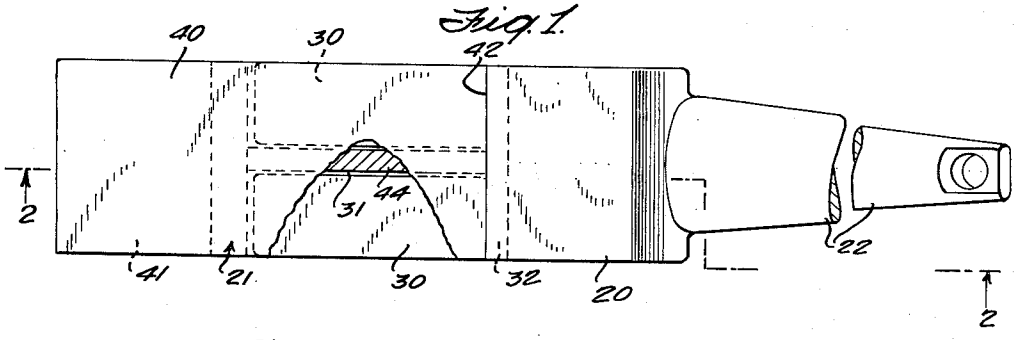
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EXCAVATOR TOOTH

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Fig. 1.



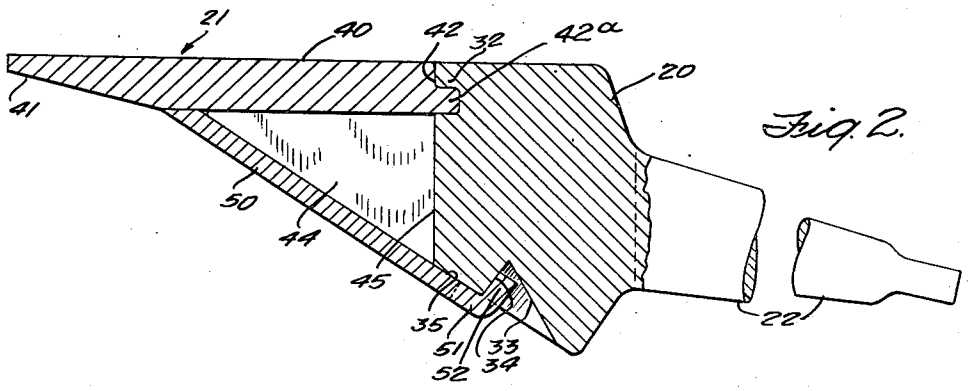


Fig. 2.

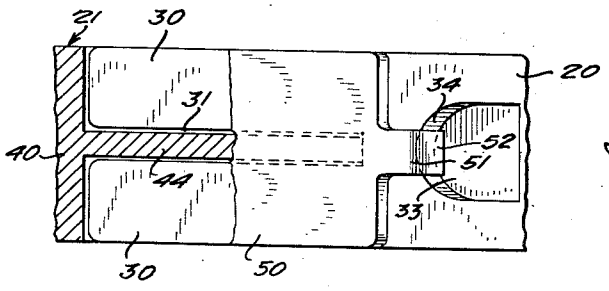


Fig. 3.

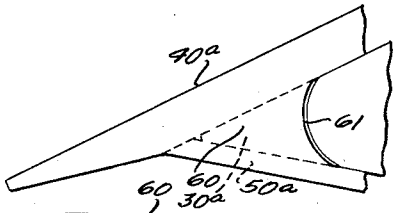


Fig. 4.

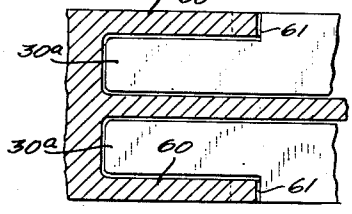


Fig. 5.

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Fig. 6.

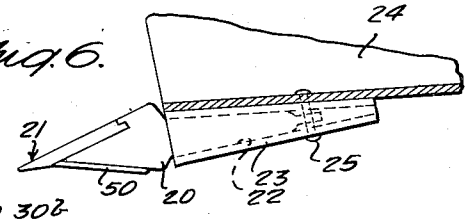


Fig. 7.

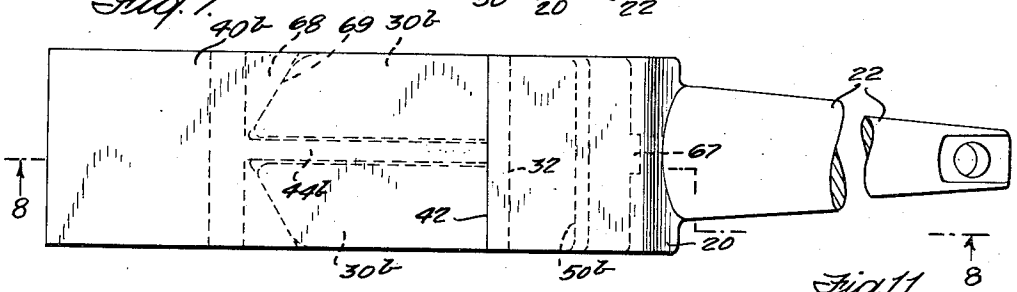


Fig. 8.

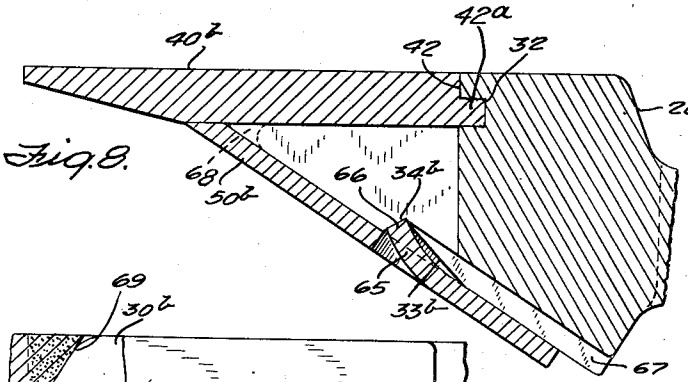


Fig. 9.

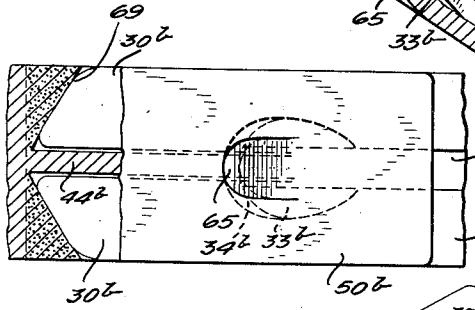


Fig. 10.

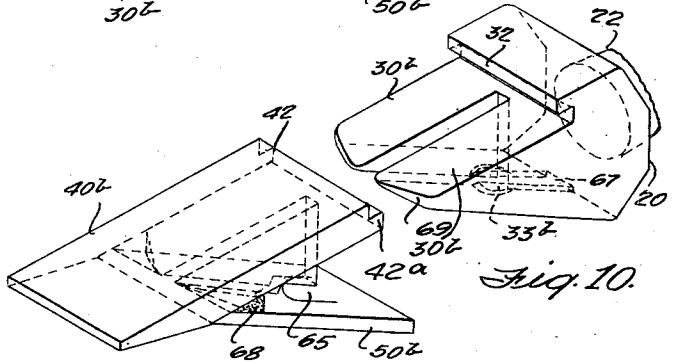


Fig. 11.

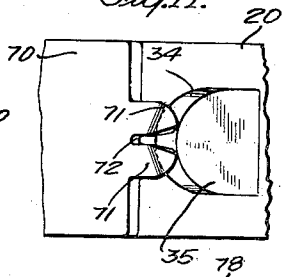


Fig. 12.

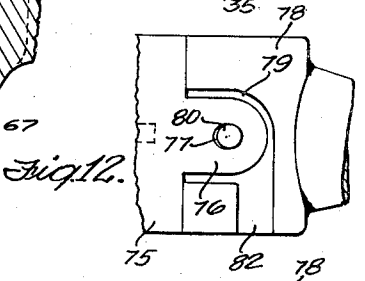
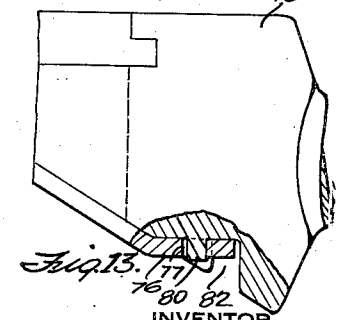


Fig. 13.



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UNITED STATES PATENT OFFICE

2,305,653

EXCAVATOR TOOTH

Abraham W. Ward, San Francisco, Calif.

Application March 14, 1941, Serial No. 383,253

10 Claims. (Cl. 37—142)

This invention relates to excavator teeth such as are used on steam shovels, trench machines, and other types of excavators and earth or rock moving apparatus. Teeth of this character are subject to extreme conditions of wear, and it is desirable to provide the teeth with removable and renewable points so that when a digging point breaks or wears out it may be removed and replaced without the necessity of discarding the base portion of the tooth.

It is an important object of my invention to provide a tooth having a removable point construction in which the point is very securely mounted in the base of the tooth, so that it cannot be dislodged during the digging. At the same time it is important that the point may be easy to apply and easy to remove so that valuable time will not be lost in changing a point when necessary. These results are accomplished by my invention.

In previous attempts to mount removable points on excavator teeth the effort has usually been made to devise a means of attachment which would hold the point to the base so tightly that relative movement between the two should be completely prevented at all times. In practice, however, it has proved impossible to secure this result, and I have observed that, with prior constructions, after a short period of use the tooth point becomes loosened on the base and this condition progressively gets worse until the tooth point may entirely come off. The reason for this is that in constructions heretofore used the fastening devices, being incapable of maintaining the tight immovable mounting of the tooth point, have also been of such a nature that when loosening once began the condition became progressively worse. In accordance with my invention I provide a means of attachment which will be substantially unaffected by such relative movement between the tooth point and the base as may occur in practice. As such relative movement is inevitable I provide an attaching means of such a nature that it remains firm and effective in spite of such relative movement, and does not progressively loosen but maintains the tooth point always firmly upon the base irrespective of some lateral movement of the tooth point.

A further feature of the invention is that the means for attaching the tooth point to the base is of such nature that it may be readily bent into a position to permit the removal of the tooth point without injury to itself, or distortion of any part of the tooth point, except the bendable attaching piece. This permits the tooth point to be taken off for repair and then replaced without having to be reformed, because of distortion in its removal. All that is necessary to attach the replaced tooth point properly is to again bend down the bendable retaining means.

Other objects and advantages of the invention will appear in the course of the following description of certain forms of the invention chosen to illustrate the principles thereof, and the best modes now known to me for practicing the same.

In the accompanying drawings forming part of the specification:

Figure 1 is a plan view of one form of tooth embodying my invention, parts being broken away.

Figure 2 is a longitudinal section of the tooth shown in Figure 1, on line 2—2 of Figure 1.

Figure 3 is a plan view showing the opposite side of the tooth from that shown in Figure 1.

Figure 4 is a fragmentary side elevation and Fig. 5 is a view in sectional plan showing a modified construction of tooth point, and ends of the supporting lugs of the base.

Figure 6 is a view partly in section and partly in side elevation showing a portion of a dipper bucket with a socket thereon having one of the improved teeth mounted therein.

Figure 7 is a plan view of a modified construction of tooth.

Figure 8 is a longitudinal sectional view of the tooth shown in Fig. 7, taken on line 8—8 of said figure.

Figure 9 is a view partly in plan and partly in section of the tooth shown in Figures 7 and 8, showing the opposite side of the tooth from that shown in Fig. 7.

Figure 10 is a perspective view of the tooth-base and point separated, of the form shown in Figs. 7 to 9.

Figure 11 is a plan view of a portion of a back of a modified form of tooth showing a modified form of attaching tongue.

Figure 12 is a plan view of a back of a portion of another modified form of tooth showing a different form of attaching means.

Figure 13 is a side elevation of the construction shown in Figure 12, partly broken away to show a vertical section through the attaching means.

Referring to the drawings in detail, the improved excavator tooth comprises a base or body 20 and a removable point 21. The base 20 may be made to form part of, or be secured to the excavator element in any suitable manner. For instance, the invention is shown in Fig. 6 as applied to a dipper tooth, the base of the tooth having a stem 22 received in a socket 23 on the dipper 24 and retained therein by any suitable means, such as a pin or rivet 25.

In the preferred construction shown in Figures 1 to 6 the base is provided with a pair of wedge-shaped supporting lugs 30 separated by a vertical slot 31. The base is provided with a transverse

seat 32 on its front face which is preferably undercut so as to overlie a complementary face on the removable point, as will be explained. The back of the base 20 is provided with a recess 33, the wall 34 of which, towards the tip of the tooth, forms an angle, preferably approximately a right angle, with the plane of the inclined back face 35 of the base so as to provide a retaining shoulder. The wall or shoulder 34 is also curved transversely with curvature concave towards the base of the tooth.

The tooth point comprises a face member 40 which is preferably formed of very hard and tough metal such, for instance, as an alloy steel adapted to withstand wear and shock. This face 40 is extended at its forward end into a sharp tip or digging edge 41 which may be of any suitable formation adapted to conditions of use. The inner end 42 of the face 40 is shaped to interlock with the undercut seat 32 on the base. For this purpose the end 42 is provided with a transverse rib 42*a* extending across the width of the tooth point which fits into the undercut part of the seat 32, the space above the rib 42*a* constituting a transverse recess which receives the overhanging part of the base seat 32. This interlocking engagement between the face of the tooth point and the base assists in preventing a displacement or lifting of the face of the tooth point when the tooth point is subjected to severe stresses. The tooth point is also preferably provided with a web 44 which is adapted to be received in the slot 31, the inner edge 45 of the web preferably seating against the bottom of the slot.

The tooth point is also provided with a back plate 50 which is firmly attached to or made integral with the face member 40 and the web 44. This back plate overlies and fits closely against the inclined back faces of the lugs 30. At the center of the rear end of the back plate 50 is formed an attaching tongue 51 which overlies the inclined face 35 of the base and projects partly over the recess 33 so that when it is desired to attach the point to the base, this can be accomplished by hammering down the tip 52 of the tongue 51 into the recess 33 so that it engages firmly against the curved wall 34 or shoulder thereof. The tongue is somewhat narrower than the recess so that if there is slight lateral movement between the tooth point and tooth base, the tip 52 of the tongue may rock in the recess along the curved wall 34 without tendency to be pried or wedged away from its close engagement with such curved wall or shoulder. As a result of the central location of the tongue and its engagement with the concavely curved abutment wall, substantial internal movement or working of the tooth point upon the tooth base is possible without any progressive loosening of the means of attachment, so that the tooth point will remain permanently held to the base and there is no danger of its working itself off, as occurs with many prior constructions.

The recess 33 is sufficiently large and open so that the tip 52 of the tongue 51 may be readily struck with a hammer or punch and bent into firm holding engagement with the shoulder 34. It is also possible with a chisel or the like to bend the tongue so as to release the engagement of the tongue with the shoulder and permit the tooth point to be removed for repair or replacement. The tip of the tongue is also protected from wear by the surrounding parts of the tooth base.

In Figs. 4 and 5 a slightly modified construction is shown in which the face 40*a* and back 50*a* of the tooth point are connected towards the outer end of the tooth by side wall portions 60 which enclose the ends of the base supporting lugs 30*a* so as to assist in preventing the possible spreading of the latter and to limit so far as possible lateral working of the tooth point upon the base. The lugs 30*a* may, if desired, be provided with recesses 61 to receive the wall portions 60.

A further modified form of tooth is shown in Figs. 7 to 10, inclusive. In this construction the base of the tooth is provided with a recess 33*b* having a retaining wall or shoulder 34*b* not unlike the recess and shoulder in the first form of tooth described. The back plate 50*b* of the removable tooth point is, however, somewhat differently shaped, in that it is carried up so as to extend over the recess 33*b* and is cut out at a point forward of its rear end to provide a tongue 65, preferably having a rounded end or tip 66 which is adapted to seat against the retaining shoulder 34*b* when the tip of the tongue is hammered down into the recess 33*b*. The engagement between the tip of the tongue and the shoulder of the recess retains the tooth point upon the base in a very firm manner which, as in the previous construction, is not affected by slight lateral movement or working of the tooth point upon the base. If desired the tooth base may be provided with a slot 67, extending rearwardly from the recess 33*b* to the back of the tooth base, such slot being adapted for the insertion of a punch or similar tool which may be driven against the under side of the downwardly bent tongue 65 so as to bend it out and permit the removal of the tooth point.

As shown particularly in Figs. 9 and 10, the face 40*b* and back plate 50*b* of the point may be united near the point of the tooth by wedge-shaped filler portions 68. The tips of the base supporting lugs 30*b* are cut away at 69 so as to receive the filler pieces 68 which thus embrace the tips of the supporting lugs and tend to prevent spreading of the latter and assist in limiting lateral working of the tooth point upon the base.

Figure 11 shows a portion of a tooth point with a modified form of attaching tongue which is adapted to be used with the tooth base construction shown in Figs. 2 and 3. The tooth base 20 is provided with the recess 33 having the abutment wall 34 of the form already described. The tooth point 70 is provided with two attaching tongue portions 71, separated by a split 72. This permits the two tongue portions to be separately driven down into the recess so that less force is required to bend the parts into place, or to bend them out when the tooth point is to be removed. The two tongue portions can also seat themselves separately against the concave surface 34, during which they may diverge slightly so as to better fit the curvature of the surface 34.

Figures 12 and 13 show another form of attaching means in which the tooth point 75 is provided with an attaching tongue 76 having a hole 77 therein. The tooth base 78 is provided with a recess 79 from the bottom of which projects a pin 80. When it is desired to attach the tooth point, the tongue 76 is driven down into the recess 79, the hole 77 receiving the pin 80 which thus retains the tooth point on the base. Slight lateral working of the tooth point upon the base about the pin 80 as a center may take place without loosening the holding engagement between the tongue and the pin. For facilitating

the lifting of the tongue when detaching the point the base may be provided with a groove 82 through which a tool may be inserted under the tongue 76.

While I have illustrated and described in detail certain preferred forms of my invention, it is to be understood that changes may be made therein and the invention embodied in other structures. I do not, therefore, desire to limit myself to the specific constructions illustrated, but intend to cover my invention broadly in whatever form its principle may be utilized.

I claim:

1. A digging tooth comprising a base and a digging point removably mounted thereon, said digging point comprising a face and a diverging back plate receiving portions of said tooth base between them, a part of said back plate extending in contact with the surface of said base, said base surface having a recess therein, the wall of which nearest to the tip of the tooth is formed to provide a concave retaining shoulder, the back plate of said removable point having a bendable portion, of substantially less width than said recess, bent into engagement with said concave shoulder so as to retain said removable point upon said tooth body, without tending to become loosened by lateral working of the removable point upon the tooth body.

2. A digging tooth comprising a base, a digging point removably mounted thereon, said digging point including a face member and a back plate receiving a portion of said base between them, said base having a recess formed therein in a face thereof covered by said back plate, said recess having a forward wall forming a retaining shoulder, said back plate on said removable point having a cut-out therein forming a bendable tongue adapted to be bent into said recess into engagement with said retaining shoulder.

3. A digging tooth comprising a base, a digging point removably mounted thereon, said digging poing including a face member and a back plate receiving a portion of said base between them, said base having a recess formed therein in a face thereof covered by said back plate, said recess having a forward wall forming a retaining shoulder, said back plate on said removable point having a cut-out therein forming a bendable tongue adapted to be bent into said recess into engagement with said retaining shoulder, said base having a groove therein communicating with said recess for insertion of a tool to force said bendable tongue out of engagement with said retaining shoulder.

4. A digging tooth comprising a base having a tapered body and a tooth point removably secured thereon, said tooth point including a face member of wear resistant metal and a back member attached at its forward end to the face member and diverging rearwardly therefrom, said face and back members fitting against opposite inclined side faces of the tapered tooth body, the inclined face of said tapered tooth body engaged by said back member being formed with a locking recess located substantially centrally with respect to a plane passing through the longitudinal axis of the tooth, the forward wall of said recess nearest to the point of the tooth forming a retaining shoulder, and said back member being formed with a substantially central bendable tongue bent into engagement with the forward wall of said recess.

5. A digging tooth comprising a base, tapered supporting lugs thereon separated by a slot, the back of said base being formed to provide a concave shoulder facing away from the outer end of the tooth, and a removable tooth point mounted on said base and comprising a face member supported by said tapered lugs and having a web projecting from the rear thereof through the slot between said lugs, and a back member attached to said web and engaging the backs of said lugs, said back member being provided with a bendable tongue, narrower than said concave shoulder, bendable into engagement with said shoulder to interlock therewith and retain said removable point on said base.

6. In a digging tooth, a base member having two tapered supporting lugs separated by a slot and having a portion forming a transverse undercut shoulder facing the point of the tooth and extending across the width of the base, and a removable tooth point comprising a face member fitting over the tapered portion of said base and having an end wall abutting against and shaped to interlock under the transverse undercut shoulder on said base, said removable tooth point also having a web portion fitting in said slot and a back portion diverging from said face member and attached to said web, said back portion engaging the other inclined faces of said tapered lugs, and being provided with a bendable portion adapted to be bent into interlocking engagement with a portion of said base member.

7. A removable point for a digging tooth comprising a face member of wear resistant metal extending into a digging edge, a back member of malleable metal secured at its forward end to and diverging rearwardly from said face member, said back member being formed to provide a bendable tongue substantially centrally located with reference to the longitudinal axis of the back member, said tongue lying substantially in the plane of said back member before attachment of the removable point to a tooth body, but being bendable out of said plane for securing said point to such body.

8. A digging tooth as claimed in claim 3 in which the bendable tongue on the tooth point is split longitudinally into two bendable retaining portions.

9. A removable point for a digging tooth comprising a face member and a back member, said back member being formed to provide a two-part, longitudinally split, bendable tongue substantially centrally located with reference to the longitudinal axis of the removable point.

10. A digging tooth comprising a base having a tapered supporting lug and a digging point removably mounted on said base, said tooth point including a face member and a back plate diverging from one another and fitting against opposite sides of said tapered supporting lug, and means for retaining the tooth point on the base comprising inter-engaging portions on the back plate of said tooth point and base, said inter-engaging portions having co-acting surfaces having substantially concentric centers of curvature lying in a plane transverse to the back plate passing through the longitudinal axis of the tooth whereby the tooth point may work laterally with some degree of movement with respect to the base without loosening the engagement between the inter-engaging portions, the inter-engaging portion on the tooth point being formed on a bendable member, bendable into and out of engagement with the inter-engaging portion on the tooth base.

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