

Aug. 30, 1955

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2,716,526

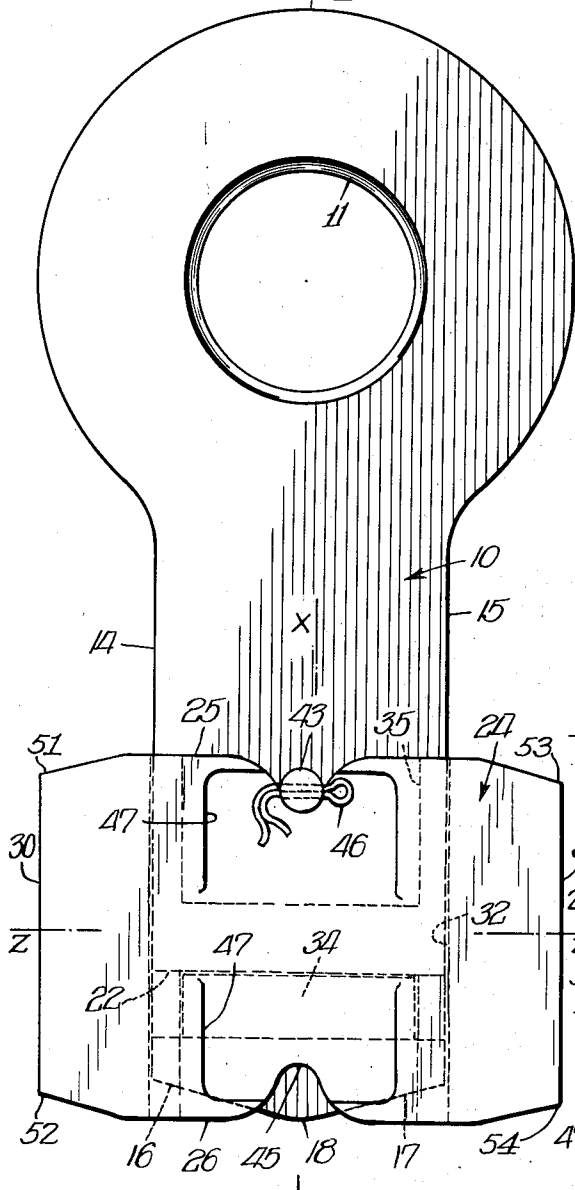
RENEWABLE TIP PULVERIZER HAMMER

Filed Sept. 17, 1952

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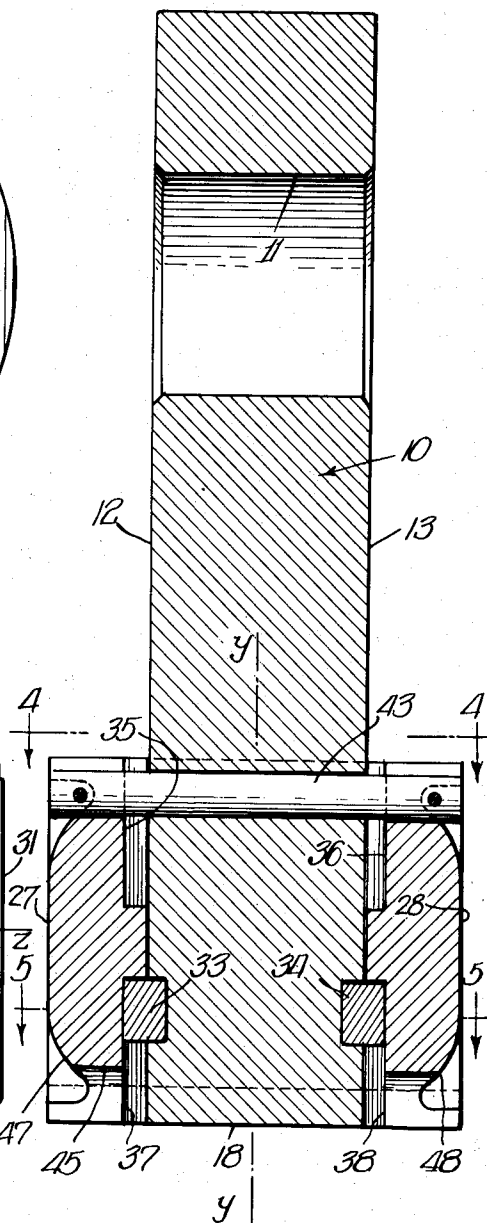
Fig. 1

← 2



← 2
x

Fig. 2



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Fig. 3

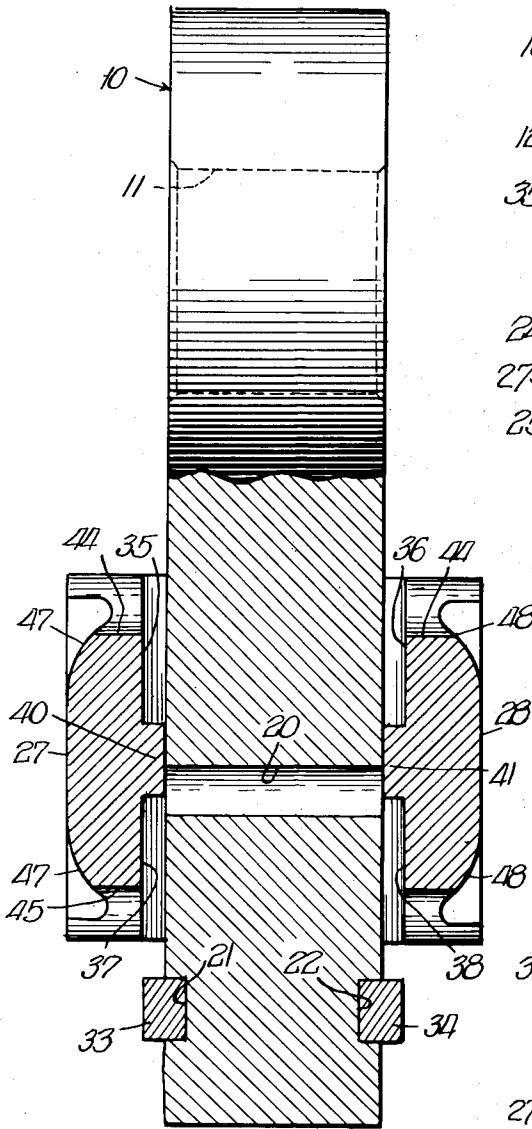


Fig. 4

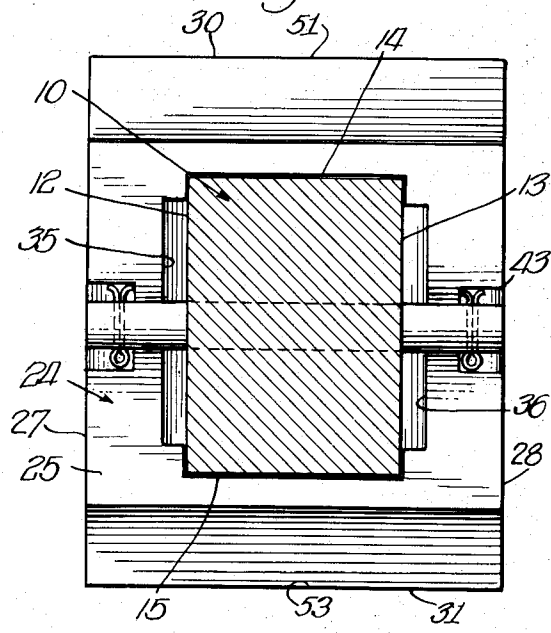
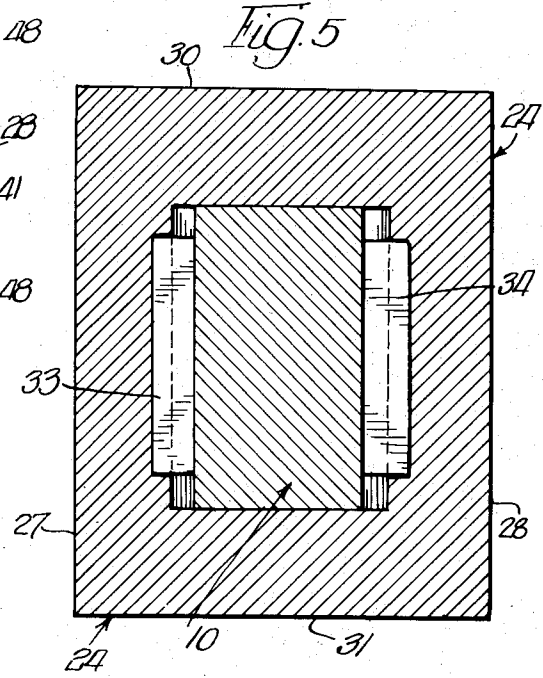


Fig. 5



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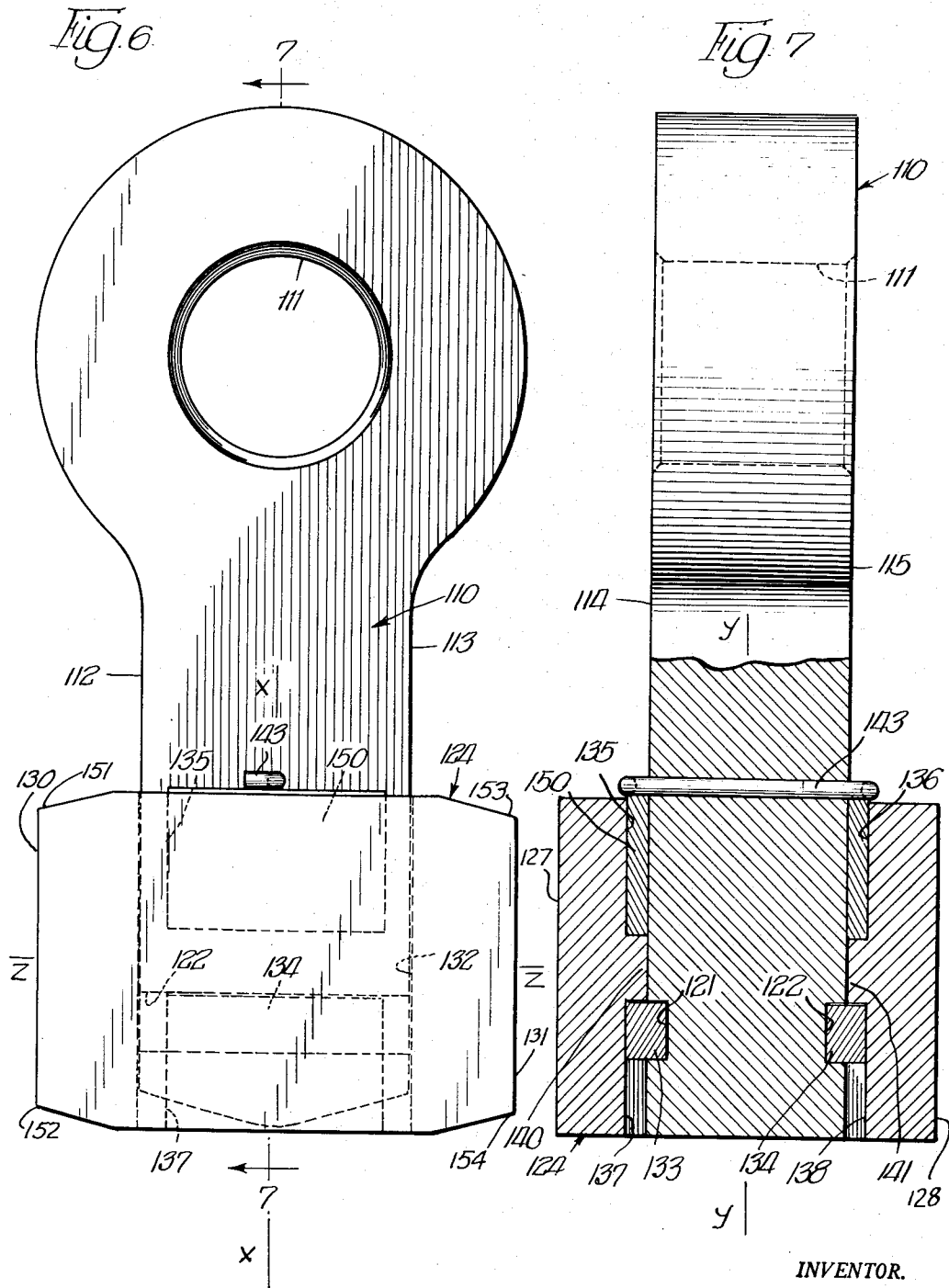
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RENEWABLE TIP PULVERIZER HAMMER

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3 Sheets-Sheet 3



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RENEWABLE TIP PULVERIZER HAMMER

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8 Claims. (Cl. 241—197)

The invention relates to rotary hammers for use in impact crushers or pulverizers and has reference particularly to an improved hammer tip adapted to be releasably fixed to a hammer shank, the improvements relating to the mounting of the hammer tip on the shank.

A general object of the invention is to provide a hammer of the rotary type having a tip which is detachable from the shank and reversible thereon so that all four edges may be presented for action and thus subjected to wear. As a result of the present improvements the hammer tip can be easily and quickly reversed end for end and side for side, the said reversing operation having the additional advantage that removal of the hammer shank from the mill is not necessary.

Another object of the invention is to provide a rotary hammer consisting of a shank and a hammer tip and wherein the hammer tip will have a socket fit on the shank with positive locking action by means of interfitting keys and a locking pin to insure proper positioning and locking of the hammer tip on the shank. More particularly, the keys interfit with the hammer tip and shank in a manner to completely protect them from wear. Also the design of the tip is such as to provide the maximum protection possible for the pin as permitted in devices of this nature.

Another object of the invention resides in the provision of a hammer tip having a central bore extending there-through from top to bottom and which is of a size to receive the shank, the said hammer tip being functionally connected to the shank by a pin and by keys which are completely shielded and protected and which hold the hammer tip on the shank so as to resist the centrifugal force of the rotating shank and other forces applied thereto during operation.

Another object is to provide a combination hammer shank and hammer tip wherein the tip is functionally connected to the shank in the manner as herein described, wherein said structure provides the maximum protection for the interfitting parts, being further characterized by ease of disassembly, and which does not require any special tools.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation as will be more fully described and particularly pointed out in the specification, drawings and claims appended thereto.

In the drawings which illustrate an embodiment of the invention, and wherein like reference characters are used to designate like parts—

Figure 1 is a side elevational view showing a shank and hammer tip therefor embodying the improved structural features of the present invention;

Figure 2 is a vertical sectional view taken substantially along line 2—2 of Figure 1 showing details of the interfitting keys and locking pin whereby the hammer tip is releasably held on the shank;

Figure 3 is a sectional view similar to Figure 2 but

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showing the hammer tip in elevated position on the shank to provide access to the keys;

Figure 4 is a transverse sectional view taken substantially along line 4—4 of Figure 2;

5 Figure 5 is a transverse sectional view taken substantially along line 5—5 of Figure 2;

Figure 6 is a front elevational view illustrating modifications coming within the invention; and

10 Figure 7 is a vertical sectional view taken substantially along line 7—7 of Figure 6 and illustrating modified structure for releasably mounting and locking the hammer tip on its shank.

The impact hammer of the present invention is adapted for use in rotary or centrifugal disintegrators or mills wherein the hammer is fixed to a main operating shaft assembly which is adapted to rotate at high speed. Since the components of the disintegrator or mill are conventional, the present drawings disclose only the hammer shank and tip or head portion therefor, the head portion being mounted on the shank in an improved manner whereby the said portion is detachable and reversible thereon so that all four edges may be presented for action and thus subjected to wear. The numeral 10 designates a flat, metal hammer shank having a hole 11 at one end by means of which the shank is mounted on and fixedly secured to the main operating shaft assembly of the mill. The hammer shank accordingly extends radially outward of the shaft and the said shank is approximately rectangular in transverse section, having two parallel long sides identified by numerals 12 and 13, and having two shorter sides 14 and 15. At the terminal end of the hammer shank the same is abruptly tapered to provide the inclined surfaces 16 and 17 which meet at the apex 18. Intermediate the length of the hammer shank 10 the same is provided with the pin receiving opening 20 which extends from the surface 12 through the shank to surface 13. A pair of key receiving recesses 21 and 22 are formed in the shank outwardly of opening 20. Surface 12 contains the recess 21, whereas recess 22 is formed in surface 13. Accordingly, the recesses are parallel to the surfaces 12 and 13. However, the pin receiving opening 20 extends at right angles thereto, being parallel to the surfaces 14 and 15, see Figure 4.

The hammer tip or head portion 24 of the present rotary hammer is shown in side elevation in Figure 1 and in vertical section in Figures 2 and 3. The head portion 24 is also approximately rectangular in shape, having top and bottom surfaces 25 and 26 and side surfaces 27 and 28, Figure 3, and end surfaces 30 and 31 which provide the grinding surfaces, the same being subjected to considerable wear during operation of the rotary hammer. The head portion 24 is provided with a central passage 32, extending through the portion from the top surface 25 to the bottom surface 26. The size of the central passage is such as to receive the hammer shank, providing an easy fit of the head portion on the shank. The improvements of the invention relate to novel structure for releasably mounting and locking the head portion on the shank by means of interfitting keys and a locking pin. This structure will now be described in detail.

As previously explained, the recesses 21 and 22 in the shank are each adapted to receive a key member identified by numerals 33 and 34, respectively, and which are inserted in their respective recesses after the head portion has been mounted on the shank and while said portion is held in an elevated position. Elevating the head portion functions to expose the recesses 21 and 22, making them accessible to the operator so that the keys 33 and 34 can be located therein. The head portion is formed with cooperating recesses which are formed in certain walls of the central passage. The spaced walls of the passage, having coacting relation with the surfaces 12 and 13 of

the shank, are recessed in accordance with the invention to provide a pair of recesses 35 and 36, extending from the top surface 25 downwardly to terminate some distance short of the vertical center of the head portion. Similar recesses 37 and 38 extend from the bottom surface 26 upwardly to likewise terminate some distance short of the vertical center. The recesses 21 and 22 in the shank have a depth at least half the width of the key members 33 and 34 and the width of recesses 35, 36, 37 and 38 is likewise at least half the width of the key members. The above structure can be best understood by reference to Figure 3 which shows the head portion in elevated position on the shank and with the key members 33 and 34 in place in their respective recesses 21 and 22. The width of the recesses 37 and 38 is such as to allow the head portion to descend to operative position, with the key members entering the recesses until they engage the abutments 40 and 41. As a result the head portion is positioned on the shank for operation, all as clearly illustrated in Figure 2.

The next step in the procedure of mounting the hammer tip on its shank is to lock the same in said operative position. For this purpose the locking pin 43 is inserted in the opening 20. The location of the said opening requires the provision of grooves in the head portion such as the groove 44 located centrally in a transverse direction in surface 25 and the groove 45 similarly located in surface 26. The grooves are arcuate as regards their bottom formation which conforms to the curvature of the pin. The grooves locate the pin well below the surfaces 25 and 26 and thus the maximum protection for the pin as permitted in devices of this nature is provided. This particular structural detail has the added advantage of locating the cotter pins 46 in the side recesses 47 and 48, respectively. Top and bottom side recesses 47 are formed in the side surface 27 of the head portion and similar top and bottom side recesses 48 are formed in surface 28. The cotter pins which hold the pin 43 in place are thus protected and due to such protection the cotter pins are subjected to very little, if any, wear.

The head portion or hammer 24 of the invention is thus symmetrical about three planes. The first is a vertical transverse plane identified as $x-x$, Figure 1, and which bisects the head portion into two identical halves on the respective sides of the grooves 44 and 45. A vertical longitudinal plane identified as $y-y$, Figure 2, bisects the head portion into two vertical halves centrally of the working faces 31 and 32 and a central horizontal plane $z-z$, Figure 1, divides the portion so as to form a top half which is identical with a bottom half. As a result the hammer tip can be assembled on the shank in any one of four different positions so that by reversing the hammer tip, end for end and side for side, it is possible to present all four edges of the grinding faces for action. In the drawings, Figures 1 and 4, the said edges are identified by numerals 51, 52, 53 and 54, and the same are formed by the working faces 30 and 31 intersecting with the outwardly angulated sections of the top and bottom surfaces 25 and 26. Accordingly, the maximum useful life of the tip is obtained. When the tip is reversed end for end the surface 26 is disposed on top and surface 25 becomes the bottom surface. Also when the tip is reversed end for end the recesses 35 and 37 are located on the right side of the shank and recesses 36 and 38 are on the left side. In all positions of the tip the keys function in the same manner and the pin 43 likewise functions in the same manner for locking the tip to the shank.

The modifications of Figures 6 and 7 incorporate the same inventive concept as described in connection with Figures 1 to 5 inclusive. The only structural difference concerns the locking pin and its manner of locking the hammer tip. Referring to said figures, the shank 110, having surfaces 112-113 and 114-115 is recessed at 121 and 122 for receiving the keys 133 and 134. The head portion 124 has a passage extending from the top

surface 125 to the bottom surface 126 and recesses are formed in opposed walls of the passage such as 135 and 136 which extend downwardly from the top surface and 137 and 138 which extend upwardly from the bottom. The depth of the recesses is such as to provide the abutments 140 and 141 and the width of the recesses accommodates the keys which are thus shielded within the head portion and protected from wear.

Instead of the locking pin and the cotter pins which hold it in place the modification of Figures 6 and 7 substitutes a member 143 which may be identified as a pin which is much smaller in circumference than pin 43. Also member 143 is employed with stabilizer plates 150 so that the cotter pins are eliminated. Following insertion of the keys 133 and 134 and the positioning of the head portion on the shank with the abutments in contact with the keys, the next operation is to lock the head portion in place. First the stabilizing plates 150 are placed in the recesses 135 and 136 and then the member 143 is passed through an opening provided therefor in the shank. The ends of the member 143 are slightly bent to thus secure the member to the shank. The location of member 143 is such as to overlie the stabilizer plates 150 and by locking the plates in their respective recesses the head portion is likewise locked in operative position on the shank.

In all forms of the invention the hammer tip can be easily and quickly reversed, end for end and side for side, and the reversing operation has the additional advantage that removal of the hammer shank from the mill is not necessary. The keys in combination with the locking pins insure positive locking action of the hammer tip on the shank with the added advantage that the interfitting parts are almost completely protected from wear. However, for disassembling the hammer tip no special tools are required and it is not necessary to remove the shank from the mill.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings as various other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. A hammer of the character described, comprising a head portion having a passage extending through the portion from top to bottom for receiving a hammer shank, the head portion and shank having a recess respectively and which are disposed in communicating relation when the head portion is operatively positioned on the shank, at least one key member adapted for location in the communicating recesses whereby to interfit with the head portion and shank for holding the head portion on the shank in a manner to prevent movement of the head portion along the shank in a certain direction, and a pin adapted to have location in an opening in the shank for locking the head portion on the shank in said operative position.

2. A hammer of the character described, comprising a head portion having a passage extending centrally through the portion from top to bottom for receiving a hammer shank, the head portion having a pair of recesses located in opposed walls respectively of the central passage and said shank having a pair of recesses on opposed side walls respectively adapted to communicate with those located in the head portion when the head portion is operatively positioned on the shank, a key member located in each of the communicating recesses whereby to interfit with the head portion and shank for holding the head portion on the shank in a manner to prevent movement of the head portion along the shank in a certain direction, and a pin adapted to have location in an opening in the shank so as to extend on either side of the shank for locking the head portion on the shank in said operative position.

3. A hammer for rotary mills and the like comprising a head portion having a central passage extending through

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the same from top to bottom, a hammer shank on which the head portion is mounted, said shank having a recess in certain side walls adjacent its terminal end, a key in each recess, the head portion also having a recess in certain walls of the passage adapted to receive the keys supported by the recesses in the shank whereby the keys interfit with the shank and the head portion and serve to hold the head portion on the shank in a manner to prevent movement of the head portion toward the terminal end of the shank, and a pin adapted to have location in an opening in the shank so as to extend on either side of the shank, said pin being positioned at the end of the head portion opposite the keys whereby to thus lock the head portion on the shank.

4. A hammer for rotary mills and the like comprising a head portion substantially rectangular in shape and having top and bottom surfaces, side surfaces and end grinding faces, said head portion having a passage extending centrally through the portion from the top surface to the bottom surface for receiving a hammer shank, said hammer shank having a recess in certain opposed side walls in right angle relation to the length of the shank and adjacent the terminal end thereof, a pair of keys adapted to be located in the recesses respectively, said keys having a width with respect to that of the recesses so that the keys project outwardly of the side walls of the shank, said head portion having communicating recesses in certain opposed walls of the passage, a pair of recesses extending downwardly from the top surface and a pair of similar recesses extending upwardly from the bottom surface of the head portion, said recesses terminating short of the vertical center of the head portion to form abutments and which contact the keys when the head portion is operatively positioned on the shank, that pair of recesses extending upwardly from the bottom surface of the head portion receiving the outwardly projecting sections of the keys to thus permit said operative positioning of the head portion whereby the keys are completely shielded and protected from wear, and a pin adapted to have location in an opening in the shank so as to extend on either side of the shank for locking the head portion on the shank in said operative position.

5. A hammer for rotary mills as defined by claim 4, wherein the top surface of the head portion is provided with a groove adapted to receive the projecting ends of the pin, and additionally including cotter pins for locking the pin in place, said cotter pins being adapted to pass

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through openings provided therefor in respective ends of the pin and whereby said cotter pins have associated relation with the side surfaces of the head portion.

6. A hammer for rotary mills as defined by claim 4, wherein the top surface of the head portion is provided with a groove adapted to receive the projecting ends of the pin, wherein the bottom surface is also provided with a groove adapted to receive the projecting ends of the pin when the head portion is reversed on the shank end for end, and additionally including cotter pins for locking the pin in place, said cotter pins being adapted to pass through openings provided therefor in respective ends of the pin and whereby said cotter pins have associated relation with the side surfaces of the head portion.

7. A hammer of the character described comprising a head portion having a passage extending centrally through the portion from top to bottom for receiving a hammer shank, said hammer shank having a recess in certain opposed side walls to comprise a pair of recesses, the head portion having a recess extending downwardly from the top and a similar recess extending upwardly from the bottom in certain opposed walls of the central passage to form a first and a second pair of recesses in the head portion, the second pair of recesses communicating with those in the shank when the head portion is operatively positioned on the shank, and said first pair of recesses being adapted to communicate in a similar manner with the recesses in the shank when the head portion is reversed end for end on the shank, a key member adapted to be located in each recess in the shank for holding the head portion on the shank in said operative position, and a pin adapted to have location in an opening in the shank for locking the head portion on the shank in said operative position.

8. A hammer of the character described as defined by claim 7, additionally including a stabilizer plate located in each recess of said first pair, and wherein the said pin for locking the head portion on the shank has locking contact with the stabilizer plates on respective sides of the shank.

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