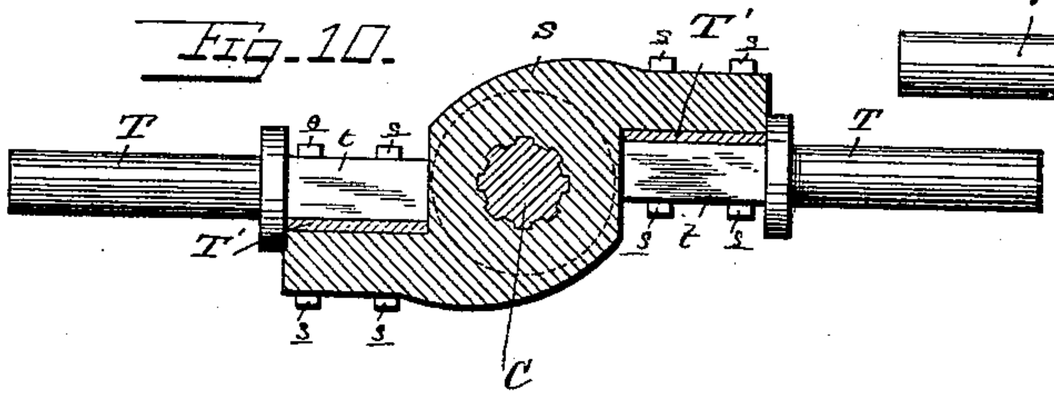


Fig. 13.

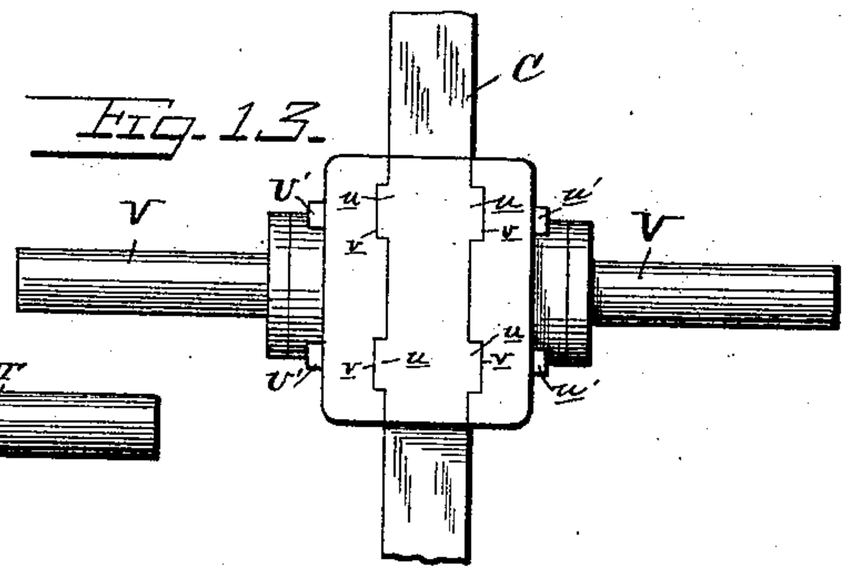
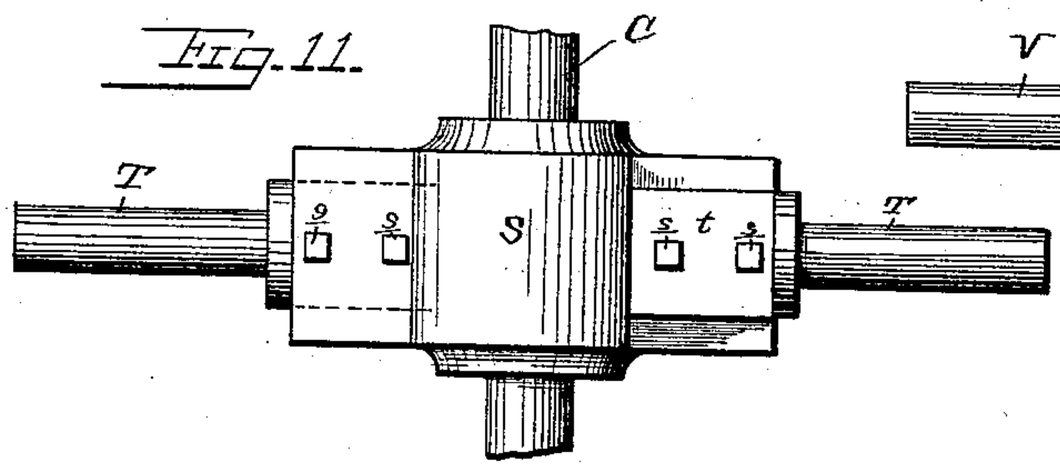


Fig. 11.



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(No Model.) 4 Sheets—Sheet 4.

H. MANTEY.

EDGE RUNNER OR VERTICAL MILLSTONE.

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Fig. 14.

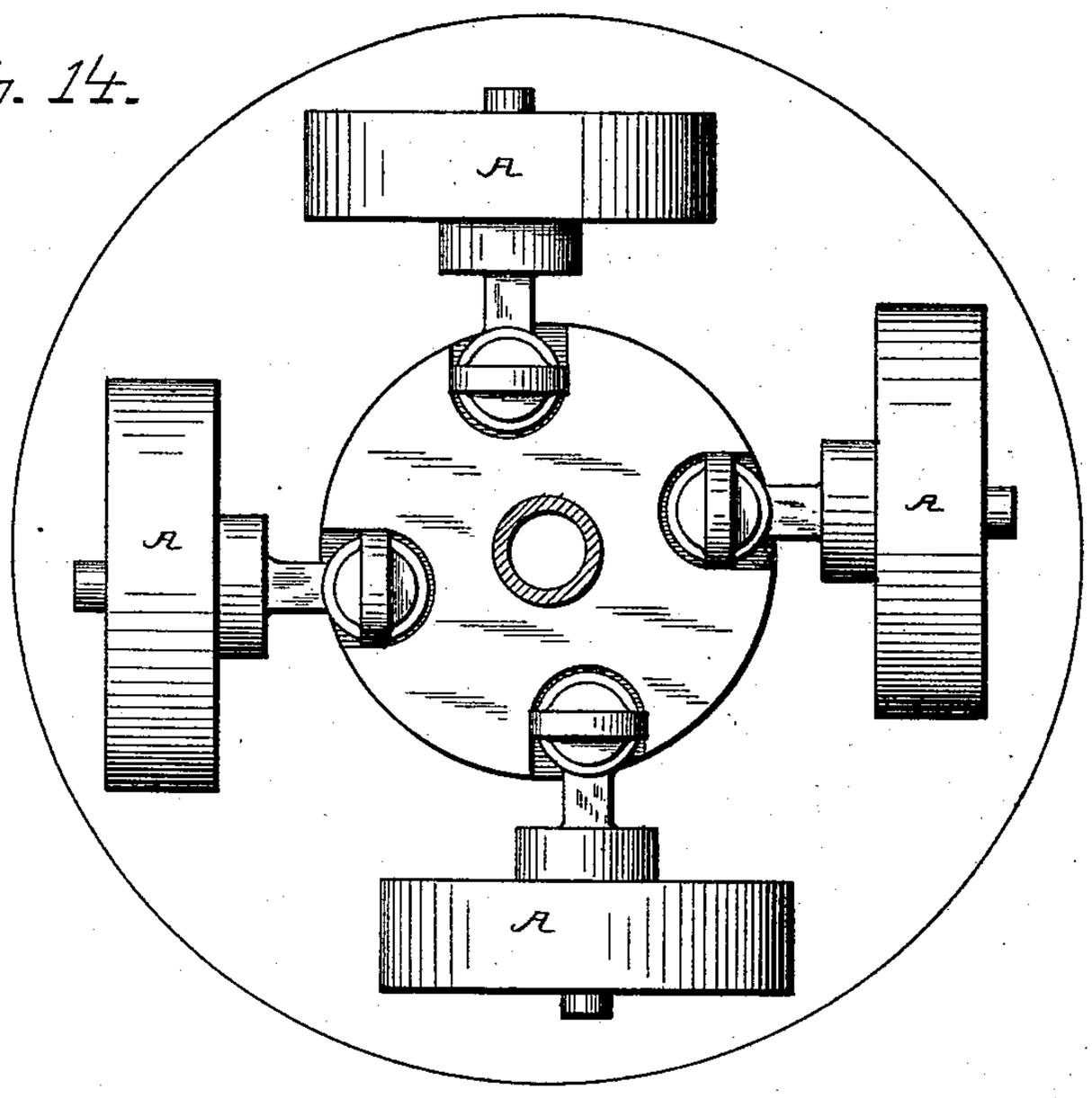
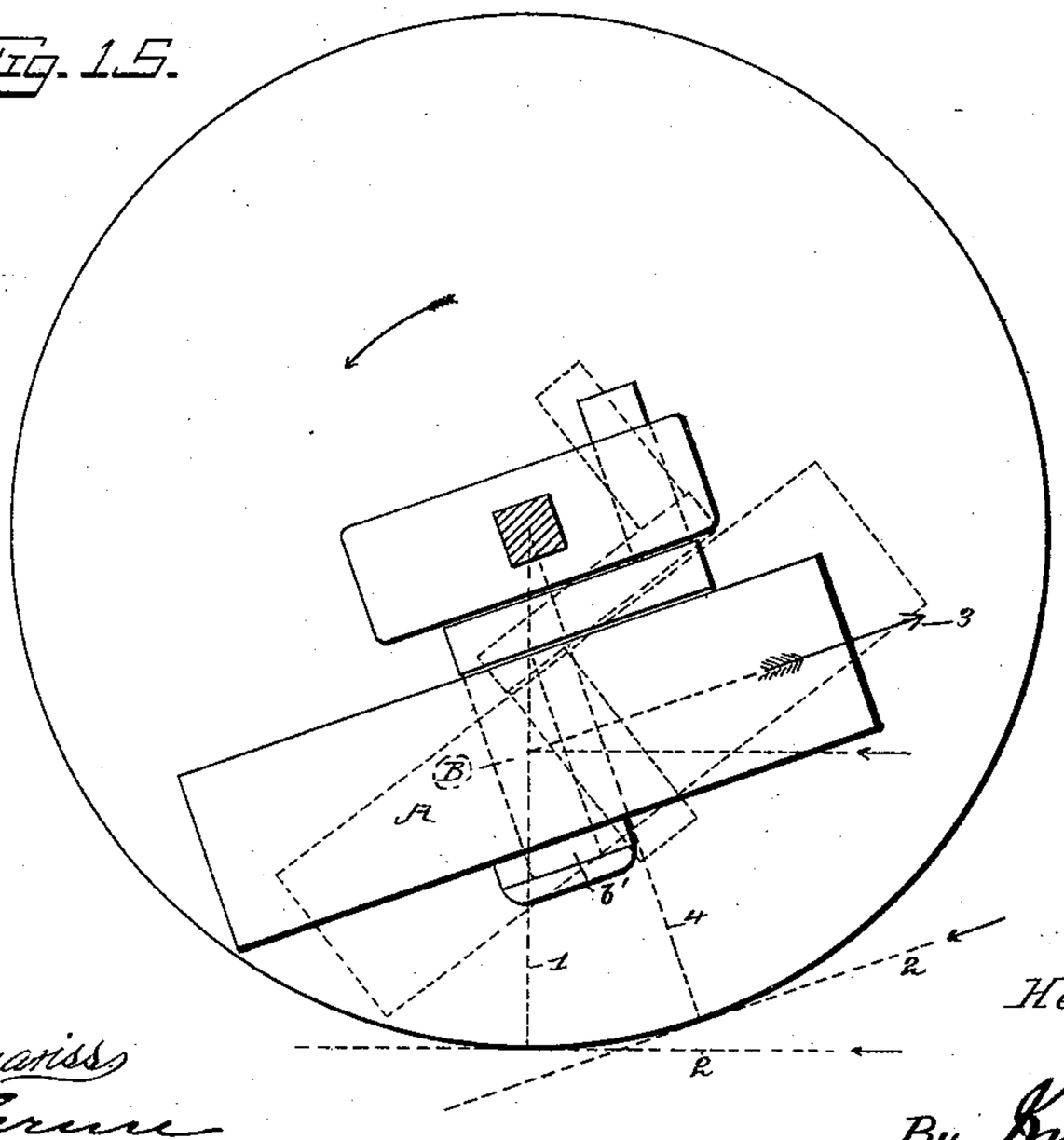


Fig. 15.



Attest:

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UNITED STATES PATENT OFFICE.

HENRY MANTEY, OF ORIZABA, MEXICO.

EDGE-RUNNER OR VERTICAL MILLSTONE.

SPECIFICATION forming part of Letters Patent No. 487,930, dated December 13, 1892.

Application filed September 8, 1892. Serial No. 445,323. (No model.) Patented in Belgium February 12, 1890, No. 89,496; in France February 12, 1890, No. 203,838; in Mexico August 7, 1890, and in Germany December 24, 1890, No. 58,110.

To all whom it may concern:

Be it known that I, HENRY MANTEY, a citizen of the United States, residing in the city of Orizaba, in the State of Vera Cruz, Mexico, have invented a new and useful Improvement in Edge-Runners or Vertical Millstones, (for which I have obtained Letters Patent in Belgium, No. 89,496, dated February 12, 1890; in Mexico, dated August 7, 1890; in France, No. 203,838, dated February 12, 1890, and in Germany, No. 58,110, dated December 24, 1890,) of which the following specification, taken in connection with the accompanying drawings, is a full, clear, and exact description, such as will enable those skilled in the art to make and use the same.

My invention relates to an improvement upon the millstones described and claimed in my allowed application, Serial No. 417,196, filed January 6, 1892, in which the millstones are mounted upon axles arranged in the same horizontal plane of rotation, but in different vertical planes, which vertical planes are forwardly inclined with relation to the radius of rotation and do not pass through or cut the central vertical operating-shaft. The object of this arrangement is to obviate the tendency of the millstones to press outwardly on their bearings under the influence of the centrifugal force, and thereby to obtain a decrease in the wear of the axles and bearings.

The action of my improved mill, described in my above-named application, may be explained as follows: The resistance on the working faces of all cylindrical vertical millstones is exerted in a direction parallel with the tangent of the circle of revolution, and the stones tend to move in the same direction. In the common form of vertical millstones the axles upon which the stones are mounted extend radially from the vertical operating-shaft, and consequently the resistance on the working faces of the stones is exerted at right angles to their axles, and the tangential tendency of the stones, which moves them outwardly on their axles, is not counteracted. Therefore with this form of mill the centrifugal force which results from the rapid revolution of the millstones is materially aided by the outward tendency of the stones, caused by the friction on their working-faces, and it tends to throw the stones outwardly on their bearings with great force and causes a great deal of wear. In my improved form of mill, however, the supporting-axles do not extend radially from the vertical operating-shaft, but are supported therefrom by a suitable boxing in such relation that they will be inclined to the radius and tangent of the circle of revolution, so that the resistance on the working faces of the stones (which is always in a direction parallel to the said tangent) will give them an inward tendency on their axles and counteract their outward tendency from the centrifugal force.

In the operation of this style of millstones it is obvious that the centrifugal force varies with the rate of speed at which the mill is run, and therefore it is very desirable to be able to adjust the inclination of the axles to the tangent of the circle of revolution to correspond with the rate of speed, and it is the object of my present invention to provide means for accomplishing this result.

To this end my invention consists, broadly, in providing means for regulating the angle of inclination of the axles to the radius or tangent of the circle of revolution.

In order that my invention may be fully understood, I will first describe the same with reference to the accompanying drawings, and then more particularly point out in the claims what I deem as new therein.

In the drawings, Figure 1 is a front edge view of a mill representing the preferred embodiment of my improvement, the stones being mounted upon adjustable crank-axles and the pan being shown in section. Fig. 2 is a top plan view of the same, the vertical operating-shaft being shown in section. Fig. 3 is a detail top elevation of a modified arrangement for adjustably connecting the crank-axles to the operating-shaft. Fig. 4 is a detail edge view of the same. Figs. 5, 6, and 7 are detail views of a further modification showing simple axles pivoted to the boxing and having set-screws for adjusting their position. Figs. 8 and 9 are detail top and side elevations of another form of my improvements in which the axles are pivoted to the boxing. Figs. 10, 11, 12,

and 13 are detail top and side elevations of further modifications. Fig. 14 is a diagrammatic representation of a mill employing four stones, to which my improvement can also be applied. Fig. 15 is a diagrammatic view illustrating the action of my improved mill. Fig. 16 is a detail sectional view taken on the line 16 16 of Fig. 2.

In Figs. 1 and 2, which represent the preferred embodiment of my invention, A A are the vertical millstones operating, as usual, in the pan A′, and B B are adjustable crank-axles, having the inner journal ends *b b*, which are mounted in adjustable boxes, presently to be described, and the outer journal ends *b′ b′*, upon which the millstones A A are mounted, as shown. C is the central vertical operating-shaft mounted in suitable bearings and driven by suitable gearing. D is a cross-beam keyed to the shaft C and formed with curved portions *d d′*, extending, respectively, from points near the center of the opposite edges of the beam to the outer ends thereof. The ends of the beam D are formed with horizontal cross cuts or slots for the reception of the adjustable journal-boxes. E E′ are the adjustable journal-boxes, in which the inner journal ends *b b* of the crank-axles are journaled. These boxes fit in the cross-cuts of the beam D and are formed with upper and lower curved flanges *e e′*, which bear against the curved portions *d d′* of the cross-beam. Suitable bolts F F extend from the curved faces of the cross-beam and pass through slots *f f′* in the curved flanges *e e′* of the boxes E E′, and are held therein by the nuts F′ F′. It is obvious that by loosening the nuts F′ F′ the boxes E E′, carrying with them the crank-axles, can be adjusted on the curved faces of the cross-beam so as to change the inclination of the outer bearing ends *b b′* of the crank-axles B B to the radius and tangent of the circle of revolution.

In Figs. 3 and 4, C is the vertical operating-shaft. G is the cross-beam keyed to the shaft C, and H H′ are crank-axles adjustably connected to the opposite ends of the cross-beam G. J J are journal-boxes having flat grooved under faces *j j*, which rest on the upper face of the cross-beam G near its opposite ends and are adapted to slide thereon. The inner journal ends *h* and *h′* of the crank-axles H H′ are journaled in the boxes J J and retained therein by linchpins K. *g g* are vertical longitudinal slots arranged centrally in the ends of the cross-bar G, and *g′ g′* are set-screws passing through said slots and engaging screw-threaded openings in the under sides of the journal-boxes J J. By unscrewing the set-screws the boxes J J, carrying with them the crank-axles, may be adjusted longitudinally on the cross-beam G, which changes the angle of inclination of the outer axle ends *h h′* of the crank-axles (upon which the millstones are journaled) to the radius and tangent of the circle of revolution, as in the preferred form of my improvement.

In Fig. 5, 6, and 7, C is the central vertical operating-shaft, to which is keyed an oblong boxing L, having flaring mouths or sockets *l l* at its opposite ends, in which the enlarged ends *m m* of the axles M M are horizontally pivoted by means of pivot-pins *m′ m′*. N N and N′ N′ are set-screws operating in the side walls of the mouths or sockets *l l* at the opposite ends of the boxing L and adapted to engage the enlarged ends *m m* of the axles for regulating the angle of inclination of the axle with relation to the radius of revolution. By respectively unscrewing and screwing up the set-screws at the opposite sides of the sockets *l l* it is obvious that the axles will be moved on the pivots *m′ m′* and their position changed.

In Figs. 8 and 9 I have shown a somewhat simpler arrangement, in which the millstone axles are also adjustably pivoted to their boxing. C is the vertical operating-shaft, and O is the boxing keyed to the shaft. The boxing is formed with projecting shoulders *o o* and slots *o′ o′* in the ends and shoulders. The axles P are formed with right-angled extensions *p p*, and are pivoted at Q Q in the slotted ends of the boxing O, so that the extensions *p p* will normally rest in the slots of the shoulders *o o*. R R are screw-bolts passing through corresponding perforations in the shoulders *o o* and projections *p p*, by means of which the axles can be adjusted on their pivots.

In Figs. 10 and 11 the cross-beam S is formed with oppositely-extending flat faces, to which the enlarged ends *t t* of the axles T are secured by means of bolts *s s*, passing through perforations in both of them. Plates T′ T′ are placed between the ends of the axles and cross-beam to regulate the angle of inclination of the axles, a change in the thickness of the plates changing the inclinations.

In Figs. 12 and 13 the cross-beam U is keyed to the operating-shaft C and formed with longitudinal ridges *u u*. The axles V V are formed with enlarged ends *v v*, having longitudinal grooves *v′ v′*, corresponding to and fitting over the ridges *u u* of the cross-beam. The adjacent faces of the cross-beam U and axle ends *v v* are serrated, as shown, so as to more intimately engage each other. U′ U′ are screw-bolts projecting from the opposite faces of the cross-beam and passing through corresponding slots in the ends of the enlarged axle ends *v v* and held in any adjusted position therein by the nuts *u′ u′*. By loosening the screw-nuts *u′ u′* and moving the axles on the cross-beam it is clear that the inclination of the axles with relation to the radius of revolution can be regulated.

In Fig. 14 I have shown my improvements applied to a mill employing four millstones. Each axle can be adjustably supported on the boxing in any suitable manner, such as shown. The axles are shown with enlarged ends adjustably connected to the boxing by means of set-screws.

It is quite obvious that my invention would apply equally as well to that form of vertical mill in which the stones are rotatively supported on a suitable axle, which is held in fixed bearings, and the pan is made to revolve under the stones. This is of course an equivalent arrangement, and the action of the stones is substantially the same.

Fig. 15 represents the action of the form of mill shown in Figs. 1 and 2. The change in position of the axles B is indicated by dotted lines. The lines 1 4 indicate the radial changes in the position of the millstones, and the lines 2 2 represent the tangential change in the direction in which the resistance on the working-faces of the stones is exerted. The stone A when otherwise uninfluenced tends to move at right angles to the journal end *b'* of the axle, as indicated by the arrow 3, and as the line of direction constantly gets nearer to the center of rotation until it crosses the radius 4, which is parallel to the journal end *b'*, it is clear that the stone alone has an inward tendency, which is increased by the direction of the resistance.

The operation has already been explained, and will be clear from the above description. It is obvious that the position of the axles can be adjusted to such a nicety that they will exactly counteract the centrifugal force at whatever the speed it is desired to run the machine. Of course each adjusted position of the axles will only serve to counteract the centrifugal force up to a certain rate of speed.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. The combination of the vertical millstones, the axle or axles upon which said millstones are journaled, means for revolving said millstones around a common center, and means for adjusting the angle of inclination of the axles to the radius of the circle of rotation, substantially as set forth.

2. The combination of the central operating-shaft, the cross-beam or boxing keyed to said shaft, axles adjustably secured to said cross-beam or boxing, and vertical millstones mounted on said axles, whereby the angle of inclination of the axles with relation to the radius of revolution can be adjusted, substantially as set forth.

3. The combination of the vertical millstones, the crank-axles upon which the stones are journaled, the vertical operating-shaft, a cross-beam or boxing secured to the shaft, and journal-boxes in which the inner journal ends of the crank-axles are journaled, adjustably secured to the cross-beam or boxing, whereby the angle of inclination of the axles can be adjusted with relation to the radius of revolution, as set forth.

4. The combination of the vertical shaft, the cross-beam or boxing keyed to said shaft and having curved faces or edges, journal-boxes having curved faces fitting against the curved faces of the cross-beam and adjustably secured thereto, and crank-axles having inner and outer journal ends, the inner journal ends being journaled in the adjustable boxes and the outer journal ends supporting the millstones, substantially as and for the purpose set forth.

5. The combination of the vertical shaft, the cross-beam or boxing keyed to said shaft and having the opposite faces or edges curved and the ends horizontally slotted, journal-boxes fitting against the slotted ends of the cross-beam and having curved flanges which fit against the curved portions of the cross-beam, screw-bolts projecting from the curved faces of the cross-beam and engaging slots in the curved flanges of the journal-boxes, crank-axles journaled in the adjustable boxes, and millstones mounted on the crank-axles, substantially as herein set forth.

HENRY MANTEY.

Witnesses:
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WILSON B. PENNOCK.