United States Patent

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[15] **3,653,522**

[45] **Apr. 4, 1972**

[54] VEHICLE LOADER

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[22] Filed: **June 5, 1970**

[21] Appl. No.: **43,918**

[52] **U.S. Cl.** **214/83.3,** 100/256

[51] **Int. Cl.** **B65f 3/00**

[58] **Field of Search** 214/503, 83.3; 100/233, 260, 100/256

[56] **References Cited**

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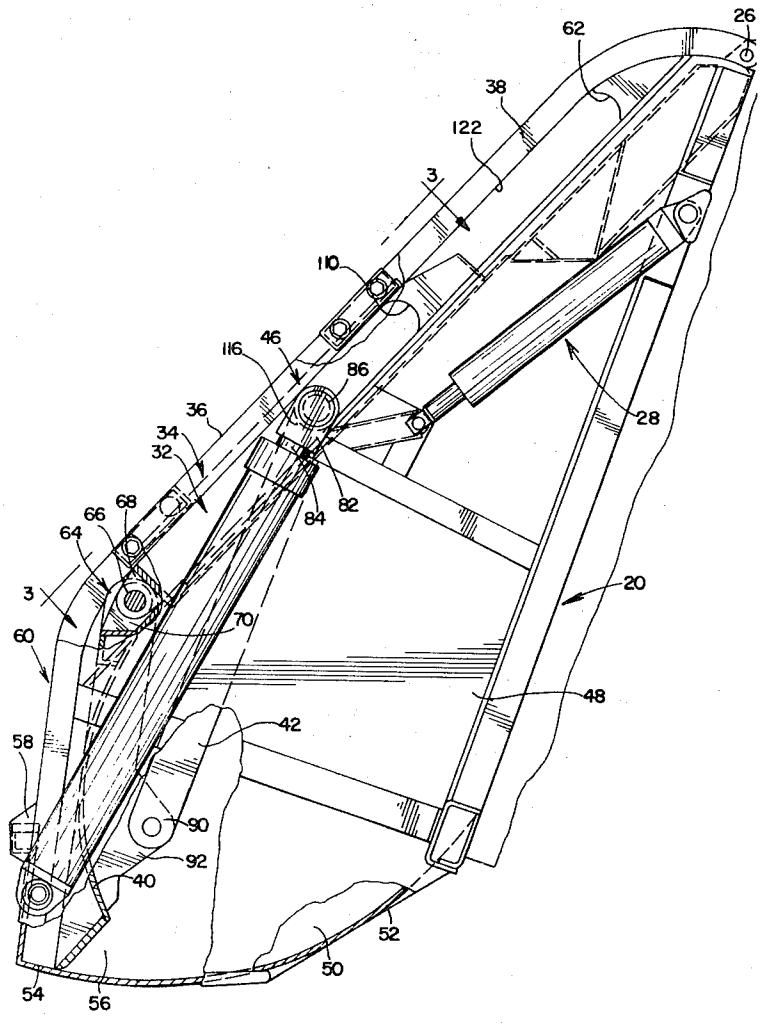
[57] **ABSTRACT**

A refuse loader including an improved mechanism for insuring proper sequential movement of a loading apparatus having a packer plate, a plate carrier, and at least one operating link and including means for pivoting, retracting, and repositioning the packer plate. The packer plate is pivotally mounted on a reciprocable carrier which, together with the plate, is adapted to be first extended and lowered for engaging loose material to be packed, whereupon the plate is swung through an arc to collect and compact the material. Thereafter the carrier and plate move together to a discharge portion of the loader. After performing the cycle, the packer plate is pivoted downwardly and returned to the original position for repetition of the cycle. The principal improvement comprises the provision of means associated with the carrier which have a predetermined resistance to sliding or reciprocable movement of the carrier in relation to the resistance to arcuate or pivotal movement of the plate, whereby, with only a single actuating means, such as a piston and cylinder assembly, and one link extending between the carrier and the pivot, operation will be carried out in the proper sequence.

2 Claims, 8 Drawing Figures



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SHEET 1 OF 4

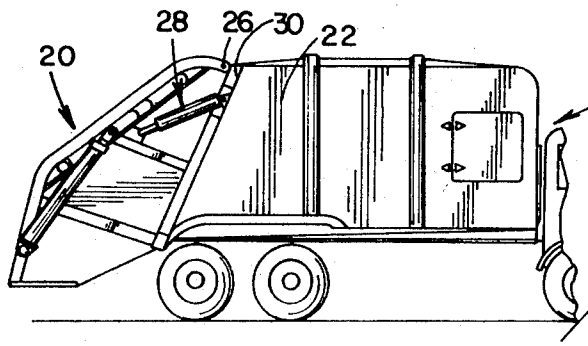

FIG. 1

FIG. 2

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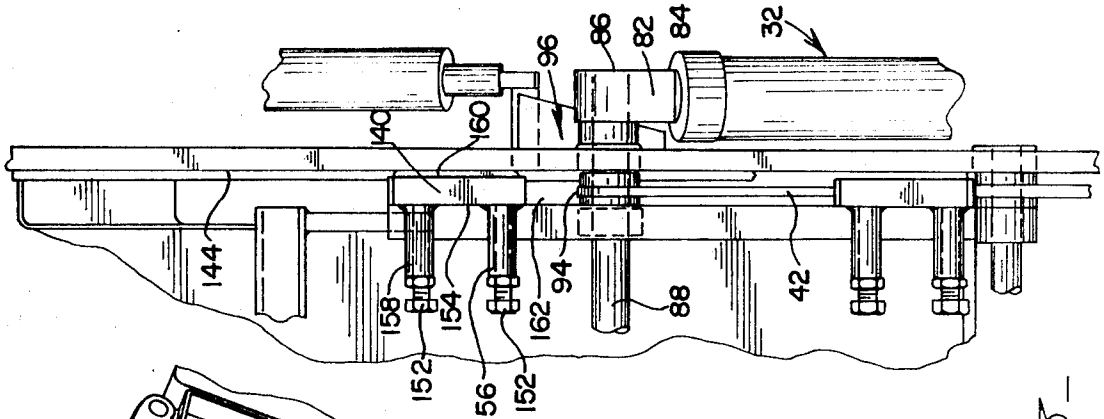

FIG. 3

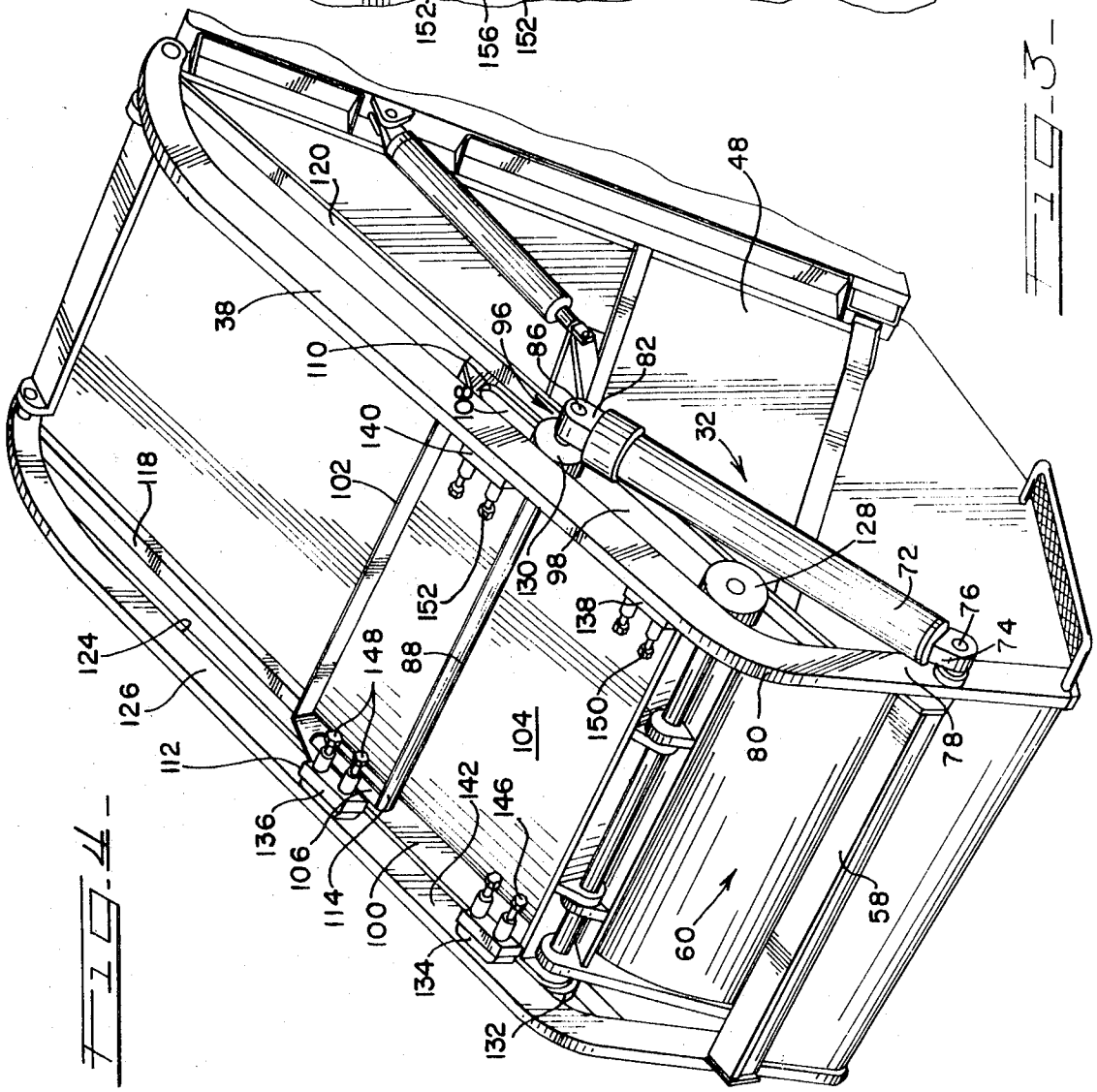

FIG. 4

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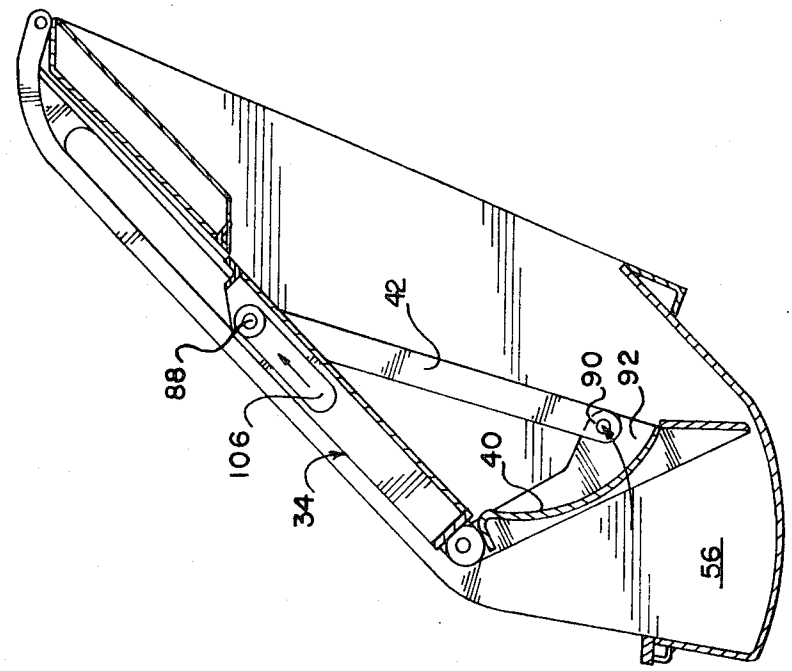

FIG. 6

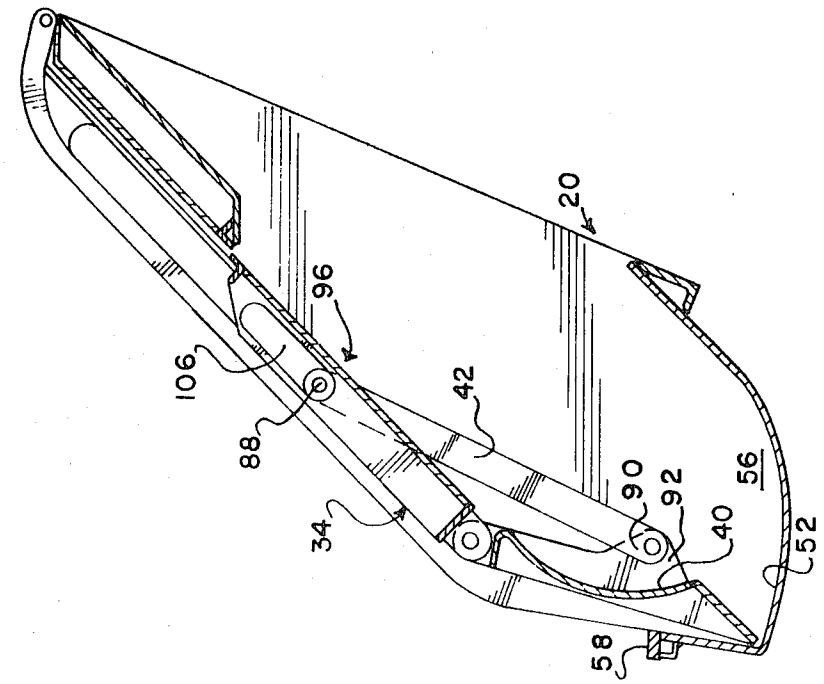

FIG. 5

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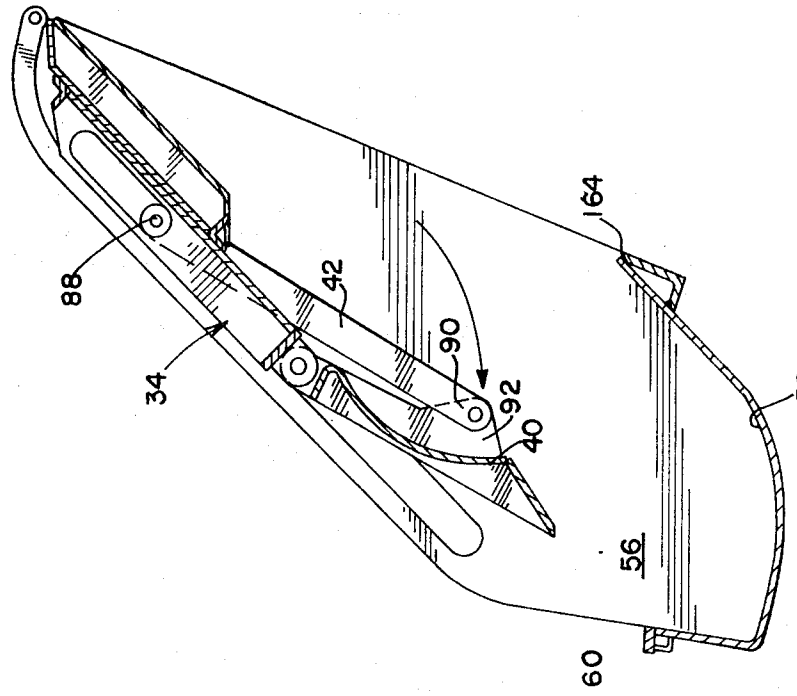

FIG. 8

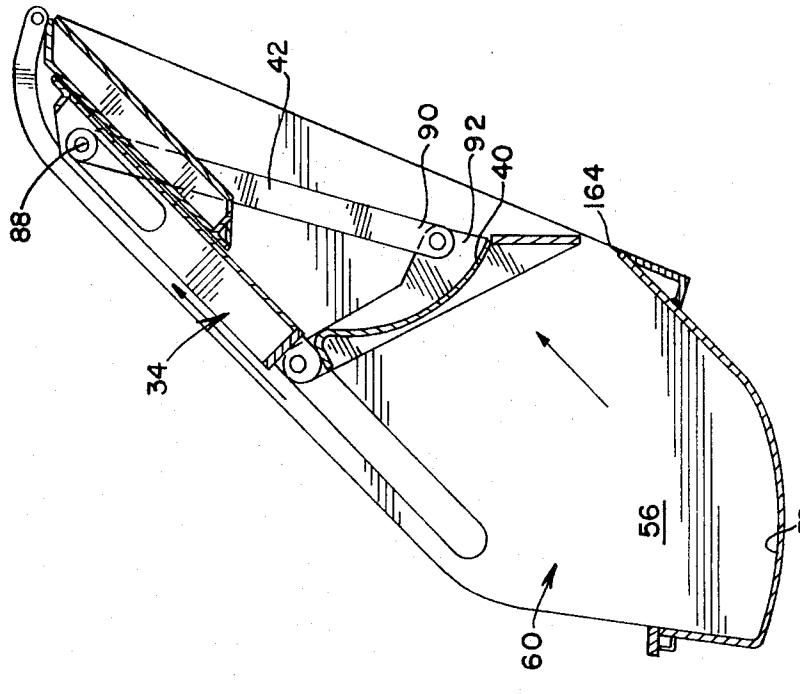

FIG. 7

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VEHICLE LOADER

BACKGROUND OF THE INVENTION

THe present invention relates to refuse collecting vehicles, and in particular, to an improved construction or refuse loaders for use with truck bodies of the type in which refuse is loaded into a bin or refuse receiving portion of the loader, then picked up by a powered packer plate, and moved into a discharge area from which it is transferred to the interior of the body proper so that the truck body may be fully loaded with material of maximum density before emptying thereof.

Refuse collecting vehicles of the type in question are known to be designed to meet certain structural and functional criteria; one such desirable feature is that a loader for refuse includes power equipment thereon to the maximum practical degree, to minimize labor cost and time spent in refuse collection. This is important from the standpoint of direct operational cost as well as because business and residential owners commonly prefer that refuse be picked up only during certain hours of the day.

Inasmuch as the regions in which refuse is dumped for burning, or for removal to a more remote area are often somewhat distant from the places at which refuse is collected, it is desirable to insure that the maximum volume of refuse can be packed in a truck body, and it is also desirable that the material be packed as densely as possible so that the maximum possible weight thereof can be accommodated between trips to the unloading area.

It is also a requirement for a satisfactory refuse or garbage collecting vehicle that the design provide for maximum access to a loading or pickup area thereof. Therefore, refuse collecting trucks commonly include a wide open bin extending across the entire rear of the body so that the bin is easily accessible from either side and from the rear. Such a construction, when associated with its operating mechanism, inherently makes the vehicle undesirably heavy in the rear, thereby limiting the amount of useful load that may be placed therein, particularly where regulations limit the maximum vehicle loading per axle as well as gross vehicle weight. In other words, vehicles having heavy mechanisms in an overhanging position produce a substantial moment about the rear axle, undesirably concentrating excess weight on the axle, although not necessarily producing an excessive gross weight.

In addition, extending the mechanism behind the rear wheels in this way tends also to increase the overall length of the vehicle and to limit the manuever ability thereof, which is a significant drawback in vehicles intended for use in cramped areas such as alleys, docks and the like.

Accordingly, in view of the various characteristics desired in refuse collecting and loading equipment, and in view of the shortcomings of various prior art loader constructions, it is an object of the present invention to provide an improved refuse loader assembly.

Another object of the present invention is to provide a refuse loader having a simplified construction of the essential elements.

Another object is to provide a refuse loader having a mechanism such that movement of a single actuator served to position the packer plate and move the carrier in a desired sequence.

Another object of the present invention is the provision of a loader mechanism wherein a single movement sequence accomplishes these objects, and wherein no outside control is needed to perform the transition from one step or function to the succeeding function or step except continuous movement of the pistons within associated hydraulic cylinders.

Another object is the provision of such a system making extensive use of existing components in the interest of simplicity and economy.

A further object is to provide a refuse loader in which a reduced number of components is required to perform an operation previously requiring a greater number of parts or elements.

A further object is the provision of a loader unit which may be mounted for pivotal movement in respect to an associated truck body.

A still further object of the invention is to provide a mechanism for a refuse loader in which a packer plate and an associated carrier are moved as a unit to the pickup area of the loader, and in which the plate is then moved to pick up and compact the refuse, and thereafter moved with the carrier as a unit into a second position for discharging the refuse from the loader into an associated vehicle.

Still another object of the invention is to provide a mechanism for moving a packer plate from a first position for engaging refuse to a second position for discharging the refuse and which includes a carrier for pivotally supporting a packer plate, and one or more operating links attached at one end thereof to the plate and at the other end to an actuator operated by a hydraulic cylinder and wherein the end associated with the actuator is positioned for relative movement within the carrier to a limited extent so that movement of the actuator will move the plate relative to the carrier and then move the carrier and the plate together as a unit.

Another object is to provide a construction wherein the ratio of the resistance to movement of the packer plate to the resistance to movement of the carrier may be carefully controlled so that plate movement will take place to a permitted extent prior to carrier movement, thereby enabling a desired movement sequence of the components to take place.

A further object of the present invention is to provide a carrier plate having novel locating means as well as means for adjusting the movement resistance of the carrier, and to embody such a carrier within a compact loader unit.

The present invention achieves these objects and other inherent objects and advantages by providing, in a mechanism having a packer plate movable between first and second positions, a carrier unit positioning the packer plate for pivotal movement and having adjustable positioning and movement resistance means and a pair of hydraulic cylinders for moving the plate and carrier as a unit to first position, then moving the plate to a retracted position, and thereafter moving the carrier and plate as a unit to the second position for discharging refuse picked up by movement from the first position.

The manner in which these objects, and other objects and advantages inherent in the invention are accomplished will become more clearly apparent when reference is made to the detailed description of the preferred embodiments of the invention and to the accompanying drawings forming a part hereof, in which like reference numerals indicate corresponding parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary side elevational view, showing the loader of the invention in a normal position of use associated with a truck body;

FIG. 2 is an enlarged view, partly in section and partly in elevation, of the loader unit of the invention;

FIG. 3 is a fragmentary end elevational view of a portion of the loader of FIG. 2, taken along lines 3—3 thereof;

FIG. 4 is a perspective view of the loader unit of the invention;

FIG. 5 is a partially schematic vertical sectional view of the loader of the invention, showing the packer plate, carrier, and operating links in one position thereof;

FIG. 6 shows the elements of FIG. 5 in another position thereof;

FIG. 7 shows the elements of the FIGS. 5 and 6 in still another position thereof; and

FIG. 8 shows the elements of FIGS. 5–7 in still another operational position thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

Before referring in detail to the embodiments of the invention illustrated in the drawings, it will be understood that the invention is useful in a number of different environments and may be embodied in various forms, and that it may be used on various types of associated vehicles, including those with or without auxiliary load packing means, and including trucks having bodies mounted for dumping, or other forms of unloading the contents thereof. It will also be understood that a principal use of a loading device of this type is for loading refuse, but that other materials may be loaded into associated truck bodies with loaders embodying the principles of the invention. Certain features of the present invention, and particularly the means for creating resistance to movement of the carrier to insure that the packer plate may be moved without bringing about movement of the carrier, represent an improvement over a general type of mechanism previously known to perform this operation, such general mechanisms being referred to in the application of Robert A. Boda, Ser. No. 43,935, filed June 5, 1970.

Referring now to the drawings in greater detail, the invention will be illustrated by reference to an embodiment wherein the loader **20** of the invention is associated with the body portion **22** carried by a truck **24**, and wherein means in the form of a hinge **26** and a hydraulic piston and cylinder assembly **28** serve to attach the loader **20** to the rear end portion **30** of the truck body **22**.

Referring now to FIG. **2**, it will be seen that the loader **20** is comprised of a number of principal elements, including a hydraulic cylinder and piston assembly **32** for moving a carrier assembly **34** with a reciprocating motion generally parallel to a top edge portion **36** of a combination loader bOdy frame element and carrier guide **38**. The cylinder and piston assembly also serves to move the packer plate **40** by movement of the operating links **42** extending between a link mounting flange portion **44** of the plate **40** and a carrier drive and link positioning assembly **46**. FIG. **2** also shows that the loader **20** includes a pair of side wall portions **48, 50**, and a generally arcuate bottom wall **52** forming, in combination with a vertical end wall **54**, a refuse receiving area **56** lying below the sill **58**, which in turn defines the lower edge of the refuse receiving opening **60** which is presented when the plate **40** is in another position of use, as will be described in further detail herein.

FIG. **2** also shows a top guide stop **62** associated with an upper end portion of the carrier guide **38**, and mounting means **64** including a shaft **66** for maintaining the mounting ears **68, 70** associated with the carrier **34** and the plate **40** respectively, in position for permitting pivotal movement of the packer plate **40**.

Referring now also to FIGS. **3** and **4**, it is shown that the hydraulic piston and cylinder assembly **32** includes a double-acting cylinder **72** having a mounting ear portion **74** thereof mounted by means of a fastener **76** to a lower portion **78** of the lower frame member **80**. A movable end portion **82** of the assembly **32** is attached to the piston rod **84** and mounted by a fastener **86** to a transverse rod **88**. Attached to the opposite end of the rod **88** is a similar end portion (not Shown) of a left hand piston and cylinder assembly (also not shown), which corresponds to the right hand assembly **32** and is similarly constructed and arranged. FIG. **4** also shows that the operating link **42**, in addition to being joined at its lower end **90** (FIG. **2**) to the flange **92**, is also joined at its other end **94** to the rod **88**, thereby forming, with the fastener **86** and movable end portion **82** of the piston rod **84**, a carrier drive and link positioning assembly **96**. In the form of the invention shown, the carrier **34** includes a pair of oppositely disposed side portions **98, 100**, a forward edge **102**, a cover element **104**, and a pair of slots **106, 108** in the sides **98, 100**, in which the rod **88** may reciprocate before engaging the rounded upper stops **110, 112** or rounded bottom stops **114, 116** forming the ends of the slots **106, 108**, respectively.

Referring now in particular to the carrier **34**, it is shown to be positioned for movement parallel to the top guide **38** and held in place between the top surfaces **118, 120** of the side walls **48, 50** and the lower surfaces **122, 124** of the top guides **38, 126** by engagement therebetween of rollers **128, 130, 132**, etc. which are associated with the carrier **34**. Lateral movement of the carrier **34** is limited by the provision of guide assemblies **134, 136, 138** and **140** which include portions thereof bearing against the side walls **142, 144** of the guides **38, 126**. Four pairs of adjusting screws **146, 148, 150** and **152** are associated with the guide assemblies **134, 136, 138** and **140** so that resistance to movement of the carrier assembly **34** with respect to the fixed portions of the loader **20** may be adjusted, for reasons which will presently appear.

Accordingly, in view of the above-described disposition of the rollers **128, 130, 132** etc., the various surfaces serving as guides, and the guide assembly **134, 136, 138, 140**, all of which combine to define the nature and extent and movement of the carrier **34**, it will be appreciated that movement of the carrier **34** may be accomplished by exerting sufficient forces in either direction on the carrier **34**. As shown in FIG. **3**, for example, a typical guide assembly **140** preferably includes a fixed block **154** to which are attached sleeves **156, 158** for receiving the adjusting screws **152**. Acting through springs (not shown) these adjusting screws may more or less forcefully urge the contact plate **160** against the side wall **144** of the guide **38**. The block **154** is secured, as by welding, to a flange **162** on the side **98** of the carrier **34**. Therefore, frictional resistance to movement of the carrier **34** may be adjusted by adjusting the sets of screws **146, 148, 150, 152**. It will therefore be understood that, assuming that there is appreciable resistance to displacement of the carrier **34**, a force acting on the carrier drive and link positioning assembly **96** will tend to move the rod **88** and its associated operating link **42**, provided that such movement may be accommodated by passage of the rod **88**, link **42** and associated components through the opened portions of the slots **106, 108**.

The provision of the guide assemblies **134, 136, 138, 140**, the adjustable screws **148, 150, 152** associated therewith, and the positioning thereof on the carrier assembly **34** comprise an important feature of the invention, inasmuch as this arrangement of parts provides for an effective means of locating the carrier assembly **34** against lateral movement, and a simple and effective way to assemble and align the relatively movable components of the loader assembly. Furthermore, continuous adjustment of these elements may be made as the unit is being used. In this way, variations in friction, variations caused by wear of the parts, and variations in the operating cycle which are desired by reason of the type of material being loaded may be accommodated readily by adjustment by the user during conditions of actual use without the aid of expensive tools or the need for adjustment to the hydraulic system.

In addition to the features and advantages referred to above, it will also be apparent that the means of mounting the carrier plate **34** is economical and reliable as well as making a replacement and repair of the elements in question very simple and economical. The accessibility of these elements makes adjustment thereof easy, and the location thereof insures that these elements will encounter the least likelihood of coming in contact with the material being loaded.

Reference will now be made to the operating cycle of the loader, whereby the reasons for this fact will be made more clear.

Referring now to FIGS. **5–8**, inclusive, positions of certain of the movable elements are shown in various portions of a complete operating cycle. In the position of FIG. **5**, the plate **40** is in a fully extended position and the carrier **34** is in a position of extreme downward movement. In FIG. **6**, carrier **34** remains stationery but the plate **40** has moved to a retracted position, and in FIG. **7**, the carrier **34** and plate **40** have moved as a unit to the maximum extent of travel in the opposite direction. In FIG. **8**, the carrier **34** remains in the extreme upward position but the plate has been moved to a fully

extended position in preparation for movement of the carrier **34** downwardly to the position of FIG. **5**, from which the cycle will be repeated.

Referring in particular to FIG. **5**, it will be assumed that the portion of the loader **20** which receives the refuse has been substantially filed with refuse so that addition thereto of additional refuse would cause the load to spill out over the sill **58**, and that the carrier **34**, with the plate **40** extended has moved to the position shown. This traps refuse between the arcuate bottom surface **52** of the loader **20** and the front surface of the packer plate **40**. When an actuating force is applied to the carrier drive and link positioning assembly **96**, provided that the rod **88** and its associated parts are movable freely in the slot **106**, and that resistance to arcuate movement of the plate **40** is not sufficiently great to prevent rod movement, the link **42** will urge the flange **92** and the plate **40** to the position shown in FIG. **6**. This serves to compact the refuse and/or move it somewhat upwardly from the receiving area **56** of the loader **20**. In the position shown in FIG. **6**, the rod **88** has reached its maximum upward movement within the slot **106**, and accordingly, continuing upward force supplied thereafter will be applied through the end portion **112** of the slot to the carrier assembly **34**, causing it to move upwardly to the position shown in FIG. **7**. Thereupon, refuse carried by the plate **40** is carried or transferred over the upper edge **164** of the wall **52**, from which position it falls or is pushed to the interior of the body **22** of the truck **24**. FIG. **8** shows that, provided in this instance there is resistance to movement of the carrier **34**, a downward force applied to the rod **88** will first permit the rod **88** to move downwardly in the slot **106**, thereby moving the associated link **42** and plate **40** to the illustrated extended position. This is the normal position of the carrier **34** and plate **40** when the bin **56** is being loaded.

One feature of the invention which is achieved by the operational features of the mechanism provided is that in the event, for one reason or another, there is great resistance to arcuate movement of the plate **40** from the extended position (FIG. **5**) to the retracted position (FIG. **6**), and an actuating force continues to be exerted, such force will then tend to move the carrier **34** in the same direction as the force is applied. In other words, assuming that plate **40** would not undergo a pivoting motion, the rod **88** would therefore not be permitted to slide forward, and the carrier **34** and plate **40** would, in effect, be a single unit, so that the actuating force transmitted through link **42** to the plate **40** would tend to move the entire assembly as a unit. In such a case, if the obstruction to movement of the plate **40** could be bypassed as the carrier moved toward an extreme upward position, when the obstruction or obstacle were bypassed, resistance to a retracting movement of the plate would be diminished and the rod **88** would again move forward in relation to the carrier **34**. As a result, at the end of the operating sequence, the carrier **34** and plate **40** would occupy the position shown in FIG. **7**, although the exact movement sequence undergone by these parts to arrive at this position would be different from the ordinarily intended sequence already described. On the other hand, if the resistance to arcuate plate movement continued throughout the entire stroke, the position shown in FIG. **7** would never be achieved, but the position of elements shown in FIG. **8** would result, namely, a position in which the carrier **34** would be in its maximum upward position while the plate **40** would remain in the extended position. The possibility of undergoing these movement sequences is a safety feature, inasmuch as, upon encountering unusual conditions, the mechanism will undergo a movement sequence determined by the portion of the sequence which presents the path of least resistance during the portion of the cycle in question. Consequently, the cylinder and piston assemblies are not as likely to be overloaded as they would be in a construction wherein retraction and carrier movement were accomplished by plural pairs of cylinders rather than merely one pair of cylinders. The present construction also has the advantage of simplicity in that only one cylinder or pair of cylinders need be provided.

Furthermore, the form of linkage is simplified in respect to prior art linkages. Inasmuch as the mechanism itself is simplified, the control system is simplified, and, in normal use of the mechanism, assuming that it is properly adjusted, the movement sequence is self operating, and therefore, separate sequencing controls or elements need not be provided.

The location and disposition of the elements of the loader of the present invention is such that massive elements need not be placed at the rear portion of the loader. As a consequence, the loader can be made compact in front-to-rear dimensions and relatively light in weight in relation to its capacity, thereby allowing a truck to be more compact for better maneuverability and to have more favorable weight distribution so that a given gross weight will be more equally distributed on the truck axles than would be the case in the use of prior art designs.

Inasmuch as the present construction uses a minimum of links, rods, actuators, and the like, its inherent simplicity provides dependability and reliability at low cost.

As can be appreciated by reference to FIGS. **1**, **2**, and **3**, the auxiliary hydraulic cylinder **28** and its counterpart (not shown) enable the loader assembly **20** as a whole to be pivoted rearwardly and upwardly about the point **26** so that the body **22** of the truck **24** can be emptied in a conventional manner, such as by the use of a body dumping mechanism, a refuse removal plate, or the like.

It will thus be seen that the present invention provides an improved refuse loader for use with a collection vehicle having a number of advantages and characteristics, including those herein particularly pointed out, and others which are inherent in the invention.

I claim:

1. In a mechanism for movement of a packer plate in relation to an associated refuse loader from a first position for engaging refuse in a load receiving portion of said loader to a second position for discharging refuse packed and transferred by said plate to the discharge portion of said loader, said mechanism comprising, in combination, a carrier for a packer plate, a packer plate pivotally connected to said carrier, at least one operating link attached at one end thereof to said plate for causing arcuate movement thereof between extended and retracted positions upon movement of the other link end relative to said carrier, means carried by said carrier receiving said other link end to permit free but limited movement of said other link end, and at least one movable actuator associated with said other link end, the improvement comprising the inclusion of means for providing predetermined resistance to movement of said carrier in relation to the resistance to arcuate movement of said plate, whereby movement of said other link end in one direction will first move said plate to said extended position and thereafter move said carrier and said extended plate as a unit to said first position, and movement from said first position in the opposite direction will first move said plate to said retracted position and thereafter move said carrier and said retracted plate as a unit to said second position, said means for providing said predetermined resistance including a plurality of assemblies each including a contact plate for being urged into abutting relation to a guide surface for said carrier, spring means urging said plates into said abutting relation, and adjusting means for varying the force on said spring means.

2. A mechanism as defined in claim **1** wherein four of said assemblies are provided and wherein each is disposed adjacent a corner of said carrier.

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