March 8, 1960 J. C. DAY 2,927,386

EXCAVATING TOOTH POINT RETAINING DEVICE

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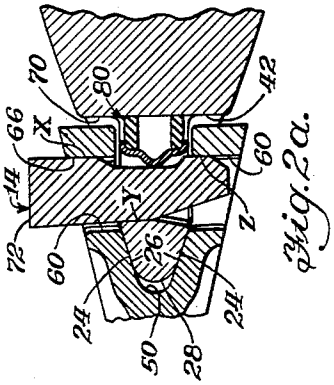


Fig. 2a.

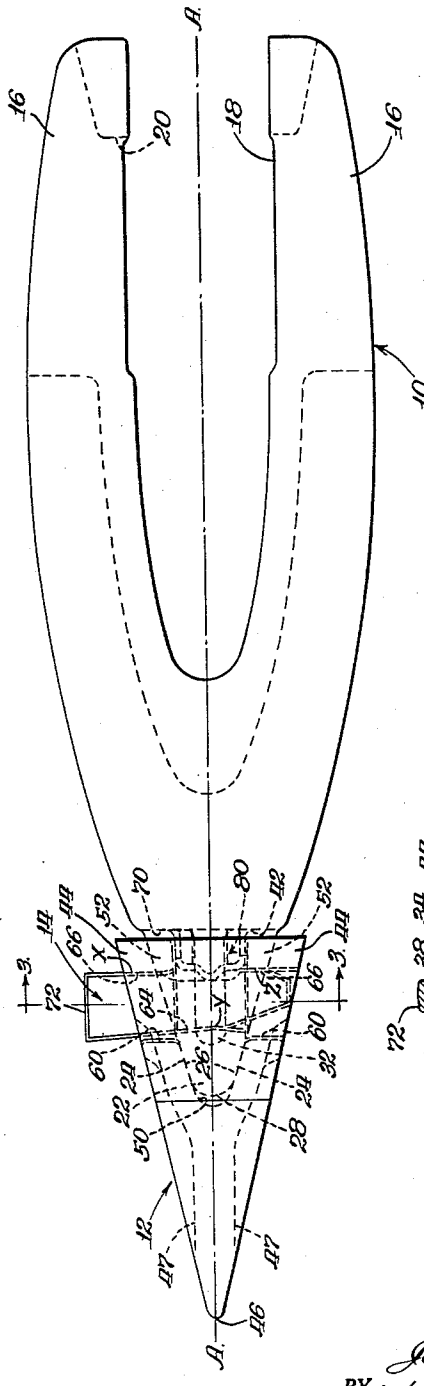


Fig. 2.

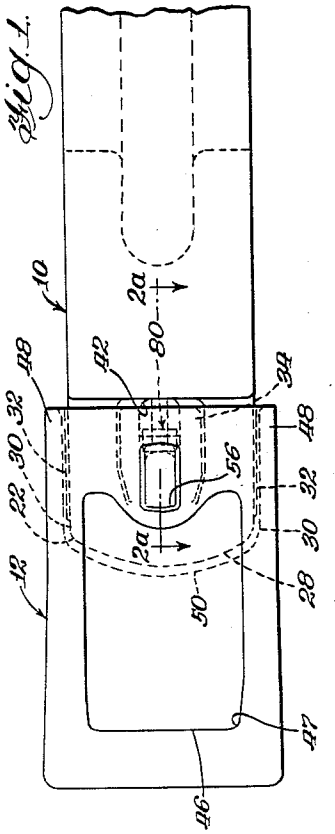


Fig. 1.

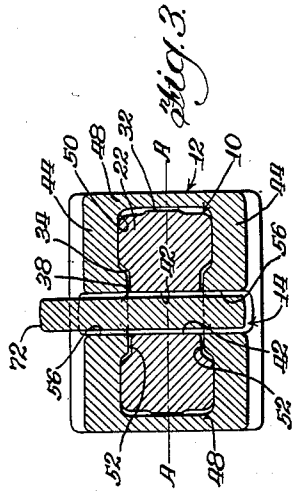


Fig. 3.

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Fig. 4.

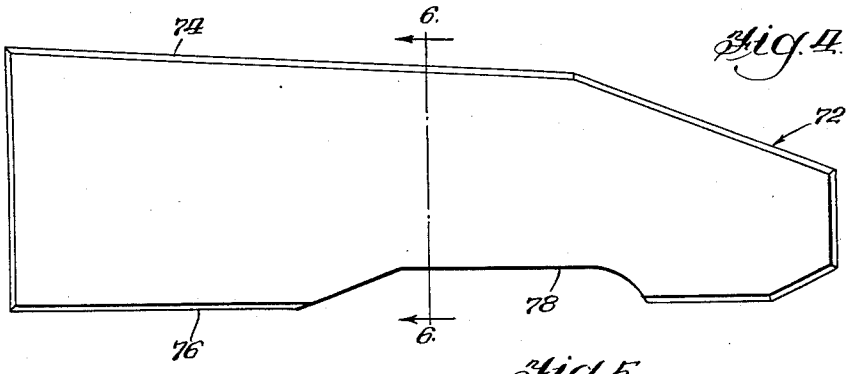



Fig. 5.

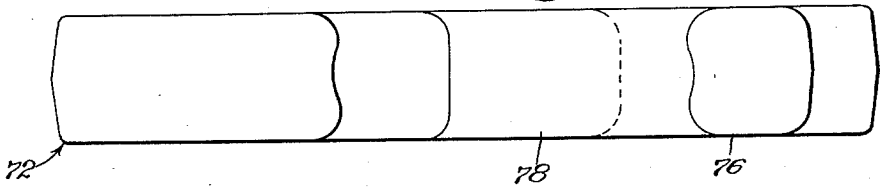



Fig. 7.

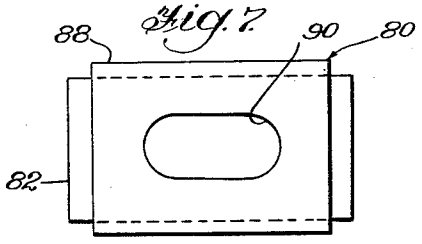



Fig. 6.

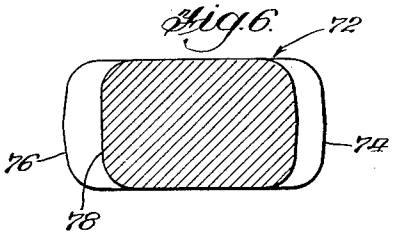



Fig. 8.

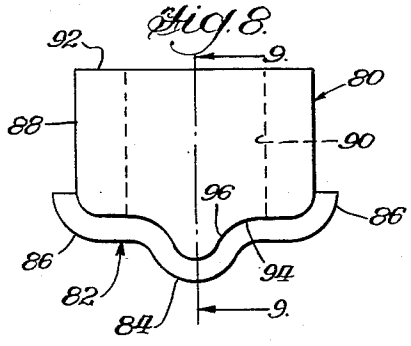
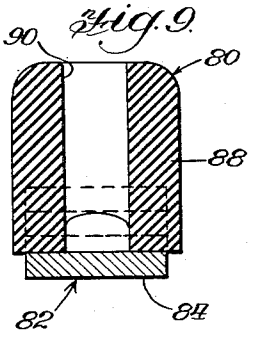



Fig. 9.




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# EXCAVATING TOOTH POINT RETAINING DEVICE

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Application March 22, 1956, Serial No. 573,161

9 Claims. (Cl. 37—142)

This invention relates to excavating teeth and more particularly to those adapted for use on the digging or cutting edges of power driven shovels, dippers, scoops, buckets, and similar excavating equipment.

The invention comprehends an improved excavating tooth of the type comprising a base and a removable point secured to each other in rigid telescopic relationship by a wedge key. While the wedge key arrangements have been heretofore employed in this connection, a primary disadvantage thereof has been that ordinary use tends to loosen the wedge key and cause its accidental displacement which results in the separation of the tooth elements from each other. This is expensive, not only because of the cost of replacement of lost parts, but also because of the cost of tying up machines while repairs are being made.

There have been numerous attempts to design a wedge key that cannot be accidentally displaced. Some designs have provided for elaborate or involved key arrangements including resilient wedge keys, but I have found that the best operation results from a nonresilient wedge key having three point metal to metal contact with the related tooth elements, and a resilient retaining device to prevent accidental displacement of the key.

One problem constantly facing operators of excavating equipment having removable excavating teeth is that of removal of the points or teeth. After relatively short periods of use the entry of foreign matter, such as pieces of the material being excavated into the key slots of the teeth, wedges the keys and key retaining devices in so tightly that it is almost impossible to remove them without a great deal of hammering and forcing of the frozen parts.

It is therefore a primary object of this invention to provide an improved two piece excavating tooth assembly having a nonresilient wedge key and a resilient wedge key safety retainer.

Another object of the invention is the provision of an improved excavating tooth wherein a wedge key is in three point metal to metal contact with the related members of the tooth.

Another object of the invention is the provision of a resilient wedge key safety retaining means disposed in a slot of the base and engageable with a key to prevent its accidental displacement.

A further object of the invention is to provide a resilient wedge key safety retaining assembly that exerts pressure on the wedge key only if the key tends to become displaced from a slot.

Yet another object of the invention is the provision of a safety wedge key retaining device so snugly disposed in the base as to prevent entry of foreign matter therein.

A more specific object of the invention is the provision of a resilient wedge key safety retaining assembly comprising a metal clip engageable with a recess of the wedge key and a resilient block disposed between the clip and an extremity of the slot.

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



Figure 1 is a fragmentary top plan view of an excavating tooth assembly embodying features of my invention;

Figure 2 is a side elevational view of the structure illustrated in Figure 1;

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

Figure 3 is a fragmentary sectional view taken along line 3—3 of Figure 2;

Figures 4 and 5 are detailed side elevational and rear views, respectively, of the wedge key illustrated in Figures 1–3;

Figure 6 is a sectional view taken on line 6—6 of Figure 4;

Figures 7 and 8 are detailed rear elevational and side views, respectively, of the wedge key safety retaining assembly illustrated in Figures 1 and 2, and

Figure 9 is a sectional view taken on line 9—9 of Figure 8.

It will be apparent 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, it will be seen that the excavating tooth assembly as illustrated in the drawings comprises a tooth base indicated generally at **10** and a tooth point indicated generally at **12** secured to each other in telescopic engagement by a wedge key and slot arrangement indicated generally at **14**. In the preferred form of my invention, as illustrated in the drawings, both the base **10** and point **12** of the tooth are shown as being symmetrical about a lateral center plane A—A extending longitudinally of the tooth. By making the parts symmetrical and necessarily reversible, it is apparent that their service life can be extended.

The base **10** comprises a pair of integrally formed upper and lower jaws **16** which diverge rearwardly to form therebetween an opening **18** adapted to seat on a cutting lip of an excavating bucket or scoop (not shown). The jaws present vertically coaligned apertures **20** for receipt of a key (not shown) operable to secure the base to the lip.

The forward ends of the jaws **16** merge with each other to present a substantially wedge shaped nose **22** extending forwardly from the base. The nose is provided with substantially flat forwardly sloping upper and lower surfaces **24** which blend into an arcuate forward surface **28** and parallel side surfaces **30** of the nose which are substantially flat and preferably provided with raised bearing portions or bosses **32**.

The upper and lower surfaces **24** are preferably recessed or set in as at **34** to provide shelf surfaces **38** extending generally parallel to each other and to the longitudinal lateral center plane A—A of the tooth.

The nose is provided with a generally elongated slot **42** extending therethrough in a direction substantially normal to the plane A—A and is disposed generally centrally of the tooth to extend through the shelves **34**.

The removable point **12** preferably comprises generally flat upper and lower rearwardly diverging walls **44** which merge at their forward ends to form a cutting edge or surface **46**. The walls **44** are interconnected by generally flat parallel side walls **48** to form at the rear of the point a substantially wedge shaped pocket **50** which is generally complementary in shape to the nose **22** of the base **10**. In order to reduce the over-all weight of the point without decreasing its service life, the outer surfaces of walls **44** may be recessed to provide cavities **47**. The point **12** is provided with a pair of upper and lower ledges **52** extending into the pocket **50** and disposed in planes parallel to the longitudinal center plane A—A of the tooth.

The upper and lower walls 44 of the point are also provided with a pair of coaligned generally elongated slots 56 extending through the point in a direction substantially normal to the longitudinal lateral center plane of the tooth. The slots 56 are of substantially the same width as the slot 42 of the nose but are of substantially less length than slot 42. The slots in the base and point are so disposed that when the nose is inserted in the pocket of the point they are in substantial alignment with each other with the forward walls 60 of the point slots being slightly forwardly of the forward wall 64 of the base slot. Thus, because of the difference in lengths of the slots, the rear walls 66 of the point slots are disposed approximately midway between the forward and rear walls 64 and 70 of the base slot.

In order to detachably secure the base and point to each other in telescopic relationship with the base nose disposed in the point pocket, a wedge key 72 is disposed in the related slots.

The key 72, as best seen in Figures 4 through 6, is a substantially flat bar, rectangular as seen in cross section with downwardly and inwardly inclined forward and rear sides 74 and 76, respectively, the rear side presenting a transversely extending recess 78. When the base and point are assembled in telescopic relationship with the respective slots in alignment and with the upper and lower inclined surfaces 24 of the nose engaging the upper and lower wedge surfaces 26 of the pocket, the wedge key 72 can be inserted through the slots 56 of the point and slot 42 of the base so that the forward surface 74 of the key is in direct metal to metal contact with the forward surface 64 of the base nose slot as at Y and the rear key surface 76 is in direct metal to metal contact with the rear surfaces 66 of the upper and lower point slots 56 as at X and Z.

It will be noted that the forward surface 64 of the nose slot is preferably V-shaped in order to accommodate engagement with the inclined forward surface 74 of the key if the position of the base is reversed.

In order to prevent the accidental displacement of the key from the slots in the event of its loosening, a resilient wedge key safety retaining device, indicated generally at 80 is disposed in the base slot 42 between the rear surface 76 of the wedge key and the rear surface 70 of the base slot.

The key safety retaining member 80, as best seen in Figures 7 through 9, comprises a clip 82 preferably provided with an outer or forwardly extending boss 84 for receipt in the recess 78 of the wedge key rear surface 76 and with end sections 86 which serve to retain a resilient block 88 preferably formed of rubber.

The key safety retaining member is disposed in the base nose slot 42 with the rearward surface 92 of the resilient block abuttably engaging the rear surface 70 of the nose slot and with the forward surface 94 of the block seated on the rear surface 96 of the clip and retained there by the clip ends 86.

It will be noted that the block 88 is just wide enough to fit snugly into the slot of the base without affording clearance between it and the adjacent walls of the base nose slot. The elimination of this clearance prevents foreign matter from becoming lodged in the slot, thus facilitating removal of the key and retaining assembly 80. This has been accomplished by providing an opening, cavity or passageway 90 extending through the rubber block which accommodates expansion of the block when it is in a compressed condition.

To assemble the device the block 88 and clip 82 are disposed at the rear of base nose slot 42 in the position previously described. The base nose is then inserted into the point pocket with the base and point slots in alignment with each other. Key 72 is then forced through the respective slots of the base and point until it is in tight metal to metal three point contact as with the base and point slot surfaces as indicated at X, Y and Z on



Figure 2 of the drawings. While the key is being inserted through the nose slot 42 the boss 84 of the clip engages the rear surface 76 of the key and the resilient block 88 is compressed. However, once the key is all the way in place, the boss 84 of the clip becomes disposed in the key rear surface recess 78 so that the resilient block is no longer under any appreciable amount of compression.

Thus it will be seen that the point and base are rigidly secured to each other by the nonresilient wedge key element by its three point metal to metal contact with the related parts, and that the wedge key safety retaining assembly is operable only in the event the key becomes loosened and tends to work its way out of the slots, in which event the resilient block offers pressure against the key to prevent its accidental displacement. To remove the key, intense direct pressure must be exerted on the lower end of the key to force the upper end out of the slots and pass the safety key retaining assembly.

I claim:

1. In an excavating tooth, the combination of: a point member comprising rearwardly diverging upper and lower inclined walls and parallel side walls formed integrally therewith to define a substantially wedge shaped pocket therebetween at the rearward end thereof, said pocket presenting upper and lower spaced ledge surfaces disposed in planes extending generally parallel to the longitudinal lateral center plane of the tooth, said upper and lower walls presenting co-aligned elongated slots extending therethrough in a direction substantially normal to the longitudinal lateral center plane of the tooth, a base member comprising a pair of rearwardly diverging jaws merged at their forward ends to present a substantially wedge shaped nose, said nose presenting forwardly and inwardly inclined upper and lower walls and parallel side walls, the upper and lower walls of the nose being recessed to present centrally disposed upper and lower shelf surfaces disposed in planes extending generally parallel to the longitudinal lateral center plane of the tooth, said nose having a centrally disposed slot extending therethrough in a direction substantially normal to the longitudinal lateral center plane of the tooth, the nose of said base member being telescopically disposed within the pocket of said point member with portions of the slots of the respective members in alignment with each other, a wedge key having downwardly and inwardly converging forward and rearward surfaces, the rear surface of said key having a recess therein, said key being disposed to extend through the slots of the respective members with the forward surface of the key in abutting engagement with the forward surface of the nose slot and with the rearward surface of the key in abutting engagement with the rearward surfaces of the respective point slots, and means to prevent the accidental disengagement of the key from the respective slots, said means including a clip disposed in the nose slot and having a boss disposed in the recess of the key rearward surface, and a resilient block having an aperture extending longitudinally therethrough, said resilient block being snugly disposed in said nose slot between and noncompressibly engaging the clip and the rearward surface of said nose slot.

2. In a multi-piece excavating tooth assembly the combination of: a pair of telescoping members, a wedge key having downwardly and inwardly converging forward and rearward surfaces, the rearward surface of said key having a recess therein, said key being disposed to extend through aligned slots of the respective members with the forward surface of the key in abutting engagement with a forward surface of the slot of one of the members and with the rearward surface of the key in abutting engagement with rearward surfaces of the slots of the other of said members, and means to prevent the accidental disengagement of the key from the respective slots, said means including a clip disposed in said slot of the one member and having a boss disposed in said key recess,

and a resilient block having an aperture extending longitudinally therethrough, said resilient block being snugly disposed in said slot of the one member between and noncompressibly engaging the clip and a rearward surface of said one slot.

3. An excavating tooth comprising a metal base having converging surfaces defining a wedge shaped nose, a metal point having a wedge shaped pocket within which said nose is tightly wedged, aligned apertures through the nose and point, the nose aperture intersecting said surfaces, a metal key having front and rear edges converging inwardly toward the center of said apertures, said key being in tight metal-to-metal wedge contact with the point at opposite sides of the nose aperture and being in tight metal-to-metal wedge contact with the nose within said nose aperture, a recess in the rear edge of said key between its ends facing away from said nose, and spring means seated against the key in said recess and seated against a surface of the base which faces said nose, the tight metal-to-metal wedge contact between the nose and point and the tight metal-to-metal wedge contact of the key with the nose and the point positively preventing compression of said spring means by relative movement between the nose and point, whereby said spring means functions solely to engage the key at one end of said recess to prevent loss of the key in the event that it accidentally becomes loose in service.

4. An excavating tooth comprising a rigid base having converging surfaces defining a wedge shaped rigid nose, a rigid point having a wedge shaped pocket within which said nose is tightly wedged, aligned apertures through the nose and point, the nose aperture intersecting said surfaces, a rigid key member having front and rear sides converging inwardly with respect to said apertures, one of said key member sides being in tight, rigid abutment with spaced areas of the point in its respective apertures and the other of said sides being in tight rigid abutment with an area of the nose in its aperture, said last-mentioned area facing said spaced areas, a resilient member engaged with a seat on the base facing said nose area, a recess in one of said members, a projection on the other of said members received within said recess, the rigid contact of the key member sides with said areas positively preventing compression of the spring member by the key member except during assembly thereof, whereby said spring member functions solely to prevent loss of the key member in the event that it accidentally becomes loose in service.

5. In a multi-piece excavating tooth assembly the combination of: a pair of telescoping members, a wedge key having downwardly and inwardly converging forward and rearward surfaces, the rearward surface of said key having a recess therein, said key being disposed to extend through aligned slots of the respective members with the forward surface of the key in abutting engagement with a forward surface of the slot of one of the members and with the rearward surface of the key in abutting engagement with rearward surfaces of the slots of the other of said members, and means to prevent the accidental disengagement of the key from the respective slots, said means including a resilient block having an aperture extending longitudinally therethrough, said resilient block being disposed in said slot of the one member between and engaging a rearward surface of the slot in said one member and the recess in the key.

6. In an excavating tooth, a rigid base member having a wedge shaped nose tapering forwardly, a rigid point member having a wedge shaped pocket receiving said nose in tight rigid wedge contact therewith, said point having a pair of aligned slots, said nose having a slot aligned with the point slots, a rigid wedge key having surfaces in tight rigid engagement with the point member at the rear edges of the point member slots, said key having another surface converging with respect to said key surfaces and in tight rigid engagement with a rearwardly facing surface of the base member in its slot, resilient means in the base slot, and means on the key engageable with said resilient means to prevent removal of the key from said slots except by compressing said resilient means, said engagement of said key surfaces with the point and base members, and said rigid wedge contact between the nose and point positively preventing movement of the point forwardly or rearwardly with respect to said base.

7. In a dipper tooth assembly having a pair of telescoping members, means to maintain said members in snug engagement with each other, said means comprising: a wedge key receivable within aligned slots of the respective members and presenting opposed surfaces directly engageable with oppositely facing surfaces of the respective members, said key having a recess in one of said opposed surfaces; and a resilient element positioned within the slot of one of the members and having a portion disposed within the recess of the key when the key is in assembled position to prevent accidental removal of the key from said slots, said resilient element always being compressible to accommodate the intentional insertion into or removal from said slots of said key but never being under compression when said key is in assembled position.

8. In an excavating tooth assembly, the combination of: a pair of telescoping members; a wedge key having front and rear surfaces converging toward one end thereof, one of said surfaces having a recess therein, said key being disposed to extend into aligned slots of the respective members with the other surface of the key in abutting engagement with a surface of the slot of one of the members and with said one surface of the key in abutting engagement with oppositely facing surfaces of the slot of the other of said members; and means for preventing the accidental displacement of the key from the respective slots, said means including a rubber block element disposed in the slot of said one member between and engaging a surface in said key recess and another surface of the slot of said one member which faces the first mentioned surface of said one member, when the key is in assembled condition said block element engaging surfaces being spaced from each other a distance substantially equal to the length of the block element so that the block is not under any substantial compression except during insertion and removal of the key.

9. In an excavating tooth assembly, the combination of: a pair of telescoping members; a wedge key having front and rear surfaces converging toward one end thereof, one of said surfaces having a recess therein, said key being disposed to extend into aligned slots of the respective members with the other surface of the key in abutting engagement with a surface of the slot of one of the members and with said one surface of the key in abutting engagement with oppositely facing surfaces of the slot of the other of said members; and means for preventing the accidental displacement of the key from the respective slots, said means including a resilient block element having an internal cavity permitting its internal expansion, said block element being disposed in the slot of said one member between and engaging said key recess and another surface of the slot of said one member which faces the first mentioned surface of said one member.

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