T. F. PHILIPPI.

CRUSHER.

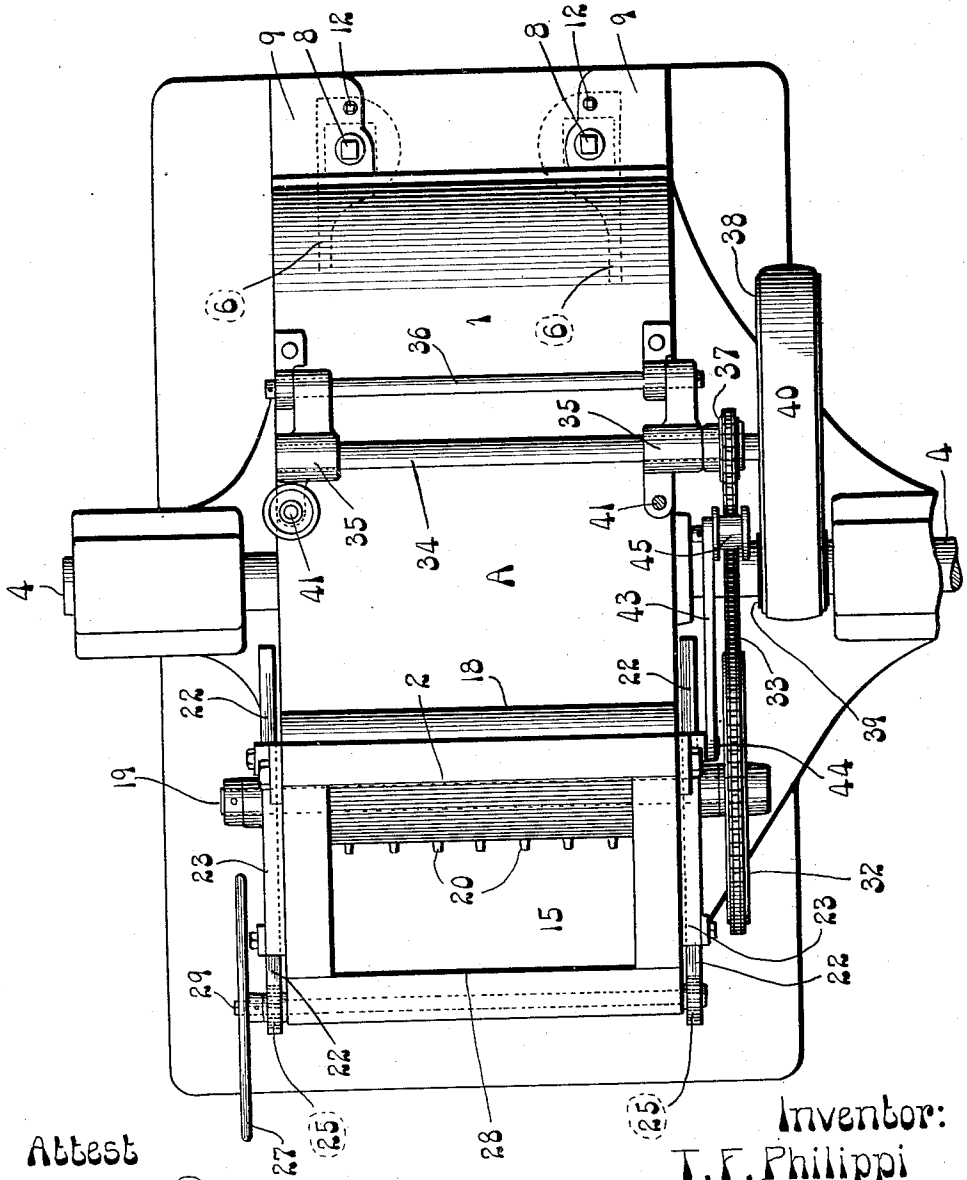
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1,131,002.

Patented Mar. 9, 1915.

4 SHEETS—SHEET 1.

Fig. 1.



Attest

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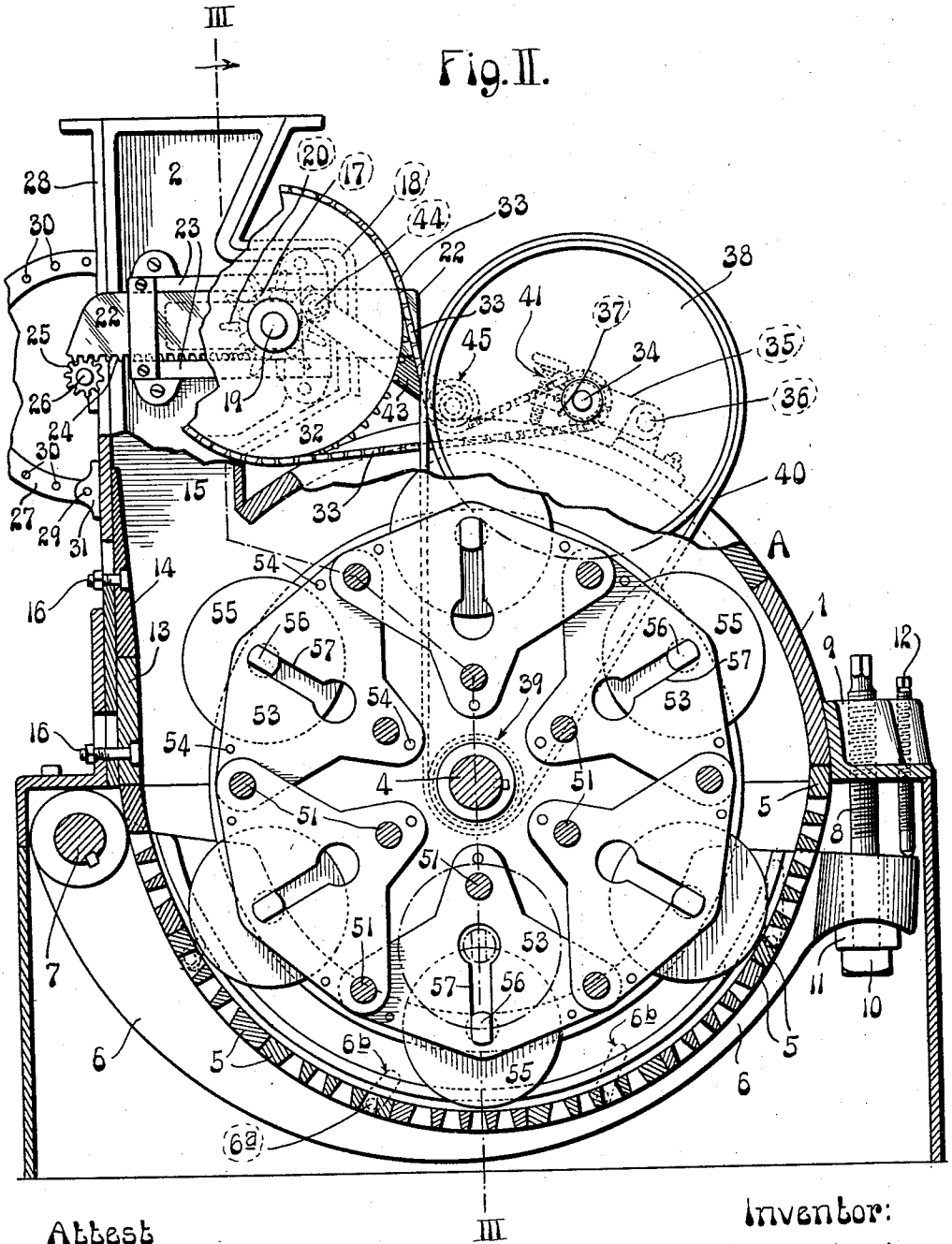
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4 SHEETS—SHEET 2.

Fig. II.



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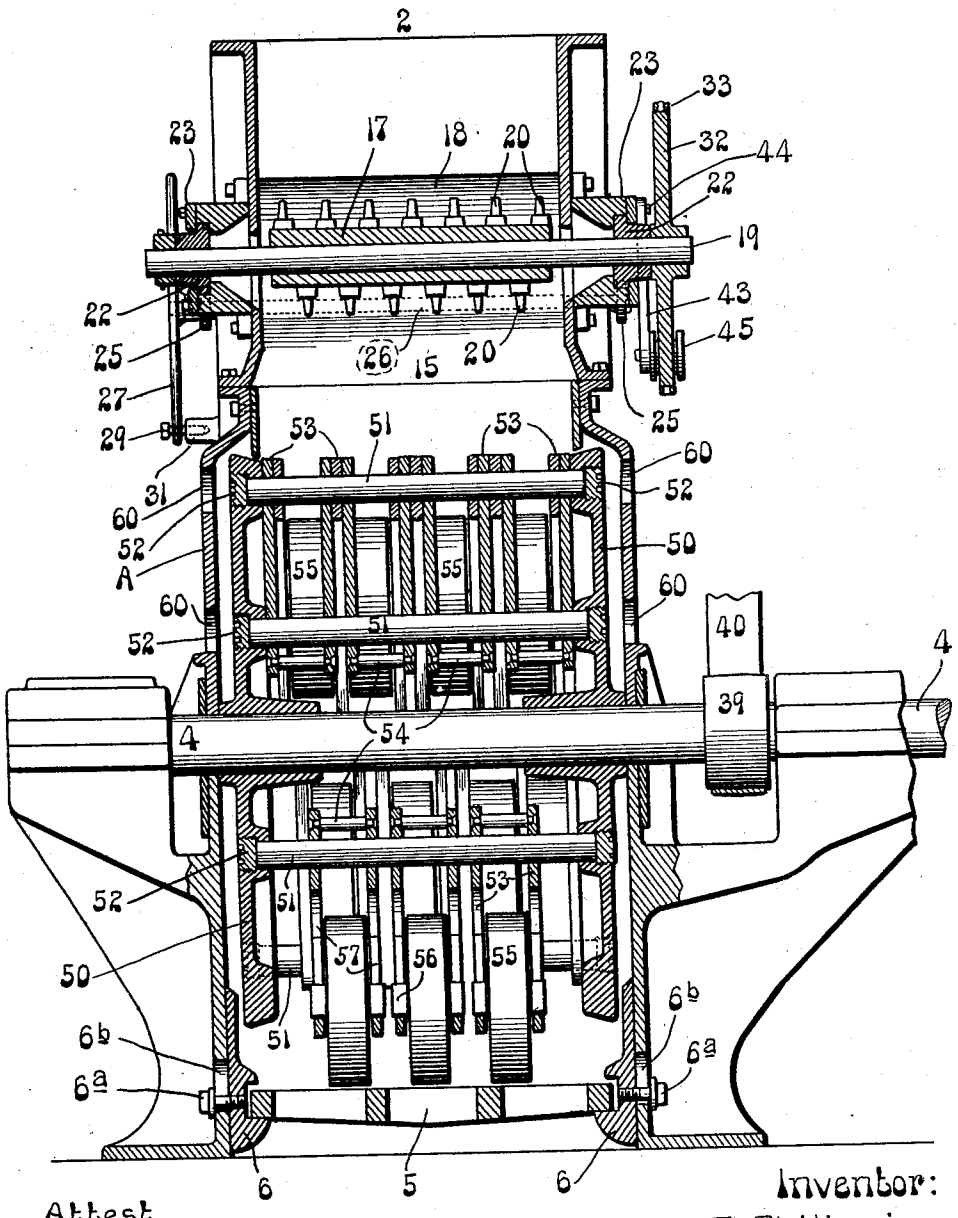
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4 SHEETS—SHEET 3.

Fig. III.



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4 SHEETS—SHEET 4.

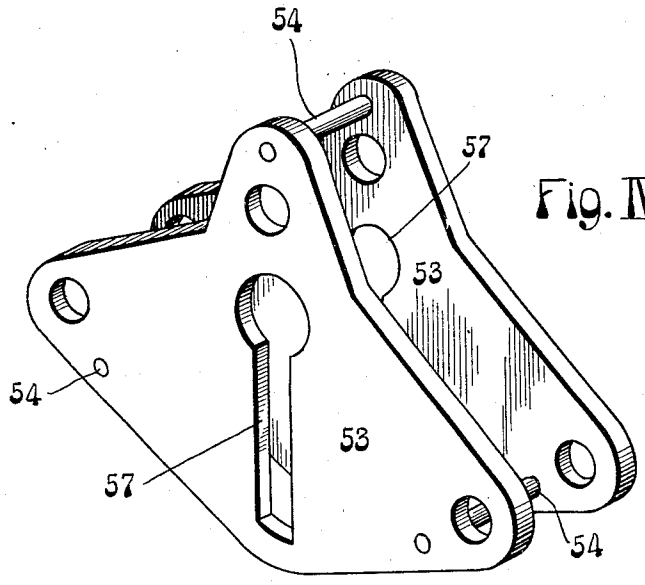


Fig. IV.

Fig. V.

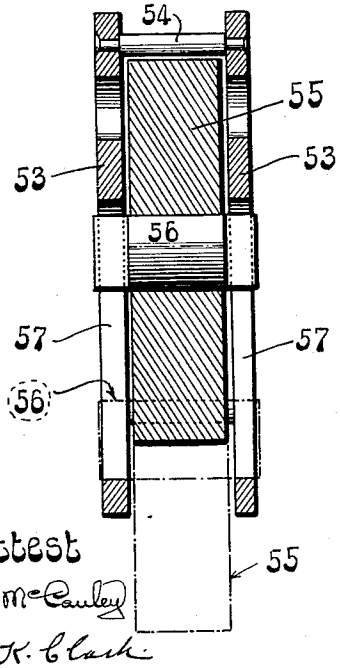


Fig. VI.

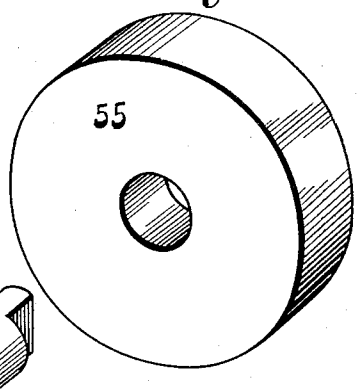
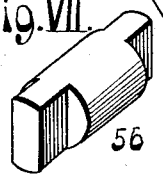


Fig. VII.



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UNITED STATES PATENT OFFICE.

THEODORE F. PHILIPPI, OF EAST ST. LOUIS, ILLINOIS.

CRUSHER.

1,131,002. Specification of Letters Patent. Patented Mar. 9, 1915.

Application filed April 24, 1914. Serial No. 834,045.

To all whom it may concern:

Be it known that I, THEODORE F. PHILIPPI, a citizen of the United States of America, and a resident of East St. Louis, county of St. Clair, and State of Illinois, have invented certain new and useful Improvements in Crushers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to a crusher or pulverizer, one of the objects being to provide an adjustable grate movable toward the crushing element; combined with an adjustable abutment preferably in the form of a breaker plate engaging an end of the grate and adapted to be shifted to different positions where it will engage the end of the grate after the latter has been adjusted toward the crushing element.

The invention also includes a new rotor structure and certain details of construction which will be hereinafter described.

Figure I is a top or plan view of my crusher. Fig. II is a side elevation partly in section. Fig. III is a vertical section taken approximately on the line III—III, Fig. II. Fig. IV is a perspective view of one of the holders for the crushing rollers. Fig. V is a vertical section of the holder, showing the pin slidably mounted in slots in the holder, and the crushing roller mounted on said pin, the pin being positioned in the enlarged ends of the slots through which it may be moved to release the crushing roller from its holder. Fig. VI is a perspective view of one of the crushing rollers. Fig. VII is a perspective view of a pin having a circular middle portion adapted to fit into the roller and having flattened ends adapted to slide in the roller holder.

In the accompanying drawings A designates a casing provided with a top wall 1 and an inlet hopper 2. A rotor provided with crushing rollers is secured to a drive shaft 4. A sectional grate, arranged below the rotor, is composed of grate sections 5 carried by arms 6, said arms being secured to a pivot rod 7.

8 designates adjusting screws screwed into supports 9 and rotatably fitted to the arms 6 which support the grates. Each adjusting screw 8 is provided with a non-circular upper end, and a head 10 at its lower end.

11 designates a washer interposed between the head 10 and the free end of the grate supporting arm 6, the washer being provided with a convex upper face which engages a concave face at the end of the arm 6. The screws 8 may be adjusted to shift the grate toward the axis of the rotor.

12 designates abutment screws located adjacent to the adjusting screws 8 and engaging the ends of the pivoted arms 6. These abutment screws serve as means for limiting the movement of the grate, and they may be screwed downwardly onto the arms 6 to firmly clamp said arms between the washers 11 and the lower ends of the abutment screws.

The sectional grate is slidably fitted to curved guideways formed in the adjustable arms 6 and the machine is so constructed that the grate sections slide in said arms when the grate is adjusted toward the rotor. The grate section 5 shown in Fig. II at the right hand end of the grate, engages a fixed abutment formed by the top wall of the casing. The grate section at the left hand end of the grate engages a movable abutment in the form of a breaker plate 13. When the grate is shifted toward the rotor the right hand end of the grate is prevented from rising by the fixed abutment 1, and the grate sections therefore slide in the pivoted arms 6, the left hand end of the grate being elevated as a result of the sliding movement of the grate. The breaker plate 13 abutting against the left hand end of the grate, is adjustably secured to the casing so that it may be moved vertically. The adjustable breaker plate is maintained in engagement with one end of the grate while the opposite end of the grate is at all times engaged with the fixed abutment 1, the object being to prevent material from escaping at the ends of the adjustable grate. The breaker plates 13 and 14 are arranged at the lower end of an inlet passageway 15 and secured to the casing by means of bolts 16 passing through slots in the casing.

The adjustable grate supporting arms 6 are secured to the casing by screws 6^a passing through slots 6^b in the side walls of the casing, see Figs. II and III. The screws are secured to the arms 6 and provided with heads which lie exteriorly of the casing. These screws guide the long arms 6 in their movements and hold said arms against the side walls of the casing.

A rotatable feeder 17 is arranged in a feeder housing 18 communicating with the inlet passageway 15. This feeder is preferably a cylinder secured to a shaft 19 and provided with feeding fingers 20. The feeder may be shifted from the feeder housing to partially close the inlet opening, the object being to regulate the flow of material by adjusting the feeder, also to prevent material from being accidentally discharged through the inlet passageway.

The adjustable devices for supporting the feeder include bearing plates 22 serving as bearings for the feeder shaft 19, said bearing plates being slidably fitted to guides 23. The feeder shaft 19 extends through slots in the side walls of the inlet passageway. The bearing plates are provided with rack teeth 24 meshing with pinions 25, the latter being secured to a shaft 26.

27 designates a hand wheel secured to the shaft 26 for the purpose of shifting the feeder toward and away from the wall 28 of the inlet passageway. The hand wheel 27 may be operated to turn the pinions 25, thereby sliding the bearing plates 22 which carry the feeder. The adjusting mechanism for shifting the feeder may be locked in different positions by a locking pin 29 adapted to pass through any one of a series of apertures 30 in the hand wheel 27, see Figs. II and III.

31 designates a keeper secured to the machine housing and adapted to receive the locking pin 29. It will now be understood that the feeder may be adjusted to different positions in the inlet passageway 15 and that it may be securely held in position by the locking pin 29.

The means for driving the adjustable feeder while it occupied different positions in the inlet passageway comprises a sprocket wheel 32 secured to the feeder shaft 19, and a chain 33 for driving said sprocket wheel. A shaft 34 arranged above the casing A is rotatably mounted in bearings 35 secured to a pivot rod 36.

37 designates a sprocket wheel secured to the shaft 34 and meshing with the sprocket chain 33. The shaft 34 is driven through the medium of a large pulley 38 secured to said shaft, a small pulley 39 secured to the main drive shaft 4 and a belt 40 passing around said pulleys 38 and 39. The pivoted bearings 35 carrying the shaft 34 may be adjusted to tighten the belt 40 or to stop the feeder driving mechanism, by the adjustment of screws 41 passing through the pivoted bearings 35 and engaging the top wall of the casing A. The drive chain 33 passing around the sprocket wheels 32 and 34 is flexed between said sprocket wheels as seen in Fig. II and this chain is free to yield in response to an adjustment of the feeder 17. A weighted chain tightener 43 is pivotally supported at 44 and provided at its free end with a roller 45 which lies upon the chain 33.

The rotor, or rotary crushing element of my machine comprises side members 50 preferably in the form of large disks secured to the drive shaft 4 and located near the side walls of the casing A. Transverse rods 51 carried by the side disks 50 are arranged in apertures in said disks and held in position by removable plugs 52 screwed into the apertures and engaging the ends of the transverse rods 51. Crusher holders are formed by a series of slotted frames 53 arranged in pairs and secured to the transverse rods 51, each of said slotted frames being supported by three of the rods 51. Each crusher holder consists of two of the slotted frames 53 and rivets 54 connecting said frames.

55 designates crushing rollers arranged in the crusher holders and rotatably mounted on pins 56, the latter being provided with circular middle portions for the reception of the rollers and reduced ends which lie within the slots 57. The enlarged middle portions of the pins 56 are arranged directly between the slotted frames 53 and the flattened ends of said pins are closely fitted to the walls of the slots 57 to prevent the pins from turning. The crushing rollers and the pins 56 are free to slide toward and away from the axis of the rotor and the inward movement of said parts is limited by the rods 51 at the inner ends of the slotted frames 53.

In removing the crushing rollers and pins 56 from the machine the first step is to remove the rods 51 which normally form abutments for retaining these parts in the machine, and after these rods are removed the rollers and pins may be moved to the position seen in dotted lines at the lower portion of Fig. II and in full lines Fig. V. The pins are then alined with the enlarged inner ends of the keyhole slots 57 and the rollers may be released from their holders by withdrawing the pins 56 through the enlarged inner ends of the slots.

All of the transverse rods 51 which support the crushing elements, are removably secured to the large side disks 50 by the removable plugs 52 (Fig. III) and the side walls of the casing A are provided with apertures 60 through which the rods 51 may be withdrawn from the rotor. After the rods 51 have been removed from the rotor, the crushing rollers and their holders are released from the rotor and a section of the casing may be removed to permit the removal of said rollers and holders.

I claim:—

1. A crusher comprising a casing, a movable crushing element in said casing, a grate adjacent to said movable crushing element,

arms at the sides of said grate, means for adjusting said arms and grate to shift the grate toward said movable crushing element, said casing being provided with slots, and screws passing through said slots and secured to said arms, said screws being provided with heads which lie exteriorly of said casing.

2. A crusher comprising a casing, and a rotor in said casing, said rotor comprising a series of slotted frames arranged in pairs, a series of pins each of which is slidably mounted in the slots of a pair of said frames, said pins being movable toward and away from the axis of said rotor, and crushing rollers rotatably mounted on said pins, each of said pins being provided with an enlarged middle portion which lies between a pair of said frames, and the slots in the frames being closed at their outer ends and enlarged near their inner ends to permit the removal of said pins.

3. A crusher comprising a casing, and a rotor in said casing, said rotor comprising a series of frames provided with keyhole slots, a series of pins each of which is slidably mounted in a pair of said frames, each of said pins being provided with reduced ends which lie in the slots of a pair of said frames and also provided with a circular middle portion which lies between said frames, said pins being movable toward and away from the axis of the rotor, and crushing rollers rotatably mounted on the circular middle portion of said pins.

4. A crusher comprising a casing, and a rotor in said casing, said rotor comprising frames provided with slots, a series of pins slidably mounted in said slots and adapted to move toward and away from the axis of said rotor, crushing rollers rotatably mounted on said pins, the inner end portions of said slots being enlarged to permit the removal of said pins, and abutments, removably secured to said rotor, adapted to limit the inward movement of said pins.

5. A crusher comprising a casing, and a rotor in said casing, said rotor comprising side members, a series of rods mounted in said side members, a series of crusher holders removably mounted on said rods, each of said crusher holders comprising a pair of frames rigidly connected to each other, and crushing rollers arranged between said frames, each of said crushing rollers being provided with a supporting pin which extends into a pair of said frames.

6. A crusher comprising a casing, and a rotor in said casing, said rotor comprising side members, a series of rods mounted in said side members, a series of crusher holders removably mounted on said rods, each of said crusher holders comprising a pair of slotted frames rigidly connected to each other, and crushing rollers arranged between said frames, each of said crushing rollers being provided with a supporting pin which extends into the slots in a pair of said frames.

7. A crusher provided with a crushing element, a sectional grate adjacent to said crushing element, an adjustable grate holder provided with a pair of curved guides to which the grate sections are slidably fitted, means for shifting said grate holder to move the slidable grate toward said crushing element, and a movable abutment engaging an end of said grate, the said movable abutment being adjustable to different positions where it will engage an end of said grate after the latter has been adjusted toward said crushing element.

8. A crusher provided with a crushing element, a sectional grate adjacent to said crushing element, an adjustable grate holder having a pair of curved guides to which the grate sections are movably fitted, means for shifting said grate holder to move the grate toward said crushing element, a fixed abutment engaging one end of said grate, a movable abutment plate engaging the opposite end of said grate, the grate sections being adapted to move with respect to said grate holder when the latter is adjusted toward said crushing element, and means for securing said movable abutment plate in different positions where it will engage an end of said grate after the latter has been adjusted toward said crushing element.

9. A crusher provided with a casing having an inlet opening, a crushing element in said casing, a sectional grate adjacent to said crushing element, an adjustable grate holder to which said grate is slidably fitted, means for shifting said grate holder to adjust the grate toward said crushing element, thereby sliding said grate in said grate holder and toward said inlet opening, a breaker plate adjacent to said inlet opening, and means for adjustably securing said breaker plate to said casing so that the breaker plate may be maintained in engagement with an end of the adjustable grate.

10. A crusher comprising a support, a movable crushing element, a grate adjacent to said crushing element, arms pivoted to said support, said pivoted arms constituting a support for said grate, abutment screws for limiting the movement of said arms, lifting screws rotatably fitted to said pivoted arms and screwed into said support, and curved seat members interposed between the lower portions of said lifting screws and the free ends of said pivoted arms, said lifting screws being operable to shift the grate toward said crushing element.

11. A crusher comprising a casing, and a rotor in said casing, said rotor comprising a pair of slotted frames, a pin mounted in the slots of said frames, said pin being mov-

able toward and away from the axis of said rotor, a crushing roller rotatably mounted on said pin, said pin being provided with an enlarged middle portion which lies between said frames, one of the slots being enlarged to receive the enlarged middle portion of said pin, and a movable device for holding said pin away from the enlarged portion of said slot.

12. A crusher comprising a casing, and a rotor in said casing, said rotor comprising a pair of frames each of which is provided with a slot, and a pin mounted in said slots, said pin being movable toward and away from the axis of said rotor, a crushing roller mounted on said pin, said pin being provided with an enlarged middle portion which lies between said frames, and the slots being closed at their outer ends and the side walls of said slots being so formed as to permit the enlarged middle portion of said pin to pass through one of said slots.

THEODORE F. PHILIPPI.

In the presence of—
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."