Aug. 22, 1961 E. L. LAUNDER 2,996,816

DETACHABLE TOOTH CAP

Filed Sept. 8, 1958

FIG. 1.

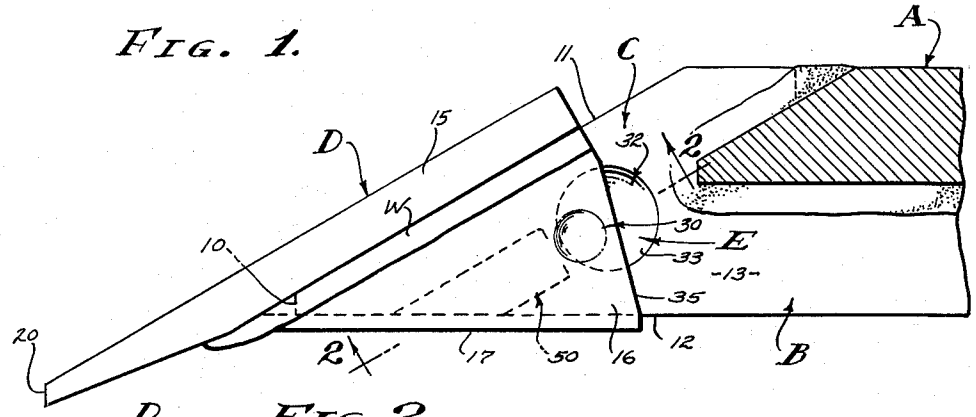


FIG. 2.

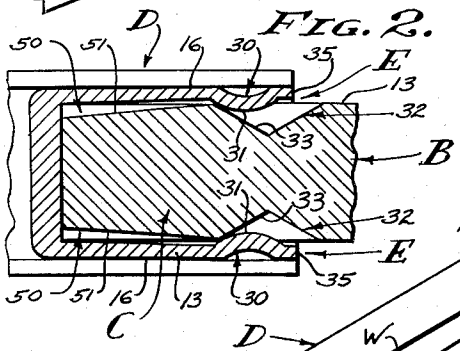


FIG. 3.

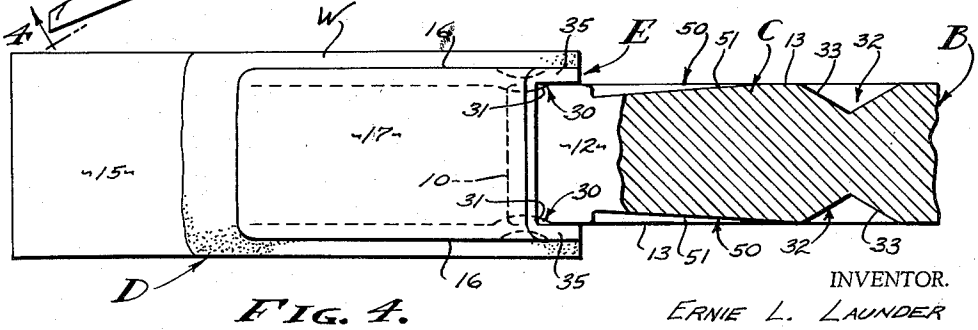


FIG. 4.

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United States Patent Office 2,996,816 Patented Aug. 22, 1961

2,996,816

DETACHABLE TOOTH CAP

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Filed Sept. 8, 1958, Ser. No. 759,812
7 Claims. (Cl. 37—142)

This invention has to do with a structure involving a tooth cap which is separable or detachable from its supporting shank and it is a general object of the invention to provide such a structure which is simple and inexpensive of manufacture, convenient and quick to operate and which is dependable in operation.

The structure embodying the present invention involves a tooth cap applied to a tip provided on the forward end of a digger tooth shank. The tip of the shank is forwardly convergent or tapered and has flat parallel sides. The cap engages or fits over the tip of the shank and is preferably provided with a blade-like top with a sharpened forward end, with depending cheeks that extend down from the edges of the blade and a bottom that extends between and connects the lower edges of the cheeks. The invention provides retaining means by which the cap is releasably secured or retained on the tip of the shank.

The connection of a tooth cap to a tip is complicated by roughness of manufacture inherent in such parts and by the extreme abuses to which the parts are subjected in use. Various fastening structures have been proposed and used for the purpose of holding a tooth cap in place, it being a general objective to yieldingly urge the tooth cap into pressured engagement with the tip This invention provides said pressured engagement utilizing only the basic elements of the tooth cap structure and without resorting to additional fasteners, such as pins or bolts which characterize the prior art.

The retaining means of the present invention is characterized by either one or both of the cheeks of the cap being provided with inwardly extending projections which normally extend into sockets or depressions in the sides of the tip. The particular cap structure involved is such as to allow the cheeks to spread or spring somewhat apart as the cap is being arranged on or removed from the tip. In the form of the invention illustrated the projections are at the inner or rear edge of the cap and guide channels are provided in the sides of the tip, the said channels having inclined bottoms to be engaged by the projections so that the cheeks are spread by wedging action as the cap is applied to the tip. Further, the parts and elements of the structure involved are so arranged as to impose a substantial amount of deflection upon the cheeks when the cap is in working position and so that the projections, which are inclined, are yieldingly urged into pressured engagement with the edge portions of the sockets or depressions.

A general object of the present invention is to provide a tooth construction of the general character referred to characterized by retaining means that holds the cap on the tip of the shank, which means is normally yieldingly held engaged so the cap is held on the tip through resilience of the cap.

Another object of the invention is to provide a structure of the general character referred to in which the retaining means involves a permanent projection or embossment on the inner side of the cheek of the tooth cap, which projection is inclined and is received in a socket provided in the side of the tip.

A further object of this invention is to provide a construction of the general character referred to which serves to effectively retain a tooth cap on a shank without requiring manipulation or deformation of any part upon assembly of the structure and without requiring additional

fastening devices likely to become displaced or subject to failure.

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

FIG. 1 is a side elevation of a digger tooth and adapter shank, being a view showing the parts and elements as they appear when assembled. FIG. 2 is a sectional view taken substantially as indicated by line 2—2 on FIG. 1. FIG. 3 is a view similar to FIG. 1 illustrating the mode of assembly of the parts and elements, and FIG. 4 is a view with certain parts broken away to show in section and taken as indicated by line 4—4 on FIG. 3.

The present invention is particularly practical when employed for securing a tooth cap on a shank and in the drawings a simple form of the invention is shown applied to a common or typical form of digger tooth construction. In the case illustrated an implement such as a bucket (not shown) is provided with a plurality of digger teeth each of which involves an elongate shank B at the lip A of the bucket and at the forward end portion of which there is a tip C. A tooth cap D is applied to or engaged over the tip of the shank and releasable retaining means E normally secures the cap on the tip.

The shank B is shown as an elongate element and the tip C is shown as an integral extension or continuation of the shank which converges or tapers to a point at 10. The particular tip C illustrated in the drawings has a flat top 11, a flat bottom 12 and flat parallel sides 13. The top 11 and bottom 12 converge as they extend forward to come together or join at the tip portion 10. The sides 13 may be simple flat parallel parts, as shown throughout the drawings.

The cap D is, in effect, a jacket or cover that engages over the tip on the shank and in the case illustrated it involves, generally, a top 15 in the form of a blade, sides or cheeks 16 which depend from the top and a bottom 17 which extends between and connects the lower edge portions of the cheeks.

The blade 15 is a heavy or substantial element that rests on the top 11 of the shank tip and which projects forward therefrom and has its forward end 20 dressed or finished to have the desired digging or cutting action. The cheeks 16 are joined to the edge portions of the blade 15 and depend therefrom to occur close to or against the sides 13 of the tip. The cheeks cover the sides of the tip where the cap occurs on the tip. The bottom 17 extends between or joins the lower edge portions of the cheeks and engages or bears against the bottom 12 of the tip.

The retaining means provided by the present invention operates to hold or secure the cap D on the tip C and in practice the retaining means can be carried out in connection with either one or both of the cheeks of the cap. Since the retaining means when applied to both sides or cheeks will be alike I will describe one side only, it being understood that such description is applicable to both sides or cheeks.

The retaining means involves, generally, an inwardly extending embossment or projection 30 on the inner side or face 31 of the cheeks 16 which projection enters a socket or depression 32 provided in the side 13 of the tip which is opposed by the cheek. In the form of the invention illustrated throughout the drawings, the projection 30 of the means E is an inwardly bent or pressed part in the form of an embossment causing a projection at the inner side of the cheek and a depression or dimple at the outer side thereof. The said projection 30 is located at or near the rear or inner edge 35 of the cheeks where it cooperatively engages with a socket or depression

32 in the side 13 of the tip. In the form of the invention illustrated, the projection 30 of the means E involves bending of the wall or cheek 16, as shown, so that it is indented inwardly with a convexly rounded inner face 31. In practice, the projection is circular in form and with the face 31 merged with the wall of the cheek 16. That is, the projection 30 is disposed inwardly a substantial depth and so that the said face 31 is inclined to merge with the cheek 16.

The socket or depression 32 in the side 13 of the tip C is tapered or conical in form so that it has a tapered wall 33, as best illustrated in FIG. 2 of the drawings. The socket 32 can be formed in the tip C as by countersinking with a suitable drill, the wall 33 being disposed at substantially the same angle as the face 31 of the projection 30, above described.

With the construction as above described the cap can be applied to the tip when the tip has plain smooth sides 13 which are uninterrupted and are parallel with each other. As the cap is started onto the tip the entering action of the tip by engagement with the projections 30 spreads the cheeks and holds them spread until the cap reaches operating position at which time the projections 30 enter the sockets 32 allowing the cheeks to assume a normal operating position. The engagement of the inclined face 31 of the projection with the inclined wall of the socket effectively retains the cap on the tip until such force is applied as to cause the cheeks to be spread, by a cam action, and the cap to be then forced off the tip.

In accordance with the invention the cheeks 16 are formed of such material and are of such wall thickness as to allow for or permit of the desired movement or spreading action in order to permit of engagement and disengagement of the retaining means E, as hereinabove described. In the particular case illustrated the blade 15 is a heavy rigid element, preferably a steel plate, whereas the cheeks 16 and bottom 17 that form a housing are formed of a relatively thin-walled material, preferably sheet steel and thus affording the desired resilience for operation of the cheeks in a manner to allow for engagement and disengagement of the projections 30 over the tip C and into and out of the sockets 32.

In carrying out the present invention, the blade 15 and the housing formed by the parts 16 and 17 are made of comparatively different materials. That is, when steel is employed in the manufacture of the cap of the present invention, the blade material is selected for hardness and toughness while the housing material is selected for resiliency. In the manufacture of the particular tooth cap D illustrated, the blade and housing are separate elements joined by welding W, and since these elements are permanently joined together it is necessary to heat treat them together. Therefore, I employ a material such as, for example, S.A.E. 4142 or S.A.E. 8742 chrome molybdenum steel for the blade 15 and I employ a material such as, for example, S.A.E. 4115 or S.A.E. 8715 chrome molybdenum steel for the housing formed by the elements 16 and 17. The above mentioned materials, as specified, are brought to the same heat during heat treatment and as a result the blade is hardened to a Brinell of 514 to 535 while the housing is hardened to a Brinell of 285 to 302. As a result of the foregoing selection and simultaneous heat treatment of the material employed, the blade is adapted to hard usage without subject to breakage while the housing is adapted to yield under force and is resilient so as to make effective the means E above described.

In the structure thus far described the projections 30 of the means E are engaged over the tip C with some difficulty. That is, the tooth cap D cannot be installed in working position with any degree of predetermined facility. Therefore, channels 50 are provided in the sides 13 of the tip C, said channels having inclined or pitched bottoms 51 which have wedging action upon engagement with the projections 30 causing the cheeks 16 to be spread as the cap D is moved to a position where the projections 30 drop or engage into the sockets 32. The channels 50 with the inclined bottom faces 51 are provided primarily as a means of facilitating spreading of the cheeks in the course of engaging the cap with the tip and open forwardly to freely receive the projections 30. In the case illustrated, the blade 15 overlies the top 11 of the tip C in which case it is desirable to rest the blade 15 upon the top 11 when the cap D is moved rearward into engagement with the tip C, and, therefore, the channels 50 are preferably parallel with the top 11 and open at the bottom 12 to receive the projections 30. The bottom faces 51 of the channels 50 are outwardly inclined to the planes of the sides 13 immediately ahead of the sockets 32 (see FIG. 3) so that the projections 30 are easily spread apart before they are urged partially into the sockets 32.

From the foregoing it will be apparent that I have provided a simple and conveniently operable removable and replaceable tooth cap. It is a simple matter to drive said tooth cap off of the tip. A simple hammer, and drift if desired, is used to apply and remove the tooth cap, and when the cap is in working position the inclined faces 31 of the projection 30 engage with the inclined bottom 33 of the socket 32 to the end that inward pressure of the cheeks 16 causes the tooth cap to be urged rearwardly into tight engagement with the tip. When the tooth cap is forced onto the tip by working conditions, the wedging action of the cap on the tip tensions the cheeks 16 causing them to tend to straighten and consequently urges the projections 30 inwardly with added pressured engagement with the socket bottom 33. Further, the projections 30 and contacts made thereby are at the center of rotation of stress so that there is no tendency for looseness to develop when the parts are in working position relative to each other.

Having described only a typical preferred form and application 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. In combination, a tooth tip having a face with a recess therein opening laterally of the tooth, a tooth cap comprising a housing engageable over the tip, and means releasably retaining the cap on the tip in a working position and including an inwardly disposed projection on one wall of the housing and partially entering and engaged in the recess, the portion of the housing having the projection thereon being a resilient part and the tip having an inclined face positioned to be engaged by the projection and acting to deflect the projection outwardly away from the tip upon rearward movement of the housing relative to the tip, said resilient part normally urging the projection into engagement with the recess in the tip whereby the tooth cap is yieldingly pressed onto the tooth tip.

2. In combination, a tooth tip having parallel sides one having a recess therein opening laterally of the tip, a tooth cap engageable over the tip from its forward end and having a blade seated on the tip and cheeks depending from the blade and overlying the sides of the tip, and means releasably retaining the tooth cap on the tip and including, an inwardly disposed projection on one of the cheeks and engaged in the recess, the said cheek being a resilient part to urge the projection inwardly into the recess, the projection being inclined rearwardly and inwardly to cooperatively engage with the recess in the tip whereby the tooth cap is yieldingly pressed onto the tooth tip.

3. In combination, a tooth tip having parallel sides one having a recess therein opening laterally of the tip, a tooth cap engageable over the tip from its forward end and having a blade seated on the tip and cheeks depending from the blade and overlying the sides of the

tip, and means releasably retaining the tooth cap on the tip and including, an inwardly disposed projection on one of the cheeks and engaged in the recess, the said cheek being a resilient part to urge the projection inwardly into the recess, the projection being inclined rearwardly and inwardly, said recess having an inclined bottom engaged by the inclined projection when the tooth cap is fully applied to the tip whereby the tooth cap is yieldingly pressed onto the tooth tip.

4. In combination, a tooth tip having parallel sides one having a recess therein opening laterally of the tip, a tooth cap engageable over the tip and having a blade seated on the tip and having cheeks attached to the blade and overlying the sides of the tip, and means releasably retaining the tooth cap on the tip and including an inwardly disposed inclined projection on one of the cheeks and engaged in the recess, the said cheek being a resilient part to urge the projection inwardly into engagement with the recess, there being a longitudinally disposed face in the tip and inclined rearwardly to terminate at the recess and adapted to engage the projection to spring it outwardly upon movement of the tooth cap rearward relative to the tip.

5. In combination, a tooth tip having parallel sides one having a recess therein opening laterally of the tip, a tooth cap engageable over the tip and having a blade seated on the tip and having cheeks attached to the blade and overlying the sides of the tip, and means releasably retaining the tooth cap on the tip and including an inwardly disposed inclined projection on one of the cheeks and engaged in the recess, the said cheek being a resilient part to urge the projection inwardly into engagement with the recess, there being a longitudinally disposed channel in the tip parallel with the face of the tip supporting the tooth cap and with a bottom face inclined rearwardly to terminate at the recess and adapted to engage the projection to spring it outwardly upon movement of the tooth cap rearward relative to the tip.

6. In combination, a tooth tip having parallel opposite sides with recesses therein opening laterally of the tip, a tooth cap on the tip having resilient cheeks overlying the said sides of the tip, and opposed inwardly disposed inclined projections on the cheeks and engaged in the recesses, the projections being adapted to cooperatively engage with the recesses when the tooth cap is fully engaged on the tip to urge the tooth cap onto the tooth tip.

7. In combination, a tooth tip having parallel opposite sides with recesses therein opening laterally of the tip and having inclined guide faces at the sides extending rearwardly from the forward end portion of the tip to points at the sides immediately forward of the recesses, a tooth cap on the tip having resilient cheeks overlying the said sides of the tip, and opposed inwardly disposed projections on the cheeks and engaged in the recesses, the projections being adapted to cooperate with the guide parts and be spread thereby as the cap is moved rearward and to cooperate with the recesses when the tooth cap is fully engaged on the tip.

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