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EXCAVATING TOOTH POINT RETAINING DEVICE

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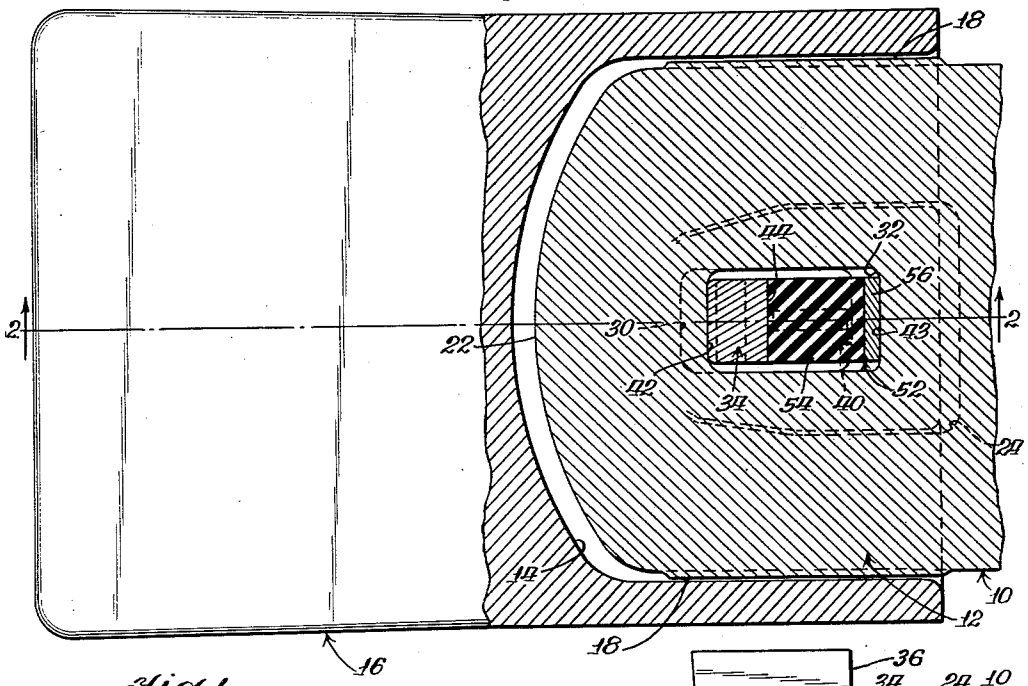


Fig. 1.

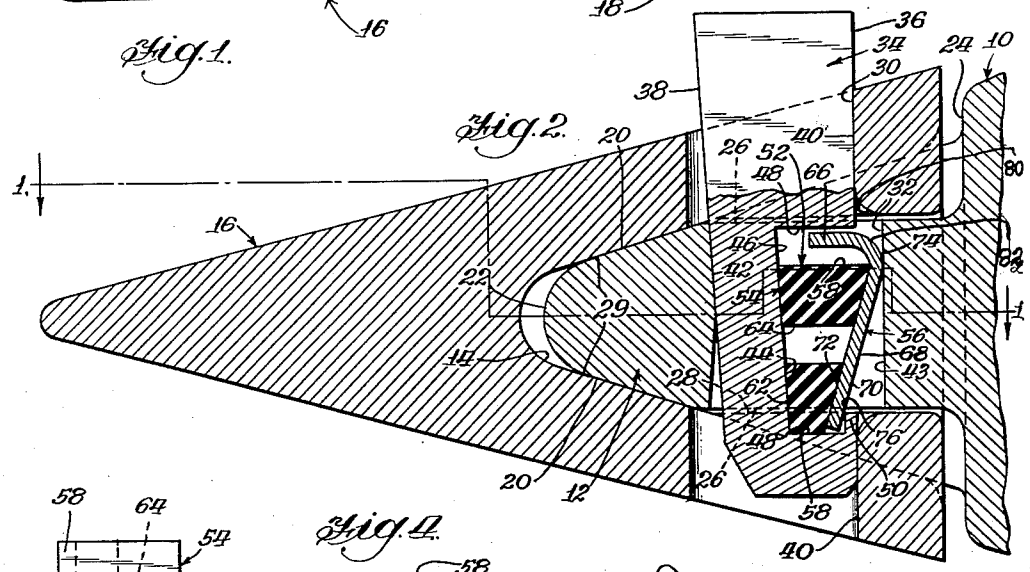


Fig. 2.

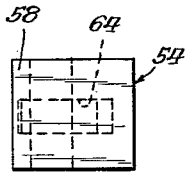


Fig. 3.

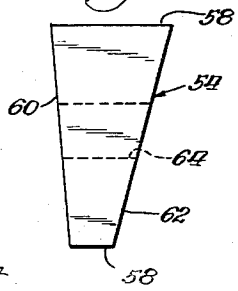


Fig. 4.

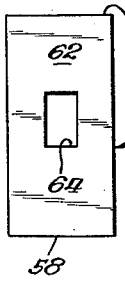


Fig. 5.

INVENTOR.
Glenn F. Drover
BY Walter J. Schlegel, Jr.
Atty.

Witness:
Richard W Carpenter

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EXCAVATING TOOTH POINT RETAINING DEVICE

Glenn F. Drover, Riverside, Ill., assignor to American Steel Foundries, Chicago, Ill., a corporation of New Jersey

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8 Claims. (Cl. 37—142)

This invention relates to excavating teeth of the type adapted for use on the cutting edges of scoops, buckets, dippers and other excavating equipment and particularly to a tooth having a separate base and point keyed to each other in telescopic relationship.

The invention comprehends a novel safety retaining device operable to prevent the accidental displacement of a wedge key in the event that it becomes loosened.

A highly undesirable feature incidental to the use of wedge keys as securing means is that, after relatively short periods of operation, they tend to loosen and work their way out of the slots of secured members, with the result that the members separate from each other. Various ways have been devised to insure the retention of wedge keys in slots of secured members, such as the use of cotters or auxiliary keys extending through the keys, but the complexities of most of these arrangements have rendered them impractical from the standpoint of cost and operation. A few of these arrangements have utilized resilient keys or resilient devices compressibly engaging the keys. A common disadvantage of these arrangements has been that the pressure exerted by the compressed device against the key tends to urge the key away from engagement with the members causing it to work loose.

Another problem constantly arising in connection with the use of auxiliary key retaining devices is that of removal of the key and retaining device. After a tooth has been in operation for a brief period of time, pieces of the material being excavated become lodged in the slots of the tooth members with the result that removal of the key and retaining device becomes virtually impossible. Even where a resilient block is disposed between the key and one of the tooth members, entry of the foreign matter rapidly causes the slot to be filled to the extent that, because the resilient block has no room for deformation or expansion, it not only fails to serve its purpose, but actually prevents removal of the key.

It is therefore a primary object of this invention to provide a practical key retaining device of simple operation and construction which will function successfully at all times and under all operating conditions.

It is another object of the invention to provide a key retaining device which will accommodate removal of the key even when the slot in which the key and retaining device is disposed is filled with foreign matter.

Another object of the invention is the provision of a key retaining device which can be housed substantially within the key itself and inserted into the slots of the members at the same time the key is inserted.

A further object of the invention is to provide a resilient key retaining device noncompressibly disposed in a cavity of the key.

Still another object is the provision of a resilient key retaining device capable of internal expansion so as to be operable under all conditions.

A more specific object of the invention is the provision of a key retaining device comprising a resilient block

having a passageway extending therethrough to permit its internal expansion and a nonresilient clip capable of retaining said block in proper position within the tooth.

These and other objects of the invention will be apparent from the examination of the following description and accompanying drawings, wherein:

Figure 1 is a fragmentary sectional view, taken along line 1—1 of Figure 2, illustrating a portion of an excavating tooth assembly embodying features of my invention;

Figure 2 is a fragmentary sectional view taken along line 2—2 of Figure 1;

Figures 3 through 5 are detailed top plan, side elevational and front elevational views, respectively, of the wedge key retaining assembly block.

It will be noted that certain elements have been intentionally omitted from certain views where they are better illustrated in other views.

Referring now to the drawings for a better understanding of the invention, and particularly to Figures 1 and 2, it will be seen that the excavating tooth comprises a base indicated generally at **10**, having a forwardly extending substantially wedge shaped nose portion **12** telescopically received in a complementally shaped pocket **14** of a removable point indicated generally at **16**.

As illustrated in the drawings, the base and point are preferably formed symmetrically about their vertical and lateral center planes in order that they may be reversible either individually or jointly.

The base nose **12** presents parallel side surfaces **18** interconnected by forwardly converging upper and lower inclined surfaces **20** and spaced parallel upper and lower shelf surfaces **28** which blend into an arcuate forward surface **22**.

The surfaces **20** may be recessed, as at **24**, to present a pair of vertically spaced upper and lower shelf surfaces **26** disposed in planes parallel to each other and to the lateral center plane of the tooth and parallel to shelf surfaces **28**. The spaced parallel surfaces **26** actually function in two ways to aid in keeping the base and point members in assembled relation. First, because they are parallel, they do not tend to exert wedging pressures which would tend to force the members apart as would diverging surfaces; and second, in the event a securing key is accidentally withdrawn, the parallel surfaces actually serve to temporarily retain the members together for to become separated the members would have to be moved away from each other while in almost perfect longitudinal alignment.

The point and base members are provided with coaligned preferably rectangular slots **30** and **32**, respectively, which extend through the respective members in a direction substantially normal to the lateral center plane of the tooth.

To secure the base and point members in telescopic relationship to each other, a key **34**, preferably formed of metal and wedge shaped with a straight rear surface **36** and a rearwardly sloping forward surface **38**, is disposed in the slots of the respective members with the rear key surface **36** in nonresilient metal-to-metal surface contact with the rear walls **40** of the point slots **30** and the forward key surface **38** in direct nonresilient surface engagement with the forward wall **42** of the nose slot **32**. It will be noted that the forward wall **42** is slightly V-shaped, as seen in elevation, in order to accommodate the reversal of positions of the nose relative to the wedge key.

Key **34** is provided adjacent its rear surface **36** with a channel or cavity **44** extending transversely therethrough and having a forward surface **46** which is preferably inclined with respect to the upper and lower surfaces **48** of the key channel. A shoulder or lip **50** formed on the key adjacent the channel **44** serves to

enclose the lower portion of channel 44. The function of this channel is to house a wedge key safety retaining assembly indicated generally at 52, the details and function of which are hereinafter described.

In order to insure the retention of key 34 in position within the co-aligned slots of the tooth members, a key safety retaining device indicated generally at 52 is provided and preferably disposed substantially within the key channel 44 for engagement between the key and the adjacent tooth member.

It is to be understood that the key itself constitutes the primary means to secure the members in telescopic relation with each other and the function of the key retaining device is only to prevent the accidental displacement or withdrawal of the key from the slots of the members.

As best seen in Figure 2, the retaining device 52 comprises a resilient pad or block 54 and a metal clip 56. The block 54 is preferably formed of a readily deformable material such as rubber and, as illustrated in Figures 3–5, may be generally trapezoidal in vertical section having parallel top and bottom surfaces 58 and upwardly diverging front and rear surfaces 60 and 62, respectively.

Additionally, the block is provided with a preferably rectangular opening or passageway 64 extending therethrough from the front to the rear surface, the function of the passageway being hereinafter described.

The clip may be formed of metal and generally V-shaped as seen in side elevation comprising a pair of substantially flat integral upper and side arms 66 and 68, respectively, which diverge to form an inner angle therebetween of less than 90 degrees, the upper arm preferably being less than half the length of the side arm.

When the tooth is completely assembled, the retaining device is snugly positioned in the key channel 44 with the forward and bottom surfaces 60 and 58 of the block 54 in abutting engagement with the forward and lower surfaces 46 and 48, respectively, of the channel 44 and the rear surface 62 of the block in abutting engagement with the forward or inner surface 72 of the clip side arm 68. Before the tooth is assembled, the device 52 is retained in the key channel by the engagement of clip arm 66 with surface 48 and by engagement of the clip side arm 68 with the lip 50 as at 76. After assembly of the tooth, the engagement between clip surface 70 and the rear wall 43 of the base nose slot as at 74 serves to maintain the elements of the device 52 in snug engagement with each other and with the key and base member. Although the parts of the device are of such dimensions as to preclude clearance between the elements and the key and base member, the block is preferably under no appreciable compression.

With this snug fit, it will be seen that the front and rear entrances to block passageway 64 are closed thereby preventing the entrance of foreign matter into the passageway. Thus when the tooth is in operation and foreign matter becomes lodged around the retaining device, the open passageway affords room for internal expansion of the block to permit its compression for removal of the key when desired.

It will also be understood that because the engagement between the angle shaped clip and key lip 50 serves to maintain the block and clip in firm contact with each other and retain both elements of the retaining device within the key channel, the necessity for having the elements bonded or otherwise permanently secured together is eliminated thereby further reducing the cost of construction.

To assemble the device, the base nose is inserted in the point pocket with the inclined surfaces 20 of the nose in surface engagement with the inclined surfaces 29 of the pocket and with the nose slot 32 in substantial alignment with the point slot 30. Retaining assembly 52 is then inserted into the key channel 44 with the block 54 and the clip 56 retained in the key channel by the lip 50 in the position as above described. The key is then inserted into the aligned slots 30 and 32 of the nose until the forward and rear surfaces 38 and 36 of the key are in metal-to-metal surface contact with the forward and rear surfaces 42 and 40 of the nose and point slots 32 and 30, respectively, and the rear surfaces 70 of the clip side arm 68 engaging the rear wall 43 of the nose slot.

Although the block must be compressed in order to permit the insertion or removal of the key and retaining device from the tooth member slots, the block is preferably not under any appreciable compression while in normal operating position. I have discovered that this is conceivable for when a retaining device is highly compressed between a wedge key and one of the tooth members, the lateral pressure it exerts to hold the key in place actually urges the key away from the walls of the slots of one of the members and partially defeats the purpose of the wedge key itself.

In order to disassemble the device, pressure is exerted upon the bottom of the key to force it upward and out of the slots. A camming action takes place between the cam surfaces 80 and 82 of the tooth point slot rear wall 30 and the outer side of the clip 56, respectively, which serves to compress the retaining device and permit withdrawal of the key.

I claim:

1. In an excavating tooth having a removable point member with a pocket therein and a base member having a nose telescopically disposed in the pocket of said point, the combination of: a downwardly tapered wedge key disposed in aligned slots of the respective members and operable to secure said members to each other in telescopic engagement, said key presenting a channel extending laterally therethrough and having a lip thereon adjacent said channel, said key having nonresilient surface contact with one of said members at two places and with the other member at one place intermediate said two places, and a resilient wedge key safety retaining device disposed in said key channel in noncompressed abutting engagement with said key and said other member, said device comprising a resilient block capable of internal expansion snugly positioned adjacent said key and a separate metal clip snugly disposed between said block and said other member, said lip being operable to retain said assembly in said key channel during insertion of the key into the slots of the members, and camming means between the clip and one of the members being operable to facilitate the withdrawal of the key from the slots of the members, wherein said block is substantially trapezoidal, as seen in side elevational view, and wherein said clip, as seen in side elevational view comprises a pair of integral arms, one being at least twice as long as the other, which diverge to form an acute angle therebetween.

2. In an excavating tooth having a removable point member with a pocket therein and having a base member with a nose telescopically disposed in said pocket, the combination of: a wedge key disposed in aligned slots of the respective members and in rigid nonresilient wedge contact with both members to secure said members to each other, said key having a channel extending laterally therethrough and having a lip thereon adjacent said channel, and a resilient wedge key safety device disposed in said channel in substantially noncompressed abutting engagement with said key and said base member, said device comprising a resilient block snugly disposed against the key and comprising a metal clip snugly positioned against said block and against said base member, said lip being engageable with the clip to retain said device in said channel during insertion of the key into the slots of said members, and spaced camming means on the clip and one of the members, respectively, said camming means being interengageable to compress the block upon withdrawal of the key from the slots, said block having an internal cavity to permit its internal expansion when compressed and said cavity being closed

at the ends thereof by abutment of the block with said key and clip to prevent the entrance of foreign matter into said cavity.

3. An excavating tooth comprising a rigid base having a forwardly tapered nose defined by top and bottom converging surfaces, a rigid point having an internal forwardly tapered socket within which said nose surfaces are tightly wedged, apertures through said nose and point, the nose aperture intersecting said surfaces, a key having an edge in tight rigid abutment with an area of the nose in its aperture, said area facing the base, said key having another edge converging downwardly with respect to the first mentioned edge toward the center of said apertures, said other edge having tight rigid contact with the point along areas thereof facing the nose area, a resilient key retainer recessed within the key and engaging an area of the base facing said nose area, said retainer and point having upwardly and downwardly facing cam means, respectively, the cam means being spaced from each other and interengageable to compress the retainer when the key is driven from said apertures, whereby the rigid engagement of the key edges with the point areas and with the nose area prevent compression of the retainer except during assembly and disassembly of the key.

4. An excavating tooth comprising a rigid base having a forwardly tapered nose defined by top and bottom converging surfaces, a rigid point having an internal forwardly tapered socket within which said nose is tightly wedged, apertures through said nose and point, a key having an edge in tight rigid abutment with an area of the nose in its aperture, said area facing said base, said key having another edge converging downwardly with respect to the first mentioned edge toward the center of said apertures, said other edge having tight rigid contact with the point along areas thereof facing the nose area, a resilient key retainer recessed within the key and engaging an area of the base facing said nose area, said retainer and point having upwardly and downwardly facing cam means, respectively, spaced from each other and interengageable to compress the retainer when the key is driven from said apertures.

5. An excavating tooth comprising a rigid base having a forwardly tapered nose, a rigid point having an internal forwardly tapered socket within which said nose is tightly wedged, apertures through said nose and point, a key having an edge in tight rigid abutment with an area of the nose in its aperture, said area facing said base, said key having another edge converging downwardly with respect to the first mentioned edge toward the center of said apertures, said other edge having tight rigid contact with the point along areas thereof facing the nose area, a resilient key retainer disposed within a recess of the key, and means on the key and retainer for retaining the latter within said recess when the key is removed from said apertures, said retainer comprising an internal expansion chamber substantially closed from the atmosphere to permit compression of the retainer upon removal of the key even though the recess is tightly packed with foreign matter around the retainer.

6. A wedge key and retainer assembly for maintaining a pair of telescoping excavating tooth base and point members in tight engagement with each other comprising a key having converging wedge surfaces, one of said key surfaces having tight metal-to-metal contact with one of said tooth members at two places spaced from each other, the other of said key surfaces having tight metal-to-metal contact with the other of said tooth members at a place located between said two places, a recess in one of said surfaces, a clip in said recess and separable with respect to said key, said clip having legs engageable with the key at opposed points in its recess to retain the clip in assembly therewith, a resilient mass between the key and clip in said recess, a closed internal passage in said mass to accommodate compression thereof when the recess is completely packed with foreign matter, and cam means on said clip on the external sides of said legs at their juncture with each other, said cam means projecting outwardly of the recess to engage an associated member and thereby compress said mass as the key is removed from association with said member.

7. A wedge key and retainer assembly for maintaining a pair of telescoping excavating tooth base and point members in tight engagement with each other comprising a key having converging wedge surfaces, one of said key surfaces having tight metal-to-metal contact with one of said tooth members at two places spaced from each other, the other of said key surfaces having tight metal-to-metal contact with the other of said tooth members at a place located between said two places, a recess in one of asid surfaces, a clip in said recess and separable with respect to said key, said clip having legs joining each other and defining at their juncture a cam surface disposed outwardly of said recess, said legs being engageable with the key at spaced points in its recess to retain the clip in assembly therewith, a resilient mass between the key and clip in said recess, a closed internal passage within said mass to accommodate compression thereof when the recess is completely packed with foreign matter, said recess being closed at one end by the key and at the other end by the clip and being otherwise spaced from the perimeter of said mass.

8. A wedge key and retainer assembly for maintaining a pair of telescoping excavating tooth base and point members in tight engagement with each other having converging surfaces, one of said key surfaces having tight metal-to-metal contact with one of said tooth members at two places spaced from each other, the other of said key surfaces having tight metal-to-metal contact with the other of said tooth members at a place located between said two places, a recess in one of the surfaces, a clip in said recess movable with respect to said key, said clip having interconnected arms arranged at an acute angle with each other and engageable with the key at spaced points in its recess to retain the clip in assembled relationship therewith, and resilient means in said recess compressible between the key and the clip, said arms having external surfaces at their point of connection forming a cam surface above the resilient means and outwardly of the recess.

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