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3,367,585

REPLACEABLE TIP MEMBER FOR A TWO-PART HAMMER

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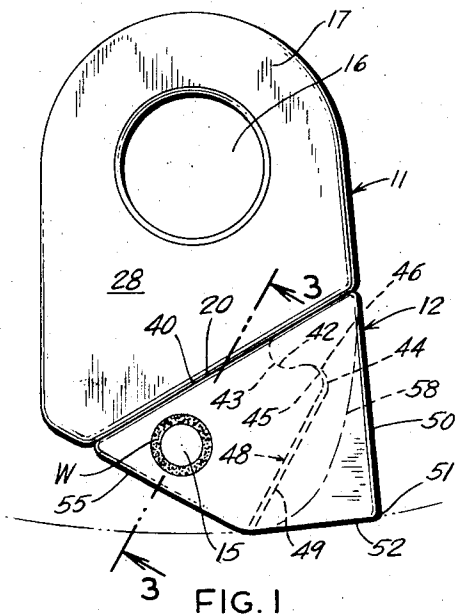


FIG. 1

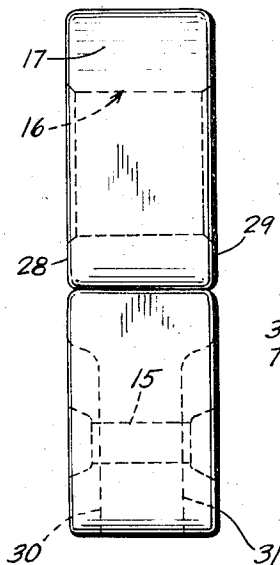


FIG. 2

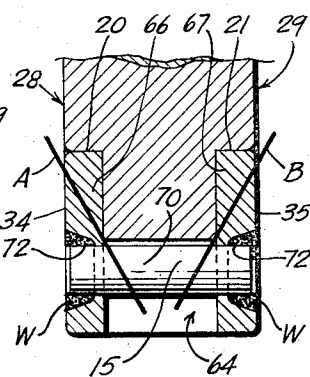


FIG. 3

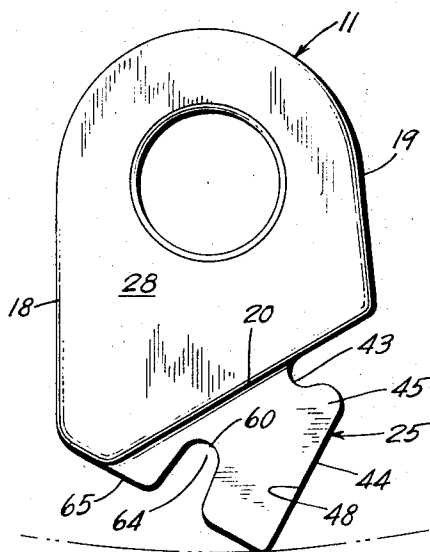


FIG. 4

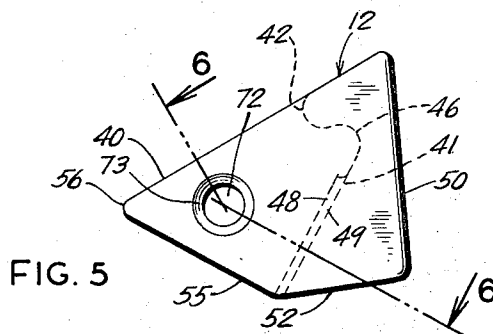


FIG. 5

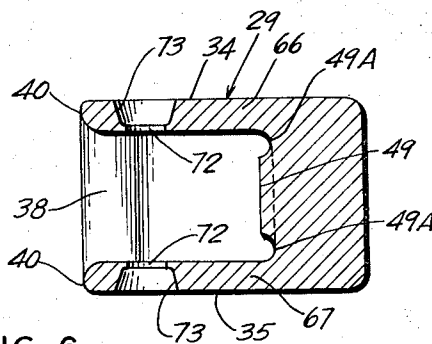


FIG. 6

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REPLACEABLE TIP MEMBER FOR A TWO-PART HAMMER

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ABSTRACT OF THE DISCLOSURE

Replacement of a worn tip on a two-part hammer or a hammer mill is achieved more readily by forming an aperture in a side wall of the tip aligned with an outwardly opening recess in the shank of the hammer with an elongated retainer entered in the aperture and recess. The retainer may be secured in place as by welding, and the outwardly opening recess affords access for cutting the retainer to displace the tip from the shank.

This invention relates to two-piece hammers for a hammer mill and more particularly to hammers including a replaceable tip removably mounted on the lower end of a hammer shank.

In operating a hammer mill, the head or tip of the hammer is rotated continually to impinge against a charge of ore or the like in the hammer mill to comminute the charge. The tip at the outer end of the hammer shank bears the brunt of the impinging and grinding action and consequently encounters much greater wear than the hammer shank. After the tip has been worn, the tip is replaced with a new tip being attached to the same shank which preferably is not detached from a rotor or a portion of the rotor during the replacement of the tip. Accordingly, an object of the present invention is to secure a hammer tip to its shank in a manner to facilitate attaching and removing of the tip from the shank.

Because the tip on the hammer shank undergoes severe vibrations and working forces, the tip must be held securely on the hammer shank. In many instances, it is desired to secure a tip to a shank by retainer element welded in place. When such a welded in place retainer element is employed, this element must be torched or flame cut from its interlocking relationship to release the hammer tip for removal from the shank. Accordingly, another object of the invention is to relate a hammer tip to a hammer shank to permit burning loose of the tip from the shank without damaging the shank.

Another object of the invention is a novel two-part hammer having a readily replaceable hammer head secured to a shank by a retainer pin welded to the hammer head which is configured to facilitate removal of the retainer pin when replacing a hammer shank.

A further object of the invention is a hammer head having a wearing surface or impact area on one side of the hammer and configured to slip on and to interfit with a hammer shank to which it may be secured by a welded retainer pin.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show preferred embodiments of the present invention and the principles thereof and what is now considered to be the best mode contemplated for applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

FIG. 1 is an elevational view of a two-piece hammer constructed in accordance with the preferred embodiment of the invention;

FIG. 2 is a side view of the hammer of FIG. 1;

FIG. 3 is a sectional view taken along the line 3-3 of FIG. 1 in the direction of the arrows and showing a pin welded in position;

FIG. 4 is an elevational view of a hammer shank constructed in accordance with the preferred embodiment of the invention;

FIG. 5 is an elevational view of a hammer head; and FIG. 6 is a sectional view taken along the line 6-6 of FIG. 5 and showing the hammer tip.

Referring now to the drawings, there is illustrated a two-piece hammer which includes a shank member 11 and a related head or tip 12 secured to the hammer shank 11 by a pin 15 welded in place by a weld W.

The hammer shank 11 is preferably of the type secured for rotation with a rotor within a hollow charging chamber in the mill. Usually, the rotor is in the form of a disk or plate having a plurality of shafts or supporting pins of large diameter projecting therefrom for carrying a number of hammers. The shank 11 is adapted for securing to such rotor pins and shafts by a relatively large cylindrical opening 16 extending through the upper portion 17 of the shank 11.

The hammer shank 11 has a pair of opposed and generally vertical and parallel side walls 18 and 19 extending downwardly to inclined shoulder walls 20 and 21, FIG. 3. Beneath the inclined shoulder walls 20 and 21 is the lower portion of the hammer including a complexly configured connecting portion 25. The lower and connecting portion 25 of the shank 11 is of reduced thickness from its upper portion between parallel walls 28 and 29 of the shank 11.

The reduced cross-sectional thickness of the lower connecting portion 25 of the shank 11 at its side walls 30 and 31 allows the attached hammer tip 12 to have its outer side wall surfaces 34 and 35 in the planes of the respective shank walls 28 and 29 of the shank 11, as best seen in FIG. 3.

The tip 12 is that element of the hammer which has the greatest wear since it impinges against the charge to grind or comminute the charge within the mill. As a result, the tip 12 wears rather rapidly and it is necessary to replace periodically the tip 12 with a new tip. Preferably, the tip is cast of a tough, shock and abrasion resistant, austenitic manganese steel.

The tip 12 has a large central recess 38 cast therein into which is adapted to be slid the connecting end portion 25 of the lower end of the shank. The recess 38 is configured for complementary fitting with the connecting portion 25 of the shank 11, as seen in FIG. 1.

When sliding the hammer tip 12 of FIG. 5, on the hammer 11 of FIG. 4, the spaced and generally inclined upper walls 40 of the tip 12 slide along the similarly inclined walls 20 and 21 of the hammer shank 11 in a downwardly and leftwardly direction, as viewed in FIGS. 1 and 4. The hammer head 12 has an interior wall 41 within the recess 38 configured with an upper hook or lug portion 42 of a generally rounded configuration for fitting within a complementary rounded socket or pocket 43, formed in a forward wall 44, FIG. 4, of the hammer shank. When the hammer tip 12 has its hook 42 disposed in the pocket 43, a rounded projection or lug 45, FIG. 4, on the hammer shank wall 44 is adapted to fit in a complementary recess 46, FIGS. 1 and 5, in the hammer tip 12. The interior, forward wall 41 within the recess 38 of the tip 12 has a downwardly and rearwardly inclined wall surface 49 for engagement with a similarly inclined wall surface 48 on the forward wall 44 of the shank 11. As best seen in FIGS. 5 and 6, the inclined wall surface

49 of the hammer tip 12 is cast to extend above the corner recesses 49A, FIG. 6, to assure a wide and generous contact of the surface 49 on the tip 12 with the surface 48 on the shank 11.

As the two-piece hammer is rotated within the hammer mill, the outer, forward face wall 50 of the tip 12 constitutes the leading wear face of the hammer. The leading face wall 50 of the hammer does the greatest work and is worn away particularly at the forward or leading point 51 joining the forward work face wall 50 to a lower work face wall 52 of the hammer head. The face wall 52 also wears rearwardly toward and lower face wall 55, which is inclined to meet the upper, inclined wall 40 at a pointed portion 56 on the hammer tip 12.

After the tip 12 is subjected to considerable wear along the forward face wall 50 and the lower face wall 52, the tip 12 wears back toward a contour generally indicated by the phantom line 58, FIG. 1. When the tip has worn from the point 51 back to the rounded shape, outlined by the phantom line 58, it is desired to remove the tip 12 and replace it with a new and similar tip.

An important aspect of the present invention is that of readily replacing a worn hammer tip 12 from a hammer shank 11 without damaging the hammer shank 11, thereby avoiding the necessity of replacing the shank 11. Also, it is desirable to replace a tip 12 without removing the shank 11 from a rotor (not shown) and with tools usually available at a hammer mill location. For this purpose, the retaining pin or means 15 is disposed at the rearward pointed portion of the hammer head 12, and the hammer shank 11 has an elongated slot or opening 64 along a rear surface wall 65 through which the cutting torch is directed when cutting away the side walls 66 and 67 of the hammer tip recess along the planes indicated by the lines A and B, FIG. 3. That is, the rearward portions of the walls 66 and 67 of the hammer are torched and cut away forward of pin-receiving openings 72 in the walls 66 and 67 and along a downward and inward angle and through the connecting pin 15 rearward of the welds W, as seen in FIG. 3. As will be seen from the configuration of the hammer tip 12 in FIG. 5, the rearward pointed portion 56 of the tip 12 reduces the amount of material needed to be cut through by the torch thereby reducing the time of cutting.

After the pin 15 has been cut along the planes A and B into the middle portion 70 of the pin 15, FIG. 3, the middle portion 70 of the pin 15 will be free to drop from the opening or slot 64 at its rounded seat wall 68 thereby permitting the head 12 to be pulled upwardly to disengage the rounded hook 42 on the head 12 from the rounded pocket 43 on the hammer shank 11. Manifestly, the opening 64 in the connecting portion 25 of the shank may be other shapes than the elongated slot shown in the described embodiment of the invention.

The retainer means or pin 15 is preferably a manganese steel pin and is welded within enlarged annular openings 73 about the holes 72, FIG. 3, in the annular opening 73 for receiving the welds W about the exterior ends of the pin 15. The retainer means 15 may be of other configurations than that of a cylindrical pin and still be within the purview of the present invention.

Another important aspect of the present invention is that of furnishing large surface contact along bearing walls such as the inclined walls 20, 40 and 48, 49 of the hammer shank 11 and tip 12. As the hammer is rotated in the counterclockwise direction, as viewed in FIG. 1, the large mating and engaging surfaces 20, 40 and 48, 49 afford relatively wide bearing or engaging surfaces over which to distribute the forces encountered during the impact of the leading surfaces 50 and 52 against the charge.

From the foregoing, it will be seen that the present invention affords a ready replaceable hammer tip which is easily secured in place and readily removed by a torch cutting away a securing pin without damage to the

hammer shank. Also the hammer head is a relatively simple construction adapted to be readily slidable on the hammer shank to engage wide surfaces of which to distribute the severe forces encountered within a hammer mill.

Hence, while preferred embodiments of the invention have been illustrated and described, it is to be understood that they are capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. A two-part hammer of the kind to be used in a hammer mill and comprising: a shank member adapted at one end to be connected for rotation within the hammer mill, and a replaceable tip member formed with a connecting recess therein for receiving a portion of said hammer shank, said recess being bounded on three sides by an upwardly extending internal front wall and a pair of opposed side walls, said shank and said recess in said tip member having complementary interfitting portions, pin means extending between said side walls of said tip member and secured thereto, said shank having walls engaging said pin means to hold said tip member against displacement from said shank, said last-mentioned walls opening into a recess through which a cutting flame may be directed and through which a portion of the pin means may drop when said pin means is cut by the torch.

2. A two-part hammer of the kind to be used in a hammer mill and comprising: a shank member adapted to be secured for rotation and a replaceable tip secured to an end of said shank member, said end of said shank member including a portion of reduced cross sectional thickness, said end of said shank member having a hook portion integrally formed thereon, said tip member having a leading face wall, a trailing face wall, and an upper wall and a lower wall, a recess in said tip member extending from the upper wall towards the lower wall and forming opposed side walls, said opposed side walls of said tip member having apertures therein, a downwardly inclined interior wall in said recess, a complementary inclined wall on the end of said shank member, a trailing wall in said shank member having a forwardly directed recess therein, and retaining means inserted through said apertures in said side walls of said tip member and through said opening on the trailing wall of said shank member to immobilize the tip on said shank member, said forwardly directed recess in said shank member affording a cutting space for a torch flame when cutting said side walls and said retaining means.

3. A replaceable hammer head adapted to be secured by a retaining means to a shank member to constitute a hammer for use in a hammer mill, said hammer head having a leading wall, a top wall extending rearwardly from said leading wall, a bottom wall extending rearwardly from said leading wall, opposed side walls on said hammer head, said walls together defining a recess which opens rearwardly and which also opens at the top wall, a forward interior wall surface in said recess including a hook like surface for engaging a complementary surface in said shank member, and said side walls having aperture means leading to said recess for receiving a retaining means which spans said recess and to which access may be had when also spanning a rearwardly opening recess formed in a shank on which the head is mounted.

4. A two-part hammer of the kind to be used in a hammer mill to comminute a charge and comprising: a shank member adapted at one end to be connected for rotation in a hammer mill, and a replaceable tip member formed with a recess therein for receiving a lower portion of said hammer shank, said recess being bounded in part by a pair of opposed side walls and having an open wall for slipping on said lower portion of said shank member, complementary interfitting portions on said tip member

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and said shank member for interlocking said members in assembled relation, said tip member having a leading face to engage said charge, aperture means in said opposed side walls of said tip member leading to said recess, said shank member having an outwardly opening recess therein aligned with said aperture means, elongated retaining means received in said aperture means and spanning said outwardly opening recess and engaging a surface of said shank member within said outwardly opening recess to hold said tip member against displacement, said retaining means being welded in place and said outwardly opening recess affording access for cutting the retaining means.

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References Cited

UNITED STATES PATENTS

	1,693,058	11/1928	Shelton	-----	241—197
5	1,717,759	6/1929	Briggs	-----	241—197
	2,186,047	1/1940	Stine	-----	241—197
	2,534,301	12/1950	Sennholtz	-----	241—197

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