March 24, 1953 F. B. FERRIS, JR 2,632,261

BRUSH GRUBBING DEVICE

Filed May 5, 1950 3 Sheets-Sheet 1

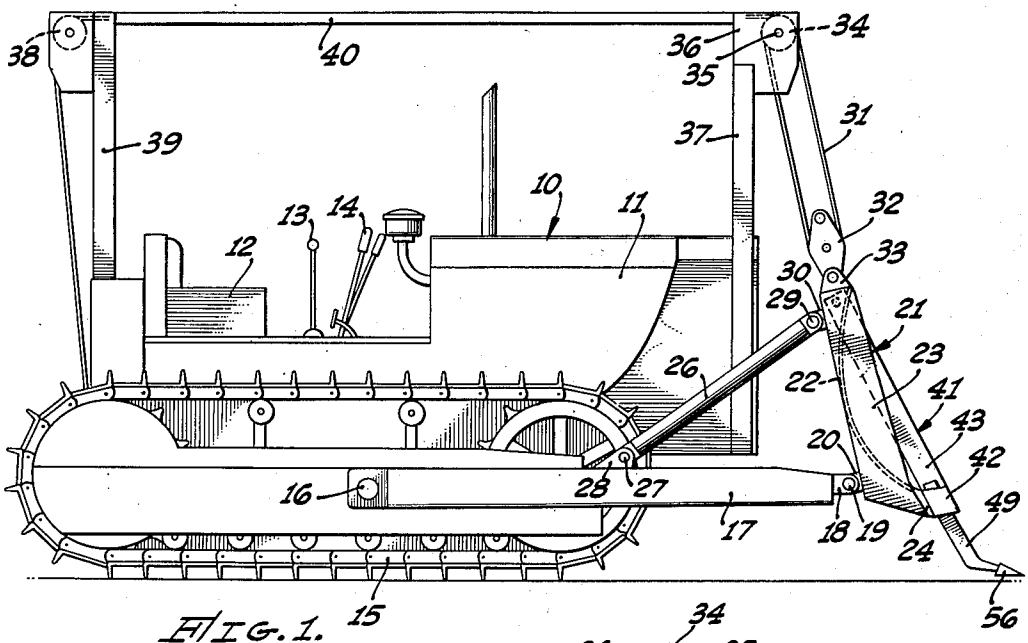


FIG. 1.

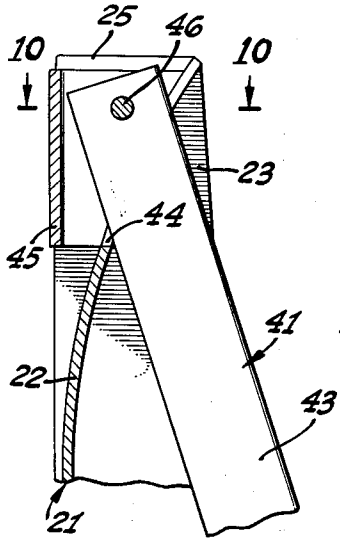


FIG. 3.

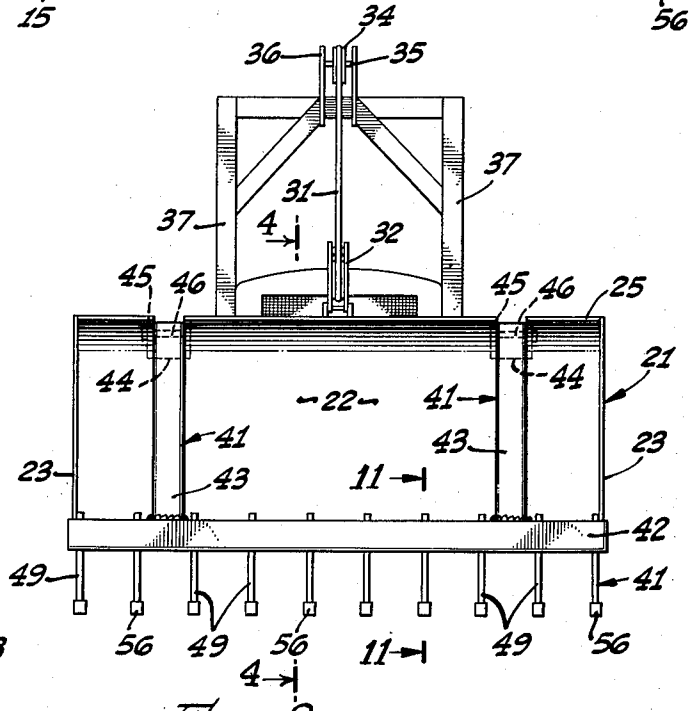


FIG. 2.

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BRUSH GRUBBING DEVICE

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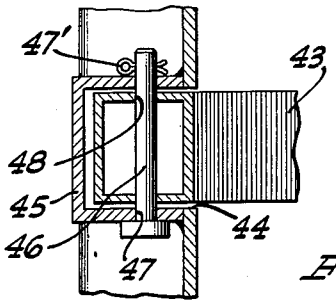


FIG. 10.

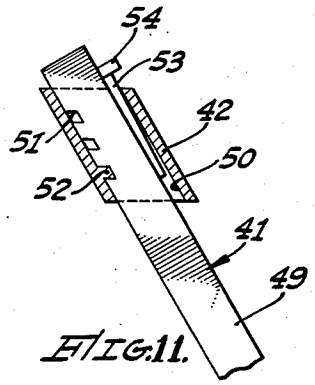


FIG. 11.

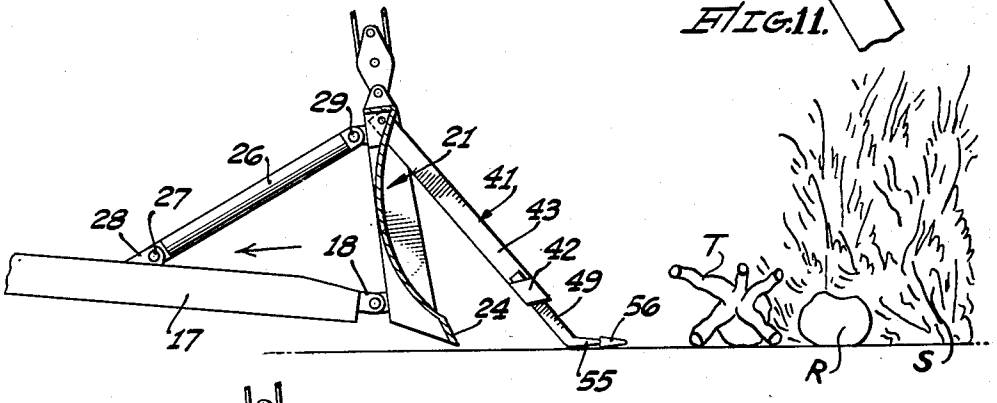
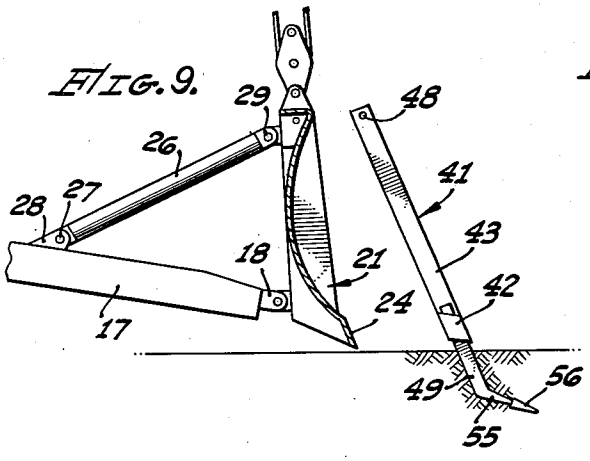


FIG. 7.

FIG. 9.



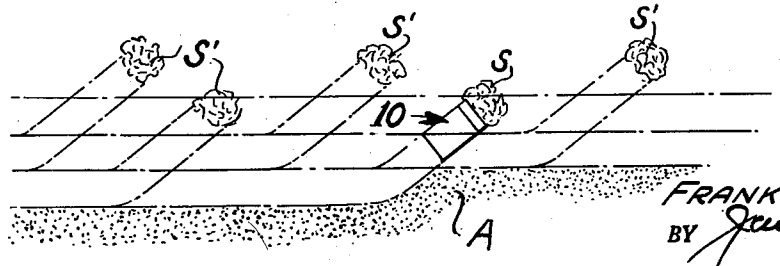


FIG. 8.

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BRUSH GRUBBING DEVICE

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FIG. 4.

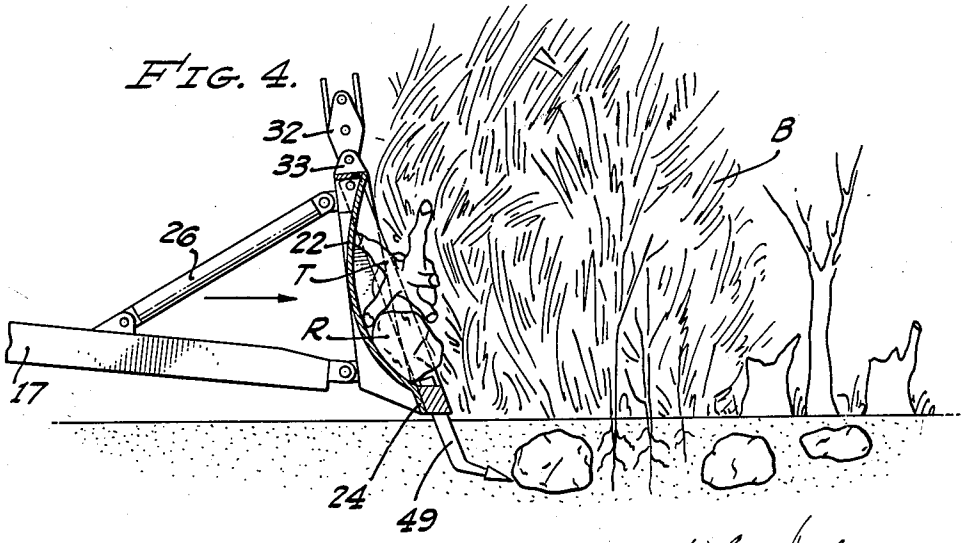
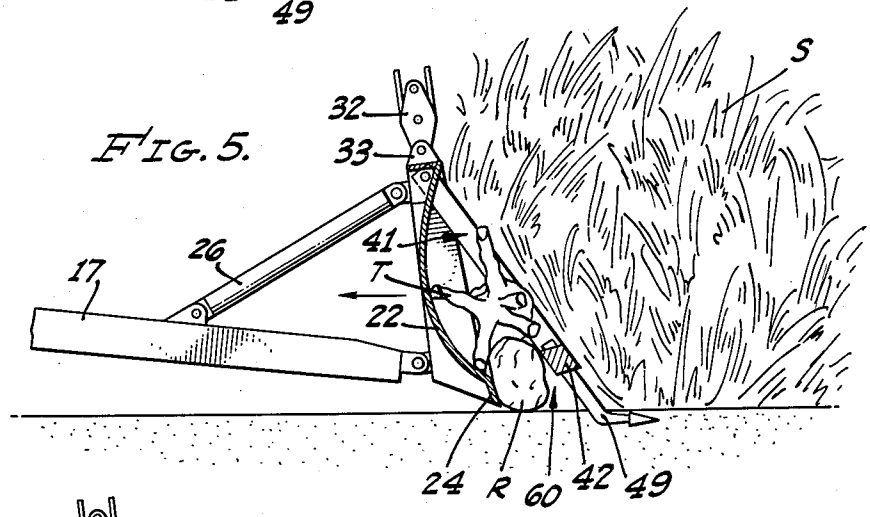


FIG. 5.



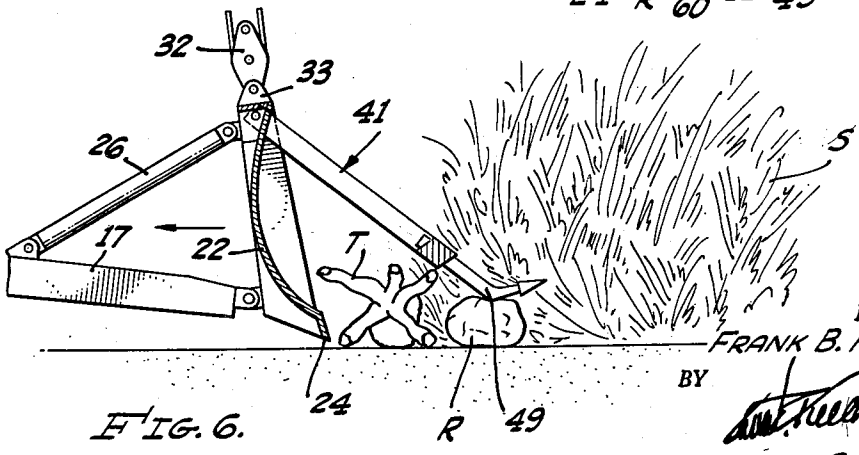


FIG. 6.

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2,632,261

BRUSH GRUBBING DEVICE

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Application May 5, 1950, Serial No. 160,369

1 Claim. (Cl. 37—2)

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This invention relates to earth working implements and particularly pertains to a brush grubbing device.

In land clearing operations it is frequently necessary to remove thick brush and small trees over large areas. Many different power tools have been devised for accomplishing this function, some of which have included attachments for bulldozers. The bulldozer is universally available for use in land clearing operations but the attachments hitherto provided for adapting a bulldozer for the grubbing of brush met with indifferent success.

It is accordingly an object of the present invention to provide a brush grubbing device adapted to be employed in association with a bulldozer which will enable the latter to be effectively utilized in brush grubbing operations.

One of the principal defects of the best of the brush grubbing bulldozer attachments previously tried out is its inherent susceptibility to getting boulders and stumps and heavy brush caught in the structure thereof. These can only be removed manually by the operator. The necessity for the operator to spend much of his time and considerable muscular energy in clearing the device of such impedimenta between successive grubbing operations greatly decreased the usefulness of such prior devices.

It is another object of the invention, therefore, to provide a brush grubbing device operable by association with a bulldozer and which is self-clearing of a heavy accumulation of brush, large boulders and stumps merely by backing the bulldozer away from such an accumulation.

It is a further object of the invention to provide a brush grubbing device which is simple and rugged in construction and which may be quickly and with relative ease attached to or detached from the moldboard of a bulldozer.

The invention is illustrated by way of example in the accompanying drawings in which:

Figure 1 is a view in side elevation showing the application of a bulldozer blade and a preferred embodiment of the brush grubbing device of the invention to the forward end of a power propelled vehicle of the tracklaying type.

Fig. 2 is a view in front end elevation showing the combination of a bulldozer blade and the brush grubbing device with which the present invention is concerned.

Fig. 3 is an enlarged view in transverse vertical section showing the hinge connection between the arms of the brush grubbing device and the upper portion of the bulldozer blade.

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Fig. 4 is a diagrammatic vertical sectional operational view taken on the line 4—4 of Fig. 2 and illustrating the invention as it is being propelled forwardly by a bulldozer in a brush grubbing operation.

Fig. 5 is a view similar to Fig. 4 and illustrates the retraction of the brush grubbing device of the invention from a stack of brush formed in the operation shown in Fig. 4 after this stack has been diverted out of a brush covered area and into a cleared area, so as to deposit said stack in the latter area. This view also illustrates the manner in which heavy boulders, stumps and the like gravitate downwardly through the device incidental to the retraction of the same from said stack.

Fig. 6 is a view similar to Fig. 5 illustrating an immediately following phase of the retraction of said device from said stack in which said device rides upwardly over boulders, stumps and the like which have gravitated through said device and onto the ground.

Fig. 7 is a view similar to Fig. 6 and illustrates the completion of the retraction of the brush grubbing device of the invention from a stack of brush uprooted thereby and delivered from a brush covered area onto a cleared area.

Fig. 8 is a diagrammatic plan view illustrating the practice followed in the operation of the invention in clearing a brush covered area of brush and delivering the same in a series of stacks onto an adjacent area from which the brush has been cleared.

Fig. 9 is a view similar to Fig. 7 showing the manner in which the brush grubbing device of the invention may be temporarily parked with the teeth thereof driven into the ground while the bulldozer on which this is normally mounted is used separate from said device.

Fig. 10 is an enlarged detail view in transverse section as seen on the line 10—10 of Fig. 3 and shows the hinge pin mounting and the nested arm connection between an arm of the brush grubbing device of the invention and the upper edge portion of the moldboard of the bulldozer.

Fig. 11 is an enlarged detail vertical sectional view taken on the line 11—11 of Fig. 2 and showing the shank of a tooth of the invention and the manner in which it is preferably adjustably locked within an opening in the crosshead of the invention.

Referring more particularly to the drawing, 10 indicates generally a tractor structure, comprising a main frame upon which a power unit 11 is supported, a seat structure 12 being carried at the

rear of the main frame, this accommodating a driver for the vehicle who may manipulate the vehicle by a clutch lever 13 and suitable controls indicated at 14. It is preferable that the vehicle shall be provided with tracklaying units 15 which are disposed at opposite sides of the vehicle and are driven from power unit 11 as controlled by the members 14. The tracklaying units carry trunnions 16 upon which blade supporting arms 17 are pivotally mounted. These arms are free to swing in parallel vertical planes at opposite sides of the vehicle and carry mounting brackets 18 at their free ends. The brackets receive pivot pins 19 which pass through complementary brackets 20 extending rearwardly from the rear side of the usual bulldozer blade 21, the blade 21 is usually constructed with a vertically disposed concave moldboard 22 along the vertical edges of which are out-turned flanges 23. The lower edge of the moldboard carries the usual scraping and grader blade 24 which extends between the flange portions 23. Extending across the upper edge of the moldboard and between the flanges 23 is an outwardly projecting horizontal flange 25. The bulldozer blade 21 may swing vertically along an arc defined by the supporting arms 17 and the links 26. The lower ends of the links 26 are pivoted upon pins 27 carried by brackets 28 which are mounted upon the upper faces of the supporting arm 17. The upper ends of the links 26 are pivoted upon pins 29 which are mounted upon brackets 30. The links 26 establish an articulate connection between the supporting arm 17 and the bulldozer blade 21 as the blade is raised and lowered. The raising and lowering of the blade 21 is effected by a cable 31 which passes around a sheave block 32 carried upon brackets 33 and mounted upon the flange 25 of the bulldozer blade. The cable 31 is trained about the pulleys on the sheave block 32 as well as pulleys 34 mounted upon a shaft 35 within a crown block structure 36. The crown block is supported upon uprights 37 carried by the vehicle. The cable 31 extends rearwardly over the vehicle from the crown block 36 to an idler pulley structure 38 which is supported upon uprights 39 at the rear of the vehicle. The cable is led through a horizontal guide 40 and then is led downwardly to a winding drum (not shown on the drawings) which is controlled by the operator of the vehicle.

It is understood that all of the structure described in the preceding portion of the specification is of standard construction and that the invention in the particular case has to do with a brush grubbing device generally indicated at 41 and which may be operatively mounted upon the bulldozer blade 21 and manipulated as the bulldozer blade is manipulated by the standard operating equipment with which the tractor is provided. The brush grubbing device 41 comprises a cross head 42 which extends horizontally and may swing vertically as hereinafter described. Secured to the cross head and extending upwardly therefrom are a pair of spaced rigid arms 43 which are fastened to the cross head by any desirable means although they are herein indicated as being preferably welded in position. The upper ends of the arms 43 fit through notched openings 44 formed in the upper edge of the moldboard 22. Secured to the moldboard directly in the rear of the notched openings 44 are U-shaped brackets 45 which receive the upper ends of the arms 43 and allow them to receive pivot pins 46 which may pass through perforations 47 in the opposite sidewalls of the U-shaped brackets 45 and through openings 48 in the arms 43. In order to attain lightness in construction, the arms 43 are preferably of the box-girder type and thus provide a strong hollow arm structure which will resist the great amounts of pressure to which the brush grubbing device is subjected. The cross head 42 is preferably of solid bar or heavy hollow construction which will act to weight the free ends of the arms 43 downwardly and will tend to press the teeth 49 downwardly into engagement with the soil. As shown in Fig. 11 of the drawing, the cross head 42 is of rhomboid section so that the vertical sides are parallel to each other and conform to the angle of inclination of the scraping blade 24 carried by the bulldozer blade 21. It will also be seen that the two opposite faces of the cross head are parallel to each other, and openings 50 are formed through the cross head at equally spaced intervals throughout the length thereof, and parallel to the front and rear walls of the cross head to receive the shanks of the brush grubbing teeth 49. In the rear face of each tooth 49 is a series of latch notches 51 which may be moved into vertical register with teeth 52 extending inwardly from the rear walls of the openings 50. Tapered latch pins 53 may be driven into the openings 50 between the forward faces of the shanks of the teeth 49 and the front walls of the openings 50. This insures that when the notches 51 and the teeth 49 are in register, the pins 53 will wedge the shanks of the teeth into position and hold the teeth 49 rigidly with relation to the cross heads. The upper ends of the latch pins 53 are formed with heads 54 which facilitate removal of the pins when desired.

By reference to Figs. 1, 7 and 9 of the drawing, it will be seen that the teeth 49 have a main straight shank and a downwardly and upwardly tapering portion 55. A renewable hard point 56 may be mounted upon the free end of the outwardly tapered portion 55.

In operation of the present invention, it is understood that the usual power propelled bulldozer structure is provided as indicated by the numeral 10 with the upper edge of the bulldozer blade equipped to receive the brush grubbing device 41 and pivotally support it. When it is desired to utilize the brush grubbing device, it is mounted in position by placing its arms 43 through the notched openings 44 at the upper edge of the moldboard and then pivotally attaching the arms to the blade structure 43 by passing pivoted pins 46 through the openings in the arms 43 and the brackets 45. The pins may be temporarily held in position by cotter pin 47'. It is to be pointed out that the notched openings 44 at the upper edges of the moldboard bears such a relation to the cross head 42 of the brush grubbing device 41 as to insure that when the device is hanging free, the cross head 41 will rest upon the forward face of the scraper blade 24. This blade occurs at the lower edge of the bulldozer blade 21 and is disposed at an angle to the vertical. The inclination to vertical of the front and rear faces of the cross head 42 are such as to insure that the rear face of the cross head will lie flush against the free face of the scraper blade 24 and hold the cross head firmly during brush grubbing operations. At this time the teeth 49 of the brush grubbing device 41 are disposed with their projecting portions 55 inclined downwardly and forwardly as shown in Fig. 1 of the drawing, and with said teeth suspended just above the surface of the ground.

With the apparatus disposed as shown in Fig. 1

the driver starts a brush grubbing operation by proceeding forwardly with the bulldozer until he comes to an edge of a brush covered area A as shown in Fig. 8. The driver then lowers the moldboard while continuing forwardly to cause the teeth 49 to dig into the ground and uproot brush, small saplings, small trees, stumps, and the like, which are in the path of the bulldozer. Rocks small enough to pass between the teeth 49 are by-passed by these teeth while larger rocks such as the rock R shown in Fig. 4 ride upwardly on an adjacent pair of the teeth 49 and are elevated by pressure thereagainst of a mass of brush B which accumulates in advance of the bulldozer as it proceeds through the brush area A. Tree stumps such as the stump T shown in Fig. 4, and which lie in the path of the bulldozer, are uprooted by the teeth 49 and accumulate with the mass of uprooted brush B. Occasionally one or more of these stumps is lodged in the brush grubbing device 41 between the arms 43 and resting on the crosshead 42. In Fig. 4 such a stump is shown riding on top of the boulder R. An important advantage of this invention is to be found in its capacity to thus handle large boulders and tree stumps without these clogging up the apparatus and without the necessity of manually clearing the latter of boulders, tree stumps or heavy brush in the operation thereof.

It is the practice in clearing a piece of land of brush, tree stumps and the like, with the present invention, to do this in the manner illustrated in plan in Fig. 8. As shown in this view, a bulldozer 10 incorporating the apparatus of the invention has proceeded along an edge of the area A until it has accumulated a substantial stack S of brush, stumps, stone and the like. When the stack has reached proportions where it is a burden upon the power unit of the bulldozer to continue to force this ahead of the latter, the driver turns the bulldozer outwardly as shown in Fig. 8 to push the stack S into the clear, whereupon the driver halts the bulldozer and reverses it to retract the brush grubbing device 41 from the stack S. The first tendency of this retraction is to swing device 41 upwardly as shown in Fig. 5 producing a substantial gap 60 between the cutting blade 24 of the moldboard 22 and the crosshead 42 of the brush grubbing device 41. The rock R and stump T, carried within the device, immediately gravitate downwardly through the gap 60 and onto the surface of the ground where they obstruct the movement of the crossbar 42 with the retracting motion of the bulldozer causing this bar and the teeth 49 to ride upwardly over the rock R and stump T as clearly shown in Fig. 6. The withdrawal of the device 41 from the brush stack S is thus completed as shown in Fig. 7 without the necessity for the driver to leave his seat on the bulldozer.

The retraction of the bulldozer 10 from the stack S, which starts with this stack and the bulldozer related as shown in Fig. 8, winds up with the tractor in a good position parallel with the adjacent edge of the brush area A to resume grubbing brush in continuation of the swath being debrushed by the bulldozer along that edge of said area. A plurality of stacks of brush S' are shown in Fig. 8 which were formed by the bulldozer 10 preceding its formation of stack S as shown in this view.

When it is desired to park the device 41 and use a bulldozer 10 without this device attached thereto, the latter may be lowered with the bulldozer moving forwardly so as to imbed the teeth 49 in the soil and the bulldozer then be halted and the pins 46 removed whereupon the bulldozer may be backed away as shown in Fig. 9 and employed separately from the device 41 as an ordinary bulldozer. When it is desired to reunite the bulldozer with the device 41, it is merely returned to the same relation with the device 41 existing at the time the pins 46 were removed, and these pins are then reinserted.

While I have shown the preferred form of my invention as now known to me, it will be understood that various changes may be made in the combination, construction and arrangement of parts by those skilled in the art without departing from the spirit of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

A brush grubbing device adapted for association with a bulldozer moldboard having a scraper blade along its lower edge, said device comprising: a heavy crosshead adapted to lie flat against said scraper blade and substantially co-extensive in length therewith, said crosshead having a series of spaced tooth-mounting openings formed at regular intervals throughout its length, yet possessing a relatively high resistance to torque and bending strains; teeth mounted in said openings and extending downwardly and forwardly from said crosshead; a pair of heavy upright arms highly resistant to bending strains, the arms being of a length approximately equal to the height of the moldboard and having their lower ends integrally welded to said crosshead with said arms in a widely spaced relation to form a relatively wide and deep, unobstructed center opening in said device having a depth substantially equal to the length of said arms and a width equal to the spacing of said arms and through which opening large boulders, tree stumps and pieces of brush may readily pass; and means located at the upper edge of said moldboard pivotally mounting the upper ends of said arms on the upper portion of said moldboard whereby said device is free to swing forwardly when said moldboard is retracted to allow said boulders, tree stumps and brush which have entered through said opening and are riding on said crosshead, to pass downwardly between said blade and said crosshead and then under said crosshead and said teeth.

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