Aug. 19, 1924. **1,505,476**

J. M. LONDON

APPARATUS FOR HANDLING COAL AND OTHER MATERIAL

Original Filed July 28, 1919 2 Sheets-Sheet 1

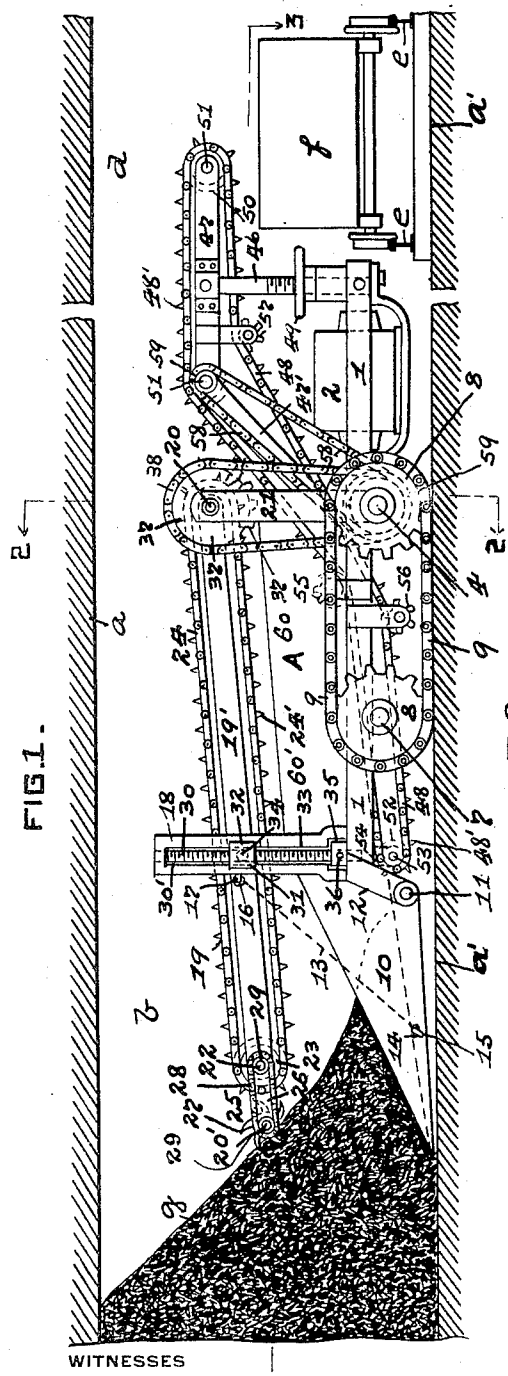


FIG. 1.

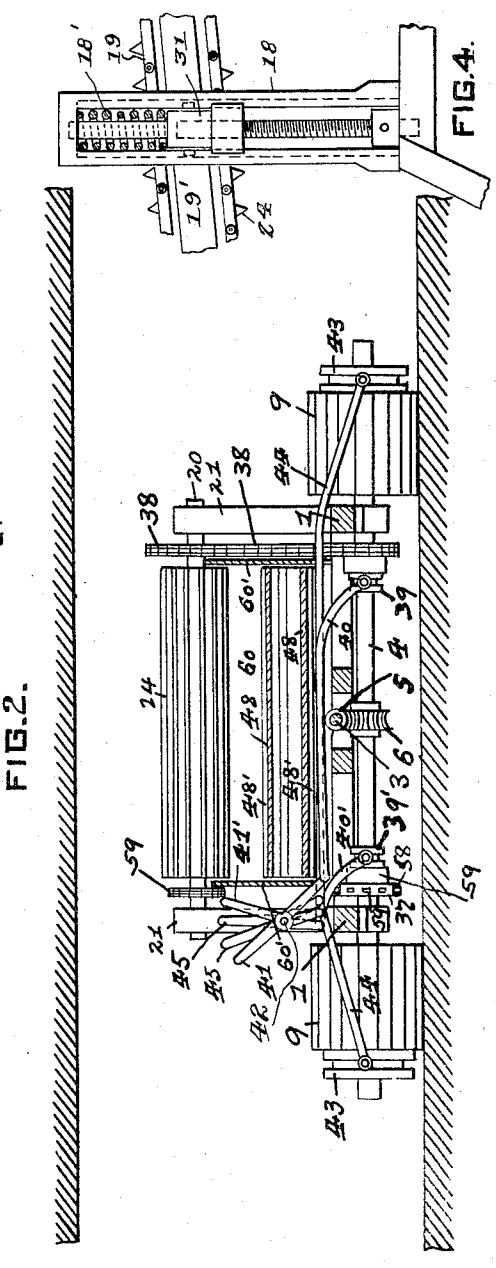


FIG. 2.

FIG. 4.

WITNESSES

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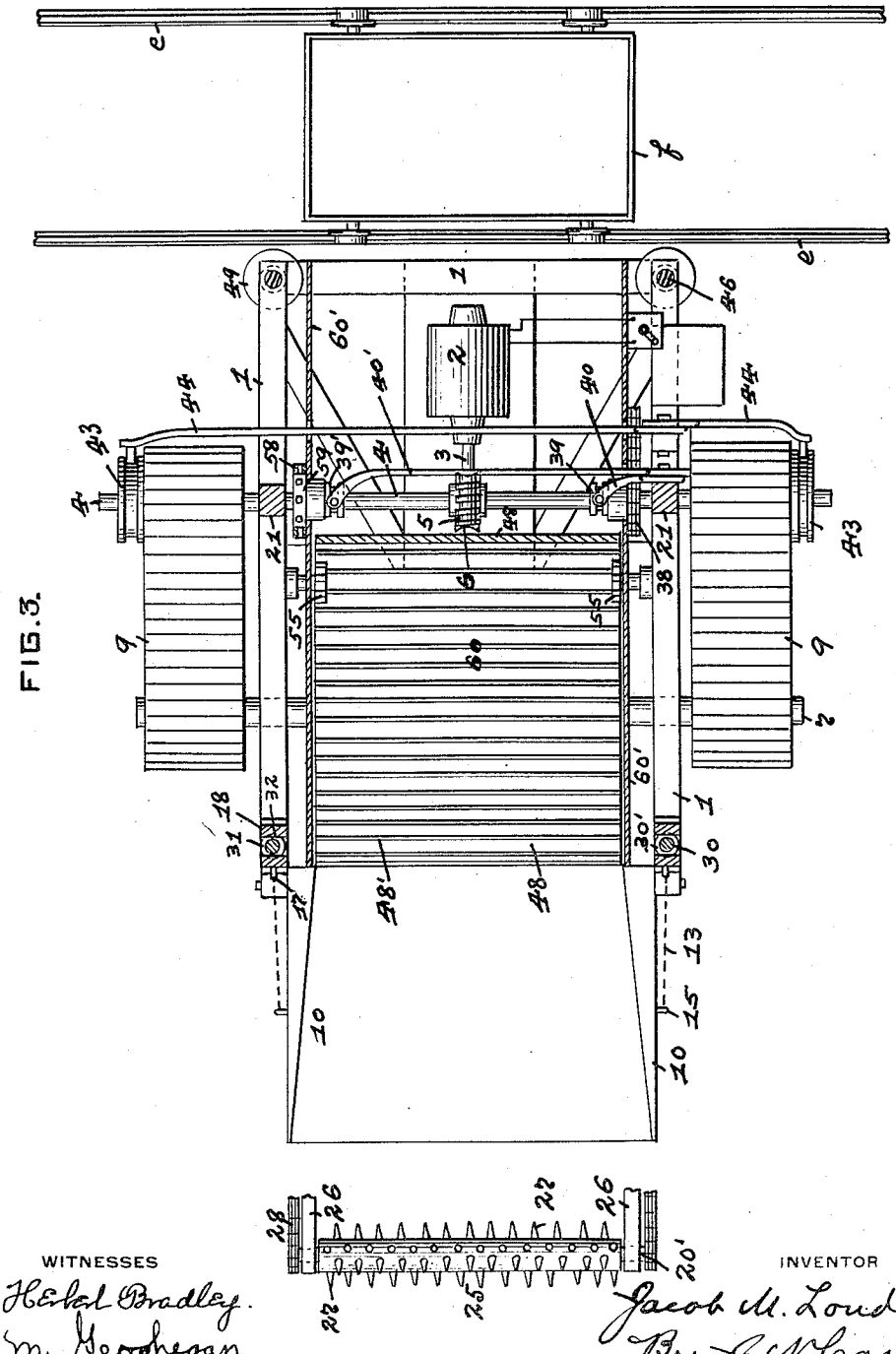


FIG. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

JACOB M. LONDON, OF BROOKVILLE, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO GEORGE M. CRAWFORD, OF PITTSBURGH, PENNSYLVANIA.

APPARATUS FOR HANDLING COAL AND OTHER MATERIAL.

Application filed July 28, 1919, Serial No. 313,818. Renewed March 20, 1924.

To all whom it may concern:

Be it known that I, JACOB M. LONDON, a citizen of the United States, and a resident of Brookville, in the county of Jefferson and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Handling Coal and Other Material; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to an apparatus for handling materials, such as coal, and has special reference to the handling of the coal in the mine after it is under-cut and shot down in the entries or rooms.

The object of my invention is to provide a cheap, simple and efficient apparatus for handling such coal, whereby the coal, after it is mined, or cut and thus dropped into the usual piles or heaps on the floor of the rooms or entries, can be picked up or loaded, hauled and dumped or discharged into the mine cars usually employed in the mine at any distance from the working face of the coal.

A still further object of the invention is to employ such a method and apparatus whereby the mined coal in different rooms or entries of a mine can be loaded, hauled and discharged into the mine cars by the same method and apparatus without the use of any tracks in such rooms or entries, and by a single machine, if desired, through being capable of traveling and operating by means of its own power from one entry or room to another in its operations.

To these ends my invention consists, generally stated, in the novel arrangement, construction and combination of parts, as hereinafter more specifically set forth and described and particularly pointed out in the claims.

To enable others skilled in the art to which my invention appertains to construct and use the apparatus, I will describe the same more fully, referring to the accompanying sheets of drawings, in which:

Fig. 1 is a side elevation of the machine, showing the same ready for operation in a mine;

Fig. 2 is a cross-section on the line 2—2 Fig. 1;

Fig. 3 is a top view of the machine, showing some of the parts in section, as taken on line 3—3 Fig 1 looking in the direction of the arrows and

Fig. 4 is a detail view showing a slight modification in which a resilient mounting is provided for the rake and the upper conveyor.

Like symbols of reference herein indicate like parts in each of the figures of the drawings.

As illustrated in the drawings *a* represents the ordinary coal mine, which is provided with the usual rooms or entries *b* within the same. These rooms or entries *b* communicate with the usual main entry *d* within the mine *a*, which is provided with the usual tracks *e*, and on which the ordinary mine cars *f* are adapted to travel.

The machine employed is shown at A and is provided with supporting frame 1, upon which is mounted a motor 2 of any approved construction for operating the different parts of such machine, and which has the main shaft 3 connected thereto and with the cross-shaft 4 by means of a worm 5 on said main shaft engaging with a worm-wheel 6 on said cross-shaft. Another cross-shaft 7 is mounted in front of the cross-shaft 4 and the ends of such shafts are each provided with a sprocket wheel 8. A traveling traction chain 9, such as the usual caterpillar form, is placed on each side of the machine A and is mounted on and operated by the sprocket wheels 8 on the shafts 4 and 7 by power from the shaft 4, so that the bottom of such chain can directly grip or engage with the floor *a'* of the mine *a* and thus enable the supporting of the machine and traveling of the same along such floor.

At the front end of the frame 1 is the door 10, which forms a scoop-like member, as will be hereinafter described, which is hinged at 11 to the arms 12 extending down on each side of said frame, and a steel or wire rope 13 is connected to each side of such door by a hook 14 at one end of the same engaging with an eye 15 on said door, while a hook 16 at the opposite end of each of the ropes 13 connects with an eye 17 on each of the uprights or supporting posts or standards 18 hereinafter described which extend up from the frame 1.

A conveyor device 19 having arms 19' is placed on each side of the machine A, and such arms are pivotally connected at their rear ends to a cross-shaft 20 which is supported in vertical standards 21 extending up

from the frame 1. These conveyor arms 19′ have a cross-shaft 22 supported between their front ends, and such shaft and the shaft 20 are each provided with a sprocket wheel 23 at each end of the same and around which passes a conveyor 24 having the raking teeth or cleats 24′ thereon or other suitable raking projections.

A raking device 25 is supported in front of the arms 19′ and chain 24, and consists of a shaft 20′ which is supported by means of the arms 26 extending out from and in front of the shaft 22 and such shaft 20′ is provided with the raking teeth or hooks 27 extending out therefrom. The shaft 20′ is operated from the shaft 22 by means of a chain 28 which passes around sprocket wheel 29 on each side of said shaft.

The standards 18 carrying the conveyor 19 and raking device 25 are supported intermediate of the cross-shaft 20 and shaft 22 and has therein the vertically mounted adjusting screw 30 on each side of the frame 1 and extending up therefrom, and such screw is mounted within a space 30′ in each of the standards 18. On each of the screws 30 is a nut 31, which is provided with flanges 32 on each side of the same for fitting over the side edges 33 of said space and such nuts are connected together by a rod 34 between the same. At the bottom of each of the screws 30 is a head 35 which has holes 36 within the same for the insertion of a rod or bar (not shown) to turn said screws and raise or lower the nuts 31 thereon and with such nuts the conveyor 19 and raking device 25 through the connection of such device with such nuts by the rod 34.

On each side of the shafts 4 and 20 are sprocket wheels 37 around which passes the chain 38, and this chain is operated to operate the shaft 20 from such main shaft 4 by means of the clutch 39 on the shaft 4 engaging with the wheel 37 on said shaft, which clutch is operated by the rod 40 engaging therewith and connected to the lever 41 and mounted on the shaft 42. Clutches 43 are also mounted on the shaft 4 for engaging with the sprockets 8 on said shaft in the operation of the traction chains 9, which clutches are connected by the rods 44 with levers 45 mounted on the shaft 42.

Extending up from each side of the frame 1 in the rear of the motor 2 are screw posts 46, which posts are adapted to support the frame 47 for carrying the rear end of the conveyor 48, and such frame 47 is supported at its front end by the inclined frame portions 47′ connecting with the frame 1. The rear end of such chain 48 is adapted to be raised and lowered by means of a handle or wheel nut 49 engaging with each of the screw posts 46. The conveyor 48 is provided with raking teeth or cleats 48′ on the same, and such chain at its rear end passes around a sprocket wheel 50 which is mounted on cross-shafts 51 at each end of the frame 47. The conveyor 48 extends forward to the rear of the door 10 where it passes around a sprocket wheel 52 mounted on a cross-shaft 53 supported in brackets 54 extending down from the frame 1, and the upper forward portion of such chain passes under a sprocket or sheave 55 supported on and above the said frame. The lower forward portion of the conveyor 48 passes over a sprocket or sheave 56 supported on and extending down from the frame 1, and the lower rearward portion of such chain passes over a sprocket or sheave 57 supported on and extending down from the frame 47. The conveyor 48 is operated by means of the sprocket chain 58 which passes over sprocket wheels 59 on each end of the main shaft 4 and shaft 51, and such chain is operated through clutch 39′ on shaft 4, rod 40′ and lever 41′.

The use and operation of my improved apparatus for handling materials, such as coal, is as follows: After the coal has been undercut and shot down in the different entries or rooms, and it is desired to load, haul and discharge such loose coal, as shown at *g* into the usual mine cars *f* on the tracks *e* in the main entry *d*, the machine A is moved up to such coal by means of the traction chains 9 engaging with the mine floor *a*′, which chains are operated by the motor 2 through the shaft 4 to which such chains are connected, so that in the movement of such machine the door 10 will pass under such loose coal for some distance. The raking device 25 is then operated through the medium of the conveyor device 19 by means of the conveyor 24 being operated by the motor 2 and shaft 4 and such shaft being connected to the shaft 20 through the sprocket wheels 37 on said shafts carrying the sprocket chain 38 with such shaft 4 carrying such conveyor 24, so that movement is imparted to the raking teeth 27 on the shaft 20′ by means of the said shaft being connected to the shaft 22 and by the chain 28 connecting with said shafts 20′ and 22. The shaft 22 carries the front end of the chain 24 and the chain 28 is operated by the sprocket wheels 29 on the shafts 20′ and 22.

The raking device 25 having been positioned by the raising or lowering of the conveyor device 19 through the screws 30, so that the teeth 27 on the shaft 20′ will engage with the loose coal *g* and thus rake the coal down onto the door 10, while the teeth or cleats 24′ on the conveyor 24 will rake the coal back from the said door into the receptacle 60 and onto the front part of the conveyor 48. While the loose coal *g* is being raked onto the door 10 and into the receptacle 60 on the front end of conveyor 48 by the teeth 24′ and 37, the machine will

be moved forward by the traction chains 9 until such receptacle is filled. The ropes 13 then are disconnected from the eyes 17 by their hooks 16 and such hooks engaged with the conveyor 24. The conveyor device 19 can be raised by the screws 30 which will thus raise the door 10 and throw the coal then remaining on said door back into the receptacle 60 formed by the vertical side walls 60′ on the frame 1 over and onto the front or forward portion of the elevator conveyor 48, thereby such door closing the front end of said receptacle, said vertical side walls extending from a point substantially as near the bottom of the frame as practical to as near the top of the frame as the construction will permit. The machine A can then be reversed by the motor 2, so that it will move backwards along the mine floor *a′* by means of the traction chains 9 until the rear end or portion of the chain 48 extends over one of the mine cars *f* on the tracks *e* in the main entry *d*, and then power can be applied from said motor to operate the said chain 48 through the chain 58 passing over the sprocket wheels 59 on the main shaft 4 and the forward shaft 51 engaging with the conveyor 48 through the sprocket wheel 50 on said shaft. The conveyor 48 being thus operated and moving over the sprockets 50 on the shafts 51 and the sprocket 52 on the shaft 53 and also over the sprockets 56 and 57 will allow the teeth 48′ on said chain to carry the coal from within the receptacle 60 and from the front portion of said chain up the inclined portion of said chain onto the rear portion thereof where it is dumped or discharged off the rear end of said chain into the car *f*.

When the car *f* has thus been filled it can be moved along the tracks *e*, so that another empty car can be filled by the same operations with the machine A, and it will be obvious that the loose coal in any one of the entries *b* can be picked up, hauled and discharged into a car at any place on said tracks opposite any one of said entries, as such machine being propelled by its own power can be made to travel along the floor *a′* of the mine *a* and into any one of the entries where the loose coal is shot down and ready for being gathered up for placing in the cars.

It will thus be seen that in the use of my improved method and apparatus the machine can be easily and quickly handled and operated and all the loose coal in each entry or room can be picked up and discharged into the mine cars rapidly and conveniently while such device or machine being capable of being operated to travel from room to room along the floors of the rooms by its own power, the ordinary cars and their tracks will be eliminated from such rooms, thereby permitting free travel of such machine through such rooms and enabling a great saving in the expense and time in handling the coal in a mine.

If desired, as shown in Fig. 4 a spiral spring 18′ can be inserted around the upper end of the screw 30 and between the upper end of the frame posts 18 and nut 32 in order to allow the conveyor 19 and raking device 25 to strike the loose coal *g* with a vibrating movement, thereby giving blows to the loose coal in case of the conveyor and device striking hard lumps.

It will be evident that my improved method and machine can be used for handling materials other than coal, and various other modifications and changes in the design and operation of the machine, other than those described may be resorted to, without departing from the spirit of the invention, or sacrificing any of its advantages.

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

1. A machine of the class described, comprising a motor, traction chains carried by the machine and operated by said motor for supporting the machine and enabling the traveling of the same along a mine floor, a conveyor operated by said motor for elevating and discharging the coal, a receptacle over said conveyor, a conveyor operated by said motor and adapted to be raised and lowered for moving the loose coal onto said first named conveyor, and a movable door for extending under said coal and for closing the end of said receptacle.

2. A machine of the class described, comprising a motor, traction chains carried by the machine and operated by said motor for supporting the machine and enabling the same to travel along the mine floor, a conveyor operated by said motor for elevating and discharging the coal, a receptacle over said conveyor, a conveyor operated by said motor and adapted to be raised and lowered for moving the loose coal onto said first named conveyor, a raking device on said second named conveyor for raking the loose coal onto said first named conveyor, and a movable door for extending under said coal and for closing the end of said receptacle.

3. A machine of the class described, comprising a motor, traction chains carried by the machine and operated by said motor for supporting the machine and enabling the same to travel along a mine floor, a conveyor operated by said motor for elevating and discharging the coal, a receptacle over said conveyor, a conveyor operated by said motor and adapted to be raised and lowered for moving the loose coal onto said first named conveyor, and a movable door for extending under said coal, said door being adapted to be connected to said last named conveyor for closing the end of said receptacle.

4. A machine of the class described, comprising a motor, traction chains carried by the machine and operated by said motor for supporting the machine and enabling the traveling of the same along a mine floor, a conveyor operated by said motor for elevating and discharging the coal, a receptacle over said conveyor, a conveyor operated by said motor and adapted to be raised and lowered for moving the loose coal onto said first-named conveyor, a movable door for extending under the coal, and means connected to said door and removably connected to last named conveyor for raising the door to close the end of said receptacle.

5. A machine of the class described, comprising a motor, traction chains carried by the machine and operated by said motor for supporting and enabling the traveling of the same along a mine floor, a conveyor operated by said motor for elevating and discharging the coal, a receptacle over said conveyor, a conveyor operated by said motor and adapted to be raised and lowered for moving the loose coal onto said first-named conveyor, a movable door for extending under the coal, a raking device on said last-named conveyor and operated therefrom for raking the coal onto said first-named conveyor, and means connected to said door and removably connected to said last-named conveyor for raising the door to close the end of said receptacle.

6. A machine of the class described for handling and hauling loose coal in the rooms and entries of mines comprising a frame, means on the frame for propelling the same in the mine, means thereon for gathering coal, a relatively large receptacle formed within the frame and into which the gathering means delivers, means for discharging the contents of said receptacle, and means extending above the gathering means and receptacle for pushing the coal back into the receptacle.

7. A machine of the class described for handling and hauling coal in the rooms and entries of mines, comprising a substantially rectangular frame, means for propelling the frame, means thereon comprising a scoop for gathering coal, a receptacle supported within the frame and occupying the greater portion of the space within the frame, said receptacle being open at one end and being in alinement with said scoop, said scoop being arranged to deliver material into the open end of said receptacle, means comprising an endless conveyor having projections thereon above said receptacle and said scoop for pushing the coal toward the rear of the receptacle, and means for removing coal from the receptacle.

8. A machine of the class described for handling and hauling coal in the rooms and entries of mines, comprising a frame, means thereon for supporting and moving the frame, a receptacle of relatively large capacity in the frame, and of substantially the width of the frame, said receptacle having vertical side walls extending from near the bottom of said frame to near the top thereof, a scoop-like means on the frame for gathering coal into said receptacle, other means on the frame for discharging coal from the receptacle, an endless conveyor above the receptacle and scoop-like gathering means having means thereon for assisting in pushing coal into the receptacle, said receptacle being so disposed with relation to said scoop-like gathering means and discharging means as to permit them to operate freely in confined spaces.

9. A loading machine comprising longitudinally extending side frame members, cross frame members connecting the side frame members to form a supporting frame, spaced-apart side walls carried by the frame members, a conveyor having a substantially horizontal portion disposed between the side walls near the bottom thereof and terminating near the front end of said side frame members, said conveyor having an inclined portion back of the substantially horizontal portion and having a rearwardly extending portion back of the inclined portion, a scoop member carried by the supporting frame at the front end thereof and arranged to collect the material to be loaded and deliver it to the conveyor, and means for movably carrying the supporting frame whereby the loader may be moved from place to place.

10. A machine of the class described, comprising means for elevating and discharging the coal, a receptacle over said means, raking means capable of being raised and lowered for moving the loose coal onto said first named means, and movable means adapted to extend under the loose coal and for closing the end of said receptacle.

11. A machine of the class described comprising means adapted to be moved beneath a pile of loose material for gathering the material therein, a receptacle adjacent to the gathering means and into which the gathering means delivers and of which the gathering means forms a part, other means carried by a pivotally supported rigid frame above the end of said gathering means and adapted to engage the upper part of a pile of material for raking material into the gathering means, both of said means being capable of swinging vertically with respect to each other without changing the angle of the receptacle, and means whereby the pivotally supported rigid frame may be adjustably positioned at various angles.

12. A machine of the class described comprising means adapted to be moved beneath a pile of material for gathering the material

therein, a receptacle adjacent to the gathering means and into which the gathering means delivers, rotary raking means supported above the end of such gathering means and adapted to engage the upper part of a pile of material for raking material into the gathering means, said gathering and raking means being capable of swinging vertically with respect to each other without changing the angle of said receptacle, and means for yieldably and adjustably supporting the raking device at various angles and at various heights above the gathering means.

13. A machine of the class described comprising means adapted to be moved beneath a pile of material for gathering the material therein, a receptacle adjacent to the gathering means and into which the gathering means delivers, rotary raking means supported above the end of such gathering means and adapted to engage the upper part of a pile of material for raking material into the gathering means, said gathering and raking means being capable of swinging vertically with respect to each other without changing the angle of said receptacle, and means whereby the rotary raking means is resiliently and adjustably supported at different angles.

14. A machine of the class described comprising a supporting frame, a gathering means at one end of the frame for projecting beneath the pile of loose material, a receptacle supported in the frame and into which said gathering means delivers, an endless conveyor forming the bottom and rear of said receptacle, a vertically swinging frame member projecting from the opposite end of said supporting frame, said endless conveyor being extended over said vertically adjustable frame member whereby the material may be discharged from said receptacle at the various angles without varying the angle of said supporting frame and receptacle.

15. A loading machine comprising a frame, an elevating and discharging conveyor in the frame, a receptacle for supplying the conveyor, a pivoted end member for said receptacle adapted to be projected under the material to be loaded for gathering it, and means whereby the end member may be swung vertically to deliver the material gathered thereby into the receptacle and for forming a closure at one end of the receptacle, said conveyor having a substantially horizontally extending portion which forms the bottom of said receptacle and having an inclined portion and a rearwardly extending portion.

16. A loading machine comprising a frame, an elevating and discharging conveyor in the frame, a receptacle for supplying the conveyor, a pivoted end member for said receptacle adapted to be projected under the material to be loaded for gathering it, means whereby the end member may be swung vertically to deliver the material gathered thereby into the receptacle and for closing one end of the receptacle, and another conveyor supported in the frame above the receptacle and extending over said pivoted end member for pushing the material to be gathered into the receptacle.

17. A loading machine comprising a frame, an elevating and discharging conveyor in the frame, a receptacle for supplying the conveyor, a pivoted end member for said receptacle adapted to be projected under the material to be loaded for gathering it, means whereby the end member may be swung vertically to deliver the material gathered thereby into the receptacle and for closing one end of the receptacle, and another conveyor supported in the frame above the receptacle and extending over said pivoted end member for pushing the material to be gathered into the receptacle and having a rotary digging device disposed at the front end thereof and operated by said conveyor.

18. A loading machine comprising a frame, an elevating and discharging conveyor in the frame, a receptacle for supplying the conveyor, a pivoted end member for said receptacle adapted to be projected under the material to be loaded for gathering it, means whereby the end member may be swung vertically to deliver the material into the receptacle and for closing the end of said receptacle, and means for raising the end member to vertical position when it is loaded with the material.

19. A portable loading and transporting machine comprising a movably supported frame, a longitudinally extending endless conveyor in the frame, said conveyor having a substantially horizontally extending portion in the bottom thereof near the front part of the frame, said conveyor being inclined intermediate its ends and having a rearwardly extending portion behind the inclined portion above the horizontal front portion and adjustable vertically with respect to the inclined portion, whereby material may be loaded onto the lower front part of the conveyor and delivered at various elevations at the back without varying the inclination of the supporting frame, and material retaining sides on the supporting frame extending from a point adjacent the forward end of the conveyor back to and partially enclosing the inclined portion, whereby a receiving capacity is provided above the horizontal portion and between the sides.

20. A portable loading and transporting machine comprising a movably supported frame, a longitudinally extending endless

conveyor in the frame, said conveyor having a substantially horizontally extending portion in the bottom thereof near the front part of the frame, said conveyor being inclined intermediate its ends and having a rearwardly extending portion behind the inclined portion above the horizontal front portion and adjustable vertically with respect to the inclined portion, whereby material may be loaded onto the lower front part of the conveyor and delivered at various elevations at the back without varying the inclination of the supporting frame, material retaining sides on the supporting frame extending from a point adjacent the forward end of the conveyor back to and partially enclosing the inclined portion, whereby a receiving capacity is provided above the horizontal portion, and gathering means at the front of the machine for delivering material onto the front of the conveyor.

In testimony whereof, I, the said JACOB M. LONDON, have hereunto set my hand.

JACOB M. LONDON.

Witnesses:

J. N. COOKE,

J. M. GEOGHEGAN.