Jan. 9, 1940. J. E. STINE 2,186,047

HAMMER FOR CRUSHING MACHINERY

Original Filed May 16, 1935

Fig. 1.

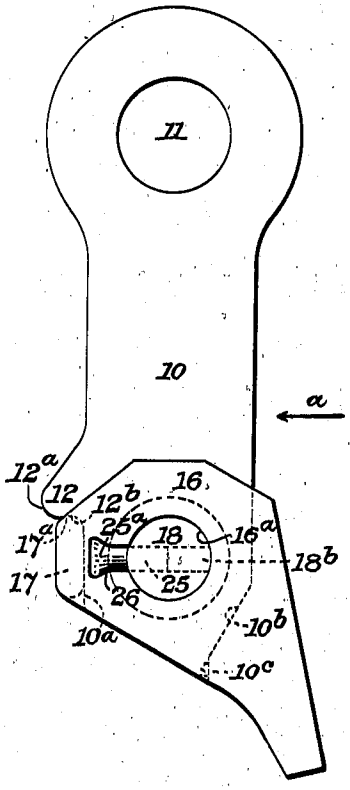


Fig. 3.

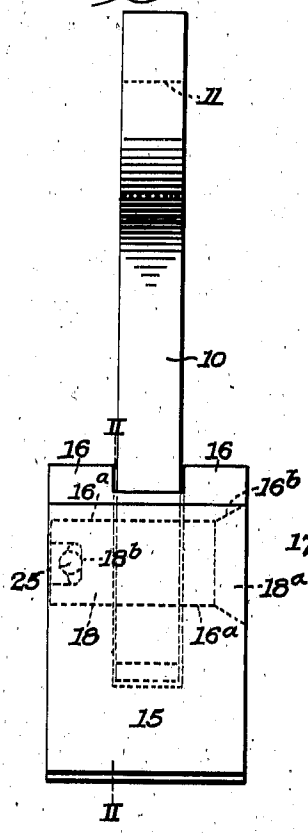


Fig. 2.

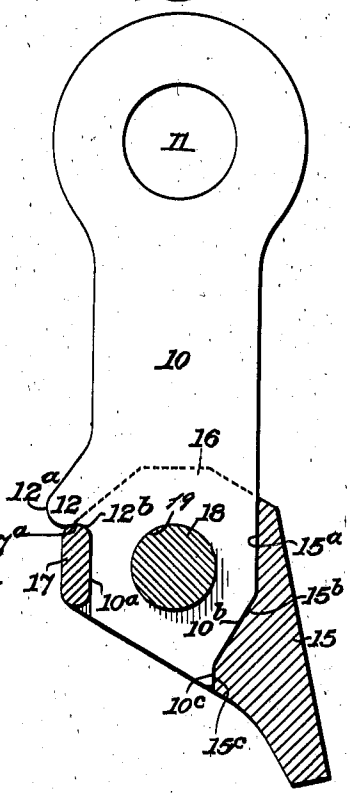


Fig. 4.

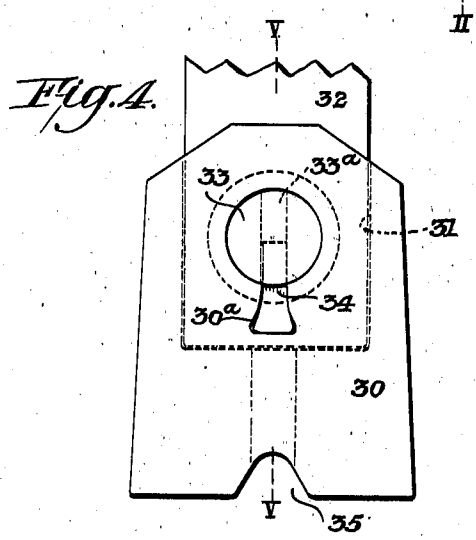
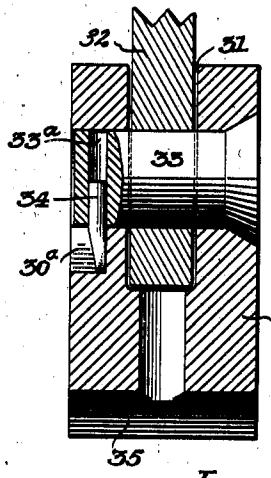


Fig. 5.



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Patented Jan. 9, 1940 2,186,047

UNITED STATES PATENT OFFICE

2,186,047

HAMMER FOR CRUSHING MACHINERY

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Application May 16, 1935, Serial No. 21,874
Renewed September 1, 1938

5 Claims. (Cl. 83—11)

My invention relates to hammers employed in crushing mills and similar machinery, and comprises more particularly a novel combination of hammer shank and removable tip and means for detachably securing the same together.

Various hammers of the removable tip type have been proposed in which the tip—the portion of the hammer receiving the greatest amount of wear—is replaceable. Such replaceable tips may be and frequently are composed of a metal differing from the metal of the shanks. One difficulty with the usual type of replaceable tip hammers, however, has been that the connecting means and the shape of the parts have not been such that the tip may be readily attached to the shank and detached therefrom after it has been worn out; the battering to which such tip is subjected tending to rivet it in place. Additionally, such hammers have been frequently unsatisfactory, inasmuch as the stress imposed upon the tip has not been carried properly to and through the shank structure and, as a result, the shank has broken—usually at the eye portion.

I have heretofore proposed one type of hammer structure, having in view a development that would serve to avoid these difficulties, or at least some of them, and reference is made to my application for patent filed April 12, 1934, Serial No. 720,269.

My present improvements comprise a further extension of the improvements embodied in the type of hammer illustrated in the application referred to, in which certain features of such structure have been retained, but in which a much simpler type of hammer shank and tip has been provided, my present improved structure possessing a number of special advantages, including ease of assembly and disassembly.

The main object of my present invention is to provide a hammer structure of economical design having a removable tip which may be readily associated and dissociated from the hammer shank.

A further object of my invention is to provide a novel form of hammer structure with a detachable tip for the shank portion thereof, the parts being so arranged and positioned that the forces applied against the impact face of the tip may be properly carried through the tip and through the shank and distributed in such a manner that they are spread comparatively evenly throughout the shank.

A further object of my invention is the provision of simple and efficient means of novel character for detachably retaining the hammer shank and tip in connected relation.

These and other objects of my invention are more fully described hereinafter, reference being had to the accompanying drawing, more or less diagrammatic in character, in which:

Figure 1 is a side elevation of one type of removable tip hammer, showing also fastening means for the tip, within the scope of my invention.

Fig. 2 is a view similar to Fig. 1, showing the removable tip and the retaining pin in cross-section on the line II—II, Fig. 3.

Fig. 3 is an edge view of the structure, looking in the direction of the arrow *a*, Fig. 1.

Fig. 4 is a fragmentary view, illustrating a modified form of removable tip hammer within the scope of my invention, and

Fig. 5 is a sectional view on the line V—V, Fig. 4.

In the embodiment of my invention, shown in Figs. 1, 2, and 3, the hammer structure illustrated comprises an elongated shank 10, having adjacent one end thereof an eye 11 whereby it may be mounted upon a rod of the usual rotor structure of a hammer mill (not shown). The eye end of the shank may be slightly greater in superficial area than the width of the main body of the shank.

At or adjacent to the opposite end of the shank, I provide a laterally disposed boss or extension 12, rounded at 12^a, and provided with a reëntrant curved portion 12^b which meets the edge 10^a of the end portion of the shank beyond such boss aligned with the edge of the main portion of the same. A portion of the opposite edge of the shank is cut away diagonally, as indicated at 10^b, meeting a surface 10^c parallel with the longitudinal axis of such shank. This cutting away of the shank slightly reduces the end of the same for a purpose hereinafter described.

The renewable tip shown in Figs 1, 2, and 3 may comprise a substantially cap-shaped member having an impact portion 15; side walls 16 which embrace the end of the shank; and a rear cross-wall 17 connecting said side walls opposite the impact portion 15. The walls 16 are apertured at 16^a for the passage of a retaining pin or bolt 18, whereby such tip may be connected to the shank; the latter being apertured at 19 for the passage of said bolt. This may be a tight fit, or a relatively loose fit, as conditions may require. The cross-wall 17, provided at the rear of the tip, has a curved upper edge 17^a which seats against the reëntrant curved surface 12^b of the boss 12 at the rear edge of the shank, the latter providing an abutment for the

rear wall 17 of the tip. The inner surface of the forward or impact portion 15 of the tip corresponds to the edge surface of the end of the shank, including the face 15^a which engages the edge of the main portion of the shank, the diagonal surface 15^b which engages the diagonal edge 10^b of the shank, and the short, straight wall portion 15^c which engages the edge surface 10^c at the end of the shank.

The shank and tip are retained in connected relation by the retaining pin or bolt 18, which may have a rivet type head 18^a seated in a countersunk recess 16^b, formed in one of the side walls of the tip and lying flush with the surface of the latter. In order that the pin 18 may be locked in place, the end opposite the head is drilled through, as indicated at 18^b, and such opening receives a loose pin 25 whose length is slightly less than the diameter of the pin. One wall of the tip is provided with a recess 26 opening into the apertured portion 16^a thereof, and the inner wall of this recess is opposite the inner wall of the aperture 18^b of the retaining pin 18, so that, when said pin has been entered through the registering apertures in the walls of the tip and shank, the key pin 25 is free to move in the pin 18 and a portion may enter the recess 26 formed in the wall of the tip. In such position, that portion of the key pin 25 which enters such recess may be flattened or spread laterally by a blunt-nosed tool to an extent sufficient to approximately fill said recess, as indicated in Figs. 1 and 4; the spreading of such end of the pin providing a head 25^a which prevents displacement under working conditions.

This manner of locking the retaining pin or bolt 18 in place keeps all parts of the retaining means holding tip and shank together within the boundaries of the tip, and avoids all danger of displacement of such parts by contact with material undergoing crushing. When it is desired to dismantle the hammer structure for the purpose of applying a new tip, the enlarged end 25^a of the locking key or pin 25 may be cut away by a cape chisel, and when this is done, the remainder of the locking key or pin may be displaced into the aperture 18^b or the tip-retaining pin or bolt 18. The latter may then be driven out of the tip and shank when the latter is positioned to receive a new tip, which may be secured in place on the end of the shank in the manner already described.

In operation, the inner faces of the forward portion of the tip bear against the corresponding faces at the edge of the shank so that the impact of the tip against the material in the crusher is transmitted to the shank not only at its lowermost end, but also at a point remote from such end by reason of the engagement of the rear wall 17 of the tip with the abutment 12 of the shank, and the stress of such impact is properly distributed throughout the shank.

I do not wish to be limited to the precise form of tip shown in Figs. 1, 2 and 3, and it will be understood that other types of tips fitting over the end of the shank may be employed having modified forms of impact portions. In lieu of disposing the recess 26 toward the side of tips of the type indicated in Fig. 1, it may be otherwise positioned without departing from my invention, especially if the shape of the tip is so modified as to increase its mass or to provide another form of impact face. One such arrangement wherein the position of a recess having the function of that indicated at 26 has been changed, is illustrated in Fig. 4.

The securing means for the retaining pin illustrated in Figs. 1 and 2 may be employed with other types of removable tip hammers, and in Figs. 4 and 5, I have illustrated another type of tip, indicated at 30, having a recessed portion 31 to receive the end of a shank 32; the walls of such recessed portion and the shank having registering apertures for the reception of an apertured retaining pin 33. This retaining pin may be held in place by a locking pin or key 34 of a type exactly similar to and employed in the same manner as that illustrated at 25 in Figs. 1 and 2, such locking pin fitting a cross-aperture 33^a in the retaining pin and being movable into a flaring recess 30^a communicating with the aperture receiving such retaining pin. The portion of the locking pin 34 entering the recess 30^a may be flattened to form a head, like the pin illustrated in Figs. 1 and 2.

The tip shown in Figs. 4 and 5 has a recess 35 at its impact end, such form providing two striking or impact surfaces, as the head is reversible when one side or impact face is worn. This form of tip may be modified by providing a deeper recess of the character illustrated in Fig. 4, or by removing a portion of the end of the tip diagonally thereof to change the shape of the impact portion, without departing from my invention.

Various modifications may be made in the foregoing embodiment of my invention without departing from the spirit and scope of the same as set forth in the appended claims.

I claim:

1. The combination with a relatively narrow hammer shank, of a detachable tip recessed to receive the end of the same; said shank and tip having registering apertures, a retaining pin having a length not greater than the thickness of the tip passing through said apertures; one wall of the tip having a flaring recess in communication with its aperture and said retaining pin having a through opening adapted to register with said recess, and a key pin having a length not greater than the diameter of the retaining pin adapted to be received in said through opening and extend into the flaring recess; said key pin having one end enlarged for retention by the walls of said recess.

2. The combination with a hammer shank, of a detachable tip embracing the end of the same; said shank and tip having registering apertures, a retaining pin having a length not greater than the thickness of the tip passing through said apertures; one wall of the tip having a flaring recess in communication with its aperture and said retaining pin having a through opening adapted to register with said recess, and a key pin having a length not greater than the diameter of the retaining pin adapted to be received in said through opening and extend into the flaring recess; said key pin having one end enlarged to form a head substantially filling said recess.

3. The combination of parts to be connected having registering apertures for the reception of connecting means, a headed retaining pin having an overall length not greater than the combined thickness of the parts at their point of connection and fitting said registering apertures; the outer wall of one of the connected parts having a recess flanking its aperture and said retaining pin having a through opening substantially at right angles to its longitudinal axis adapted to register with said flanking recess, and a key pin having a length not greater than the diameter of

the retaining pin arranged in the through opening thereof and extending into the flanking recess of the connected part; said key pin having an enlarged end for retention by the walls of said recess.

4. The combination of a hammer shank, a detachable tip for connection with and embracing an end of said shank; said shank and tip having registering apertures, a retaining pin having an overall length not greater than the combined thickness of the shank and tip at their point of connection and fitting said registering apertures; an outer wall of the tip having a recess flanking its aperture and said retaining pin having a through opening at right angles to its longitudinal axis adapted to register with said flanking recess, and a key pin having a length not greater than the diameter of the retaining pin arranged in the through opening thereof and extending into the recess of the tip; said key pin having an enlarged end for retention by the walls of said recess.

5. The combination of a hammer shank, a detachable tip recessed to receive an end of said shank; said shank and tip having registering apertures, a retaining pin having an overall length not greater than the combined thickness of the shank and tip at their point of connection and fitting said registering apertures; said retaining pin having a head and the tip having a recess flanking its aperture and said retaining pin having a through opening at right angles to its longitudinal axis adapted to register with said flanking recess, and a key pin having a length not greater than the diameter of the retaining pin arranged in the through opening thereof and extending into the flanking recess of the tip; said key pin having an enlarged end for retention by the walls of said recess.

JAMES E. STINE.