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RIPPER TOOTH FOR BULLDOZER BLADE

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2 Sheets-Sheet 1

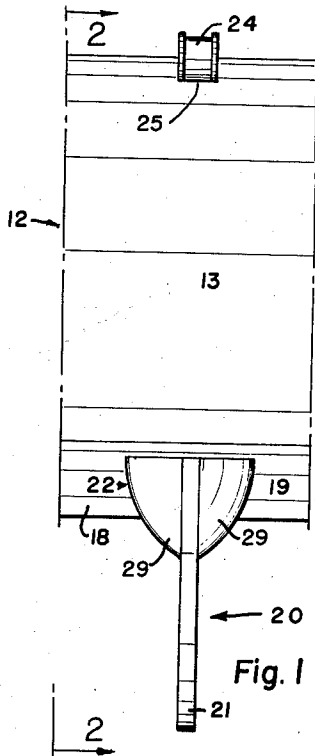


Fig. 1

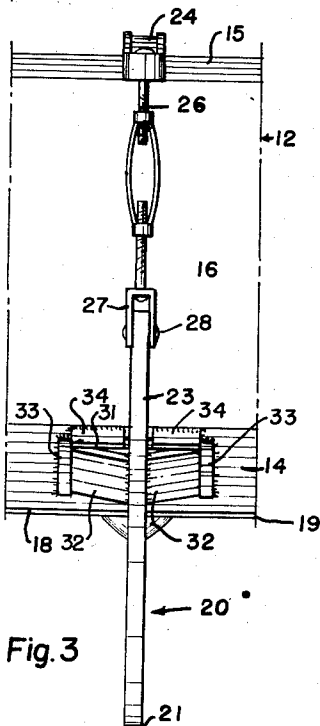


Fig. 3

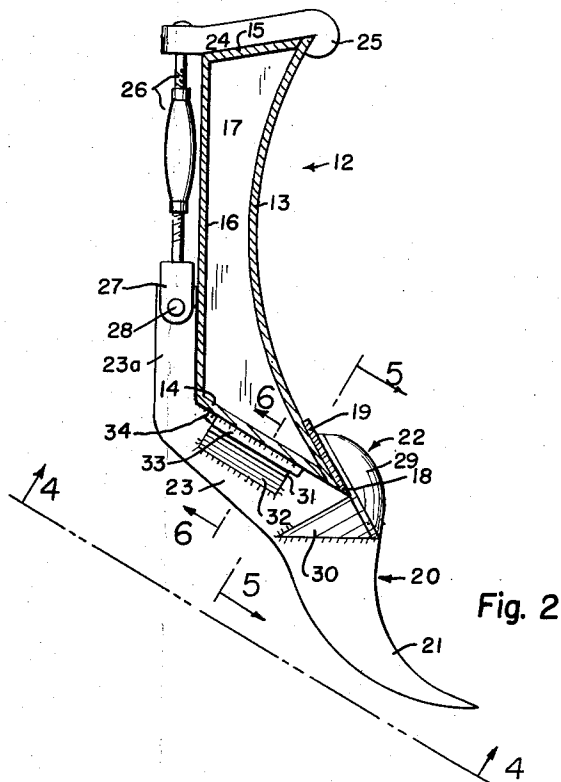


Fig. 2

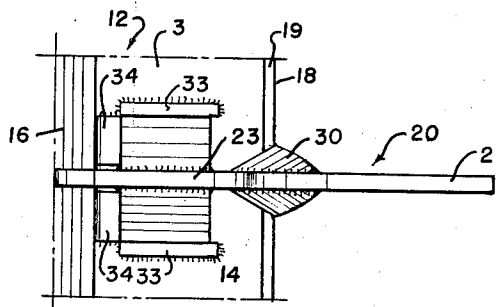


Fig. 4

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RIPPER TOOTH FOR BULLDOZER BLADE

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4 Claims. (Cl. 37—145)

This invention relates to earth-moving apparatus and more particularly to earth-ripping teeth and has as a primary object the provision of an improved construction of an earth-ripping tooth, hereinafter called a ripper tooth, which is an accessory item for an ordinary bulldozer, being adapted for attachment to the bulldozer blade to extend below the bottom edge of the blade.

Other objects of the invention include the provision of an improved construction of a ripper tooth adapted to be carried upon the blade of a bulldozer or similar earth-moving equipment, which: (a) will permit the bulldozer to cut and rip up furrows of packed earth, rock or pavement too hard for ordinary bulldozing operations with the blade only, (b) may be mounted upon the blade at any position along the blade or at a selected position on the blade in a specially prepared socket, (c) is adapted to naturally lock and wedge itself upon the blade when mounted thereon, (d) is adapted to transmit the forces resulting from a ripping operation upon a substantial area of the blade and thereby prevent over-stressing of the plates forming the blade, (e) is stabilized to resist lateral or twisting forces against the tooth, (f) has the minimum possible weight for the requisite sturdiness and strength required in heavy-duty ripping operations, (g) is sufficiently light in weight to be handled by a single man and can be quickly and easily mounted upon or removed from the bulldozer blade without the aid of a crane or hoist and, (h) is an easily manufactured, economical rugged and durable unit.

With the foregoing and other objects in view, all of which more fully hereinafter appear, my invention comprises certain novel and improved constructions, combinations and arrangements of parts and elements as hereinafter described and defined in the appended claims and illustrated, in preferred embodiment, in the accompanying drawing, in which:

Figure 1 is a front elevation of a portion of a conventional bulldozer blade with my improved ripper tooth attached thereto.

Figure 2 is a side elevation of the ripper tooth section of the bulldozer blade, as viewed from the indicated line 2—2 at Fig. 1.

Figure 3 is a rear elevation of the portion of the bulldozer blade and of the ripper tooth and showing elements providing for a socket on the bottom of the bulldozer blade to better hold the tooth in position.

Figure 4 is an underside view, as viewed from the indicated line 4—4 at Fig. 2.

Figure 5 is a fragmentary sectional detail of a portion of the ripper tooth and a fragment of the bulldozer blade as viewed from the indicated line 5—5 at Fig. 2, but on an enlarged scale.

Figure 6 is a fragmentary sectional detail of a portion of the ripper tooth and bulldozer blade further illustrating socket forming elements on the bulldozer blades, all as viewed from the indicated line 6—6 at Fig. 2, but on an enlarged scale.

Figure 7 is a side elevation similar to Fig. 2 but show-

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ing an alternate construction of the ripper tooth attaching elements.

Figure 8 is a fragmentary sectional detail as viewed from the indicated line 8—8 at Fig. 7, but on an enlarged scale.

Figure 9 is a side elevation similar to Fig. 2, but showing another alternate construction of the ripper tooth attaching elements.

Figure 10 is a fragmentary view of the underside of the blade as from the indicated line 10—10 at Fig. 9.

Referring in detail to the drawing, my improved ripper tooth 20 is adapted to be carried upon a bulldozer blade 12 of a type ordinarily used for heavy duty equipment. Such a blade 12 is formed as an elongated box-like unit with the longitudinal members thereof including an upstanding, inwardly-arched face plate 13, a bottom plate 14, a top plate 15 and a rear wall plate 16 and with the transverse members thereof including end and intermediate reinforcing plates 17. Only a portion of the blade is shown in the drawing since it does not change in section, and linkages and bars which interconnect the blade to the tractor and hold it in an upright position are not shown in the drawing.

The arched construction of the lower section of the face plate 13 provides a forwardly-extending, and leading bottom edge 18 which is along the corner of a reinforcing wear strip 19 at the lower edge of the plate and this leading edge is the cutting edge of the blade 12. The bottom plate 14 slopes upwardly and rearwardly from the leading bottom edge 18 so that in section the lower portion of the bulldozer blade 12 is wedge-shaped with the edge 18 at the cutting point of the wedge.

The ripper tooth 20 is formed as a base portion which is adapted to embrace and interlock itself upon the bottom of the blade 12, and as a tooth finger 21 which depends from the base. The unit is preferably shaped from a heavy steel plate with the base portion being further reinforced as hereinafter described. This plate is of sufficient thickness to provide a requisite sturdiness to the finger 21 and this finger may be shaped in any suitable manner such as the hooked construction illustrated. The unit may be made of hardened steel or the finger may be hard-faced according to various conventional practices to provide a long life in actual use.

The base of the ripper tooth has a socket-like configuration at its top to embrace the bottom of the blade 12, as stated, and this socket is defined by a head 22 at the forward side which extends over the leading edge 18 to bear against the wear plate 19, and an arm 23 which extends along the underside of the bottom plate 14 and thence upwardly against the rear wall plate 16 as at 23a to connecting means hereinafter described. The wedge shaped leading-edge section of the bulldozer blade 12 is fitted into this socket and the ripper tooth is locked into position on the blade by the steps of inclining the tooth with the arm 23a rearwardly and downwardly so that the leading edge 18 may be placed in the socket.

Then, the arm 23 is rotated upwardly to push the leading edge 18 to its position in the socket under the head 22 and position the upright portion of the arm 23a against the rear wall plate 16. Pressure on the finger 21 in ripping operations in a direction of forward movement of the blade will tend to rotate this tooth in the direction of the locking position so that the tooth will ordinarily hold itself upon the bulldozer blade, while pressure upon the finger 21 in a reverse direction of movement will disconnect the tooth from the blade. Such connecting and disconnecting of the tooth from the blade becomes an extremely simple operation where no actual lifting of the tooth is required.

When so positioned, the tooth may be secured by connecting the end of the arm 23a to the bulldozer blade

12. Figs. 1 through 6 illustrate a tension-type arm attachment which includes a holding bar 24 adapted to set upon the top plate 15 and having a hook 25 at one end adapted to grasp the forward top edge of the arched face plate 13. This bar is of sufficient length so that the rear end overhangs the rear wall plate 16 and a turnbuckle rod 26 is connected to this overhang by a suitable orifice therein. The turnbuckle rod 26 depends from this overhanging end to the top of the arm 23a and is connected thereto by an ordinary clevis 27-pin 28 arrangement, the pin extending through orifices in the clevis and a registering orifice at the top of the arm 23a. In such an arrangement the tooth may be set at any selected position upon the bulldozer blade 12 and then locked in position by the bar-turnbuckle connector.

When the finger 21 is used for ripping earth, the head 22 will exert a tremendous force upon the wear strip 19 and on the face plate 13, and the head 22 is therefore strengthened by wing members 29 at each side of the plate forming the tooth. The underside of each wing 29 is flush with the underside of the plate portion of the head so that the combined surface of the plate portion and wings will bear against the wear strip 19 and thereby reduce the unit bearing stress at the surface of contact, as well as strengthen the head itself.

The outstanding wing members 29 extend below the head 22 and along the front of the ripper tooth below the socket for the blade 12. Each wing is reinforced in the section below the sockets by a gusset 30. Each gusset extends from the outer edge of its wing member to the central plate forming the body of the ripper tooth 20. The gussets 30 form corners at their upper junctures with the wing members 29 and such corners become stops which fit against the cutting edge 18 of the blade with the tooth mounted on the blade to prevent twisting of the tooth 20 when it is so mounted. These reinforcing wings 29 are made sufficiently large to provide a bearing area against the wear strip 19 which will avoid overstressing any portion of the bulldozer blade 12 and in combination with the gussets 30 they will strengthen the head 22 to withstand any load imposed upon the tooth. To stabilize the ripper tooth upon the bulldozer blade against lateral forces which would tend to tip the tooth sidewise, a shelf plate 31, outstands from each side of the arm 23 and bears against the bottom plate 14 of the bulldozer blade. Each shelf plate may be welded to the central body plate of the tooth as shown at Fig. 6 or the two opposing shelf plates may be a single member set across a notch in the body plate of the tooth to provide greater strength to the unit. Each shelf plate 31 is reinforced against tipping by inclined strut plates 32 or any similar reinforcement which holds them normal to the members forming the body of the ripper tooth 20. It is to be noted that the shelf plates 31 cooperate with the wings 29 of the head 22 to form opposing surfaces between which the wedge shaped leading bottom portion of the bulldozer blade will bear and a substantial portion of the forces occurring in the operation of the ripper tooth will be taken by the shelf plates bearing against the bottom plate 14.

This construction of the ripper tooth will permit it to be positioned at any point along the bulldozer blade. However, for ordinary use it is desirable to position the ripper tooth at a selected point of the bulldozer blade, ordinarily in line with members connecting the bulldozer blade to the tractor not herein shown. When the ripper tooth is to be positioned at such a selected point it is desirable to provide a socket along the underside of the bulldozer blade to further secure the tooth in position. Such a socket may be formed of bars welded to the underside of the bottom plate 14 and include a pair of side edge bars 33 which fit alongside the edges of the shelf plates 31 and function to prevent lateral movement or twisting of the tooth. Also the socket will include

back bars 34 which bear against the back edge of the shelf plates 31 to resist the direct loading forces acting upon the ripper tooth and reduce the loads and pressure on the head 22 bearing against the wear strip 19.

Figs. 7 and 8 show an alternate construction of elements for attaching the arm portion 23a of the tooth 20 against the rear wall 16 of the blade 12 where the ripper tooth is to be set only at one selected position on the blade such as in a socket formed by bars 33 and 34. In this construction a pair of clip angles 35 outstand from the rear wall plate 16 and the arm 23a is adapted to move between the legs of these clip angles. They are provided with suitable orifices which will register with an orifice in the end of the arm 23a and a pin 28 may be inserted for connection of the arm portion 23a and the clip angles 35.

A second alternative construction is shown at Figs. 9 and 10 to provide a further simplification of the ripper tooth, where the bottom plate 14 is inclined sufficiently from the leading edge 18 to permit the placing of a depending element such as a clip angle 35' thereon without such element interfering with regular bulldozing operations when the ripper tooth is not used. In this construction a pair of clip angles 35' depend from the bottom plate 14 and the arms 23' extends only across the bottom plate with the upright portion 23a being eliminated. The arm 23' and clip angles 35' contain orifices which lie in mutual registration with the arm portion between the clip angles 35' against the bottom plate and the assembly may then be locked into position by a pin 28 as shown. This alternate construction includes a modified shelf 31' at each side of the arm 23' which bears against the bottom plate 14 and also against the end of the clip angles 35' so that the clip angles 35' resist part of the thrust encountered in using the ripper tooth.

While I have illustrated and described many details of construction, alternatives and equivalents will occur to those skilled in the art which are within the scope and spirit of my invention; hence it is my desire that my protection be not limited to the details herein illustrated and described, but only by the proper scope of the appended claims.

I claim:

1. The combination with a box-type bulldozer blade having a front face plate and a bottom plate forming, with the face plate, a wedge-shaped cutting edge, of a shallow socket at the bottom plate, a ripper tooth having a body section formed by a head adapted to seat upon the face plate above the cutting edge and an arm adapted to extend underneath the blade and against the bottom edge and within said socket with the opening between the head and arm configured to that of the wedge-shaped cutting edge whereby to wedge the body upon the blade responsive to pressure of the body against the blade, means for securing the body to the blade, a ripping finger depending from the body and lateral extension means on the arm adapted to fit within the socket whereby to resist torsional movements of the tooth upon the blade.

2. The combination with a box-type bulldozer blade having a front face plate and a bottom plate forming, with the face plate a wedge-shaped cutting edge, of a shallow socket at the bottom plate, a ripper tooth having a body section formed by a head adapted to seat upon the face plate above said cutting edge, an arm adapted to extend underneath the blade against the bottom edge and within the socket with the opening between the head and arm configured to that of the wedge-shaped cutting edge whereby to wedge the body upon the blade responsive to pressure of the body against the blade, means for securing the body to the blade, a ripping tooth depending from the body and shelf plates outstanding from each side of the arm adapted to fit into said socket whereby to resist torsional movements of the tooth upon the blade.

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3. The combination with a box-type bulldozer blade having a front face plate and a bottom plate forming, with the face plate, a wedge-shaped leading cutting edge of laterally restraining seating means at the bottom plate, a ripper tooth having a body section formed by a head adapted to seat upon the face plate above said cutting edge and an arm adapted to extend underneath the blade and against the bottom edge within said seating means with the opening between the head and arm configured to that of the wedge-shaped cutting edge whereby to wedge the body upon the blade responsive to pressure of the body against the blade, means for securing the body to the blade, a ripping finger depending from the body and laterally outstanding plate means on the arm adapted to socket within the seating means whereby to resist torsional movements of the tooth upon the blade.

4. For a box-type bulldozer blade having an arched front face plate, a comparatively wide bottom plate and a rear wall plate, with the front plate and bottom plate forming a wedge-shaped leading cutting edge, a ripper tooth including a body section formed by a head adapted to seat upon the face plate above said cutting edge

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and an arm adapted to extend underneath the blade and against said bottom plate with the opening between the head and arm configured to that of the wedge-shaped cutting edge whereby to wedge the body upon the blade responsive to pressure of the body against the blade, an extended portion of the arm adapted to reach upwardly from the bottom plate and against the rear wall plate of the blade, a holding bar at the top of the blade adapted to grasp the extended end of the arm and a ripping finger extending from the body.

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