Feb. 13, 1940. I. F. DAVIDSON 2,190,056

ADJUSTABLE PLOW

Filed July 30, 1938 4 Sheets-Sheet 1

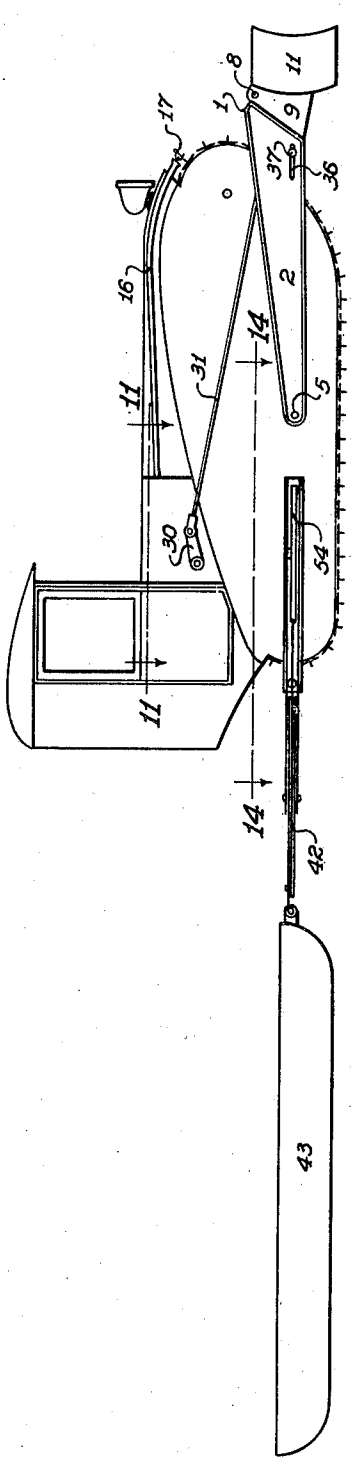


Fig. 1

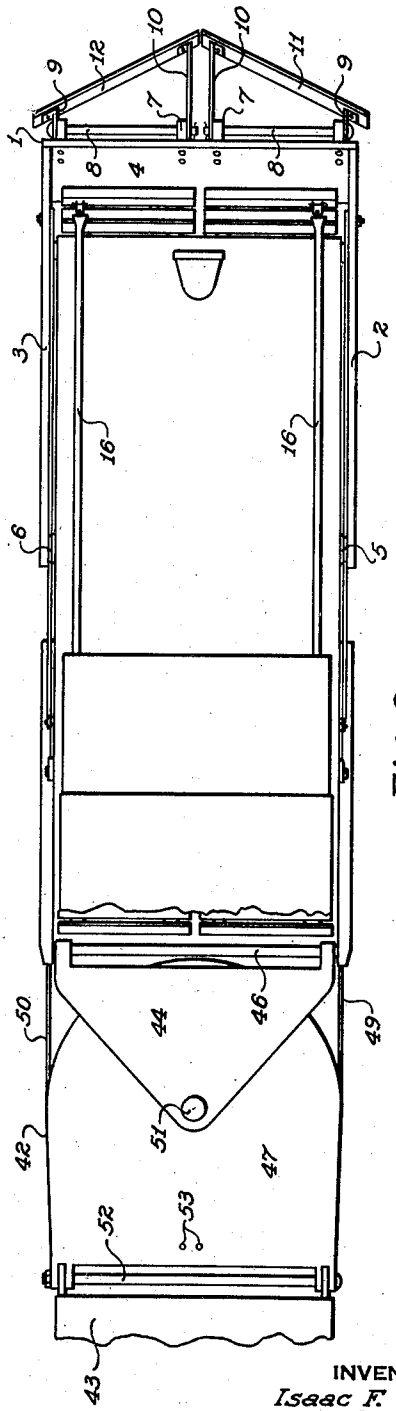


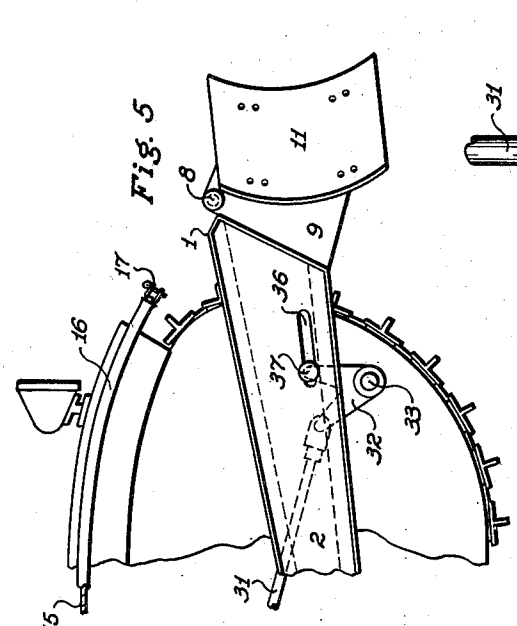
Fig. 2

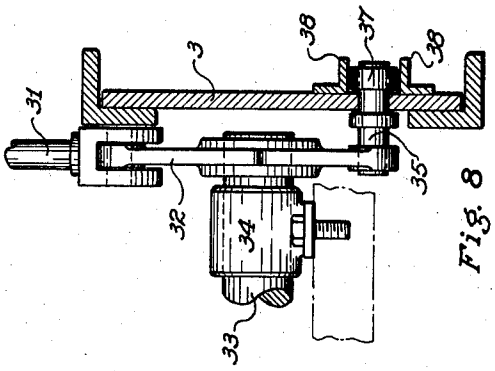
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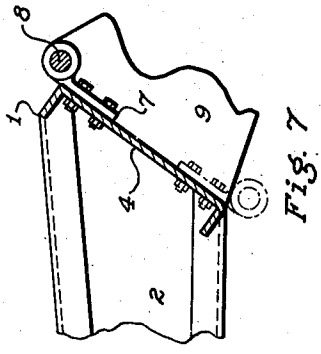
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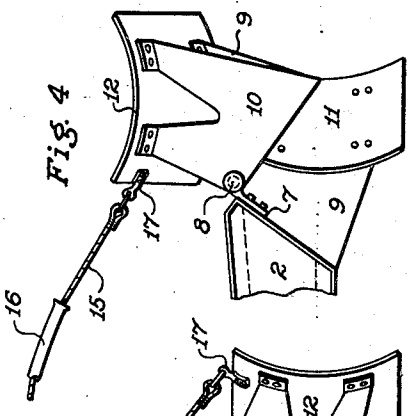
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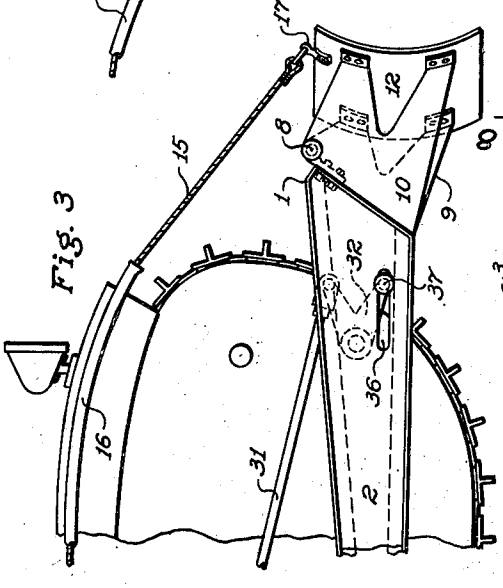
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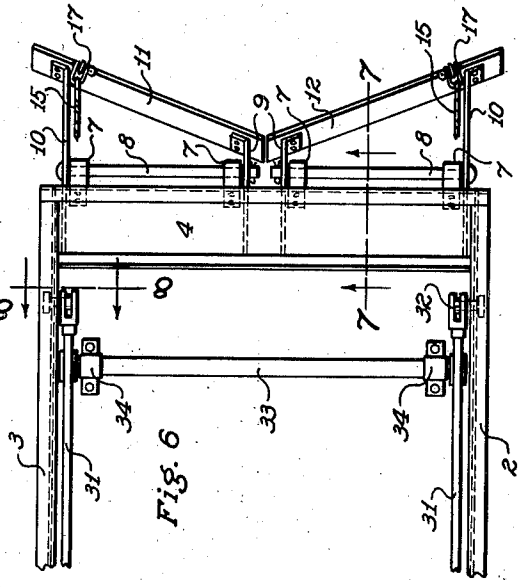












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ADJUSTABLE PLOW

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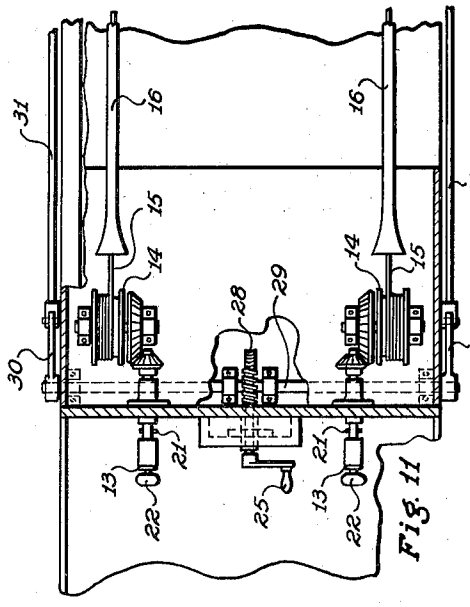


Fig. 11

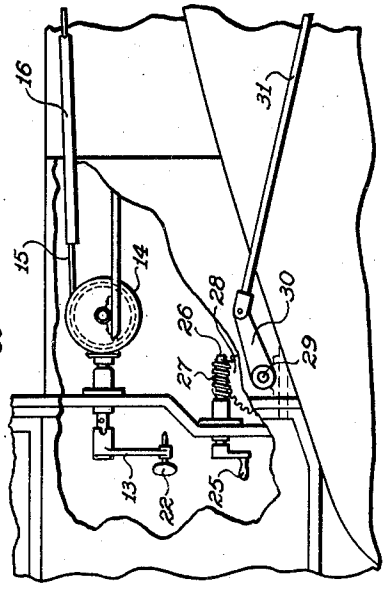


Fig. 12

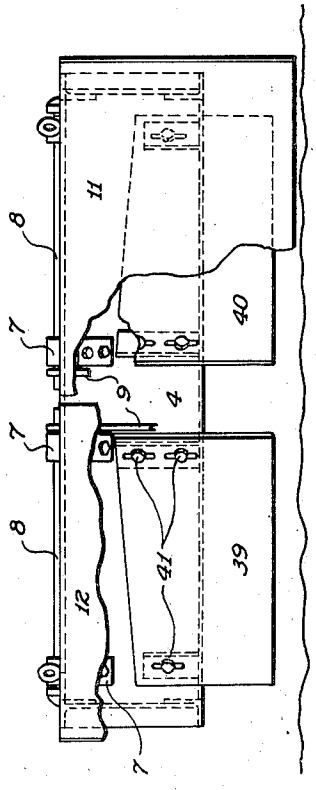


Fig. 9

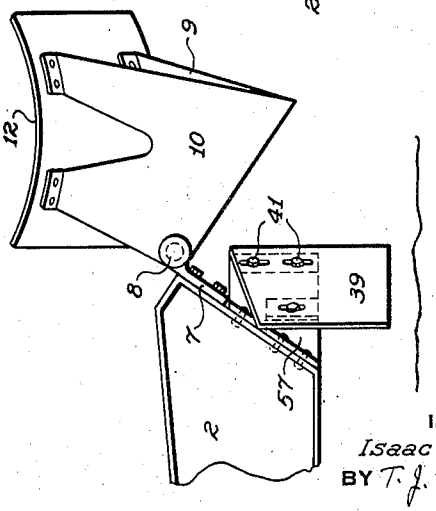


Fig. 10

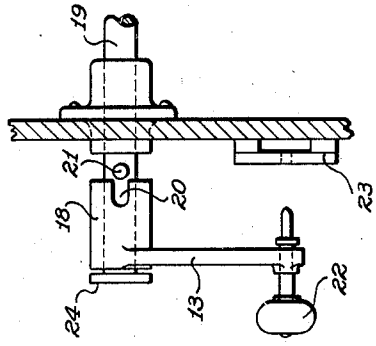


Fig. 13

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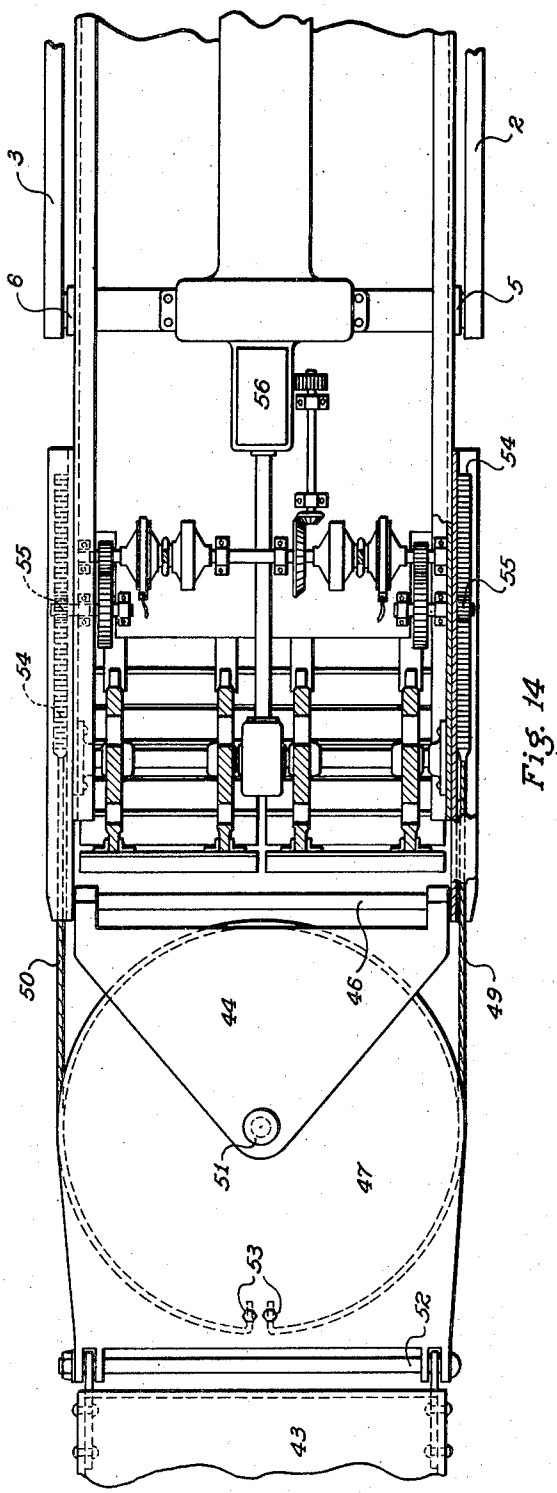


Fig. 14

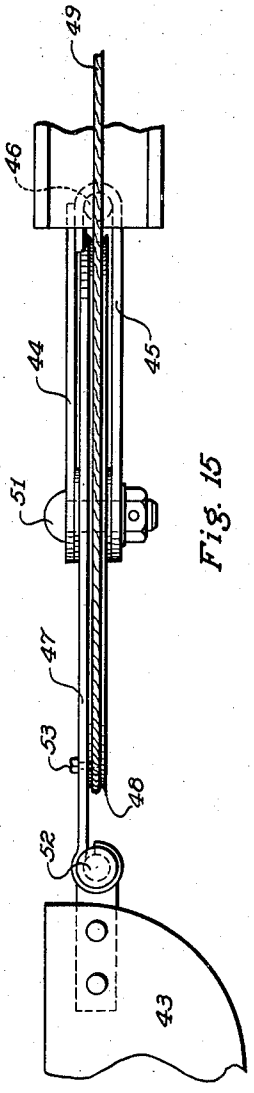


Fig. 15

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UNITED STATES PATENT OFFICE

2,190,056

ADJUSTABLE PLOW

Isaac F. Davidson, Portland, Oreg.

Application July 30, 1938, Serial No. 222,238

8 Claims. (Cl. 37—144)

My invention relates to adjustable plows of the type adapted to be carried at the front of trucks, tractors or similar vehicles for removing, leveling or making a pathway thru snow, or, in general, for leveling or grading earth or similar material.

More particularly, my invention is concerned with an adjustable plow forming an attachment to a tractor of the caterpillar type, especially tractors which are specifically adapted for use in snow, such as those described in my co-pending applications, Ser. No. 136,426 and 170,846.

An object of my invention is to provide a simple practical plow comprising adjustable elements which may be easily controlled from the cab or driver's seat of the truck or tractor.

Another object of my invention is to provide a snow plow particularly adaptable for sloping ground or hillsides, whereby a comparatively level roadway may be formed on the sloping ground for the tractor or truck to which the plow is attached. This specific object I accomplish by arranging the plow-shares of my device so that, when desired, only one side share or blade of the plow need be used, and thus when used on a hillside for plowing the snow or grading the ground or other material, the plow-share on the high side may be used alone, thus removing the snow or other material on the high side and transferring the same to the low side for the purpose of making a level roadway. Consequently, one of the important features of my plow is the fact that either share may be readily elevated and adjusted independently of the other.

A further object of my invention is to provide a plow having separate shares or blades so arranged that they may be converted from a clearing or diverting position to an accumulating and transferring position; thus, in addition to having the shares or blades separately adjustable, having these so attached to the plow that they may be set at either an obtuse angle or acute angle with the direction of travel of the vehicle, and consequently forming either the usual V-shaped plow or a scraper or leveler of inverted V-shape.

A still further object of my invention is to provide a plow, attached to a tractor or similar vehicle, of which all parts may quickly be raised as a unit in order to lift the entire plow over obstacles, or to raise the plow out of the way when further use of the plow is not desired.

Another object of my invention is to provide a plow of the type indicated which, in addition to the usual plow-shares, will have auxiliary blades to serve as a supplementary means of leveling the roadbed ahead of the tractor or truck, to provide such auxiliary blades so that they will function independently of the position of the main plow-shares, and to have these auxiliary blades in themselves separately and independently adjustable.

All these and additional related objects I attain by constructing my plow and associated mechanism in the form hereinafter described with reference to the accompanying drawings.

In the drawings:

Fig. 1 is an assembly view of my invention combined with a certain type of snow tractor which I have found particularly adaptable and practical for use with my plow for snow;

Fig. 2 is a partial plan view corresponding to Fig. 1 but drawn to a larger scale;

Fig. 3 is a partial side elevation showing the main portion of my device in a certain operative position;

Fig. 4 is a corresponding fragmentary side elevation showing one of the plow-shares of Fig. 3 raised to inoperative position;

Fig. 5 is a partial side elevation similar to Fig. 3 but showing the entire plow raised to inoperative position;

Fig. 6 is a plan view conforming to Fig. 3;

Fig. 7 is a sectional elevation on the line 7—7 of Fig. 6 but drawn to a larger scale;

Fig. 8 is a sectional elevation on the line 8—8 of Fig. 6 illustrating certain parts of the operating mechanism but drawn to a considerably larger scale;

Fig. 9 is a front elevation of my plow with portions of the plow-shares broken away to show the auxiliary blades behind them;

Fig. 10 is a corresponding side elevation of the forward end of the plow, with the main plow-shares in raised position to show the auxiliary blades;

Fig. 11 is a sectional plan on the line 11—11 of Fig. 1 illustrating the actuating mechanism of my plow, but drawn to a larger scale than Fig. 1;

Fig. 12 is a corresponding side elevation of the mechanism shown in Fig. 11.

Fig. 13 is an enlarged detail of certain parts of the mechanism illustrated in Figs. 11 and 12;

Fig. 14 is a sectional plan on the line 14—14 of Fig. 1, drawn to a larger scale, illustrating also a type of hitch which may be used in connection with the tractor shown in Fig. 1, certain non-related parts, such as side sheathing, being omitted from the tractor for clarity; and

Fig. 15 is a side elevation of the hitch illustrated in Fig. 14.

My invention is shown in the drawings and described herein as used in connection with a tractor similar to that described in my co-pending application, Serial No. 136,426. However, the use of my plow is not confined to any particular type of tractor and may readily be used with other kinds of automotive vehicles, as previously mentioned.

The plow elements of my device are carried on a U-shaped frame 1 which comprises side beams 2 and 3 and a forward connecting member 4. The side beams 2 and 3 may be of any structural form to furnish the required strength, and these side beams have their rear ends pivotally mounted as at 5 and 6 on the vehicle chassis (see Fig. 2). The forward ends of the beams 2 and 3 slope downwardly and rearwardly as illustrated and the connecting member 4 which is rigidly secured to them is carried in a corresponding oblique position. Brackets 7 are attached by bolts near the upper edge of member 4. Removable shafts 8, journaled in the brackets 7, serve as pivotal mountings for the vertical plates 9 and 10, to which in turn are secured a pair of vertically curved plow-shares or blades 11 and 12 as shown in Figs. 2 and 6. The vertical plates 9 are considerably narrower than the plates 10, so that the plowshares 11 and 12 will be held at an angle to the center line of the tractor, for example, as shown in Fig. 2. The plowshares 11 and 12 are similar but oppositely sloped, interchangeable, and extend from the center line to a short distance in excess of the over-all width of the tractor or vehicle. When these plowshares are in lowered or active position, the rear edges of the supporting plates 9 and 10 will be contiguous with the front face of member 4, and the thrust of snow or other material which comes in contact with the plowshares 11 and 12 is transmitted to the side beams 2 and 3 and thus to the vehicle chassis.

Each of the plow-shares 11 and 12 may be raised or lowered independently of the other by means of twin elevating mechanisms (see Fig. 11) each of which comprises a crank 13, preferably located in the cab of the vehicle, adapted to rotate a drum 14 on which is wound a flexible cable 15 extending thru a suitable guide tube 16 to swivel connection with a clamp 17 located on the upper edge of the plow-shares 11 or 12. Preferably these clamps 17 are located near the outer end of the plow-shares 11 and 12 as shown. Thus rotation in the proper direction of either of the drums 14 causes the supporting plates 9 and 10 of the corresponding plow-share to pivot upwardly on its shaft 8 and thus swing such plow-share up out of operating position. The plow-share 12 is shown in such raised position in Figs. 4 and 10. In order to provide for rapid lowering of the plow-shares 11 and 12 from such raised position, each of the cranks 13 may be constructed as shown in detail in Fig. 13, namely, the hub 18, of each crank 13, is slidably and rotatably mounted on shaft 19. Shaft 19, thru suitable gearing, is adapted to rotate the corresponding drum 14. The hub 18 is provided with diametrically opposite slots 20 so that when the hub 18 is pressed inwardly the slots will engage a pin 21 rigidly disposed in the shaft 19, thus enabling rotation of the crank 13 to cause similar rotation of the shaft 19, when the particular plow-share is to be raised.

The raised plow-share may be held at any desired position by simply pushing the stem of the handle 22, which is slideably disposed in the end of the crank 13, into a hole in a bracket 23 secured to the vehicle framework. When it is desired to lower the raised plow-share the crank 13 is pulled outwardly causing the slots 20 to be disengaged from the pin 21 and simultaneously the stem of the handle 22 to become disengaged from the hole in the bracket 23. This allows the plow-share to drop by gravity causing the shaft 19 to spin within the hub 18. Should it be desired to lower the plow-share less rapidly, the rotation of the shaft 19 may be retarded by pulling on the crank 13 until the outer end of the hub 18 bears against a shoulder 24 provided on the end of the shaft 19, whereby the frictional contact of the hub 18 and shoulder 24 serves as a brake.

The twin mechanisms just described for independently controlling the plow-shares and the independent pivotal mounting of the plow-shares, render my device especially suitable for plowing, leveling or grading over rough surfaces where the contour of the ground and the obstructions may necessitate frequent raising and subsequent lowering of either one share or the other.

Figs. 1, 2 and 5 show the plow-shares 11 and 12 as mounted on member 4 in the usual V-shaped plow position. This arrangement of the plow-shares is suitable in general when my device is to be used to clear snow or other material from the path of the vehicle. In such case the plow-shares 11 and 12 divide the mass and thrust it to each side of the path. However, when it is desired to use my device as a "bull-dozer" for grading, leveling or transfer purposes, the plow-shares 11 and 12 may be interchanged to the position shown in Figs. 3, 6 and 9, that is, arranged in an inverted V-form. This is done very easily by removing the shafts 8, disconnecting the clamp 17, and interchanging the plow-shares. With this arrangement the snow or other material will accumulate in front of the plow-shares 11 and 12 and thus be pushed along by the plow and vehicle to the place where it is desired to deposit the same for filling or leveling. In side hill work, particularly, the snow or other material may be transferred from one side of the roadway to the other, and it is frequently desirable with such work for one of the plow-shares to be raised to an inoperative position, as previously stated, thereby facilitating the clearing or transferring of the snow or other material with the plow-share on one side only, usually on the high side, whereby the snow or other material is moved from the high side of the path to the low.

In addition to the provision for independently and separately raising and lowering the plow-shares 11 and 12, I provide for raising or lowering the entire forward plow assembly as a unit thru the operation or rotation of a single crank such as 25 (Figs. 11 and 12), which is preferably located in the cab of the vehicle near the cranks 13. The crank 25 is keyed to the shaft 26 carrying a worm 27, which worm meshes with a worm gear 28 mounted on a shaft 29 journaled transversely of the vehicle chassis in suitable bearings and having arms 30 secured at its outer ends. The arms 30 are coupled by forked rods 31 to bell-cranks 32. These bell-cranks 32 are keyed to the end of a transverse shaft 33 which is mounted at the forward end of the vehicle chassis in suitable bearings such as 34 (Figs. 6 and 8). The other arms of each bell-crank 32 carries a stub-shaft 35 which extends thru a slot 36 in the side beam 2 or 3. The stub-shafts 35 may be attached to the bell-crank 32 as shown in

Fig. 8, and fitted with a roller 37 adapted to travel in ways 38 secured to the side beam adjacent the slot 36. Rotation of the crank 25 imparts rotary motion (at a much slower rate) to the worm gear 28 and shaft 29 with consequent arcuate movement of the arms 30 and bell-cranks 32, causing the rollers 37 to travel in the ways 38 and thus raise or lower the entire forward end of the frame 1, the frame 1 pivoting on the vehicle chassis at the points 5 and 6.

I have found it desirable, under many conditions, to provide auxiliary leveling blades 39 and 40 mounted in a vertical position on suitable brackets 57, which brackets are bolted to the member 4 of the supporting frame (see Figs. 9 and 10). The mounting of the blades 39 and 40 to the brackets 57 is preferably thru slotted connections 41 so as to permit a certain amount of vertical adjustment. These auxiliary blades 39 and 40 do not extend down as far as the plow-shares 11 and 12, when the latter are in lowered position, but extend down sufficiently to serve as additional leveling means when either or both of the plow-shares 11 or 12 are raised, and these auxiliary blades also prevent mass material from clogging the track belts of the tractor. The inner pair of supporting brackets 57 for these auxiliary blades are larger than the outer pair, and thus the two auxiliary blades 39 and 40 are held in V-shape or plow formation.

The tractor on which I have shown my plow mounted in Figs. 1 and 2 is similar to the tractor described in my co-pending application, Ser. No. 136,426. As an auxiliary means of steering the tractor, I have found it practical, under certain conditions, to provide a sled 43, attached to the tractor by means of a hitch 42. The particular hitch which I show comprises a pair of spaced plates 44 and 45 pivotally mounted on the draw bar 46 at the rear of the tractor. (See Figs. 1, 2, 14 and 15.) A plate 47 is interposed between the spaced plates 44 and 45, and the interposed plate 47 carries an integral sheave 48, adapted to receive the flexible cables 49 and 50. The plate 47 and sheave 48 are rotatably connected to the plates 44 and 45 by a pivot pin 51. The plate 47 is pivotally secured to the draw-bar 52 mounted at the front of the sled 43, as shown in Figs. 14 and 15.

Each of the cables 49 and 50 encompasses about a quadrant of the sheave 48 when the tractor and sled are in alinement. The rear end of these cables are anchored to plate 47 and sheave 48 by a suitable fixture 53. The cables 49 and 50 extend forwardly and their forward ends are attached to rack bars 54 slideably disposed at each side of the tractor. The rack bars 54 are caused to move longitudinally by means of cooperating pinons 55, which pinons are given rotary motion thru the media of suitable gearing and clutches by which power is secured from the tractor transmission 56. If one of the rack bars 54, with its attached cable, is made to move forward, while the other rack bar is permitted to move in reverse position, the tractor and sled will be turned with respect to each other.

It is, of course, possible to hitch two tractors together instead of a tractor and a sled. Should it be desired to hitch two tractors together in tandem fashion in this manner, when both tractors are equipped with my plow device, this may easily be accomplished by removing, from the rear tractor, the plow-shares 11 and 12, the auxiliary blades 39 and 40, and the brackets 57 on member 4. Then the two outer brackets 7 are moved from the top edge to the bottom edge of member 4, as indicated by the broken lines in Fig. 7, a draw-bar similar to bar 52 is mounted between these lowered brackets 7 and the plate 47 of the hitch is pivotally mounted on the draw-bar.

Various modifications, of course, may be made in the specific shape and size of the plow-shares, and the auxiliary blades of my device, and also in the shape and form of the brackets and other supporting members on which the plow-shares and blades are mounted, without departing from the principles of my invention. Similarly, other mechanical means for raising the plow or the separate plow-shares might be substituted for the particular mechanical means which I have suggested, and which I show as operated from the tractor cab. It is not my intention to limit my invention to any of the specific control means herein described.

I claim:

1. In a device of the character described, a vehicle, a U-shaped frame pivoted on said vehicle, said frame comprising side portions and a cross member joining said side portions at the forward end, means on said vehicle for raising said frame, a pair of plow shares, each of said shares secured to a pair of brackets, one of said brackets extending forwardly further than the other, said brackets hinged to said cross member for up and down movement, the hinges of said brackets being in horizontal alinement, said hinges so arranged that said share assemblies may be removed or interchanged, means on said vehicle removably connected to each of said shares whereby either of said shares may be swung upwardly independently of the other.

2. In a device of the character described, a vehicle, a bulldozer frame pivotally mounted on said vehicle and normally held in substantially horizontal position, said frame comprising side portions and a cross member joining said side portions at the forward end, the plane of said cross member sloping downwardly and rearwardly, means on said vehicle for raising said frame, a pair of plow shares removably interchangeably hinged to said cross member, the hinges of said shares being in horizontal alinement, means on said vehicle removably connected to each of said shares whereby either of said shares may be swung upwardly independently of the other, a pair of vertical auxiliary blades removably and adjustably secured to said cross member between said shares and said cross member.

3. In a device of the character described, a track-laying tractor, a U-shaped frame pivoted on said track-laying tractor, said frame comprising side portions and a cross member joining said side portions at the forward end, means on said track-laying tractor for raising said frame, a pair of plow shares, each of said shares secured to a pair of vertical brackets, one of said brackets extending forwardly further than the other, said brackets hinged to said cross member for up and down movement, said hinges so arranged that said share assemblies may be removed or interchanged, means on said track-laying tractor connected to each of said shares whereby either of said shares may be swung upwardly independently of the other, a pair of vertical auxiliary blades removably secured to said cross member between said shares and said cross member.

4. In a device of the character described, a track-laying tractor, a bulldozer frame pivotally

mounted on said track-laying tractor and normally held in substantially horizontal position, means on said track-laying tractor for raising said frame, a pair of plow shares, each of said shares secured to a pair of brackets, one of said brackets extending forwardly further than the other, said brackets hinged to the front end of said frame for up and down movement, said hinges so arranged that said share assemblies may be removed or interchanged, means on said track-laying tractor removably connected to each of said shares whereby either of said shares may be swung upwardly independently of the other, a pair of auxiliary blades, each of said auxiliary blades adjustably mounted on a pair of brackets secured to the front end of said frame, one of said last named brackets extending forwardly further than the other but said last named brackets being smaller than said first named brackets of said shares.

5. The combination described by claim 4 with the hinges of said first named brackets being in horizontal alinement.

6. In a device of the character described, a vehicle, a bulldozer frame pivotally mounted on said vehicle, and normally held in substantially horizontal position, means on said vehicle for raising said frame, a pair of plow shares, each of said shares secured to a pair of vertical brackets, one of said brackets extending forwardly further than the other, said brackets hinged to the front end of said frame for up and down movement, the hinges of said brackets being in horizontal alinement, said hinges so arranged that said share assemblies may be removed or interchanged, means on said vehicle connected to each of said shares whereby either of said shares may be swung upwardly independently of the other, a pair of auxiliary blades, each of said auxiliary blades adjustably mounted on a pair of vertical brackets secured to the front end of said frame, one of said last named brackets extending forwardly further than the other but said last named brackets being smaller than said first named brackets of said shares.

7. In a device of the character described, a vehicle, a U-shaped frame pivoted on said vehicle and normally held in substantially horizontal position, said frame including side portions and a front member, a pair of plow shares, each of said plow shares attached to a pair of brackets, one of said brackets extending forwardly further than the other, said brackets carried by said front member, said shares hinged for up and down movement, and means on said vehicle for swinging each of said shares upwardly independently of the other.

8. In a device of the character described, a vehicle, a U-shaped frame pivoted on said vehicle, said frame including side portions and a front member, the plane of said front member sloping downwardly and rearwardly, a pair of plow shares, each of said shares secured to a pair of brackets, said brackets hinged to said front member for up and down movement, means on said vehicle for swinging each of said shares upwardly independently of the other.

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