Dec. 13, 1966 M. J. KASHERGEN 3,290,769

TOOL FOR ASSEMBLING AND DISASSEMBLING TEETH ON EXCAVATING EQUIPMENT AND THE LIKE

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Fig. 1.

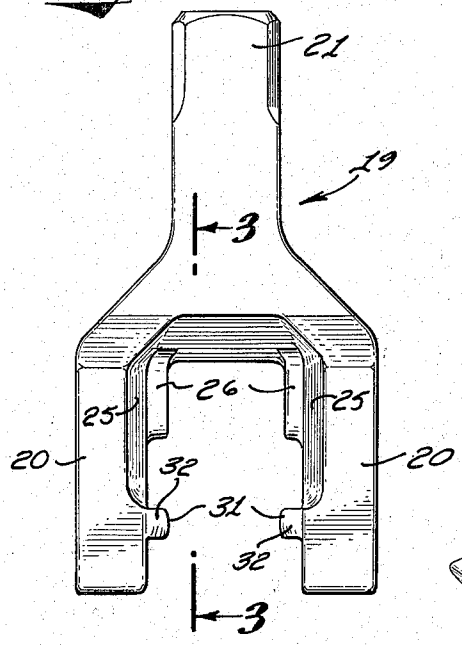


Fig. 4.

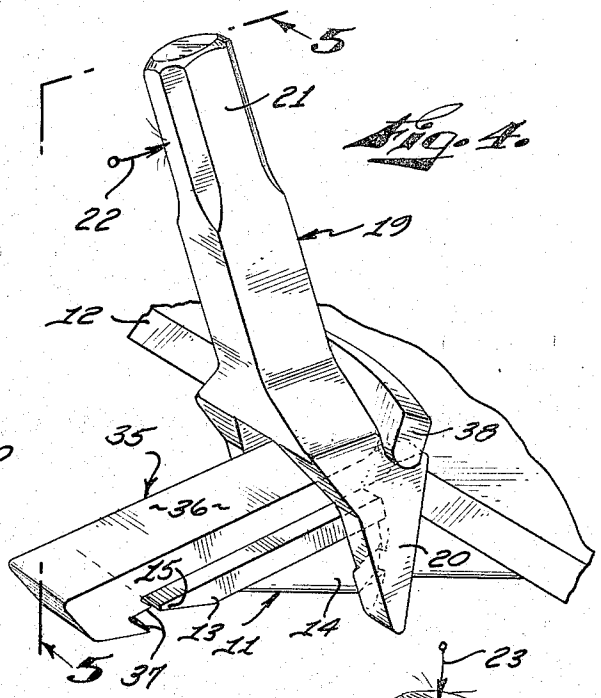


Fig. 2.

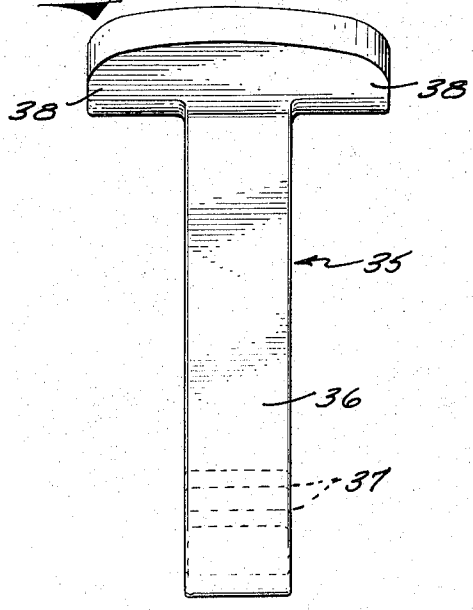
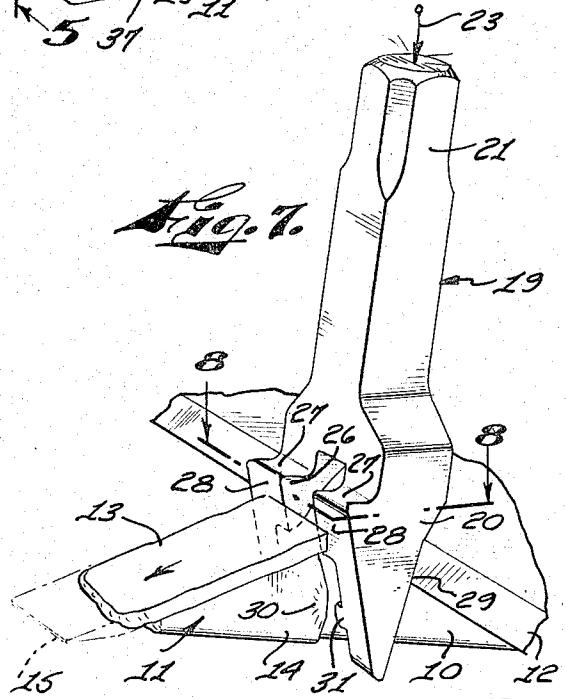


Fig. 7.



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Fig. 3.

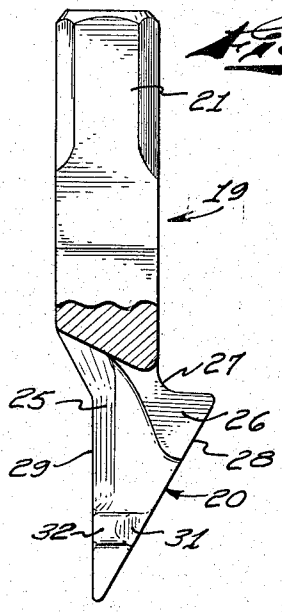


Fig. 5.

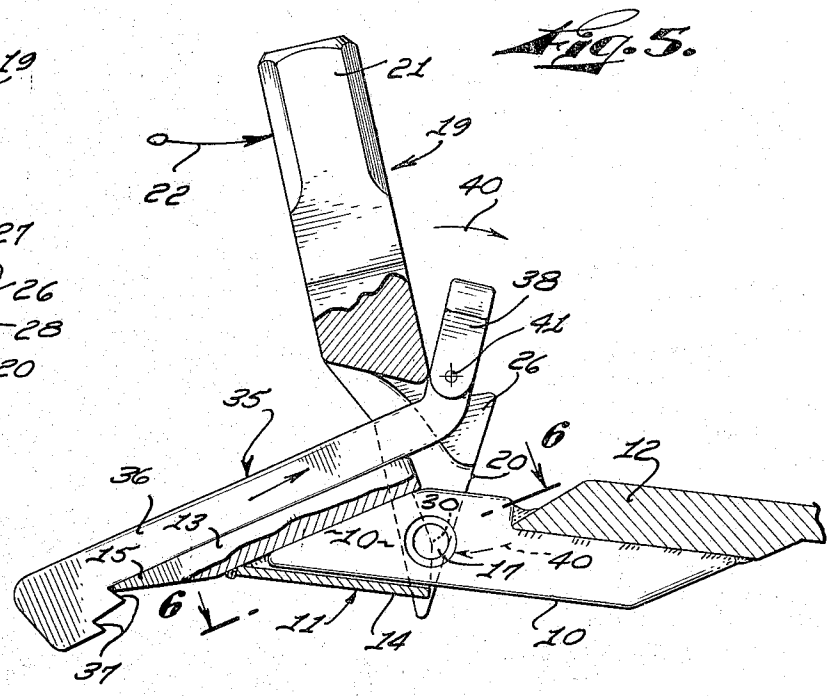


Fig. 6.

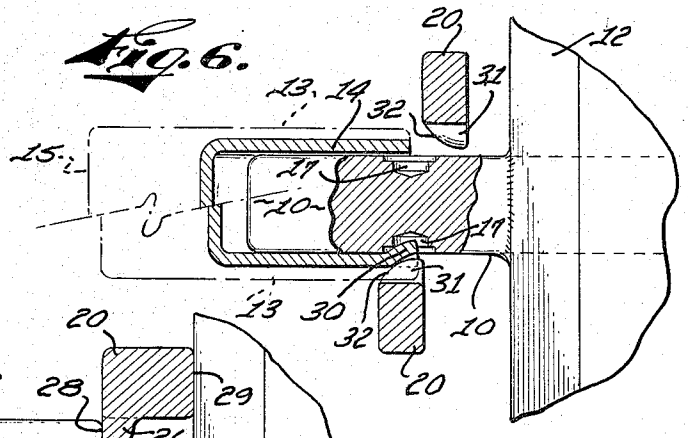
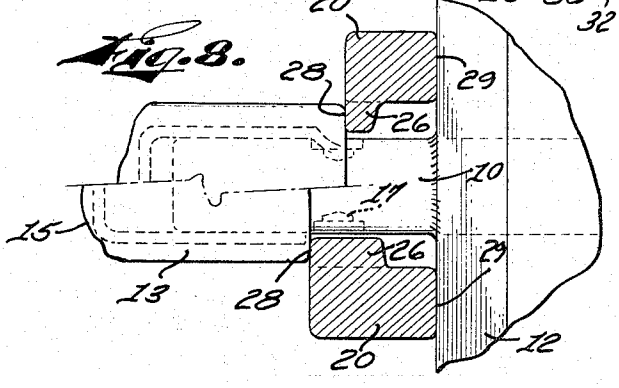


Fig. 8.



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3,290,769

TOOL FOR ASSEMBLING AND DISASSEMBLING TEETH ON EXCAVATING EQUIPMENT AND THE LIKE

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3 Claims. (Cl. 29—275)

This invention relates to a tool adapted to both assemble and disassemble the teeth which are mounted on the buckets of backhoes, power shovels, etc., as well as on trenchers, mining machines, and numerous other types of equipment in excavating and other fields.

The teeth on excavating equipment, materials handling equiment, etc., are conventionally constructed of two parts, namely an inner core or shank which does not wear, and an outer cap or cover which does wear. Because of the abrasive nature of the material into which the teeth are penetrated, the caps must normally be replaced at frequent intervals. For example, when a trencher is operating in highly abrasive soil, it may be necessary to replace all of the caps of the trencher teeth within a matter of hours. On certain other types of equipment, the caps must only be replaced every few days or weeks.

Regardless of the time interval between cap replacements, the procedure is difficult, tedious and sometimes dangerous. The caps are mounted on the shanks by hammering on the sides of the caps to effect crimping operations. Because the sides of the caps are relatively inaccessible to a hammer, various bars, etc., are frequently employed in order to transmit the hammer blows to the caps. Disassembly or de-mounting of the caps is conventionally effected by merely swinging a hammer at the upper portions of the caps. Because the caps are frequently frozen onto the shanks, such hammering may not produce the desired result, so that burning and other procedures become necessary. It may occur that, during a hammering operation, the cap is suddenly released from the shank, and is projected by the hammer toward the person swinging the same, so that injury may result.

In view of the above and other factors characteristic of the mounting and de-mounting of caps on the shanks of bucket teeth and the like, it is a primary object of the present invention to provide a simple, economical and highly effective tool adapted to effect mounting or de-mounting in a matter of seconds, and without danger of injury to the operator.

Another object is to provide a cap-mounting tool which seats the same very firmly on the shank, thereby reducing the likelihood that dirt will penetrate between the cap and shank and produce corrosive, abrasive and freezing effects.

Another object is to provide a combination tooth-assembling and disassembling tool wherein one of the components operates to effect both assembly and disassembly.

These and other objects will become apparent from the following detailed description taken in connection with the accompanying drawings in which:

FIGURE 1 is a front elevational view illustrating the lever and wedge means which forms one of the two components of the tool;

FIGURE 2 is a corresponding view of the fulcrum and actuating component of the tool;

FIGURE 3 is a sectional view taken on line 3—3 of FIGURE 1;

FIGURE 4 is a perspective view illustrating the operation of the tool in effecting mounting of a cap onto a shank;

FIGURE 5 is a sectional view taken on line 5—5 of FIGURE 4 and showing the various directions of both pivotal and translational movement;

FIGURE 6 is a sectional view taken generally on line 6—6 of FIGURE 5, illustrating the cap in two positions one of which is prior to mounting and the other of which is after mounting;

FIGURE 7 is a perspective view illustrating the operation of the wedge portion of the tool in de-mounting or disassembling a cap from a shank; and

FIGURE 8 is a sectional view taken generally on line 8—8 of FIGURE 7, and again being a two-position view which illustrates the manner of disassembly.

The tool is adapted to be employed in assembling and disassembling a conventional type of tooth comprising a shank **10** having a cap **11** mounted thereover. The shank **10** is welded or otherwise secured to a suitable supporting means, for example the edge or lip **12** of the bucket of a backhoe. The shank **10** projects perpendicularly from edge **12**, it being understood that a substantially number of shanks and associated caps are provided on conventional excavating and other equipment.

Cap **11** comprises an upper or blade portion **13** to the underside of which is welded a hollow body portion **14** formed of ductile metal. The blade has a sharp forward or outer edge **15** adapted to penetrate the earth, and has edge portions which overhang the side faces of body **14**. The upper and lower faces of shank **10**, against which body **14** and blade **13** are mounted, are inclined or forwardly convergent.

Formed in the sides of shank **10** are recesses **17** into which the rear or inner edges of the vertical sides of body **14** are adapted to be crimped, thereby holding the cap **11** on the shank. This is best illustrated in the lower portion of FIGURE 6. Such crimping was previously effected, as indicated above, by use of various types of makeshift instruments adapted to be struck by a hammer. Of course, recesses **17** may be replaced by any suitable indented, shouldered, or other portion behind which metal may be crimped to provide a locking action.

Referring next to FIGURE 1, one component of the tool comprises a lever and wedge element **19** the lower end of which is generally yoke-shaped or bifurcated to form two arms **20**. The upper portion of element **19** resembles the stem of the letter Y, and comprises an anvil portion **21** the side and end of which are adapted to be struck by a hammer as indicated by arrows **22** and **23** in FIGURES 4, 5 and 7.

Interior surfaces **25** (FIGURE 1) of arms **20** are spaced apart by a distance sufficient to receive between them the tooth blade **13**, as shown in FIGURE 4. Formed adjacent the surfaces **25**, and spaced sufficiently far back that they will not be engaged by the tooth blade **13**, are boss portions **26** which provide two effects as the tool is employed for assembly and disassembly purposes. In the first place, the boss portions **26** cooperate with adjacent portions of arms **20** to form fulcrum-engaging portions **27** adapted to engage the fulcrum and actuating element to be described subsequently. Preferably, the fulcrum-engaging portions are rounded or notched as illustrated. In the second place, the boss portions **26** form wedge surfaces **28** adapted to bear wedgingly against the inner end of tooth blade **13** in order to remove the cap **11** from shank **10** and as shown in FIGURES 7 and 8.

The wedge surfaces **28** cooperate with wedge surfaces **29** on the opposite sides of arms **20**, which wedge surfaces are downwardly convergent. When inserted between the edge **12** and the inner end of tooth blade **13**, as will be described hereinafter, the wedge surfaces cooperate with each other in removing the cap from the shank.

Additional and extremely important components of the lever and wedge element **19** are cam bosses **31**. Such

bosses are provided on the inner surfaces of arms **20**, beneath bosses **26**, for engagement with the inner edges **30** of the cap body **14** at points outwardly adjacent recesses **17**. As best shown in FIGURE 6, the cam bosses **31** have inclined cam faces **32** adapted to engage such inner vertical edges **30** of cap body **14** and provide camming and crimping of portions of such edges into the recesses **17** in response to pivotal movement of the lever **19**.

The second component of the tool comprises a fulcrum and actuating element **35** which is generally T-shaped, as best shown in FIGURES 2, 4 and 5. Element **35** has an elongated body or tongue portion **36** adapted to be disposed longitudinally along the blade **13**, in surface engagement therewith. The outer end of the body **36** is provided with one or more notches, hooks, or other means **37** adapted to be hooked over the end **15** of blade **13**. This not only anchors the fulcrum and actuating element **35** when a hammer blow is struck as shown by the arrows **22**, but also actuates the cap **11** into firmly-seated relationship on shank **10**.

Provided integrally at the inner end of element **35** is a fulcrum portion **38** the lower edges of which are preferably rounded for seating in the fulcrum-engaging portions **27** of element **19**. The fulcrum portion **38** is seen to comprise the crossbar of a T having the body or tongue portion **36** as the stem. As illustrated, a plurality of notches or hooks **37** may be provided in order to accommodate blades **13** having different lengths.

Operation of the tool in assemblying a tooth cap 11 onto a shank 10

To assemble a cap onto a shank, the cap is first manually mounted over the shank as far as it will go. However, because of factors such as imperfections in the caps and shanks, it is frequently not possible (prior to operation of the present tool) to mount the cap over the shank to the very firmly-seated condition which is desirable in order to prevent rattling, entrance of foreign matter, etc.

The tool components are then mounted in the position shown in FIGURES 4, 5 and 6 (upper portion), this being normally done by pre-assembling the component **19** with the component **35** and then mounting the yoke arms **20** in straddling relationship over shank **10** as illustrated. It is to be noted that one of the notches **37** seat or hooks over the outer end **15** of the blade **13**.

The anvil portion **21** of element **19** is then struck by a large hammer, as indicated by the arrows **22** in FIGURES 4 and 5. Such striking effects the following two actions substantially simultaneously:

(a) Cap **11** is shifted to the right, into very firmly-seated condition on shank **10**, due to the action of actuating element **35** which is shifted (translated) to the right in response to movement of element **19**,

(b) Element **19** pivots clockwise, as indicated by arrows **40** in FIGURE 5, about a center which is located approximately at point **41** in such figure. Such clockwise pivotal movement operates to force the cam surfaces **32** of bosses **31** to the left, so that portions of the inner edges **30** of the vertical sides of body **14** are crimped into recesses **17** as shown in FIGURE 6.

The tool does not fly off the tooth at the conclusion of the hammer blow. This is because the notches **37**, and also the crimped portions of body **14**, provide a stopping or restraining effect.

Because of the length of anvil portion **21**, a decided mechanical advantage is present which facilitates the cam-crimping action.

The described action is remarkable in that the upper or blade section **13** of the tooth cap tends to move to the right under the action of element **35**, at substantially the same time that the lower or body section **14** of the tooth cap tends to be moved to the left due to the action of bosses **31**. In the described manner, the tooth cap is not only firmly seated but also locked in seated condition, responsive to a single firm hammer blow and in a very small fraction of a second. Of course, if the first hammer blow is not sufficiently strong, several hammer blows may be struck.

Operation of the tool in de-mounting a tooth cap 11 from the shank or core 10

It is emphasized that, in normal operation, the cap **11** may not be disassembled or de-mounted from the shank **10** by merely prying the crimped portions out of the recesses **17**. This is because the enormous forces present during the digging action create wedging, corrosive, and other effects which often freeze the caps onto the shanks. Thus, as stated above, prior-art workers have resorted to burning, hammering, etc.

Referring to FIGURES 7 and 8, the component **19** of the tool is first reversed relative to the position shown in FIGURES 4 and 5. The arms **20** are then inserted downwardly into the gaps between edge **12** and the inner end of blade **13**. Such insertion is facilitated because the arms **20** have forward and rear surfaces which are downwardly convergent, as stated above.

One or more hammer blows are then struck, as indicated by the arrow **23** in FIGURE 7, against the upper end of anvil portion **21** of element **19**. This forces the forward and rear wedge surfaces **28** and **29** into wedging relationship between edge **12** and the inner end of tooth blade **13**. The resultant forces not only cam the crimped portions out of recesses **17**, but also effect loosening of the frozen-on body **14** so that the cap is readily removed.

It is a feature of the wedging tool that the forces exerted against the cap are balanced, so that no binding action results. It is emphasized that the boss portions **26** provide the wedge surfaces **28** on one side of the tool, while permitting insertion of the blade **13** into a position between arms **20** when the tool is employed for assembling purposes as shown in FIGURE 4.

In summary, therefore, a single simple tool, which may be readily manufactured as two castings, and which requires no factory assembly, is employed to effect both mounting and de-mounting of tooth caps in a very short period of time and with minimum effort. The assembly operation is such that the caps are more firmly and tightly mounted onto the shanks **10** than is the case with prior art methods.

The foregoing detailed description is to be clearly understood as given by way of illustration and example only, the spirit and scope of this invention being limited solely by the appended claims.

I claim:

1. A tool for mounting a metal cap on the shank of an excavating tooth while said shank is mounted on a support, said tool comprising:

an actuating and fulcrum element having a hook-shaped outer end adapted to be hooked over the end of said cap remote from said support for said shank, said element also having a fulcrum portion,

a bifurcated lever element having arms which are spaced apart sufficiently far to fit downwardly on opposite sides of said shank,

said arms having cam portions thereon adapted to effect cam-crimping of portions of said cap into locking relationship relative to said shank and in response to pivotal movement of said lever element about said fulcrum portion,

said lever element being pivotally associated with said fulcrum portion of said actuating element,

said lever element having an anvil portion adapted to extend away from said shank and to be disposed on the opposite side of said fulcrum portion from said shank,

whereby striking of the face of said anvil portion remote from said support will effect shifting of said actuating element to seat said cap firmly on said shank, and

will also effect pivotal movement of said lever element about said fulcrum portion to effect crimping of said cap portions into locking relationship with said shank.

2. The invention as claimed in claim 1, in which said arms are formed with wedge surfaces adapted to be inserted wedgingly between said cap and said support, whereby hammering of said lever element downwardly will effect wedging of said cap off said shank.

3. The invention as claimed in claim 2, in which said arms have inner surfaces spaced apart sufficiently far to receive between them the inner end of said cap, said arms being provided with boss portions which are pivotally associated with said fulcrum portion of said actuating element, and which also define certain of said wedge surfaces.

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