

April 2, 1935.

F. W. PARKER

1,996,485

ROTARY BREAKER

Filed Oct. 10, 1933

2 Sheets-Sheet 1

Fig. 1.

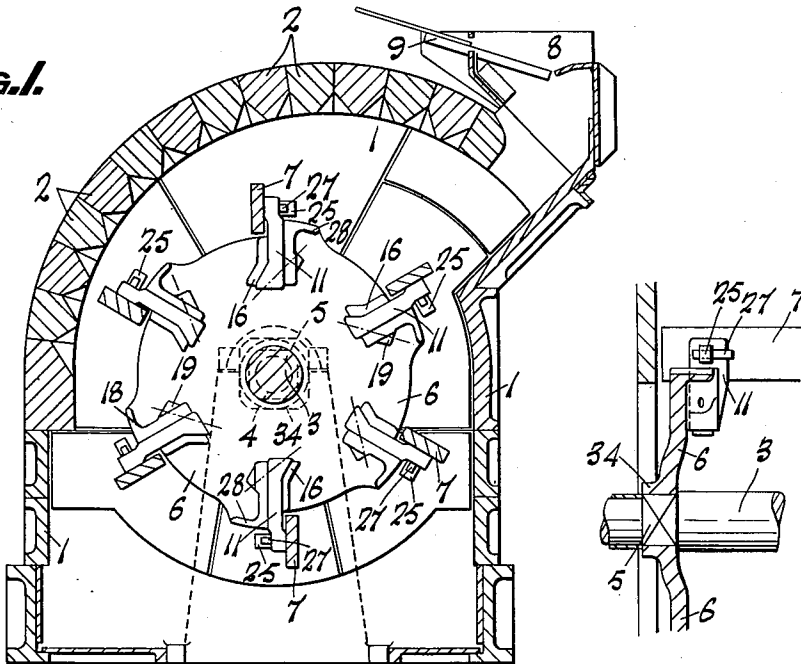


Fig. 2.

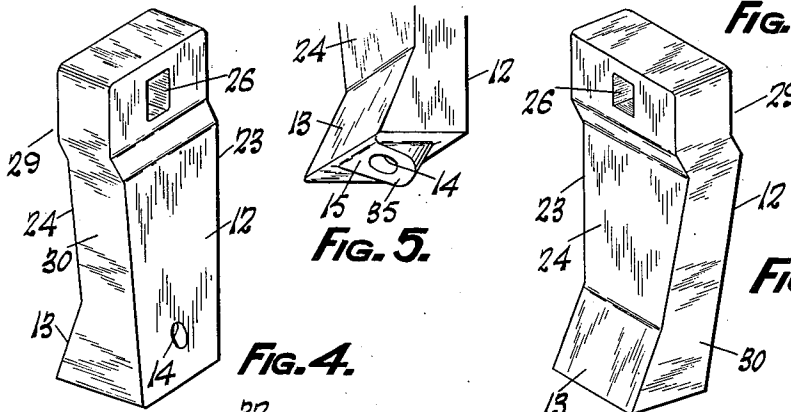


Fig. 5.

Fig. 4.

Fig. 3.

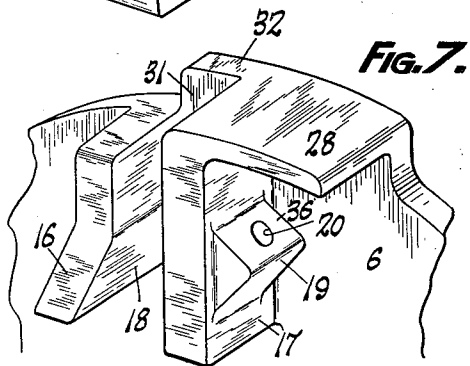


Fig. 7.

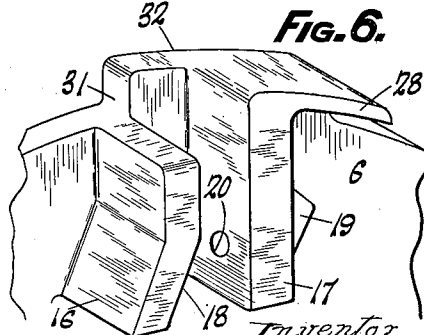


Fig. 6.

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2 Sheets-Sheet 2

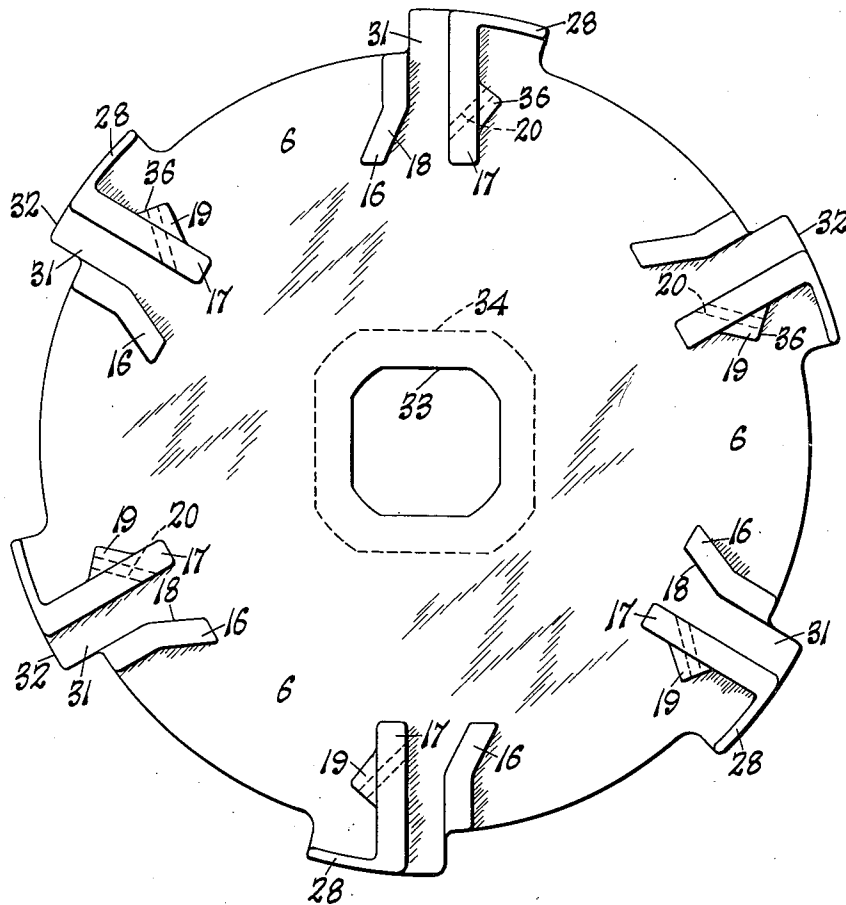


Fig. 8.

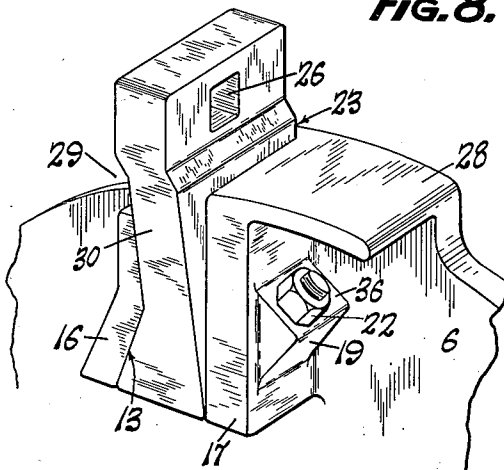


Fig. 9.

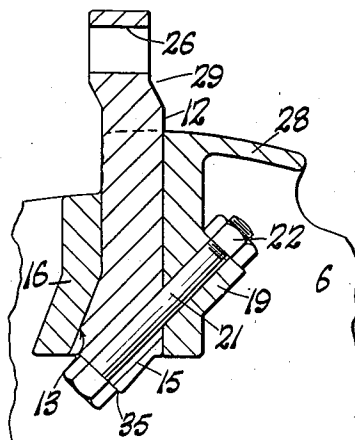


Fig. 10.

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UNITED STATES PATENT OFFICE

1,996,485

ROTARY BREAKER

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Application October 10, 1933, Serial No. 693,019
In Great Britain October 19, 1932

6 Claims. (Cl. 83—11)

This invention relates to machines for breaking or granulating stone and like material and concerns those of the rotary type wherein a rotor having a series of radial hammers revolves within a casing having a roughened or equivalent interior against which the material to be broken or granulated is thrown by the revolving hammers.

In particular the invention is applicable to rotary machines of the above mentioned type wherein the hammers are carried by discs which are spaced apart upon a driven rotary shaft, said hammers being attached at opposite ends to radial arms on the discs.

In rotary stone or like breaking or granulating machines of the rotor disc kind as heretofore constructed the aforementioned radial arms have been formed integrally with the rotor discs, for instance they have been cast on the discs, and it has been found by experience that they are liable to break off the disc. When such an accident occurs it has heretofore been necessary to replace the whole disc by a new one which replacement has been an expensive procedure on account not only of the cost of the new disc but also the cost of the labour required for dismantling and re-assembling the parts of the machine involved.

The object of the invention is to overcome the disadvantage just mentioned and this is achieved, according to the invention, by making the radial arms detachable from the discs of the rotor so that in the event of breakage or for any other reason any one or more of the arms can be detached from the disc and a new one inserted in its place.

In the following further description reference will be made to the accompanying drawings wherein a practical example of the invention is shown.

In the drawings,

Figure 1 is a sectional end elevation of a breaker of the rotor disc type having said example applied thereto.

Figure 2 is a fragmentary sectional elevation of a rotor and an attached hammer.

Figure 3 is a perspective front view of one of the hammer arms.

Figure 4 is a perspective rear view of such arm.

Figure 5 is a perspective view of the lower end of the arm.

Figure 6 is a perspective front view of one pair of lugs on a rotor disc for a hammer arm.

Figure 7 is a perspective rear view of the same pair of lugs.

Figure 8 is a side elevation of a complete rotor disc.

Figure 9 is a perspective rear view of a hammer arm fixed in position between a pair of lugs on the rotor disc, and

Figure 10 is a sectional elevation of the same parts.

Figures 1 and 2 are drawn to a smaller scale than Figure 8 and the latter is drawn to a smaller scale than the remaining figures.

Referring to Figure 1, in general form the machine comprises a frame or casing 1 having fixed therein, in known manner, a series of breaker bars 2, a shaft 3 rotatable in bearings, such as 4, and rotor discs, such as 6, mounted on squared portions such as 5 of the shaft (see also Figure 2) and carrying hammers 7. The hammers 7 and the breaker bars 2 extend parallel to the axis of the shaft 3. The frame or casing 1 is provided with an inlet 8, a sliding door 9 for opening and closing the inlet, and a discharge opening 10.

The rotor discs 6 are fitted with removable hammer arms 11, and referring to Figures 3, 4, 5, 9 and 10, each arm consists of a metal bar 11 rectangular in cross section and of suitable length for the intended purpose. The said arm is flat at the back as represented at 12 and at its inner end (this being the end for attachment to the disc) is tapered or wedge-shaped as shown at 13 at the front. Formed obliquely through the said lower end of the arm is a hole 14 the upper end of which opens through the back of the arm as shown in Figure 4, and the lower end opens through a boss 15 on the bottom, as shown in Figure 5.

Referring to Figures 1, 6, 7 and 8, for each arm there is on one side of each of the rotor discs 6 a pair of lugs 16, 17. These lugs are integral with the disc adjacent to its periphery and they project laterally as shown (see also Figure 2) from the side of the disc on which they are formed and are spaced apart a distance equal to the thickness of the lower end of the arm. The lower part of the inside face of one of these lugs is inclined or bevelled as shown at 18 to match the wedge or inclined part 13 on the front of the arm. The said part on the arm is (assuming the arm to be upright) inclined outwards and downwards thus making the lower end of the arm enlarged or wedge-shaped with the thickest part of the wedge downwards.

When the arm is inserted between the lugs on the disc as shown in Figures 9 and 10 the said inclined lower end is brought into contact with the correspondingly inclined inner face of the adja-

cent lug so that if the arm is pulled or pressed upwards i. e. radially outwards on the disc, its lower end will be wedged tight between the lugs.

The lug 17 against which the back of the arm comes has a boss 19 and through said boss and lug there is formed obliquely a hole 20 with which the aforesaid hole in the lower part of the arm aligns when the arm is in position between the two lugs. After the arm 11 has been placed between the lugs a bolt 21 (Figure 10) is inserted through the aligned holes 14 and 20 in the parts mentioned and the tightening of a nut 22 in the bolt has the effect of drawing the lower part of the arm in an outward radial direction thereby creating the aforesaid wedging action to hold the arm rigidly between the lugs and consequently on the disc as shown in Figure 10.

When attached as described the arm 11 is disposed radially and with one side edge 23 against the face of the disc 6, as shown in Figure 2, its front and back faces 24, 12 being at right angles to the said face of the disc. The lower part of the arm is between the fixed lugs 16, 17 on the disc and the upper part extends radially beyond the periphery of the disc, as shown in Figures 1, 2 and 10, for the attachment of one end of a hammer 7, Figures 1 and 2, thereto. The hammer has tongues, such as 25, to pass through holes, such as 26, in the upper ends or radially projecting parts of the arms, keys or wedge-shaped bars 27 being passed through holes in the tongues at the back of the arms to secure the hammers 7 to the arms. The hammers are like bars and extend from one disc of the rotor to the other and are attached at opposite ends to arms on the respective discs, as shown in Figures 1 and 2.

Projecting from the top or back of the lug 17 through which the bolt 21 passes and from the adjacent side or periphery of the disc 6 is a guard 28 to cover the nut 22 of the securing bolt to protect the latter from bombardment by the flying pieces of material being operated upon. The guard 28 is preferably made integrally with the lug and disc. It may, however, be made separately and attached by suitable means, as for instance, screws, rivets or by welding.

Instead of making the inclined or wedge-shaped enlargement 13 on the front of the arm it may be provided on the back thereof in which case the lugs on the disc would have inner faces shaped to suit. Or there may be an inclined or wedge-shaped enlargement on both back and front of the arm the latter fitting between lugs shaped to correspond.

The enlargement of the lower end of the arm is preferably of such length that it fills the lower part only of the space between the lugs on the disc. Thus the lower part of the space is wedge-shaped and the upper part is parallel. Alternatively, however, the enlarged lower end of the arm may fill the greater part or the whole of the space between the lugs.

The arms 11 and hammers 7 are preferably so applied to the disc 6 that in the direction of rotation, indicated by the arrow in Figure 1, the hammers are on front of the arms and the bolts which secure the arms to the disc are behind said arms. The upper ends of the arms to which the hammers are attached may be slightly offset forward as shown at 29. The sides of the arms are advantageously inclined relatively the greater width of the arms being at the top. Conveniently the side 23 is vertical and the side 30 is inclined inwards from the parallel-sided offset top por-

tion as shown. Alternatively the arm may be wholly parallel sided. There may be any desired number of detachable arms on the discs. For example there may be six pairs of lugs 16, 17 on each disc, as shown in Figure 8, and consequently six arms on each disc, but there may be a less number according to requirements.

As shown in Figure 2, each hammer arm is disposed with its vertical side 23 against the inner face of the disc 6, and to afford adequate support for the arm at this side and at the back, the disc has a radial projection 31 on its periphery adjacent to the lug 17 so as to enable the latter to be extended radially i. e. to the peripheral edge 32 of the radial projection which is preferably made arcuate concentrically with the disc. The aforesaid guard extends in the form of a lip backwards from the lug 17 and inwards laterally from the peripheral edge 32 of the radial projection and is correspondingly curved as shown.

The disc has a squared central hole 33 formed through a boss or hub 34, so as to enable it to fit upon the corresponding squared portion of the shaft 3.

The bosses 15, 19 are formed so as to provide faces 35, 36 at right angles to the bolt holes respectively for the head of the bolt 21 and the nut 22. The wedge shaped end of the arm 11, and the lug 17 may be otherwise formed to provide faces for the purpose aforesaid:

What I claim then is:

1. A rotary breaker comprising a casing against which the material to be broken is thrown, a shaft rotatably mounted in the casing, a rotor disc on the shaft for rotation within the casing, radial arms on the disc, each arm being of a gradually diminishing thickness for a portion of its length at least, and having an obliquely disposed bolt hole therein, said disc having for each arm laterally projecting fixed lugs providing between them a radially extending space of a form corresponding to the tapering form of the arm, one of said lugs having an obliquely disposed bolt hole therein to correspond with the hole in the arm, a nut and bolt fastening for each arm whereby, when the bolt is passed through the holes and the nut is tightened, the arm is drawn in an outward radial direction with a wedging action so that it is held rigidly between the lugs, and hammers attached to the arms whereby the pieces of the material to be broken are thrown against the interior of the casing.

2. A rotary breaker comprising a casing against the interior of which the material to be broken is thrown, a shaft rotatably mounted in the casing, a rotor disc on the shaft for rotation within the casing, radial arms on the disc, each arm being of a gradually diminishing thickness for a portion of its length at least, and having an obliquely disposed bolt hole therein, said disc having thereon for each arm laterally projecting fixed lugs providing between them a radially extending space of a form corresponding to the tapering form of the arm, one of said lugs having an obliquely disposed bolt hole therein to correspond with the hole in the arm, a nut and bolt fastening for each arm whereby, when the bolt is passed through the holes and the nut is tightened, the arm is drawn in an outward radial direction with a wedging action so that it is held rigidly between the lugs, hammers attached to the arms whereby the pieces of material to be broken are thrown against the interior of the casing, and guards on the discs for the nuts of said fastenings.

3. A rotary breaker comprising a casing against the interior of which the material to be broken is thrown, a shaft rotatably mounted in the casing, rotor discs on the shaft for rotation within the casing, radial arms on each disc, each arm being of gradually diminishing thickness for a portion of its length at least, and having an obliquely disposed bolt hole therein, said disc having for each arm laterally projecting fixed lugs providing between them a radially extending space of a form corresponding to the tapering form of the arm, one of said lugs having an obliquely disposed bolt hole therein to correspond with the hole in the arm, a nut and bolt fastening for each arm whereby, when the bolt is passed through the arm and the nut is tightened, the arm is drawn outward, radially with a wedging action so that it is held rigidly between the lugs, and hammers attached at opposite ends to corresponding arms so as to extend parallel to the axis of the shaft whereby the pieces of material to be broken are thrown against the interior of the casing.

4. A rotary breaker comprising a casing against the interior of which the material to be broken is thrown, a shaft rotatably mounted in the casing, rotor discs on the shaft for rotation within the casing, radial arms on each disc, each arm being of a gradually diminishing thickness for a portion of its length at least, and having an obliquely disposed bolt hole therein, said disc having thereon for each arm laterally projecting fixed lugs providing between them a radially extending space of a form corresponding to the tapering form of

the arm one of said lugs having an obliquely disposed bolt hole therein to correspond with the hole in the arm, a nut and bolt fastening for each arm whereby, when the bolt is passed through the holes and the nut is tightened, the arm is drawn in an outward radial direction with a wedging action so that it is held rigidly between the lugs, hammers attached at opposite ends to corresponding arms so as to extend parallel to the axis of the shaft whereby the pieces of material to be broken are thrown against the interior of the casing, and guards on the discs for the nuts of said fastenings.

5. A rotary breaker of the character described comprising a casing, a shaft mounted in said casing, rotor discs carried by said shaft radial arms for the support of breaker hammers, each arm being of substantially wedge formation, lugs arranged in pairs on said discs with the members of each pair spaced apart and defining a space of wedge formation conforming to that of the arms in which the arms are seated and means for wedging the arms in radial direction against the lugs when the arms are attached to the discs.

6. In a rotary breaker, as claimed in claim 1, one of the laterally projecting lugs being formed with an angular projection with its upper face obliquely disposed, and forming an abutment for a nut, and the beater arm formed with an oblique face, parallel with face of said angular projection and forming a seat for the head of the bolt.

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