

(No Model.)

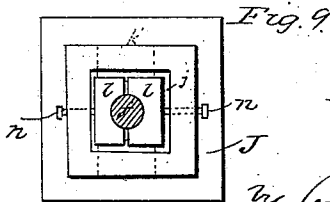
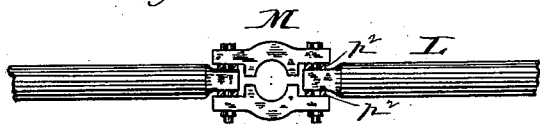
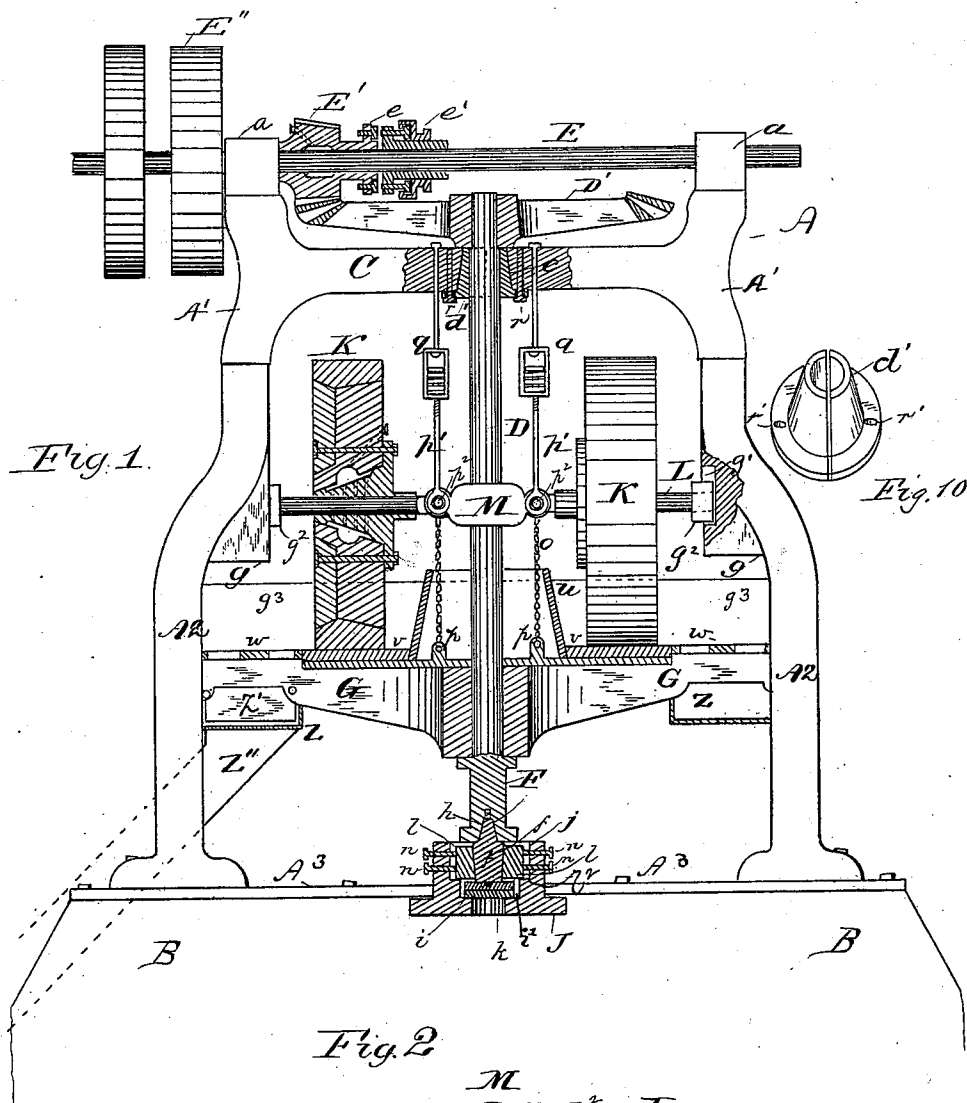
4 Sheets—Sheet 1.

T. H. CARLIN.

GRINDING OR CRUSHING MILL.

No. 333,389.

Patented Dec. 29, 1885.



Witnesses

Alva A. Moore.
A. A. Connolly

Thomas H. Carlin
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(No Model.)

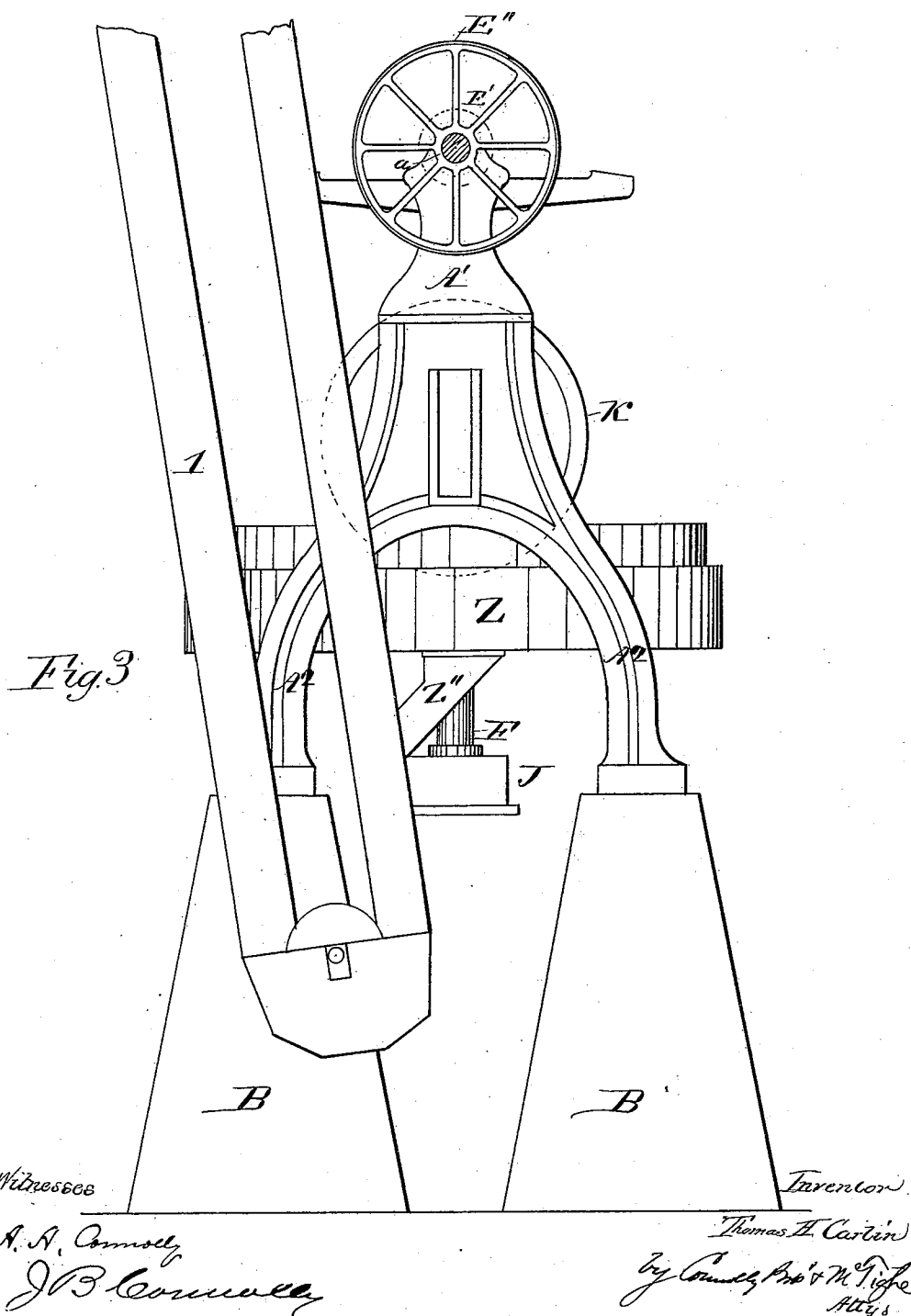
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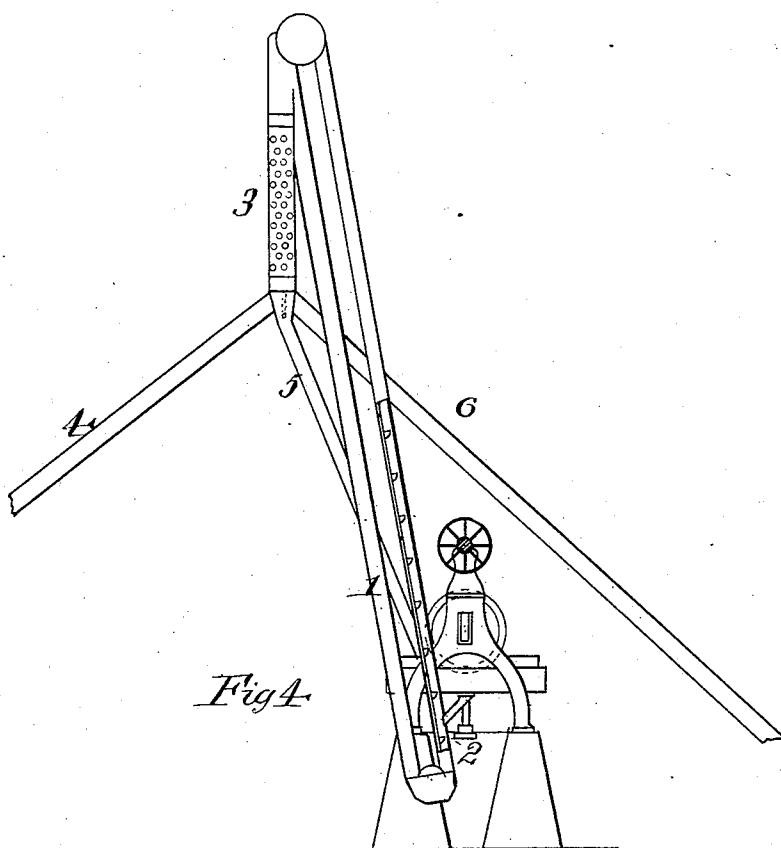
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Atty's

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4 Sheets—Sheet 4.

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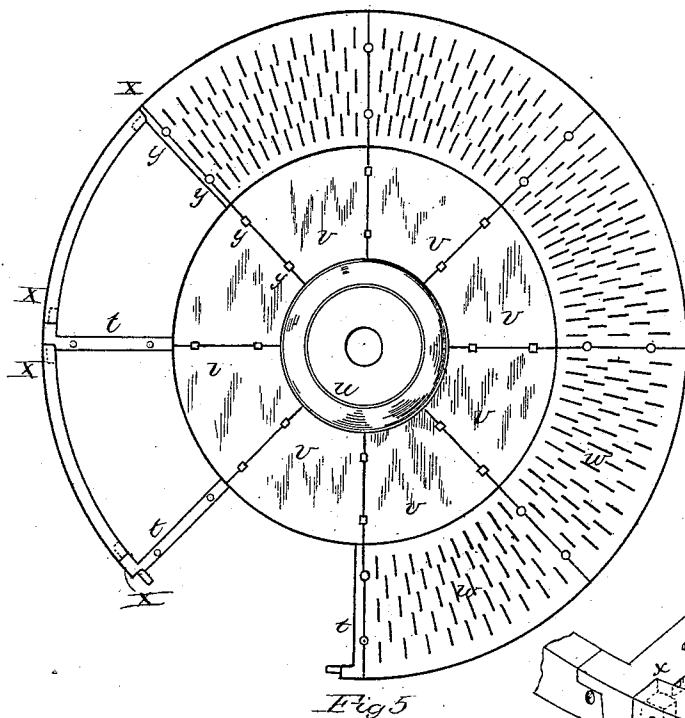


Fig. 5

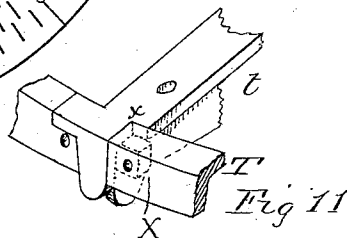


Fig. 11

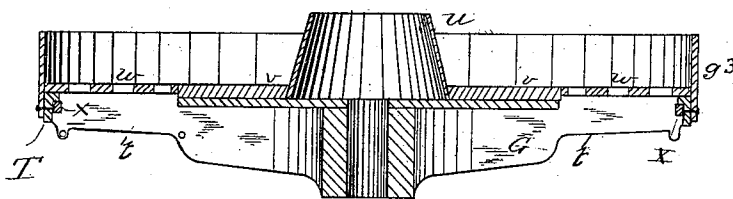


Fig. 6



Fig. 7

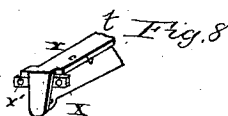


Fig. 8

Witness.

Ala H. Moor

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UNITED STATES PATENT OFFICE.

THOMAS H. CARLIN, OF ALLEGHENY, PENNSYLVANIA.

GRINDING OR CRUSHING MILL.

SPECIFICATION forming part of Letters Patent No. 333,389, dated December 29, 1885.

Application filed December 27, 1884. Serial No. 151,317. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. CARLIN, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Grinding or Crushing Mills; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, in which—

Figure 1 is a side elevation, partly in section, of the mill. Fig. 2 is a detail view showing the shaft and hinge. Fig. 3 is a rear elevation of the mill. Fig. 4 is a side view of the elevator. Fig. 5 is a top view of the pan, with some of the sifter-plates removed. Figs. 6, 7, 8, 9, 10, and 11 are views of certain details.

This invention has relation to grinding or crushing mills, and is particularly adapted to crush hard and refractory materials.

The objects of this invention are, first, to provide a novel construction of housings or frame of the mill, whereby solidity of construction and great strength are obtained with less material and labor than are used in the mills as ordinarily constructed; second, to provide a pan of such construction as to be capable of sustaining a great amount of work with but little liability of breaking or injuring the pan.

The invention consists in the peculiar construction and combinations of parts, as hereinafter more fully described and shown and specifically claimed.

Referring to the accompanying drawings, A represents the frame or housing of the mill, constructed of the upright side pieces, A' A', which are cast with the upper portion solid and the lower part forming an arched opening with the legs or uprights A² A². This arched construction is capable of sustaining a greater amount of weight with smaller amount of material employed in the construction thereof than if the sides were cast solid. The legs or uprights A² A² are securely fastened to base-plates A³, extending across the foundation. These plates are bolted to the blocks B B, of iron, stone, or other material, which are anchored in the ground at suitable distances

apart. The sides A' A' are joined together near the top by a cross-beam, C, having a conical opening, *c*, in the center thereof for the reception of the bushing *a'*, in which is journaled the center shaft, D. The upper ends of the side bars, A' A', are provided with bearings for the horizontal shaft E, said shaft having coupled to it, by means of the clutch *e e'*, the pinion E', which gears with and operates the wheel D', which is keyed to the center shaft, D. The horizontal shaft E is also provided with a pulley-wheel, E'', outside the frame A, through which power is supplied to the mill. The center shaft, D, which, as stated, is journaled in the cross-beam C at *c*, is supported at its lower end by the conical pedestal or toe *f*, fitting into the opening *h* in the bottom of the shaft. This toe fits snugly in the opening *h*, so that when the shaft D is turned the toe will turn with it and not wear or enlarge the opening *h*. The pedestal or toe *f* is supported on blocks *i i'*, of hard steel or other suitable material, which are placed in the depression *j* of the block J. This block or base-plate J is made of any desired shape, but is preferably square, as seen in Fig. 9, and has the depression *j* of the same shape. A hole, *k*, of slightly-larger diameter than the toe or pedestal *f*, extends vertically through the block J, for a purpose which will be hereinafter more fully explained.

Embracing the pedestal or toe *f* are two plates of metal, *l l*, resting on the flange *l'* on the interior of the base-block J, and held in close proximity to the toe by means of adjusting-screws *n n n n*, said plates having semi-circular recesses on their inner faces fitting the surface of the toe. The plates *l l* are intended to retain the toe in position on the center of the plate *i*. The orifice between the plates *l l* is tapering, the widest part being at the top of the plates, so that when they are brought close together around the toe *f* the latter will be partially supported by the bearings obtained from the plates.

The object in constructing the toe and its bearings of this particular form is as follows: When it is desired to remove the toe or pedestal *f*, the links or chains *o o* are fastened to the bottom of the pan in eyes *p p*, and at the top are fastened to the connecting-pins *p'*,

which couple the rods p' to shaft L. The screw-swivels q q are then turned, thus raising the pan G, crushing-wheels K K, and their shaft L until their weight is entirely borne on the cross-bar C, instead of being borne on the shaft D and toe f . The plates i i' are then drawn out from under the toe f , through opening k' , formed in the side of the base-plate J. The screws n n are then loosened, allowing the plates l l to separate, and the toe f drops or is forced down through the orifice k . When a new toe is to be placed in position, it is raised through opening k , and the plates i i' being driven under it the screws n n n are tightened. The plate i , which supports the toe f , has a groove cut across its face to retain the lubricating-oil that is supplied to the toe, and thus prevent undue wear and friction at the point of the toe. The toe f and plate i are made of metals which will not weld together, this being necessary to prevent the welding of these parts together, which is liable to occur if they are made of metals which readily weld. The upper end of the central shaft, D, is journaled in the cross-beam C through bushing d' . The hole c in the cross-beam C is cone-shaped, having the base of the cone at the lower part, and the bushing d' is of the same form on its outer circumference, with a flange extending completely around its lower edge. The bushing d' is divided vertically into two parts, (see Fig. 10,) and is held in position in the opening c by means of bolts r r , passing through elongated slots r' r' in the edge of the bushing, and into the cross-bar C. It will be seen that as the interior of this bushing becomes worn from usage the two parts can be drawn closer together, thus compensating for such wear. The shaft D is either enlarged at its lower end, or has a collar, F, firmly and rigidly attached thereto to support the pan G, which is so fastened to the shaft D as to revolve with it.

The grinding or crushing rolls K K, which are either of solid metal or of the peculiar construction shown herein, and which I do not describe more fully, as I have made the same the subject of a separate application for a patent, filed December 15, 1884, No. 150,436, are placed on the shaft L and revolve around it, their tires either resting on or being in close proximity to the bottom of the pan G. The outer ends of the shaft L are held in boxes g g on the uprights of the housings, said boxes being slotted or recessed at g' , to allow vertical play of the shaft, through the medium of the guiding-bushes g^2 and the inner ends of the shaft L, which is made in two sections, as shown, and hinged to a split collar, M, in such a manner as to allow a vertical motion either when the rolls are lifted by the swivels and rods p' p' q q or to admit of the passage under the rolls of a mass of material. On account of centrifugal motion, the natural tendency of the rolls K K is to be thrown outward and strike the housings of the mill or the edge of the pan. This I overcome by the

guiding-bushes g^2 , placed in the slots at the sides of the housings, said bushings receiving the thrust of the rolls when the latter are thrown outwardly. The shaft L is further supported near the center by the swivels q q and bolts p' p' . These bolts are fastened to the shaft where it hinges to the collar M, as shown in Fig. 1 of the drawings. The rods p' p' being forked at their lower ends, each end forms an eye which enters between the collar M and the shaft L, the same pin serving as a pintle for the hinge on the collar and as a support for the rods p' p' . The gear-wheel E' is attached to the shaft E by means of the collar and clutch e e' , so that the mill can be stopped at any time without stopping the pulley E' and shaft E. The gear E' , as will be understood, is loose upon the shaft E, while the clutch member e' is adapted to turn with said shaft, and is adjustable lengthwise of said shaft, in the usual way, so as to be brought into engagement with or disconnected from the collar or clutch member e , which forms part of the gear-wheel E' .

The construction in detail of the clutch mechanism need not be described, as such clutches are well known.

The construction of the pan is as follows: The body or frame of the pan is made of cast metal, and is of circular form, having a raised edge, g^2 , which can be either cast integral with the pan or fastened thereto in any suitable manner. The center of the pan is cast solid, and has radial arms or spokes t t t extending to the periphery thereof. Around the center or hub of the pan is either cast or fastened a cone-shaped guard or ledge, u , slightly higher than the outer edge, g^2 , the purpose of this guard or ledge being to prevent the material in the pan from being banked in the center thereof, and to cause it to fall under the crushing-rolls K K. The hub or center of the pan forms a collar on its lower side, which rests on the shaft D, and serves to support the pan in position. The center of the pan has a false bottom formed of several plates, v v v , of angular shape, so as to completely cover the bottom and surround the guard or ledge. The outer edges of these plates are parts of the circumference of a circle, so that when placed in position in the pan their outer edges will form a complete circle, exactly coinciding with the periphery of the solid part of bottom of the pan G. The spokes or arms t t t , which extend from the solid part of the pan G to its outer edge, are L-shaped in cross-section, being flanged on their upper edges, as shown. Their ends are correspondingly flanged, and at the junction of the two flanges an offset, x , is formed to receive the end of a segment or tire, T. Behind the vertical flanges and below the horizontal flanges are formed or fitted the steps X, upon which said segments or tires rest, said lugs being provided with the bolts x' . These segmental pieces are formed with flanges on their upper edges, which fit over the lugs x on the ends of the spokes or arms

t t. Bolts are driven through the ends of the segments and the lugs X, to hold the segments against and in position on the ends of the spokes.

5 On top of the spokes *t t* and segments T are placed the sifter-plates *w w w*, having their edges closely abutting against one another. These plates are held in position on the spokes by means of bolts *y y y*, fastened in the tops
10 of the spokes and passing through holes in the edges of the plate, said holes being countersunk to receive the heads of the bolts.

The sifter-plates are made of cast metal with the holes or slots chilled therein.

15 The feeding and distributing devices are shown in Fig. 4 of the drawings, in which 1 represents a bucket-elevator of any of the well-known forms. This elevator is placed at one side of the pan in such a position that
20 the material from the chute Z', which leads from the annular trough Z, located below the outer edge of the pan G, will fall into the buckets of the elevator. A scraper, Z', attached to the frame-work of the pan and moving
25 therewith, travels through the trough Z and forces the contents of the latter toward and into the chute Z'. As the buckets are raised, the material is delivered to a sieve, 3, having
30 three chutes, 4 5 6. The particles which are sufficiently ground to pass through the sieve 3 are carried by chute 4 to the mill or car for transportation, while those that pass over the
35 sieve are either returned to the mill, for re-grinding, through chute 5 or are carried off through chute 6, a suitable gate being provided at the junction of 5 and 6, whereby the refuse may be directed either through 5 or 6.

What I claim is—

40 1. In a grinding or crushing mill, the combination, with a vertically-adjustable pan and a shaft by which the same is supported and revolved, of means, substantially as shown and described, whereby said pan may be lifted and the shaft relieved of its weight, as set
45 forth.

2. In a grinding or crushing mill, the combination, with a vertically-adjustable pan and a shaft through which the same is supported and revolved, of a detachable toe or
50 pedestal secured to said shaft, substantially as shown and described.

3. In a grinding or crushing mill, the combination, with the grinding-rolls and a vertical rotary shaft, of a pan provided with a false bottom formed of separate plates, said plates
55 being retained in position on the bottom of the pan by means of countersunk bolts in the edges of the plates, the bolts being held in position between the plates, substantially as set forth.

4. In a grinding or crushing mill, the combination, with the main frame, the grinding or crushing rolls, the pan, and a vertically-adjustable shaft upon which the pan is supported, of rods or chains attached to the shafts
60 of said rolls and to the cross-beam of the main frame, and means, substantially as described, whereby the pan and rolls may be vertically adjusted, as and for the purpose set forth.

5. In a grinding or crushing mill, the combination, with a rotary pan and a pair of grinding-rolls, of a shaft having its lower end recessed, a detachable toe inserted in said recess,
70 a base-block, and plates supporting said toe and shaft, with guiding plates and screws in said block to hold said toe in the center of the plate, substantially as described.

6. In a grinding or crushing mill comprising a rotary pan and a pair of grinding-rolls, the combination, with said pan and rolls, of a
80 vertical shaft having a recess in its lower end, a removable toe inserted in said recess, and a supporting-base having a central orifice, through which said toe may be removed without displacing the shaft, substantially as described.

7. In a grinding or crushing mill comprising a pan, grinding-rolls, and means for operating the same, the combination, with a pan having radial arms or spokes provided with
90 lugs on their outer ends, of flanged segmental pieces fitting on said lugs and bolted thereto, and sifter-plates resting on said segmental pieces and supported thereby, substantially as shown and described.

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

THOMAS H. CARLIN.

Witnesses:

A. A. CONNOLLY,
A. A. MOORE.