March 27, 1962 P. V. LARSEN ET AL 3,026,947

GROUND WORKING TOOTH

Filed Nov. 27, 1959 2 Sheets-Sheet 1

Fig. 1.

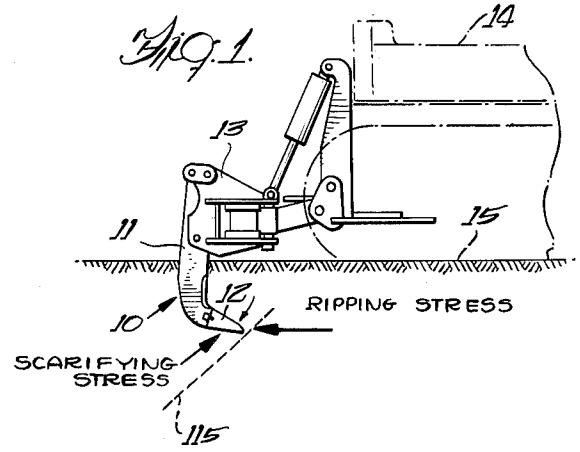
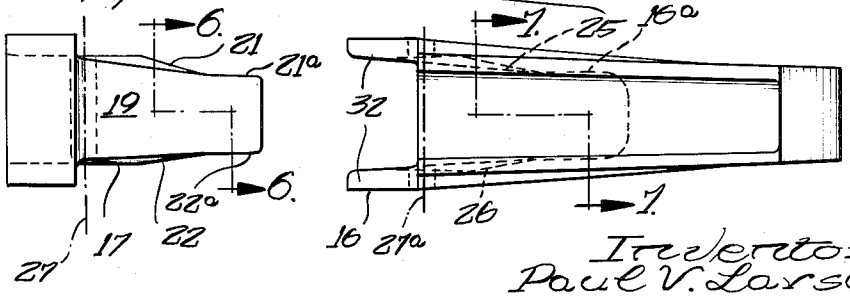


Fig. 3.



Inventors
Paul V. Larsen
Paul Gyolfson
George W. Hill
Dawson, Dillon, Dallon & Lungmus
Attorneys

March 27, 1962 P. V. LARSEN ET AL 3,026,947

GROUND WORKING TOOTH

Filed Nov. 27, 1959 2 Sheets-Sheet 2

Fig. 4.

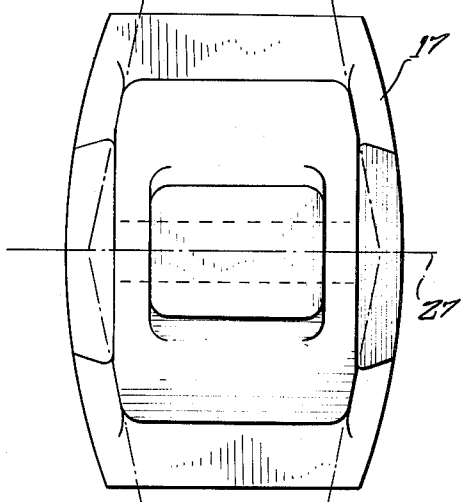


Fig. 5.

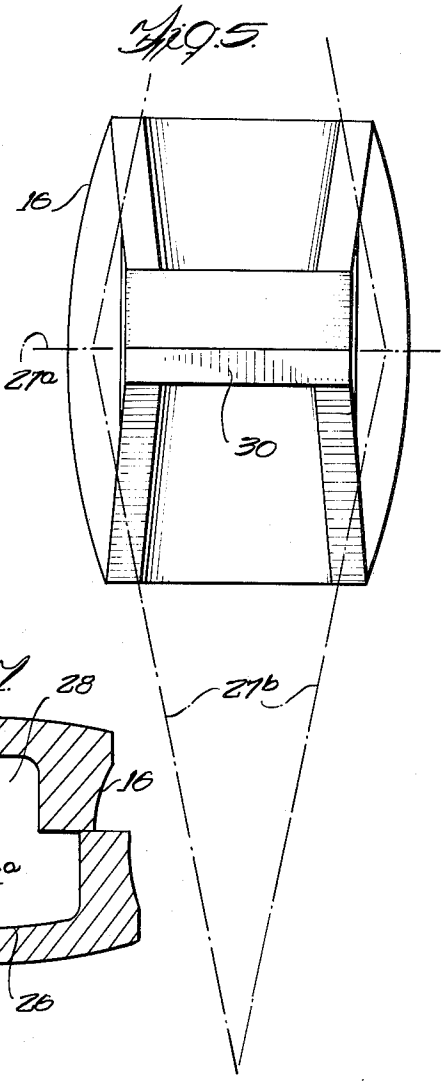


Fig. 6.

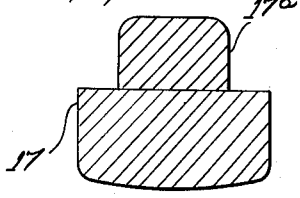


Fig. 7.

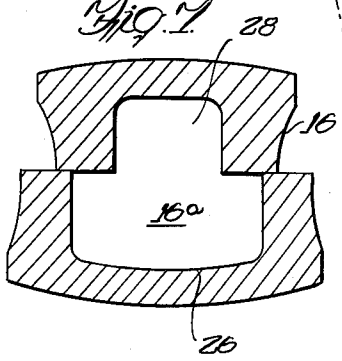
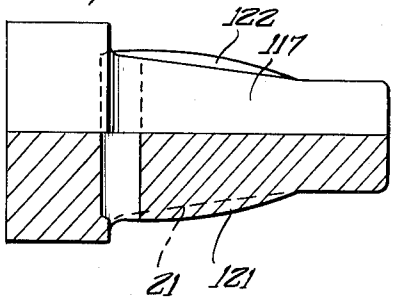


Fig. 8.



Inventors
Paul V. Larsen
Paul E. Olson
George W. Hill
Dawson, Zilton, Zallon & Lungmus
Attorneys

United States Patent Office 3,026,947
Patented Mar. 27, 1962

3,026,947

GROUND WORKING TOOTH

Paul V. Larsen and Paul Eyolfson, Portland, George W. Hill, Newberg, and Eugene W. Dils, Jr., Portland, Oreg.; said Larsen, said Eyolfson, and said Hill assignors to Esco Corporation, a corporation of Oregon

Filed Nov. 27, 1959, Ser. No. 855,713
15 Claims. (Cl. 172—762)

This invention relates to a ground working tooth and, more particularly, to teeth including replacement adapters and points adapted for use on power-driven rippers, excavating and loading buckets, dippers, scoops, scarifiers, and similar ground working tools.

This application is related to the copending, co-owned application of Paul V. Larsen, Serial No. 729,858, filed April 21, 1958, now Patent No. 2,919,506, and reference may be had to that application for additional details of construction.

In a ground working device of the aforementioned character, a shank or base is provided which in turn provides a supporting nose on which is mounted a tooth point or an adapter for supporting a tooth point. The present invention is concerned primarily with the nose, the hollow point or socket element removably carried by the nose, and with means for uniting these elements. The nose may be the adapter nose, or it may be the nose formed integrally with a base member such as the ripper shank or lip of a bucket, etc., and the socket element may be the cap or point portion of a tooth received upon the nose of the adapter itself. In describing the invention we will refer mainly to the nose carried by the adapter and to the tooth point carried thereby. In the type of adapter nose and point commonly employed today, the nose has a generally wedge-shaped contour and the surfaces of this contour contact similar internal surfaces in the tooth point.

The most effective tooth is one that successfully resists rupture-inducing stresses applied by the ground being worked and simultaneously remains tightly inter-engaged. These desirable characteristics have not been simultaneously possible of attainment. Neither could be sacrificed, so both were compromised.

In ground working, the principal reaction on the composite tooth is in a vertical plane, the ground being resistive to being upset and thereby producing pivoting of the tooth in the vertical plane. The presence of rocks, hardness of ground, etc., all tend to aggravate this potential pivoting. Any pivoting in an essentially rigid structure produces wear and, therefore, looseness of fit. The more this pivoting occurs, the sooner the tooth must be replaced which means unproductive "down-time" in an expensive piece of equipment for which there is usually no substitute.

The acknowledged expedient of improving fit in wedge-shaped inter-engaged members is to elongate the wedge shape. This is unavailable here since it would render the tooth weak so that any extraordinary stress might rupture it.

In those devices where particularly harsh stresses are encountered, such as rippers and the like, the tooth is required to be relatively small—and this feature complicates the problem. The usual wedge, in the past, had to be additionally tapered, i.e., horizontally as well as vertically, in order to perform under these harsh conditions. This meant that any vertical pivoting of the point relative to the nose changed the full bearing area of the side surfaces to a point contact. In other words, any pivotal movement of the tooth changes it from a full bearing area to a point contact, the point contact being one back corner of the point opposite to the direction in which the tooth is moved. This point contact, by

directing the full force of the impact thereon, causes excessive wear and greatly shortens the life of the tooth point.

It is an object of this invention to provide a novel tooth structure which is effective to resist both internal wear and rupture. In an embodiment of the invention this is achieved by providing mating arcuate contours on the side faces of the tooth elements. The principal stress is taken by the adapter or nose-providing element and this element also determines just how good a wedge fit can be obtained. By providing this element with convex side walls, both desirable characteristics are achieved.

Another object is to provide a nose-providing element which is wedge-shaped in side elevation with a side wall (preferably both) being outwardly rounded as by including a segmental surface generated about an axis generally normal to the side wall. In this structure, a conforming point, when pivoted vertically, maintains a line of contact irrespective of its angular orientation, thereby minimizing wear and the possibility of premature failure. At the same time, the nose element is equipped with a thicker section so as to better resist stresses, and this thicker section simultaneously provides a greater area of bearing contact to reduce wear and without the need for the disadvantageous elongation of the wedge.

Still another object is to provide a tooth point with a wedge-shaped socket, the socket being equipped with at least one and preferably two opposed, generally vertically-extending side walls, concave in contour and being segmental surfaces of revolution with the revolution axis being perpendicular to the length of the point and in a horizontal plane.

A further object is to provide a combination of nose and socket elements united by keys or other means whereby the points may swing vertically relative to each other to a limited extent while at the same time providing wide areas of contact between the members during each portion of such travel so that a large bearing surface is provided between the members under heavy load and irrespective of the relative position of the two members.

Yet another object is to provide in ground working devices, nose and socket elements wherein the nose is provided with a cone surface or spherical surface or other surface of revolution contacting a corresponding surface of the socket element, thus enabling the parts to move in a vertical arc relative to each other with the bearing surfaces of the two members substantially in full contact.

A still further object is to provide a ground working device having a novel internal configuration, i.e., the mating surfaces of the nose and point—the nose particularly being characterized by a square-like end or box shape that projects from the forwardly tapered faces of the nose. A yet further object is to provide a tooth structure wherein the point and nose are equipped with a generally square-type projection at the socket apex and in which the point is shaped in a novel fashion to provide a pick-type penetrating end. Other objects and advantages of the invention may be seen in the details of construction and operation as set forth in the following portion of the specification.

The invention will be described in conjunction with the accompanying drawing, in which—

FIG. 1 is a fragmentary elevational view, partially in phantom line, of a ground-working device equipped with a tooth embodying the invention, the ground level for two positions of the tooth being shown, one level being in dashed line; FIG. 2 is an exploded side elevational view of the shank and tooth portion of FIG. 1; FIG. 3 is a top elevational view of the point and nose portions of the tooth as seen in FIG. 2 and also featuring these elements in exploded relation; FIG. 4 is a front end elevational view of the nose portion seen in FIGS. 2 and 3;

FIG. 5 is a view similar to FIG. 4 but of the point portion; FIGS. 6 and 7 are sectional views taken along the lines 6—6 and 7—7, respectively, of FIG. 3; and FIG. 8 is a top elevational view, partially in longitudinal section, of a modified form of tooth.

Referring now to the drawing, and in particular FIG. 1, the numeral 10 designates generally a ground-working tool or device. The specific form illustrated is a ripper which includes an elongated, generally vertically-extending shank 11 and a tooth 12. The tool 10 is pivotally connected by means of an articulatable frame 13 to a tractor 14, the tractor being shown in phantom line. The ground level is indicated by the numeral 15.

In the operation of the equipment just described, the ripper is moved forwardly by the tractor 14 in a position beneath the surface of the ground 15 and is operative to upset the ground, which usually is quite hard or difficult to dig. It is believed that this particular type of tooth 12 and its associated structure illustrates one of the most difficult jobs to be performed by ground-working equipment. Softer ground may be simultaneously loosened and excavated by diggers, dragline buckets, etc., all of which are also conventionally equipped with teeth. Irrespective of the environment, however, the tooth is subjected to tremendous forces tending to pivot it about its mounting on the shank 11 and in a generally vertical plane. However, when the ripper is entering the ground or scarifying, the point is at an angle to ground level, the level of the ground under this condiiton being designated by the numeral 115, and the forces are reversed, as indicated. Thus, the tooth must be able to withstand forces in both directions.

As mentioned hereinbefore, the tooth usually includes a point and an adapter. These can be seen in enlarged form in FIGS. 2 and 3, where the point is designated by the numeral 16 and the adapter or nose is designated by the numeral 17. In the view seen in FIG. 2, the adapter 17 is seen to be mounted on the shank or base 11, and this connection is achieved in a rigid fashion by means of a locking key or pin (not shown). Alternatively, the adapter 17 may be provided as an integral part of the base 11, as by welding.

The adapter 17 and the point or cap 16 may be fastened together by means of a retainer key 18 which is installed in openings 18*a* in adapter 17 and 18*b* in point 16, when these openings are aligned as seen in FIG. 1. In some instances, a press fit between the point 16 and the adapter 17 may be adequate to maintain these two elements in inter-engagement, in which case the locking means, consisting of the pin 18 and the openings 18*a* and 18*b*, can be dispensed with.

In the illustration given, the adapter is generally wedge-shaped, i.e., the adapter 17 tapers inwardly toward the point-receiving end thereof. The point 16 is equipped with a socket 16*a* (see also FIG. 7) which is adapted to receive the adapter or nose 17.

As can be appreciated from a comparison of FIGS. 2 and 3, the tooth of the specific illustration given tapers both in the horizontal and vertical directions. In other words, the upper and lower surfaces 19 and 20 converge as one proceeds toward the end of the nose or adapter 17*a*. In like fashion, the side walls 21 and 22 also converge as one proceeds toward the end 17*a*. The corresponding surfaces of the socket 16*a* of the point 16 are similarly convergent, as can be appreciated from a comparison of FIGS. 2 and 3 relative to the top and bottom surfaces 23 and 24, respectively, and the side surfaces 25 and 26, respectively, each of which is seen only in dashed line since these surfaces are hidden in the elevational views presented. However, the surface 26 can be seen in FIG. 7.

Attention is now directed to the surfaces 21 and 22 on the sides of the nose or adapter 17 and with the corresponding longitudinally-extending vertical side surfaces 25 and 26 in the point 16. Each of the four surfaces just

mentioned is, in the illustration given, an arcuate surface developed or generated by rotating an imaginary line about a horibontal axis extending transversely of the length of the tooth. The axis of generation is designated by the numeral 27 relative to the adapter 17 and by the numeral 27*a* relative to the point 16. When the point and adapter are inter-engaged, the two axes are substantially colinear.

In the illustration given and with reference to FIGURES 2–7, the surfaces 21, 22, 25 and 26 each include a conical segment. The development of this segmental surface can be appreciated from a consideration of FIGURE 5 in which the axis 27*a* is seen and in which imaginary lines 27*b* are also seen. The lines 27*b*, with the axis 27*a* form a triangle and the solid of revolution generated by this structure is a cone. Where the angles formed between the lines 27*b* and the axis 27*a* are acute angles as shown, the cone developed will be a double ended cone, hence, each of the surfaces 20, 21, 25 and 26 will include a conical segment. It is apparent, however, that by arranging one of the lines 27*b* at a right angle to the axis 27*a* that a single ended cone will be developed. In such a case, only one pair of corresponding bearing surfaces would be conical, i.e., surfaces 22 and 26 or surfaces 21 and 25.

The conical surfaces provided herein are segmental in that they are interrupted in a vertical direction by the top and bottom surfaces of the adapter 17 or the top and bottom surfaces 23 and 24 of socket 16*a*, as the case may be. In some cases, it may be advantageous also to provide the upper and lower bearing surfaces (19 and 20 in adapter 17, and 23 and 24 in socket 16*a*) with an arcuate surface of the nature provided relative to the side surfaces, i.e., the generally vertically and longitudinally extending surfaces.

Surface contours other than conical may be employed in the practice of the invention and one such alternative surface can be seen in FIGURE 8. In that figure, the modified nose is designated by the numeral 117 and the tapered surface 121 is seen to include a spherical segment. This would be achieved by revolving a circular arc in place of the straight line 27*b* of FIGURE 5. For purposes of comparison the location of the conical surface is indicated in FIGURE 8 by a dotted line to which the numeral 21 is applied. However, by comparing the opposite side 122 with the side 22 of FIGURE 3, it will be seen that irrespective of the surface of revolution employed, there is a curvature provided that exists in a vertical plane and which is helpful in achieving the benefits alluded to hereinbefore.

From the foregoing, it will be appreciated that the contour of the side surfaces 21 and 22 provide a thickened section in the nose 17 resulting in greater strength and without the heretofore necessary disadvantageous widening of the wedge angle. Widening of the wedge angle results in less effective bearing surface for the desirable tight fit between the nose and point. Also, the provision of additional metal in the area of the adapter 17 receiving the impact of ground working stresses results in a superior operation when there is relative movement between the point and adapter. Any pivotal movement of the point 16 relative to the adapter 17 is accompanied by an entire line of bearing rather than just a point contact—the latter necessarily being productive of greater wear.

In the illustration given, the adapter 17 is provided with a box-shaped end 17*a* which can be readily appreciated from a consideration of FIGURES 2 and 3. The surfaces making up the box-shaped end 17*a* are essentially flat, with the side surfaces 21*a* and 22*a* being essentially perpendicular to the axis 27. In other words, the surfaces 21*a* and 22*a* are parallel to the plane of pivotal action which the tooth follows under the impact of ground working stresses. A similar configuration, i.e., box-shaped recess is provided at the extreme inner end

of socket **16***a*—this being designated by the numeral **28** in FIGURE 7.

When the tooth is under any pressure which is normally encountered in digging, the point tends to move forward on the top surface of the nose. This forward movement of the top portion of the point places a strain on any retaining key or pin, if one is provided as at **18**. In the ordinary tooth, it is the keystone that tends to hold the point back in position on its normal bearing surface. However, through the provision of the square nose tip in the inventive tooth, the point cannot follow its normal course down the inclined top surface without tending to raise up and ride over the square end. For the point to raise up and ride over the square end, its direction of travel would necessarily have to be directly opposed to the force which created the downward travel in the first place.

We have found that this desirable reverse stress action can be obtained with very short end projections—of the order of approximately ¼" to ½" long, varying somewhat with the size of the tooth and the strength of the material. Here, it is to be appreciated that the term "square" as applied to this projection **17***a* is employed in its sense of denoting that the nose end is provided by surfaces approximating a box shape, the precise cross-sectional configuration depending upon the width and taper of the four nose-forming faces rearward of the box tip. Generally, the projection **17***a* will have a rectangular cross section.

For the advantageous tooth operation described above, a projection **17***a* constituting less than 10–15% of the nose length is very effective, and with harder materials of construction, nose projections of 4–5% the nose length (measured from the tip to the shoulder against which the rear of the point bears) may be employed advantageously.

The box tip **17***a* of the nose **17** may be advantageously rounded in the upper forward edge thereof, as at **17***b* of FIG. 2. For example, a curvature of as little as that provided by a ⅛" radius in maximum sized teeth may be effective in prolonging the life of a tooth. This rounding effectively prevents "peening" of the box end which may result from the distorting force that is applied hundreds of times each digging operation. This "peening" results in working the top surface of the tip **17***a* and ultimately may result in a shear failure of the tip. The lower forward edge may be similarly rounded to permit ready reversibility of the point on the nose.

We have found that curvatures having radii less than about 25% of the length of the tip **17***a* are effective in resisting undesirable strain such as would result from the above-described "peening." In other words, for a box-shaped tip **17***a* having a length of ½" (measured in the direction of nose length), the radius of curvature should be less than about ⅛" and excellent results are obtainable with curvatures substantially less.

Also cooperating with the box-shaped tip projection on the nose to stabilize the point, is the conforming point socket portion **28**. The upper point portion adjacent the socket portion **28** is made somewhat thicker as at **29** (see FIG. 2) to aid in this stabilizing action—thereby better resisting any deformation-producing forces applied to the point by the box-shaped tip. This upper wall (adjacent the area designated by the numeral **29**) provides the usual "spike" portion associated with a point.

The ground-engaging end **30** of the point **16** may be made essentially "pick"-shaped for superior ripping action. This is achieved in the illustration given by beveling the point **16** as at **31** (again see FIG. 2). From this, it is seen that there is a massive point portion, or reinforced area, between the socket tip and the point tip. The point **16** is also equipped with integral, rearwardly-extending tongues **32** which mate with corresponding recesses in the adapter-equipped shank **11**.

The angle between the nose inclined upper surface **19** and the upper surface of the box-shaped projection **17***a* on the nose **17** is of the order of about 160°. A similar angle exists between the lower nose surface **20** and the lower flat surface of the box-shaped projection **17***a*. A slightly greater angle exists between the upper interior wall **23** of the socket **16***a* and the upper surface of the socket apex **28**—the angle being about 1° greater than the corresponding angle in the nose **17**. The same larger angle is found to exist between the lower wall of the box-shaped socket **28** and the lower wall **24**. We also find it advantageous to provide the socket apex, i.e., in the box-shaped portion, about ⅛" or so greater in height than the height of the nose tip **17***a*. The different angularity in the socket and nose therefore provides initial contact between the point and the nose at the extreme rear of the point and permitting slight play at the forward portion. This play is immediately taken up on the application of any digging force by engagement of the flat surfaces of the nose projection **17***a* and the conforming socket **28** of the point **16**. This initial contact brings about the desirable reversal of force direction mentioned above so as to stabilize the point on the nose. Thus, by slightly exaggerating the angle in the socket (as contrasted to the nose tip), we insure that the box-providing surfaces make initial contact so that there is a pressure fit in the tooth rather than a mechanically designed fit. This is effective even where the length of the nose projection is relatively short, i.e., the nose projection constituting less than about 15% of the length of the nose, measured from the shoulder of the adapter against which the point bears.

While, in the foregoing specification, we have set forth a detailed description of the invention for the purpose of explanation thereof, many variations in the details herein given may be made by those skilled in the art without departing from the spirit and scope of the invention.

We claim:

1. An excavating tooth, comprising a socket member and a nose member subject to vertical stresses, said nose member being equipped with a longitudinally tapered nose and said socket member being equipped with a longitudinally tapered socket conforming to said nose and in which said nose is removably mounted, said socket having at least one arcuate side bearing surface fitting a corresponding arcuate side bearing surface on said nose, each of said side bearing surfaces being flanked and defined by upper and lower portions, said bearing surfaces being generally vertical and including surfaces of revolution having a common axis of generation extending horizontally and transversely of the length of said members, the removable mounting of said members coupled with wear on the confronting upper and lower portions of said nose and socket necessarily resulting from said stresses permitting relative vertical movement between said nose member and socket member when a vertical stress is applied, said bearing surfaces remaining in fitting engagement during relative vertical movement of said members.

2. An excavating tooth, comprising a socket member and a nose member subject to vertical stresses, said nose member being equipped with a longitudinally tapered nose and said socket member being equipped with a longitudinally tapered socket conforming to said nose and in which said nose is removably mounted, said socket having at least one arcuate side bearing surface fitting a corresponding arcuate side bearing surface on said nose, each of said side bearing surfaces being flanked and defined by upper and lower portions, said bearing surfaces being generally vertical and including surfaces of revolution having a common axis of generation extending horizontally and transversely of the length of said members, the removable mounting of said members coupled with wear on the confronting upper and lower portions of said nose and socket necessarily resulting from said stresses per-

mitting relative vertical movement between said nose member and socket member when a vertical stress is applied, said bearing surfaces remaining in fitting engagement during relative vertical movement of said members, said nose being equipped with a box-shaped tip and said socket being equipped with an apex generally conforming to said tip.

3. An excavating tooth, comprising a socket member and a nose member subject to vertical stresses, said nose member being equipped with a longitudinally tapered nose and said socket member being equipped with a longitudinally tapered socket conforming to said nose and in which said nose is removably mounted, said socket having at least one arcuate side bearing surface fitting a corresponding arcuate side bearing surface on said nose, each of said side bearing surfaces being flanked and defined by upper and lower portions, said bearing surfaces being generally vertical and including surfaces of revolution having a common axis of generation extending horizontally and transversely of the length of said members, the removable mounting of said members coupled with wear on the confronting upper and lower portions of said nose and socket necessarily resulting from said stresses permitting relative vertical movement between said nose member and socket member when a vertical stress is applied, said bearing surfaces remaining in fitting engagement during relative vertical movement of said members, and pin means extending transversely through said members for interconnecting said members, said pin means being effective to maintain said members in coupled condition without interfering with said relative vertical movement.

4. An excavating tooth, comprising a point and an adapter subject to vertical stresses, said adapter being equipped with a longitudinally tapered nose and said point being equipped with a longitudinally tapered socket conforming generally to said nose and in which said nose is removably mounted, said socket being equipped with a pair of opposed side bearing surfaces fitting a pair of corresponding arcuate side bearing surfaces on said nose, said side bearing surfaces being flanked and defined by upper and lower portions on said nose and said socket, said bearing surfaces being generally vertical and including surfaces of revolution having a common axis of generation extending horizontally and transversely of the length of said nose, the removable mounting of said point on said adapter coupled with wear on the confronting upper and lower portions of said nose and socket necessarily resulting from said stresses permitting vertical movement of said point on said adapter when a vertical stress is applied to said point, said bearing surfaces remaining in fitting contact during said vertical movement.

5. An excavating tooth, comprising a point and an adapter subject to vertical stresses, said adapter being equipped with a longitudinally tapered nose and said point being equipped with a longitudinally tapered socket conforming generally to said nose and in which said nose is removably mounted, said socket being equipped with a pair of opposed side bearing surfaces fitting a pair of corresponding arcuate side bearing surfaces on said nose, said side bearing surfaces being flanked and defined by upper and lower portions on said nose and said socket, said bearing surfaces being generally vertical and including surfaces of revolution having a common axis of generation extending horizontally and transversely of the length of said nose, the removable mounting of said point on said adapter coupled with wear on the confronting upper and lower portions of said nose and socket necessarily resulting from said stresses permitting vertical movement of said point on said adapter when a vertical stress is applied to said point, said bearing surfaces remaining in fitting contact during said vertical movement, said nose being equipped with a socket-shaped tip and said socket being equipped with an apex generally conforming to said tip.

6. An excavating tooth, comprising a point and an adapter subject to vertical stresses, said adapter being equipped with a longitudinally tapered nose and said point being equipped with a longitudinally tapered socket conforming generally to said nose and in which said nose is removably mounted, said socket being equipped with a pair of opposed side bearing surfaces fitting a pair of corresponding side bearing surfaces on said nose, said side bearing surfaces being flanked and defined by upper and lower portions on each of said nose and socket, said bearing surfaces being generally vertical and each pair including surfaces of revolution generated by revolving two nonparallel imaginary lines about a single axis of generation common to both pairs and extending horizontally and transversely the length of said nose, the removable mounting coupled with wear on the confronting upper and lower portions of said nose and socket necessarily resulting from said stresses permitting vertical movement of said point on said adapter when a vertical stress is applied to said point, said bearing surfaces remaining in fitting contact during said vertical movement.

7. A tooth point for an excavating tooth subject to vertical stresses, comprising a point having a support portion adapted to fit a support member with limited vertical movement between said point and support member, said support portion having generally vertically and longitudinally-extending nonparallel side bearing surfaces, at least one of said bearing surfaces including an arcuate surface of revolution having an axis of generation perpendicular to said plane and being interrupted and flanked by the top and bottom edges of said support portion, said surfaces being adapted to be in full mating contact with said side surfaces on said support member during said vertical movement.

8. A replaceable excavating point subject to vertical stresses, comprising a spike portion integral with and projecting forwardly from the supporting portion, said supporting portion being equipped with vertically and longitudinally-extending side bearing surfaces adapted to engage similarly extending side bearing surfaces on the tooth point support, said point being adapted to move vertically relative to said support when a vertical stress is applied, said bearing surfaces on said tooth point being generally convergent in a direction longitudinally of the tooth point, said bearing surfaces including surfaces of revolution having a common axis of generation adjacent the rear of said supporting portion and extending horizontally and transversely of the length of the point, the side bearing surfaces of said point being adapted to remain in fitting engagement with the support side surfaces during said relative vertical movement.

9. A tooth point subject to vertical stresses, comprising a generally wedge-shaped body terminating in a digging edge and equipped with a wedge-shaped socket, said socket being defined by convergent upper and lower walls and a pair of generally vertically-extending side walls, said side walls including arcuate surfaces of revolution generated about a horizontal axis extending generally parallel to said edge, said socket being adapted to releasably receive a correspondingly shaped nose of a tooth adapter and when so arranged said body being adapted to move vertically on said adapter when a vertical stress is applied, said body side walls remaining in mating contact with the corresponding side walls of said nose during vertical movement of said body relative to said adapter.

10. A tooth point subject to vertical stresses, comprising a generally wedge-shaped body terminating in a digging edge and equipped with a wedge-shaped socket, said socket being defined by convergent upper and lower walls and a pair of generally vertically-extending side walls, said side walls including arcuate surfaces of revolution generated about a horizontal axis extending generally parallel to said edge, said socket being adapted to releasably receive a correspondingly shaped nose of a tooth

adapter and when so arranged said body being adapted to move vertically on said adapter when a vertical stress is applied, said body side walls remaining in mating contact with the corresponding side walls of said nose during vertical movement of said body relative to said adapter, said socket being equipped with a box-shaped apex and aligned apertures in opposite walls thereof for receiving a pin for releasably locking said body on the adapter.

11. A tooth point subject to vertical stresses, comprising a wedge-shaped point having convergent outer top and bottom walls extending longitudinally thereof to define a wedge shape, a generally wedge-shaped socket in said point generally aligned with the wedge shape defined by said outer walls, said socket having at least one generally vertically-extending side wall, said socket being adapted to releasably receive a correspondingly contoured adapter nose for mounting the point on the adapter, said point when so mounted being adapted to move vertically relative to said adapter when a vertical stress is applied, said side wall including a surface of revolution generated about a horizontal axis extending transversely of the length of said point, said side wall being adapted to remain in fitting engagement with a corresponding side wall of the adapter nose during movement of said point relative to the adapter.

12. A tooth point adapted to be releasably mounted on a support member and upon being subjected to a vertical stress being adapted to move vertically relative to said member, said point comprising an elongate body equipped with a socket at one end adapted to mate with said member and a digging edge at the other end, said socket being equipped with a vertical arcuate surface adapted to remain in bearing contact with a corresponding surface of said member during the vertical movement of said point on said member, said surface being a surface of revolution generated about a horizontal axis extending transversely of the length of said body, said socket having a box-shaped apex.

13. An adapter for supporting a releasable excavating tooth point projecting forwardly therefrom and subject to vertical stresses producing relative vertical movement of the point on the adapter, said adapter having vertically-extending side bearing surfaces adapted to engage corresponding side bearing surfaces on the tooth point, at least one of said bearing surfaces including a surface of revolution having an axis of generation adjacent the rearward portion thereof, said axis of generation extending in an approximately horizontal direction and normal to the length of the adapter, said side bearing surfaces of said adapter adapted to remain in mating contact with the point corresponding side bearing surfaces during said relative vertical movement.

14. An adapter for supporting a replaceable excavating tooth point projecting forwardly therefrom and subject to vertical stresses producing relative vertical movement of the point on the adapter, said adapter having a nose partially defined by generally vertically and longitudinally-extending side bearing surfaces adapted to engage corresponding side bearing surfaces on the tooth point, said bearing surfaces being generally convergent in their longitudinal direction, each of said bearing surfaces including an arcuate surface of revolution having an axis of generation adjacent the rearward portion thereof, said axis of generation extending in an approximately horizontal direction and normal to the length of said adapter, said side bearing surfaces of said adapter adapted to remain in mating contact with the point corresponding side bearing surfaces during said relative vertical movement.

15. An adapter for supporting a replaceable excavating tooth point projecting forwardly therefrom and subject to vertical stresses producing relative vertical movement of the point on the adapter, said adapter having a nose partially defined by generally vertically and longitudinally-extending side bearing surfaces adapted to engage corresponding side bearing surfaces on the tooth point, said bearing surfaces being generally convergent in their longitudinal direction, each of said bearing surfaces including an arcuate surface of revolution having an axis of generation adjacent the rearward portion thereof, said axis of generation extending in an approximately horizontal direction and normal to the length of said adapter, said side bearing surfaces of said adapter adapted to remain in mating contact with the point corresponding side bearing surfaces during said relative vertical movement, said nose being equipped with a box-shaped tip.

References Cited in the file of this patent

UNITED STATES PATENTS

2,666,272	Everett	Jan. 19, 1954
2,716,822	Launder	Sept. 6, 1955
2,915,290	Petersen	Dec. 1, 1959
2,919,506	Larsen	Jan. 5, 1960