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RESILIENT BALL RETAINER FOR TOOTH AND HOLDER

Filed July 18, 1966

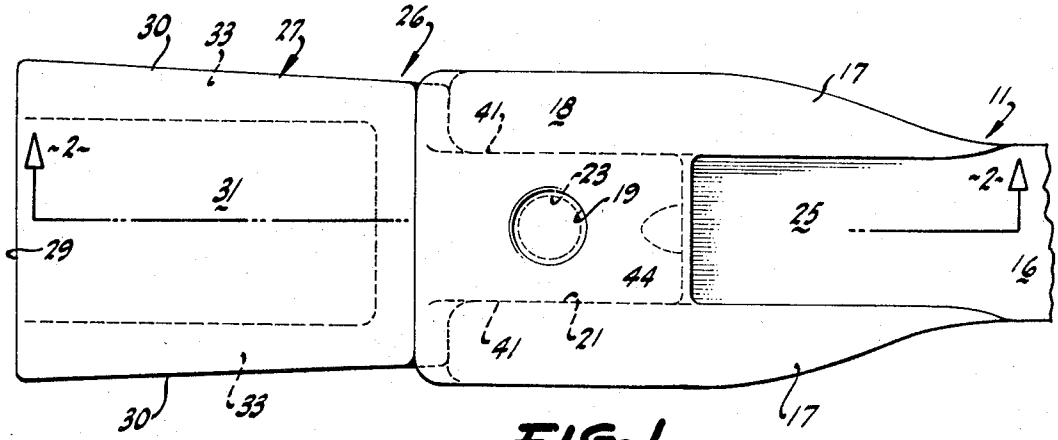


FIG. 1

FIG. 2

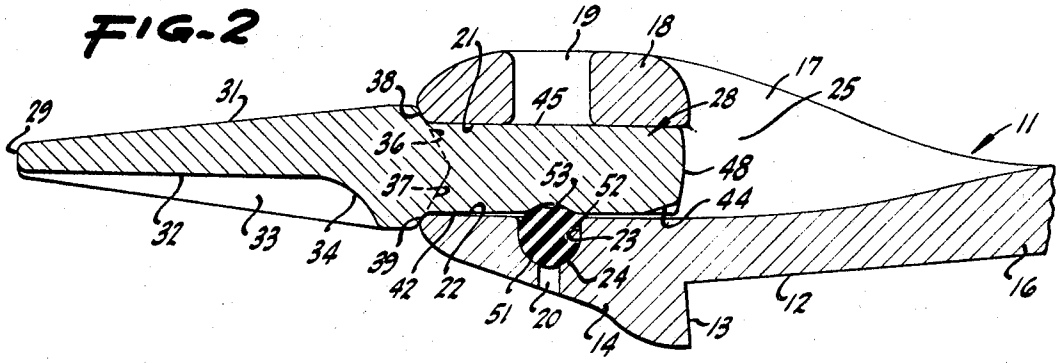


FIG. 3

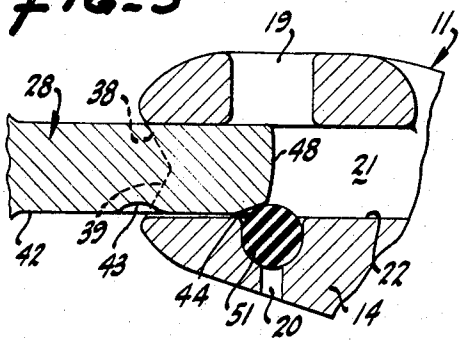
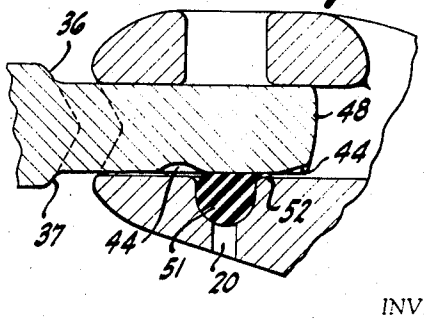


FIG. 4



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RESILIENT BALL RETAINER FOR TOOTH AND HOLDER

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ABSTRACT OF THE DISCLOSURE

An excavating tooth and holder are formed with mating shank and holder. The holder is formed with a bore in which is a deformable ball which is sufficiently resilient so that when the tooth is seated in the holder it enters a dimple depression in the tooth and detachably secures the tooth against unintentional dislodgement.

This invention relates to a new and improved ball retainer for tooth and holder. More particularly, the invention relates to a combination of a tooth of the type used in excavating equipment, a tooth holder therefor, and a ball partially received in a recess in the holder and projecting therefrom, which engages a surface of the tooth received in the holder, is deformed by the force of insertion of the tooth and is sufficiently resilient so that it fits into a depression in the tooth to serve as a detent. Thus, the ball serves to restrain the tooth from unintentional dislodgment from the holder.

A particular feature and advantage of the invention is the fact that the ball can be used repeatedly to perform its retaining function. This feature of the ball arises out of the fact that after it has been used once it may be rotated slightly and a different portion of its surface then serves to contact the tooth. Accordingly, although the ball is somewhat deformed after each use, the area of the ball which is so deformed is small compared with its over-all area thereby permitting a new portion of the surface to be presented each time the ball is used.

Accordingly, the present invention provides a convenient means for retaining a tooth in its holder which may be used repeatedly and is as effective each time it is used as the preceding times.

In the structure hereinafter described in detail, there is provided a tooth having a distal portion of a broad, flat spade-like shape and having a proximal portion of lesser cross section. The holder has an enlarged outer end formed with a recess complementary to the proximal portion of the tooth. A bore is formed in one wall of the recess and a ball fits in the bore and its top projects into the recess. The ball may be formed of nylon or other hard but resilient material. Preferably, the bore is larger than the ball to accommodate deformation thereof. A preferred form to accomplish this result is to form the bore with a semi-spherical bottom complementary to the ball and a short cylindrical section above the semi-spherical bottom. The back end of the tooth is slightly relieved to permit the back end of the tooth to fit over the exposed top of the ball. As the tooth is forced ino the holder, the ball deforms to permit passage of the tooth past the ball. However, a depression is formed in the surface of the tooth which is immediately opposite the bore when the tooth is fully seated in the holder and by reason of the resilient nature of the ball, it fits into the depression and serves to lock the tooth in place against unintentional displacement. Provision is made for driving the tooth out of the holder when it is necessary to change or sharpen the same, the ball likewise deforming to permit this operation. During the installation of the tooth the ball is deformed and truncated at the exposed top. When the ball

is re-used, it is turned so that a new surface is presented each time the ball is used.

Accordingly, it is a principal purpose of the present invention to provide a resilient ball retainer which normally securely retains the tooth in its holder but which can be deformed by pressure applied from an external source so that the retainer is disengaged.

A further feature of the invention is provision of a tooth having at its distal portion rearwardly-centrally slanted surfaces which mate with cooperating surfaces on the forward end of the tooth holder to limit inward movement of the tooth relative to the holder and also to cooperate in holding the tooth in alignment relative the holder.

Oher objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which sismilar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a top plan view of the tooth and a portion of the holder.

FIG. 2 is a longitudinal vertical sectional view taken substantially along the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary sectional view showing a preliminary step in the insertion of the tooth in the holder.

FIG. 4 is a view similar to FIG. 3, showing a further step in the insertion of the tooth.

The present invention has particular application in excavating machines (not shown) of a type commercially available used in smoothing roadway surfaces preparatory to paving. In such machines there is provided a rotating shaft which is horizontally-transversely disposed and power driven, having radial members (not shown) to which the holders **11** of the present invention are applied as by welding, bolting or other convenient means. For such purpose the underside of holder **11** is provided with a step **12** having a forward shoulder **13** for attachment purposes. Forwardly of shoulder **13** the underside of holder **11** is formed with an enlarged bottom portion **14**. Extending above the top of the rearward stem **16** of holder **11** are side portions **17** and the side portions **17** are interconnected at the front end of the holder **11** by a top portion **18** which extends transversely therebetween. An aperture **19** is formed centrally in top portion **18** in order to insert the ball as hereinafter described. Between top portion **18** and bottom portion **14** is a recess **21** which is generally rectangular in cross-section. In the bottom wall **22** of recess **21** and extending into bottom portion **14** is a centrally disposed cylindrical bore **23** having a spherical bottom **24**. Knock-out hole **20** extends out the bottom. Rearwardly of top portion **18** is an opening **25** through which an instrument may be inserted to drive the tooth out of the recess when required.

Tooth **26** is formed with a distal portion **27** and a proximal portion **28**. Distal portion **27** has sidewardly-outwardly diverging vertical side edges **30** which terminate in a blunt transverse forward cutting edge **29** having a width slightly greater than that of holder **11**. Top surface **31** slants downwardly-forwardly as viewed in FIG. 2 and the central bottom surface **32** tapers forwardly toward front edge **29**. Because of the wear of the front corners and the susceptibility of such corners to be broken off, bottom surface **32** is provided with relatively narrow side ribs **33** which coverge forwardly toward front edge **29**. Bottom surface **32** curves as indicated by reference numeral **34** adjacent the rearward end of the distal portion so that there is a substantial thickness of material in the back of the distal portion. The back surfaces **36**, **37** of the distal portion angle rearwardly-inwardly and the forward end of holder **11** is likewise formed with angular

inward-rearward surfaces **38, 39** mating with surfaces **36, 37**, respectively. The shape of the cooperating rear surfaces of the tooth and forward surfaces of the holder limit inward movement of the tooth relative to the holder and also tend to hold the tooth in alignment relative to the holder and to the machine in which it is installed.

Proximal portion **28** of the tooth is of lesser width than distal portion **27** and has parallel vertical side edges **41** spaced apart approximately half the distance between edges **30**. The bottom **42** of portion **28** is flat through most of its area. However, a depression or dimple **43** is formed therein in registry with bore **23** in the assembled position of the tooth and holder. Further, the bottom back edge is relieved as indicated by reference numeral **44** for a purpose which hereinafter appears. Top surface **45** is generally flat and fits against the top wall of recess **21**. Rearward end **48** is flat and transverse.

The retainer to hold the tooth in the holder is a ball **51** which fits in bore **23** and rests on spherical bottom **24** with its top portion projecting above surface **22**. Ball **51** may be formed of nylon or other relatively hard suitable material and is of a commercially available type used in various industries.

The proximal end **28** of tooth **26** is inserted in recess **21** with ball **51** in place. Insertion of ball **51** may be accomplished by dropping it through opening **19** or by inserting it through the front of the recess **21**. As the back edge **48** moves rearwardly, it encounters the top exposed portion of ball **51** and the relieved portion **44** fits over the top of ball and serves as a ramp so that as the inward movement of the tooth continues to the position shown in FIG. 4, the ball **51** is squeezed and deformed in bore **23** and partially bent back in a tip **52** which is squeezed into the clearance between the proximal portion of the tooth and the recess **21**. When the tooth reaches its fully inserted position as shown in FIG. 2, by reason of the resilient nature of ball **51**, it at least partially returns to its original position and thus at least partially fills depression **43**. The ball **51** thus serves to lock or keep the tooth in the holder. As shown in FIG. 2, the top of the ball as indicated by reference numeral **53** is somewhat deformed, part of the displaced material appearing in the tip **52**. The extent of the total surface area of the ball which is thus deformed is relatively small and hence the ball may be re-used repeatedly by merely turning it in bore **23**. It has been found that although ball **51** is deformed, little if any material is actually shaved off.

When it is necessary to remove the tooth, an instrument may be inserted through the back opening **25** and driven against the back end **48**. During such operation, the ball **51** again deforms. The ball may be unseated by probing through hole **20**, then turned in seat **24** to expose a different part of its surface.

Although the foregoing invention has been described in some detail, by way of illustration and example for purposes of clarity and understanding, it is understood that certain changes and modifications may be practiced within the spirit of the invention and scope of the appended claims.

What is claimed is:

1. In combination, a tooth having a distal portion formed with at least one cutting edge and a proximal portion, said proximal portion being generally rectangular in cross-section and having a longitudinally extending first surface, a tooth holder having a forwardly-opening recess shaped generally complementary to said proximal portion and having a longitudinally extending second surface in proximity to said first surface, said first surface being formed with a dimple-like depression and said second surface being formed with a bore in registry with said depression; said bore being cylindrical at its outer end and hemispherical at its inner end, the back end of said first surface being formed with a central relieved area, and a retainer shaped in a ball, said ball being partially in said bore and having its top projecting beyond said second surface, said retainer being of a radius about equal to that of said hemispherical end of said bore, said retainer fitting in said depression in the assembled position of said tooth and holder to restrain unintentional dislodgement of said tooth, said retainer in the assembled position of said tooth and holder being resiliently squeezed and deformed and bent backward in a tip squeezed between said first and second surfaces, the relieved area of said back end of said first surface facilitating commencement of deformation of said retainer to permit insertion of said proximal portion in said recess, the top of said retainer being deformed with a flat surface, the extent of said flat surface being substantially less than the extent of projection of said retainer above said second surface, said retainer also being deformable to permit withdrawal of said proximal portion from said recess, said retainer being rotatable within said recess when said proximal portion is removed from said recess to permit different portions of the surface of said retainer to be exposed above said second surface each time said retainer is used.

2. The combination of claim **1** in which said holder is formed with a hole in the surface opposite said second surface.

3. The combination of claim **1** in which said proximal portion is narrower than said distal portion and the top and bottom of the rearward end of said distal portion to either side of said proximal portion slants downward-inward, the forward face of said holder shaped complementary to said rearward end to limit inward movement of said tooth relative to said holder and hold said tooth in alignment with said holder.

References Cited

UNITED STATES PATENTS

1,874,783	8/1932	Mekeel	37—142
2,256,488	9/1941	Murtaugh	37—142
2,263,215	11/1941	Larsen	37—142
2,319,464	5/1943	Massa	37—142
2,546,457	3/1951	Launder et al.	37—142
2,852,874	9/1958	Grubb	37—142
2,896,985	7/1959	Braatz	37—142
2,990,634	7/1961	Eyolfson	37—142
3,275,376	9/1966	Prox	299—92
3,285,668	11/1966	Fearon	299—92
3,318,401	5/1967	Carbert	287—119 XR
3,325,926	6/1967	Wilson	37—142
3,367,727	2/1968	Ward et al.	287—119 XR

FOREIGN PATENTS

543,733	3/1942	Great Britain.

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U.S. Cl. X.R.

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