May 20, 1969 R. C. HENSLEY 3,444,633

TWO-PART EXCAVATING TOOTH

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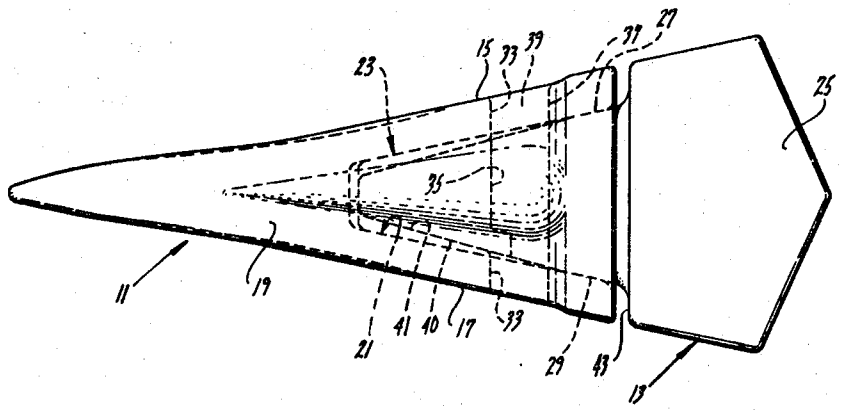

Fig. 1

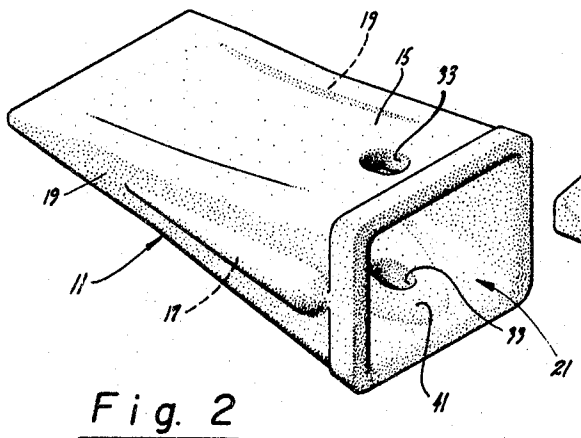

Fig. 2

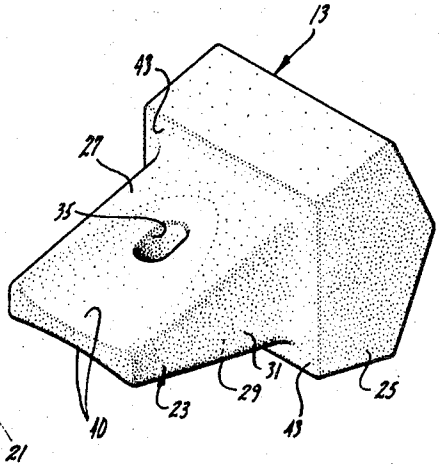

Fig. 3

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Fig. 5

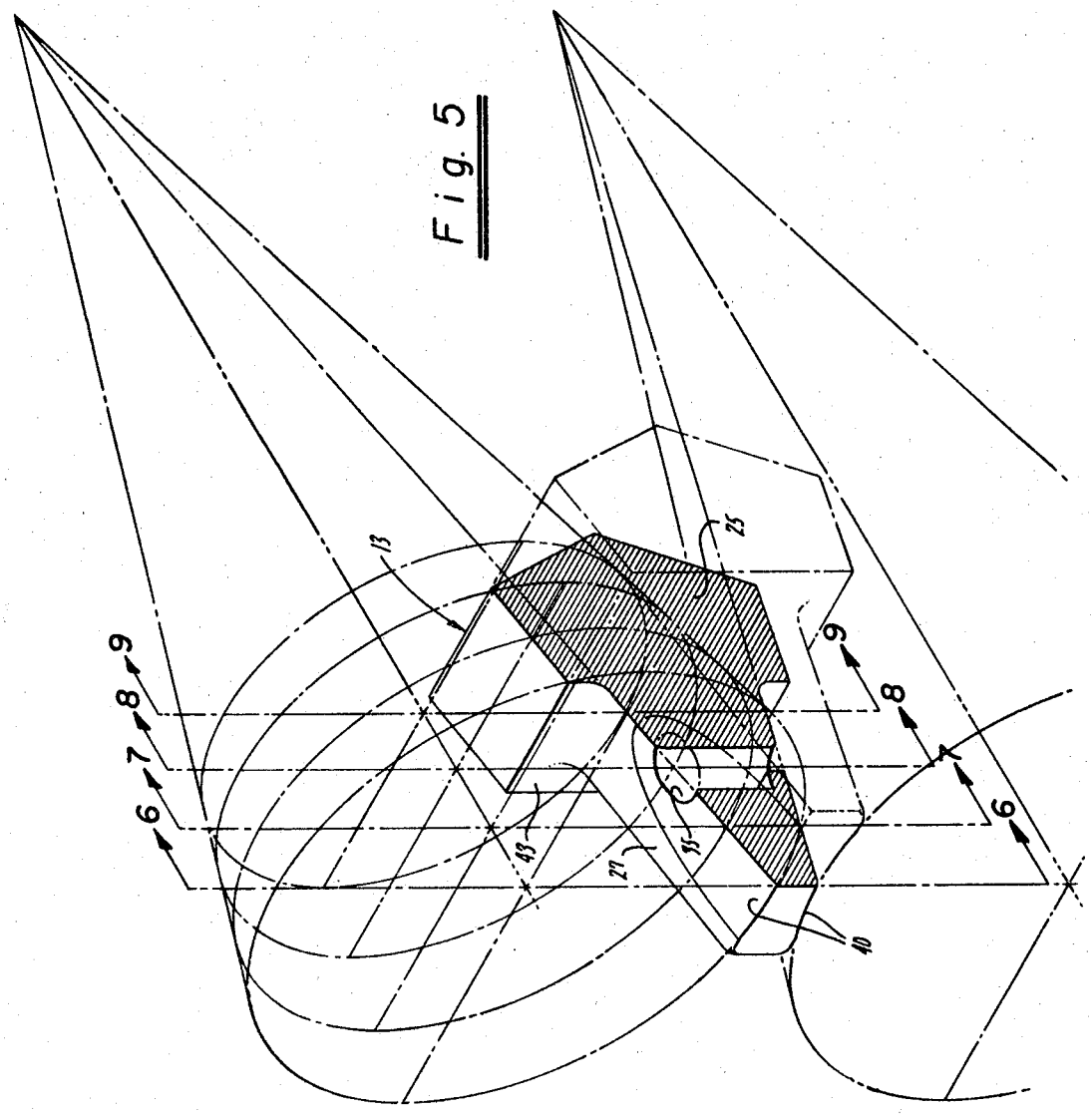
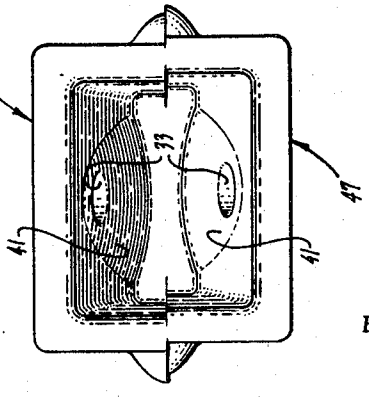


Fig. 4



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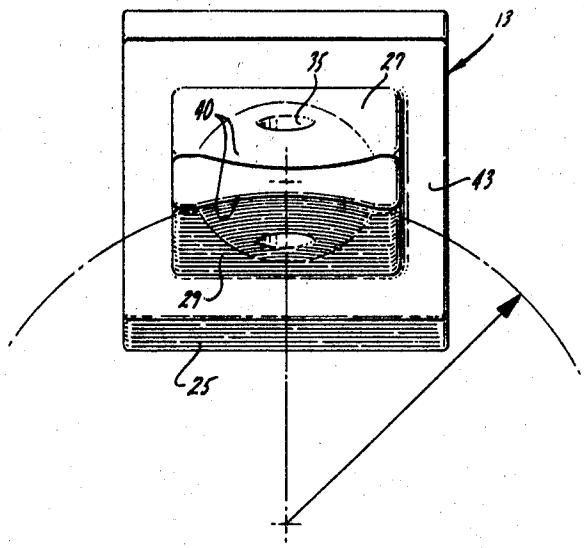

Fig. 6

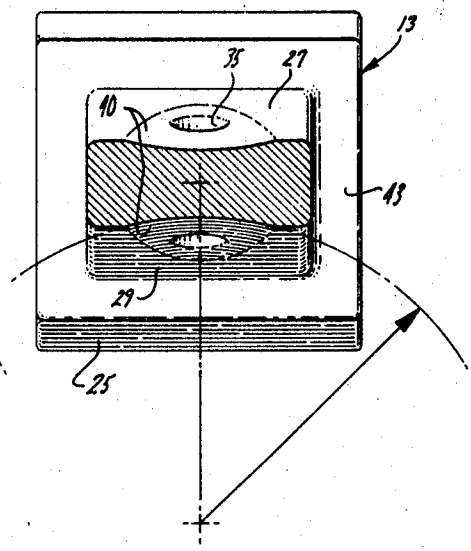

Fig. 7

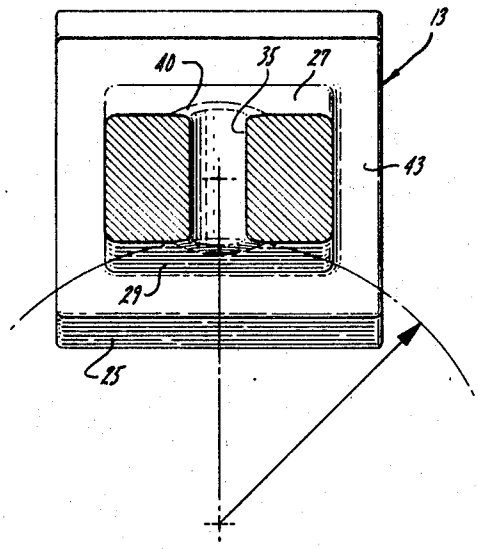

Fig. 8

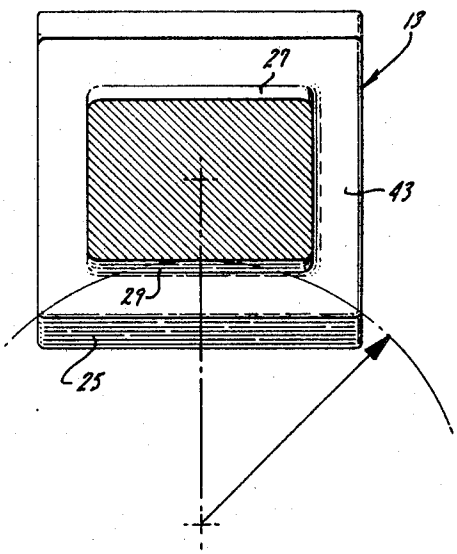

Fig. 9

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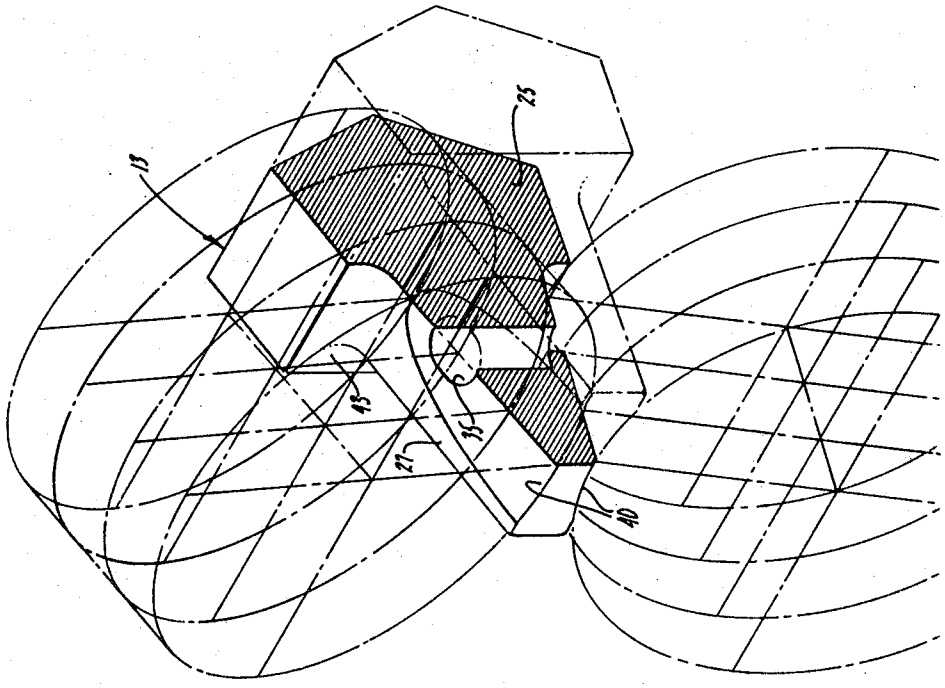

Fig. 10

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3,444,633

TWO-PART EXCAVATING TOOTH

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Int. Cl. E02f; E21c *13/00*
U.S. Cl. 37—142 9 Claims

ABSTRACT OF THE DISCLOSURE

An excavating tooth including an adapter and a wear point having generally wedge shaped mating surfaces the faces of which include a cooperating depression and raised portion which decrease both in height and width from the vertex of the wedge to the rear of the adapter and point.

This invention relates to excavating teeth and more particularly to excavating teeth of the two-part type including an adapter and a wear point.

In order for excavating teeth of the two-part type to be suitable for rugged field use, the parts must fit together tightly with substantial surface contact, not only when they are new but also when worn. In the past, wedged shaped adapter noses and wear point sockets, together with a resilient connecting element have served to provide this tight fit between the parts even after wear. The wedge surfaces of such teeth, however, are usually on the upper and lower surfaces only, the side surfaces ordinarily being parallel to each other. As wear progresses on the parallel sides, surface contact to oppose lateral movement between the parts is gradually depleted and eventually permits such wide lateral movement as to cause breakage. The problem is not overcome by forming the sides in a wedge shape, since the sides will not necessarily wear at the same rate as the top and bottom.

Various other attempts have been made to provide adequate all around surface contact between the parts but each attempt has met with some substantial disadvantage.

Accordingly, it is a general object of this invention to provide an improved two-part excavating tooth.

It is a more particular object of this invention to provide such an improved excavating tooth in which surface contact is maintained between the parts even after extensive wear.

It is a further object of this invention to provide an excavating tooth of the aforementioned character which also includes a heavy section on the adapter nose and the wear point itself at points of high stress.

It is still another object of the invention to provide a tooth of the aforementioned character and which further minimizes the problem of fit caused by shift or off center manufacture of the upper and lower halves of either the adapter or the wear point.

These and other objects and features of the invention will become more clearly apparent upon a review of the following description in conjunction with the accompanying drawing, in which:

FIGURE 1 is a side elevational view of an excavating tooth in accordance with the invention;

FIGURE 2 is an isometric view of the wear point portion of the tooth shown in FIGURE 1;

FIGURE 3 is an isometric view of the adapter portion of the tooth shown in FIGURE 1;

FIGURE 4 is a rear elevational view of a wear point manufactured in accordance with the invention showing an exaggerated shift between the upper and lower parts thereof;

FIGURE 5 is a schematic view showing one method of construction for an adapter in accordance with the invention;

FIGURES 6, 7, 8 and 9 are sectional views taken along the lines **6—6**, **7—7**, **8—8** and **9—9**, respectively, of FIGURE 5; and

FIGURE 10 is a schematic view showing another method of construction of an adapter in accordance with the invention.

Referring to FIGURE 1 there is shown an excavating tooth according to the invention including a wear point **11** and an adapter **13**, also shown in FIGURES 2 and 3, respectively. The wear point is generally of the box type including a top **15** and a bottom **17** and sides **19**. The top, bottom and sides together form a generally wedge shaped socket **21** into which fits the generally wedge shaped nose **23** of the adapter **13**. The adapter further includes a rearward portion **25** which may be welded to the lip of a dipper bucket or the like. Rather than the weld on type of adapter, it is also common that a variety of other shanks may be employed whereon the adapter is bolted, riveted, or otherwise secured to the lip of the dipper bucket.

Like the socket of the wear point, the nose of the adapter includes a top **27**, a bottom **29** and the sides **31**. The adapter and wear point are manufactured such that the sides **31** of the adapter fit inside the sides **19** of the wear point with a small amount of clearance. Consequently, the contact between the wear point **11** and the adapter **13** takes place on the top and bottom surfaces **27** and **29** of the adapter.

In order to hold the wear point onto the adapter, the wear point is provided with openings **33** in the top and bottom walls thereof and the adapter has an opening **35** through its nose which, when the parts are assembled, is in registry with the openings **33** on the wear point. A pin **37**, having a resilient center, **39**, is passed through the openings **33** and **35** to not only secure the parts together but to firmly seat the wedge shaped socket of the wear point onto the generally wedge shaped nose of the adapter.

While the socket of the wear point and the nose of the adapter have heretofore been generally described as wedge shaped, it is noted that the top and bottom **27** and **29** of of the adapter nose includes a depression **40** whose depth generally decreases from the tip toward the rear of the adapter nose. Likewise the generally wedge shaped socket of the wear point includes a raised portion **41** corresponding to the depression **40** on the adapter and generally decreasing in depth from the vertex of the socket toward the open end.

When the wear point **11** fits onto the adapter **13** the cooperating upper and lower wedge faces maintain substantial surface contact to withstand vertical forces on the tooth. But also, the concave depression on the wedge faces of the adapter nose and the cooperating convex raised portions in the socket of the wear point provide surface contact to resist lateral forces exerted on the tooth. Moreover, as the parts are subjected to wear, the wear point **11** rides up on the nose of the adapter **13** under the influence of the resilient pin **37**. In this manner not only do the wedge shaped surfaces maintain surface contact but also the concave and convex portions of the adapter and wear point maintain surface contact to continue resistance of the lateral forces.

Moreover, the convex raised area on the interior of the wear point socket increases the cross section of the wear point in an area of major stress. Thus, as can be seen in FIGURE 1 the raised areas is greatest at the vertex of the socket at which point the wear point is subjected to severe stresses when its tip receives a vertical load. Also, even though the adapter has a reduced cross section at its vertex the cross section of the nose remains heavy at the rearward portion adjacent the shoulders **43**

in which area it is subjected to major forces particularly when the entire tooth is subjected to a vertical force.

In two-part teeth manufactured heretofore and which include generally a wedge shaped adapter nose and wear point socket, there has been a problem of manufacturing tolerance whenever the wedge faces were other than flat. In the normal manufacture, of excavating teeth, the castings are made from a pattern including two sections, one for the top and one for the bottom. In some instances, when these sections are joined together they are not precisely aligned and the resultant casting has a shift between its upper and lower portions as can be seen in an exaggerated sense in FIGURE 4.

The shift shown in FIGURE 4 includes an upper section **45** displaced to the left of the lower section **47**. In cases where the cooperating wedge faces are flat this shift, which is ordinarily on the order of a sixteenth of an inch or less, is of little or no importance since the side walls of the adapter and wear point are manufactured with sufficient clearance. However, a problem does ordinarily exist when the wedge faces are not flat. Assume, for example, that the wedge faces on the adapter include a constant depression extending from front to back and the wedge faces on the wear point socket include a corresponding raised portion. If this wear point included a shift of the type shown in FIGURE 4, it would be extremely difficult, if not impossible, to affix the wear point to the adapter. The mating surfaces at the constant depression in the adapter and the constant raised area in the wear point will not incorporate the lateral clearance ordinarily encountered along the side walls of the parts.

With the construction as shown in the present invention, however, the problem of shift is minimized since in the area that the shift is most critical the wedge faces of the socket and of the adapter nose are substantially flat. Thus, when a wear point having a shift essentially as shown in FIGURE 9, is placed upon an adapter without such a shift, the parts will attempt to twist because of the displacement at the vertex of the socket and the adapter nose. But, at the rear of the socket and adapter nose and at the location of the key ways, the wedge faces are substantially flat and the key can be placed through the holes and the point secured on the adapter.

Having described the general nature of the invention, reference to FIGURES 5 through 9 will show one form of construction wherein the depressions in the upper and lower wedge faces of the nose, as well as the corresponding raised portions of the wear point socket conform to the surfaces of cones having axes parallel to each other and to the horizontal mid plane of the parts. As can be seen particularly from FIGURES 6 through 9, the depression in the nose decreases from the tip thereof to the rear. Thus, at the four sections shown the depression takes the form of four different circular arcs having a commonly located center but a continually reducing radius.

Referring to FIGURE 10, another embodiment of the invention is shown wherein, rather than the surfaces being formed as cones they are formed by the surface of cylinders having axes which are at an angle to the mid plane of the parts somewhat greater than the angle of the wedge faces themselves. In the case of the embodiment shown in FIGURE 10 the generally decreasing depression on the nose is also apparent but instead of the construction as shown in FIGURES 6 through 9, it should be realized that the depressions would all be from a common elliptical arc but with a continually lowering focal point.

Having described the invention in terms of two separate embodiments, it should be realized that the invention is not limited to the particular embodiment shown but rather to the claims hereinafter appended.

I claim:

1. An excavating tooth comprising an adapter and a wear point, said adapter including a generally wedge shaped nose having upper and lower forwardly converging wedge faces, at least one of said wedge faces including a depression therein decreasing in depth and width from the vertex of the wedge faces toward the rear thereof, said wear point including a wedge shaped socket having a raised portion therein corresponding to the depression on the nose of said adapter and generally decreasing in height and width from the vertex of said socket toward the open end thereof, and means for removably securing said wear point to said adapter the surfaces of said depression and said raised portion each including a segment of a surface of revolution.

2. An excavating tooth as described in claim **1** wherein said depression on the nose of the adapter and the raised portion of the socket on the wear point conform to the surface of a cone having an axis parallel to the mid plane of the point.

3. An excavating tooth as defined in claim **1** wherein said depressions are formed on the surface of a cylinder having an axis disposed at an angle with respect to the mid plane of the tooth greater than the angle of the wedge faces themselves.

4. A wear point comprising top and bottom walls and side walls, said top and bottom walls being generally convergent to form a wedge shaped socket, the interior of the wedge shaped socket including a raised portion decreasing in height and width from the vertex of the socket toward the open end thereof the surface of said raised portion including a segment of a surface of revolution.

5. A wear point as defined in claim **4** wherein said raised portion conforms to the surface of a cone having an axis parallel to the mid plane of the wear point.

6. A wear point as defined in claim **4** wherein said raised portion conforms to the surface of a cylinder having an axis at an angle with respect to the mid plane of the wear point greater than the angle of the wedge faces themselves.

7. An adapter including a nose having upper and lower surfaces converging toward the front thereof to form a wedge shaped nose, said wedge shaped nose including a depression having a depth and width decreasing from the vertex of the edge shaped nose to the rear thereof the surface of said depression including a segment of a surface of revolution.

8. An adapter as described in claim **7** wherein said depression conforms to the surface of a cone having an axis parallel to the mid plane of the adapter.

9. A wear point as defined in claim **7** wherein said depression conforms to the surface of a cylinder having an axis at an angle to the mid plane of the adapter greater than the angle of the wedge face itself.

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U.S. Cl. X.R.

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