Jan. 2, 1945. N. D. LEVIN 2,366,536

LOADING MACHINE

Original Filed Oct. 22, 1937 2 Sheets-Sheet 1

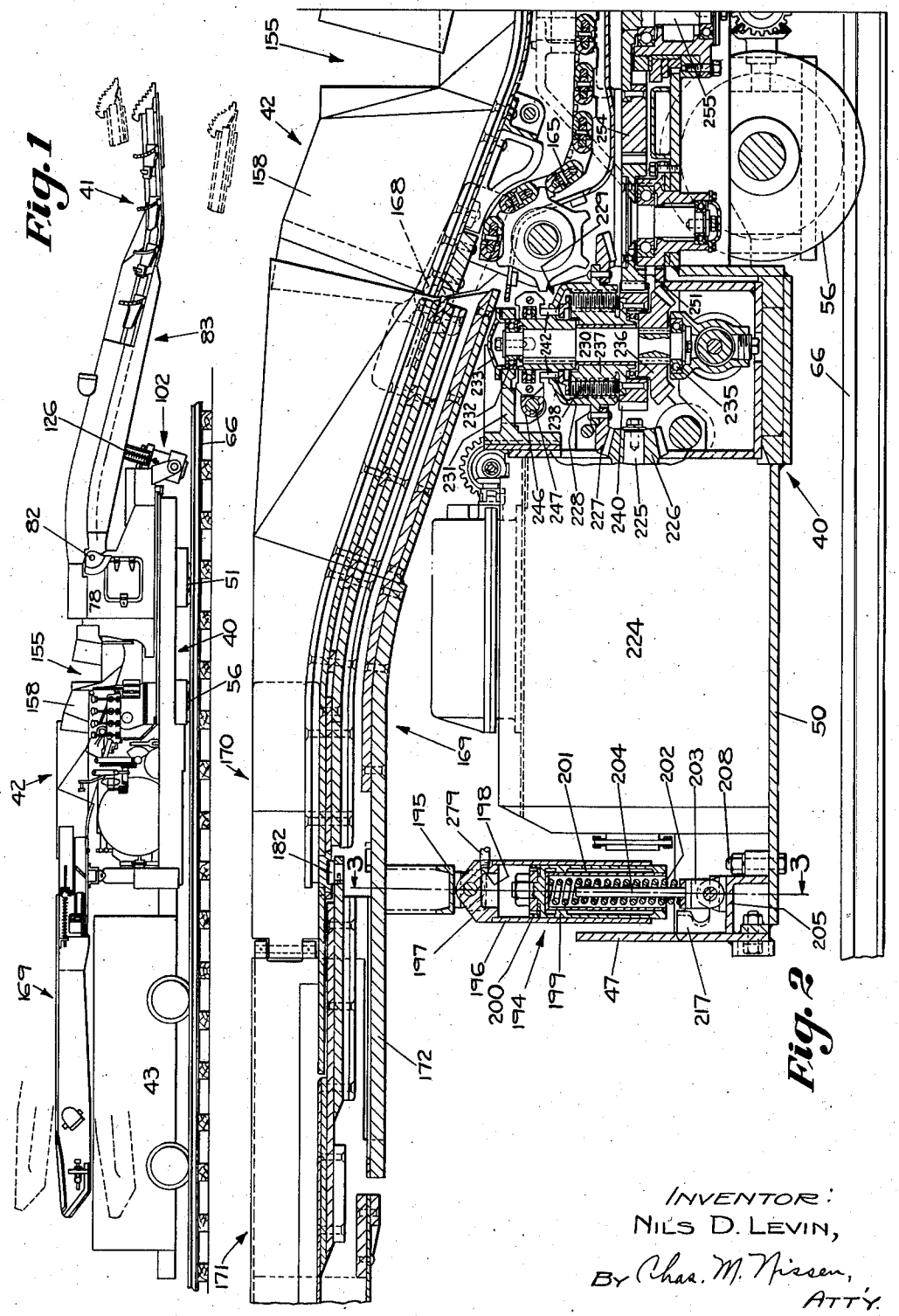


Fig. 1

Fig. 2

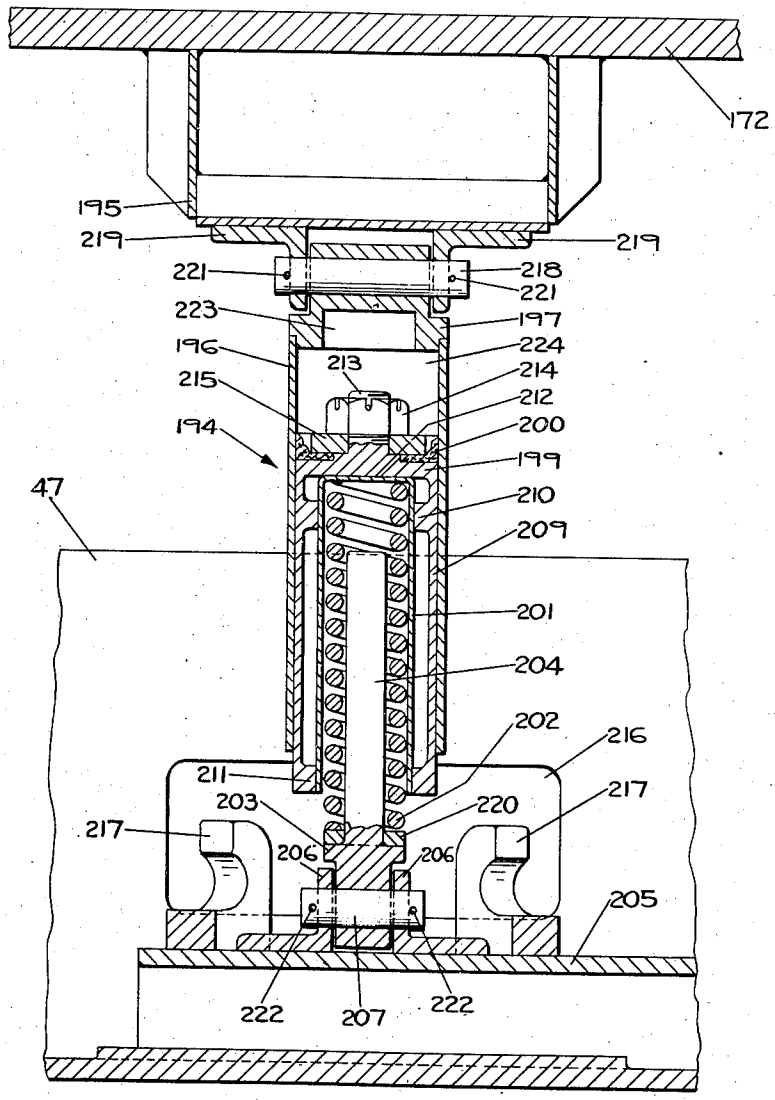
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Fig. 3



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2,366,536

LOADING MACHINE

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Original application October 22, 1937, Serial No. 170,426. Divided and this application September 22, 1943, Serial No. 503,407

20 Claims. (Cl. 198—233)

This invention relates to loading machines, and one of the objects of the invention is the provision of improved hydraulic mechanism for adjusting the elevation of a conveyor swingable on a horizontal axis and resiliently supporting such conveyor when in adjusted position.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

In the accompanying drawings,

Fig. 1 is a side elevational view of the loading machine embodying my improvements;

Fig. 2 is a vertical longitudinal sectional view of the rear portion of the loading machine shown in elevation in Fig. 1; and

Fig. 3 is an enlarged sectional elevation taken on the line 3—3 of Fig. 2, looking in the direction of the arrows.

This application is a division of my abandoned application, S. N. 170,426, filed Oct. 22, 1937, for an Improvement in a loading machine.

The loading machine illustrated in Fig. 1 of the accompanying drawings comprises a track mounted truck 40 upon which is mounted a gathering conveyor 41 and a discharge conveyor 42, the former being adapted to dig into and gather loose or semi-compact coal and to convey it to the latter by which it is discharged into track mounted coal cars, one of which is illustrated at 43.

Power means is provided to tram the loading machine along the mine tracks at a relatively fast speed, and to operate it along said tracks at a feeding or operating speed while at the same time operating the gathering and discharge conveyors to gather and load coal into coal cars 43.

The truck 40 comprises forward flanged wheels 51 for engaging the mine track 66 and also rear flanged wheels 56 for engaging the track 66. The gathering conveyor unit 41 is pivotally connected at 82 to a supplemental frame 78, for up and down swinging adjustment by means of the hydraulic motor 102 on which the boom 83 is resiliently mounted. The hydraulic motor 102 is mounted on the forward end of the supplemental frame 78 and acts to adjust the elevation of the front end of the conveyor unit 41. The gathering conveyor unit 41 is also swingable laterally to various angular positions relative to the truck 40, the supplemental frame 78 being pivoted on an upright axis on the truck 40 for this purpose.

The boom 83 is supported on a pair of coil springs 126 one of which is shown in Fig. 1. When the loading machine, with the gathering conveyor unit 41 elevated, travels along the mine track 66, about the same weight is carried on each of the axles of the wheels 51 and 56. When at the coal face, the front end of the gathering conveyor unit 41 is lowered until it rests on the mine bottom. This takes a great amount of weight off the front axle and, except for springs 126, 126, would throw the machine out of balance to such an extent that the front wheels 51 might raise off the track and derail the machine. Also, sometimes the front end of the gathering conveyor 41 climbs up a roll in the mine bottom. The springs 126, 126 insure sufficient load on front wheels 51, 51 to keep them on the track rails under all normal conditions and prevent derailment.

The discharge conveyor unit 42 extends rearwardly from the hopper 155 into which gathered material is delivered by the gathering conveyor unit 41. An endless chain flight conveyor 165 transfers the material in the hopper 155 to the mine cars 43.

The bed plate 50 is attached rigidly to the truck frame 40 and extends rearwardly of the rear wheels 56. This bed plate 50 supports the single drive motor 224 which operates all the apparatus on the loading machine including the mechanism for driving the endless traveling conveyors of the gathering unit 41 and the endless chain flight conveyor 165 of the discharge unit 42.

The electric motor 224, although reversible, is preferably always driven in the same direction so as to drive the conveyors through the power transmission mechanism shown in Fig. 2, always in the same direction. Truck propelling mechanism as shown in detail in said co-pending application, S. N. 170,426 (and also in another co-pending application, S. N. 379,475, filed Feb. 18, 1941, as a division of S. N. 170,426), is provided to reciprocate the entire loading machine along the mine track 66 during loading operations.

As shown in Fig. 2, the discharge conveyor unit 42 is divided into sections, one being a hopper section 158 which is mounted in fixed relation to the truck 40 and the other section being a discharge boom 169 which is pivoted at 168 for up and down adjustment on a horizontal axis.

Rigidly secured to the bottom plate 172 of the discharge boom 169 is a transverse bracket 195. Interposed between the bracket 195 and the rear end of the bed plate 50 is a single acting hydraulic piston motor device 194.

Pivotally connected to the transverse bracket 195 on a horizontal axis is a cylinder 196 having a head 197 provided with an appropriate inlet port 198 within which cylinder extends a cylindrical piston 199 provided at its top with a clamped

leather or compound sealing ring 200 which makes a leak-proof sliding fit, within which cylindrical piston 199 is a guide cylinder 201 within which extends a coil spring 202 mounted upon a pivoted coupling member 203 having an upstanding guide rod 204 which extends into the coil spring 202 and into the guide cylinder 201, the coupling member 203 being pivotally attached to a bracket 205 formed integral with the rear bed plate 50 and the bumper plate 47 of the truck 40.

It is evident that the coil spring 202 will provide a flexible support for the discharge boom 169 for any position of adjustment thereof, thus relieving any strain caused by a large lump of coal on the boom striking the top of the mine roof or for any other similar cause. The guide rod 204 provides a guide and retaining means for the coil spring 202.

It will be evident that by admitting fluid under pressure from pipe 279 to the port 198 or discharging it by said port, the piston 199 may be adjusted in the cylinder 196 to expand or contract the hydraulic piston motor mechanism 194 thus swinging the discharge boom 169 about the horizontal axis provided by the pins 168. By locking the fluid in the cylinder 196, as hereinafter described, the boom 169 may be locked in any elevated position.

As shown in Fig. 2, the electric motor 224 is mounted upon the rear bed plate 50 of the truck 40 and compactly positioned below the discharge conveyor 42 which extends upwardly and rearwardly from the hopper 155. Due to this positioning of the electric motor 224 it is possible to provide a very large and powerful motor which is capable of effecting any and all of the drives required at any time while maintaining a machine of low height to permit its use in a relatively low head coal mine. Said electric motor 224 is provided with a forwardly extending armature shaft 225 carrying a drive pinion 226 meshing with a bevel ring gear 227 which is rigidly attached to the housing 228 of a friction clutch mechanism 229. The housing 228 is keyed to a vertical shaft 230 which is mounted at its top in a bracket 231 rigidly attached to the main frame of the truck 40, there being an anti-friction ball bearing 232 interposed between the bracket 231 and the shaft 230 which is held in place by a removable cap 233. The bottom of the shaft 230 is supported in a bracket formed rigid with the bottom plate 50, said support being through an anti-friction ball bearing 235. Keyed to the lower end of the shaft 230 and above the bearing 235, is a bevel gear 236. It may thus be noted that the gear 227 and the gear 236 being both keyed to the shaft 230, will be driven together at all times from the motor 224.

Journaled loosely on the central portion of the shaft 230 is a clutch member 237. Splined on the interior of the housing 228 and on the exterior of the clutch member 237, which members 228 and 237 comprise co-operating clutch members, is a plurality of overlapping stacked friction plates 238, alternate ones of which are connected to the housing 228 and the clutch member 237, respectively. Adjacent its bottom the clutch member 237 is provided with an integral extended flange to which is pinned a gear 240. The flange, in addition to supporting the gear 240, also acts as one compression member for the friction clutch plates 238.

To effect a compression of the clutch plates 238 and thus to effect an engagement of the clutch elements 228 and 237, I provide a compression ring within the housing 228 having a flange which bears against said plates 238. Downward movement of the ring to effect the aforementioned compressing action is effected by a plurality of pins 242 which extend through apertures in the housing 228 and are carried by a ring operable through an anti-friction ball bearing by a trunnion collar which is controlled by a shipper 246 keyed on a shaft 247 (Fig. 2).

It will be evident that rocking movement of the shaft 247 to urge the collar downward will cause an application of the friction clutch 229 to drive the gear 240 and when the shaft 247 is released the clutch 229 will automatically become disengaged due to lack of sufficient clamping pressure on the plates 238.

It may be stated that the gear 240 which is controlled by the clutch 229 is individual to a gear train comprising the gears 251 and 254, for driving the gathering conveyor, as more fully explained in my co-pending application, S. N. 379,475. The hydraulic motor means for swinging the gathering conveyor unit 41 on the upright axis of the shaft 255 is also disclosed in said co-pending application. This application also fully discloses the mechanism for mounting the hydraulic motor 102 together with the springs 126.

During normal operation, the conveyor boom 83 rests on the springs 126, while the front wheels 51 are on the mine track. When the gathering conveyor is adjusted in elevation the hydraulic motor 102 acts through the springs 126 on the bottom plate of the boom 83, but when the upward movement of the gathering conveyor is resisted by dislodged coal fallen from the semi-compact mass onto the receiving end of the gathering unit 41, the springs 126 may be completely compressed to afford a direct connection between the motor 102 and the boom 83 thereby effecting a powerful and positive lifting of the receiving end of the gathering unit from the mass of dislodged coal. At the same time the truck propelling mechanism may be reversed to effect withdrawal of the gathering unit from such mass of dislodged coal.

It should be particularly noted that a single electric motor 224 is provided for operating the entire loading machine including the operation of a hydraulic pump to provide hydraulic pressure to the hydraulic control system for the motors 102, 194 and the hydraulic motor for swinging the gathering conveyor unit 41 on the upright pivot 255. These hydraulic motors may be controlled individually by the operator located at a single station at one side of the loading machine. By means of one valve the operator may control the double acting hydraulic motor 102 to effect adjustment in elevation of the gathering conveyor unit 41 and the locking thereof in any of the adjusted positions shown in full and dotted lines at the right-hand end of Fig. 1. By means of another valve the operator may effect adjustment of conveyor unit 42 by means of the single acting vertical reciprocating hydraulic motor 194 on the horizontal axis of the pivot at 168, to the full and dotted line positions shown at the left-hand end of Fig. 1. When the gathering conveyor unit 41 is in the full line position shown in Fig. 1, the whole machine may be transported along the mine track under the control of the operator who may start or stop the electric motor 224 by means of motor controlling apparatus. By means of a reversing switch the operator may reverse the electric motor 224 and thereby con-

trol the directions of travel of the conveyor chains of the gathering unit 41 and the discharge unit 42.

The truck propelling means comprises power transmission mechanism between the electric motor 224 and all of the wheels 51 and 56 of the truck. This power transmission mechanism is under the control of the clutch 229 in Fig. 2. The operator may apply or release the clutch 229 by rocking the shaft 247. The truck propelling power transmission mechanism also includes two reversing clutches, either of which may be applied by the operator and consequently the loading machine during operation may be moved along the mine track in either direction without reversing the electric motor 224.

It will thus be seen that the electric motor 224 may be operated continuously in the same direction, while by means of said reversing clutches the gathering mechanism may be moved forwardly or rearwardly under the control of the operator. A very powerful sumping movement of the gathering unit 41 into the semi-compact mass of shot down coal may thus be effected and whenever desired a very powerful withdrawal movement of the gathering mechanism may also be effected. If there should be an overload on the gathering conveyor unit due to contact between its conveyor flights and solid or irremovable coal, the applied reversing clutch will slip, whereupon such slipping clutch may be manually released and the other reversing clutch manually applied to cause the machine to be moved rearwardly thereby causing the conveyor flights to release the contacted coal and relieve the overload.

The discharge conveyor unit 42 may comprise two sections 170 and 171, with the rear section 171 movable laterally on the upright pivot 172. Hydraulic motor mechanism is controlled by a valve at the operator's station to effect power swinging of the rear section 171 of the discharge conveyor.

It is preferred that a main operator should be in a position to operate all of the valve controlling levers and that another operator should be able by means of extended actuating connections, to control adjustments of the discharge conveyor independently of the operation of the gathering conveyor. As the mine cars are brought up, loaded, and replaced by empty cars, a rear operator may start and stop the discharge conveyor and adjust the elevation of the rear end thereof as well as its lateral position. The main operator will know when the discharge conveyor stops without looking backward and thus stop the gathering conveyor to prevent overflow from hopper 155.

Whenever the electric motor 224 is operating, the hydraulic pump is being continuously operated so that at all times the hydraulic system is in readiness for performing the various adjustments by means of the hydraulic reciprocating motors including those designated 102 and 194. The controlling valves when released, automatically move to their neutral positions where the hydraulic motors are locked, thus rigidly holding the various parts in adjusted positions. It is important to note that whenever a controlling valve is manually released it is returned automatically to neutral position and at the same time a by-pass valve is automatically moved to no-load position. The high pressure valve opens only when the maximum output of pressure is exceeded but when the valve is opened, a very free passageway is provided for by-passing the liquid continuously pumped by the hydraulic pump while the main motor 224 is continuously operating.

Reverting to the single acting reciprocating hydraulic motor 194, attention is called to the enlarged view in Fig. 3 which is a sectional elevation on the line 3—3 of Fig. 2 looking in the direction of the arrows. As shown in Fig. 3, the coupling member 203 at the lower end of the guide rod 204 is pivoted by means of the pivot pin 207 to the angles 206, 206 which are rigidly secured to the bracket 205 which may be in the form of a cross-piece detachably secured to the rear end of the bed plate 50 by means of bolts one of which is shown at 208 in Fig. 2.

As shown in Fig. 3, the piston 199 is provided with a tubular extension 209 which is open at its lower end. This tubular extension is provided with an inner annular flange 210 near its upper end and with another annular flange 211 at its lower end. These annular flanges 210, 211 have the same diameters, each equal to the outer diameter of the guide cylinder 201.

The flanges 210, 211 receive the guide cylinder 201 and the spring 202 presses against the inner upper closed end 212 of the cylinder to hold the same against the bottom of the piston 199.

The upper side of the piston 199 is provided with a screw-threaded extension 213 to receive a nut 214 for clamping the washer 215 against the sealing ring 200 to hold the latter in place.

In front of an opening 216 in the bumper plate 47 is a pair of spaced-apart hooks 217, 217 rigidly secured to the bracket 205 and adapted to have anchored thereto a towing rope or other coupling means extending to a mine car or to a hauling mine locomotive. In other words, the hooks 217, 217 may serve to connect the loading machine to mine cars so that the latter may be transported in the mine if the loading machine is self-propelling. If it is not desired to use the self-propelling means of the loader for transportation purposes, a mine locomotive may be coupled to the hooks 217 and such locomotive relied on to move the loader from one place to another in the mine.

Not only is the lower end of the reciprocating hydraulic motor 194 pivotally connected at 207 to the rear end of the bed plate 50 and therefore to the rear end of the truck frame, but the upper end of such hydraulic motor is also provided with means for pivotal connection to the transverse bracket 195 which is rigidly connected to the bottom plate 172 of the discharge boom 169.

As shown in Figs. 2 and 3, the upper closure head 197 of the cylinder 196 is provided with a pivot pin 218 extending through the angles 219 which are rigidly secured to the transverse bracket 195. The pivot pin 218 may be held in place by means of cotter pins inserted through the transverse perforations 221. In a smiliar manner the pivot pin 207 may be kept from dropping out by means of cotter pins inserted through the transverse perforations 222.

It should be particularly noted that the upper and lower pivot pins 218 and 207 are in parallelism with each other and each extends transversely of the loading machine so that when the hydraulic motor 194 is expanded and contracted to adjust the elevation of the rear end of the discharge conveyor unit 42, the piston 199 will always be free to move in the cylinder 196 without binding. Such free movement of the piston 199 in the cylinder 196 is also facilitated by telescoping the piston 199 and its extension 209 into the

cylinder 196 so that the guiding action of the piston in the cylinder extends over a wide cylindrical area. At the same time, the spring 202 always extends into the guide cylinder or inverted cup 201 over almost its entire length so that at all times the weight of the discharge boom 169 and the load thereon, is carried by this spring, the latter and the hydraulic motor 194 being always in series between the bed plate 50 and the plate 172, irrespective of the adjusted elevation of the rear end of the discharge conveyor unit 42.

It should also be noted that the upwardly projecting guide rod 204 may serve as a limit stop to protect the lower end of the guide cylinder 201 and the lower flange 211 of the piston extension 209, against striking against the angles 206, 206. If the discharge conveyor unit should become overloaded the spring 202 would be compressed until the upper end of the rod 204 engaged the inverted bottom 212 of the guide cup or cylinder 201 thereby limiting the extent of downward movement of the cylinder 201 and of the flange 211. The upper end of the coupling member 203 may be circular and of the same diameter as the washer 220 thereon and each of less diameter than the inner diameter of the cylinder 201 so that when the spring 202 is compressed to the extent permitted by the limit stop rod 204, the lower end of the cylinder 201 will telescope over the washer 220 and the upper end of the coupling member 203 without reaching the angles 206, 206.

The lower side of the cylinder head 197 is provided with a recess 223 for receiving the nut 214, thereby increasing the length of stroke of the piston 199. When there is no hydraulic pressure in the chamber 224, the cylinder head 197 may rest on the piston 199 or the screw-threaded extension 213. The discharge conveyor and its load will then be carried by the spring 202. With normal loads on the discharge conveyor, the hydraulic motor 194 may be expanded and contracted, and the discharge conveyor and its load would still be carried by the spring 202.

With overloads on the discharge conveyor unit 42 the spring 202 will be compressed to its maximum extent and then the discharge conveyor and its load would be carried on the limit stop rod 204. But whether the discharge conveyor unit 42 and its load is carried by the spring 202 or by the rod 204, the hydraulic motor may always be expanded and contracted to adjust the elevation of the rear end of the discharge conveyor.

When the cylinder 196 is at its lowermost limit of travel, the upper end of the screw-threaded extension 213 will abut against the ceiling of the recess 223 and at such time the inverted bottom 212 of the guide cylinder 201 will rest against the top of the limit stop rod 204. There will then be a rigid supporting connection, entirely mechanical, between the discharge boom 169 and the rear end of the truck frame but in such event the spring 202 is still in series with the hydraulic motor 194, with the spring 202 under maximum compression ready to expand again as soon as the load on the discharge conveyor is sufficiently reduced. Even when the spring 202 is under maximum compression the hydraulic motor 194 may be expanded and contracted to adjust the elevation of the rear end of the discharge conveyor unit 42. Normal loads are therefore always supported by the spiral spring 202 irrespective of the elevation of the rear end of the discharge conveyor unit 42 and abnormal loads are positively resisted and supported when necessary to prevent breakage of any mechanism.

The spring 202 is preferably relatively large and very strong to enable it to not only carry the discharge boom 169 and its load but also to absorb the shocks due to the largest lumps of coal suddenly engaging the roof of the mine chamber while being conveyed to mine cars. The spring 202 fits loosely in the cylinder 201 and also fits loosely over the guide rod 204 as shown in Fig. 3, so that free compression of the spring may be secured without binding. Nevertheless, the axes of the rod 204, spring 202 and cylinder 201 substantially coincide at all times during compression and expansion of the spring 202, thereby maintaining the guiding action of the rod 204 to facilitate free movement of the piston 199 in the hydraulic cylinder 196 and thus keeping the axis of the latter always in position to coincide with the aforesaid axes of the rod 204, spring 202 and cylinder 201. In other words, not only are the spring 202 and hydraulic cylinder 196 always in series, but the axis of the spring 202 always coincides substantially with the axis of the piston 199.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and I therefore wish not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of my invention, what I desire to secure by Letters Patent of the United States is:

1. A loading machine comprising the combination with a supporting frame, of a conveyor mounted on said supporting frame for swinging movement relatively thereto on a horizontal axis, an elongated reciprocating hydraulic piston motor comprising a cylinder open at one end and an elongated piston projecting from such open end, a spiral cushioning spring connected to the piston of said motor, mechanism connecting said motor and said spring in series to constitute an expansible resilient supporting unit, a pivotal connection between one end of said unit and said conveyor, and an additional pivotal connection between the other end of said unit and said frame, the construction and arrangement being such that said spring is able to resiliently support the conveyor for pivoted movement on said horizontal axis relatively to said supporting frame in any position to which the motor may be adjusted.

2. A loading machine comprising the combination with a supporting frame, of a conveyor mounted thereon for adjustment relative thereto, a combined fluid pressure motor and cushioning device, said device comprising a fluid pressure cylinder pivoted to said conveyor and a cylindrical piston extending upwardly into such fluid pressure cylinder, a fluid pressure chamber being thus formed above said piston, cushioning mechanism pivoted at its lower end to said supporting frame and comprising a spring extending upwardly into said cylindrical piston, and means for controlling the flow of fluid pressure medium into and out of said fluid pressure chamber to effect adjustment in elevation of said conveyor relative to said frame.

3. A loading machine comprising the combination with a supporting frame, of a conveyor pivoted thereto, a combined hydraulic jack and cushioning device pivotally connected to said

conveyor and said frame to occupy a position between the same, said device comprising a hydraulic cylinder pivotally connected to said conveyor and a rod pivotally connected to said frame with the rod extending upwardly into a cushioning spring and the latter extending upwardly into a cylindrical piston located in said hydraulic cylinder, and a hydraulic connection to said hydraulic cylinder above the upper end of said piston, the construction and arrangement being such that by introducing liquid into said hydraulic cylinder and withdrawing liquid from said hydraulic cylinder the elevation of the conveyor may be adjusted while said spring cushions the weight of the conveyor and the variable load thereon during operation thereof.

4. A loading machine comprising the combination with a supporting frame, of a conveyor mounted thereon for adjustment relative thereto on a horizontal axis, a combined fluid-pressure motor and cushioning device pivotally connected at its ends to said frame and said conveyor, said device comprising a cylindrical piston extending into a fluid pressure cylinder forming a fluid pressure chamber on one side of said piston, mechanism comprising a spring extending into said cylindrical piston, and means for controlling the flow of fluid pressure medium into and out of said fluid pressure chamber to effect adjustment in elevation of said conveyor on said horizontal axis while said cushioning mechanism cushions the vibrations of the conveyor due to transfer of material thereby during operation thereof.

5. A loading machine comprising the combination with a supporting frame, of a conveyor mounted on said supporting frame for adjustment relative thereto on a horizontal transverse axis, a reciprocating hydraulic motor comprising a cylinder open at one end with an elongated piston reciprocable therein and projecting from such open end, cushioning spiral spring means, mechanism connecting said hydraulic motor and said spiral spring means in series to constitute an expansible resilient supporting unit, a pivotal connection between said unit and said conveyor, another pivotal connection between said unit and said supporting frame, and means for controlling said hydraulic motor to effect reciprocations of said piston relatively to said cylinder and the locking of the hydraulic motor at adjusted length whereupon said spiral spring means yieldingly supports said conveyor for limited swinging movement on said horizontal transverse axis.

6. In a loading machine, the combination with a supporting frame, of a conveyor mounted on said frame for swinging movement about a horizontal axis, a hydraulic piston motor comprising a cylinder open at one end with an elongated piston therein and projecting therefrom, spiral spring mechanism extending into said elongated piston and connected in series with said hydraulic motor to constitute an expansible supporting unit, a pivotal connection between one end of said unit and said conveyor, and another pivotal connection between the other end of said unit and said supporting frame, the construction and arrangement being such that said spiral spring mechanism supports the conveyor for limited movement when the piston of said motor is held in any position to which it may be adjusted.

7. In a loading machine, the combination with a supporting frame, of a conveyor pivotally mounted thereon for adjustment relative thereto on a horizontal axis and extending therefrom, a reciprocating hydraulic motor comprising a cylinder open at one end with an elongated piston therein and projecting therefrom, resilient supporting means connected in series with said hydraulic motor to constitute an expansible resilient supporting unit, said resilient supporting means comprising an elongated helical spring extending into said piston, a pivotal connection between the upper end of said unit and said conveyor, and another pivotal connection between the lower end of said unit and said supporting frame, the construction and arrangement being such that at whatever elevation the hydraulic motor holds the conveyor relative to the frame the said hydraulic motor and said resilient supporting means shall remain in series so that the conveyor and its load shall always be carried by said resilient supporting means.

8. In a loading machine, the combination with a supporting frame, of an elongated conveyor pivoted to said supporting frame for adjustment about a horizontal axis and extending from said frame, an elongated hydraulic motor comprising a cylinder open at one end with an elongated open ended piston therein and projecting therefrom, resilient supporting means connected to one end of said hydraulic motor to form a supporting unit, said resilient supporting means comprising an elongated helical spring extending into said open ended piston, and means pivotally connecting the ends of such supporting unit to said supporting frame and said conveyor so that in all the positions to which said conveyor is adjusted by said hydraulic motor the whole weight of the conveyor and its load may be sustained by said resilient means and the pivotal connection between said conveyor and said supporting frame.

9. In a loading machine, the combination with a supporting frame, of an elongated conveyor unit comprising a conveyor frame pivoted to said supporting frame on a horizontal axis, a fluid pressure motor comprising an elongated piston in an open ended cylinder, resilient supporting mechanism pivoted on a horizontal transverse axis to one of said frames, said resilient supporting mechanism comprising an elongated helical spring extending into said piston to the bottom thereof, a pivotal connection between said fluid pressure motor and the other frame, mechanism connecting said resilient supporting mechanism and said fluid pressure motor in series, and means for controlling said motor to effect expansion of said fluid pressure motor and thereby adjust said conveyor frame relative to said supporting frame on said first-named horizontal axis while said resilient supporting mechanism affords a yielding support for the conveyor frame on said supporting frame.

10. In a loading machine, the combination with a supporting frame, of a conveyor pivoted thereto for adjustment relative thereto on a horizontal axis, a hydraulic motor comprising a cylinder and an elongated piston in said cylinder and projecting therefrom, compression spring means connected to said motor in series therewith to constitute an expansible resilient support, said compression spring means extending into said piston and projecting therefrom, mechanism connecting said unit between said supporting frame and said conveyor, and an abutment associated with said spring in position to limit the extent of compression thereof.

11. In a loading machine, the combination with a supporting frame, of a conveyor comprising a frame mounted on said supporting frame for swinging adjustment relative thereto about a horizontal axis, a hydraulic piston motor comprising a cylinder with a piston therein, a tubular extension of said piston, a spring in said tubular extension, a rod extending into said spring, a pivotal connection between said cylinder and one of said frames, and an additional pivotal connection between said rod and the other frame.

12. A loading machine comprising the combination with a wheeled truck adapted to travel on a mine track, of a discharge conveyor unit pivoted to said truck on a horizontal axis, a reciprocating fluid pressure motor depending from said discharge conveyor unit and comprising an elongated piston extending into an open ended cylinder, and means for resiliently mounting said fluid pressure motor on said truck, said means comprising an elongated helical spring extending into said elongated piston to the bottom thereof.

13. A loading machine comprising the combination with a supporting frame, of a conveyor comprising a frame mounted on said supporting frame for adjustment relative thereto, a combined fluid pressure motor and cushioning device, said device comprising a fluid pressure cylinder pivoted to one of said frames and a cylindrical piston extending into said fluid pressure cylinder, said device also comprising cushioning mechanism pivotally connected to the other frame and including a spring extending into said cylindrical piston, and means affording flow of fluid pressure medium into and out of the said fluid pressure cylinder for variation of the expansion of said motor for control of the elevation of the free end of said conveyor frame.

14. A loading machine comprising the combination with a supporting frame, of a conveyor unit pivoted thereto, a combined hydraulic motor and a cushioning device pivotally connected to said conveyor and pivotally connected to said frame to occupy a position between the same, said device comprising a hydraulic cylinder and a rod extending axially into a cushioning spring and the latter extending axially into a cylindrical piston located in said hydraulic cylinder, and a hydraulic pressure port for ingress and egress of the hydraulic liquid into and from said cylinder, the construction and arrangement being such that by introducing liquid into said hydraulic cylinder and withdrawing liquid from said cylinder the elevation of the conveyor may be adjusted while said spring cushions the weight of the conveyor and the variable load thereon during operation thereof.

15. A loading machine comprising the combination with a supporting frame, of a conveyor mounted thereon for adjustment relative thereto on a horizontal axis, a combined fluid-pressure motor and cushioning device pivotally connected at its ends to said frame and said conveyor, said device comprising a fluid pressure cylinder with an elongated piston telescoping thereinto and an elongated helical cushioning spring, said device being mounted between the pivotal connections to said frame and said conveyor, and means for controlling the expansion and contraction of the fluid pressure motor to effect adjustment in elevation of said conveyor on said horizontal axis while said cushioning spring cushions the vibrations of the conveyor due to transfer of material thereby during operation thereof.

16. A loading machine comprising the combination with a supporting frame, of a conveyor mounted thereon for adjustment relative thereto on a horizontal axis, a combined fluid-pressure motor and cushioning device mounted between said conveyor and said supporting frame, said device comprising a fluid pressure motor and cushioning spring arranged in series, said motor comprising an elongated open ended piston telescoping into a cylinder and adapted to receive said spring, and limit stop mechanism associated with said spring and serving to positively limit the downward movement of said conveyor relatively to said supporting frame, said limit stop comprising a rod extending into said spring and into said piston.

17. A loading machine comprising the combination with a supporting frame, of a conveyor mounted thereon, a hydraulic piston motor, a cushioning spring, means connecting said motor and said spring in series between said conveyor and said frame, and a limit stop rod extending into said spring in position to be engaged by the piston of said motor to limit the extent of compression of said spring.

18. In a loading machine, the combination with a hydraulic reciprocating motor comprising a cylinder and a piston therein, of a support, a cushioning spring between said piston and said support, a limit stop mounted on said support in position to be engaged by said piston to limit the extent of compression of said spring, and an additional limit stop for the other side of said piston.

19. In a loading machine, the combination with a hydraulic reciprocating motor comprising a cylinder and a piston therein, of a support, a cylindrical extension from said piston and adapted to project from one end of said cylinder, a spring between said support and said piston, a rod extending from said support into said spring, and a tubular guide for said spring located in said piston extension.

20. A loading machine comprising the combination with a supporting frame, of a conveyor mounted thereon for adjustment relative thereto, a combined hydraulic motor and cushioning device mounted between said supporting frame and said conveyor and comprising a cylinder with a piston therein connected in series with a cushioning spring, a limit stop in said cylinder for one side of the piston, and an additional limit stop for the other side of said piston, the construction and arrangement being such that when both of said limit stops act as such, positive supporting connections are afforded between the frame and the conveyor with the spring under maximum compression.

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