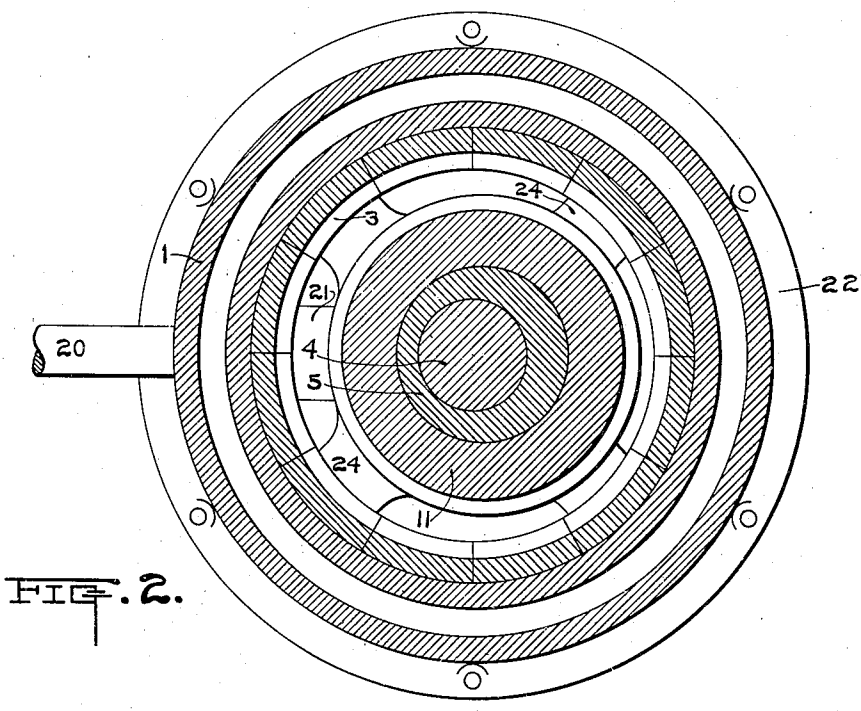
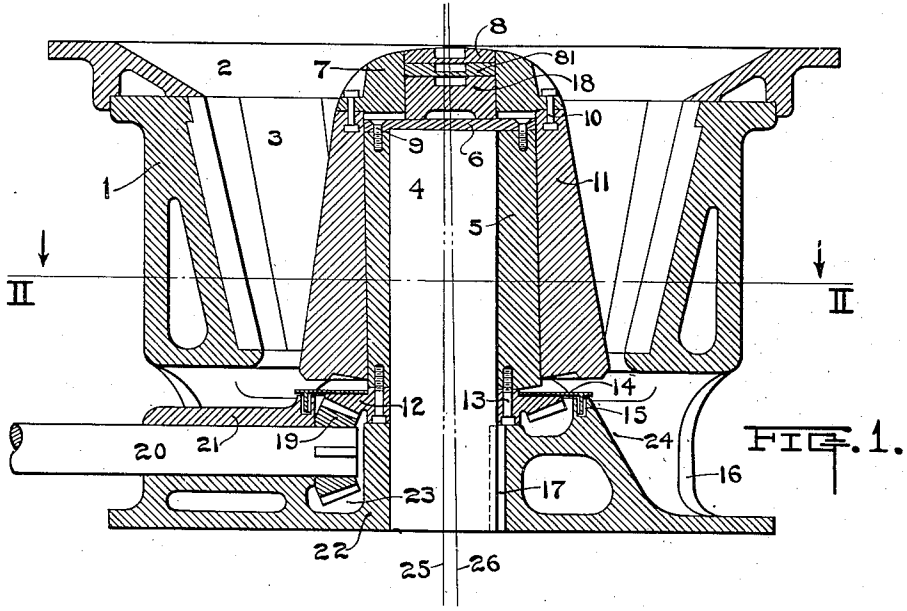


G. F. DE WEIN.  
 GYRATORY CRUSHER.  
 APPLICATION FILED APR. 4, 1910.

961,084.

Patented June 7, 1910.



WITNESSES —  
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# UNITED STATES PATENT OFFICE.

GEORGE F. DE WEIN, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO ALLIS-CHALMERS COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF NEW JERSEY.

## GYRATORY CRUSHER.

961,084.

Specification of Letters Patent.

Patented June 7, 1910.

Application filed April 4, 1910. Serial No. 553,185.

*To all whom it may concern:*

Be it known that I, GEORGE F. DE WEIN, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Improvement in Gyratory Crushers, of which the following is a specification.

This invention relates to improvements in the construction of crushers and in particular, crushers of that type in which a crushing head is caused to gyrate within a stationary shell.

An object of the invention is to produce a crusher which is simple in its construction and efficient in operation, and in which the overall height is a minimum, this being a particularly desirable feature in portable crushers.

Another object of the invention is to produce a crusher having its hopper opening entirely free from obstructions, such as the spider arms used in ordinary crushers of this type.

A further object is to provide a means for adjusting the crushing head whereby the fineness of the crushed material can be easily determined.

A clear conception of one embodiment of the invention can be obtained by referring to the accompanying drawing in which like reference characters designate the same or similar parts in the various views.

Figure 1 is a central vertical section through a crusher built in accordance with the invention. Fig. 2 is a horizontal section of the device shown in Fig. 1, the section being taken along the line II—II of Fig. 1, looking in the direction of the arrow.

The main crusher frame 1 is cylindrical in shape and has its interior, which is of less diameter of bore near its lower than at its upper end, lined with a series of concaves 3 forming a shell. The circular hopper 2 is supported by the frame 1 and concaves 3, and has a central unobstructed opening therethrough which connects with the interior of the frame 1. The frame 1 is supported upon the crusher base 22 by means of a series of ribs 24, which ribs 24 extend outwardly from a central boss of the base 22. The stationary supporting stud 4 is held vertically in the central boss formed on the base 22, and extends upwardly within the frame 1 to a point slightly below the

top thereof. The stud 4 is fixed in the base 22 at its lower end by means of a key 17, but is unsupported at its upper end. The axis of the stud 4 is indicated by a line 25 in Fig. 1. The eccentric 5, having its central axis indicated by a line 26, surrounds the stud 4 and is supported at the upper end of the supporting stud 4 by means of a plate 6.

It will be noted that the lines 25, 26, representing the axes of the stud 4 and eccentric 5, respectively, are not parallel, indicating that the throw of the eccentric 5 is less near the top of the stud 4 than near the bottom thereof. It may be desirable in crushers operating on certain classes of material to have the throw near the lower end of the eccentric less than near the top thereof. In this case, the lines 25, 26, would not intersect above the crusher frame 1, as shown, but at a point below the frame 1 instead. The plate 6 has its lower surface, which coacts with the upper end of the stud 4, formed perpendicular with the axis of the stud 4. The upper surface of the plate 6 is formed perpendicular to the central axis of the eccentric 5, and supports the adjusting plug 18. The plate 6 is fastened to the eccentric 5 in any suitable manner, as by tap bolts 9. The crushing head 11 is conical in shape, being concentric with the eccentric 5. The head 11 is made of suitable wearing material and has a cap 7 which is fastened to the upper end of the head 11 by means of bolts 10. The combined head 11 and cap 7 are supported on the plate 6 by means of the adjusting plug 18 which screws into the cap 7. The locking plug 81 also screws into the cap 7, and serves to lock the plug 18 in a fixed position. The closing plug 8 screws into the cap 7 above the plugs 81, 18, and serves to keep foreign matter from marring the threads formed in the cap 7. It will be noted that neither the crusher head 11, cap 7, nor plug 18 are fastened to the eccentric 5, these elements being free to rotate about the eccentric 5. The driving gear 12, which is concentric with the stud 4, is fastened to the lower end of the eccentric 5 by bolts 13. The gear 12 meshes with a pinion 19; which pinion 19 is keyed to the end of the power shaft 20 and is located in a pocket 23 formed in the base 22. The shaft 20 is supported in a bearing formed integral with the base 22,

being held in position by the cap 21. The gear 12 carries with it an inverted cup shaped baffle 14, the side walls of which are inserted in a circular groove 15 in the base

22. The openings 16 form communications between the interior of the crusher and the exterior, being the discharge openings for crushed material leaving the crusher.

During the operation of the crusher, the eccentric 5 is caused to rotate about the stud 4 by means of power applied through the stud 20 and pinion 19, to the gear 12. The material to be crushed is dropped into the annular space between the concaves 3 and the crusher head 11 through the hopper 2. The rotation of the eccentric 5 causes the head 11 to gyrate about the line 25 as an axis, thus producing a crushing action between the head 11 and the shell formed by the series of concaves 3. It will be noted that with the construction, as shown, the crushing action is greater near the lower end of the crusher than at its upper end, so that the largest pieces of material being crushed are subjected to the least crushing action, the action increasing as the material advances toward the discharge end of the crusher. This action might also be reversed as heretofore stated, by providing an eccentric 5 having greater throw near its upper than at its lower end.

With the crushing head 11 free to revolve on the eccentric 5, it will be seen, that if the material in the crusher should become packed between the shell of concaves 3 and head 11, the rotation of the eccentric 5 will not be retarded, the head in this event remaining stationary while the eccentric 5 slips within it. During such action of the head 11, all points on the head 11 will have a combined vertical and side motion, thus differing from the ordinary short crushers in which the motion of points on the head is horizontal only. By having the axes of the eccentric 5 and stud 4 intersect beyond the crusher elements, there are no points on the head 11 which have no motion, this being the case if the axes intersect within the crusher head 11. It has been found that in crushers having the axis of the eccentric intersecting the main crusher axis, within the crusher, a dead motion point or space of no crushing is produced along the horizontal plane intersecting the intersection point of the axes, thus causing the material being operated on to hang within the crusher along such plane. With the present arrangement, the material is prevented from hanging at any point within the crusher, being urged toward the discharge end of the crusher by the vertical motion of the head 11.

Upon leaving the annular space between the head 11 and concaves 3, the crushed material is discharged from the crusher through the discharge openings 16. The baffle 14

above the gear 12 prevents any of the crushed material and dust from getting at the gear 12 and pinion 19, which gear and pinion are ordinarily run in oil.

As the crushed head 11 and concaves 3 wear down, it is desirable to maintain the same opening at the discharge end of the crusher space. It is therefore necessary to provide a means for vertically adjusting either the head 11 or shell of concaves 3. This adjustment, as shown, is accomplished by means of the adjusting plug 18 which can be screwed up or down within the cap 7, thus either lowering or raising the head 11 as desired. The adjustment might also be made at the concaves 3, thus giving the same results, but complicating the general structure, see patent to Gates, 251,039.

The plate 6, which supports the eccentric 5, can be easily constructed and forms a simple and efficient bearing for the eccentric 5 and head 11. A plate having its lower surface perpendicular to the line 25 and having an upper surface formed spherical with the intersection of the lines 25, 26, as a center, might be inserted in place of the plate 6, the lower surface of the plug 18 in this event being formed spherical and coacting with the upper surface of the plate 6. Such a construction is disclosed in the patent to Gates, 525,410, the point of suspension in the patent however, being above instead of below the point of intersection of the axes.

With the arrangement of the head 11 and eccentric 5 as shown, it will also be noted that these elements can be very easily removed for repairs or inspection by raising them bodily from the stud 4 upon which they are supported.

It should be understood that it is not desired to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent,—

1. In a crusher, a shell, a crusher head within said shell, a rotatable eccentric within said head, and a stud within said eccentric, said stud being supported only from underneath said shell, and said eccentric being supported on the upper end of said stud and having a different throw at different points along its length.

2. In a crusher, a shell, a crusher head within said shell, a rotatable eccentric within said head, said eccentric having a different throw at different points along its length, and a stud within said eccentric, said stud being supported only from underneath said shell, said eccentric being supported on the upper end of said stud, and said head being supported on said eccentric.

3. In a crusher, a shell, a crusher head within said shell, a rotatable eccentric within

said head, a stud within said eccentric, said eccentric having a different throw at different points along its length, and means for adjusting said head on said eccentric.

- 5 4. In a crusher, a shell, a crusher head within said shell, a rotatable eccentric within said head, and a stud within said eccentric, the axes of said stud and said eccentric intersecting at a point beyond said head.
- 10 5. In a crusher, a shell, a crusher head within said shell, a rotatable eccentric within said head, and a stud within said eccentric, the axis of said eccentric being inclined to the axis of said stud and the top of said eccentric extending over said stud and having
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surfaces perpendicular to the axes of said stud and eccentric respectively.

6. In a crusher, a shell, a crusher head within said shell, an eccentric within said head said eccentric having an outer cylindrical surface and a cylindrical bore, the axis of said outer surface being at an angle to the axis of said bore, and a stud within said bore.

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In testimony whereof, I affix my signature 25  
in the presence of two witnesses.

G. F. DE WEIN.

Witnesses:

H. C. CASE,

W. H. LIEBER.