

M. F. WILLIAMS & E. H. FRICKEY.  
PULVERIZER.

APPLICATION FILED JUNE 15, 1910.

1,022,454.

Patented Apr. 9, 1912.

3 SHEETS—SHEET 1.

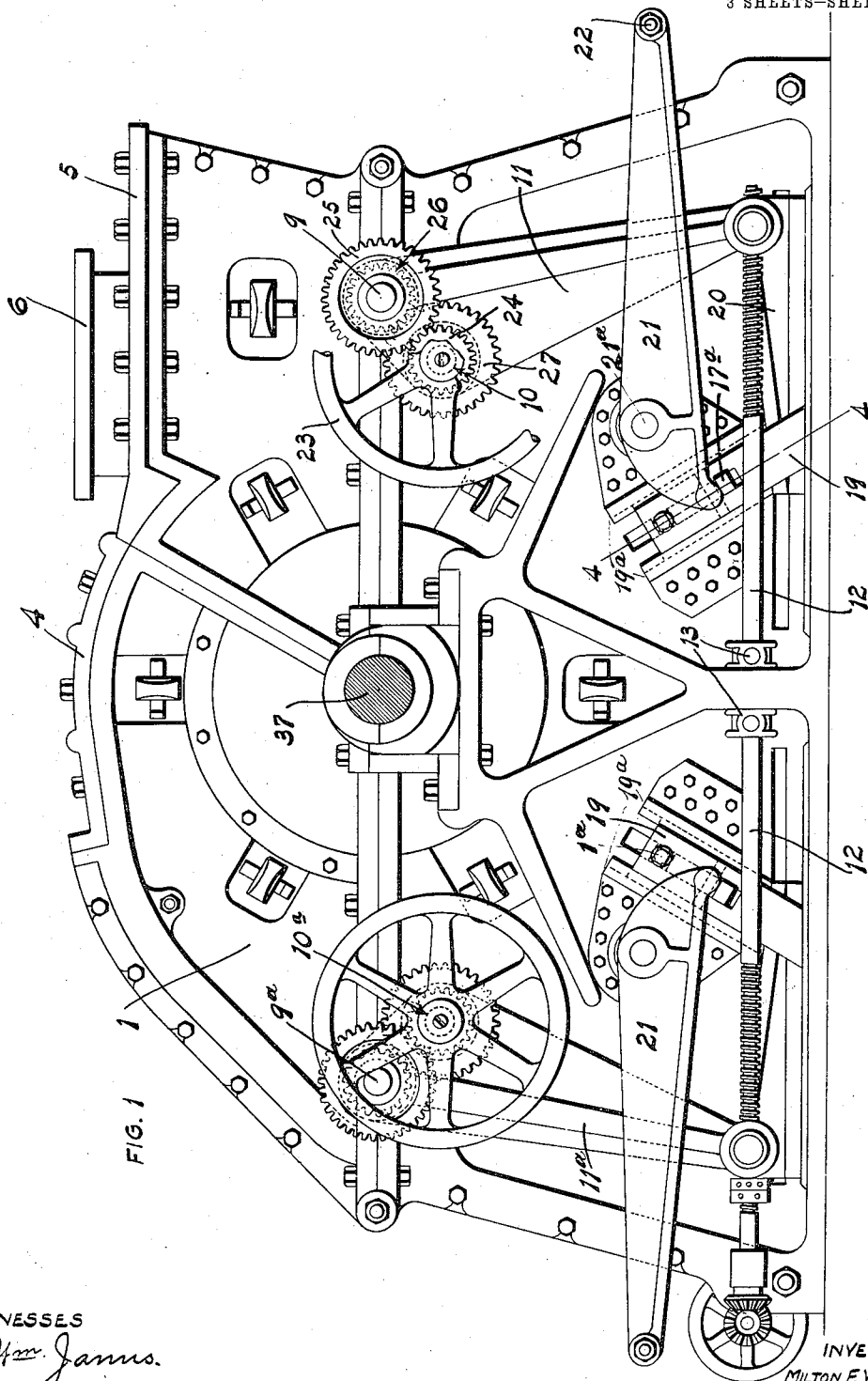


FIG. 1

WITNESSES

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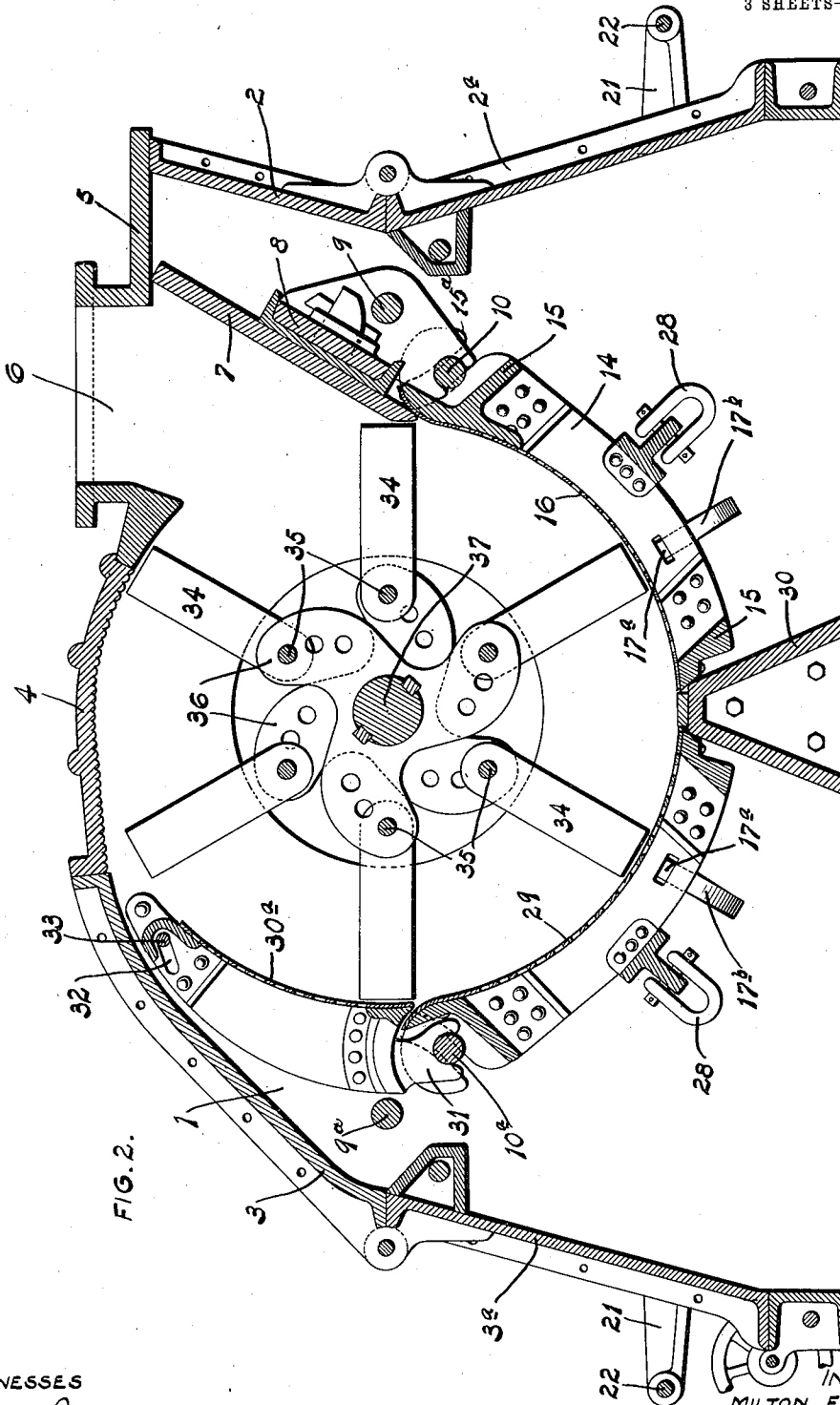
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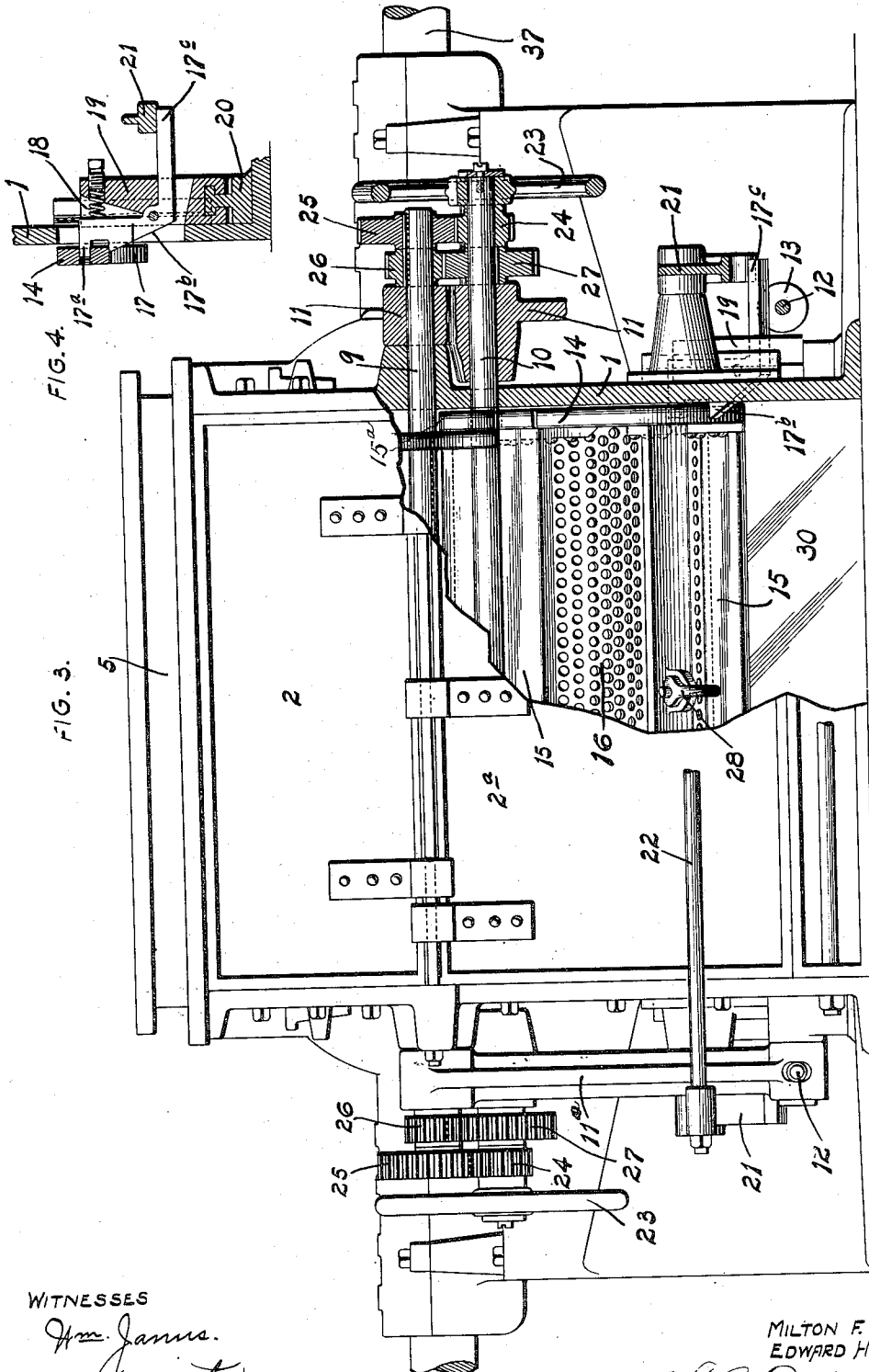
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3 SHEETS—SHEET 3.

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# UNITED STATES PATENT OFFICE.

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TO WILLIAMS PATENT CRUSHER & PULVERIZER COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

## PULVERIZER.

1,022,454.

Specification of Letters Patent.

Patented Apr. 9, 1912.

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*To all whom it may concern:*

Be it known that we, MILTON F. WILLIAMS and EDWARD H. FRICKEY, citizens of the United States, residing in St. Louis, Missouri, have invented a certain new and useful Improvement in Pulverizers, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this application, in which—

Figure 1 is a side elevational view of our improved pulverizer. Fig. 2 is a vertical longitudinal section through the same. Fig. 3 is a front elevational view partly in section. Fig. 4 is a detail sectional view on line 4—4 of Fig. 1.

This invention relates to a new and useful improvement in pulverizers, the object being to construct a device so that the grinding surfaces may be adjusted by novel mechanism toward and from the hammers.

A further object is to construct the device so that the grinding surface, or a section thereof, may be dropped for the purpose of discharging a load, or of getting rid of uncrushable material, means being also provided for restoring the dropped cage section to its operative position.

With these objects in view the invention consists in the construction, arrangement and combination of the several parts as will hereinafter be described and afterward pointed out in the claims.

In the drawings 1 indicates the side walls of the machine, preferably in the form of a casting, and 2 is the front wall, the lower portion 2<sup>a</sup> of which is preferably hinged for the purpose of gaining access to the interior to renew the grinding surfaces. 3 is the rear wall, whose lowest section 3<sup>a</sup> is hinged for the same purpose.

4 is the top wall which is preferably provided with a corrugated inner face which serves as a grinding surface. A portion of the casting 5, constituting a continuation of this wall, is provided with a feed opening 6, through which material to be reduced is introduced into the machine.

7 is a breaker plate, as it is called, which is preferably mounted upon a casting 8,

pivotally arranged upon a rod 9. This casting 8 is provided with a slot or opening in its lower end for coöperating with a rod 10. The rod 10 is carried by levers 11, arranged on each side of the machine, the side walls 1 being slotted for the passage of said rod. Levers 11 are pivotally mounted upon the rod 9, said levers having threaded openings in their lower ends for coöperating with the screw threads of the rotatable rods 12. Each of the rods 12 may be turned by means of a collar 13, having suitable openings whereby levers 11, and the carried rods 10 may be adjusted inwardly and outwardly. By the engagement of the rod 10 with the breaker plate carrying frame the lower end of the breaker plate may be adjusted toward and from the hammers to compensate for wear and renewal of said hammers.

Suspended from rod 10 is a frame 7' comprising the curved side bars 14, and castings 15, the latter connecting said side bars together. This frame carries a grinding surface 16. The frame is preferably suspended from the rod 10 by means of hooked extensions 15<sup>a</sup>, and is not only capable of having its upper end moved toward and from the hammers to compensate for wear and renewal when the rod 10 is adjusted, but said frame may also swing from said rod to discharge the material, when the machine is overloaded, choked or uncrushable material is fed thereto. The frame is supported in position by means of latch levers 17, see Fig. 4, the upper inner ends of which are provided with projections 17<sup>a</sup>, which fit in the openings 1<sup>a</sup> in the side frames, while the lower inner faces of which are formed with cam faces 17<sup>b</sup>, whereby, when said frame is raised to be restored to position the latch levers are moved outwardly by the engagement of the parts 14 with the cam faces until the projections 17<sup>a</sup> register with the opening in the side frame. A spring 18 tends to hold the latch lever, a latch-lever being on each side of the frame, in position, and this spring and latch lever are carried by a block 19 mounted in guide-ways 19<sup>a</sup>, preferably radially disposed, to the axis of revolution of the hammers. This carrying block 19 is supported by a wedge 20 preferably dove-tailed therein,

which wedge has its outer end connected to the lower end of lever 11. Thus when lever 11 is adjusted not only does the rod 10 move the upper end of the grinding section inwardly, but the wedge operated latch lever also moves the lower end of the grinding section inwardly or outwardly, as the case may be to compensate for wear or renewal of the hammers.

21 indicates a lever arranged on each side of the machine, and fulcrumed upon the side frames at 21<sup>a</sup>, said levers being connected by a rod 22, each of said levers 21 co-operating with a projection 17<sup>a</sup> on the latch levers. In the event that the machine is choked, overloaded or uncrushable material is fed thereinto, and it is desired to discharge the load so as to relieve the machine the rod 22 is raised, whereupon the latch levers are retracted and the pivoted cage section permitted to drop.

To restore the cage section to position we loosely arrange a hand wheel 23 on the end of shaft 10, outside of the casing, to which hand wheel is conjoined a pinion 24. Pinion 24 meshes with a gear 25, which is either splined upon the shaft 9 or is conjoined to a pinion 26 splined on said shaft, and which pinion 26 meshes with a gear 27 splined on the shaft 10. Shaft 10, where the grinding section is hooked thereover, is preferably provided with two flat faces with which the hooked portions engages, so that irrespective of the previous adjustment of said grinding section, said grinding section when it is dropped, may be swung back into position by the rotation of the shaft 10, the latch levers being relied upon to support said grinding surface into position, irrespective of the radially adjusted positions of said latch levers. The rod 10, while geared to the hand wheel in the manner above described, is perfectly free to rotate with the dropping cage and by so doing rotate the gears, because no restraint in any way of a locking pawl is imposed upon the gears. The purpose of employing reducing gear from the hand wheel 23 to the shaft 10, is to enable an operator to restore the dropped cage section manually. Instead of having the shaft 10 flattened, which enables the removal of the cage section, it is obvious that said cage section could be fastened directly to the shaft 10 by means of pins, or in any other well known manner, as the removability is a matter of infrequent occurrence, whereas, the dropping and restoration of the cage section is a matter of possible frequency, and it may be desirable not to weaken the shaft 10 by flattening the sides thereof as herein described. The cage section is preferably provided with a clevis 28 located about its center for the purpose of attaching a chain to remove the same in case of renewal.

29 indicates a cage section pivotally mounted in the rear of the machine and constituting practically the second quarter of the grinding surface, this rear cage section being separated from the forward pivotally mounted cage section by means of a casting 30, which may be secured to the side frames of the machine. Cage section 29 is supported by latch levers carried by the wedges 20, by which its lower end may be adjusted, and by a shaft 10<sup>a</sup>, by which its upper end may be adjusted, in the manner heretofore described, and the means for effecting this adjustment and restoring this cage section, should it be selected as the one to be dropped to relieve the machine of a load, choke or uncrushable matter, is substantially the same as that herein before described, so that repetition of a detailed description of such means is believed to be unnecessary. At the rear end of the machine there is, of course, no breaker plate to be adjusted, but we utilize the movement of the upper end of the cage section 29 to adjust the cage section 30<sup>a</sup>, mounted upon a suitable frame, whose lower end is provided with forked projections 31, which support said cage section and embrace the shaft 10<sup>a</sup> mounted in levers 11<sup>a</sup> in the manner heretofore described in connection with the shaft 10 and levers 11. The shaft 10<sup>a</sup> is provided with gears and a hand wheel, said gears being in mesh with gears on a shaft 9<sup>a</sup> for restoring the pivoted cage section 29 in the manner hereinafter described. The upper end of the cage section 30 is provided with inclined slots 32, which coöperate with a rod 33 secured to the side frame 1, so that when the lower end of said cage section 30 is moved inwardly the upper end, by means of said rod and slots, will also be moved inwardly.

The pivoted revolving hammers are indicated at 34 and these initially operate upon the material by striking on the breaker plate 7 as it enters the machine, these hammers also co-act with the grinding surfaces in further crushing the material until it is of such size to pass through the openings.

Instead of the perforated plates shown, spaced bars or other forms of grinding surfaces, common in this art may be employed. The hammers 34 are pivotally mounted upon rods 35 carried by three-armed supporting plates 36 the arms of which are staggered with relation to each other, and provided with openings for the passage of the bolts 35 at different distances from the axis of rotation. Initially the bolts 35 are arranged in the innermost openings, and as the hammers are worn at their points the bolts can be positioned in the openings farther from the axis of rotation, until finally the bolts are located in the outermost openings as shown. Any intermediate adjustment, when

the hammers are worn, can be taken up by adjusting the cage section. The hammer supports in the form of the three-armed plates shown, are arranged upon the shaft 5 37 mounted in suitable bearings in side frames 1, and whose ends are provided with a driving pulley and a balance wheel respectively, neither of which is shown. By staggering the supporting plates 36 it is 10 obvious that the hammers 34 are likewise staggered, and a hammer mounted between any two arms is in line with the body portion of the supports, whereby, the arms cover the side area across the machine, and, 15 therefore, have a striking area equal to the length of the shaft occupied by their supporting plates.

What we claim is;

1. In a machine of the character described, 20 the combination of a pivotally mounted breaker plate, a grinding section suspended therefrom adapted to be adjusted therewith, and also having a movement independent of said breaker plate, and means for adjusting 25 the lower end of said grinding section.

2. In a machine of the character described, the combination of a pivotally mounted breaker plate, a cage section pivotally 30 mounted thereon, a catch for holding said cage section in position, and means for moving said catch to release the cage section whereby material may be discharged from the machine.

3. In a machine of the character described, 35 the combination of a pivotally mounted breaker plate, a pivotally mounted cage section suspended therefrom, and means for simultaneously adjusting said breaker plate, the end of the cage section connected there- 40 to, and the lower end of the cage section remote therefrom.

4. In a machine of the character described, the combination of a pivotally mounted breaker plate, a cage section carried thereby, 45 a lever for adjusting said breaker plate and adjacent end of said cage section, and a wedge operated by said lever for adjusting the opposite end of said cage section.

5. In a machine of the character described, 50 the combination of hammers, a pivotally mounted breaker plate, a cage section pivotally connected to the breaker plate, levers arranged on opposite sides of the breaker plate, and connections between said levers 55 and breaker plate for adjusting the lower end of said plate and the upper end of said cage section.

6. In a machine of the character described, the combination of a pivoted cage section, 60 of latch levers for said section arranged on opposite sides thereof, and adjustable means in which said latch levers are mounted.

7. In a machine of the character described, the combination of a pivoted cage section, 65 latch levers for said section arranged on

each side thereof, a block in which said latch levers are mounted, and means for adjusting said latch levers.

8. In a machine of the character described, the combination of a pivoted cage section, 70 latch levers for supporting the lower end thereof in position, blocks carrying said latch levers, wedges for operating said blocks, and means for moving said wedges in unison. 75

9. In a machine of the character described, the combination of a pivoted cage section, a latch lever for supporting the same in position, and means for operating said latch lever to release said cage section. 80

10. In a machine of the character described, the combination of a pivoted cage section, latch levers for supporting the same in position, and means for operating said latch levers to release said cage section. 85

11. In a machine of the character described, the combination of a pivoted cage section, latch levers arranged on each side thereof, means for adjusting said latch levers to move said cage section, and means 90 for releasing said latch levers to drop the cage section and discharge the load.

12. In a machine of the character described, the combination of a pivoted cage section, latch levers for supporting the same 95 in operative position, springs for holding said latch levers in operative relation to said cage section, and connected levers for operating said latch levers in unison to release the cage section. 100

13. In a machine of the character described, the combination of an adjustable shaft or rod, a rigid cage section pivotally 105 mounted thereon, and gearing for swinging said cage section about said shaft or rod.

14. In a machine of the character described, the combination of an adjustable shaft or rod, a cage section mounted thereon, a hand wheel, and reducing gears interposed 110 between the hand wheel and said shaft for moving said cage section about said shaft.

15. In a machine of the character described, the combination with a fixed pivot shaft, levers arranged thereon, a rod or shaft carried by said levers, a cage section 115 mounted on said last mentioned shaft, and intermeshing gears arranged on said pivot shaft, and said last mentioned rod or shaft, whereby the said cage section may be moved.

16. In a machine of the character described, the combination of two pivotally 120 mounted and oppositely movable grinding sections, a breaker plate connected to one of said grinding sections and adjustable therewith, and an additional grinding section 125 connected to the other of said grinding sections and movable therewith.

17. In a machine of the character described, the combination of two pivotally 130 mounted and oppositely movable grinding

sections, a breaker plate connected to and movable with one of the grinding sections, means for adjusting said grinding sections, and independent means for tripping said  
5 sections.

18. In a machine of the character described, the combination of a pivotally mounted breaker plate, a grinding section pivotally connected thereto at one end, and  
10 having a movement independent of said breaker plate, a latch engaging said grinding section at the opposite end, and means for releasing said grinding section by moving the latch.

19. In a machine of the character described, the combination of a pivoted cage section, a latch for supporting said section,

means for tripping said latch, and means for independently moving the latch to adjust the position of the cage section.

20. In a machine of the character described, the combination of a pivotally mounted breaker plate, a rod engaging said plate, a grinding section pivotally mounted on said rod, and means for changing the  
25 position of said rod.

In testimony whereof, we have hereunto affixed our signatures in the presence of two witnesses, this 8th day of June, 1910.

MILTON F. WILLIAMS.  
EDWARD H. FRICKEY.

Witnesses:

F. R. CORNWALL,  
M. P. SMITH.