April 27, 1943. E. R. BARRETT 2,317,511

SCRAPER

Filed Feb. 24, 1941 3 Sheets-Sheet 1

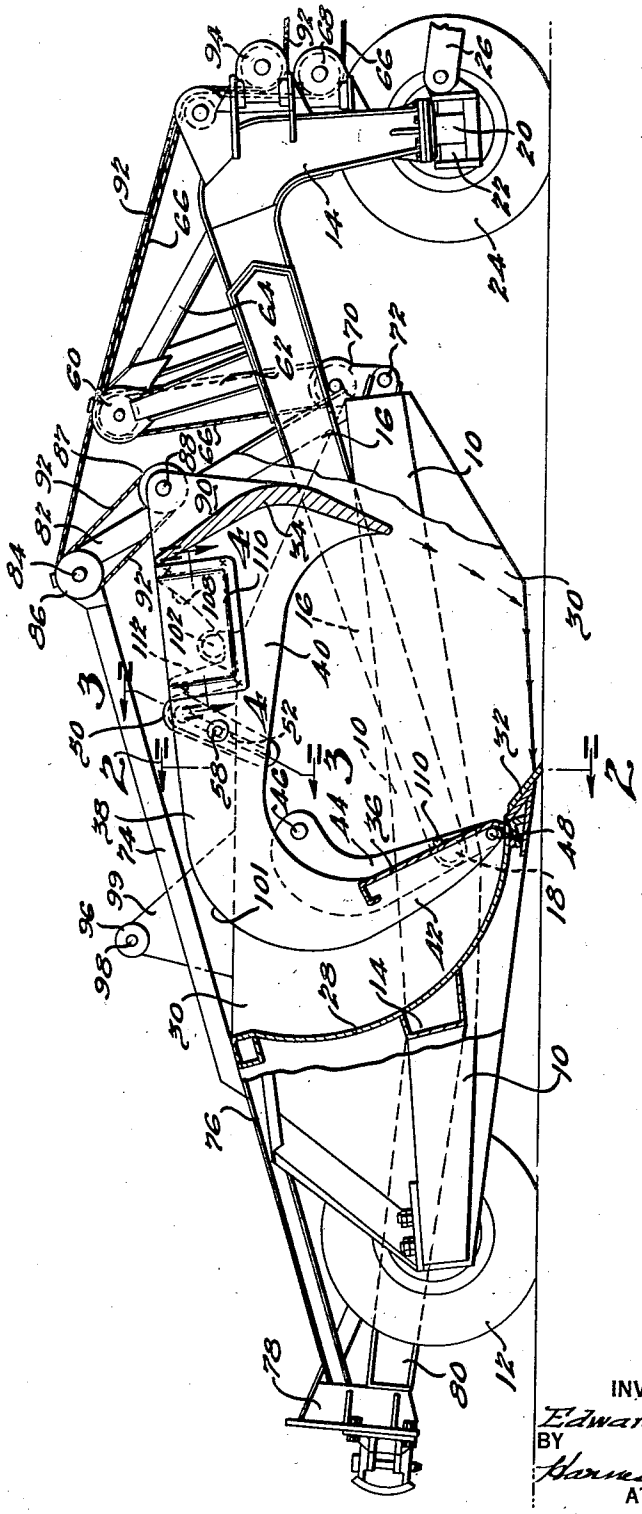


Fig. 1.

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Filed Feb. 24, 1941 3 Sheets-Sheet 2

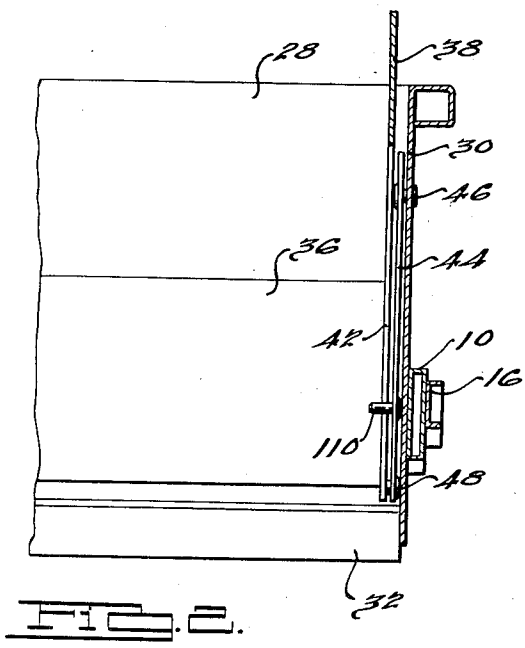


Fig. 2.

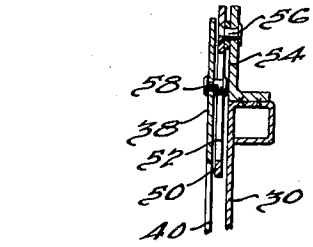


Fig. 3.

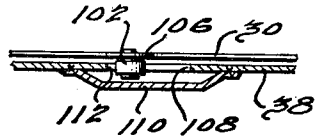


Fig. 4.

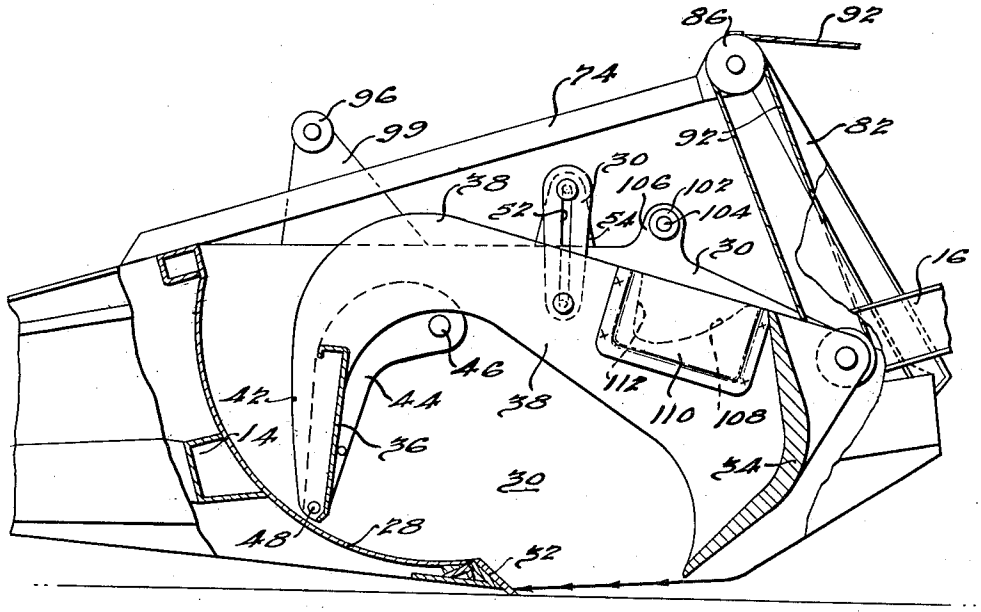


Fig. 5.

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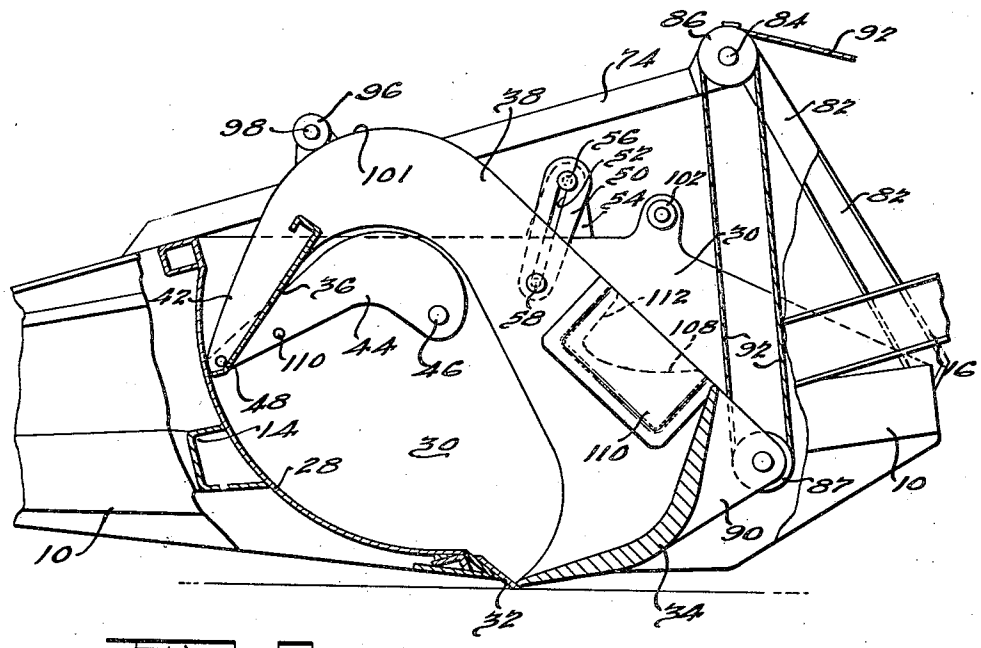


FIG. 6.

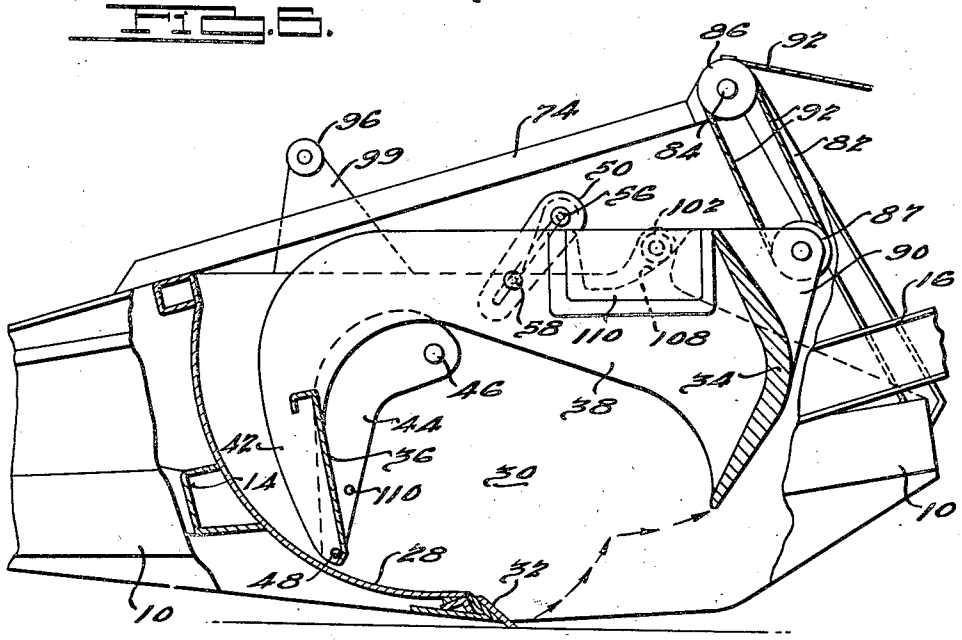


FIG. 7.

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2,317,511

SCRAPER

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Application February 24, 1941, Serial No. 380,161

6 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 an improved scraper in which the material being worked upon is loaded in an improved and efficent manner.

A further object of the invention is to provide an improved scraper in which the material in front of the cutting blade is drawn or forced into the scraper bowl, so that such bowl is efficiently loaded.

Another object of the invention is to provide a scraper in which the material carried by the bowl is positively ejected therefrom in an improved manner.

A further object of the invention is to provide an improved scraper in which an ejector member and a front apron or gate member co-operate with each other and are moved simultaneously in both the discharge and loading of the material worked upon.

A further object of the invention is to provide an improved front gate or front apron mounting on a scraper so that such gate follows a predetermined path in the opening and closing thereof in order to obtain an improved loading and dumping action.

A further object of the invention is to provide an improved front gate or apron mounting on a scraper in which the gate follows a different path in opening than in closing, so that an efficient operation is obtained.

A further object of the invention is to provide improvements in the operation of cable operated scrapers.

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 side elevational view with parts removed and showing parts in cross-section of a cable operated scraper according to the present invention;

Fig. 2 is an enlarged, fragmentary cross-sectional view taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is a cross-sectional view taken substantially along the line 3—3 of Fig. 1;

Fig. 4 is a cross-sectional view taken substantially along the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary view, similar to Fig. 1, showing the front gate or apron in a partly closed position and moving toward the fully closed position from open position;

Fig. 6 is a view similar to Fig. 5, showing the apron or gate in its fully closed position; and

Fig. 7 is a view similar to Fig. 5, showing the gate or apron in an intermediate position in its movement from closed to open positions.

Referring to the drawings, the scraper comprises a main frame which includes longitudinally extending, box frame members 10 which are pivotally connected adjacent the rear end to an axle having ground engaging wheels 12 mounted thereon, and a cross beam 14 connecting the beams 10 in front of the wheels 12 and behind the bowl. A bifurcated draft member, including an upstanding central portion 14, 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 outside of the frame members 10. Such arms 16 are pivotally connected to the frame members 10 by means of a pivot pin 18, which is preferably located slightly to the rear of and slightly above the scraper cutter. The depending portion 14 is connected through a swivel 20 with a transversely extending axle member 22, to which ground engaging wheels 24 are mounted. A drawing 26 is pivotally connected to the axle 22, and such drawbar is adapted to be connected to a power driven tractor in the usual way.

A bowl, including a downwardly and forwardly curved bottom member 28 and forwardly extending side members 30, is rigidly secured to the frame members 10 and 14. The sides 30 extend forwardly beyond the bottom edge of the bowl 28; and a transversely extending cutter element 32 is rigidly fixed to the bottom edge of the bowl at the proper cutting angle.

The upper edges of the bottom 28 and sides 30 are preferably formed in box section, in order to strengthen the structure.

According to the present invention, a transversely extending apron or gate member 34 and a transversely extending ejector member 36 are integrally connected so that such members are moved simultaneously in the operation of the scraper. The member 36 is in the form of a flat plate which is adapted to be positioned within the bowl transversely thereof between the sides and move along the bottom of the bowl from the position shown in Fig. 6 to that shown in Fig. 1 when the bowl is being dumped. The gate member 34 is preferably of curved form, as shown in

the drawings, and is adapted to be positioned between the sides 30 and move toward and from the cutter 32, in order to close and open the bowl, respectively.

In order to mount the members 34 and 36 and to operatively connect them, a pair of side arm members 38, which are generally L-shaped, are provided which have forwardly projecting portions 40 and rear depending portions 42. Such members 38 are mounted adjacent the inside surfaces of the side walls 30 of the bowl by means of depending linkage members 44, each of which is pivotally connected to one of the sides 30 by means of a pivot pin 46, and is pivotally connected to the lower end of the adjacent arm 38 by means of a pivot pin 48. Each of the arms 38 is also pivotally connected to one of the sides 30 by means of a lost motion link 50, having an elongated slot 52 formed therein. The upper end of such link 50 is pivotally connected to an upstanding bracket 54 mounted on the upper edge of each of the sides 30, between the forward and back ends thereof, by means of a pivot pin 56. A pivot pin 58 is fixed to the forwardly projecting portion 40 of the arm 38 between the ends thereof, and is pivotally and slidably received within the slot 52.

The members 34 and 36 extend between the arm members 38 and are rigidly fixed thereto at the proper angles, the member 34 being fixed to the arms adjacent the forward edge of the portion 40, and the members 36 being fixed to the depending portions 42 of the arms.

In order to position the bowl and the main frame 10 with respect to the ground so that the bowl may assume its proper operating position, a lift control cable means is provided which includes sheaves 60 mounted on upright posts 62 and braced by posts 64, which are located at substantially the transverse center of the scraper and are fixed to the draft frame members 14 and 16. A cable 66 leads from a power means, such as a power winch, mounted on the tractor, and is trained about sheave blocks 68 mounted on upright portion 14. Such cable 16 is then trained about the sheave blocks 60 and is further trained about another sheave block 70, which is pivotally connected by means of a pivot pin 72 to the forward edge of the bowl and main frame 10 at substantially the transverse center thereof. A suitable number of such sheaves may be used in order to obtain the mechanical advantage desired, and the end of such cable 66 may then be fixed to one of the mounting members 62 or 64 adjacent the sheaves 60.

It will thus be seen that by operation of the cable 66, the bowl and the cutting edge 32 may be positioned with respect to the ground.

In order to effect the operation of the apron or gate 34 and the ejector member 36, cable means are provided which are operatively connected to move the arms 38.

Such cable means, including the mounting therefor, include a longitudinally extending strut 74 which is disposed at substantially the transverse center of the bowl and which is fixed with respect to the bowl and with respect to the main frame adjacent the rear end thereof. Such member 74 may be braced by frame members 76, which extend rearwardly and are rigidly connected to a bumper structure 78. The bumper structure 78 may be mounted on and braced by another frame member 80, which is located at substantially the transverse center of the scraper and extends forwardly thereof where it is fixed to the frame member 14.

A pair of oppositely disposed struts 82 are provided, each of which is mounted on one of the frame members 10 and slopes upwardly and inwardly toward the transverse center of the scraper. The adjacent ends of the members 82 and 74 are pivotally connected by means of a pivot pin 84. It will thus be seen that the two members 82 and the member 84 provides a triangular mounting, and that the member 74 may pivot with respect to the members 82 as the main frame is pivoted with respect to the draft members 16.

Sheaves 86 are pivotally mounted on the pivot pin 84; and other sheaves 87 are pivotally mounted on a pivot pin 88. The pivot pin 88, in turn, is mounted on brackets 90, which are fixed to the forward surface of the apron 34 adjacent the upper edge thereof and positioned at substantially the transverse center thereof. A suitable number of such sheaves 86 and 87 may be used with a cable 92 trained therearound, in order to obtain the desired mechanical advantage. The cable 92 extends from a suitable power means, such as the winch mounted on the tractor, and is trained about a pulley 94 mounted on the upstanding portion 14 of the draft member. One of the ends of the cable 92 may be fixedly secured to one of the sheave blocks 86, so that as the cable 92 is actuated, the arms 38, together with the members 34 and 36, are moved through the connection with the sheaves 87.

In order to control the operation of the members 34 and 36 so that the member 34 follows a definite and predetermined path during the opening and closing thereof, and so that positive ejection of material within the bowl is accomplished during the simultaneous movement of the members 34 and 36, guide means are provided which include a roller 96 disposed on each side of the bowl. Each of such rollers 96 is mounted on a pivot pin 98 to the upper end of an upstanding bracket 99, which is fixedly mounted on the upper edge of each of the sides 30 adjacent the rear end of the bowl. The corner of each of the members 38 is rounded, as indicated at 101, and such rounded corners are adapted to slidably bear against their respective rollers during certain portions of the operation of the scraper, as will be pointed out in detail hereinafter.

The arms, and consequently the apron or gate 34, are further guided during their movement by means of other rollers 102, one of such rollers being disposed at each side of the bowl. Each of such rollers 102 is pivotally mounted to one of the sides 30 by means of a pivot pin 104, which is fixed to an upstanding projection 106 formed on the top edge of each of the sides 30 forwardly of the brackets 54 and at a predetermined height. As the arms 38 are moved upwardly, such roller is adapted to engage a guide surface 108, which is formed by removing a portion of each of the arms 38 adjacent the forward ends thereof. A cover plate 110 is disposed over the removed portion, including the back edge 112 thereof, on the inside faces of members 38.

In the operation of the scraper and with the cutter 32 in digging position, the parts are shown in Fig. 6 with the gate or apron 34 in its closed position, at which time the ejector member 36 is in its uppermost position. At such time, the curved surfaces 101 of the arms 38 are in engagement with rollers 96. By then pulling the cable 92, the front ends of the arm 38 are raised to open

the apron 34; and during such initial stages of opening, the curved portions 101 of the arms 38 are forced against the rollers 96, so that a substantial force is applied on the ejector member 36 to force material from the bowl.

During the raising of the arms 38 and the opening of the gate 34, the lower edge of the gate 34 follows a path indicated by the arrows in Fig. 7. It will thus be seen that the lower edge first moves upwardly at a relatively sharp incline, during which time the edges 101 are bearing against rollers 96. Thereafter, the pin 58 may move along the slot 52 and the lower edge of the gate 34 follows a path at less of an incline. The member 34 is shown in its fully opened position in Fig. 1, and it will be seen that the ejector member 36 is then positioned at the lower edge of the bowl bottom 28 adjacent the cutter 32.

The arrows shown in Fig. 1 indicate the path that the lower edge of the gate 34 follows during the closing of such gate member when the pull on the cable 92 is released. In moving to a fully opened position, referring to Figs. 7 and 1, it will be seen that, during the latter stages of opening, the rollers 102 engage the guide surfaces 103 formed on arms 38.

In order to control the limit of movement during opening, stop pins 110 are mounted on members 44 and project outwardly across the path of member 36, so that as such member 36 reaches the position shown in Fig. 1, it abuts against the stop pins 110 and limits the movement thereof.

The removed portions of the arms 38, defined by the edges 103 and 112, are sufficient so that there is no interference by roller 102 as the arms 38 are dropped. Further, during digging, when the gate 34 is dropping, in the event that such gate strikes against a boulder, it will be free to move upwardly without interference with the roller 102.

As stated above, during the initial stages of closing of the gate 34, the lower edge of the gate moves downwardly at a relatively sharp incline, as shown by the arrows in Fig. 1. Such lower edge drops to a position, at this relatively sharp incline, substantially level with the cutter 32. Thereafter, during the further closing the member 34, the lower edge of the gate follows a substantially horizontal path, as shown by the arrows in Figs. 1 and 5. This action is of considerable importance in improving the loading characteristic of the scraper, in that it pulls or positively pushes the material being worked upon into the scraper. Certain materials, especially sand, are difficult to load into a scraper because as the scraper moves forwardly the sand tends to push forwardly of the scraper 32 without going into the bowl. Mounds of such material, therefore, form forwardly of the cutter 32, and continue to move forwardly as the scraper is moved forwardly, without getting into the bowl. The action of the apron 34, above described, thus positively pulls such mounds of material into the scraper.

Furthermore, the closing of the gate is assisted due to several forces, including the force of the material against the member 36, the force of the material against the outside face of the member 34, and the force of the material which is thrown onto the inside face of the member 34 as the scraper is loaded.

From an understanding of the above, it will be seen that, due to the action of the ejector 36, the material carried by the conveyer is efficiently ejected therefrom. This is a matter of considerable importance when working on materials, such as gumbo, which tend to stick to the walls of the bowl and make it difficult to quickly dump the load. Also, due to the action of the gate or apron 34, the bowl may be quickly loaded since, in opening, the lower edge of the gate 34 moves upwardly at a sharp incline out of the way of material coming in, and the bowl may be efficiently loaded due to the closing action of the gate, as it moves downwardly on a steep path and thereafter moves inwardly toward the cutter 32 in a substantially horizontal path to pull or push the material into the bowl.

Formal changes may be made in the specific embodiment of the invention described without departing from the spirit and substance of the invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. A scraper comprising a frame having ground engaging wheels mounted thereon, a bowl mounted on said frame, a transversely extending cutter element mounted adjacent the leading edge of said bowl, a gate positioned to extend across the front of said bowl adjacent said element and disposed forwardly thereof, mounting means for movably mounting said gate for movement forwardly of said element between open and closed positions, and means for moving said gate, said mounting means including guide means for controlling the movement of said gate as it moves from closed to open positions and returns to closed position so that said gate follows a closed path in which the path of the lower edge of the gate in moving from closed to open position is such that said lower edge first moves upwardly at a relatively sharp incline forwardly of said element and then moves upwardly and forwardly at less incline, and in moving from open to closed positions said lower edge first moves downwardly on a relatively sharp incline toward the level of said cutter element and then moves toward said scraper element in a substantially horiozntal path at substantially the level of said cutter element.

2. A scraper comprising a frame having ground engaging wheels mounted thereon, a bowl mounted on said frame, a transversely extending cutter element mounted adjacent the leading edge of said bowl, a gate positioned to extend across the front of said bowl adjacent said element and forwardly thereof, mounting means for movably mounting said gate for movement forwardly of said element between open and closed positions, and cable means for moving said gate, said mounting means including guide means for controlling the movement of said gate as it moves from closed to open positions and returns to closed position so that said gate follows a closed path in which the path of the lower edge of the gate in moving from closed to open positions is above the path of the lower edge in moving from open to closed positions and forwardly of said element.

3. A scraper comprising a frame having ground engaging wheels mounted thereon, a bowl mounted on said frame, a transversely extending cutter element mounted adjacent the leading edge of said bowl, a gate positioned to extend across the front of said bowl adjacent said element and forwardly thereof, mounting means for movably mounting said gate for movement forwardly of said element between open and closed positions, and cable means for moving said gate, said mounting means including guide means for controlling the movement of said gate as it moves from closed to open positions and returns to

closed position so that said gate follows a closed path in which the path of the lower edge of the gate in moving from closed to open position is such that said lower edge first moves upwardly at a relatively sharp incline forwardly of said element and then moves upwardly and forwardly at less incline, and in moving from open to closed positions said lower edge first moves downwardly on a relatively sharp incline toward the level of said cutter element and then moves toward said cutter element in a substantially horizontal path at substantially the level of said cutter element.

4. A scraper comprising a frame having ground engaging wheels thereon, a bowl including side walls mounted on said frame, a transversely extending cutter element mounted adjacent the leading lower edge of said bowl, a gate positioned to extend across the front of said bowl adjacent said cutter element, an ejector member positioned within said bowl transversely thereof, a pair of arm members disposed adjacent the sides of said bowl, said arm members being rigidly connected to said gate and to said ejector member, mounting means connecting said arm members with said side walls for floating movement with respect thereto, and means for moving said arms, said mounting means including guide means engaging said arms for controlling the movement of said arm members so that as said gate moves from open to closed positions the lower edge of said gate follows a substantially horizontal path at substantially the level of said cutter element as said lower edge approaches said cutter element.

5. A scraper comprising a frame having ground engaging wheels thereon, a bowl including side walls mounted on said frame, a transversely extending cutter element mounted adjacent the leading lower edge of said bowl, a gate positioned to extend across the front of said bowl adjacent said cutter element, an ejector member positioned within said bowl transversely thereof, a pair of arm members disposed adjacent the sides of said bowl, said arm members being rigidly connected to said gate and to said ejector member, mounting means connecting said arm members with said side walls for movement with respect thereto, and means for moving said arm members, said mounting means including members pivotally connected to said side walls and pivotally connected to said arms adjacent the rear ends thereof, a lost motion linkage means mounted on one of said side walls and pivotally connected to one of said arms intermediate the ends thereof, said pivot means and said linkage means being so constructed and arranged as to cause said gate to follow a predetermined path as it is moved from closed to open positions and returned to closed position.

6. A scraper comprising a frame having ground engaging wheels thereon, a bowl including side walls mounted on said frame, a transversely extending cutter element mounted adjacent the leading lower edge of said bowl, a gate positioned to extend across the front of said bowl adjacent said cutter element, an L-shaped arm member disposed adjacent one of the sides of said bowl and having the outer corner thereof rounded, means rigidly connecting said gate and said ejecting member to said arm adjacent the front and rear ends thereof, respectively, mounting means connecting said arm member with said one of said side walls for movement with respect thereto, and means attached to the forward edge of said arm for lifting such forward edge, said mounting means including members so constructed and arranged as to guide the path of movement of said arm when the front end thereof is raised, and means mounted adjacent said rounded corner and adapted to be engaged by said rounded corner when the forward end of said arm is first raised so that a substantial leverage is active on said ejector member to force material from said bowl.

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