

No. 612,247.

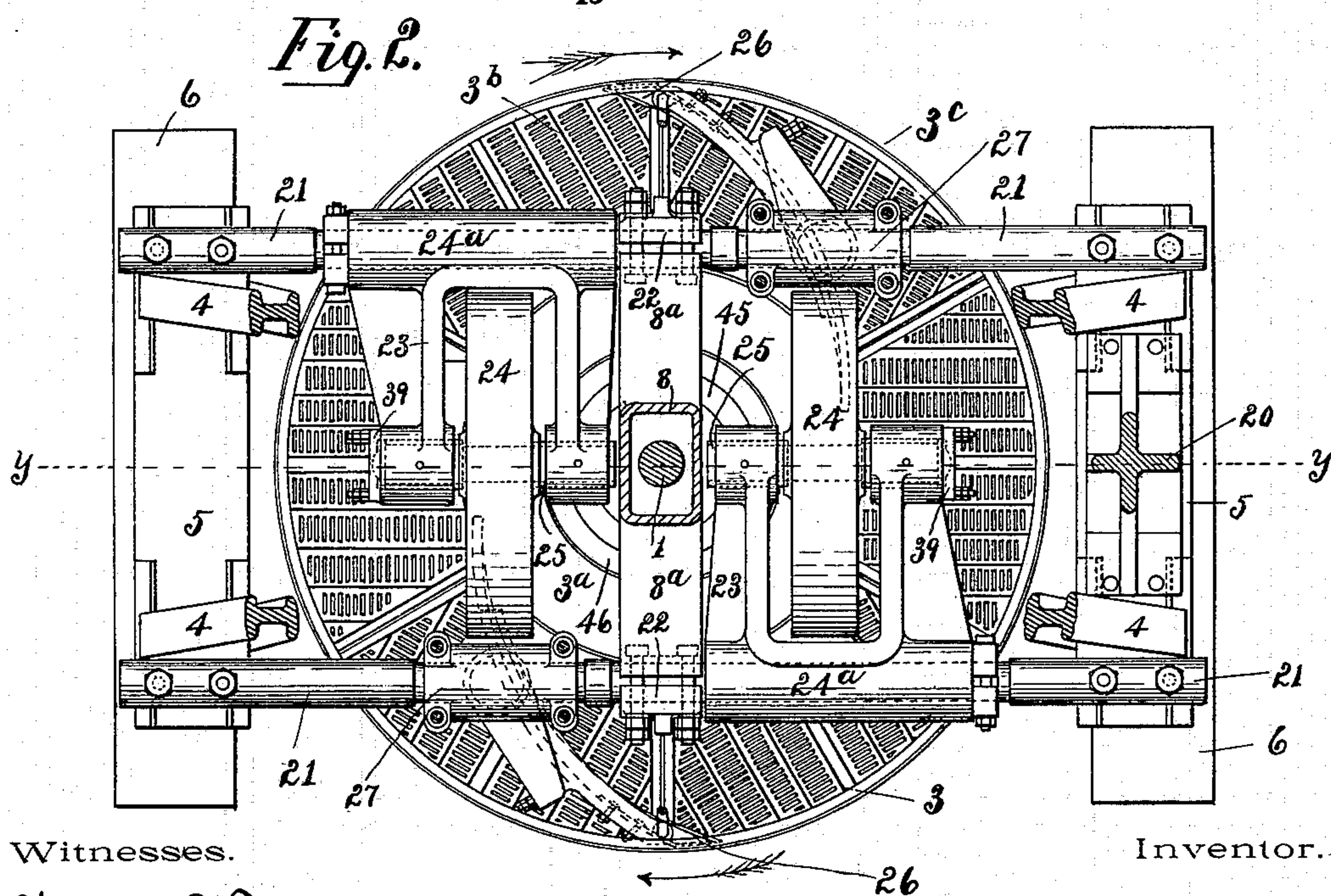
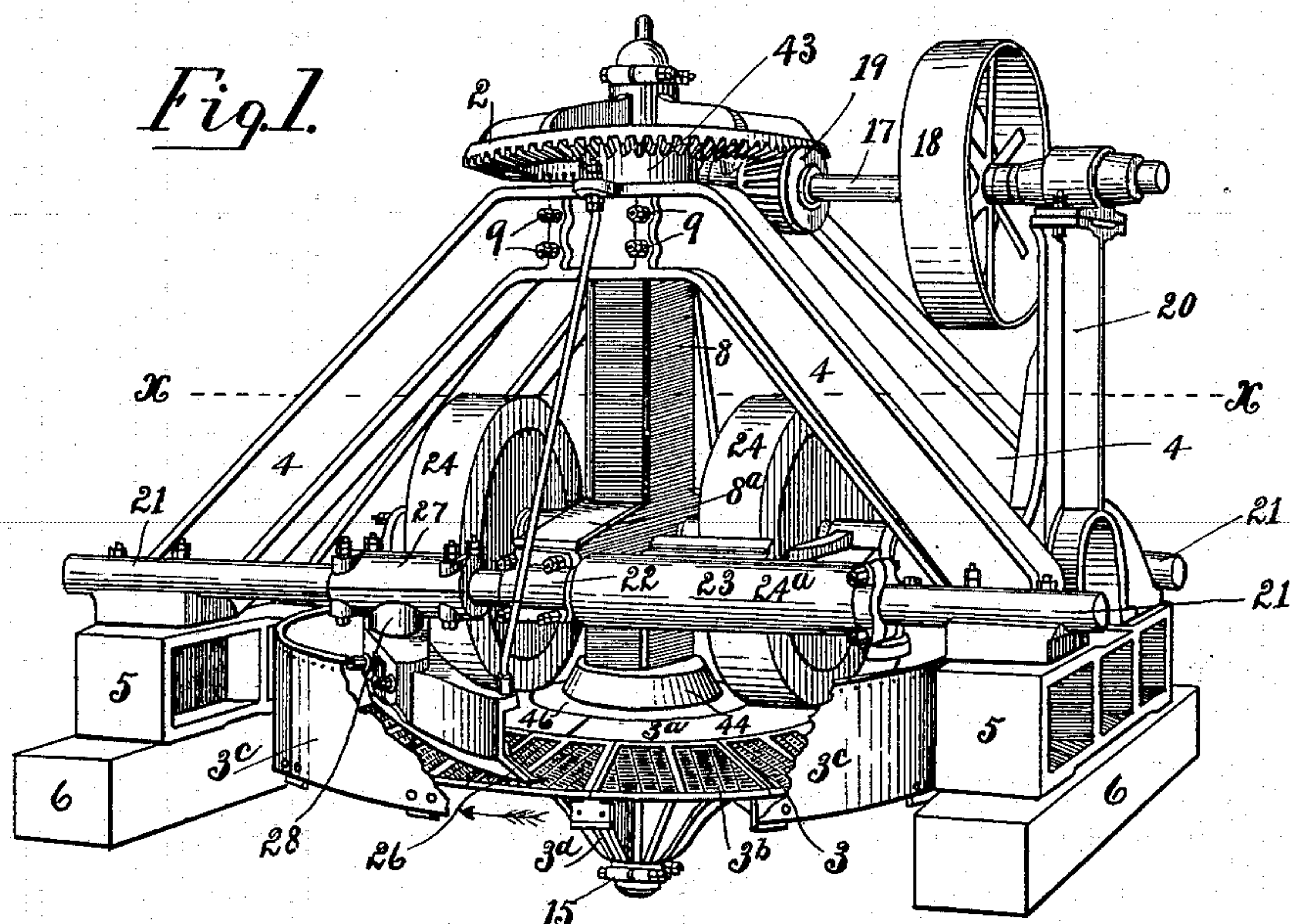
Patented Oct. 11, 1898.

H. K. KING.  
CHILIAN MILL.

(Application filed May 1, 1897.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.

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A. V. Grouper

Inventor.

Howard K. King,  
per Joshua Pusey  
Attorney.



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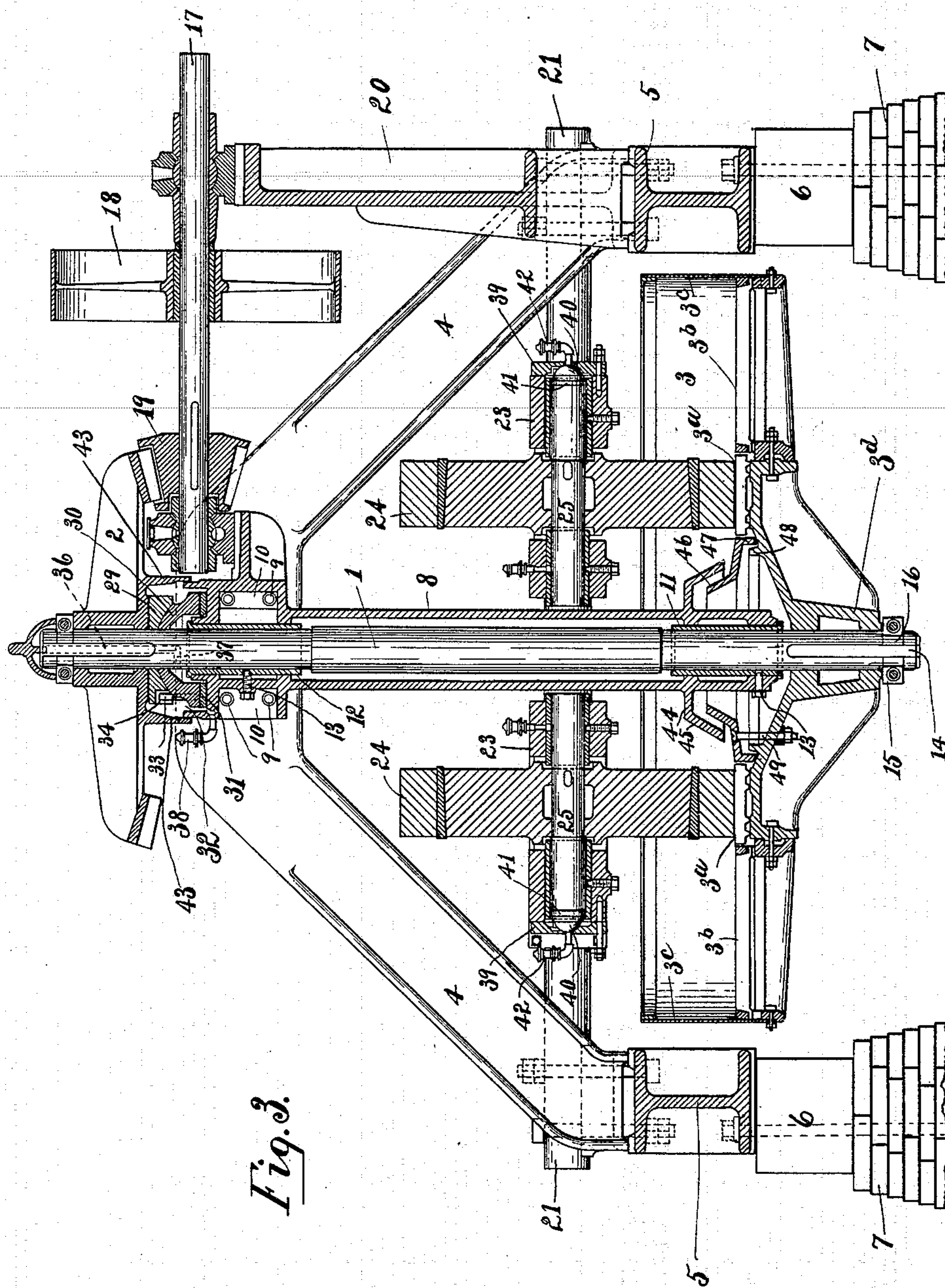


Fig. 3.

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# UNITED STATES PATENT OFFICE.

HOWARD K. KING, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE CHAMBERS BROTHERS COMPANY, OF SAME PLACE.

## CHILIAN MILL.

SPECIFICATION forming part of Letters Patent No. 612,247, dated October 11, 1898.

Application filed May 1, 1897. Serial No. 634,724. (No model.)

*To all whom it may concern:*

Be it known that I, HOWARD K. KING, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Chilian Mills, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, of which—

Figure 1, Sheet 1, is a perspective view, the pan-rim being partly broken away; Fig. 2, a horizontal section on line *x x*, Fig. 1. Fig. 3, Sheet 2, is a full vertical section as on line *y y*, Fig. 2, enlarged, the plow or scraper being omitted.

This invention relates to the class of machines for grinding or pulverizing clay and other material which are known as "Chilian mills" or "chasers."

A leading feature of the invention consists in locating the usual rotatable disk or pan upon which the muller-rolls run at the lower end of a perpendicular shaft and supporting the latter, with its driving mechanism, in suitable bearings above the said pan in a manner that an unobstructed space is secured under the full diameter of the pan for convenience of removal of the pulverized material that falls from the pan.

The invention consists also of certain constructions or combinations hereinafter described and particularly pointed out, and whose object is to improve the construction and operation of machines of the said class.

Referring to the accompanying drawings, 1 is a vertical shaft carrying at its upper end a large bevel-gear 2 and at its lower end the usual pan 3, having the plane surface 3<sup>a</sup>, upon which the muller-rolls run, and exterior thereto the perforated or screen portion 3<sup>b</sup>, together with the rim 3<sup>c</sup>. The shaft, with its adjuncts, is supported as follows: 4 are two arched or angular truncated frame-pieces, preferably cast-iron, whose bases are secured to and rest upon bed-plates 5, which in this instance rest upon and are bolted to timbers of wood 6, (to take up vibration,) that are supported by suitable masonry 7, to which they are bolted. As seen, the lower ends of these pieces 4 are apart laterally, while their truncated tops approach each other. Be-

tween the latter is placed a vertical hanger 8, rectangular in cross-section, through which the shaft 1 passes, as most clearly seen in Fig. 3, the ends of the shaft projecting beyond the hanger. The latter is secured to the frame-pieces by means of bolts 9, that pass through the said pieces and through lateral extensions 10 of the hanger.

The under side of the hub of the gear 2 rests upon a suitable bearing of the summit of the frame-pieces. The bearing which I prefer to use and which is clearly shown in Fig. 3 is designed to lessen friction and also to insure in a large measure a true vertical position of the shaft 1. This will be described farther on.

The lower portion of the shaft is guided and supported against lateral movement by the hanger, the shaft running in a box or sleeve 11, that is secured to the hanger. The upper part of the shaft, just below the horizontal bearings thereof, is likewise guided by a similar sleeve 12. These sleeves are for convenience usually detachable and are held in place to the hanger by screws 13.

The bored hub 3<sup>d</sup> of the pan 3 is slid upon the free end of the shaft extending below the hanger and is keyed thereto by a key 14 and supported thereon by a clamping-plate 15, that is entered into a peripheral groove 16 of the shaft. The gear 2 is secured to the upper end of the shaft by similar means. This gear is driven from a horizontal shaft 17, upon which is a driving-pulley 18 and a small bevel-gear 19, that engages gear 2, said shaft running in a bearing on the top of a post 20, supported by one of the bed-plates 5.

The frame-pieces 4 are tied against lateral strain by means of two strong chord bars or rods 21, that also serve other important purposes that will be explained farther on. The ends of one of these bars is bolted to the bases of one of the frame-pieces and the ends of the other bar to the bases of the other frame-piece, as shown. The hanger 8 is provided with laterally-projecting arms 8<sup>a</sup>, thus giving the hanger as a whole the form of an inverted Roman cross. The free ends of said arms are firmly secured to the tie-bars 21, respectively, midway of their length. In the present instance the ends of the arms are semi-



circular to receive the bars, and corresponding semicircular plates 22 are bolted to the arms, respectively, as seen in Figs. 1 and 2. Thus the lower portion of the depending hanger, and consequently the shaft 1, is firmly braced against lateral movement. The swinging frames 23, which carry the muller-rolls 24, are pivoted upon these bars 21. Each frame is a U-shaped yoke, whose crown is a sleeve 24<sup>a</sup>, through which passes the bar 21 and between and in the free ends of the limbs of which yoke the shaft 25 of the roll is journaled. These limbs extend toward the direction of the rotation of pan 3. (Indicated by the arrow adjacent to the latter.) Thus the strain upon the frame 23 when the rollers are doing work is in the direction toward the pivotal line of the said frame, and the rollers will be better kept to their work than would be the case, owing to the greater tendency to be raised from the pan, if the frame extended from the shaft in a direction with the movement of the pan.

26 are the plows or scrapers for carrying the material deposited on the pan inwardly to the grinding-surface 3<sup>a</sup> of the pan—that is, in the path of the rolls. The plows, whose lower edges lie close to the surface of the pan, are secured to the bars 21, preferably by means of clamp-plates 27, which are bolted to the bars, respectively, and have a downward projection 28, Fig. 1, to which the plow is fastened. Thus the plows may be adjusted to and fro on the bars. The plows are also capable of vertical and other adjustments; but as means for effecting the adjustments may be supplied by a mechanic and form no part of my invention I have not deemed it necessary to describe such means. The form of the plows is curvilinear, and they are arranged to form an acute angle or tangent to the periphery of the pan, as shown, while their inner extremities extend to or a short distance beyond the outer edge of the grinding-surface of the pan and as far as possible under the muller-rolls, their inner edges being suitably curved or beveled to that end. The lower edges of the plows are inwardly bent or beveled, as seen in Fig. 1, at an angle of about forty-five degrees to the surface of the pan.

Having thus described the important features of construction of my invention, I shall now briefly describe the operation of the machine.

The shaft 1 is driven so as to turn the pan on which the clay or the like to be pulverized is deposited in the direction of the arrow in Figs. 1 and 2. As the clay is carried around it will, owing to the peculiar form and arrangement of the plows, be gently and gradually lifted from the adjacent surface of the pan and carried inwardly to the grinding-surface or path of the rolls. The pulverized material falling through the screen 3<sup>b</sup> may, owing to the entirely clear space be-

neath the pan, be conveniently removed when necessary, or it may descend into a truck or other suitable receptacle.

In the construction of Chilean mills prior to my invention there has been, so far as I am aware, a bearing for the vertical shaft beneath the pan, and thus the underlying space was obstructed. Besides in the prior structures one or more of the bearings of said shaft being below the pan the dirt and dust from the latter fell into the bearings, and thus caused considerable friction and wearing away, which does not occur in my construction hereinbefore described.

The bed-plate, &c., to which the frame-pieces 4 are secured, prevents the spreading of the latter laterally, while the connecting or tie bars 21 prevent their spreading longitudinally. Thus a compact framework of exceeding strength and rigidity is obtained, while the bars 21 further serve to support the frames of the muller-rolls, as also the plows, and also to brace or steady the hanger, which guides and stays the vertical pan-shaft.

I shall now describe certain details of construction which, although not essential to the successful operation of the machine, tend to improve the operation thereof.

Under the hub of the gear 2 is a plate 29, through which the shaft 1 passes. The lower side of the plate is concave and rests upon the correspondingly convex top plate 30, like an inverted cup, whose base rests upon a flat ring 31, that lies in the bottom of a circular groove 32 of the top of the hanger 8. The plates 29 and 30 are keyed together by a vertical pin 33, secured to the latter plate and projecting into a slot 34 of the former, which slot is wider radially than the diameter of the pin.

By the described concavo-convex and pin-and-slot construction the shaft will, so to say, automatically take the vertical position without affecting the bearing of the plate 30 upon the ring 31.

In order to supply oil to the bearings of the vertical shaft 1, I make in the upper end of the latter a vertical hole 36 (indicated by dotted lines in Fig. 3) and a lateral passage-way 37 therefrom leading to the space under the plate 30. Oil entering the said space lubricates the bearing-surfaces of plate 30 and of the ring 31, while a portion of the oil runs down between the sleeves or boxes 12 and 11 and the shaft 1, and thus lubricates these bearings. In order to further insure the lubrication of the said plate and ring, I usually provide an external oil-cup 38, Fig. 3, which communicates therewith.

As the outward thrust of the rolls 24 is considerable I lessen the wear and friction by securing to the end of the bearing of the shaft 25 a plate 39 with a concavity therein and interpose between said plate and the end of the shaft a plano-convex plate 40, whose convex end is entered into the concavity of



the plate 39, and I sometimes interpose a disk 41 between the plate 40 and the end of the shaft, all as seen in Fig. 3, oil being supplied to the bearing of the latter and to the plates from an oil-cup 42, communicating therewith.

It is important in a machine such as that described, which in working dry material, such as clay, raises considerable dust, that the bearings of the pan-shaft shall be protected against the entrance of dust or dirt. To this end I provide on the under side of the large bevel-gear 2 a circular flange 43, Fig. 1, that extends partly over and close to the periphery of the outer wall of the aforesaid groove 32, in which latter lies the ring 31, and in order to prevent the ingress of the dust or dirt into the side bearings of said shaft I provide near the lower end of the hanger 8 a circular flange 44, with a peripheral downwardly-tapering portion 45, that extends over the truncated upwardly and inwardly tapering part of a plate 46, which plate has also a downwardly-projecting peripheral flange 47, that passes over a vertical circular flange 48 of the hub of the pan 3. The said plate 46 is secured to the pan by means of bolts 49 and so rotates with the latter. Thus the ingress of dirt or dust into the lower end of the hanger and the shaft-bearings therein is effectually prevented.

Having now described my invention, I claim as new and desire to secure by Letters Patent—

1. In a Chilean mill, the combination of the frame, the pan, the rolls, and the vertical, rotatable shaft to the lower end of which the pan is secured, said shaft being suspended from a horizontal bearing of said frame, and guided laterally by a suitable vertical bearing; the said bearings of said shaft being above the pan, whereby the space beneath the pan is entirely unobstructed, substantially as and for the purpose set forth.

2. In a Chilean mill, the combination of the framework, the rotatable, vertical shaft suspended therefrom, the pan on the free lower end of the shaft and means connected to said framework for laterally guiding and staying the lower part of said shaft; the construction and arrangement being substantially as shown and described, whereby there is an entire unobstructed space beneath the pan.

3. In a Chilean mill, the combination of the frame-pieces, the rotatable vertical shaft suspended upon a horizontal bearing of said frame-pieces, the pan on the lower end of said shaft, and the vertical hanger having its upper end secured to said pieces and having bearings in which said shaft runs, whereby the latter is guided and stayed against lateral movement, the construction and arrangement being as shown and described, whereby there is secured an entire unobstructed space beneath the pan.

4. In a Chilean mill, the combination of the two angular or arched frame-pieces united

together at the top and supported upon a suitable foundation, the vertical rotatable shaft suspended from and between said frame-pieces, the pan secured to said shaft, the chord-bars or tie-rods secured to the base portions of said frame-pieces, respectively, and the muller-rolls pivotally connected to said bars, or rods, respectively, substantially as set forth.

5. In a Chilean mill, the combination of the arched frame supported by a suitable foundation, the rotatable vertical shaft suspended from horizontal bearings thereof and carrying at its lower free end the pan, the hanger fixed to and depending from said frame and adapted to guide and stay the said shaft against lateral movement, the chord-bars connected to the bases of the frame, and the arms of said hanger whose free ends are connected to said bars, substantially as and for the purpose set forth.

6. In a Chilean mill, the combination of the arched frame supported by a suitable foundation, the rotatable vertical shaft suspended from horizontal bearings thereof, the pan on the free end of said shaft, means located above the pan for guiding and staying the shaft against lateral movement, the chord tie-bars connecting the bases of the said frame, the rolls and their frames pivoted on said bars, substantially as described.

7. In a Chilean mill, the combination of the arched frame supported by a suitable foundation, the vertical shaft supported thereby, the pan on the lower end of said shaft, the rolls, the chord tie-bars connected to the bases of said frame, and the plows secured to said bars respectively, substantially as described.

8. In a Chilean mill, the combination of the supporting-frame, the rotatable vertical shaft, the pan on the lower end thereof, the rolls, the parallel bars, 21, the U-shaped frames and the rolls journaled respectively therein; said frames being pivoted to said bars respectively and extending therefrom in opposite directions toward the direction of rotation of the pan, substantially as and for the purpose described.

9. In a machine of the nature described, the combination of the supporting-frame, the rotatable vertical shaft suspended therefrom, the gear on the upper end of said shaft, means for driving said gear, the rotatable plano-concave plate on which the hub of said wheel rests, and the corresponding convex rotatable plate supported by the frame, together with means for supplying oil to the bearing of the last-mentioned plate, substantially as specified.

10. In a machine of the character described, the combination of the supporting-frame, the rotatable vertical shaft, the pan carried thereby, the hanger provided with the bearing or bearings through which the shaft passes, the circular flanged plate, 44, secured to the hanger, and the flanged plate 46, connected to



the pan, together with the circular flange projecting vertically from the pan, the construction, form and arrangement of said flanges and plate, being substantially as shown and  
5 described, whereby the ingress of dust to the said shaft-bearings is prevented.

In testimony whereof I have hereunto af-

fixed my signature in the presence of two subscribing witnesses.

HOWARD K. KING.

Witnesses:

WALTER C. PUSEY,  
JOSHUA PUSEY.