

[54] **BRAKING COLLAR FOR HINGED BEATER ARMS OF A HAMMER MILL, USED ESPECIALLY FOR GRINDING OF FUEL**

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[51] Int. Cl. **B02c 13/04; B02c 13/06**

[58] Field of Search **241/194**

[56] **References Cited**

FOREIGN PATENTS OR APPLICATIONS

1,134,570 8/1962 Germany 241/194

Primary Examiner—Roy Lake

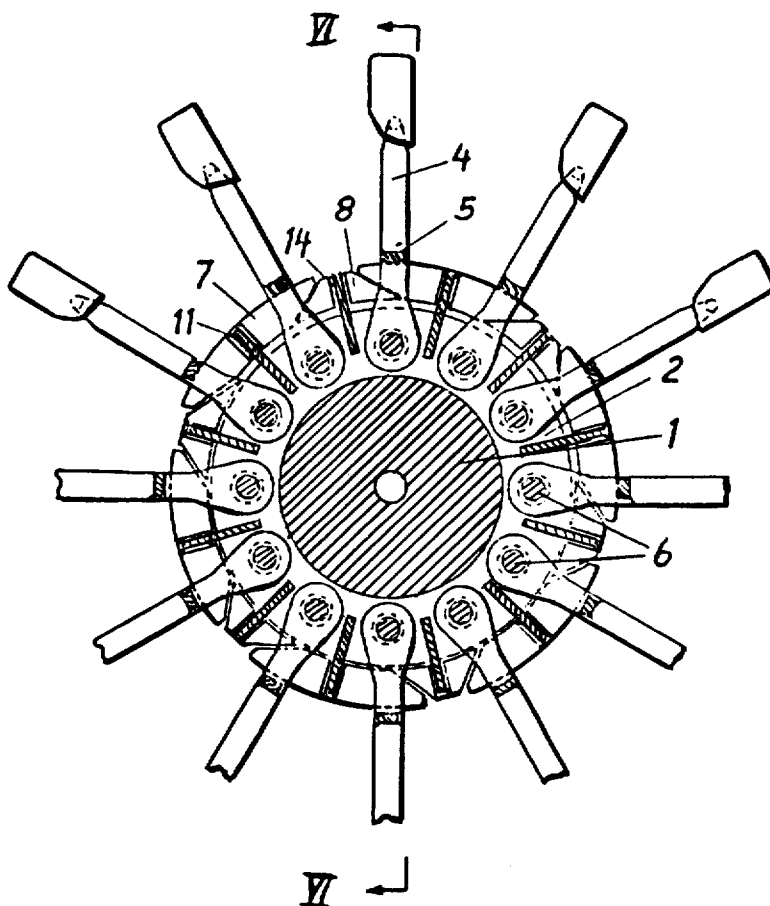
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[57] **ABSTRACT**

A braking collar consisting of inner and outer segments, which under the action of centrifugal force, are pressed against projecting lugs of the beater arms of a hammer mill and thereby apply a braking force to the swinging rhythmic movement of the arms.

3 Claims, 6 Drawing Figures



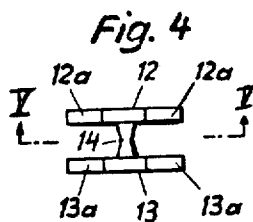
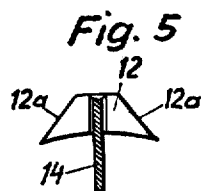
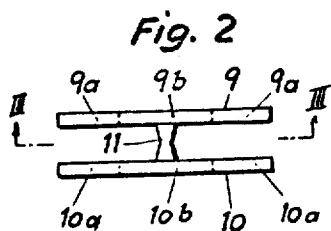
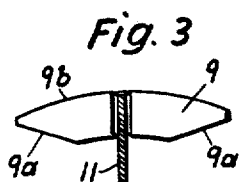
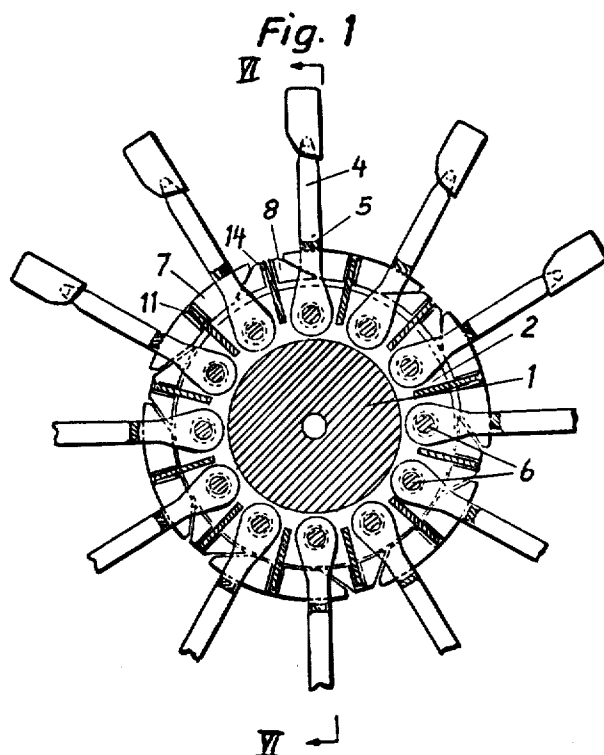
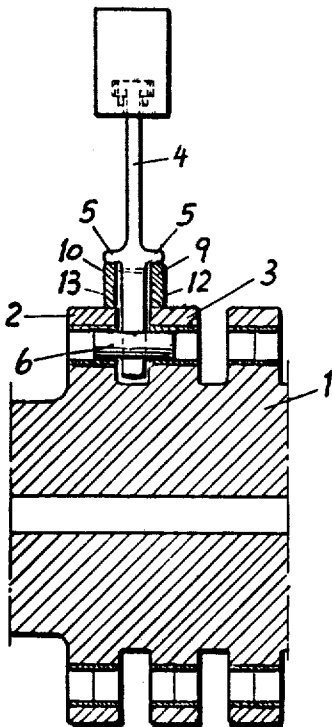


Fig. 6



BRAKING COLLAR FOR HINGED BEATER ARMS OF A HAMMER MILL, USED ESPECIALLY FOR GRINDING OF FUEL

BACKGROUND OF THE INVENTION

The invention pertains to a braking collar used to prevent rhythmic movement of beater arms with attached beater heads, that are swingingly arranged in a beater mill, that is used especially for grinding of fuel. The braking collar consists of inner and outer segments which, under the action of centrifugal force, are pressed with their outer strips of cylindrical surface of the outer segments against projecting lugs on the beater arms.

In such type of hammer mills it is necessary to avoid resonance vibrations of the beater arms during the rotation of the beater shaft. It is also necessary to avoid large swings of the beater arms during start up and shut down of the hammer mill. The vibration and swinging cause severe wear on the hinge pins of the beater arms, in the pivot holes of the hub rings of the beater shaft and in the eyelets of the beater arm, which inevitably must lead to a breakdown of the beater mill. It is already known (German Pat. No. 1,134,570) to provide in a beater mill a braking collar consisting of inner and outer segments, having a radial surface and strips of inner and outer cylindrical surfaces. The staggered parts of the segments surround the beater arms on both sides in a fork-like fashion. Under the action of the centrifugal force the segments press against the projecting lugs on the beater arms and thereby reduce or eliminate the resonance vibrations. Of course, there are gaps between the inner segments and between the outer segments in a radial-axial direction. Small vibrations of the beater arms during rotational movement can be subdued by the frictional forces between the lugs and the outer segments. However, during start ups and shut downs of the beater mill, the beater arms experience continuously strong swings (due to inertia) within these gaps. As a result, especially during frequent start ups and shut downs, the segments are pushed together and a large gap is formed which grows larger to its maximum slack, especially during opposite swings of two neighboring beater arms, so that the lugs of the arms slip-off the edge of the outer segment, causing the outer segment to fall out. This results in an operating disturbance that could lead to destructions inside of the beater mill.

SUMMARY OF THE INVENTION

This invention intends to improve the design. It has as an aim to provide a brake collar which has no gaps between the segments in the circumferential direction during the rotation of the beater shaft, and in which the stop lugs projecting from the beater arms can not move beyond the edges of the outer segment even at maximum possible slack.

According to this invention the problem is solved by avoiding the radial-axial plane between the outer segments and between the inner segments. The invention provides on each outer segmental plate two slanted surfaces, that are flat and rectangular with the distance between them increasing rapidly towards the outside. The inner segmental plates have corresponding slanted surfaces, that are flat and rectangular but with the distance between them decreasing corresponding towards the

outside (tapered). During the rotation of the mill the inner and outer segmental plates lock together under the action of the centrifugal force to form two closed rings, without gaps, on each side of the beater arm. The strips of the cylindrical outer surface of the outer segments extend in the circumferential direction so far, that at both ends a considerable distance is available beyond the contact surface with the lugs projecting from beater arms.

Although the outer segments have been provided with a large circumferential length to avoid any possibility of the stop lugs on the arm to slip off the outer ring segments, there is a further provision of the invention to assure that this can not happen. In order to fix the position of the braking collar in the circumferential direction the links of the outer segments protrude to the hinge pins in the hub rings of the beater shaft, or between the eyelets of the beater arms.

The advantages of the invention consist mainly of the following. The use of slanted surface between the segmental plates adds the gliding component of the centrifugal force of the inner segment to the pressure exerted on the stop lug, thus improving the braking action. Also during coasting of the mill at shut downs the knocking forces of the beater arms are converted into a braking action because the outer segment, which is affected by the knocking force (when the arm hits the link), is shoved up along the slanted surface of the inner segments, thus reducing an eventual gap that could be occurring due to the reduction of the centrifugal force action. In addition, the construction of the brake collar is such, that radial movements of the segments are possible without occurrence of a gap between the segments, whereby a continuous satisfactory contact between all the surfaces is assured, that avoids the wear usually occurring when previously separated parts are suddenly brought into contact. Finally, because of the large operational reliability of the beater mill constructed according to this invention it is possible to apply considerably cheaper materials for the segments, like cast steel or cast Mechanite. Therefore, the usually used forged steel construction, which always require extensive supplementary welding, can be obviated and a large saving can be realized.

BRIEF DESCRIPTION OF THE DRAWINGS

An example of the application of the invention is depicted in the attached drawings and is further explained below.

FIG. 1 shows a cross section through the rotor of a beater mill with the braking collar in rotating position.

FIG. 2 shows a plan view from the outside of an outer segment of the braking collar.

FIG. 3 shows a section along line III — III in FIG. 2.

FIG. 4 shows a plan view from the outside of an inner segment of braking collar.

FIG. 5 shows a section along line V — V in FIG. 4.

FIG. 6 shows a section along line VI — VI in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 depicts a rotor of a beater mill in cross section in the rotating position. It consists of a beater shaft 1 with hub rings 2 and 3 (FIG. 6), many beater arms 4 with projecting stop lugs 5. The beater arms 4 are hingedly connected to the hub rings 2, 3 through pins 6 inserted into the hub rings 2, 3. The braking collar

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consists of outer segments 7 and inner segments 8. During the rotation of the beater shaft 1 the braking collar is pushed outwards by the centrifugal force so that the outer segments 7 press so strongly against the stop lug 5, that the swinging motion of the beater arms 4 is hindered or checked.

According to FIG. 2 and FIG. 3 the outer segment 7 consists of two parallel segmental plates 9 and 10 with axial slanted rectangular flat surfaces 9a and 10a and strips of outer cylindrical surface 9b and 10b. The two segmental plates 9 and 10 are rigidly connected by a fixed link 11 which protrudes to the hinge pins in the hub rings of the beater shaft, in order to fix the position of the braking collar in the circumferential direction.

According to FIG. 4 and FIG. 5 the inner segment 8 consists of two parallel segmental plates 12 and 13 with axial slanted rectangular flat surfaces 12a and 13a. The segmental plates are rigidly connected by a fixed link 14 which extends radially towards the rotor axis between the hinge pins 6 or between the eyelets of the beater arms, in order to improve the positioning of the segments forming the entire brake collar.

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

1. A braking collar to prevent the rhythmic movement of hinged beater arms with attached beater heads of a hammer mill, especially when used for grinding of fuels, said braking collar consisting of inner and outer segments, the outside strips of cylindrical surfaces on the outer segments being pressed against lugs projecting from the beater arms under the action of the centrifugal force; characterized by, the relation of the radial-axial mean plane of the external segment and the internal segment in which the segmental plates of the outer segment have slanted surfaces that are flat, rectangular and strongly spread outwards, while the seg-

mental plates of the inner segments have correspondingly slanted surfaces that are flat, rectangular and tapered to the outside; the said surfaces being arranged to each other so, that under centrifugal action said outer surface segmental plates together with said inner surface segmental plates form closed rings; and, that the strips of the cylindrical outer surface of the segmental plates have, in the circumferential direction of the braking collar, an adequate length so that their two ends extend considerably beyond the contact surface of the lugs on the beater arms.

2. A braking collar according to claim 1, wherein the braking collar prevents the rhythmic movement of hinged beater arms of a hammer mill, the hammer mill having a beater shaft, a plurality of hub rings on the shaft and a plurality of beater arms connected by hinge pins to the hub rings, the braking collar including inner and outer segments, each segment having a pair of segmental plates interconnected by a link, in which the interconnecting links of the segmental plates of the inner segments protrude to the hinge pins in the hub rings of the beater shaft, in order to fix the position of the braking collar in the circumferential direction.

3. A braking collar according to claim 1, wherein the braking collar prevents the rhythmic movement of hinged beater arms of a hammer mill, the hammer mill having a beater shaft connected to a plurality of hub rings and a plurality of beater arms connected by hinge pins to the hub rings, the braking collar including inner and outer segments, each segment having a pair of segmental plates interconnected by a link, in which the interconnecting links of the segmental plates of the outer segments protrude to the hinge pins in the hub rings of the beater shaft, in order to fix the position of the braking collar in the circumferential direction.

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