Nov. 21, 1944. V. SMELY 2,363,204

LOADING APPARATUS

Filed June 21, 1941 4 Sheets-Sheet 1

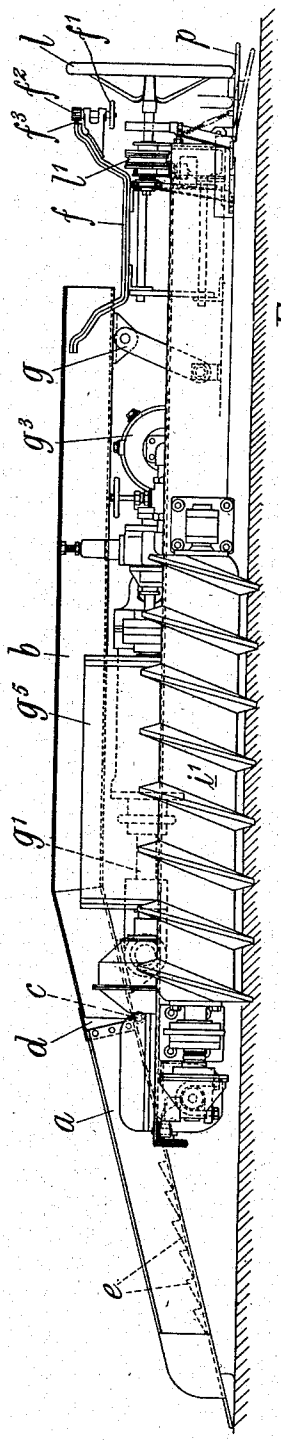


Fig. 1.

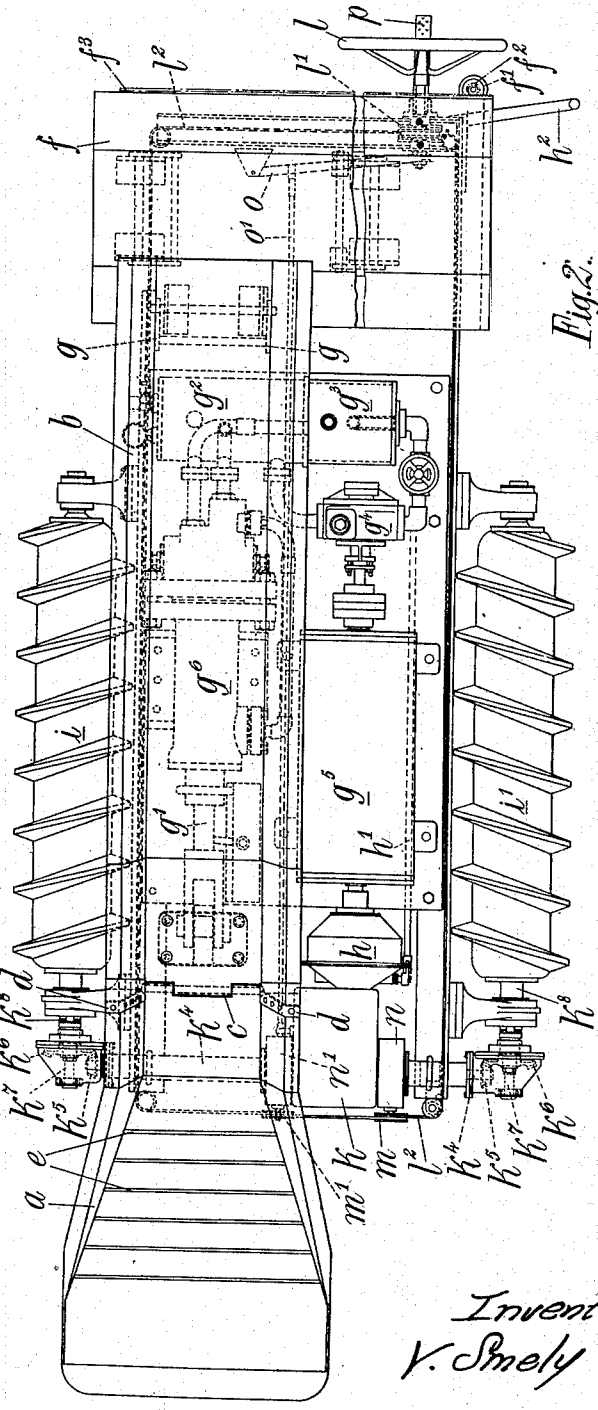


Fig. 2.

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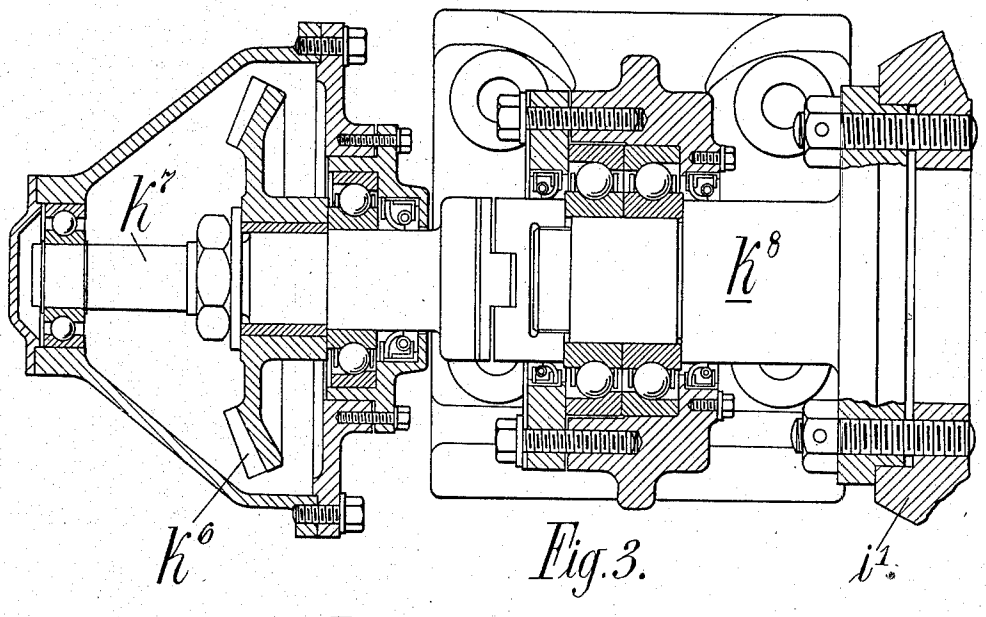


Fig. 3.

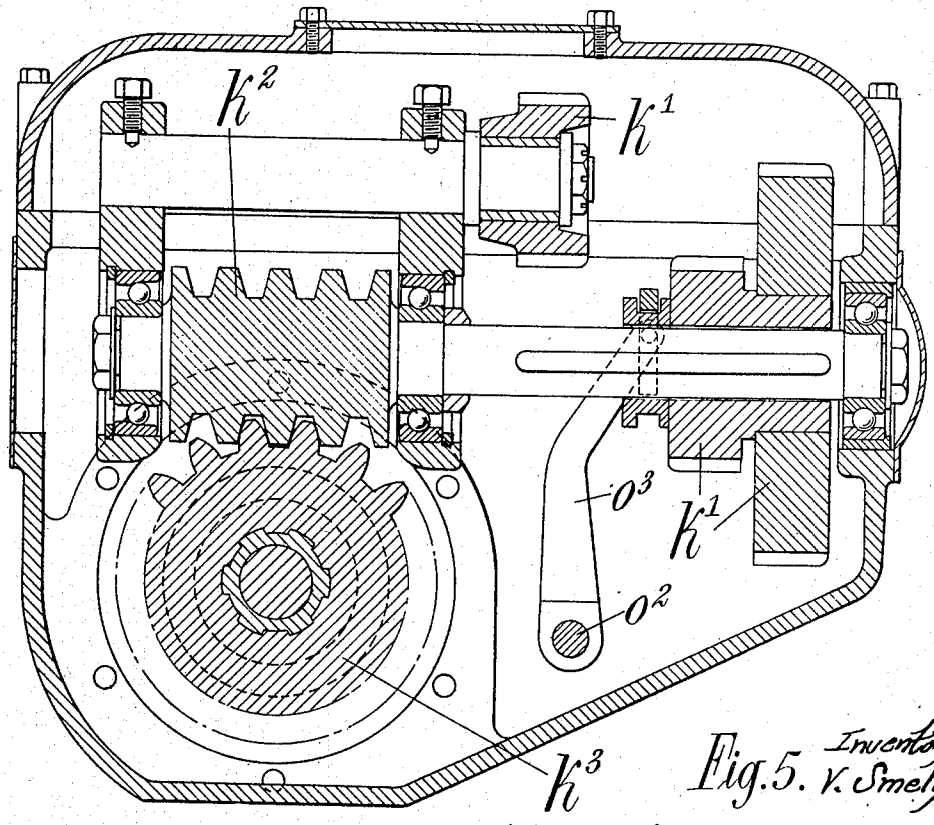


Fig. 5.

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LOADING APPARATUS

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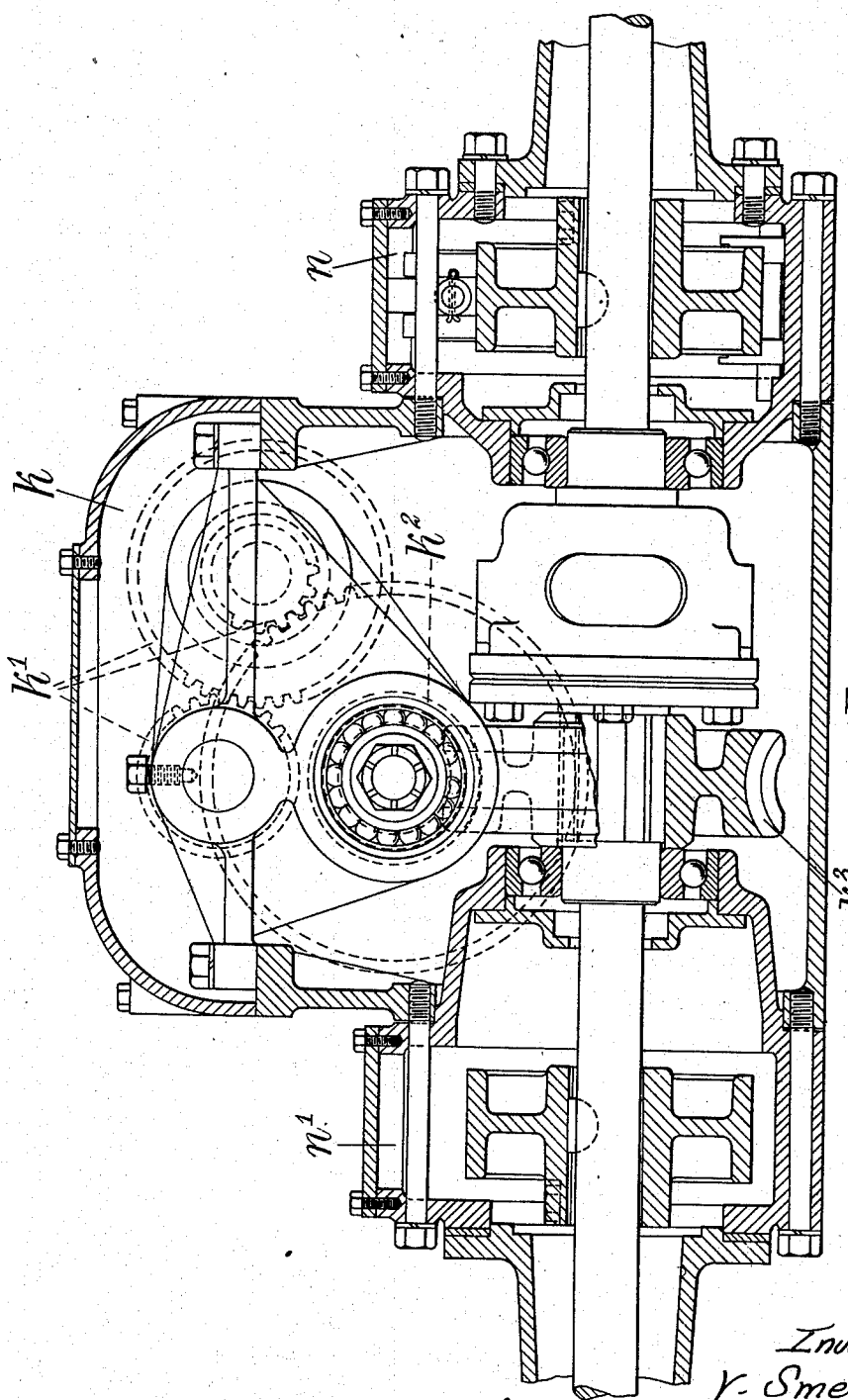


Fig. 4.

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LOADING APPARATUS

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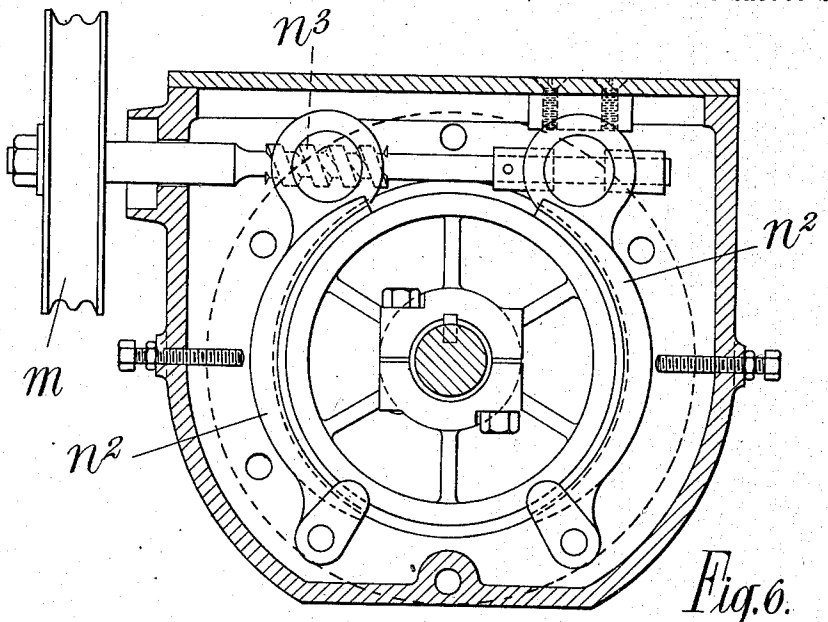


Fig.6.

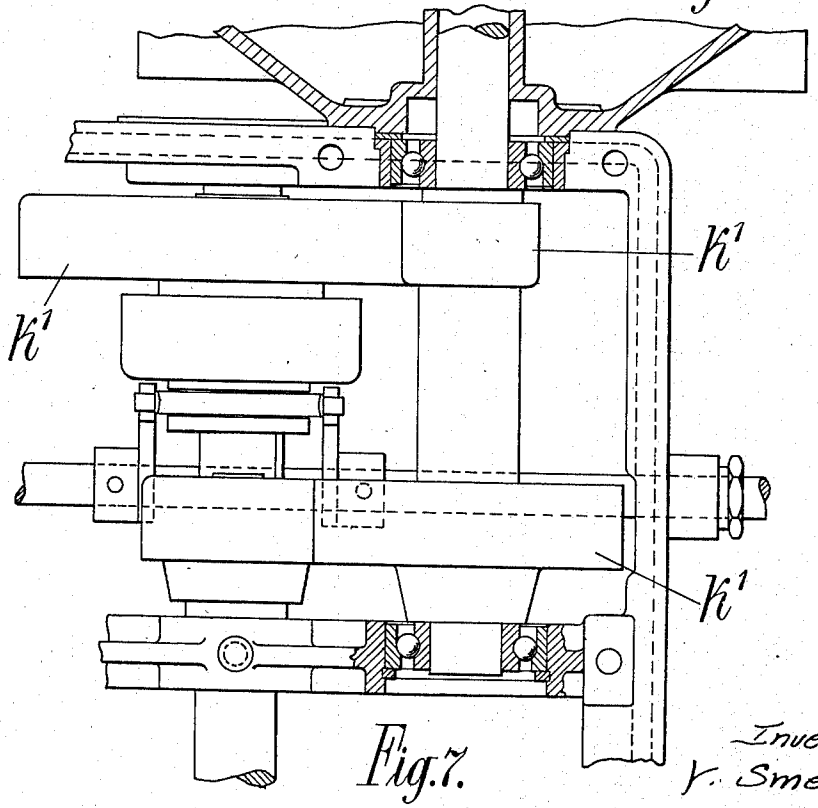


Fig.7.

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Patented Nov. 21, 1944 2,363,204

UNITED STATES PATENT OFFICE

2,363,204

LOADING APPARATUS

Vaclav Smely, Pelton, England

Application June 21, 1941, Serial No. 399,195
In Great Britain June 22, 1940

3 Claims. (Cl. 198—14)

This invention relates to loading apparatus, particularly for use in coal mines in association with shaker or other conveyors, by means of which the coal is carried away from the coal face.

Hitherto it has been known to provide as part of the shaker conveyor a loading apparatus, such, for example, as the "duckbill" loader, which digs into the coal and transfers it to the shaker conveyor to which it is attached.

Such apparatus, however, is not altogether satisfactory particularly when dealing with thin seams as the duckbill digs into the seam at such a rate that the apparatus must be continually stopped (with consequent considerable loss of time) for the purpose of disconnecting the loader from the conveyor and introducing new conveyor sections to permit of the duckbill moving forward as the coal is excavated. Moreover, the strain on the conveyor sections due to the loader digging into the coal is very considerable and the connections soon break down and must be repaired or renewed with further loss of working time.

The present invention overcomes these disadvantages by providing a mobile loading unit adapted to travel independently of the conveyor and to deliver the coal thereinto.

The invention also consists in a unit according to the preceding paragraph adapted to be movable by means of screws for which the ground surface acts as the nuts.

Further features of the invention will be apparent from the description given hereafter.

The accompanying drawings illustrate one convenient form of apparatus in accordance with the invention.

Figure 1 is a side elevation.

Figure 2 is a plan.

Figure 3 is an enlarged section of a part shown in Figures 1 and 2.

Figure 4 is an enlarged transverse section of parts shown in Figure 2.

Figure 5 is a cross-sectional view of Figure 4.

Figure 6 is a cross-section of the right-hand end of Figure 4, and

Figure 7 is a plan of gearing shown in Figure 4 with the cover removed.

In carrying my invention into effect in one convenient manner as, for example, in its application to the loading of coal in a coal-mine I may make the shaker conveyor (not shown) of any usual or suitable form and dispose the same in the usual manner in a conveniently accessible position adjacent the coal face which is undercut to permit of the operation of my loader forming the subject of the present invention.

The loading apparatus in accordance with the invention consists of a mobile unit carrying a duckbill or like loader which is conveniently formed in two parts, the front part a being hinged at c to the rear part b and there being convenient rubber sealing flaps d to prevent the fine coal falling through the crevices at the hinge. In order to prevent the sliding back of the material on the inclined portion a of the duckbill during the back (slow) stroke this inclined section is preferably provided with cleats or the like as shown at e. The duckbill is associated with a short transverse conveyor f and preferably the latter is made telescopic so that its length may be adjusted to suit the location of the main conveyor so that thereby material picked up by the duckbill may be transferred to the transverse conveyor f and by this to the main conveyor.

The adjustment of the short conveyor f may, for example, be effected by means of a handwheel f' actuating a pinion f^2 engaging a rack f^3 on one of the relatively sliding sections of the conveyor.

The loading unit so far described is quite independent of the main shaker conveyor and the loader may be operated by the usual mechanism, or it may be given the necessary reciprocatory motion hydraulically or otherwise. In the particular construction shown the duckbill loader is suspended by the links g and the reciprocatory motion is given by means of the ram g' in the hydraulic cylinder g^6, the pressure medium being supplied to the hydraulic cylinder from the reservoir g^2 while the exhaust is into the reservoir g^3.

The pressure medium is supplied to the reservoir g^2 by means of a hydraulic pump g^4 driven by a motor g^5.

The short transverse shaking conveyor f may be operated from the duckbill shaking mechanism by a bell crank or other connection or it may have its own separate hydraulic cylinder for the purpose of its actuation.

The main purpose of the drives for the loader and conveyor is to give a differential motion involving a quick acceleration against the flow of material and the operating apparatus may be generally as described in my prior specification No. 340,613 (this being the arrangement illustrated in the drawings) or it may be of other suitable form.

As indicated above the loading unit is mobile so that it may be moved along the coal face and in relation to the main conveyor as may be re-

quired for its operation. Since in general the coal face is not dead straight it is also desirable that the unit should be capable of being steered and it must also be capable of being moved back and forward, usually with a slow speed forward into the pile of loose coal and at a higher speed backward when the machine is not picking the coal up. All these requirements are fulfilled by the propulsion apparatus shown in the drawings and the propulsion may be effected (as shown) by the motor g^5 which drives the hydraulic pump, or a separate motor may be provided if desired. The propulsion motor (in this case g^5) is adapted to be clutched to, and de-clutched from, the propelling gear by a clutch h which is operated by the rod h' and lever h^2 so that by engaging or disengaging the clutch the machine may be made to be stationary or to move independent of whether the shaking or loading mechanism is in operation or not. For the purpose of moving the unit backwards and forwards the power from the motor may be transmitted to endless tracks or wheels but I prefer to transmit the power to a pair of longitudinally disposed screws i i', the ends of which may be more or less rounded off or tapered to allow for inequalities in the surface, the screws engaging with the ground which acts as a nut so that rotation of the screws will cause longitudinal movement of the unit. The screws or helices may be of solid material as shown, or they may be in the form of simple helices of steel or metal strip with trunnion ends.

In order that the unit may be driven backward and forward at varying speeds the drive passes from the motor by way of the clutch h to a change speed and reverse and differential gear contained in the casing k (Figure 2) and shown in detail at k' (Figure 5) and from the change speed gear box the drive passes by way of the worm k^2 and worm wheel k^3 to the transverse power shaft k^4 having the bevel pinions k^5 thereon engaging with the bevel wheels k^6 mounted upon the shaft k^7 coupled to the shafts k^8 connected to the screws.

The steering of the unit to the right or to the left in a smaller or greater arc is effected by means of the steering wheel l mounted upon the same shaft as a drum l' round which passes an endless cord or like flexible connection l^2, the cable l^2 also passing round the cable drums m m' by which the brakes n n' are actuated. For example, as shown in Figure 6, rotation of the cable drum m or m' may actuate the brake shoes n^2 by means of the screw n^3 operating in conjunction with a suitable nut. It will, however, be understood that any suitable form of brake mechanism may be adopted, and depending upon the pressure applied to the respective brakes the two traction helices can be made to rotate at different speeds, or either one of them can be brought to a complete standstill such as may be necessary for example when negotiating a very sharp bend.

In addition to effecting the steering of the unit the steering wheel l may also be employed for actuating the change speed gear as, for example, it may be made to move axially on its feathered shaft and by such axial movement it operates a lever o connected by the link o' to an arm outside the gear box by which the shaft o^2 (Figure 5) is rotated so as to operate the change speed lever o^3.

In order, however, to guard against the danger that the operator might try to change the speed from "forward" to "reverse" or vice versa without disengaging the clutch h I provide a foot pedal p which prevents the steering wheel l from being moved axially and the foot pedal p is interconnected with the clutch h in such a manner that when the foot pedal is pressed down it disengages the clutch and until this is done the direction of motion of the machine cannot be reversed so that in this way the gears of the gear box are safeguarded against the sudden shock which would inevitably follow any attempt to reverse the direction of motion of the machine with the clutch engaged. I prefer to associate either the handle of the clutch lever h^2 or the steering wheel l with a suitable low current auxiliary switch to operate the main motor switch by means of a solenoid, the auxiliary switch being enclosed within a compressible casing such that the operator must exert conscious pressure thereon to permit the motor functioning but which if the pressure is relaxed will bring the unit to a stop and will also stop the duckbill (the unit and duckbill being normally operated by the same motor) so that in fact the device constitutes a "dead man's hand."

It will be understood, however, that the invention is not limited to the foregoing details of construction which are given purely by way of example since I may modify the form of loading unit and the means adopted for driving same and may associate the unit with any type of main conveyor depending upon any practical requirements that may have to be fulfilled.

Furthermore, although I have described the invention in reference to the loading and conveying of coal it will be understood that it may be used in any situation either above or below ground for which its use may be indicated.

I claim:

1. In a loading device, the combination of a framework, a duck-bill loader carried thereby, a hydraulic engine for operating the duck-bill with a rapid acceleration against the flow of material, a pump supplying fluid to said engine, a shaking conveyor arranged transversely of the duck-bill for receiving material from the duck-bill and discharging it from the loader, mechanical means for moving the loader from place to place, and power means for operating said mechanical means and the pump supplying the hydraulic motor.

2. In a loading device, the combination of a framework, a duck-bill loader carried thereby, a hydraulic engine for operating the duck-bill with a rapid acceleration against the flow of material, a pump supplying fluid to said engine, a shaking conveyor arranged transversely of the duck-bill for receiving material from the duck-bill and discharging it from the loader, mechanical means for moving the loader from place to place and a single motor for operating said mechanical means and the pump supplying the hydraulic motor.

3. In a loading device, the combination according to claim 1 in which the framework is mounted upon longitudinally disposed screws for which the ground surface acts as the nuts, the screws being adapted to be rotated by the said power means.

VACLAV SMELY.