Feb. 13, 1962 R. L. LAUNDER 3,020,655

WEAR PLATE MOUNTING FOR DIGGER TOOTH CONSTRUCTION

Filed Dec. 8, 1958 2 Sheets-Sheet 1

FIG. 1.

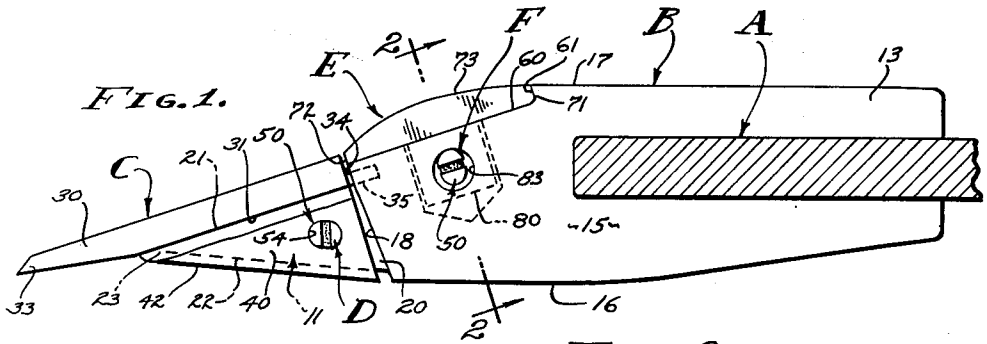


FIG. 2.

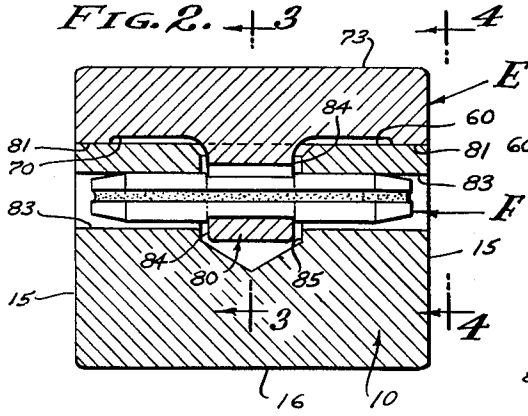


FIG. 3.

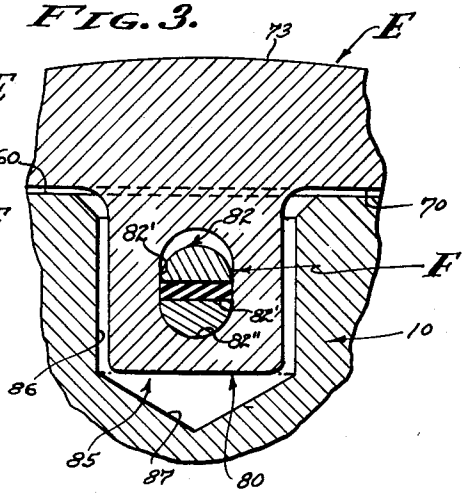


FIG. 4.

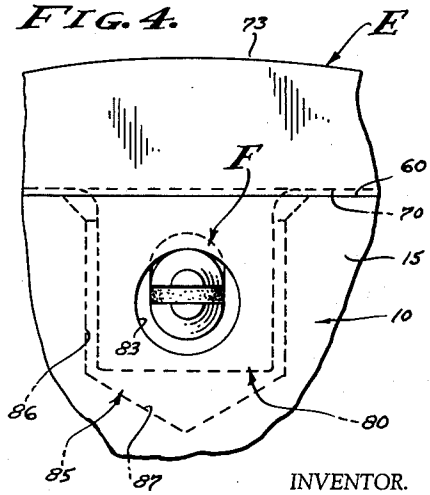
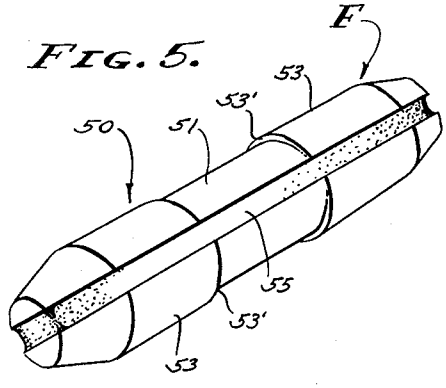


FIG. 5.



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FIG. 6.

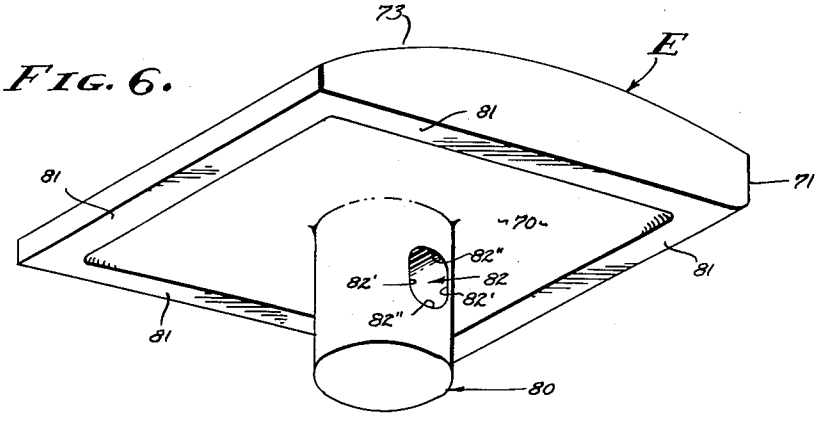
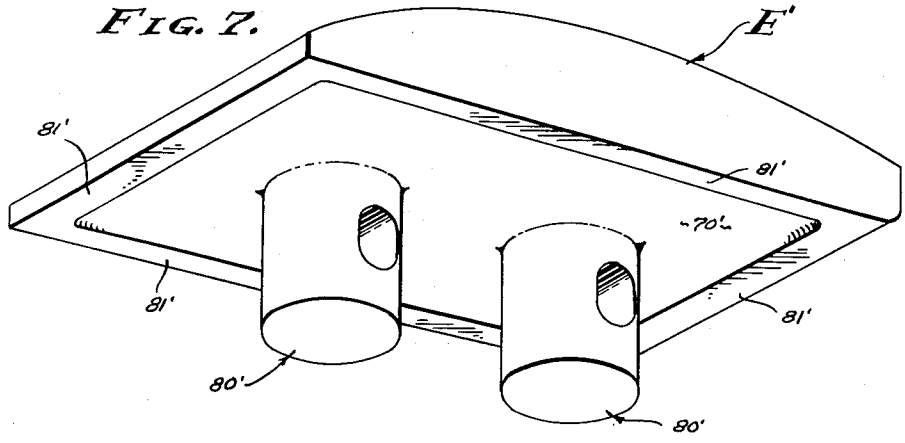


FIG. 7.



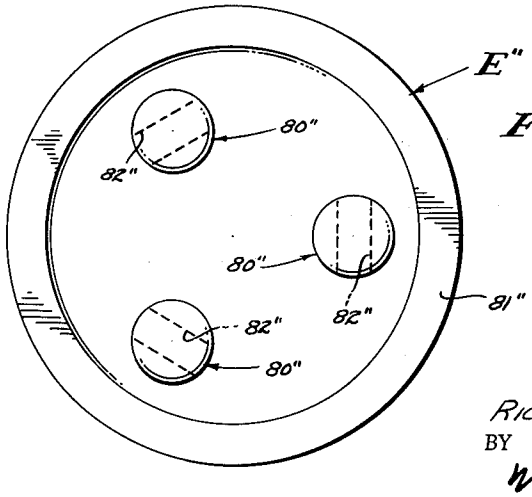


FIG. 8.

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WEAR PLATE MOUNTING FOR DIGGER TOOTH CONSTRUCTION

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10 Claims. (Cl. 37—142)

This invention has to do with digger tooth construction and it is a general object of the invention to provide a simple, practical, improved mounting structure for a wear plate adapted to be applied to a tooth for use on shovel dippers, dragline buckets, rippers, or like equipment.

Digger teeth are used extensively on rippers, shovel dippers, dragline buckets, rippers and like devices, and as a result of being subjected to considerable wear it is common practice to provide a replaceable or readily removable wear plate on the shank that carries the digger tooth cap. The cap and wear plate are provided with the view of supplying the structure with removable or replaceable parts that are subject to wear.

In structures of the type under consideration there is a tooth body in the form of a permanent part and which body is provided with a shank adapted to be secured to a ripper, shovel, bucket or like structure. The tooth body has a base portion carried by and projecting forward from the shank and a nose carried by and projecting forward from the base portion. A replaceable cap is ordinarily carried over the nose and has a tongue entered into a socket in the forward end of the base portion. The upper forward portion of the base of the body is recessed and a wear-taking plate is seated in the recess to extend rearwardly from the rear end of the blade of the cap. Mounting means heretofore provided for the wear-taking plate have been complex and not altogether satisfactory. For example, the wear plate mounting as disclosed in Patent Number 2,762,139 is characterized by a complex construction involving side plates fixed to and depending from the edge portions of the wear-taking plate and entered into indentations in the sides of the base rearward of the forward end thereof. Retaining means for the wear plate involves a pin that engages with the side plates at the lower portions thereof, there being lugs entering into cavities provided in the base to hold the wear plate down. Further, there are keys on the lower edge portions of the side plates to enter into keyways in the base.

An object of this invention is to provide a mounting construction for a wear plate that is employed to protect the body, for example a body that carries the tooth, which elements are combined or related so that the wear plate is releasably retained on the body and so that the structure as a whole is of simple, sturdy construction.

Another object of this invention is to provide a mounting for a structure of the general character referred to wherein a wear plate is secured in working position to protect the body of a tooth carrying adapter immediately rearward of said tooth, which structure is such as to provide effective retention of the wear plate without materially enlarging or in any way encumbering either the tooth or the body which supports the tooth.

Another object of this invention is to provide a wear plate mounting of the character referred to wherein looseness and rocking of the said plate is eliminated. In the structure that I provide the wear plate has bearing engagement with a flat surface at spaced points, and it is yieldingly urged into pressured engagement with said surface by means acting at the geometric center, or center of motion, of said wear plate.

It is another object of this invention to provide a

mounting for a tooth construction of the general character referred to wherein the wear plate is mounted on or carried by the body wholly independent of the mounting of the tooth, or tooth cap, and the body on the bucket or shovel to which it is applied.

It is also an object of this invention to provide a wear plate mounting construction that employs a plurality of individual anchor units to advantage in order to secure a wear plate to a substantially extensive area.

It is still another object of this invention to provide a wear plate mounting construction of the general character referred to having but a few simple, practical and inexpensive parts that are not subject to being accidentally displaced or lost and which can be removed and replaced easily and quickly when necessary.

The various objects and features of my invention will be fully understood from the following detailed description of the typical preferred forms and applications of my invention, throughout which description reference is made to the accompanying drawings, in which:

FIG. 1 is a side elevation of a typical bucket installation showing the tooth thereon and incorporating the features of the present invention. FIG. 2 is a transverse detailed sectional view of the structure shown in FIG. 1, being a view taken as indicated by line 2—2 on FIG. 1. FIGS. 3 and 4 are sectional views of the structure shown in FIG. 2, being views taken as indicated by lines 3—3 and 4—4 on FIG. 2. FIG. 5 is a perspective view illustrating the retaining pin that is employed in the structure. FIG. 6 is a perspective view illustrating the wear plate unit that I provide and which is shown in FIGS. 1 through 4, and FIGS. 7 and 8 are views illustrating modified applications of the invention employing the mounting that I provide.

Digger teeth of the type under consideration can be used in various situations and for purpose of example a tooth embodying the present invention is shown applied to a lip A of a bucket, or the like. In accordance with the invention, the tooth has a body B suitably secured to the lip A and formed with a forwardly projecting base portion **10** and a tip or nose **11** which projects forward from the base portion to form a point. A cap C is mounted on the nose **11** and is retained thereon by a retaining means D. A wear-taking unit or wear plate E is mounted on the base **10** and is retained thereon by a retaining means F, the means D and F being similar.

The body B of the structure is formed as a part of or may be applied to the lip A in any suitable manner. In the particular case illustrated the body B is shown as including a shank portion **13** adapted to be secured to the lip A as by means of suitable fasteners, welding, or other suitable means.

The base **10** of the body B is shown in the drawings to be in the nature of an enlargement on the forward end of shank **13** and it is formed so that it has flat, vertical, parallel side walls **15**, a bottom wall **16**, a top wall **17** and a front wall **18**. The bottom wall **16** in the case illustrated is substantially flat and extends or projects forward and somewhat upward from the lowermost portion of the body. The front wall **18** of the base **10** is preferably flat and in the construction illustrated is shown as extending up and somewhat forward from the edge where it joins the bottom **16**. The top **17** of the base is preferably interrupted by the mounting provided by the present invention and to receive the wear plate E, as hereinafter described.

The tip or nose **11** of body B is carried by and projects forward from the base **10** and in the form illustrated has flat, parallel, vertical sides **20** spaced inward from the sides **15** of the base and projecting forward from the forward end **18** of the base. The nose has a top

21 which is flat and which joins the front 18 of the base 10 below the top of the base and projects forward and somewhat downward therefrom. The nose has a flat bottom 22 that adjoins the base above the bottom 16 thereof and projects forward from the front 18 of the base and somewhat upward. The top 21 and bottom 22 join at a point 23 a suitable distance forward of the front 18 of base 10.

The cap C may vary in form and construction and in the particular case illustrated the cap is shown as characterized by a flat elongate blade 30 having a bottom 31 which seats upon the top 21 of the nose 11. The tip or forward end portion 33 of the blade is preferably dressed or sharpened, as circumstances require, while the back or rear end 34 of the blade is preferably flat and opposes and is adjacent the front 18 of the base 10. A tongue 35 is provided on and projects rearwardly from the rear end 34 of the blade 30 and is entered in a socket provided in the front end of base 10, the tongue 35 and the socket that receives the tongue being substantially narrower than the blade.

The cap C is provided with a mounting means and in the construction illustrated this mounting means includes cheek plates 40 fixed to and depending from the edge portions of the blade 30. The cheek plates 40 are preferably shaped and proportioned to, in effect, completely cover the sides 20 of nose 11 and they are preferably proportioned so that their outer sides are substantially flush with the sides 15 of the base 10. The mounting means further includes a bottom 42 which extends between the lower edge portions of the cheek plates 40 and which seats against the bottom 22 of nose 11.

With the cap construction above described, the cap is effectively supported on the nose 11, is held thereon by wedging engagement and it completely encloses or encases the nose while at the same time it is effectively guided by and anchored to the base 10 of body B by engagement of the tongue 35 in the socket provided therefor.

The retaining means D serves to releasably retain the cap C on the nose 11. In the case illustrated, the retaining means D includes a retainer 50 having a sectional pin portion 51 carried in an opening provided in the nose 11 transversely thereof a suitable distance forward of the front end 18 of base 10. As in common practice heads or enlargements 53 are provided on the ends of the pin 50 and are laterally disposed to be seated in openings 54 provided in the cheek plates 40 of the cap. Further, the heads 53 form inwardly faced shoulders 53' that act to hold the retainer in working position and they are tapered so that the ends of the retainer are cone-shaped. In the case illustrated the retainer 50 formed by the sectional pin portion 51 with the heads 53 is an elongate structure that is split longitudinally into two like sections between which there is a flat, resilient insert 55 preferably formed of rubber, or the like. In practice, the rubber 55 is bonded to the like sections of the retainer, each retainer section being semi-circular in cross section. When this form of retainer is employed, the openings 54 in the cheek plates are made elongate in a direction lengthwise of the tooth, and the opening through the nose is made large enough to pass a head 53 of the retainer. When this retainer is in place, the plane of the flat insert 55 is vertically disposed and one pin portion 51 bears against the forward side of the opening in the nose while the heads 53 of the other pin portion bear against the rear sides of the openings 54 in the cheek plates. As a result of this construction, the retainer 50, which has tapered ends and which is subject to being forced or driven into and out of operating position, is locked in place by reason of the shoulders 53' engaging the sides 20 of the nose, while at the same time it yieldingly urges the cap C rearwardly onto the nose 11 so that the cap is maintained tight on the nose.

In accordance with the improved wear plate mounting of the present invention the upper forward portion of the base 10 of body A is provided or formed with a flat face and is preferably provided with a recess and this recess involves a flat bottom 60 and a forwardly facing back wall 61. The bottom 60 of the recess is in a plane substantially parallel with that of the blade 30 of the cap C and is preferably located somewhat below the plane of the top of blade 30. The back wall 61 of the recess is flat and normal to the bottom 60 and extends downwardly from the top 17 of base 10 to join the bottom 60 of the recess. The back wall 61 is also substantially parallel relative to the front 18 of the base so that the recess forms a step, or stop shoulder, as clearly illustrated in FIG. 1 of the drawings. As shown, the recess just described extends completely across the base portion 10 between the side walls 15, the bottom 60 being uniformly flat and smooth for purposes later described.

The wear taking unit or wear plate E is carried on the face provided on the base 10 and preferably occupies the recess provided in the base 10, and it involves a body that has a flat bottom 70 which opposes the bottom 60 of the recess, and it has a rear end 71 that seats or bears against the back wall 61 of the recess. The wear plate E is preferably coextensive with the recess both longitudinally of and transversely of the tooth so that its forward end 72 terminates flush with and forms a continuation of the end 18 of the base 10 and opposes the rear end 34 of the blade 30 of the cap C. The top 73 of the wear plate E is preferably curved or convex in form and in order to form a raised wear portion in the nature of a rounded hump covering the forward portion of the base 10. It is this rounded or humped portion of the wear plate, or raised wear-taking portion, that protects the base 10.

The retaining means F serves to releasably retain the wear plate E on the base 10. In the case illustrated, the means F involves, generally, a retainer 50, as above described, and an anchor 80 that is engaged by the retainer 50 to secure the wear plate E in working position. The body of the wear plate E, which is a flat plate-like element, has a peripheral marginal portion 81 that depends somewhat from the bottom 70 of the plate and which is adapted to have bearing engagement on the uniformly flat and smooth bottom 60 of the recess, above described. As indicated, the marginal portion 81 occurs at the rear end 71, forward end 72 and sides of the wear plate E, and bears flat against the bottom 60 and so that the bottom 70 of the wear plate does not bear on the bottom of the recess.

In accordance with the present invention, a socket 85 is provided in the base 10 to receive the anchor 80, that is, so that the anchor enters into the body 10 when the marginal portion 81 of the wear plate is engaged with the bottom 60. The socket 85 is formed in the base 10 to enter through the bottom 60 at the geometrical center of the recess, or center of force of the wear plate E. As shown, the socket 85 is a drilled or bored, or otherwise formed, opening that extends into the base 10 and has a cylindrical side wall 86 and a bottom 87. The axis of the socket 85 is normal to the plane of the bottom 60 and the socket loosely receives the anchor 80 with substantial side and bottom clearance.

The anchor 80 is an elongate stem-like part that depends from the wear plate body to enter into the socket 85 where it is engaged by the retainer 50. The anchor is preferably round in cross-section and is formed integrally with the body of the wear plate. In accordance with the invention, the anchor 80 is provided with an opening 82 that extends transversely therethrough on an axis parallel with the plane of the bottom 70 and marginal portion 81. The opening 82 is positioned a substantial distance downward from the bottom 70 and is made large enough to pass the heads 53 of the retainer. In carrying out the invention, the opening 82 is elongated lengthwise of the anchor 80, so that it has flat side walls 82' that extend

between top and bottom arcuate walls **82''**. The opening **82** is a straight opening, the walls **82'** and **82''** being parallel with each other and adapted to cooperate with the retainer **50**.

Further, and in accordance with the invention, the base **10** is provided with aligned openings **83** that enter into the base **10** at opposite sides **15** thereof and which open into the socket **85**. Like the openings **82**, the openings **83** are made large enough to pass the heads **53** of the retainer. A feature of the structure is that the openings **83** are offset relative to the opening **82**, being spaced farther from the bottoms **70—60**.

With the wear plate and anchor construction as above described and with the tooth formed in the manner above described, the resilient retainer **50** can be driven into working position to yieldingly urge the wear plate E into pressured engagement with the base **10** and more specifically with the bottom **60** of the recess in the base **10**.

In order to insert the retainer **50** into working position the tapered head end of the retainer is passed through the opening **83** at one side of the structure and so that the retainer is started into the opening **82** in the anchor **80**. As best shown in FIGS. 3 and 4 of the drawings, the retainer **50** is elongated in cross section, being narrower in the plane of the insert **55** than it is between the two convex faces of the sections **51**. Thus, the tapered end of the retainer guides the retainer into the opening **82** where it is manipulated and turned until the narrow dimension of the retainer extends between the opposed sides **82'** of the opening. With the retainer properly rotated, with the plane of the insert **55** parallel with the plane of the bottoms **60** and **70**, the pin is driven and forced into working position. However, even if not properly rotated the retainer will automatically orient itself rotatively by virtue of the tapered ends thereof which cam the sections **51** into proper position when the retainer is driven into working position. When the retainer **50** is in place in the openings **82** and **83**, the plane of the flat insert **55** is horizontally disposed and parallel with the bottoms **60** and **70** and the upper section of the pin bears against the tops of the openings **83** while the lower section of the pin bears against the bottom of the opening **82**. As best illustrated in FIG. 2 of the drawings the outer wall **84** of the anchor **80** is adapted to engage with the inwardly faced shoulders **53'** on the pin sections, thereby locking the retainer **50** in working position. As a result of the proportioning of parts, as above described, the retainer with its tapered ends can be forced or driven into and out of working position where it is locked by reason of the shoulders **53'** engaging the wall **84** at opposite sides of the anchor. When the retainer is in said working position the rubber **55**, or like resilient material or member, is compressed so that the wear plate E is pulled downwardly into tight fitting position or bearing engagement with the bottom **60** of the recess in the base **10**.

With the construction above described the unit formed by the wear plate E and anchor **80** is arranged in place by entering the anchor **80** into the socket **85** and then driving the retainer **50** into position. The retainer **50** yieldingly urges the anchor **80** downwardly bringing the marginal portion **81** into pressured bearing engagement with the bottom **60**, at the peripheral portion thereof. Since the marginal portions **81** are spaced from each other at opposite sides of the wear plate E, and are coplanar, there is no rocking or looseness between the base **10** and wear plate.

In FIG. 7 of the drawings I have shown a second application of the wear plate mounting wherein a multiplicity or a plurality of anchor units are employed. In some cases a wear plate is extensive and requires more than a single mounting at the center of stress, as hereinabove set forth. For example, I have illustrated an elongated wear plate E' that involves a body that has a flat bottom **70'** adapted to oppose a bearing or supporting face and marginal portions **81'** to have bearing engagement with said face, all as above described. However, a plurality of anchors **80'** depend from the wear plate E', one at each end portion of the plate and so that the two ends of the plate are urged into pressured engagement with a base when retainers are applied to each of the two anchors in the manner above described. In accordance with the invention, the two anchors **80'** are positioned to balance and equally distribute the load or forces involved in yieldingly urging the wear plate E' onto the base to which it is attached. It will be apparent how the base can be adapted to receive two anchors **80** and retainer **50**, etc.

In FIG. 8 of the drawings I have shown a third application of the wear plate mounting wherein a plurality of anchor units are employed and are arranged in groups. Instances arise when the wear plate is not only extended, or possibly of irregular shape, but it is extended in more than one direction. In this case I group the anchors **80''** to enter corresponding sockets in a base so that the anchors **80''** are positioned to balance and equally distribute the load or forces involved in yieldingly urging the wear plate E'' onto the base to which it is attached. In the case under consideration I have shown a round plate with a circumferential portion **81''** and I have shown a group of three anchors **80''** spaced 120° apart about the center of the plate. It will be apparent that other groupings can be employed as circumstances require depending upon the configuration of the particular wear plate involved. It will be observed that the openings **82''** that extend through the anchors are arranged so as to allow any one of the three retainers (not shown) to be inserted and/or removed from either end, without interfering with each other.

From the foregoing detailed description it will be apparent how my wear plate mounting provides an effective, simple and practical connection for the wear taking part that is accommodated on a base or in the recess in the base **10**. It will be immediately apparent how a tooth cap C can be readily arranged in place and secured by a retainer **50**, and it will likewise be clear how the unit formed by the wear plate E and the depending anchor is locked into place to supplement the tooth cap C and with its rear end **71** effectively engaged with the back wall **61** formed in the base **10**. The wear plate E is effectively positioned rotatively by the engagement with the wall **61** and is tightly held in place by the retainer **50**.

It is to be understood that the wear plate hereinabove described can be formed integrally as by casting or it may be a fabricated part. It is also to be understood that the wear plate can be advantageously formed of a material that is extremely hard, and wear resistant, or subject to being heat treated to give it these characteristics.

Having described only the typical preferred forms and applications of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention, I claim:

1. A digger tooth including, a tooth body having a forwardly extending base and a tooth point projecting forward from the base, a flat wear plate with a bottom engaging the base and adjoining the tooth point and extending rearwardly therefrom, and means mounting the wear plate and including a stem depending from the bottom of the plate to enter into the base, and a resilient retainer pin engaged transversely through the base and stem and yieldingly and releasably drawing the bottom of the plate onto the base.

2. A digger tooth including, a tooth body having a forwardly extending base and a tooth point projecting forward from the base, a flat wear plate with a bottom engaging the base at the upper forward portion thereof and adjoining the tooth point and extending rearwardly

therefrom, and means mounting the wear plate and including a stem depending from the bottom of the plate to enter into the base, and a sectional retainer pin with a resilient element between the sections thereof and engaged transversely through the base and stem and yieldingly drawing the bottom of the plate onto the base.

3. A digger tooth including, a tooth body having a forwardly extending base and a tooth point projecting forward from the base, a flat wear plate mounted on and with a bottom engaging the base and adjoining the tooth point and extending rearwardly therefrom, the base having a socket in a face beneath the bottom of the plate and the plate having a depending part entered into the socket, there being offset openings extending transversely through the base and through said part respectively, and a resilient retainer engaged transversely through said openings and drawing the bottom of the plate onto the base.

4. A digger tooth including, a tooth body having a forwardly extending base and a tooth point projecting forward from the base, a flat wear plate mounted on and with a bottom engaging the base and adjoining the tooth point and extending rearwardly therefrom, the base having a socket in a face beneath the bottom of the plate and the plate having a depending part entered into the socket, there being offset openings extending transversely through the base and through said part respectively, and a sectional retainer with a resilient element between the sections thereof and engaged transversely through said openings to bear on one side of the opening in the base and the other side of the opening in the said part and drawing the bottom of the plate onto the base.

5. A digger tooth including, a tooth body having a forwardly extending base and a tooth point projecting forward from the base, a flat bottomed recess in the base adjoining the tooth point and extending rearwardly to a forwardly facing wall, a flat wear plate engaged on the bottom of the recess and engaged with said wall, the base having a socket in the recess beneath the plate and the plate having a depending part entered into the socket, there being offset openings extending transversely through the base and through said part respectively, and a resilient retainer engaged transversely through said openings and having a head to engage said part and drawing the plate onto the base.

6. A digger tooth including, a tooth body having a forwardly extending base and a tooth point projecting forward from the base, a flat bottomed recess in the base adjoining the tooth point and extending rearwardly to a forwardly facing wall, a flat wear plate engaged on the bottom of the recess and engaged with said wall, the base having a socket in the recess beneath the plate and the plate having a depending part entered into the socket, there being offset openings extending through the base and through said part respectively, and a resilient retainer engaged transversely through said openings and having heads at opposite ends thereof to engage with said part and drawing the plate onto the base.

7. In combination, a base element with a recess therein, said recess having a flat bottom, a flat wear plate carried in the recess and with a marginal portion seated on the bottom of the recess, and mounting means releasably retaining the plate engaged on the bottom of the recess and including a stem depending from the plate, and a resilient retainer engaged through the base and through the stem and yieldingly and releasably drawing the plate onto the base.

8. In combination, a base element with a recess therein, said recess having a flat bottom, a flat wear plate carried in the recess and with a marginal portion seated on the bottom of the recess, and mounting means releasably retaining the plate engaged on the bottom of the recess and including a stem depending from the plate, and a sectional retainer with a resilient element between the sections thereof and engaged through the base and through the stem and yieldingly drawing the plate onto the base.

9. In combination, a base element with a recess therein, said recess having a flat bottom, a flat wear plate carried in the recess and the recess having a socket in the bottom thereof beneath the plate and the plate having a depending part entered into the socket, there being offset openings extending transversely through the base and through said part respectively, and a resilient retainer engaged transversely through said openings and drawing the plate onto the base.

10. In combination, a base element with a recess therein, said recess having a flat bottom, a flat wear plate carried in the recess and the recess having a socket in the bottom thereof beneath the plate and the plate having a depending part entered into the socket, there being offset openings extending transversely through the base and through said part respectively, and a sectional retainer with a resilient element between the sections thereof and engaged transversely through said openings to bear on one side of the opening in the base and the other side of the opening in the said part and drawing the plate onto the base.

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