Jan. 27, 1931. J. P. HEIL ET AL 1,789,975

MECHANICAL HOIST

Filed Feb. 7, 1927 5 Sheets-Sheet 1

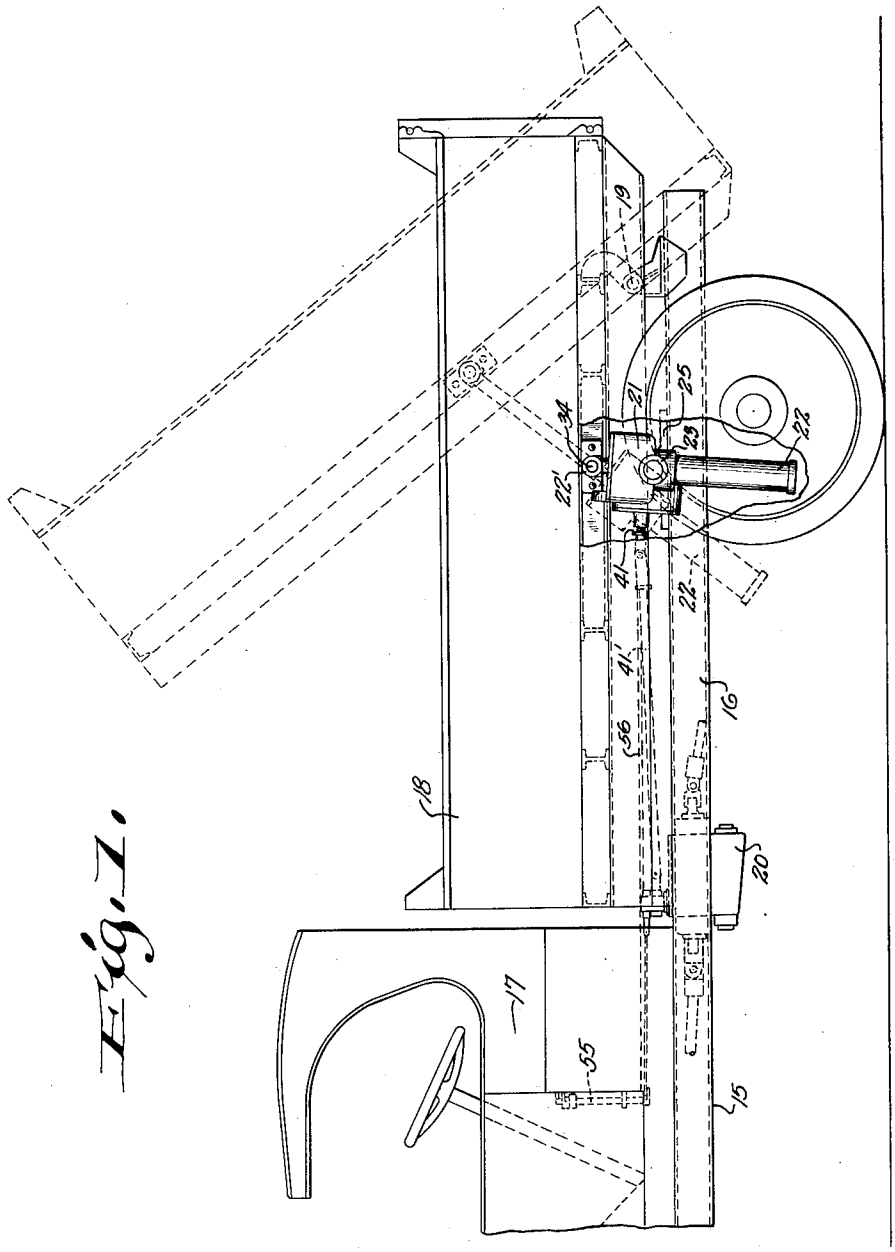


Fig. 1.

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MECHANICAL HOIST

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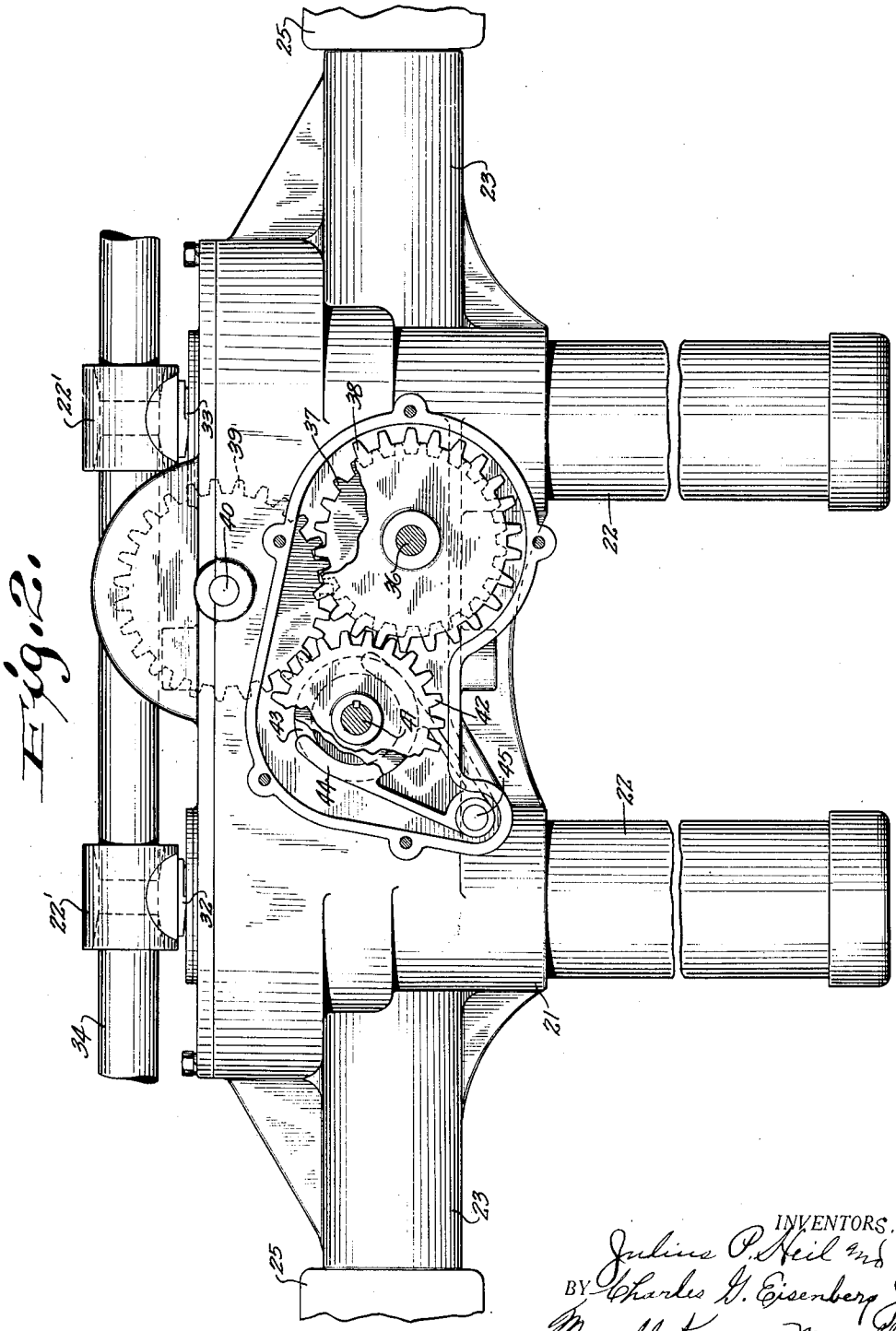


Fig. 2.

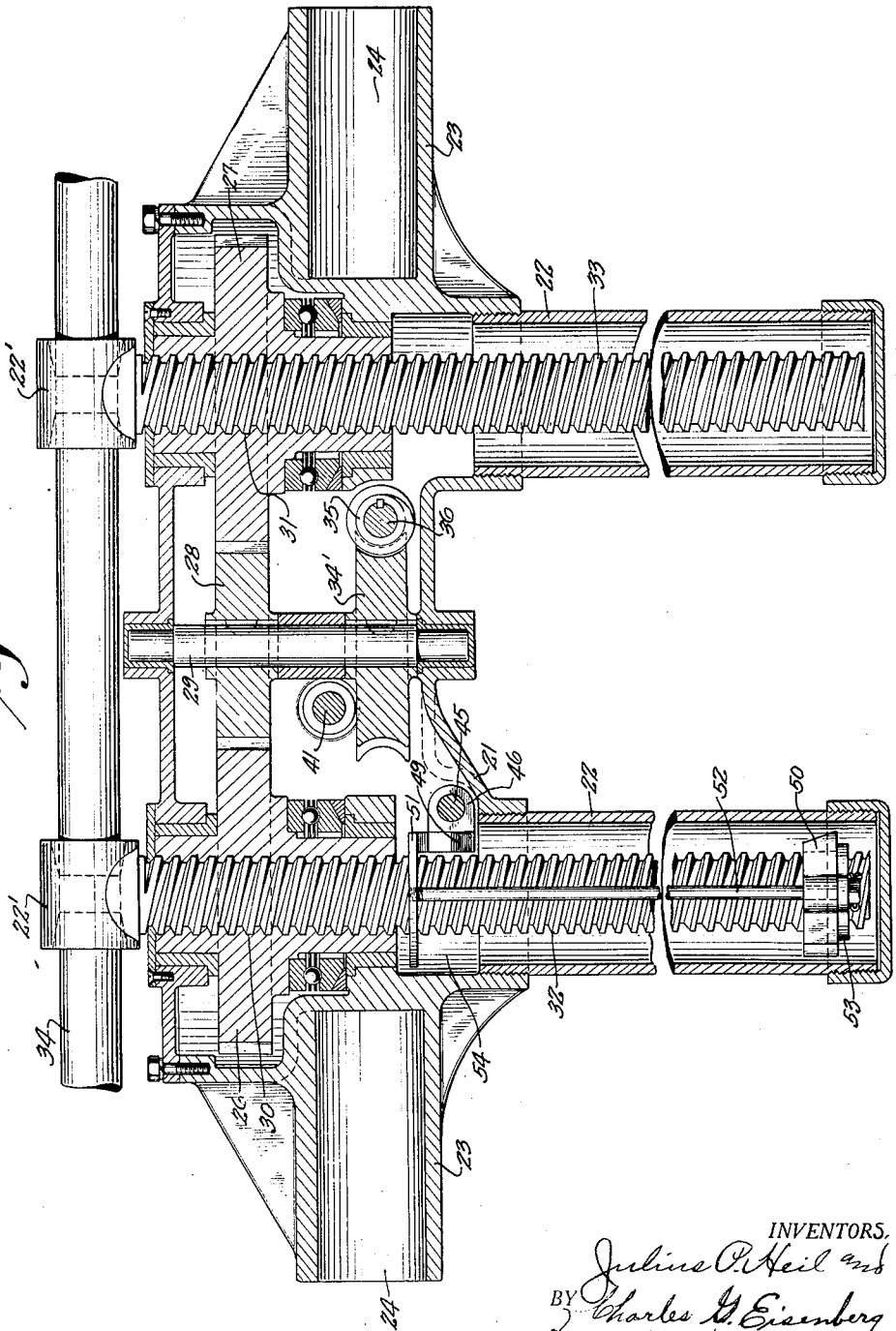
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MECHANICAL HOIST

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Fig. 3.



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MECHANICAL HOIST

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Fig. 5.

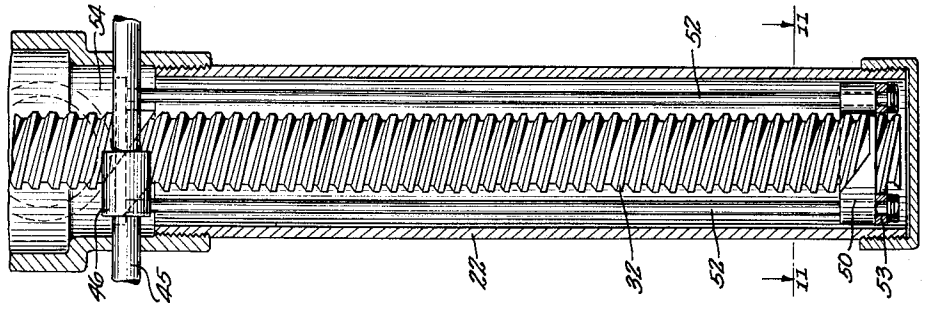
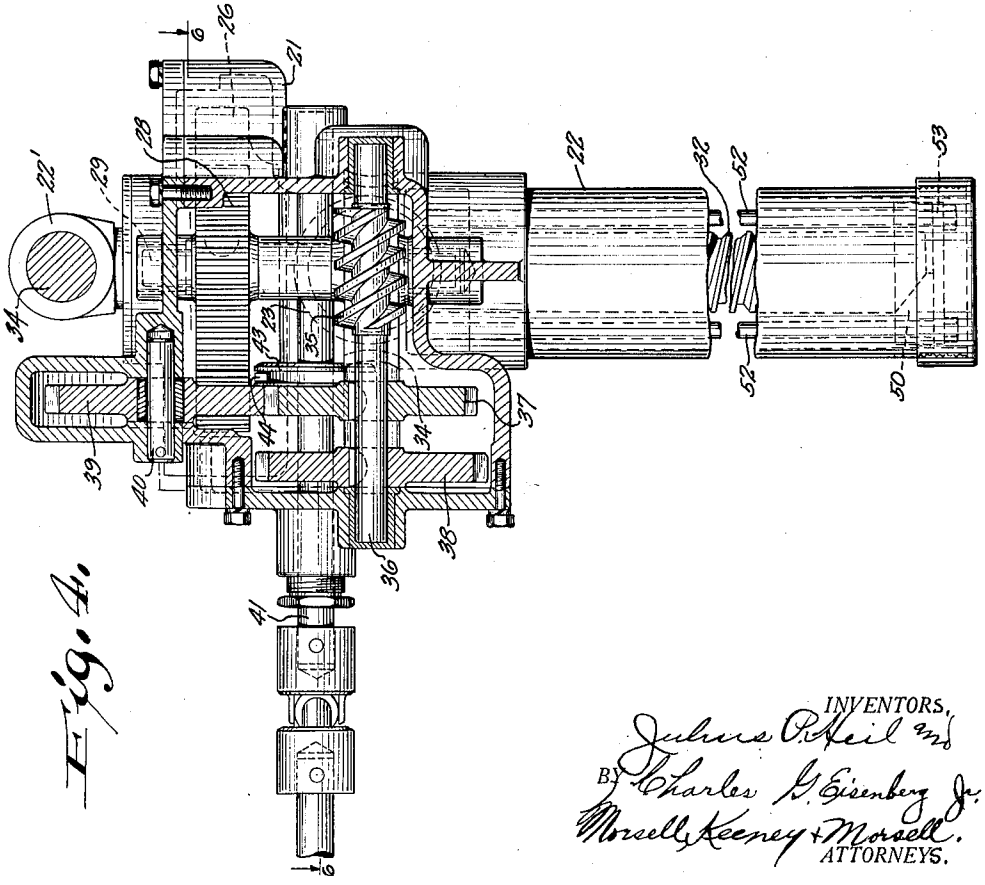


Fig. 4.



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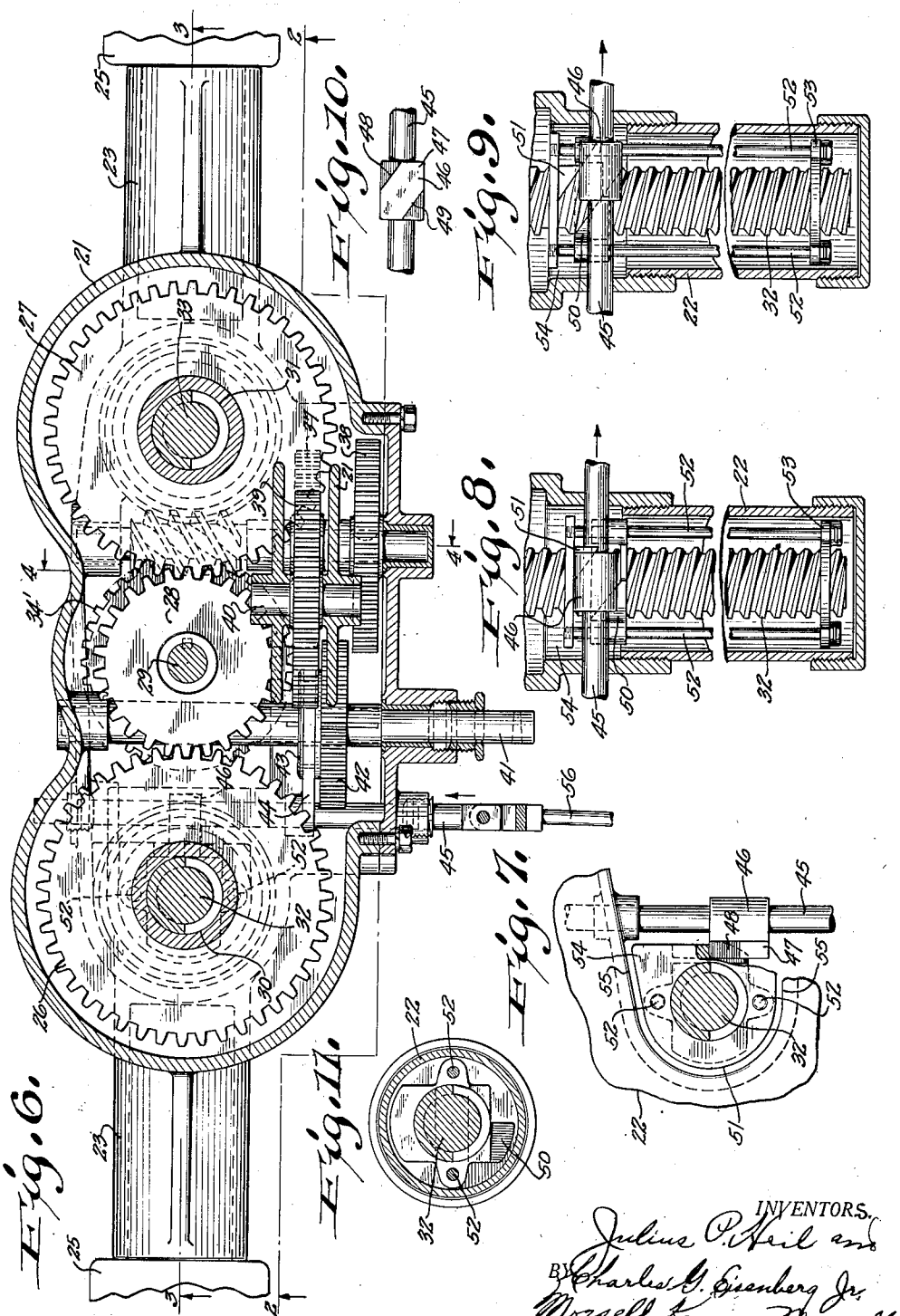


Fig. 6.

Fig. 10.

Fig. 9.

Fig. 8.

Fig. 7.

Fig. 11.

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1,789,975

UNITED STATES PATENT OFFICE

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MECHANICAL HOIST

Application filed February 7, 1927. Serial No. 166,476.

This invention relates to improvements in mechanical hoists, more particularly, although not solely adapted for operating the dump bodies of power driven trucks or other vehicles.

It is one of the objects of the present invention to provide a mechanical hoist which may be used in connection with any standard make of truck and dump body, and which will not require any space between the forward end of the body and the cab or seat of the truck.

A further object of the invention is to provide a mechanical hoist which will permit the positioning of the body with relation to the front and rear axles of the truck, to more evenly distribute the load thereon and thereby increase the capacity of the truck.

A further object of the invention is to provide a mechanical hoist which is a unitary structure, and is self contained, and has therefore a minimum number of parts and may be easily mounted on a truck.

A further object of the invention is to provide a mechanical hoist which will automatically stop the further tilting of the truck body when said body reaches its predetermined dumping inclination.

A further object of the invention is to provide a mechanical hoist in which screw means actuated by gears are provided for lifting the load, which means will maintain the load at any height desired.

A further object of the invention is to provide a mechanical hoist in which a pair of screw members in spaced relation are arranged to lift and support the load.

A further object of the invention is to provide a mechanical hoist which is of simple construction, is strong and durable, and is well adapted for the purpose described.

With the above and other objects in view, the invention consists of the improved mechanical hoist and its parts and combinations as set forth in the claims, and all equivalents thereof.

In the accompanying drawings in which the same reference characters indicate the same parts in all of the views:

Fig. 1 is a side view of a portion of a motor truck provided with the improved mechanical hoist, parts broken away to show the location of other parts, the view also illustrating by dotted lines the dumping position of the body of the truck;

Fig 2 is a front sectional view of the mechanical hoist taken on line 2—2 of Fig. 6, parts of the casing removed and other parts broken away to show interior construction;

Fig. 3 is a vertical sectional view of the hoist taken on line 3—3 of Fig. 6;

Fig. 4 is a vertical sectional view taken on line 4—4 of Fig. 6;

Fig. 5 is a vertical sectional view of a portion of the reversing mechanism, with the sliding part in its outer position;

Fig. 6 is a sectional view of the hoist taken on line 6—6 of Fig. 4;

Fig. 7 is a detail view partly in section of a part of the reversing mechanism of the hoist;

Fig. 8 is a vertical sectional detail view of a part of the reversing mechanism, the slidable member being shown in its neutral position;

Fig. 9 is a similar view, with the slidable member shown in its inner position;

Fig. 10 is a side view of the slidable member opposite to that shown in Fig. 9; and

Fig. 11 is a sectional detail view taken on line 11—11 of Fig. 5.

Referring to the drawings, the numeral 15 indicates a portion of a motor truck, 16 the side members of the frame or chassis, 17 the cab or seat portion and 18 the tiltable load carrying body of the truck. The said body near its rear end portion is pivotally connected to the opposite outer side members 16 by a pivot and bracket means 19. The truck is provided with a transmission 20 for connection with the rear axle of the truck to transmit power thereto. The parts thus far described are of ordinary construction.

The improved mechanical hoist comprises a casing 21 with spaced depending cylindrical portions 22 and opposite side outwardly extending portions 23 having aligned trunnion recesses 24 for pivotally receiving the inwardly projecting trunnions of brackets 25 which are mounted on the outer side members of the

chassis. The casing is pivotally supported on said trunnions and depends downwardly therefrom, and has two spaced gears 26 and 27 journaled therein. A pinion 28 interposed between the two gears 26 and 27, and in mesh therewith, is mounted fast on a short shaft 29 which is journaled in the casing. The gears 26 and 27 are formed with threaded bores 30 and 31 for receiving screws or threaded members 32 and 33 which extend through said gears 26 and 27 and downwardly into the cylindrical casing portions 22. The upper ends of the screws extend through the casing and are formed with upper eyed ends 22′ for receiving the pivot rod 34 which pivotally connects the screws 32 and 33 to the tiltable body portion 18 of the truck. The pivotal connection of the screw members and the casing permit the said parts to tilt and aline with said pivotal connections while the truck body is traveling through its arc of movement to an inclined unloading position.

A worm wheel 34′ keyed on the short shaft 29 is in mesh with a worm 35 forming part of a short horizontally extending shaft 36 journaled in the casing. Said worm shaft also has mounted thereon gears 37 and 38, of which gear 37 is in mesh with a reverse gear 39 journaled on a short shaft 40 mounted fast within the casing 21. A driving shaft 41 journaled in the casing and projecting outwardly therefrom is provided with a shift gear 42 which is keyed to and slidingly mounted on the said shaft. The said shift gear 42 is adapted to be moved into mesh with either gear 38 or reverse gear 39, as desired. Assuming that shaft 41 is rotated clockwise with relation to Fig. 6, the meshing of the shift gear 42 with gear 38 will actuate the parts to tilt the truck body, while the meshing of the gear 42 with the reverse gear 39 will actuate the parts to lower the body. The forward end of the shaft 41 is adapted to be connected to a shaft 41′ extending to the transmission 20 of the truck, and is driven thereby.

The shift gear 42 is formed with a hub having an annular groove 43 for receiving the bifurcated arms of a shift member 44 mounted on an endwise reciprocal shaft 45 extending transversely through the casing alongside of the screw member 32. A collar 46 mounted fast on the shaft 45 is formed with a projecting part 47 extending toward the screw member 32, and parts of the upper and lower surfaces of said projection are angled, as indicated by the numerals 48 and 49, to cooperate with angular faced stop members 50 and 51, in reciprocating the shaft 45. The lower angular faced stop member 50 is in the form of a nut threaded on the screw member 32 and extends around guide rods 52 to prevent the turning of the member 50 and cause it to travel in a perpendicular line and in alinement with the lower angular face 49 of the collar 46. The upper angular faced stop member 51 extends freely around the screw member 32 and the upper ends of the guide members 52 are threaded into said member 51 and are held in spaced relation thereby. The lower angular face of the member is in perpendicular alinement with the upper angular face 48 of the collar 46. The lower ends of the guide rods 52 are connected to a collar 53 which loosely surrounds the screw member 32. The upper portion 54 of the casing 21, in which the screw member 32 is positioned, is formed with flat sides, and the upper angular faced member 51 is correspondingly faced to prevent the turning of the guide rods and the said member 51. As the parts are thus arranged, and assuming that the gears are turning to tilt the load, the collar 46 will be manually moved to the position shown in Fig. 5 to start the upward movement, and the stop member 50 will be moved upwardly by the screw member 32, and when the truck body has almost reached its uppermost position, the upper inclined surface of the stop member 50 will engage the lower inclined face of the collar 46 and move said collar and its shaft 45 rearwardly, and through the intermediary of the shift member 44 and the grooved hub 43, slide the shift gear 42 out of mesh with the gear 38 to a neutral intermediate position, as shown in Fig. 6, and stop further rotation of the screw members and upward tilting of the truck body. If the operator now desires to lower the body, he operates one of the cab controls 55 to push the rod 56 and the connected shaft 45 further rearwardly to move the shift gear 42 into mesh with the reverse gear 39, and the screw members will be rotated in the opposite direction to lower the truck body. In moving rearwardly, the upper inclined surface 48 of the collar 46 will engage the inclined surface of the stop member 51 and move said member and the guide rods 52 and the collar 53 upwardly to the position shown in Fig. 9. When the truck body has almost reached its lowermost position, the stop member 50 will engage the collar 53 and move it and the rods 32 and the collar 51 downwardly to cause the inclined surface of the collar 51 to engage the upper inclined surface 48 of the collar 46 and move said collar and the shift gear 42 to neutral position and stop further lowering of the body. To again tilt the body, it is only necessary to operate the cab lever to pull the rod 56 forwardly to slide the gear 42 again into mesh with the gear 38 as before described.

From the foregoing description, it will be seen that the mechanical hoist is of very simple construction and is well adapted for the purpose described.

What we claim as our invention is:

1. A mechanical hoist, comprising a casing

for pivotal connection with a vehicle chassis, a gear journaled in the casing, a screw member threaded through the gear for pivotal connection with the tiltable body of the vehicle, a worm and gear means for rotating the screw member gear and including a direct drive gear, a reverse drive gear and a shift gear manually movable to engage either gear, and means actuated by the screw member for automatically moving the shift gear to a neutral position when the screw member reaches its outer or inner position.

2. A mechanical hoist, comprising a casing for pivotal connection with a vehicle chassis, a gear journaled in the casing, a vertically extending screw member threaded through the gear for pivotal connection with the tiltable body of the vehicle, a driving shaft having a slidable gear keyed thereon, a worm and gear means for transmitting motion from the driving shaft gear to the screw member gear, one of the gears of the worm gear means arranged to transmit motion in a reverse direction to the screw member gear, and means for automatically moving the slidable gear from engagement with the reverse gear or one of the other gears of the worm gear means to a neutral position when the screw member reaches its upper or lower position.

3. A mechanical hoist, comprising a casing for pivotal connection with a vehicle chassis, a gear journaled in the casing, a vertically extending screw member threaded through the gear for pivotal connection with the tiltable body of the vehicle, a driving shaft having a slidable gear keyed thereon, a worm and gear means for transmitting motion from the driving shaft gear to the screw member gear, one of the gears of the worm gear means arranged to transmit motion in a reverse direction to the screw member gear, means for automatically moving the slidable gear to a neutral position when the screw member reaches its upper or lower position, and other means for moving the slidable gear into mesh with the reverse gear or the other gear of the worm gear means.

4. A mechanical hoist, comprising a casing for pivotal connection with the chassis of a motor vehicle, a pair of gears journaled in the casing, screw members threaded through the gears for pivotal connection with the tiltable body of the vehicle, a gear means for rotating the pair of gears and including a reversing mechanism and means for moving one of the gears of the gear means to a neutral position to stop the rotation of the screw member gears, and means for automatically moving said movable gear of the gear means to a neutral position when the screw members reach their outer or inner position.

5. A mechanical hoist, comprising a casing for pivotal connection with the chassis of a motor vehicle, a pair of gears journaled in the casing, screw members threaded through the gears for pivotal connection with the tiltable body of the vehicle, a worm and gear means for rotating the pair of gears and including a reversing mechanism and means for moving one of the gears of the worm gear means to a neutral position to stop the rotation of the screw member gears, means for automatically moving said movable gear of the gear means to a neutral position when the screw members reach their outer or inner position, and means for moving the movable gear from a neutral position into mesh with the reverse gear or one of the other gears of the worm gear means.

6. A mechanical hoist, comprising a casing for pivotal connection with the chassis of a motor vehicle, a pair of spaced gears journaled in the casing, an interposed gear in mesh with both of said gears, screw members threaded through the spaced gears for pivotal connection with the tiltable body of the vehicle, a worm and gear means for rotating the interposed gear and including a direct driving gear and a reverse driving gear, a slidable gear movable into mesh with either the direct or the reverse driving gear, and means for automatically moving the slidable gear to a neutral position intermediate the two last mentioned gears when the screw members have reached their inner or outer positions.

7. A mechanical hoist, comprising a casing for pivotal connection with the chassis of a motor vehicle, a pair of spaced gears journaled in the casing, an interposed gear in mesh with both of said gears, screw members threaded through the spaced gears for pivotal connection with the tiltable body of the vehicle, a worm and gear means for rotating the interposed gear and including a direct driving gear and a reverse driving gear, a slidable gear movable into mesh with either the direct or the reverse driving gear, and means actuated by one of the screw members for moving the slidable gear to a neutral position intermediate the direct and the reverse driving gears.

8. A mechanical hoist, comprising a casing for pivotal connection with the chassis of a motor vehicle, a pair of spaced gears journaled in the casing, an interposed gear in mesh with both of said gears, screw members threaded through the spaced gears for pivotal connection with the tiltable body of the vehicle, a worm and gear means for rotating the interposed gear and including a direct driving gear and a reverse driving gear, a slidable gear movable into mesh with either the direct or the reverse driving gear, a nut threaded on one of the screw members and movable upwardly and downwardly therewith, and a cam means between the nut and the slidable gear for moving said gear to a neutral position when the screw member

reaches the upper or lower end of its movement.

9. A mechanical hoist, comprising a casing for pivotal connection with the chassis of a motor vehicle, a pair of spaced gears journaled in the casing, an interposed gear in mesh with both of said gears, screw members threaded through the spaced gears for pivotal connection with the tiltable body of the vehicle, a worm and gear means for rotating the interposed gear and including a direct driving gear and a reverse driving gear, a slidable gear movable into mesh with either the direct or the reverse driving gear, a nut threaded on one of the screw members and movable upwardly and downwardly therewith, said nut having a cam portion, a cam collar loosely surrounding the upper portion of the screw member and having connection with a collar positioned at the lower end portion of the screw member to be engaged by the nut, a reciprocal shaft mounted in the casing and having a collar mounted fast thereon which is provided with cam faces engageable by the cam portions of the collars to reciprocate the reciprocal shaft, and a yoke carried by the reciprocal shaft for moving the slidable gear into and out of mesh with the direct and the reverse driving gears.

10. A mechanical hoist, comprising a casing for pivotal connection with the chassis of a motor vehicle, a pair of spaced gears journaled in the casing, an interposed gear in mesh with both of said gears, screw members threaded through the spaced gears for pivotal connection with the tiltable body of the vehicle, a worm and gear means for rotating the interposed gear and including a direct driving gear and a reverse driving gear, a slidable gear movable into mesh with either the direct or the reverse driving gear, a nut threaded on one of the screw members and movable upwardly and downwardly therewith, said nut having a cam portion, a cam collar loosely surrounding the upper portion of the screw member and having a connection with a collar positioned at the lower end portion of the screw member to be engaged by the nut, a reciprocal shaft mounted in the casing and having a collar mounted fast thereon which is provided with an upper and a lower cam face engageable by the cam portions of the nut and upper collar to actuate the reciprocal shaft, a yoke carried by the reciprocal shaft for moving the slidable gear into and out of mesh with the direct and the reverse driving gears.

11. A mechanical hoist, comprising a casing for pivotal connection with the chassis of a motor vehicle, a pair of spaced gears journaled in the casing, an interposed gear in mesh with both of said gears, screw members threaded through the spaced gears for pivotal connection with the tiltable body of the vehicle, a worm and gear means for rotating the interposed gear and including a direct driving gear and a reverse driving gear, a driving shaft journaled in the casing, a slidable gear splined on the driving shaft and movable into mesh with either the direct or the reverse driving gear and having a grooved hub portion, a nut threaded on one of the screw members and movable upwardly and downwardly therewith and having a projecting cam portion, a cam collar loosely surrounding the upper portion of the screw member above the nut and having connection with a collar positioned at the lower end portion of the screw member beneath the nut and positioned to be engaged by said nut, a reciprocal shaft mounted in the casing and having a collar mounted fast thereon which is provided with an upper and a lower cam face engageable by the cam portions of the nut and upper collar to actuate the reciprocal shaft, a yoke carried by the reciprocal shaft and engaging the grooved hub portion for moving the slidable gear into and out of mesh with the direct and the reverse driving gears, and means for permitting the manual movement of the reciprocal shaft.

12. A mechanical hoist, comprising a casing for pivotal connection with the chassis of a motor vehicle, a pair of spaced gears journaled in the casing, an interposed gear in mesh with both of said gears, screw members threaded through the spaced gears for pivotal connection with the tiltable body of the vehicle, a worm and gear means for rotating the interposed gear and including a direct driving gear and a reverse driving gear, and a slidable gear movable into mesh with either the direct or the reverse driving gear.

13. A mechanical hoist, comprising a casing for pivotal connection with a motor vehicle chassis adjacent the centerline of the rear axle of the vehicle, a gear journaled in the casing, a screw member threaded through the gear for connection with the tiltable body of the vehicle, a worm and gear means for rotating the screw member gear and including a shift gear means for reversing the direction of rotation of parts and permitting the movement of the shift gear to a neutral position, and means actuated by the screw member for automatically moving the shift gear to neutral position when the screw member reaches its outer or inner position.

In testimony whereof, we affix our signatures.

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