

July 25, 1933.

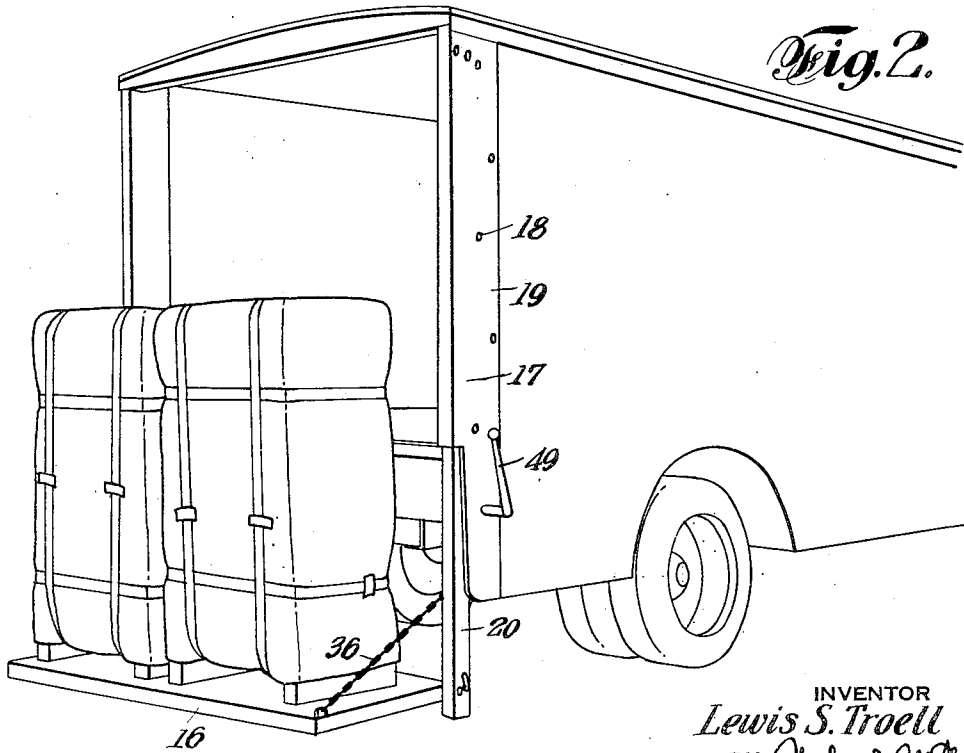
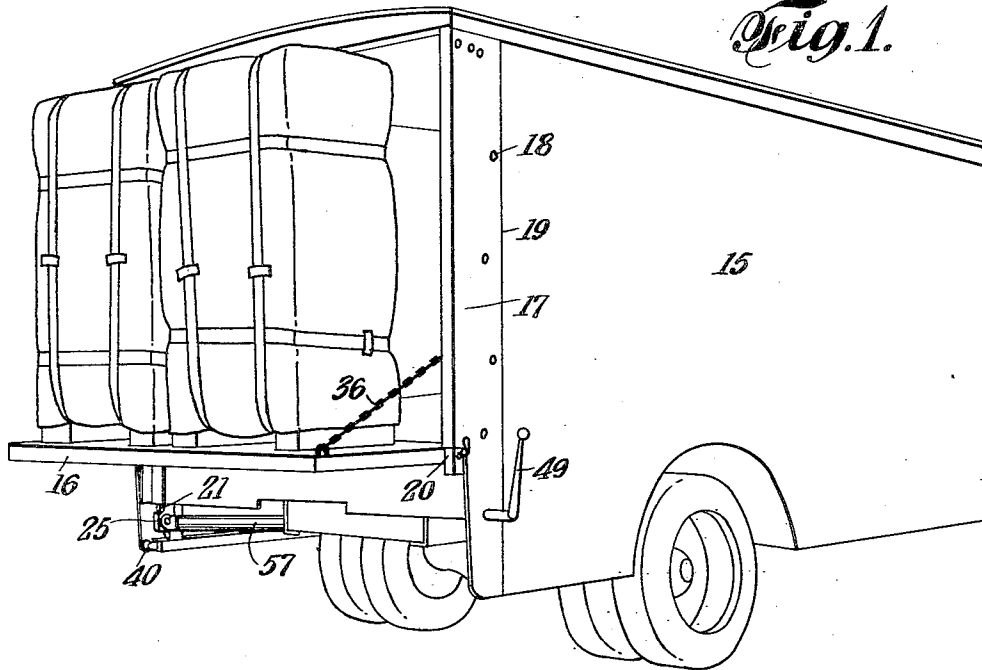
L. S. TROELL

1,919,608

TAIL GATE ELEVATOR

Filed April 6, 1932

3 Sheets-Sheet 1



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July 25, 1933.

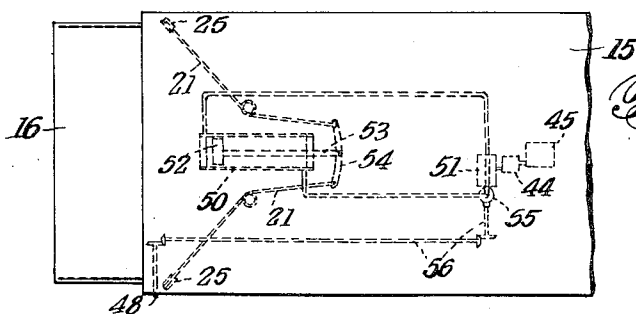
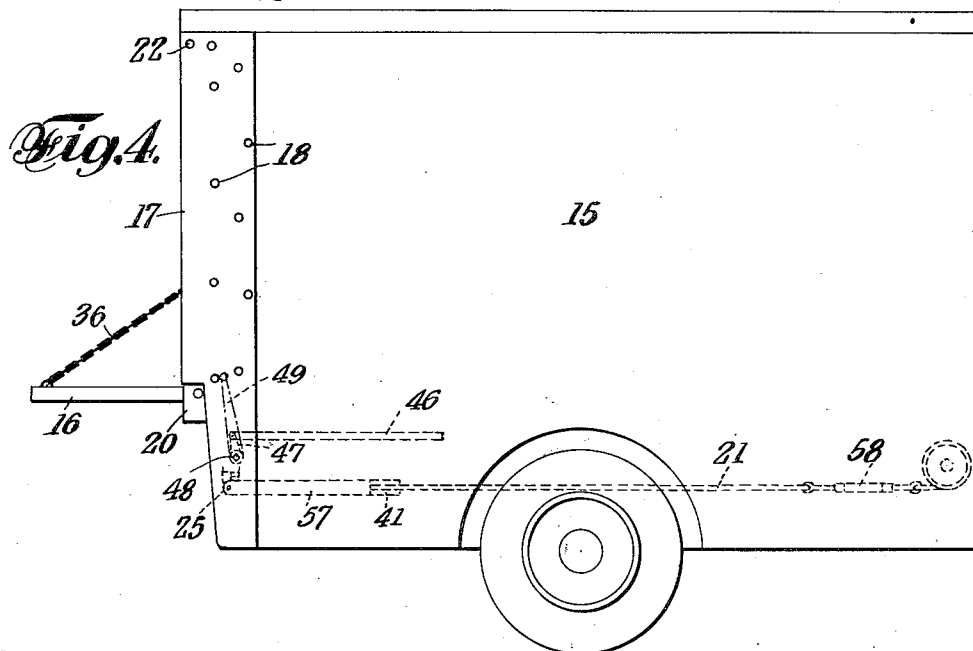
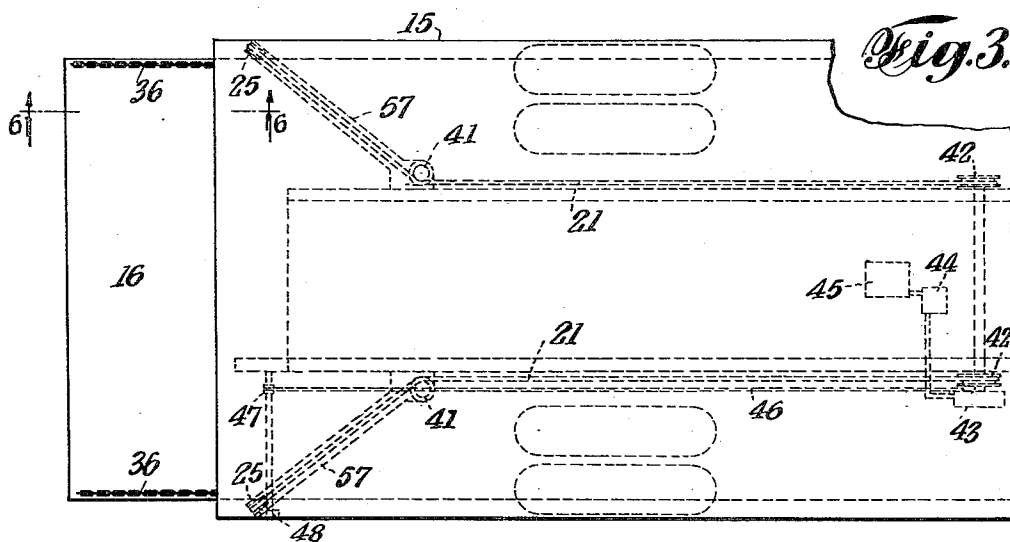
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TAIL GATE ELEVATOR

Filed April 6, 1932

3 Sheets-Sheet 2



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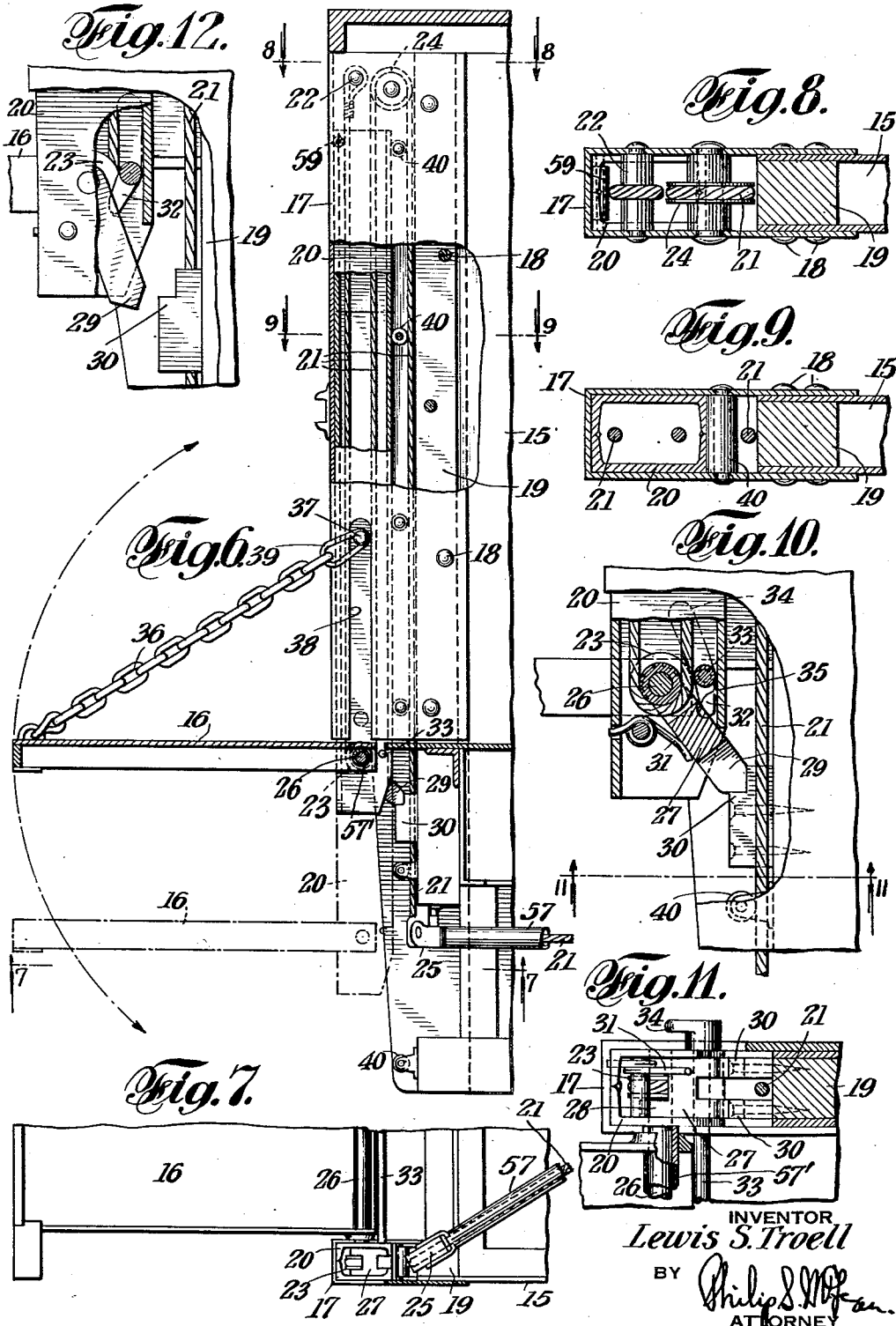
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TAIL GATE ELEVATOR

Filed April 6, 1932

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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TAIL GATE ELEVATOR

Application filed April 6, 1932. Serial No. 603,576.

The objects of this invention are to facilitate the loading and unloading of trucks, particularly in respect to the lifting and lowering of heavy objects to be carried by or removed from such vehicles; to provide simple, sturdy and relatively inexpensive apparatus for such purpose readily applicable to trucks now in use; to provide such apparatus in a safe form in which moving parts will be properly protected; and further to combine elevator apparatus with the tail gate structure and to do this without impairing the usual functions of such structure and without adding to the bulk or affecting the appearance of the vehicle structure.

The foregoing and other desirable objects are attained by the novel features of construction, combinations and relations of parts hereinafter described and broadly claimed.

The drawings accompanying and forming part of the specification illustrate certain of the preferred embodiments of the invention. It is to be understood, however, that the structure may be modified and changed as regards the present illustrations, all within the true intent and broad scope of the invention.

Figs. 1 and 2 in the drawings are broken perspective views of an embodiment of the invention illustrating the tail gate first in the elevated position and second in the lowered position.

Fig. 3 is a broken plan view of the invention as incorporated in the vehicle and showing in broken lines concealed parts of the apparatus.

Fig. 4 is a broken side elevation of the apparatus appearing in Fig. 3.

Fig. 5 is a plan view similar to Fig. 3 illustrating the substitution of a form of hydraulic power hoist for the straight cable hoist shown in Fig. 3.

Fig. 6 is a broken and partly vertical sectional view as on generally the plane of line 6—6 of Fig. 3 and on a larger scale.

Fig. 7 is a broken plan and part sectional view as on substantially the plane of line 7—7 of Fig. 6.

Figs. 8 and 9 are enlarged cross sectional details as on lines 8—8 and 9—9 of Fig. 6.

Fig. 10 is a broken part sectional detail illustrating particularly the dog or pawl construction for securing the elevator in the upper, normal position.

Fig. 11 is a broken part sectional bottom plan view as taken on line 11—11 of Fig. 10.

Fig. 12 is a fragmentary detail view illustrating features of the control by which the supporting dogs are thrown out of action to permit the elevator being lowered.

One of the special features of the invention is that the elevator mechanism is so incorporated in the truck structure as to be practically concealed, so that from external appearances, the truck with its body 15 and tail gate 16 may be of usual, standard design.

Another and important novel feature is that the elevator mechanism is such that it may be added as an attachment built on to the end of the body structure. The latter is accomplished by means of extensions substantially U-shaped in horizontal section and bolted, riveted or otherwise suitably secured as at 18 in Figs. 8 and 9 over the ends of the body sides 19, said extensions serving as housings, guides and supports for the rams or sliding shoes 20 of the elevator structure.

In Figures 7 and 9, the rams are shown as made up each of two channel bars arranged face to face with their flanges welded together to form a hollow rectangular box which is of light weight for its strength and will carry heavy loads without bending or twisting. In addition, this hollow construction enables the hoisting connections being carried down through the same, to the lower ends of the rams.

In the present embodiment of the invention, the operating connections are shown as cables 21 anchored in the top of the housings at 22 and extending down through the hollow rams, around pulleys 23 in the lower ends of the rams, upward over pulleys 24 in the upper ends of the housings and then down through the housings to pulleys 25 and from the latter to suitable hoist mechanism.

While this gives a desirable multiplication of power and centers the rams by suspending them in bights of the cable at the lower ends of the rams, it will be seen that the connections may be modified to meet different requirements. Thus where speed is more desirable than the extra power, the ends of the cables may be directly connected to the lower ends of the rams.

10 The tail gate 16 is shown as pivoted to the lower ends of the rams on a cross rod 26 and the ram pulleys 23 are shown as journaled on this same cross rod.

The hinge rod for the tail gate is further 15 utilized in the present disclosure as a mounting for the dogs or pawls 27 which are shown in Figs. 10 and 11 as having branched upper ends 28 pivotally engaged on the rod at opposite sides of the pulleys thereon and 20 as having their lower ends forked at 29 to fully clear the downwardly extending reaches of the cable and projecting from the rams sufficiently to make positive engagement with the steps or supporting shoulders 30.

The dogs for supporting the elevator rams are shown as thrust forwardly by springs 31 and as adapted to be tripped and held in retracted position by cranks or cams 32 on a 30 cross shaft 33 journaled in the lower ends of the rams and operable by a handle 34. These cam or lever elements 32 are shown in Fig. 12 as having a seating or interlocking engagement in the dogs at 35 for the purpose of securing the dogs, as long as may be desired, in the retracted inactive position. As will be clear from Fig. 10, the relation of the parts is such that the elevator must be slightly lifted to take the weight off the 35 dogs before the dogs can be thrown back out of the supporting position. This is a safety feature making it impossible for anyone to accidentally release the elevator by operating the handle 34—this handle actually not being operative until the hoist mechanism has first been positively set into operation to lift the weight of the elevator off the dogs or supporting links.

The tail gate may be hung by the usual 40 chains such as indicated at 36, the same being shown as caught to the headed studs 37 projecting from the inner sides of the rams through slots 38 cut up through the inner sides of the guide housings 17. These 45 chains are shown as detachably connected to the studs as by means of widened links 39 which, upon lifting of the tail gate may be unhooked from the studs to permit the tail gate to swing downward, when required. Thus the invention does not interfere with any customary use of the tail gate.

The hollow rams are made of a size to slide freely up and down in the guide housings and to facilitate such movement, rollers 50 may be provided in the guide housings or on

the rams or in or on both guides and rams. It has been found sufficient and in fact preferable, to provide freely rotating rollers 40 in the guides at the front sides of the rams, leaving the rear sides of the rams to 70 slide over the rear sides of the guides, for a certain degree of frictional control which aids smooth uniform action of the rams. The lower guide rolls are preferably located as low as is practically possible on the body 75 structure so that in the extended lowered position, Fig. 2, the rams will be so braced that they will still slide freely in the guides.

The cables 21 are shown as extending forwardly from the lower guide pulleys 25 and inwardly to guide pulleys 41 on the frame of the machine, and from these to the drum or hoist mechanism. The hoist mechanism consists in the first disclosed form of the invention of the drums 42 driven through 85 clutch mechanism 43 from the power take-off indicated at 44 in Fig. 3, deriving its power from the transmission at 45. For controlling the clutch mechanism, a control rod is indicated at 46 extending back to an 90 arm 47 on rock shaft 48, the latter being operated by a handle 49 which may be detached when not actually in use. This hoist control handle and the dog control handle 34, as will be evident from Fig. 1, are both 95 located at the rear of the vehicle in convenient position for an operator standing at the end of the tail gate.

As an alternative form of power mechanism for the hoist, a hydraulic cylinder such 100 as shown at 50, Fig. 5, may be employed, the same being governed by a pump 51 operated by the power takeoff from the transmission and having a piston 52 and piston 105 rod 53 carrying an equalizer bar 54 connected with the hoist cables. Suitable three-way valve mechanism 55 may be provided to control operation of this hydraulic power unit, the same being actuated from the control shaft 48 through shafting such as indicated at 56. 110

In line with concealment and protection of the various moving parts, the elevator cables are shown as covered at the rear by passing through hollow struts 57 extending 115 from the inner guide pulleys 41 to the lower, outer guide pulleys 25, these struts serving as braces for the pulleys as well as guards for the cables.

The invention it will be seen is so built 120 into the truck structure as not to spoil the appearance of the vehicle or interfere with the handling of the same. The tail gate may be used for all ordinary purposes and in addition may be used as an elevator for 125 raising or lowering heavy objects, in the loading and unloading operations. The elevator operations are completely controlled from a convenient position, at the end of the tail gate, where the operations 130

may be closely watched and governed accordingly. The various parts of the apparatus are covered, making it safe to handle and serving also to keep the mechanism in proper running order. Mechanically, the structure is simple, rugged and strong and operates smoothly and quietly. The elevator rams are long enough and are positively guided throughout sufficient of their movement to prevent binding. The rolls which back up the rams contribute largely to the freedom and smoothness of action and the bottom rolls being located below the body at the axle line, or even lower, brace the rams in their fully extended position so that they may carry the full load, without binding, even in this position. The substantially square cross section of the rams and the correspondingly rectangular shape of the guides, together with the cross connection of the rams through the tail gate and the hinge rod for the latter contribute their effects in keeping the rams in strictly parallel free sliding relation. At the same time, this construction is sufficiently flexible to enable the elevator structure to accommodate itself to any racking or twisting of the body, without injury to the parts. Also this construction will operate freely on the various inclines which the truck may have to assume on different roadways. The tail gate hinge may be simply a long bolt rod, set up tight to the rams with a long spacing bushing 57' thereon on which the tail gate pivots. The holding dogs and lower pulleys may be proportioned to occupy substantially the full width of the hollow rams so as to be properly positioned by their simple engagement on the rod within the hollows of the rams. To offset and compensate for unequal stretching in the cables and wear of other parts, a turn buckle 58 or the like may be interposed in one or both of the cables. In the arrangement disclosed and particularly in the modification described where the ends of the cables are directly connected to the lower ends of the rams, "double weaving" of the cables is practically avoided and hence the wear on the cables is kept to a minimum. If desired, the cables may be equalized by connecting the ends of the same together, as by substituting pulleys in place of the anchorages 22 and bringing the ends of the cables together over such pulleys, across the top, just beneath the roof of the truck body. A similar automatic equalizing effect may be obtained by bringing the ends of the cables together at the bottom, through the tail board. It has been found preferable, however, in a construction like that first shown to use a turn buckle or the like to effect such equalization as may be required from time to time. In Fig. 6, antifriction rollers 59 are indicated

journalled in the upper end portions of the rams and exposed at the rear so as to engage the rearward sides of the guide housings, such rollers coming into action principally when the rams are extended or fully lowered so as to offset any binding tendency at such time and enable the rams to travel smoothly and without undue friction when thus extended.

What is claimed is:

1. In combination, a truck elevator including hollow rams, a tail board, a hinge rod for said tail board, said rod extending through said hollow rams and holding dogs within the hollow rams and pivotally engaged on the portions of the hinge rod extending through said rams.

2. In combination, a truck elevator including hollow rams, a tail board, a hinge rod for said tail board, said rod extending through said hollow rams, holding dogs within the hollow rams and pivotally engaged on the portions of the hinge rod extending through said rams and hoist pulleys for the rams also located on the hinge rod within the hollows of the rams.

3. A truck elevator comprising in combination, guide housings, hollow rams operating in said guide housings, pulleys journalled in the lower ends of said rams, cables supported at the upper ends of the housings and extending down through the hollow rams, about said pulleys and upward to the tops of the housings, pulleys at the tops of the housings for said upwardly extending runs of the cables, hoist means connected with the traveling ends of said cables and a tail gate structure carried by the rams, a hinge rod connecting the lower portions of the rams, the tail gate being pivotally mounted on said hinge rod and the lower pulleys being journalled on said hinge rod.

4. In combination with a truck body having sides, connected together at the top in definitely spaced parallel relation, vertical guide housings of general U-shape in horizontal cross-section secured with their open sides engaged over the ends of the sides of the truck body and thereby forming in effect hollow extensions of the truck sides, held in definitely parallelism by the connection of the sides at the top, pulleys mounted by and completely housed, within the upper portions of said closed vertical guide housings, hollow rams operating in said guide housings, a tie rod connecting the lower ends of said rams together in definitely spaced relation, a tail gate hinged on said tie rod and cable connections having a hoisting connection with the ram-spacing, tail gate mounting tie rod and operating up through the hollow rams and about the pulleys in the upper ends of the guide housings and thereby concealed and protected and pulleys at the lower ends of the guide housings in

line with those at the top, said cable connections extending downwardly through the housings from said upper pulley and about said lower pulleys, whereby the rams and said operating connections are entirely enclosed and protected.

5. In combination with a truck body having sides, vertical guide housings of general U-shape in horizontal cross-section secured with their open sides engaged over the ends of the sides of the truck body and thereby forming in effect hollow extensions of the truck sides, hollow rams operating in said guide housings, a tie rod connecting the lower ends of said rams together in definitely spaced relation, a tail gate hinged on said tie rod, cable connections having a hoisting connection with the ram-spacing, tail gate mounting tie rod and operating through the hollow rams and within the guide housings and thereby concealed and protected, swinging pawls pivoted on the tail gate mounting rod within the lower end portions of the hollow rams, supporting shoulders on the truck structure engageable by said pawls, means for shifting the pawls out of supporting engagement with said shoulders, said swinging pawls and the shoulders being relatively positioned to require a lifting movement of the pawls before they can be released from the shoulders and whereby said shifting means can not be operated to throw the pawls out of supporting position until the rams have been elevated a definite amount.

6. In combination, a truck body having

sides in definite spaced parallel relation, vertical guide housings of general U-shape in horizontal cross-section and arranged with the spaced sides of the same secured to the ends of the truck sides and with the closed loop portions of said U-shaped housings to the rear of the truck body to form hollow rearward extensions of the truck body sides, rams operating in said guide housings, a tie rod rigidly connecting the lower end portions of the rams together in definite spaced relation, a tail gate hinged on said tie rod and cable means including pulleys mounted in the upper ends of the housings, cables having a hoisting connection with the rams and operating over said pulleys within the closed portions of the hollow guide housings, pulleys at the lower ends of the housings, said cables extending downward about said lower pulleys and concealed and protected within the housings.

7. A tail gate elevator for trucks, comprising vertical guide housings of general U-form in horizontal cross-section, rams operating in said guide housings, a tie bolt connecting the lower end portions of the rams, a spacing tube engaged on said tie bolt between the rams for bracing and definitely spacing the latter in parallel relation with the guide housings, a tail gate structure hinged on said spacing tube, pulleys journaled between the sides of said U-shaped guide housings and cables concealed within said housings, operating over the pulleys therein and connected with the rams.

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