

Feb. 1, 1955

E. T. SMALL
SCARIFIER TOOTH LOCK

2,700,833

Filed July 3, 1950

2 Sheets-Sheet 1

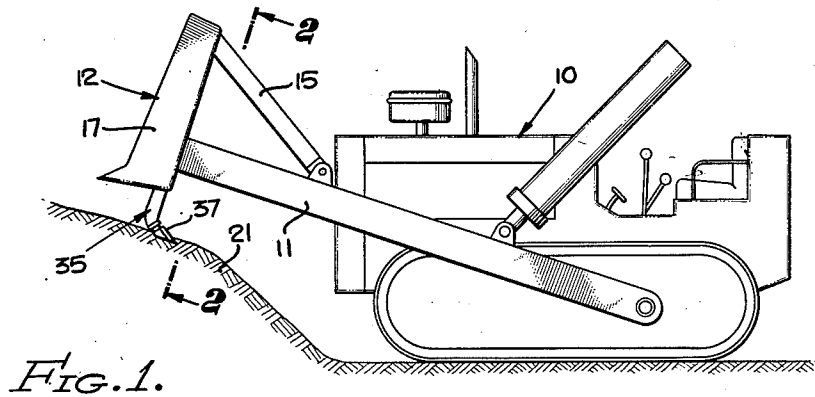


FIG. 1.

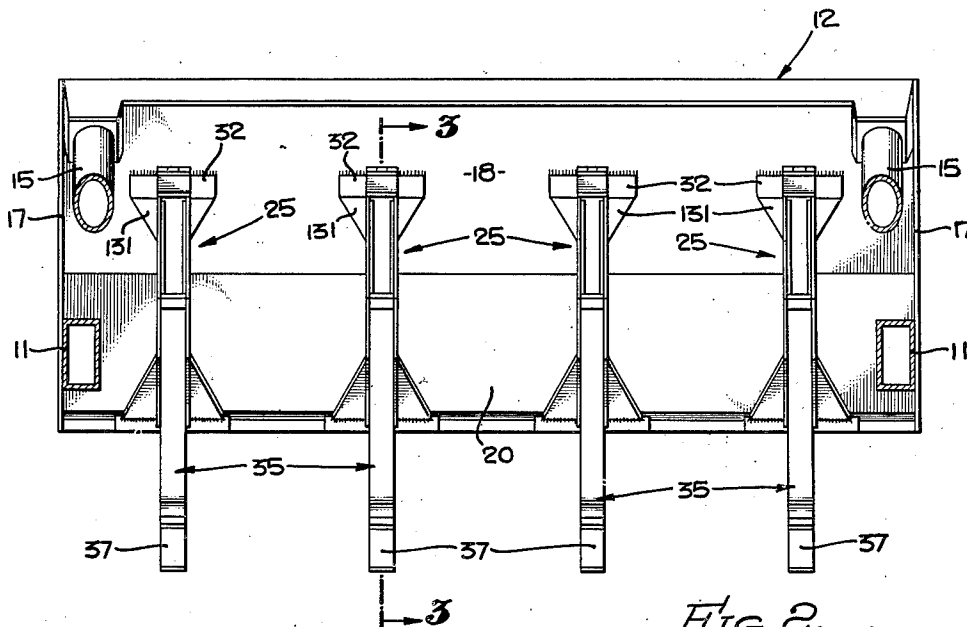


FIG. 2.

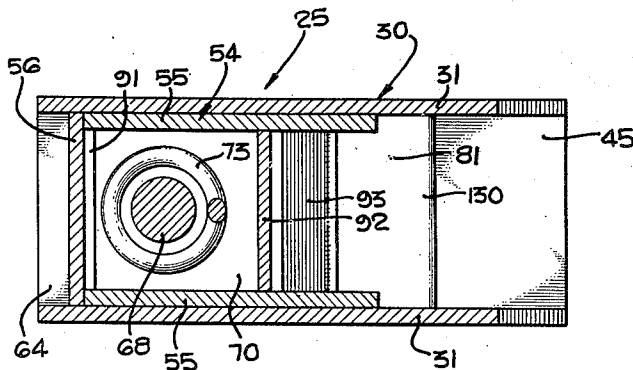


FIG. 5.

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2 Sheets-Sheet 2

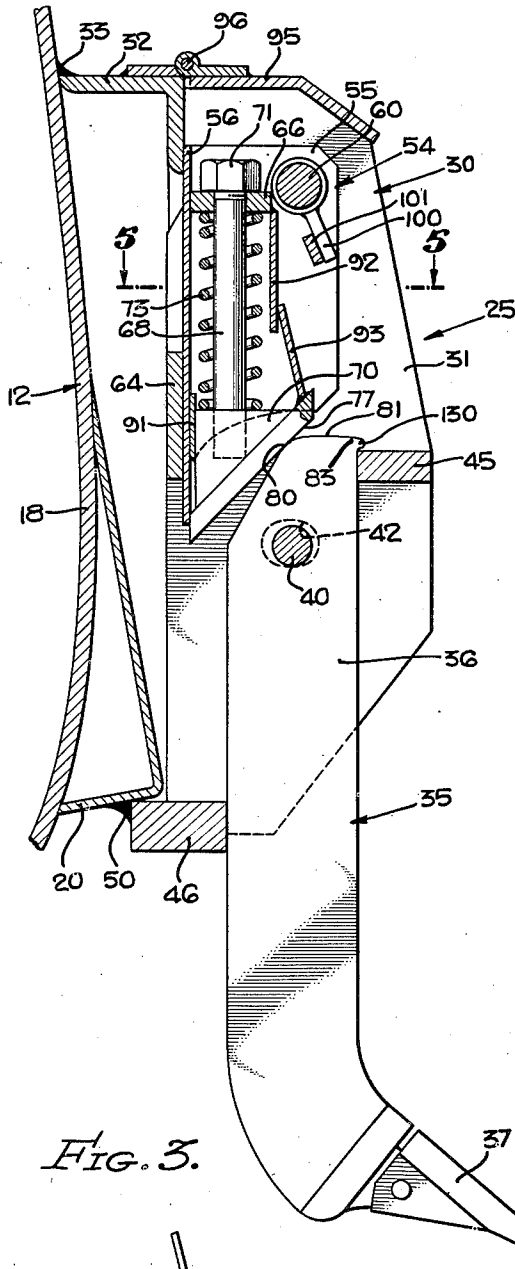


FIG. 3.

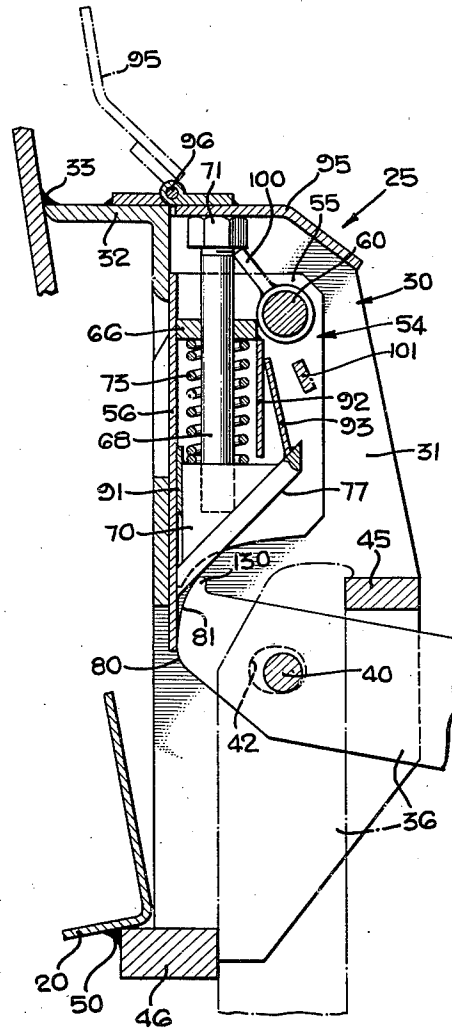


FIG. 4.

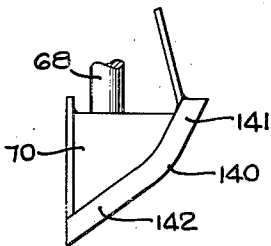


FIG. 6.

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SCARIFIER TOOTH LOCK

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Application July 3, 1950, Serial No. 171,785

2 Claims. (Cl. 37—145)

This invention relates to attachments for bulldozers and the like, and particularly to scarifying tooth attachment adapted to be secured to the back of a bulldozer blade or the like.

It has been heretofore proposed to use scarifying teeth on the back of a bulldozer blade so that when the bulldozer is backing, the ground or soil will be ripped by the scarifying teeth so that when the bulldozer once again advances the bulldozer blade can push and collect the soil ripped up by the teeth. In these prior constructions the teeth merely dangled from the bulldozer blade and were swingably mounted so that when the bulldozer blade was advanced the teeth merely dragged along the ground but when the bulldozer blade was moved backwardly the teeth would engage the ground. This type of machine works successfully on level ground but when the push beam or bulldozer body or both are inclined so that the bulldozer blade is positioned upwardly and forwardly of the bulldozer body the teeth under the influence of gravity hang vertically but in such a position do not successfully engage the ground but merely slide along the ground.

It is a main object of the present invention to provide a scarifying tooth attachment for a bulldozer blade wherein the scarifying tooth is always urged into a plane normal to the push beam which plane would also be generally parallel to the plane of the bulldozer blade.

Another object of the present invention is to provide a scarifying tooth attachment which includes swingably mounted scarifying tooth with an arrangement so designed that the scarifying tooth can be allowed to freely dangle for use on level ground or can be urged into a predetermined position for use on inclined ground.

Another object of the present invention is to provide an attachment including a swingably mounted scarifying tooth which is urged into a normal position and in which the parts of the attachment are protected from dirt, rocks, and the like.

With the foregoing and other objects in view, which will be made manifest in the following detailed description and specifically pointed out in the appended claims, reference is had to the accompanying drawings for an illustrative embodiment of the invention, wherein:

Figure 1 shows a bulldozer of any suitable construction having an attachment embodying the present invention secured to the back of the bulldozer blade;

Fig. 2 is a sectional view along line 2—2 of Fig. 1 showing the back of the bulldozer blade;

Fig. 3 is an enlarged sectional view in elevation along lines 3—3 of Fig. 2, showing the details of mounting a scarifying tooth;

Fig. 4 is a view similar to Fig. 3, with the parts of the attachment in a different position from that shown in Fig. 3;

Fig. 5 is a cross-sectional view along lines 5—5 of Fig. 3; and

Fig. 6 discloses a fragmentary sectional view in elevation showing a modified form of the plunger.

Referring to the accompanying drawings wherein similar reference characters designate similar parts throughout, Fig. 1 shows a bulldozer generally entitled 10 having push beams 11 to which a bulldozer blade assembly, generally designated by the reference numeral 12 is secured. There are braces 15 connecting the push beams to the bulldozer blade assembly. The bulldozer blade assembly includes end plates 17, a bulldozer blade proper 18, and moldboard reinforcements 20, compare Figs. 1

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and 3. The bulldozer in Fig. 1 is shown as working on an inclined mound of earth 21.

On the back of the bulldozer blade 18 are secured a plurality of scarifying tooth attachments generally entitled 25 which have scarifying teeth 35 dangling below the bottom edge of the blade 18. Since all the attachments are identical in construction only a single attachment will be described in detail.

An attachment 25 as shown in Figs. 3 and 4 comprises a scarifying tooth housing 30 having sides 31 joined by a cross member 32 at the top which is welded at 33 to the back of the blade 18. A scarifying tooth 35 has a shank 36 disposed at approximately right angles to a ground-engaging portion 37. Shank 36 has a pivot pin 40 integral therewith and passing therethrough. The ends of pin 40 are receivable in elongated slots 42 provided in side members 31 of housing 30 so as to swingably support the tooth 35. There is a forward stop 45 and a rearward stop 46 secured to sides 31 of housing 30 and are adapted to engage respectively the forward and rearward sides of the tooth 35 to take the thrust imposed on the tooth 35 by its ripping engagement with the ground. Stop 46 is secured to the moldboard reinforcement as at 50 by welding or other suitable means.

Fig. 3 shows tooth 35 in position for ripping the ground. In this position the stops 45 and 46 take substantially the entire thrust imposed on the tooth 35 by its ripping engagement with the ground and there is very little shearing force imposed on the pin 40 by this ripping engagement with the ground. There may be upward shearing force imposed on pin 40 when the bulldozer blade assembly 12 is lifted and lowered into engagement with the ground but the pins are sufficiently strong to successfully withstand these shearing forces.

There is a spring pressed plunger assembly arranged to engage the upper end of shank 36 for constantly urging the tooth 35 to remain in a normal, as contrasted to a vertical, position when the spring pressed plunger assembly is allowed to operate. This spring pressed plunger assembly comprises a plunger housing 54 having sides 55 and a back 56. Housing 54 is supported by housing 30 by means of a bolt 60 which passes through the sides 31 of the tooth housing 30 and has a nut, not shown, threaded on the threaded end of the bolt. There is a back stop bar secured to opposite sides of the housing 30 and the plunger housing 54 bears against this stop bar. There is a lug 66 provided on the back 56 of plunger housing 54 which lug is apertured to receive the stem 68 of plunger 70. Stem 68 threadably receives a stop nut 71 which stop nut limits downward movement of the plunger 70. There is a compression spring 73 which is in partially compressed condition, as shown in Fig. 3, so that the compression spring always urges the plunger in a downward direction. Plunger 70 has an inclined lower end 77 which engages the upper end of shank 36 of tooth 35 for urging the tooth into its normal position. The lower end of plunger 70 is inclined so that it may engage the upper end of tooth 35 at all times during the swinging movement of tooth 35. Since spring 73 is compressed more when the tooth 35 is swung rearwardly there will be a greater force urging the tooth to travel to its normal position than there will be to urge the tooth to remain in normal position. There is, however, a sufficient force obtained by this construction to serve to maintain the tooth 35 in its normal position during all uses of the bulldozer blade and at whatever angle the bulldozer blade is positioned.

In order to obtain a sufficient force on the tooth 35 while it is in its normal position, the engaged surface 80 of tooth 35 is located at a considerable distance from the pivotal axis of pin 40 so that the force imposed on surface 80 by plunger 70 will have a greater leverage than if the force were imposed on a surface closer to the pivotal axis of pin 40. The upper surface 81 of tooth 35 is formed so that the upper right-hand point numbered 83 as the parts are depicted in Fig. 3, is farthest from the pivotal axis of the tooth, and therefore, the plunger 70 will always be urged in a counterclockwise direction and into its normal position regardless of the position into which the tooth is moved during the forward travel of the blade 18. The surface 81 is actually an arc having

its center of curvature below and back of pin 40 and surface 80 is an arc having its center of curvature above pin 40.

There is a bearing plate 91 provided on the back of plunger 70 which bears against the back 56 of plunger housing 54. There is a stationary dirt guard 92 secured to lug 66 and the sides of housing 54 and there is a movable dirt guard 93 carried by plunger 70 and which either engages or moves very closely to the stationary dirt guard 92. There is an upper dirt guard 95 hinged at 96 to the angle member 32 which upper dirt guard prevents rocks, dirt, and the like moving over the top of the bulldozer blade from falling on the plunger mechanism.

When the scarifying tooth 35 would dangle under the influence of gravity in a position which would make it unworkable on inclined ground, the plunger mechanism is sufficient to urge the tooth into a normal position so as to allow the tooth to successfully engage the inclined ground. However, if level ground is to be worked on it is undesirable to have the tooth 35 constantly rubbing on the ground because of the increased wear on the tooth. Therefore a plunger stop 100 is provided which is pivoted on bolt 60 and is adapted to be moved from the rest 101 to a stop position as shown in Fig. 4, where it engages under the stop nut 71 and prevents downward movement of plunger 70. In this position, the tooth 35 is under the influence of gravity and not the plunger mechanism, and therefore, there is no undesirable added rubbing engagements of the tooth 35 with the ground.

The tooth 35 has a protuberance 130 which has an upper surface which is a continuation of surface 81 and so has its center of curvature at the same point as the surface 81. With this construction, there will be no over-center action between the upper end of the tooth and inclined lower end 77 of plunger 70. There therefore is no danger of accidentally locking the tooth 35 in the position as shown in Fig. 4 during use of the tooth in its free-floating position. The tooth will actually be positioned under the influence of gravity in the vertical position shown in dot-dash lines in Fig. 4, the full line position being shown for the purpose of illustrating that there will be no over-center action between the tooth and lower end of plunger 70.

The plunger 70 can be moved to its upper position by merely grasping the lower portion of the tooth 35 and lifting the tooth to the full line position shown in Fig. 4, which movement serves to raise the plunger to the position shown in Fig. 4 to allow the plunger stop 100 to be flipped over and under the nut 71 on stem 68 of plunger 70.

From Fig. 2 it can be seen that the angle members 32 extend outwardly on either side of housing 30 and have gussets 131 connecting them to the housing 30.

It is obvious that one of the major reasons for having an inclined face on plunger 70 is to provide a force having a horizontal component to the right as the parts are depicted in Fig. 3, so as to urge the tooth 35 into normal position as shown in Fig. 3.

A modified form of plunger is shown in Fig. 6, and the plunger is provided with a curved face 140 which has a steep portion 141 flowing into a somewhat less portion 142. Portion 141 is adapted to contact the tooth 35 when the tooth 35 is in its normal position. The additional steepness of portion 141 allows the horizontal component of the vertically applied force to be greater than when the face of the plunger has a flat shape as shown for plunger 70 in Fig. 3. This construction allows a sufficient force to urge the tooth into its normal position without requiring an extra heavy spring or without requiring excessive travel by the plunger.

Various changes may be made in the details of construction without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. In combination with a bulldozer blade, a plurality of scarifier teeth, means for mounting each tooth on the back of the blade for swinging movement relatively thereto limited in one direction to a scarifying position, a plate engageable with each tooth, spring means urging the plate to force the tooth to its limited position, and means for releasably locking each plate out of engagement with its tooth against the action of the spring means so that each tooth may swing freely from its limited position.

2. A scarifier tooth and mounting therefor comprising a scarifier tooth, a mounting adapted to be attached to the back of a bulldozer blade, a pivot pin supported on the mounting on which the scarifier tooth is pivotally mounted, stops engageable by the scarifier tooth on the mounting above and below the pivot pin limiting the tooth to a scarifying position but permitting the tooth to swing therefrom, the top of the tooth being beveled off, plate means engageable with the bevel to crowd the tooth into stop-engaging position, spring means mounted on the mounting for urging the plate into engagement with the tooth, and means for releasably locking the plate out of engagement with the tooth against the action of the spring means.

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