Nov. 17, 1942. T. M. STEPHENS 2,302,069

MATERIAL BREAKING IMPLEMENT

Filed April 7, 1938

Fig. 1.

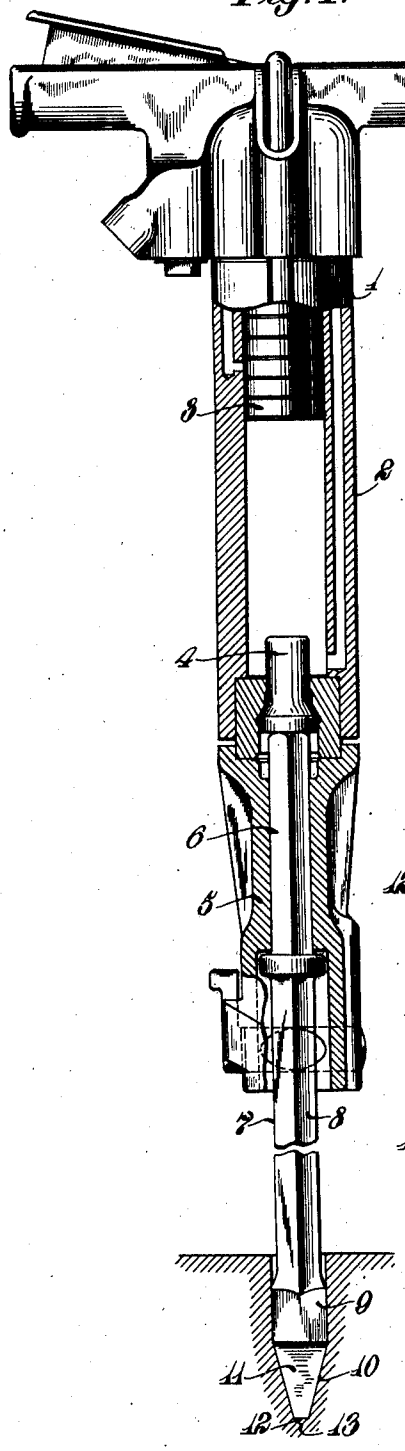



Fig. 2.

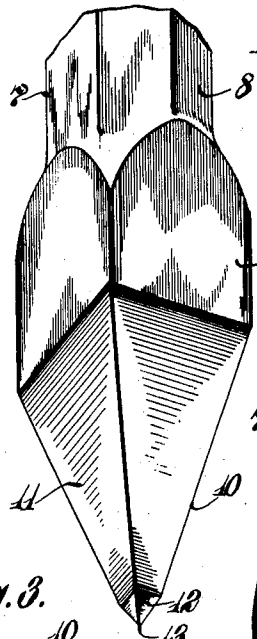



Fig. 3.

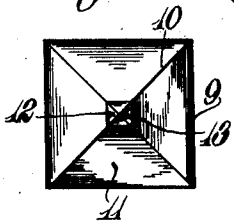



Fig. 4.

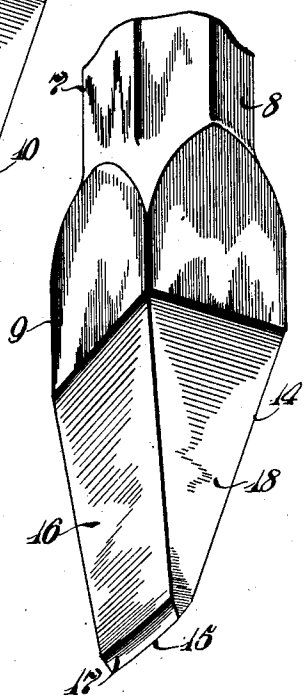
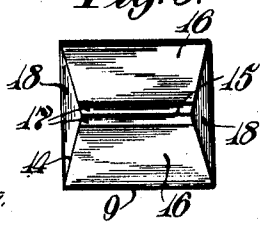



Fig. 5.




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# UNITED STATES PATENT OFFICE

2,302,069

## MATERIAL BREAKING IMPLEMENT

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Application April 7, 1938, Serial No. 200,722

9 Claims. (Cl. 262—33)

This invention relates to material breaking implements, and more particularly, but not exclusively, to picks designed for use with pneumatic hammers. Such implements have various uses, of which one of the most common is in the breaking of concrete or other paving substances.

Implements of the type to which this present invention relates operate with, or depend at least in large measure upon, a wedging action. They should be so constructed that they may be positioned when in use to exert the maximum wedging effect in the direction in which the material will most easily be broken. Resistance to penetration causes the implement to heat when in use, with the result that some tools have a very short working life. I have found that this heating increases with the distance the point must be driven into the material and with the resistance to penetration. The greater the surface area that must be moved through the material in contact with the latter, the greater the heating effect. I have found that by properly determining the angle of the surfaces at the forward end of the implement, adequate wedging to break the material may be secured without requiring the tool to be driven very deep into the material, thus reducing the heating up of the bit by lessening the time element, the area that must be moved in frictional contact with the material, the sealing in of the working end of the tool with a reduced capacity for effective heat transfer, and the actual amount of work done upon the implement. I have found, moreover, that by reducing to a minimum the resistance due to wedging action that is ineffective in producing a breaking action in the direction of least resistance, very beneficial results are obtained. And I have further found that by providing a head of small surface area in its portion of maximum cross section and of greater dimension in most directions at least than the rod or bar which supports it and through which it is actuated, disadvantageous heating is diminished where fracture does not occur until after the wedge and the supporting head have both been driven into the material.

Accordingly, in preferred embodiments, the invention may include one or more of the features of: a wedge angle as great as the material to be broken will permit to advantage, a head of comparatively small lateral surface contact with the material even when driven wholly into the latter, a head of larger cross section than the shank which supports it, and a head so shaped that the wedging portions thereof are so formed that the wedging effect may, as it were, be concentrated in the most useful direction.

It is an object of this invention to provide an improved material penetrating implement. It is another object of this invention to provide an improved picking tool designed for use with pneumatic hammers. It is still another object of this invention to provide an improved picking tool having a head and pick point particularly adapted for breaking, in an improved manner, the material acted on by the tool. These and other objects and advantages of my improved construction will, however, hereinafter more fully appear.

In the accompanying drawing there are shown for purposes of illustration two forms which the invention may assume in practice. In this drawing,

Fig. 1 is a view, mainly in central longitudinal vertical section through a pneumatic hammer having associated therewith an illustrative form of my improved material penetrating implement.

Fig. 2 is a perspective view of the head and penetrating point of one illustrative form of the improved picking tool.

Fig. 3 is an end view of the picking tool shown in Fig. 2.

Fig. 4 is a perspective view of the head and penetrating point of another form of the improved picking tool.

Fig. 5 is an end view of the picking tool shown in Fig. 4.

In Fig. 1 there is shown a pneumatic hammer drilling machine, generally designated 1, herein of any standard type, having a cylinder 2, in which a hammer piston 3 reciprocates in the usual manner to impart a series of impact blows to a usual striking block 4. As shown, the forward end of the pneumatic hammer drilling machine is provided with a chuck 5 adapted to support the shank 6 of my improved picking tool 7 in position to receive the impact blows of the hammer piston transmitted through the striking block 4. As the specific construction of this drilling machine does not enter into this invention, further detailed description of the same appears to be unnecessary.

The improved picking tool specifically shown in Figs. 2 and 3 is designated 7 and is herein shown as comprising a shank 8 of hexagonal cross-section and having formed at its forward end a comparatively short, enlarged head 9 of rectangular cross section. A pick point 10 of rectangular cross-section is formed at the forward end of the enlarged head by cutting away

the sides of the head to form plane surfaces 11 extending forwardly and inwardly and which, if sufficiently extended, would converge at a point in a line including the longitudinal axis of the shank 8. The forward end of the pick point 10 is however, to increase durability, somewhat blunted, and is shaped by beveling the sides of the point, thereby forming triangular shaped surfaces 12 cutting the plane surface 11 and having their apexes converge at the point 13 on the longitudinal axis of the shank 8.

In the form of construction shown in Figs. 4 and 5, the picking tool has a shank 8 and a short enlarged head 9 similar in shape and proportion to that shown in Fig. 2. The forward end of the head is cut away in this construction to form a wedge generally designated 14, having a cutting edge 15 lying in a plane including the longitudinal axis of the picking tool. The faces of the wedge 14 are formed by plane surfaces 16 extending forwardly and inwardly from forward edges of the enlarged head, and the edge of the wedge is shaped by beveling the sides of the wedge at the forward ends of the plane surfaces 16. The beveling may be such as to give slightly curved surfaces 17, as shown, intersecting the surfaces 16 and extending forwardly and inwardly to intersect each other at the cutting edge 15, which then becomes slightly arcuate in side elevation; or, if desired, the surfaces 17 may be plane, thereby forming a straight cutting edge. The ends of the wedge are cut back slightly, forming substantially triangular shaped plane surfaces 18 extending forwardly and inwardly from forward edges of the enlarged head, thereby reducing the length of the cutting edge to a dimension slightly less than that of the enlarged head. The construction described minimizes the resistance to penetration at the surfaces where a positive wedging action is not desired for any purpose other than to provide any clearance that may be needed.

As a result of this invention, it will be noted that an improved picking tool is provided having an elongated shank and a short enlarged head carrying a pick point or wedge at one end. The wedge angle is desirably made such as to effect fracture of the material before extreme penetration occurs. It will further be noted that, by the provision of the enlarged, relatively short head, the surface contact of the implement with the material on which work is performed, is reduced, even when somewhat deeper penetration occurs, thereby reducing the heat generated by friction and prolonging the life of the pick. In Figs. 4 and 5 the concentration of wedging force largely in the desired direction will be noted. Other advantages will be apparent to those skilled in the art.

While there are in this application specifically described two forms which the invention may assume in practice, it will be understood that these forms of the same are shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A picking tool comprising a straight elongated body having a shank at one end and an enlarged head at the other end formed integral with the body for penetrating below the surface of material to be broken, said enlarged head having all of its dimensions perpendicular to the longitudinal axis of said picking tool exceeding corresponding dimensions of said shank whereby said picking tool may be swung about said enlarged head, on penetration of the latter below the surface of the material, to provide a leverage action for breaking the material, a pick point formed at the end of said head and bounded by surfaces extending forwardly and inwardly and having a point in a line containing the longitudinal axis of said picking tool.

2. A picking tool comprising a straight elongated body having a shank at one end and a comparatively short enlarged head of rectangular cross-section at the other end for penetrating below the surface of material to be broken, said enlarged head having bounding surfaces extending parallel to the longitudinal axis of the picking tool and having all of its dimensions perpendicular to said axis exceeding corresponding dimensions of said shank whereby said picking tool may be swung about said enlarged head, on penetration of the latter below the surface of the material, to provide a leverage action for breaking the material, and a pick point formed on said head and bounded by plane surfaces extending forwardly and inwardly and terminating in a point in the longitudinal axis of said picking tool extended.

3. A picking tool comprising an elongated body having a shank at one end and a pick point at the other end, an enlarged head at the end of said body adjacent said pick point for penetrating below the surface of material to be broken, said enlarged head having all points in its periphery spaced more outwardly from the longitudinal axis of said picking tool than are the points in the periphery of said shank whereby contact area between the tool and material remains constant and leverage action about said head as a fulcrum may be obtained on penetration of the latter below the surface of the material, surfaces extending rearwardly and outwardly from said pick point, and surfaces extending forwardly and inwardly from the forward end of said enlarged head, said rearwardly extending surfaces and said forwardly extending surfaces intersecting in a plane perpendicular to the longitudinal axis of said picking tool.

4. In a picking tool, an elongated body, an enlarged head formed at the forward end of said elongated body for penetrating below the surface of material to be broken, said head forming a longitudinal portion of rectangular cross-section and bounded by substantially rectangular-shaped surfaces spaced from the axis of the tool a sufficient distance to provide a clearance between the sides of the elongated body and the material, thereby reducing resistance to penetration and making it possible to obtain a uniform leverage action for different penetrations of the head below the surface of the material, a pick point of rectangular-shaped cross-section formed at the end of said enlarged head and bounded by trapezoidal-shaped plane surfaces and triangular-shaped plane surfaces intersecting in a plane perpendicular to the longitudinal axis of said elongated body.

5. A tool of the character which comprises an elongated rectilinear shank and a relatively short working end and which tool is percussively actuated rectilinearly in a direction axially of its shank for driving said end below the surface of material to be broken, said working end comprising a portion bounded longitudinally principally by pairs of mutually opposite surfaces whose ele-

ments extending longitudinally of the tool are parallel to the axis of said tool, and which portion has all points in its periphery spaced more outwardly from the longitudinal axis of said tool than are the points in the periphery of said shank, whereby a uniform leverage action is obtained for different depths of penetration of said end below the surface of the material, said end having in advance of said portion a wedging portion bounded by forwardly converging surfaces intersecting said pairs of surfaces in a plane perpendicular to the axis of said tool and arranged in mutually opposite pairs, with the angle between at least one of said pairs chosen to provide the desired wedging action.

6. A tool as defined in claim 5 in which there are two pairs of mutually opposite, lateral surfaces upon said working end, and in which the pair of forwardly converging surfaces connecting the surfaces providing the wedging action make at least a much smaller dihedral angle between them.

7. A picking tool comprising an elongated shank portion and a working end, said working end comprising a penetrating point and a fulcrum-providing body which supports said point, said body of relatively short length and having a peripheral surface which is so related to the axis of the tool that all points therein are spaced radially from the latter greater distances than the nearby points in the shank portion which are in the same axial planes, whereby, when said body has been driven into the material to be broken and is positioned wholly below the surface of the latter, a clearance is provided all around the shank portion above said body so that said shank portion may be moved laterally substantial distances, upon swinging of said tool about said body as a fulcrum, without engaging the material, and said penetrating point tapering from said body forwardly to its forward end, the lengths and the lateral surface areas and conformations of said body and said point so determined that a leverage action of the first class is obtained, with said body providing the fulcrum, when the outer end of said shank portion is moved laterally with the body wholly below the surface of the material to be broken.

8. A tool of the character which comprises an elongated rectilinear shank and a relatively short working end and which tool is percussively actuated rectilinearly in a direction axially of its shank for driving said end below the surface of material to be broken, said working end comprising a portion bounded longitudinally principally by pairs of mutually opposite surfaces whose elements extending longitudinally of the tool are parallel to the axis of said tool, and which portion has all points in its periphery spaced more outwardly from the longitudinal axis of said tool than are the points in the periphery of said shank, whereby a uniform leverage action is obtained for different depths of penetration of said end below the surface of the material, said end having in advance of said portion a wedging portion which has a transversely extending cutting edge at its forward end and which is bounded by by forwardly converging surfaces intersecting said pairs of surfaces in a plane perpendicular to the axis of said tool and arranged in mutually opposite pairs, with the angle between at least one of said pairs chosen to provide the desired wedging action.

9. A tool of the character which comprises an elongated rectilinear shank and a relatively short working end and which tool is percussively actuated rectilinearly in a direction axially of its shank for driving said end below the surface of material to be broken, said working end comprising a portion bounded longitudinally principally by pairs of mutually opposite surfaces whose elements extending longitudinally of the tool are parallel to the axis of said tool, and which portion has all points in its periphery spaced more outwardly from the longitudinal axis of said tool than are the points in the periphery of said shank, whereby a uniform leverage action is obtained for different depths of penetration of said end below the surface of the material, said end having in advance of said portion a wedging portion bounded by forwardly converging surfaces intersecting said pairs of surfaces in a plane perpendicular to the axis of said tool and arranged in mutually opposite pairs, with the angle between at least one of said pairs chosen to provide the desired wedging action, said wedging portion terminating at its forward end in an elongated edge lying in a plane bisecting said working end midway between a pair of said first mentioned mutually opposite surfaces and of such length that it extends for the full distance between the foremost points in one of said second mentioned pairs of mutually opposite surfaces.

THOMAS M. STEPHENS.