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G. D. SHAEFFER

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SCRAPER

Filed Oct. 28, 1942

4 Sheets-Sheet 1

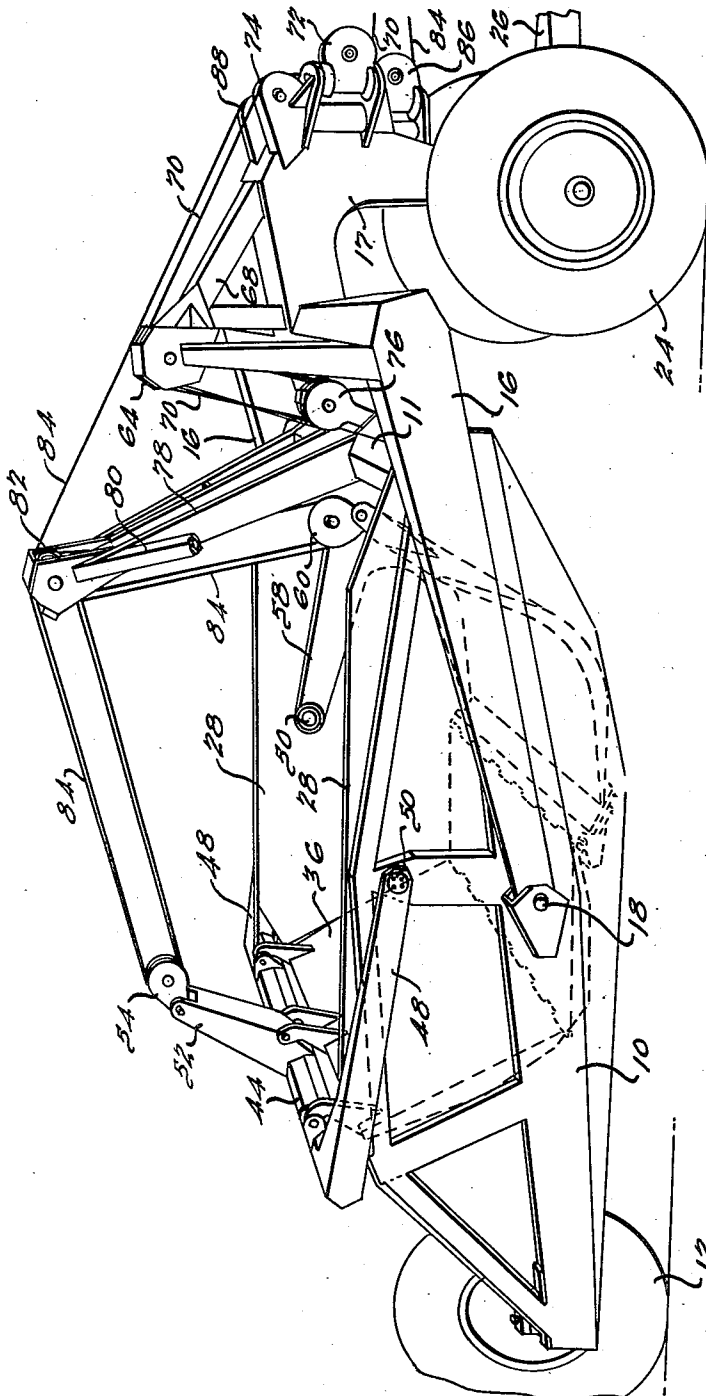


FIG. 1.

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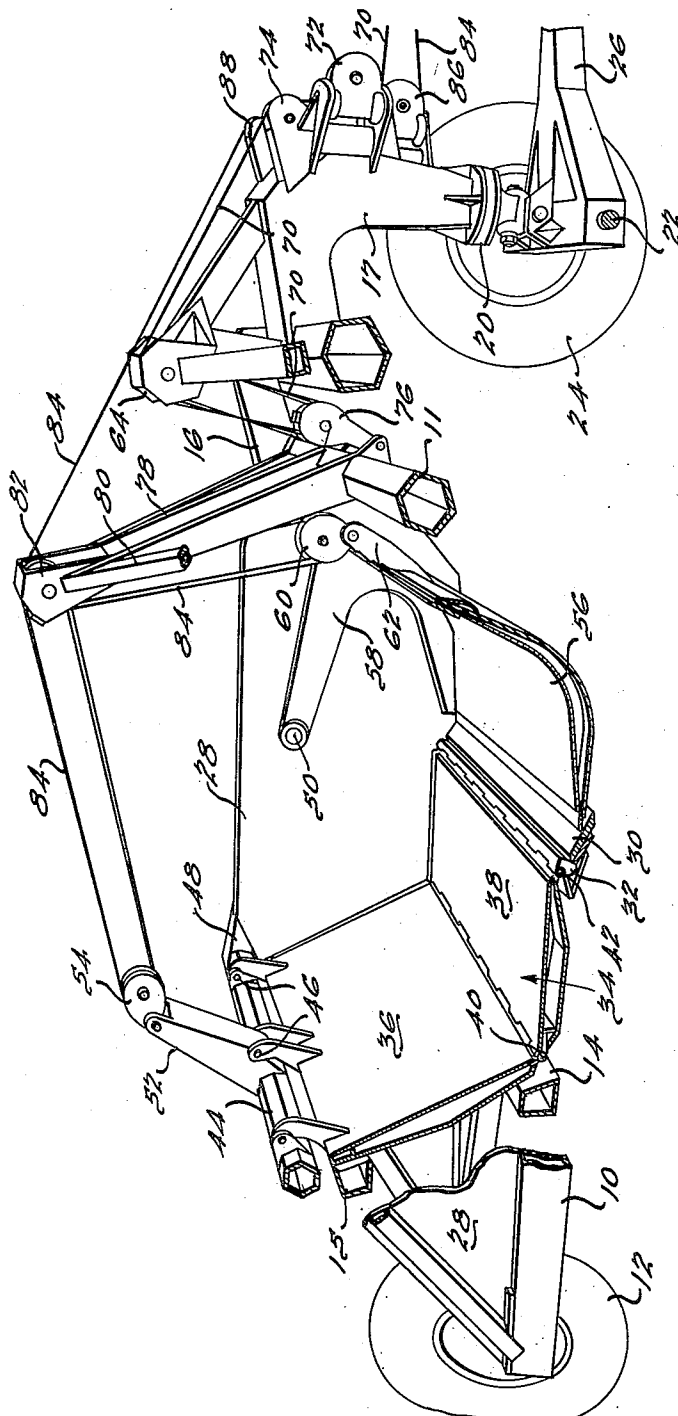


FIG. 2.

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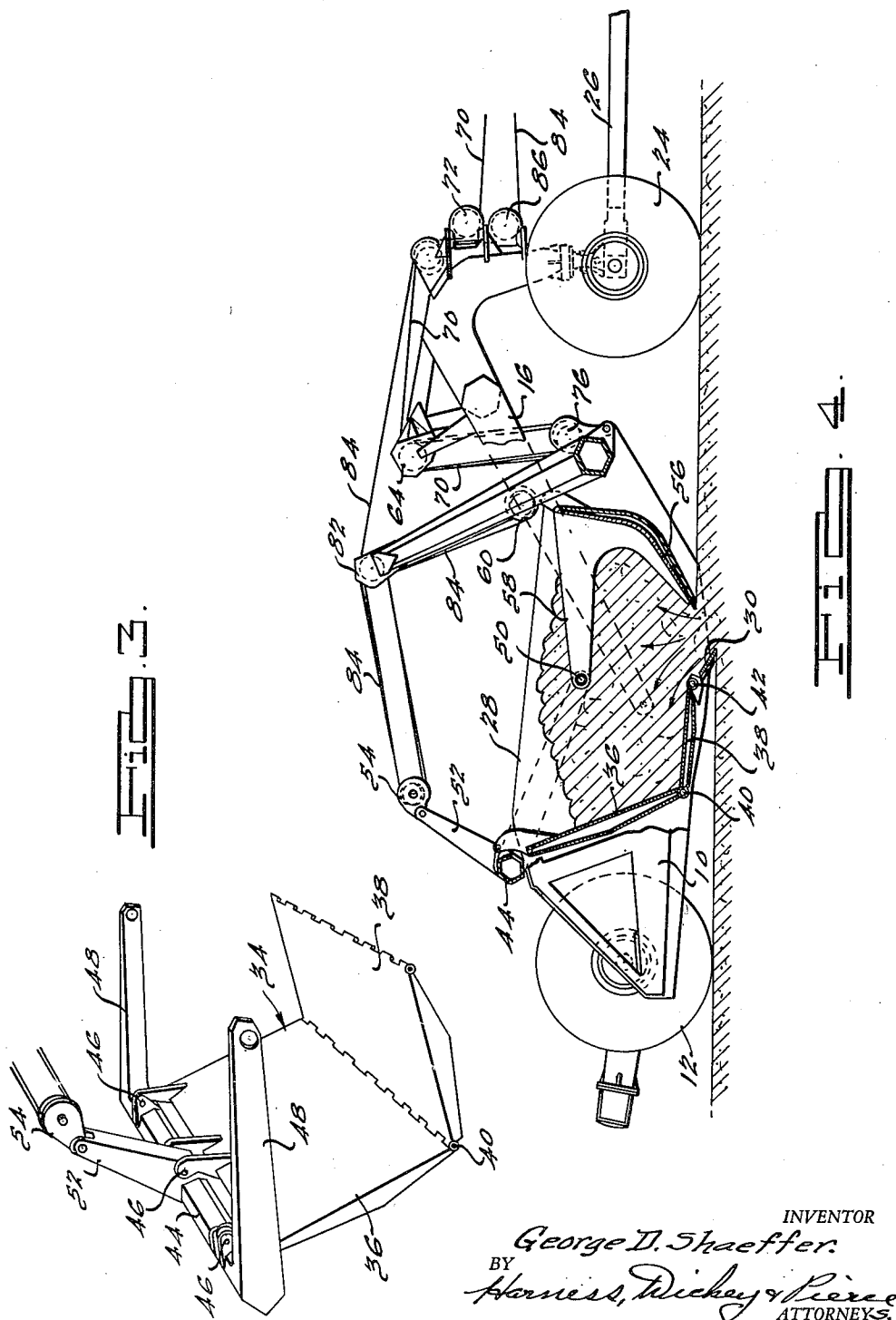
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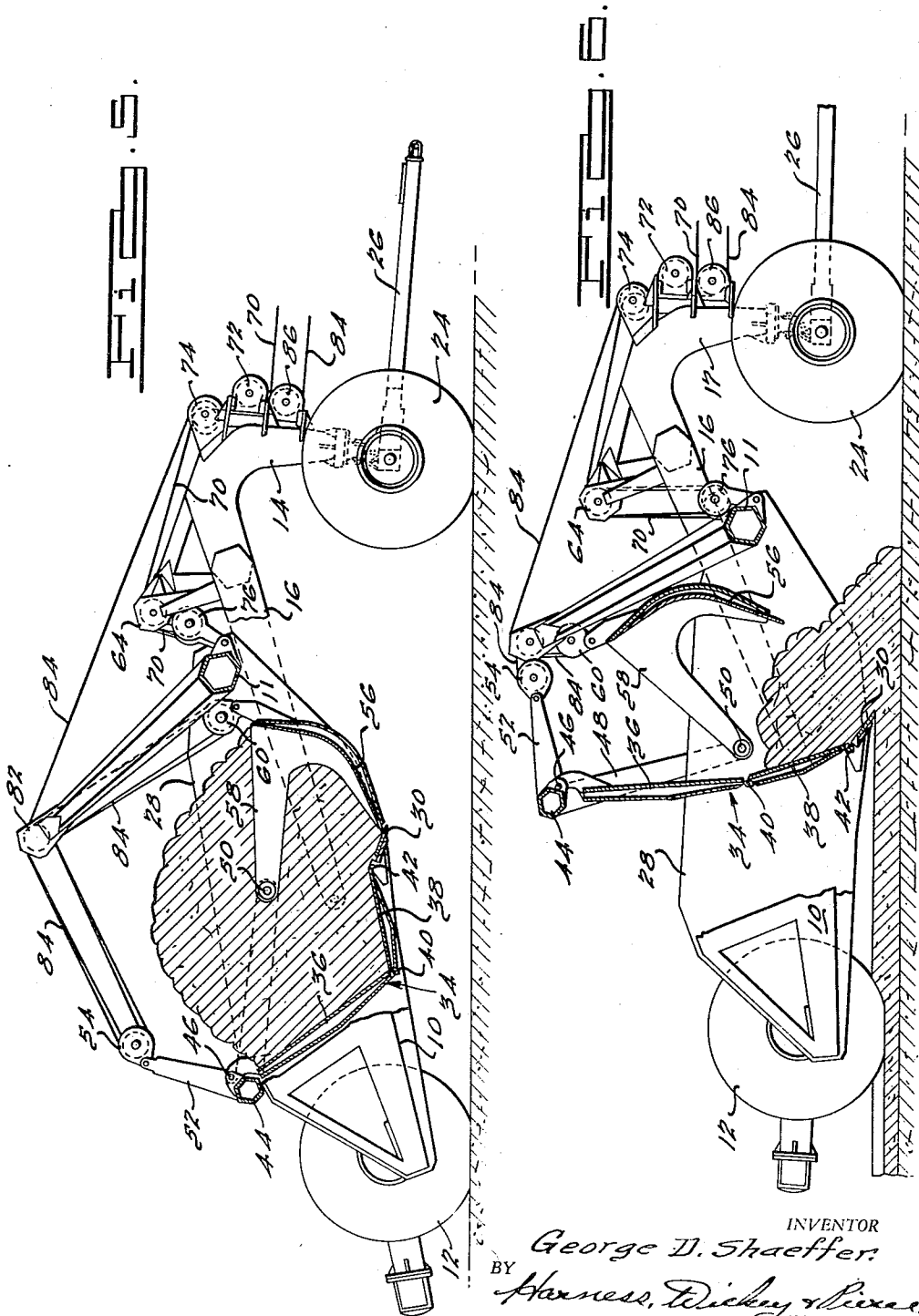
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SCRAPER

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8 Claims. (Cl. 37-126)

The present invention relates to material handling devices, and particularly relates to scrapers used for excavating, loading, transporting, and placing earth materials.

One of the primary objects of the present invention is to provide improved scrapers by which the material being handled is unloaded in an improved and efficient manner.

Another object of the invention is to provide improved scrapers in which the rate of lift of the material discharged is accelerated.

Another object of the invention is to provide an improved scraper construction in which compression of the material being handled between the bowl and the gate is reduced to a minimum during discharge, which has material advantages, particularly in handling sticky materials.

Another object of the invention is to provide greater clearance, while discharging the load, between the bowl and front apron thereby accomplishing more uniform or gradual discharge, especially in handling sod or sticky material.

A further object of the invention is to provide improvements in scraper bowl constructions so that, during discharge, all of the material, particularly that in the corner between the back and bottom of the bowl, is discharged from the bowl, thereby increasing the practical capacity of the scraper.

A further object of the invention is to provide an improved scraper construction in which the bowl, lift cable, and sheaves are positioned higher, out of the way of the material carried by the scraper.

Other objects of the invention will become apparent from the following specification, the drawings relating thereto, and from the claims hereinafter set forth.

In the drawings, in which like numerals are used to designate like parts in the several views throughout:

Figure 1 is a perspective view of a scraper embodying features of the present invention;

Fig. 2 is a perspective view of the scraper shown in Fig. 1, with a portion of one of the sides removed so as to show the interior construction;

Fig. 3 is a perspective view of the bowl, embodying features of the present invention, and showing such bowl in its association with certain of the operating elements;

Fig. 4 is a side elevational view of the structure shown in Fig. 2 and illustrating the scraper elements in their positions during loading and illustrating the material being loaded.

Fig. 5 is a view similar to Fig. 4 and showing the scraper in its carrying position;

Fig. 6 is a view similar to Fig. 4 and showing the scraper in its full, unloading position.

In the use of prior scrapers, it has been found that difficulties are encountered in unloading the material from the scraper, in that considerable power is required to raise the bowl and all of the materials contained in the bowl are not discharged. This is particularly true in the handling of sticky materials. A portion of the material contained within the bowl at the rear corner of the bowl will stick in place and will not be discharged. With this portion of the material remaining in the bowl, the practical capacity of the bowl is materially decreased. Furthermore, in the use of the prior structures, during unloading, when the bowl is raised, the material contained within the bowl is compressed or pinched between the back and bottom of the bowl and the front gate. This makes unloading difficult because there is not a free flow of material through the discharge opening.

According to the present invention the bowl is constructed with substantially planar back and bottom members which are hingedly connected together transversely of the bowl along the rear bottom corner thereof. The bottom member of the bowl is pivotally connected to the scraper side members adjacent the cutter element. The back member of the bowl is pivotally connected to the scraper frame in such a way that, as the back member is raised, the back and bottom bowl members hinge with respect to each other, so that from the bottom, carrying position to the full, discharge position the angle between such bottom and back members always increases, or any variation of the angular relationship between the bowl members is increased. With such angle increasing there can be no compressing or pinching of the material between the bowl and the front gate, nor any compressing or pinching between the bowl members themselves. When the bowl is in its full discharge position the back and bottom members are at substantially a straight line with respect to each other, or the surfaces of such members lie substantially in a common plane, so that all of the material contained within the bowl is discharged. That part of the material which is contained at the rear corner of the bowl, even though it be sticky material, would be relieved of engagement with the bowl members, particularly the back member which is pulled away from the material,

so that such material would drop down through the discharge opening.

In the particular embodiment illustrated, the scraper elements are cable controlled. According to the present invention, the cable and sheaves which are connected to the bowl are positioned so that they are spaced above the material being handled even when the bowl is fully loaded. This further improves the scraper operation.

For a detailed description of an illustrative embodiment of the present invention, reference may be had to the accompanying drawings, in which the scraper is illustrated as comprising a main frame which includes longitudinally extending box frame members 10, which are rigidly connected together adjacent the forward end thereof by means of a transverse, box frame member 11. The frame members 10 are pivotally connected adjacent the rear ends thereof to an axle having ground-engaging wheels 12 mounted thereon. Cross-beam members 14 and 15 connect the frame side members in front of the wheels 12 and behind the bowl. Such frame members 14 and 15 serve to support the bowl when it is in its down position.

A bifurcated draft member, including an upstanding central portion 17, is disposed at the front of the scraper and has forked rearwardly disposed portions, including a pair of longitudinally extending side arms 16 which extend along the outsides of the frame members 10. Such arms 16 are pivotally connected to the frame members 10 by means of pivot pins 18, which are preferably located slightly to the rear of and slightly above the scraper cutter. The upstanding portion 17 of the draft member is connected through a swivel 20 with a transversely extending axle member 22, on which ground-engaging wheels 24 are mounted. A draw bar 26 is pivotally connected to the axle 22, and such draw bar is adapted to be connected to a power driven tractor in the usual way.

Side wall members 28 extend longitudinally of the scraper and are fixed to the longitudinal members of the main frame, such as the frame members 10. The walls 28 serve as the side confining walls for the material contained within the scraper. A transversely extending cutter element 30 is rigidly fixed with respect to the main frame and with respect to the side members 28. Such cutter member 30 may be mounted upon a transverse mounting member 32, which may be fixedly mounted to the sides 28.

A bowl generally indicated at 34 is mounted between the sides 28. Such bowl 34 includes a back member 36 and a bottom member 38. The members 36 and 38 may be formed in box section for the purpose of strengthening them, and are preferably formed with substantially planar interior surfaces against which the material being handled is disposed. The member 36 forms substantially the complete back and the member 38 forms substantially the complete bottom and such members are hingedly connected together as indicated at 40 along a transverse line located at the inner bottom corner of the bowl. The bottom member 38 is pivotally or hingedly connected to the member 32 adjacent the cutter blade 30 as indicated at 42. The bowl back 36 is adapted to rest upon and be supported by the transverse frame members 14 and 15 when the bowl is in its bottom position.

In order to control the raising of the bowl during the discharge operation, the bowl back 36 is pivotally connected to a U-shaped member

44 by pivot pin 46, through brackets connected to the bowl back 36 and the member 44. The member 44 has integral arms 48 formed thereon which extend forwardly of the scraper along the outsides thereof and which are pivotally connected to the scraper frame by means of pivot pins 50. The member 44 has an integral upstanding projection 52 formed thereon which has a sheave 54 pivotally connected to the upper end thereof for connection with the cable control for raising the bowl.

A transversely extending front gate or apron 56, which may be of conventional construction, is disposed between the side members 28. Such member 56 is pivotally connected to the main frame and side members by means of rearwardly extending side arms 58 which are rigidly connected to the gate 56, and which are pivotally connected to the main frame by the pivot pins 50. The gate 56 is adapted to be raised and lowered through a sheave block 60, which is mounted to an upstanding projection 62, disposed on the upper edge of the gate 56 at the mid-point thereof. The operation of the gate 56, in its movement toward and away from the cutter blade 30, is the same as in conventional prior scrapers.

In order to position the bowl, cutter, and the main frame with respect to the ground so that the scraper may assume its proper loading, carrying, and dumping positions, a lift controlled cable means is provided which includes sheaves 64 mounted on upstanding bracing elements 66 and 68, which are located at substantially the transverse center of the scraper and are fixedly mounted to the draft frame member 17 and the transverse member extending between the arms 16. A cable 70 leads from a power means, such as a power winch, mounted on the tractor, and is trained about a pivoted guide sheave, and guide pulley 74, which are mounted on the upright portion 17. Such cable 70 is then trained about the sheaves 64 and is further trained about the sheaves of a sheave block 76, which is pivotally connected to the transverse frame member 11 at substantially the transverse center thereof. A suitable number of sheaves may be provided on the sheave blocks in order to obtain the mechanical advantage desired, and the end of the cable 70 may then be fixed to the sheave block 64.

Thus, by operating the power means to which the cable 70 is attached, the main scraper frame, the bowl, and the cutting edge may be pivoted about the axle of the ground-engaging wheels 12 for properly positioning the scraper with respect to the ground for the particular operation desired.

In order to control the operation of the bowl 34 and the gate 56, upright mounting standards 78 are mounted to the transverse frame member 11 substantially midway between the ends thereof and are braced by bracing members 80. A sheave block 82, having a desired number of sheaves mounted thereon, is mounted to the upper end of the standards 78. Cable means are provided for controlling the movement of the bowl and gate, and such cable means includes a cable 84, which leads from a power means, such as a power winch, mounted on the tractor. The cable 84 is trained about a pivot guide sheave 86, which is mounted on the draft member 17 and also trained about a guide sheave 88, which is mounted on the draft member 17 above the sheave 86. The cable 84 is then trained about certain of the sheaves of the sheave block 82 and about sheave

60, then about other pulleys of the sheave block 82 and about the sheave 54. The end of the cable may then be fixed to the sheave block 82. A suitable number of sheaves may be provided on the sheave blocks in order to obtain the mechanical advantage desired.

It will be appreciated that the bowl 34 is heavier than the gate 56, so that, when power is applied to the cable 84, the gate 86 is first raised to provide a discharge opening. Thereafter, the cable acts on the sheave 54 to lift the bowl so that the material is discharged through the discharge opening.

In Fig. 4, the scraper is shown in digging position. In this position, the main frame is lowered, so that the cutting plate 30 is in its proper position with respect to the ground and the gate 56 is open. The material passes into the scraper through the opening between the plate and the bottom edge of the gate and is disposed within the scraper in the directions indicated by the arrows. The scraper may be filled to carry a load such as that indicated in Fig. 5. The scraper is there shown in the carry position, with the gate 56 closed and with the frame and bowl raised above the ground, so that the material may be transported over the ground.

To dump the load, the frame is properly positioned with respect to the ground, particularly if leveling is desired, and the gate 56 is opened. As the bowl 34 is raised, the angle between surfaces 36 and 38 increases from the obtuse angle shown in Figs. 4 and 5 to substantially a straight line, or so that the surfaces lie in substantially the same plane, as shown in Fig. 6. In this way, when the bowl members reach the full dump position, all of the material contained within the bowl can then slide directly down through the discharge opening. The back 36 is constantly pulling away from the material, so that such material is freed from the back. This prevents any compacting or pinching of the material between the bowl and the gate or between the bowl members 36 and 38. That material which has been contained within the bottom rear corner of the bowl is freed, so that it can drop directly down through the discharge opening and all of the material within the bowl is discharged.

The movement of the bowl members 36 and 38, so that they will assume the proper angular relationship with respect to each other, is controlled by the pivot arms 48.

As best shown in Fig. 5, it will be seen that the cable 84 is disposed in spaced relation above the material carried by the scraper when the scraper is carrying a normally full load.

What is claimed is:

1. In a scraper construction, a frame having ground engaging wheels thereon, side wall members fixed with respect to said frame, a bowl including bottom and back members hingedly connected together transversely of the scraper, a transverse cutter element disposed between said side members adjacent the leading lower edge of said bowl and fixed with respect to said frame, means pivotally connecting said bottom member with respect to said frame adjacent said cutter element, means pivotally connecting said back member with respect to said frame, a gate positioned to extend across the front of said bowl adjacent said cutter element and pivotally mounted with respect to said frame, and means to raise said gate and bowl, said bowl members being so constructed and arranged that, during raising, the angle between said bowl members always in-

creases until at the upper limit of travel said members lie in substantially the same plane.

2. In a scraper construction, a frame having ground engaging wheels thereon, side members fixed with respect to said frame, a bowl including bottom and back substantially planar bowl members hingedly connected together transversely of the scraper, a transverse cutter element disposed between said side members adjacent the leading lower edge of said bowl, and fixed with respect to said frame, means pivotally connecting said bottom bowl member with respect to said frame adjacent said cutter element, means pivotally connecting said back bowl member with respect to said frame, a gate positioned to extend across the front of said bowl adjacent said cutter element and pivotally mounted with respect to said frame, and means to raise said gate and bowl, said bowl members being so constructed and arranged that, during raising, any variation of the angular relationship between the load supporting surfaces of the bowl members is increased so that said bowl members approach a full discharge position where they lie in substantially the same plane.

3. In a scraper construction, a frame having ground engaging wheels thereon, side member fixed with respect to said frame, a bowl including bottom and back bowl members hingedly connected together transversely of the scraper, a transverse cutter element disposed between said side members adjacent the leading lower edge of said bowl and fixed with respect to said frame, means pivotally connecting said bottom bowl member with respect to said frame adjacent said cutter element, means pivotally connecting said back bowl member with respect to said frame, a gate positioned to extend across the front of said bowl adjacent said cutter element and pivotally mounted with respect to said frame, and means to raise said gate and bowl, said bowl members being so constructed and arranged that, when said bowl is raised, the angle between said bowl members increases from an obtuse angle to substantially a straight line.

4. In a scraper construction, a frame having ground engaging wheels thereon, side wall members fixed with respect to said frame, a bowl including an upstanding back member and a bottom member, means hingedly connecting said bottom and said back members together along the rear bottom corner of said bowl, a transverse cutter element disposed between said side members adjacent the leading edge of said bottom member and fixed with respect to said frame, means pivotally mounting said bottom member with respect to said frame adjacent said cutter element, means pivotally mounting said back member with respect to said frame, a movable gate positioned to extend across the front of said bowl adjacent said cutter element and pivotally mounted with respect to said frame, and means to raise said gate and said bowl.

5. In a scraper construction, a frame having ground engaging wheels thereon, side wall members fixed with respect to said frame, a bowl including an up-standing back member and a bottom member, means hingedly connecting said bottom and said back members together along the rear bottom corner of said bowl, a transverse cutter element disposed between said side members adjacent the leading edge of said bottom member and rigidly mounted with respect to said frame, means pivotally connecting said bottom member with respect to said frame, means to

raise said bowl, and means controlling the movement of said back and bottom members during the raising of the bowl, said last named means including a member pivotally connected to said back member transversely thereof, and an arm member pivotally connecting said last named member with respect to said frame.

6. In a scraper construction, a frame having ground engaging wheels thereon, side members fixed with respect to said frame, a bowl including an upstanding back member and a bottom member, means hingedly connecting said bottom and said back members together along the rear bottom corner of said bowl, a transverse cutter element disposed between said side members adjacent the leading edge of said bottom member and fixed with respect to said frame, means pivotally connecting said bottom member with respect to said frame, a gate positioned to extend across the front of said bowl adjacent said cutter element and pivotally mounted with respect to said frame, means to raise said gate and said bowl, and means controlling the movement of said back and bottom members during the raising of the bowl, said last named means including a forwardly extending arm member having its rear end pivotally connected to said back member adjacent the upper edge of said back member and having its forward end pivotally connected with respect to said frame.

7. In a scraper construction, a frame having ground engaging wheels thereon, side members fixed with respect to said frame, a bowl including an upstanding back member and a bottom member, means hingedly connecting said bottom and said back members together along the rear bot-

tom corner of said bowl, a transverse cutter element disposed between said side members adjacent the leading edge of said bottom member and fixed with respect to said frame, means pivotally connecting said bottom member with respect to said frame, cable means to raise said bowl, and means controlling the movement of said back and bottom members during the raising of the bowl, said last named means including a transverse member pivotally connected to said back member, an arm member pivotally connecting said transverse member with respect to said frame, and an upwardly directed sheave supporting member mounted on said transverse member and having a sheave mounted to the upper end thereof, said sheave forming a part of said cable means so that the sheave and cable are disposed in spaced relation to the top of a normal full load in the scraper.

8. In a scraper construction, a frame having ground-engaging wheels thereon, side wall members fixed with respect to said frame, a bowl including an upstanding back member and a bottom member, means hingedly connecting said bottom and back members together along the rear bottom corner of said bowl, a fixed pivot means pivotally mounting said bottom member with respect to said frame, means pivotally mounting said back member with respect to said frame, a movable gate positioned to extend across the front of said bowl adjacent the lower leading edge of said bottom member and pivotally mounted with respect to said frame, and means to raise said gate and said bowl.

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