

March 30, 1943.

R. Q. ARMINGTON ET AL

2,315,363

PLURAL SCOOP SCRAPER

Filed May 3, 1940

4 Sheets-Sheet 1

FIG-1

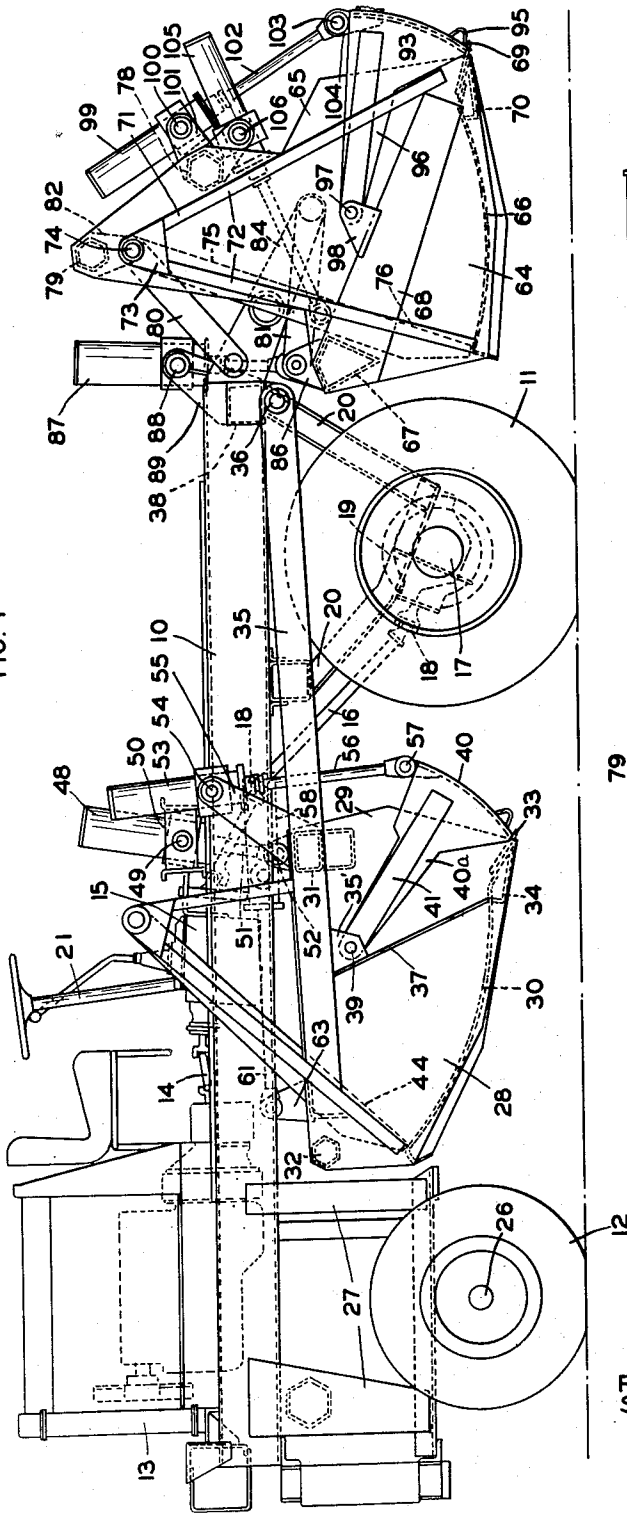
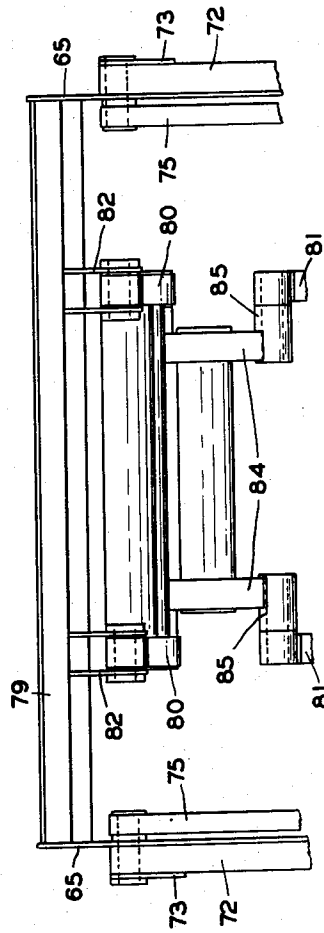


FIG-7



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4 Sheets-Sheet 2

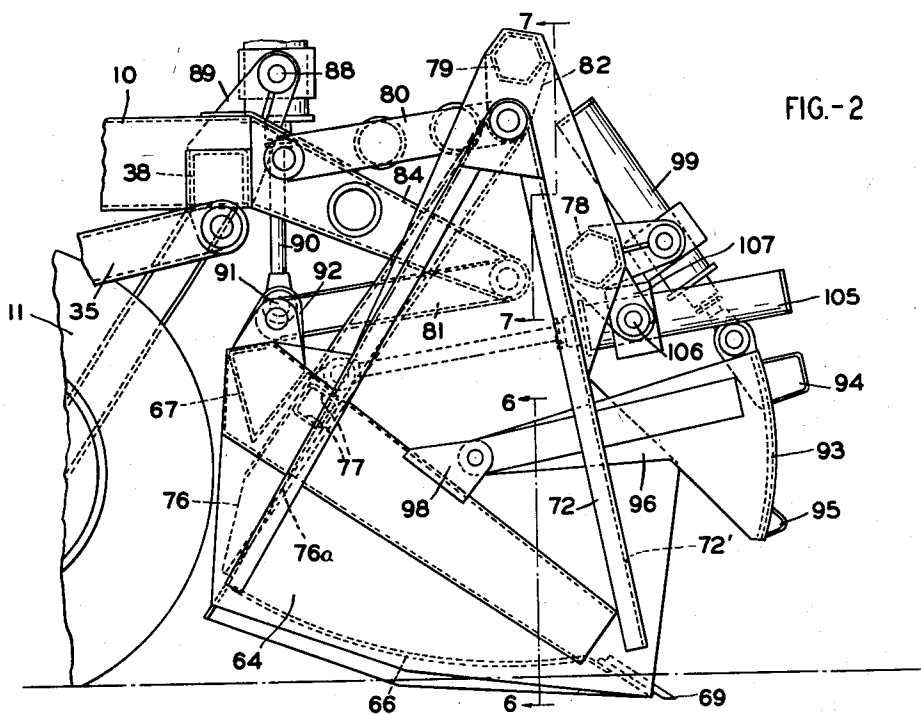


FIG.-2

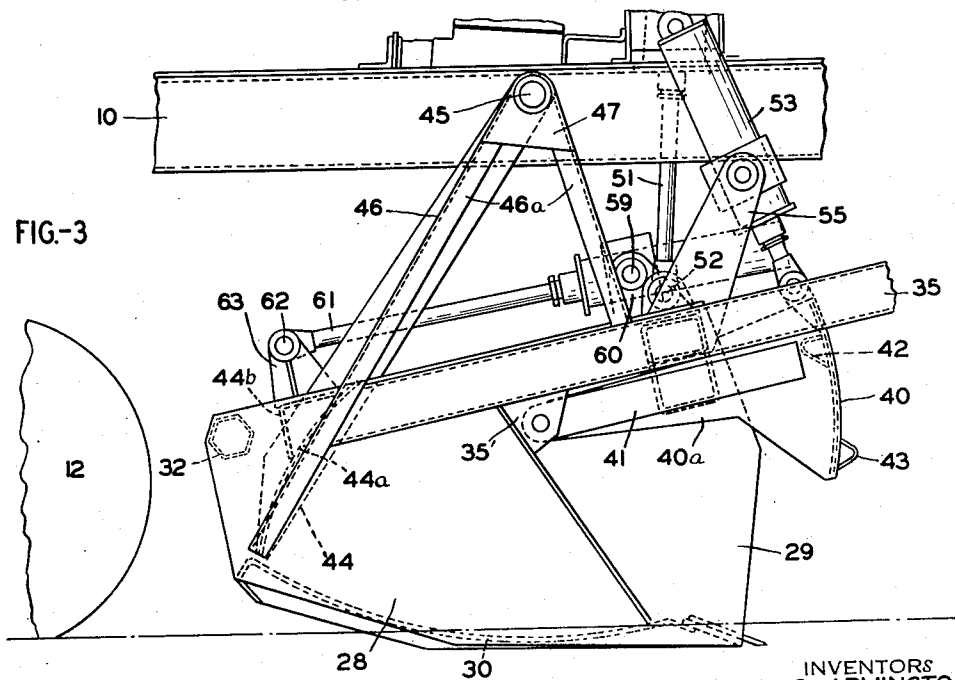


FIG-3

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4 Sheets-Sheet 3

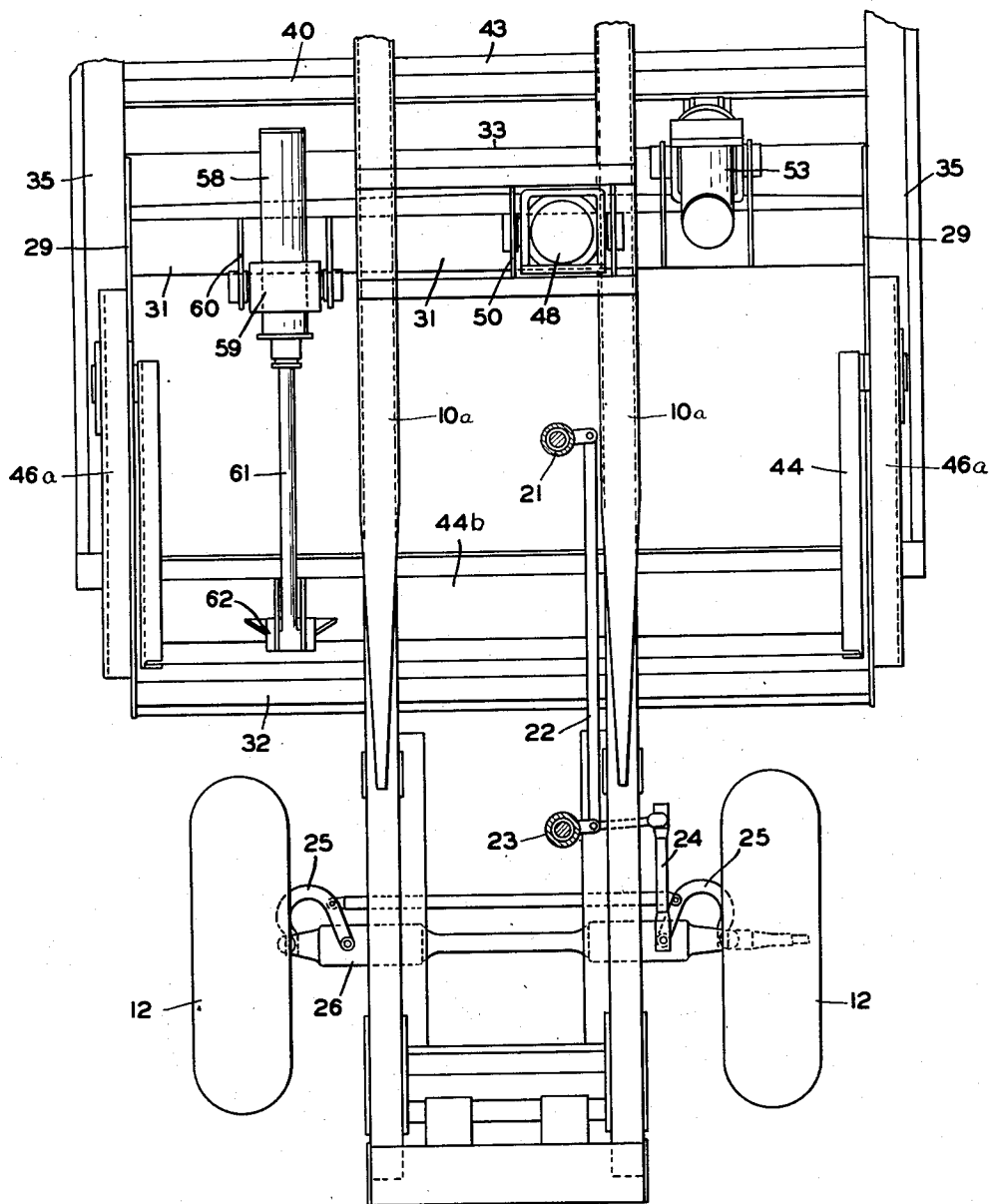


FIG.-4

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4 Sheets-Sheet 4

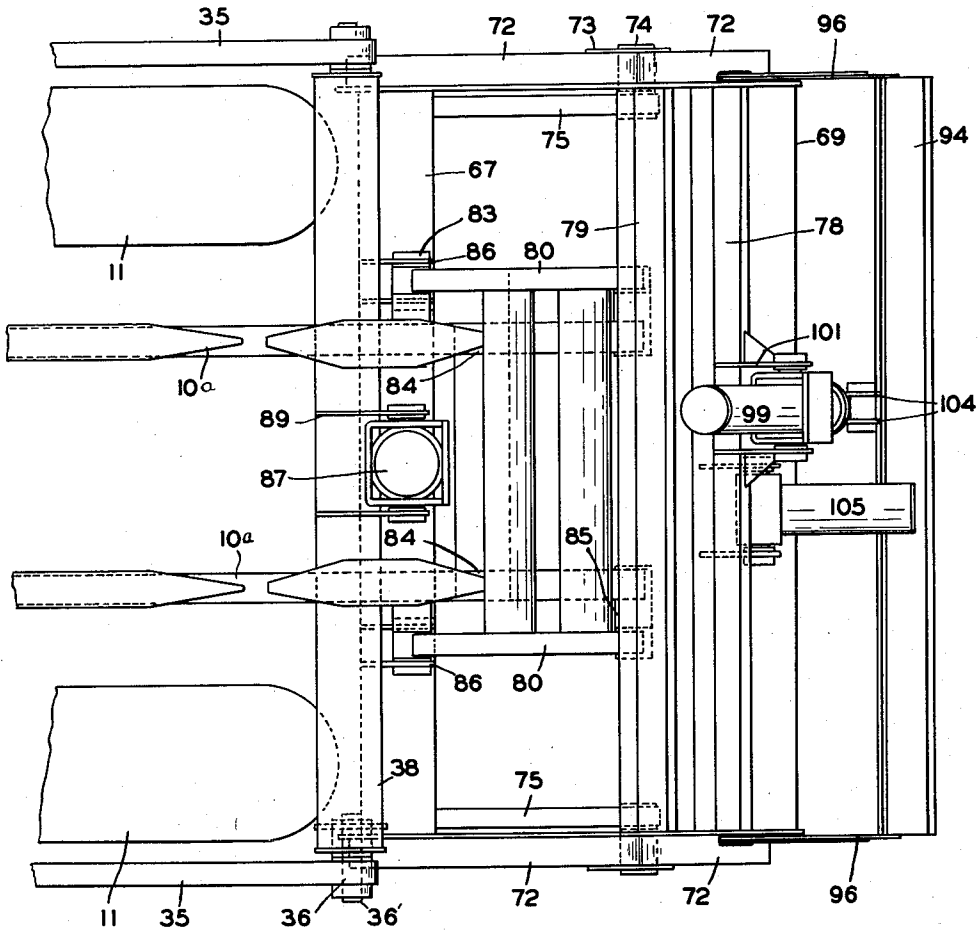
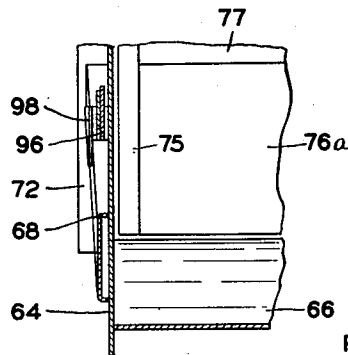


FIG.-5

FIG.-6



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PLURAL SCOOP SCRAPER

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Application May 3, 1940, Serial No. 333,154

4 Claims. (Cl. 37—127)

This invention relates to improvements in scrapers for moving earth or the like, and particularly where one scraper frame supports a plurality of scoops, buckets or other working elements.

One of the objects of the present invention is to provide a self-powered scraper unit having front and rear wheels, wherein the front wheels are used for driving and the rear wheels for steering, and a forwardly opening scoop is provided in front of the front wheels. Such a scraper provides a maximum of tractive effort, enables the operator to fill in ditches and culverts, provides easy maneuverability and provides a vehicle well adapted to cooperate with another vehicle where the tractive effort of two vehicles is required to produce a given result.

Another object of the present invention is to provide a self-contained scraper unit providing earth moving scoops located on opposite sides of a driving axle and wherein each scoop is equipped with a front closing gate, a rear ejecting gate and independent means for raising and lowering the scoop.

Another object of the present invention is to provide a self-powered scraper unit having the driving axle at the forward end, a power unit at the rear end, an earth moving scoop carried at an intermediate portion of the scraper and driving means comprising a drive line from the rear power unit to the forward driving axle and arched over the intermediate scoop.

Another object of the present invention is to provide a scraper unit wherein an earth moving scoop is hung in cantilever fashion with respect to a driving axle behind it so that every bit of load added to the scoop increases the tractive effort on the drive wheels so that the heavier the load in the scoop the greater the effort which may be produced to complete the filling of the scoop.

Another object of the present invention is to provide a scraper in which an earth moving scoop is supported adjacent an axle by draft links which extend to the other side of that axle whereby novel and important operating characteristics are provided.

Other objects and advantages in the present invention consist in the novel arrangement of a plurality of scoops in a wheel driven vehicle wherein the scoops are wide enough to clear a track for the wheels, together with special structural arrangements providing novel raising and lowering characteristics of the scoops and a novel arrangement of the parts whereby a scoop located at the forward end of a scraper may be used as

a bulldozer blade, all of which will appear from the accompanying specification and drawings and the essential features thereof will be summarized in the claims.

5 In the drawings, Fig. 1 is a side elevation of one form of scraper embodying the present invention; Fig. 2 is an enlarged side elevational view of the front scoop of Fig. 1 showing the scoop in digging position; Fig. 3 is an enlarged side elevational view of the rear scoop of Fig. 1 showing the scoop in digging position; Fig. 4 is an enlarged top plan view of the rear portion of Fig. 1 with the bowl in digging position and with certain parts re-
10 moved so as to more clearly indicate the steering mechanism and scoop structure; Fig. 5 is an enlarged top plan view of the front scoop of Fig. 2 and operating mechanism therefor; while Figs. 6 and 7 are sectional views taken substantially along similarly numbered lines of Fig. 2.

20 In the drawings, Fig. 1 represents a scraper embodying many of the features of the present invention and comprising generally a rigid frame 10 having a pair of front driving wheels 11 which in the present instance are nonsteerable, and a pair of rear wheels 12 with means for steering the latter. An internal combustion engine mounted upon the frame is indicated at 13 and having a drive shaft 14 leading to a transmission case 15 and thence through an arched driving shaft 16 to the front axle 17. It is thought special details of the drive need not be illustrated save to point out that the drive shaft 16 includes universal joints 18 where necessary, the drive being to the usual differential axle housed in the casing 19 surrounding the axle 17. The frame 10 as best
35 seen in Figs. 4 and 5, comprises a pair of rigid members 10a extending from front to rear of the scraper and having a supporting structure 20 for carrying the axle 17 and housing 19 in suitable position beneath the forward portion of the frame. The steering arrangements will be best understood from Figs. 1 and 4 and comprise a steering column 21 connected by a transfer arm 22 with column 23 which in turn is connected by drag link 24 with the usual steering knuckles 25 for steering the wheels 12 which are supported by the usual kingpin structure. It will be noted that the wheels 12 are much smaller than the wheels 11 because the bulk of the load is concentrated on the wheels 11 and smaller wheels are easier to steer. Preferably rubber tires are used on all wheels and those on wheels 11 are generally tractor-type tires which give a powerful digging effect which is later described. The rear axle 26 is suit-

ably supported beneath the frame 10 by the sub-structure 27.

The rear scoop 28 comprises a pair of substantially parallel side walls 29 connected by means of a bottom 30 providing a scoop which is normally open at both the front and the rear thereof. The side walls of the scoop are connected by several rigid beams. For instance, at 31 at the upper forward edge of the bucket is a box beam having a deeper section at the center of the scoop than at the side walls thereof. At the upper rear portion is a hexagonal box beam 32 tying together the walls 29 and just to the rear of the cutting blade 33 is provided another box beam 34 which ties together the side walls, strengthens the bottom and reinforces the cutting blade. The scoop 28 is supported for vertical movement relative to the frame 10 by means of two drag links 35, one at each side of the scraper. These drag links are pivotally connected at 36 by means of pins 38 with a box beam structure 38 which in turn is rigidly mounted at the forward ends of the frame members 10a. The drag links 35 are welded to and form a portion of the side walls 29 of the scoop 28. It will be noted that the connection of these drag links is at the ends of the beams 31 and 32 which gives a very strong construction. A web 37 is welded to each side wall 29 at right angles thereto and extends from the drag link 35 to a point near the box beam 34. A bracket 35' welded to the drag link 35 and to the web 37 supports at each side of the scoop the pivot pins 39 for the front gate 40. This gate comprises side arms 40a connected with the pivot pins 39, which arms oscillate outside the plates 29 between the position of Fig. 1 and that of Fig. 3. The arms 40a are reinforced by plates 41 welded to the outside thereof and the gate 40 is reinforced by a plate 42 U-shape in section and best seen in Fig. 3. This plate as well as gate 40 and another reinforcing plate 43 near the bottom of the gate extend the full width of the scoop.

A rear ejector gate 44 is mounted to swing about a pivot point 45 so as to swing over the arcuate bottom 30 of the scoop from rear to front thereof to discharge material from the scoop. The support for the ejector gate is provided by an A-frame 46 at each side of the scoop, these A-frames being comprised of channels 46a welded to the drag links 35 and to the scoop side plates 29 at their lower ends and converging at their upper ends and there secured together by a plate 47. The ejector gate 44 comprises a curved plate 44a supported between a pair of side arms and reinforced by an L-shape member 44b which is welded to the rear wall thereof and extends from side to side of the scoop. The means for manipulating the scoop 28 comprises a hoisting jack 48, the cylinder of which is mounted on trunnions 49 which are supported by a bracket structure 50 mounted on the frame members 10a near the center line of the scraper. The piston rod 51 of this jack is pivotally connected at 52 with a bracket mounted upon the beam 31. The front gate 40 is operated by a jack 53, the cylinder of which is pivotally mounted on trunnions 54 which are supported by bracket ears 55 mounted on the beam 31 near one side of the scoop. The piston rod 56 of this jack is pivotally connected at 57 to a bracket on the gate 40. The rear ejector gate 44 is operated by means of a jack 58 which is mounted on trunnions 59 supported by bracket 60 on beam 31. The piston rod 61 of this jack 58 is pivotally connected at 62 to a bracket 63 on reinforcing member 44b.

It will be noted that the particular mounting of the scoop 28 on the long drag links 35 pivoted on the frame at the other side of axle 17, permits the mounting of scoop 28 close to the wheels 11 and adapted for movement in a vertical direction in a very shallow arc about the pivot points 36.

The front scoop 64 comprises a pair of parallel side plates 65 connected together by an arcuate bottom 66. At their upper rear portions the side plates are connected by the torque tube 67 somewhat triangular in section and providing a box beam extending between the side plates. Along the outside of each side plate is welded a channel 68 with its web outermost, the channel being of deeper section at the upper rear portion of the side walls 65 and becoming shallower as it extends forwardly and downwardly to a point near the cutting edge 69. A box beam 70 ties the side walls and bottom together just to the rear of the cutting edge. Welded to each side wall is an A frame 71 comprising channel members 72 welded at their bottoms to the plate 65 near the front and rear of the scoop and converging at the top where they are united by a plate 73 which supports the pivot pins 74 for arms 75 upon which is mounted the front ejector gate 76. As best seen in Fig. 2 this comprises a straight plate 76a reinforced at the top by a bent plate structure providing a box beam 77 extending from side to side of the scoop along the top of the ejector gate.

The side plates 65 are also connected together by a box beam 78 hexagonal in section which supports the jacks for operating the front and rear gates. At their upper extremity the plates 65 are connected together by a box beam 79 hexagonal in section. Means is provided for moving the scoop 64 in a vertical direction from the carrying position of Fig. 1 to the digging position of Fig. 2. This means comprises a pair of links 80 and a pair of links 81. The links 80 are pivotally mounted at their forward end on brackets 82 carried by beam 79. The links 80 are pivotally mounted at their rear end on bosses 83 mounted on forward extensions 84 of the frame members 10a. The links 81 are vertically below the links 80 and are pivotally connected at their forward ends on bosses 85 mounted on the frame projections 84. The links 81 at their rear ends are pivotally connected to brackets 86 carried by beam 67. It will be noted that in moving from the position of Fig. 1 to that of Fig. 2, the links 81 pass from a position just above the horizontal to a position just below the horizontal, or in other words, through a dead center position, while the links 80 pass from a position of inclination about 45° to the vertical in Fig. 1 to a position nearer the horizontal in Fig. 2. It results from this particular arrangement that the cutting edge 69 moves in a slight S curve practically in a vertical direction.

The operating means for the scoop 64 is as follows: A jack 87 is mounted by trunnions 88 on brackets 89 which are carried by the beam 38. The connecting rod 90 of this jack is pivotally connected at 91 to brackets 92 mounted on beam 67. A gate 93 similar to gate 40 serves to close the front of scoop 64. This gate is reinforced along its entire length by a box member 94 near its upper edge and by a V-shape member 95 near its lower edge. The side arms 96 of this gate pass through openings 72' in the forward A frame member 72 and are pivotally connected at 97 with brackets 98 which are welded to the channels 68. This front gate is operated by a jack 99 mounted by trunnion 100 on bracket

ets 101 carried by beam 78. A piston rod 102 of this jack is pivotally connected at 103 to a bracket 104 connected to gate 93 alongside the reinforcing member 94. The ejector gate 76 is operated by jack 105 which is mounted by trunnions 106 on brackets 107 carried by beam 78.

It will be understood that all of the jacks here described are double-acting and are provided with suitable pressure fluid lines and control valves not shown. The operation of the scoops 28 and 64 is entirely independent of each other. Either scoop may be raised or lowered at will. Its associated front gate may be raised and lowered as required and the associated ejector gate may be swung forwardly to clear material out of the scoop or rearwardly when the scoop is to be filled with material.

It will be noted that both scoops are wide enough to cut a track as wide as the distance between the wheels 11 or 12. Thus the scraper can dig a trench with vertical sides. It will be noted also that with a loaded scoop on each side of the driving axle 17, maximum tractive effort is provided on the wheels 11. Attention is called to the fact that with scoop 64 pointed forwardly ahead of the driving wheels 11 and in cantilever position relative to axle 17 that every bit of material added to scoop 64 adds more than its own weight to the tractive effect of the wheels 11. This is due to the fact that additional load in the front scoop moves the center of gravity of the entire loaded scraper nearer to the axle 17. Thus the load added to scoop 64 when moving in a forward direction aids in further loading of the scoop 64.

It will be noted that with the steering wheels 12 at the rear and the scoop 64 out in front facing forwardly, this machine is particularly adapted for filling in culverts, ditches, etc.

The gate 93 is strongly reinforced at 94 and 95 and is very ruggedly connected by means of reinforced arms 96, beam 67 and links 81 with the frame extensions 84. Thus the scraper unit here shown is excellently adapted to be used as a bulldozer when the forward scoop is in the raised position of Fig. 1. It will be noted that the force exerted through arms 96 and links 81 is in parallel and in closely aligned planes so as to effectively transmit power frame members 84 to the gate 93. Alternatively, a pulling effort may be exerted on gate 93 so as to act on the frame members 84 to pull the present unit forward by means of a tractive vehicle ahead of it if desired.

Obviously a true bulldozer blade might be utilized in place of the front gate 93 but for illustrative purposes the gate 93 is to all intents and purposes a bulldozer blade in effect.

What we claim is:

1. A scraper comprising a frame, front wheel means, rear wheel means, power means on said

frame for driving said front wheel means, means for steering said rear wheel means including a manually operated steering member, a scoop carried by said frame between said wheel means, a scoop carried by said frame forwardly of said front wheel means, both of said scoops having cutting edges facing forwardly, means for raising and lowering and for discharging material from each of said scoops, and said steering member being located to the rear of the cutting edge of said first named scoop, whereby the operator of the steering member can easily watch the loading of both scoops.

2. A scraper comprising a frame, front wheel means, rear wheel means, power means on said frame for driving said front wheel means, means for steering said rear wheel means, a scoop carried by said frame between said wheel means, a scoop carried by said frame forwardly of said front wheel means, both of said scoops having cutting edges facing forwardly, each of said scoops being open at the front, a front gate for closing each scoop, an ejector gate movable through each scoop from rear to front to discharge material, means for raising and lowering each scoop, and means for operating said gates.

3. A scraper comprising a frame, wheel means therefor, driving means for said wheel means, a scoop carried by said frame forwardly of said wheel means, and a front gate for said scoop extending ahead of said frame and forming the forwardmost portion of said scraper, there being connecting means between said front gate and said frame adapted to transmit force from said frame to said gate, and reinforcing means extending from side to side of said gate in position to adapt said gate for use as a bulldozer.

4. A scraper comprising a frame, wheel means therefor, a scoop facing in a fore and aft direction, and a support for said scoop comprising upper and lower links of approximately the same length pivotally connected between said scoop and frame, the upper of said links having its forward end connected with said scoop and its rearward end connected with said frame, the lower of said links having its forward end connected with said scoop, the rearward ends of said links being substantially in vertical alignment, means for moving said scoop in an up and down direction thereby causing oscillation of said links, the parts being so arranged that during said oscillation said lower link moves from a position slightly above the horizontal to a position slightly therebelow, and said upper link moving from a position steeply inclined to the horizontal in raised position of the scoop to a position near the horizontal in lowered position of the scoop.

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