Sept. 23, 1947. J. BAER 2,427,651

EXCAVATING TOOTH

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Fig. 1

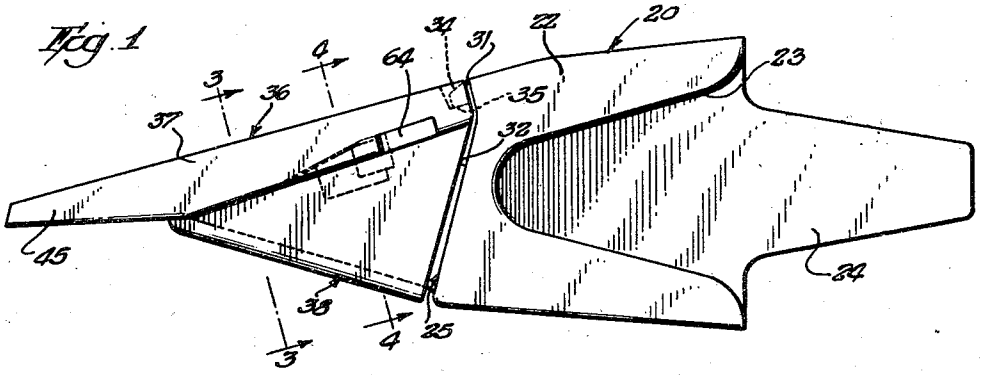


Fig. 2

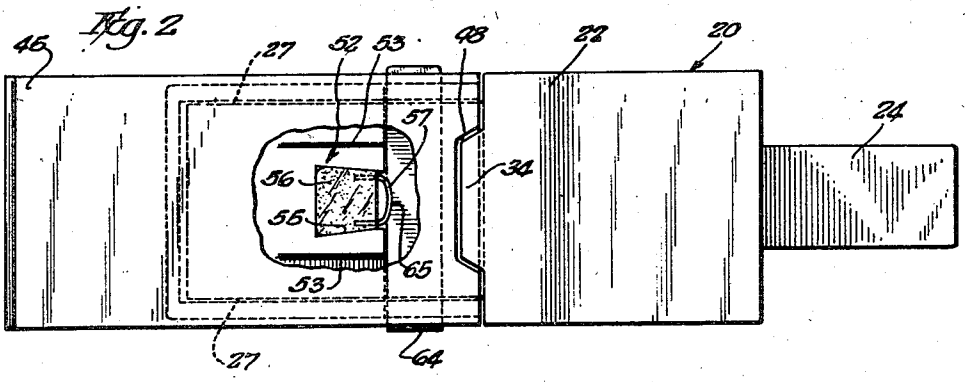


Fig. 3

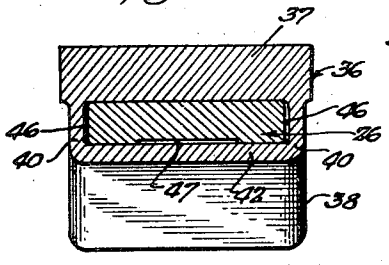


Fig. 4

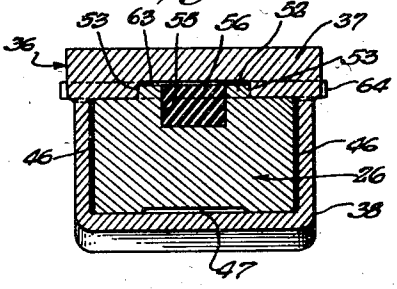


Fig. 5

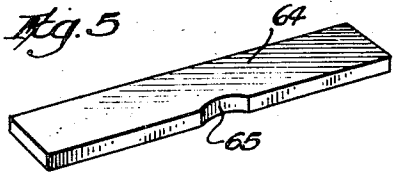
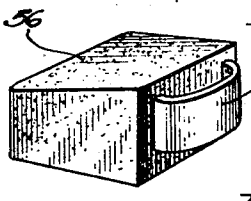


Fig. 6



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Fig. 7

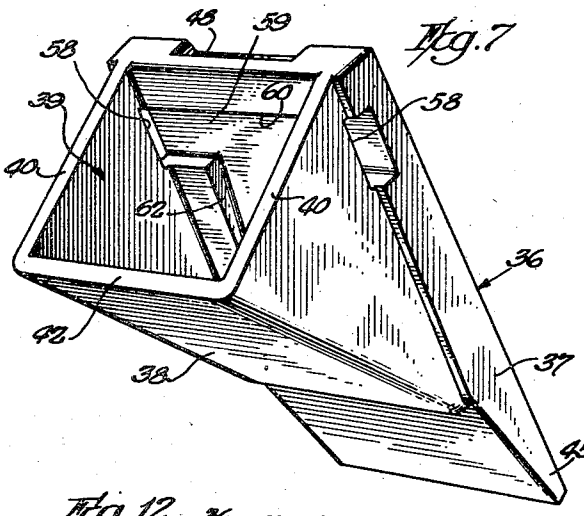


Fig. 11

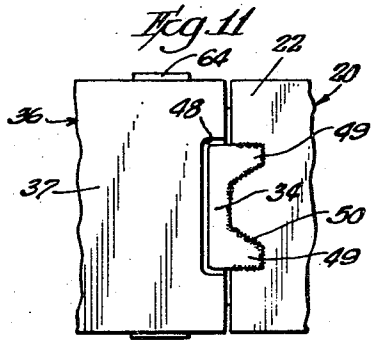


Fig. 12

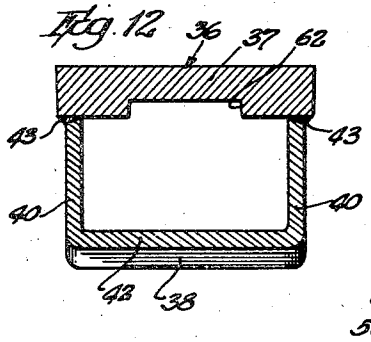


Fig. 8

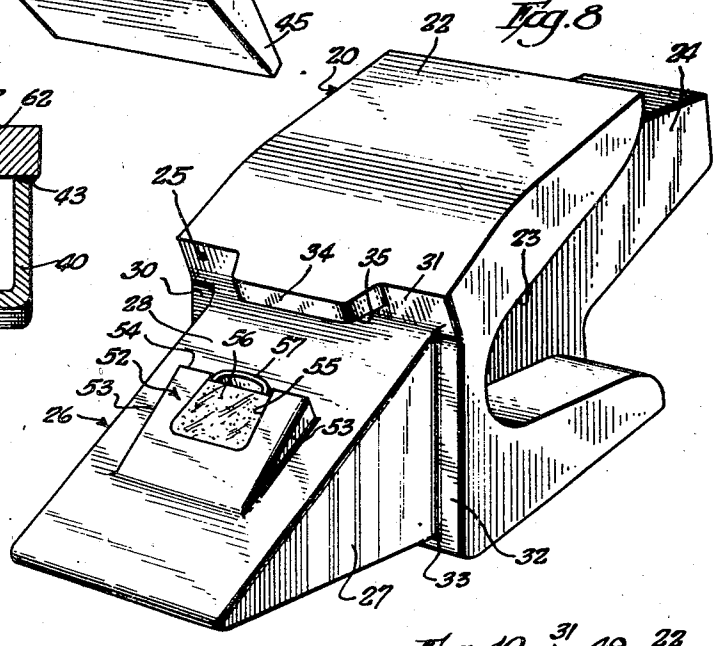


Fig. 9

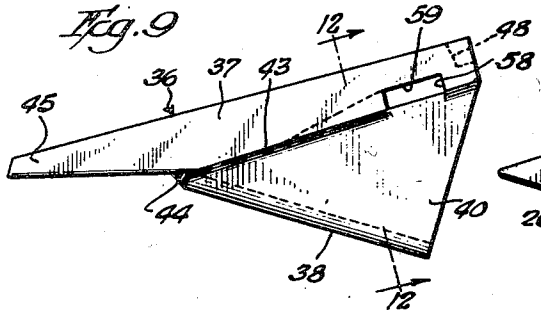
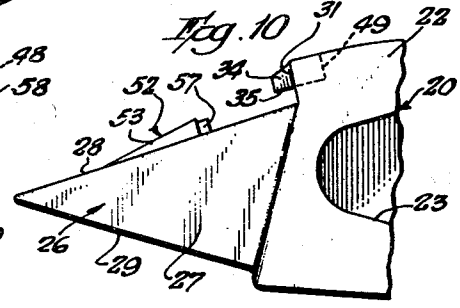


Fig. 10



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EXCAVATING TOOTH

Josef Baer, Washington County, Oreg., assignor to Electric Steel Foundry, Portland, Oreg., a corporation of Oregon

Application June 6, 1945, Serial No. 597,856

9 Claims. (Cl. 37—142)

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The present invention relates to excavating teeth and particularly to those having replaceable tooth points and adapted to use on the forward cutting edges of power driven digging, excavating and loading buckets, dippers, scoops, scarifiers and the like.

A general object of this invention is to provide an improved excavating tooth structure including an adapter and a coacting removable tip held firmly in place upon the adapter by an easily removable key.

As another object, the invention contemplates the provision of an improved key and key retaining structure for holding the removable tip of an excavating tooth in place upon the adapter portion of the tooth.

The invention has for an additional object the provision of co-acting adapter and removable tip structures for excavating teeth in which the engaging surfaces are urged into gripping relation and thereby to minimize relative movement caused by the forces encountered in normal use, even after reasonable wear or deformation resulting from use.

It is also an object of the present invention to provide an excavating tooth structure including a removable tip and an adapter upon which the tip is normally mounted and which is suited to either cast or welded construction.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawings, of which there are two sheets,

Fig. 1 is a side elevational view of an excavating tooth embodying my invention in a preferred form;

Fig. 2 is a top plan view of the excavating tooth shown in Fig. 1 and includes a cut-away portion illustrating a part of the internal structure;

Figs. 3 and 4 are sectional views taken substantially on lines 3—3 and 4—4 of Fig. 1, respectively, and each viewed in the direction indicated by the arrows;

Figs. 5 and 6 are each perspective views to an enlarged scale of parts of the excavating tooth structure shown in Figs. 1 and 2;

Figs. 7 and 8 are perspective views of disassembled parts of the excavating tooth shown in Figs. 1 and 2;

Figs. 9 and 10 are side elevational views of disassembled parts of an excavating tooth similar to that shown in Fig. 1 but including certain modified details of construction;

Fig. 11 is a fragmentary top plan view of a portion of the excavating tooth structure shown in Figs. 9 and 10, with the parts in assembled relationship; and

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Fig. 12 is a sectional view with the section taken substantially on a line 12—12 of Fig. 9 and viewed in the direction indicated by the arrows.

Although there are various ways in which excavating teeth of the general type disclosed may be mounted along the edge of a shovel or the like, the forms shown in the various views of the accompanying drawings have an adapter 20 including a shank portion 22, the sides of which are recessed as at 23 to fit over edge portions of the shovel or the like. A rearwardly projecting tang 24, which is formed integrally with the shank portion of the adapter, is utilized for securing the adapter to the bucket or structure with which it is utilized.

Projecting from a front face 25 of the adapter, is an integral forwardly projecting wedge-shaped nose 26. Desirably the projecting nose 26 has substantially parallel side surfaces 27 of generally triangular shape and substantially rectangular upper and lower wedge surfaces 28 and 29, respectively. In the preferred embodiment of my invention, the base of the projecting nose 26, which adjoins the shank portion of the adapter, is smaller than the front face 25, so as to provide forwardly facing shoulders 30, 31, 32 and 33, surrounding the base of the nose. It is also considered preferable that the corners formed by the juncture of the surfaces of the nose with the shoulders 30, 31, 32 and 33 are filleted to exaggerate the wedge shape of the nose adjacent the shank portion of the adapter.

At the top surface of the adapter 20, a tongue 34 projects forwardly from the surface of the shoulder 31 intermediate the sides thereof and in spaced relationship to the adjacent wedge surface 28 of the nose 26. By preference, the inner surface 35 of the tongue 34 is substantially parallel to the adjacent surface 28 of the nose. The length of the tongue is relatively short as compared to the length of the projecting nose 26.

Adapted for removable mounting upon the projecting nose 26 of the adapter 20, is a tooth point 36 including a spike portion 37 and a housing portion 38, which together form a wedge-shaped socket 39 having an open end at the rear of the tooth point. The housing portion has substantially parallel sides 40 of generally triangular shape and an integral web 42.

In the preferred embodiment of my invention, illustrated in Figs. 1 to 4 and 7, the housing portion 38 is cast or otherwise integrally formed with the spike portion 37 of the tooth point. In the modified construction, illustrated in Figs. 9 and 12, the housing portion 38 is formed or cast separately from the spike portion 37 and the two parts are welded together, as illustrated at 43 and 44 in Figs. 9 and 12. By the use of the welded construction, the spike portion 37 of the

tooth point may be forged of a metal particularly adapted to resist the abrasion encountered in use while the housing portion **38** may be made of a metal particularly suited to the resistance of shock and the retention of a close fit between the engaging surfaces of the tooth point and adapter. As the spike portion **37** is either formed with or welded to the housing portion **38**, the spike portion has a tip **45** sharpened to provide a digging edge and extending forwardly from the front edge of the housing portion **38**.

In order to provide effective and durable gripping surfaces on the projecting nose and within the co-acting socket **39**, it is preferred that the co-acting gripping action shall be between the wedge surfaces of the parts. That is, as illustrated in Figs. 3 and 4, the interior of the housing portion **38** is somewhat wider than the width of the nose **26**, so as to provide clearances **46** between the sides of the nose and the inside of the socket walls. In like manner, it is preferred that the mid portion of the nose shall be longitudinally recessed at **47** to provide relief between the side surfaces of the nose which engage the interior of the socket. To allow for wear and the effects of impact against the tip of the tooth in use, the length of the nose is somewhat greater than the depth of the socket so that there is normally a clearance between the shoulders **30**, **31**, **32** and **33** on the adapter and the rear surfaces of the tooth point.

The spike portion **37** of the tooth point desirably has a considerably heavier section than do the walls of the housing portion **38**. At the rear end of the spike portion **37** and in the top surface thereof, a recess **48** is provided for receiving the tongue **34** so that the rear edge of the spike portion **37** is gripped beneath the tongue to aid in the resistance of the tooth to lateral forces against the surface thereof encountered in use.

In the modified form of my invention, illustrated in Figs. 10 and 11, the function and operation of the tongue **34** are similar to those described. However, in this modified form, the tongue **34** is made as a separate piece from the adapter **20** and has rearwardly projecting side wings **49** which fit into suitable recesses in the shank portion of the adapter; the tongue being secured in place relative to the tooth adapter by welding the adjoining edges of the tongue and adapter together, as indicated at **50**.

In order to hold the tooth point firmly in position with the engaging surfaces of the nose and socket seated together, and to permit the removal of the tooth point from the adapter with relative ease, a removable key and locking structure is provided. As a part of this structure, and as shown in Figs. 1, 2, 4 and 8, a protuberance **52**, having substantially triangular side walls **53**, slopes upwardly toward the rear of the wedge surface **28** to provide an end surface **54** spaced from and facing toward the shoulder **31**. The side walls **53** of the protuberance are spaced inwardly from the side walls **27** of the nose so that the tooth point seats against the wedge surface **28** of the nose along the sides of the protuberance.

Laterally between the sides of the protuberance, a recess **55** is provided which is desirably of a dove-tail shape and opens rearwardly through the intermediate portion of the surface **54**. In the preferred embodiment, and as shown in Fig. 4, the recess **55** preferably extends inwardly of the nose beyond the depth of the protuberance.

A block of compressible resilient material **56**, shown in Fig. 6, which may be of rubber or one

of the known substitutes therefor, fits into the recess **55** and is secured therein by vulcanizing or other suitable means. Secured to the block of resilient material and extending across the front surface thereof, is a curved metal strip **57** which normally projects outwardly from the recess beyond the surface **54** when the block is in place, as shown in Figs. 2 and 8. Although the curved metal strip **57** may be made narrow, so as to clear the surface **28**, I prefer to extend the recess **55** rearwardly of the surface **54** to accommodate a wider metal strip, as indicated in Fig. 1.

As shown in Figs. 1 and 7, aligned side openings **58** in the tooth point **36** and a key-receiving passage are provided by a lateral channel **59** extending across the inner surface of the spike portion **37** of the tooth point near the open end of the socket **39**. The channel **59** provides a surface **60** which is substantially parallel to and spaced from the end surface of the tooth point, as well as spaced from and opposed to the rearwardly facing surface **54** of the protuberance **52**.

To allow space for the upward projection of the protuberance **52** above the wedge surface **28** of the nose, a recess **62** is provided in the inner surface of the spike portion **37** of the tooth, which recess adjoins the mid portion of the cross channel **59** on the forward side thereof. Consistent with the preferred limitation of the seating surfaces between the tooth point and nose to definite portions of the wedge surfaces, the recess **62** is desirably of a depth sufficient to provide a clearance between the surfaces of the protuberance and spike portion of the tooth point, as indicated at **63** in Fig. 4.

With the tooth point firmly seated upon the nose portion of the adapter, a key **64**, shown in Fig. 5, is pressed into one of the side openings **58** and across the projecting surface of the curved metal strip **57** to a position in which its ends are substantially flush with the sides of the spike portion of the tooth point, as shown in Fig. 2. The key **64** has a notch **65** on one side thereof which seats against the curved surface of the metal strip **57** releasably to retain the key in its holding position relative to the nose and adapter. When the key is thus seated, the resilient block **56** provides a biasing force, urging the key rearwardly of the tooth point and against the surface **60** of the cross channel **59**, thereby continually to urge the tooth point into firm seating engagement with the nose of the adapter. Any forces tending to remove the tooth point from the adapter which are sufficient to overcome the biasing force of the resilient block **56**, are resisted by engagement of the key **64** with the surface **54** of the protuberance to prevent the tooth point from coming off.

From the foregoing description of the structure and relationship of parts, it may be understood that to facilitate manufacturing or to provide a structure which has long life under certain conditions of operation, the construction of the parts may comprise their integral formation or their fabrication by welding portions together from separately made pieces. In either event, the disclosed construction provides definite coacting seating surfaces on the nose of the adapter and in the removable tooth point which are held firmly in engagement by a removable key and strengthened in their resistance to lateral thrusts by the tongue **34** which seats in the recess **48**.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the

invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. An excavating tooth comprising, in combination, an adapter having a rear shank portion and an integral forwardly projecting wedge-shaped nose, said nose being smaller in section than said shank portion to provide a shoulder adjoining the nose at the forward end of the body portion, a tongue spaced from one of the wedge surfaces of said nose and projecting forwardly from said shoulder, a wedge-shaped protuberance projecting from said one of the wedge surfaces at a position inwardly from the sides thereof and having an end surface facing said shoulder, said protuberance having a recess therein adjoining and intermediate the ends of said end surface thereof, a block of compressible resilient material disposed in said recess, a metal face carried by said block and having a curved surface projecting outwardly between the said ends of the end surface of the protuberance, a separate tooth point having a rearwardly opening socket presenting opposed surfaces adapted to grip the wedge surfaces of said nose, said tooth point having on one side an internal channel adapted to fit over said protuberance and block and an external recess into which said tongue is adapted to project, said tooth point also having aligned side openings and an internal cross channel in position for substantial alignment at one side with the end surface of said protuberance, and a key insertable through said side openings and cross channel for holding said tooth point in place on the nose of the adapter, said key having a notch in one side for receiving the metal face on said resilient block for releasably retaining the key in its tooth point holding position.

2. An excavating tooth comprising, in combination, an adapter having a rear shank portion and an integral forwardly projecting wedge-shaped nose, said nose being smaller in section than said shank portion to provide a shoulder adjoining the nose at the forward end of the body portion, a tongue spaced from one of the wedge surfaces of said nose and projecting forwardly from said shoulder, a wedge-shaped protuberance projecting from said one of the wedge surfaces at a position inwardly from the sides thereof and having an end surface facing said shoulder, said protuberance having a recess therein adjoining and intermediate the ends of said end surface thereof, a block of compressible resilient material disposed in said recess, a metal face carried by said block and having a curved surface projecting outwardly between the said ends of the end surface of the protuberance, a separate tooth point having a rearwardly opening socket presenting opposed surfaces adapted to grip the wedge surfaces of said nose, said tooth point having on one side an internal channel adapted to fit over said protuberance and block and an external recess into which said tongue is adapted to project, and means coacting with said tooth point, adapter and resilient block for firmly and releasably holding the tooth point in place upon the adapter.

3. An excavating tooth comprising, in combination, an adapter having a shank portion and an integral wedge-shaped nose projecting forwardly therefrom, said nose having opposite wedge faces and substantially parallel side faces, a tongue spaced from one of the wedge faces and projecting from said shank portion in substantially parallel relation to said one of the wedge faces, means providing a rearwardly facing surface on said one of the wedge faces and spaced from the shank portion, a recess in said nose opening through said rearwardly facing surface, a block of compressible resilient material mounted in the recess, means providing a hard wear resisting surface on one side of said block and projecting outwardly from the recess beyond said rearwardly facing surface, a separate tooth point having a rearwardly facing socket presenting opposed inner surfaces adapted to grip the wedge faces of the nose, said socket being of a size to have clearance from said substantially parallel side faces of the nose, said tooth point having an external recess on one side into which said tongue projects and a wall between said recess and the nose of a thickness to be gripped between the tongue and nose, said tooth point also having side openings and an internal cross channel providing a forwardly facing surface opposed to and spaced from said rearwardly facing surface on the nose, and a key fitting between said opposed forwardly and rearwardly facing surfaces and gripped between the forwardly facing surface and said projecting surface of the resilient block for holding the tooth point firmly in place on the nose of the adapter.

4. An excavating tooth comprising, in combination, an adapter having a shank portion and an integral wedge-shaped nose projecting forwardly therefrom, said nose having opposite wedge faces and substantially parallel side faces, a tongue spaced from one of the wedge faces and projecting from said shank portion in substantially parallel relation to said one of the wedge faces, means providing a rearwardly facing surface on said one of the wedge faces and spaced from the shank portion, a recess in said nose opening through said rearwardly facing surface, a block of compressible resilient material mounted in the recess, means providing a hard wear resisting surface on one side of said block and projecting outwardly from the recess beyond said rearwardly facing surface, a separate tooth point having a rearwardly facing socket presenting opposed inner surfaces adapted to grip the wedge faces of the nose, said socket being of a size to have clearance from said substantially parallel side faces of the nose, said tooth point having an external recess on one side into which said tongue projects and a wall between said recess and the nose of a thickness to be gripped between the tongue and nose, said tooth point also having means providing a forwardly facing surface opposed to and spaced from said rearwardly facing surface on the nose, and means intermediate said forwardly and rearwardly facing surfaces for holding said tooth point in place on the nose, said resilient block coacting with the last mentioned means releasably to hold said last mentioned means in place.

5. An excavating tooth comprising, in combination, an adapter having a shank portion and an integral wedge-shaped nose projecting forwardly therefrom, said nose having opposite wedge faces and substantially parallel side faces, means providing a rearwardly facing surface on said one of the wedge faces and spaced from the shank portion, a recess in said nose opening through said rearwardly facing surface, a block of compressible resilient material mounted in the

recess, means providing a hard wear resisting surface on one side of said block and projecting outwardly from the recess beyond said rearwardly facing surface, a separate tooth point having a rearwardly facing socket presenting opposed inner surfaces adapted to grip the wedge faces of the nose, said socket being of a size to have clearance from said substantially parallel side faces of the nose, said tooth point also having means providing a forwardly facing surface opposed to and spaced from said rearwardly facing surface on the nose, and means intermediate said forwardly and rearwardly facing surfaces for holding said tooth point in place on the nose, said resilient block coacting with the last mentioned means to urge said surfaces of the tooth point socket into engagement with the nose of the adapter.

6. In an excavating tooth, a removable tooth point comprising, in combination, a spike portion of relatively heavy section, a housing portion having substantially parallel side walls and an integral web forming in combination with the spike portion a wedge-shaped socket having an open end adjacent one end of the spike portion, a recess in the outer face of said spike portion narrower in width than the spike portion and opening outwardly at said one end of the spike portion intermediate the sides thereof, a lateral channel extending across the surface of the spike portion within the open end of the socket and providing spaced and opposed surfaces substantially parallel to said one end of the spike portion, and said spike portion having a second recess of a width less than that of the interior of the housing portion intermediate the sides thereof and adjoining said channel on the side thereof facing toward the open end of the socket.

7. In an excavating tooth, a removable tooth point comprising, in combination, a forged spike portion of wear resisting metal and relatively heavy section, a cast housing portion having side walls of substantially triangular shape and an integral web, said side walls and one end of said web being welded to one surface of the spike portion to form therewith a wedge-shaped socket having an open end substantially flush with one end of the spike portion, a recess in the outer face of said spike portion defined laterally of the spike portion by integral parts of the spike portion and opening outwardly at said one end of the spike portion intermediate and inwardly of the sides thereof, a lateral channel extending across the surface of the spike portion within the

open end of the socket and providing spaced and opposed surfaces substantially parallel to said one end of the spike portion, and said spike portion having a second recess of a width laterally of the spike portion less than that of the interior of the housing portion intermediate the sides thereof and adjoining said channel on the side thereof facing toward the open end of the socket.

8. In an excavating tooth, an adapter for supporting a removable tooth point and comprising, in combination, a shank portion having a front face, a wedge-shaped nose having triangularly shaped sides and substantially rectangular wedge faces formed integrally with the shank portion and projecting from said front face, said front face providing a shoulder intermediate the nose and shank portion, the corners between said nose and shoulder being filleted, a tongue integral with the shank portion and projecting from said shoulder in spaced relation to one of said wedge faces, means projecting from one of the wedge faces and providing a surface facing toward said shoulder in spaced relationship thereto, said means having a recess intermediate the ends of the last mentioned surface, and resilient means mounted in said recess and having a curved surface extending outwardly from the recess beyond said last mentioned surface.

9. In an excavating tooth, an adapter for supporting a removable tooth point and comprising, in combination, a shank portion having an integral and substantially wedge-shaped nose projecting from one surface thereof, a wedge-shaped protuberance on one surface of the nose and providing a surface facing the shank portion, said protuberance having triangularly shaped sides spaced inwardly from the sides of the nose and having a recess intermediate said triangularly shaped sides and opening through said surface facing the shank, and resilient means disposed in said recess and projecting beyond the last mentioned surface.

JOSEF BAER.

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