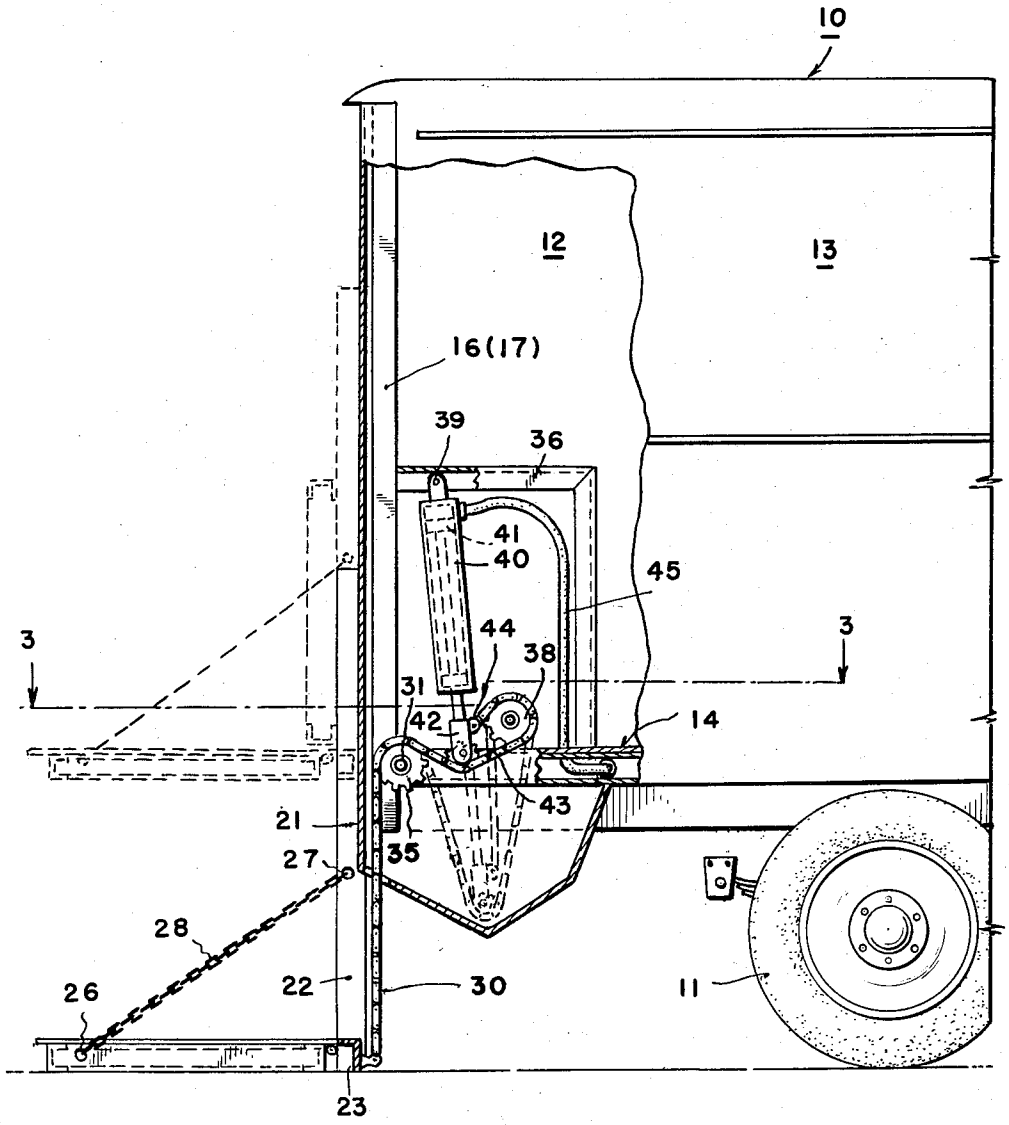
Feb. 8, 1955 L. C. WILLIAMSEN 2,701,654

ENDGATE ELEVATOR FOR MOTOR TRUCKS

Filed Dec. 11, 1950 4 Sheets-Sheet 1

FIG. 1



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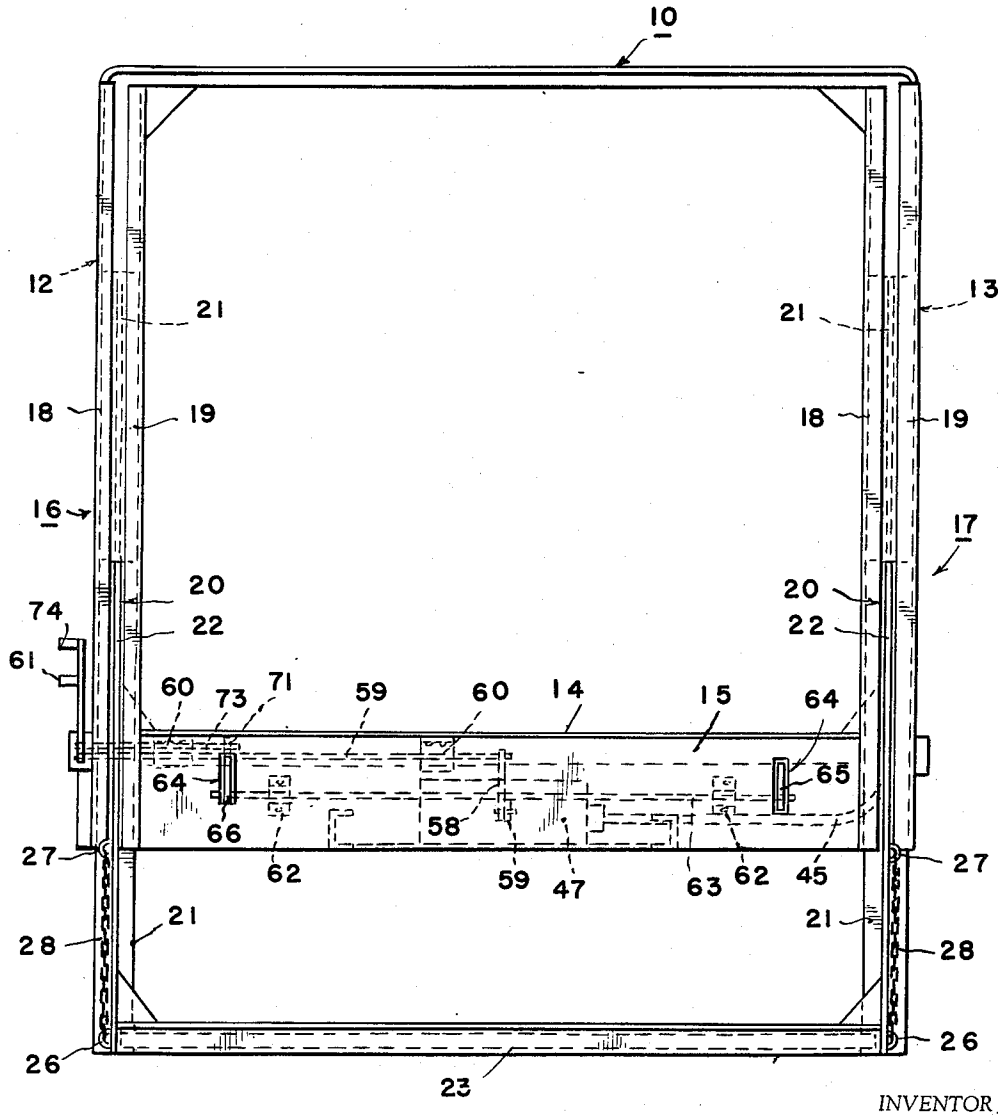
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FIG. 2



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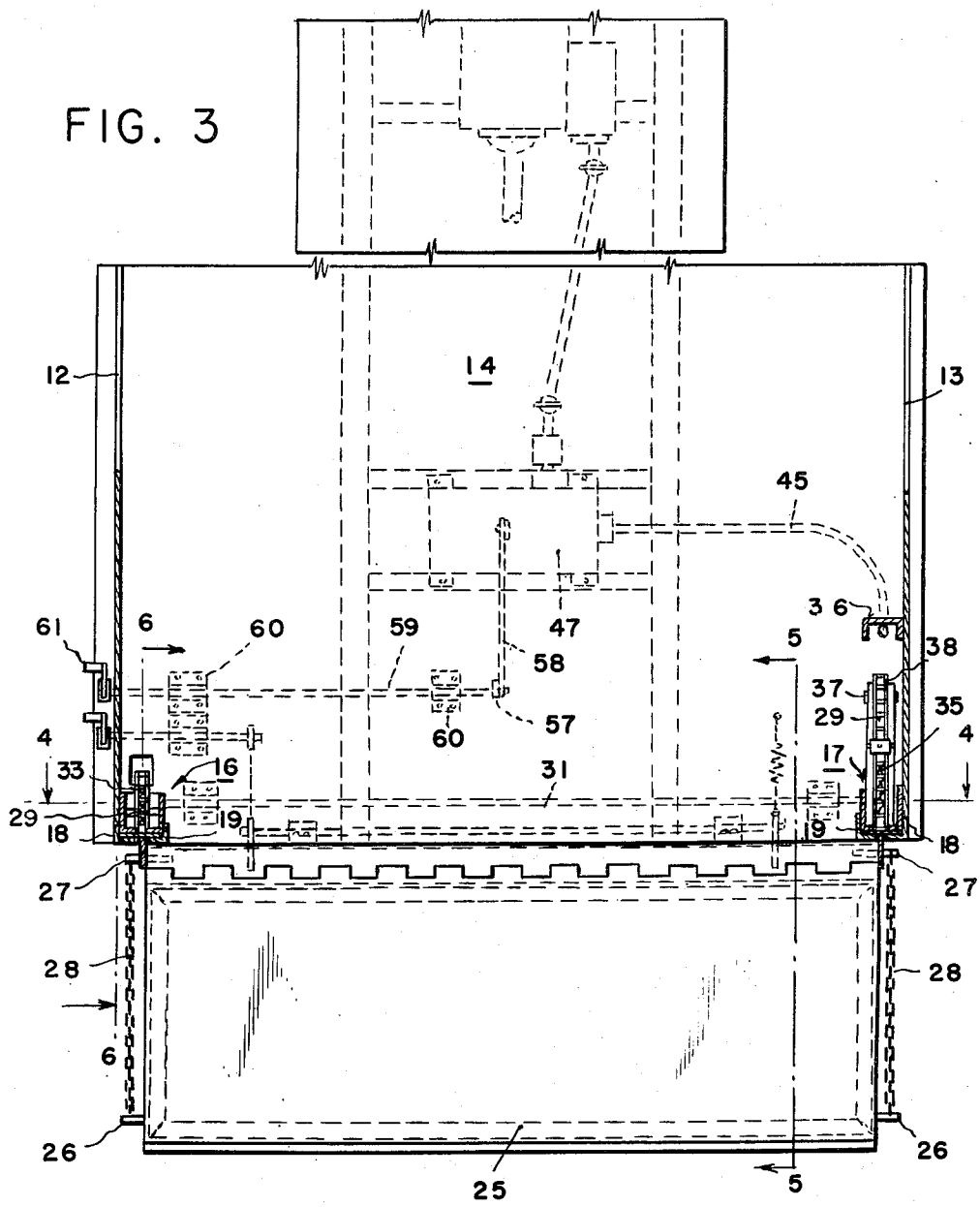
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FIG. 3



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FIG. 4

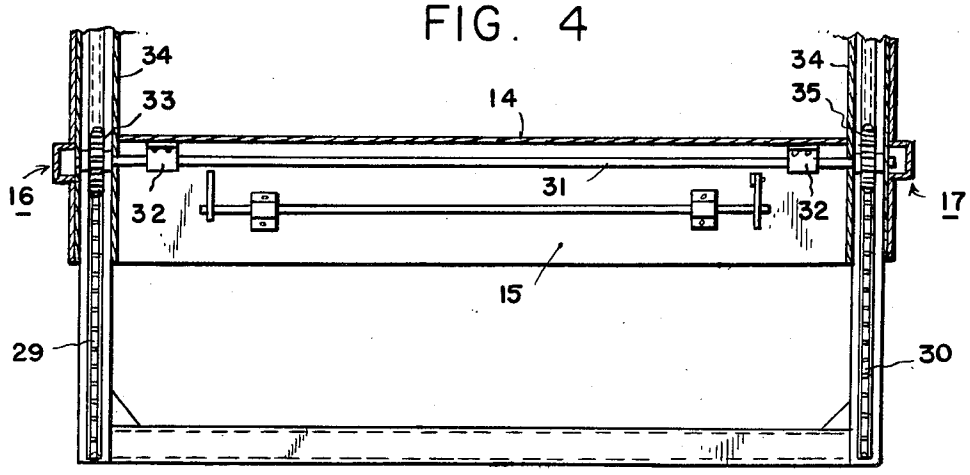


FIG. 5

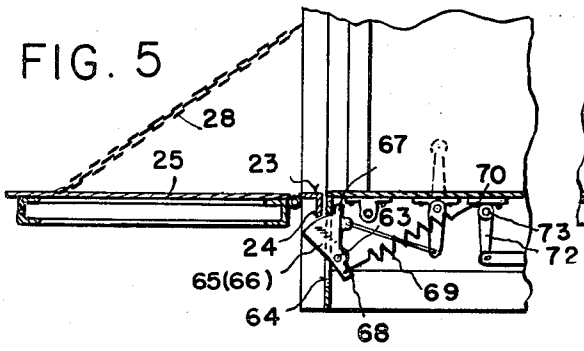


FIG. 6

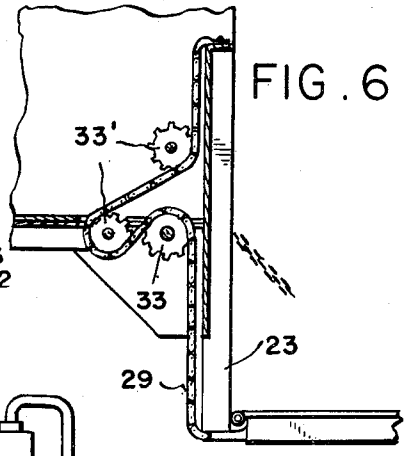
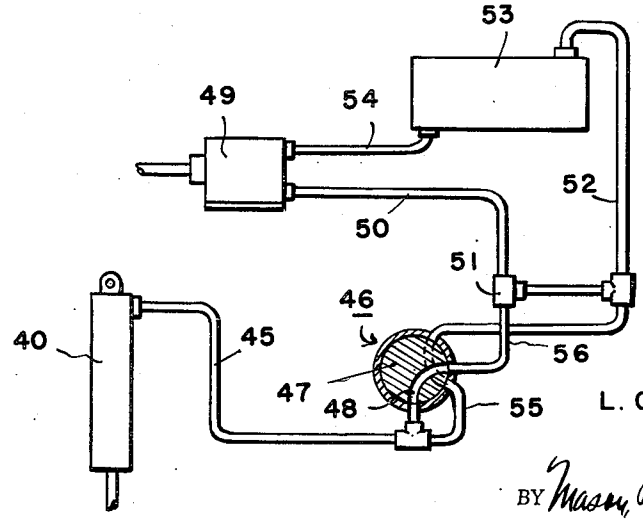


FIG. 7



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United States Patent Office 2,701,654 Patented Feb. 8, 1955

2,701,654

ENDGATE ELEVATOR FOR MOTOR TRUCKS

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Application December 11, 1950, Serial No. 200,135

2 Claims. (Cl. 214—75)

The following specification sets out in detail novel improvements in end gate elevators for motor trucks of the type used for lifting and lowering the heavy articles which are being transported in the trucks. The improvement is in the facilities provided for raising and lowering the end gate while extended horizontally. This permits its use as an elevator in raising and lowering heavy loads.

Various attempts have been made to incorporate power actuated means for elevating end gates of trucks and the like, but it has been found difficult to incorporate elevating elements in the rear ends of the walls of a truck body without increasing the size of the body or without using valuable floor space therein.

With this thought in mind, this invention contemplates a small hydraulic jack or cylinder mounted in a corner of a side wall of a motor truck body and provided with chains arranged to elevate the end gate of the truck with a comparatively small movement and with the end gate slidably mounted in channels on the rear edges of the side walls of the body.

One of the objects of my invention is to provide mechanism adaptable for installation in usual truck bodies, without undue increase in floor space or carrying capacity.

It is a further object of this invention to provide for latching the end gate mechanically in its elevated position. This is desirable during the movement of the load to and from the floor of the truck. It is also insurance against inadvertent lowering of the end gate while the truck is moving.

A still further object of the invention is to provide power operated mechanism acting directly on the elevating means for the end gate.

By way of illustration, I have shown the preferred form of my invention on the appended drawings in which

Fig. 1 is a view in side elevation showing the rear portion of a motor truck body with parts broken away illustrating elevating means for the tail gate of the body and wherein parts are shown in section;

Fig. 2 is a view in end elevation looking toward the rear end of the truck body showing the end gate in the lowered position;

Fig. 3 is a plan view through the rear portion of the truck body partly in section taken on line 3—3 of Fig. 1;

Fig. 4 is a vertical cross-section through the rear portion of the truck body taken on line 4—4 of Fig. 3 and showing the end gate in the lower position;

Fig. 5 is a vertical cross-section through the rear portion of the truck body and end gate taken on line 5—5 of Fig. 3, showing the end gate in the elevated position;

Fig. 6 is a similar vertical cross-section through the opposite side of the truck body and end gate taken on line 6—6 of Fig. 3 and showing the end gate in the lower position and

Fig. 7 is a diagrammatic view illustrating the hydraulic system for providing fluid under pressure to the hydraulic cylinder for elevating the end gate.

The preferred form of my invention as shown consists broadly in a pair of vertical tracks or guides through which slidebars are elevated and lowered. These slidebars are connected to the end gate, and the latter is thus lifted to the level of the floor of the truck, or lowered

to rest upon the roadway when the load is shifted at that level.

The elevating movement is effected by use of vertical lifting chains which are caused to rise and fall at will by the movement of a ram, for example a fluid-operated piston or cylinder.

The usual motor truck has been illustrated as having a body 10. Only the rear traction wheels 11 are illustrated, the body having the customary side walls 12 and 13 rising from the floor 14. This floor 14 at the rear has a depending apron 15 shown on Fig. 4.

The opposite rear corners of the truck body support vertical corner posts 16 and 17.

These corner posts are shown as of heavy sheet metal construction bent in the cross-section of the letter U.

Each post 16 and 17 carries on its rear face a pair of angle irons 18 and 19. These angle irons have flanges spaced from the rear face of the corner posts. There is thus formed a slotted track 20 running vertically over the rear face of each corner post and defined by the angle irons 18 and 19.

For convenience, the angle irons may be of the same height as the posts, although successful operation may not require use of the upper end.

A T-shaped slidebar 21, 21 is fitted on each slotted track and slides easily vertically along the track. Each slidebar 21 has a center rib 22 which extends through the slot of the track and projects to the rear.

The bottom ends of the bars 21, 21 are connected rigidly by means of a plate 23. This plate 23 forms part of the end gate structure. It is provided with a downwardly extending flange 24 opposite the upper portion of the apron 15. (See Fig. 5.) The main portion of the end gate 25 has a continuous hinge running the full width of the gate and connecting it to the plate 23.

Eyelets 26 are provided at the outer corners of the end gate 25. Similar eyelets 27 are attached to the ribs 22 at a higher midportion similar to what is shown in Fig. 1. A loose chain 28 connects the eyelets 26 to the eyelets 27. In this way, the end gate is supported in lower horizontal position during its vertical movement.

The slidebars 21 are raised and lowered by means of sprocket chains 29, 30. These chains are sufficiently strong to support the load which it is intended to raise or lower with the end gate.

The chains are carried over an idle shaft 31 which runs transversely beneath the floor 14 of the truck and slightly in advance of the apron 15. This shaft is carried in bearings 32, 32 below the floor 14.

At one end, the shaft 31 carries a sprocket 33. This sprocket is surrounded by a housing 34 so as to shield it from contact with the articles which may be carried on the floor itself.

One sprocket chain 29 is anchored to the lower end of plate 23 or slidebar 21 and brought up and around the sprocket 33 as indicated in Fig. 6, and thence back over idlers 33' to a fastening on the upper end of plate 23. In this way, the adjacent slidebar 21 may be caused to rise or fall with the chain 29. The slack portion of the chain is kept from falling to the roadway, and the necessity of supplying a receiver for it is avoided.

The opposite end of shaft 31 carries a sprocket wheel 35. This sprocket wheel may be located within the hollow portion of the corner post 17 as shown in Fig. 3.

The second sprocket chain 30 is connected to the lower end of the adjacent slidebar 21 and is carried over the sprocket wheel 35.

The truck body is provided with a rigid housing 36 opposite the sprocket wheel 35. In this housing, on bearings 37, is mounted an idle sprocket 38. Sprocket chain 30 passes over sprocket wheel 35 and around sprocket 38 in the opposite direction, as shown in Fig. 1.

The upper frame of the housing 36 is provided with a pivot bearing 39. A pressure cylinder 40 is journaled on the bearing 39 and extends downwardly between the sprocket wheels 35 and 38. A plunger 41 slidable in

cylinder 40 extends downwardly between sprocket wheels 35 and 38. The end of the plunger carries a yoke 42 which forms a bearing for an idle sprocket 43. The sprocket 43 is in engagement with the chain 30 in the space between the wheels 35 and 38.

The free end of the chain 30 is attached to a fastening 44 on the yoke 42.

Fluid under high pressure is applied to the upper end of the cylinder 40 through high pressure flexible tubing 45. The tubing 45 is connected in turn to a valve 46. The valve 46 has a member 47 which may be moved to and held in three positions. The valve member 47 has a single passageway 48. This passageway may be placed in registry with the desired piping.

A pump 49 is provided to maintain the fluid under the desired pressure. The pump discharges through pipe 50 to the valve 46. A T-connection 51 has a pressure relief valve which, when the pressure is not used or otherwise becomes excessive, discharges the fluid through return pipe 52 to reservoir 53.

Reservoir 53 in turn is connected by pipe 54 to the intake side of pump 49.

When the passageway 48 is connected to discharge pipe 50, fluid under pressure is delivered to the tubing 45, and thus fills the chamber of cylinder 40, and causes plunger 41 to extend downwardly into the dotted line position shown in Fig. 1.

As the plunger 41 is extended downwardly, it serves to increase the distance of the sprocket 43 and yoke 42 from both sprocket wheel 35 and sprocket 38. There is thus approximately a threefold extension of the chain 30. This causes the lower end of the chain 30 and the end gate to rise a distance equal to approximately three times the travel of the plunger 41. By shifting the valve member 47 so that passageway 48 is out of registry with the discharge pipe 50, the pressure condition in the cylinder may be held constant at any point on the travel of the plunger 41. The end gate is therefore held in the desired position, either level with the floor of the truck, or at an intermediate point.

The tubing 45 has a branch 55 which also leads to the valve 46. A second branch 56 leads from the valve 46 to the return pipe 52 at a point beyond the T-connection 51. Branches 55 and 56 are spaced so that they may be connected by the passageway 48. This position of the valve thus relieves the pressure within the cylinder 40 and discharges the fluid back to the reservoir 53.

As a result of this release of pressure, the combined weight of the end gate and chains will cause the plunger 41 to rise to its upper position in cylinder 40, while the end gate is lowered to the ground.

It will be apparent from the above that the movement imparted by chain 30 to the sprocket wheel 35 will cause the idle shaft 31 to rotate the sprocket 33. In the elevating movement, chain 29 will thus be wound around the sprocket 33. This provides equal lifting power for both slidebars 21, 21.

The pump 49 will be operated by a power take-off from the power plant of the truck, or by any other source of power. The valve member 47 is controlled by a rock-arm 57. The rock-arm 57 is connected eccentrically to the valve member 47 by means of a control link 58. The rock-arm is attached to a shaft 59 journaled in bearings 60, 60 below the floor of the truck. The shaft 59 extends beyond the outer side wall of the truck where it carries a handcrank 61 for manual operation.

Latching means are provided for holding the end gate in elevated position in the plane of the floor of the truck.

The apron 15 has bearings 62, 62 in which shaft 63 is journaled. At the ends of the shaft 63, the apron is slotted as shown at 64, 64 to permit transverse movement of latch plates 65, 66. The latch plates are rigidly attached to the shaft 63. Each latch plate has a detent 67 at the upper rear corner. This detent is above the slot 64, so that the outward movement of the latch plates is thus limited.

One latch plate 65 is extended below and to the rear of the shaft 63 to provide an arm 68. This arm is connected by means of spring 69 to an anchor 70 on the lower surface of the floor 14. The arm 68 is angularly disposed, so that in its forward movement it strikes the plane apron when the forward edge of the latch plate 65 is fully retracted.

The other latch plate 66 is connected by a link 71 to

the lower end of a rock-arm 72. This rock-arm is fixed to a transverse shaft 73 journaled below the floor 14. The shaft 73 is extended beyond the outer side wall of the truck and there carries a handcrank 74. By operating the handcrank, the latch plate 66 is rocked backward through the slot in the apron 15. In this movement, the shaft 63 is rocked, overcoming the spring 69 and retracting the opposite latch plate 65.

The spring 69 normally holds the latch plates 65 and 66 extended. As the end gate is elevated, the plate 23 rises against latch plates 65 and 66, forcing them back into the slots 64, 64. As the plate and end gate reach the level of the floor 14, the spring 69 rocks shaft 63 and advances latch plates 65, 66 to holding position below the plate 23.

The end gate is therefore held in elevated position regardless of the pressure conditions in the cylinder 40.

To lower the end gate requires retraction of the latch plates 65, 66, out of the path of the plate 23. This may be facilitated by exerting a slight lifting movement on the elevating chains 29, 30. With the latch plates 65, 66 out of its path, the plate 23 and the end gate 25 may be lowered as desired. Release of the handcrank 74 allows the spring 69 to advance the latch plates into operating position again.

In the arrangement thus described, the end gate is elevated with its load by means of the chains, the power of the hydraulic jack being transmitted by one chain to the sprocket shaft and then distributed evenly between opposite ends of the end gate structure. The gate with its load, when lifted to the plane of the vehicle floor, releases the latch which holds the end gate in this position mechanically.

Lowering of the end gate is accomplished by first lifting it slightly to permit the latches to be retracted. The release of fluid pressure from the cylinder will then allow the end gate to be lowered until it rests on the ground.

The only exposed mechanism is the pair of chains.

While the preferred form of the invention has been set out in full, it is to be understood that changes in minor details, proportions and material are permissible without departing from the invention as defined in the following claims.

What I claim is:

1. In combination a vehicle body having vertical rear corner posts, a track formed on the backs of the posts with inwardly projecting flanges, a slide member carried between said flanges of each track and having a projecting rib, a cross-bar connecting the lower ends of the slide members, an end gate hinged to the cross-bar, chains depending from the rib of the slide members for holding the gate extended horizontally, a transversely disposed shaft journaled on the vehicle body, a pair of sprockets on the shaft opposite the slide members, a drive chain attached to the lower end of each slide member and passing over one of said sprockets, an idle sprocket mounted on the side of the vehicle body opposite one of said shaft sprockets, a hydraulic jack mounted within the vehicle body adjacent one of said sprockets with its piston extending downwardly, a piston on the jack movable transversely between the shaft sprocket and the idle sprocket, and a sprocket on the piston, the drive chain passing over said sprocket being carried around the idle sprocket and its free end attached to said piston with the sprocket on the piston displacing the intermediate portion of the chain laterally.

2. An elevating end gate for motor trucks comprising vertically disposed channels positioned on the rear ends of the side walls of the truck body and providing tracks, vertically disposed bars slidably mounted in said tracks, an end gate carried by said bars and hinged to the lower ends thereof, a transversely disposed shaft journaled on the under surface of the said truck body and spaced from the rear end thereof, sprockets mounted on the said shaft and aligned with the said vertically disposed bars, chains attached to the lower ends of the said vertically disposed bars and extended over the said sprockets, a hydraulic jack mounted within said truck body having a piston therein with a piston rod extended from one end and having a sprocket journaled in a yoke on the outer end of the piston rod, a sprocket journaled on the said truck body and positioned in a vertical plane extended through the sprocket on one end of the transverse shaft, and means attaching the end of the chain extended over the sprocket on the transversely disposed shaft to the

yoke on the end of the piston rod, with the chain extended around the sprocket carried by the yoke, and also around the sprocket mounted within the truck body, a pair of latches carried by a bar pivotally mounted on the under surface of the truck body and positioned to engage the lower edge of the end gate with the end gate in an elevated position, and means releasing said latches.

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