

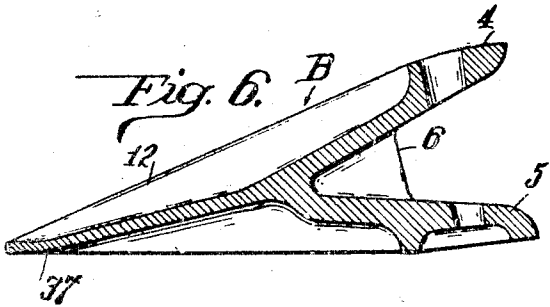
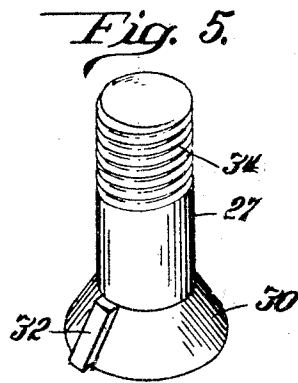
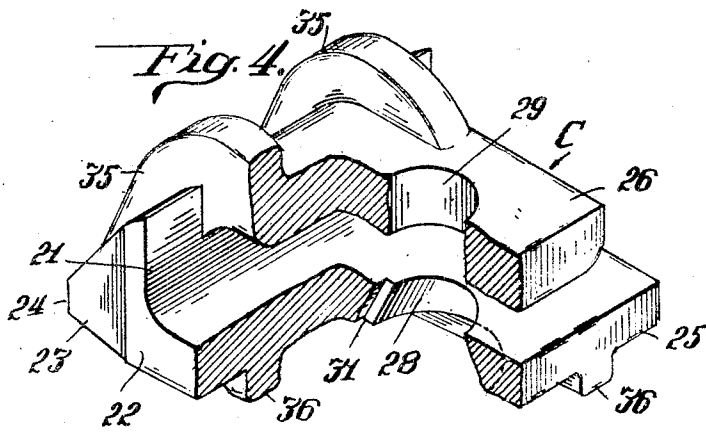
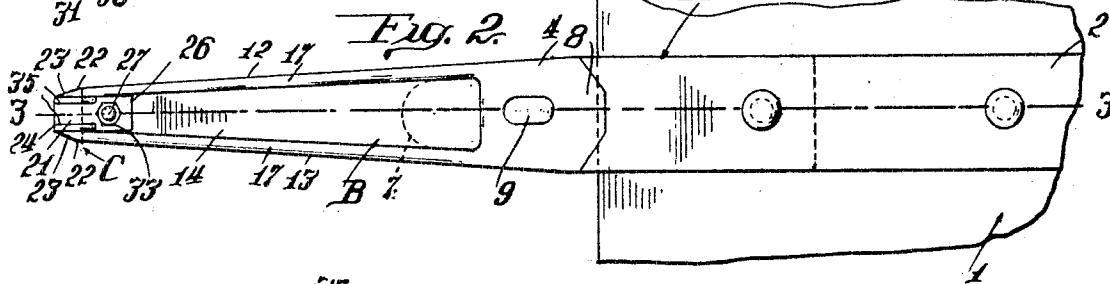
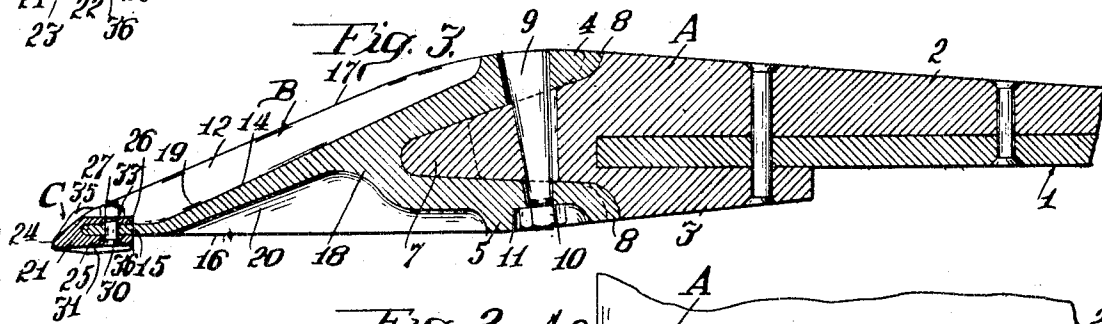
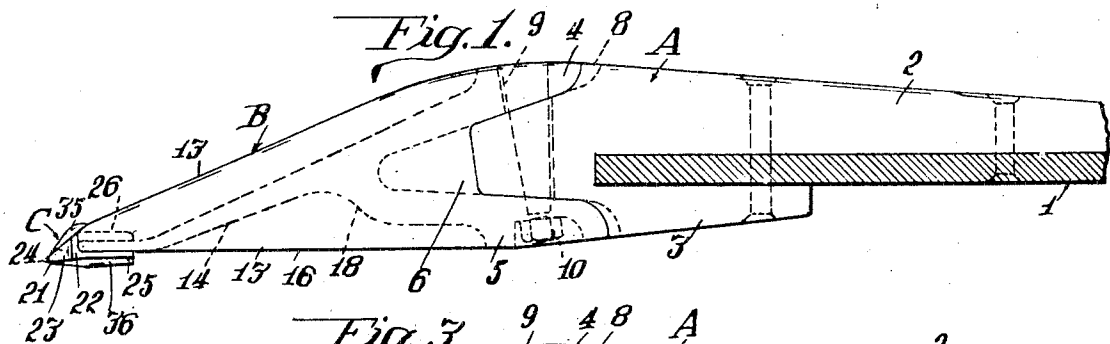
Aug. 2, 1932.

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1,870,044

DIPPER TOOTH

Filed July 22, 1931



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# UNITED STATES PATENT OFFICE

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## DIPPER TOOTH

Application filed July 22, 1931. Serial No. 552,395.

This invention relates to certain new and useful improvements in a dipper tooth for excavating buckets or similar apparatus.

More particularly the invention relates to a comparatively long and narrow tooth adapted to operate with a gouge effect, and which may be constructed in sections, including a comparatively small and light renewable and replaceable tip which takes the greater portion of the wear. The point portion of the tooth comprises substantially vertical side flanges, the upper and lower edges of which converge toward the cutting edge, the flanges being connected by an intermediate web so as to leave upper and lower open recesses between the web and side flanges. Both the side flanges and the web are comparatively thin so that the weight of the tooth is reduced without substantially decreasing its strength and the tooth will have a self sharpening point as it wears away. A small detachable tip member has a wedge shaped head forming substantially a prolongation of the point and a forked rearwardly extending portion which embraces the end of the web and is removably attached thereto.

The principal object of the invention is to provide an improved dipper tooth of the type briefly described hereinabove and disclosed more in detail in the specifications which follow.

Another object is to provide an improved three-part dipper tooth comprising a base, a removable point, and a removable tip attached to the edge of the point.

Another object is to provide an improved two-part dipper tooth comprising a removable tip attached to the point or digging edge of the tooth.

Another object is to provide an improved replaceable tip for a dipper tooth.

Another object is to provide an improved form of self-sharpening dipper tooth point.

Other objects and advantages of this invention will be more apparent from the following detailed description of one approved form of device built according to the principles of this invention.

In the accompanying drawing:

Fig. 1 is a side elevation of the assembled tooth.

Fig. 2 is a plan view of the tooth shown in Fig. 1.

Fig. 3 is a longitudinal vertical section, taken substantially on the line 3—3 of Fig. 2.

Fig. 4 is a perspective view, partially broken away, of the removable tip.

Fig. 5 is a perspective view of the bolt for holding the tip in place.

Fig. 6 is a longitudinal vertical section, similar to Fig. 3, through a modified form of point.

A fragment of the front edge of an excavating dipper is indicated at 1, and the jaws 2 and 3 at the rear of the base portion of the dipper tooth are secured to opposite sides of the edge 1 of the dipper in the usual manner. It is to be understood that a plurality of these teeth are mounted in spaced parallel relation along the edge of the dipper.

The improved tooth, which forms the particular subject matter of this invention, comprises a base A, a removable and reversible point B, and a removable tip C. As will be hereinafter apparent, the base A and point B may, if desired, be made as one integral member, and the tooth is operable without the removable wear tip C.

The improved point B is comparatively long and narrow and is wedge-shaped in vertical section. The substantially vertical sides of the tooth also preferably converge somewhat toward the front cutting edge, as shown in Fig. 2. The larger rear end of the point is shaped for removable attachment to the forward end of the base A. There are a great number of well-known methods by which these parts A and B may be detachably connected, the one here shown being merely disclosed by way of example. In the example shown, the point B is formed at its rear end with upper and lower jaws 4 and 5 which fit similarly shaped recesses in the front of base A. The forward ends of the jaws 4 and 5 are connected by side webs 6 to form a pocket into which projects the nose 7 at the front of the base. The jaws 4 and 5 have central rearward projections 8 which fit correspondingly shaped recesses in the base A to

resist lateral stresses. A wedge-shaped key 9 threaded at its smaller end is passed through substantially aligned recesses or openings in the jaws 4 and 5 and the intervening portion of base A and is drawn into locking position by means of a nut 10 threaded on the key and housed within a recess 11 in jaw 5. It will be noted that the upper and lower portions of these mating ends of the base and point are substantially symmetrical about a central plane, so that the point B may be reversed if desired, so as to equalize the wear on the upper and lower faces thereof. The removable attaching means, just described, between the base A and point B is merely shown by way of example and it is to be understood that other suitable methods of joining these parts can be used. As will also be hereinafter apparent, the point B might be made integral with the base A, but it is preferable to have the point B removable, so that it may be replaced by a new point when sufficiently worn.

The forward digging portion of point B comprises a pair of comparatively thin vertical side flanges 12 and 13, which preferably converge slightly toward one another in the direction of the cutting edge, as shown in Fig. 2. These flanges 12 and 13 are connected by an intermediate web 14 which extends from the main rear body portion of the point forwardly to the cutting edge. In the preferred form of point shown in Figs. 1, 2 and 3, the forward portion 15 of web 14 connects the side flanges 12 and 13 substantially flush with their bottom edges 16, but the intermediate portion of the web slopes upwardly so as to be positioned substantially intermediate the lower and upper edges 16 and 17 of the side flanges until it merges with the main rear body portion of the point, as indicated at 18. The web 14 is comparatively thin, its forward portion 15 being substantially no thicker than the side flanges 12 and 13. Preferably the web 14 becomes gradually thicker toward its rear end 18 so as to provide the requisite strength. Open recesses 19 and 20 are left between the side flanges 12 and 13 and above and below the intermediate web 14. It will be noted that a minimum of metal is used in this point, so as to reduce its cost and weight, and due to the relatively narrow construction of the tooth, adequate strength is provided, even though the flanges 12 and 13 and web 14 are comparatively thin.

The point B has a slightly blunted front end, against which fits the wedge-shaped head 21 of the removable tip C. This head 21 is wedge-shaped in vertical cross-section so as to form substantially a prolongation of the wedge shaped point B. The rear portion 22 of the head 21 has a width substantially equal to the overall width of the point B, but the front sides of the head are preferably beveled

inwardly, as indicated at 23, toward the front cutting edge 24 of the tip. From the bottom rear edge of head 21 projects rearwardly a comparatively thin flat wear-plate 25 of substantially the full width of point B and adapted to underlie the forward ends of the side flanges 12 and 13 and the forward portion 15 of web 14. An upper flange 26 projects rearwardly substantially parallel with wear plate 25, and is somewhat narrower in width so as to be received between the front portions of the side flanges 12 and 13 and rest upon the upper face of portion 15 of the web. It will be noted that the forked rear portion of the tip formed by flange 26 and wear plate 25 rather snugly embraces the upper and lower surfaces of the web 15, and the tip is held against lateral displacement by the engagement of upper flange 26 between the side flanges 12 and 13. A retaining bolt 27 is adapted to be passed through mating openings 28 and 29 formed in tip members 25 and 26 and through a corresponding opening in the web 15. The opening 28 in the wear plate 25 is counter-sunk so as to house the head 30 of bolt 27, and the opening 28 is provided with a side slot 31 to receive the rib 32 on the bolt head, whereby rotary movement of the bolt is prevented. A nut 33 is screwed onto the threaded upper end 34 of the bolt to lock the parts together. It will be apparent that the nut 33 and upper end of bolt 27 are housed within the forward portion of recess 19 between the side flanges 12 and 13 to minimize the tendency for breaking off these parts during the digging operations.

Preferably the tip is formed with upwardly projecting ribs 35 spaced apart and positioned adjacent the side edges of flange 26. These ribs curve upwardly and forwardly from about midway the length of flange 26 and extend around the head 21 to merge downwardly into the cutting edge 24. A similar pair of bottom ribs 36 are positioned on the wear-plate 25, extending forwardly from the rear edge of this wear-plate and merging upwardly at their front ends into the cutting edge 24. These ribs 35 and 36 function to add strength to the tip without interfering with the comparatively narrow sharp cutting surfaces presented to the material into which the tip is forced.

It will now be apparent that although this tip C covers the entire cutting edge of the point and takes practically all of the wear during the digging operation, it is very small and simple in construction and economical to manufacture, so that it may be entirely discarded when worn and quickly replaced by a new tip. The tip is also so small that if broken off or lost during the digging operation, it will not materially injure the stone-crusher or other apparatus into which it may find its way along with the excavated material. The tip C is of such form that it can

be drop-forged, and can be made of any suitable mechanically treated steel or other hard wear-resisting metal capable of withstanding the hard service to which such a digging tooth is subjected.

Although it is preferable to always use one of the removable tips C on the point B, thereby avoiding wear on the more expensive point B, it is entirely practicable to use the points B for digging operations in case the tips C become exhausted and no more are available. The forward edge portions of the flanges 12 and 13 and web 14 are sufficiently sharp for digging purposes, and it will be noted that as the parts wear back, the cutting surfaces will be renewed so that the point is substantially self-sharpening. Nearly all of the forward half of the point B may be worn away and the tooth will still be practicable for digging purposes. Due to the narrow construction of the tooth and the comparatively thin side flanges and web of the point, at no time will there be sufficiently wide surfaces presented to the material that is being excavated to produce a "sled" effect tending to lift the teeth and bucket out of the material. The teeth will always have a gouge action tending to force them into the material, even after considerable wear has taken place.

The point B may even be designed especially for use without the removable tip C, in which case it may be found desirable to initially form the point with a somewhat sharper cutting edge and position the web 14 more nearly centrally in the point, as indicated at 37 in Fig. 6. If such a construction is used, it is desirable to have the point B separable from the base A, so that it may be replaced when worn. In case the renewable tips C are used, there is very little wear taking place on the point B, and this point B may, if desired, be made integral with the supporting base A, as already noted. However, a three-part construction, such as hereinabove disclosed, is preferred.

This improved dipper tooth is applicable for use on practically any type of excavating bucket, such as a drag-line bucket, scraper bucket, shovel bucket, clam-shell bucket, grab bucket or other similar apparatus.

I claim:

1. A removable tip for a dipper tooth point, said tip being in the form of a single metal casting having a wedge-shaped cutting edge shaped to form a prolongation of the point, and a rearwardly extending forked portion comprising a bottom wear plate adapted to fit against the lower surface of the point, and an upper narrower flange substantially parallel to the wear plate and adapted to project into a recess in the point, and means for securing the flange and wear plate to the point.

2. A removable tip for a dipper tooth point, said tip being in the form of a single

metal casting having a wedge-shaped cutting edge shaped to form a prolongation of the point, and a rearwardly extending forked portion comprising a bottom wear plate adapted to fit against the lower surface of the point, and an upper narrower flange substantially parallel to the wear plate and adapted to project into a recess in the point, the wear plate and flange being perforated to receive a securing bolt passed therethrough and through the intervening portion of the point.

3. A removable tip for a dipper tooth point, said tip being in the form of a single metal casting having a wedge-shaped cutting edge shaped to form a prolongation of the point, and a rearwardly extending forked portion comprising a bottom wear plate adapted to fit against the lower surface of the point, and an upper narrower flange substantially parallel to the wear plate and adapted to project into a recess in the point, the flange having a bolt-hole therethrough, and the wear plate being formed with a counter-sunk opening in line with the bolt-hole to receive the head of an anchoring bolt.

4. A removable tip for a dipper tooth point, said tip being in the form of a single metal casting having a head of substantially the same width as the front of the point and having top and bottom surfaces converging to a cutting edge so as to form a prolongation of the point, the side edges of the head being beveled inwardly to the cutting edge, the tip also comprising a rearwardly projecting lower wear-plate of substantially the full width of the point and a narrower upper flange substantially parallel with the wear-plate and adapted to extend into a recess in the point, there being spaced apart upwardly projecting reinforcing ribs on the flange and similar downwardly projecting ribs on the wear-plate, and means positioned between the ribs for securing the flange and wear-plate to the intervening portion of the point.

5. A removable tip for a dipper tooth point, said tip being in the form of a single metal casting having a head of substantially the same width as the front of the point and having top and bottom surfaces converging to a cutting edge so as to form a prolongation of the point, the side edges of the head being beveled inwardly to the cutting edge, the tip also comprising a rearwardly projecting lower wear plate of substantially the width of the point, and a narrower upper flange substantially parallel with the wear-plate and adapted to extend into a recess in the point, and means for securing the flange and wear-plate to the intervening portion of the point.

6. A removable tip for a dipper tooth point, said tip being in the form of a single metal casting having a head of substantially the same width as the front of the point and hav-

ing top and bottom surfaces converging to a cutting edge so as to form a prolongation of the point, the side edges of the head being beveled inwardly to the cutting edge, the tip  
 5 also comprising a rearwardly projecting lower wear-plate of substantially the width of the point, and a narrower upper flange substantially parallel with the wear-plate and adapted to extend into a recess in the point,  
 10 the flange and wear-plate being perforated to receive a bolt also extending through the intervening portion of the point.

7. A removable tip for a dipper tooth point, said tip being in the form of a single metal casting having a head of substantially the same width as the front of the point and having top and bottom surfaces converging to a cutting edge so as to form a prolongation of the point, the side edges of the head being  
 20 beveled inwardly to the cutting edge, the tip also comprising a rearwardly projecting lower wear plate of substantially the width of the point, and a narrower upper flange substantially parallel with the wear-plate and adapted to extend into a recess in the point,  
 25 the flange and wear plate being perforated to receive a bolt also extending through the intervening portion of the point, the opening in the wear-plate being countersunk to receive the head of the bolt, the nut on the bolt being  
 30 housed in the recess in the point.

8. The combination with a dipper tooth point having its forward portion formed with substantially vertical relatively thin side  
 35 flanges having upper and lower edges converging toward the forward cutting edge, and a web connecting the side flanges and having a thickness similar to that of the side flanges, of a removable tip having a wedge-shaped  
 40 head shaped to form a prolongation of the point, and having a forked rear portion adapted to embrace the web, and means for securing the forked portion to the intervening web.

9. The combination with a dipper tooth point having its forward portion formed with substantially vertical relatively thin side  
 45 flanges having upper and lower edges converging toward the forward cutting edge, and a web connecting the side flanges and having a thickness similar to that of the side  
 50 flanges, of a removable tip having a wedge-shaped head shaped to form a prolongation of the point, and having a forked rear portion comprising a wear plate adapted to fit  
 55 against the lower side of the web, and an upper flange shaped to fit between the side flanges of the point above the web, there being aligned openings through the flange,  
 60 web and wear-plate, and a removable attaching means passed through the openings.

10. The combination with a dipper tooth point having its forward portion formed with substantially vertical relatively thin side  
 65 flanges having upper and lower edges con-

verging toward the forward cutting edge, and a web connecting the side flanges and having a thickness similar to that of the side flanges, of a removable tip having a wedge-shaped  
 70 head shaped to form a prolongation of the point, and having a forked rear portion comprising a wear-plate adapted to fit against the lower side of the web, and an upper flange shaped to fit between the side flanges of the point above the web, there being aligned  
 75 openings through the flange, web and wear-plate, and a bolt passed through the openings, the opening in the wear-plate being countersunk to receive the head of the bolt, the nut on the bolt being housed in the recess between the side flanges of the point.

11. The combination with a dipper tooth point having its forward portion formed with substantially vertical relatively thin  
 80 side flanges having upper and lower edges converging toward the forward cutting edge, and a substantially horizontal web of a thickness similar to that of the side flanges and connecting the lower portions of the side flanges so as to leave a recess between the  
 85 flanges above the web, of a removable tip having a head of substantially the full width of the point and wedge-shaped to form a prolongation of the point, the tip also comprising a wear-plate of substantially the same  
 90 width as the head and point and adapted to fit against the lower surface of the web, and an upper flange projecting rearwardly substantially parallel to the wear-plate and of a width to fit between the side flanges of the point above the web, the flange, web and wear-plate being formed with substantially  
 95 aligned openings, and a securing means passed through the openings.

12. The combination with a dipper tooth  
 100 point having its forward portion formed with substantially vertical relatively thin side flanges having upper and lower edges converging toward the forward cutting edge, and a substantially horizontal web of a thickness similar to that of the side flanges and connecting the lower portions of the side flanges so as to leave a recess between the  
 105 flanges above the web, of a removable tip having a head of substantially the full width of the point and wedge-shaped to form a prolongation of the point, the tip also comprising a wear-plate of substantially the same width as the head and point and adapted to fit against the lower surface of the web,  
 110 and an upper flange projecting rearwardly substantially parallel to the wear-plate and of a width to fit between the side flanges of the point above the web, there being spaced apart upwardly projecting reinforcing ribs on the upper flange and similar downwardly  
 115 projecting ribs on the wear-plate, the flange, web and wear-plate being formed with substantially aligned openings between the ribs, a bolt passed through the openings having  
 120  
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a nut on its upper end housed between the side flanges, the opening in the wear-plate being countersunk to receive the head of the bolt.

5 13. The combination with a dipper tooth comprising a base and a point removably se-  
cured to the base, the point being substan-  
tially wedge shaped in vertical section and  
converging toward a forward cutting edge,  
10 the point being formed with vertical side  
flanges and an intermediate connecting web  
of a thickness similar to that of the side  
flanges so as to form open recesses in the  
point above and below the web and between  
15 the side flanges, of a removable tip having  
a head shaped to form a prolongation of the  
point, and having a forked rearwardly ex-  
tending portion adapted to embrace the  
front portion of the web, one arm of the fork  
20 extending between the side flanges, and  
means for securing the arms of the fork to  
the intervening portion of the web.

14. The combination with a dipper tooth  
comprising a base and a point removably se-  
cured to the base, the point being substan-  
tially wedge shaped in vertical section and  
converging toward a forward cutting edge,  
the point being formed with vertical side  
flanges and an intermediate connecting web  
30 of a thickness similar to that of the side  
flanges so as to form open recesses in the  
point above and below the web and between  
the side flanges, of a removable tip having  
a head shaped to form a prolongation of the  
point, and having a forked rearwardly ex-  
tending portion adapted to embrace the front  
portion of the web, one arm of the fork ex-  
tending between the side flanges, and a se-  
curing bolt passed through the arms of the  
40 fork and the intervening portion of the web.

15. The combination with a dipper tooth  
comprising a base and a point removably  
secured to the base, the point being substan-  
tially wedge shaped in vertical section and  
converging toward a forward cutting edge,  
45 the point being formed with vertical side  
flanges and an intermediate connecting web  
of a thickness similar to that of the side  
flanges so as to form open recesses in the  
point above and below the web and between  
50 the side flanges, of a removable tip having  
a head shaped to form a prolongation of  
the point, and of substantially the full width  
thereof, and having a forked rearwardly ex-  
tending portion comprising a bottom wear  
55 plate adapted to fit against the lower surface  
of the web, and an upper flange adapted to  
project over the web and between the side  
flanges, the web, flange and wear plate being  
60 formed with substantially aligned openings,  
and a securing means passed through the  
openings.

16. The combination with a dipper tooth  
comprising a base and a point removably  
65 secured to the base, the point being substan-

tially wedge shaped in vertical section and  
converging toward a forward cutting edge,  
the point being formed with vertical side  
flanges and an intermediate connecting web  
of a thickness similar to that of the side  
70 flanges so as to form open recesses in the  
point above and below the web and between  
the side flanges, of a removable tip having  
a head shaped to form a prolongation of  
the point, and of substantially the full width  
75 thereof, and having a forked rearwardly ex-  
tending portion comprising a bottom wear  
plate adapted to fit against the lower surface  
of the web and side flanges, and a narrower  
upper flange adapted to fit between the side  
80 flanges of the point and above the web, the  
tip-flange, web and wear-plate being formed  
with substantially aligned openings, and a  
bolt passed through the openings, the open-  
ing in the wearplate being countersunk to  
85 receive the head of the bolt, the nut on the  
bolt being housed in the recess between the  
side flanges of the point.

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