Aug. 2, 1955 J. J. HAY 2,714,459

PORTABLE SHOVEL TYPE LOADING DEVICE

Filed June 3, 1953 4 Sheets-Sheet 1

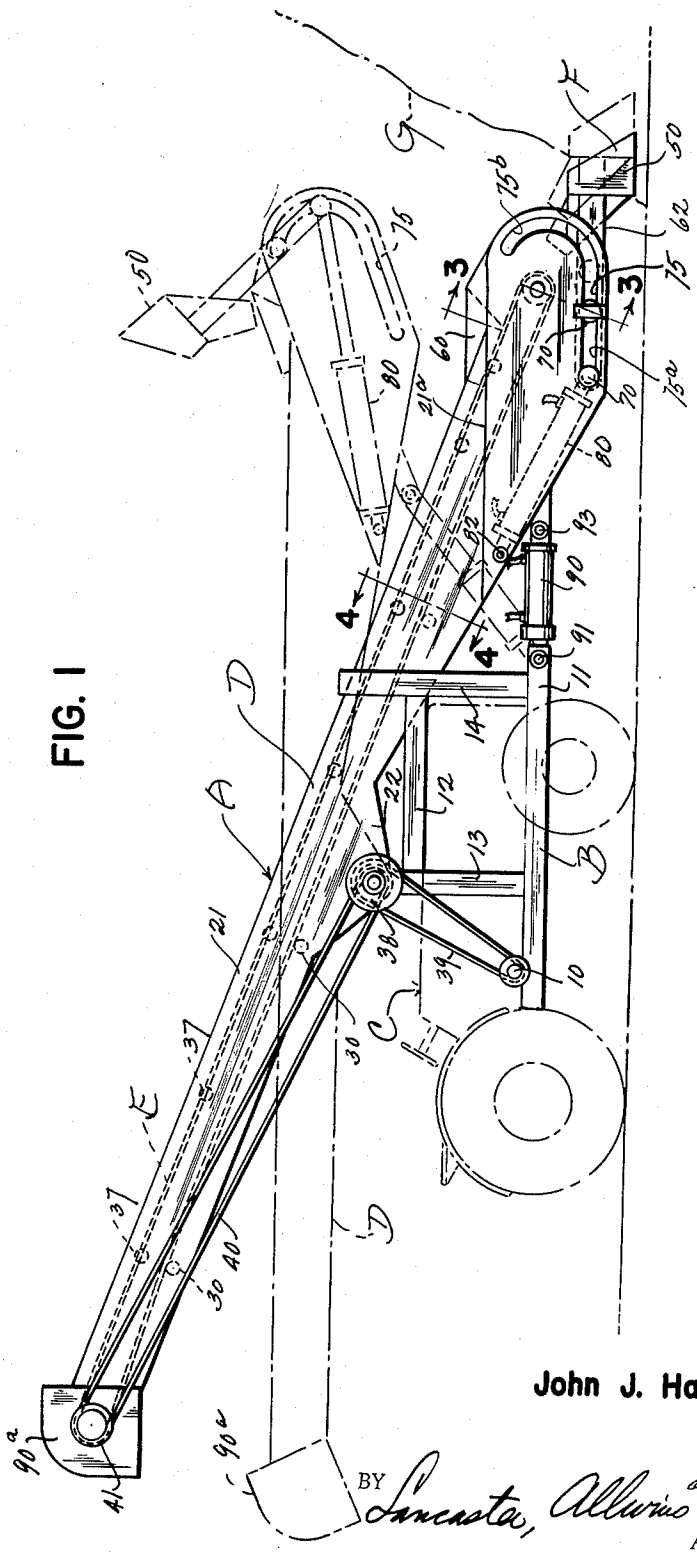


FIG. 1

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Filed June 3, 1953 4 Sheets-Sheet 2

FIG. 2

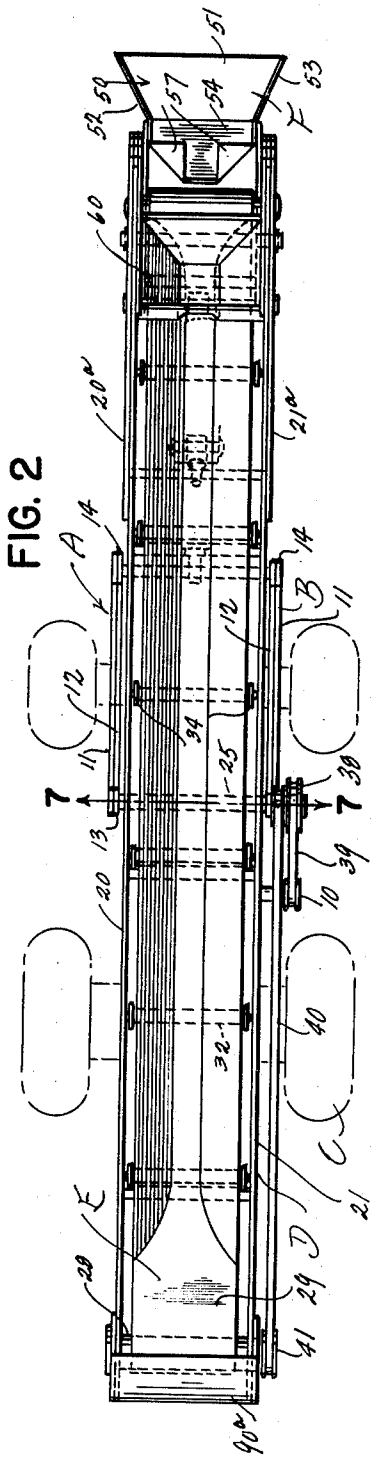


FIG. 4

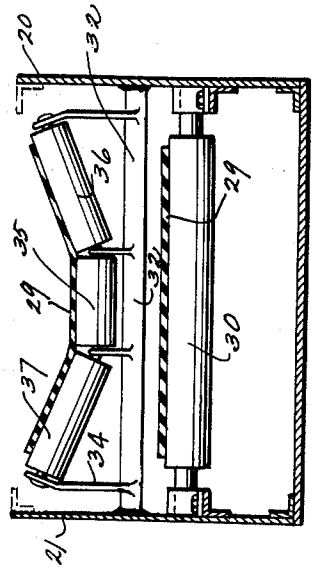
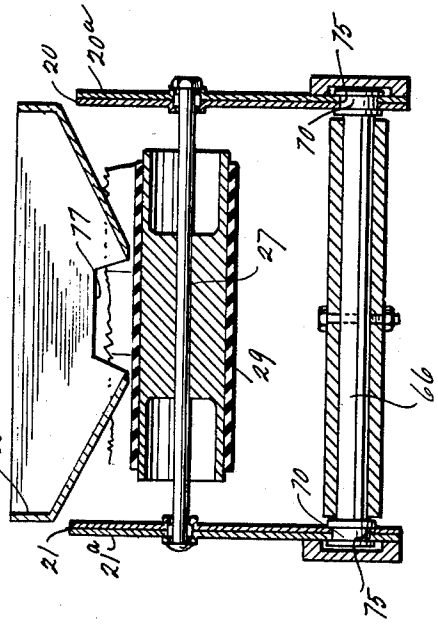


FIG. 3



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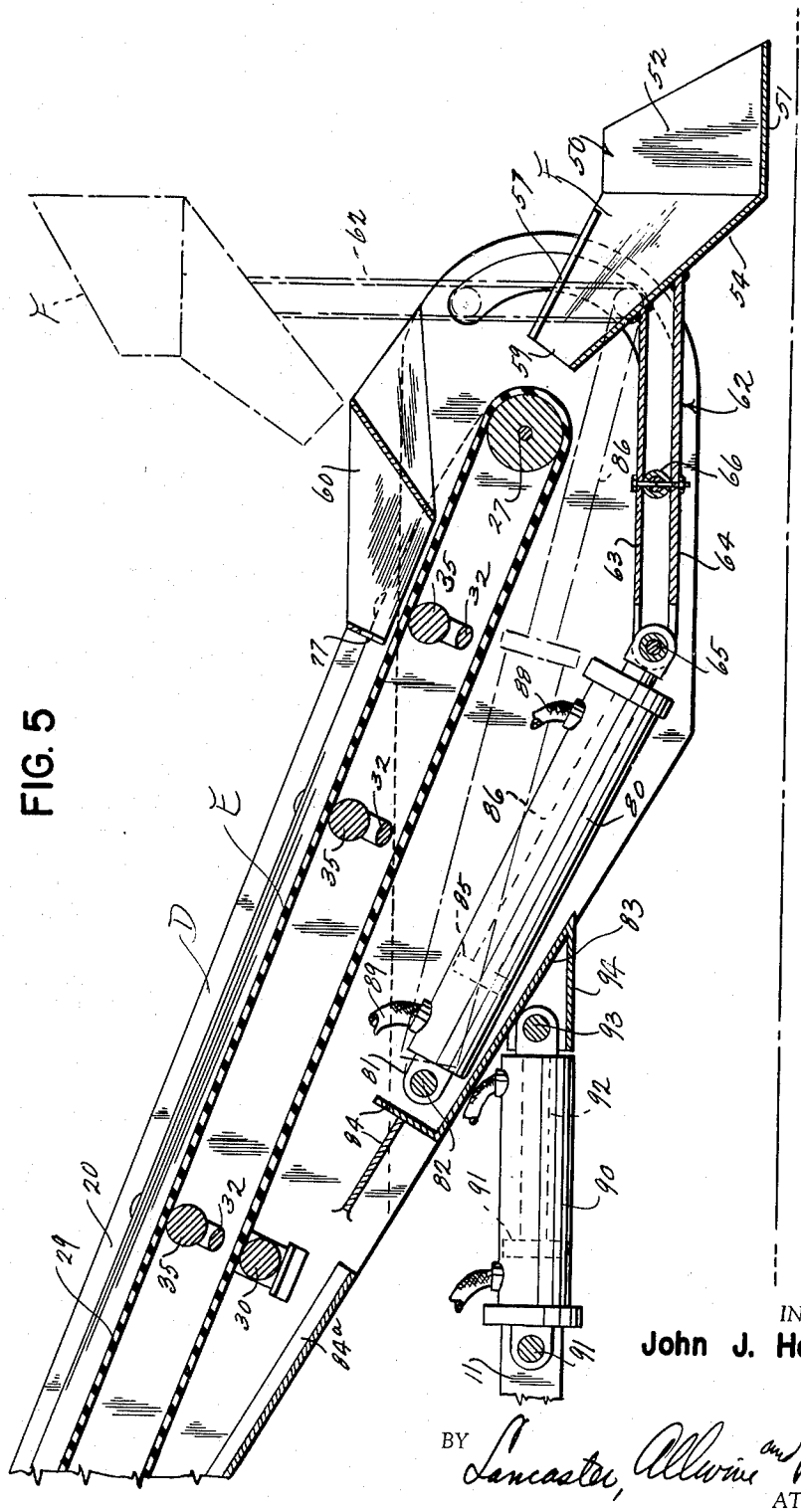
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Aug. 2, 1955 J. J. HAY 2,714,459

PORTABLE SHOVEL TYPE LOADING DEVICE

Filed June 3, 1953 4 Sheets-Sheet 3

FIG. 5



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Aug. 2, 1955 J. J. HAY 2,714,459

PORTABLE SHOVEL TYPE LOADING DEVICE

Filed June 3, 1953 4 Sheets-Sheet 4

FIG. 6

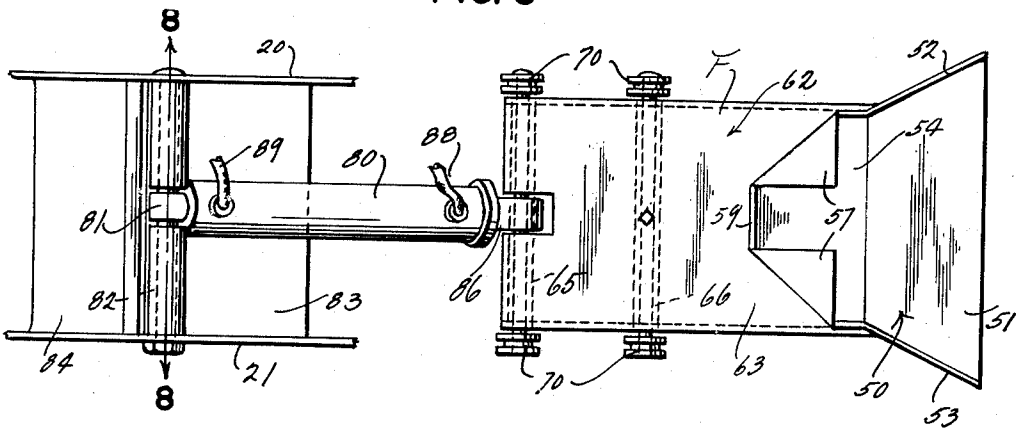


FIG. 7

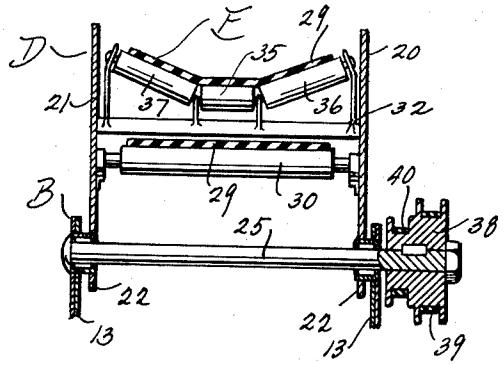


FIG. 8

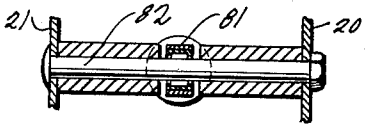
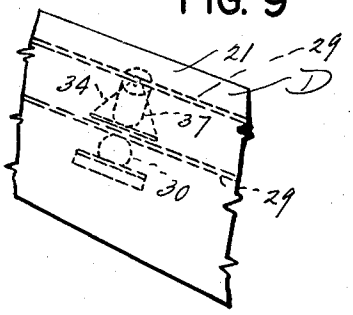


FIG. 9



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United States Patent Office 2,714,459
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2,714,459

PORTABLE SHOVEL TYPE LOADING DEVICE

John J. Hay, Knoxville, Tenn.

Application June 3, 1953, Serial No. 359,413

1 Claim. (Cl. 214—90)

This invention relates to improvements in shoveling and loading machines.

The primary object of this invention is the provision of an improved loading machine particularly well adapted for attachment to automotive vehicles, such as tractors, for the purpose of loading materials from ground storage.

A further object of this invention is the provision of an improved shoveling and loading mechanism particularly well adapted for connection to tractors, automobiles and the like, having a relatively inexpensive assemblage of parts, and hydraulic means for operating shovel and conveyor details for the expeditious shoveling and loading of loose materials, such as rock, sand, coal, etc.

A further object of this invention is the provision of an improved loading machine having improved means for mounting and actuating a shovel construction associated therewith.

A further object of this invention is the provision of an improved shoveling and loading mechanism particularly well adapted for the loading of loose materials such as rock, sand, coal, etc. upon trucks, cars, etc., the same having improved complementary shovel and conveyor mechanisms to enable an efficient loading of the material with a minimum amount of unnecessary movement and disturbance of the pile of material being loaded.

In the accompanying drawing, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views:

Fig. 1 is a side elevation of the improved shoveling and loading machine, showing in full lines the position it assumes for the shoveling of material from a stock pile; the view showing in dot and dash lines a loading position of the parts.

Fig. 2 is a plan view of the mechanism shown in Fig. 1.

Figs. 3 and 4 are transverse cross sectional views taken through the details of the improved loading and conveying machine substantially on the respective lines 3—3 and 4—4, shown in Fig. 1 of the drawings.

Fig. 5 is an enlarged fragmentary sectional view taken through the shovel end of the mechanism, and showing the relation of the shovel with respect to the conveyor.

Fig. 6 is a plan view of the improved shovel.

Fig. 7 is a transverse cross sectional view taken substantially on the line 7—7 of Fig. 2, through the conveyor frame construction of the loading mechanism.

Fig. 8 is a cross sectional view taken substantially on the line 8—8 of Fig. 6.

Fig. 9 is a fragmentary side elevation, showing in dotted lines certain bracket details for the rollers of a belt type of conveyor.

In the drawings, wherein for the purpose of illustration is shown only a preferred embodiment of the invention, the letter A may generally designate the improved loader. It preferably comprises a main frame structure B adapted for detachable or other mounting upon a self-propelled tractor or other automotive vehicle

C, for the support of the machine. The latter also includes a frame D; endless conveyor belt E and shovel mechanism F.

The tractor or self-propelled vehicle C preferably includes the usual power take-off 10.

The frame B, for the mounting of the loading mechanism upon the tractor C, preferably comprises base frame rails 11 at each side of the tractor; top horizontal rails 12 and vertical standards 13 and 14. They may be welded, bolted or otherwise secured to the parallel lower and upper rails 7 and 12. All of these frame parts may be bolted,welded or otherwise secured to the chassis and frame construction of the tractor C in any manner. There may also be cross beams between the parts 11, 12 and 13, if found necessary to stabilize the structure.

The loader frame D preferably includes side wall portions 20 and 21 connected in parallelism by the various rollers and cross braces to be subsequently described. About midway between their ends the walls 20 and 21 are provided with bottom extensions 22, supported on a horizontal shaft 25; the latter at its ends bearing in the uprights 13 of the tractor attached frame structure B, as better shown in Figs. 1 and 7 of the drawings. This mounting of the conveyor frame structure B enables the latter to tilt with a see-saw action to facilitate loading and conveying of materials.

The walls 20 and 21 at their extreme ends are provided with conveyor supporting rollers 27 and 28 bearing in the walls 20 and 21, and over which the belt 29 of the conveyor mechanism E is trained.

The belt 29 is of flexible material of any approved type, and the lower tread portion thereof at various places along the walls 20 and 21 is supported by means of cross rollers 30, as shown in Figs. 1, 4 and 5 of the drawings. The upper tread portion of the endless belt is supported in trough like fashion for the lateral retention of loose materials on the conveyor, in the manner shown in Figs. 4 and 7 of the drawings. For this purpose cross braces or supporting rods 32 may be welded or otherwise secured to the walls 20 and 21. These cross pieces 32 support intermediate and end uprights 34, the upper ends of which furnish bearings for an intermediate roller 35 and two sloping side rollers 36 and 37, at each of these locations. These rollers 35, 36 and 37 are positioned to support the upper tread of the belt 29 in a trough like condition, as shown in Figs. 4 and 7.

The pivot shaft 25 upon which the conveyor mechanism swings is provided with a pulley member 38 at an end thereof, shown in Figs. 1 and 7, having one larger pulley wheel portion thereof receiving a belt 39; the latter being connected to the power take-off 10. It is to be noted that the shaft 25 rotates and transmits power to the belt 29. The frame structure D pivots upon the shaft 25. The pulley 38 also includes another pulley wheel portion, smaller in size, receiving a power transmitting belt 40 in trained relation thereover; the belt 40 being trained at its opposite end around a pulley 41 upon the end shaft 28 of the conveyor mechanism, for rotating the belt 29 upon its end supporting shafts 27 and 28.

The lower tread supporting rollers 30 and the upper tread supporting rollers 35, 36 and 37 are positioned at appropriately spaced distances along the length of the conveyor mechanism for properly supporting the treads for efficient transmittal of the loose material carried thereby.

Referring to the shovel mechanism F and its associated parts, the walls 20 and 21 at the shovel end of loader are deeper and preferably have outside reinforcing plates 20^a and 21^a welded or otherwise connected thereto for reinforcement, inasmuch as they are transversely slotted and support the weight of the shovel.

The shovel mechanism F includes the scoop **50** which may assume various shapes but includes the lower bottom wall **51** and the flaring entrance walls **52** and **53**. An upwardly sloping bottom rear wall **54** is disposed in a plane greater than 90° with respect to the plane of the bottom wall **51**. The wall **54** has side wall portions **55** and **56** relatively converging at the rear end of the shovel, and they may have overturned top guide walls **57** to provide an exit passageway **59** for concentration of the shoveled materials onto the central portion of the top belt tread and into the hopper **60**.

The scoop **50** has integrally connected therewith a supporting arm or carriage **62** which is provided with rollers for operating along guide slots in the side walls of the conveyor frame. Preferably the carriage includes top and bottom wall portions **63** and **64**, in parallelism, having a transverse shaft **65** fixedly connected therewith at the end of the carriage remote from the scoop **50**, and also an intermediate shaft **66**. The ends of these shafts **65** and **66** are reduced and rotatably support circumferentially grooved rollers **70** at the ends thereof; said rollers **70** being adapted to ride along the scoop controlling guide slots **75** provided in the walls **20** and **21** and reinforcing plates **20**[a] and **21**[a]. These guide slots **75** each include a lower straight line portion **75**[a] adapted to guide the scoop for movement parallel to the ground surface until it enters the pile of loose material, shown at G in the drawings; the slots **75** at their forward ends arcuating upwardly at **75**[b] for the receiving of the rollers **70** in order to guide the carriage **62** along its path of travel, for vertical positioning, as shown in dotted lines in Figs. 1 and 5 of the drawings, for dumping of the materials into a hopper **60**.

The hopper construction **60** may be welded or otherwise secured between and to the side walls **20** and **21**, in the position shown in Fig. 2; the same having sloping side walls and sloping bottom walls and front walls. A rear wall has an exit passageway **77** directly at the central portion of the belt **29** for exit of materials onto the belt from the hopper. Any other hopper arrangement may be provided. The sides thereof are secured to the side walls supporting the endless belt for stabilizing this end of the conveyor construction.

It is to be noted that the scoop is intended to be carried forward and then upward and this is accomplished through movement of the rollers **70** along the slots **75**.

The means for operating the carriage and the scoop preferably comprises a ram having a cylinder portion **80** connected at **81** to a shaft **82**. The shaft **82** is secured to the side walls **20** and **21** of the conveyor frame structure. At this location the two walls **20** and **21** may be additionally reinforced by a cross piece **83** and other right angled cross bracing **84**, shown in Fig. 5. Also the walls **20** and **21** may be additionally reinforced by other cross bracing **84**[a] at any desired location along its length. All of this will prevent buckling of the side walls of the conveyor supporting frame. The ram includes a piston **85** and a piston rod **86** operating therein; the latter being secured to the shaft **65** of the carriage between the ends thereof, as shown in Fig. 6 and elsewhere. The hydraulic cylinder and piston arrangement is of the reversible type, including hose connections at each end, at opposite sides of the piston, for transmission of an operating fluid. These hose connections are shown at **88** and **89** in the drawings.

It will be apparent from the foregoing that fluid from the hydraulic mechanism, which will usually be received from a pump on the supporting vehicle C enters the cylinder **86**, outwardly forcing the piston **85** and the piston rod therewith. This will cause movement of the carriage **62**, as guided by the slots **75**, and moves the scoop **50** horizontal for a distance, say 12", into the stock piled material, and then the shovel or scoop **50** will be elevated to the position shown in the dotted lines in Fig. 5, for the dumping of the material into a hopper **60** and onto the belt **29**.

Hydraulic means is provided for swinging the conveyor frame B upon the shaft **25**, and such may consist of a ram including a cylinder **90** pivotally connected at **93** to a portion **94** of the cross piece **83** of the frame B, the hydraulic mechanism also including a piston **91** and a piston rod **92**. The latter is pivotally connected at **93** to a portion **94** of the cross piece **83** of the frame B, as shown in Fig. 5. Flexible hose connections are provided on the cylinder for transmittal of the hydraulic fluid into and out of either end of the cylinder **90** for causing the conveyor mechanism to swing upwardly into the dotted line position shown in Fig. 1 or downwardly to loading position as shown in full lines in Figs. 1 and 5.

In the operation of the improved loading mechanism the hydraulic mechanism for the bucket assembly forces the scoop parallel into the base of the stock pile for about 12", although this distance is not important, since it may vary with the type of material handled. The scoop is then moved upwardly through an arc to a vertical position, as shown in dotted lines in Fig. 5 of the drawings. This discharges the load into a hopper **60** and the material is taken by the belt **29** and moved to the loading position. At the discharge end the conveyor mechanism is provided with an adjustable hood or shield mounted with restrictive pressure upon the shaft **28** for enabling an orderly loading of the material into the truck or car positioned at the discharge end of the conveyor mechanism. The slope of the conveyor during this action may be regulated through the hydraulic mechanism. Preferably, during the movement of the bucket and scoop to its discharge position with respect to the hopper the hydraulic mechanism for controlling the position of the conveyor frame raises the lower end of the conveyor so the bottom of the bucket will not drag back material which happens to roll down the stock pile. As soon as the bucket resumes its starting position the conveyor end will then be lowered to its starting position. Of course the elevating of the conveyor mechanism during this operation will facilitate loading of the material since the conveyor need not be positioned at a steep incline, during the entire operation.

Various changes in the shape, size and arrangement of parts may be made to the form of invention herein shown and described without departing from the spirit of the invention or scope of the claim.

I claim:

A shoveling and loading mechanism comprising an automotive vehicle having a frame, and a power take-off, an elongated conveyor frame pivoted between its ends upon the vehicle frame for a see-saw type motion with respect to the vehicle frame, an endless conveyor belt rotatably supported by the conveyor frame, means for operating said belt off of the power take-off of the vehicle, hydraulic means for moving the conveyor frame with respect to the vehicle frame on said pivot axis, a hopper carried by said conveyor frame in position to move materials onto the conveyor belt, a scoop type shovel having an entrance opening thereto and an opposed discharge opening, means mounting said shovel for movement upon the conveyor frame for loading and swinging movements to discharge material from the scoop into said hopper, and hydraulic means connected between said conveyor frame and said shovel for moving the shovel between shoveling and dumping positions.

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