W. M. HOPPIN.

CRUSHING MACHINE.

APPLICATION FILED OCT. 2, 1920.

1,406,189.

Patented Feb. 14, 1922.

5 SHEETS—SHEET 1.

Fig. 1.

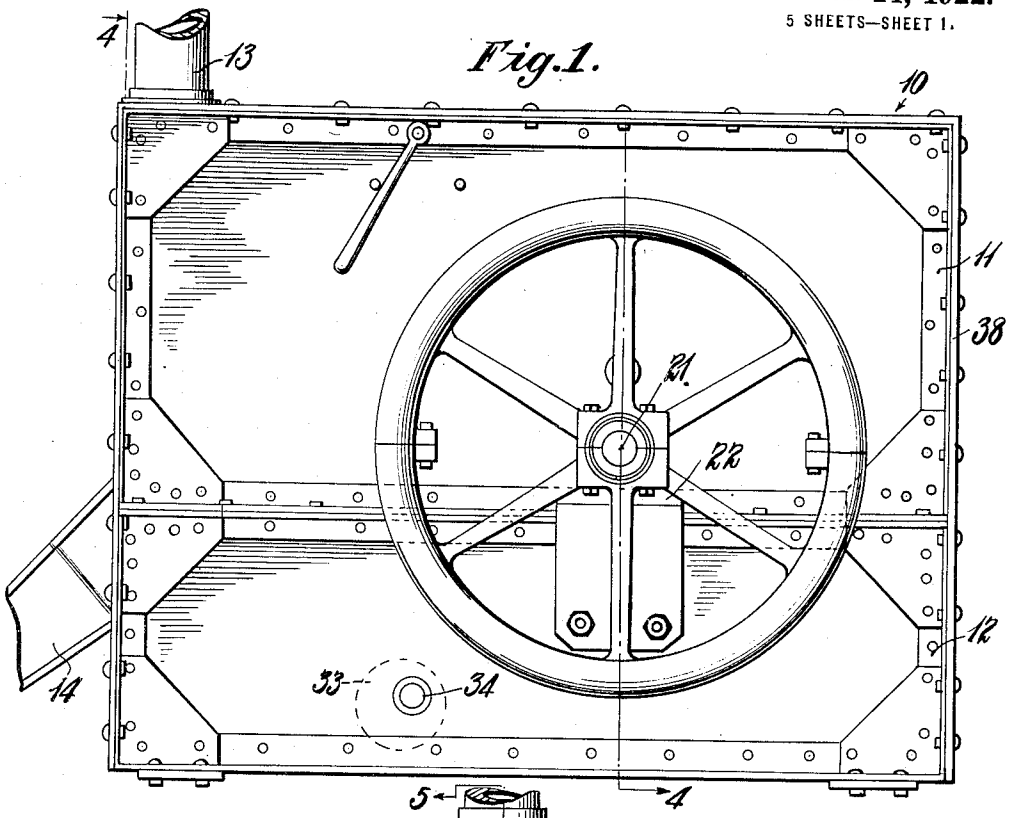
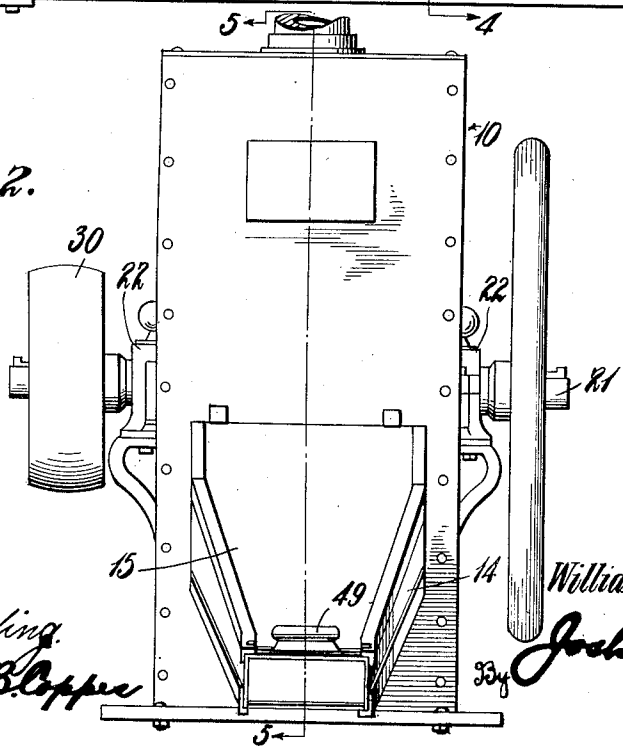


Fig. 2.



Witnesses

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Fig. 3.

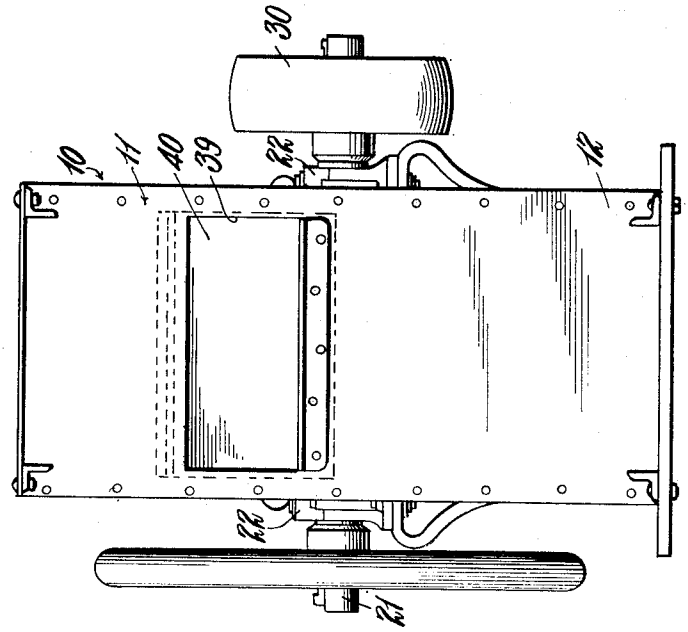
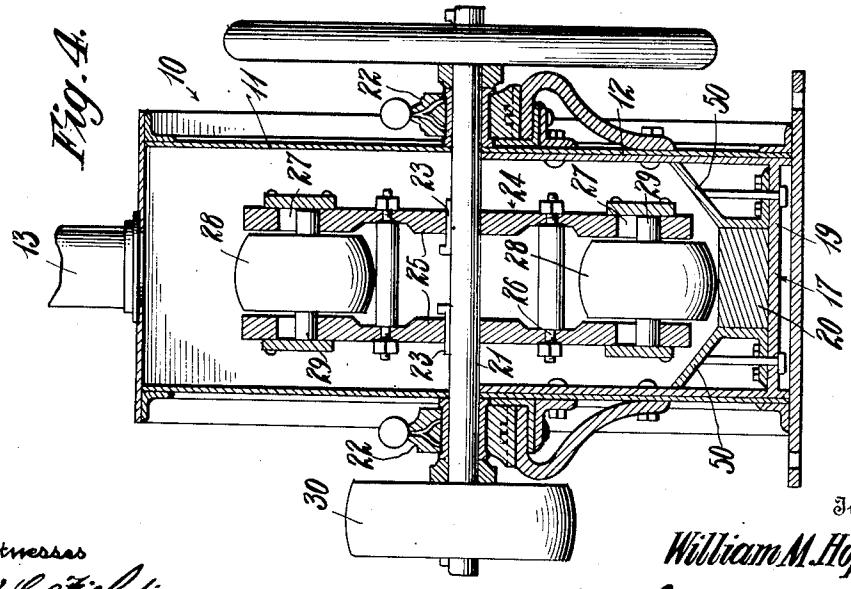


Fig. 4.



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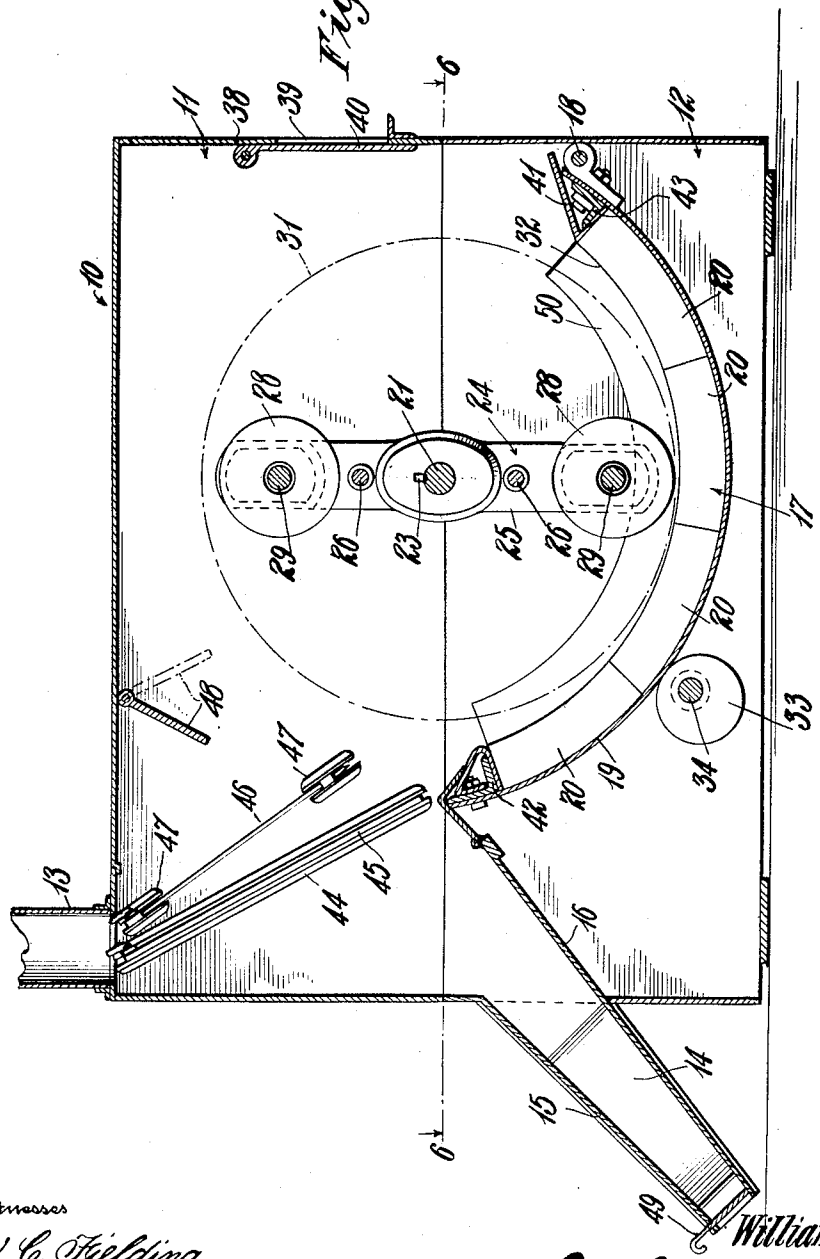
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5 SHEETS—SHEET 3.

Fig. 5.



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5 SHEETS—SHEET 4.

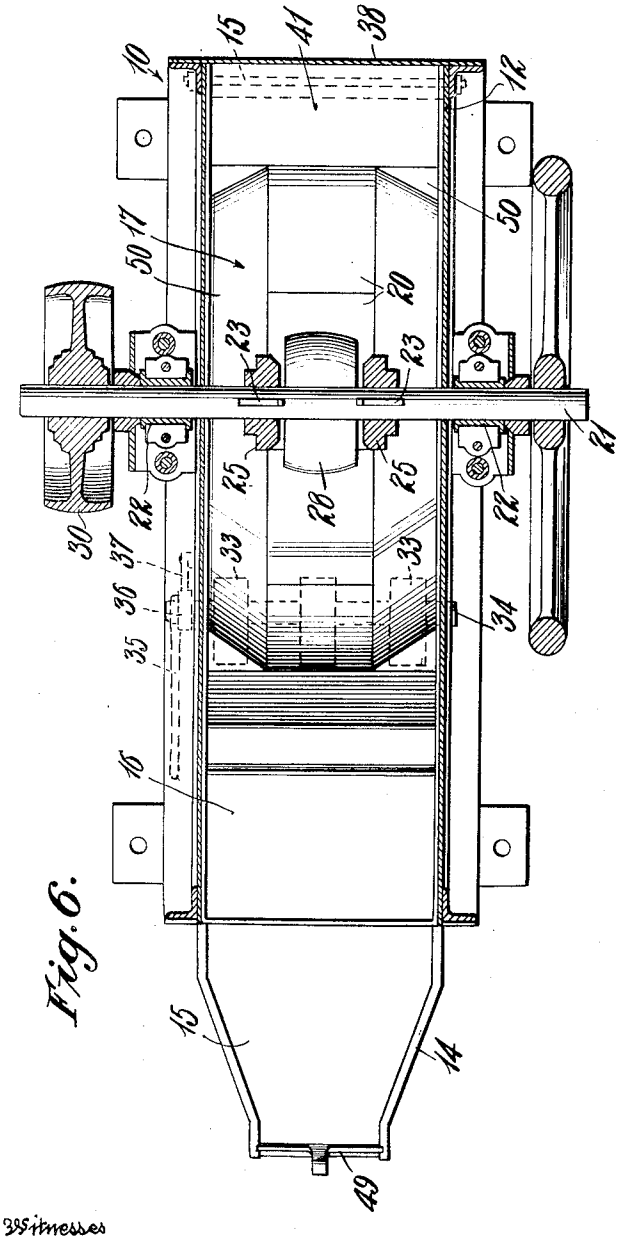


Fig. 6.

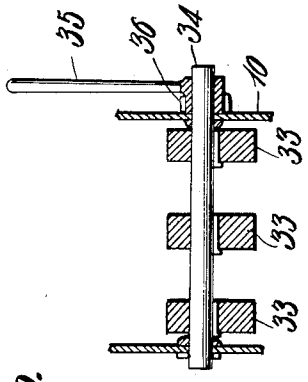


Fig. 10.

Witnesses

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5 SHEETS—SHEET 5.

Fig. 7.

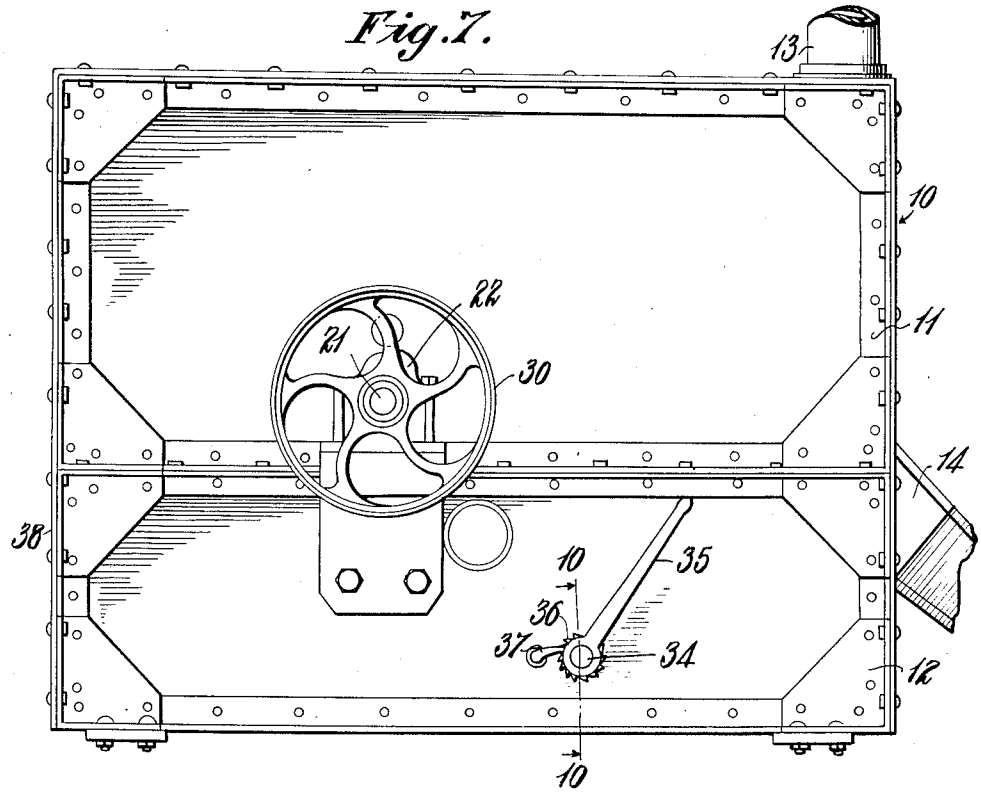


Fig. 8.

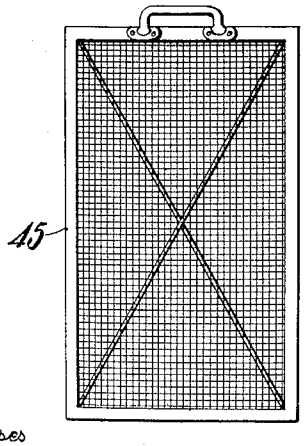
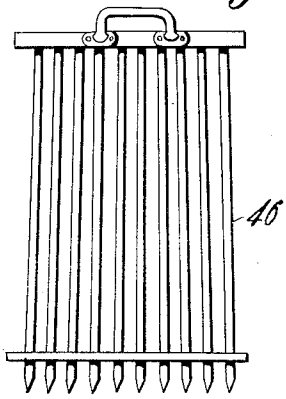


Fig. 9.



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM M. HOPPIN, OF SHARON HILL, PENNSYLVANIA.

CRUSHING MACHINE.

1,406,189. Specification of Letters Patent. Patented Feb. 14, 1922.

Application filed October 2, 1920. Serial No. 414,220.

To all whom it may concern:

Be it known that I, WILLIAM M. HOPPIN, a citizen of the United States, residing at Sharon Hill, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in Crushing Machines, of which the following is a specification.

One object of my invention is to provide an improved crushing machine such for example as for crushing stone, wood or the like and to so construct the machine that it will be of a simplified character with parts which will not readily get out of order and which will operate to crush material by the use of a comparatively small amount of power.

Another object is to make my improved machine in such manner that it can be quickly adjusted to vary the degree of fineness into which the material is to be crushed.

A still further object is to arrange the parts that they may be easily moved into various positions to suit different requirements in the use of a machine of this character.

These objects, and other advantageous ends which will be described hereinafter, I attain in the following manner, reference being had to the accompanying drawings in which—

Figure 1 is a side elevation of my improved machine,

Figure 2 is an elevation showing one end of said machine,

Figure 3 is a view showing the opposite end of the machine,

Figure 4 is a transverse section taken on the line 4—4 of Figure 1,

Figure 5 is a longitudinal section taken on the line 5—5 of Figure 2,

Figure 6 is a sectional plan view taken on the line 6—6 of Figure 5,

Figure 7 is an elevation showing the opposite side of the machine,

Figure 8 is a face view of a screen which I preferably employ,

Figure 9 is a face view of a grate which I preferably employ, and

Figure 10 is a fragmentary section taken on the line 10—10 of Figure 7.

Referring to the drawings, 10 represents a box or casing which is made rectangular in the present instance and is formed of two main sections 11 and 12; the section 11 being positioned above the section 12 and provided at its top adjacent one end with the take-off pipe 13 for the dust and small particles caused by the crushing action. The section 12 has an outlet passage 14 which is provided by a chute 15 at one end of the casing as clearly shown in Figures 1, 2, 5 and 6; said chute having a bottom plate 16 which leads into the space within the casing for a purpose hereinafter described.

A segmental crushing bed 17 is pivotally mounted at one end as shown by the hinge 18; said segmental crushing bed in the present instance consisting of a base portion 19 of metal which is faced by a number of blocks 20 preferably of cast steel, said blocks constituting a die. An actuating shaft 21 is mounted in bearings 22 supported on the sides of the casing and said shaft extends transversely through said casing and is secured by keys 23 to an actuator 24. This actuator consists of arms 25 which are spaced apart and secured by tie bolts 26. The arms 25 have portions which extend in opposite directions from the shaft 21 and the opposite ends of these arms are provided with slots 27 which are elongated in the direction of the length of the arms. Crushing rollers 28 have trunnions 29 which extend into said slots 27; said crushing rollers being movable radially to the extent of the length of the slots 27. Thus when the arms 25 are in a vertical position as shown in Figures 4 and 5, the trunnions of the rollers 28 will rest in the lower ends of the slots 27. In other words, the trunnions of the lower roller will rest in the outer portions of their slots while the trunnions of the upper roller will rest in the inner ends of their slots. It is thus obvious that there is a bodily movement of the rollers in addition to the rotatable movement which they assume when the shaft 21 is rotated. The outer end of the shaft 21 is provided with a pulley 30 to which power may be applied to rotate the shaft. The curvature of the arcuate crushing bed 17 is preferably made greater than the path of outermost travel of the crushing rollers 28 during the rotation of the shaft 21 as is clearly illustrated in Figure 5 by the comparison of the dot-and-dash line circle 31 and the inner curved surface 32 of the blocks 20 of the bed 17. The bed 17 adjacent its forward end is supported on eccentric regulating or adjusting cams 33; said cams being secured to a rod 34 which extends through the casing and at its outer end is provided with a lever 35 by

the use of which the cams 33 can be moved so as to cause the bed 17 to swing on its hinge or pivot 18 and thereby move the surface 32 toward or from the path of movement of the crushing rollers 28. The lower portion of the lever 35 is preferably provided with notches or teeth 36 into which a detent pawl 37 or other suitable locking structure enters so that after the cams 33 are moved into the desired position they will be locked against accidental movement.

By having the bed 17 constructed and positioned as above set forth, it will be noted that when any material, which is to be crushed, is deposited upon the surface 32 of the bed that the rollers 28 during the rotation of the actuator 24, will strike said material and due to the resistance of the bed 17 will crush said material to a fineness varying in proportion to the distance the surface 32 of the bed 17 is from the path of movement 31 of said crushing rollers. It is therefore obvious that by a mere movement of the hand lever 35 that various grades of crushed material may be had.

The rear end 38 of the casing is provided with an opening 39 which is normally closed by a swinging door 40 and the material to be crushed can be discharged through said opening 39 upon the bed 17. I preferably provide a plate baffle 41 over the hinge 18 and connecting elements and in this manner the material as it is dumped into the casing will be kept from engaging the hinged portion of the bed 17 or the means which secure the blocks 20 of the bed in position. I preferably secure the blocks 20 by setting them between metallic angle irons 42 and 43; said blocks being wedge shape as shown in Figure 5 and serving when bound between the angles 42 and 43 to firmly retain the arcuate position as illustrated.

At a position above the forward end of the bed 17 the inner walls of the casing are provided with guideways 44 in which is mounted a screen 45; said screen extending rearwardly at a slant; the structure being such that the screen can be slid down within the guideways 44 when an upper portion of said casing is removed.

I also preferably position a grate 46 within guideways 47 mounted on the side walls of the casing; said grate being positioned at a slant preferably at a different angle from that of screen 45 so that the grate and screen converge upwardly as illustrated in Figure 5. I also preferably provide an adjustable baffle 48 adjacent the top of the casing and so mount the baffle 48 that it may be swung into various positions suitable to the operation of the machine. It will be noted that during the rotation of the actuator 24 that the material will be thrown upwardly; the heavier uncrushed portion being thrown upwardly in such manner that it will fall, or a portion of it will fall, upon the grate 46. The finer or crushed material will be thrown in such manner that the greater portion thereof will pass directly upon the screen 45 in the space between the screen 45 and the grate 46. This screen 45 may be made of any gage or mesh which is desired for the discharged material and in this manner no material will pass out of the machine unless it first passes through the screen 45. The grate in addition to serving as a screen also serves as a guard and thereby prevents the large pieces of stone or other material from initially engaging the screen 45. Thus the screen 45, which may be made of wire mesh or perforated sheet material, is protected by the grate 46. The material, dropping through the screen 45, will fall upon the bottom plate 15 of the chute 16 and will then slide out through the passage 14. The lower end of the chute 15 may be closed by a gate 49 so that the discharge of the material may be cut off at any time desired. The side surfaces of the blocks 20 of the bed 17 are positioned between two arcuate members 50 as clearly shown in Figures 4 and 5; said members 50 also forming a part of the bed 17 and providing, together with the top surfaces 32 of the blocks, an arcuate trough so that the material tends to move toward the middle of the surface 32 where it can be readily engaged by the crushing rollers 23. Thus during the rotation of the actuator the material is confined on the bed and and by the application of a comparatively small amount of power, the stone or other material can be readily crushed to suit any purpose desired.

While I have described my invention as taking a particular form, it will be understood that the various parts of my invention may be changed without departing from the spirit thereof, and hence I do not limit myself to the precise construction set forth, but consider that I am at liberty to make such changes and alterations as fairly come within the scope of the appended claims.

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

1. A machine of the character described including rotatable crushing means; a curved bed positioned below the path of movement of said crushing means, the curvature of said bed being eccentric to the axis of rotation of said crushing means and of greater radius; means for movably supporting said bed whereby one end of the bed which projects beyond the path of rotation of said crushing means can be moved upwardly and downwardly; and a screen mounted independently of said bed and out of the path of said crushing means, said end of the bed, due to its movement, being capable of deflecting crushed material at

various tangent angles with respect to said screen; substantially as described.

2. A crushing machine including a casing; crushing means rotatable within said casing; a segmental bed within said casing below the path of action of said crushing means, said bed including a die portion so that the material to be crushed can be fed thereon and thrown upwardly by the crushing means; a slanting screen above said bed; means for varying the position of said bed relatively to the crushing means, said casing having a discharge passage at one side of said screen whereby the material will be thrown from the bed onto the screen and graded so as to pass out of said discharge passage; and a grate spaced from said screen, the space between said screen and grate tapering upwardly, the lower portion of the space between the grate and screen being substantially in line with the top of said bed whereby the finer crushed material can pass upwardly between the grate and screen and the larger portion will be thrown more directly upward and return directly to the bed or strike the grate and be returned to the bed; substantially as described.

3. A crushing machine including a casing; crushing means rotatable within said casing; a segmental bed within said casing below the path of action of said crushing means, said bed including a die portion so that the material to be crushed can be fed thereon and thrown upwardly by the crushing means; a slanting screen above said bed; means for varying the position of said bed relatively to the crushing means, said casing having a discharge passage at one side of said screen whereby the material will be thrown from the bed onto the screen and graded so as to pass out of said discharge passage; a grate spaced from said screen, the space between said screen and grate tapering upwardly, the lower portion of the space between the grate and screen being substantially in line with the top of said bed whereby the finer crushed material can pass upwardly between the grate and screen and the larger portion will be thrown more directly upward and return directly to the bed or strike the grate and be returned to the bed; and an adjustable baffle positioned above and to one side of said grate for causing the material not passing directly between the screen and grate to be deflected on the outer side of said grate to allow any smaller particles mixed therewith to pass through the grate and the larger particles to be returned to said bed; substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM M. HOPPIN.

Witnesses:
ELIZABETH GARBE,
CHAS. E. POTTS.