Nov. 1, 1960 L. J. MEYER 2,958,474

HAMMER CRUSH ROTOR

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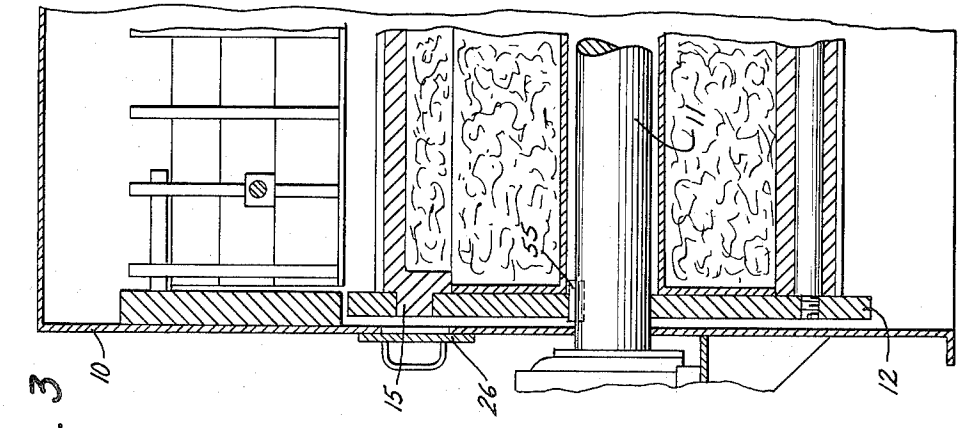


FIG. 3

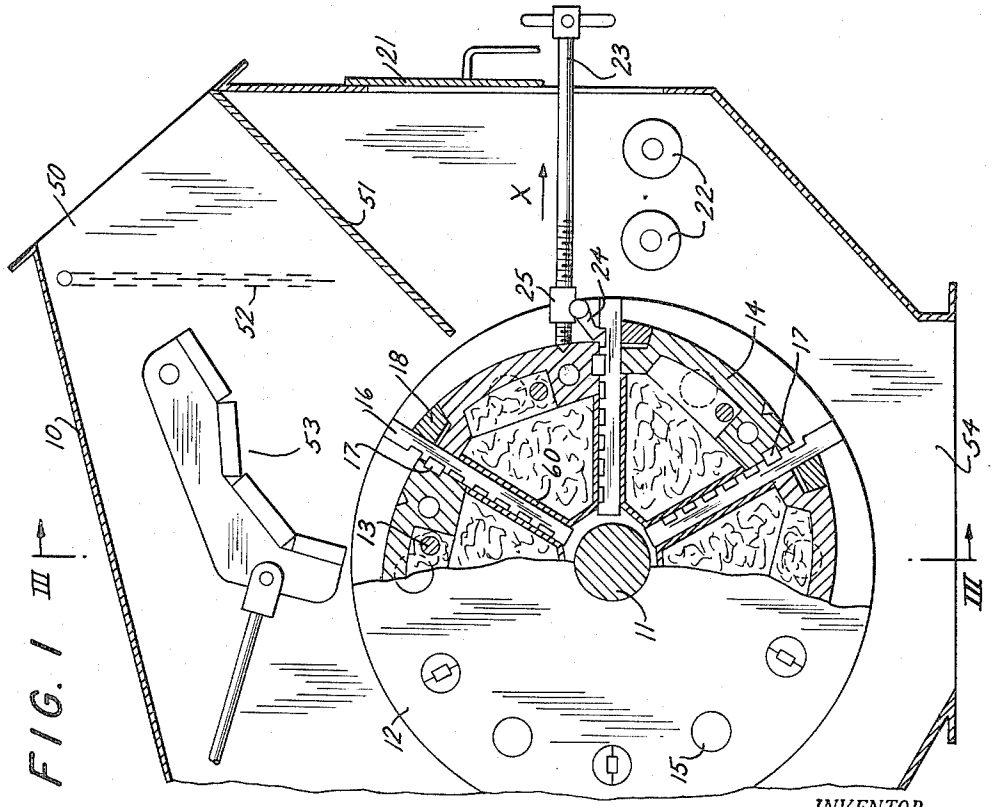


FIG. 1

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HAMMER CRUSH ROTOR

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FIG. 4

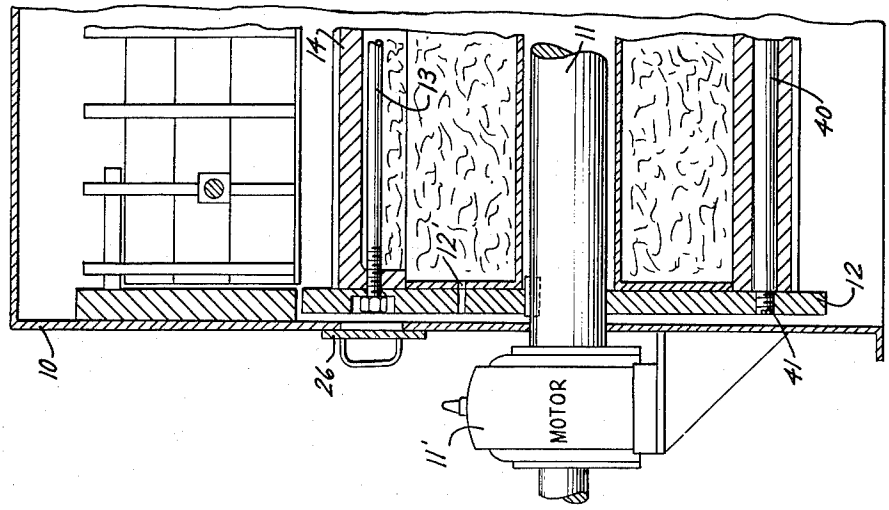
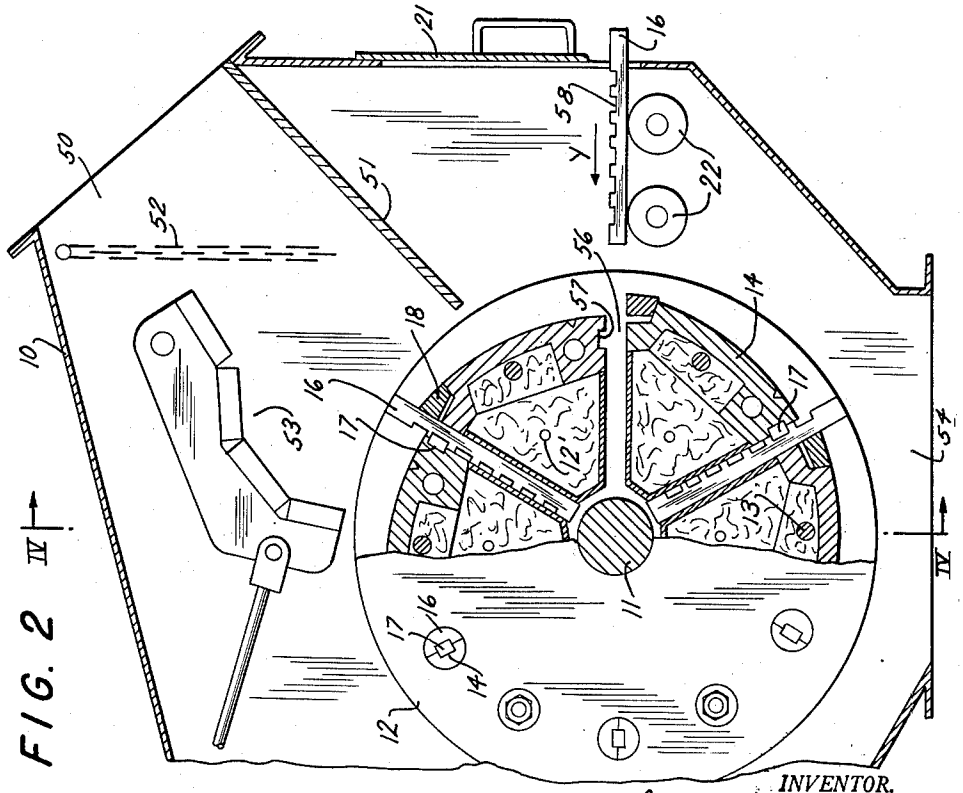


FIG. 2



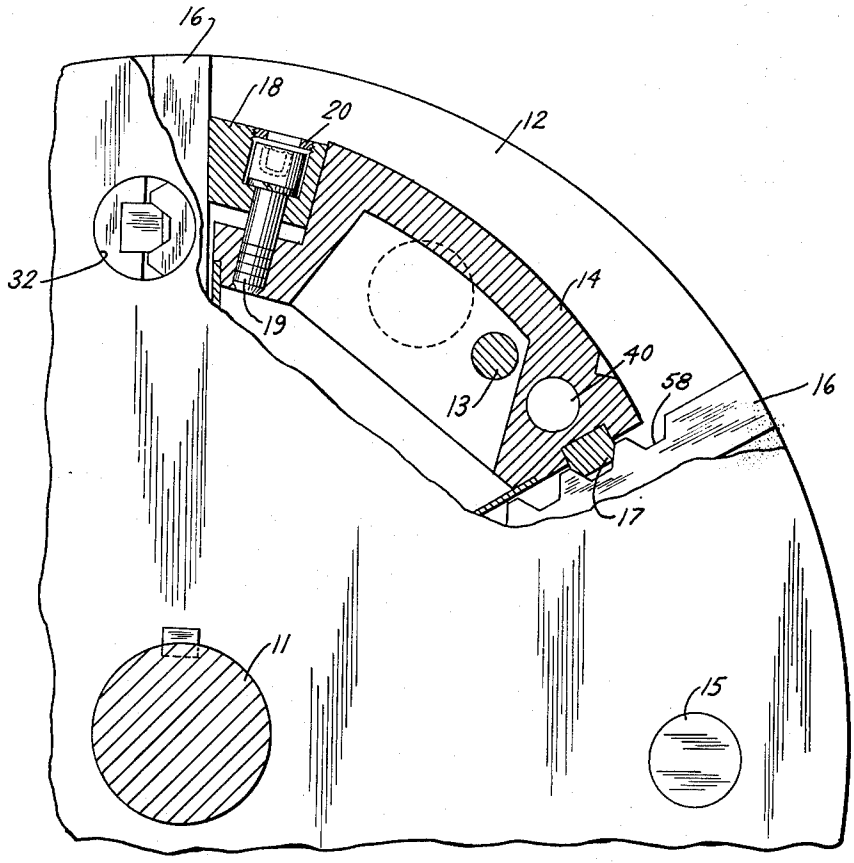
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FIG. 5



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United States Patent Office 2,958,474 Patented Nov. 1, 1960

2,958,474

HAMMER CRUSH ROTOR

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Filed Mar. 23, 1959, Ser. No. 801,123

Claims priority, application Germany Mar. 27, 1958

10 Claims. (Cl. 241—192)

The present invention relates to crushing machines.

More particularly, the present invention relates to a rotor of a hammer crusher.

The rotors of hammer crushers are provided with hammers which engage the work to be crushed or pulverized, and these hammers become worn in a relatively short time. As a result it is essential with the machines of this type to stop the operation in order to replace or adjust the hammers, and this stopping of the operation and placing the machine again in a condition where it can efficiently crush or pulverize the work requires an extremely large amount of time and considerable work at the present time.

One of the objects of the present invention is to provide a rotor of the above type whose parts are capable of being rapidly assembled and disassembled from the exterior of the machine while the rotor remains in the housing of the crusher mill.

Another object of the present invention is to provide a rotor of the above type with hammer elements which can be rapidly adjusted without removing any of the rotor structure from the housing so as to compensate for wearing away of the hammer elements.

It is also an object of the present invention to provide an exceedingly rugged crusher rotor whose parts can be conveniently assembled and disassembled from the interior of the housing of the crusher mill and at the same time whose construction is exceedingly simple.

With the above objects in view the present invention includes in a hammer crusher rotor, a rotary shaft and a pair of end plates carried by the shaft for rotation therewith. A plurality of rigid spacer means are distributed circumferentially about the shaft between the end plates and are fixed to the latter, and this plurality of spacer means are respectively spaced from each other and define between themselves a plurality of slots which extend between the end plates axially of the shaft. Each of the spacer means is formed at one side thereof with a first groove extending substantially parallel to the shaft and directed toward the next spacer means. A plurality of hammer plates are respectively located in the slots formed between the plurality of spacer means, and these hammer plates respectively have impact portions extending outwardly beyond the plurality of spacer means. The hammer plates themselves are respectively formed with second grooves which are respectively aligned and communicate with the above-mentioned first grooves of the spacer means so as to form pairs of communicating grooves, and a plurality of keys are respectively located in the pairs of communicating grooves to lock the hammer plates to the plurality of spacer means, respectively.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific

embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a partly broken away, partly sectional, side elevation of a crusher according to the present invention;

Fig. 2 shows the structure of Fig. 1 during assembly of the parts thereof;

Fig. 3 is a sectional elevation taken along line III—III of Fig. 1, Fig. 3 fragmentarily showing only one side of the machine;

Fig. 4 is a sectional elevation taken along line IV—IV of Fig. 2, Fig. 4 also fragmentarily showing only one side of the machine; and

Fig. 5 is a fragmentary enlarged, partly sectional view showing the details of how the components of the rotor of the invention are assembled together.

Referring now to Figs. 1–4, it will be seen that the hammer crusher of the invention includes an outer housing 10 which is formed at its upper right hand portion, as viewed in Figs. 1 and 2, with a feed inlet 50. The material which is to be crushed or pulverized after being introduced through the feed inlet 50 moves downwardly by gravity along the plate 51 which is supported in the interior of the housing 10 extending between a pair of side walls thereof. A curtain made up of chains 52 is supported in the feed inlet 50 with the bottom ends of the chains respectively located at a predetermined distance above the inclined wall 51, so that these chains will serve to provide a substantially uniform thickness in the work material which moves downwardly along the wall 51 to be crushed or pulverized in the mill of the invention.

The material which is to be worked on is engaged by hammers of a rotor described below and forming the subject matter of the present invention, and the material is centrifugally thrown from the hammers to a plurality of breaker plates 53 one of which is shown in the drawing, so that in this way the material will strike a breaker plate, fall from the latter to again be engaged by a hammer and again thrown against another breaker plate, and in this way the material is crushed and pulverized and eventually leaves through the outlet 54 at the bottom of the mill.

The rotor which forms the present invention includes the rotary shaft 11 which extends through the side walls of the housing 10 and is supported for rotation at these side walls by any suitable bearings which are not illustrated. The rotary shaft 11 is driven from any suitable motor 11' or the like located at the exterior of the housing 10, as indicated in Fig. 4.

A pair of end plates 12 of the rotor are carried by the rotary shaft 11 for rotation therewith, these plates 12 being circular and being coaxially mounted on the shaft 11. One or both of the end plates 12 is formed with a keyway which receives a key 55 which is also located in a keyway of the shaft 11, so that in this way the end plates are constrained to rotate with the shaft 11.

A plurality of spacer means 14 are distributed about the rotary shaft 11 between the end plates 12 and are spaced from each other so as to define between themselves a plurality of slots 56 (Fig. 2). The plurality of spacer means 14 hold the end plates 12 apart from each other. A means is provided for pulling the end plates 12 toward each other so as to compress the plurality of spacer means therebetween, and this means takes the form of a plurality of bolts 13. These bolts have head ends located in recesses formed in the outer surface of one of the end plates 12, and the threaded ends of the bolts 13 extend into recesses formed in the outer face of the other plate 12, one of the bolts 13 being shown at its threaded end in Fig. 4. It will also be noted that the spacer means 14 are formed at their ends with openings aligned with the openings of the end plates 12 through which the bolts pass, so that the bolts

13 pass through the end walls of the spacer means 14 as well as through openings of the end plates 12. The threaded ends of the bolts 13 receive nuts which are tightened onto the bolts, so that in this way the pair of end plates 12 are drawn toward each other and press tightly against the plurality of spacer means 14.

Each spacer means 14 is made of a rigid strong metal and has an outer arcuate wall which is provided at its ends, respectively, with a pair of projections 15 one of which is visible in Fig. 3, these projections 15 respectively extending into mating cutouts formed in the end plates 12, as is also shown in Fig. 3. Thus, the bolts 13 passing through the aligned openings of the spacer means 14 as well as the location of the projections 15 of the spacer means 14 in the mating cutouts of the end walls 12 serve to position the plurality of spacer means 14 between the end plates 12, and of course the bolts 13 as well as the projections 15 serve to fix the plurality of spacer means to the pair of end plates 12 for rotation therewith. Each spacer means 14 includes in addition to the heavy outer arcuate wall thereof an elongated substantially trough-shaped enclosure of substantially triangular cross section, this enclosure 60 having, as is shown most clearly in Fig. 1, opposite side walls which are fixed at their free edges to the outer heavy arcuate wall of each spacer means, and thus each spacer means is hollow and extends from its outer relatively heavy wall almost up to the shaft 11, as is indicated in Figs. 1 and 2. The end walls of the trough like enclosures 60 are respectively formed with openings 12′ (Fig. 4) and the plates 12 are formed with bores which respectively communicate with these openings 12′, so that these bores and openings form passages leading from the exterior of the rotor into the interior of the several hollow spacer means 14. A suitable foam material may be introduced into the hollow spacer means through these passages so as to fill the hollow spacer means with this foam material which may simply be blown in through the passages formed by the openings 12′ and the end plate bores aligned therewith. For example, material similar to heat insulating material used in housing constructions may be blown through these passages in order to fill the spaces within the hollow spacer means 14, and in this way none of the pulverized material can become located within the rotor in order to produce undesirable unbalancing thereof.

Each spacer means 14 is formed in one of its side edges which is directed toward the next spacer means with an elongated groove 57 extending substantially parallel to the axis of the shaft 11 along the entire length of the spacer means.

A plurality of hammer plates 16 are respectively located in the slots 56. These hammer plates extend almost all the way up to the shaft 11, and when the hammer plates are new they may engage the shaft 11. In their operating position, the hammer plates 16 respectively have outer edges which are aligned with the outer peripheries of the end plates 12. As is apparent from the drawings, the hammer plates 16 extend at their outer portions beyond the plurality of spacer means 14 so as to provide exposed impact portions which engage the material to be crushed or pulverized so as to throw this material against the breaker plates. The hammer plates 16 are each formed in one of their faces with a plurality of parallel grooves 58, and when the hammer plates 16 are located within the slots 56 they are positioned with their grooved faces directed toward the groove 57. The grooves 58 extend along the entire length of the hammer plates 16 which have a length equal to the distance between the end plates 12 so that the hammer plates extend up to the end plates 12. Thus, one of the grooves of each hammer plate 16, these grooves extending parallel to the shaft 11, is aligned with a groove 57 so as to form therewith a pair of communicating grooves which receive the key 17. These keys 17 thus serve to releasably lock the several hammer plates 16 to the spacer means 14. As may be seen particularly from Fig. 5, the end plates 12 are formed with openings 32 which are respectively aligned with the ends of the grooves of the hammer plates and spacer means, so that the ends of the keys 17 are accessible through these openings 32. The end walls of the housing 10 are formed with openings which are covered by cover members 26 which are removably fastened to the housing 10 at the exterior thereof, so that when the covers 26 are removed the openings 32 are accessible and at this time any suitable rod or the like may be pushed or struck against an end of a key 17 so as to push the latter out of the pair of communicating grooves and thus unlock the particular hammer plate 16. The covers 26 are shown in Figs. 3 and 4 over the shaft 11. However, the side walls of the housing 10 are formed with openings located at the elevation of the groove 56 shown in Fig. 2 and covered by cover 26, so that when the latter covers are removed access may be had to a key 17 while the plate 16 which cooperates therewith is in a substantially horizontal position, as evident from Fig. 2.

The side edge of each spacer means 14 at its outer heavy wall is stepped at the edge thereof opposite to the edge formed with the groove 57, so that the hammer plate 16 forms with the stepped edge of the spacer means 14 which engages the ungrooved surface of the hammer plate 16 an enlongated recess extending longitudinally between the end plates 12. As is particularly evident from Fig. 5, the recess which is formed in this way by cooperation of the hammer plate 16 and each spacer means 14 is of a wedge-shaped configuration, and a wedge means in the form of an elongated wedge member 18 is located in this recess. This elongated wedge member 18 is formed with a plurality of openings through which a plurality of bolts 19 pass into threaded engagement with the spacer means 14 in the manner shown most clearly in Fig. 5, and by tightening the bolts 19 the longitudinal wedge member 18 is pressed radially toward the axis of the shaft 11 so as to press the cooperating hammer plate 16 toward the grooved side surface of the next spacer means 14, and in this way the plurality of wedge member 18 will compensate for variations in the thickness of the several hammer plates 16.

In order to reduce the weight of the arcuate outer wall of each spacer means 14 as well as to balance the stepped side edge portion thereof, this arcuate outer wall of each spacer means is formed with an elongated bore 40 passing longitudinally therethrough, and the end walls 12 are formed, as shown at the lower parts of Figs. 3 and 4, with openings aligned with the bores 40 and closed by plugs 41. These openings 40 and plugs 41 are adapted to be located in alignment with housing openings which are covered by the removable cover 26, so that when the latter are removed the plugs 41 may also be removed, and then a bar may be introduced through the opening of the end wall 12 which was closed by the plug 41 into the opening 40 in order to shift the spacer means 14 with respect to the end plate 12 in order to align the bores of the spacer means 14 which receive the rod 13 with the openings of the end plates 12 which receive this rod 13, during assembly of the rotor of the invention. Once the projections 15 are located in the mating openings of the end walls 12 and the bolts 13 extend through the aligned openings of the plurality of spacer means and end plates, the plugs 41 are replaced so that the bores 40 are closed.

As is shown most clearly in Fig. 2, the housing 10 of the mill is formed at one end with a relatively large manhole which is removably covered by a cover 21, and within the housing 10 and accessible through this manhole are a pair of rollers 22 whose top surfaces are in a plane aligned with the slot 56 when the latter is horizontal, as is evident from Fig. 2. In this way, when the cover 21 is removed a hammer plate 16, which is quite heavy, can be placed on the rollers 22 to be advanced in the direc-

tion of arrow Y of Fig. 2 into the slot 56, so that in this way the parts are very easily assembled although their weight is relatively high and although they are of considerable bulk. When the hammer plate 16 has been introduced into the slot 56, the key 17 is introduced in order to lock the hammer plate to the spacer means, and then the bolts 19 are tightened so as to press the wedge member 18 against the hammer plate. As may be seen from Fig. 5, the recesses of the wedge element 18 which receive the heads of the bolts 19 are threaded at their outer ends to receive the annular cover members 20 of relatively hard material which serves to protect the heads of the bolts 19 against excessive wear from the material which is being crushed or pulverized. The sockets in the heads of the bolts 19 are accessible through the openings of the protecting rings 20, as is evident from Fig. 5.

As is evident from Figs. 1 and 2, when the hammer plates 16 are positioned in their slots 56, respectively, there will be one groove 58 located outwardly beyond the groove 57 and beyond the spacer means 14. This groove enables the position of the hammer plate to be adjusted. After a period of time these hammer plates become worn at their outer impact portions and it is necessary to shift the hammer plates outwardly so that they can continue to be used. For this purpose the cover 21 is removed, as indicated in Fig. 1, and the tool 23 which is shown in Fig. 1 is introduced in order to adjust the hammer plate. Thus, the key 17 is removed, and the tool 23 is in the form of an elongated threaded spindle having a sleeve 25 threaded thereon, and this sleeve 25 pivotally supporting a hook 24 which is placed in the outermost groove 58 of the hammer plates 16. With the tool 23 in the position shown in Fig. 1, after the cover 21 has been removed, and after the key 17 has been removed and the bolts 19 of the wedge element 18 loosened, the spindle of the tool 23 is turned so as to advance the sleeve 25 together with the hook 24 in the direction of the arrow X of Fig. 1, and in this way the hook 24 cooperates with the plate 16 through the outermost groove 58 of the latter to shift the plate 16 outwardly until its outer edge is again aligned with the outer periphery of the end plates 12. Actually, the plate 16 is shifted outwardly until its next groove is aligned with the groove 57, and the position is evident through visible inspection through the opening 32. Once the plate 16 is aligned in this way the key 17 is replaced and the bolts 19 are again tightened, and in this quick easy manner the several hammer plates 16 may be adjusted from time to time so that the best possible use may be made of the relatively expensive material which makes up these hammer plates 16. Also, it should be noted that it is possible, if desired, to entirely remove a hammer plate and reverse it so that its inner edge can be located in a position next to the outer periphery of the end plates 12 to serve as an impact portion. Thus, the most economical use is made of the hammer plate 16 in this way. As may be seen from Fig. 5, the grooves 58 are of wedge-shaped cross section, and the keys 17 have a mating cross section.

The spacer means 14 may each be formed at its outer surface with one or more substantially conical recesses to receive the pointed left end of the tool 23, as indicated in Fig. 1.

Of course, after removing the nuts from the bolts 13 and shifting the plates 12 apart from each other it is possible to bodily remove the plurality of spacer means 14 through the manhole which is covered by the cover 21, and it is apparent that with the structure of the invention the entire rotor may be assembled and disassembled within the housing 10 itself in a quick easy manner.

A suitable tube may be introduced through the relatively small opening covered by the cover 26 and placed in communication with a bore of the plate 12 which communicates with an opening 12' so that through such a tube the foam material may be blown or otherwise introduced into the hollow interior of each spacer means 14.

The hollow trough-like enclosures 60 are respectively fixed to the heavy outer arcuate walls of the several spacer means 14, respectively, as by being welded or bolted thereto.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of crushers differing from the types described above.

While the invention has been illustrated and described as embodied in hammer crushers, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a hammer crusher rotor, in combination, a rotary shaft; a pair of end plates carried by said shaft for rotation therewith; a plurality of rigid spacer means distributed circumferentially about said shaft between said end plates and fixed to the latter, said plurality of spacer means being spaced from each other and defining between themselves a plurality of slots extending between said end plates axially of said shaft, and each spacer means being formed at one side with a first groove extending substantially parallel to said shaft and directed toward the next spacer means; a plurality of hammer plates respectively located in said slots and having impact portions extending outwardly beyond said spacer means, said hammer plates respectively being formed with second grooves respectively aligned and communicating with said first grooves to form pairs of communicating grooves; and a plurality of keys respectively located in said pairs of grooves and locking said hammer plates to said spacer means, respectively.

2. In a hammer crusher rotor, in combination, a rotary shaft; a pair of end plates carried by said shaft for rotation therewith; a plurality of rigid spacer means distributed circumferentially about said shaft between said end plates and fixed to the latter, said plurality of spacer means being spaced from each other and defining between themselves a plurality of slots extending between said end plates axially of said shaft, and each spacer means being formed at one side with a first groove extending substantially parallel to said shaft and directed toward the next spacer means; a plurality of hammer plates respectively located in said slots and having impact portions extending outwardly beyond said spacer means, said hammer plates respectively being formed with second grooves respectively aligned and communicating with said first grooves to form pairs of communicating grooves; a plurality of keys respectively located in said pairs of grooves and locking said hammer plates to said spacer means, respectively; and a plurality of wedge means respectively carried by said plurality of spacer means, respectively engaging the surfaces of said hammer plates opposite to those surfaces thereof which are respectively formed with said second grooves, and respectively pressing the surfaces of said hammer plates which are formed with said second grooves against the surfaces of said spacer means which are respectively formed with said first grooves, respectively, so that said plurality of wedge means compensate for variations in the thickness of said plurality of hammer plates.

3. In a hammer crusher rotor, in combination, a rotary shaft; a pair of end plates carried by said shaft for rotation therewith, at least one of said end plates being

formed with a plurality of bores passing therethrough; a plurality of rigid hollow spacer means distributed circumferentially about said shaft between said end plates and fixed to the latter, said plurality of spacer means being respectively formed with openings communicating with said bores so that said bores and openings cooperate to provide passages leading into the interior of said hollow spacer means, said plurality of spacer means being spaced from each other and defining between themselves a plurality of slots extending between said end plates axially of said shaft and each spacer means being formed at one side with a first groove extending substantially parallel to said shaft and directed toward the next spacer means; a plurality of hammer plates respectively located in said slots and having impact portions extending outwardly beyond said spacer means, said hammer plates respectively being formed with second grooves respectively aligned and communicating with said first grooves to form pairs of communicating grooves; and a plurality of keys respectively located in said pairs of grooves and locking said hammer plates to said spacer means, respectively.

4. In a hammer crusher rotor, in combination, a rotary shaft; a pair of end plates carried by said shaft for rotation therewith; a plurality of rigid spacer means distributed circumferentially about said shaft between said end plates and fixed to the latter, said plurality of spacer means being spaced from each other and defining between themselves a plurality of slots extending between said end plates axially of said shaft, and each spacer means being formed at one side with a first groove extending substantially parallel to said shaft and directed toward the next spacer means; a plurality of hammer plates respectively located in said slots and having impact portions extending outwardly beyond said spacer means, said hammer plates respectively being formed with second grooves respectively aligned and communicating with said first grooves to form pairs of communicating grooves; a plurality of keys respectively located in said pairs of grooves and locking said hammer plates to said spacer means, respectively; and means cooperating with said end plates for pulling the same toward each other and compressing said plurality of spacer means therebetween.

5. In a hammer crusher rotor, in combination, a rotary shaft; a pair of end plates carried by said shaft for rotation therewith, said end plates respectively having inner faces directed toward each other and formed with a plurality of cutouts; a plurality of rigid spacer means distributed circumferentially about said shaft between said end plates and fixed to the latter, said plurality of spacer means respectively having projections respectively located in said cutouts of said end plates, and said plurality of spacer means being spaced from each other and defining between themselves a plurality of slots extending between said end plates axially of said shaft and each spacer means being formed at one side with a first groove extending substantially parallel to said shaft and directed toward the next spacer means; a plurality of hammer plates respectively located in said slots and having impact portions extending outwardly beyond said spacer means, said hammer plates respectively being formed with second grooves respectively aligned and communicating with said first grooves to form pairs of communicating grooves; and a plurality of keys respectively located in said pairs of grooves and locking said hammer plates to said spacer means, respectively.

6. In a hammer crusher rotor, in combination, a rotary shaft; a pair of end plates carried by said shaft for rotation therewith; a plurality of rigid spacer means distributed circumferentially about said shaft between said end plates and fixed to the latter, said plurality of spacer means being spaced from each other and defining between themselves a plurality of slots extending between said end plates axially of said shaft, and each spacer means being formed at one side with a first groove extending substantially parallel to said shaft and directed toward the next spacer means; a plurality of hammer plates respectively located in said slots and having impact portions extending outwardly beyond said spacer means, said hammer plates respectively being formed with second grooves respectively aligned and communicating with said first grooves to form pairs of communicating grooves; a plurality of keys respectively located in said pairs of grooves and locking said hammer plates to said spacer means, respectively; a housing supporting said rotary shaft for rotation about its axis, and said end plate, said plurality of spacer means, and said plurality of hammer plates and said plurality of keys being located in the interior of said housing, the latter being formed with an opening; and roller means carried by said housing in the interior thereof and accessible through said opening thereof for supporting said hammer plates for movement respectively into and out of said slots.

7. In a hammer crusher rotor, in combination, a rotary shaft; a pair of end plates carried by said shaft for rotation therewith; a plurality of rigid spacer means distributed circumferentially about said shaft between said end plates and fixed to the latter, said plurality of spacer means being spaced from each other and defining between themselves a plurality of slots extending between said end plates axially of said shaft, and each spacer means being formed at one side with a first groove extending substantially parallel to said shaft and directed toward the next spacer means; a plurality of hammer plates respectively located in said slots and having impact portions extending outwardly beyond said spacer means, said hammer plates respectively being formed with second grooves respectively aligned and communicating with said first grooves to form pairs of communicating grooves; a plurality of keys respectively located in said pairs of grooves and locking said hammer plates to said spacer means, respectively; a housing supporting said rotary shaft for rotation about its axis, and said end plates, said plurality of spacer means, and said plurality of hammer plates and said plurality of keys being located in the interior of said housing, the latter being formed with an opening; roller means carried by said housing in the interior thereof and accessible through said opening thereof for supporting said hammer plates for movement respectively into and out of said slots; and manually operable hook means adapted to be placed in the interior of said housing through said opening thereof for engaging a selected hammer plate and one of said plurality of spacer means for withdrawing said selected hammer plate from the slot in which it is located.

8. In a hammer crusher rotor, in combination, a pair of end plates; a pair of spacer means located between and fixed to said end plates, said pair of spacer means defining between themselves an elongated slot extending between said end plates and one of said spacer means being formed at a surface portion thereof directed toward the other spacer means with an elongated groove; a hammer plate located in said slot and having an impact portion extending outwardly beyond said pair of spacer means, said hammer plate being formed in a surface thereof which is directed toward the surface which is formed with said groove with a plurality of parallel grooves one of which is placed in alignment and in communication with said first-mentioned groove so as to form therewith a cavity; and a key located in said cavity for fixing said hammer plate to said pair of spacer means, whereby after said impact portion of said hammer plate becomes worn said key may be removed and said hammer plate may be shifted outwardly to place the next groove thereof in communication with the groove of said one spacer means and the key then replaced so that the hammer plate may continue to be used.

9. In a hammer crusher rotor, in combination, a ro-

tary shaft; a pair of end plates carried by said shaft for rotation therewith; at least a pair of spacer means located between and fixed to said end plates and defining between themselves an elongated slot extending axially of said shaft, one of said spacer means having an elongated stepped side edge directed toward the other of said spacer means; a hammer plate located in said slot and having an exterior impact portion extending outwardly beyond said pair of spacer means, said plate defining with said stepped side edge of said one spacer means an elongated recess extending longitudinally of said shaft; and wedge means located in said recess and pressing said hammer plate against the other of said spacer means.

10. In a hammer crusher rotor, in combination, a rotary shaft; a pair of end plates carried by said shaft for rotation therewith; at least a pair of spacer means located between and fixed to said end plates and defining between themselves an elongated slot extending axially of said shaft, said pair of spacer means respectively having side surfaces directed toward each other and one of said side surfaces being formed with an elongated groove extending substantially axially of said shaft;

a hammer plate located in said slot and having a surface directed toward said groove and formed with a plurality of parallel grooves adapted to be successively aligned with said first-mentioned groove when said hammer plate is adjusted after wear thereof, at least one of said grooves of said hammer plate being located outwardly beyond said first-mentioned groove and beyond the spacer means which is formed with said first-mentioned groove so that a suitable tool may be placed in said one groove of said hammer plate and in engagement with one of said spacer means for withdrawing said last-mentioned hammer plate from said slot; and a key located in said first-mentioned groove as well as in a groove of said hammer plate for locking the latter to said pair of spacer means.

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