Dec. 17, 1929. D. WHAMOND 1,739,624

LOADING MACHINE

Filed June 4, 1927 2 Sheets-Sheet 1

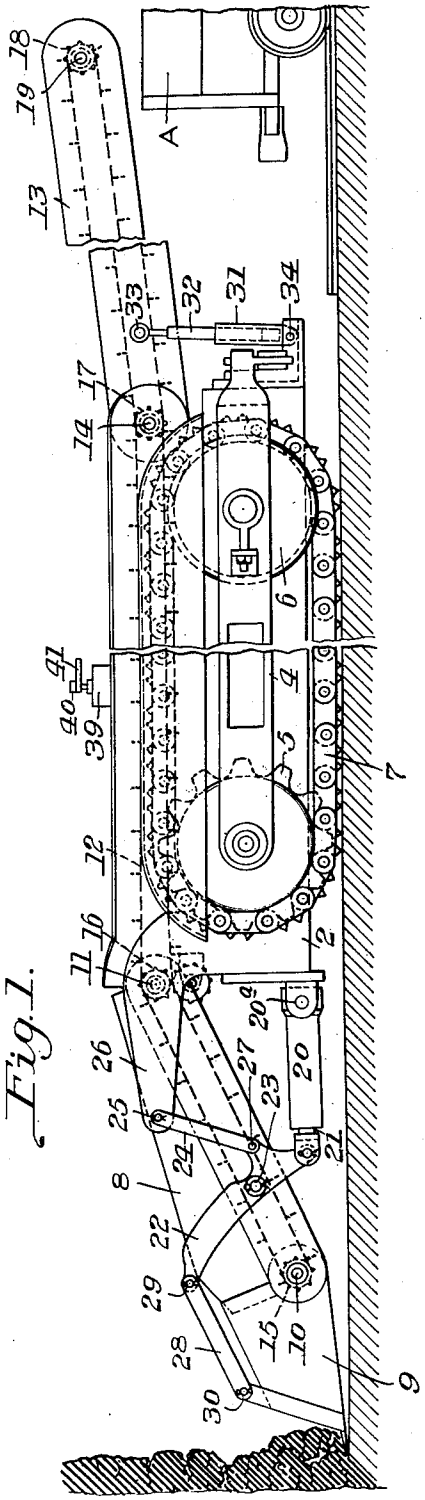


Fig. 1.

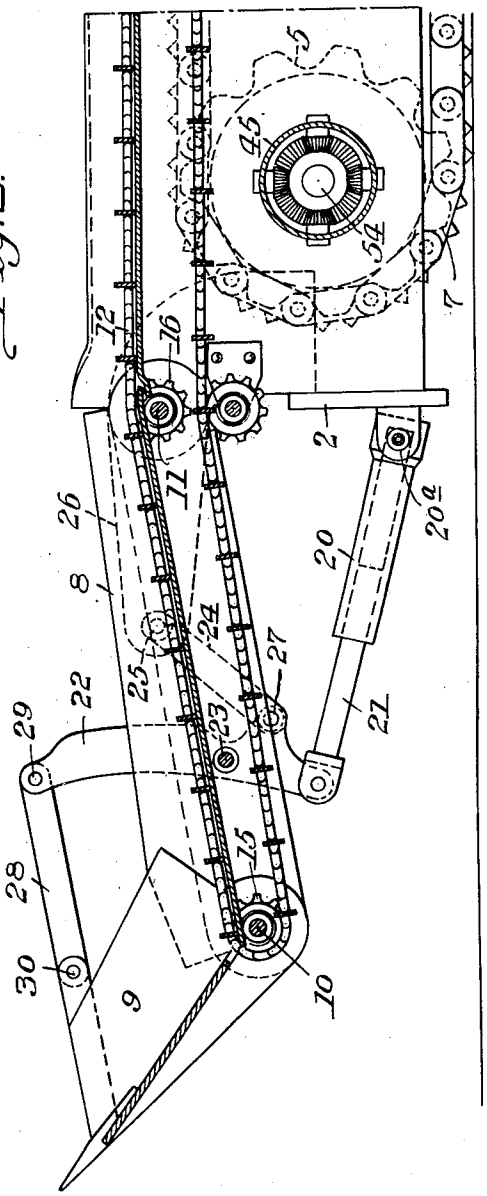


Fig. 2.

INVENTOR

David Whamond

by W. G. Doolittle

Attorney.

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Fig. 3

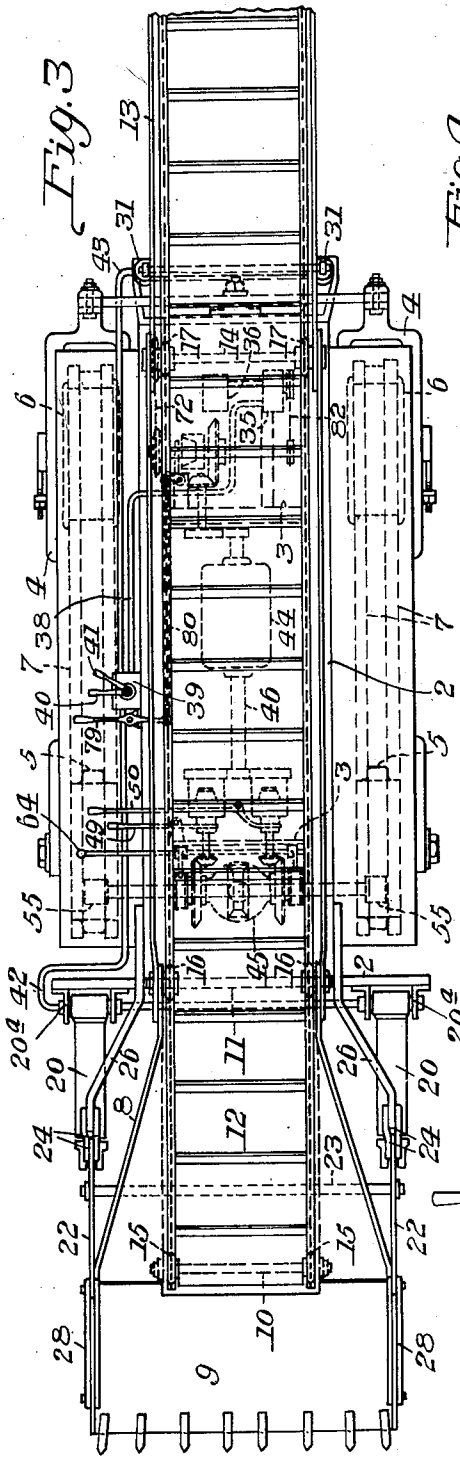


Fig. 4

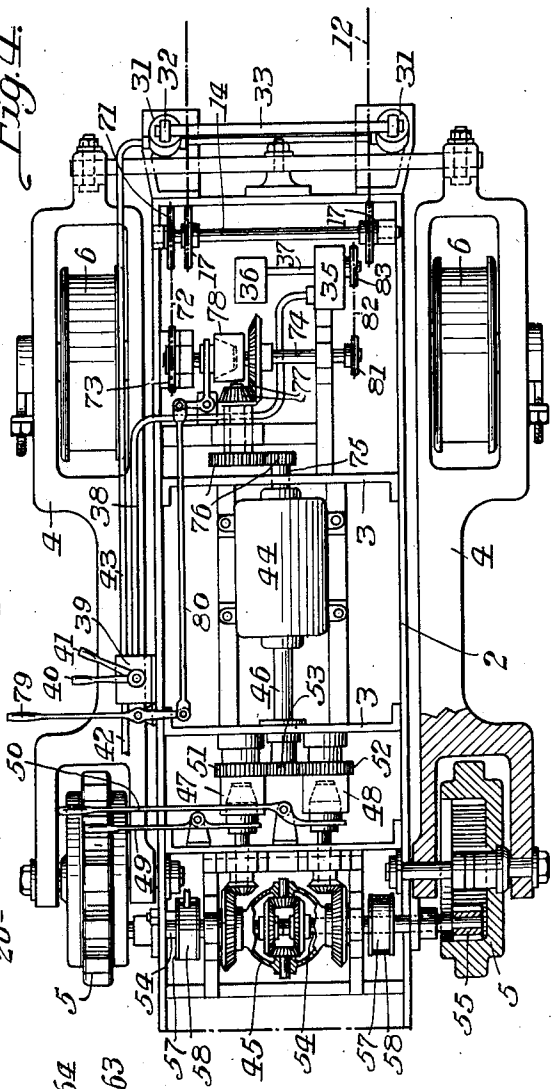
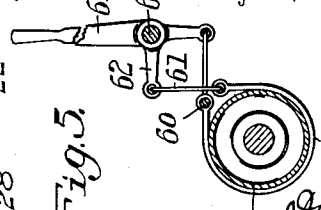


Fig. 5



INVENTOR

David Whamond

by W. G. Doolittle

Attorney.

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UNITED STATES PATENT OFFICE

DAVID WHAMOND, OF KITTANNING, PENNSYLVANIA

LOADING MACHINE

Application filed June 4, 1927. Serial No. 196,412.

This invention relates to a loading machine, and a particular, but not limitary, field for its use is in coal or other mines.

A prime object is to provide a novel compact organization of parts which may be used to gather a load of coal or other material, as within a mine, convey the load to a relatively distant location if desired, as to a car, either inside or outside of the mine, and which is further operable to discharge the load into the car, or otherwise.

An important aim is to produce such an apparatus having a supplemental conveyor frame capable of a swinging or an up-and-down movement to adapt itself to loading and discharging functions, and which frame carries a scoop or shovel, together with means operable to swing the frame and as well move the shovel relatively to the frame to facilitate discharge of the material gathered by the scoop onto the supplemental conveyor frame.

A further object is to provide a loading apparatus of the character described having, in combination with the shovel and front supplemental supporting frame, a truck or main frame, an adjustable rear supplemental frame, and a conveyor common to the different frames and adapted to flex according to the positions assumed by the supplemental frames.

Still further, it is an important object of the present invention to provide an apparatus of the character described wherein a single motor or source of power, such as an electric motor, may be used for propulsion and may also be utilized to furnish power for all of the operating parts or mechanisms, particularly the conveyor, supplemental supporting frames, and shovel.

The more specific objects and advantages of my invention will be pointed out or become apparent in considering the following description taken in connection with the accompanying drawings.

In the said drawings, which illustrate an application of my invention:

Fig. 1 is a side elevational view of the machine;

Fig. 2, an enlarged central longitudinal sectional view of the scoop or shovel end of the machine, with the scoop in elevated position;

Fig. 3, a plan view;

Fig. 4, an enlarged plan, particularly showing the power and drive mechanisms; and

Fig. 5, a detail of a brake mechanism employed.

The loading machine embodying my invention, as illustrated and as preferred, includes a conventional main frame 2 constructed of plate and structural shapes and having transverse or cross members 3. The frame is designed to carry the power and driving mechanisms hereinafter described. Frame 2 is mounted on a conventional four-wheeled truck 4, the truck being somewhat of the usual caterpillar design, having power driven front sprocket wheels 5 and idle rear chain guide drums or wheels 6, around which an endless chain 7 passes, the links of the chain having a toothed tread face for tractive engagement with the floor of the mine.

Pivotally mounted on the main frame 2, at the forward or scoop end of the machine, is a vertically movable supplemental frame 8. This frame 8 is designed to carry a scoop or shovel 9 pivotally secured thereto; the frame 8 also functions to support a portion of the conveyor employed for transferring material from the shovel to the rear end of the machine.

10 designates a transversely extending shaft journalled in suitable bearings attached to the forward end of the supplemental frame, and this shaft is rigid with and pivotally supports the scoop 9. A similar shaft 11 is carried on an end of the main frame 2, and it is by means of this shaft that the supplemental frame is pivotally connected to the said main frame.

A material conveyor 12, of any preferred construction, extends from the front end of the supplemental frame 8 to the rear of the machine. This conveyor is designed to be intermittently driven at will and to travel over suitable supports carried on the main frame, the front supplemental frame 8, and a rear vertically movable or swinging supple-

mental frame 13, the latter frame being pivotally connected with the rear of the main frame by a transverse shaft 14. The conveyor 12, as illustrated, comprises a continuous chain-type conveyor extending from the forward end of the front supplemental frame 8 over the main frame to the rear end of the second supplemental frame 13, and is so arranged that its forward and rear end portions, or the portions of the conveyor on the said frames 8 and 13, will move up and down with those respective frames for properly handling the material supplied thereto by the shovel or scoop.

A series of cooperating sprocket wheels for driving the conveyor 12 are provided. These include a pair of sprocket wheels 15 on shaft 10, a pair 16 on shaft 11, a pair 17 on shaft 14, the latter being the main driving sprockets, and a pair of sprockets 18 mounted on a shaft 19 carried at the rear end of the supplemental frame 13. The main drive sprockets 17 are driven by a motor and intermediate mechanism hereinafter described.

In the use of the machine for loading coal in mines, the machine is advanced into the shot seam, as indicated by Fig. 1, whereupon the supplemental frame 8, together with its scoop or shovel 9, is manipulated by pneumatically operable means including a pair of cylinders 20 pivotally connected to the main frame at 20^a, and their pistons 21, to elevate the frame and its scoop into the position shown by Fig. 2 of the drawings.

The mechanism connecting the outer ends of the pistons 21 and the frame 8 and scoop 9, and designed to cooperate with the pistons for imparting the desired movement to the frame and scoop, includes a pair of levers 22 mounted on opposite ends of a shaft 23 extending through the sides of the frame 8, the shaft 23 constituting the fulcrum point of the said lever members 22, supporting links 24 having their upper ends pivotally connected at 25 with projecting arms 26 carried by the main frame 2, their opposite ends connected at 27 with the lever members 22; and a pair of link members 28 each respectively connected, on opposite sides of the frame, with the upper end of one of the members 22 at 29 and with the shovel 9 at 30.

From the construction just described, it will be understood that, when the pistons are moved outwardly, levers 22 fulcrum on shaft 23, causing the scoop or shovel to swing on its pivot shaft and simultaneously causing a swinging or upward movement of the supplemental frame 8 on its shaft 10. The arrangement of the lever and link mechanisms is such that the shovel 9 will articulate and will move faster than frame 8 and thus will be given an additional movement relatively to the movable frame 8 for the purpose of causing the scoop to assume an upwardly inclined position relatively to the conveyor portion positioned on the said frame 8, thereby permitting the coal in the scoop to slide down or empty onto that portion of the conveyor then on the supplemental frame. The position of the parts as just described is shown by Fig. 2.

The rear supplemental frame 13 and that portion of the conveyor thereon is designed to be elevated when necessary to bring the discharge end of said frame into the desired position relatively to, for example, a mine car A. For accomplishing this end, I provide hydraulic means including cylinders 31 having their pistons 32 connected with the said frame 13 at 33, the said cylinders 31 being pivotally mounted on the main frame at 34.

Each pair of cylinders 20 and 31 is included in the hydraulic power system employed for elevating the supplemental frames and the means carried thereon, and, as shown, are in valve-controlled communication with a pump, for example, an oil pump 35, the latter being in turn connected with a source of oil supply, carried in a tank 36 mounted on the main frame of the machine, by a pipe 37. A system of piping for conveying fluid under pressure from the pump 35 to the respective cylinders 20 and 31 is provided, and includes a line 38 leading from the pump to a suitable control valve mechanism 39, the latter having operating levers 40 and 41.

From the said valve structure 39, a line 42 leads to the cylinders 20 and a line 43 to the cylinders 31. By properly manipulating the operating levers 40 and 41 of the by-pass valve mechanism, it will be understood that fluid medium may be directed to the respective pairs of cylinders and utilized for elevating the front and rear supplemental frames at will. An exhaust of the pressure fluid from the cylinders 20 will, due to the weight of the front supplemental frame 8 and its pivotal connection with the main frame, permit said frame 8 to be lowered by gravity. A similar action will be effected with respect to the rear supplemental frame 13 upon a withdrawal of the fluid medium from the cylinders 31.

The main power element employed in my construction preferably comprises an electric motor 44, which is mounted on the main frame of the machine. This motor is designed to be connected up with the drive sprocket wheels 5 of the traction chain 7 through a differential drive gearing 45 connected with the drive shaft 46 of the motor through clutch mechanisms 47 and 48, operable by hand-operated levers 49 and 50, and gears 51 and 52 meshing with a pinion 53 carried on an end of the motor shaft. The differential gearing includes two transversely extending shafts 54, each carrying on its outer end a pinion 55 designed to mesh with internal tooth gearing 56 of the respective wheels 5.

In addition to the pinion 55, each shaft 54 carries brake mechanisms, preferably of a drum band type including a drum 57, brake band 58, and an operating lever 64, the brake mechanism being particularly shown by the detail view, Fig. 5. As illustrated by Fig. 5, one end of the brake band 58 is secured to a fixed pin 60 carried on the frame, and its opposite end connected to one end of a movable link 61, the latter having its opposite end connected with an arm 62 fixedly secured to and movable with a rock shaft 63, the latter being designed to be rocked by an operating lever 64. Two brake constructions, as described, operate to effect the desired steering.

As illustrated, the conveyor 12 is designed to be intermittently driven by the motor 44, and to this end, the drive sprockets 17 are keyed to cross shaft 14 having a sprocket 71 fixedly secured on an end thereof and designed to be driven by a chain drive 72 extending from a wheel or sprocket 73 mounted on a driven shaft 74. Shaft 74 is driven from a stub driving shaft 75 of the motor 44 by spur gearing 76 and bevel gearing 77.

The conveyor drive is controlled by a clutch mechanism 78 carried on shaft 74, said clutch mechanism being operable by a clutch lever 79 and the connecting member 80 interposed between the said clutch and its operating lever.

In addition to driving the conveyor drive sprockets, shaft 74 is designed to drive the pump 35, and, for this purpose, shaft 74 carries a chain drive wheel 81, over which an endless chain 82 extends. 83 designates a sprocket on the pump 35, over which the chain 82 is passed.

Various changes may be resorted to within the spirit and scope of the invention as defined by the appended claims.

I claim:

1. In a loading machine, a tractor truck, a main frame mounted on the truck, a supplemental frame pivotally mounted on the main frame at the forward end of the machine, a shovel pivotally mounted on the supplemental frame, an intermittently driven conveyor on the supplemental frame, pneumatically operable means for simultaneously elevating the supplemental frame and shovel, including a lever pivotally mounted on the supplemental frame, power means projecting from the main frame and connected with said lever, and a connection between said lever and the main frame above the power means, means for effecting an elevation of the shovel relatively to the conveyor during the simultaneous elevation of the supplemental frame and shovel to direct material from the shovel onto the conveyor, and means for intermittently driving the conveyor.

2. In a loading machine, a tractor truck, a main frame mounted on the truck, a supplemental frame pivotally mounted on the main frame at the forward end of the machine, a supplemental frame pivotally mounted on the rear end of the machine, a shovel pivotally mounted on the first mentioned supplemental frame, a conveyor carried by said frames, and pneumatically operable means for elevating each of the said supplemental frames relatively to the main frame.

3. In a machine of the class described, a main frame, a supplemental frame mounted thereon normally disposed with its forward end relatively close to the ground, a shovel carried by the supplemental frame and in shoveling position being substantially a continuation thereof, and means for simultaneously raising the supplemental frame and shovel, said means having a connection for moving the shovel relatively to the supplemental frame and including a lever pivotally mounted on the supplemental frame, power means projecting from the main frame and connected with the lever, and a connection between said lever and the main frame.

4. In a machine of the class described, a main frame, a supplemental frame mounted thereon normally disposed at a downward and forward inclination, conveyor means associated with said frames, a shovel carried by the supplemental frame, means including a lever pivotally mounted on the supplemental frame, power means projecting from the main frame and connected with said lever, and a connection between said lever and the main frame for raising the supplemental frame and shovel, said means having a connection for moving the shovel relatively to the supplemental frame for emptying the contents of the shovel onto the conveyor means.

5. In a machine of the class described, a main frame, a supplemental frame normally disposed at an acute angle at the front of the main frame, conveying means for the supplemental frame, a shovel carried by the supplemental frame at the front thereof normally as a continuation of the supplemental frame, and means to simultaneously raise and articulate the frame and the shovel so that the shovel will move into obtuse relation to the supplemental frame to discharge its contents onto the conveying means.

6. A machine of the class described having a main frame, a supplemental frame pivoted to the main frame so that its forward end may be disposed relatively close to the ground, a conveyor common to said frames, means on said frames for mounting the conveyor, a shovel pivoted to the supplemental frame, and means operable to elevate the supplemental frame through an arc and relatively close to the ground including a lever pivotally mounted on the supplemental frame, power means projecting from the main frame and connected with said lever, and a connection between said lever and the main frame.

7. A machine of the class described having a main frame, a supplemental frame pivoted

thereto, a shovel carried by the supplemental frame, a lever pivoted on said supplemental frame, a connection between the lever below its fulcrum to said main frame forwardly of the connection of the supplemental frame thereto, and a connection from the lever above its fulcrum to the shovel, and means to actuate the lever, whereby the supplemental frame will be elevated and the shovel will be moved relatively thereto.

8. A machine of the class described having a mobile frame, means to drive the frame, a conveyor on the frame so that its forward end may be disposed relatively close to the ground, means to intermittently operate the conveyor from the first mentioned means, a supplemental frame pivoted to the main frame, said conveyor also traversing the supplemental frame, a shovel pivoted to the supplemental frame, means operable to elevate the supplemental frame including a lever pivotally mounted on the supplemental frame, power means projecting from the main frame and connected with said lever, and a connection between said lever and the main frame, and a connection from the latter means to the shovel to cause the latter to discharge its contents onto the conveyor.

9. A machine of the class described having a main frame, a supplemental frame movable in an arc relatively close to the ground and adjustable at said end as to elevation, a conveyor traversing the main frame and supplemental frame and articulating with the latter, a shovel pivoted to the supplemental frame, and means operable to simultaneously raise the supplemental frame and shovel and to cause the shovel to move relatively thereto to discharge onto said conveyor, including a lever pivotally mounted on the supplemental frame, power means projecting from the main frame and connected with said lever, and a connection between said lever and the main frame above the power means.

10. A machine of the class described comprising a mobile frame, a supplemental frame movable in an arc relatively close to the ground and shafts carried by said frame, a conveyor, drive members for said conveyor on one of said shafts, another shaft on the supplemental frame, means on the latter shaft over which said conveyor is trained, a shovel pivoted to the supplemental frame by means of the latter shaft, means including a lever pivotally mounted on the supplemental frame, power means projecting from the main frame and connected with said lever, and a connection between said lever and the main frame to elevate the supplemental frame at its forward end, the last mentioned means also including a connection to cause the shovel to articulate and empty its contents onto said conveyor.

11. A machine of the class described having a truck, means operable to propel the truck, shafts on the truck having sprocket wheels thereon, means to intermittently drive one of said shafts from the first mentioned means, a conveyor trained over said sprocket wheels, a supplemental frame pivotally mounted by one of said shafts, a shaft on the supplemental frame, the latter shaft having sprocket wheels over which the conveyor is trained, a shovel pivoted to the supplemental frame by means of the last mentioned shaft, a lever pivoted intermediate its ends to the supplemental frame, link means connecting the lever to the truck, link means connecting the lever to the shovel, and means operable to shift said lever for the purpose specified.

12. A machine of the class described having a truck, propelling means therefor, shafts journalled on said truck, means to drive one of said shafts from the first mentioned means, sprocket wheels on said shafts, a conveyor trained over said sprocket wheels, a front supplemental frame pivotally connected to the truck by one of said shafts, a rear supplemental frame pivotally connected to the truck by the other shaft, a shaft on the front supplemental frame, sprocket wheels on the latter shaft over which the conveyor is also trained, a shovel pivotally connected to the front supplemental frame by means of the latter shaft, the truck having a forward extension, a lever pivoted intermediate its ends to the front supplemental frame, link connections from the lever on opposite sides of its fulcrum to said extension and to said shovel, respectively, a pressure device for operating said lever, a shaft on the rear supplemental frame, sprocket wheels on the latter shaft over which the conveyor is also trained, a pressure device to govern the position of the rear supplemental frame, and means to operate said pressure devices from a common source of power and independently of the propulsion of the truck.

13. In a loading machine, a main frame, a supplemental frame pivoted thereto to move in an arc between the ground and a plane passing horizontally through the pivot of the supplemental frame, a lever pivoted on the supplemental frame, a shovel pivoted to the supplemental frame adjacent the forward end, a connection from the shovel secured to the lever above the axis of the latter, an operating connection pivoted to the frame and to said lever below said axis, said operating connection comprising relatively movable parts, and a link means from the main frame attached to the lever between said connections.

14. In a loading machine, a relatively low main frame, a supplemental frame pivoted thereto, a shovel carried at the forward end of the supplemental frame, and means operable to swing said supplemental frame and articulate said shovel in paths substantially

within the height of the main frame and from a position relatively close to the ground comprising a lever pivotally secured to the supplemental frame, a power actuated means projecting from the main frame and connected with the lever, and a connection between the lever and the shovel.

15. In a loading machine, a main frame, a supplemental frame pivoted thereto, a shovel carried at the forward end of the supplemetal frame, means to elevate the supplemental frame and articulate the shovel relatively thereto, said means including an extensible connection pivoted to the main frame and comprising a cylinder and a piston therein to be operated by fluid pressure, a pair of levers pivotally connected to the supplemental frame and to the extensible means, and links connecting said levers and the shovel.

16. A machine of the class described having a frame, a shovel carried thereby, a main frame to which the first frame is pivoted, a lever pivoted on the first frame by an axis closer to the lower end than the upper end of the lever, means extending from the main frame to the lower end of the lever operable to move the lever to elevate the first frame, and a connection from the upper end of the lever to the shovel to actuate the latter to discharge its contents as the first frame is elevated.

In testimony whereof I affix my signature.

DAVID WHAMOND.