J. M. VEST.

LOADING APPARATUS.

APPLICATION FILED NOV. 3, 1919.

1,389,021.

Patented Aug. 30, 1921.

5 SHEETS—SHEET 1.

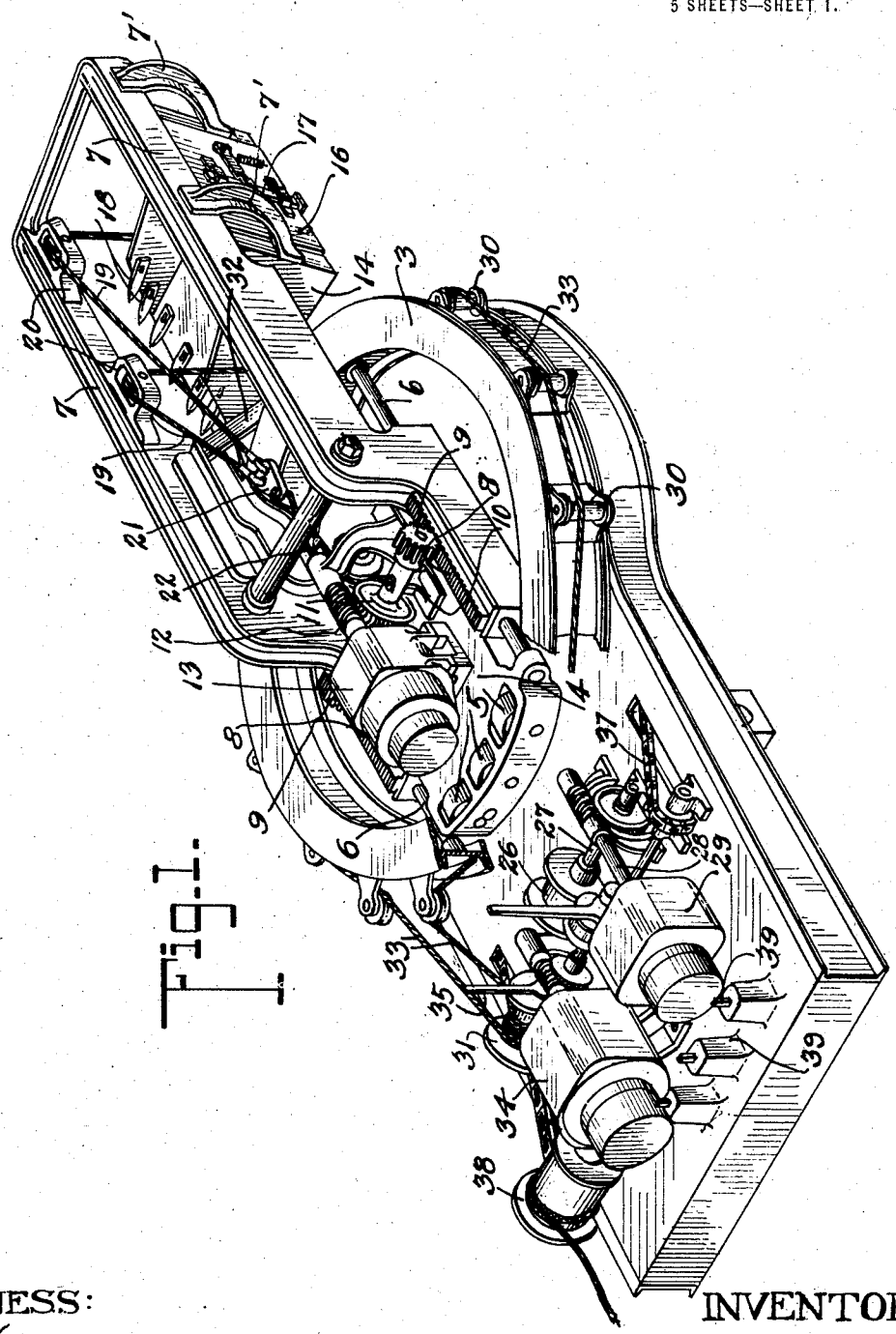


Fig. 1.

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5 SHEETS—SHEET 2.

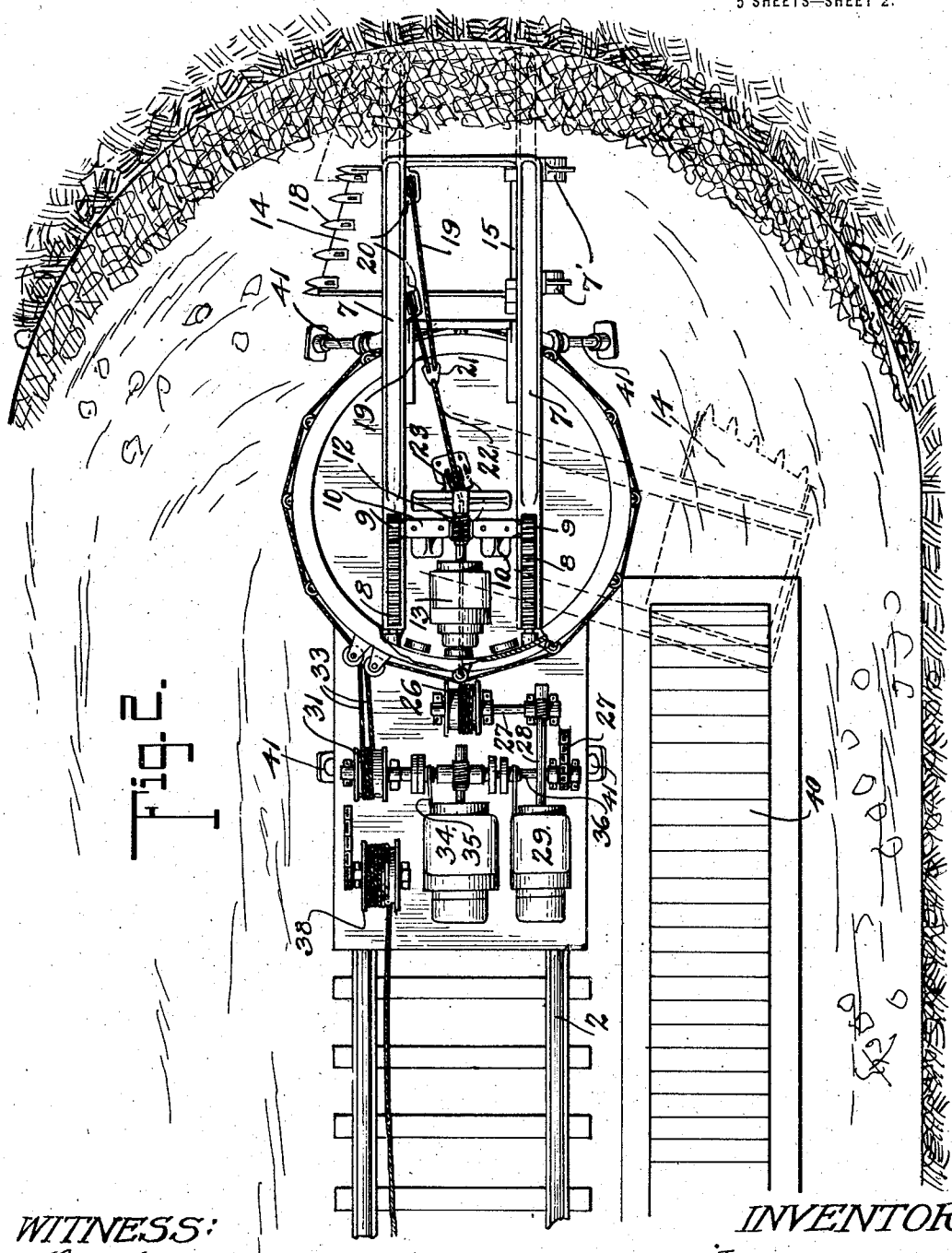


Fig. 2.

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5 SHEETS—SHEET 3.

Fig. 3.

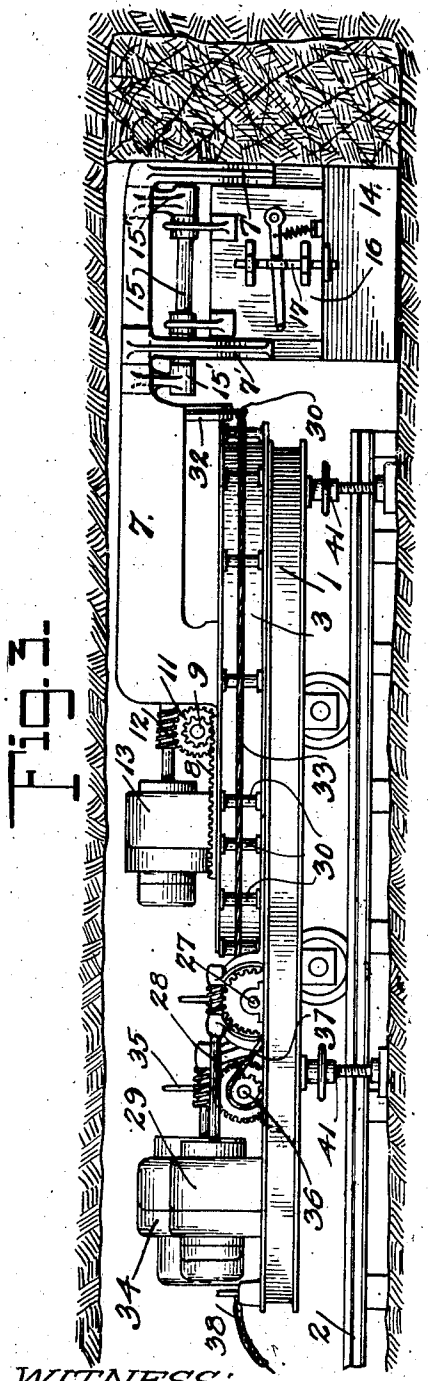
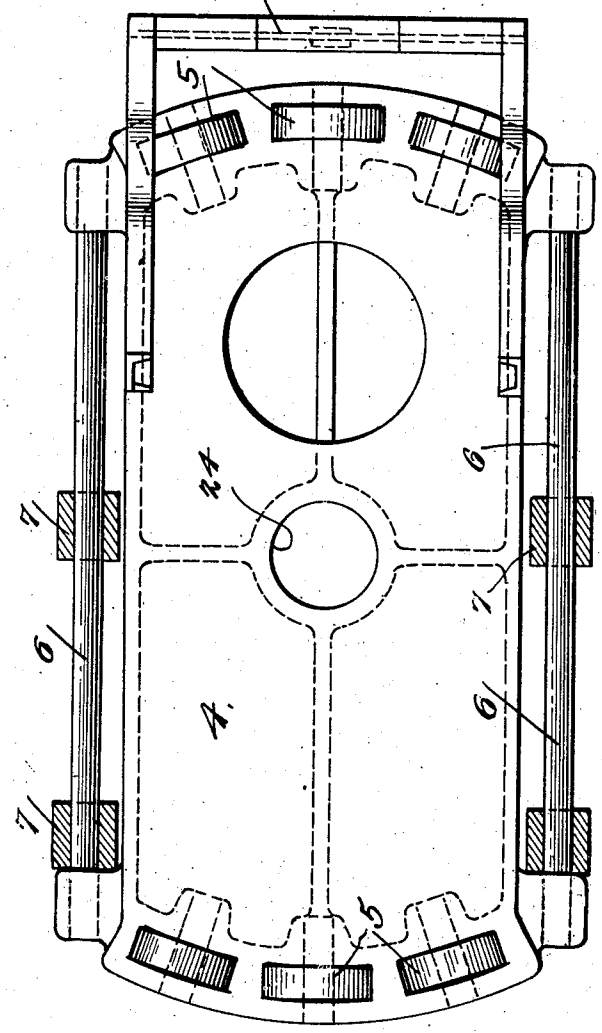


Fig. 5.



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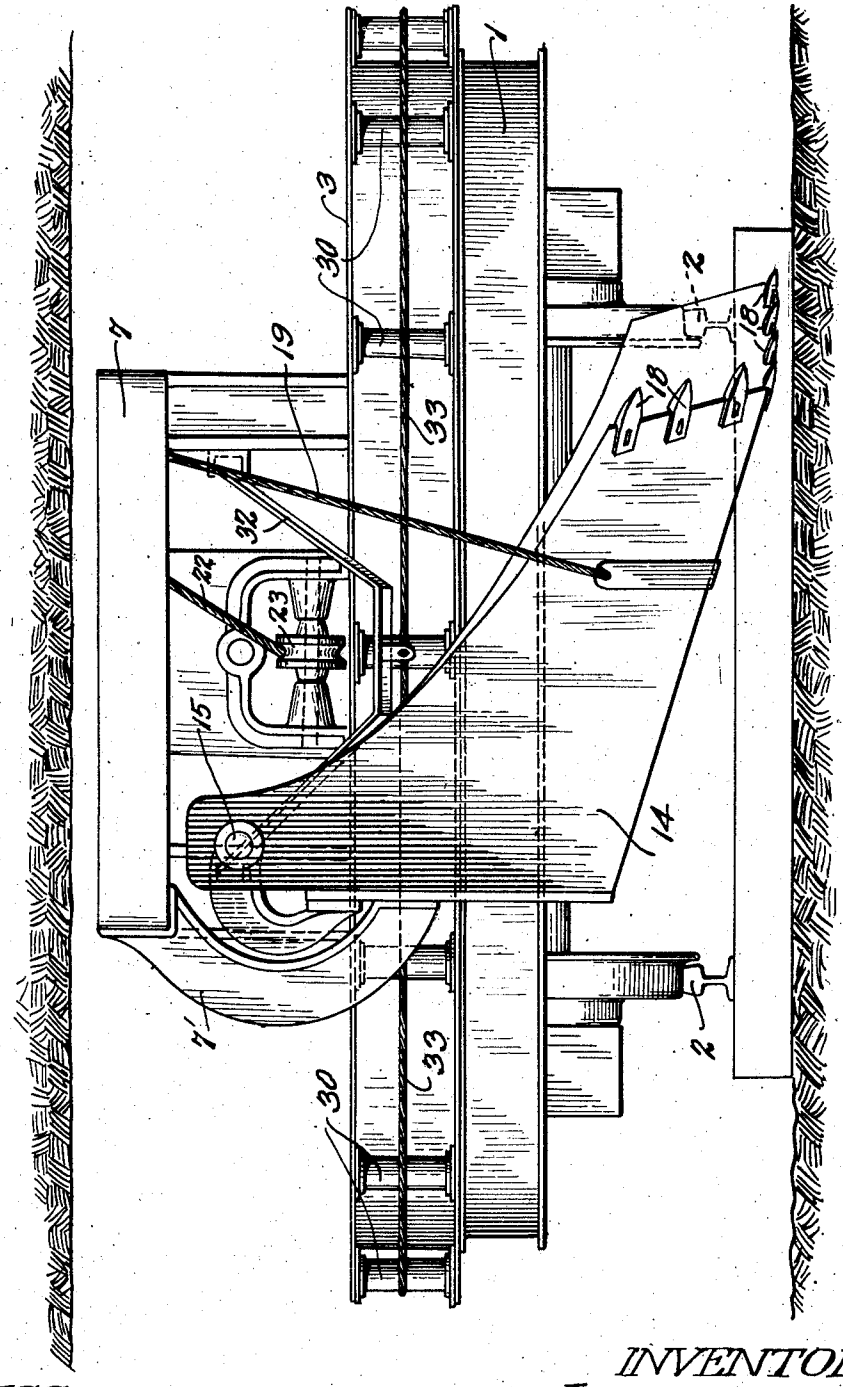
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5 SHEETS—SHEET 4.

Fig. 4.



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5 SHEETS—SHEET 5.

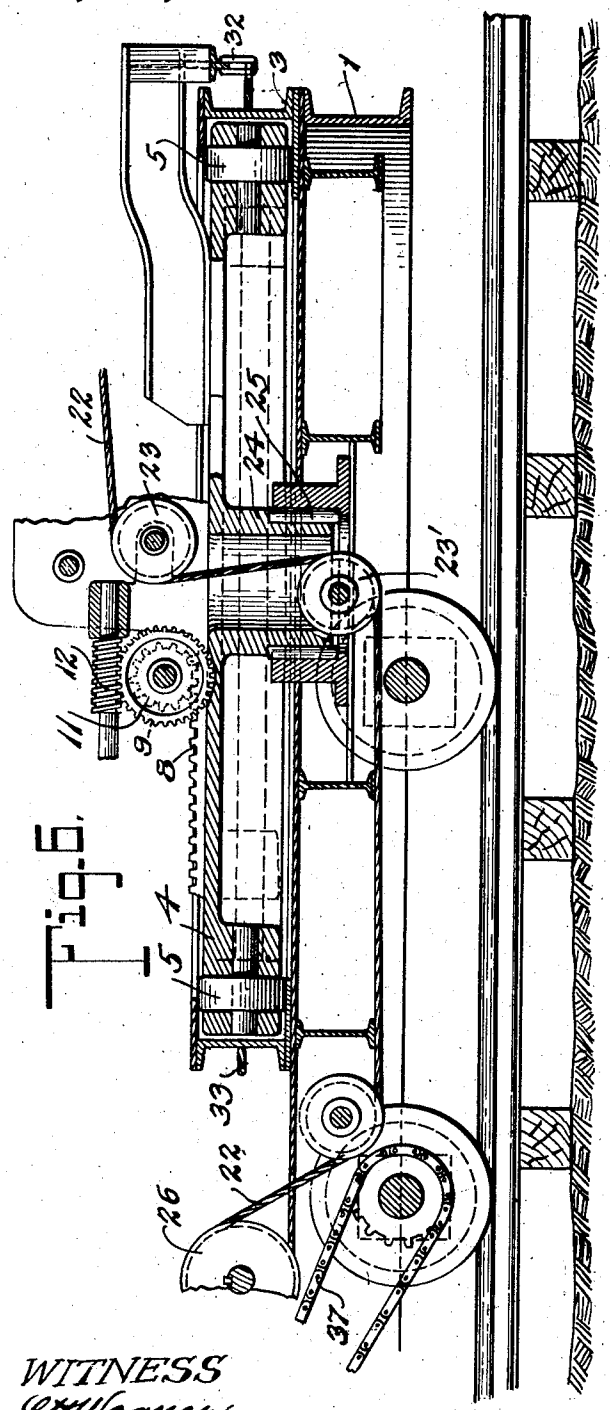


Fig. 6.

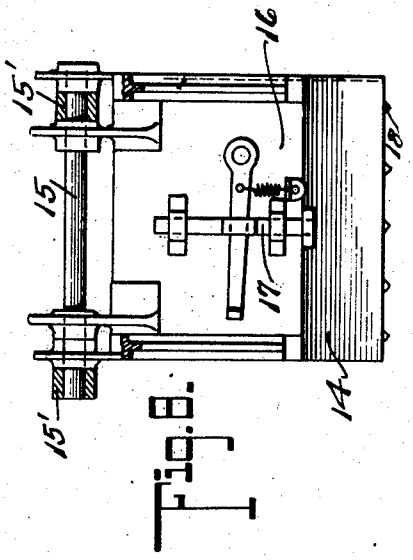


Fig. 8.

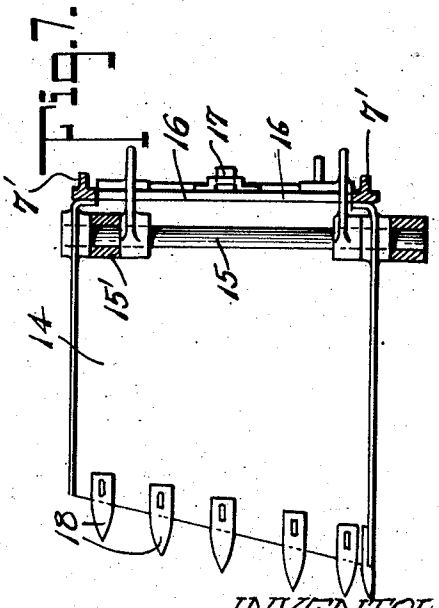


Fig. 7.

WITNESS

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UNITED STATES PATENT OFFICE.

JAMES M. VEST, OF DEHUE, WEST VIRGINIA.

LOADING APPARATUS.

1,389,021. Specification of Letters Patent. Patented Aug. 30, 1921.

Application filed November 3, 1919. Serial No. 335,531.

To all whom it may concern:

Be it known that I, JAMES M. VEST, a citizen of the United States, residing at Dehue, in the county of Logan and State of West Virginia, have invented certain new and useful Improvements in Loading Apparatus, of which the following is a specification.

The present invention relates to improvements in loading apparatus and especially to that type designed to be used where the head room is more or less restricted.

More specifically, the primary object of my invention is to provide a practical device which is simple in construction but of adequate strength or power to handle coal or ore within mine levels, tunnels or similar places, and by means of which the removal of large quantities of said material may be greatly facilitated. But I desire it to be understood that the utility of my invention is not confined to such mine operations alone since the apparatus is capable of carrying out its functions in connection with other like operations, as in road work, unloading vessels, etc.

Another object in view is to provide an apparatus having novel means for obtaining variability of its radius, that is means whereby the horizontal distance from the axis of rotation to the point at which the load is suspended may be varied and that by means separate from the means employed for hoisting the load.

A still further object is to provide a machine with a horizontally swinging boom to which the loading device or shovel is directly connected so as to obtain the maximum efficiency of thrust without likelihood of damage, and means for shifting the shovel from loading to unloading position and vice versa independent of the boom swinging operation.

These and such other objects as may hereinafter appear are attained by the novel construction, combination and arrangement of parts to be hereinafter specifically described and claimed. Reference will now be had to the accompanying drawings forming a part of this specification, wherein:

Figure 1 is a perspective view of an embodiment of my invention.

Fig. 2 is a top plan view of the apparatus.

Fig. 3 is a side elevation thereof.

Fig. 4 is a front end elevation.

Fig. 5 is a top plan view of the boom carrier or supporting frame.

Fig. 6 is a longitudinal sectional view through the loading apparatus.

Fig. 7 is a detail plan view of the shovel, and

Fig. 8 is a rear elevation of the shovel.

Throughout the following detail description and on the several figures of the drawings, similar parts are referred to by like reference characters.

As indicated above, the apparatus used in the mining of coal and ore has very restricted limits in the vertical and it therefore becomes impracticable to employ machines embodying vertically operated lifting booms or jibs. The range of operation in the horizontal even is not ordinarily very extensive so that in designing my invention it has been my aim to arrange its structural parts so that it will have a fair radius of action subject to certain extension to eliminate unnecessarily frequent shifting of the machine.

It should be furthermore understood that the material which is handled by this machine is ordinarily of a loose character, or is preferably loosened previous to being worked upon by the apparatus; however, it is so constructed as to be able to actually excavate the material if it is not in its loosened state.

In the preferred embodiment, the mechanism is mounted upon the truck 1 which operates or moves upon the usual mine track 2 into position for loading the material, as will be hereinafter described. Upon the forward end of the truck 1 is mounted a turntable, consisting of channeled track 3 which carries a boom supporting frame 4 of special construction. At the forward and rearward ends of this support are disposed a plurality of anti-friction rollers 5 which operate upon the circular track 3, and at the

sides of this support are provided longitudinally extending rods 6. The turn table is thus designed to support a horizontally extending boom which in the embodiment disclosed is of U-shaped form, comprising the spaced side members 7 which at their inner ends are slidably mounted upon the support rods 6. The upper surface of the inner ends of the side members 7 are formed with the racks 8 with which pinions 9 engage and by means of which the boom is actuated forwardly and rearwardly, or more strictly speaking longitudinally, to extend its radius of action. The pinions are carried by a short drive shaft mounted in bearing supports 10 supported upon the frame 4 and said shaft also carries the worm gear 11 which is driven by the worm 12 and the motor 13. This motor is also mounted upon the support 4 and its weight tends to counterbalance the weight upon the outer end of the boom so as to eliminate unnecessary strain upon the channeled track.

A special feature of this apparatus resides in the mounting of the bucket or shovel upon the outer end of the boom. It will be observed that the bucket 14 is pivotally suspended upon the shaft 15 mounted in suitable bearing brackets 15′ upon a side member 7 of the boom frame so that the shovel in operation swings transversely of the boom. At its rear end this shovel is provided with a discharge gate or door 16 having a suitable lock 17 for holding the door in closed position until the discharge of the contents is desired. It is to be understood that this locking mechanism for the door may be manually or automatically operated, it being immaterial which so far as this invention is concerned. At its forward or cutting edge the shovel is preferably provided with suitable teeth 18 to facilitate the loading of the material if it is not thoroughly loosened.

The shovel is provided with power hoisting mechanism for raising and lowering the same on its pivot connection in loading and discharging its contents. For this purpose I connect to the forward end at each side a cable 19, 19 each of which passes over an overhanging sheave 20 and attaches to the common connector 21 to which the cable 22 from the lifting drum is connected. This cable 22 passes over the sheave 23 mounted upon the boom support 4 adjacent to the axis of the support which consists of a hollow hub 24 suitably provided with friction bearings 25, the cable passing downward through the said hub 24 and about a lower sheave 23′, then rearwardly to the lifting drum 26 upon the rear portion of the platform 1. The drum is actuated through the shafts 27 and 28 by the motor 29 carried upon said platform.

At this point it is important to observe that the side member of the boom to which the shovel 14 is connected is provided with depending stop arm 7′ which limit the downward movement of the shovel and sustain the thrust imparted to the shovel in the loading of the material thereupon. These arms are so arranged as not to interfere with the discharge gate for the shovel hereinbefore referred to.

The boom is swung about the axis by mechanism which is now to be specifically set forth. About the periphery of the channel track 3 are arranged a series of friction rollers 30 and a cable from the drum 31 on the platform 1 extends about each side of this track to a point in front of the turn table where each is connected to the swinging arm or bracket 32 extending from the boom support. The head and tail lines or cables just referred to, designated 33, 33 are operated through the instrumentality of the main motor 34, a clutch lever 35 being provided for the control of this operation. This motor also controls the movement of the truck through the transverse shaft 36 which drives the truck through the chain connection 37, it being contemplated that certain clutch connections for this purpose are employed to obtain the proper actuation of the drum swinging elements and the propelling means, which is a purely conventional mechanical arrangement and need not be more specifically indicated. At one side of the platform is also located the cable drum 38, operated through the propelling mechanism so as to properly wind and unwind the current cables for the motor instrumentalities, the motors themselves being controlled by means of the conventional motor controls 39 arranged at the rear end of the platform 1.

In the operation of the device it will be understood that the loading apparatus hereinbefore described is run into the mine upon the usual track 2, as hereinbefore indicated, to the point where the material for loading is located. The shovel is then lowered upon its pivotal connection and the boom swung about its pivot thereby loading the shovel with the material to be handled. The shovel is then hoisted upon its pivot connection and the boom swung in the opposite direction to the point of discharge, which is most clearly shown in Fig. 2 of the drawings, as upon a conveyer 40 arranged at one side of the track which conveyer passes the material rearwardly in the usual conventional manner. The contents, of course, are discharged from the bucket by tripping the locking mechanism 17 and the shovel is then again loaded in a similar manner. During the loading operation the usual jacks 41 may be employed to support the platform extremities if desired. The load-

ing of the material continues until that which is within the radius of swing of the boom is disposed of whereupon the boom is moved forwardly by the motor 13 and its rack and pinion connection to the boom, giving a greater radius of swing to the boom. This continues, in the loading operation until it becomes necessary to advance the truck, which is accomplished by means of the propelling motor in the manner hereinbefore indicated.

In conclusion it will be observed that a very rigid and compact apparatus is provided by the foregoing arrangement and said apparatus is capable of carrying out its function in places where the head room is very low, because the bucket is operated within the planes below the boom. The direct connection of the bucket to the boom permits of considerable power being exerted against the same when it is being loaded or pushed into the material which is to be handled. It is to be understood, of course, that slight modifications may readily be made in the details of construction without departing from the spirit of the invention and within the scope of the claims hereto appended.

Having thus described my invention, what I claim as new is:

1. In loading apparatus of the class described, the combination of a horizontally swinging boom, a transversely arranged loading device connected thereto, and means connected to the loading device for shifting the same from loading to dumping position and vice versa.

2. In a loading apparatus of the class described, the combination of a support, a laterally swinging boom, load engaging means carried by said boom and arranged to receive its load as an incident to the lateral swinging movement, and means to shift the boom to increase or decrease its arc of swinging movement and range of loading action.

3. In a loading apparatus of the class described, the combination of a support, a boom, revoluble means connecting the boom to the support to swing laterally to effect loading action, load engaging means carried by said boom to receive its load through said lateral movement, and means for shifting said boom on the revoluble means aforesaid to vary the position of the loading engaging means when laterally swung to load the same.

4. In a loading device of the class described, a support, a horizontally moving boom, a bucket carried thereby, and means to adjust the boom to fix the position of the bucket with respect to the boom support during loading movement of the boom.

5. In loading apparatus of the class described, the combination of a support, a boom including means to receive a load, means revolubly connecting the boom to the support to swing horizontally for loading, and means for slidably adjusting the boom on the connecting means aforesaid to preliminarily fix the position of the loading means with relation to the boom support during loading movement of the boom.

6. In loading apparatus of the class described, the combination of a turn table support, a boom supporting frame revolubly mounted thereon, a boom connected to said frame for swinging about a vertical axis, material handling means carried by said boom, and means for shifting the boom on said frame to position the handling means with relation to the axis of said boom supporting frame previous to loading movement of the boom.

7. In loading apparatus of the class described, the combination of a revoluble boom supporting frame, a boom slidably connected thereto, a shovel connected to the boom, means to slide the boom outwardly or inwardly to position the shovel for loading, means to then revolve the boom to engage the shovel with the material for loading the same, and means for actuating said shovel on its connection with the boom to discharge it.

8. In loading apparatus of the class described, the combination of a revoluble boom supporting frame, a boom slidably connected thereto, a shovel connected to the boom and arranged to receive its load by revolving of the boom, means for actuating said shovel on its connection with the boom to discharge the load, and means for sliding the boom on said supporting frame to vary the distance between the shovel and the axis of said frame.

9. In loading apparatus of the class described, the combination of a turn table support, a boom supporting frame revolubly mounted thereon, a boom forwardly and rearwardly movable on said frame, a shovel connected to said boom, and means for actuating the boom and shovel forwardly and rearwardly to determine the loading position of the latter and rotatably to load the shovel.

10. In a loading machine of the class described, the combination of a wheeled support, a shovel mounted thereupon and having its loading end arranged laterally with respect to the support, means for raising and lowering the loading end of the shovel, means for shifting the shovel outwardly and inwardly with respect to the support to position the same at loading position, a closure for the opposite end of the shovel, and means for releasing said closure to discharge the contents of the shovel.

11. In a loading machine of the class described, the combination of a wheeled support, a boom projecting forwardly therefrom and revolubly connected to said support, a shovel attached at one end to said

boom and having its loading end disposed laterally with respect to the boom whereby to receive its load upon lateral swinging movement of the boom in one direction, means for shifting the boom longitudinally to determine the preliminary position of the shovel, a closure at the opposite end of the shovel from the loading end, means for raising and lowering the loading end of the shovel upon its connection with the boom, and means for releasing the closure whereby on movement of the boom in the opposite direction to shovel loading movement, the contents of said shovel may be discharged.

12. In a loading machine of the class described, the combination of a wheeled support, a boom projecting forwardly therefrom and revolubly connected to said support, a shovel attached at one end to said boom and having its loading end disposed laterally with respect to the boom whereby to receive its load upon lateral swinging movement of the boom in one direction, means for shifting the boom longitudinally to determine the preliminary position of the shovel, a closure at the opposite end of the shovel from the loading end, means for raising and lowering the loading end of the shovel upon its connection with the boom, and stop means carried by the boom in a position to be impinged by the shovel to thereby limit the lowering movement and to receive the thrust produced by loading movement of the boom.

13. In loading apparatus of the class described, the combination of a horizontal swinging boom, means for varying the radius of swinging movement of the boom, a shovel swingingly connected to the boom, and means for swinging the shovel on its connection transversely of the boom.

14. In loading apparatus of the class described, the combination of a forwardly, rearwardly and turnably shiftable boom, a shovel pivotally connected at one end to said boom to partake of the forward, rearward, and turning movements, and having its loading end arranged laterally of the boom so as to receive its load on turning movement of the boom, mechanism for imparting the movements aforesaid to the boom, and means connected to the other end of the shovel to swing the same about its connection with the boom into load carrying position.

15. In means of the character described, the combination of a horizontal swinging boom, a shovel having its discharge end connected to one side of said boom, and means for shifting its other end about the longitudinal axis of said boom.

16. In means of the character described, the combination of a horizontally swinging boom, a shovel arranged transversely of the boom and connected to one side thereof, hoisting means connected to the loading end of the shovel whereby to raise the shovel into load carrying position, and load discharging means connected to the other end of the shovel.

17. In means of the character described, the combination of a horizontally and longitudinally shiftable boom, a shovel arranged to receive its load during swinging of the boom horizontally in one direction, and means to discharge the contents of the shovel at a point in the swing of the boom in the opposite direction.

18. In loading apparatus of the class described, the combination of a movable truck, a turn table track of channeled form disposed upon said truck, a boom supporting member revolubly mounted upon said track, a boom longitudinally shiftable upon said support and revoluble about its axis, said boom comprising spaced side members, a shovel pivotally connected at one end to one of the said side members and arranged transversely of the boom, a hoisting cable connected to the other end of the shovel and passing through the axis of the boom support, and power actuating means arranged upon the truck to which said hoisting means is connected.

19. In loading apparatus of the class described, the combination of a movable truck, a turn table track of channeled form disposed upon said truck, a boom supporting member revolubly mounted upon said track, a boom longitudinally shiftable upon said support and revoluble about its axis said boom comprising spaced side members, a shovel pivotally connected at one end to one of the said side members and arranged transversely of the boom, a hoisting cable connected to the other end of the shovel and passing through the axis of the boom support, power actuating means arranged upon the truck to which said hoisting means is connected, and boom swinging means comprising cables extending about the channeled track in opposite directions and connected to the boom forwardly of the track, and power instrumentalities to which said cables are connected for shifting the boom upon the turntable.

20. In loading means of the class described, the combination of a boom, a shovel connected thereto, means on the boom to receive the thrust of the shovel incident to loading operation to hold said shovel against movement, and means to actuate the shovel.

21. In means of the class described, the combination of a swinging boom, a shovel movably connected thereto, means for actuating the shovel to load and unload the same, and stop means on the boom to hold the shovel against movement during the loading operation.

22. In loading means of the class described, the combination of a boom, a shovel swingingly connected thereto, stop arms depending from the boom preventing movement of the shovel in one direction during the loading operation, and means for swinging the shovel on its connection away from the arms in loading and discharging the shovel.

23. The combination of a revoluble support, a shovel or bucket having one end pivotally connected thereto to partake of the revolving movement for loading the shovel, mechanism for imparting turning movement to the support, and means connected to the loading end of the bucket whereby to raise or lower it in order to load or discharge the same.

In testimony whereof I affix my signature.

JAMES M. VEST.