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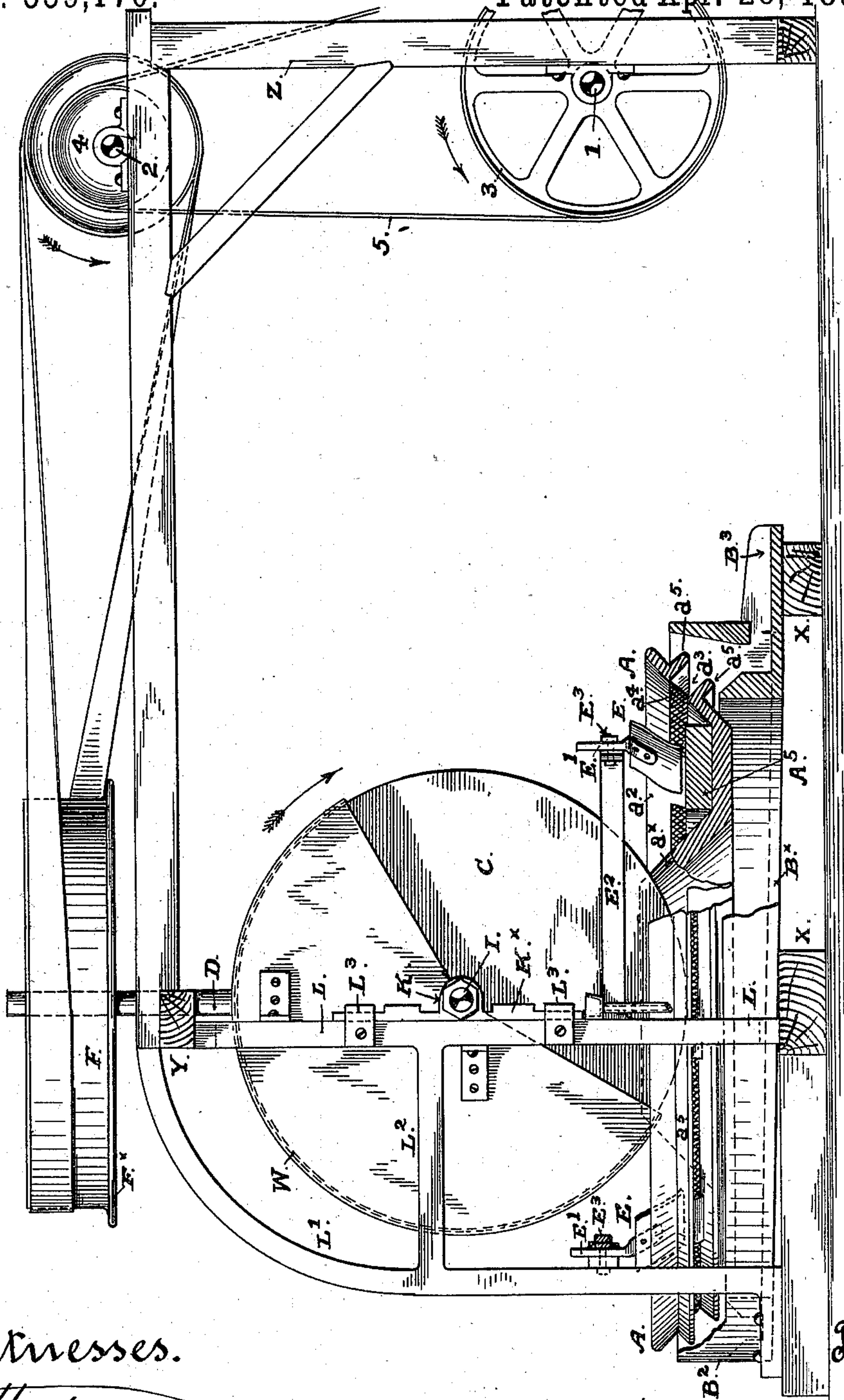
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N. FOSSATI.
PAN AND ROLLER MILL.

No. 559,170.

Patented Apr. 28, 1896.

Fig. 1.



Witnesses.

J. Monteverde

M. Regner

Inventor

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*By ~~Smith & Son~~
his Atty.*

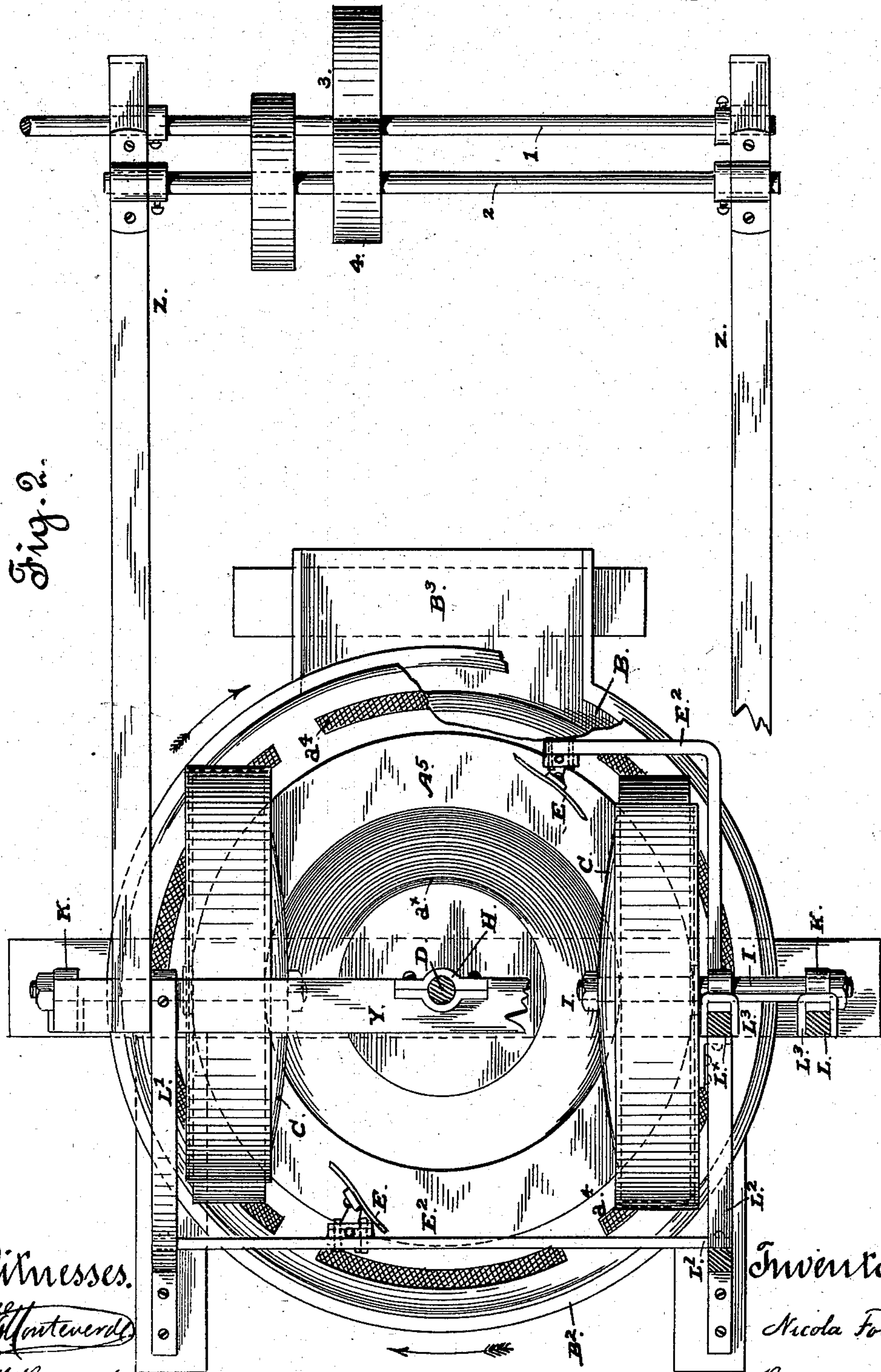
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PAN AND ROLLER MILL.

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(No Model.)

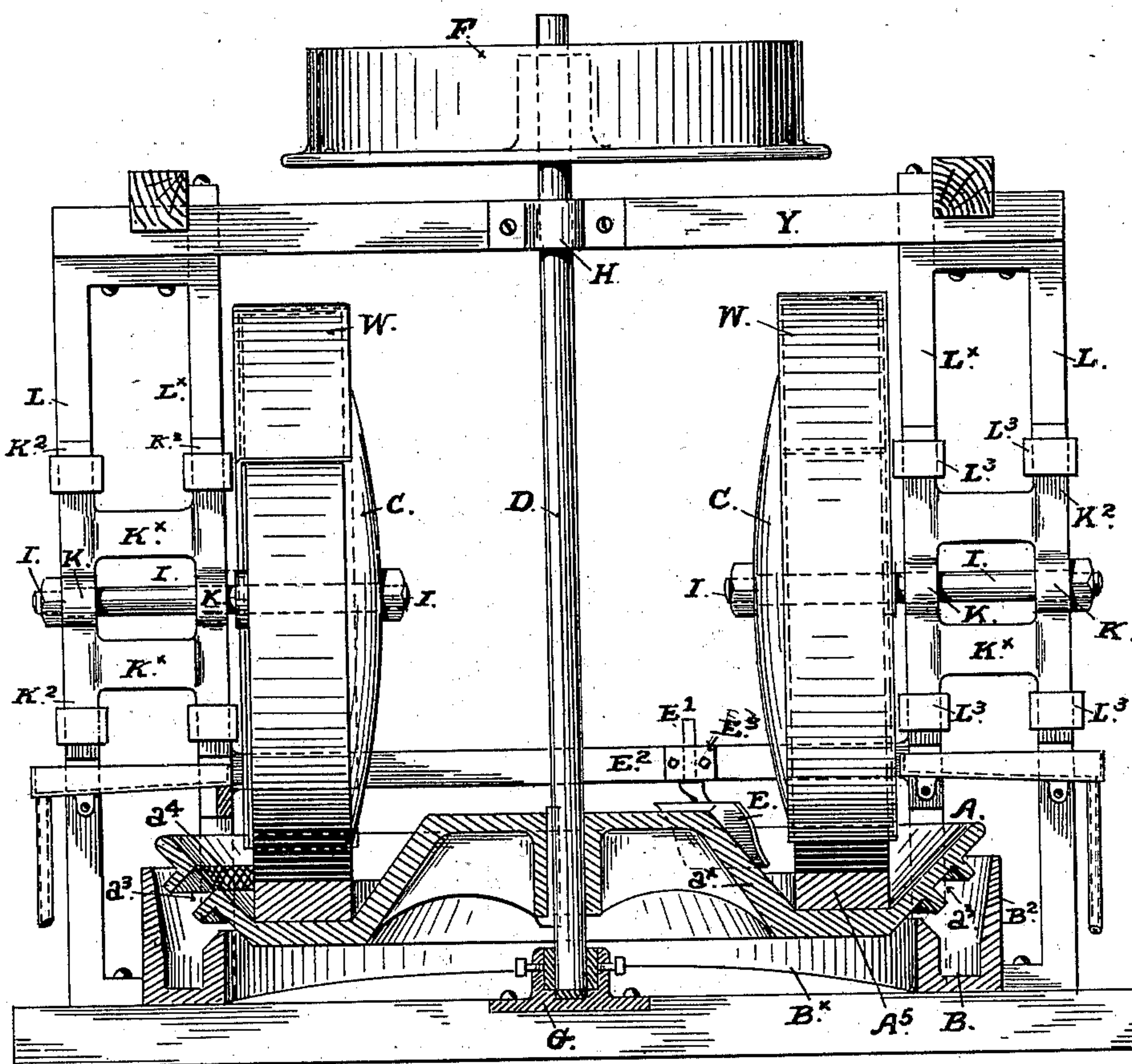
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Fig. 3.



Witnesses.

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(No Model.)

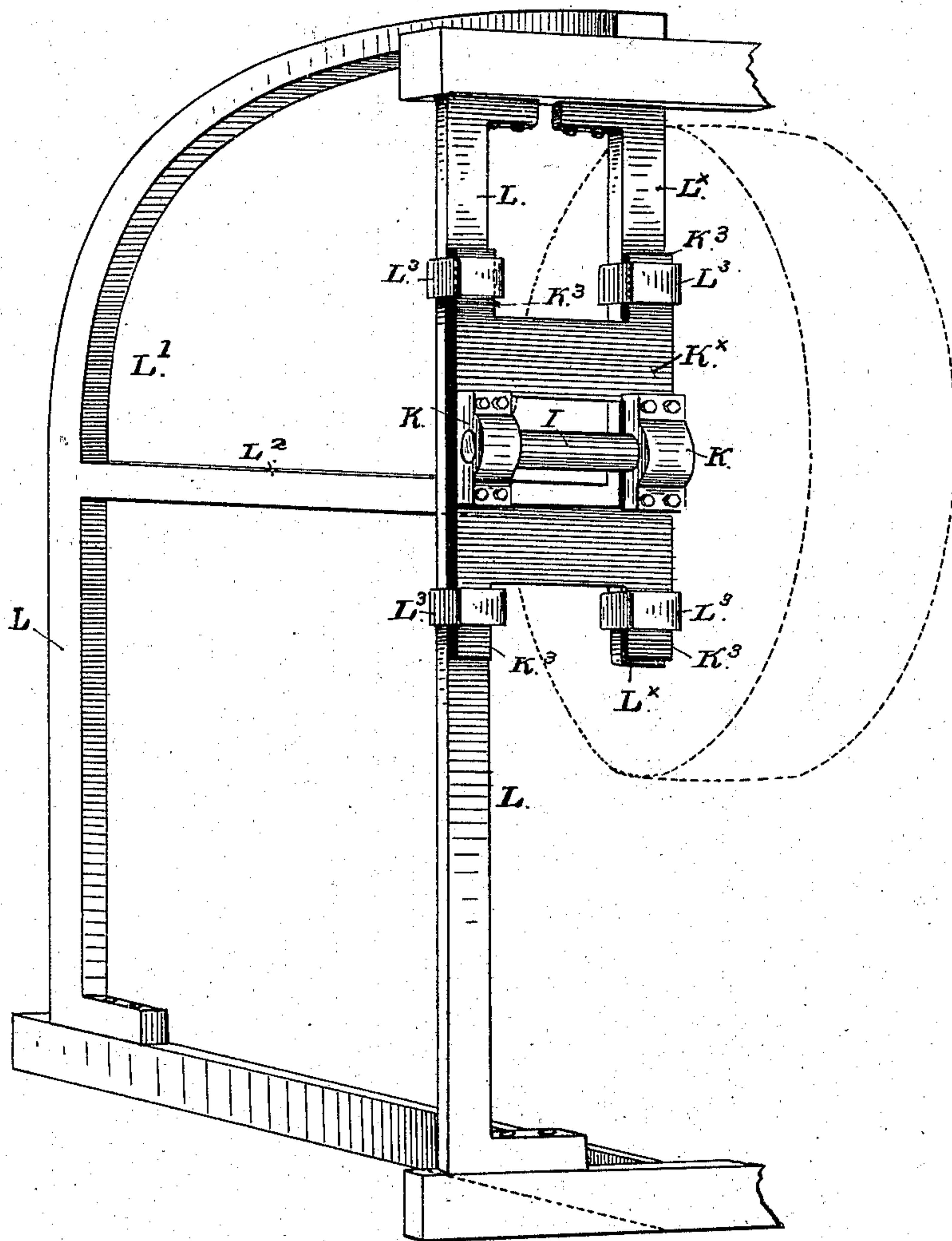
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Patented Apr. 28, 1896.

Fig. 4.



Witness:

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UNITED STATES PATENT OFFICE.

NICOLA FOSSATI, OF SMITH'S FLAT, CALIFORNIA.

PAN-AND-ROLLER MILL.

SPECIFICATION forming part of Letters Patent No. 559,170, dated April 28, 1896.

Application filed June 4, 1895. Serial No. 551,649. (No model.)

To all whom it may concern:

Be it known that I, NICOLA FOSSATI, a citizen of the United States, residing at Smith's Flat, El Dorado county, State of California, have invented certain new and useful Improvements in Roller-Mills, of which the following is a specification.

My invention relates to improvements made in that class or description of pan-and-roller mills in which the pan is caused to revolve beneath the rollers, while the rollers, being mounted to rotate on horizontal axles, are stationary as to position in the pan.

The object of these improvements is to overcome several defects and objections existing in mills of this description that in a great measure have prevented the successful employment and practical use of such mills for reducing metalliferous ores to pulp, and especially to produce a strong, durable, and lighter-running mill that is capable of being operated at comparatively small expense.

To such ends and object my said invention consists in the construction and combination of parts and the production of an improved ore-crusher of the before-mentioned class, as hereinafter fully explained and set forth, reference being had to the drawings that accompany and form part of this specification.

In the said drawings, Figure 1 represents, in side elevation, a roller-mill constructed according to my said invention, a portion of the revolving pan and the stationary sluice being broken away to show their construction more clearly. Fig. 2 represents the same in plan or top view. Fig. 3 is an elevation of the pan and rollers, taken from the left-hand side of the mill, as represented in Fig. 1, the revolving pan and stationary trough being shown in vertical section and the driving-gear and the supporting-frame being cut off. Fig. 4 is a view in perspective of one of the supporting-frames and sliding part thereon on which the roller-axle is mounted.

A indicates the pan, in mills of this class sometimes termed the "mortar." B is a stationary sluice set on bed-timbers X X under the rim of the pan, and C C are two crushing and pulverizing wheels or rollers on horizontal axles placed on opposite sides of the upright central shaft D, that gives motion to the pan. E E are scrapers that control the material on

the dies or the pulverizing-surface of the pan during the operation of the mill. F is a drum or band-wheel, with a bottom flange F^x , fixed on the upright shaft, to which the driving-power is applied by a belt from a suitable power-shaft. These parts of the mill, as regards their general arrangement, are similar to those found in roller-mills of this class; but with regard to the particular construction each part differs in several respects from those in existing mills.

The revolving pan A has a raised center a^x , with the fixed shaft or spindle D extending through it, and a flaring rim a^2 , in which are openings a^3 , covered by removable screens a^4 . Above and below the edges of the screen-openings are outwardly-projecting ledges or ribs a^5 on the external face of the pan-rim; but the inner surface of the rim is smooth or without projections. Between the standing center of the pan and the flaring rim a flat-faced annular die A^5 , fixed on the bottom of the pan, forms the crushing and pulverizing surface. A suitable step and bearing G for the end of the pan-spindle is set under the center of the pan on the bed-timbers, and a box H on an overhead timber Y of the frame over the pan supports the upper end of the spindle. In these two bearings G H the pan-spindle is fitted to revolve with the least friction. The drum or pulley is fixed on that portion of the spindle above the upper bearing H, and consequently the pulling force of the driving-belt does not affect the perpendicularity of the spindle.

The stationary sluice B is an annular trough formed with an open center, an inner rim B^x and an outer rim B^2 extending all around the circle of the pan, excepting at the front of the mill, at which part the sluice is extended outwardly with straight-standing sides to form the chute or discharge-spout B^3 . The bottom of the sluice has a slight pitch or inclination downward to the outlet B^3 , before mentioned, and the outermost standing side B^2 extends upwardly to a point above the projecting flange a^5 over the screened openings, so that the bottom edge of that flange lies within the rim of the sluice, and in like manner the lower flange on the pan-rim sets within the inner flange B^x of the sluice. The object of this construction and arrangement of revolving

pan and stationary sluice is to catch and confine all the pulverized material as it is discharged from the pan by the centrifugal motion and to direct it into the sluice without waste.

The rollers C crush and pulverize, by virtue of their weight, as the ore or substance fed into the pan is brought under the rollers by the revolving motion of the pan. Each roller is fixed on an axle I, extending horizontally from one side of the roller, and bearings in boxes K K are arranged for the shaft on the stationary frame at one side of the pan. The axle of each roller is thus carried and supported only on the outer side of the roller and independently of the pan or central driving-spindle.

The frame or stationary support for the axle-boxes of each roller is constructed of two parallel standards or posts L L^x, which are bolted down at the feet to the bed-timbers and are secured at the upper ends to cross-timbers of the framework. These uprights are strengthened and braced by a curved standard L', that is placed behind the inner one of the standards L and is secured at the foot to the bed-timbers and at the top to the cross-timber. Such inner post is set to extend from above downward within the rim of the pan and is supported in that position close up to the face of the roller by the outer standards L^x and L' and the connecting rigid bars or braces I². Two boxes for the axle of the roller are provided on a sliding plate or carriage K, that is constructed to slide evenly up and down on the uprights L L^x with a limited extent of movement, the axle being thereby supported by one box at a point close up to the face of the roller and by the other box at the outer end of the axle. The effect of this construction is to secure the true horizontal position of the axle during work and to resist or overcome the angular strains or forces that are thrown upon the axle by the perpendicular or lateral movements of the roller, such as are produced by the material being carried against and beneath the roller by the revolutions of the pan.

The carriage, or part on which are set the axle-boxes, is attached to and confined on the two supports L L^x by means of the stirrups or guides L³, and the narrow bars K³ on the top and bottom of the carriage in line with the boxes, which are fitted to slide smoothly in the guides on the uprights. This construction provides for a limited play of the roller in a vertical direction in the pan and at the same time secures the true horizontal position of the axle under varying conditions of work. In this way the roller-bearings are brought entirely outside the pan and are detached altogether therefrom, as well as from the central upright driving-shaft, so that the bearings of that shaft are not affected by the angular strains thrown upon the rollers and their supports. The rollers are supported in this way at the outer sides only and entirely out-

side of, as well as independently of, the pan. They are also detached and entirely separate from the upright spindle.

The construction of axle-boxes, sliding carriage, and supporting-frame is the same for both rollers.

The scrapers E are supported from horizontal bars attached to the stationary frame and have qualities of adjustability by which they can be set to stand at different angles across the annular dies and also at different heights with respect to the surface of the dies.

A scraper is set in front of each roller and is adjusted to such an angle across the dies that the material as it is fed into the pan is properly distributed under the roller and constantly thrown from the outer portion to the inner portion of the dies or in the direction contrary to that in which the centrifugal force tends to throw it, thereby directing the material toward the center of the pan and under the center of the rollers.

The scraper is formed of a blade E, attached to the lower end of a depending arm E', which at its upper end is attached to the stationary supporting-bar E² over the pan. The arm E' is secured to the fixed horizontal bar E² by means of a clamp and bolts, so that it is adjustable both vertically by raising or lowering the arm and in an angular direction by turning the arm upon itself in the clamp. Thus the scraper E is adjusted both vertically with relation to the surface of the die in the pan and also at different angles by turning the arm E' in the clamp.

Power is best applied to the pan by a belt and a flanged pulley, or "drum," as it is sometimes called, the application of the power being made to advantage through the arrangement of a power-shaft and counter-shaft illustrated in Figs. 1 and 2, where 1 indicates the power-shaft, 2 a counter-shaft, and 3 4 two pulleys for a belt 5, connecting the two shafts. On the shaft 2 is a pulley, from which a quarter-twist belt is carried to the drum on the pan-spindle. These parts have bearings in a supplementary frame Z Z at the front side of the pan.

Usually the rollers are covered by stationary hoods or casings W, that extend at the rear quite close to the pan and upward over the tops to prevent the water and pulp from being thrown off the rim of the rollers. These casings are supported from the frames L at the sides.

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

1. The improved crushing-mill, consisting of a suitable stationary bed; the stationary annular trough having standing inner and outer rims, the inner one of which is of less height than the outer one; the revolving pan having a closed center, a flaring outer rim provided with screen-covered openings and having projecting flanges on the outer face thereof above the top line and below the bot-

tom line of said openings, the said flanges being inclined downwardly and outwardly and extending within the standing rims of the stationary trough; the upright revoluble shaft 5 to which said pan is secured and by which it is supported, and means applied to said shaft to revolve the pan; crushing-rollers mounted to rotate in said pan on opposite sides of its axis, but stationary as to their position in 10 said pan; the stationary supports formed of the parallel upright posts and braces and cross-bars uniting said uprights; and the movable carriage provided with axle-boxes in line with each other to receive the roller- 15 axles, and adapted to play vertically on the said upright supports, combined for operation as set forth.

2. In a crushing-mill of the character hereinbefore described, the combination of the

stationary annular trough having standing 20 rims the inner one of which is of less height than the outer one; with the revoluble pan having a closed bottom and a flaring rim provided with screen-covered openings and the projecting flanges on the outer face of said 25 rim above and below the said openings, the said flanges being inclined downwardly and outwardly at an angle to overhang the inner rim of the trough and to extend within and below the top edge of the outer rim of said 30 trough.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

NICOLA FOSSATI. [L. s.]

Witnesses:

CHARLES ORELLI,
PRENTISS CARPENTER.