March 8, 1960 C. E. SENNHOLTZ 2,927,739

IMPACT HAMMER WITH REMOVABLE WEAR MEMBER

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Fig. 1.

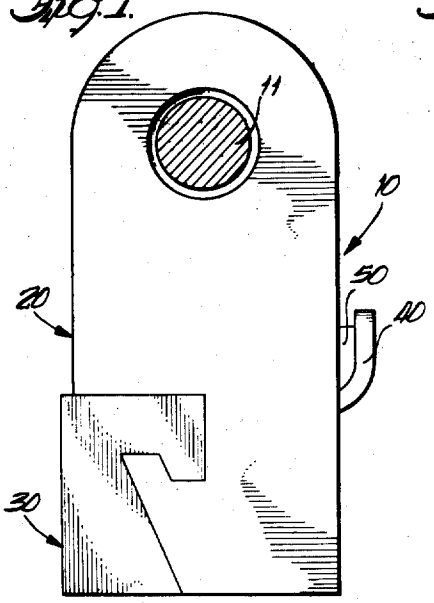


Fig. 2.

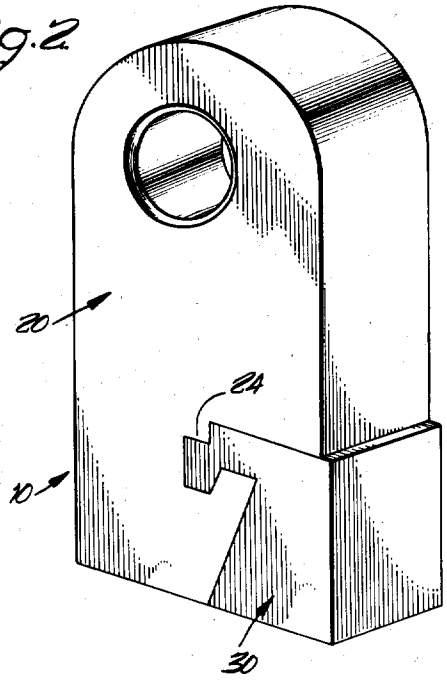


Fig. 3.

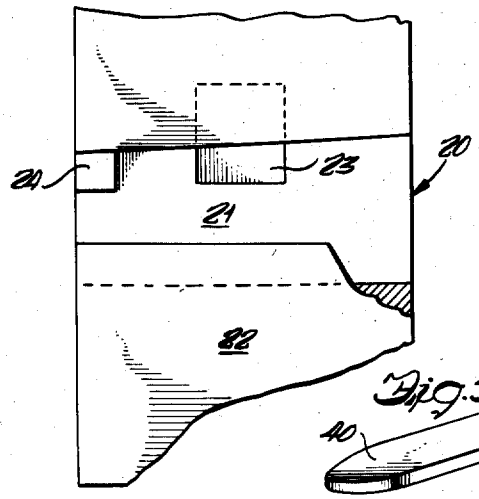


Fig. 4.

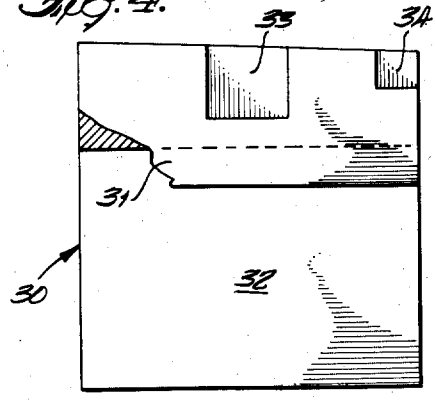


Fig. 5.

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Fig. 7.

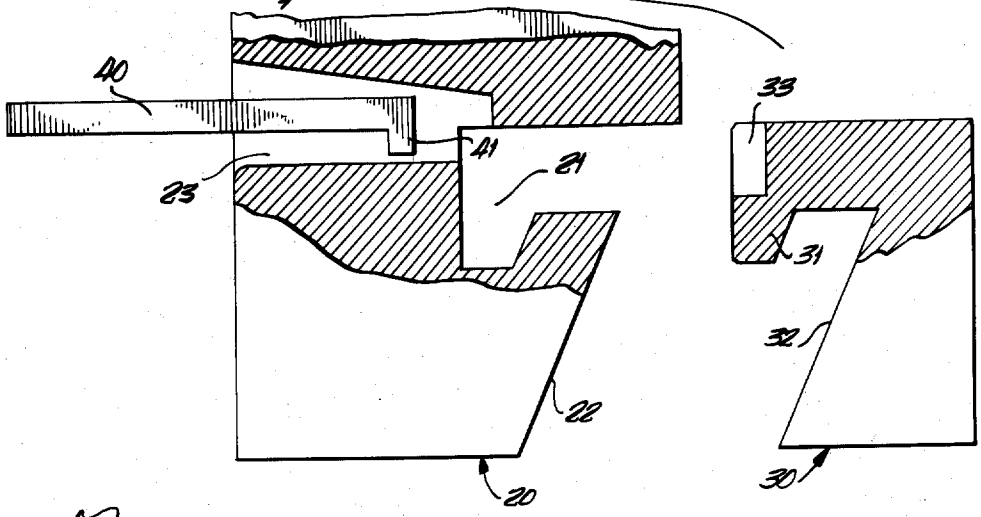


Fig. 8.

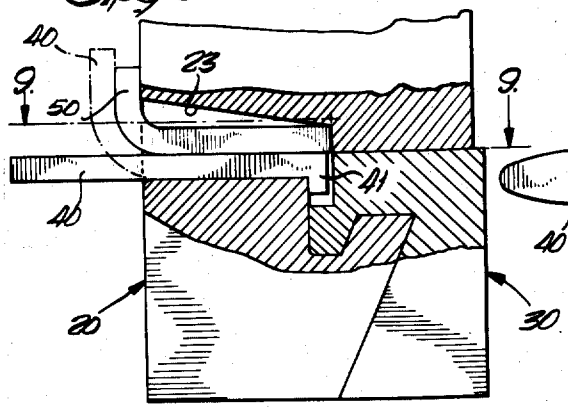


Fig. 9.

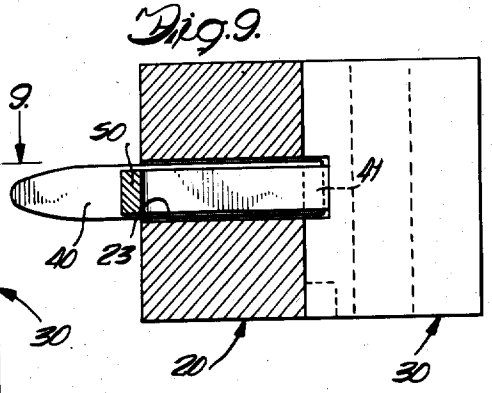
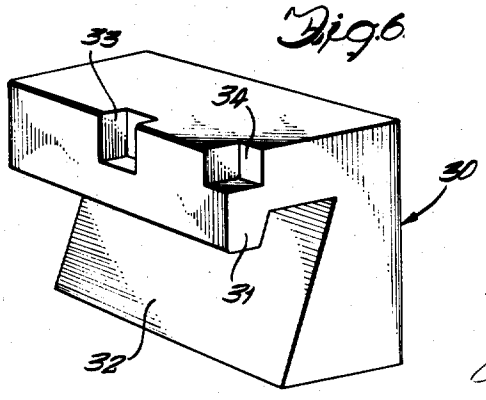


Fig. 6.



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IMPACT HAMMER WITH REMOVABLE WEAR MEMBER

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2 Claims. (Cl. 241—197)

The present invention relates generally to rotary impact crushers or pulverizers and more particularly to impact hammers for use in such devices.

It is an object of the invention to provide an impact hammer for use in rotary crushing or pulverizing mills having a tip for absorbing wear that is simply attached but firmly wedged in proper position without looseness of play, and is formed so that impact or centrifugal forces do not tend to jam the tip on the hammer making removal difficult. It is a related object to provide a hammer having a replaceable tip that firmly interfits therewith in such a manner that the tip may be locked in place without subjecting the locking means to any loads during normal use of the hammer.

It is another object to provide a hammer of the above character having a removable tip which is locked into place by a fastening means that is simple, easily operated, foolproof, accessible and not subject to the disadvantages of a bolted, screwed, or riveted connection.

It is a further object to provide a fastening means of the above type that is shielded from normal striking contact with the material being crushed but which, if struck, is not loosened or jammed so as to prevent its being loosened.

It is moreover an object to provide an impact hammer which is efficient and inherently strong but, nevertheless, of straightforward construction that may be inexpensively manufactured requiring a minimum of machining operations.

Other objects and advantages of the invention will become apparent upon reading the attached, detailed description and upon reference to the drawings in which:

Figure 1 is a side elevation of a hammer constructed according to the present invention with the replaceable tip positioned and locked in place.

Fig. 2 is a perspective view of the hammer shown in Fig. 1.

Fig. 3 is a fragmentary end view of the shank portion alone of the hammer shown in Fig. 1.

Fig. 4 is an end view of the replaceable tip alone shown in Fig. 1.

Fig. 5 is a perspective view of the locking means shown in place in Fig. 1.

Fig. 6 is a perspective view of the replaceable tip shown in place in Fig. 1.

Fig. 7 is an exploded view partially in section of the hammer shown in Fig. 1.

Fig. 8 is a section view of the assembled hammer shown in Fig. 1.

Fig. 9 is a sectional view taken along line 9—9 in Fig. 8.

While the invention will be described in connection with a preferred embodiment, it will be understood that we do not intend to limit the invention to the embodiment, but on the contrary intend to cover such alternative embodiments and constructions as may be included within the spirit and scope of the appended claims.

Turning first to Figs. 1 and 2, there is shown an impact hammer 10 that is constructed according to the

present invention. When installed in a crusher or pulverizer, the hammer 10 is mounted on a supporting shaft 11 which, in turn, is carried by a rotatable drum or disc, not shown. In operation, the drum or disc is rapidly rotated so as to swing the hammer in a clockwise direction as shown in Fig. 1 into jarring contact with the material to be crushed or pulverized. The resulting high impact forces not only break up the material as desired, but also cause considerable wear on the impact surfaces of the hammer.

In order to lengthen the useful life of the impact hammer and to reduce operating cost to a minimum, the hammer 10 comprises a shank 20 provided with a removable wear member or tip 30. The tip 30 is positioned to receive most of the crushing impact forces as the hammer 10 is swung into the material worked upon. When the tip 30 becomes too worn for further effective use, it may be simply and cheaply replaced, thereby restoring the hammer 10 to its original effectiveness by the replacement of a minimum amount of material.

In accordance with the present invention, the hammer shank 20 has an irregular relieved portion at one corner forming a transverse key slot and the replaceable wear tip 30 is shaped to seat itself against the surfaces of the relieved portion and has a key portion to slidingly interfit with the key slot formed in the shank 20, and means are provided to lock the wear tip and shank against relative sliding movement when the key portion registers with the key slot. In the present embodiment, the shank 20 of the hammer 10 is provided with a generally L-shaped key slot 21. To slidingly interfit within the slot 21, the tip 30 is provided with a corresponding L-shaped key portion 31. The parts are so proportioned that the key 31 fits snugly within slot 21, permitting the tip 30 to slide transversely and into the plane of the hammer shank 20. It is significant to note that when the key 31 is within slot 21, the surface 32 on the tip 30 is firmly seated against the corresponding surface 22 on shank 20, so that when the parts are inter-engaged, they present a single unitary structure.

For releasably securing the tip 30 against relative sliding movement with shank 20, and thus lock the two parts together, a locking key 40 is provided. To permit the locking key 40 to secure the parts against relative sliding movement, tip 30 has formed thereon a notch 33 whose side walls define a pair of spaced vertical abutments and which may be alined with an opening 23 in the shank 20. When the notch 33 is in alinement with the opening 23, the key 40 can be slid into and through the opening 23 to project between the pair of spaced abutments forming the side walls of notch 33 and thus lock the shank 20 and tip 30 against relative sliding movement.

For the purpose of holding key 30 in its locking position, the key has a hook-shaped end 41, thus when the key 40 is inserted through opening 23 and into the notch 33, the hooked end 41 may be lowered to engage the inner edge of opening 23 and prevent the key 40 from being withdrawn. To prevent the key 40 from being raised and its portion 41 unhooked from the inner edge of opening 23, a blocking key 50 is utilized. In the illustrated embodiment, the blocking key 50 is generally L-shaped and is proportioned so that it may be slid into opening 23 on top of key 40 to effectively fill the opening and thus prevent the hook portion 41 from being raised and unhooked from the inner edge of opening 23. To prevent the blocking key 50 from being removed from opening 23 when the two keys 40 and 50 are in proper position, the end of locking key 40 is bent upwardly to overlie the short leg of the L-shaped key 50. For this purpose the key 40 is formed of a malleable material so that an ordinary hammer may be conveniently used to

bend the key from its full line to its dashed line position shown in Fig. 8.

In order to simply and accurately position the tip **30** with respect to the shank **20**, and thus ensure that notch **33** is in alinement with opening **23**, a suitable stop **24** is provided within and at one end of the key slot **21**. In the embodiment illustrated, the stop **24** is received by a notch **34** formed in the removable tip **30**. When the replaceable tip **30** is slid into engagement with the shank **20**, the stop **24** will fit within notch **34** and arrest the relative sliding movement of the parts when they are in proper position, thus ensuring that the notch **33** is alined with opening **23**.

In accordance with one of the features of the invention, the slot **21** and key **31** are tapered so that the tip **30** may be wedged into proper position without looseness or "play." As shown in Fig. 3, the slot **21** narrows from right to left and, as shown in Fig. 4, the key portion **31** is similarly tapered. The proportions of these parts is such that the key **31** snugly interfits within slot **21** so that the key **31** must be tightly wedged within the slot **21** to bring the notch **34** into abutment with stop **24**. It will be apparent, therefore, that in operation the tip **30** will not rattle or rub against the hammer shank **20** but will be held as a rigid part of a unitary hammer structure.

It is of significance to note that the opening **23** extends to notch **33** from the rear of the shank **20**, so that when the hammer is assembled, as shown in Fig. 1, the exposed ends of keys **40** and **50** are behind the hammer **10** and away from the direction of impact. In this way the keys cannot be accidentally jarred or loosened. Furthermore, it will be appreciated that the locking key **40** only prevents transverse sliding movement of the removable tip and is not called upon to resist any component of the impact forces imposed by normal operation of the hammer. Therefore, although impact hammers of this type are subject to considerable heavy duty wear, the locking key **40** may be conveniently formed of a malleable material without danger of the key being broken and the parts flying apart while in operation.

It will be likewise appreciated that while the replaceable tip **30** is firmly wedged into proper position on the hammer shank **20**, the wedging action takes place in a direction transverse to the direction of impact so that when heavy crushing blows are imposed on the hammer the forces will tend neither to loosen the wedging engagement or to jam the tip more tightly onto the shank and make removal difficult.

I claim as my invention:

1. An impact hammer with a replaceable tip comprising a shank having a transverse key slot, a replaceable tip having a key portion to register with said slot and permit relative sliding movement therein, said tip being shaped so that surfaces on the tip are seated against corresponding surfaces on the shank when said key portion and slot are in register, said shank defining an opening therethrough which is closed and shielded by said tip when said key portion and slot are in register, said tip having a rearward facing notch positioned to come into alinement with said opening when said key portion and slot are in register, a locking key, having an offset tip portion, insertable through said opening so that the offset tip can enter said notch and hook on the inner edge of said opening thereby locking the shank and top against relative sliding movement, and a blocking key for insertion in said opening with the locking key to prevent the latter from being unhooked.

2. An impact hammer with a replaceable tip comprising a shank having the forward face of the lower end portion thereof recessed to define a transverse, tapered, generally L-shaped key slot, a tip having transverse surfaces complementary to the surfaces of said lower end portion and in flat engagement therewith, said tip also having a tapered key portion wedged within said key slot, said tip having a pair of vertical abutments transversely spaced from each other to define a rearwardly opening notch in one of said complementary surfaces of the tip, said shank having an opening in its rearward face extending through said shank in general alinement with said notch for providing access to the latter, a locking key inserted through said opening from the rear of said shank and into said notch in interfitting engagement between said vertical abutments to prevent relative sliding movement between the tip and the shank, said locking key having an offset end portion shiftable within the notch hooked on the forward face of said shank surrounding said opening, and releasable means holding said offset end portion of said locking key in hooked engagement with said shank and thus preventing the key from being withdrawn from said notch.

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