Feb. 10, 1953 W. C. ROGERS ET AL 2,628,038

STATIONARY PEG OR PULVERIZER FOR ROTARY BEATER MILLS

Filed March 17, 1950

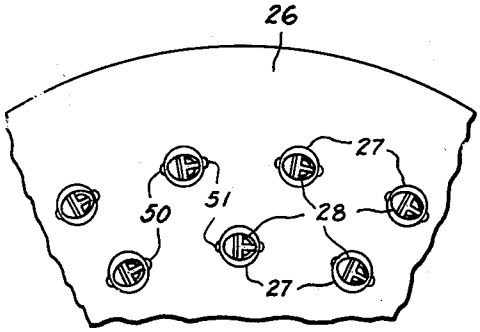


Fig. 6

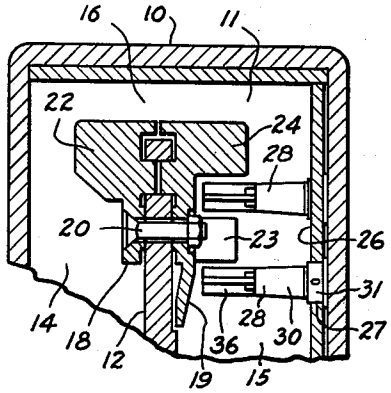


Fig. 5

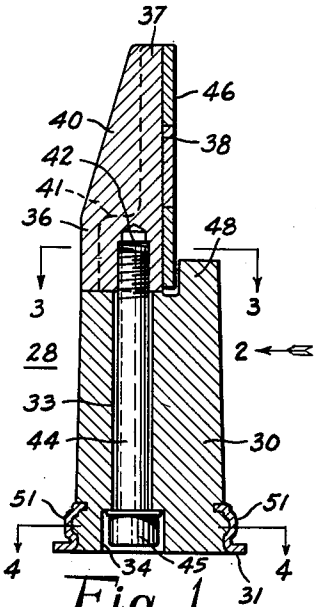


Fig. 1

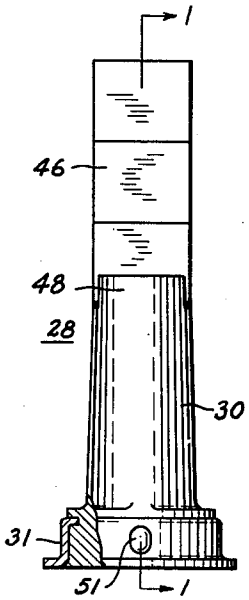


Fig. 2

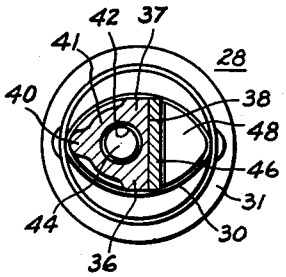


Fig. 3

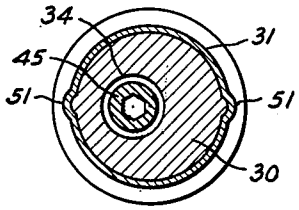


Fig. 4

INVENTORS
WAYNE C. ROGERS
LESTER A. BOLTON JR.

BY Albert G. Blodgett

ATTORNEY

Patented Feb. 10, 1953

2,628,038

UNITED STATES PATENT OFFICE

2,628,038

STATIONARY PEG OR PULVERIZER FOR ROTARY BEATER MILLS

Wayne C. Rogers and Lester A. Bolton, Jr., Worcester, Mass., assignors to Riley Stoker Corporation, Worcester, Mass., a corporation of Massachusetts

Application March 17, 1950, Serial No. 150,146

8 Claims. (Cl. 241—300)

1

This invention relates to pulverizing apparatus, and more particularly to the construction of the stationary pegs or pulverizing elements in machines of the rotary beater type.

One machine of this type which has proven to be highly successful comprises a rotatable disk mounted within a stationary casing. The material to be pulverized, for example coal, is carried through the casing by means of an air current, and pulverization is brought about by the action of interfitting stationary and revoluble impact pegs mounted on the casing wall and the rotor disk respectively. The stationary pegs are subjected to considerable abrasive action, as well as to the impact of the coal and of any foreign bodies which may be mingled therewith. Consequently these pegs may become worn rather rapidly, and under some circumstances they may even be broken in service.

It is accordingly one object of the invention to provide a novel construction for a pulverizing element which will have a far longer life of useful service than prior devices.

It is a further object of the invention to provide a pulverizing element which is adapted to withstand abrasive action and impact without appreciable wear or damage throughout an extremely long period of operation.

It is a further object of the invention to provide a pulverizing element which can be manufactured at a cost that is low in comparison with the length of service obtainable therefrom.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

In accordance with the invention there is provided a pulverizing element comprising a base portion adapted to be attached to a supporting structure. This base portion is preferably in the form of a short peg of hard metal cast into a flanged metal ferrule which serves to support the peg at its inner end. The peg is preferably of approximately oval or lenticular cross section. On the outer end of the peg there is mounted a piece of strong tough metal forming an extension of the peg and having on its front side a flat surface which preferably lies at approximately right angles with the major axis of the oval cross section of the peg. This extension piece is fastened to the peg by a tension member such as a screw or the like of strong tough metal which extends longitudinally through the peg. To the said flat surface of the extension piece there is secured a

2

protective lining or armor plate comprising one or more flat pieces of an extremely hard material, such as tungsten carbide. The peg is preferably formed on its outer end with a short integral lug which overlaps the inner edge of the armor plate.

Referring to the drawings illustrating one embodiment of the invention, and in which like reference numerals indicate like parts,

Fig. 1 is a longitudinal cross section through a stationary pulverizing element, the section being taken on the line 1—1 of Fig. 2;

Fig. 2 is a front elevation of the pulverizing element as indicated by the arrow 2 in Fig. 1, with a small portion of the device broken away for clearness of illustration;

Fig. 3 is a view taken in section on the line 3—3 of Fig. 1;

Fig. 4 is a view taken in section on the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary sectional view of a pulverizer with the improved stationary elements mounted therein; and

Fig. 6 is a fragmentary elevation of the pulverizer cheek plate with the improved stationary elements mounted thereon.

In Figs. 5 and 6 there is shown a portion of a pulverizer of the general type disclosed in the prior patent to Craig No. 1,714,080, granted May 21, 1929. This machine comprises a casing 10 shaped to provide a generally cylindrical pulverizing chamber 11 within which there is mounted a vertical disk 12 rotatable about a horizontal axis. This disk divides the chamber 11 into an inlet zone 14 and an outlet zone 15 which are connected by an annular passage 16 around the outer edge of the disk. Wear plates 18 are mounted on the inlet zone side of the disk, and other wear plates 19 are mounted on the outlet zone side of the disk, these parts being held in place by bolts 20. Certain of the plates 18 are provided with integral impact members 22, and the plates 19 are provided with integral impact members 23 and 24 arranged in two concentric circular rows around the axis of the disk. A vertical cheek plate 26 is mounted within the outlet zone 15 in a position adjacent the wall of the casing 10 and spaced appreciably from the rotor disk. This cheek plate is provided with two concentric circular rows of openings 27 around the axis of the disk, and within each opening there is mounted a stationary pulverizing element 28. These elements 28, which form the subject matter of the present invention, extend from the cheek plate 26 toward the rotor disk, and they interfit in known manner with the revolving elements 23 and 24. When the

machine is in operation, a cloud of air and particles of coal (or other material being pulverized) will whirl at high speed in the outlet zone 15 under the influence of the revolving elements 23 and 24. As the rapidly moving coal particles strike the stationary elements 28, these particles will be reduced to a fine powder. This powder will be entrained by the air stream and thus be carried out of the pulverizing chamber. During such operation the stationary elements 28 are subjected to severe abrasive action and to the impact of rapidly traveling coal particles and foreign matter.

In order that the elements 28 may withstand such severe conditions, they are constructed in a novel manner. Thus each element 28 comprises a base portion in the form of a short peg 30 of a hard metal, such as white iron, cast into a flanged ferrule 31 of a strong resilient metal, such as steel. This ferrule is located at the inner end of the peg and serves as a support for the peg. While the ferrule and the adjacent portion of the peg are circular, the remaining portion of the peg, which extends outwardly from the ferrule, is of approximately oval or lenticular cross section. An opening 33 extends longitudinally through the peg 30, the inner end of this opening being enlarged to form a counterbore 34. The axis of the opening 33 is parallel with the centerline of the peg and somewhat offset therefrom in a rearward direction along the major axis of the oval cross section of the peg. On the outer end of the peg 30 there is mounted an extension piece 36 formed of a strong tough metal such as steel. This piece 36 comprises a plate portion 37 elongated in the outward direction, the portion 37 having a flat front surface 38 generally aligned with the peg and extending at right angles with the major axis of the oval cross section of the peg, and a rib 40 extending longitudinally along the rear surface of the plate portion 37. At the inner end of the piece 36 there is provided a boss 41 having a screw-threaded hole 42 therein aligned with the opening 33 in the peg 30. A tension member in the form of a bolt or screw 44 extends through the opening 33 and into the hole 42 to engage the threads therein, the inner end of the screw having a head 45 thereon of the socket type which lies within the counterbore 34. The screw 44 is preferably made of steel or other strong resilient material. The extension piece 36 is protected from abrasion by means of armor plate 46 applied to its front face 38. This armor plate comprises three flat rectangular pieces of an extremely hard material, preferably tungsten carbide in the cast form, although cemented tungsten carbide or other hard materials can be employed. The armor plate may be secured to the face 38 by silver soldering or brazing. On the outer end of the peg 30 there is formed a small lug 48 which lies in front of the armor 46 and slightly overlaps the inner edge thereof, this lug having a plane rear surface which lies close to the front surface of the armor. In order that the elements 28 will be oriented properly when placed in the pulverizer, each opening 27 in the check plate 26 is provided with two diametrically opposed recesses 50, and each ferrule 31 is provided with two diametrically opposed radial bulges or projections 51 adapted to enter the recesses 50 at assembly and to ensure that the major axes of the oval pegs will extend circumferentially as shown in Fig. 6.

It will be apparent from Fig. 5 that the revolving impact members 23 and 24 overlap the extension pieces 36 but not the pegs 30. When the machine is in operation there will be a zone of tremendous turbulence in the region where these parts overlap, and the elements 28 will be subjected to very severe abrasive action from the material undergoing pulverization, as well as to the impact of particles of material traveling at very high speeds. Most of this abrasive action and impact is received directly by the armor plate 46, which is capable of withstanding such conditions for very long periods without appreciable wear. The armor protects the steel extension piece 36 from abrasion, and the extension piece in turn provides the strength and resilience necessary to support the armor properly. In the case of a very heavy blow or impact on the armor 46, the bolt 44 may yield elastically, permitting the piece 36 to rock slightly to the rear, so that the shock may readily be absorbed without physical damage to any of the parts. The lug 48 performs a very important duty in shielding the inner edge of the armor 46 from the abrasive particles and in this manner preventing undercutting of the material of the peg 30 by a concentrated stream of such particles. It will be understood that while the white iron peg 30 is hard, it does not even remotely approach the tungsten carbide armor 46 in hardness. The oval shape of the pegs 30 has the effect of reducing the eddy currents in the cloud of air and material traveling past the pegs, thereby providing a smoother flow for this cloud, with less abrasive wear on the pegs.

The invention provides a pulverizing element which is comparatively simple and inexpensive to manufacture. It is constructed for the most part of steel and cast iron, which are inexpensive materials. While the armor 46 is preferably of tungsten carbide, which is rather costly, only a small quantity of this material is required. The improved pulverizing element has a far greater life of useful service than any construction heretofore employed for the purpose.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A pulverizing element comprising a base portion in the form of a peg of hard cast metal adapted to be attached at its inner end to a supporting structure, an extension piece of a strong tough metal fastened to the outer end of the peg, the extension piece including a plate portion elongated in the outward direction and having a substantially flat front surface generally aligned with the peg, a substantially flat armor plate of extremely hard material fastened to the said front surface in position to be subjected to severe abrasive action by material undergoing pulverization when the element is in service, and a lug integral with the peg and projecting outwardly therefrom in front of the inner portion of the armor plate.

2. A pulverizing element as set forth in claim 1, in which the lug is provided with a flat rear surface which lies close to the inner portion of the front surface of the armor plate.

3. A pulverizing element comprising a base portion in the form of a peg of hard cast metal adapted to be attached at its inner end to a supporting structure and having an opening extending longitudinally therethrough, an extension piece of a strong tough metal mounted on the outer end of the peg and having a substantially flat front surface generally aligned with the peg, a

tension member extending through the said opening and connecting the inner portion of the peg to the inner portion of the extension piece, and a substantially flat armor plate of extremely hard material fastened to the said front surface in position to be subjected to severe abrasive action by material undergoing pulverization when the element is in service.

4. A pulverizing element as set forth in claim 3, in which the tension member is in the form of a screw with a head at its inner end and screw threads on its outer end which engage a screw threaded opening in the inner end of the extension piece.

5. A pulverizing element as set forth in claim 3, in which the tension member has a head on its inner end which fits within a counterbore at the inner end of the opening through the peg.

6. A pulverizing element comprising a base portion in the form of a peg of hard cast metal adapted to be attached at its inner end to a supporting structure and having an opening extending longitudinally therethrough, an extension piece of a strong tough metal mounted on the outer end of the peg and including a plate portion having a substantially flat front surface generally aligned with the peg, a rib extending along the rear surface of the plate portion, and a boss at the inner end of the extension piece having a screw-threaded hole therein aligned with the said opening, a screw extending through the said opening and engaging the screw-threaded hole to fasten the extension piece to the peg, and a substantially flat armor plate of extremely hard material fastened to the said front surface in position to be subjected to severe abrasive action by material undergoing pulverization when the element is in service.

7. A pulverizing element comprising a base portion in the form of a peg of hard metal cast at its inner end into a flanged circular metal ferrule, an extension piece of a strong tough metal fastened to the outer end of the peg and having a substantially flat front surface generally aligned with the peg, and a substantially flat armor plate of extremely hard material fastened to the said front surface in position to be subjected to severe abrasive action by material undergoing pulverization when the element is in surface, the ferrule having one or more small radial bulges adapted to engage recesses in a supporting structure and to ensure correct orientation of the pulverizing element when it is installed in a pulverizing machine.

8. A pulverizing element as set forth in claim 3, in which there is provided a lug integral with the peg and projecting outwardly therefrom in front of the inner portion of the armor plate.

WAYNE C. ROGERS.
LESTER A. BOLTON, JR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,186,071	Bledsoe	June 6, 1916
1,322,339	Plaisted	Nov. 18, 1919
1,576,472	Riley	Mar. 9, 1926
2,208,892	Bukacek	July 23, 1940
2,246,799	Holland-Letz	June 24, 1941

FOREIGN PATENTS

Number	Country	Date
432,024	Germany	July 29, 1926
658,310	Germany	Apr. 13, 1938