

Oct. 19, 1948.

J. W. BIRCH

2,451,656

POWER DRIVEN CONVEYER ATTACHMENT FOR DUMP TRUCKS

Filed Dec. 19, 1946

5 Sheets-Sheet 1

FIG. 1.

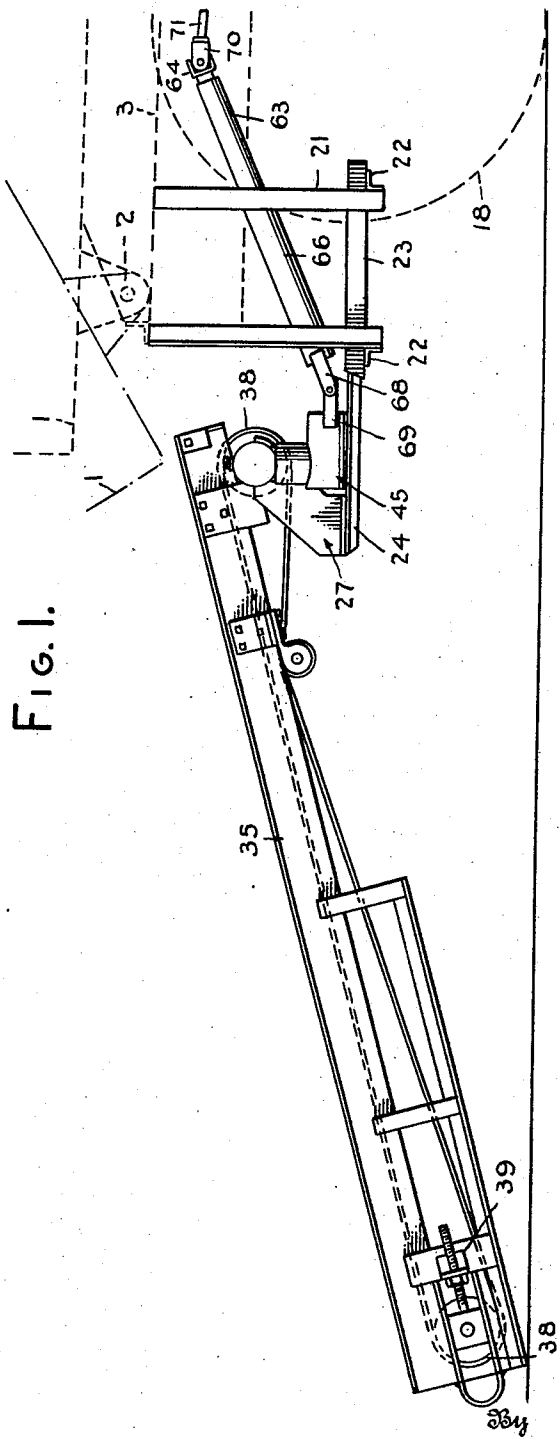


FIG. 7.

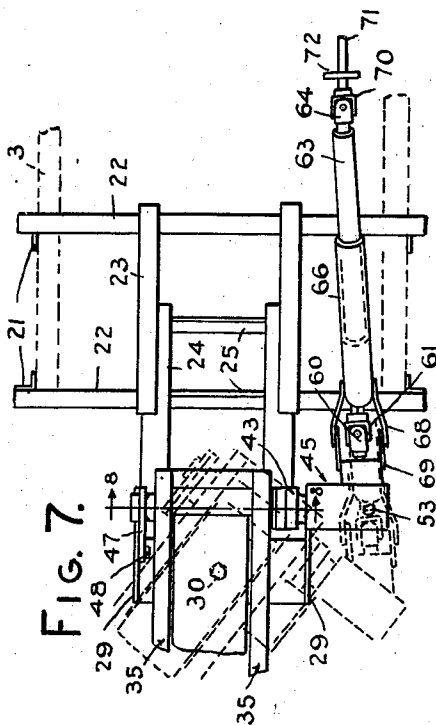
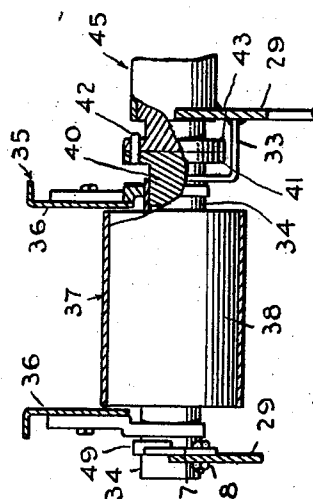


FIG. 8.



Inventor

J. W. Birch

Robert R. Birch

Attorneys

Oct. 19, 1948.

J. W. BIRCH

2,451,656

POWER DRIVEN CONVEYER ATTACHMENT FOR DUMP TRUCKS

Filed Dec. 19, 1946

5 Sheets-Sheet 2

FIG. 2.

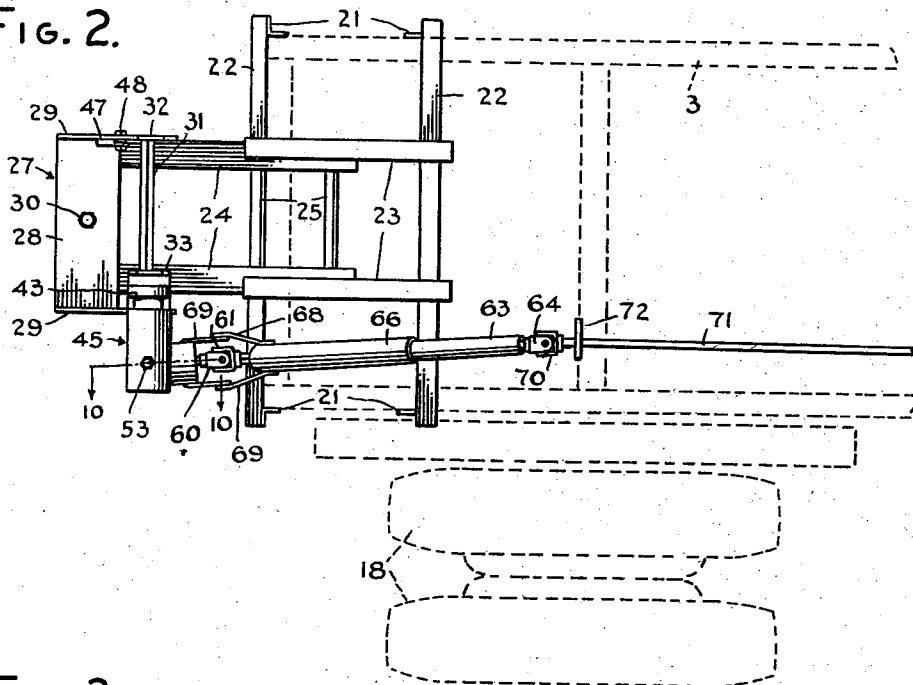
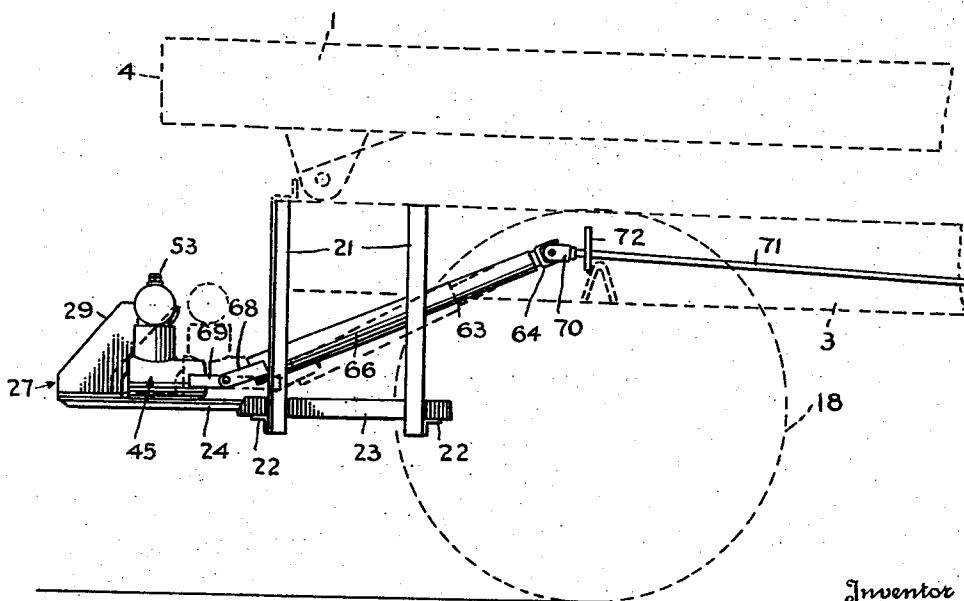


FIG. 3.



Inventor

J. W. Birch

34

Robert R. Birch

Attorney

Oct. 19, 1948.

J. W. BIRCH

2,451,656

POWER DRIVEN CONVEYER ATTACHMENT FOR DUMP TRUCKS.

Filed Dec. 19, 1946

5 Sheets-Sheet 3

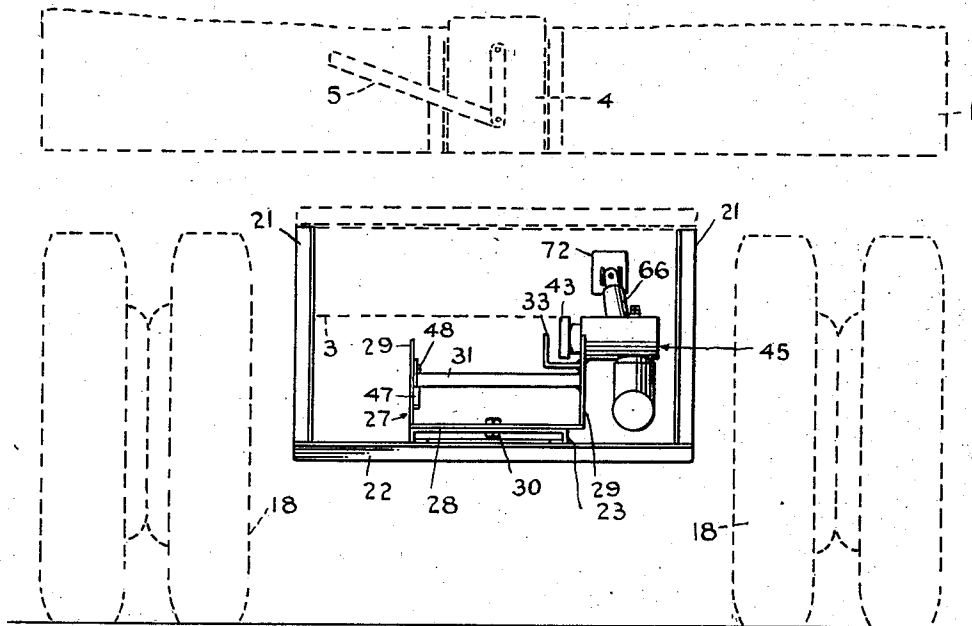


FIG. 4.

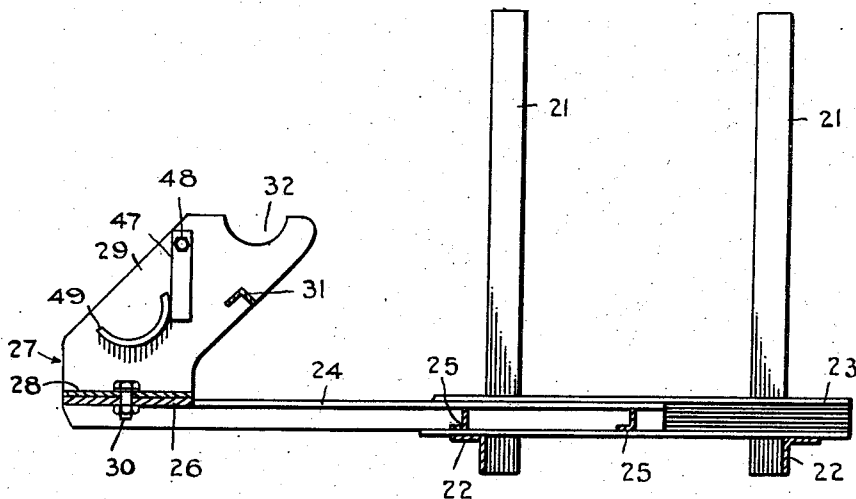


FIG. 9.

Inventor
J. W. Birch
By *Robert R. Rood*
Attorneys

Oct. 19, 1948.

J. W. BIRCH

2,451,656

POWER DRIVEN CONVEYER ATTACHMENT FOR DUMP TRUCKS

Filed Dec. 19, 1946

5 Sheets-Sheet 4

Fig. 5.

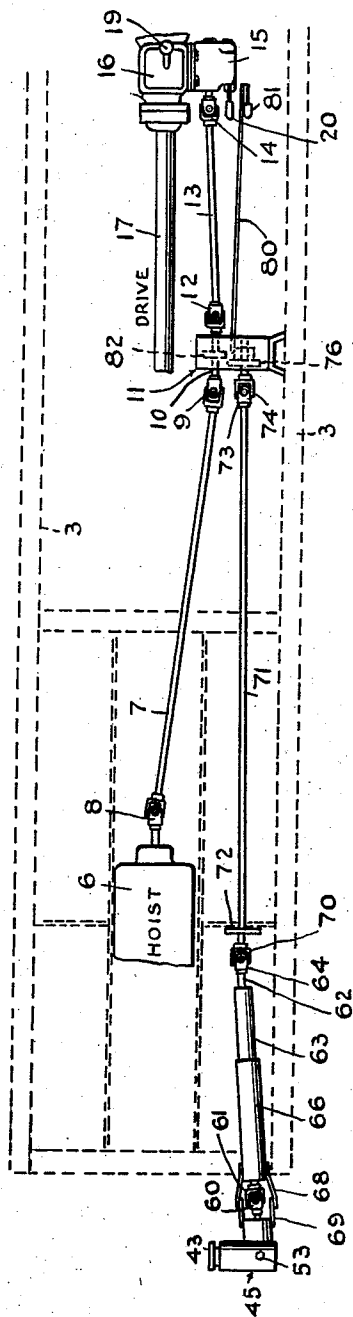
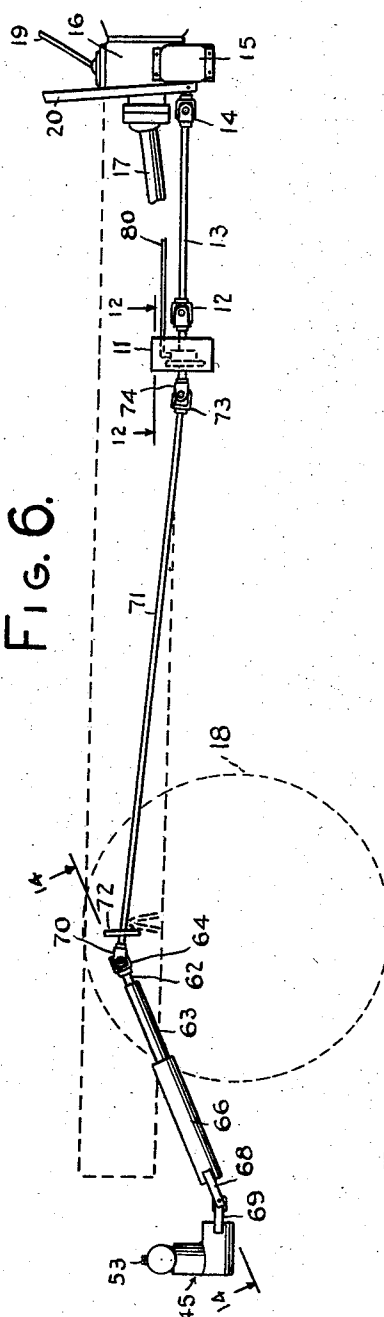


Fig. 6.



Inventor

J. W. Birch

శ్రీ

Robb Robb

Attorneys

Oct. 19, 1948.

J. W. BIRCH

2,451,656

POWER DRIVEN CONVEYER ATTACHMENT FOR DUMP TRUCKS

Filed Dec. 19, 1946

5 Sheets-Sheet 5

FIG. 10.

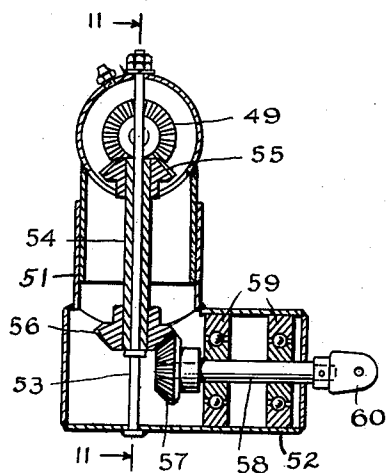


FIG. 11.

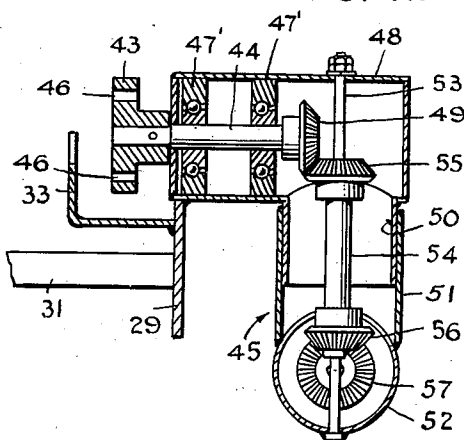


FIG. 12.

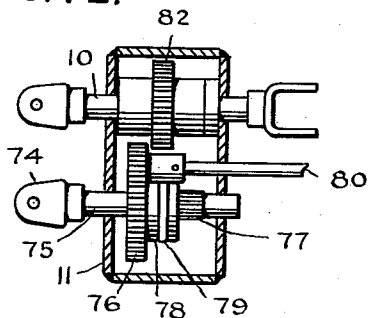


FIG. 13.

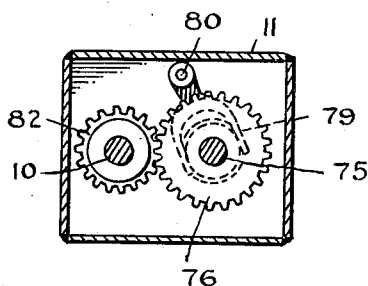
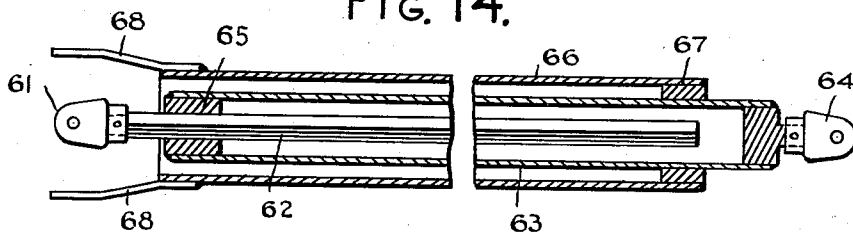


FIG. 14.



Inventor

J. W. Birch

By

Robert Robb

Attorneys

UNITED STATES PATENT OFFICE

2,451,656

POWER-DRIVEN CONVEYER ATTACHMENT
FOR DUMP TRUCKSJohn W. Birch, Washington, D. C.; Catherine
Ruth Birch executrix of said John W. Birch,
deceased

Application December 19, 1946, Serial No. 717,118

6 Claims. (Cl. 214—83.26)

1

The present invention relates to unloading mechanisms for hauling and delivery vehicles, and more especially to power-driven endless conveyor attachments for motor-driven trucks used for the transportation and delivery of coal, sand, gravel, and other materials.

The primary object of the invention is to provide a conveyor attachment and power drive therefor which may be readily applied to trucks of conventional type without material change or modification of the truck, and which can be effectively employed with rearwardly tilting and discharging dump bodies having a low center of gravity. This feature is especially advantageous since it avoids many faults and difficulties which are occasioned by the use of special bodies and/or body mountings which have a high center of gravity characteristic, including those of the bottom discharge type.

A further object of the invention is to provide a simple and improved power-driven conveyor attachment which may be conveniently handled and operated, preferably by one man, but not limited to sizes of the one-man type, said attachment being so constructed that the endless conveyor is in the form of a detachable unit which can be quickly and easily removed when its use is not required, and which permits the dump body to be used for direct dumping of its contents when desired.

A still further object of the invention is to provide a new and improved power drive to which the endless conveyor unit above referred to may be connected and disconnected at will, said power drive being so constructed as to permit the conveyor unit to be swung to either side of the longitudinal center of the vehicle, as well as inclined upwardly or downwardly, as the occasion requires for the delivery of the materials from the truck body to the point of deposit. In attaining this objective, the power drive is so constructed as to not only allow for such inclination and lateral swinging adjustments of the conveyor unit, without interruption of the drive, but also permits the conveyor support and the power connections associated therewith to be shifted forwardly to an out-of-the-way position beneath the truck body when the conveyor unit is not in use, so as not to interfere with dumping of the truck body independently of the conveyor.

Another object of the invention is to provide an improved power drive for power-driven conveyor attachments for vehicles of the aforementioned type, wherein the drive mechanism includes a telescopic driving shaft and torque tube

2

assembly between a power take-off and a movable driving head or gear box adapted to be connected to the conveyor unit so as to accommodate the adjustments of the conveyor unit and its support, as aforesaid.

Other and further objects and advantages of the invention will be hereinafter described and the novel features thereof defined in the appended claims.

In the drawings:

Figure 1 is a view in side elevation showing my new power-driven conveyor as applied to the rear end of a conventional truck of the rearwardly tilting and dumping type;

Figure 2 is a fragmentary-view in top plan of the rear portion of the vehicle showing the slidable mounting for the conveyor unit, together with a portion of the power driving mechanism therefor, the vehicle being illustrated in broken lines with the dump body removed;

Figure 3 is a fragmentary view in side elevation of the slidable mounting and the power driving mechanism illustrated in Figure 2, with the vehicle and the dump body shown in broken lines;

Figure 4 is a view in rear elevation of the parts shown in Figures 2 and 3, with the vehicle and its dump body shown in broken lines;

Figure 5 is a fragmentary top plan view as seen from above the vehicle frame with the dump body removed, and particularly showing the power driving mechanisms for both the conveyor attachment and the dump body hoist;

Figure 6 is a view in side elevation of the parts shown in Figure 5;

Figure 7 is a fragmentary view illustrating the conveyor unit in full lines in the operative position for discharge of the materials from the truck body directly rearwardly, and in broken lines with the conveyor unit laterally shifted to one side so as to discharge the materials in an angular direction toward one side of the longitudinal center of the vehicle;

Figure 8 is a fragmentary vertical sectional view taken on the line 8—8 of Figure 7, at the forward end of the conveyor unit and through the coupling between the power driving mechanism and the forward drive roller for the endless belt of the conveyor unit;

Figure 9 is an enlarged fragmentary vertical sectional view taken on the line 9—9 of Figure 4, through the center of the sliding support and framework for the conveyor unit;

Figure 10 is a vertical sectional view taken on the line 10—10 of Figure 2, through the driving

head or gear box which is carried by the slidable support for the conveyor unit;

Figure 11 is a vertical sectional view through the driving head or gear box of Figure 10, taken on the line 11—11 of Figure 10;

Figure 12 is a horizontal sectional view taken on the line 12—12 of Figure 6, through the forward gear box of the drive mechanism which is located between the power take-off and both the dump body hoist and the driving head for the conveyor unit;

Figure 13 is a vertical sectional view taken on the line 13—13 of Figure 12, through the forward gear box; and

Figure 14 is a sectional view taken on the line 14—14 of Figure 6, through the telescopic drive shaft and torque tube assembly which is connected to the driving head for the conveyor unit.

Like reference characters designate corresponding parts in the several figures of the drawings, wherein 1 denotes the body of a motor-driven dump truck of any suitable make, said body being pivotally attached at its rear end, as indicated at 2, to the truck frame 3. The dump body 1 is of the rearwardly tilting, rearwardly discharging type, and is provided at the back end thereof with a door or gate 4 which is movable upwardly and downwardly by means of a manually operated lever 5 or other suitable instrumentalities, to shift the door 4 from a closed position as shown in Figure 4 of the drawings, to an open position which permits discharge of the material from the dump body in the conventional manner.

As in dump trucks of this type, the truck is usually provided with a power-operated hoist, generally indicated at 6 in Figure 5 of the drawings, said hoist usually being of the hydraulic type which may be controlled from the cab of the truck or from the rear thereof by suitable controls (not shown). The hoist is driven by a drive shaft 7 which is connected thereto at its rear end by means of a universal joint 8. The forward end of the shaft 7 is connected by another universal joint 9 to a shaft 10 which is rotatably mounted in a gear box generally designated 11. The forward end of the shaft 10 is in turn connected by a universal joint 12 to another drive shaft 13 which is connected at its forward end by a universal joint 14 to a power take-off 15 driven in the usual manner or in any suitable way from the transmission generally indicated at 16, the latter being driven by the truck motor (not shown). The transmission 16 is also connected to the usual propeller or drive shaft 17 which drives the rear wheels 18 of the truck, and the transmission is provided, as customary, with the usual gear shift lever 19 for changing speeds of the truck. The power take-off 15 is preferably equipped with a control lever 20 which may be operated to connect the power take-off to the transmission 16 or to disconnect the same therefrom, at will. The elements above described are all conventional and constitute standard equipment of many dump trucks, and hence the elements need not be further described in detail since they will be readily understood by those skilled in the art. It is to be understood, however, that the present invention is not limited to use with dump bodies equipped with hydraulic hoists, since any other suitable means may be employed to tilt the dump body for discharge of its contents, including manually operated hoisting mechanisms.

Referring now to my new conveyor attachment, it will be seen that the same includes a suitable

supporting framework including a pair of uprights 21, 21 attached to the rear end of the truck frame 3 in spaced parallel relation to each other, at each side of the truck frame. These uprights or standards may have the form of rigid bars or angle irons which are suitably attached at their upper ends to the truck frame by bolts, rivets, welding, or otherwise. At their lower ends, the uprights 21 are suitably connected by cross braces 22, 22 which also may have the form of angle irons suitably fastened by welding or otherwise to the uprights 21, and extending laterally therebetween in spaced parallel relation to each other.

Mounted on the cross braces 22, 22 in spaced parallel relation to each other and equidistant from the longitudinal center of the truck, is a pair of guides 23, 23, which are suitably secured to the cross braces as by welding or otherwise, and which may have any suitable form such as channel irons. Mounted in each guide 23, 23 is a slide 24 which also may have the form of angle irons or any other suitable form, said slides being suitably interconnected by cross braces 25, 25 suitably rigidly connected thereto and having the form of angle irons or otherwise. The two slides 24, 24 are therefore free to slide longitudinally in the guides 23, 23 and may be shifted backwardly or forwardly, at will, as a unit.

Mounted on the rear ends of the slides 24, 24 and suitably secured thereto is a rigid plate 26 which extends transversely between the slides 24, 24. Disposed on the upper side of the plate 26 is a supporting saddle generally indicated at 27, said saddle including a flat bottom plate 28, at the opposite ends of which are provided a pair of laterally spaced, upwardly extended and forwardly inclined arms 29, 29. The saddle 27 is pivotally mounted on the plate 26 as by means of a bolt 30 extending through the plate 26 and the plate 28 of the saddle, so that the saddle is free to swing about a vertical axis. A brace 31 extending between the arms 29, 29 and attached thereto as by welding, serves to reinforce the saddle 27 and hold the arms 29, 29 rigid with the plate 28.

In the upper end of one of the arms 29 of the saddle 27, there is provided a semi-circular recess 32. The opposite arm 29 is provided near its upper end with a laterally inwardly offset bracket 33 suitably secured to the arm, as by welding, and the upper end of the bracket is provided with a semi-circular recess transversely aligned with and corresponding to the recess 32 aforesaid, the latter recess and the recess in the bracket 33 being adapted to receive therein trunnions 34, 34 extending laterally outwardly from opposite sides of a conveyor unit generally designated 35. The conveyor unit 35 is preferably of the endless belt type which may have any suitable length and width as may be desired, but preferably of such size as to be capable of being handled by one man. It is to be understood, however, that the invention is not limited to use with conveyor units of the one-man type.

The details of the conveyor unit 35 are immaterial to the present invention and may be modified as desired. In the preferred form, the conveyor unit is provided with laterally spaced upright side walls 36, 36 of suitable height and length, and between which is disposed the upper reach of an endless belt 37 which extends about a pair of rollers 38, 38 located respectively adjacent the opposite ends of the conveyor unit. Suitable means are preferably provided for tightening the belt 37, as indicated at 39.

When the conveyor unit is mounted with one

5

of its ends supported by the saddle 27, its opposite end may be elevated to any desired level so that the conveyor assumes either an upwardly inclined position or a downwardly inclined position, or any position intermediate the same. In addition, the conveyor unit may be swung to either side, due to the pivotal mounting of the saddle 27, so that the conveyor may assume an angular position relative to the center line of the truck.

Extending laterally through the trunnion 34 which is supported by the saddle bracket 33, is a shaft 40 on which the forward roller 38 is mounted to rotate with the shaft, said shaft 40 extending beyond the trunnion and terminating in a coupling plate 41 having a plurality of apertures therein adjacent to its periphery, said coupling plate 41 lying at the inside of the bracket 33, that is, between the bracket 33 and the adjacent arm 29 of the saddle 27. Fixed in the apertures in the coupling plate 41, and extending laterally outwardly therefrom are pins 42 which are receivable in corresponding apertures in a complementary coupling plate 43 which is fixed to a shaft 44 extending from a gear box or driving head 45 rigidly mounted on the arm 29 of the saddle 27. The coupling plate 43 lies between the arm 29 and the bracket 33 thereon so that it is disposed for opposed abutting engagement with the coupling plate 41 on the conveyor unit. The pin-receiving apertures in the coupling plate 43 are designated 46 and may be of any suitable number.

In order to permit the pins 42 to be engaged in the openings 46 and disengaged therefrom on mounting the conveyor unit on the saddle, or in dismounting the conveyor unit from the saddle, sufficient clearance must be afforded between the bracket 33 and the coupling plate 43 as to allow a limited lateral shifting movement of the conveyor unit relative to the saddle arms 29, 29 and the bracket 33. After engagement of the pins 42 in the apertures 46 of the coupling plate 43, and the coupling plates 41 and 43 are in abutting engagement with each other, the conveyor unit may be positively held in this laterally shifted position by means of a latch member 47 which is pivotally connected at 48 to the opposite arm 29 of the saddle 27. The latch member 47 terminates at its free end in an arcuate part 49 which engages over the trunnion 34 at the corresponding side of the conveyor unit. The arcuate part 49 is of sufficient width to engage against the side of the conveyor unit and prevent the conveyor unit from shifting laterally away from the coupling plate 43. At the same time, the arcuate part 49 also serves to prevent inadvertent displacement of the conveyor unit from the saddle 27 when the latch member is swung into position over the trunnion 34. In order to disconnect the conveyor unit from the saddle, it is first necessary to displace the latch member 47 to the position shown in Figure 9, thereby disengaging the same from the trunnion 34, following which the conveyor unit may be laterally displaced away from the coupling plate 43 sufficiently far to withdraw the driving pins 42 from the openings 46 in the plate 43, following which, the conveyor unit may be lifted off the saddle and stowed in the body of the truck or otherwise disposed of as desired.

As previously indicated, the driving head or gear box 45 is rigidly mounted on the saddle 27 at one side of the latter, and consequently is movable with the saddle when the saddle is swung

6

on the axis of the bolt 30, as well as when the saddle and the supporting slides 24, 24 are shifted forwardly and rearwardly in the guides 23, 23. The shaft 44 on which the coupling plate 43 is mounted is rotatably supported in suitable bearings 47', 47' which are disposed in a cylindrical housing 48 rigidly connected to the saddle arm 29, as by welding or otherwise, and extending laterally outwardly from the saddle arm. A bevel gear 49 is fixed to the inner end of the shaft 44 for rotation therewith.

The housing 48 is extended downwardly at its outer extremity, as indicated at 50, said extension also preferably being cylindrical in shape and telescopically fitting within a complementary cylindrical housing section 51 which terminates at its lower end in a horizontally disposed cylindrical housing portion 52 which is welded or otherwise rigidly secured to the housing section 51. A tie-bolt 53 extends vertically through the housing section 48 and its extension 50, and through the lower housing sections 51 and 52, as clearly shown in Figure 11 of the drawings, said tie-bolt serving to hold the housing together, while permitting rotation of the telescopic portions 50 and 51 relative to each other about the axis of the tie-bolt.

Rotatably mounted on the tie-bolt is a hollow shaft 54 having a bevel gear 55 fixed thereto at its upper end and meshing with the bevel gear 49 on shaft 44. A second bevel gear 56 is fixed to the lower end of the shaft 54 and meshes with a companion bevel gear 57 fixed to a shaft 58 rotatably supported in suitable bearings 59, 59 in the lower horizontal housing section 52. The shaft 58 extends forwardly through the housing section 52 and terminates at its forward end in a U-shaped coupling 60 which is adapted to be connected to a corresponding U-shaped coupling 61 on the rear end of a square or polysided shaft 62 which is telescopically received in a hollow shaft section 63 provided at its forward end with a U-shaped coupling 64. The rear end of the hollow-shaft section 63 is provided with a bushing 65 secured to the interior of the hollow shaft section and having an aperture therein corresponding in shape to the shaft section 62 to establish a driving relation between the two shaft sections 62 and 63, while permitting the shaft sections to have telescopic movement one within the other.

Around the outside of the telescopic shaft sections 62 and 63, there is provided a hollow torque tube 66 which is provided with a bushing 67 at its forward end, secured within the torque tube and slidably fitting the outside of the hollow shaft section 63. The rear end of the torque tube 66 is provided with a pair of straps 68, 68, which are welded or otherwise secured thereto on diametrically opposite sides thereof, the extreme rear ends of said straps being pivotally connected to the forward end of the housing section 52 of the driving head or gear box unit 45, or to diametrically opposed straps rigidly attached thereto, as indicated at 69, 69.

The coupling 64 on the forward end of the hollow telescopic shaft section 63 is adapted to be connected to another U-shaped coupling member 70 on the rear end of a drive shaft 71 so as to provide a universal joint, as in the case of the connection between the couplings 60, 61. The rear end of the drive shaft 71 is suitably supported in a bracket 72 secured to the truck frame, and the forward end of the drive shaft 71 is connected by a U-shaped coupling 73 to a complementary coupling 74 so as to provide a

universal joint between said drive shaft and a stub shaft 75 which extends through the gear box 11 in spaced parallel relation to the shaft 19 as previously described, said shaft 75 having a pinion 76 mounted thereon for rotation therewith and axially displaceable therealong. The pinion 76 is provided with a hub 78 having an annular groove therein for receiving a shifting yoke 79 mounted on the rear end of a control rod 80 leading forwardly to the truck cab or operator's station and suitably operated as by means of a control lever 81 to permit the pinion 76 to be axially shifting on the shaft 75 which is splined to the pinion 76 as indicated by the splines 77. Mounted on the shaft 10 in the gear box 11 is second pinion 82 which is suitably fixed to the shaft 10 for rotation therewith, and held against axial displacement on the shaft 10.

When the conveyor unit 35 has been mounted in position on the saddle 27 for delivering materials contained in the dump body 1 as said materials are dumped on to the conveyor belt 37, the conveyor unit may be set into operation by the power derived from the truck motor, simply through manipulation of the lever 20 which serves to couple the power take-off 15 to the transmission 16, and also by manipulating the lever 81 so as to pull the control rod 80 forwardly, whereby to shift the pinion 76 into meshing engagement with the pinion 82 which is driven by the power take-off 15 through the shaft 13. The power is then transmitted through the two pinions 82 and 76, to the shaft 71, and through the telescopic shafts 62, 63 and torque tube assembly 66 interconnecting the shaft 71 with the shaft 58 of the driving head or gear box 45. From the shaft 58, the power is transmitted through the bevel gears 57, 56, the hollow shaft 54, bevel gears 55, 49, to the coupling plate 43, which in turn transmits the power through the pins 42 to the coupling plate 41 on the shaft 40 which drives the roller 38 on which the endless belt is mounted.

As will be seen from reference to Figure 7 of the drawings, the power may be transmitted to the conveyor unit 35 irrespective of the angular position of the conveyor unit. For example, the conveyor unit may be swung to the angular position shown in broken lines in Figure 7, or to any other suitable angular position, under which condition the telescopic drive shafts 62, 63 either elongate or shorten up, as the case may be, to take care of the displacement of the driving head or gear box 45 which swings with the conveyor unit. It will be noted, however, that the lower portion of the driving head or gear box 45, that is the housing sections 51 and 52, are free to turn relative to the upper portions of the housing, and the housing section 52 is always maintained in alignment with the axis of the telescopic shafts 62, 63, due to the torque tube 66 which is pivotally connected to the housing section 52 at one end, and freely slidable on the telescopic shaft assembly at the other end.

After use of the conveyor unit 35, or when direct dumping of the materials from the truck body 1 is desired, without the use of the conveyor unit, the conveyor unit may be removed from the saddle in the manner previously described, and the saddle with its supporting slides shoved forwardly beneath the truck frame to an out-of-the-way position, under which circumstances, the telescopic drive shaft sections 62, 63 and torque tube assembly 66 accommodate the shortening up of the distance between the driv-

ing head or gear box 45 and the end of the shaft 71, without necessitating any disturbance or disconnection of the drive mechanisms. During transportation of the loads in the truck body, the saddle and the sliding frame on which it is mounted is normally moved into the out-of-the-way position, beneath the truck frame until such times as use of the conveyor unit 34 is desired, at which time, the saddle may be withdrawn to the extended position as shown in Figure 1 of the drawings, ready for mounting of the conveyor unit 35 on the saddle, with the conveyor unit disposed in a position to receive the materials from the dump body as the dump body is rearwardly tilted by the hoist mechanism 6, under the control of the gate 4, said hoist mechanism being power-driven through the driving connections leading to the power take-off 15, as previously described.

It will be understood from the foregoing that my new power-driven mechanism is very simple in form and effective in operation. In lieu of a power-driven endless conveyor of the type disclosed herein, the extensible mounting above described may be adapted for supporting other forms of unloading apparatus which may or may not be power-driven, including chutes and the like. Accordingly, the term "conveyor" as used herein, is to be interpreted in its broadest sense. Similarly, the power transmitting mechanism described herein may be utilized to drive apparatus other than conveyors, and may be adapted for the transmission of power to any suitable power-operated apparatus which would be useful in the handling, delivery or disposition of materials transported by the vehicle of which the driving mechanism forms a part, or for the transmission of power to any other suitable apparatus which may be conveniently or practically associated with the vehicle.

While the specific details have been herein shown and described, the invention is not confined thereto as changes and alterations may be made without departing from the spirit thereof as defined by the appended claims.

I claim:

1. A power-driven conveyor attachment for motor-driven dump trucks of the rearwardly tilting and discharging dump body type, comprising a stationary frame attached to the rear end of the truck beneath the rear end of the dump body, a movable frame slidably supported by the stationary frame for shifting movements from an out-of-the-way position beneath the truck, to a rearwardly extended position, a saddle pivotally mounted on the movable frame for pivotal movements about a vertical axis, a conveyor unit of the endless belt type attachable to the movable frame when the latter is extended and pivotally supported at one end on the saddle for pivotal movements about a horizontal axis in a vertical plane, said conveyor unit also being swingable with the saddle about the vertical pivotal axis of the latter while always maintaining the conveyor unit in a position to receive the contents of the dump body when the latter is rearwardly tilted to discharge said contents, and power-driven means for transmitting power from the truck motor to the conveyor for driving the latter.

2. Power transmission mechanism for transmitting power to power-driven conveyor attachments of motor-driven dump trucks of the rearwardly tilting and discharging dump body type, comprising a power take-off operable by the truck motor, a driving head disposed at the rear of of

the truck and having means for coupling the same to and uncoupling the same from the conveyor, at will, said driving head being mounted for bodily movement about a vertical axis and also forwardly and rearwardly relative to the truck, and means for operatively connecting the driving head to the power take-off for the transmission of power to the driving head from the power take-off irrespective of the position of the driving head.

3. Power transmission mechanism for transmitting power to power-driven conveyor attachments of motor-driven drump trucks of the rearwardly tilting and discharging dump body type, comprising a power take-off operable by the truck motor, a driving head disposed at the rear of the truck and having means for coupling the same to and uncoupling the same from the conveyor, at will, said driving head being mounted for bodily movement about a vertical axis and also forwardly and rearwardly relative to the truck, and means for operatively connecting the driving head to the power take-off for the transmission of power to the driving head from the power take-off irrespective of the position of the driving head, said connecting means including a telescopic shaft unit.

4. Apparatus as defined in claim 2, wherein the driving head comprises an upper housing section having a horizontally disposed power shaft rotatably mounted therein, a lower housing section pivotally connected to the upper section for pivotal movements of the latter section about a vertical axis, a vertical shaft rotatably mounted within said housing sections with its axis coinciding with the vertical pivotal axis aforesaid, said vertical shaft being geared to the first-mentioned horizontal shaft, and a second horizontally disposed shaft rotatably mounted in the lower housing section and geared to the vertical shaft.

5. Apparatus as defined in claim 2, wherein the driving head comprises an upper housing section having a horizontally disposed power shaft rotatably mounted therein, a lower housing section pivotally connected to the upper section for pivotal movements of the latter section about a vertical axis, a vertical shaft rotatably mounted within said housing sections with its axis coinciding with the vertical pivotal axis aforesaid, said vertical shaft being geared to the first-mentioned horizontal shaft, and a second

horizontally disposed shaft rotatably mounted in the lower housing section and geared to the vertical shaft, and wherein the connecting means between the driving head and the power take-off includes a telescopic shaft unit connected at one end to the last-mentioned horizontally disposed shaft aforesaid of the driving head, and operatively connected at its other end with the power take-off.

6. Apparatus as defined in claim 2, wherein the driving head comprises an upper housing section having a horizontally disposed power shaft rotatably mounted therein, a lower housing section pivotally connected to the upper section for pivotal movements of the latter section about a vertical axis, a vertical shaft rotatably mounted within said housing sections with its axis coinciding with the vertical pivotal axis aforesaid, said vertical shaft being geared to the first-mentioned horizontal shaft, and a second horizontally disposed shaft rotatably mounted in the lower housing section and geared to the vertical shaft, and wherein the connecting means between the driving head and the power take-off includes a telescopic shaft unit connected at one end to the last-mentioned horizontally disposed shaft aforesaid of the driving head, and operatively connected at its other end with the power take-off, and a torque tube slidably mounted on the telescopic shaft unit at one end and pivotally connected at its other end to the lower pivotal housing section of the driving head.

JOHN W. BIRCH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
710,611	Ray	Oct. 7, 1902
2,293,486	Barrett	Aug. 18, 1942
2,303,490	Nelson	Dec. 1, 1942
2,325,492	Erickson	July 27, 1943
2,381,783	Stevenson	Aug. 7, 1945
2,419,824	Davis	Apr. 29, 1947

FOREIGN PATENTS

Number	Country	Date
472,467	Great Britain	Sept. 23, 1937