Aug. 17, 1948. G. S. ALLIN 2,447,455

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Filed Sept. 18, 1944 4 Sheets-Sheet 1

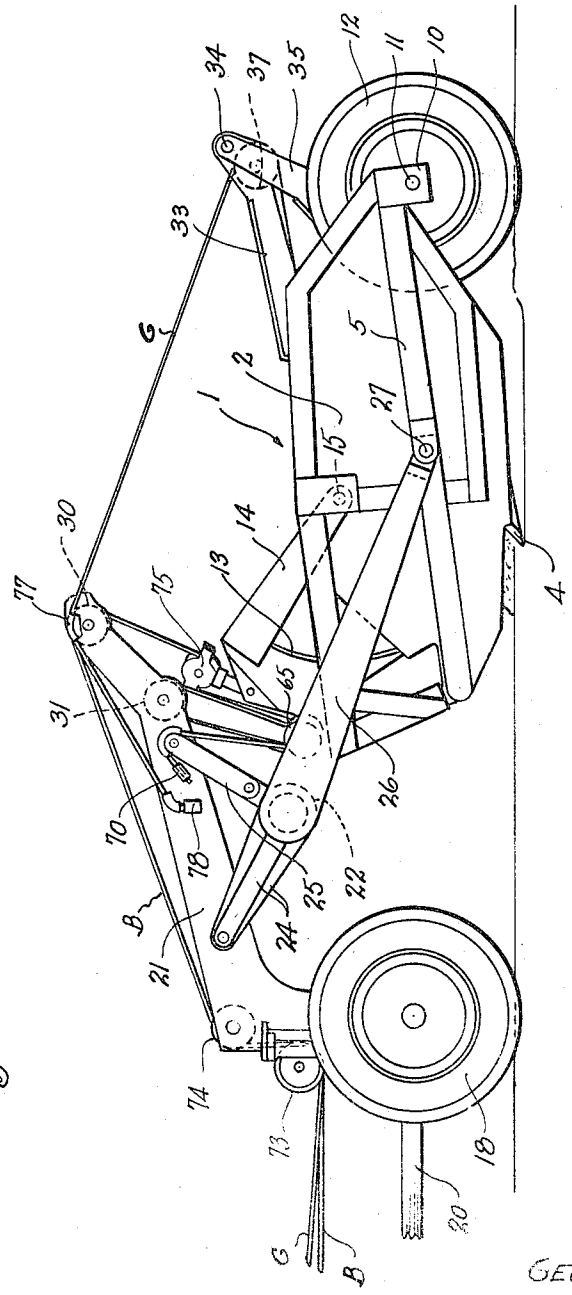


Fig. 1

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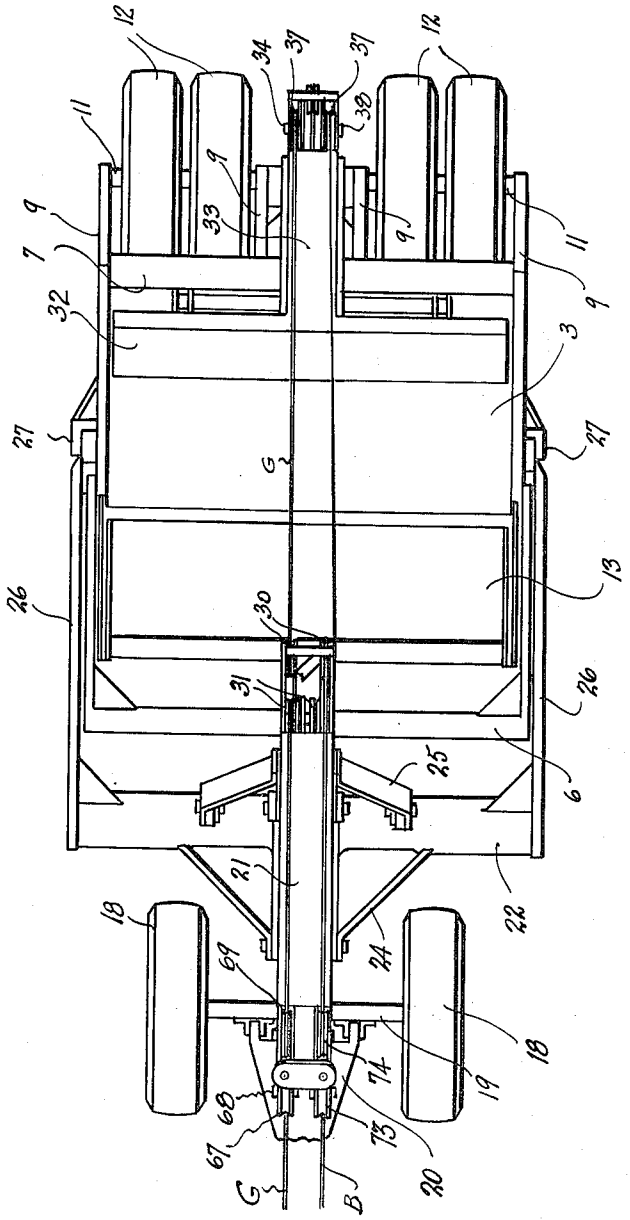


Fig. 2

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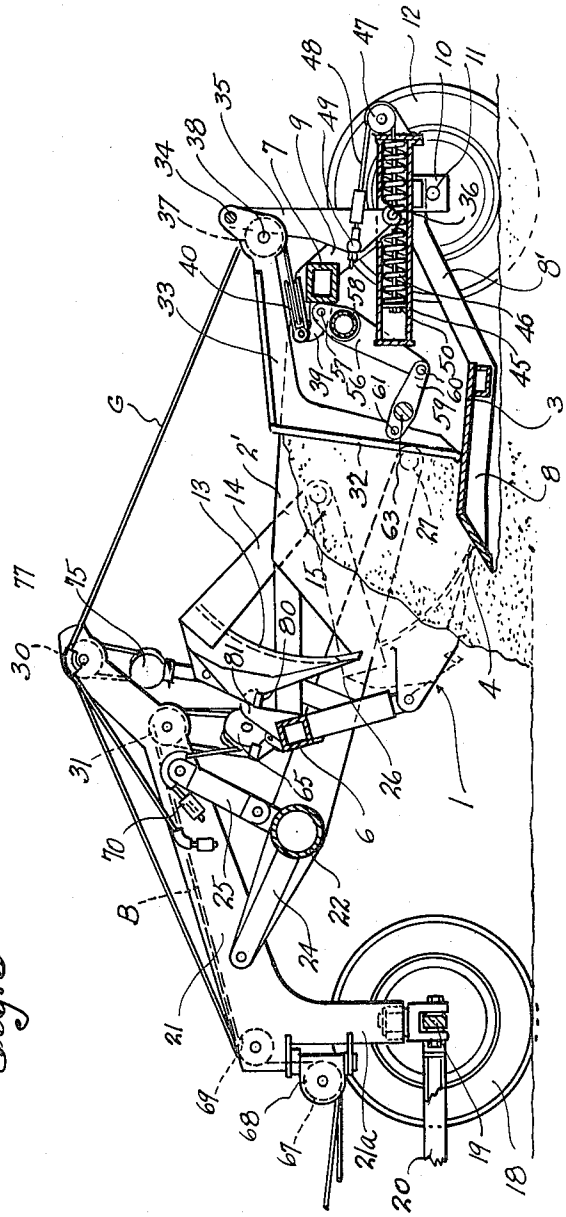


Fig. 3

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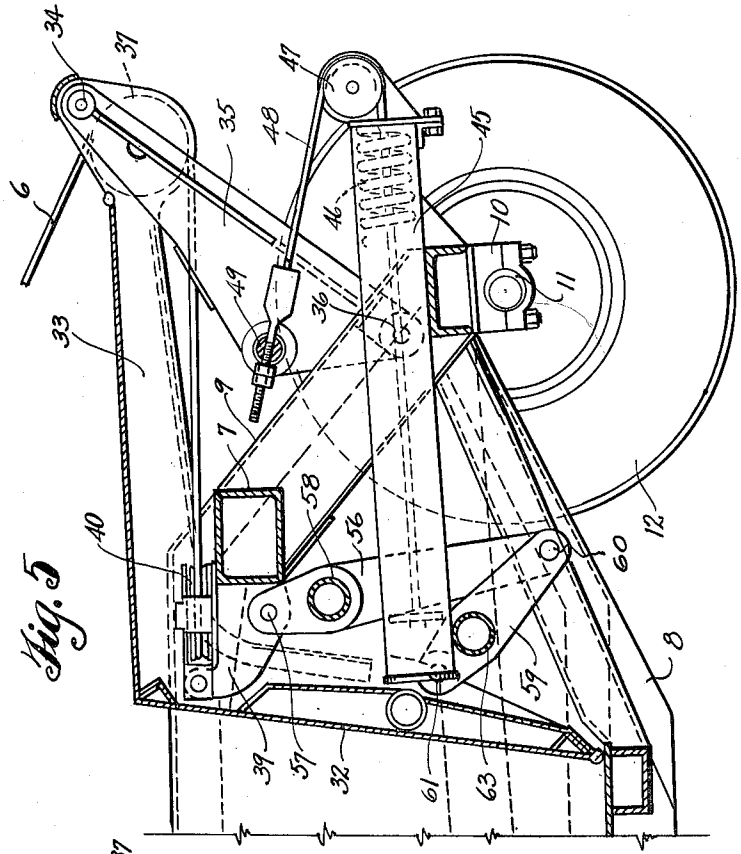


Fig. 5

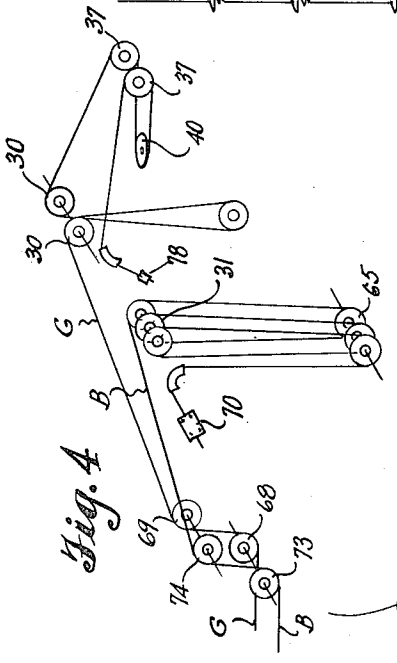


Fig. 4

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UNITED STATES PATENT OFFICE

2,447,455

SCRAPER

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Application September 18, 1944, Serial No. 554,642

3 Claims. (Cl. 37—126)

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This invention relates to dirt moving vehicles of those kinds, or types, referred to in the art and known in industry as "scrapers." More particularly, the invention has reference to improvements in scrapers of large capacity, to be drawn by a tractor, or other powered draft vehicle and designed to scrape up, carry and forcibly eject their loads.

Scrapers of the above kind now in general use, have a forwardly opening bowl, equipped across the forward edge of its bottom wall with a blade by which dirt may be scraped up, upon so lowering the forwardly drawn bowl as to bring the blade into ground contact. Forwardly of the blade, the bowl is equipped with a gate that may be raised for bowl loading operations and then lowered to retain the load in the bowl. Such scrapers also have been equipped with mechanically powered load ejector means.

In scrapers of the kind referred to, the lowering and raising of the bowl, the control of the gate and the actuation of the load ejector devices are, in some instances, controlled by hydraulic means. In other instances, by cables extended between the operated parts and cable winding drums on the towing tractor. However, in present-day cable operated vehicles of this kind to which this application particularly relates, there are objectionable features, now to be mentioned, which have been overcome by the invention hereinafter disclosed.

It is generally the case that a heavy superstructure is employed for the suspension of pulley blocks and sheaves that support and guide the cables that control the raising and lowering of the bowl. Likewise, on the bowl, is a structure that carries blocks and sheaves for the cables that control the gate movements. Heretofore, where the bowl and the various control cables have been so suspended, the lowering or raising of the bowl has caused an incidental change in position of parts that resulted in a tightening or loosening effect on the gate operating cables that was not only undesirable but was detrimental as well. Furthermore, such superstructures have added considerable weight to the vehicles and have interfered with the vision of the operators on the towing tractors, thus making it difficult to observe dirt conditions in the scraper bowls. Superstructures, particularly over the bowl, seriously interfere with power shovel loading should such loading of the scrapers be desired.

In view of the foregoing, and for other reasons, it has been an object of this invention to provide a cable operated scraper, incorporating improved features of construction therein, whereby

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the usual superstructure is eliminated and a substantial amount of weight is thereby avoided; whereby the raising or lowering of the bowl has no position changing effect on the gate relative to the bowl and causes no detrimental slackening or tightening effect on the cables; whereby obstructions in the line of vision between operator and the bowl are avoided to the maximum and a more satisfactory construction and better operating device is obtained.

Another object of the present invention is to provide a single operating cable for both gate and ejector actuation and to provide means in connection therewith whereby the gate will be moved to full open position before the ejector is actuated. Furthermore, to so arrange the cable connections that shortening or lengthening, due to change in position or relationship of frame parts in raising or lowering the bowl, will be automatically compensated for.

It is also an object of this invention to provide improvements in the ejector mechanism whereby the application of power for advancing the ejector for discharge of a load will have a lifting effect on the ejector plate, causing it to float or ride easily over the bottom plate with a minimum of friction. Also, to provide novel linkage in connection with the ejector whereby torque reaction is balanced and the ejector plate held in proper alinement in its operations.

Still further objects of the invention reside in details of construction of the various parts, in their combination and mode of operation as will hereinafter be fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a side view of a scraper embodied by the present invention, showing the gate in partly raised position, and the blade in scraping contact with the ground for loading the bowl.

Fig. 2 is a top view of the scraper.

Fig. 3 is a longitudinal, vertical section of the scraper, showing the gate fully opened and a position of the ejector plate during an ejection operation.

Figure 4 is a view diagrammatically illustrating the cable, and pulley block arrangement.

Fig. 5 is an enlarged sectional detail of the ejector mechanism showing the ejector fully retracted.

Referring more in detail to the drawings—

The scraper bowl is designated in its entirety by reference numeral 1, and it comprises oppo-

site side walls 2 and 2' and a bottom wall 3, which latter wall joins the lower edges of the side walls and extends from substantially even with their back edges to about half the distance to their forward edges and there is equipped, across the width of the scraper, with a downwardly and forwardly directed blade 4, and this, as noted in Fig. 1, extends slightly below the bottom edges of the side walls.

The side walls of the bowl comprise sheet metal plates that are rigidly fixed to a frame structure which includes, as parts thereof, the horizontally directed bars 5 that extend along the opposite side walls to the forward and rearward edges thereof. Also, the frame includes tubular cross beams 6 and 7 that rigidly join the side wall frames at the top edges across the forward and rearward ends of the bowl, as is clearly shown in Fig. 3. The bottom wall 3 and blade 4 are braced and supported by longitudinally directed beams 8 that underlie the wall and which have rear end portions 8' thereof extended upwardly and rearwardly from the bottom wall and joined, rearward of the bowl, with downwardly directed brace arms 9 fixed to the side wall frames and to the cross beam 7 for the mounting of four, transversely alined bearings 10 in which transversely alined axles 11 are fixed and on which axles dual sets of ground wheels 12 are mounted. These wheel sets are located symmetrically at opposite sides of the longitudinal center line of the bowl, as noted in Fig. 2. In that space between the wheel sets, the ejector actuating mechanism, presently to be described, is located.

The gate, whereby a scraped up load may be retained in the bowl, is designated by numeral 13, and it is operatively mounted on the bowl by means of arms 14—14 rigidly secured to its opposite ends. These arms have ends pivoted in the frame structure of the side walls of the bowl, as at 15, so that the gate may be swung upwardly and forwardly, from its closed position with its lower edge engaged against the blade, as shown in dotted lines in Fig. 3, to the fully raised position in which it is shown in full lines in that view.

The forward end of the vehicle is supported by a pair of ground wheels 18, mounted on the opposite ends of a cross axle 19 to which axle a tongue 20 is operatively attached for the operative connection of the scraper to a draft vehicle of suitable kind.

Supported upon and fixed pivotally to the cross axle 19, centrally between its ends, is the downwardly directed, forward end portion 21*a* of a boom beam 21 which extends from the axle in a rearwardly and upwardly directed position above the forward end portion of the bowl. Beneath this boom 21 is a rigid frame structure comprising a tubular, horizontally directed cross-beam 22 which extends equally to opposite sides and slightly beyond the line of the side walls of the bowl, as noted in Fig. 2. This cross beam is fixed rigidly to the beam 21 by means of forwardly directed brace members 24, and upwardly and rearwardly directed members 25. Fixed rigidly to the opposite ends of the cross beam 22, are paired, rearwardly and downwardly extended arms 26—26, which, at their rearward ends, have pivoted connections, as at 27, with opposite sides of the bowl; these points of pivotal connection being transversely alined and being located a distance back of the cutting edge an amount equal to the height above the cutting edge. The height above the cutting edge is equal to the rolling radii of the standard size tires for each different size scraper.

The rearward end portion of the boom beam 21 centrally overhangs the gate and the forward part of the bowl and it carries therein at its extreme end, a pair of sheaves 30 over which a cable G operates, as presently explained, for control of movements of the gate and ejector. Near its end, the boom carries another set of sheaves 31 over which a cable B for the raising and lowering of the bowl extends. This also will presently be explained.

The load ejector is shown best in Fig. 3, and it comprises an upright plate 32 extended between the side walls of the bowl and normally resting along its lower edge upon the bottom wall of the bowl. This plate extends substantially to the full width of the bowl and its location therein when the bowl is being loaded, is a retracted position adjacent the rear edge of the bottom plate.

Fixed rigidly to the ejector plate, centrally thereof and at its top edge, is a rearwardly extended horizontally directed arm 33 which arm, at its rear end, extends between and has a pivoted or hinged connection, as at 34, with the spaced upper end portions of an upright arm or link 35. The link 35 is hingedly mounted at its lower end in the bowl frame, as at 36, to swing forwardly and rearwardly with the forward or rearward movements of the ejector plate.

Mounted in the arm 33, at a short distance forwardly of its pivotal connection with link 34, are paired sheaves 37 carried on a cross shaft 38, and fixed to the cross beam 7 at a location midway of its ends, is a forwardly directed bracket arm 39 to which a sheave block containing a sheave wheel 40 is pivotally attached; this wheel being directly below the arm 33 as noted in Fig. 3. The cable G is extended about the sheave wheels 37 and the sheave 40, as presently explained, for the forward actuation of the ejector.

The retraction of the ejector, after being moved forwardly by its operating means, takes place when the operating tension on the cable is slackened off, and this retraction is effected by means shown in Fig. 5, wherein 45 designates a cylinder that is fixed rigidly and centrally in the rear end portion of the bowl supporting frame, and extended in the longitudinal direction of the bowl. In the cylinder is a coiled spring 46 under compression. At the rear end of the cylinder is a sheave wheel 47 and extended over this is a cable 48 which, at one end, is pivotally attached to the arm 35 as at 49. The other end portion of this cable is extended into the cylinder, axially of the spring and is attached to a plate 50 against which the inner end of the spring seats. The spring is thus held under tension and, through the cable 48, operates to pull the arm 35 from its forward position, as at the end of a load ejecting operation, to a rearwardly inclined position, as seen in Figs. 1 and 5, and by this movement, and through its connection with arm 33, pulls the ejector plate to its retracted position; the spring 46, however, yields under pull of the ejector operating cable G and allows the ejector to move forwardly.

By reference to Fig. 1, it will be understood that the forward pull of the ejector cable on arm 33 will have a lifting effect on the arm due to the tendency of the spring 46 to hold the link 35 against forward movement. This upward

pull takes the weight off the ejector plate so that its rounded lower edge will ride freely on the bottom wall 3 of the bowl on a self-lubricating film of dirt. In fact, the ejector plate has a semi-floating action.

It is essential, due to the weight of the dirt to be ejected, and length of the ejector plate across the width of the bowl, and possibility of uneven loading, that means be provided for retaining the ejector plate against angular misalinement. Therefore, I have provided the torque reaction and equalizing linkage shown best in Fig. 3, wherein a paired set of links 56, transversely spaced and located back of the ejector plate, have upper ends pivoted on the forward side of the cross beam 7, as at 57. These links are rigidly joined near their upper ends by a horizontal cross shaft 58. At their lower ends, the links 56 are pivotally connected as at 60, to the rearward ends of a set of links 59 which have forward ends pivotally affixed, as at 61, to ribs on the back side of the plate 32, near its lower edge. The links 59 are rigidly joined by a cross shaft 63. The hinge axes of the two sets of links with each other and with the frame and plate are all parallel, horizontal and transverse of the bowl. Therefore, the plate will be held against any angular misalinement in its forward or rearward movements, regardless of uneven distribution of the load.

The raising and lowering of the bowl between loading and raised positions in which it has been shown in Figs. 1 and 3, is effected by the following described means: Affixed centrally to the cross beam 6 which joints the forward ends of the side wall frames of the bowl, is a pulley block 65. This is in a cooperative location below the pulley sheaves 31 carried in the upper end portions of the boom beam 21. The bowl operating cable B previously mentioned, is extended from a winding drum on the draft vehicle, not shown, about a guide sheave 67, see Fig. 2, carried in a housing 68 that is pivoted on the forward side of the vertical leg 21a of the boom beam 21, then extends upwardly over a guide sheave 69 at the upper end of leg 21a, then is extended along the beam 21, threaded about the sheaves 31 and wheels of pulley block 65, and has a dead end connection on the beam 21 as effected by the clamp 70 seen in Fig. 3. Thus, by paying out or drawing in on this cable B to lengthen or to shorten the distance between the sheaves 31 and block 65, the forward end of the bowl will be raised or lowered accordingly.

The raising and lowering of the gate, likewise, is effected by the winding in and paying out of the previously mentioned cable G, which extends from a winding drum on the draft vehicle; these parts not being shown, passing rearwardly therefrom about a guide sheave 73 that is paired with sheave 67, then over a guide sheave 74, paired with sheave 69, then to the upper end of beam 21 and is there extended over a pulley sheave 30, then downwardly about a pulley wheel in a pulley block 75 fixed centrally to the gate, then extended upwardly and over another sheave 30, thence rearwardly about one of the sheave wheels 37 at the rear end of the ejector arm 33, then forwardly about sheave 40, then rearwardly and about the other sheave wheel 37 on shaft 38, then forwardly over a guide 77 and is dead ended on the beam 21 as seen at 78. Thus, when the cable G is wound in, it first raises the gate to its limit of upward travel, then with farther winding in of the cable, the ejector plate is moved forwardly

accordingly. When the cable G is paid out, the ejector is first retracted by the expanding action of spring 46, and then, after it has reached its fully retracted position, the gate will lower as the cable is paid out.

The upward travel of the gate is limited by the engagement of stops 80 fixed thereto at its opposite ends, with hook brackets 81 that are fixed to the cross beam 6 as observed in Fig. 3.

An advantageous feature of the present ejector mechanism resides in the fact that when the ejector plate has been fully advanced by the forward swinging action of arm 35, at which its lower edge then is substantially even with the top edge of the blade 4, an additional slight pull on the cable G will cause the plate to kick upwardly and forwardly, thereby to clear the blade of any dirt that might otherwise pile up thereon against the plate. Also, this will give the operator a line of vision to the back of the bowl which will indicate to him that the bowl has been emptied.

Another advantage in the use of the floating type ejector plate is that a false bottom plate may be easily and quickly placed over bottom 3 for its protection when gravel loading of the bowl is to be by shovel instead of by scraper action.

With the forward frame structure of the vehicle, including the boom 21, cross beam 22 and the arms 26—26, pivotally connected to the bowl at the transversely alined pivot points 27, it will be apparent that with the raising and lowering of the bowl by the paying out or winding in of cable B, there will be a relative change in distance between the axes of sheave wheels 30 and sheaves 37, and also change in distance between sheaves 30 and the gate, assuming it remains closed. Such change in spacing, in cable operated vehicles as heretofore designed, would cause tightening up or extending of certain cables with undesirable or detrimental results; for example, causing the gate to open. However, in the present instance, the relationship of parts and their action is such that such lengthening or shortening due to change in spacing, is compensated for. For example, with the present bowl in a raised position and the gate closed, should the bowl be lowered, the distance between sheaves 30 and block 75 is somewhat increased, but not to the same extent as the bowl movement since, with the lowering of the bowl, the pivot points 27 also move downward and this causes a rearward and downward movement of the upper end of boom 21 and a shortening of the distance between sheaves 30 and 37, thereby permitting the paying back of the two runs of cable between sheaves 30 and 37 to the block 75 that will compensate for the increase in distance between sheaves 30 and the block and thus not cause lifting of the gate from its closed position.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent is:

1. In a scraper, a bowl open at its forward end and having opposite side walls and a bottom wall, a load ejector mechanism comprising an upright ejector plate disposed across the bowl and movable therein toward and from its open end, an arm fixed rigidly to the plate and extended rearwardly therefrom, a link hinged at its lower end to the bowl and hinged at its upper end to the said arm at its rearward end, spring means connected under tension with said link to effect the retractive movement of the ejector and resist ejecting movement thereof, and a powered cable means having forward and upward pulling con-

nection with the said plate arm forwardly of its point of connection with the hinged link to counteract downward pressure of the plate on the bottom wall of the bowl.

2. In a scraper, a bowl open at its forward end and having opposite side walls and a bottom wall, a load ejector mechanism comprising a substantially upright ejector plate disposed across the bowl for travel toward and from its open end, a pusher arm fixed rigidly to the plate at its upper edge and extended rearwardly therefrom, an upright link, hinged at its lower end to the bowl and hinged at its upper end to the said pusher arm, spring means mounted in the bowl and having a connection under tension with the said link to retract the ejector and to resist its forward travel, linkage connection with the plate and bowl to retain its transverse alinement during travel and a powered cable having a forward and up pulling connection with said pusher arm for actuation of the ejector.

3. A scraper comprising a forwardly opening bowl, trucks supporting the bowl at its rear end, supporting trucks forwardly of the bowl, a boom mounted on the latter trucks and extended rearwardly therefrom to a position above the forward end portion of the bowl, a draft frame fixed rigidly to the boom and comprising lever arms extended along opposite sides of the bowl and having pivotal connection therewith at a medial location, means supporting the forward end of the bowl from the boom and adjustable to raise or lower the bowl, an upwardly opening gate mounted in the forward end of the bowl, an upright ejector

plate disposed across the bowl and movable toward and from its open end, an ejector arm fixed rigidly to the plate at its top edge and extended rearwardly therefrom, spring means for effecting automatic retraction of the ejector plate, cable guide sheaves on the boom, cable guide sheaves on the bowl, cable guide sheaves on the gate and cable guide sheaves on the ejector plate arm rearwardly of and above that on the bowl and a continuous cable forming a bight suspended from the boom, and passing about the guide sheaves on the gate, thence about the guide means on the arm and bowl, and whereby, upon winding in of the cable, the gate will be lifted to open position, then the ejector actuated forwardly with a forward and upward pulling force on the arm and whereby on paying out the cable, the ejector plate will first be retracted and then the gate lowered.

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