

May 4, 1943.

L. T. HARRIS

2,318,219

RENEWABLE TIP PULVERIZER HAMMER

Filed Aug. 7, 1940

2 Sheets-Sheet 1

Fig. 1

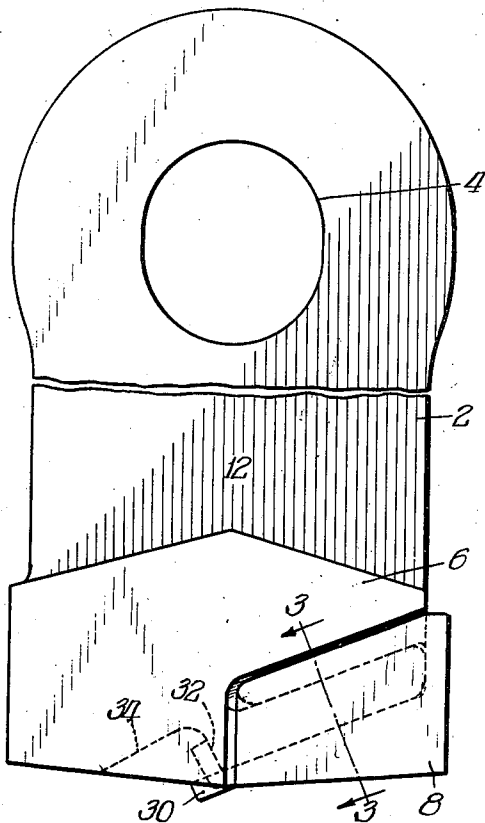


Fig. 2

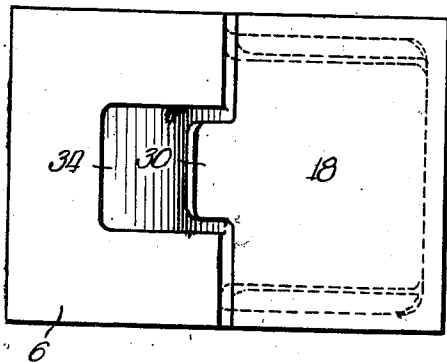


Fig. 3

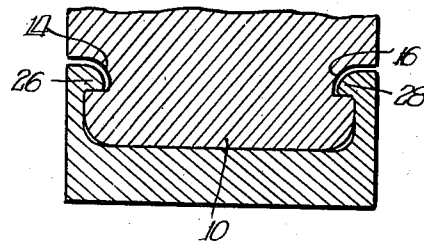


Fig. 4

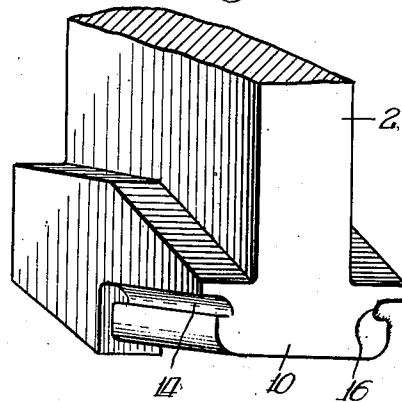
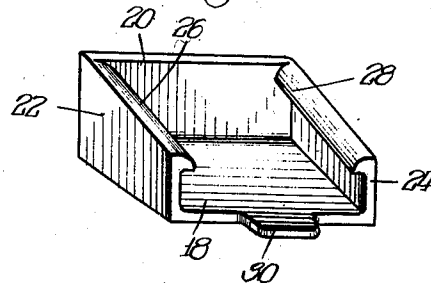


Fig. 5



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2 Sheets-Sheet 2

Fig. 8.

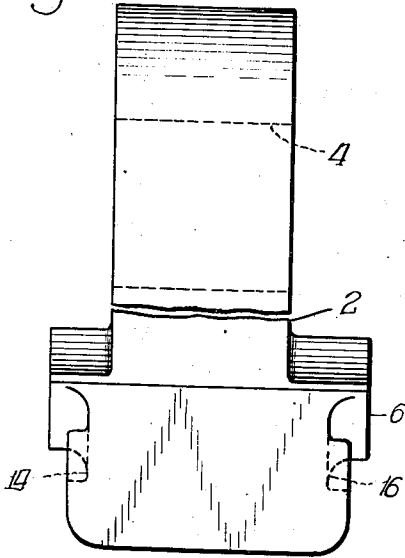


Fig. 9.

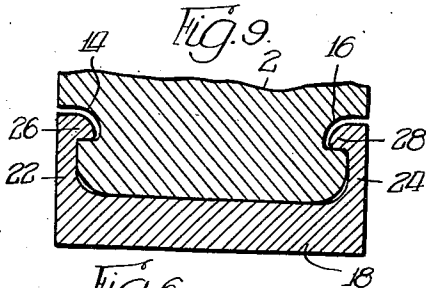


Fig. 6.

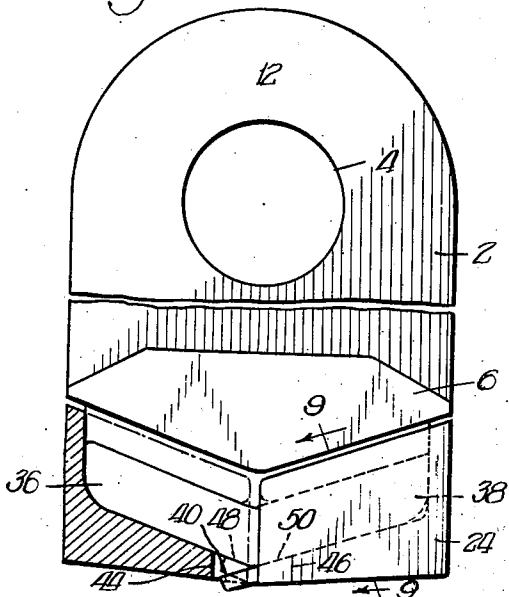


Fig. 7.

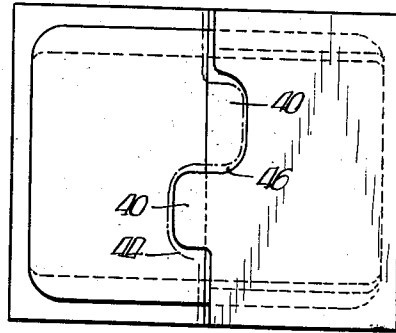


Fig. 10.

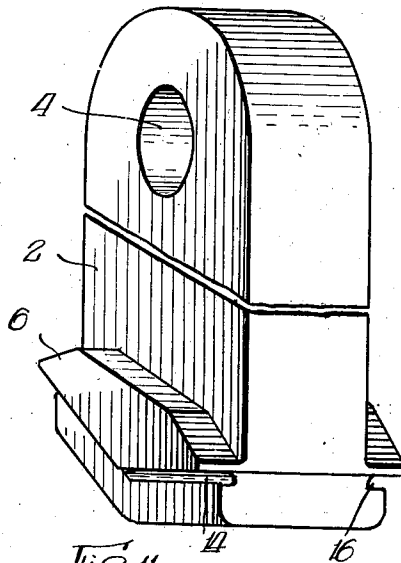
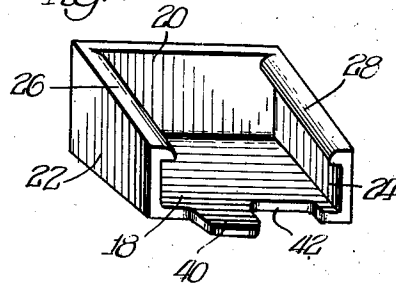


Fig. 11.



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UNITED STATES PATENT OFFICE

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RENEWABLE TIP PULVERIZER
HAMMER

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Application August 7, 1940, Serial No. 351,740

9 Claims. (Cl. 83—11)

The present invention relates to hammers for centrifugal devices, and more in particular to pulverizing hammers of multi-part construction having renewable tips or heads for use in such instrumentalities or mechanisms as mills and crushing or pulverizing machines of the centrifugal or rotary beater type.

Among the objects of the present invention is to provide a novel pulverizer hammer of multi-part construction having one or more replaceable tips or heads which are particularly subjected to heavy duty and considerable wear, thus requiring frequent renewal or replacement.

Another object contemplated by the present invention is to provide a novel pulverizer hammer having one or more tips or heads renewable or replaceable as the same become so worn as to require such replacement in order to secure maximum performance and efficiency of the said device to which the same is attached.

As a further desideratum within the purview of the present invention, the novel pulverizer hammer characterizing the present contribution in the art embodies one or more tips or heads of box or shell-like construction which can be readily and easily replaced as becomes necessary due to wear at a relatively low cost, the said structure also embodying as novel features means for effecting this removal of a worn tip or head and replacement by a new tip or head with ease and facility and at a low cost, thus eliminating expensive labor charges and loss of production when such renewal becomes necessary.

The invention also contemplates a novel pulverizer hammer construction embodying novel means for assembling one or more replaceable tips or heads with the operating arm thereof whereby the tip or head is urged into proper seating relation with its associated part of the hammer structure to prevent loosening thereof with respect to said associated part of the hammer construction, which would cause inefficient operation of the device and possible damage thereto should this looseness result in structural failure of the said tip or head.

More particularly, the invention comprehends a pulverizer hammer construction embodying a replaceable tip or head which, because of the excessive wear and heavy duty to which the same is subjected, must be replaced or renewed from time to time in order to secure maximum performance of the centrifugal device of which the same is a component part, such renewable tip or head being relatively small and of box or shell-like construction which permits of its fabrica-

tion at a relatively low cost and its ready replacement without loss of production and large installation costs.

The novel pulverizer hammer according to the present invention incorporates a novel dovetailed interlock between the arm and one or more tips used in association therewith to assure proper seating relation between the tip and arm at all times during its operation to provide for maximum operating efficiency, yet permitting ready removal and replacement of the said tip or head when the same has become worn during its operation.

As a further object of the present invention, a novel means is contemplated for use in combination with the dovetailed interlock mechanism of the tip and arm which provides for easy assembly and disassembly of the tip with respect to the arm, the said attaching means, according to one embodiment disclosed herein, taking the form of a pliable lip or lug integral with the tip and bendable into interlocking engagement with a shoulder formed as a part of an open-faced recess provided in the arm with which said tip is associated.

The present invention also contemplates a novel multi-part pulverizer hammer embodying a separate renewable tip having dovetailed interlock relation with the said arm and angularly disposed with respect to the axis of the arm so as to cause centrifugal force in the orbital movement of the arm, as also in the reaction from hammer blows, to be exerted in a direction to force the tip to its seat in abutting relation to the said arm, thus providing at all times for tight cooperative relation between the two parts to decrease the wear and increasing the efficiency of the device and preventing possible damage to the machine with which the same is associated, which might occur when looseness prevails between a removable tip or head and the arm.

The invention in its more specific application involves the use of a box or shell-like tip or head removably associated with a relatively large weighted end of an operating arm and in slidable embracing and interlocking relation therewith to form an impact element having the part thereof subjected to the greatest wear replaceable at will without necessitating removal of the entire arm, thus decreasing the cost of maintaining such a device in operation, as well as maintenance expenses due to shut down in operation when such repairs become necessary. The above-defined structure, as part of the inventive concept herein disclosed, may embrace structure

providing the interlock between the replaceable tip and arm so disposed as to assure proper seating relation between the tip and said arm due to centrifugal force during operation, as well as a novel attaching means constituted by a bendable lug provided on the renewable tip and engageable with the head to facilitate assembly and disassembly of the elements of the composite structure.

The invention further includes as an object the provision of a pulverizer hammer construction having opposed replaceable tips of box or shell-like construction embracing the novel structural features hereinabove set forth, and which structure may be incorporated in centrifugal devices where such opposed replaceable tips are desirable to provide for reversibility of the pulverizer hammers.

Other objects, features, capabilities and advantages are comprehended by the invention, as will later appear and as are inherently possessed thereby.

Referring to the drawings:

Figure 1 is a fragmentary view in side elevation of a pulverizer hammer embodying novel features of construction in accordance with the present invention;

Figure 2 is an end plan view of the hammer shown in Figure 1 of the drawings;

Figure 3 is a fragmentary sectional view taken in the plane represented by line 3—3 of Figure 1 of the drawings;

Figure 4 is a fragmentary view in perspective of the end of the operating arm of the pulverizer hammer, with the renewable tip removed to disclose the construction thereof more in detail;

Figure 5 is a view in perspective of a renewable tip made in accordance with the present invention;

Figure 6 is a fragmentary view partly in elevation and partly in section disclosing a modified form for a pulverizer hammer embodying the novel features according to the present invention;

Figure 7 is an end plan view of the pulverizer hammer shown in Figure 6 of the drawings,

Figure 8 is a fragmentary view in end elevation of the arm of the pulverizer hammer shown in Figure 6, with the renewable tips removed to disclose the construction thereof more in detail;

Figure 9 is a fragmentary view in cross-section taken in the plane represented by line 9—9 of Figure 6 of the drawings;

Figure 10 is a fragmentary view in perspective of the arm shown in Figure 8 of the drawings; and

Figure 11 is a view in perspective of a renewable tip used in the assembled embodiment of the invention shown in Figure 6 of the drawings.

Referring now more in detail to the drawings, a pulverizer hammer made in accordance with the present invention is disclosed in Figures 1 to 5, inclusive, as including an operating arm 2 formed at one end with an opening 4 to receive a bolt or pivot rod whereby the said arm may be secured to a rotor structure or the like for rotary movement within a housing of a mill or crushing machine for pulverizing material introduced into the same, all as well understood in the art. This arm is formed adjacent its other end with a relatively large weighted portion 6 to which is secured on one face thereof a renewable tip 8 of novel construction and assembled therewith in accordance with the present invention.

As disclosed in this embodiment, the end por-

tion 6 is formed with a tongue 10 extending laterally from adjacent the longitudinal axis 12 and toward one face of the arm 2, the same being inclined with respect to the axis of the said arm for a purpose to be hereinafter more particularly identified. The said tongue 10 has its marginal surfaces offset inwardly with respect to the faces of the enlarged end portion 6 and is provided with the opposed longitudinal grooves 14 and 16 which are likewise angularly disposed with respect of the axis 12 of the arm and substantially in longitudinal parallel relation with the general disposition of the tongue.

The renewable tip 8 is of relatively light construction from the standpoint of its weight, and is characterized as being of box or shell-like construction of sufficient rigidity and having sufficient wear-resisting properties to provide an effective impact member for pulverizing material with which the same comes in contact, but being readily replaceable when the same has become so worn as to be ineffective in its normal operation to cause disintegration of the said material and to properly protect the arm 2 and to provide for maximum efficiency of the device. This renewable tip 8 is formed with a facing wall 18, a rear end wall 20, an opposed open front end and the opposed side walls 22 and 24 formed with the inwardly presented flanges 26 and 28, respectively, which said flanges are adapted to slidably engage within the grooves 14 and 16, respectively, into dovetailed interlock with the tongue 10 as the tip is slid laterally in embracing relation thereover. As will be apparent from the drawings, the facing wall 18 provides in part the end surface of the pulverizing hammer, while the walls 22 and 24, because of the offset relation of the tongue 10 with respect to the associated wall surfaces of the enlarged part 6, forms a continuation of said surfaces, while the end wall 20 is disposed in abutting relation to the tongue 10 to provide an effective impact element for pulverizing the material with which the same comes in contact.

To assure proper seating of the tip with the tongue 10 at all times and to prevent any tendency for the tip to move outwardly with respect of the arm 2, the dovetailed interlock established between the tongue 10 and the box-like renewable tip 8 is inclined outwardly at an angle to the axis 12 of the arm sufficient to cause centrifugal force in the orbital movement of the arm, as also in the reaction from hammer blows, to be exerted in a direction to force the tip 8 to its seat in abutting relation with the tongue 10.

This assembled relation between the tip and the arm 2 is maintained by the provision of a pliable lug or tongue 30 formed integral with the facing wall 18 and bendable, after the tip 8 has been assembled with respect to the arm 2, into interlocking relation with a ridge or shoulder 32 formed as a part of an open-face recess 34 formed in the end of the enlarged part 6 of the pulverizing hammer.

This form of connection has been found very effective in holding the renewable tip 8 in proper operative association in seating relation to the tongue 10 and has the further advantage of providing a readily detachable connection when removal of the tip 8 becomes necessary because of wear to make way for a new tip. When the worn tip has been removed and the new tip inserted in place in embracing relation with the tongue 10, the lug 30 may be readily and easily bent into engaging interlocking relation with the ridge or

shoulder 32 to secure said new tip in place. The attaching means therefore provides an effective readily manipulable operative connection for the renewable tips, thus greatly decreasing the time required to renew the operating efficiency of the entire structure and greatly decreasing the time and expense and the lost production which is incidental to such renewals.

Figures 8 to 11, inclusive, disclose a further embodiment of the invention, the same incorporating opposed replaceable tips or heads having dovetailed interlock relation with the arm of the hammer, and which embodiment, in a good many of its aspects, conforms to the embodiment shown in Figures 1 to 5, inclusive, and accordingly the same reference numerals are applied to like structure. The embodiment of Figures 8 to 11, inclusive, however, varies in certain details to accommodate the opposed renewable tips at the end of the operating arm 2. In this modification, the relatively large weighted end 6 of the operating arm 2 is formed with the opposed and laterally extending tongues 36 and 38, each of which is provided with the longitudinally extending grooves 14 and 16 adapted to cooperate with the inturned flanges 26 and 28 of the renewable tip which, in the present embodiment, has its facing wall 18 of somewhat different construction than that shown in Figure 5 of the drawings, in that the tabs, such as 40, are offset in respect of the longitudinal axis of the said tip and adjacent which tabs in a recess 42 to permit the tab of the opposing tip to be bent into interlocking engagement with a shoulder of a facing recess formed at the end of the operating arm 2. In the illustrative embodiment, each of the renewable tips is provided with a tongue 40 laterally of which are the recesses 44 and 46 adapted to receive the lug of the opposed tip whereby the same can be bent inwardly to engage the shoulders 48 or 50.

As in the previous illustrated example of the invention, the angular or inclined disposition of the tongues with respect of the longitudinal axis 12 of the operating arm provides a structure assuring proper seating of the tips in respect to the tongues under operating conditions. The pulverizer hammer according to the embodiment shown in Figures 6 to 11, inclusive, can be reversed in respect of its mounting whereby the same may be continued in use even after wear has taken place on one of the tips which would otherwise necessitate its replacement. With this reversible type of structure, the pulverizer hammer may be reversed in its mounting to present the opposed tip to impact or pulverizing blows until such time as it becomes necessary to renew both tips. This embodiment of the invention also incorporates the advantages of the embodiment of Figures 1 to 5, inclusive, in that the replaceable tips of box or shell-like construction are relatively small and light in weight and accordingly inexpensive as compared to the entire arm, and which can be readily replaced without loss of time or any great additional expense in placing the hammer in condition for maximum performance.

While I have herein described and upon the drawings shown illustrative embodiments of the invention, it is to be understood that the invention is not limited thereto but may comprehend other constructions, arrangements of parts, details and features without departing from the spirit of the invention.

I claim:

1. A hammer for a centrifugal device, comprising an arm member having means adjacent one end thereof for connecting the same to operating mechanism and having at its other end a tongue laterally disposed with respect to the longitudinal axis of said arm, a renewable tip having a facing wall and connected side and end walls to provide open faces in opposed relation to said facing and end walls forming a member of box-like construction embracing said tongue with its end wall in abutting relation to the end of said tongue and having means providing a dovetailed interlock therewith, one of said members of said hammer having a shoulder, and the other of the members of said hammer having a lug normally disengaged from said shoulder during assembly but bendable into engagement therewith to prevent displacement of said tip with respect to said arm.

2. A hammer for a centrifugal device, comprising an arm having means adjacent one end thereof for connecting the same to operating mechanism and having at its other end a tongue laterally disposed with respect to the longitudinal axis of said arm, a renewable tip having a facing wall and connected side and end walls to provide open faces in opposed relation to said facing and end walls forming a member of box-like construction embracing said tongue and having a dovetailed interlock therewith, said tip slidably fitting said tongue and having end abutting relation therewith, said arm having a facing recess provided with a shoulder, and said tip having a pliable locking lug bendable into engagement with said shoulder to prevent relative displacement of said tip and arm.

3. A hammer for a centrifugal device, comprising an arm having means adjacent one end thereof for connecting the same to operating mechanism and having at its other end a tongue laterally disposed with respect to the longitudinal axis of said arm, a renewable tip having a facing wall and connected side and end walls to provide open faces in opposed relation to said facing and end walls forming a member of box-like construction embracing said tongue and having a dovetailed interlock therewith, said tip slidably fitting said tongue and having end abutting relation therewith, said dovetailed interlock being inclined outwardly at an angle to the axis of said arm sufficient to cause centrifugal force in the orbital movement of the arm, as also in the reaction from hammer blows, to be exerted in a direction to force the tip to its seat in abutting relation to said tongue, and means for attaching said tip to said arm.

4. A hammer for a centrifugal device, comprising an arm having means adjacent one end thereof for connecting the same to operating mechanism and having at its other end a tongue laterally disposed with respect to the longitudinal axis of said arm, a renewable tip having a facing wall and connected side and end walls to provide open faces in opposed relation to said facing and end walls forming a member of box-like construction embracing said tongue and having a dovetailed interlock therewith, said tip slidably fitting said tongue and having end abutting relation therewith, said dovetailed interlock being inclined outwardly at an angle to the axis of said arm sufficient to cause centrifugal force in the orbital movement of the arm, as also in the reaction from hammer blows, to be exerted in a direction to force the tip to its seat in abutting

relation to said tongue, said arm having a facing recess provided with a shoulder, and said tip having a pliable locking lug bendable into engagement with said shoulder to prevent relative displacement of said tip and arm.

5. A hammer for a centrifugal device, comprising an arm having means adjacent one end thereof for connecting the same to operating mechanism and having at its other end a relatively large weighted part provided with a tongue laterally disposed with respect to the longitudinal axis of said arm, said tongue being provided with opposed grooves, a renewable tip of box-like construction having a rear end wall and an open front end adapted to receive said tongue and opposed side walls formed with inwardly presented flanges slidable into dovetailed interlock relation into said grooves, said dovetailed interlock being inclined outwardly at an angle to the axis of said arm sufficient to cause centrifugal force in the orbital movement of the arm, as also in the reaction from hammer blows, to be exerted in a direction to force the tip to its seat with its rear end wall in abutting relation to said tongue, said arm having a facing recess provided with a shoulder, and said tip having a pliable lug bendable into engagement with said shoulder to attach said tip to said arm.

6. A hammer for a centrifugal device, comprising an arm having means adjacent one end thereof for connecting the same to operating mechanism and having at its other end oppositely disposed tongues extending laterally from substantially the central portion of said other end in the plane of rotation of said arm, opposed renewable tips each having a facing wall and connected side and end walls to provide open faces in opposed relation to said facing and end walls forming members of box-like construction each slidably embracing one of said tongues in dovetailed interlock relation thereto with the end wall thereof in lateral seating relation with the end of the tongue whereby said tips form a substantially complete covering for said other end of said arm, said other end of said arm having opposed shoulders, and said tips having pliable lugs bendable into interlocking engagement with said shoulders for attaching said tips to said arms to prevent relative displacement thereof, each of said tips having a recess offset laterally with respect to the lug thereof whereby the lug of the opposed tip can be bent into engagement with a shoulder.

7. A hammer for a centrifugal device, comprising an arm having means adjacent one end thereof for connecting the same to operating mechanism and having at its other end oppositely disposed tongues extending laterally from substantially the central portion of said other end in the plane of rotation of said arm, opposed re-

newable tips each having a facing wall and connected side and end walls to provide open faces in opposed relation to said facing and end walls forming members of box-like construction each slidably embracing one of said tongues in dovetailed interlock relation thereto with the end wall thereof in lateral seating relation with the end of the tongue whereby said tips form a substantially complete covering for said other end of said arm, said dovetailed interlock for said tips and tongues being inclined outwardly from and at an angle to the axis of said arm sufficient to cause centrifugal force in the orbital movement of the arm, as also in the reaction from hammer blows, to be exerted in a direction to force the tips to their seats in abutting relation to said tongues, and means for attaching said tips to said arm to prevent relative displacement thereof.

8. A hammer for a centrifugal device, comprising an arm having means adjacent one end thereof for connecting the same to operating mechanism and having at its other end oppositely disposed tongues extending laterally from substantially the central portion of said other end in the plane of rotation of said arm, opposed renewable tips each having a facing wall and connected side and end walls to provide open faces in opposed relation to said facing and end walls forming members of box-like construction each slidably embracing one of said tongues in dovetailed interlock relation thereto with the end wall thereof in lateral seating relation with the end of the tongue whereby said tips form a substantially complete covering for said other end of said arm, said dovetailed interlock for said tips and tongues being inclined outwardly from and at an angle to the axis of said arm sufficient to cause centrifugal force in the orbital movement of the arm, as also in the reaction from hammer blows, to be exerted in a direction to force the tips to their seats in abutting relation to said tongues, said arm having opposed shoulders, and said tips having pliable lugs bendable into interlocking engagement with said shoulders for attaching said tips to said arms to prevent relative displacement thereof, each of said tips having a recess offset laterally with respect to the lug thereof whereby the lug of the opposed tip can be bent into engagement with a shoulder.

9. A renewable tip for pulverizing hammers comprising a box-like structure formed with a facing wall, a rear end wall and an open opposed face in opposed relation to said rear end wall, and side walls having inturned attaching flanges, said facing wall having a pliable lug bendable into engagement with a shoulder upon an operating arm on which said tip is mounted to prevent relative displacement thereof.

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