

Sept. 2, 1958

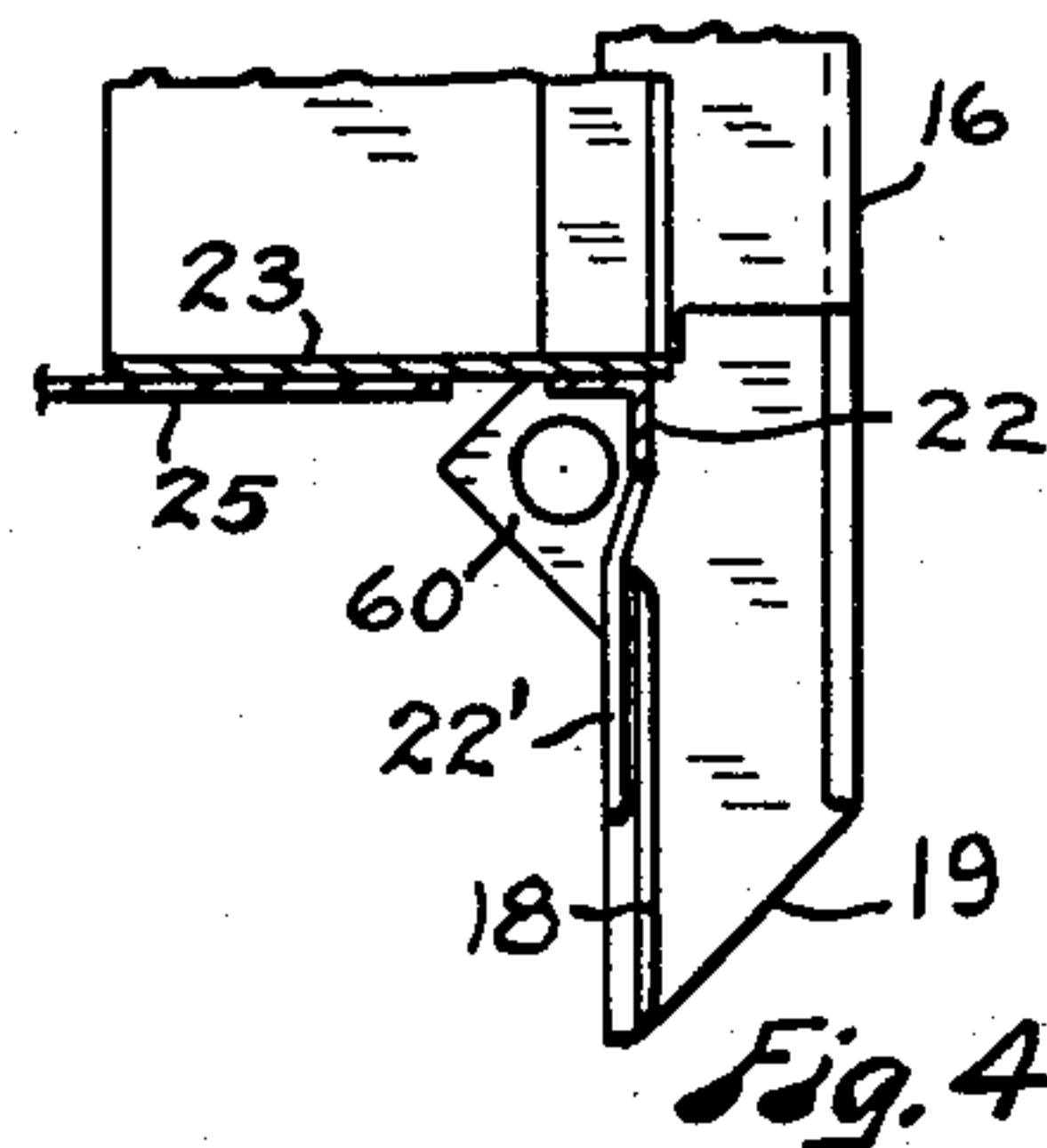
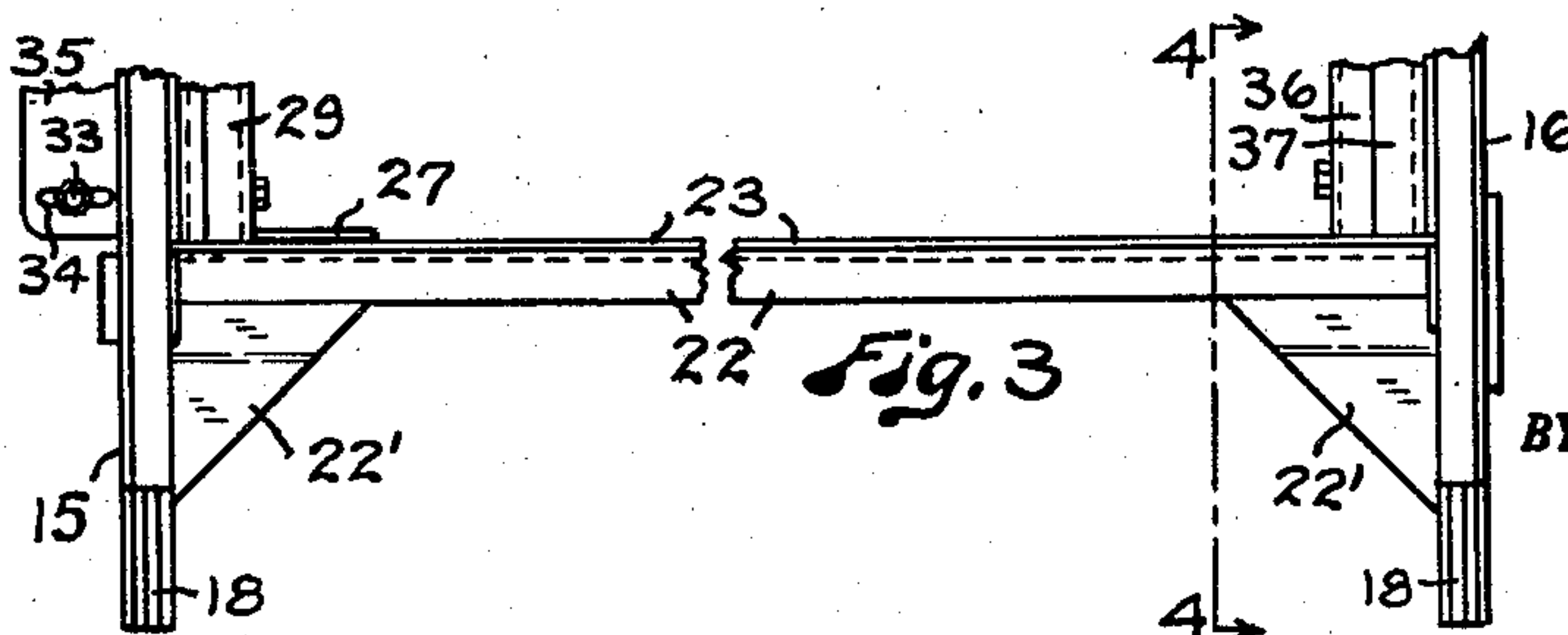
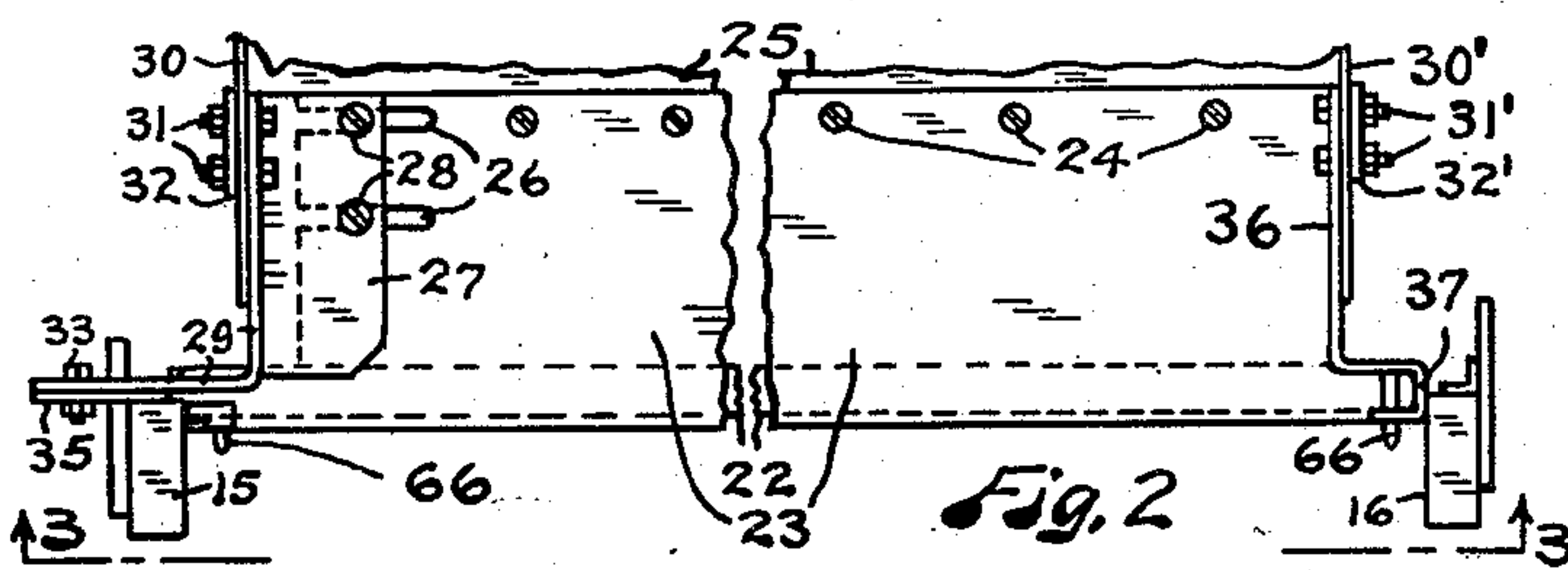
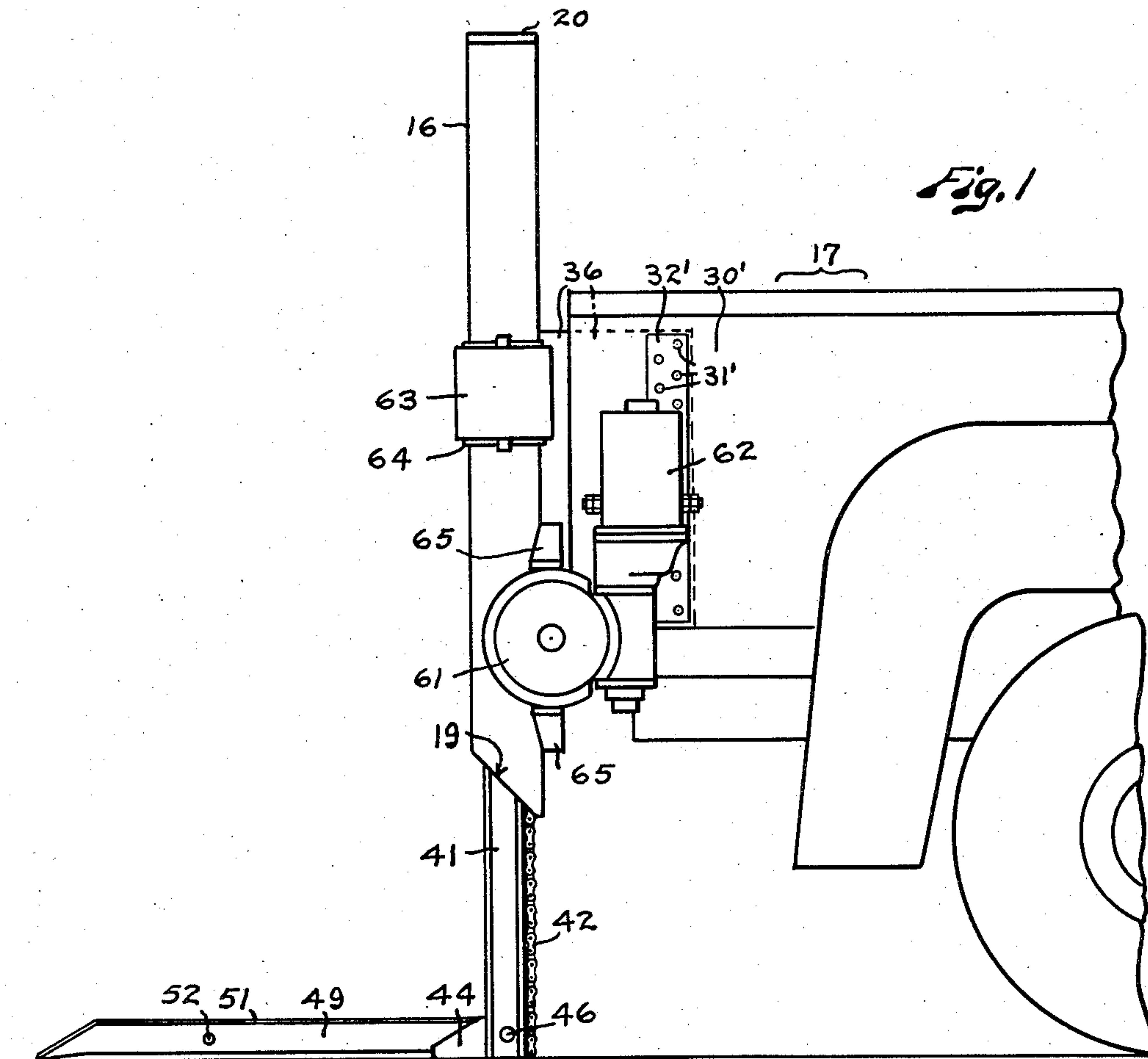
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LIFT GATE FOR TRUCK BODY

Filed March 26, 1956

2 Sheets-Sheet 1



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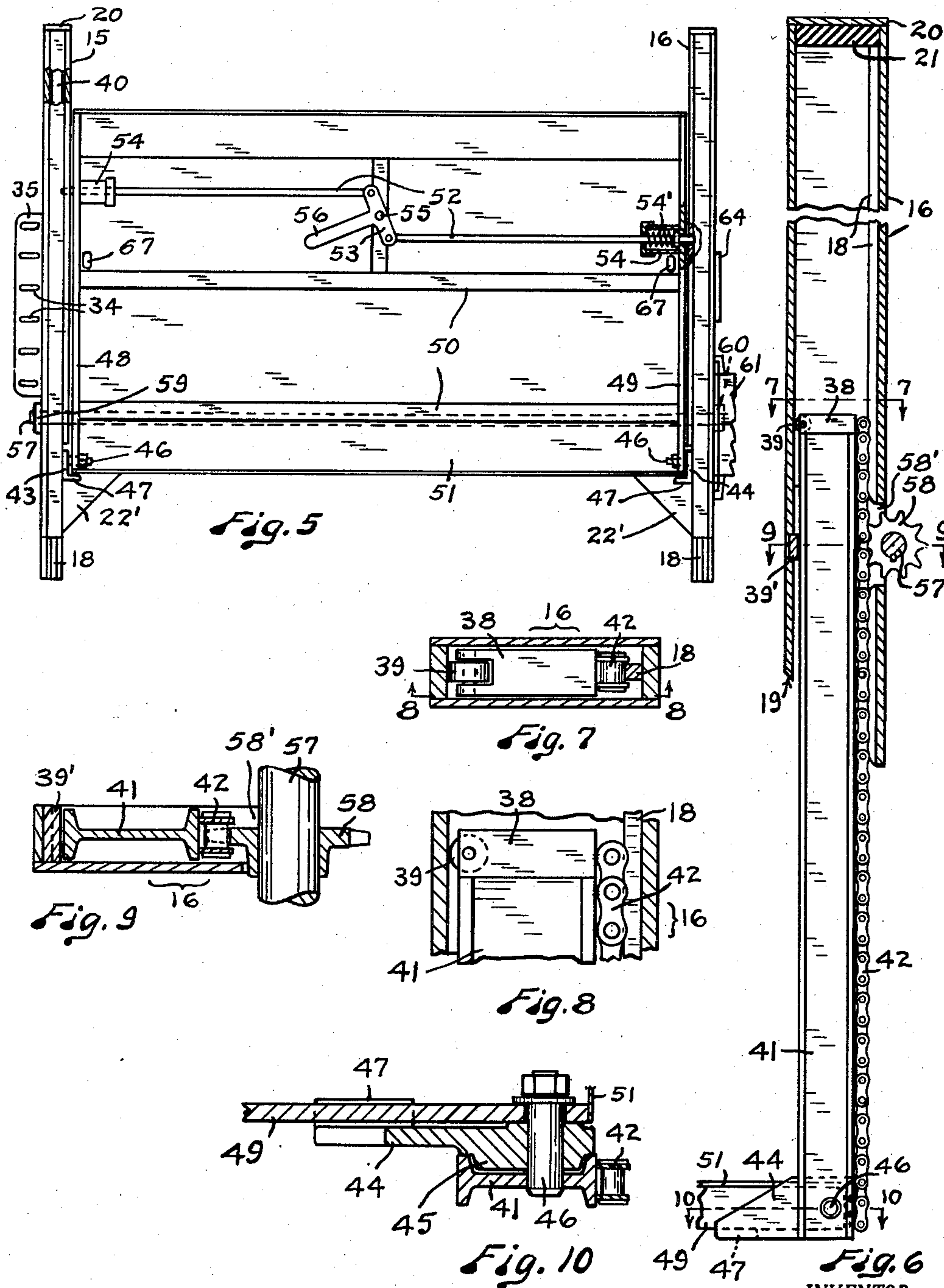
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1

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LIFT GATE FOR TRUCK BODY

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Application March 26, 1956, Serial No. 573,717

6 Claims. (Cl. 214—75)

This invention relates to a lift gate for the rear end of a truck body and an object of this invention is to provide a lift gate of this type which is electrically operated and which is simple in construction, efficient in operation and not expensive to manufacture.

Another object of this invention is to provide electrically operated lift gate mechanism which can be assembled as a unit ready for installation on the rear end of a truck body and which is adjustable to compensate for variations in the width of truck bodies.

Another object is to provide a lift gate comprising a transverse support attachable to the rear end of a truck body, two spaced apart upright parallel guide members rigid with said support, two rolling beam type lift bars vertically movable in said guide members, two roller chains lying flat against and secured to the front faces of the lift bars, sprocket pinions meshing with said roller chains and a deck pivotally attached to the lower end portions of the lift bars.

Another object is to provide lift gate mechanism in which a roller chain is applied to a lift member and meshes with a sprocket pinion in such a manner that the roller chain functions as a rack without passing around the pinion or flexing or bending and at the same time retains its roller characteristics and serves as an anti-friction means facilitating movement of the lift bar in a guide member with a minimum amount of friction thus providing smoother and easier lifting and lowering of loads on a deck which is secured to the lower end of the lift bar.

Another object is to provide lift gate means for the rear end of a truck body in which a vertically movable deck is raised and lowered by an electric motor operating through self locking gear reduction means thereby providing accurate control of the vertical movement of the deck including the stopping and holding of the deck at any desired elevation.

Other objects of the invention will be apparent from the following description taken in connection with the accompanying drawings.

Figure 1 is a side elevation showing the rear end of a truck equipped with my lift gate, the deck being in a lowered and horizontal position.

Fig. 2 is a detached assembly view in plan, with parts broken away, showing a bed plate together with upright guide members and brackets which form part of this lift gate.

Fig. 3 is a fragmentary elevation looking in the direction of broken line 3—3 of Fig. 2.

Fig. 4 is a view partly in section and partly in elevation looking in the direction of broken line 4—4 of Fig. 3.

Fig. 5 is a detached rear elevational view of the lift gate mechanism, with parts broken away to reveal interior constructions, and showing a deck in a raised and oriented position which it would ordinarily occupy when forming the tail gate closure means for a truck body.

Fig. 6 is a vertical sectional view through an upright guide member showing in elevation therein a movable

2

roller beam type lift bar having a deck attached to its lower end and having a roller chain lying flatly against and rigidly attached to its front face with a sprocket pinion engaging the roller chain.

Fig. 7 is a view in cross section on a larger scale than Fig. 6 looking in the direction of broken line 7—7 of Fig. 6, parts being shown in plan.

Fig. 8 is a view partly in elevation and partly in cross section taken substantially on broken line 8—8 of Fig. 7.

Fig. 9 is a view in cross section, on a larger scale than Fig. 6, taken substantially on broken line 9—9 of Fig. 6.

Fig. 10 is a view in cross section, on a larger scale than Fig. 6 taken substantially on broken line 10—10 of Fig. 6.

This electrically operated lift gate mechanism comprises two upright spaced apart parallel tubular guide members 15 and 16, preferably of generally rectangular cross section, rigidly connected with each other by transverse bed plate means, Figs. 2, 3 and 4, and secured to the rear end portion of a truck body 17. The two guide members 15 and 16 are made right and left but are otherwise of similar construction and the following description as applied to the guide member 16 will apply equally well to guide member 15.

Each guide member 15 and 16 has a vertically or longitudinally extending straight track 18 of less width than the guide member secured to the inner side of its front wall. Also each guide member has an inclined bottom end 17 which slopes downwardly from the rear toward the front side of the guide member. The top end of each guide member 15 and 16 has a rigidly attached cap 20 and a rubber shock pad 21 is disposed within each guide member and rests against the cap 20.

The inner side plate of each guide member 15 and 16 terminates short of the lower end of the guide member to provide clearance for parts hereinafter described, see Figs. 3, 4 and 6.

The bed plate means which rigidly supports the two guide members 15 and 16 in spaced apart parallel upright relation at the rear end of the truck body 17, see Figs. 2, 3 and 4, is as follows: A transverse angle bar 22 extends between and has its two ends rigidly secured to the two guide members 15 and 16. Two corner gusset plates 22' are rigid with the angle bar 22 and the respective guide members 15 and 16 and serve as trusses and angle braces to render the structure rigid. A flat bed plate 23 overlaps and is rigidly secured to the angle bar 22. The flat bed plate 23 rests upon and is secured by bolts 24 to the floor 25 of the truck body. The end of the bed plate 23 shown at the left in Figs. 2 and 3 has inwardly extending slots 26 and is lapped by an adjustment plate 27. The two plates 23 and 27 are adjustably secured to each other and to the truck bed floor 25 by bolts 28. Thus the two bed plate members 23 and 27 are relatively adjustable to fit truck bodies of different widths. The extension plate 27 has an upright angle bracket 29 rigidly connected with its outer edge and extending upwardly therefrom. The angle bracket 29 is secured to a side wall 30 of the truck body by suitable means, such as bolts 31 and a backing plate 32. The outwardly extending flange of the angle bracket 29 is adjustably secured, by bolts 33 operating in slots 34, to a transversely extending attachment plate 35 which is rigid with the adjacent upright guide member 15. Thus adjustment of the bracket 29 to truck bodies of variable widths is provided and the bracket 29 is rigidly connected with the guide member 15 after this adjustment has been made but the guide member 15 is not adjustable with the bracket 29 and adjustment plate 27. The end portion of the flat bed plate 23 shown at the right in Figs. 2 and 3 is provided with an upwardly extending rigid

bracket 36. The bracket 36 is secured to a side wall 30' of the truck body by suitable means such as bolts 31' and a backing plate 32'. The bracket 36 has an outwardly extending reversely bent portion 37 which is rigidly secured to the upright guide member 16. Preferably most of the parts of this device which are permanently rigidly secured together are welded. The structure just described provides a rigid assembly comprising the upright guides 15 and 16, cross bar 22, bed plate 23 and bracket 36 with plate 27 and bracket 29 forming an adjustable part of this assembly. The rigidly assembled parts insure proper spacing and support of the upright guide members 15 and 16. The adjustable parts 27 and 29 adapt this lift gate structure to trucks having bodies of varying widths within predetermined limits.

Two rolling beam type lift bars 40 and 41 of "I" shaped cross section and of duplicate construction except that, in some respects they are right and left, are longitudinally movably disposed within the respective guide members 15 and 16. Each lift bar, see bar 41, Figs. 1, and 6 to 10 inclusive, has a piece of roller chain 42 of substantially the same length as the lift bar placed flat against the forward face of the lift bar and secured to the lift bar. The roller chain 42 is taut from end to end and is supported against the lift bar so that it does not flex or bend. The edges of the links forming the chain 42 may be brazed or welded to the lift bar throughout the entire length of the lift bar or approximately six inches of each end portion of each chain 42 may be thus brazed or welded to the lift bar. The diameters of the rollers of the chain 42 are less than the width of the end portions of the links so that the rollers do not contact the faces of the lift bars but said rollers do roll on the tracks 18 and thus reduce friction and provide smoother operation in lifting and lowering loads.

Each lift bar 40 and 41 has a mounting block 38 rigidly secured to its top end and each mounting block 38 carries a rotatively mounted anti-friction roller 39 which engages with and rolls on the inside surface of the back wall of the guide member 15 or 16.

Two brackets, 43 and 44, Figs. 1, 5, 6 and 10, of duplicate construction except that they are made right and left, are welded or otherwise rigidly secured to the lower end portions of the respective lift bars 40 and 41 and extend rearwardly at right angles therefrom. Each of these brackets, see bracket 44 Fig. 10, has a thickened part 45 which fits between the flanges of the lift member 41. An inwardly protruding shouldered pin 46 extends through the thickened part 45 of each bracket 43 and 44 and through the adjacent lift bar 40 or 41 and is welded to the lift bar and to the bracket part 45. The inwardly directed end portion of each pin 46 is of reduced diameter and is threaded to receive a nut and forms a pivot stud for a lift deck as hereinafter described. The rearwardly extending end portion of each bracket 43 and 44 is provided with an inwardly directed shelf 47.

The combined tail gate and lift platform, herein referred to as the deck, comprises two flat side bars 48 and 49 connected by cross bars 50, Fig. 5, and having a metal top plate 51 secured thereto. Preferably the outer end of the plate 51 is sloped downwardly to facilitate handling loads and articles thereover. The end portions of the flat side bars 48 and 49 adjacent the lift bars 40 and 41 are pivotally mounted on the stud pins 46. This provides pivotal movement of the deck from a generally horizontal position with the side bars resting on the shelves 47 of the brackets 43 and 44 to an upright position in which the deck, when elevated, serves as a tail gate or closure member for the rear end of the truck body 17. The deck is locked in the upright elevated position in which it is shown in Fig. 5 by two bolts 52 which have their inner ends pivotally secured to a cross bar 53 and their outer ends slidably disposed in tubular sleeves 54. The sleeves 54 are secured to the side bars 48 and 49 and the sleeve at the right in Fig. 5 is shown in cross section.

Preferably a spring 54' urges each bolt 52 outwardly. The cross bar 53 is fulcrumed on a pivot 55 and has a handle 56 by which the bolts 52 may be retracted. The outer ends of the bolts 52 can lock into suitable holes in the upright guide members 15 and 16 thus locking the deck in an upright raised position. Preferably two rearwardly projecting horizontal support pins 66, Fig. 2, are secured, one to the upright guide member 15 and the other to the bracket part 37 and holes 67, Fig. 5, in the plate 51 fit over these pins when the deck is in a raised and upright position so that the pins 66 help to support the deck.

A shaft 57 extends crosswise of the rear end of the truck body 17 just below the level of the bottom 25 of said truck body and two sprocket pinions 58 are secured to this shaft 57 and extend through suitable openings 53' in the front walls of the guide members 15 and 16 and mesh with the roller chains 42 on the forward faces of the lift bars 40 and 41. Obviously rotation of the shaft 57 will move the two lift bars 40 and 41 either up or down with the roller chains 42 functioning like anti-friction racks. A bearing member 39' of sintered bronze is provided in each guide member 15 and 16 opposite to the pinion 58 to resist the separation force due to this pinion.

Shaft mounts or bearings 59 and 60, Figs. 4 and 5, rotatively support the respective end portions of the shaft 57 and one end portion of said shaft 57 extends into a gear housing 61 where further bearings are provided and the shaft 57 is connected with suitable speed reduction gears. The speed reduction transmission means in housing 61 preferably includes self locking worm means. Since this transmission is of conventional construction and easily obtainable on the market it is not described in detail. A direct current motor 62, which can be energized from the usual battery of the truck, is connected with the transmission in housing 61 for driving the same. A switch box 63 containing the control means for the motor 62 is mounted on a plate 64 which is secured to the guide member 16. The electrical control means in the switch box 63 may be of conventional form and is not herein described in detail. The transmission housing 61 is secured by brackets 65 to the upright guide member 16 and the motor 62 may be mounted on said housing 61. Thus all of the driving units are carried by the guide member 16 and are parts of the lift gate assembly and are mounted directly on the truck.

The deck 51 is shown substantially at ground level in Fig. 1 but the guide members 15 and 16 and lift members 40 and 41 are preferably long enough to permit lowering the deck several inches below the level of the surface on which the truck rests. The deck can be raised at least high enough to bring it flush with the floor 25 of the truck body. When said deck is in a raised position and flush with the bed plate 23 loads may be transferred smoothly and easily between the truck and the deck over said bed plate.

The roller chains 42 are secured to and lie flatly against the lift bars 15 and 16 at all times and the rollers of these chains insure minimum friction with the sprocket pinion 58. The chain rollers further bear against and have rolling contact with the racks 18 and the rollers 39 on the upper ends of the lift bars maintain rolling contact with the opposite walls of the guide members 15 and 16. Thus the leverage exerted on the lift bars 15 and 16 by a load on the deck will be borne by the chain rollers and the rollers 39 and the friction incident to vertical movement of the lift bars 40 and 41 in the guide members 15 and 16 will be minimized.

The foregoing description and accompanying drawings clearly disclose a preferred embodiment of my invention but it will be understood that changes may be made within the scope of the following claims.

I claim:

1. In a lift gate for attachment to the body of a truck, an upright guide member; a longitudinally extend-

5

ing track within said guide member; a lift bar longitudinally movable in said guide member; a roller chain secured to and lying flat against one face of said lift bar and supported against flexing throughout its entire length by said lift bar, said roller chain having rolling engagement with said track; a driven pinion meshing with said roller chain longitudinally moving said lift bar in said guide member when it is rotated; and a lift deck pivotally connected with the lower end of said lift bar movable from a horizontal to an upright position and extending away from the side of the lift bar opposite said roller chain when it is in a horizontal position.

2. In a lift gate for a truck body, an upright guide member of approximately rectangular hollow cross section; a rolling beam type lift bar of I shaped cross section longitudinally movable in said guide member; an anti-friction roller rotatively mounted on the upper end portion of said lift bar and having rolling contact with one side of said guide member; a roller chain lying flat against and rigidly secured to the face of said lift bar opposite the side at which said roller is mounted; a track in said guide member engaged by said roller chain; and a sprocket pinion engaging the side of said roller chain outwardly from said lift bar, said anti-friction roller and said roller chain providing rolling contact of said lift bar with two opposed sides of said guide member.

3. In a lift gate for a truck, two upright spaced apart parallel guide members secured to the rear end of the truck; a lift bar longitudinally movable in each guide member; a roller chain lying flat against and fixedly secured to one face of each lift bar and supported against flexing throughout its entire length by the lift bar; a transverse driven shaft extending across both of said lift bars; two sprocket pinions secured to said shaft and meshing with the sides of the respective roller chains outwardly from the lift bars; speed reduction gear means including a self locking worm connected with said shaft; an electric motor having a driving connection with said speed reduction gear means; and a deck pivotally connected with the lower ends of said lift bars.

4. In a lift gate for attachment to the rear end of a truck body, a normally horizontal bed plate resting on and attached to the floor of the truck body; an upright bracket rigid with one end portion of said bed plate and attachable to the side of the truck body; another upright bracket adjustably connected with the other end portion of the bed plate and attachable to the other side of the truck body and affording adjustment to truck bodies of different widths; two upright spaced apart parallel guide members secured to said bed plate; a lift bar movable in

6

each of said guide members; a roller chain lying flat against and fixedly secured to one face of each lift bar and inflexibly supported throughout its entire length by the lift bar; a driven shaft extending crosswise of said lift bars and said guide members; two sprocket pinions secured to said shaft and meshing with the roller chains on the respective lift bars; and a deck pivotally connected with the lower end portions of the lift bars.

5. The apparatus as claimed in claim 4 in which the driving means for the shaft comprises an electric motor connected with the shaft by a speed reduction gear including a self locking worm and in which the speed reduction gear and motor are both mounted on one of the upright guide members providing a lift gate assembly in which all of the parts are attachable to and detachable from the truck body as a unit.

6. In a lift gate for attachment to the rear end of a truck body, a cross bar; a normally horizontal bed plate secured to said cross bar and resting on and attached to the floor of the truck body; a fixed upright bracket rigid with one end portion of said bed plate and attachable to one side of the truck body; an adjustable upright bracket adjustably connected with the other end portion of the bed plate and attachable to the other side of the truck body; an upright guide member secured to one end of said cross bar and to said fixed bracket; another upright guide member secured to said cross bar and said bed plate adjacent said adjustable bracket, said cross bar and said bed plate supporting said guide members in relatively fixed spaced apart parallel relation and said adjustable bracket providing adjustment to truck bodies of varying widths; a lift bar movable in each of said guide members; a roller chain lying flat against and fixedly secured to one face of each lift bar and supported against flexing throughout its entire length by the lift bar; a driven shaft extending cross wise of said lift bars and said guide members; two sprocket pinions secured to said shaft and meshing with the roller chains on the respective lift bars; and a deck pivotally connected with the lower end portions of the lift bars.

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