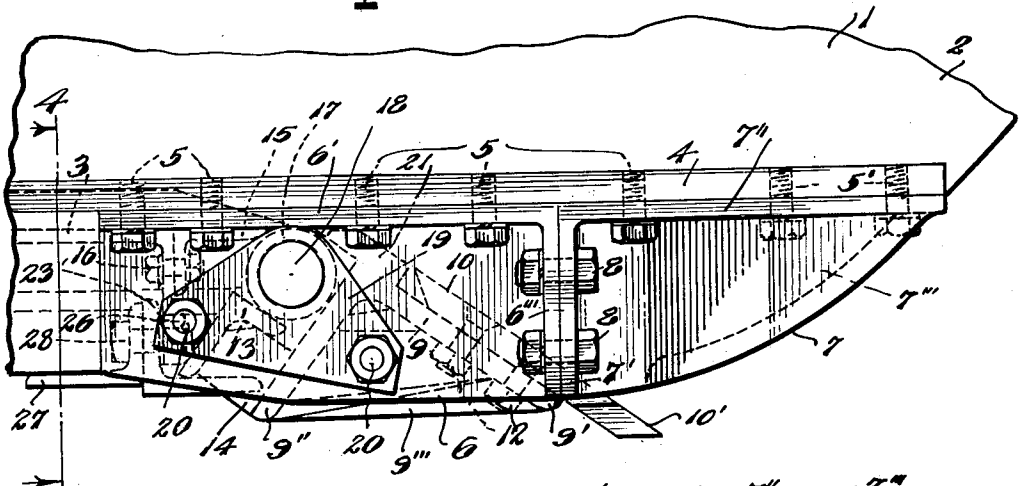
Oct. 7, 1941. G. A. VAUGHN 2,257,992

DIRT MOVING MACHINE

Filed Nov. 14, 1939 4 Sheets-Sheet 1

Fig. 1.



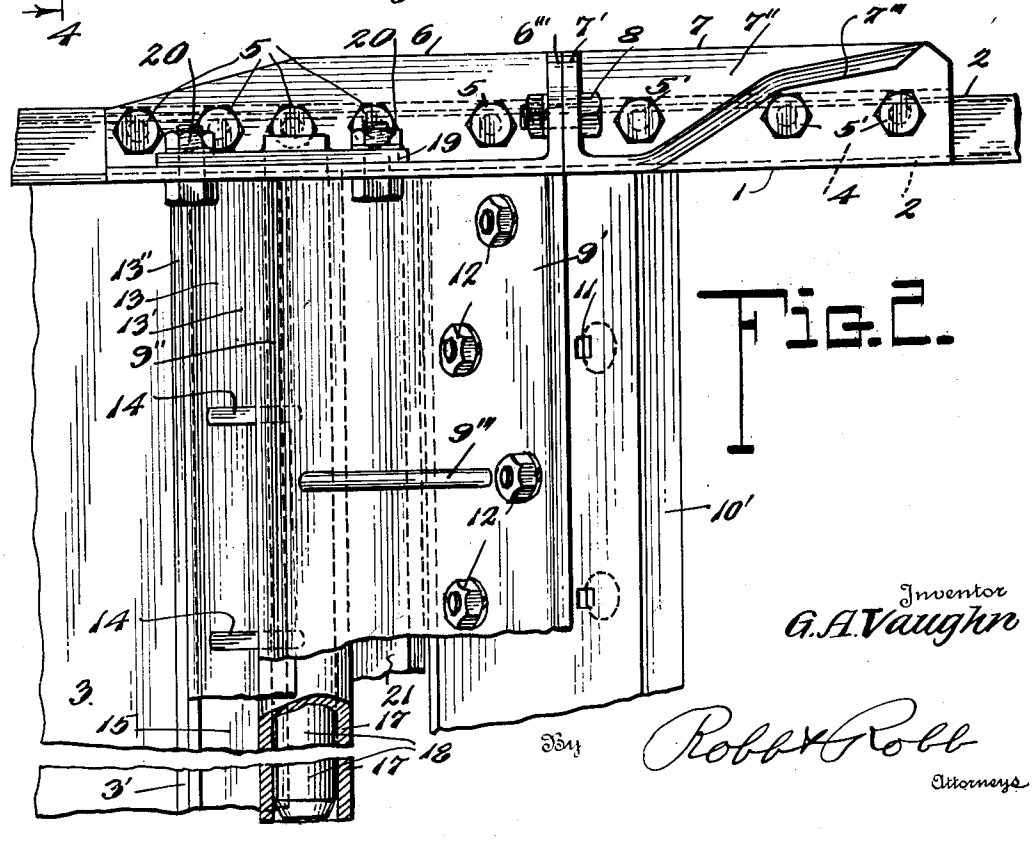


Fig. 2.

Inventor
G. A. Vaughn

By Robb & Robb
Attorneys

Oct. 7, 1941. G. A. VAUGHN 2,257,992

DIRT MOVING MACHINE

Filed Nov. 14, 1939 4 Sheets-Sheet 2

Fig. 3.

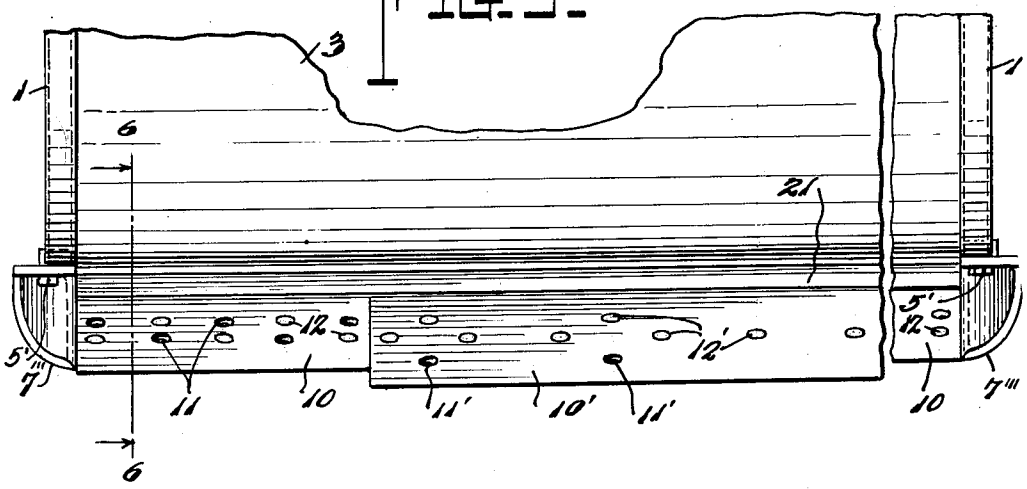
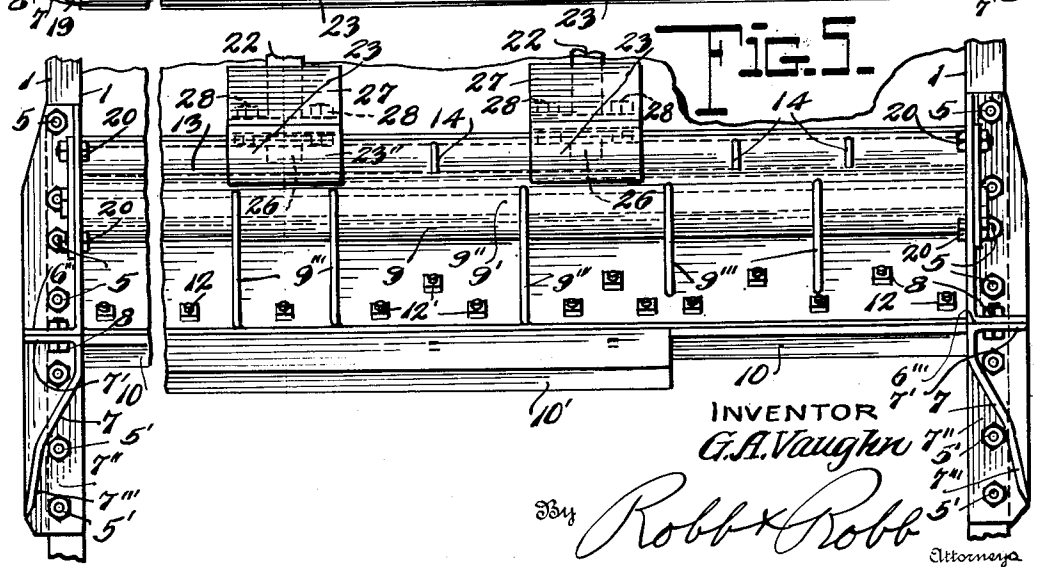


Fig. 4.
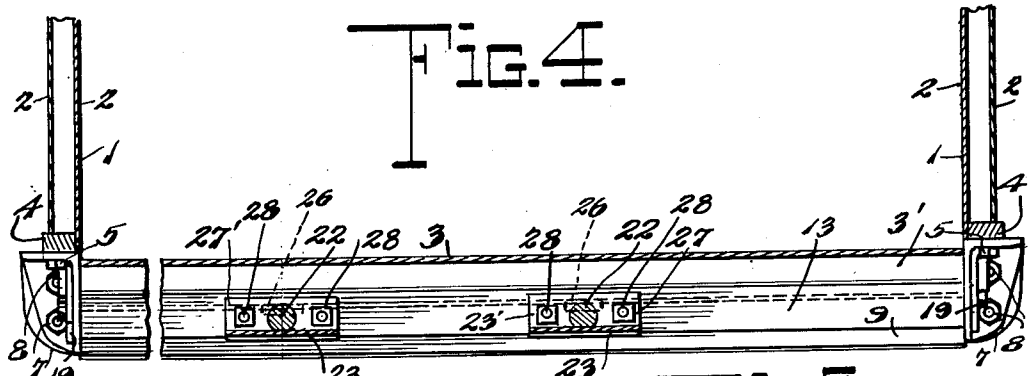


Fig. 5.



INVENTOR
G. A. Vaughn
By Robb & Robb
Attorneys

Oct. 7, 1941. G. A. VAUGHN 2,257,992

DIRT MOVING MACHINE

Filed Nov. 14, 1939 4 Sheets-Sheet 3

Fig. 6.

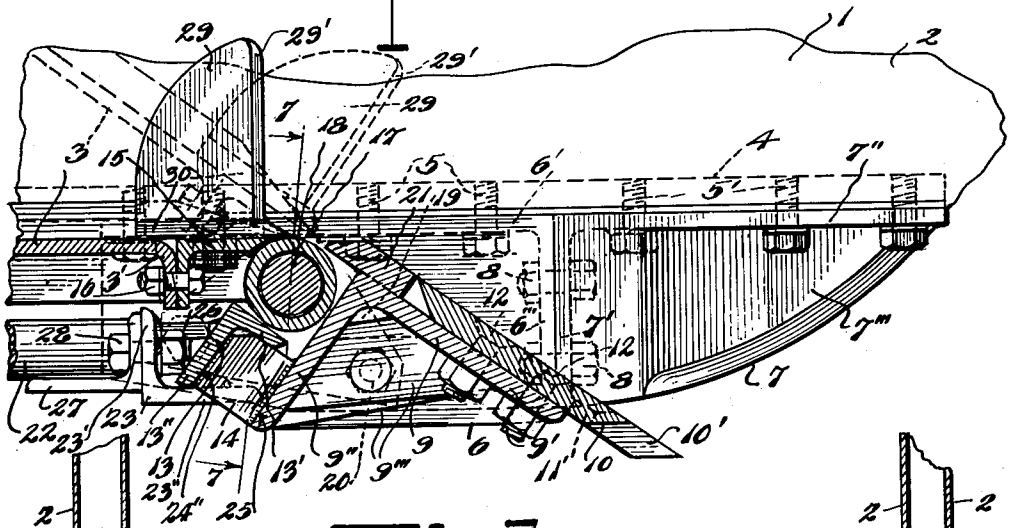


Fig. 7.

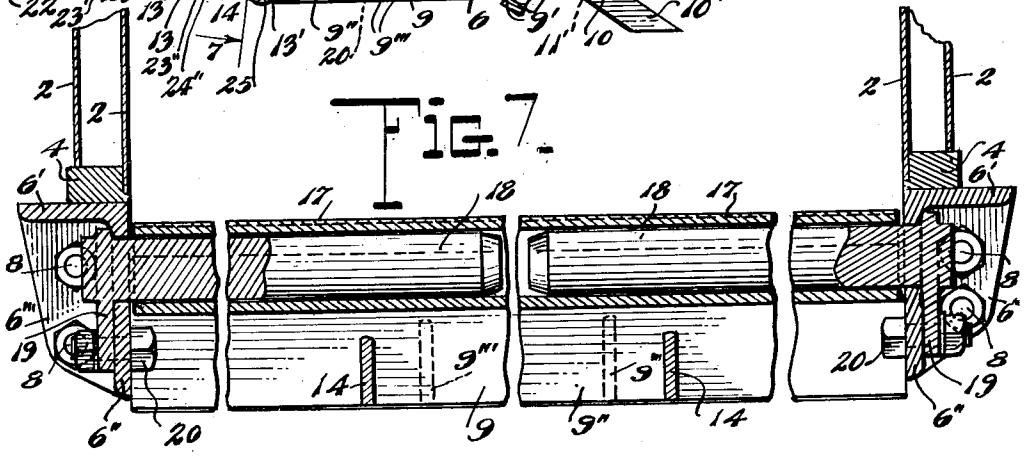


Fig. 8.

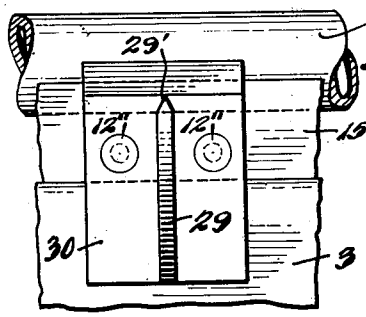
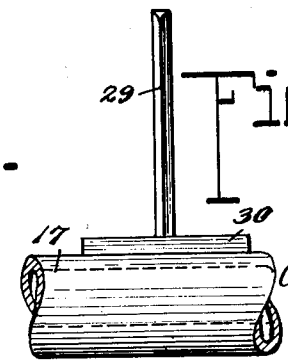


Fig. 9.



Inventor
G. A. Vaughn

By
Robb & Robb
Attorneys

Oct. 7, 1941. G. A. VAUGHN 2,257,992

DIRT MOVING MACHINE

Filed Nov. 14, 1939 4 Sheets-Sheet 4

Fig. 10.

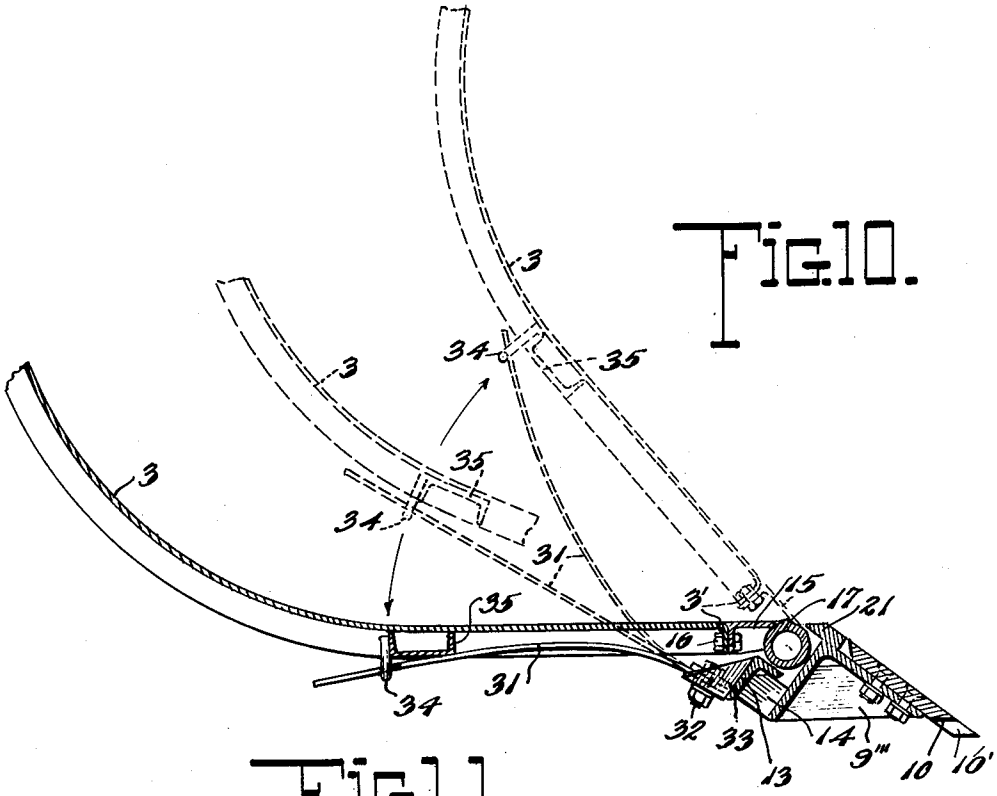
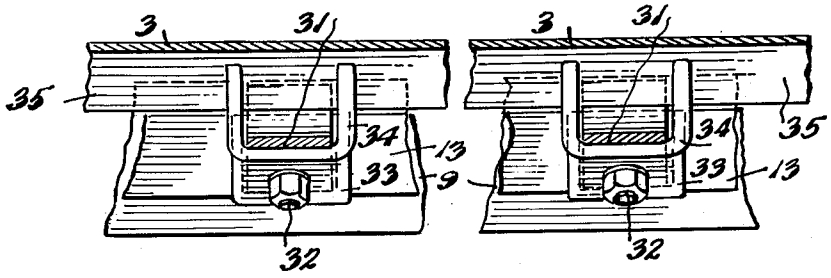


Fig. 11.



Inventor.
G. A. Vaughn

By Robb & Robb

Attorneys

Patented Oct. 7, 1941 2,257,992

UNITED STATES PATENT OFFICE

2,257,992

DIRT MOVING MACHINE

George A. Vaughn, Newton, Iowa, assignor, by mesne assignments, to Koehring Company, Milwaukee, Wis., a corporation of Wisconsin

Application November 14, 1939, Serial No. 304,427

15 Claims. (Cl. 37—118)

This invention appertains to dirt moving machines or scrapers of the mobile load-carrying type which are used in road building or for such other grading or moving purposes where the ground is to be levelled off by scraping and the loosened material transported to a convenient place of deposit. More especially, my invention has to do with that type of scraping apparatus which embodies a main traveling frame which is movable toward and away from the ground to scraping and load transporting positions respectively, and which is provided with a cutter or scraper blade disposed transversely of the main frame and fixed thereto so as to be movable therewith, and an associated apron or dirt- carrying member disposed at the rear of the cutter or scraper blade and pivotally connected to and carried by the main frame so as to be movable vertically from a load-receiving to a load-dumping position.

In the past, considerable difficulty has been experienced with such machines in the field, particularly from the standpoint of the ability of the scraper to withstand the loads and stresses imposed upon the same when in use, and the provision of a practical and efficient means for controlling the pivotal movement of the rear apron or load-carrying member in restoring the apron to loading position after dumping of the load. Perhaps the most troublesome defect results from the tendency of the dirt to jam the apron pivot or hinge and become so tightly packed around the pivot as to bend or distort the pivotal connection by forcing the apron away from the cutter blade, thereby rendering the apron inoperative and sometimes necessitating that the packed dirt be actually chipped away at the hinge, and some of the parts repaired or replaced before the machine can be further used.

Another common source of trouble results from the tendency of the dirt to pile up in front of the main frame at the sides thereof, thus interfering with the scraping action of the fixed blade, and sometimes preventing the blade from penetrating the ground to the desired depth, or causing the frame and blade to be prematurely elevated above their normal scraping positions.

In some localities, where the soil has a high silt and alkaline content and little, if any, true sand, such soil being commonly known as gumbo, it has been found that the conventional scrapers are very unsatisfactory. This is due in part to the fact that the scraper blade will not readily penetrate the ground and tends to ride on top. If and when the scraper blade does penetrate, it does so suddenly, imposing severe strains on the machine, and tends to bite too deeply and roll the gumbo onto the apron or carrier in one solid lump, or, in comparatively few lumps which reunite, especially if the gumbo is relatively wet. Dumping of the material then becomes impossible, or can at best be accomplished only with the greatest difficulty.

One of the primary objects of the present invention is to provide a materially improved and more efficient assemblage of fixed scraper or cutter blade and associated pivoted apron or load carrier for machines of the character referred to at the commencement hereof, the same being more rugged than formerly to better withstand the strains of service, and more easily manufactured, assembled, and disassembled.

The scraper or cutter blade is preferably mounted upon a cutter bar of special unitary construction which is removably attached to the main frame of the machine, and, when attached, becomes a rigid part thereof.

A further object of the invention is to provide a novel colter arrangement in association with the cutter bar and fixed blade, the same serving to make a clean cut at the opposite extremities of the blade, and to effectively direct the dirt into and onto the rear apron or load carrier without interfering with the forward end of the frame and the travel thereof.

Still another primary object of the invention is to provide an improved pivotal or hinge connection for the rear apron or load carrier which effectively prevents jamming or distoration of the hinge, and which is substantially self-cleaning, easy to operate, and unusually strong and rugged.

Another object of the invention is to provide novel lump breaking or cutting instrumentalities in association with the pivotal rear apron or load carrier, the same being so constructed and arranged as to be movable relative to the fixed cutter blade or scraper to facilitate dumping of the load, especially in the handling of soils, such as gumbo.

The invention additionally contemplates the provision of a novel control means for the pivotal rear apron or load carrier, whereby to yieldably initiate restoration of the apron to its normal load-carrying position after dumping, and which also preferably cushions the return movement of the apron after dumping and aids in the initiation of the dumping operation.

Other and further objects and advantages of the invention will be hereinafter described and

the novel features thereof defined by the appended claims.

In the drawings:

Figure 1 is a fragmentary view in side elevation of a scraper or dirt moving machine embodying the improved features which constitute my invention;

Figure 2 is a fragmentary bottom plan view of the parts shown in Figure 1, on an enlarged scale, the parts being seen from below;

Figure 3 is a fragmentary view in front elevation, and particularly showing a stepped arrangement of reversible cutter blades or scrapers, and the manner in which the same may be mounted on the cutter bar in front of the apron or load carrier and between the colters disposed at the opposite sides of the main frame;

Figure 4 is a vertical sectional view taken approximately on the line 4—4 of Figure 1, looking in the direction of the arrows;

Figure 5 is a fragmentary bottom plan view of the assemblage as seen from beneath;

Figure 6 is a vertical longitudinal sectional view taken about on the line 6—6 of Figure 3, looking in the direction of the arrows;

Figure 7 is a fragmentary sectional view taken about on the line 7—7 of Figure 6, looking in the direction of the arrows, and particularly illustrating the pivotal or hinge connection between the rear apron or load carrier and the supporting frame;

Figure 8 is a fragmentary top plan view showing one form of lump breaking or gumbo cutting instrumentality in association with the rear apron or load carrier, the same being mounted on the apron adjacent to the forward hinged end;

Figure 9 is a fragmentary detail view generally similar to Figure 8, showing the parts in front elevation;

Figure 10 is a vertical longitudinal sectional view taken through the rear apron and associated fixed cutter bar and blade assembly, and particularly illustrating one form of control means which serves to yieldably initiate the return movement of the apron after dumping, the apron being shown in full lines in its normal load-carrying position, and in broken lines in different stages of its movement towards or away from the dumping position; and

Figure 11 is a fragmentary vertical sectional view taken at the rear of the pivotal axis of the apron or load carrier and looking towards the axis so as to illustrate the manner of attachment of the fixed end of the control means, which control means is shown in the form of a flat leaf spring.

Like reference characters designate corresponding parts in the several figures of the drawings which show only those parts of the scraper or dirt-moving machine which are necessary to an understanding of my invention. The main frame is generally designated 1, and includes laterally spaced side members, each of which may be composed of a pair of spaced frame plates 2, 2, as best seen in Figure 4. It is to be understood that this frame usually forms a part of a wheeled structure which is propelled by power applied to the same by any suitable power plant forming a unitary part of the machine or otherwise associated therewith. The construction of the main frame 1 and the propelling apparatus may take various forms, and the details thereof have not been disclosed herein for the reason that they will become apparent to those skilled in the art. It will suffice to say that the main frame 1 is bodily movable from a position relatively close to the ground, such position being assumed during a scraping or loading operation, to a more elevated position a suitable distance above the ground to afford sufficient clearance in transporting the load, and to facilitate dumping of the load. As with the usual machines of this type, there is provided an apron or load carrier, generally designated 3, which is positioned between the spaced side members 1, 1 of the main frame, the apron being supported by the main frame and hingedly or pivotally connected thereto so as to be movable in a generally vertical plane. As best shown in Figure 10, the apron 3 extends rearwardly from a point near the front of the main frame, and is preferably curved upwardly towards the rear thereof to facilitate loading and dumping of the apron in a manner which will hereinafter become apparent.

Attached, as by welding, to the lower extremities of the plates 2, 2, which make up each of the laterally spaced main frame members 1, 1, is a bar 4, shown clearly in Figures 4 and 7, this bar extending rearwardly along the lower edges of the respective side frame members. Attached to each bar 4, as by a series of machine bolts 5, is an angle plate 6 having one of its flanges 6' disposed horizontally and seated against the bottom of the bar 4, and the other of its flanges 6'' disposed substantially vertically and co-extensive with the inner plate 2 of the side member 1 of the main frame. At the forward end of the side angle member 6 which extends longitudinally beneath the respective sides 1 of the main frame, and terminates somewhat to the rear of the forward end of the main frame, the angle member is provided with a laterally offset flange 6''', which serves as an attachment flange for a colter member, generally designated 7, the colter member being provided with a corresponding laterally offset flange 7' through which the attaching means, such as the bolts 8, may be passed to secure the same to the flange 6'''. Similarly, the colter is provided with a horizontal flange 7'' along its upper edge which is adapted to abut against the lower side of the bar 4, to which it may be attached in any suitable manner, as by means of the machine screws 5'. The colter member includes a depending blade 7''', which is curved forwardly and upwardly, as clearly shown in Figures 1 and 6, the blade being preferably sharpened at its forward edge to more readily penetrate the ground and produce a clean cut. The colter blade 7''' is preferably arranged in forwardly diverging relation respecting the longitudinal center of the machine, as will be best seen from reference to Figures 1, 3 and 5. It will be understood that there is a colter member 7 disposed at each side of the machine near the forward end of the main side frames 1, 1, and these colter members serve to cleanly cut the ground in advance of the transverse scraper blade which will now be described, and thus the colters act to direct the dirt between the side frame members, thereby preventing the dirt from piling up in advance of the side frame members and interfering with the scraping action of the fixed scraper blade.

Disposed transversely between the opposite side angle members 6, 6 is an angle bar 9, hereinafter referred to as a cutter bar, the same being secured at its opposite ends to the respective side angle members 6, 6, as by welding, so as to become a

rigid and integral part thereof. As best seen in Figure 6, the cutter bar 9 is arranged with its apex uppermost, thus positioning one of its flanges 9' in a forward downwardly inclined position, and the other of its flanges 9'' in a rearward downwardly inclined position. The flanges 9' and 9'' are reenforced by welding a series of laterally spaced webs or plates 9''' thereto. The forward flange 9' of the cutter bar serves as a seat to which the cutter blades 10, 10' may be attached. If desired, a single cutter blade may be employed, extending the full width of the machine between the side angle members 6, 6. I have found, however, that under some circumstances, a much more more improved cutting or scraping action can be attained through the use of a stepped arrangement of cutter blades, as shown in Figure 3, in which the deepest blade 10' is disposed in the center, and is flanked by two shallower blades 10, 10. On the other hand, the cutter blade may be composed of a plurality of short blades, all of the same depth, and arranged end to end, if preferred. The cutter blades are preferably reversible, and while they may be fixedly attached to the cutter bar in any suitable manner, I preferably employ the arrangement as clearly shown in Figures 1 to 3 and 6. According to this arrangement, the shallow blades 10, 10 are provided with a double row of spaced apertures 11 adapted to be alined with correspondingly spaced apertures in the flange 9' of the cutter bar 9, and removable attaching bolts 12 are passed through the registered apertures, preferably in a staggered arrangement, to firmly secure the blade to the cutter bar. The central deeper blade 10' is preferably provided with three rows of apertures 11', two rows of which are adapted to be registered with corresponding two rows of apertures in the flange 9' of the cutter bar, to which the blade is attached by the removable bolts 12'. The opposite edges of the respective cutter blades are beveled to facilitate penetration of the ground, and as one edge becomes worn the blades may be reversed by simply removing the attaching bolts 12, 12', and reinserting the bolts through the registered apertures, as described above.

It will be understood from the foregoing that the cutter bar 9 and blades 10, 10' constitute a rigid assembly, and, since the cutter bar is united with the opposite side angle members 6, 6, the entire assembly may be removed from the machine as a unit, for purposes of repair or replacement, by removing the bolts 5, 5'. The cotler members 7, 7 may be removed without disassembling the entire cutter bar unit, this being accomplished by removing the bolts 5' and 8. When these parts are fully assembled on the machine, they effectively brace the side frame members 1, 1, and maintain the forward ends of the same in the desired spaced relation to each other, while being movable vertically with the main frame, when the latter is lowered, to condition the machine for scraping action, and raised for transporting and dumping of the dirt.

The manner in which the apron or load carrier 3 is pivotally mounted between the side members 1, 1 of the main frame will now be described. Disposed rearwardly of and in spaced relation to the cutter bar 9 is a somewhat smaller angle bar 13, clearly shown in Figure 6, the same being arranged transversely between the side angle members 6, 6 and attached thereto, as by welding. The angle member 13 occupies a position generally corresponding to that of the cutter bar 9, so that its flanges 13' and 13'' lie substantially parallel to the respective flanges 9' and 9'' of the cutter bar. A series of laterally spaced webs or plates 14 is preferably interposed between the angle member 13 and the rear flange 9'' of the cutter bar, these webs or plates being attached to the angle member 13 and cutter bar in any suitable manner, as by welding, and serving to reenforce and rigidify the assembly as a whole, and particularly the angle member 13. As clearly shown in Figure 6, the forward flange 13' of the angle member 13 is disposed substantially perpendicular to the rear flange 9'' of the cutter bar, and forms therewith a substantially V-shaped pocket or seat which is open at its bottom in a downward direction by virtue of the termination of the flange 13' in spaced relation to the flange 9''. This V-shaped pocket or seat serves as a bearing or hinge for the rear apron 3, which is pivotal about a horizontal axis extending transversely of the machine close to the fixed transverse scraper or cutting blades. The forward transverse edge of the apron is preferably turned downwardly to provide a depending flange 3' to which is attached an angle bar 15 in any suitable manner, as by means of a series of bolts 16 (see Figure 6). Welded or otherwise fixedly secured to the forward edge of the angle bar 15 is a tube 17 which extends the full width of the apron 3, which is of such width as to bring its opposite marginal edges relatively close to the inner sides of the side frame members 1, 1 and the side angle members 6, 6. The tube 17 normally rests in the V-shaped pocket or seat formed by the flanges 13' and 9'' so as to bear thereon at opposite sides and be supported thereby throughout its full length, the tube being free to rotate in the seat with a hingelike action to permit the apron or load carrier 3 to be rocked from its normal load-receiving or load-carrying position shown in full lines in Figures 6 and 10 to its dumping position shown in dotted lines in these figures. Extending into the tube 17 at each of its opposite ends is a pin 18 adapted to be inserted through an aperture formed in each of the side angle members 6, 6 in registry with the tube. Each of these pins 18, which may be termed hinge pins or pintles, is provided with a plate 19 welded on the outer end thereof, the plate being provided with one or more apertures to enable the same to be bolted or otherwise removably fastened to the outside of the respective angle members 6, as by the bolts 20. The pins 18, 18 are preferably slightly smaller in diameter than the inner diameter of the tube 17 so as to afford sufficient clearance between the same so that the tube will normally rest on its V-shaped seat. Thus, the pins 18, 18 are primarily intended to hold the apron in place, rather than to bear the weight of the apron and its load. By removing the bolts 20 and withdrawing the pins 18, 18, the apron or load carrier 3 may be easily removed from the machine.

Secured to the cutter bar 9, as by welding, at its upper side is a hardened steel plate 21 which is extended rearwardly towards the forward end of the apron 3, in close proximity to the tube 17. The rear edge of this plate is beveled so as to permit the dirt to freely and smoothly pass from the fixed cutter or scraper blades onto the apron or load carrier 3. Any dirt which may happen to enter between the plate 21 and the tube 17 will be free to pass around the tube 17 next to the cutter bar 9, and thence downwardly through the space between the cutter bar 9 and the angle

member 13, this being the principal reason for the spaced arrangement of these latter parts and the reenforcing webs or plates 14. This construction is quite important as it affords a more or less self-cleaning action of the apron hinge. Packing of the dirt between the tube 17 and the cutter bar is thus prevented, particularly having in mind that the clearance between the inside of the tube 17 and the hinge pins 18, 18 will allow the tube 17 and apron 3 to move slightly away from the cutter bar to permit the dirt to pass therebetween and drop out at the bottom without packing. This minimizes jamming of the apron or load carrier and possible consequent distortion or damage of the hinge.

To further reenforce and brace the structure hereinbefore described, I preferably provide a plurality of laterally spaced struts or braces 22, having their forward ends suitably secured to the rear of the cutter bar assembly, and their rear ends secured to a convenient part of the main frame at the rear thereof. One convenient form of attaching means for the forward ends of the respective struts 22 is shown in Figures 4 to 6, wherein 23 designates a relatively short angle bar having one of its flanges 23' disposed vertically, and the other of its flanges 23'' disposed horizontally, the latter flange being welded at 24'' to the bottom of the angle bar 13, and at 25 to the flange 9'' of the cutter bar. A horizontal plate or web 26 is welded between the vertical flange 23' and the rear flange 13'' of the angle bar 13. Attached to the forward extremity of each strut 22 is a short angle bar 27, which extends laterally therefrom at opposite sides thereof, and is provided with suitable apertures to receive attaching bolts 28 which are passed through the same and through corresponding apertures in the vertical flange of the angle bar 23. The bolts 28 must be removed before the cutter bar assembly is disassembled from the machine, when such occasion arises. Likewise, the hinge pins 18, 18 must also be removed when it is desired to disconnect the cutter bar from the machine.

Referring now particularly to Figures 6, 8 and 9, I have shown suitable instrumentalities for breaking up clods or lumps of dirt as they pass onto the apron or load carrier 3, these instrumentalities being especially useful in handling gumbo. The instrumentalities preferably comprise a series of laterally spaced knives or cutting blades 29, 29, each of which is arranged in a generally upright position and provided with a forward cutting edge 29'. Each knife or blade may be welded or otherwise secured to a base plate or block 30, which is, in turn, preferably secured by welding or suitable fastening devices 12'' to the angle bar 15 and forward end of the apron 3 in a manner to position the blades 29 just back of the hinge tube 17. In such an arrangement, the cutters or blades 29 are movable with a vertically swinging motion responsive to the swinging movement of the apron or load carrier 3. This results in the distinct advantage that, upon dumping the load from the apron, the cutting blade or knives 29 may be effectively used to break up any lumps or solid chunks which may tend to clog the discharge opening at the front of the machine, such action being accomplished by imparting to the apron or load carrier a series of alternate tilting movements in opposite directions near the upper limit of its dumping movement. When the machine is in the act of being loaded, the cutters or knives 29 break up the lumps or large chunks of dirt, and, in the case of gumbo, slice the gumbo so that it will not roll onto the apron in one solid piece. The curvature of the apron itself further contributes to the breaking up of the dirt during the loading action, effectively distributing the load, so that maximum loading will be assured.

Referring now to Figures 10 and 11, I preferably provide a means for controlling the tilting movement of the apron or load carrier 3, so that, after dumping, the control means is effective to initiate the downward movement of the apron and restoration of the same to its normal load-carrying position. The control means has been illustrated in the form of a flat leaf spring 31, which is fixed at one end in any suitable manner and operatively connected with the apron 3 at its free end. A multiple leaf spring may be used instead of the single leaf illustrated in the drawings, where the forces involved are great enough to require a stronger spring. Also, a plurality of springs arranged in laterally spaced relation to each other may be used where such an arrangement is found to be convenient.

As shown, the fixed end of the spring 31 is attached by a bolt 32 to a bracket 33 formed from a flat blank having its ends bent upwardly at right angles to the intermediate part of the blank, and forming side walls of generally triangular shape between which the forward end of the leaf spring may be disposed in flat engagement with the bottom of the bracket. The bracket 33 is preferably welded or otherwise fixed to the angle bar 13 so as to become a rigid and integral part of the cutter bar assembly. The free or rear end of the spring 31 is loosely engaged within a U-shaped clip 34, which is attached directly, as by welding, to the bottom of the apron 3, or to a transverse reenforcing channel or brace 35 welded to the bottom of the apron, as shown in the drawings. As the apron is swung upwardly from its loading or load-carrying position, shown in full lines in Figure 10, towards the dumping position represented by the upper broken lines in this figure, the spring 31 is free to slide in the clip 34 while permitting the spring to flex, and thus exerting a yieldable pull on the apron in a counter-clockwise direction, as viewed in Figure 10. Thus, if the upper end of the apron (which is broken away and not shown in the drawings) assumes a position during the dumping action which throws the center of gravity of the apron beyond the pivotal axis (or to the right of the hinge in Figure 10), or the apron otherwise does not tend to move downwardly by its own weight after dumping, the spring will automatically urge the apron back downwardly toward its normal position as soon as the lifting force, usually applied to the apron by a cable, is relieved. The spring 31 also acts as a cushion to check the fall of the apron and absorb at least a portion of the shock as it reaches its normal position. It is to be noted from Figure 10 that, when the apron is in its normal full line position, the spring 31 is flexed downwardly below its relaxed or unstressed position which occurs at an intermediate position in the movement of the apron, as shown also by broken lines in Figure 10, so that the spring tends to aid in lifting the apron and its load at the commencement of the dumping operation.

While the specific details have been herein shown and described, my invention is not confined thereto, as changes and alterations may be made without departing from the spirit thereof as defined by the appended claims.

I claim:

1. In apparatus of the class described, a main frame including spaced side walls adapted to be moved in a generally upward and downward direction, a fixed cutter bar having a forwardly and downwardly inclined surface, a cutter blade secured to the inclined surface aforesaid, means for detachably connecting the opposite ends of the cutter bar to the respective walls of the main frame near their forward ends, with the cutter blade extending transversely between the side walls and depending below the same, and a load-carrying apron carried by the main frame and disposed rearwardly of the cutter bar and blade, the said detachable connecting means for the cutter bar including a pair of opposed angular plates, each having one of its flanges disposed generally vertically and co-extensive with one of the side walls of the main frame at the bottom of the latter, and to which the opposite ends of the cutter bar are respectively rigidly united, and another flange disposed generally horizontally and extending laterally outwardly from the vertical flange for detachable engagement with the lower edges of the respective side walls, and fastening means for securing the last-mentioned flange to its side wall of the frame.

2. In apparatus of the class described, a main frame including spaced side walls adapted to be moved in a generally upward and downward direction, a fixed cutter bar having a forwardly and downwardly inclined surface, a cutter blade secured to the inclined surface aforesaid, means for detachably connecting the opposite ends of the cutter bar to the respective walls of the main frame near their forward ends, with the cutter blade extending transversely between the side walls and depending below the same, and a load-carrying apron carried by the main frame and disposed rearwardly of the cutter bar and blade, the said detachable connecting means for the cutter bar including a pair of opposed angular plates, each having one of its flanges disposed generally vertically and co-extensive with one of the side walls of the main frame at the bottom of the latter, and to which the opposite ends of the cutter bar are respectively rigidly united, and another flange disposed generally horizontally and extending laterally outwardly from the vertical flange for detachable engagement with the lower edges of the respective side walls, and fastening means for securing the last-mentioned flange to its side wall of the frame, in combination with a colter disposed in advance of the cutter bar and blade at each side of the main frame and detachably connected to the frame and to the respective angular connecting plates aforesaid so as to be removable with and independently of the cutter bar.

3. In apparatus of the class described, a main frame including spaced side walls, a fixed cutter bar disposed transversely between the side walls of the main frame near their forward ends and rigidly connected thereto, a cutter blade carried by the cutter bar, and a load-carrying and dumping apron hingedly mounted between the side walls of the main frame at the rear of the cutter bar and adjacent thereto for swinging movement in an upward and downward direction, said apron including a hinge member extending transversely across its forward edge parallel to and normally in bearing engagement with the cutter bar, but having limited movement away from the cutter bar to afford a self-cleaning action.

4. In apparatus of the class described, a main frame including spaced side walls, a fixed cutter bar disposed transversely between the side walls of the main frame near their forward ends and rigidly connected thereto, a cutter blade carried by the cutter bar, a load-carrying and dumping apron hingedly mounted between the side walls of the main frame at the rear of the cutter bar and adjacent thereto for swinging movement in an upward and downward direction, said apron including a hinge member extending transversely across its forward edge parallel to and normally in bearing engagement with the cutter bar, but having limited movement away from the cutter bar to afford a self-cleaning action, and means for holding the hinge member aforesaid in place and limiting the movement of the same away from the cutter bar.

5. Apparatus as defined in claim 4, wherein the hinge member comprises a tube, and the holding means comprises a pair of pin members fixed to the respective side walls of the main frame and projecting into the opposite end of the tube, said pin members being slightly smaller than the tube to afford clearance therebetween to permit limited movement of the tube towards and away from the cutter bar responsive to the self-cleaning action of the hinge.

6. In apparatus of the class described, a main frame including spaced side wals, a fixed cutter bar and blade assembly rigidly attached to the side walls of the main frame near their forward ends and having a generally V-shaped bearing seat extending thereacross, said seat being open at the bottom in a downward direction, and a load-carrying and dumping apron hingedly mounted between the side walls of the main frame at the rear of the cutter bar and adjacent thereto for swinging movement in an upward and downward direction, said apron including a hinge member extending transversely across its forward edge and disposed in the V-shaped bearing seat aforesaid, but having limited movement away from the bearing seat to afford a self-cleaning action.

7. In apparatus of the class described, a main frame including spaced side walls, a fixed cutter bar and blade assembly rigidly attached to the side walls of the main frame near their forward ends and extending transversely therebetween, said assembly including a pair of parallel angle bars arranged in spaced relation to each other to afford clearance therebetween, with their apexes uppermost, forming a transverse generally V-shaped bearing seat therebetween, a pivotal load-carrying and dumping apron disposed between the side walls of the main frame at the rear of the cutter bar and blade assembly, and including a generally cylindrical bearing member extending transversely across the forward edge thereof and disposed in the bearing seat aforesaid, and means for holding said bearing member in the seat while allowing limited movement thereof away from the seat to afford a self-cleaning hinge-like action in dumping the apron and restoring the same to its load-receiving and carrying position.

8. In apparatus of the class described, a main frame including spaced side walls, a fixed cutter blade extending transversely between the side walls near their forward ends and depending therebelow, a load-carrying and dumping apron pivotally mounted between said side walls at the rear of the cutter blade for movement in an upward and downward direction, and means for automatically initiating downward movement of

the apron when the apron reaches the limit of its upward movement upon dumping the same, said last-named means serving also to cushion the downward movement of the apron.

9. In apparatus of the class described, a main frame including spaced side walls, a fixed cutter blade disposed transversely between said side walls near their forward ends and depending therebelow, a load-carrying and dumping apron pivotally mounted between the side walls at the rear of and adjacent to the cutter blade for swinging movement in an upward and downward direction, and a leaf spring having one end fixedly connected to the main frame and its other end operatively engaged with the apron at a distance from its pivotal axis, said leaf spring being so arranged that it is normally relaxed or unstressed when the apron is in an intermediate position between the upward and downward limits of its pivotal movement.

10. In apparatus of the character described, a main frame including spaced side walls, a cutter bar having a scraping edge for use in scraping operations extending transversely between said side walls, and means for detachably connecting the opposite ends of the cutter bar to the respective walls of the frame comprising a pair of opposed angular plates, each having one of its flanges disposed generally vertically and co-extensive with one of the side walls of the main frame at the bottom of the latter, and to which the opposite ends of the cutter bar are respectively rigidly united, and another flange disposed generally horizontally and extending laterally outwardly from the vertical flange for detachable engagement with the lower edges of the respective side walls, and fastening means for securing the last-mentioned flange to its side wall of the frame.

11. In apparatus of the character described, a main frame including spaced side walls, a cutter bar having a scraping edge for use in scraping operations extending transversely between said side walls, a colter disposed in advance of the cutter bar and its scraping edge at each side of the main frame, and means for detachably connecting the opposite ends of the cutter bar to the respective walls of the frame comprising a pair of opposed angular plates, each having one of its flanges disposed generally vertically and co-extensive with one of the side walls of the main frame at the bottom of the latter, and to which the opposite ends of the cutter bar are respectively rigidly united, and another flange disposed generally horizontally and extending laterally outwardly from the vertical flange for detachable engagement with the lower edges of the respective side walls, and fastening means for securing the last mentioned flange to its side wall of the frame, said colter being detachably connected to the frame and to the respective angular connecting plates aforesaid so as to be removable with and independently of the cutter bar.

12. In apparatus of the character described, a main frame including spaced side walls, a cutter bar having a scraping edge for use in scraping operations extending tranversely between said side walls, means for detachably connecting the opposite ends of the cutter bar to the respective walls of the frame, a colter disposed in advance of the cutter bar and its scraping edge at each side of the main frame, and means detachably connecting said colters to said cutter bar and the main frame so as to be removable from the main frame with and independently of the cutter bar.

13. In apparatus of the class described, a main frame including spaced side walls, a fixed cutter bar and blade assembly rigidly attached to the side walls of the main frame near their forward ends and extending transversely therebetween, an apron disposed between the side walls of the main frame at the rear of the cutter bar and blade assembly, means hingedly connecting said apron adjacent said cutter bar for vertical pivotal movement between a lower load receiving position and an upper dumping position, and dirt cutting and breaking instrumentalities comprising a plurality of laterally spaced cutter blades mounted on said apron adjacent its hinge and upstanding from the forward end of the apron with their edges presented forwardly, said blades being movable with said apron to cut and break masses of earth adjacent said hinge tending to prevent movement of dirt from said apron as the same is moved vertically to dumping position.

14. In apparatus of the class described, a main frame including spaced side walls, a cutter blade at the lower front portion of the side walls extending transversely therebetween and attached thereto, an apron pivotally connected at its front edge to the side walls adjacent the cutter blade, said apron being pivotally movable between a lower load receiving position and an upper dumping position, and resilient means connected to said main frame and said apron, said resilient means being adapted to resist movement of said apron towards either its dumping or load receiving positions and to be placed under tension as the apron approaches such positions for assisting in the movement of the apron from such positions.

15. In apparatus of the class described, a main frame including spaced side walls, a cutter blade at the lower front portion of the side walls extending transversely therebetween and attached thereto, an apron pivotally connected at its front edge to the side walls adjacent the cutter blade, said apron being pivotally movable between a lower load receiving position and an upper dumping position, a leaf spring secured at one end to said main frame, and means connecting the other end of said spring to said apron for movement therewith, said connecting means permitting sliding movement of said spring with respect thereto as said apron is moved between its upper and lower positions.

GEORGE A. VAUGHN.