

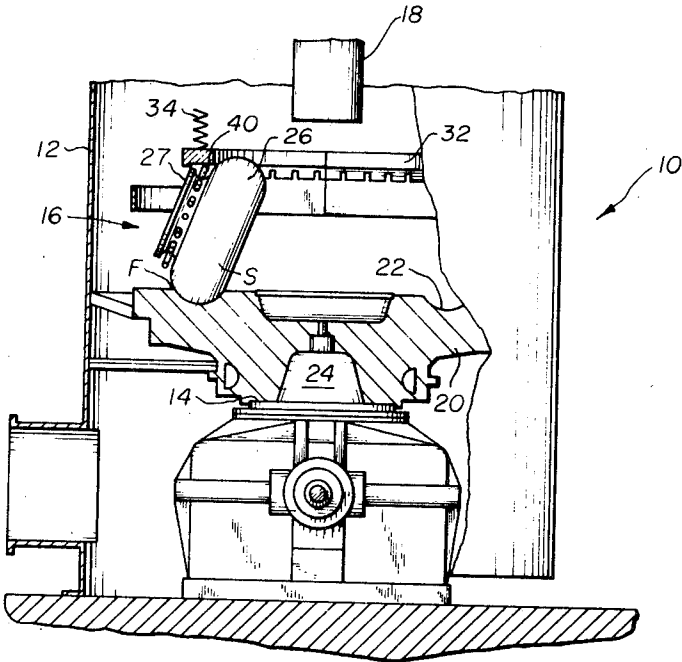
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[54] **PULVERIZER**
3 Claims, 4 Drawing Figs.
[52] U.S. Cl..... **241/118,**
74/416, 241/103
[51] Int. Cl..... **B02c 15/00,**
F16h 1/12
[50] Field of Search..... **74/415,**
416; 241/103, 104, 106, 120, 126, 300, 118, 125

ABSTRACT: Apparatus is provided for pulverizing raw coal feed stock into comminuted particles which can be conveyed to the combustion chamber of a furnace. A meshing gear arrangement is provided between the rollers and the thrust ring of the pulverizer to prevent skidding of the rollers.



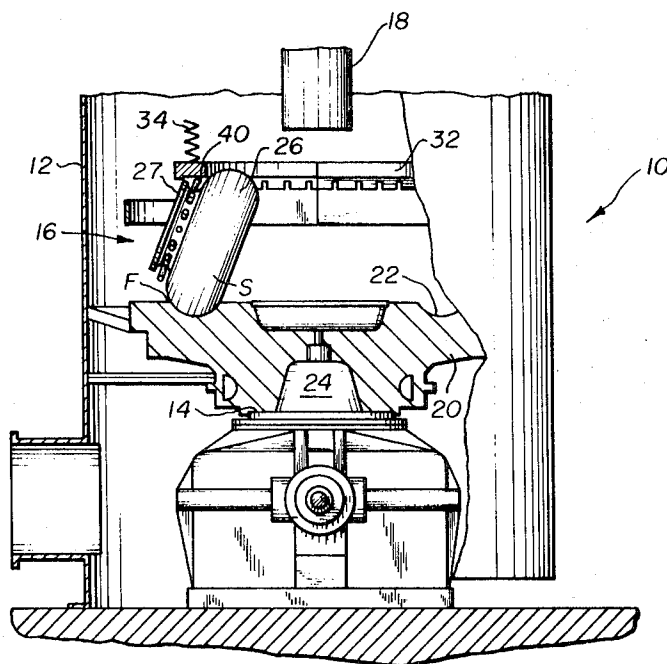


FIG. 1

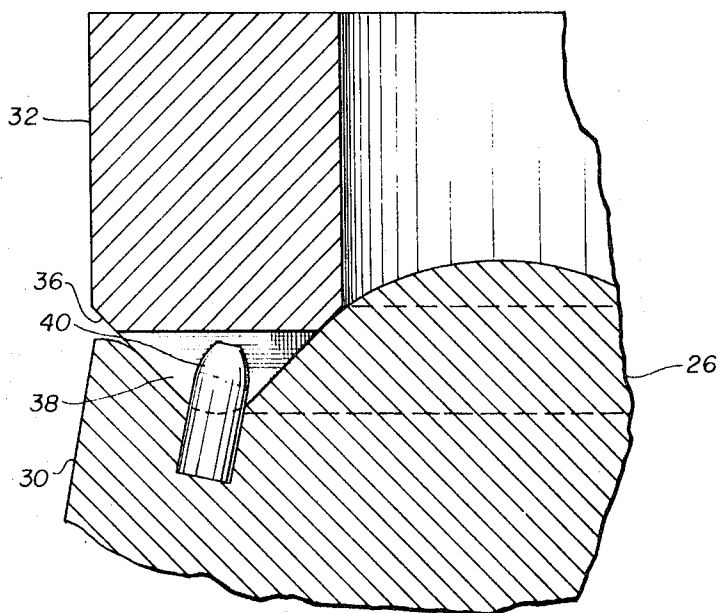


FIG. 2

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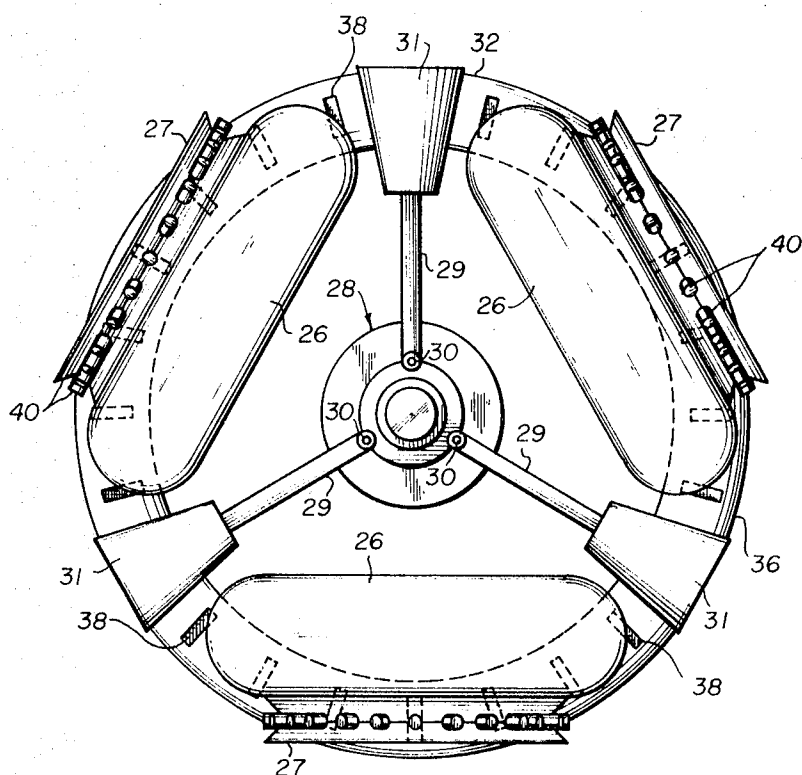


FIG. 3

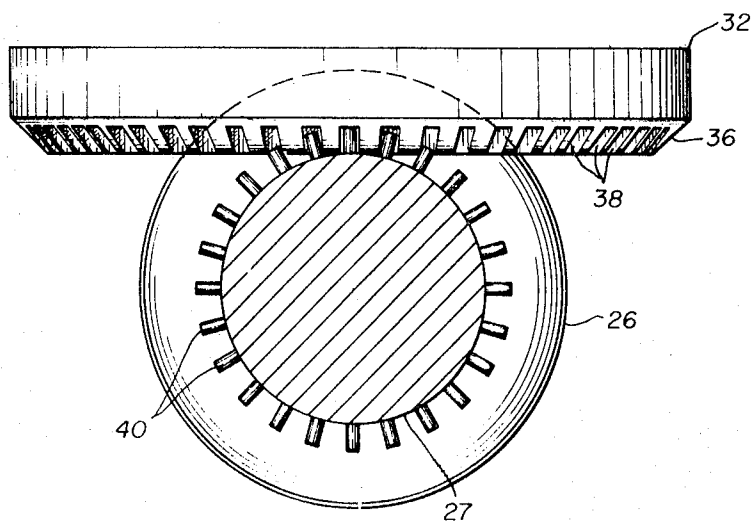


FIG. 4

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PULVERIZER

BACKGROUND OF THE INVENTION

In connection with the operation of relatively large coal fired furnaces which are used in vapor generating systems in the utility industry for production of electricity, it is necessary to supply finely powdered coal to the combustion chamber of the furnace. The raw coal feed stock is usually reduced to comminuted particles in a pulverizer apparatus which generally consists of a rotating grinding table on which there is formed a grinding surface, and three relatively heavy pulverizer rollers are journaled within the apparatus and maintained in contact with the grinding surface by a thrust ring. The pulverizer rollers are usually separated by means of a spacer attachment which includes separate blocks positioned between the pulverizer rollers.

In the operation of pulverizing apparatus, there has developed a problem in that the rollers skid along the grinding surface. This skidding phenomena is due to dimensional differences of the respective rollers in a pulverizing apparatus, as well as changes in roller configuration caused by wear. Accordingly, each of the rollers has a different velocity, which results in the fastest moving roller in a pulverizing apparatus pushing the roller in front of it, and thereby establishing skidding action. When the three rollers begin to skid, the grinding operation in the pulverizer completely ceases.

In accordance with the present invention, the skidding of the rollers has been essentially eliminated by providing positive engagement between the rollers and the thrust ring. This is achieved by forming gear teeth along each of the rollers which are capable of meshing engagement with slots formed along the lower periphery of the thrust ring. Thus, when a hard particle becomes lodged between the grinding surface of a roller and the rotating bed, the positive engagement of a gear tooth in a slot will prevent the rollers from skidding.

SUMMARY OF THE INVENTION

In accordance with an illustrative embodiment demonstrating features and advantages of the present invention, there is provided an apparatus for pulverizing material into comminuted particles including a housing and a table having a grinding surface mounted in the housing for rotation. Means are provided for rotating the table and for introducing the material into the housing in contact with the grinding surface. A plurality of rollers each having a peripheral grinding face are maintained in contact with the grinding surface. Gear teeth are formed around each of the rollers and spaced apart from the grinding surface. A thrust ring is mounted in contact with the rollers, and the thrust ring is formed with slots for receiving the gear teeth in meshing engagement such that the rollers are prevented from skidding along the table.

BRIEF DESCRIPTION OF THE DRAWINGS

The above brief description as well as further objects, features, and advantages of the present invention will be more fully appreciated by reference to the following detailed description of a presently preferred but nonetheless illustrative embodiment in accordance with the present invention, when taken in connection with the accompanying drawings wherein:

FIG. 1 is a front sectional view of a portion of a pulverizing apparatus embodying features of the present invention;

FIG. 2 is an enlarged sectional view of part of the gear and slot arrangement of FIG. 1, showing a gear tooth in meshing engagement with a slot;

FIG. 3 is an enlarged bottom plan view of the thrust ring and rollers shown removed from the pulverizing apparatus in FIG. 1 in order to more clearly show the gear and slot arrangement of the present invention; and

FIG. 4 is a front elevational view similar to FIG. 3, but showing a single roller in meshing engagement with the thrust ring.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, a pulverizing apparatus is shown which is generally designated by the reference numeral 10. The pulverizing apparatus 10 includes a steel housing 12 within is mounted at ground level for enclosing a support 14 on which there is rotatably mounted a grinding unit 16. Raw coal feed stock is introduced into the housing 12 through a conduit system 18 which is generally located above the grinding unit 16.

The grinding unit 16 includes a table 20 formed with an annular groove 22 which defines a grinding surface F. The table 18 is mounted for rotation on the support 14 by means of a rotating hub 24 which is powered by an electric motor which has not been shown in the drawings for the sake of simplicity.

A plurality of spaced apart pulverizing rollers 26, preferably three in number, which has a grinding face S, ride in groove 22, and each of the rollers 26 is formed with a bearing collar 27. The rollers 26 are separated by means of a spacer attachment 28 which includes three spacer arms 29, which are mounted at pivots 30 and provided with spacer blocks 31 at the outer ends thereof. The spacer attachment 28 is mounted in the pulverizing apparatus 10 by securing the pivots 30 to the rotating hub 24, and for the sake of simplicity, the spacer attachment 28 has been shown schematically in FIG. 3. A thrust ring 32 is mounted in housing 12 above the pulverizing rollers 26, and contact is maintained by means of compression springs 34. The thrust ring 32 is integrally formed with an annular lip 36 which is configured in accordance with the outer periphery of the bearing collar 30, in order to achieve smooth mating contact.

As best shown in FIGS. 3 and 4, annular lip 36 is formed with a series of open slots 38 which are spaced apart along the circumference of thrust ring 32. Also, a series of gear teeth 40 are mounted along the circumference of bearing collar 27. The gear teeth 40 are spaced apart from each other in accordance with the distance between the slots 38, such that, when the pulverizing rollers 26 rotate, each successive gear tooth will come into mating contact with a respective successive slot 38. In this manner, positive engagement is obtained between the thrust ring 32 and the pulverizing rollers 26, such that skidding between the grinding surface S and grinding face F is reduced.

A latitude of modification, change and substitution is intended in the foregoing disclosure and in some instances some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the spirit and scope of the invention herein.

I claim:

1. Apparatus for pulverizing material into comminuted particles comprising a housing, a table having a grinding surface mounted in said housing for rotation, means for rotating said table, means for introducing said material into said housing in contact with said grinding surface, a plurality of rollers each having a peripheral grinding face maintained to contact said grinding surface, each of said rollers integrally formed with a bearing collar which is axially displaced along the outermost portion of the axis of said rollers, gear teeth formed around the outer circumference of each of said bearing collars and spaced apart from said grinding face, a stationary thrust ring mounted above and in contact with said rollers, said thrust ring formed with slots for receiving said gear teeth in meshing engagement such that said rollers are prevented from skidding along said table, and said gear teeth spaced apart from each other in accordance with the distance between said slots such that said gear teeth can successively achieve mating engagement with said slots.

2. Apparatus according to claim 1, in which three of said rollers are provided and spacer means are positioned between said rollers for maintaining said rollers spaced apart from each

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other, said spacer means including three arms, said arms pivotally mounted at their ends at a central hub location, and spacer blocks mounted on the opposite outer ends of said arms.

3. Apparatus according to claim 1, in which an annular lip is integrally formed on said thrust ring, said bearing collar is

formed with an annular groove capable of achieving mating contact with said annular lip, said gear teeth are positioned along said annular groove and said annular lip is formed with said slots.

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