Nov. 30 1943. C. S. SCHROEDER 2,335,572

TRUCK

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Fig. 1.

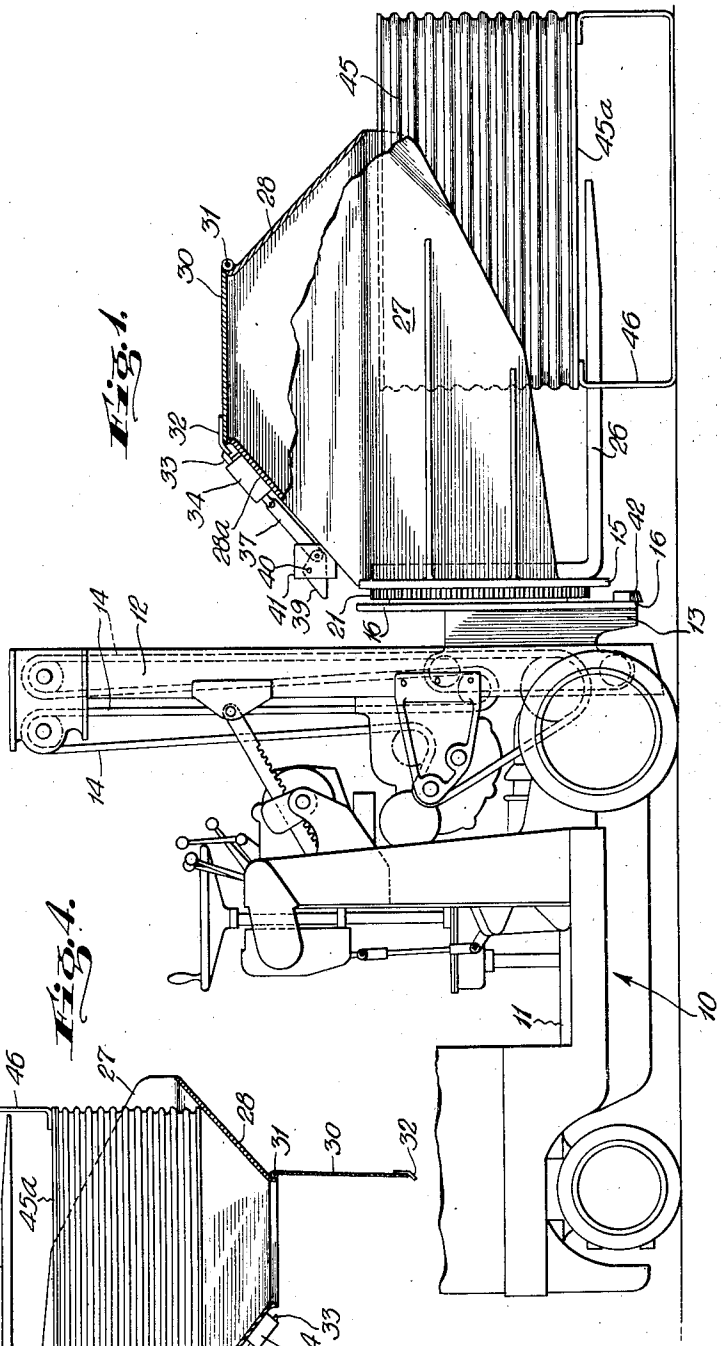


Fig. 4.

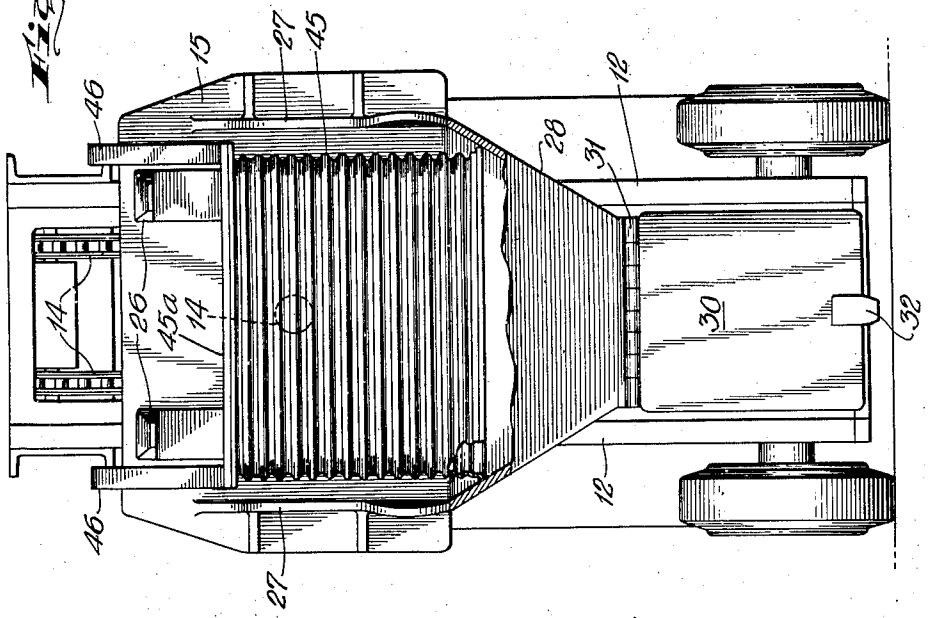
INVENTOR
C. S. Schroeder
BY
A. H. Golden
ATTORNEY

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Fig. 3.



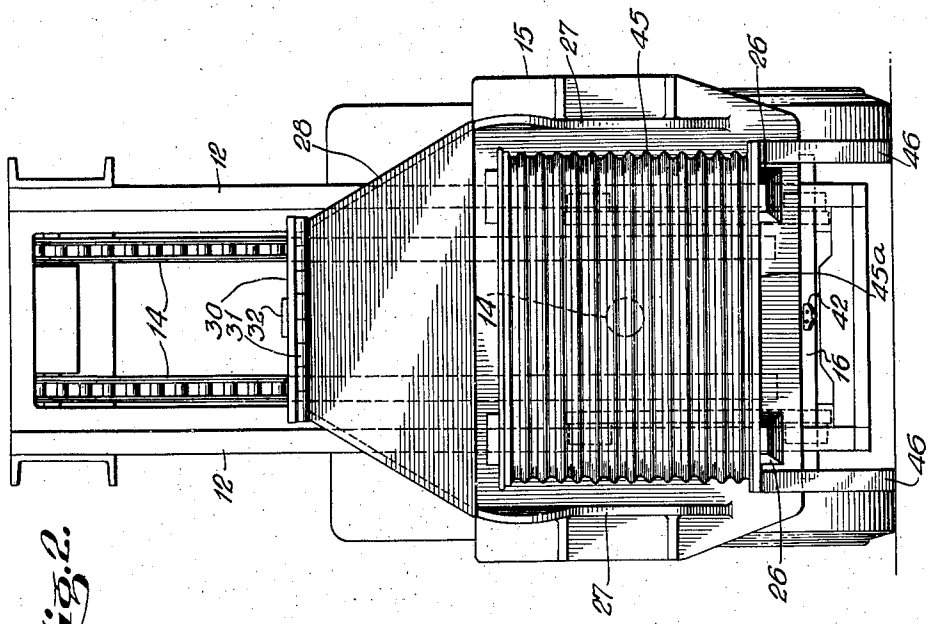


Fig. 2.

INVENTOR
C. S. Schroeder
BY A. H. Golden
ATTORNEY

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Fig. 5.

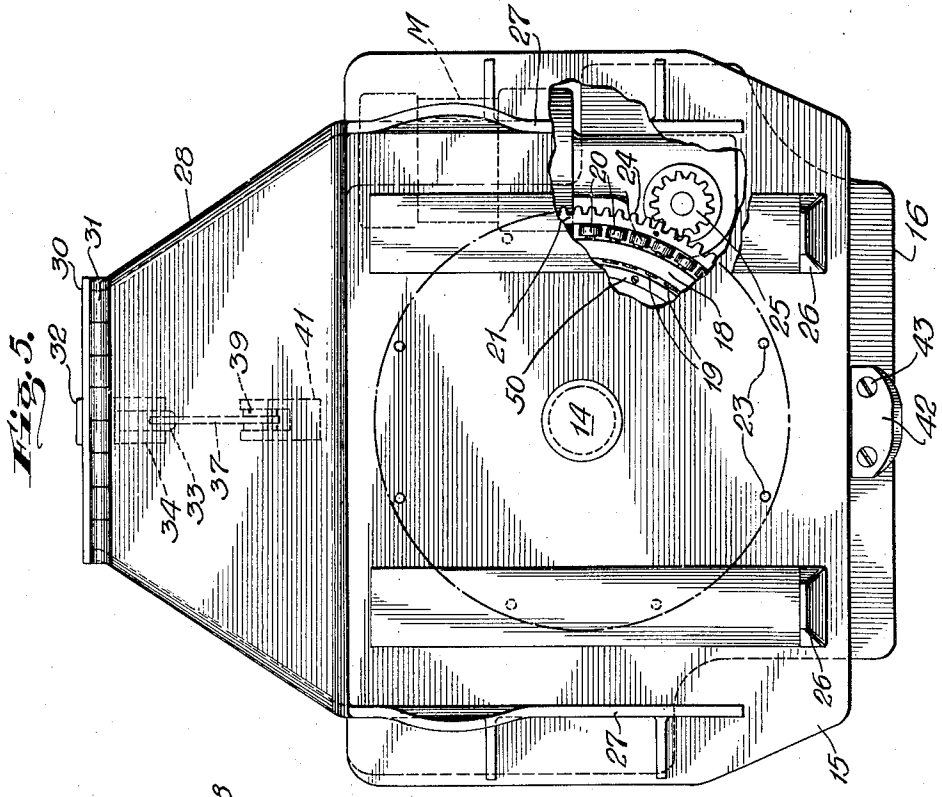


Fig. 6.

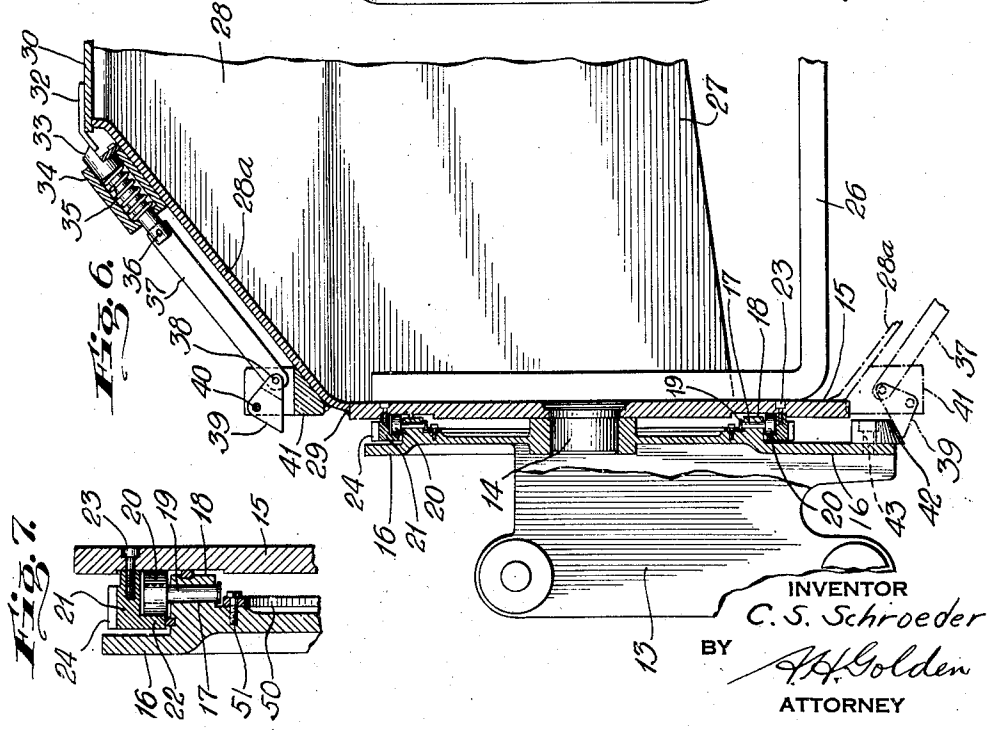


Fig. 7.

INVENTOR
C. S. Schroeder
BY
A. H. Golden
ATTORNEY

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UNITED STATES PATENT OFFICE

2,335,572

TRUCK

Charles S. Schroeder, Philadelphia, Pa., assignor to The Yale & Towne Manufacturing Company, Stamford, Conn., a corporation of Connecticut

Application April 24, 1942, Serial No. 440,329

23 Claims. (Cl. 214—66)

This invention relates to an industrial truck, and more particularly, to an industrial truck of that type which is adapted to lift and handle loads carried on skids.

More particularly, my invention relates to a novel mechanism for use in an industrial truck to facilitate the handling of skids, especially skids of the bin type. As a feature of my invention, the skid or bin may be lifted in a conventional manner and then rotated so that the contents thereof may be dumped in a particular location, whereupon the skid or bin may be returned to its original location for refilling. As a further feature of my invention, the skid or bin may be rotated and the contents thereof directed by means forming a part of my invention, so that more accurate dumping of the contents is possible.

Still a further feature of my invention resides in a novel type of material handling structure whereby a skid or bin may be lifted and rotated so that the contents thereof are dumped into what I term a hopper. As a further feature of the invention, the hopper and skid lifting and rotating mechanism form a single structure. An additional feature of my invention resides in structure wherein the dumping operation is automatic, with the dumping preferably taking place upon the skid or bin being rotated to a particular position.

I have thus described generally the nature of my invention and its more important features. However, other important features which are inherent in the invention will appear upon a reading of the description of my invention which follows hereinafter. Such additional important features will be the subject of claims appended thereto. Those skilled in the art will fully appreciate the value of my contribution to the art and will recognize that my invention may readily be incorporated in many different structures.

Referring now to the drawings, Fig. 1 is a side view illustrating an electric truck having my invention incorporated therein, and about to engage a skid or bin for lifting the bin and for thereafter dumping the material contained in the bin. Fig. 2 is an end view of Fig. 1, showing the skid or bin and the forks of the truck after the forks have come into contact with the floor of the skid. Fig. 3 shows the parts of Fig. 2 with the skid lifted and rotated into dumping position. Fig. 4 is a view of certain parts of Fig. 1 showing the skid in its position of Fig. 3 and the contents about to be dumped. Fig. 5 is an end view of my invention showing the preferred manner of mounting and rotating the skid handling mechanism. Fig. 6 is a side view of the construction of Fig. 5 and illustrates the operation of the means for releasing the hopper door so that the contents may be dumped in a particular position. Fig. 7 is an enlarged view of certain details shown generally in Fig. 6.

Referring now more particularly to the drawings and especially Fig. 1, reference numeral 10 indicates an industrial truck of the electric type having the usual operator's platform 11 and the uprights 12 on which is mounted a vertically moving load carriage 13, this load carriage being raised and lowered relatively to the uprights 12 by load chains 14 in a manner which is well known to those skilled in the art and needs not be emphasized here. The load carriage 13 and its method of lifting, lowering and tilting, are well known in the art, the novelty in this application residing in the means mounted on the load carriage, and which means I shall call a skid engaging means or skid handling means, as the case may be.

These skid handling or engaging means comprise an assembly mounted for rotation on the load carriage 13 through a trunnion shaft 14 extending from a base plate 15. The load carriage 13 has formed integrally therewith a mounting plate 16 in which this trunnion shaft is mounted as best seen in Fig. 6. As is best seen in Fig. 7, radially drilled bores 17 are formed in a circular flange 18 extending from the mounting plate 16, and in each of the radial bores there is mounted a pin 19 on which is supported a roller 20. The pins are retained against inward movement by a retainer ring 50 held in place on the mounting plate 16 by screws 51. The base plate 15 is adapted to rest against the periphery of the several rollers 20 for rotation relatively to the mounting plate 16 all as will now be apparent.

For supporting the base plate 15 against movement away from the mounting plate 16 and the rollers 20, and for accepting certain forces which will arise, I utilize a ring gear 21 whose main function is to rotate the base plate 15 and the parts carried thereon. This ring gear is in the form of a circular ring whose cross section is L shaped, the foot of the L being denoted by reference numeral 22 in Fig. 7 and lying against the inner peripheries of the several rollers 20. Through a series of bolts 23 the ring gear 21 is secured to the base plate 15 and readily supports that base plate 15 for rotation on the trunnion axis 14. The ring gear 21 is formed with a series

of teeth 24 as best illustrated in Fig. 5, and cooperating with the gear teeth 24 is a pinion 25 driven by a suitable electric motor M. It is now quite obvious that the electric motor, the controls of which are accessible at the operator's platform 11, effects the rotation of the base plate 15 and all that is supported thereon.

Welded or otherwise secured to the base plate 15 there may be a series of forks 26, or some other suitable equivalent bin or skid supporting member. Secured also, as by welding or otherwise relatively to the base plate 15, are a pair of side plates 27 extending upwardly and welded or otherwise secured to a hopper 28. The rear plate of this hopper 28 is designated by reference numeral 28a in Fig. 6, and is shown welded at 29 to the base plate 15. The fabrication of the hopper and the manner in which it is secured to the side plates 27 and the base plate 15, and in turn to the forks 26, is not exceedingly important, since any suitable type of hopper and skid supporting mechanism of the same general type may be used as part of my invention.

The hopper 28 is formed with an open mouth that is covered by a hopper cover 30 pivoted at 31 to one of the sides of the hopper. The cover 30 is formed with a lip 32 relatively to which cooperates a latchbolt 33 that is adapted to slide within a casing 34 welded to the plate 28a of my hopper, all as is best illustrated in Figs. 1 and 6. A spring 35 presses the latchbolt 33 into engagement with the lip 32 and holds the cover 30 in closed position. Pivoted to the bolt 33 at 36, is a rod 37 which is pivoted at 38 to a cam 39. The cam 39 is in turn adapted for pivotal movement on pin 40 relatively to a mounting bracket 41 welded to the plate 28a of the hopper.

When the several parts are in the position of Figs. 1, 5 and 6, the hopper cover 30 is of course held in closed position. However, when the base plate 15 is rotated through coaction of the pinion 25 with the gear teeth 24 formed on the ring gear 21, the parts move into the position illustrated in Figs. 3 and 4, and shown partially in dash and dot lines in Fig. 6. It will be noted from Fig. 6 that the cam 39 has moved into contact with a cam lug 42 secured as by bolts 43 to the mounting plate 16. This coaction causes a pivotal movement of the cam plate 39 so as to actuate the rod 37 to retract the latchbolt 33 from its solid line position of Fig. 6 against the pressure of spring 35. The hopper being in its position of Figs. 3 and 4, the cover 30 will move to open position and the contents of the hopper will be dumped. I shall now describe the cooperation of the several parts of my invention with a skid of the bin type.

Referring now again to Fig. 1, reference numeral 45 indicates a skid of the bin type formed of corrugated metal and having supporting legs 46 at each side thereof. The skid 45 is of the usual type well known in the art and itself is not part of my invention. The forks 26 are adapted to enter between the legs 46 and under the floor 45a of the skid 45. The open end construction of the hopper permits the movement of the hopper into position over the skid 45 as the forks 26 move into position under the floor of the skid. When the load carrier 13 is elevated from the position of Fig. 1 to the position of Fig. 2, the floor 45a of the bin or skid 45 is engaged by the forks 26, further movement being adapted to elevate the several parts until the bearing plate 16 and trunnion shaft 14 are in the position of Fig. 3. Fig. 3 illustrates just what happens when the base plate 15, together with the forks 26, the hopper 28, and the skid 45 are rotated as a unit from the position of Figs. 2 and 5 by the pinion 25 through its cooperation with the gear teeth 24 of the ring gear 21. It is obvious that the contents of the bin 45 are first dropped into the hopper 28, and that when the cam 39 contacts the cam lug 42, the hopper cover 30 will be opened and the contents dumped from the open hopper as may well be appreciated by glancing at Figs. 3 and 4. By now rotating the entire assembly about the shaft 14 in a reverse direction, the hopper cover 30 is obviously moved to closed position, in which position it is latched by the latchbolt 33. The empty bin or skid 45 may now be deposited and released by the withdrawal of the forks 26 therefrom as will be understood from Fig. 1. Thereafter a new bin may be picked up by the truck and emptied as just set forth. It is thought that the operation and utility of my invention will now be apparent to those skilled in the art.

I now claim:

1. In a truck of the class described, a skid engaging means adapted to enter under the floor of a skid in support relation thereto, means for elevating said skid engaging means and the skid supported thereby, means for rotating said skid engaging means whereby to dump the contents of the skid, means for supporting the sides of said skid as said skid is rotated to dumping position in either a clockwise or counterclockwise direction, and means for holding said skid against movement with the said contents as said contents are dumped therefrom.

2. In a truck of the class described, a skid engaging means adapted to enter under the floor of a skid in support relation thereto, means for elevating said skid engaging means to engage said skid and thereafter to elevate the skid, means for rotating said skid engaging means whereby to dump the contents of the skid, and means secured to said skid engaging means for guiding the contents of said skid as said contents are dumped therefrom.

3. In a truck of the class described, skid engaging and supporting forks adapted to enter under the floor of a skid, means for elevating said forks to engage the skid and thereafter to elevate the skid, means for rotating said forks whereby to dump the contents of the skid, means secured to said forks in superimposed relation thereto for guiding the contents of the skid as said contents are dumped therefrom, and means for holding said skid against movement with the said contents as said contents are dumped therefrom.

4. In a truck of the class described, a vertically movable load carrier, a skid handling member mounted for rotation on said load carrier, means on said load carrier for rotating said skid handling member to dump a skid carried thereby, means on said skid handling member for entering under the floor of said skid and for simultaneously enveloping the sides of said skid whereby to support the said skid as said skid is rotated with the skid handling member to dump the contents of said skid.

5. In a truck of the class described, a vertically movable load carrier, a skid handling member mounted for rotation on said load carrier, means on said load carrier for rotating said skid handling member to dump a skid carried thereby, means on said skid handling member for enter-

ing under the floor of said skid when the skid handling member is in an initial skid engaging position, side plates on said skid handling member adapted to move in juxtaposed relation to the sides of the skid as said means enter under the floor of said skid, and surfaces extending from said side plates for supporting the skid when it is rotated into dumping position by said skid handling member and for guiding the contents thereof.

6. In a truck of the class described, a vertically movable load carrier, a skid handling member mounted for rotation on said load carrier, means on said load carrier for rotating said skid handling member to dump a skid carried thereby, means on said skid handling member for entering under the floor of said skid when the skid handling member is in an initial skid engaging position, side plates on said skid handling member adapted to move in juxtaposed relation to the sides of the skid as said means enter under the floor of said skid, and a hopper formed as an extension of said side plates and into which the skid contents enter as said skid is rotated with said skid handling member into dumping position.

7. In a truck of the class described, a vertically movable load carrier, a skid handling member mounted for rotation on said load carrier, means on said load carrier for rotating said skid handling member to dump a skid carried thereby, means on said skid handling member for entering under the floor of said skid when the skid handling member is in an initial skid engaging position, side plates on said skid handling member adapted to move in juxtaposed relation to the sides of the skid as said means enter under the floor of said skid, a hopper formed as an extension of said side plates and into which the skid contents enter as said skid is rotated with said skid handling member into dumping position, a cover for said hopper, and means for automatically opening said cover when said skid handling member is rotated to a predetermined position relatively to said load carrier.

8. In a truck of the class described, a vertically movable load carrier, a skid handling member mounted for rotation on said load carrier, means on said load carrier for rotating said skid handling member to dump a skid carried thereby, support means on said handling member for entering under the floor of said skid when the skid handling member is in an initial skid engaging position, a hopper formed as a part of said skid handling member and having an open forward end whereby to move into an inverted position over said skid when the support means move under the floor of said skid, the rotation of said skid handling member on said load carrier effecting the dumping of the skid contents into said hopper.

9. In a truck of the class described, a vertically movable load carrier, a skid handling member mounted for rotation on said load carrier, means for rotating said skid handling member to dump a skid carried thereby, support means on said skid handling member for entering under the floor of said skid when the skid handling member is in an initial skid engaging position, a hopper formed as a part of said skid handling member and having an open forward end whereby to move into an inverted position over said skid when the support means move under the floor of said skid, the rotation of said skid handling member on said load carrier effecting the dumping of the skid contents into said hopper.

10. In a truck of the class described, a vertically movable load carrier, a skid handling member mounted for rotation on said load carrier, means on said load carrier for rotating said skid handling member to dump a skid carried thereby, means on said skid handling member for entering under the floor of said skid when the skid handling member is in an initial skid engaging position, a hopper formed as a part of said skid handling member and held inverted when said member is in said skid engaging position, the rotation of said skid handling member on said load carrier effecting the dumping of the skid contents into said hopper, a cover for said hopper normally maintained closed, and means for automatically opening said cover when said skid handling member is rotated to a predetermined position relatively to said load carrier.

11. In a truck of the class described, a vertically movable load carrier, a skid handling member mounted for rotation on said load carrier, means on said load carrier for rotating said skid handling member to dump a skid carried thereby, forks on said skid handling member for entering under the floor of said skid, a hopper on said skid handling member adapted to lie in an inverted position when said forks are in position to engage the floor of the skid, said hopper having an opening in its front end for the entry of said skid between side extension plates of said hopper, the rotation of said skid handling member on said load carrier effecting the dumping of the skid contents into said hopper.

12. In a truck of the class described, a vertically movable load carrier, a skid handling member mounted for rotation on said load carrier, means on said load carrier for rotating said skid handling member to dump a skid carried thereby, forks on said skid handling member for entering under the floor of said skid, a hopper on said skid handling member adapted to lie in an inverted position when said forks are in position to engage the floor of the skid, said hopper having an opening in its front end for the entry of said skid between side extension plates of said hopper, the rotation of said skid handling member on said load carrier effecting the dumping of the skid contents into said hopper, a cover for said hopper normally maintained closed, and means for automatically opening said cover when said skid handling member is rotated to a predetermined position relatively to said load carrier.

13. In a truck of the class described, a hopper, means mounting said hopper for rotation on said truck, a cover for said hopper, and means extending between said mounting means and said hopper for effecting the movement of said cover to open position when said hopper is rotated to a predetermined position on said truck.

14. In a truck of the class described, a hopper, a cover for said hopper normally maintained closed, means mounting said hopper for rotation on said truck, and means extending between said hopper and a relatively fixed portion of said truck for effecting the movement of said cover to open position when said hopper is rotated to a predetermined position on said truck.

15. In a truck of the class described, a hopper, means mounting said hopper for rotation on said truck, a cover for said hopper, a latch normally locking said cover shut, and means including a device on said hopper contacting a device on said

truck when said hopper is rotated to a predetermined position on said truck for releasing said latch.

16. In a truck of the class described, a rotatable load handling member, a relatively fixed truck portion, a trunnion and bearing supporting the load handling member for rotation on said relatively fixed truck portion, and a series of rollers mounted for rotation between the relatively fixed truck portion and the rotatable load handling member for facilitating the rotation of said member on said truck portion.

17. In a truck of the class described, a rotatable load handling member, a relatively fixed truck portion, a trunnion and bearing supporting the load handling member for rotation on said relatively fixed truck portion, a series of rollers mounted on said relatively fixed truck portion, a bearing surface formed on said load handling member in contact with the outer peripheral surfaces of said rollers, and a second bearing surface in contact with the inner peripheral surfaces of said rollers and secured to said load handling member.

18. In a truck of the class described, a relatively fixed truck portion, a series of rollers mounted on said relatively fixed truck portion and having inner and outer peripheral surfaces, a rotatable load handling member having a bearing surface in contact with the outer peripheral surfaces of said rollers, and a second bearing surface in contact with the said inner peripheral surfaces of said rollers and secured to said load handling member.

19. In a truck of the class described, a relatively fixed truck portion, a series of rollers, means whereby said rollers are radially mounted on said relatively fixed truck portion with exposed inner and outer peripheral surfaces, a rotatable load handling member having a bearing surface in contact with the outer peripheral surfaces of said rollers, and a bearing member having a bearing surface in contact with the said inner peripheral surfaces of said rollers and secured to said load handling member.

20. In a truck of the class described, a relatively fixed truck portion, a series of rollers mounted on said fixed truck portion and having inner and outer peripheral surfaces, a rotatable load handling member having a bearing surface in contact with the peripheral surfaces of one side of said rollers, a ring gear having a bearing surface lying against the peripheral surfaces of the other side of said rollers, means securing said ring gear to said rotatable bearing member with the rollers therebetween, and means on said relatively fixed truck portion cooperable with the said ring gear for transmitting rotation thereto.

21. In a truck of the class described, a hopper, means mounting said hopper for rotation on said truck, a cover for said hopper, means maintaining said cover in closing relation to said hopper, and means on said hopper actuated by means on said truck when said hopper is rotated on said truck for effecting the release of said cover from the means maintaining it in closed position.

22. In a truck of the class described, a hopper, means mounting said hopper for rotation on said truck, a cover for said hopper, means maintaining said cover in closing relation to said hopper, and means on said hopper contacted by means on said truck when said hopper is rotated on said truck for effecting the release of said cover from the means maintaining it in closed position.

23. In a truck of the class described, a rotatable load handling member, a relatively fixed truck portion, means mounting said rotatable load handling member for rotation about a fixed axis on said relatively fixed truck portion, and a series of rollers mounted for rotation on axes extending radially from the said fixed axis and positioned for rotation between the relatively fixed truck portion and the rotatable load handling member for facilitating the rotation of said member on said truck portion.

CHARLES S. SCHROEDER.