Nov. 12, 1935. O. C. GRUENDER 2,020,464

FEED DEVICE FOR A CONE CRUSHER

Filed April 13, 1932 3 Sheets-Sheet 1

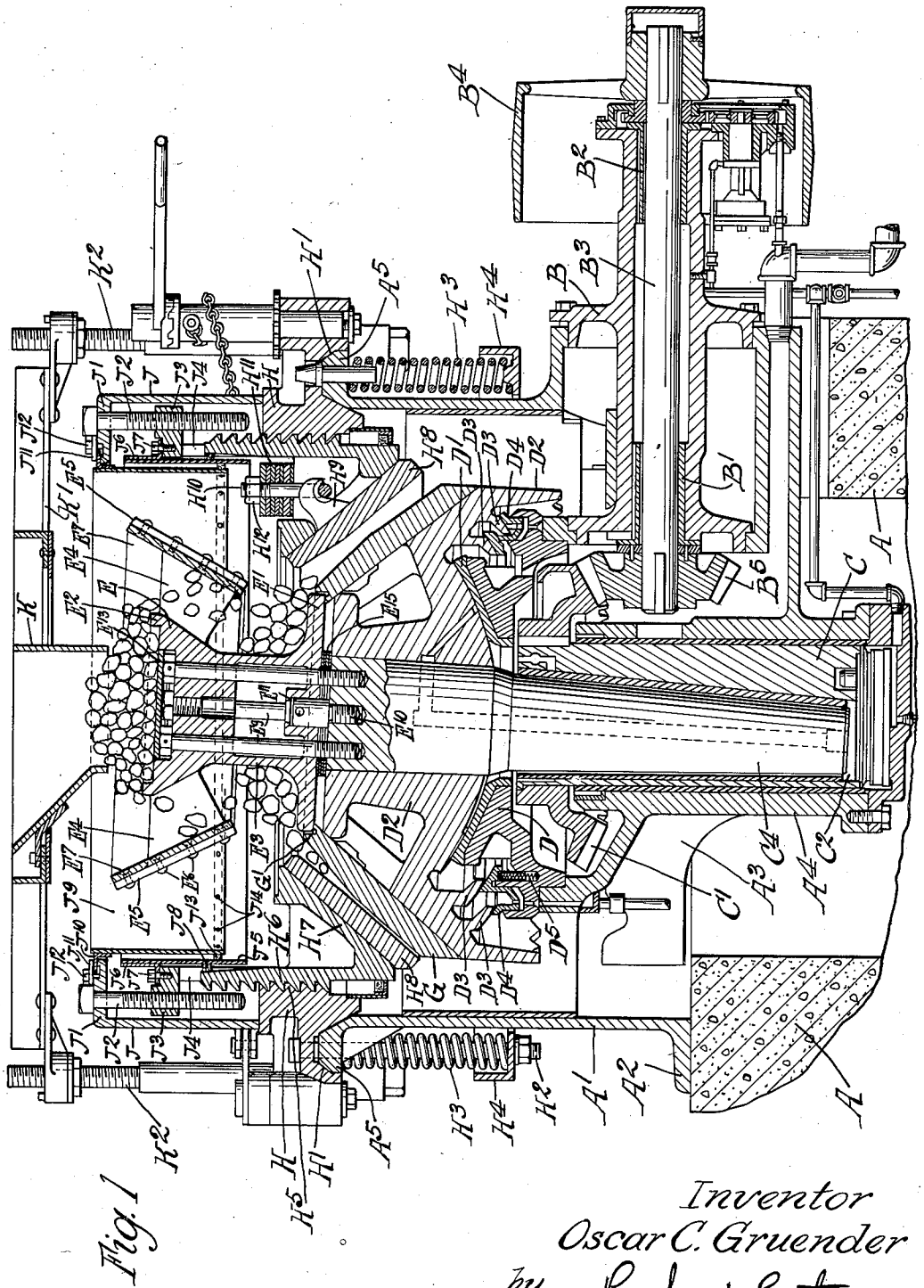

Fig. 1

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Fig. 2

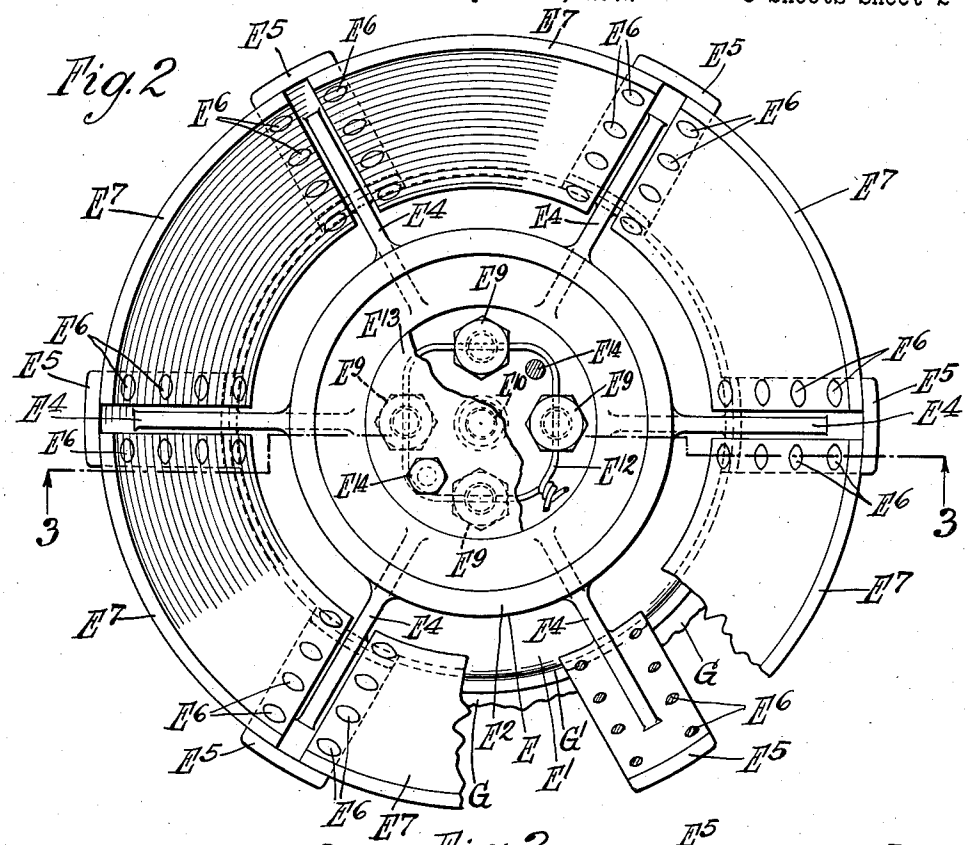
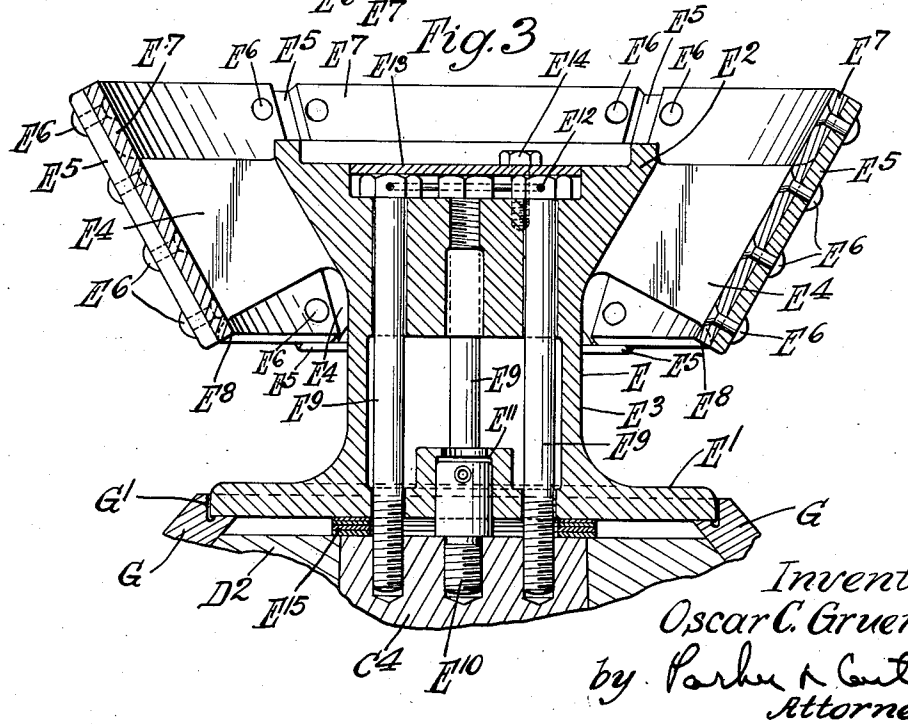


Fig. 3



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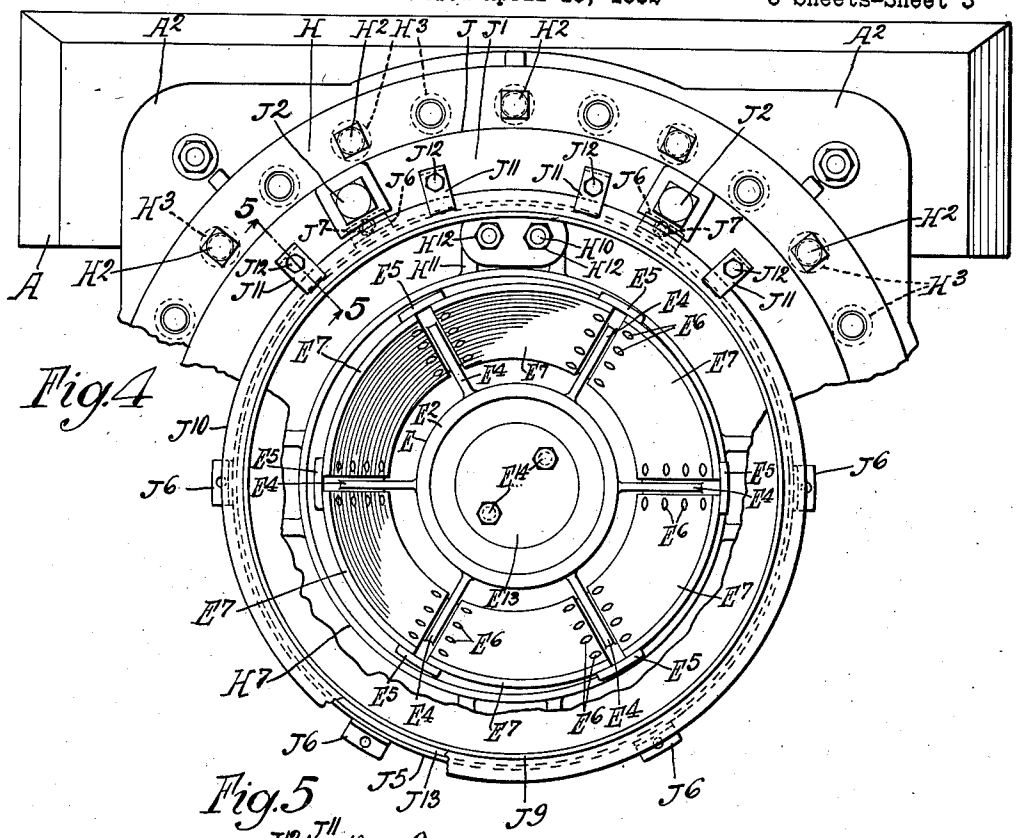

Fig. 4

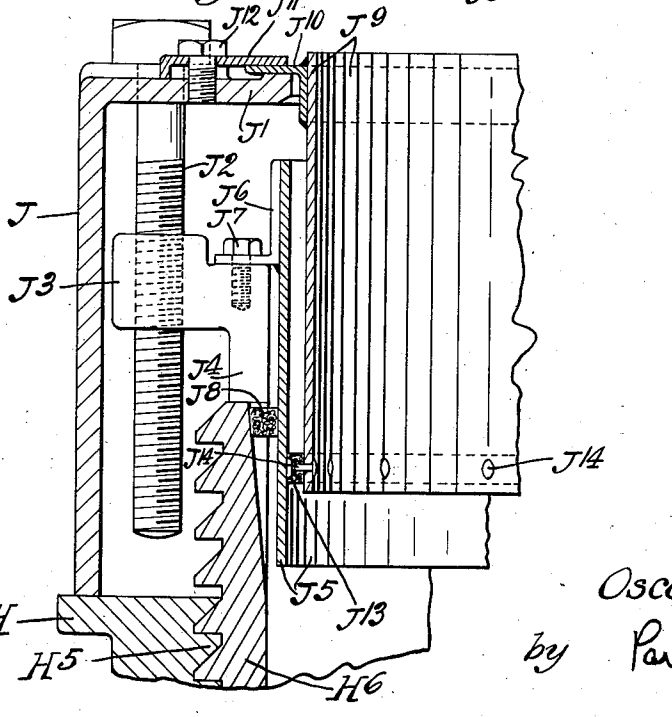

Fig. 5

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UNITED STATES PATENT OFFICE

2,020,464

FEED DEVICE FOR A CONE CRUSHER

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Application April 13, 1932, Serial No. 604,915

2 Claims. (Cl. 83—10)

My invention relates to an improvement in feeding or feed controlling devices for employment with cone crushers. One object is the provision of feeding means which shall be entirely supported upon the head or cone of a cone crusher. Another object is the provision of an improved feeding hopper device, mounted upon the head or cone of such a crusher, which shall deliver all of the material fed to the crusher direct to the top of the cone or head and thence to the crushing cavity. Another object is the provision of an improved hopper or protecting means associated with the bowl of a cone crusher. Other objects will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawings, wherein—

Figure 1 is a vertical axial section;

Figure 2 is a partial plan view illustrating the feed limiting means;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a partial plan view of the entire device; and

Figure 5 is a section on the line 5—5 of Figure 4.

Like parts are indicated by like symbols throughout the specification and drawings.

Referring to the machine as a whole, A indicates any suitable supporting base upon which may be mounted a normally fixed main frame A^1 having a base flange A^2, inwardly extending spider members A^3, a cylindrical inner sleeve A^4 supported thereby and an outwardly extending flange A^5 about the upper edge of the main frame.

Also mounted on the main frame is the bearing sleeve B carrying bearings B^1 B^2 in which rotates the shaft B^3 with the pulley B^4 at one end and the pinion B^5 at the other. The details of the bearings and the associated parts will not be further described since they do not of themselves form part of the present invention.

The pinion B^5 is in mesh with a gear C^1 keyed to the sleeve C, which is eccentrically apertured as at C^2 to receive the shaft C^4. It will be understood that rotation of the shaft B^3 rotates the eccentric sleeve C, through the pinion B^5 and the gear C^1, thus causing a gyration of the aperture C^2.

D indicates a cover member for the top of the sleeve A^4, which cover member extends outwardly over the gear D^1 and houses it. This cover member is provided with a spherical bearing member D^1 upon which is supported the correspondingly formed head D^2 which head is secured in any satisfactory manner to the top of the shaft C^4. The head D^2 is provided with a plurality of spherical wiping members D^3 opposed to corresponding wiping members D^4 mounted upon the cover member D and preferably upwardly thrust as by the springs D^5.

As will be shown in Figure 1 the upper faces of the head D^2 and of the shaft C^4 may lie approximately in the same plane. Positioned above both of them is a feed block or feeding member generally indicated as E. Where in the claims I employ the term "plate" I wish it to be understood as of sufficient breadth to include the employment of a block or extension or feed receiving member of any suitable form, such as the member or block shown in Figures 1 and 3 hereof. It includes a species of base plate E^1 and upper and outwardly flared head member E^2 and a connecting neck E^3 therebetween. From the head portion E^2 extend outwardly arms or spiders E^4 which are integrally headed as at E^5. These heads E^5 may have secured to them, as by bolts or rivets E^6 the segmental hopper members E^7 which combine to form a downwardly and inwardly flared hopper, as will be clear for example from Figures 2 and 3. The lower edge of the hopper, as at E^8 is spaced outwardly from the neck E^3 but may overhang the outer edge of the base plate E^1. The member E may be secured as a unit to the head as by the employment of a plurality of securing bolts or screws E^9. E^{10} is a centering stud penetrating an aperture E^{11} in the base plate E^1, to center the device upon the head. The screws E^9 may be held against rotation as by the employment of a wire or equivalent member E^{12} passing through apertures therein as shown for example in Figure 2. The heads may then be covered by a cover plate E^{13} recessed into the top of the head portion E^2 and held in position as by bolts or screws E^{14}. E^{15} are washers whereby the distance of the plate E^1 above the top of the head may be adjusted.

As will be clear from Figures 1 and 3 the plate E^1 overhangs the edge of the mantle G which mantle is shown as provided with a recess or ledge G^1 to receive the lower outer edge of the base plate E^1. As the screws E^9 are tightened up the plate E^1 is forced downwardly against the mantle G, which may be a single piece or formed of a plurality of rings. In either case the mantle is pressed downwardly over the head D^3.

H indicates a tilting ring formed with a channel H^1 conforming to the flange A^5 of the main frame. Any suitable means, for example the bolts H^2, the

springs H^3 and the segmental abutments H^4 may be employed for holding the ring H normally fixed in relation to the main frame A^1. The ring H is internally screwthreaded as at H^5 in mesh with similar threads on the screwthreaded portion H^6 which supports the bowl H^7. Positioned within the bowl in any suitable manner is the bowl liner H^8 opposed to the mantle G^1. I illustrate for example the lugs H^9 on the mantle H which lugs may be engaged by U-bolts H^{10} with their washers H^{11} and securing nuts H^{12} whereby the mantle is upwardly drawn against the bowl.

Supported on the upper face of the tilting ring H is the housing ring J with the upper inwardly extending flange J^1. Extending downwardly through the flange J^1 are the headed screws J^2 which mesh with blocks or bosses J^3 extending upwardly from the screw threaded portion of the ring H^6. It will be understood that thereby the housing ring J can be locked in position in the position in which it is shown in Figure 5. The bosses J^3 are supported by upward extensions J^4 of the ring H^6. An inner hopper ring J^5 is supported upon the members J^3 or J^4 as by the brackets J^6 held in position by the screws J^7 as shown for example in Figure 5. J^8 is any suitable packing member positioned between the inner face of the ring H^6 and the outer face of the ring J^5. Positioned within the hopper ring J^5 is the inner hopper ring J^9 which is secured to the flange J^1 of the ring J as by the angle ring J^{10} which in turn is locked down by locking members J^{11} drawn down against the flange J^{10} by the securing screws J^{12}. J^{13} is any suitable packing means between the lower edge of the inner hopper ring J^9 and the opposed face of the outer hopper ring J^5. The packing means are shown as riveted to the ring J^9 as by the rivets J^{14}.

K indicates any suitable feed spout mounted for example on the transverse frame work K^1 supported upon the upwardly extending screwthreaded supports K^2. It will be understood that the spout K may thereby be adjusted upwardly or downwardly in relation to the top of the member E.

It will be realized that whereas I have described and shown a practical and operative device, nevertheless many changes might be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my description and showing to be taken as in a broad sense illustrative and diagrammatic rather than as limiting me to my specific showing.

The use and operation of my invention are as follows:

Referring for example to Figure 1, material will be fed through the hopper K. This material will then pile up on the top of the head E and as it spills over, both because of continuing feed and because of gyration of the head as a whole, the particles which spill over will engage the hopper segments E^7 and will be thrown inwardly toward the neck E^3 and the rounded connection between the neck and the plate E^1. The material may pile up in this angle to a certain extent and will flow thence directly into the crushing cavity. The hopper members E^7 however cause a change of direction of the movement of the rock which prevents a free drop from a substantial height into the crushing cavity. This free drop is undesirable in the type of cone crusher shown in the present application, it being desirable that the material should begin its drop at or about or at least not much above the level of the top of the base plate E^1. In practice the stone builds up on the lower flange or plate E^1 and rolls thence into the crushing cavity. In effect the stone which falls outwardly from the edge of the head E is caused by the hopper segments E^7 to return toward the axis of the head and to pass over the belt or flange E^1 before rolling into the open top of the crushing cavity. In practice I find this disposition of parts particularly helpful for employment with the type of cone crusher shown in the co-pending application Ser. No. 489,734, filed in the name of Edgar B. Symons, on the 20th day of October, 1930, matured into Patent 1,920,488, issued August 1, 1933. As is claimed in that application, it is desirable that the material begin its drop through the crushing zone at or in the neighborhood of the level of the upper edge of the bowl liner.

The fulcrum point of the present device, as defined by the spherical bearing D^1, is about midway in the feed distributor.

As all or substantially all of the material which passes through the spout K is directed by the segmental hopper plates E^7 to the flange or base E^1, there is little tendency for the material to escape outwardly beyond the hopper carried by the head. However, in order to protect the screwthreaded engagement between the rings H and H^6 I provide the housing ring J, the outer hopper ring J^5 and the inner hopper ring J^9, supported as above described, and provided with the packing members J^8 and J^{13}.

I claim:

1. In a gyratory crusher, a head, a bowl surrounding said head, head and bowl defining a crushing cavity, means for gyrating said head, the upper portion of said head being formed with a feed receiving upper surface, a downwardly and inwardly inclined hopper mounted upon said head, the lower edge of said hopper terminating upwardly above said feed receiving surface, and a feed receiving plate mounted upon and positioned above said head and within said hopper, said plate having an upper feed receiving surface positioned at a level above the level of the lower edge of the hopper, said hopper being mounted unitarily with said plate.

2. In a gyratory crusher, a head, a bowl surrounding said head, head and bowl defining a crushing cavity, means for gyrating said head, the upper portion of the head being formed with a generally flat feed receiving upper surface generally circular in plan, said upper surface having throughout its circumference a feeding edge over which material may pass to the crushing face of the head, the flat surface extending inwardly a substantial distance from said lip, a downwardly and inwardly inclined hopper mounted upon said head and gyrating bodily therewith, the lower edge of said hopper terminating throughout its periphery upwardly above said feed receiving surface, the inclination of the hopper being such that substantially all material received in the hopper is directed thereby to the feed receiving upper surface of the head at a point within the periphery of said surface, and means for delivering material to the inner face of the hopper at a level between the upper and lower edges of the hopper, said means being adapted to prevent the passage of material through the hopper without contacting said feed receiving upper surface, the upper edge of the crushing surface of the head being located in the general plane of said feed receiving surface.

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