Aug. 3, 1965 T. A. RATKOWSKI 3,197,894

DIGGING TOOTH WITH SCREWS SET INTO RESILIENT POCKETS

Filed July 26, 1962 2 Sheets-Sheet 1

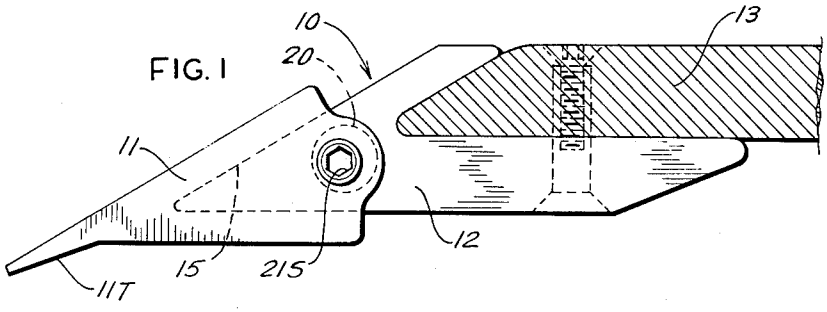


FIG. 1

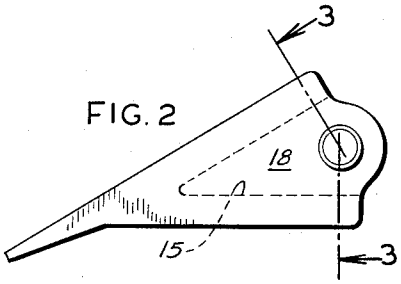


FIG. 2

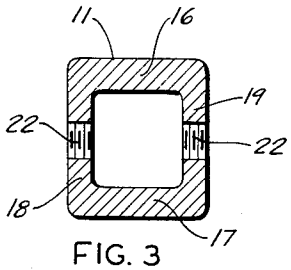


FIG. 3

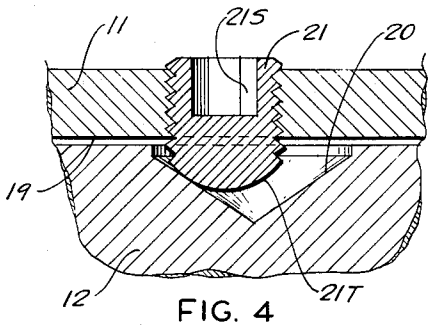


FIG. 4

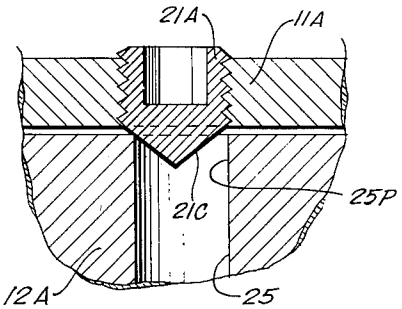


FIG. 5

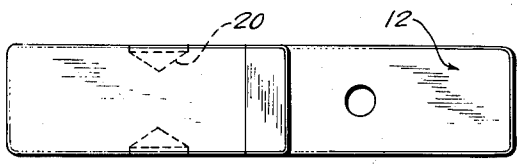
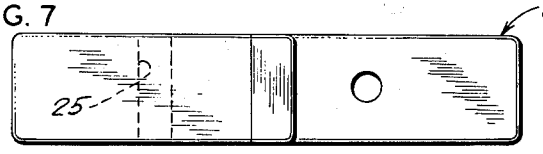


FIG. 6

FIG. 7



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Aug. 3, 1965 T. A. RATKOWSKI 3,197,894

DIGGING TOOTH WITH SCREWS SET INTO RESILIENT POCKETS

Filed July 26, 1962 2 Sheets-Sheet 2

FIG. 8

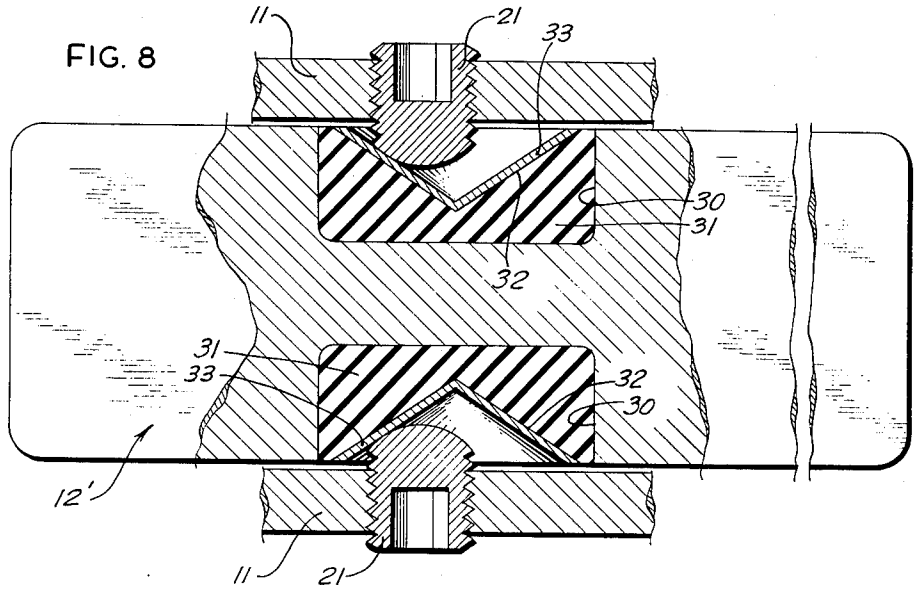
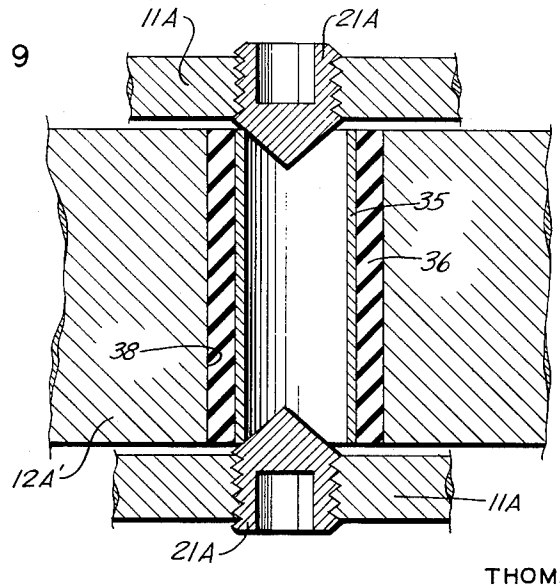


FIG. 9



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DIGGING TOOTH WITH SCREWS SET INTO RESILIENT POCKETS

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5 Claims. (Cl. 37—142)

This invention relates to digging teeth of a form to be detachably secured to an adapter or like holder.

It is a common practice to provide dipper buckets, trenchers, scrapers and like power operated earth moving equipment with digging teeth of a readily replaceable nature. Usually, such replaceable teeth or so-called points are associated with an adapter in turn rigidly secured to the lip of the power-operated member. Such teeth are sometimes detachably secured directly to the aforesaid lip. Both arrangements are contemplated under the present invention.

There is a common striving by workers skilled in this art to develop an efficient arrangement enabling a point to be removed and replaced with facility. Thus, where such detachment and replacement are difficult to accomplish, there is a reluctance on the part of the shovel operator to make the needed substitution for a worn tooth. As a consequence, the worn tooth is not replaced, and the efficiency of the digging operation is diminished.

The arrangements heretofore proposed for detachably securing the point in place are not characterized by the ease and facility of point replacement that typifies the present invention, and especially are not capable of accomplishing the kind of fit that is possible under the present invention between the point and the holder member, especially one that is resilient or capable of absorbing shock loads. These accomplishments represent the objects of the present invention and the details thereof will be more apparent from the description to follow.

Thus, in accordance with the present invention a dipper tooth, in the spaced walls thereof that in part define a recess or socket for receiving the complemental part of the holder, is provided with tapped openings in which a pair of oppositely acting set screws are disposed. The heads of the set screws are outward of the openings in the point so as to be accessible for wrench adjustment thereof, and the inner ends of the set screws are sloped and adapted to seat in receiving pockets in the holder. It is therefore a relatively simple operation to seat the set screws operatively, and by having the pockets rearwardly offset relative to the axes of the screws, the sloped ends of the latter will be effective to produce micro-adjustment when drawing the tooth up on the holder. Preferably, the set screw seats are resilient.

In connection with the foregoing, it is important to note that it is highly desirable to be able to provide for take-up or slack adjustment of the point relative to the holder during prolonged use of the tooth assembly. Thus, not only does the exterior surface of the tooth gradually wear, but there is also some tendency for the tooth to erode the holder itself resulting in loosening of the tooth which can only be compensated for by pulling the tooth farther rearwardly on the holder.

Usually in the past this has been accomplished by resilient interconnections or by wedge means that must be repeatedly adjusted by a sledge or mallet incidental to taking up the slack that has occurred as a result of rubbing action between the engaged surfaces of the point and the holder.

These adjustments incidental to eliminating slack can be readily compensated for under the present invention by tightening the set screws which are so related to the

pockets in the holder as to produce a wedging action in cooperation therewith during tightening, tending to pull the point up on the holder, and it will be realized that such tightening is manifest in a degree of slack adjustment not heretofore attained.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawing which, by way of illustration, shows a preferred embodiment of the present invention and the principles thereof and what is now considered to be the best mode contemplated for applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

FIG. 1 is a side elevation of a tooth assembly constructed under the present invention, and showing in section the lip of a shovel or the like presenting the tooth assembly;

FIG. 2 is a side elevational view of the point included as a part of the assembly shown in FIG. 1;

FIG. 3 is a sectional view substantially on the line 3—3 of FIG. 2;

FIG. 4 is a fragmentary sectional view on an enlarged scale illustrating in detail the action of the set screw element in accordance with one form of the present invention;

FIG. 5 is a sectional view similar to FIG. 4 showing a modification;

FIGS. 6 and 7 are plan views of the adapters related, respectively, to the forms of the invention shown in FIGS. 4 and 5; and

FIGS. 8 and 9 are sectional views illustrating additional modifications of the adapter or holder structure.

The dipper tooth assembly **10** illustrated in FIG. 1 includes a tooth or replaceable point **11** detachably secured to an adapter **12** representative of what is hereinafter referred to as the holder for the point **11**. The adapter **12** in turn is rigidly secured to the forwardmost edge of the lip **13** of a dipper bucket, scraper, scarifier blade or the like. It should be noted, however, that while the present invention will be described herein from the standpoint of an associated point and adapter, the point can also be associated with other kinds of holders, especially when used for trenching operations or the like.

The point **11** is in the form of a one-piece casting provided with an internal socket **15** shaped to neatly receive the forwardmost end of the holder **12** of which the point **11** is to be detachably secured. In the present instance, the socket **15** is generally V-shaped, the boundaries thereof being defined by the inner surfaces of the spaced upper and lower walls **16** and **17**, and the spaced opposed side walls **18** and **19** of the point. When the point is mounted on the holder **12**, the exterior surfaces of the latter seat complementally in contact with the inner surfaces of the walls of the point identified above in connection with FIG. 3.

Under and in accordance with the present invention, the side walls of the holder **12** which will be disposed immediately opposite the inner surfaces of the side walls **18** and **19** of the point are provided with pockets as **20**, FIGS. 4 and 6, affording seats for set screws as **21** mounted in tapped openings in the side walls of the point.

Thus, as shown in FIG. 3, the side walls **18** and **19** of the point are drilled and tapped at **22** enabling set screws as **21** to be threadedly mounted therein. The set screws **21** are of the Allen-type and the socket or heads **21S** thereof are disposed outwardly of the side walls of the point to enable an Allen wrench to be applied thereto.

The opposite or inner ends of the set screws as 21 are tapered at 21T. The pockets or recesses 20 are of tapered form and are offset rearwardly of the center lines of the tapped openings 22. The tapers are substantially complemental so that the set screws entering the pockets 20 do so with a wedging action, tending to draw the point 11 firmly up on the holder 12 in a rearward sense. Thus, the taper of the screw and the taper of the pocket incline rearwardly in a complemental relationship, and when the screw is forced in the pocket, this is accompanied by movement of the point rearward on the holder. These pockets may be resiliently lined for purposes explained hereinafter.

It will therefore be seen that the set screws 21, when the inner tapered ends thereof are seated in the tapered pockets 20, not only serve to retain the point 11 on the holder, but also enable micro-thrusts to be established on the point incidental to effecting an optimum fit of the point 11 on the holder 12.

A modified form of the invention is illustrated in FIGS. 5 and 7. The holder 12A can be viewed as identical to the holder 12 identified above with the exception that the openings or recesses in the sides of the holder for receiving the ends of the set screws are represented by the ends of a through-opening 25 which extends through the holder from one side thereof to the other.

Further, the point 11A can be assumed to be identical to the point 11 described above with the exception that the inner tapered ends of the set screws 21A associated therewith are in the form of cones 21C in comparison to the rounded convex ends 21T of the set screws 21.

Again, the axis of the receiving pockets, 25P, is offset relative to the axes of the set screws as 21A, and when the tapered end of each set screw 21A is entered in the associated pocket as 21P, the tapered wall 21C of the screw is effective to bear on the forwardmost bounding surface within the holder that defines the screw receiving pocket with the advantageous wedging action described above.

As noted above, the set screw seats in the holder may be resilient, and this permits shock loads imposed on the tooth to be absorbed. Such resilient lining of the recesses in the holder which afford the pockets for the retainer screws can be applied to either of the arrangements illustrated in FIGS. 8 and 9.

Thus, referring to FIG. 8, the modified holder or adapter is illustrated at 12', and each side thereof is formed with a relatively large opening or recess 30 in which a rubber block 31 is press-fitted. The surface of the block 31 which faces outwardly of the holder 12' is formed with a conical indentation 32, and this in turn is lined with a conical metal cup 33 presenting the desired conical seat adapted to receive the tapered or sloped end 21T of the set screw 21. The metal cup is bonded to the rubber block as by vulcanization.

The conical seats 32 thus afforded enable the set screws to act wedgingly therein incidental to drawing the point up on the holder with the desired force, but inasmuch as the blocks 31 are resilient, shock loads can be absorbed without incurring damage to the retainer screws.

In affording resilient pockets for a holder having a through opening as 25, FIG. 5, resort is had to the arrangement illustrated in FIG. 9. In this instance, a metallic sleeve or tube 35 is firmly bonded to the inside diameter of a rubber bushing 36, as by vulcanization, and the latter is pressed into a corresponding through opening 38 formed in the modified holder 12A' to extend from one side to the other, and again the relationship of parts is such that the ends of the resilient insert 35–26 afford seats for receiving the tapered inner ends of the retainer screws as 21A, FIG. 5. It will be appreciated from what has been described above in the forms of the invention illustrated in FIGS. 8 and 9 that the axes of the resilient pockets in the holder are offset

relative to the axes of the retainer screws for the purpose described.

The present invention, it will be realized, is characterized by an eccentric relationship between the axis of the retaining screws as 21 and the seats or pockets in the holder associated therewith. Specifically, the seats or pockets are offset rearwardly to define the eccentric relationship, and therefore the tapered inner ends of the screws, when turned in, first bear wedgingly on the forwardmost bounding surfaces defining the pockets to produce the desired contact of the screws with internal surfaces of the holder, thereby resulting in the desired retention of the point on the holder. The wedge action permits the point to be drawn up on the holder with a selected force.

In the event that the point becomes loose on the holder as the result of attrition between the opposed inside upper and lower surfaces of the point and holder, the resultant slack can be eliminated by wedging the screws further into the pockets. Micro-adjustments are in fact possible assuring a perfect fit at any time throughout the useful life of the tooth assembly.

Advantageously, under the present invention shock loads imposed on the tooth can be readily absorbed by affording screw-receiving seats of a resilient nature at the sides of the holder or adapter. The ability of the tooth to absorb shock loads is particularly important in the instance of small teeth.

When the exterior of the point 11 or 11A has been excessively worn down on one side, which is the usual wear pattern, the tooth can be removed and reversed to present the fresher or less worn surface, and when the reverse side has been worn excessively, the completely worn point can be removed and replaced by a new point.

Hence, while I have illustrated and described preferred embodiments of the present invention, it is to be understood that these are capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desired to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a tooth assembly of the kind described, a holder and a replaceable point supported thereby, and means detachably securing the point to the holder including screws having tapered ends disposed in openings in spaced wall portions of the point with the heads thereof disposed outward of said openings and the tapered ends thereof seated in corresponding resilient pockets in the holder.

2. A tooth assembly according to claim 1 wherein said pockets are off-set rearwardly of the openings for said set screws.

3. In a tooth assembly of the kind described, a holder and a replaceable point supported thereby, said point including a pair of spaced opposed walls in part defining a socket adapted to receive the holder, and means detachably securing the point to the holder including screws secured in openings in said walls of the point with the heads thereof disposed outward of said openings, the opposite inner ends of the screws being tapered and wedgingly engaged with surfaces in the holder in part bounding resilient pockets therein adapted to receive the inner ends of the screws.

4. The tooth assembly of claim 3 wherein said pockets have a metal lining.

5. In a tooth assembly of the kind described, a holder and a replaceable point supported thereby, said point including a pair of spaced opposed walls in part defining a socket adapted to receive the holder, said holder having recesses in the sides thereof, resilient inserts in the recesses affording pockets, and means detachably securing the point to the holder including screws with tapered ends disposed in openings in said walls of the points with the heads thereof disposed outward of said openings and

the tapered ends thereof wedgingly engaged in said pockets.

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