

June 25, 1963

J. H. WAGNER

3,095,080

HOE TYPE LOADING MACHINE

Filed Dec. 18, 1958

3 Sheets-Sheet 1

FIG. 1.

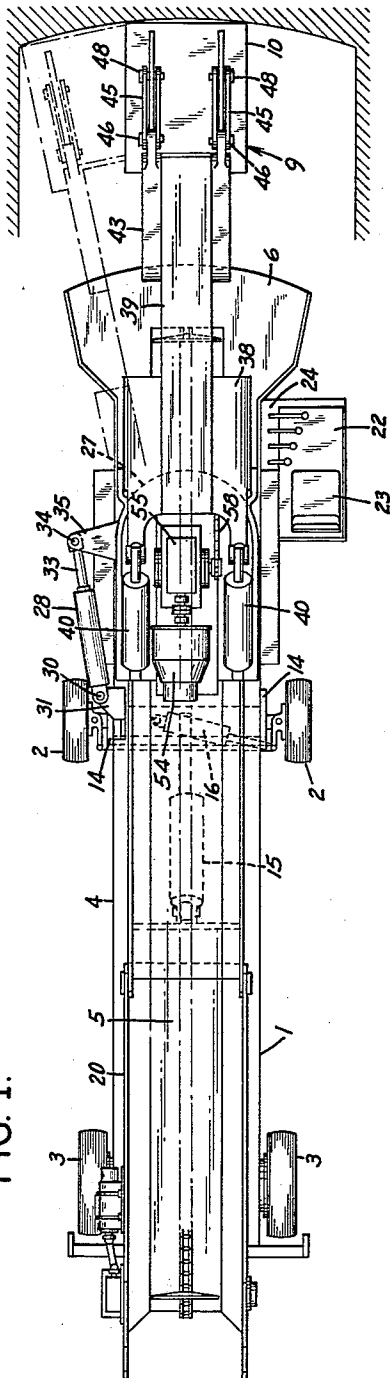
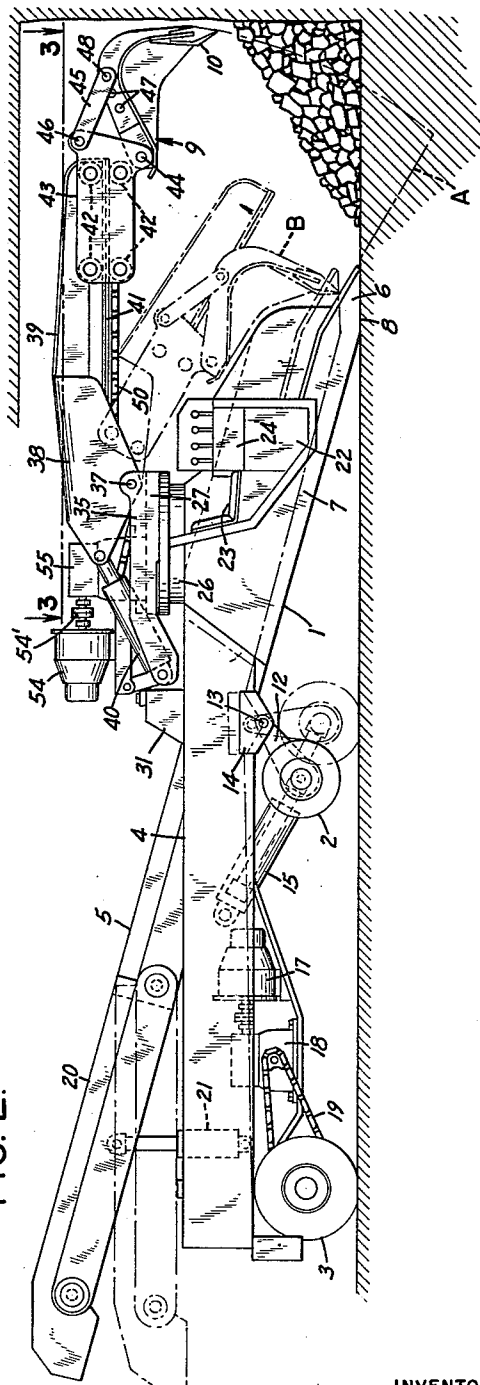


FIG. 2.



INVENTOR:
JOHN H. WAGNER
BY
Charles F. G. G. G.
ATTORNEY

June 25, 1963

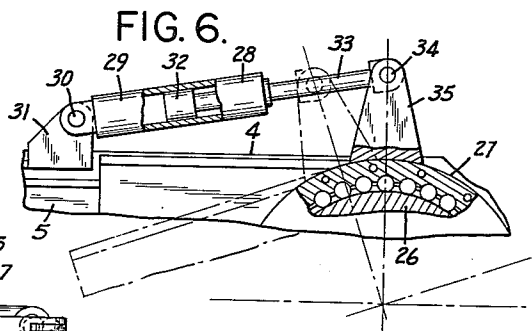
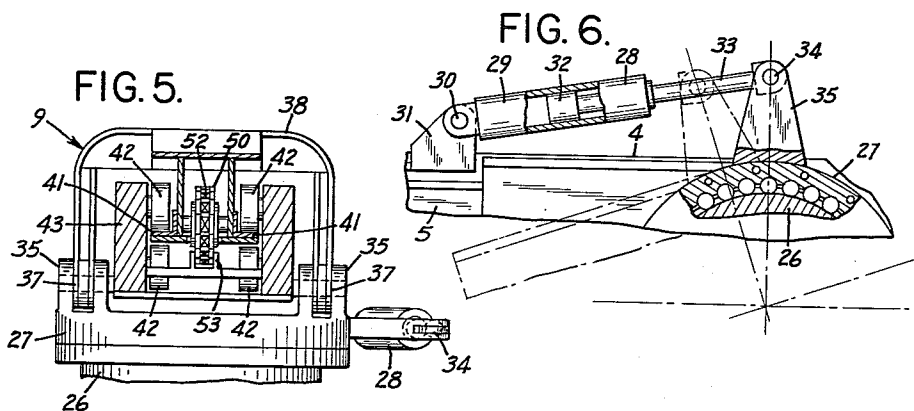
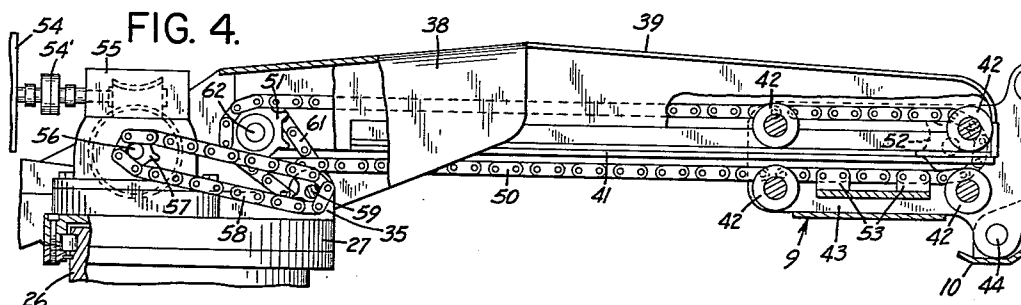
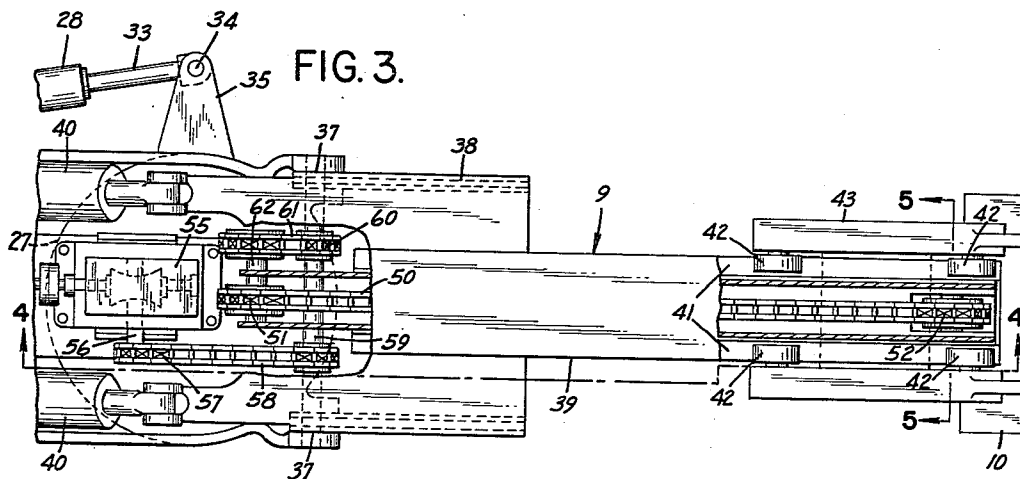
J. H. WAGNER

3,095,080

HOE TYPE LOADING MACHINE

Filed Dec. 18, 1958

3 Sheets-Sheet 2



INVENTOR:
JOHN H. WAGNER
BY *Charles F. Osgood*
ATTORNEY

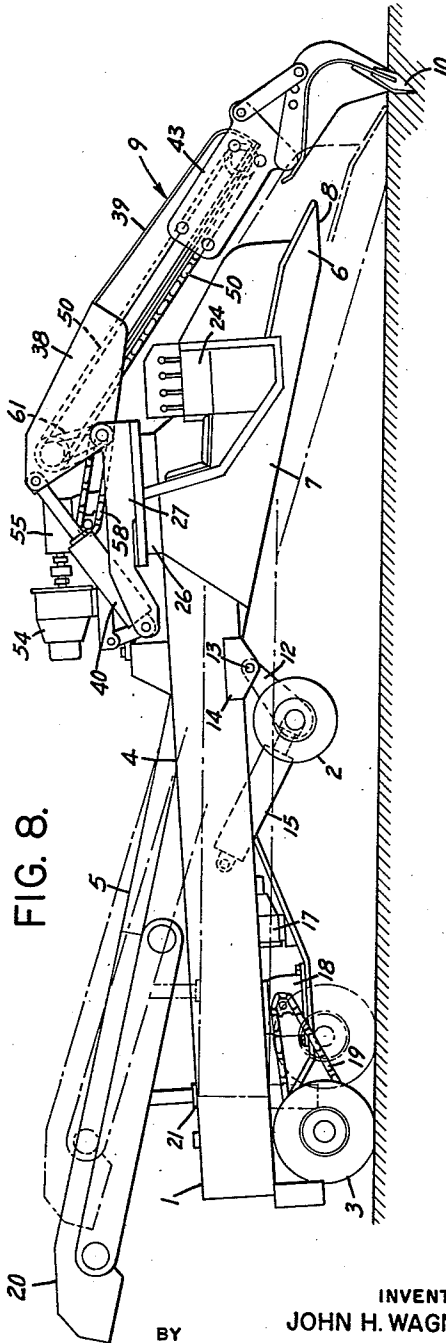
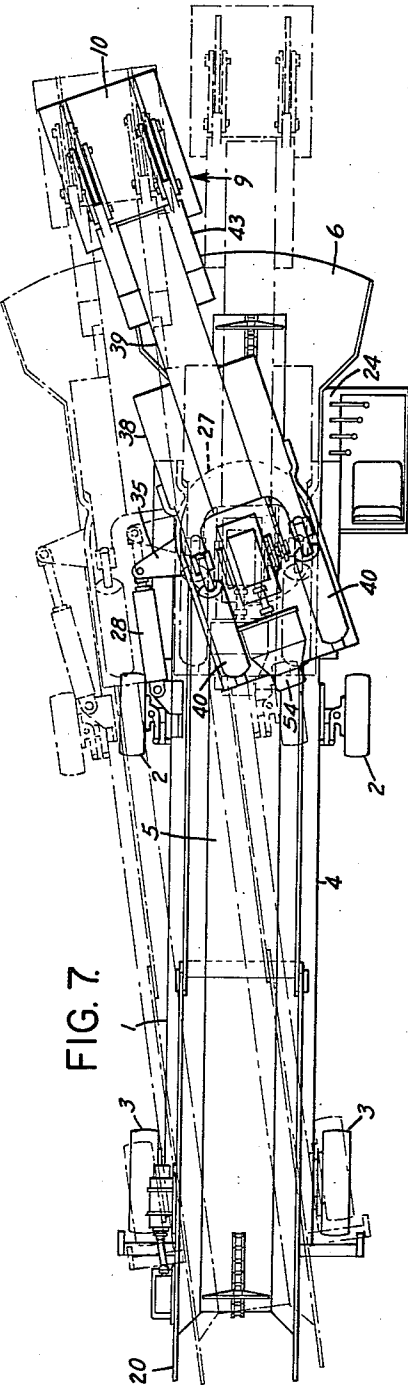
June 25, 1963

J. H. WAGNER
HOE TYPE LOADING MACHINE

3,095,080

Filed Dec. 18, 1958

3 Sheets-Sheet 3



INVENTOR:
JOHN H. WAGNER
BY
Charles F. Good
ATTORNEY

1

3,095,080

HOE TYPE LOADING MACHINE

John H. Wagner, Franklin, Pa., assignor to Joy Manufacturing Company, Pittsburgh, Pa., a corporation of Pennsylvania

Filed Dec. 18, 1958, Ser. No. 781,297

11 Claims. (Cl. 198—10)

This invention relates to loading machines and more particularly to loading machines having a hoe type gathering mechanism for moving loose material to be loaded onto the conveying means of the machine.

An object of the present invention is to provide an improved machine for loading loose material in mines or tunnels. Another object is to provide an improved mobile loading machine having improved material gathering mechanism. A further object is to provide an improved material gathering mechanism of the reciprocating hoe type and having improved mounting and moving means whereby the gathering hoe may be reciprocated to effect the loading operation. Still another object is to provide an improved mobile loading mechanism having improved means for propelling and maneuvering the same and including an improved adjusting means for the gathering mechanism whereby the machine may be moved toward and from and sidewise relative to the work.

These and other objects and advantages of the invention will, however, hereinafter more fully appear in the course of the ensuing description.

In the accompanying drawings there is shown for purposes of illustration one form which the invention may assume in practice.

In these drawings:

FIG. 1 is a plan view of a loading machine constructed in accordance with a preferred illustrative embodiment of the invention.

FIG. 2 is a side elevational view of the loading machine shown in FIG. 1.

FIG. 3 is an enlarged horizontal section, with parts shown in plan, taken on line 3—3 of FIG. 2, illustrating details of the improved gathering hoe mechanism.

FIG. 4 is a longitudinal vertical section taken on line 4—4 of FIG. 3, showing the hoe supporting and reciprocating means.

FIG. 5 is a cross section taken on line 5—5 of FIG. 3.

FIG. 6 is a detail view, partially in horizontal section, showing a portion of the hoe swinging means.

FIGS. 7 and 8 are views quite like those of FIGS. 1 and 2 respectively, showing different operating positions of the machine.

The improved loading machine is of the mobile frontal attack type and, as shown in the drawings, generally comprises a mobile base 1 having adjustable front supporting and steering wheels 2 and rear traction wheels 3, and these wheels are desirably provided with pneumatic rubber tires. The base has a frame 4 carrying conveying means 5 provided with a front loading nose 6 carried by a forward frame portion 7 having a floor or ground engaging surface 8. Pivotaly mounted on the forward upper portion of the base frame is a material gathering mechanism, generally designated 9, for gathering loose material and for moving the same rearwardly toward and onto the loading nose of the conveying means 5. The gathering mechanism includes a gathering and loading member in the form of a hoe 10 having a lower penetrating edge and mounted to swing both in horizontal and vertical planes relative to the base, as will hereinafter be described.

The adjustable front wheels 2 are swivelled to effect steering and are journaled on the lower ends of swinging arms 12 pivoted at 13 on brackets 14 secured to the sides of the base frame, and a conventional power jack 15,

2

desirably a hydraulic jack of the cylinder and piston type, serves to swing the wheel carrying arms in vertical planes and to hold the same in raised or lowered positions as desired. A conventional power steering jack 16 may serve to turn the gear to effect steering. The rear traction wheels 3 are driven by a motor 17 through a conventional gear reduction device 18 connected by drive chains 19 to the wheels, and a suitable selective transmission may be provided. The conveying means 5 is desirably of the endless chain cross flight type and has a tiltable rear portion 20 which may be tilted by a power jack 21 likewise desirably a conventional hydraulic cylinder and piston type jack, in a well known manner. The machine frame has a forwardly located operator's station 22 including a seat 23 and conveniently located control means 24 for controlling the various power devices of the machine. If desired dual controls may be provided whereby the machine may be controlled from either side thereof.

Now referring to the detail structure of the hoe type gathering mechanism 9, it will be noted that mounted on an upstanding forward circular portion 26 of the base frame is a turntable 27 and a power jack 28, likewise desirably a hydraulic jack, serves to turn the turntable and to hold the same in adjusted positions. This jack includes a jack cylinder 29 pivoted at 30 on a bracket 31 secured to the base frame and reciprocable within the cylinder is a piston 32 having its piston rod 33 pivotally connected at 34 to a bracket arm 35 secured to the turntable frame.

In this improved construction, pivoted at 37 on an upstanding frame 38 carried by the turntable is an elongated boom 39, and power jacks 40, desirably hydraulic cylinder and piston type jacks, may effect tilting of the boom in a vertical plane about its pivot and for holding the same in different tilted positions. The boom has an elongated guideway or trackway 41 engaged by the wheels 42 of a trolley or trolleylike support 43 on the lower forward portion of which the gathering hoe 10 is pivoted at 44. The trolley constitutes the extendible outer part of the boom. The elongated boom guide and trolley cooperate in effect to provide a hoe supporting boom which is variable in effective length. Side links 45 pivoted at 46 on the forward upper portion of the trolley frame are adjustably pivotally connected, as by adjusting holes 47 and pins or bolts 48, to the hoe frame whereby the hoe may be adjusted into different fixed angularly related positions with respect to the trolley frame.

Means is provided for moving the hoe supporting boom part or trolley back and forth along the boom trackway thereby to vary the effective length of the boom, comprising a flexible element desirably in the form of a roller chain 50 passing around suitable guide sprockets 51 and 52 and attached at 53 to the trolley frame. A reversible motor 54 mounted on the rearward portion of the turntable frame drives through a conventional slip clutch 54' and a worm gear reduction unit 55, a transverse shaft 56 suitably journaled within the gear reduction unit housing. A sprocket 57 secured to the shaft 56 is connected by a drive chain 58 to a cross shaft 59, herein desirably axially aligned with the boom pivot 37. A sprocket 60 secured to the shaft 59 is connected by a drive chain 61 to a cross shaft 62 suitably journaled within the rearward portion of the boom frame and to which chain sprocket 51 is secured. Thus when the motor 54 is operated the chain 50 may be circulated relative to the boom thereby to move the hoe carrying trolley back and forth along the boom trackway lengthwise of the boom frame in any angular position of the boom on its pivotal mounting. Evidently, various other known forms of mechanism may be employed in moving the hoe back and forth along the boom guideway

3

and for tilting and swinging the boom on its pivotal mounting.

The control device 24 desirably consists of a conventional valve mechanism for controlling the supply of liquid under pressure to the various hydraulically operated devices of the mechanism and a conventional motor driven pump may be provided as the liquid pressure source.

The machine may be propelled about the mine or tunnel by the rear traction wheels 3 and the front steering wheels may effect steering of the machine, with the front steering wheels at that time dropped down to the position indicated in dotted lines in FIG. 2, to raise the loaded nose slightly above the floor level. When the working place is reached the front wheels may be swung upwardly into the full line retracted position shown in FIG. 2, with the loading nose at that time resting on the floor, as shown in full lines in FIG. 2, in a position close to the material to be loaded. The boom 39 may then be swung in a vertical plane and positioned laterally about the turntable axis, to locate the hoe 10 in positions to effect digging of the material with the hoe moving rearwardly along the boom trackway to effect movement of the material rearwardly toward the loading nose where it is received by the conveying means 5. The hoe 10 may be swung downwardly to dig into and gather material below the floor or ground level, as shown in dotted lines at A in FIG. 2. The retracted position of the hoe on the loading boom is indicated in dotted lines at B in FIG. 2.

When the front wheels 2 are retracted the front end of the machine may be supported by the hoe supporting boom 39 with the hoe 10 engaging the floor or ground, as shown in FIG. 8, and the loading nose 6 of the conveying means is at that time elevated above the floor or ground level, and with the parts so positioned the hoe carrying trolley may be retracted or advanced along the boom trackway to effect movement of the base forwardly or rearwardly over the floor or ground surface. Also, as shown in FIG. 7, the boom 39 may be swung horizontally about the turntable axis while the machine remains supported by the hoe carrying boom to effect swinging of the machine laterally into different operating positions, as indicated in full and dotted lines in FIG. 7.

As a result of this invention an improved hoe type loading machine is provided wherein the material gathering and loading hoe may be effectively positioned and reciprocated to effect hoeing of loose material rearwardly toward the loading nose of the conveying means. By the provision of the boom which in effect is extensible in effective length the hoe may be reciprocated to effect gathering and loading in an improved manner. The extensible boom may be utilized to elevate the machine so that it is supported only by the rear wheels and by the boom, and when the boom is extended or retracted the machine may be moved back and forth over the floor surface, and also the extensible boom may be utilized to swing the machine frame laterally into different loading positions. The improved hoe type gathering mechanism disclosed is not only relatively flexible in operation but is also relatively simple and rugged in design, well adapted to meet the relatively severe conditions encountered in the loading of mineral or loose rock in underground mines or tunnels. Other advantages will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

4

1. In combination, a mobile base having front and rear ground engaging supporting means, a material gathering mechanism comprising a boom carrying a material gathering element movable along said boom, means for mounting said boom for swinging movement in at least a vertical plane relative to said base, power means for swinging said boom to engage said gathering element with the ground for elevating the forward end of the machine so that said front ground engaging means are disengaged from the ground and with the base at that time entirely supported by its rear supporting means and said boom, and selectively operable means for moving said material gathering element along said boom to move said mobile base in either of opposite directions over the ground relative to said boom, and means for swinging said boom horizontally about a vertical axis, while said machine is supported as aforesaid to move said mobile base relative to said boom on its rear supporting means.

2. A loading machine, a mobile frame having front and rear ground engaging means, said mobile frame comprising a material receiving element located in advance of said front ground engaging means for guiding received material to an endless conveyor mounted for circulation on said mobile frame, means for moving said front ground engaging means in a ground disengaging position whereby said material receiving element is lowered to a ground engaged position, a ground engageable hoe type material gathering element mounted on said main frame for moving material to said material receiving means, means for reciprocating and traversing said material gathering element while being ground engaged so that ground engagement of said hoe type material gathering element moves the main frame on said rear ground engaging means along the ground with respect to said gathering element in a direction depending upon whether said hoe type material gathering element is reciprocated or traversed.

3. In a loading machine, a main frame, spaced pairs of ground engaging means rotatably secured to said main frame for permitting movement of said main frame along the ground, a pair of said ground engaging means being mounted on said main frame for movement to a ground disengaging position, material gathering means mounted on said main frame comprising an articulated boom carrying a material gathering element movable along said boom, said last mentioned means being adapted to engage the ground in advance of said disengageable ground engaging means and maintain one end of said main frame in a ground disengaging position so that movement of said material gathering element along said boom causes said main frame to move along the ground on said ground engaged engaging means.

4. A loading mechanism comprising a mobile main frame, having a longitudinal axis, longitudinally spaced front and rear ground engaging means mounted on axes which are transverse to said longitudinal axis, means for retracting one of said ground engaging means from a ground engaging position, a material receiving element integral with said mobile main frame having a portion which can be selectively ground engaged in response to the retraction of one of said ground engaging means, a gathering mechanism guide frame pivotally mounted on said main frame for reciprocally guiding a gathering mechanism therealong, means for reciprocating said gathering mechanism on said guide frame, means for pivoting said guide frame to ground engage a portion of said gathering mechanism and to lift said material receiving element from a ground engaged position, and means for actuating said means for reciprocating said gathering mechanism while ground engaged to move said loading mechanism forwardly or rearwardly over the ground on said ground engaged engaging means.

5. A loading apparatus, a trough shaped elongated main frame having spaced pairs of ground engaging mo-

5

bile means, said main frame comprising a laterally extending forwardly diverging portion extending forwardly and downwardly of one pair of said ground engaging means, an articulated elongated boom secured to said main frame, material gathering means mounted for movement along said elongated boom for moving material onto said forwardly diverging portion of said main frame, and means for retracting one pair of said ground engaging mobile means in a ground disengaged position in order to suspend said main frame on the non-retracted pair of ground engaging mobile means and said forwardly diverging portion of said main frame.

6. A loading apparatus comprising, an elongated main frame having means secured thereto for movably supporting said main frame on a surface, said main frame comprising means engageable with such surface and having at least a portion spaced from said supporting means for receiving material to be loaded, material gathering means mounted on said main frame and engageable with such surface for moving material onto said material receiving means, and means for retracting a portion of said main frame supporting means out of engagement with such surface to suspend said main frame on the non-retracted portion of said main frame supporting means and on said material receiving means.

7. A loading apparatus comprising, an elongated main frame having means secured thereto for movably supporting said main frame on a surface, said main frame comprising means engageable with such surface and having at least a portion spaced from said supporting means for receiving material to be loaded, material gathering means supported on said main frame and engageable with such surface for moving material onto said material receiving means, means for retracting a portion of said main frame supporting means out of engagement with such surface to suspend said main frame on the non-retracted portion of said main frame supporting means and on said material receiving means, said material gathering means being mounted for movement relative to an elongated boom, pivot means for pivotally connecting said elongated boom to said main frame, means for pivoting said boom, and means for actuating said boom pivoting means while said material gathering element is engaged with such surface so that said main frame is movable relative to such surface.

8. A loading apparatus comprising, an elongated main frame having means secured thereto for movably supporting said main frame on a surface, said main frame comprising means engageable with such surface and having at least a portion spaced from said supporting means for receiving material to be loaded, material gathering means mounted on said main frame and engageable with such surface for moving material onto said material receiving means, means for retracting a portion of said main frame supporting means out of engagement with such surface, an elongated support pivotally mounted on said main frame and having means for reciprocably mounting said material gathering means thereon, said material gathering means being reciprocable relative to said elongated support and to said main frame and toward said material receiving means from a point in advance of said material receiving means, means for pivoting said elongated support means in a vertical plane, whereby pivotal movement of said support means in such vertical plane while said gathering element is engaged with such surface and in advance of such material receiving means disengages said portion of said material receiving means from such surface, thus suspending said main frame on the non-retracted portion of said supporting

6

means and on said material gathering element, and means for reciprocating said material gathering means along said elongated support for moving said main frame along such surface when said main frame is so suspended.

9. In an elongated mobile loading apparatus having longitudinally spaced pairs of mobile means and a material gathering element mounted for rectilinear reciprocable movement on the relative to an elongated boom which is supported on the frame of such apparatus for movement in mutually normal planes, the method of sluing such apparatus comprising; moving such gathering element adjacent the unsupported end of such boom; actuating such boom to ground engage such material gathering element; retracting a pair of mobile means from ground engagement; swinging the frame of such apparatus bodily sidewardly, with the ground engaged pair of wheels and the material gathering element acting as pivotal points, by actuating the mechanism for moving such boom laterally.

10. In an elongated mobile loading apparatus having longitudinally spaced pairs of mobile means and a material gathering element mounted for rectilinear reciprocable movement on and relative to an elongated boom which is supported on the frame of such apparatus for movement in mutually normal planes; the method of sluing such apparatus comprising; supporting the frame of such apparatus on the material gathering element and a pair of such mobile means by retracting the other pair of such mobile means from ground engagement; swinging the frame of such apparatus bodily sidewardly, with the ground engaged pair of mobile means and the material gathering element acting as pivotal points, by actuating the mechanism for moving such boom laterally

11. A loading apparatus, a main frame having spaced pairs of ground engaging means, a material receiving element integral with said main frame, means for retracting one of said pairs of ground engaging means to permit ground engagement of a portion of said material receiving element, means mounted on said main frame for moving material to said material receiving element, a boom on said main frame for reciprocably mounting said material moving means, means for tilting said boom to move said material moving means into a ground engaging position whereby ground engagement of said material moving means raises such portion of said material receiving element from a ground engaged position thus suspending the main frame on the non-retracted ground engaging means and said material moving element, said material moving means includes means for reciprocating said material moving means rectilinearly along an elongated boom, wherein reciprocation of said material moving means while ground engaged moves the main frame forwardly or rearwardly over the ground.

References Cited in the file of this patent

UNITED STATES PATENTS

21,206	Maffet	Aug. 17, 1858
754,546	Deady	Mar. 15, 1904
1,277,687	Billings et al.	Sept. 3, 1918
1,322,475	Billings	Nov. 18, 1919
1,445,332	London	Feb. 13, 1923
2,274,941	Teuscher	Mar. 3, 1942
2,425,695	Fees	Aug. 12, 1947
2,739,722	Joy	Mar. 27, 1956
2,781,927	Holopainen	Feb. 19, 1957

FOREIGN PATENTS

743,924	Great Britain	Jan. 25, 1956
---------	---------------	---------------