

T. L. & T. J. STURTEVANT.
CRUSHING MACHINE.
APPLICATION FILED JULY 3, 1908.

995,580.

Patented June 20, 1911.

3 SHEETS-SHEET 1.

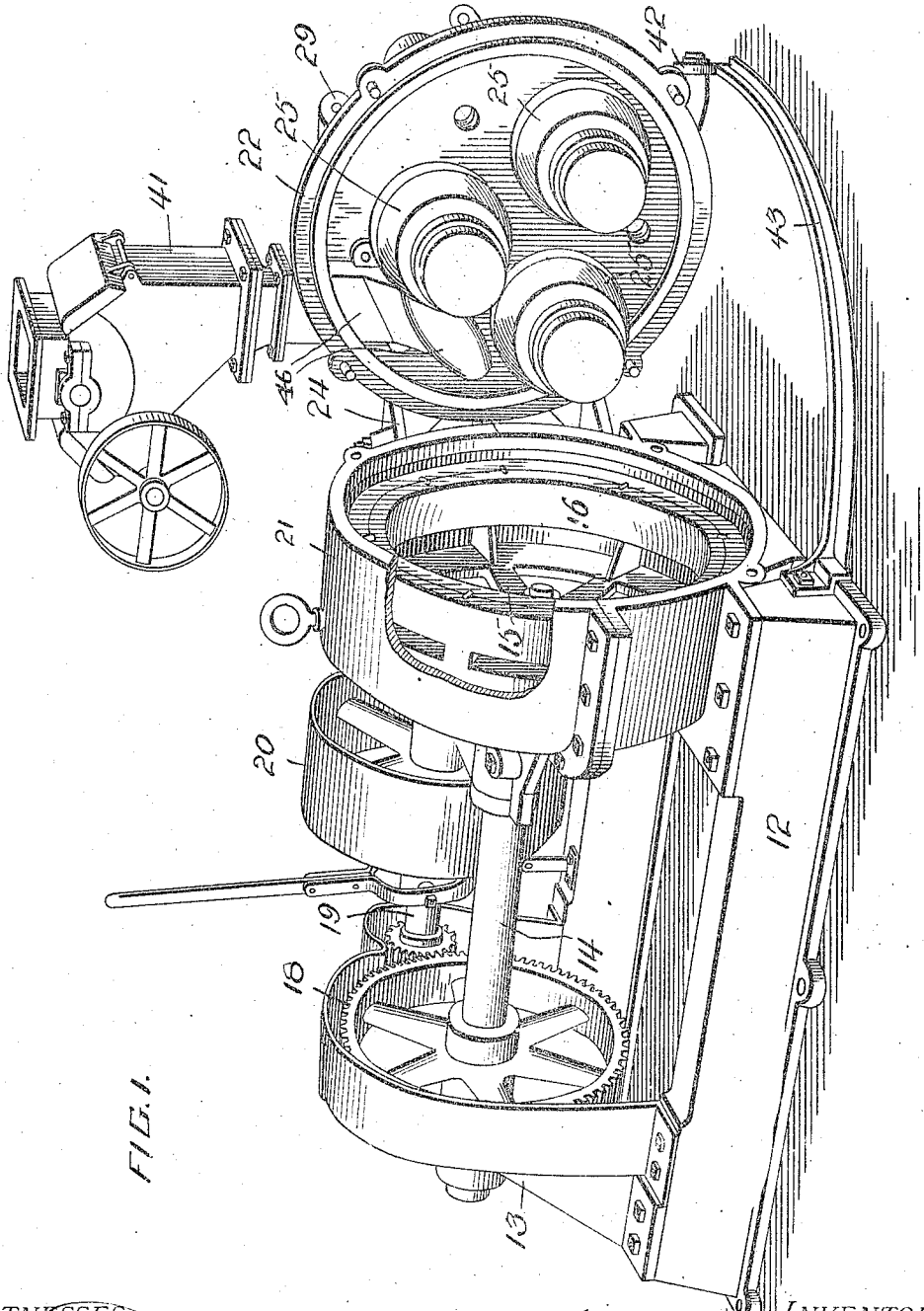


FIG. 1.

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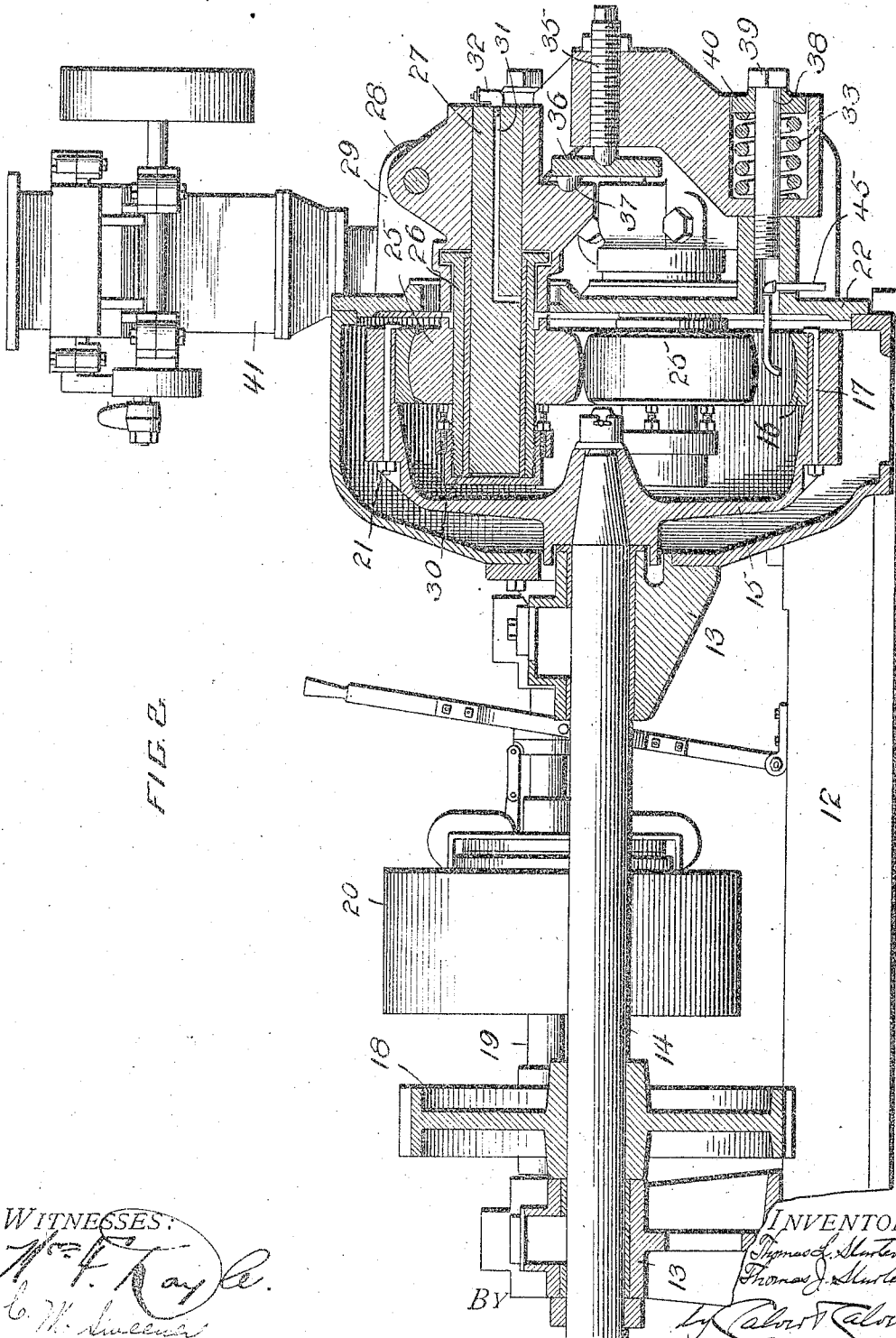


FIG. 2.

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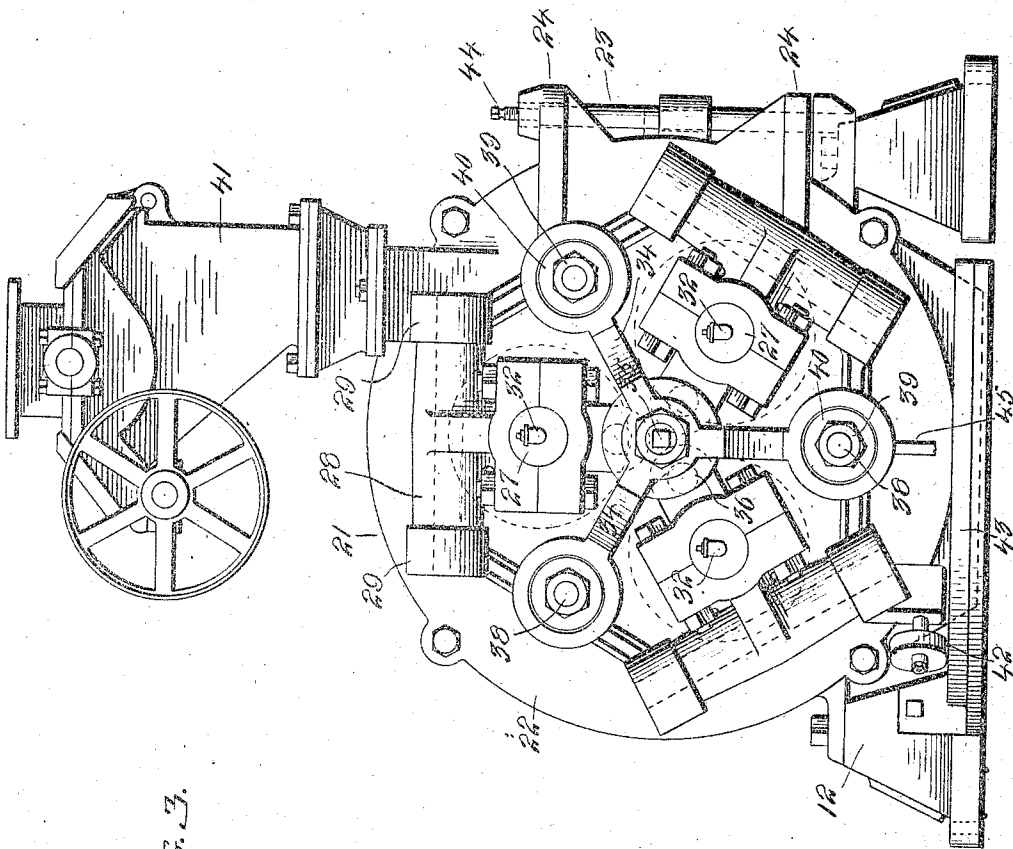


FIG. 3.

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UNITED STATES PATENT OFFICE.

THOMAS LEGGETT STURTEVANT, OF QUINCY, AND THOMAS JOSEPH STURTEVANT, OF WELLESLEY, MASSACHUSETTS, ASSIGNORS TO STURTEVANT MILL COMPANY, A CORPORATION OF MAINE.

CRUSHING-MACHINE.

995,580.

Specification of Letters Patent. Patented June 20, 1911.

Application filed July 3, 1908. Serial No. 441,857.

To all whom it may concern:

Be it known that we, THOMAS L. STURTEVANT and THOMAS J. STURTEVANT, citizens of the United States; residing, respectively, at Quincy and Wellesley, in the county of Norfolk and State of Massachusetts, have invented or discovered certain new and useful Improvements in Crushing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to that class of crushing mills comprising a rotating anvil ring with which elastically or yieldingly supported crushing or hammer rolls cooperate in the crushing operation; and the invention comprises certain improvements in the machine of this class which is fully shown and described in our Patent No. 906,829, granted December 15, 1908.

In the present improved machine the end head of the casing, by which the yieldingly supported crushing rolls are sustained, is hinged to a stationary part of the casing so that it may be swung aside as a door to afford access to the interior of the casing, and also so as to expose the crushing elements carried by said end head when access to these parts, or to the interior of the casing, is desired.

The present invention also relates to some other features of improvement; as will hereinafter appear.

In the accompanying drawings, Figure 1 is a perspective view of the improved machine with the hinged end head open or swung aside. Fig. 2 is a vertical section of said machine with the parts in working position. Fig. 3 is an end view of the machine looking from the right of Fig. 2.

Referring to the drawings, 12 denotes the frame of the machine provided with suitable bearings 13 in which is journaled a shaft 14 carrying a spider 15 on which the anvil ring 16 is mounted, said ring as herein shown, rotating in a vertical plane and being attached to the arms of said spider by means of clamping bolts 17 having toe portions which engage the outer face of said ring so as to force it into the tapered bored ring of the spider, the outer portion of the anvil ring having a corresponding taper. The spider or carrier 15, being of skeleton or open-work construction, permits the re-

duced or crushed material to be discharged from both sides of said ring. The shaft 14 may be driven in any suitable manner, but will preferably be provided with a gear wheel 18 geared to the driving shaft 19 carrying a pulley or pulleys 20 which will preferably have a suitable clutch connection with said driving shaft.

Secured to the frame of the machine is a heavy casing part 21 which incloses the rotating anvil ring and the spider by which said ring is carried, the said casing being closed at its end by a head 22 which is hinged to the said frame or to the stationary part of the casing by means of a pivot bolt 23 which will preferably be fixed to the stationary part of the casing and which may be encircled by suitable ears 24 with which the said end head is provided, so that the said head may be swung back and forth horizontally on the hinge afforded by said ears and bolt, to open or close the chamber of the casing.

The crushing hammer rolls 25, which cooperate with the anvil ring 16, are fixed to sleeves 26 which rotate on bearing-pins or shafts 27 suitably secured to blocks or carriers 28 pivoted to arms or brackets 29 on the said end head 22, half bushings 30 of brass or other suitable material, and which are secured to the pins or shafts 27, being preferably interposed between said pins or shafts and said sleeves 26. The present construction provides three of these hammer rolls, but it will be understood that any desired number thereof, from one to three or more may be employed. The said pins or shafts 27 are preferably provided with oil ducts 31 communicating with oil cups 32 for the convenient lubrication of the bearing sleeves of the crushing rolls.

The crushing rolls 25 are yieldingly forced toward the concave crushing face of the anvil ring 16, so as to have a yielding bearing on the material to be crushed and which will be interposed between said face and said rolls, by means of springs 33 housed in suitable recesses in a three-armed or spider bracket 34 having a central abutment or bearing screw 35 which abuts against a disk or washer 36 between which and the bearing carriers 28 are interposed semi-spherical abutments or half balls 37 which enter concave sockets or recesses in the said blocks or

bearing carriers 28 at points removed from their pivots, thereby affording a yielding mounting for said blocks or carriers and for the crushing rolls supported therefrom.

5 The flat outer faces of the half balls 37 abut against a disk or washer 36, so as to permit slight sliding movements between these parts. The springs 33 encircle bolts 38 which are screwed into suitable projections

10 on the head 22, and the tension of said springs can be varied by means of nuts 39 on said bolts abutting against washers 40 which are in contact with the outer ends of said springs. The disk or washer 36, receiving the pressure of the springs 33

15 through the spider bracket 34 and the central abutment screw 35 carried by said bracket, serves to equalize the pressure of said springs against the pivoted bearing carriers 28, so that the crushing force exerted

20 by said springs will be properly divided or distributed between the several hammer rolls operatively connected with said bearing carriers. The screw 35 will preferably be so

25 adjusted that when there is no material on the crushing face of the anvil ring the rolls 25 will not come to full pressure against said ring but will bear against the same only, or substantially only, by such a pressure as

30 is due to their weight; but when material to be crushed is carried by said ring the rolls 25 will be forced inward more or less against the stress of the springs 33 which will then exert a certain pressure on the crushing rolls

35 to force them against the material interposed between them and the face of the anvil ring. The adjusting screw 35 also provides means whereby the pressure of the rolls 25 toward the inner face of the anvil

40 ring can be regulated as to entirely withdraw the said rolls from contact with said face, as is desirable or necessary when the swinging head or door-like part 22, from which said rolls are supported and which

45 carries said springs, is to be opened or closed.

The anvil ring 16 is preferably made somewhat wider than the peripheral or working faces of the hammer rolls 25, so as

50 to afford a track on said ring wider than the crushing faces of the rolls. The material being crushed is normally held on the hollow or concave working face of said anvil ring by centrifugal force, and with this construction, which provides hammer rolls having

55 peripheral faces narrower than the face of the anvil ring, or a ring having a working face wider than the faces of said rolls, very little uncrushed material will be pushed off or discharged from the ring; and side shields, to hold the material from being too

60 rapidly discharged or pushed off from said ring, will therefore not be required. It will be understood that the crushed material will

65 be discharged from both faces of the anvil

ring owing to the fact that said ring is carried by a spider or somewhat open carrier affording separated arms or parts between which the crushed material can be discharged, as more fully shown and described in our Patent No. 906,829, hereinbefore referred to.

The material to be crushed will preferably be fed to the anvil ring by a mechanical feeder 41 mounted on the swinging end head 22, and which feeder is or may be of the construction fully shown and described in our Patent No. 879,423, granted Feb. 18, 1908.

The hinged or swinging end head 22 is provided on its inner side with a feed spout 46 which will convey the material to be crushed from the said mechanical feeder 41 to the anvil ring.

To facilitate the swinging movements of the head 22 from which the hammer rolls 25 and their carriers are supported, said head will preferably be provided with a bearing roller 42 running on a curved track 43 which will largely sustain the weight of said head, so as to render the swinging movements comparatively easy; and the vertical position of said head may be varied somewhat by an adjusting screw 44 tapped in the upper ear 24 surrounding the pivot bolt 23.

While we have herein shown a horizontally disposed driving shaft 14 rotating in fixed bearings and carrying an anvil ring 16 rotating in a vertical plane within the casing forming the chamber of the mill, we do not wish the term "horizontal," as used with reference to the position of the driving shaft and the plane of movement of the swinging head or door 22, or the term "vertical," referring to the position of the anvil ring, in the appended claims, to be strictly limited to horizontal or vertical planes; as it is obvious that the mill might be tilted slightly, thereby changing the positions or planes of movement of the said shaft, head or door and ring, without departing from the invention; so that the terms "horizontal" and "vertical," as used in the claims in connection with the driving shaft, the swinging head or door and the anvil ring, may be understood to mean approximately horizontal and vertical.

It is frequently desirable to clean the working face of the rotating anvil ring 16, so as to remove material which may become too much caked thereon, and to this end a pipe 45 is provided, and the inner end of which extends into the plane of rotation of said ring, and through which a jet of water or air under pressure may be forced, for the purpose of cleaning the face of said anvil ring. As herein shown the said pipe is mounted on the hinged end head 22, and in such case some part of said pipe will preferably have a flexible connection with the source of supply of water or compressed air,

so that it may be swung aside with said end head without being disconnected or detached from said source of supply.

Having thus described our invention we claim and desire to secure by Letters Patent:

1. In a crushing machine, the combination with a vertically rotating anvil ring, of one or more hammer rolls cooperating with said ring, and a vertically hinged part from which said roll or rolls are supported, so that by swinging said part aside horizontally said roll or rolls may be removed from or brought into cooperative relation with said ring.

2. In a crushing machine, the combination with a rotating anvil ring and a casing inclosing same, of a hinged part forming the end portion of said casing, and one or more hammer rolls cooperating with said ring and supported from said hinged part so that said roll or rolls may be swung aside with the said hinged part when access to the said rolls or to the interior of the casing is desired.

3. In a crushing machine, the combination with a rotating anvil ring and a casing inclosing same, of a hinged part forming a portion of said casing, one or more hammer rolls cooperating with said ring and supported from said hinged part so that said roll or rolls may be swung aside with the said hinged part when access to the said rolls or to the interior of the casing is desired, and means, mounted on said hinged part, for yieldingly forcing said roll or rolls toward the working face of said ring.

4. In a crushing machine, the combination with a rotating anvil ring and a casing inclosing same, of a hinged part forming a portion of said casing, one or more hammer rolls cooperating with said ring and supported from said hinged part so that said roll or rolls may be swung aside with the said hinged part when access to the said rolls or to the interior of the casing is desired, and a mechanical feeder also supported by and movable with said hinged part.

5. In a crushing machine, the combination with a rotating anvil ring, of a horizontal shaft by which said ring is carried, fixed bearings in which said shaft rotates, a casing inclosing said ring and comprising a swinging head which closes one end of said casing, and which is hinged so that it may be opened and closed like a door, and one or more hammer rolls cooperating with said ring and supported from said head, and thus movable out of and into working position by opening or closing said door-like part.

6. In a crushing machine, the combination with a rotating anvil ring and a casing inclosing same, said casing comprising a horizontally swinging door-like hinged part, of one or more hammer rolls cooperating

with said ring, bearing-carriers from which said rolls are supported and which are pivotally mounted on the said swinging door-like part, and means acting on said bearing-carriers, for yieldingly pressing the said hammer roll or rolls toward the crushing face of said ring.

7. In a crushing machine, the combination with a horizontal shaft mounted in fixed bearings, of an anvil ring carried by said shaft, a casing inclosing said ring, said casing comprising a door-like hinged part adapted to be swung aside horizontally, of one or more hammer rolls cooperating with said ring, bearing carriers from which said rolls are supported and which are pivotally mounted on the said door-like part, means, acting on said bearing carriers, for yieldingly pressing said hammer roll or rolls toward the crushing face of said ring, and means for adjusting the yielding pressure on said roll or rolls.

8. In a crushing machine, the combination with one or more hammer rolls, of a hinged part supporting said roll or rolls and which is adapted to be swung aside horizontally, said hinged part being provided with a bearing roller to sustain a portion of its weight when it is swung in and out, and a track on which said roller may run.

9. In a crushing machine, the combination with an anvil ring rotating in a vertical plane, of a casing inclosing said ring peripherally and provided with a hinged end head, a plurality of hammer rolls cooperating with said ring, a plurality of bearing-carriers pivotally mounted on said end head and from which said rolls are supported, a series of springs cooperating with said bearing-carriers and serving to yieldingly force the said rolls toward the working face of said ring, a spider bracket having a central abutment, and a plate or washer acted on by said central abutment and serving to communicate the pressure or stress of said springs to said pivoted bearing-carriers.

10. In a crushing machine, the combination with an anvil ring rotating in a vertical plane, of a casing inclosing said ring peripherally and provided with a hinged end head, a plurality of hammer rolls cooperating with said ring, a plurality of bearing-carriers pivotally mounted on said end head and from which said rolls are supported, a series of springs cooperating with said bearing-carriers and serving to yieldingly force the said rolls toward the working face of said ring, a spider bracket having an adjustable central abutment, and a plate or washer acted on by said central abutment and serving to communicate the pressure or stress of said springs to said pivoted bearing-carriers.

11. In a crushing machine, the combination with a horizontal shaft, of an anvil ring carried by said shaft and rotating in a ver-

tical plane, one or more hammer rolls cooperating with the inner face of said ring, a hinged door-like part from which said roll or rolls are supported, means, mounted on
 5 said hinged part, for forcing said roll or rolls toward said ring face, and means for reducing the stress of said forcing means toward said face so as to permit the withdrawal of the said hammer roll or rolls
 10 away from the working face of said ring, and thus allow said hinged part, carrying said roll or rolls, to be readily swung aside or brought into working position.

12. In a crushing machine, the combination with a rotating anvil ring and an open-work carrier therefor, of spring-pressed hammer rolls cooperating with said ring, and a hinged part from which said hammer rolls are supported and which hinged part
 20 is provided with a feed spout to direct material to be crushed to said rolls and ring, said open-work carrier permitting the reduced material to be discharged from both sides of said ring.

25 13. In a crushing machine, the combination with a stationary casing, of a rotating anvil ring, an open-work carrier therefor, spring-pressed hammer rolls cooperating with said ring, and a hinged door closing
 30 the end of the said casing, said hammer rolls being mounted on said door and being thus adapted to be swung aside therewith.

14. In a crushing machine, the combination with a stationary casing, of an anvil
 35 ring rotating in a vertical plane, hammer rolls cooperating with said ring, and a hinged door closing the end of the said casing, said hammer-rolls being mounted on said door and thus adapted to be swung
 40 aside therewith.

15. In a crushing machine, the combination with a rotating anvil ring, of a plurality of hammer rolls cooperating with said ring, pivoted carriers from which said rolls
 45 are supported, means for exerting a yielding pressure on said carriers to force said rolls toward said anvil ring, and an equalizing plate or device through which the yielding
 50 pressure is imparted to said carriers so that such yielding pressure will be properly distributed between the several carriers and the hammer rolls supported therefrom.

16. In a crushing machine, the combination with a suitable casing comprising a head, as 22, closing the end of said casing,
 55 of an anvil ring rotating in a vertical plane within said casing, hammer rolls cooperating with said ring, and a mechanical feeding device, said end head being provided with a
 60 feed spout to convey the material to be reduced from said mechanical feeding device to said anvil ring.

17. In a crushing machine, the combination with an inclosing casing, of an anvil
 65 ring rotating within said casing, an open-work carrier for said ring, spring-pressed hammer rolls also within said casing and cooperating with said ring, and a hinged part
 70 closing said casing and capable of being opened so that access may be had to the interior of the latter when it is desired to remove or replace any of the crushing members.

In testimony whereof we affix our signatures, in presence of two witnesses.

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Witnesses:

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