May 3, 1960 L. W. VAN BUSKIRK 2,934,842

DIGGING TEETH FOR EXCAVATING DIPPERS, ETC.

Filed Nov. 30, 1955 3 Sheets-Sheet 1

Fig. 1

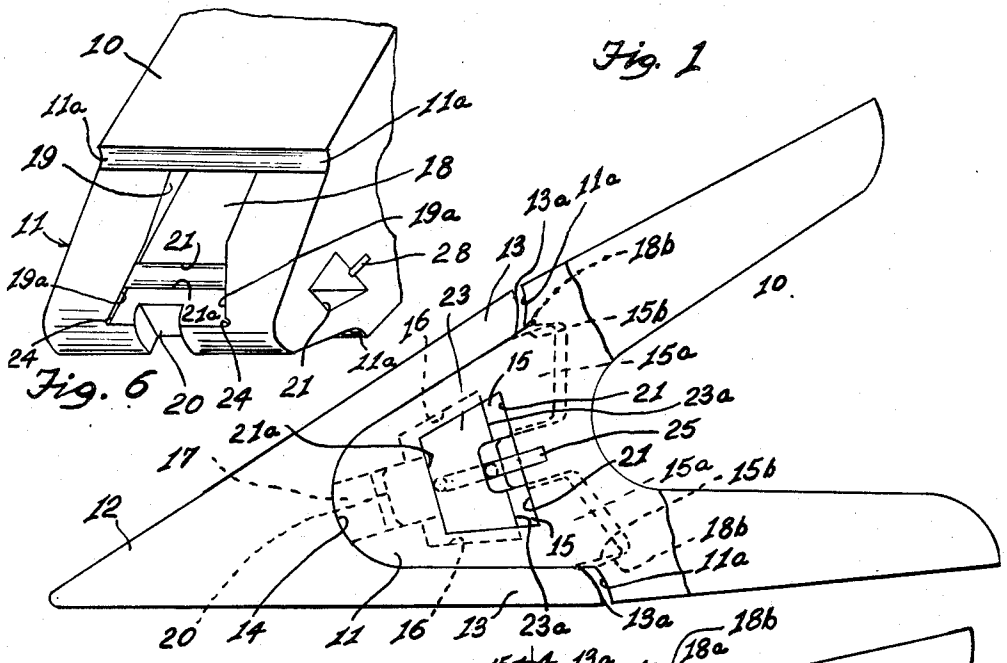


Fig. 6

Fig. 2

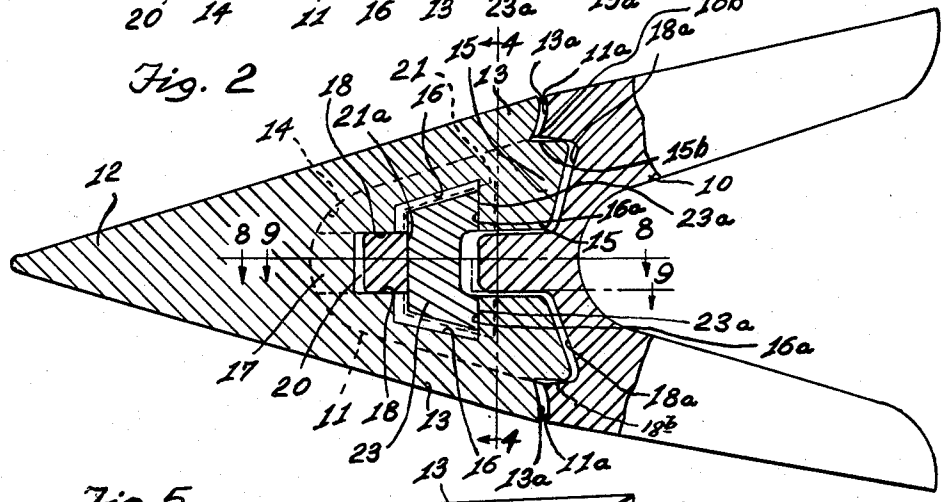
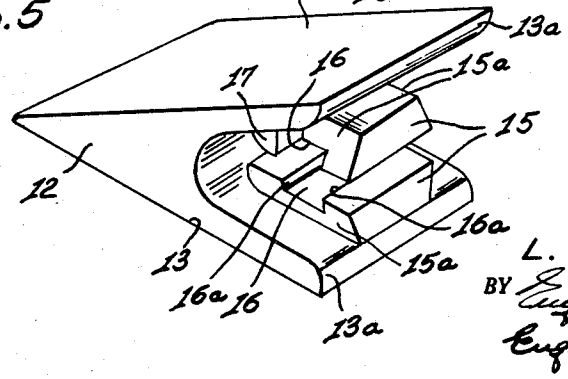


Fig. 5



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Fig. 10

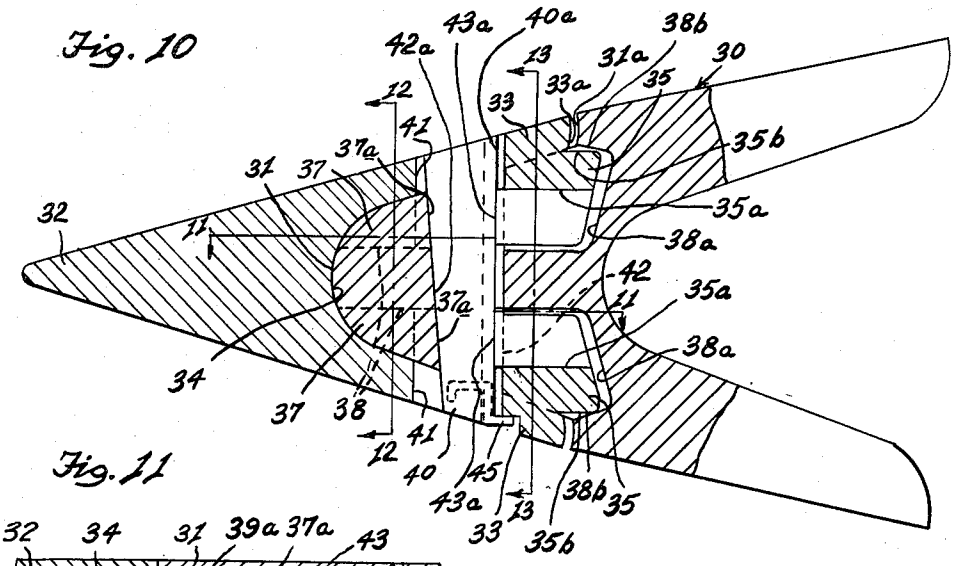


Fig. 11

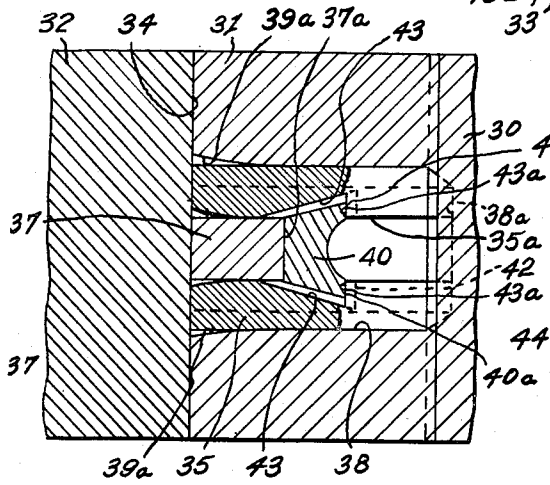


Fig. 12

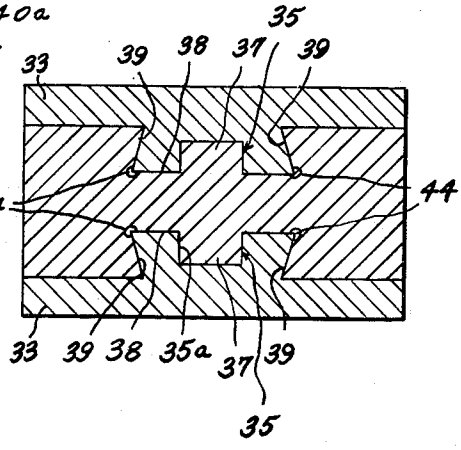
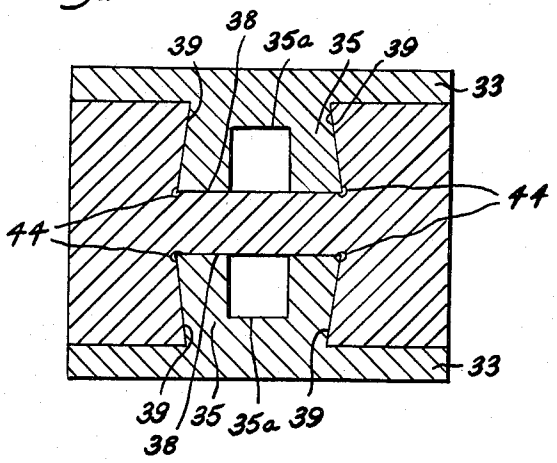


Fig. 13



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Fig. 3

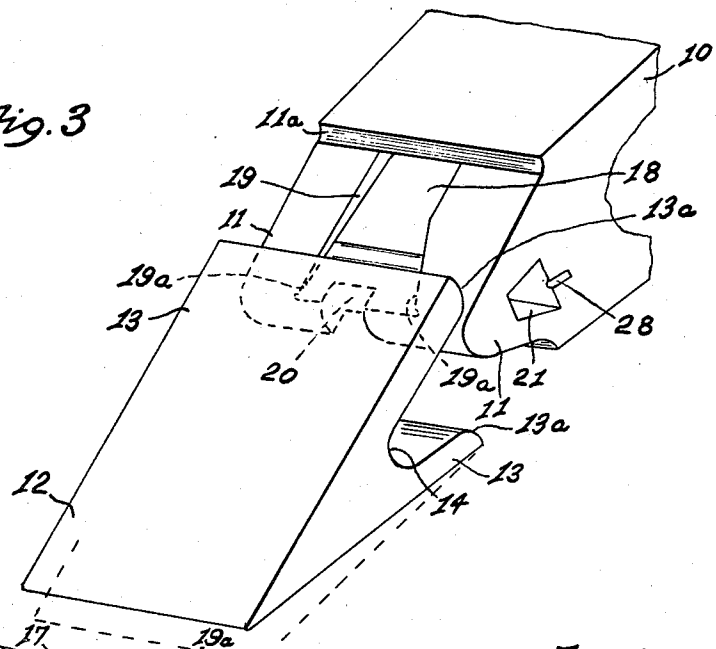


Fig. 8

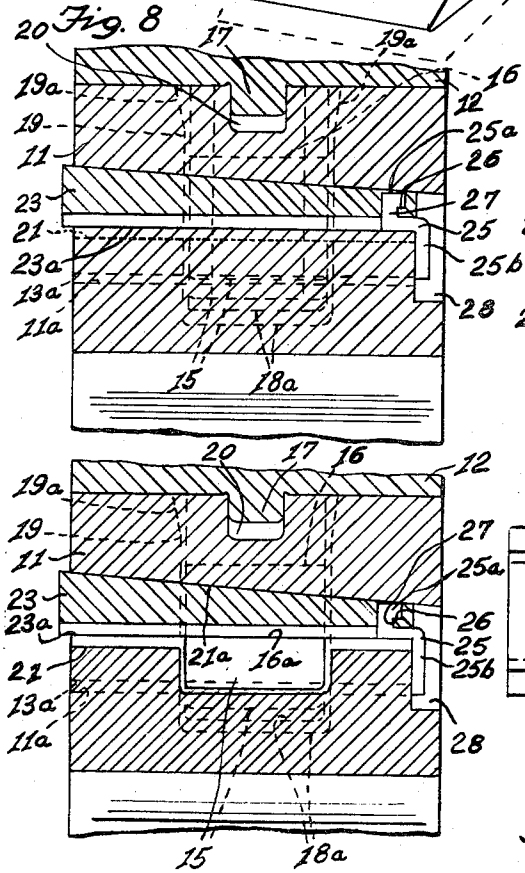


Fig. 4

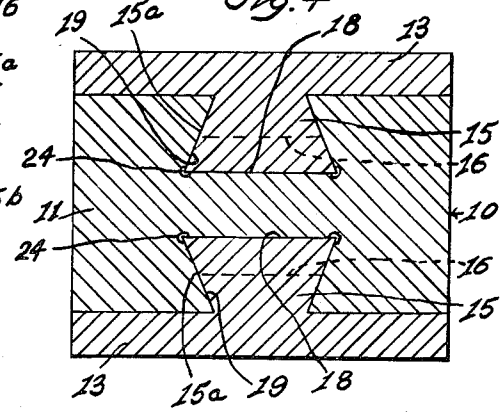


Fig. 7

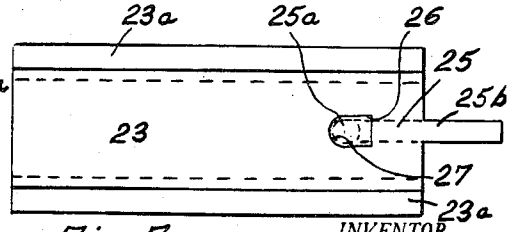


Fig. 9

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DIGGING TEETH FOR EXCAVATING DIPPERS, ETC.

Lesher W. Van Buskirk, Easton, Pa.

Application November 30, 1955, Serial No. 550,027

16 Claims. (Cl. 37—142)

My invention relates to improvements in digging teeth of the replaceable digging point type such as are disclosed in my application Serial Number 455,199, filed September 10, 1954 (Patent No. 2,891,333, dated June 23, 1959), and are carried by the digging lip of power shovel dippers, drag buckets, etc. My present development aims particularly to improve over the disclosures of said application.

Digging teeth as characterized usually comprise, as in my aforesaid application, a base section which is secured to the digging lip of the dipper or bucket. The forward end of said base section provides a nose form seat to which is detachably secured the V-form digging point, or tip, which latter provides the divergent top and bottom seat-embracing wings. Such a tip requires more or less frequent replacement, depending upon the character of material being dug.

In excavating operations involving rock or coal, the digging points of these teeth are subjected to tremendous stresses along lines originating from points forwardly of their base sections and from both vertical and lateral directions with respect to the longitudinal axis of the tooth. This means that if the interfitted or seat-providing portions of the tooth base and tip do not provide for adequate stress transfer from the tip to the base from all directions forwardly of the latter, there will be overloading of certain base-carried portions of the tip and the ultimate breaking loose of the latter.

Then, too, if the key or other tip and base securing means does not retain said parts tightly together, a pounding action will be set up in service to result in ultimate loss of the digging tip. A broken off digging tooth tip may become a dangerous piece of metal because if it subsequently gets into expensive rock or coal crushing machinery it can cause great damage thereto, necessitating a shut-down of operations for costly repairs.

Therefore, manufacturers of excavating equipment and others have devoted much time and effort to achieve satisfactory tooth base-provided digging tip support against the stresses mentioned, and to further provide tip and base securing means which will maintain the parts in tight assembly. However, such efforts have not met with any considerable degree of success for various reasons. In some instances, the opposed stress transferring surfaces of the tip and base have been improperly located or are of insufficient area, and in other cases the formation of such surfaces has made it difficult and expensive if not actually impossible to grind or machine them sufficiently to bring about adequate stress-transferring engagement.

Then, too, those of the prior art teeth which may be somewhat better than others as regards stress transfer from tip to base are difficult to assemble and separate especially in large sizes, due to an over tight or jam fit of the parts in certain areas even though proper stress transfer is lacking in other areas.

And as regards tip and base securing means, as for instance, the wedging key type which is driven into place to draw the tip onto its base seat, it has heretofore always been arranged in reference to contacting stress-transmitting tip and base parts, as to be in "shear" so as to speak.

This means that said key is subject to bending transversely of its longitudinal axis when driven in, as well as in service. Therefore, the aforementioned loosening of tip and base occurs and the resultant pounding action means ultimate loss of the tip if it is not replaced.

Once a wedge form key has been bent so that a permanent "set" is acquired, it is useless. In my aforesaid copending application, I have sought to overcome key bending by employing an oversized heavy duty key but this is expensive in metal expenditure and also requires aligned passages of considerable size through the tip and base which tend to weaken same.

In view of the fact that the top and bottom wings of digging tips tend to spread in service prior developers in the art have found it necessary to provide the tip with either a heavy gauge wing-connecting central web or wing-connecting side walls of substantial thickness. Also, such wing-connecting webs or side walls have to be especially heavy when a base-carried wedging key is to be projected therethrough to draw the tip onto the base seat and retain it there. Thus, wing-connecting webs or side walls, as I have found, add unnecessarily to the weight of the tip and consequent expense of same, and are dispensed with in my present development, as well as in that of my aforenoted application, without sacrifice of efficiency.

Therefore the primary objects of my present invention are to overcome the objections aforenoted and to provide a lighter and more serviceable digging tooth of the class indicated, but which is of simple and durable construction while providing adequate tip-to-base stress transfer, and a novel tip and base securing means which will assure tightness of said parts.

It is also an aim of the invention to provide a tooth which is relatively inexpensive to manufacture in that it requires but a minimum of easily accomplished machining of opposed stress-sustaining portions, and wherein the digging tip can be readily applied to or removed from the tooth base even as to large sized teeth, the arrangement of parts also being such that the tip and base securing member is subjected to transverse compression loads in service and is free of any shear loads which will tend to longitudinally bow or bend it in service so as to result in looseness of the parts.

More specifically, the invention contemplates in a removable V-form digging tip having vertically divergent rearwardly extending wings, the provision of opposed and parallel rearwardly extending wing-carried lugs which are of wedge form in cross-section and are received in correspondingly shaped base nose-provided seats, there being a removable tooth base-carried key cooperating with said wedge form lugs to retain the tooth base and tip in tight assembly, and which key has a compression relationship between opposed lug and base portions so as to be freed of stresses tending to longitudinally bow or bend it in service.

Also, having reference to the base nose-provided seats for the wedge-form tip lugs, mentioned in the preceding paragraph, it is an aim of the invention to provide novel means whereby the slanted side walls of said seats can be easily and quickly machined to make adequate stress-receiving engagement with the related sides of the wedge-form lugs of the digging tip.

Other objects and advantages of the invention will be developed hereinafter, or will be obvious to those versed in the art, reference being had to the accompanying drawings which illustrate now-preferred examples of my inventive concept. It is to be understood, however, that the disclosures herein are to be taken as illustrative rather than limitative, as the invention is susceptible of other mechanical expressions within the sprit and scope of the subject matter claimed hereinafter.

In the drawings, wherein the same reference characters have been used to designate the same parts wherever they appear throughout the several views—

Fig. 1 is a side elevational view, partly in longitudinal section of a tooth embodying my invention;

Fig. 2 is a longitudinal sectional view through the tooth and showing the seated stress-sustaining lugs of the digging tip and the engagement of same by a wedge action key for retaining the digging tip and base assembled;

Fig. 3 is a fragmentary perspective view illustrating the commencement of assembly of the digging tip and base section, the dotted lines indicating the permissible initial lateral play between the parts which facilitates the assembly operation;

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a perspective view of the digging tip;

Fig. 6 is a fragmentary perspective view showing the forward tip seat-providing end of the base section of the tooth;

Fig. 7 is a plan view of the tip and base-securing key and its retainer;

Fig. 8 is a sectional view of a portion of the assembled tip and base taken on the line 8—8 of Fig. 2, and showing the securing key with its retainer in operative engagement in a recess in the side of the base nose;

Fig. 9 is a section on line 9—9 of Fig. 2;

Fig. 10 is a central vertical sectional view through a modified form of tooth;

Fig. 11 is a sectional view taken on line 11—11 of Fig. 10; and

Figs. 12 and 13 are sectional views taken on the lines 12—12 and 13—13, respectively, of Fig. 10.

Referring to the drawings by reference characters, numeral 10 indicates the base section of the tooth, the rear end of which is bifurcated as usual for mounting on the digging lip (not shown) of a power shovel dipper, drag bucket or other item of excavating equipment. As shown in Figs. 1, 2 and 6, the tooth base 10 has, at its forward end, the nose projection 11 which is coextensive in width with the base and provides the seat for the separable digging point or tip 12.

In the illustrated embodiment, the top and bottom surfaces of the nose 11 taper inwardly toward the rounded forward end thereof. The top and bottom surfaces and rounded end of nose 11 make contiguous engagement with the rounded inner end of the tip-provided seating recess 14 that is bounded top and bottom by the vertically diverging rearwardly extending wings 13 of tip 12. As indicated in Fig. 2, these tip-provided wings 13 are coextensive in width with the tip 12 and the base 10, and Figs. 1 and 2 show how the opposed inner surfaces of the respective wings 13 incline outwardly as at 13*a*, adjacent to the rear ends thereof. These rear wing end surfaces 13*a* will ordinarily be initially spaced from the correspondingly inclined top and bottom shoulder-providing surfaces 11*a* at the rear end of base nose 11 when the latter is fully engaged in the seating recess 14 of tip 12. However, if the tip seat 14 is oversized or if the nose 11 has become worn as the result of many tip applications and removals, the opposed inclined surfaces 11*a*, 13*a* will cammingly engage to tend to draw wing carried wedging lugs 15 more tightly against the side walls 19 of their base nose-provided seats 18. Engagement of 11*a*, 13*a* will rarely occur.

Referring now to Figs. 2, 4 and 5, it will be noted that the digging tip 12 provides, as an integral part thereof and between wings 13, the two aforementioned vertically spaced and parallel rearwardly extending lugs 15 whose rear ends project beyond the rear ends of said wings as best shown in Fig. 2. These lugs 15, as hereinabove indicated, are wedge-form in cross-section and are of substantial width as shown in Figs. 4 and 5, they being located adjacent the inner surfaces of the respective wings 13 at points approximately midway between the sides of the latter. It is particularly important to note that the wedge-form of the lugs 15 is achieved by substantially plane side surfaces 15*a* which slant in the direction of the adjacent wing 13. It is also important to note that said lugs 15 increase in thickness rearwardly to outwardly beveled wing ends 13*a*, so as to provide substantial mid area reinforcement for said wings as a means to resist outward bending of same in service.

Figs. 2 and 5 also show the lugs 15 as having opposite key-receiving cutouts 16 extending across their opposed surfaces and which will be referred to again hereinafter.

In further carrying out the invention, I provide the digging tip 12 with the integral boss 17 which is located at the curved inner end of the nose-receiving recess 14 approximately mid-way between the wing sides. This boss 17 is an integral part of the lugs 15 adjacent the inner ends of the latter (see Figs. 2 and 5), so as to provide further mid area reinforcement for the tip wings 13 and for another purpose which will be presently understood.

Coming now to the digging tip seating and sustaining formations of the nose portion 11 of the tooth base 10, and turning to Figs. 2, 3, 5 and 6, it will be observed that the top and bottom surfaces of the nose 11 each provide an earlier mentioned rearwardly extending and groove-form lug-receiving seat 18. These seats 18 are open at their forward ends and are defined by the undercut side walls 19 which substantially conform to the slant of the lug sides 15*a* and flare laterally outward (19*a*) at the entry ends of the sockets to facilitate insertion of lugs 15. The rear end of each lug-receiving seat 18 terminates in a lug end-receiving and sustaining socket 18*a*, as best shown in Fig. 2.

Also, as indicated in Figs. 2, 3 and 6, the rounded outer end of the nose 11 has the cutout-provided seat 20 which snugly receives the boss 17 of tip decess 14. This interengagement of boss 17 with nose seat 20 cooperates with the lugs 15 and their seats 18, 18*a* to prevent relative lateral movement of the base 10 and tip 12 in service after the parts have been assembled.

In the illustrated embodiment of the invention (see Figs. 2, 4, 7 and 8), I employ the channel-form wedge form key 23 as the means for securing the tip 12 and base 10 in tight rigid assembly. The key 23 is projected through the transversely extending nose-provided cross passage 21, as indicated in Figs. 1 and 2, to bring its channel wall edges 23*a* into actuating bearing contact with the rear shoulders 16*a* which are provided by the opposed lug notches 16. The bight portion of the key 23, as indicated in Figs. 2 and 4, has uninterrupted bearing engagement with the forward wall 21*a* of the nose passage so as to be supported thereby throughout the width of nose portion 11, and particularly opposite the engaged shoulders 16*a* of the wing-carried lugs 15.

As will be appreciated from the foregoing, the key 23, as shown in Figs. 2 and 9, is in such fore and aft compression between the forward wall 21*a* of nose passage 21 and the rear shoulders 16*a* of lug notches 16 that it is not subjected in service to longitudinal bowing or bending stresses as are prior art keys and thus effectively prevents loosening of the tip 12 and base 10. As seen in Fig. 2, the top and bottom margin-adjacent areas of the bight portion of key 23 are not backed by the forward wall 21*a* of nose passage 21. However, the body of key 23 will obviously be heavy enough so that there will be no load-induced deformation thereof at the site of unsupported bight areas along lines paralleling its longitudinal axis.

Referring again to the lugs 15 and to the groove-form nose-provided seats 18 therefore, one of the problems left unsolved by the prior art, but which is solved by my invention, is to so form the interengaging stress-sustaining parts of a tooth base and digging tip as to readily admit of necessary grinding or machining of same to obtain a proper fit and avoid looseness. This I achieve by pro-

vision of the broad, unbroken and preferably plane wedging sides 15*a* of the lugs 15; and also by the drilled or cored longitudinal bores 24 (see Figs. 4 and 6) which open laterally to the wedge-receiving seats 18 at the junctions of side walls 19 with the bottom walls thereof. These bores 24 extend the full length of the respective seats 18 and related lug end-receiving sockets 18*a*, and as will be appreciated, they enable a grinding tool to properly act upon the full width of the groove bottoms and adjacent wedging walls 19, 19*a*.

The outward flaring (19*a*) of the side walls 19 at the entry ends of the lug seats 18 also facilitates grinding of the surfaces of the latter and particularly at the socket-providing inner ends 18*a* of the same. The flared entry ends of seats 18 also is important in that it facilitates assembly of the tip 12 and base 10 by admitting of limited initial lateral rocking of the former, and conversely disassembly is facilitated too.

To retain channel form wedging key 23 in place after it has been driven home, I provide the locking pin 25 of Figs. 7, 8 and 9. The major portion of pin 25 is received in the channel between key walls 23*a* and its hook-like inner end 25*a* is anchored in the transverse hole 27 in key 23, which hole 27 communicates with the surface groove 26 in the bight wall of the key. The bill terminal of the pin hook 25*a* seats in groove 26 as shown in Figs. 8 and 9. The outer end 25*b* of pin 25 is permitted to project beyond the key end as the key is being driven home to draw tip 12 onto nose 11. After key 23 has been driven home, the projecting end 25*b* of pin 25 is hammered into the surface recess 28 of nose 11 to retain key 23 in place.

Referring to Fig. 2, a further important feature of the invention is the coaction of the outer or wing-adjacent horizontal lug surfaces 15*b* with the opposed inwardly inclined wall surfaces 18*b* of the lug end-receiving sockets 18*a*. As shown in Fig. 2, the initial seating of the tip 12 on the base nose 11 leaves a space between wing ends 13*a* and the opposed base shoulders 11*a* and likewise between the free ends of the lugs 15 and the inner ends of lug sockets 18*a* so as to admit of subsequent re-tightening of the tip 12 on base nose 11 by inward actuation of wedge key 23. Such further inward actuation of tip 12 results in wings 13 being urged tighter against the top and bottom nose surfaces by the action of the inwardly inclined socket surfaces 18*b* against the opposed lug surfaces 15*b* which, as shown, are in an intersecting plane which in the illustration happens to parallel or substantially parallel the longitudinal axis of the tooth.

Bearing contact between the aforenoted surfaces 15*b*, 18*b* is further accentuated if and when the cam form wing end and base shoulders 13*a*, 11*a* are brought into engagement.

From the foregoing it will be apparent that without decreasing digging surface area, I provide a lighter weight and hence less expensive digging tip than heretofore known, and further, one which provides a simplified tip and base connection which will not work loose in service as the result of bending exertion stress on key 23 or otherwise. A long lived tip 12 is thus provided.

Also, as will be appreciated, the lug and seat arrangement 15, 18 takes advantage of the spreading tendency of wings 13 in service to effect a tightening of same and tip 12 on nose 11.

Additionally, it is evident that the lugs 15 have the further function of providing the notch shoulders 16*a* above and below the tip (12) axis to be engaged by key 23 to draw the tip 12 onto nose 11. Application of key (23) pressure to lug shoulders 16*a* at opposite sides of the tip axis and near the wings 13 accomplishes a saving in the force required to draw tip 12 onto nose 11.

The fact that key 23 is not subject to loads calculated to bow or bend it longitudinally in service enables me to use a lighter key, thus saving metal.

Figs. 10–14 disclose a modified form of the invention involving, as in my aforenoted application, a vertically extending wedging key 40 for drawing the digging tip 32 onto the nose portion 31 of the tooth base 30. However, in contradistinction to the key of said application the vertical key 40 of my present invention does not have to be an oversized heavy duty key to avoid longitudinal bowing or bending in service. This is so because my present key 40 is in fore and aft compression across said axis between portions of the base-provided nose 31 and the rear shoulders 43*a* which are provided by notches 43 in the digging tip-carried lugs 35 (see Figs. 10 and 11) as will be better understood hereinafter.

The tooth of the modified form of the invention (Figs. 10–14) differs very little from that of Figs. 1–9. Thus the modification involves the base section 30 having the forwardly extending nose 31 which fits against the concaved seating area 34 between the divergent wings 33 of digging tip 32.

The digging tip 32 has the rearwardly extending wing-carried lugs 35 of wedge form cross-section which are received in forwardly opening nose-provided seats 38 whose rear ends terminate in sockets 38*a* having inwardly inclined outer cross walls 38*b* corresponding to 18*b* of Fig. 2. The rear ends of lugs 35 enter sockets 38*a* and the outer surfaces 35*b* of the lugs 35 wedge against the inclined socket walls 38*b*, as do 15*b*, 18*b* in Fig. 2, so as to tend to force wings 33 firmly against the related top and bottom surfaces of nose 31.

In the modification the outer ends of the undercut side walls 39 of the lug-receiving nose-provided seats 38 have a curved outward flare 39*a* in opposite directions (see Fig. 11) instead of being inclined outwardly in substantially a straight line 19*a*. This is to better facilitate desirable initial lateral play between base 30 and tip 32 when assembling.

Furthermore, in the modification the boss 17 of Figs. 2 and 3 and its receiving nose end notch 20 are dispensed with and are replaced by aligned centrally located bosses 37 at the outer ends of the respective nose-provided lug seats 38, which bosses 37 work in the longitudinally extending lug grooves 35*a* as shown in Figs. 10, 11 and 12. The entry ends of grooves 35*a* are somewhat wider than the related bosses 37 so as to cooperate with the outwardly flared entry ends 39*a*, 39*a* of lug seats 38 in admitting of initial limited lateral play of the tip 32 when assembling same with base 30. However, when the tip 32 is further advanced on nose 31 bosses 37 make a snug fit in lug grooves 35*a* to sustain the tip and base 30, 31 against relative lateral movement just as do boss 17 and nose end notch 20 in Fig. 2.

It is further to be noted that the flat shoulder-providing inner ends 37*a* of bosses 37, as shown in Fig. 10, are in plane with the front wall 42*a* of the vertical wedging key-receiving cross passage 42 through nose portion 31. This key passage 42 passes through the mid-portion of lug seats 38 between side walls 39 and said passage 42 registers with the wing holes 41 of digging tip 32. Thus, 37*a*, 42*a*, 37*a* provide an elongated bearing or backing surface for the narrowed bight portion of the channel-form wedging key 40 as shown in Fig. 11. As also shown in Figs. 10 and 11, the outer edges of the outwardly inclined walls of channel key 40 bear against the rear shoulders 43*a* of the respective pairs of opposed lug notches 43.

Thus, Fig. 11 considered with Fig. 10 makes it plain that each lug 35 has the opposed notches 43 at opposite sides of its boss-receiving groove 35*a*. It is further clear from these views that when wedge key 40 is driven into its passage 41, 42, the load from the rear lug notch shoulders 43*a* will be transmitted by the key walls 40*a* to the base nose-provided boss shoulders 37*a* via the key bight, and of course the converse is true too.

Thus, Figs. 10 and 11 show that the load sustaining portion of wedging key 40 between the two sets of opposed lug notch and boss-provided shoulders 43*a*, 37*a*,

respectively, is in fore and aft compression transversely of its longitudinal axis and accordingly does not have to be made oversized in order to prevent longitudinal bowing or bending as is true of the key of my aforenoted application. Accordingly, key **40** will not bend or bow longitudinally in service to allow the tip and base to work loose.

A locking pin **45** is, or may be, carried by the small end of key **40** to retain it in place as does the pin **25** of Figs. 1–9. Also, the rear wing ends **33***a* are outwardly inclined as are the opposed nose shoulders **31***a* corresponding to **11***a*, **13***a* of Figs. 1 and 2, and for the same purpose.

Also to facilitate milling of the lug seats **38** the intersections of side walls **39**, **39***a* with the seat bottoms can be cored out as at **44**, corresponding to **24** in Figs. 3 and 6. As a matter of fact the structural arrangements herein described eliminate the necessity for milling or grinding of any surfaces except those of the lugs **15** (or **35**) and their seats **18** (or **38**). This makes for a great saving in manufacturing cost without loss of efficiency. Also the cored out seat side portions **24** (Fig. 4) and **44** (Fig. 12) constitute friction-eliminating relief areas receiving lower side edges of the lugs **15** (or **35**). The term "transverely" as applied to the key-receiving passage **21** is not to be construed as covering the vertical passage **41**, **42** of Fig. 10.

Having thus described my invention, what I claim is:

1. In a dipper tooth or the like, providing a base section having a tip-mounting nose at its forward end, a detachable V-form digging tip having rearwardly diverging top and bottom wings between which said nose fits, a rearwardly extending lug carried by opposed surfaces of each of said tip wings and arranged in spaced parallelism to each other on opposite sides of the longitudinal axis of said tip, said tip-mounting nose providing top and bottom forwardly opening socket-form seats receiving said respective lugs, the opposed surfaces of said lugs having aligned transversely extending cutouts providing rear shoulders, said nose having a transverse key-receiving cross passage which is open to opposed transverse portions of said nose-provided seats between the ends of the latter, said lug cutouts being open to said key passage when the tip is partially seated on said nose, and a longitudinally wedge form key insertable in said passage and providing rear longitudinal portions to engage said lug cutout-provided shoulders to actuate the tip onto said nose and retain it in place thereon, and said passage providing forwardly located key-sustaining wall means disposed in co-planar load-sustaining and key-compressing opposition to said lug shoulders along a portion of the length of the key in planes extending parallel to the longitudinal axis of the key whereby the key will be in tranverse compression in service and will not tend to bend or bow longitudinally.

2. In a dipper tooth or the like providing a base section having a tip-mounting nose at its forward end, a detachable V-form digging tip having rearwardly diverging top and bottom wings between which said nose fits, a rearwardly extending lug carried by opposed surfaces of each of said tip wings and arranged in spaced parallelism to each other on opposite sides of the longitudinal axis of said tip, said tip-mounting nose providing top and bottom forwardly opening seats receiving said respective lugs, said lugs and seats being wedge form in cross-section and providing plane contiguously engaging side wall surfaces so as to tighten the engagement of the lugs in said seats under attempted outward spreading action of said wings, the opposed surfaces of said lugs having aligned transversely extending cutouts providing rear shoulders, said nose having a transverse key-receiving cross passage which is open to opposed transverse portions of said nose-provided seats between the ends of the latter, said lug cutouts being open to said key passage when the tip is partially seated on said nose, a longitudinally wedge form key insertable in said passage and providing rear longitudinal portions to engage said lug cutout-provided shoulders to actuate the tip onto said nose and retain it in place thereon, and said passage providing key-sustaining wall means disposed in co-planar load-sustaining and key-compressing opposition to said lug shoulders along a portion of the length of the key in planes extending parallel to the longitudinal axis of the key whereby the key will be in transverse compression in service and will not tend to bend or bow longitudinally.

3. A dipper tooth or the like providing a base section and a detachable digging tip carried thereby, the base section having a forwardly extending tip-seating nose providing top and bottom surfaces tapering forwardly toward its outer end, the tip having rearwardly extending top and bottom wings providing an open sided recess therebetween receiving and mounting the tip on said nose, a pair of vertically spaced and parallel wing carried lugs of wedge-form cross-section providing broad opposing surfaces, said lugs located at opposite sides of the longitudinal axis of the tip and extending from adjacent the forward end of said tip-provided recess beyond the rear ends of said wings, and each of said lugs providing longitudinally coextensive and substantially plane sides tapering transversely of said lugs in the direction of the adjacent wing, the top and bottom surfaces of said nose portion having rearwardly extending wedge-form seats having bottom walls and undercut side walls, said seats being open at their forward ends and receiving the respective lugs, the rear end of each seat terminating in a socket receiving the rear end of one of said lugs, the fully engaged lugs and seats drawing said wings against adjacent nose surfaces while preventing relative lateral movement of said base and tip, a rearwardly extending boss provided by said tip at the forward end of said nose-receiving recess, said boss being integral with said lugs and located inwardly of the sides of the latter, the forward end of said nose having a seating recess snugly receiving said tip boss to cooperate with the interengaged lugs and seats to prevent relative lateral movement of the base and tip, said base-provided nose having a transverse key-receiving cross passage which is open to opposed portions of said nose-provided seats, between the ends of the latter, forwardly facing cutout-provided shoulders in said lugs and substantially aligned transversely of the latter, and a wedge-form key insertable in said passage to engage said lug shoulders to actuate the tip onto said nose, and said passage providing key-sustaining wall means disposed in co-planar load-sustaining and key-compressing opposition to said lug shoulders along a portion of the length of the key in planes extending parallel to the longitudinal axis of the key whereby the key will be in transverse compression in service and will not bend or bow longitudinally.

4. The combination set forth in claim 1, the lugs and seats having interengaging side walls, and the inner surfaces of the wing ends and the adjacent underlying opposed base section provided surfaces being rearwardly and outwardly tapered with respect to the respective wing axes whereby engagement of said surfaces tends to draw the lug and seat side walls into tighter engagement with one another.

5. The combination set forth in claim 2, and wherein the nose-provided lug seat side walls flare outwardly at the entry end of said seats whereby to admit of initial lateral rocking of the tip when the latter is being assembled on the tooth base, and also to facilitate operation of a milling tool upon inner portions of the seat walls.

6. The combination set forth in claim 2, and each of said nose-provided lug seats having a bottom wall and providing at each side a laterally extending and longitudinally coextensive recess opening from both the bottom wall and related side wall whereby to provide

a friction-eliminating relief area into which the lug side and bottom-provided edge extends.

7. A dipper tooth or the like comprising a base section and a detachable digging tip, the base-section having a nose providing separate top and bottom forwardly opening seats and the tip having a nose-receiving recess and a pair of rearwardly extending lugs projecting therefrom at opposite sides of the longitudinal axis of the tip and engageable in said nose seats, and the entry ends of said seats having outwardly flaring side walls whereby to admit of initial lateral play of the lugs when the tip and base are being assembled, said nose portion providing a cross passage extending transversely therethrough and in part open to opposed portions of said nose-provided seats between the ends of the latter, a removable wedge-form key insertable through said passage, forwardly facing lug-provided shoulders projecting into said passage and engaged by rear longitudinal portions of said key to force the tip onto said nose, and the latter having forward key-sustaining passage wall provided portions arranged in co-planar load-sustaining and key-compressing opposition to said lug shoulders along a portion of the length of the key in planes extending parallel to the longitudinal axis of the key whereby the key will be in transverse compression and will not tend to bend or bow longitudinally in service.

8. A dipper tooth or the like comprising a base section and a detachable digging tip, the base section having a nose providing separate top and bottom forwardly opening seats and the tip having a nose-receiving recess and a pair of rearwardly extending lugs projecting therefrom at opposite sides of the longitudinal axis of the tip and engageable in said nose seats, said nose portion providing a transversely extending keyway therein, said keyway having an intermediate portion open to opposed portions of said seats, a removable wedge-form key insertable in said keyway, and forwardly facing lug-provided shoulders engaged by said key to force the tip onto said nose, and the keyway providing key-sustaining wall portions arranged in co-planar load-sustaining and key-compressing opposition to said lug shoulders transversely of the longitudinal axis of the key.

9. In a dipper tooth or the like comprising a base section and a detachable digging tip-providing section carried thereby, said sections having interfitting lug and socket portions, a securing key extending transversely through portions of said interfitting lug and socket portions, said key being wedge-form in longitudinal section and also being of channel cross section to provide side walls and a bight wall, a seat provided in the outer surface of said bight wall of the key and opening into the groove between said side walls, a key-securing pin seated in and projecting from the outer end of said channel-provided groove, the groove-housed portion of said pin lying inwardly of the plane of the outer edges of the channel side walls so as to be protected thereby, said securing pin having a laterally bent inner end engaged in said bight-wall-provided seat, and said base section having a surface recess into which the outer end of said pin is bent after the key has been driven in place whereby to retain the key in operative position.

10. The structure set forth in claim 8 and said wedge form key being channel-form in cross section whereby to provide bight-connected side walls, the respective side wall edges of said key engaging said lug-provided shoulders at opposite sides of the longitudinal axis of the tip, and the bight portion of said key engaging said sustaining keyway-provided wall.

11. In a digging tooth for excavating dippers and the like, comprising separable but functionally integral base and digging point-providing sections having interfitting lug and socket-provided load-absorbing portions to prevent relative shifting of the sections under digging stress-produced loads, there being a passageway extending transversely through said base and digging point-providing sections at the site of said load-absorbing portions and approximately midway between opposite longitudinal edges of the tooth; the combination of a key which is wedge form in longitudinal section and of channel cross section and inserted in said passageway, the load-absorbing portion of said point section providing shoulders at opposite sides of the tooth axis and substantially normal thereto, said shoulders projecting into said passageway at the rear side of the latter, said channel form key providing a bight wall and side walls with the edges of different ones of the key side walls engaging said shoulders, and the base section providing key bight-engaging portions arranged in co-planar load-receiving and key-compressing opposition to the aforementioned point section provided shoulders along a portion of the length of the key in planes extending parallel to the longitudinal axis of the key, whereby the tip section will be actuated into and held in tight assembly with the base section and the key will be in transverse compression so that it will not tend to bend or bow longitudinally in service.

12. In a dipper tooth or the like comprising a base section and a V-form digging point-providing tip section having top and bottom wings, the forward part of the base section and the space between said wings providing interengaging seating surfaces, two pairs of longitudinally extending and interfitting stress transfer portions provided by said sections between said wings, one of said pairs located above and the other pair below the longitudinal axis of the digging point-providing section, the forward part of said base section providing a transversely extending keyway therein, said keyway having an intermediate portion extending through both of said pairs of interfitting stress transfer portions when said sections are assembled, each of the stress-transfer portions of said tip section having a rearwardly located and forwardly facing shoulder extending into said keyway, a wedge member insertable in said keyway and having rear surface portions engaging each of the tip section-provided shoulders to draw the tip section onto said base section, and the base section keyway providing forwardly located and rearwardly facing wall portions arranged in co-planar load-sustaining and key compressing opposition to said tip section-provided shoulders along a portion of the length of the key in planes extending parallel to the longitudinal axis of the key, whereby to prevent longitudinal bowing or bending of the wedge member in service.

13. In a dipper tooth or the like comprising a base section and a V-form digging point-providing tip section having top and bottom wings, the forward part of the base section and the space between said wings providing interengaging seating surfaces, two pairs of longitudinally extending and interfitting stress transfer portions provided by said sections between said wings, one of said pairs located above and the other pair below the longitudinal axis of the digging point-providing section, the forward part of said base section providing a cross passage extending therethrough, said cross passage having an intermediate portion extending through both of said pairs of interfitting stress transfer portions when said sections are assembled, each of the stress-transfer portions of said tip section having a rearwardly located and forwardly facing shoulder extending into said cross passage, a wedge member insertable in said cross passage and having rear surface portions engaging each of the tip section-provided shoulders to draw the tip section onto said base section, and the base section-provided cross passage having forwardly located and rearwardly facing wall portions arranged in co-planar load-sustaining and key compressing opposition to said tip section-provided shoulders transversely of the plane of the longitudinal axis of said wedge member, whereby the wedge member will be sustained against longitudinal bowing or bending in service.

14. In a dipper tooth or the like comprising a base

section and a detachable digging tip-providing section carried thereby, said sections having longitudinally extending interfitting lug and socket portions with the lug portions carried by the tip-providing section, there being a base section-provided cross passage extending through said interfitting lug and socket portions, said cross passage being open to opposed socket portions between the ends of the latter, forwardly facing lug portion-provided shoulders extending into said passage, a wedge-form securing key in said passage and making rearward bearing engagement with said lug portion-provided shoulders, and said mase section-provided passage providing key-sustaining wall portions at the forward side of said key, the key-engaged lug portion-provided shoulders and at least certain of said key-sustaining wall portions of the base section-provided passage being in co-planar fore and aft key-compressing opposition to one another transversely of the plane of the longitudinal axis of the key whereby the key will be sustained against longitudinal bowing or bending in service.

15. The combination set forth in claim 14, and said key being wedge-form in longitudinal section and of channel-form in cross section with the edges of the channel-provided walls making bearing engagement with the lug portions.

16. The combination set forth in claim 14, and the digging tip-carried lug portions having opposed longitudinally extending grooves opening from the rear ends of the latter, base-carried boss portions at the forward end of the latter and working in said respective lug grooves, the rear ends of said boss portions comprising the aforesaid key-sustaining wall portions, and each lug portion having opposed notches opening from its boss-receiving groove and providing said lug portion-provided shoulders.

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