

Dec. 24, 1963

G. H. WAGNER
MATERIAL HANDLING VEHICLE

3,115,259

Filed May 12, 1961

3 Sheets-Sheet 1

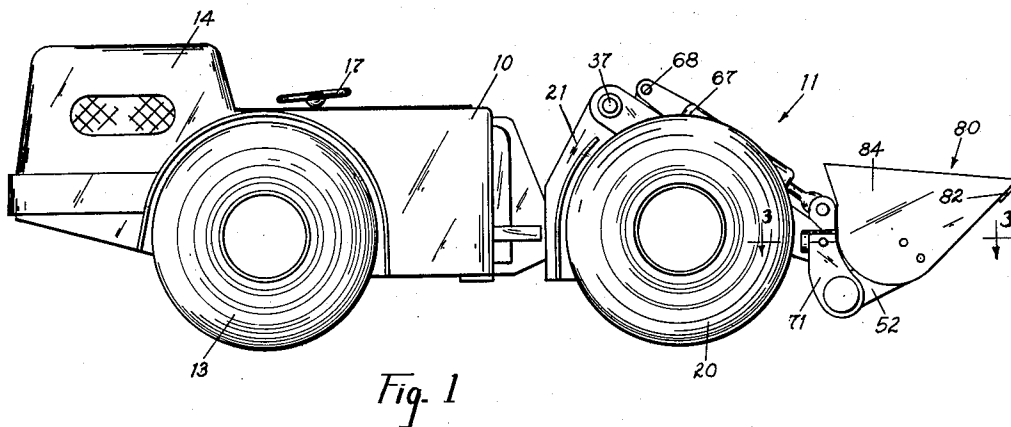


Fig. 1

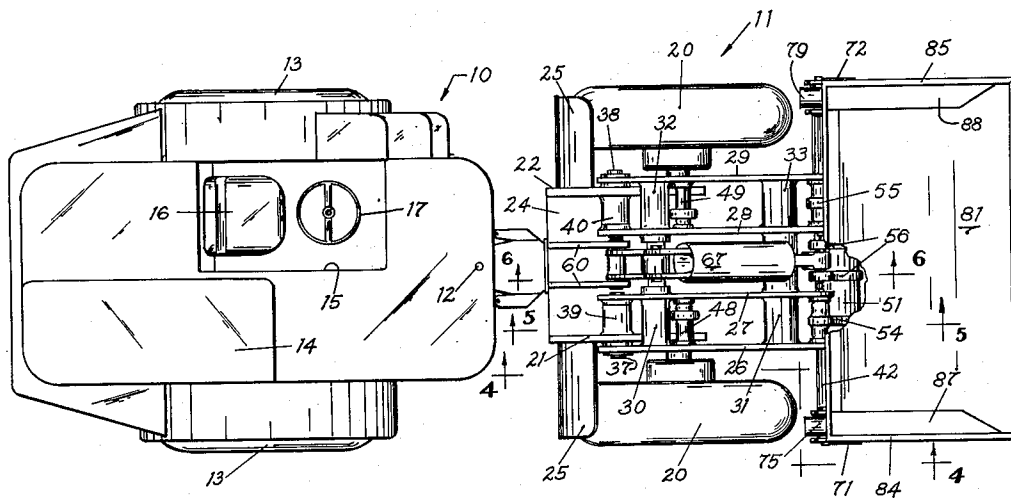


Fig. 2

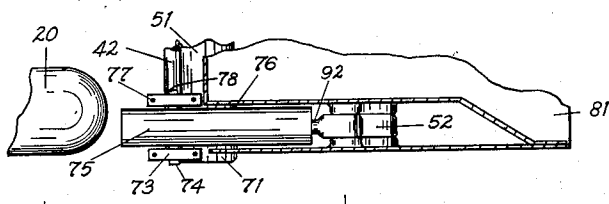


Fig. 3

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3 Sheets-Sheet 2

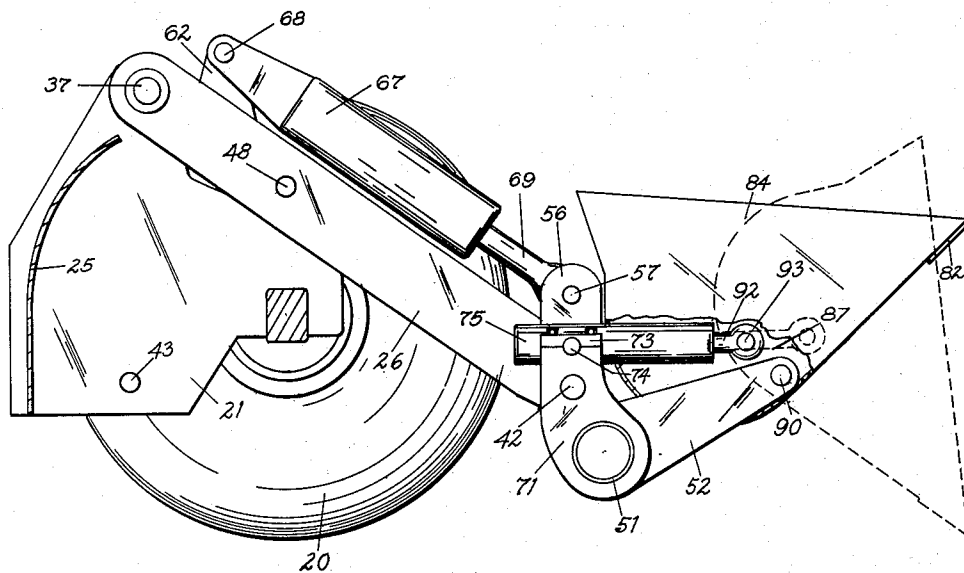


Fig. 4

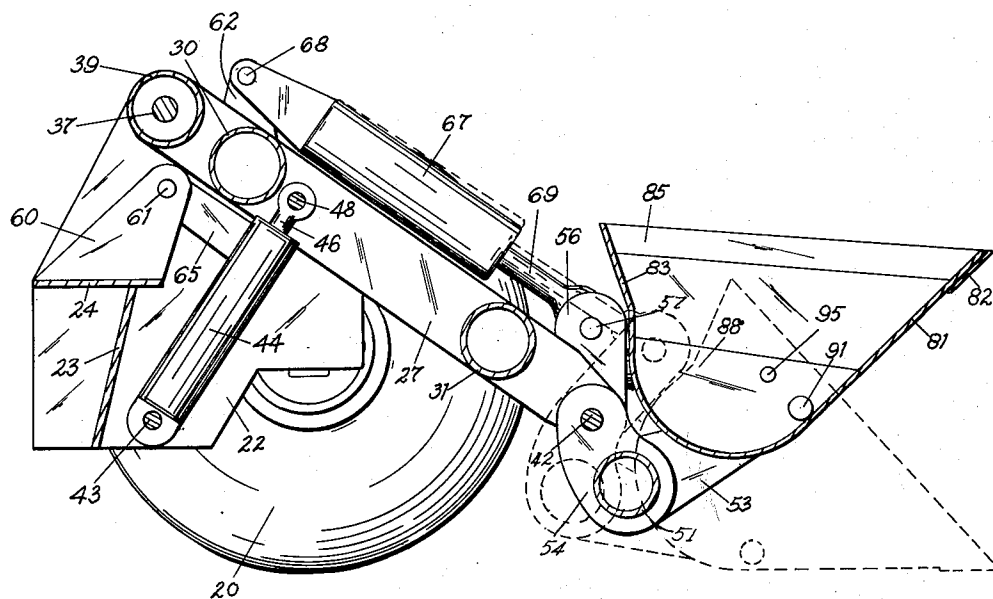


Fig. 5

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3 Sheets-Sheet 3

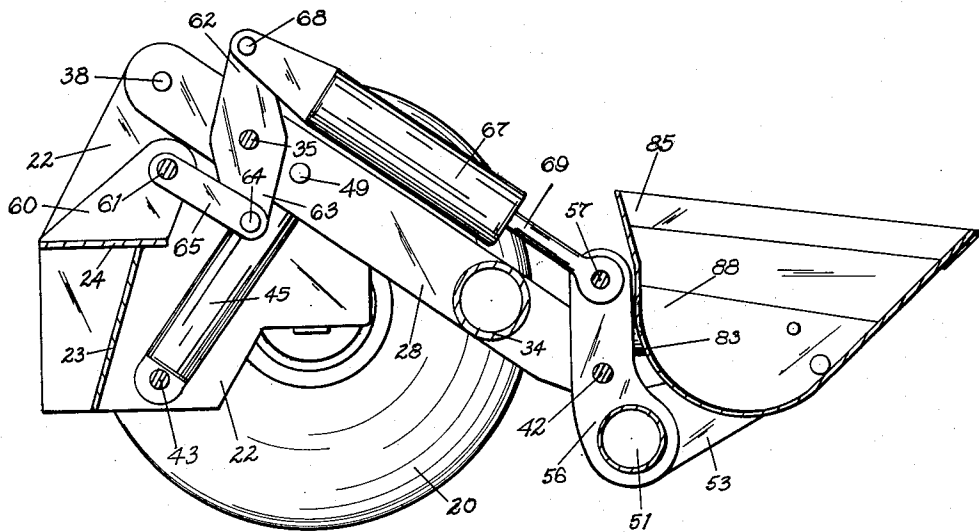


Fig. 6

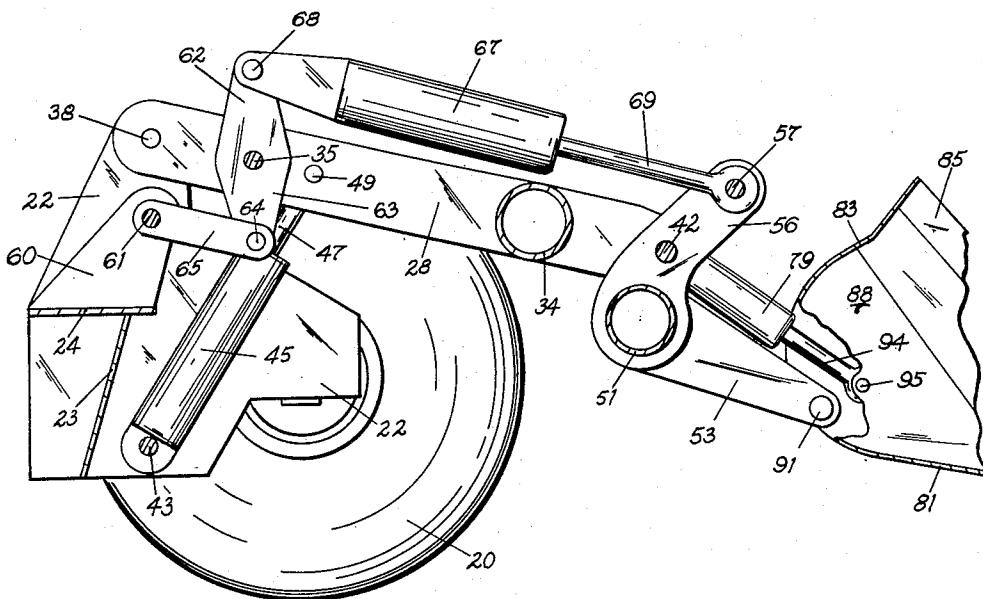


Fig. 7

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MATERIAL HANDLING VEHICLE

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4 Claims. (Cl. 214-140)

My present invention comprises an improvement in material handling vehicles, particularly scoop vehicles adapted for operations in mine tunnels and in other confined spaces having limited vertical clearance.

Principal objects of the present invention are to provide means whereby a scoop supported on the end of a swinging boom may be maintained in definite angular relationship to the horizontal during swinging movements of the boom, in which the boom and scoop may occupy a space of minimum vertical clearance, and in which full swinging movement of the scoop from an upright, material carrying position to a tipped, scooping or dumping position may be accomplished.

A further object of the present invention is to provide a device of the foregoing character in which the scoop may be moved from an upright, material carrying position to a dumping position without elevating the boom.

A further object of the present invention is to provide a device of the foregoing character in which the scoop may be moved to a scooping position and back to an upright carrying position without elevating the boom.

A further object of the present invention is to provide a device of the foregoing character in which a plurality of extensible actuating devices are provided for raising and lowering the boom and for controlling the position of the scoop, only one of which need be operated at any time for accomplishing a given operation, such as scooping material, moving the material about, dumping the material, or raising or lowering the scoop as required.

A further object of the present invention is to provide a device of the foregoing character in which the bucket may be swung from a scooping position to a material carrying position, and from a material carrying position to a dumping position, in a minimum amount of space.

The foregoing and other objects and advantages of the present invention will be more readily apparent from inspection of the following specification taken in connection with the accompanying drawings and in which like numerals refer to like parts throughout.

In the drawings,

FIG. 1 is a view in side elevation of a vehicle embodying the present invention;

FIG. 2 is a plan view of FIG. 1;

FIG. 3 is a partial horizontal section taken substantially along line 3-3 of FIG. 1;

FIG. 4 is a partial vertical section taken substantially along line 4-4 of FIG. 2, with parts broken away, the scoop being shown in full lines at a material carrying position and in dash lines at a dumping position;

FIG. 5 is a partial vertical section taken substantially along line 5-5 of FIG. 2, with parts broken away, the scoop being shown in full lines at a material carrying position and in dash lines at a scooping position;

FIG. 6 is a partial vertical section taken substantially along line 6-6 of FIG. 2; and

FIG. 7 is a view similar to FIG. 6, showing parts in other positions.

The present invention is illustrated in association with a mining scoop vehicle, but it is to be appreciated that the invention may be incorporated in other types of vehicles. The vehicle illustrated comprises a chassis including a rear part 10 and a forward part 11, the two parts being pivotally connected together by means including a

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vertical pivot 12 and steering cylinders (not shown) whereby the vehicle may be directed. The rear part 10 includes a pair of wheels 13 which are driven by suitable power means (not shown) in an engine compartment 14. The rear part is provided with a driver's seat 15 in which there is positioned a driver's seat 16, steering wheel 17 and suitable control means (not shown). The forward chassis part 11 includes a boom support rising slightly above the upper surfaces of forward wheels 20. The boom support comprises a pair of vertical plates 21 and 22 connected by cross-brace plates 23 and 24, the plates 21 and 22 respectively mounting the forward wheels 20 and fenders 25.

A boom is transversely pivoted on the upper portion of the boom support. The boom comprises four parallel bars 26, 27, 28 and 29. The bars 26 and 27 are held together in spaced-apart, parallel relation by a pair of short pipe sections 30 and 31 welded thereto, and the bars 28 and 29 are held together in parallel spaced relation by similar pipe sections 32 and 33 welded thereto. The bars 27 and 28 are held together in parallel spaced relation by a short pipe section 34 adjacent the outer end of the boom and a pivot 35 adjacent the inner end of the boom. The boom is transversely pivoted to the boom support by an aligned pair of short pivots 37 and 38 respectively journaled on the plates 21 and 22 and surrounded by spacers 39 and 40. A transverse pivot bar 42 is mounted in the forward outer ends of all four bars 26, 27, 28 and 29, the bar 42 being as long as the vehicle is wide.

A bar 43 extends transversely between lower portions of the support plates 21 and 22 and pivotally supports the lower ends of a pair of upwardly extending cylinders 44 and 45. Pistons 46 and 47 extend upwardly from the cylinders 44 and 45 respectively, and are respectively connected to the boom by means of pivots 48 and 49. The pair of cylinder and piston means 44 and 46, 45 and 47 constitute extensible means connecting the boom and the chassis whereby the boom may be swung vertically about the transverse pivotal mounting thereof.

A tiltable scoop support is transversely pivoted to the outer end of the boom by the pivot bar 42, the scoop support comprising a transverse pipe 51 to which are welded a pair of scoop support arms 52 and 53 at the outer ends of the pipe. Also welded to the pipe are a pair of cranks 54 and 55, the upper ends of which are fixed to the pivot bar 42, the crank 54 being centrally located between bars 26 and 27 and the crank 55 being centrally located between bars 28 and 29, of the boom. Also welded to the pipe 51 are a pair of double-armed cranks 56 which are fixed to the pivot bar 42 centrally thereof and the upper arms of which support a pivot 57.

The boom support comprises a pair of centrally located plates 60 which are welded to and rise vertically from the cross-plate 24. The plates 60 support a transverse pivot 61, the axis of which lies in a vertical plane extending through the axes of the pivots 37 and 38. A double arm lever having an upper arm 62 and a lower arm 63 is pivotally mounted on the transverse pivot 35 extending between the boom bars 27 and 28, the lever extending vertically, and the upper arm terminates above the boom and the lower arm terminates below the boom. The lower arm 63 supports a transverse pivot 64 to which is pivotally connected linkage means comprising a pair of longitudinally extending link bars 65. The arrangement is such that a first parallelogram linkage lying below the boom is created, the linkage comprising an inner portion of the boom and a portion of the boom support.

A second parallelogram linkage including an outer portion of the boom is provided by extensible piston and cylinder means including cylinder 67 pivotally mounted

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on a transverse pivot 68 at the end of the upper arm 62 and piston 69 extended forwardly to the pivot 57 mounted between the upper ends of the arms 56. By reason of the reversing parallelogram linkages thus provided the scoop support may be maintained in its upright position as illustrated in FIGS. 4, 5 and 6, no matter what angularity the boom may have with respect to the horizontal. However, at any time the piston 69 may be extended to rock the scoop support about the pivot bar 42 so as to effect tipping of the scoop support.

Fixed to the extreme end of the pipe 51 outside of arm 52 is a vertically rising support member 71 and a similar member 72 is fixed to the opposite extreme end. A cap block 73 is removably fastened to the upper end of the arm 71 (FIGS. 3 and 4), the arm 71 and the cap block 73 being formed to provide a journal for a trunnion 74 extending laterally from the side of a cylinder 75. Inside of the arm 52 there is a short lever arm 76 which removably supports a cap block 77 for an oppositely extending trunnion 78 fixed to the opposite side of the cylinder 75. A cylinder 79 is similarly pivotally supported at the opposite side of the machine. The cylinders 75 and 79 pivotally extend forward for arcuate swinging movement in directions parallel to the direction of movement of the boom.

Mounted on the scoop support is a scoop 80 having a forward wall 81 along the upper edge of which there is a blade 82. The forward wall 81 merges into an upwardly curved rear wall 83 which lies closely in front of the cranks 56 when the scoop is upright. The scoop is provided with side walls 84 and 85 within which are inner walls 87 and 88 respectively. The spaces between the walls 84 and 87, and between the walls 85 and 88, are open downwardly and rearwardly and the arms 52 and 53, and the cylinders 75 and 79 respectively project into the open spaces. The arm 52 is pivoted to the scoop by pivot 90 and the arm 53 by pivot 91, the pivots being transversely aligned. A piston 92 extends from cylinder 75 and is pivotally connected to the scoop at pivot 93. Likewise a piston 94 extends forwardly from cylinder 79 and is pivoted to the scoop at pivot 95. The pivots 93 and 95 are transversely aligned and are above the pivots 90 and 91 respectively.

The piston and cylinder means 75—92 and 79—94 constitute extensible piston and cylinder means for tipping the scoop from upright position toward dumping position and return.

It is to be appreciated that the cylinders 44 and 45 are double acting cylinders which are connected so as to operate in unison under control of valve means (not shown) accessible to the operator. Likewise the cylinders 75 and 79 are double action cylinders connected to act in unison under control of valve means (not shown) accessible to the operator. The construction is such that the scoop may be run in under low overhanging surfaces in a mine or the like, and the scoop operated so as to scoop material from the ground, and then drawn upright so as to hold the material. The parallelogram linkages associated with the boom increase the maneuverability of the vehicle in that the pivot 68 for the upper end of cylinder 67 is much lower than would be the case were a single parallelogram linkage placed above the boom. Also, the scoop may be completely dumped into a low mine car or the like without requiring the scoop to be elevated much more than the height of the vehicle operator's head.

Having illustrated and described a preferred embodiment of the invention, it should be apparent to those skilled in the art that the invention permits of modification in arrangement and detail. I claim as my invention all such modifications as come within the true spirit and scope of the following claims.

I claim:

1. In a material handling vehicle,

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a scoop of a predetermined width and having side walls and front and back walls, the scoop also having a bottom, a scoop support having a rigid transverse member and a pair of parallel arms spaced laterally apart a distance greater than said width of the scoop and secured rigidly to the transverse member, means securing the arms pivotally to the side walls at points spaced above the bottom of the scoop, the scoop support also including backing means rigid with the transverse member for engaging at least the portions of the back wall adjacent the side walls, a boom mounting the scoop support pivotally thereon at a point above the rigid transverse member, a chassis mounting the boom pivotally, linkage means including first extensible hydraulic means for forming a parallelogram linkage with the boom and the scoop support, the first hydraulic means serving to pivot the scoop support relative to the boom, second hydraulic means for pivoting the boom relative to the chassis, and a pair of hydraulic means for pivoting the scoop relative to the scoop support.

2. In a material handling vehicle, a scoop of a predetermined width and having side walls and front and back walls, the scoop also having a bottom and recesses at the exterior sides of the side walls, a scoop support having a rigid transverse member and a pair of parallel arms spaced laterally apart a distance greater than said width of the scoop and secured rigidly to the transverse member, means securing the arms pivotally to the side walls at points spaced above the bottom of the scoop and in positions in which the arms extend into the recesses, the scoop support also including backing means rigid with the transverse member for engaging at least the portions of the back wall adjacent the side walls, a boom mounting the scoop support pivotally thereon, a chassis mounting the boom pivotally, linkage means including first extensible hydraulic means for forming a parallelogram linkage with the boom and the scoop support, the first hydraulic means serving to pivot the scoop support on the boom, second hydraulic means for pivoting the boom relative to the chassis, and a pair of hydraulic means for pivoting the scoop relative to the scoop support and extending into the recesses in the scoop and attached pivotally to the side walls of the scoop.

3. In a material handling vehicle, a chassis, a boom pivoted at one end to the chassis, hydraulic means for moving the boom relative to the chassis, a scoop support including a rigid transverse member extending beyond each side of the boom and also including a pair of supporting arms rigidly attached at the lower ends thereof to the transverse member at spaced points intermediate the ends of the transverse member and depending from and pivotally attached to the sides of the boom, the scoop support also including a pair of forwardly projecting arms secured rigidly at one end of each arm to the opposite ends of the transverse member of the scoop support, an elongated scoop having front and back walls and side walls and bracketed between the forwardly projecting arms and pivotally connected at the side walls thereof to the forward ends of the forwardly projecting arms at laterally aligned points located intermediate the top and bottom of the scoop, the scoop support also including a pair of backing

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means secured to the transverse member near the ends thereof for engaging the back wall of the scoop near the ends thereof,

extensible hydraulic means connected to the scoop and the scoop support to move the scoop toward and away from the backing means,

the scoop support also including rigid link means secured rigidly at its lower end to the transverse member of the scoop support and extending substantially above the upper ends of the supporting arms,

and means including hydraulic means for forming a parallelogram linkage with the boom and the link means and for pivoting the scoop support on the boom between a loading position and a carrying position.

4. In a material handling vehicle,

a chassis including a pair of boom supporting brackets spaced laterally apart a predetermined distance,

a boom including a pair of longitudinal members pivotally mounted on the brackets and also having a plurality of transverse pieces connecting the longitudinal members rigidly in each other.

a scoop support including a rigid transverse member extending beyond each side of the boom and also including a pair of supporting arms rigidly attached at the lower ends thereof to the transverse member at spaced points intermediate the ends of the transverse member and depending from and pivotally attached to the longitudinal members,

the scoop support also including a pair of forwardly projecting arms secured rigidly at one end of each arm to the opposite ends of the transverse member of the scoop support,

an elongated scoop having front and back walls and side walls and bracketed between the forwardly projecting arms and pivotally connected at the side walls thereof to the forward ends of the forwardly pro-

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jecting arms at laterally aligned points located near the forward wall of the scoop and intermediate the top and bottom of the scoop,

the scoop support also including backing means secured to the transverse member near the ends thereof and positioned above the transverse member for engaging the back wall of the scoop near the ends thereof,

a pair of extensible hydraulic means connected to the side walls of the scoop and the support to move the scoop toward and away from the backing means,

the scoop support also including a link secured rigidly at its lower end to the transverse member of the scoop support and extending substantially above the upper ends of the supporting arms,

a lever pivotally connected intermediate the ends thereof to the longitudinal members and extending generally vertically between the longitudinal members,

a second support on the chassis positioned below the brackets,

first link means connecting the lower end of the lever to the second support,

and second link means connecting the upper end of the lever to the upper end of the link of the scoop support,

one of the first and second link means including adjustable extensible hydraulic means for pivoting the scoop support on the boom and adapted when in one position of adjustment of the hydraulic means to form two parallelogram linkages with the boom, lever, link and chassis.

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