May 29, 1956 A. B. HANSE 2,747,803

HAMMER ROTOR FOR HAMMERMILLS

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Fig. 1.

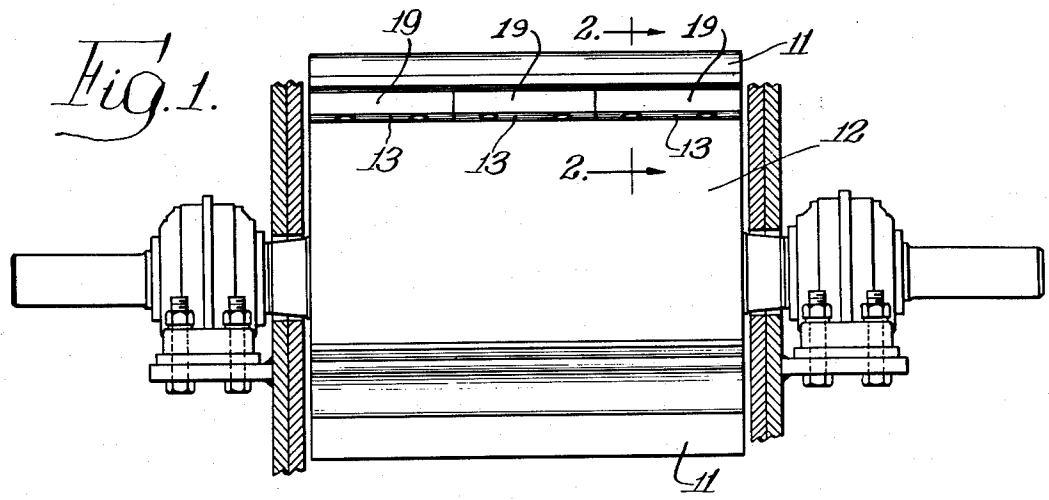


Fig. 2.

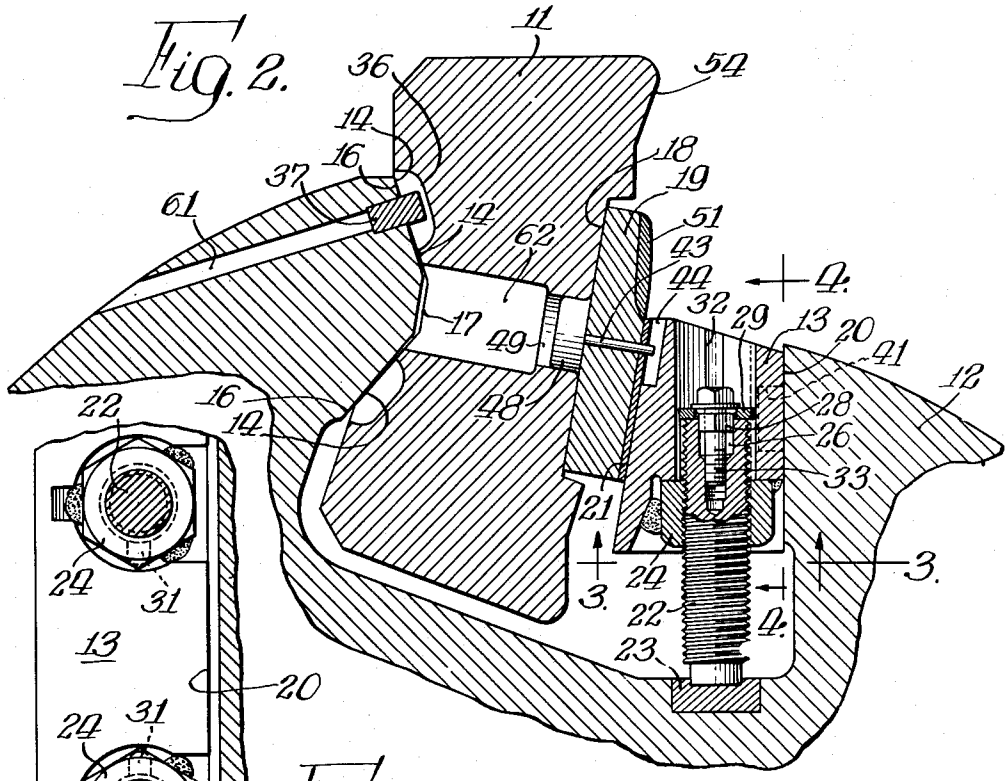


Fig. 3.

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Fig. 4.

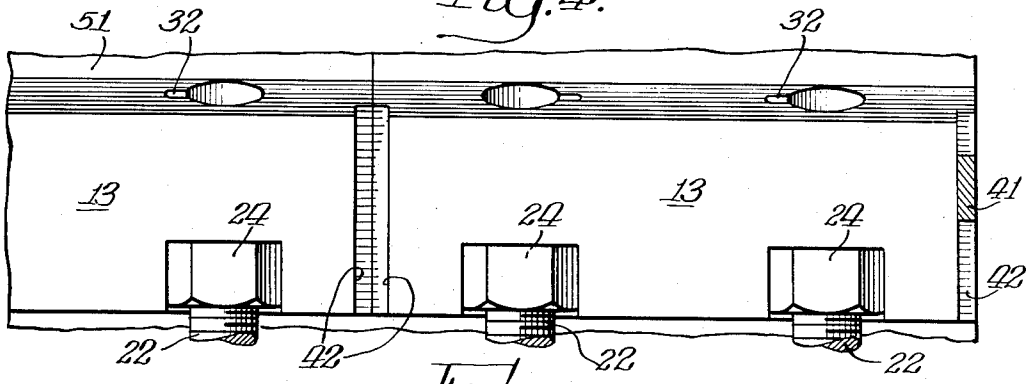


Fig. 5.

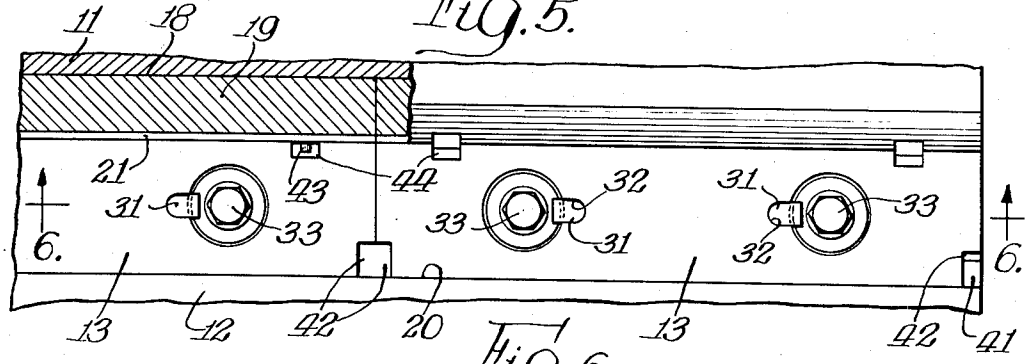
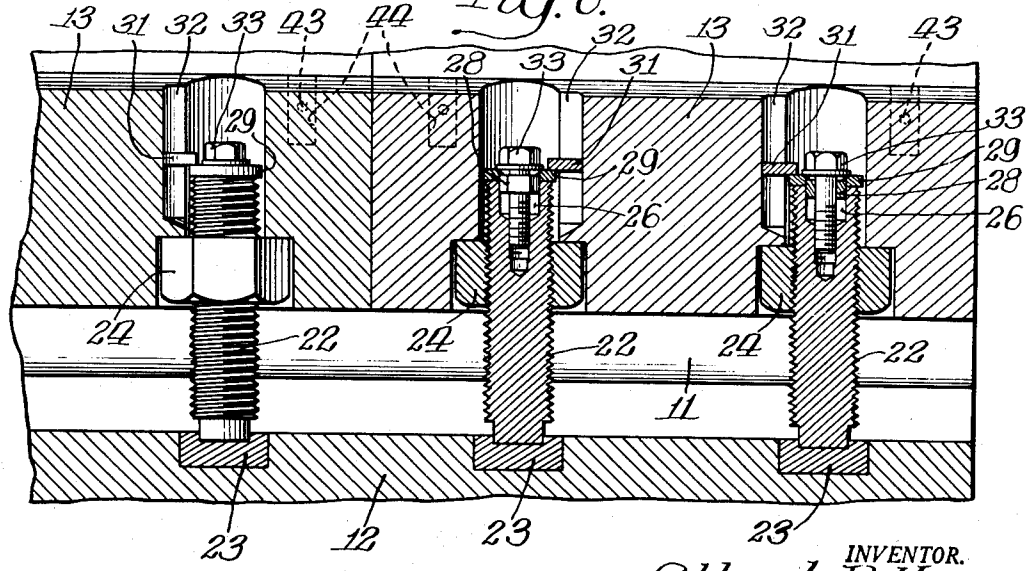


Fig. 6.



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HAMMER ROTOR FOR HAMMERMILLS

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Application July 9, 1952, Serial No. 297,905

10 Claims. (Cl. 241—191)

Hammermills generally include a rotor carrying a series of hammers which rotate with the rotor and into the path of which the material to be broken is fed. In the rigid hammer type of hammermill, the hammers, which are often in the form of bars extending from end to end of the rotor, are secured rigidly to the rotor. The rigid mounting of the hammer has as its purpose the utilization of the momentum of the rotor. It is apparent that to accomplish this purpose most completely, a very firm mounting of the hammer on the rotor is desirable. It has been the practice heretofore to mount fixed hammers by means of wedges which in turn are tightened by screws. Maintaining sufficient tightness of the wedges has nevertheless been a problem.

According to the present invention, the problem is solved through the use of an outwardly thrust wedge. During operation of the hammermill, considerable outward centrifugal force is exerted on the wedge, so that if any looseness should occur or any movement result from vibration, the wedge will move outwardly until its wedging action prevents further movement, at which time the hammer will be firmly held by the wedge action. Firmness of the hammer when held by the outwardly operating wedge is further ensured by a V type of seat, the face of the seat along one side of the V extending almost to the peripheral tip of the rotor core so that thrust will be applied to the hammer as far out on the hammer as is practical.

Additional objects and advantages of the invention will be apparent from the following description and from the drawings.

Designation of figures

Fig. 1 is a transverse sectional view through a hammermill through which the rotary hammer of the present invention has been installed, the hammer rotor assembly thus being shown as viewed from the side-front of the hammer.

Fig. 2 is a fragmentary sectional view taken along the line 2—2 of Fig. 1, showing the hammer and its mounting in detail.

Fig. 3 is a cross-sectional view taken approximately on the line 3—3 of Fig. 2, thus showing the bottom of the wedge.

Fig. 4 is a fragmentary sectional view taken approximately on the line 4—4 of Fig. 2, one wedge and a fragment of another being shown as seen from the side thereof.

Fig. 5 is a view looking at the outer face of the wedges with the associated pressure block being fragmentarily shown in section.

Fig. 6 is a fragmentary sectional view taken axially of the tightening bolts, namely approximately along the line 6—6 of Fig. 5.

Although the law requires a full and exact description of at least one form of the invention, such as that which follows, it is, of course, one purpose of a patent to cover each new inventive concept therein no matter how it may later be disguised by variations in form or additions of further improvements; and the appended claims are intended to accomplish this purpose by particularly pointing out the parts, improvements, or combinations in which the inventive concepts are found.

According to the present invention, one or more hammers 11 are firmly secured in a rotor casting 12 by an outwardly forced wedge 13. The hammer 11 preferably extends substantially from end to end of the rotor 12 as seen in Fig. 1. Throughout its length, it has seating surfaces 14 forming a groove generally V-shaped in cross section. These seating surfaces engage like seating surfaces 16 formed on the rotor. The V-shaped groove formed by the surfaces 14 is deep enough so that no seating of the hammer occurs along the zone 17 between the surfaces forming the V.

The forward face of the hammer 11 is provided with a channel 18 along its length for receiving a pressure plate 19. This pressure plate may be one piece extending from end to end of the hammer or it may comprise a plurality of separate pieces. In the illustrated form, there is a separate piece for each wedge, and since there are three wedges, there are three pressure plates 19. Being laid end to end, these extend from end to end of the hammer. The hammer 11 can be turned end-over-end when worn. The pressure plate not being turned ensures proper thrust between the wedge and the hammer in spite of the reversal and regardless of wear on exposed surfaces.

The wedge 13 may be forced directly between the pressure plate 19 and the shoulder or wedging face 20 of the rotor. In practice, a shim 21 is often provided between the pressure plate 19 and the wedge 13. Variations in the thickness of the shim chosen may be resorted to for compensating for slight lack of uniformity in dimensions of the parts, such as is likely to be encountered in most manufacturing processes.

The wedge is normally forced outwardly into wedging position by a screw 22 which bears on an end thrust button 23. The screw may be threaded to a threaded portion 24 which may be either a separate nut welded to a wedge 13 or an integral portion of the wedge. The screw 22 may be turned by an Allen wrench having a hexagonal recess 26 therein for that purpose. When the wedge 13 has been thoroughly tightened, the screw 22 should be locked in place. It may be locked either through use of a lock nut in the place of nut 24 or by some more positive means such as that seen best in Fig. 6. According to this means, a locking plug 28 is set on and into the screw 22. This plug 28 includes a hexagonal stem portion snugly fitting in the hexagonal recess 26, a cap flange 29, and a locking finger 31, all welded together. The finger 31 fits into a channel 32 formed in the wedge 13, thus preventing rotation of the plug 28 and thereby preventing rotation of the screw 22. The locking plug 28 may be held in place by a capscrew 33 threaded into the screw 22.

The various parts should be locked against endwise shifting. To this end, the hammer 11 may have one or several small notches 36 in its seating surfaces 14, these notches fitting over centering pins 37 carried by the rotor 12 and having perhaps a 1/16 inch clearance with the sides of the notches 36. The wedges 13 may be held from axial shifting by lugs 41 formed on the rotor at the ends thereof. As seen best in Fig. 5, the lug 41 is received by a notch 42 at the end of the wedge. For the sake of interchangeability the wedges are preferably provided with notches 42 along the appropriate corner of each end thereof, even though those notches at the ends of the wedges not coinciding with the ends of the rotor will be idle. The shims 21 may be held against axial or radial movement by pins 43 carried by pressure plates 19, narrow notches 44 in wedges 13 receiving the ends of pins 43. The pressure plates 19 may

be locked with respect to the hammers **11** by buttons **48** cast on pressure plates **19** and fitting loosely into apertures **49** in the hammers **11**. The pins **43** may be driven into holes or pressure plate **19** may be formed integrally therewith and extend therefrom.

The pressure plate **19** may be provided with a wear-resisting surface **51** as by welding beads therealong where it is exposed to the rock or other material being crushed.

It should be observed that the outer one of seat faces **16** on the rotor body and the corresponding seat face **14** on the hammer are designed to bear against one another almost to the periphery of the rotor body **12**. Thus the movement of the rotor body is transmitted through these spaces as far out radially of the rotor as is practical. The entering V faces **16** lie at an angle of about 121 degrees, while the straddling V faces lie at an angle of about 120 degrees. This, together with the firm wedging action ensured by the outwardly-forced wedges ensures great rigidity in the position of the active hammer surface **54**.

After the parts have been assembled as shown, the screw **22** will be turned to force the wedge **13** out as far as possible. Although the hammer is quite firmly held in this manner initially, experience has shown that the tremendous impacts encountered in hammermills causes some loosening of the parts, probably due to minute surface deformation or compacting. Frequent tightening of the wedge screws has heretofore been essential, especially with each new set of hammers. According to the present invention, it is not necessary to stop the machine for this purpose, inasmuch as the wedges will tighten themselves by centrifugal force aided by the vibration resulting from the innumerable impacts. Of course, it is desirable to take up the wedge-forcing screws occasionally when the machine is stopped for other reasons, so that there will be no danger that any conceivable occurrence could permit the wedges to become dangerously loosened.

In order to facilitate removal of the centering pin **37** if it should become worn, bores **61** may be provided. At present it appears that their use will be rare.

Pockets **62** may be provided along the length of the hammer to eliminate unnecessary metal and facilitate heat treatment. They may be aligned with apertures **49** of which there are six in the present hammer bar, 42" long. The pockets **62** are elongated in the direction of the length of the hammer bar.

I claim:

1. A hammer rotor for hammermills including a rotor base, a hammer bar having its rear face seated on the rotor base with a V-type of engagement in which one part seats with self-centering action on opposite sides of the nose of the mating part, a wedge tapering generally radially outwardly and wedged outwardly between the front face of the hammer and the rotor base, screw means for forcing said wedge outwardly, and means for locking the screw means, comprising a member having angularly interlocking engagement with both the screw means and the wedge.

2. A hammer rotor for hammermills including a rotor base, a hammer bar having one face seated on the rotor base, a wedge tapering generally radially outwardly and wedged outwardly between the opposite face of the hammer and the rotor base, screw means for forcing said wedge outwardly, and means for locking the screw means, comprising a member having interlocking engagement with both the screw means and the wedge.

3. A hammer rotor for hammermills including a rotor base, a hammer bar having one face seated on the rotor base with a V-type of engagement in which one part seats with self-centering action on opposite sides of the nose of the mating part, the nose V having a wider angle, and a wedge tapering generally radially outwardly and wedged outwardly between the opposite face of the hammer and the rotor base.

4. A hammer rotor for hammermills including a rotor base, a hammer bar having one face seated on the rotor base with a V-type of engagement in which one part seats with self-centering action on opposite sides of the nose of the mating part, a wedge tapering generally radially outwardly and wedged outwardly between the opposite face of the hammer and the rotor base, screw means for forcing said wedge outwardly, and means for locking the screw means, comprising a member having interlocking engagement with both the screw means and the wedge.

5. A hammer rotor for hammermills including a rotor base, a hammer bar having its rear face seated on the rotor base with a V-type of engagement in which one part seats with self-centering action on opposite sides of the nose of the mating part, one of said parts having the V-type engagement being a fixedly positioned part of the rotor base which fixes the radial position of the hammer, and a wedge tapering generally radially outwardly and wedged outwardly between the front face of the hammer and the rotor base; said hammer and wedge being removable by generally radially outward movement after the wedge has been loosened by being moved radially inward.

6. A hammer rotor for hammermills including a rotor base, a hammer bar having its generally rearward face seated directly on the rotor base with a V-type of engagement, in which one part seats with self-centering action on opposite sides of the nose of the mating part, the nose V having a wider angle than that of the receiving part whereby the points of engagement are separated by the full thickness of the entering part of the nose, wedge means wedged between the opposite face of the hammer and rotor base, and means for forcing said wedge into wedging action.

7. A hammer rotor for hammermills including a rotor base, a hammer bar having its rear face seated on the rotor base with a V-type of engagement, in which one part seats with self-centering action on opposite sides of the nose of the mating part, one of said parts having the V-type engagement, being a fixedly positioned part of the rotor base which fixes the radial position of the hammer, and a wedge tapering generally radially outwardly and wedged outwardly between the front face of the hammer and the rotor base.

8. A hammer rotor for hammermills including a rotor base, a hammer bar having its rear face seated on the rotor base with a V-type of engagement, in which one part seats with self-centering action on opposite sides of the nose of the mating part, one of said parts having the V-type engagement, being a fixedly positioned part of the rotor base which fixes the radial position of the hammer, a wedge tapering generally radially outwardly and wedged outwardly between the front face of the hammer and the rotor base, and screw means for forcing said wedge outwardly.

9. A hammer rotor for hammermills including a rotor base, a hammer bar having one face seated on the rotor base with a V-type of engagement, in which one part seats with self-centering action on opposite sides of the nose of the mating part, one of said parts having the V-type engagement, being a fixedly positioned part of the rotor base, which fixes the radial position of the hammer, and a wedge tapering generally radially outwardly and wedged outwardly between the opposite face of the hammer and the rotor base.

10. A hammer rotor for hammermills including a rotor base, a hammer bar having one face seated on the rotor base with a V-type of engagement, in which one part seats with self-centering action on opposite sides of the nose of the mating part, one of said parts having the V-type engagement, being a fixedly positioned part of the rotor base, which fixes the radial position of the hammer, a wedge tapering generally radially outwardly

and wedged outwardly between the opposite face of the hammer and the rotor base, and screw means for forcing said wedge outwardly.

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