This invention relates to excavating tooth structure. A known type of excavating tooth structure comprises a base member or adapter including a wedge-shaped nose having a mating telescoping engagement with a replaceable tooth point or wear point. The tooth point is detachably held on the base member, and various types of retaining or locking means have been devised for this purpose.

An object of the invention is to provide improved point-retaining means of simple, rugged, and inexpensive construction which will hold a tooth point on a complementary base member against inadvertent withdrawal, but which can readily be released to permit removal and replacement of the point.

Another object is to provide point-retaining means including a retaining or locking member which remains in the base nose during application and removal of the tooth point, and which will be confined against loss during use of the tooth structure.

A further object is to provide point-retaining means which can readily be released from locking engagement by relatively simple tool means.

The invention further consists in the several features hereinafter described and claimed.

In the accompanying drawing, illustrating certain embodiments of the invention,

FIG. 1 is a side view of an excavating tooth structure including point-retaining means of the invention, parts being shown in section;

FIG. 2 is a top plan view of the tooth structure, parts of the tooth point being shown in section;

FIG. 3 is a transverse vertical sectional view of the tooth structure, taken generally on the line 3—3 of FIG. 1;

FIG. 4 is a fragmentary detail sectional view of the tooth point, taken generally on the line 4—4 of FIG. 3;

FIG. 5 is a fragmentary side and sectional view generally similar to FIG. 1, showing the opposite ends of a resilient point-retaining member of the structure inwardly deflected by a tool to permit withdrawal of the point;

FIG. 6 is a detail side view of a modified form of point-retaining member;

FIG. 7 is a detail side view of another modified form of point-retaining member, and

FIG. 8 is a fragmentary top plan and sectional view generally similar to FIG. 2, showing a modified form of tooth structure with a plurality of point-retaining members.

Referring to FIGS. 1 to 5 of the drawings, 10 designates a shank-forming base member or adapter, and 11 designates a tooth point or wear point which is detachably carried on the base member as hereinafter described. The base member and tooth point, which together form an excavating tooth structure, are preferably steel castings, although in some instances they may be forgings or die-castings.

The base member includes a forwardly projecting wedge-shaped nose 12 with flat, forwardly convergent upper and lower faces 13 and 14 and with flat, slightly tapered, forwardly convergent side faces 15, the nose having a rounded tip 16 and a generally rectangular cross-section with rounded side edges 17. FIG. 3. The included angle between the upper and lower faces of the nose is about 30°. A forwardly facing peripheral shoulder 18 is formed on the base member around the rear end of the nose, and has inclined upper side portions 19 extending at about 10° to a plane normal to longitudinal axis of the nose.

A vertical passage 20 of generally slot-like cross-section is formed transversely through the nose at a region slightly to the rear of the midpoint of the nose and intersects the longitudinal axis of the nose, the long dimension of the passage cross-section extending transversely of the nose. Each of the upper and lower ends of the passage has an enlargement extending forwardly and rearwardly of the passage, each enlargement comprising front and rear portions 21 and 22. The rear portion of each enlargement forms a clearance pocket or recess having a rounded junction with the passage, and the front portion of each enlargement forms a rounded junction with the adjacent face of the nose. The passage can readily be formed during the machining of the base nose.

The passage 20 receives longitudinally therein a point retainer 23 in the form of a resilient sinuous plate, strip or leaf spring having a bowed intermediate portion 24 which bears on the middle of the rear wall of the passage, and reversely curved tongue-forming end portions 25 which bear on the front wall of the passage adjacent to the upper and lower ends of the passage, the extremities 26 of the sinuous leaf spring preferably being curved rearwardly. The spring extremities are adapted to interengage with a tooth point, as hereinafter described, and are also adapted to be inwardly deflected into the clearance pockets 22, as hereinafter described.

The removable tooth point 11 is wedge-shaped and has formed therein a rearwardly opening wedge-shaped socket 27 complementary to and telescopically interfitting with the base nose 12. The hollow tooth point is of generally rectangular cross-section and includes top and bottom wall portions 28 and 29 and side wall portions 30. The top and bottom wall portions present rearwardly divergent flat inner faces 31 and 32. The bottom wall portion 29 of the tooth point is subject to considerable wear, and it therefore is preferably somewhat thicker than the top wall portion 28. Recesses 33 of rectangular outline are formed in the inner surfaces of the top and bottom wall portions of the wear point to register with the end enlargements 21, 22 of the base nose passage when the point is fully seated on the nose. Each recess 33 is of angular vertical cross-section with a forwardly facing rear shoulder 34. The rear edge of the seated tooth point is adjacent to the peripheral shoulder 18 of the base member. However, at each of opposite sides of the assembly there is a downwardly converging wedge-shaped space 35 between the rear edge of the tooth point and the upper side portion of the base member shoulder, permitting a wedge-shaped tool 36, FIG. 1, to be driven downwardly into this space for forcing the point forwardly out of seating engagement with the base member.

Formed through the upper and lower wall portions 28 and 29 of the tooth point are aligned vertical bores 37 which terminate at their inner ends at the recesses 33, the rear edges of the bores being adjacent to the recess shoulders 34, and the diameter of each bore is substantially smaller than the width of the retainer spring. The bores are adapted to receive inwardly urged tool elements, hereinafter described, for deflection the spring ends inwardly into the clearance recesses 22 of the nose. In excavating teeth of the smaller sizes the bores 37 are drilled, while in larger tooth sizes the bores may be cored out.

In assembling the tooth structure, the retaining leaf spring 23 is inserted into the nose passage 20 with the opposite ends of the spring projecting therefrom, the leaf spring being frictionally retained in position in the passage.
The tooth point 11 is then telescoped over the base nose, and during the latter part of the rearward displacement of the point, the inclined inner faces of the top and bottom walls of the point exert a camming action on the spring ends, deflecting these spring ends rearwardly and inwardly into the clearance recesses 22 of the base nose. As soon as the point becomes fully seated on the nose, the leaf spring ends 26 snap outwardly into the point recesses 33 and against the shoulders 34 of these recesses, thus preventing inadvertent separation from the nose. It will be seen that the retainer spring is confined in the nose by the upper and lower wall portions of the tooth point.

When replacement of a worn tooth point is desired, the remaining spring ends are forced inwardly into the nose recesses 22 by simple tool elements or pins 38 and 39 urged inwardly through the point openings, thus permitting endwise withdrawal of the point from the nose. The pins 38 and 39 are preferably mounted in axil alignment on the opposite ends of a C-shaped frame 40 to form a tool, the pin 38 being threaded in the frame in the manner of a C-clamp. If necessary, the wedge-like tool 36 of FIG. 1 is employed to release the point from its seating engagement with the base nose. After at least partial withdrawal of the point, the pin-type tool is removed and a new point is then applied to the base nose in the manner previously described, the retainer spring 23 remaining in the base nose cross passage 20. In the event that the spring-deflecting tool is not available, the wear point can be forced off the base nose by the wedge-shaped tool 36, FIG. 1, driven between the rear side edge of the point and the peripheral shoulder 19 of the base. The deflectable spring ends are thus forcibly flexed and forced forwardly over the rounded surface of the end enlargements 21 of the nose passage, permitting withdrawal of the point from the nose.

The modified form of point retainer 23' shown in FIG. 6 is a single arm of two or more leaf spring laminations 43 which are joined at their middle portion, as by spot welding 44.

The modified form of point retainer 23' shown in FIG. 7 comprises a leaf spring 53 similar to the spring 23 and joined at its middle portion to a filler plate 54, as by spot welding 55.

In the modification of FIG. 8, which is suitable for large excavating teeth, the base nose 12' mounts a tooth point 11', and is formed with two or more laterally spaced slot-like passages 20' to receive point retainers 123 like the retainers of FIGS. 1, 6, or 7. The tooth point is provided with interior locking recesses and tool-admitting bores like those of FIG. 1.

I claim:

1. In an excavating tooth structure, a base having a forwardly projecting point-mounting nose with forwardly convergent upper and lower faces and with a transverse passage opening at said faces, said passage having enlarged upper and lower ends forming clearance spaces, a tooth point having forwardly convergent upper and lower wall portions forming between them a rearwardly opening tapered socket in which said nose has a mating telescopic fit, said tooth point wall portions having respective recesses at their inner faces registrable with the opposite ends of said nose passage, each tooth point recess presenting a forwardly facing rear shoulder, an elongated resilient retainer comprising a sinuous metal strip extending longitudinally in said nose passage and having rearwardly deflectable opposite ends forming rearwardly curved spring tongues normally engaged in said tooth point recess to prevent inadvertent withdrawal of said tooth point from said nose, said retainer being fractionally engaging with the front and rear walls of said passage, said tongue-forming retainer ends being rearwardly and inwardly deflectable into the clearance spaces at the ends of said nose passage by cam action of the forwardly convergent inner faces of said point socket on said retainer ends during relative displacement of said point over said nose into seating engagement with said nose.

2. In an excavating tooth structure, a base having a forwardly projecting point-mounting nose with forwardly convergent upper and lower faces and with a transverse passage opening at said faces, said passage having enlarged upper and lower ends forming clearance spaces, a tooth point having forwardly convergent upper and lower wall portions forming between them a rearwardly opening tapered socket in which said nose has a mating telescopic fit, said tooth point wall portions having respective recesses at the inner faces registrable with the opposite ends of said nose passage, each tooth point recess presenting a forwardly facing rear shoulder, an elongated resilient retainer comprising a sinuous metal strip extending longitudinally in said nose passage and having rearwardly deflectable opposite ends forming rearwardly curved spring tongues normally engaged in said tooth point recesses to prevent inadvertent withdrawal of said tooth point from said nose, the intermediate portion of said spring strip fractionally engaging opposite walls of said nose passage, and said retainer ends being rearwardly and inwardly deflectable into the clearance spaces at the ends of said nose passage by cam action of the inner faces of said point socket on said retainer ends during relative displacement of said point over said nose into seating engagement with said nose.

3. In an excavating tooth structure, a base having a forwardly projecting point-mounting nose with forwardly convergent upper and lower faces and with a transverse passage opening at said faces, said passage having enlarged upper and lower ends forming clearance spaces, a tooth point having forwardly convergent upper and lower wall portions forming between them a rearwardly opening tapered socket in which said nose has a mating telescopic fit, said tooth point wall portions having respective recesses at the inner faces registrable with the opposite ends of said nose passage, each tooth point recess presenting a forwardly facing rear shoulder, an elongated resilient retainer comprising a sinuous metal strip extending longitudinally in said nose passage and having rearwardly deflectable opposite ends forming rearwardly curved spring tongues normally engaged in said tooth point recesses to prevent inadvertent withdrawal of said tooth point from said nose, the intermediate portion of said spring strip fractionally engaging opposite walls of said nose passage, and said retainer ends being rearwardly and inwardly deflectable into the clearance spaces at the ends of said nose passage by cam action of the inner faces of said point socket on said retainer ends during relative displacement of said point over said nose into seating engagement with said nose.

4. In an excavating tooth structure, a base having a forwardly projecting point-mounting nose with opposite faces and with a transverse passage opening at said faces, said passage having opposite ends with front and rear enlargements, each rear enlargement forming a clearance space, a tooth point having a rearwardly opening tapered socket in which said nose has a mating telescopic fit, said point having opposite wall portions with respective recesses at their inner faces registrable with the opposite ends of said nose passage, each tooth point recess presenting a forwardly facing rear shoulder, an elongated resilient retainer comprising a sinuous metal strip extending longitudinally in said nose passage and having rearwardly deflectable opposite ends forming rearwardly curved spring tongues normally engaged in said tooth point recesses to prevent inadvertent withdrawal of said tooth point from said nose, the intermediate portion of said spring strip fractionally engaging opposite walls of said nose passage, and said retainer ends being rearwardly and inwardly deflectable into the clearance spaces at the ends of said nose passage by cam action of the inner faces of said point socket on said retainer ends during relative displacement of said point over said nose into seating engagement with said nose.
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of said passage, and said retainer ends being temporarily rearwardly and inwardly deflectable into the clearance spaces at the ends of said nose passage by cam action of the inner faces of said point socket on said retainer ends during relative displacement of said point over said nose into seating engagement with said nose.

5. In an excavating tooth structure, a base having a forwardly projecting point-mounting nose with forwardly convergent upper and lower faces and with a transverse passage opening at said faces, said passage being of slot-like cross-section with the major dimension of said cross-section extending laterally of said nose, said passage having upper and lower ends with front and rear enlargements, each rear enlargement forming a clearance space, a tooth point having forwardly convergent upper and lower wall portions forming between them a rearwardly opening tapered socket in which said nose has a mating telescopic fit, said point wall portions having respective recesses at their inner faces registrable with the opposite ends of said nose passage, each recess having a forwardly facing rear shoulder, an elongated resilient plate-like retainer extending longitudinally in said passage and having rearwardly deflectable opposite ends forming rearwardly curved spring tongues normally engaged in said tooth point recesses to prevent inadvertent withdrawal of said tooth point from said nose, said retainer ends being temporarily rearwardly and inwardly deflectable into the clearance spaces at the ends of said nose passage by cam action of the inner faces of said point socket on said retainer ends during relative displacement of said point over said nose into seating engagement with said nose.

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