July 16, 1940. W. F. HOLBROOK ET AL 2,208,128

PICKUP AND LOADER APPARATUS

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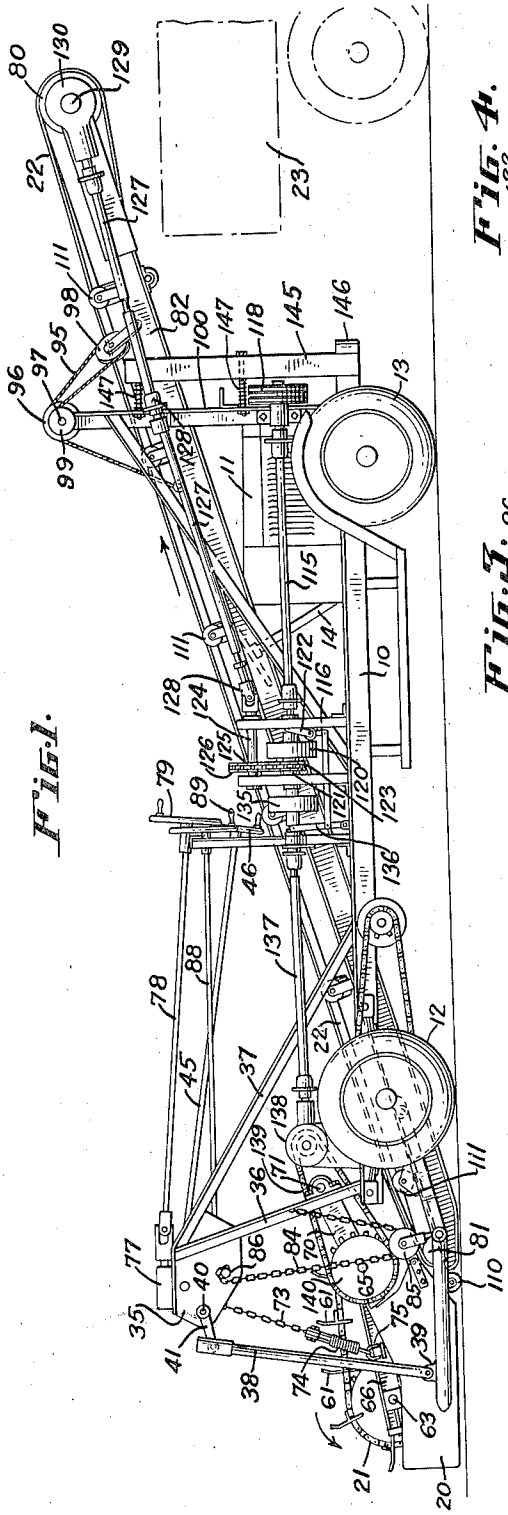

Fig. 1.

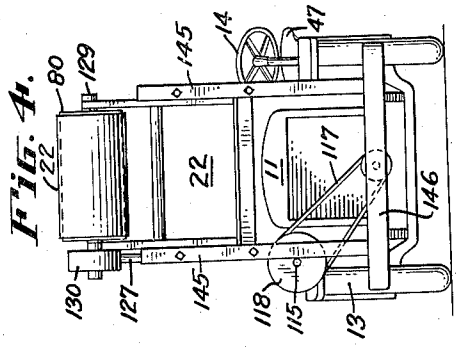

Fig. 4.

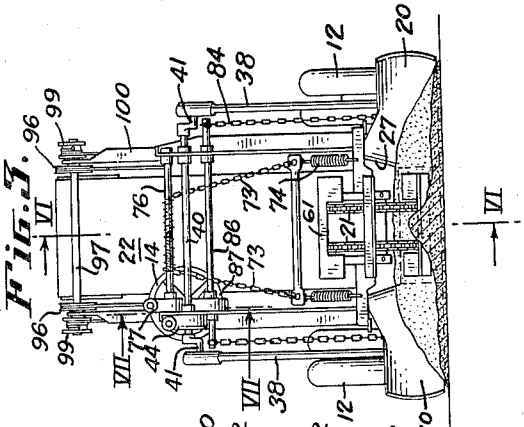

Fig. 3.

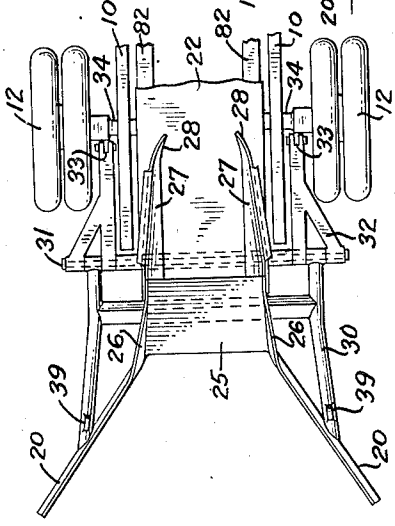

Fig. 2.

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Fig. 5.

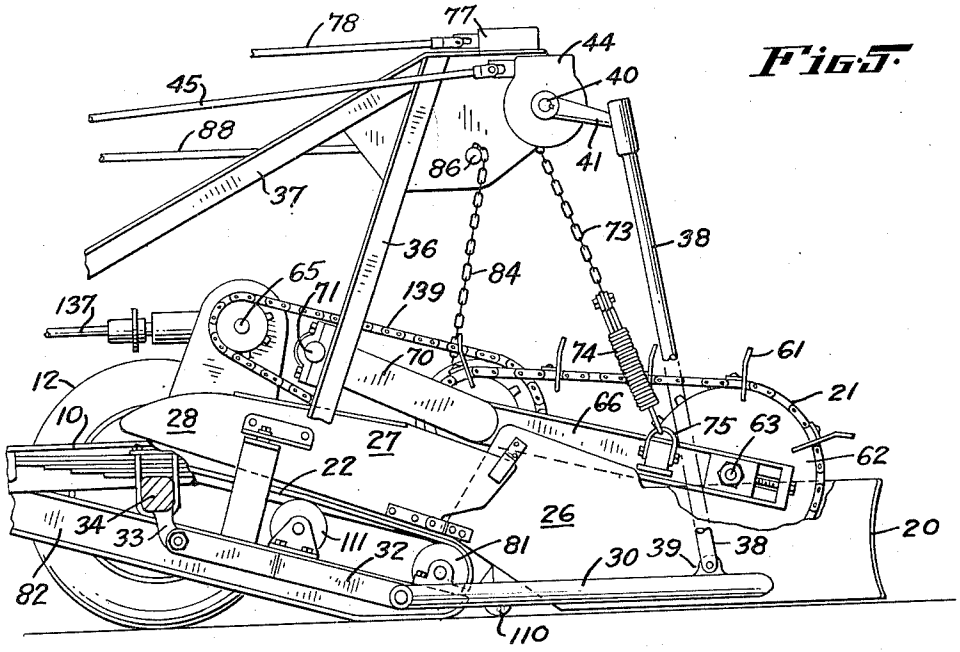

Fig. 6.

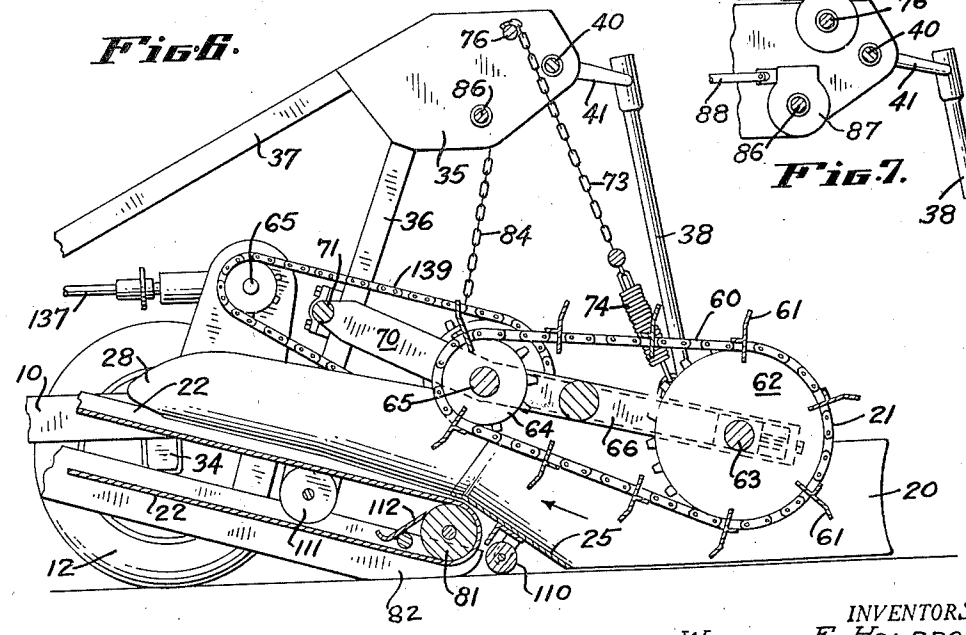

Fig. 7.

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Fig. 8.

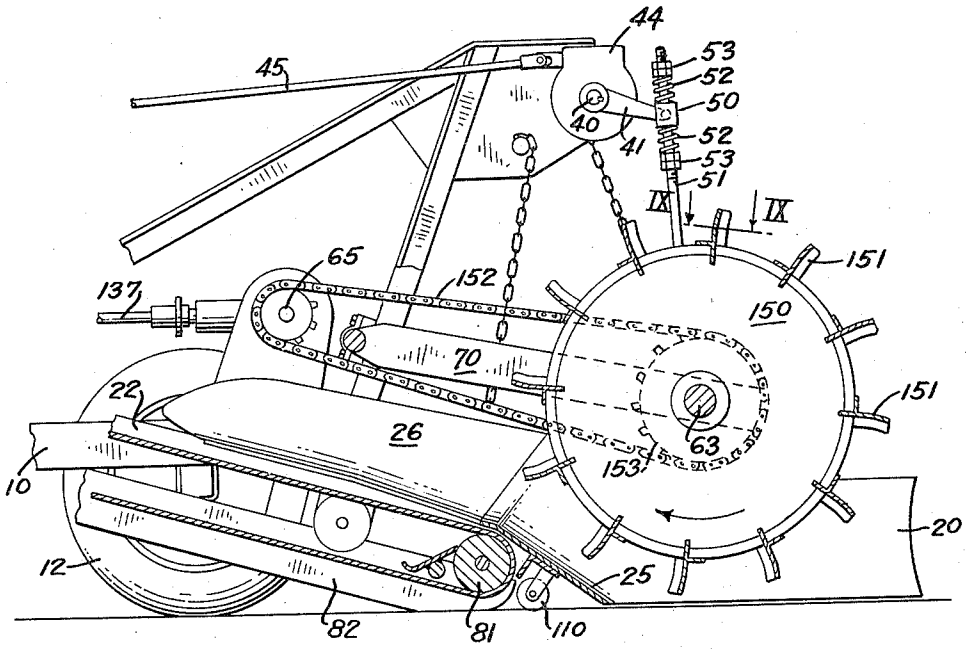
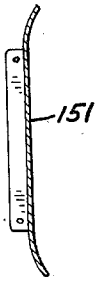


Fig. 9



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2,208,128

PICKUP AND LOADER APPARATUS

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Application December 7, 1938, Serial No. 244,396

8 Claims. (Cl. 198—8)

This invention relates to machines for the handling of loose dirt and like materials. More particularly the invention relates to the provision of an apparatus which will effectively and efficiently pick up and load loose or excess dirt which has accumulated on roadsides and in contiguous areas such as ditches and the like.

It is a well-known fact that one of the most vexatious problems in the maintenance of the modern highway is in the gathering and removal of loose dirt which has collected along the roadside as an incident to the maintenance thereof or which has been scraped from the adjacent ditches wherein it has accumulated as a result of erosion and the like.

It is true that there are instances in the prior art where others have sought to devise machines which will accomplish the aforementioned purposes, but it has been our observation that the prior art structures fall short of filling this particular need and that as a consequence none of them have been adopted for universal use. On the contrary, it has been our experience that those charged with the maintenance of the modern highway have almost without exception continued to rely on manual labor for the gathering and removal of such accumulated dirt and refuse. The manual handling of this material is costly; far out of proportion to its relative importance in highway maintenance.

In the maintenance of highways it is accepted practice to first scrape excess dirt and like materials which have accumulated in the marginal ditches, by means of an implement, such as a conventional grader, by which the material is moved into windrows on the highway proper or the adjacent shoulder, from whence it is manually gathered and loaded upon dump trucks for hauling to some other place.

The objects of this invention are attained, in general terms, through the provision of a wheeled vehicle, adapted to be propelled along the aforementioned surfaces and effectively gather the dirt or material in the windrows and mechanically deliver the same to dump trucks or other conveyances. In terms of general inclusion this is accomplished by the provision of a vehicle having forwardly diverging moldboards or blades, with a material moving apparatus working within the effective gathering area of the aforesaid moldboards and an endless elevating and conveyor means for moving the material thus gathered for convenient dumping into a separate conveyance.

These and other objects of the invention will become more apparent as this specification proceeds and the novelty of the invention will be particularly pointed out in the appended claims.

In the drawings forming a part hereof,

Fig. 1 is a side elevation of the earth gathering apparatus forming the subject matter hereof,

Fig. 2 is a plan view of the earth gathering end of the apparatus with certain parts removed for sake of clarity,

Fig. 3 is an end elevation of the machine of Fig. 1 showing the details of the earth gathering and moving means,

Fig. 4 is an end elevation of the machine opposite that of Fig. 3,

Fig. 5 is a side elevation of the earth gathering end of the machine, opposite that shown in Fig. 1, with certain parts removed for sake of clarity,

Fig. 6 is a longitudinal section through the earth gathering end of the machine, along the lines 6—6 of Fig. 3,

Fig. 7 is a fragmentary sectional view, taken on line 7—7 of Fig. 3,

Fig. 8 is a sectional view of the earth gathering end of the machine embodying a modification of the earth moving means, and

Fig. 9 is a plan view of a detail of construction along the line 9—9 of Fig. 8.

In the form selected for purposes of illustration of the principles of the invention we employ a vehicle having a chassis 10, a motor 11, driven wheels 12 and the idling steered wheels 13. While as this specification proceeds it will be appreciated that the vehicle is driven in reverse during the material gathering operation, in which a steering mechanism, generally designated by the numeral 14, acts upon the wheels 13, it will be appreciated that this is a mere detail of construction and that one may choose to power the wheels 13 and steer by the wheels 12.

The machine of our invention utilizes a pair of forwardly diverging moldboards or blades 20, in combination with the endless earth moving means 21 working within the effective gathering area of the moldboards, and an endless belt conveyor 22 serving to move and elevate the material for deposit in a separate conveyance, such as that indicated in dot-dash lines in Fig. 1 of the drawings and designated by the numeral 23.

The forwardly diverging blades 20 are illustrated to best advantage in Fig. 2 in which the endless earth mover means 21 has been removed for sake of clarity. Here it will be seen that the blades are suitably curved and that they converge into an integral pan 25, of slightly less width than the belt 22 and that the blades are each given a twist, as at 26, to provide sidewalls for the pan

25. Extension sidewalls 27, connected to the sidewalls 26, extend over the end of the belt 22 and are tapered inwardly, as at 28, to center the material passing therethrough as it is taken up on the belt 22. In Figs. 2 and 6 it will be noted that the pan 25 extends over the end of the belt 22.

The moldboards 20 and pan 25 are supported on the H-shaped frame member 30, the legs of which, through the medium of a shaft 31, are pivotally connected to the forked rods 32. The rods 32 are, in turn, pivotally connected to the lugs 33 on the dead axle 34 of the vehicle.

It should be here noted that adjustment is provided for the elevation of the moldboards 20, and particularly the outer ends thereof. An overhead frame member 35 is supported on the angle irons 36 and 37 bolted or otherwise secured to the vehicle chassis 10. Arms 38, the lower ends of which are connected to the legs of the frame member 30 by means of the lugs 39, have an operative connection with the rotatable shaft 40, horizontally disposed in the frame member 35, by means of the cranks 41 (see Figs. 1 and 5). In order to rotate the shaft 40, and hence by the means just described, raise or lower the blades 20 and the pan 25 relative to a surface, we provide the conventional worm gear arrangement indicated by the numeral 44 (see Fig. 5), there being a connecting rod 45 extending forwardly of the vehicle and having at its opposite end a hand wheel 46 in juxtaposition to the operator's station or seat 47.

The mechanism just described is adapted to particularly adjust the toes of the moldboards 20. It will be appreciated that in some cases independent adjustment of the moldboards 20 will be desirable, such as in the case of work done on an uneven surface, like a crowned road. There are many ways in which such adjustment may be accomplished. One such means is illustrated in conjunction with the modification disclosed in Fig. 8 of the drawings in which a block 50 is disposed at the end of the crank 41. The frame supporting rod 51 extends through the block 50 and the nuts 53 engaging the threaded portion of the rod 51 effect the adjustment of the elevation of the moldboard by permitting the relative lengthening or shortening of rod 51. The helical springs 52, disposed on the rod 51, above and below the block 50 and between the nuts 53, serve as shock absorbers.

Adjustment of the inner ends of the blades 20 and the connected pan 25 is accomplished through other means which will be hereinafter discussed in conjunction with the description of the conveyor 22.

It is, as stated, the function of the endless earth mover means 21 to move the earth gathered between the forwardly diverging moldboards 20 over the pan 25 onto the end belt 22. This mechanism is shown to best advantage in Figs. 1, 5 and 6, as consisting of the endless chains 60, having thereon the paddles 61, which chains turn on the sprocket 62 on shaft 63 and sprocket 64 on shaft 65. The shafts 63 and 64 are journaled in the frame members 66 and it will be noted that the bearing members for shaft 63 are adjustable lengthwise of the frame 66 to take up the slack in the chain 60 (see Figs. 5 and 6).

The inner end of the earth mover mechanism 21 is pivotally supported by the bars 70, rigidly connected at one end to the frame members 66 and connected at their other ends to the angle irons 36 by means of the pivots 71 (see Figs. 1, 5 and 6). The outer end of the earth mover 21 is supported and rendered adjustable with respect to the blades 20 and the earth surface by means of the chains 73, one end of which has a resilient connection with frame members 66 through the medium of the spring member 74 and the loops 75, the other end of which is taken up on the shaft 76. Shaft 76 is manually turned by means of the conventional worm designated by the numeral 77, there being a connecting rod 78 therefor and a hand wheel 79 at the operator's station designated by the numeral 47. It will thus be seen that when the wheel 79 is turned the earth mover 21 is caused to be raised or lowered as against its pivotal connection 71 with angle irons 36. Moreover, the earth mover 21 is full floating in the sense that the whole mechanism may rise or fall according to the depth of the material gathered between the moldboards 20.

The endless belt 22, as will be noted from Figs. 1 and 3, extends longitudinally of the vehicle, on an incline from the moldboards 20 and the earth mover means 21, running on a driven pulley 80 at its discharge end and an idler roller 81 at its intake end, both of which are on shafts suitably journaled in a frame member 82. The frame member 82 is supported at its intake end, and may be elevated to various heights, by means of the chain 84 and the block 85, the former being attached at one end to the angle iron 36, the other end being taken up on the shaft 86. Shaft 86 may be caused to rotate by the worm gear 87, the rod 88 and the handwheel 89, the latter being at the operator's station 47. Blocks 85 are attached to rods 32 and thus the taking up of chain 84 on shaft 86 will cause the elevation of the frame member 30, carrying with it the inner ends of moldboards 20, pan 25, and the intake end of conveyor 22 and its frame member 82 (see Fig. 2).

The opposite end of the frame 82 is suspended, in its relation to chassis 10, by means of the cables 95, secured at one of their ends to the frame and passing over the sheaves 96, on shaft 97, through the blocks 98, on the frame 82, and thence to the conventional winding drums 99. This mechanism is supported by the posts 100, bolted to the vehicle chassis 10, in which shaft 97 is suitably journaled.

It will thus be seen that both intake and discharge ends of conveyor 22 may be elevated to different levels, independently of each other, to meet varying conditions.

In order to prevent the pan 25 from gouging the earth and belt 22 from wear by contact therewith, we provide an idler roller 110 on the bottom of the cross-bar of frame 30 (see Fig. 6). Additionally, we have found it desirable and therefore provide a series of idler rollers 111, on frame 82, to support the belt 22 during its course. These rollers are disposed on opposite sides of the frame and pitched at slight angles to raise the edges of the belt to define a slight trough to prevent spilling of the material being handled (see Fig. 6). As a means of cleaning idler roller 81 and thus reducing wear and tear we have provided a scraper 112 therefor (see Fig. 6).

Power for the driving of the belt 22 and the earth mover 21 is derived from the motor 11 through the medium of the mechanisms shown to best advantage in Fig. 1. A live shaft 115, journaled in post 100 and post 116, has an operative connection with the main drive shaft of motor 11 through a belt 117 and pulley 118 (see also Fig. 4).

A clutch 120, on the shaft 121, upon being en-

gaged by any conventional means, such as the clutch finger 122, causes shaft 121 to rotate and the sprocket 123 thereon transmits power to shaft 124 by means of the chain 125 and sprocket 126. Shaft 127, having a universal coupling 128 with shaft 124 to compensate for regulation of the height above ground of the discharge end of belt 22, energizes shaft 129, on which is mounted pulley 80, through suitable gearing 130. Thus belt 22 is caused to travel over roller 81 and pulley 80 in the direction indicated by the arrow in Fig. 1.

A second clutch 135, engageable by suitable means, such as the lever 136, transmits the power of shaft 121, when connected by clutch 120 to shaft 115, to shaft 137 to drive the earth mover means 21. Here shaft 137, through suitable gearing 138, the chain 139 and sprocket 140, causes shaft 65 to be rotated and thus set in motion the chains 60 having thereon the paddles 61.

While we have illustrated and described a practicable, operative driving means for belt 22 and the earth mover means 21, it will be appreciated that other mechanisms may be substituted as a matter of choice without departing from the spirit of this invention. For instance a separate prime mover may be employed to drive belt 22 and earth mover 21, and thus eliminate the relatively remote connection with motor 11. Or a more direct connection with motor 11 or its main shaft may be devised. With this in mind we show the above described power transmission means merely for purposes of illustration.

The operation of the above described mechanism is as follows: The vehicle is put in reverse, with respect to the motor 11, the forwardly diverging moldboards being directed at the windrow or material to be handled, such as that illustrated in Fig. 3. The clutches 120 and 135 are thereupon engaged causing the endless belt 22 to be drawn over the pulley 80 and the idler roller 81 (in a clockwise direction looking at Fig. 1) and the endless earth mover means 21 to run in a counterclockwise direction (looking at Fig. 1). The loose material is gathered between the moldboards 20 and due to their rearward convergence forced into the area for effective handling by the paddles 61 of the earth mover means 21 by which it is moved rearwardly over the pan 25 through the throat defined by pan 25, moldboards 20 and the earth mover means 21, and thence onto the endless belt 22.

The material progresses with conveyor belt 22 for discharge beyond the end of the chassis 10, as for example, into a dump truck such as that indicated in the dot-dash lines (see Fig. 1). In this connection it should be noted that we have provided a pair of vertically disposed bumper posts 145 as a supplement to the conventional bumper 146, the same having shock absorbing springs 147 disposed between the bars 145 and the vertical posts 100, to prevent damage to the mechanism as dump trucks are backed into position under the discharge end of conveyor 22.

In Fig. 8 there is shown a modification of the earth mover means 21, consisting in the substitution of a single wheel 150 having paddles 151 secured at the periphery thereof, for the endless chain members 60 illustrated in Figs. 1 and 6. In this form the wheel 150 is mounted on the shaft 63, the latter being caused to rotate by means of its connection with a driven shaft 65 through the medium of a chain 152 and the sprocket 153. The particular shape of the paddles 151 is shown in Fig. 9 as having inwardly bent ends to more effectively move the earth gathered between the moldboards 20. It is quite probable that many would prefer a paddle wheel of this character working within the effective earth gathering area of the blades 20 to cause rearward movement of the dirt to the conveyor 22, since the gearing and driving means therefor could be more easily sealed against wear and tear caused by the material being handled.

It is believed apparent from the foregoing disclosure that we have devised a machine which is highly efficient for the purposes intended. Test runs of a full size machine have proved that loose dirt may be quickly and conveniently handled under the average conditions incident to road maintenance at but a fraction of the cost of the manual handling thereof or the operating costs of such equipment as there is in the prior art for this particular purpose.

It should be noted that one reason for the efficient performance of the apparatus is the novel floating construction of the material mover 21. It has been observed that when a deep windrow of material is encountered, such as would seemingly be greater than the normal capacity of the machine, the mover 21 swings upwardly on its pivot 71 and the paddles 61 bite downwardly into the pile until all of the gathered material is loaded upon conveyor 22.

Moreover, it was noted that due to the yieldable support for the outer end of the mover 21, clods of earth were readily broken up for easy movement due to the fact that the paddles 61 were continually striking the lumps from above, as contrasted with an attempt to force such clods through a rigid mechanism.

Were the mover 21 rigidly mounted this degree of efficient operation would not be attainable in the absence of some provision for self-adjustment of the machine to the quantity of material to be moved.

We have shown one form of our invention and modifications of details of construction thereof for purposes of illustration. Since it will be appreciated that the invention may take many other forms without departing from the spirt thereof, we desire protection to the full scope of the appended claims.

The invention claimed is:

1. In an apparatus of the class described, a wheeled vehicle, a pair of forwardly diverging moldboards disposed on one end thereof, a pan connecting the moldboards at a distance rearwardly of their forward ends, an endless conveyor extending longitudinally of the vehicle and having its intake end overlapped by said pan, adjustable supporting means for the discharge end of said conveyor, an auxiliary frame supporting the moldboards, the connected pan and the intake end of said endless conveyor, means for effecting adjustment of the relative positions above ground of the members supported by the auxiliary frame, a floating endless paddle means disposed between the moldboards to assume a position dependent on the quantity of gathered material and operative to move the material gathered between the moldboards over said pan and onto said conveyor, and means for effecting adjustment of the position above ground of the said endless paddle means.

2. In a device of the class described, a wheeled vehicle having a main frame, an auxiliary frame on one end thereof, a pair of forwardly diverging moldboards at the same end of the vehicle as the

auxiliary frame, a pan connecting said moldboards, said moldboards having portions extending forwardly beyond said pan, a pair of bars pivotally connected to the auxiliary frame, and floating means disposed between said moldboards for clearing the area between the moldboards of material gathered therein, the inner end of said clearing means being connected to the ends of said bars opposite their pivotal connection to said auxiliary frame and means suspending said clearing means being yieldably and adjustably supported by said auxiliary frame.

3. In a device of the class described, a wheeled vehicle having a main frame, an auxiliary frame on one end thereof, a pair of forwardly diverging moldboards at the same end of the vehicle as the auxiliary frame, a pan connecting said moldboards, said moldboards having portions extending forwardly beyond said pan, bars pivotally connected to the auxiliary frame, and floating means disposed between the moldboards for clearing the area between the portions and the pan of material gathered therein and thereon, the inner end of said clearing means being connected to the ends of said arms opposite their pivotal connection to said auxiliary frame and means supporting the outer end of said clearing means being yieldably and adjustably supported by said auxiliary frame.

4. In a device of the class described, a wheeled vehicle having a main frame, an auxiliary frame at one end thereof, a pair of forwardly diverging moldboards at the same end of the vehicle as the auxiliary frame, a pan connecting the moldboards, said moldboards having portions extending forwardly beyond said pan, material moving means disposed between the moldboards operative to clear the area between the said portions of material gathered therein and for moving the same across said pan, a conveyor means adapted to receive material from said pan, said material moving means and said pan and said moldboards defining a throat for the passage of material, and means in conjunction with said auxiliary frame for floatingly supporting the material moving means to permit variation in the area of said throat.

5. In a device of the class described, a wheeled vehicle having a main frame, an auxiliary frame at one end thereof, a pair of forwardly diverging moldboards at the same end of the vehicle as the auxiliary frame, a pan connecting the inner ends of the moldboards, said moldboards diverging forwardly of the pan, material moving means disposed between said moldboards operative to clear the area between the moldboards of material gathered therein and for moving the same across said pan, an endless conveyor means adapted to receive material from the pan, said material moving means and said pan and said moldboards defining a throat for the passage of material, means on the auxiliary frame suspending the forward end of said material moving means, and means pivotally connected to said auxiliary frame supporting the rear end of said material moving means for floating movement.

6. A wheeled vehicle having diverging moldboards thereon, a pan connecting said moldboards, a frame having legs connected to the moldboards and having a transverse means disposed beneath said pan for travel on the ground, means pivoting said frame to the vehicle, and a floating clearing means operative between said moldboards to move over the pan that material which is gathered between the moldboards.

7. A wheeled vehicle having diverging moldboards thereon, a pan connecting said moldboards, a frame having longitudinal legs connected at one end to the moldboards and a transverse means disposed beneath said pan for travel on the ground, means pivoting said frame to the vehicle, an auxiliary frame means extending upwardly and forwardly having an overhead portion, supporting means connected to the overhead portion and said moldboards, bars pivoted on said auxiliary frame means, and a clearing mechanism floatingly mounted by said bars located between the moldboards and operative to move over said pan that material which is gathered between the moldboards.

8. A wheeled vehicle having frame means thereon, forwardly diverging moldboards thereon, forwardly extending bars pivoted on the frame means, frame members pivoted to the forward ends of said bars, a clearing means floatingly mounted by said frame members between said moldboards for variation of its operative position dependent on the quantity of gathered material between the moldboards, a pan connecting said moldboards, said moldboards having portions extending forwardly beyond said pan, and a drive connection from the vehicle to said clearing means, said drive connection being flexible so as not to interfere with the floating movement of the clearing means.

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