FEED DISTRIBUTOR FOR CRUSHER

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Field of Search 241/202, 207, 208, 241/214, 215, 216

References Cited
UNITED STATES PATENTS
2,207,858 7/1940 Gryender 241/202
2,656,120 10/1953 Roybal 241/202
3,131,876 5/1964 Zuehr 241/202
3,614,023 10/1971 Archer et al. 241/202

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ABSTRACT
A feed distributor is shown mounted above a frame and annular crushing chamber of a gyratory crusher. The distributor has a cylindrical feed wall with an annular flange at its lower end adapted to be removable attached to the crusher frame, and a plurality of arms projecting radially inward from the feed wall to support a platform centrally located within the feed wall. A feed chute is supported on the platform for rotation about a vertical axis centrally located with regard to the feed wall and annular crushing chamber. The chute projects radially outward and downward from a point where the chute intersects the vertical axis about which the chute rotates. A feed hopper is supported by the feed wall over the chute and the hopper has a discharge spout coaxial with the vertical axis about which the chute rotates. A driving motor is supported by the feed wall and is drivingly connected to the chute to rotate the chute and turn the lower and discharge end of the chute in a horizontal annular path above the annular crushing chamber to discharge feed falling through the discharge spout of the hopper downwardly and outwardly from the lower end of the chute into and around the annular crushing chamber of the crusher. The entire feed distributor, including the cylindrical feed wall, may be pre-assembled and mounted on top of a crusher as a single unitary assembly, and removed therefrom as a single unitary assembly, thereby providing easy assembly, disassembly and access to the top of the crusher.

6 Claims, 1 Drawing Figure
FEED DISTRIBUTOR FOR CRUSHER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to rock crushing machines having a conical head and a surrounding shell that defines therebetween an annular crushing chamber, and in particular to such a machine having a feed distributor for evenly discharging feed to the annular crushing chamber. More particularly this invention is an improvement to the feed distributing arrangement disclosed in U.S. Pat. No. 3,506,203.

2. Description of the Prior Art

Crushers known to the prior art of the type referred to and including feed distributing devices, are of perhaps four types.

A first type involves transmitting the motion of a crushing cone, or the motion transmitted to a crushing cone, through gears or pulleys, to a feed distributor over the annular crushing chamber. By the selection of gear or pulley sizes and design of the gear train the feed distributor may be made to turn at a selected speed which may be considerably faster than the drive turns the cone or an eccentric bearing around the cone shaft.

A feed distributor of this type is shown in U.S. Pat. No. 475,330 of 1892. More modern versions of such a feed distributor are shown in, for example, U.S. Pat. No. 2,621,860 of 1952; and U.S. Pat. No. 2,917,247 of 1959.

A second type to appear in the prior art provides a feed distributing cone, pan or plate resiliently mounted above the crushing chamber and flexibly connected to the crushing cone so that the turning or gyrating motion of the crushing cone causes the feed distributor to wobble and this motion is utilized to distribute feed material around the annular crushing chamber. Such a feed distributor is shown in U.S. Pat. No. 1,761,240 of 1930; U.S. Pat. No. 2,586,122 of 1952; and U.S. Pat. No. 2,656,120 of 1953.

Neither of the first two types to appear in the prior art had any provision for adjusting the speed of operation of the feed distributor while the crusher was in operation and independent of the rate of gyration or rotation of the crushing head. A third type then appeared in the prior art, having one or more drive motors separate and independent of the crusher drive. Thus the feed distributor of this type can be adjusted to operate at selected rates independent of the rate of gyration or rotation of the crusher head. Such a feed distributor is shown in U.S. Pat. No. 2,737,289 of 1956; U.S. Pat. No. 3,212,720 of 1965; U.S. Pat. No. 3,358,939 of 1967; U.S. Pat. No. 3,884,215 of 1957; and U.S. Pat. No. 3,565,353 of 1971. In such machines force is applied to the feed material to move the feed in a generally horizontal plane to a location over the crushing chamber where gravity is relied upon to direct the material between the cone and the surrounding shell structure.

A fourth type is exemplified by the aforesaid U.S. Pat. No. 3,506,203 and by U.S. Pat. No. 3,604,636 of 1971, which disclose feed distributors that direct a flow of feed material around an annular crushing chamber and down an inclined path.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a new and improved feed distributor for crushers, that may be pre-assembled as a single unitary assembly including an upright cylindrical feed wall, that may then be simply and easily mounted on a crusher as a single unitary assembly, and that may be simply and easily removed from the crusher as a single unitary assembly to provide easy and unencumbered access to the top of the crusher.

According to a preferred embodiment of the present invention, a complete feed distributor is mounted above a frame and annular crushing chamber of a gyratory crusher. The distributor has a cylindrical feed wall with an annular flange at its lower end adapted to be removably attached to the frame, and a plurality of arms projecting radially inward from the feed wall to support a platform centrally located within the feed wall. A feed chute is supported on the platform for rotation about a vertical axis centrally located with regard to the feed wall and annular crushing chamber. The chute projects radially outward and downward from a point where the chute intersects the vertical axis about which the chute rotates. A feed hopper is supported by the feed wall over the chute and the hopper has a discharge spout coaxial with the vertical axis about which the chute rotates. A driving motor is supported by the feed wall and is drivingly connected to the chute to rotate the chute and turn the lower and discharge end of the chute in a horizontal annular path above the annular crushing chamber to discharge feed falling through the discharge spout of the hopper downward and outwardly from the lower end of the chute into and around the annular crushing chamber of the crusher. Thus the entire feed distributor, including the cylindrical feed wall, may be pre-assembled and mounted on top of a crusher as a single unitary assembly, and removed therefrom as a single unitary assembly, thereby providing easy assembly, disassembly and access to the top of the crusher.

Other features of the invention and how they have been attained will appear from the more detailed description of the invention shown on the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

The drawing is a fragmentary side elevation, partly in section, of a gyratory crusher according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing, an upper portion of a gyratory crusher is shown comprising a frame top shell 2, an annular bowl 7 arranged within shell 2, and a conical crushing head 8 within bowl 7 that cooperates with bowl 7 to define an annular crushing chamber 10.

A feed distributor 12 according to the present invention, is mounted on top of the frame top shell 2 and over the crushing chamber 10. The distributor 12 has a cylindrical feed wall 14 with an inwardly projecting annular flange 16 at the lower end of wall 14. The annular flange 16 is adapted to engage and seat on an annular flange 18 around the top of the frame top shell 2, and the annular flange 16 is secured to shell flange 18 by a plurality of bolts 20 projecting through holes 21 in flange 18, where bolts 20 are secured by nuts 20a. A plurality of arms 22 project radially inward of wall 14 and a platform 24 is connected by bolts 26 to the inner
ends of arms 22. The arms 22 and platform 24 are shown resting upon annular flange 16. The bolts 20 pass through a flange 27 on each arm 22 before passing through flange 16 and top shell flange 18. Thus the same bolts, labeled 20, may serve to connect the arms 22 to the flange 16 and, the entire distributor 12 to the crusher frame top shell 2.

A support 30 mounted on platform 24, carries a rotating assembly 32 for rotation about a vertical axis X-Y centrally located with regard to feed wall 14, bowl 7 and crushing chamber 10. The support 30 comprises an upright post 34 connected to platform 24 as by weld 36, bearings 38 and 40 mounted around post 34, and a hub 42 mounted about bearings 38, 40. The hub 42 has a radially outward projecting flange 44.

The rotating assembly 32 comprises an annular collar 50 which rests on top of hub flange 44, and is secured thereto by a plurality of bolts 52. An upright tubular support 54 is secured, as by welding, on top of collar 50 coaxial to the post 34 and hub 42 of the support 30. The tubular support 54 is provided with an upper edge 56 which defines a plane that is inclined relative to the vertical axis X-Y. A flat feed chute 58 has a lower portion 59 that projects radially outward and downward from a point 60 where chute 58 intersects vertical axis X-Y. A cylindrical sleeve 62 is connected to an upper portion 64 of chute 58 by a weldment 66. An annular sheave 70 is secured around the outer circumference of sleeve 62 by any suitable means (not shown). A driving motor 72 is mounted on the outer circumference of wall 14 by a mounting bracket 74. Motor 72 has a drive shaft 76 and a driving sheave 78 is secured thereto. An endless belt 80 drives sheave 78 to sheave 70.

A feed hopper 82 having a discharge spout 84 depending therefrom, is arranged with discharge spout 84 projecting downwardly and coaxially into sleeve 62. The hopper 82 is mounted on top of the cylindrical feed wall 14 by a plurality of bolts 86 that connect hopper 82 to a flange 88 made integral with wall 14 at the top of wall 14.

In the operation of the present invention such as has been described, feed material to be crushed is delivered by any suitable means (not shown) and dumped into feed hopper 82. The feed material delivered to hopper 82 drops through the discharge spout 84 to land on the upper surface of feed chute 58. Motor 72 turns shaft 76 and sheave 78 to transmit torque through belt 80 to rotate the annular sheave 70. As annular sheave 70 is turned the sleeve 62 and included feed chute 58 are rotated about post 34. The feed material dropping on the upper surface of chute 58 flows downwardly and over the lower portion 59. The rotation of chute 58 about vertical post 34 provides an even distribution of feed material around annular crushing chamber 10.

The entire distributor 12, including the stationary feed wall 14 and the rotating structures within wall 14, may be pre-assembled as a single unitary assembly, that then may be simply and easily mounted on a crusher by positioning and lowering the assembly, with bolts 20 passing downwardly through the holes 21 in the flange 18, for securing the distributor 12 to the crusher top shell 2. Likewise, the entire distributor 12, including the stationary feed wall 14 and the rotating structures within wall 14, may be simply and easily removed as a single unit by removing nuts 20a from bolts 20 and lifting the entire assembly off the crusher top shell 2, thus providing easy, quick and unencumbered access to the top of the crusher.

From the foregoing detailed description of the present invention it has been shown how the objects of the present invention have been attained in a preferred manner. However, modification and equivalents of the disclosed concepts such as readily occur to those skilled in the art are intended to be included in the scope of this invention. Thus, the scope of the invention is intended to be limited only by the scope of the claims such as are or may hereafter be, appended hereto.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a crusher having a generally vertical conical head surrounded by a frame to define therebetween an annular crushing chamber, a feed distributor comprising:
   an upright cylindrical feed wall having a lower end adapted to be removably attached to a portion of the crusher frame surrounding the annular crushing chamber;
   a plurality of arms projecting radially inward from the feed wall with a platform mounted on inner ends of the arms coaxial to the surrounding feed wall;
   a feed chute supported on the platform for rotation about a vertical axis coaxial with the feed wall; and
   a motor supported by the feed wall and drivingly connected to the chute to rotate the chute relative to the surrounding feed wall, with the cylindrical feed wall thereby carrying both the motor and the rotatable chute for unitary attachment and removal from the crusher frame.

2. A crusher according to claim 1 in which the chute has a first portion that projects outward and downward from a point at which the chute intersects the vertical axis about which the chute rotates.

3. A crusher according to claim 2 in which the chute is planar and has a second portion that projects outward and upward from the point at which the chute intersects the vertical axis about which the chute rotates.

4. A crusher according to claim 3 in which the motor is drivingly connected to the chute by means including an annular sheave arranged with an axis central thereto being coaxial with the vertical axis about which the chute rotates and with the annular sheave being connected to the second portion of the chute which projects outward and upward from the point where the chute intersects the vertical axis about which the chute rotates.

5. A crusher according to claim 3 in which a cylindrical sleeve is arranged around the second portion of the chute that projects outward and inward from the point at which the chute intersects the vertical axis about which the chute rotates, an annular sheave is secured around the outer circumference of the sleeve and coaxial to the sleeve, and an endless belt drivingly connects the motor to the annular sleeve to rotate the sleeve and the chute relative to the surrounding feed wall.

6. A crusher according to claim 5 in which a feed hopper is mounted on top of the cylindrical feed wall, with the hopper having a depending discharge spout projecting downwardly and coaxially within the rotating sleeve to a level spaced vertically above the planar chute.
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,785,578               Dated January 15, 1974

Inventor(s)                            Robert H. Kemnitz

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 55, "inward" should read -- upward --.

Signed and sealed this 1st day of October 1974.

(SEAL)
Attest:

McCoy M. Gibson Jr.                      C. Marshall Dann
Attesting Officer                          Commissioner of Patents