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EARTH AND MATERIAL HANDLING IMPLEMENT

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3 Sheets-Sheet 1

FIG-1

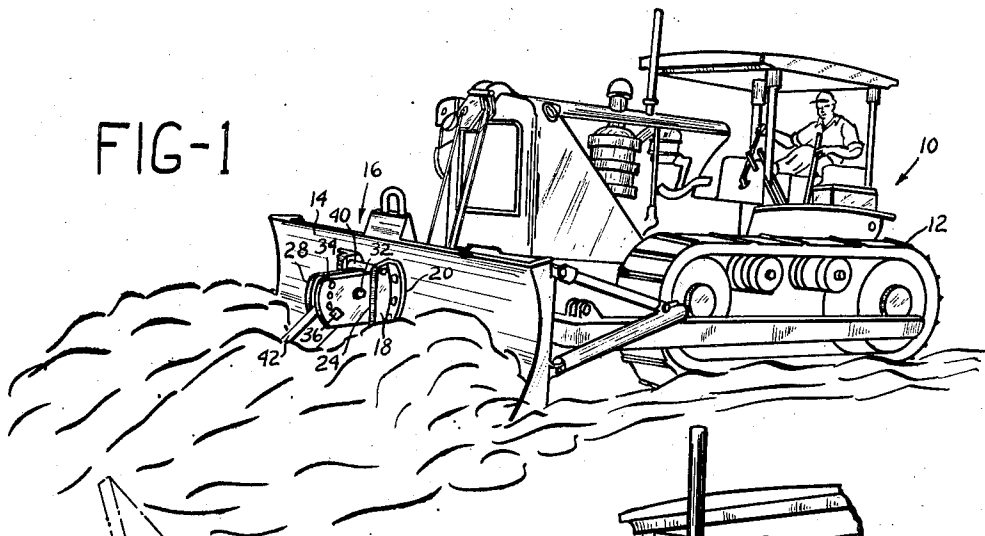


FIG-2

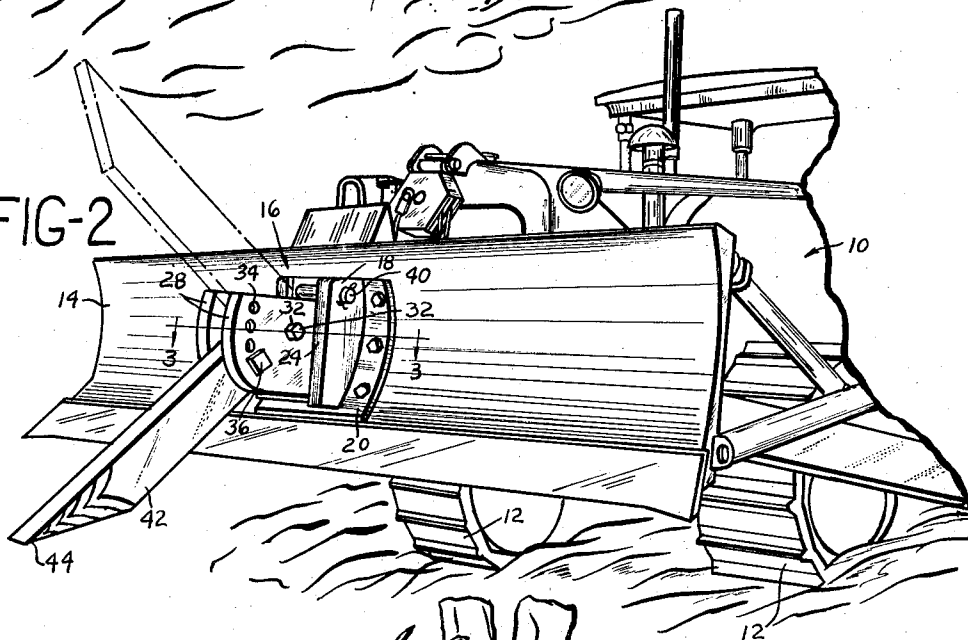
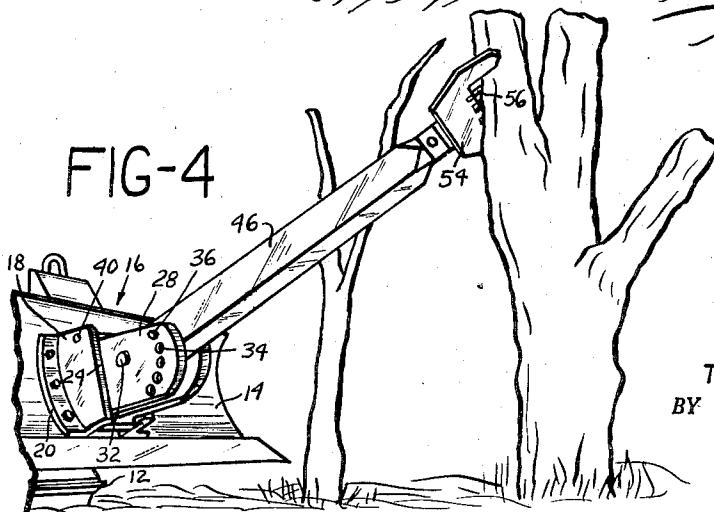


FIG-4



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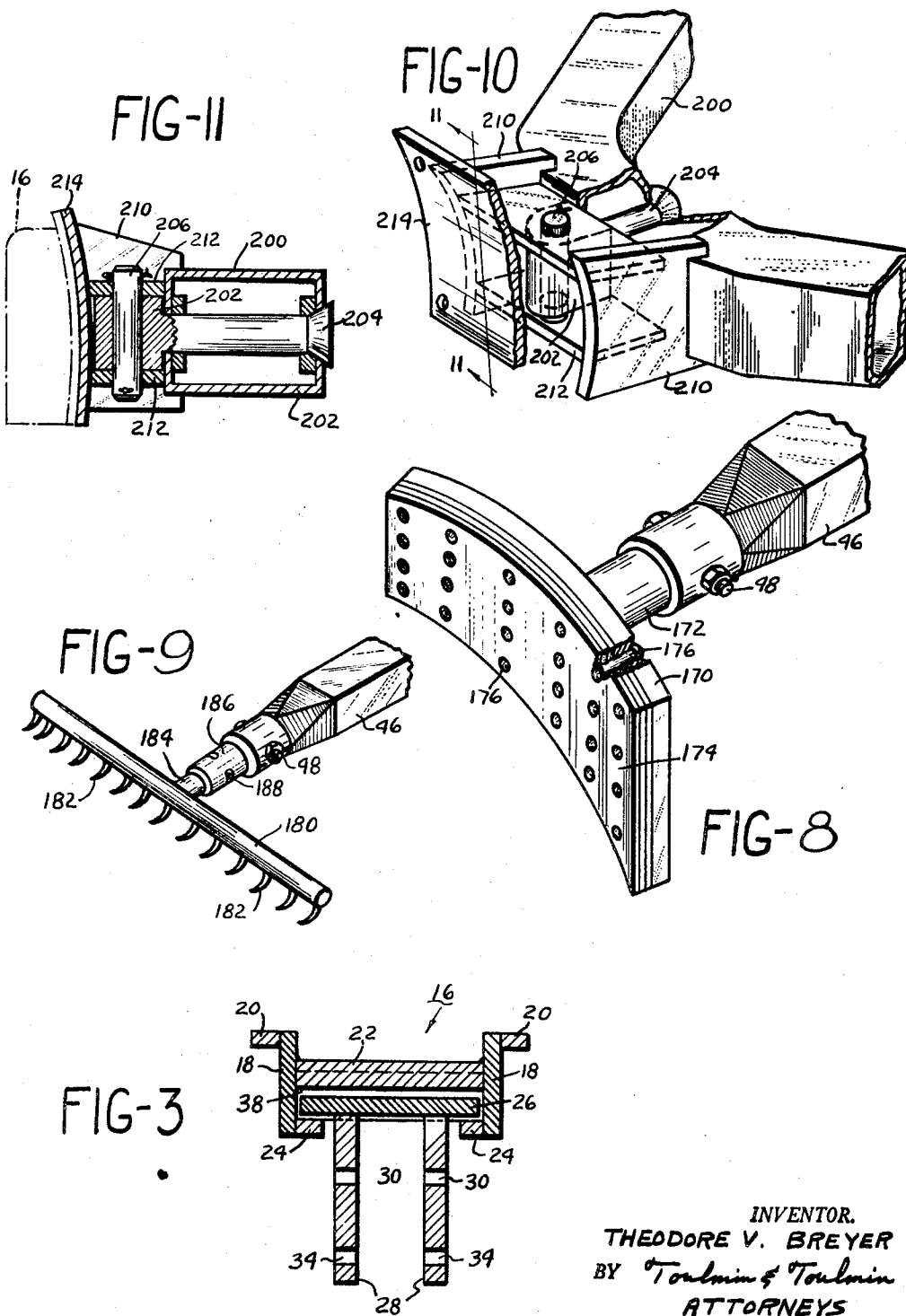
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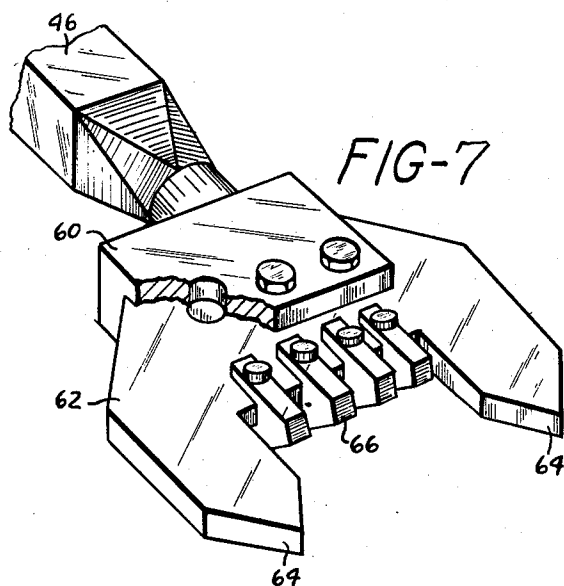
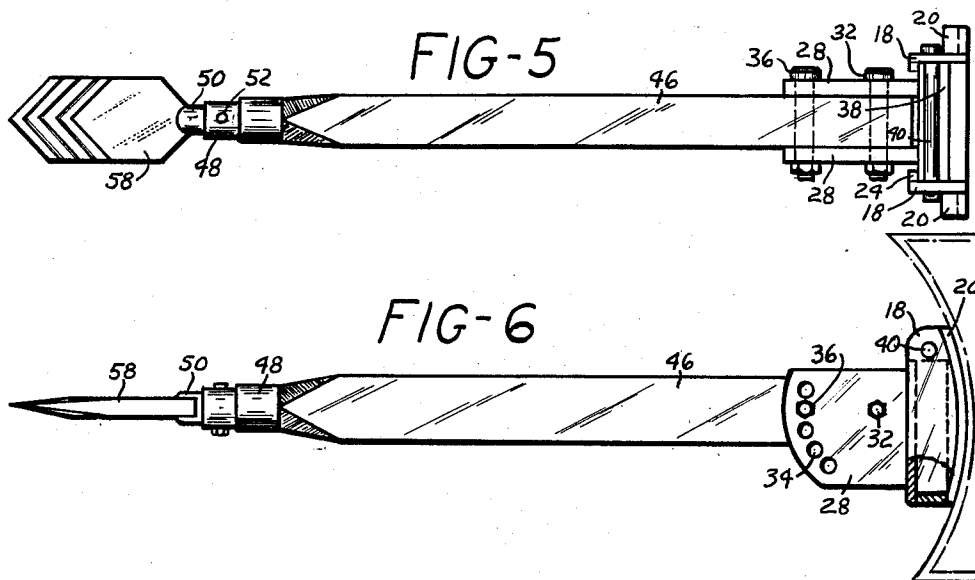
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3 Sheets-Sheet 3



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## EARTH AND MATERIAL HANDLING IMPLEMENT

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7 Claims. (Cl. 37—145)

This invention relates to earth and material handling machinery and implements and devices for use in association therewith, and particularly to implements of the nature referred to especially adapted for being detachably mounted on a bulldozer.

A highly useful and common implement for earth working is a bulldozer which consists of a powerful tractor, usually with endless track treads, and having a bulldozer blade movably mounted on the front end thereof. The blade is ordinarily movable in a horizontal plane to any desired angle to the longitudinal axis of the tractor, and is likewise tiltable and movable in a vertical plane to vary the depth of cut and the angle of cut.

An implement of this nature is powerful and extremely useful for moving earth and other work operations requiring great pushing force, but has little utility beyond this fairly limited field because of the lack of adaptability of the bulldozer blade to any work operations except that of moving earth and the like.

Having the foregoing in mind, it is a primary object of the present invention to provide means whereby implements of various types can be connected with a bulldozer of the nature referred to, thereby greatly increasing the utility of the bulldozer.

A further object of this invention is to provide a particular mounting arrangement adapted for receiving a plurality of different types of implements for being carried by the bulldozer to be operated thereby.

A still further object is the provision of a bracket device adapted for being secured to the face of the bulldozer blade for supporting various types of implements to be operated by the bulldozer.

Another object of this invention is the provision of a bracket arrangement for securing to the frame member of the tractor that lies behind the bulldozer blade upon detachment of the bulldozer blade therefrom for carrying various types of implements for operation by the bulldozer.

Still another provision of this invention is the provision of various types of devices and implements, particularly adapted for being mounted and operated by a bulldozer in accordance with the present invention.

These and other objects and advantages of this invention will become more apparent upon reference to the following specification taken in connection with the accompanying drawings, wherein:

Figure 1 is a perspective view showing a bulldozer with a bracket, according to the present invention, mounted on the face of the blade of the bulldozer and a roofer or digger member carried thereby in working position;

Figure 2 is a view similar to Figure 1 drawn at a somewhat enlarged scale showing the roofer member carried on the face of the bulldozer blade lifted out of operating engagement with the ground and with a dot-dash outline indicating the position occupied by the roofer when it is turned upward on the blade to inoperative position;

Figure 3 is a sectional view indicated by line 3—3 on

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Figure 2 showing the bracket on the face of the blade more in detail;

Figure 4 is a fragmentary perspective view showing another implement adapted for being mounted on the bulldozer blade, and which implement is a pusher for toppling trees and the like;

Figure 5 is a plan view showing more in detail an arm adapted for being carried by the bracket that is on the face of the bulldozer blade and adapted for receiving at its outer end a work member, in the case of Figure 4 the tree pusher and in the case of Figure 5 a coal ripper;

Figure 6 is a side view of the Figure 5 arrangement;

Figure 7 is a perspective view showing a tool similar to the one illustrated in Figure 5, which may be employed for toppling trees or for shearing off coal deposits and the like;

Figure 8 is a perspective view showing a pusher pad adapted for mounting on the end of the arm that is connected with the face of the bulldozer blade for pushing trucks and similar jobs;

Figure 9 is a perspective view showing the manner in which a rake or scarifier arrangement can be mounted on the end of the arm;

Figure 10 is a perspective view showing an adapter bracket adapted for being attached to the frame member that is located behind the bulldozer blade and engages the bulldozer blade in the center thereof, the said bracket being mountable on the frame after the bulldozer blade has been detached therefrom; and

Figure 11 is a sectional view indicated by line 11—11 on Figure 10.

Referring to the drawings somewhat more in detail, Figure 1 discloses a bulldozer comprising a tractor portion 10 with endless track treads 12, and mounted on the front of tractor 10 is a bulldozer blade 14 attached to the tractor in the usual manner so that the bulldozer blade is tiltable relative to the tractor in a horizontal plane, and which blade also tilts in a vertical plane and can be raised and lowered in a vertical plane, all such movements and adjustments of the bulldozer blade being well known in the art.

According to the present invention, and having reference to Figures 1 and 2, I provide a support bracket 16 mounted on the face of the bulldozer blade in the center thereof and immediately in front of the central connection of the bulldozer blade with the frame of the tractor which carries the said blade.

Having reference to Figures 1, 2 and 3, bracket 16 comprises a pair of side plates 18 having feet portions 20 projecting laterally therefrom for attachment to the face of the bulldozer blade and curved from top to bottom, as seen in Figures 1 and 2. A heavy transverse stiffening plane 22 extends between side plates 18 and, at their forward ends, side plates 18 are either turned inwardly or carry the inwardly projecting portions 24, so that a T slot extending vertically in the bracket is formed for detachably receiving the head 26 of an implement support bracket from which there projects, in a forward direction and extending between the inner ends of portions 24, the spaced mounting plates 28. Plates 28 have the registering apertures 30 for receiving a pivot bolt 32, about which the implements to be connected with the bracket or the arm to which the implements are attached, are pivotally supported on the bracket. Plates 28 also have another series of apertures 34 which are for the purpose of receiving a clamp or locking bolt or stud 36 which serves to lock the implements and the supporting arm therefor in position in the bracket.

The bottom of T slot formed in support bracket 16 is preferably closed by a transversely extending plate 38, and a pair of aligned apertures in side plates 18 to re-

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ceive a rod 40 extending across the top opening of the T slot are provided for the purpose of retaining the implement supporting bracket consisting of plate 26 and plates 28 within support bracket 16.

It will be noted in Figure 2 that bracket 16 is mounted in about the center of the bulldozer blade, and this is immediately forward of the principal connection of the bulldozer blade with the frame of the tractor. Because of this any loading of the bracket will be transmitted almost directly to the tractor frame and will not tend to break or bend the bulldozer blade. This is a distinct improvement over previous forms of attachments for being connected with or mounted on bulldozer blades, because heretofore such brackets have not transmitted the loads directly to the tractor frame, but have, instead, imposed severe bending forces on the bulldozer blade or on the hardened cutting edge thereof, with the possibility always existing that the bulldozer blade will be severely damaged by stresses imposed thereon.

In Figures 1 and 2 I show one attachment particularly adapted for being supported by the bracket arrangement of the present invention, which attachment consists of a roter bar 42 pivotally supported at its rear end on bolt 32 and clamped in place by bolt 36 and having a pointed end at 44. This simple bar-like tool is extremely useful for tearing out roots or trees or for breaking or dislodging other obstructions such as pipes, stones and the like, and will operate, generally, to prevent the bulldozer blade from being damaged by striking such subterranean articles, and will assist in permitting the bulldozer to take a much heavier cut than would otherwise be possible due to the plowing and breaking action of the bar 42.

In place of the bar 42, I also contemplate the use of a strong heavy arm carried between plates 28 which is adapted for supporting a plurality of different types of implements. Such an arm is illustrated at 46 in Figures 4, 5 and 6. This arm has its rear end secured between plates 28 in the same manner as arm 42, but its outer end is provided with a socket 48 for receiving the shank end 50 of any suitable sort of tool which may be locked within the socket by a bolt, stud or rod 52.

In Figure 4 I show a device for toppling trees which consists of a U-shaped plate 54 carried on a shank that is disposed on the socket of the outer end of arm 46 and which plate 54, across the space between the legs thereof, carries a plurality of points 56 which will dig into the tree to be toppled. The arrangement is such that when the implement is brought into engagement with a tree it will not tend to slip but, instead, will dig into the tree and great force can be exerted on the tree to push it over. In connection with the considerable amount of force that can be developed on implements carried by arm 46, it is to be noted that the said arm is quite heavy, on the order of from four to six inches square, so as to be able to withstand the heavy loads imposed thereon.

In Figures 5 and 6, arm 46, at its outer end, carries a spearhead 58 provided with a shank that is secured in the socket on the outer end of arm 46. The spearhead 58 is particularly useful for ripping coal and the like, especially where a hole has been drilled in the vein of coal, or where there is a crack or fissure into which the spearhead can be introduced. For example, by ripping the coal at ten to fifteen foot intervals along the face of an open cut, blasting of the coal is eliminated and it can readily be loaded with smaller equipment than could otherwise be used.

Also useful in working with coal is the implement illustrated in Figure 7, wherein a block 60 is provided having a shank to be received in the end of arm 46, which block supports a heavy plate 62 similar in configuration to plate 54 of Figure 4 but being much heavier in construction. Plate 62 also carries between the pointed end portions 64 a plurality of heavy sharpened teeth 66. The Figure 7 implement is useful in connection with certain strip mining operations, wherein coal is sometimes taken

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out the side of a hill by boring operations where it would be impractical to remove the overlying earth to get to the coal. These boring operations are a satisfactory economy and remove considerable coal, but a great deal of coal remains in the vein in the form of partitions or pillars between the holes. By utilizing the implement of Figure 7, to rip out some of these pillars, for example, every other one, it is possible to obtain quite a bit of coal which otherwise would be left behind.

Figure 8 illustrates the manner in which a simple pusher pad can be provided on the end of arm 46, and this is done by mounting a curved plate 170 on the end of a shank 172 and providing the plate 170 with a facing of brake band or belting material 174 secured to the plate by rivets 176. This simple attachment provides an ideal device for pushing trucks and other equipment where they cannot be moved by their own motive power.

In Figure 9 I show a scarifier or rake attachment, consisting of a transverse shaft or bar 180 having teeth 182 with a shaft 184 extending backwardly from the center of shaft 180 and rotatable within shank 186 that is carried by the outer end of bar 46. Means may be provided for limiting the rotary movement of shaft 184 in shank 186 taking the form of slot means in the shank, and pin means in shaft 184 is indicated at 188.

Turning now to Figures 10 and 11 the central portion of bulldozer blade 14 immediately to the rear of bracket 16 is engaged by the central portion of a frame member 200 for the purpose of imparting thrust to the bulldozer blade and to assist in manipulating the blade. I avail of this fact for providing a modified arrangement for mounting the implements of my invention on the tractor. Because a great many of the implements which I employ, and contemplate employing, do not require the presence of the bulldozer blade I prefer at times to remove the bulldozer blade and mount the implement directly on the end of frame member 200. This reduces the bulk of the machine, reduces the effort that must be made by the machine in manipulating the implements, and greatly improves the operator's visibility of the work.

The means that are provided for securing the bulldozer blade to the frame member 200 takes the form of a bracket on the back of the bulldozer blade (not shown), which bracket pivotally engages the head 202 of a rod 204 extending through frame member 200 and pivotal in the frame on its own axis. A pin 206 extending through the head 202 of a rod 204 at right angles to the axis of the pin forms the pivotal connection between the bulldozer blade and the pin. This combination of pivots permits the bulldozer to pivot relative to the frame 200 in both vertical and horizontal planes.

According to my invention I provide a bracket which is rigid with frame member 200 for attaching my implements after the bulldozer blade has been removed. This bracket comprises side plates 210 notched at their rear edges so as to fit over the frame member 200. Horizontal plates 212 extend between, and are rigid with, plates 210 and are provided with apertures for receiving the pin 206. When the bracket formed by plates 210 and 212 is placed in position, and the pin 206 is located in the position illustrated in Figures 10 and 11, the bracket becomes rigid with frame member 200 and cannot tilt relative thereto.

A curved face plate 214 secured to the front edges of plates 210 provides a mounting surface the same shape as the face of the bulldozer blade for receiving support bracket 16, as indicated in dot-dash outline in Figure 11.

Any of the described implements can be carried on support bracket 16 when it is mounted on the face of the bulldozer blade, and can also be carried by support bracket 16 when it is bolted to the face of plate 214 in the absence of the bulldozer blade.

From the foregoing it will be evident that what I have devised is a useful series of implements, a novel supporting arm thereof, and an improved attaching means

for attaching the arm or the implement to the face of a bulldozer blade or to the tractor frame member that is immediately behind the bulldozer blade, with the several advantages being had that a universal mount is provided for the implements, the implements can be mounted with the bulldozer blade on the tractor for use therewith, or separately therefrom, and in either case do not overload the blade or subject it to bending or breaking forces, while the bulldozer blade can be removed completely and the implements mounted directly on the frame of the tractor.

It will be understood that the implements which I show merely are exemplary of the great many different types of implements which can be designed for use in connection with my invention such as a lift hook, roller, broom, bucket, a combination rake and blade for landscaping, and the like, and that various modifications can be made in the particular structure of the supporting bracket and the implements without departing from the scope of my invention. It will, therefore, be understood that I wish to encompass within the purview of my invention all such modifications as fall within the scope of the appended claims.

I claim:

1. In combination; a tractor having means for supporting a bulldozer blade, a fixed support bracket having its back face curved to correspond to the curvature of the blade and having a T slot closed at one end and open at the other, an implement support bracket having a base to be received in said T slot, and said fixed bracket being adapted for mounting on the face of the bulldozer blade.

2. In combination, for mounting on the front end of the blade supporting frame of a bulldozer; a fixed support bracket, an implement support bracket slidable into supporting engagement with the fixed bracket from above, means on the implement support bracket forming a horizontal pivot axis for detachably receiving implements, and means for fixing implements in adjusted positions to said implement support bracket.

3. In combination; a fixed supporting bracket, a vertical T slot in said fixed bracket closed at the bottom, an implement bracket having a base slidable in said T slot and comprising spaced outwardly extending plates rigid with said base, and said plates being provided with registering apertures for detachable connection thereto of implements in adjusted positions.

4. In combination; a tractor, a bulldozer blade on the tractor, a support bracket fixed to the face of the blade in about the middle thereof, an implement support bracket detachably supported by said fixed bracket, and a heavy bar carried by said implement support bracket and projecting forwardly from the blade, said bar being adjustable in said implement support bracket in vertical pivoting movements, and having a wedge-shaped outer end for use as a digging tool.

5. In combination; a tractor, a bulldozer blade on the tractor, a support bracket fixed to the face of the blade in about the middle thereof, an implement support bracket detachably supported by said fixed bracket, and a heavy bar carried by said implement support bracket and projecting forwardly from the blade, said bar being adjustable in said implement support bracket in vertical pivoting movement and the outer end of said bar being provided with a socket for detachably receiving the shanks of implements.

6. In combination; a tractor, a bulldozer blade on the tractor, a support bracket fixed to the face of the blade in about the middle thereof, an implement support bracket detachably supported by said fixed bracket, and a heavy bar carried by said implement support bracket and projecting forwardly from the blade, said bar being adjustable in said implement support bracket in vertical pivoting movements, and an implement detachably mounted on the outer end of said bar.

7. In combination; a tractor, a bulldozer blade on the tractor, a fixed support bracket fixed to the face of the blade in about the middle thereof and above the cutting edge at the bottom of the blade, said fixed support bracket comprising a T slot open at one end, an implement support bracket having a base receivable in said T slot so as to be detachably supported by said fixed bracket, and a heavy bar carried and supported solely by said implement support bracket and projecting forwardly from the blade.

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