United States Patent [19]

Gollnick

[11] **3,739,927**

[45] **June 19, 1973**

[54] **MECHANISM FOR REFUSE COLLECTION VEHICLES**

[75] Inventor: **Cyril R. Gollnick,** Oshkosh, Wis.

[73] Assignee: **Leach Company,** Oshkosh, Wis.

[22] Filed: **Sept. 10, 1971**

[21] Appl. No.: **179,506**

[52] **U.S. Cl.** **214/83.3,** 100/233

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

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

[56] **References Cited**

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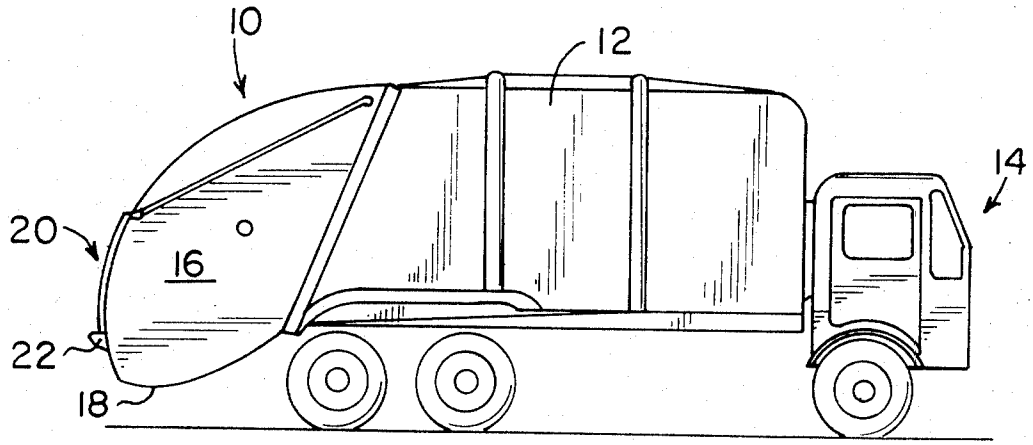
Primary Examiner—Albert J. Makay

Attorney—Fred S. Lockwood, John D. Dewey, Lloyd L. Zickert, et al.

[57] **ABSTRACT**

An improved mechanism for refuse collection vehicles of the type which include a hopper for receiving loose material and a packer plate and operating mechanism therefor disposed within the hopper. The improved device includes a packer plate mounted for pivotal movement at one end thereof, having a combination guide and pivot bar extending transversely thereof generally centrally of the plate, guide ways formed in the side walls of the hopper for receiving the end portions of the bar, and an operative connection between the bar and the piston and cylinder for applying movement to the packing plate. With the improved mechanism, there is no interference between those parts of the mechanism which impart movement to the plate and the parts which are used to position the plate with respect to guideways extending generally parallel to the bottom surface of the hopper. In operation, the plate is moved to the rear of the hopper with the plate edge being disposed adjacent the bottom wall, and thereafter, the plate is retracted while being guided so as to maintain the plate edge adjacent the bottom wall as the plate advances and gradually undergoes a pivoting motion. Upon completion of the packing stroke, the plate guide is released from the guideways for repositioning to repeat the packing cycle.

8 Claims, 8 Drawing Figures



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SHEET 1 OF 4

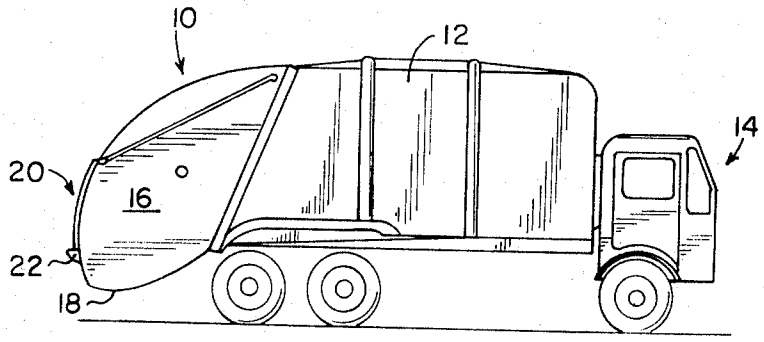


FIG. 1

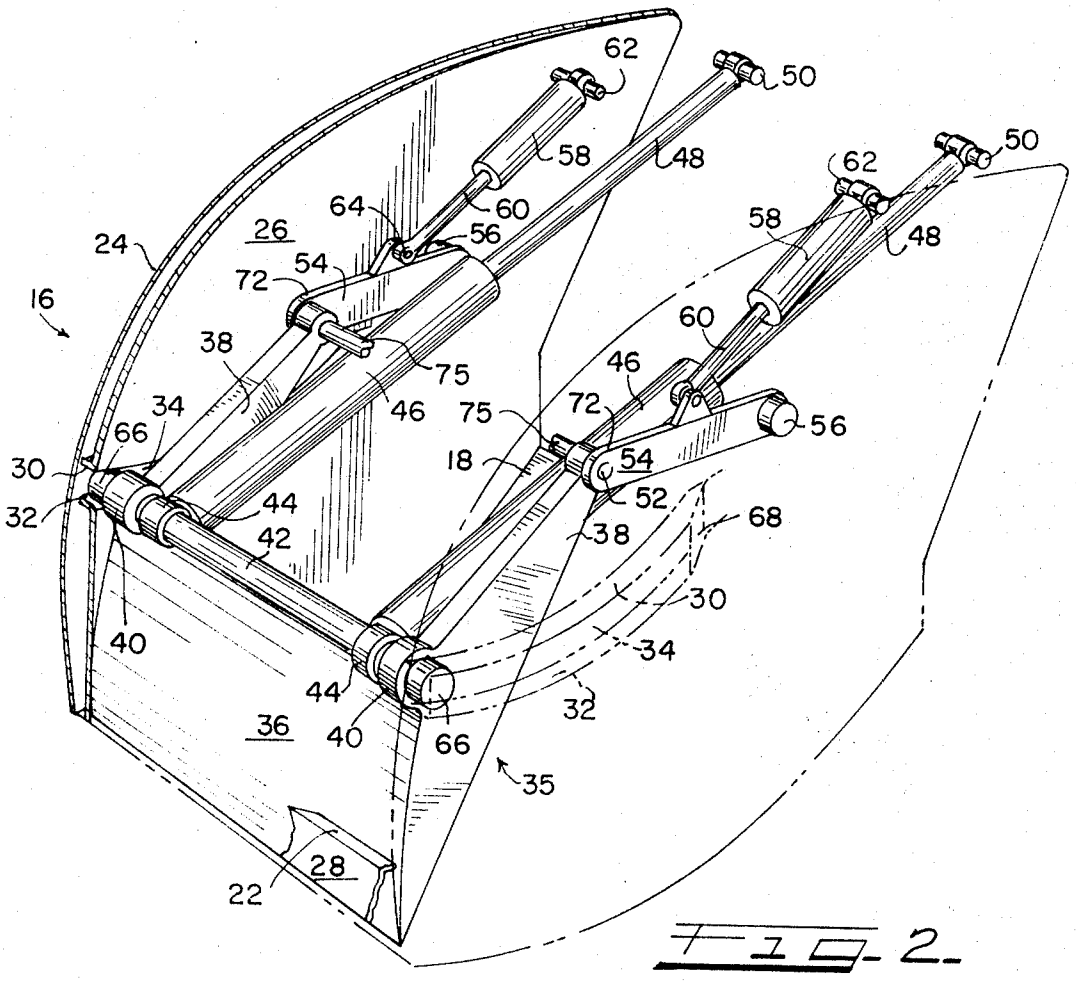


FIG. 2

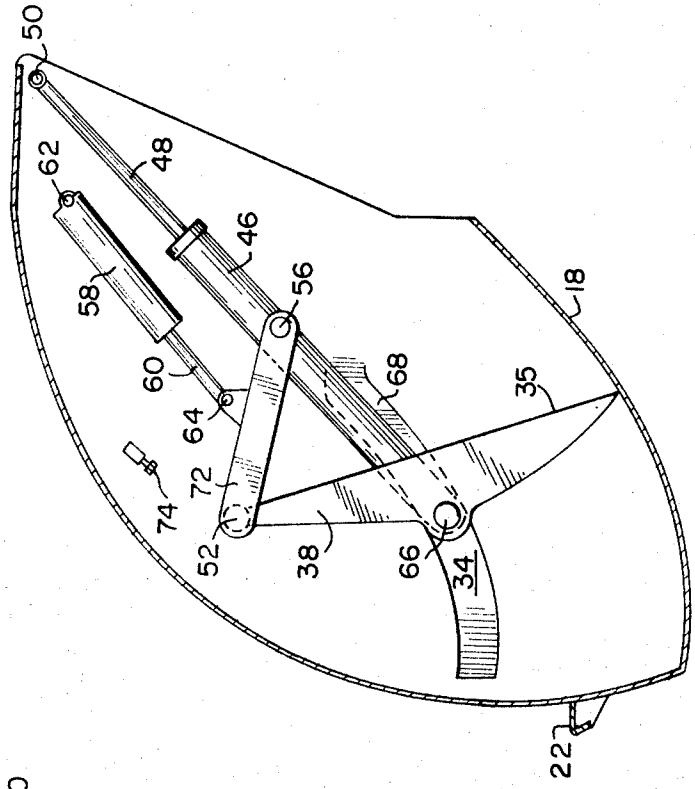

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FIG-4-

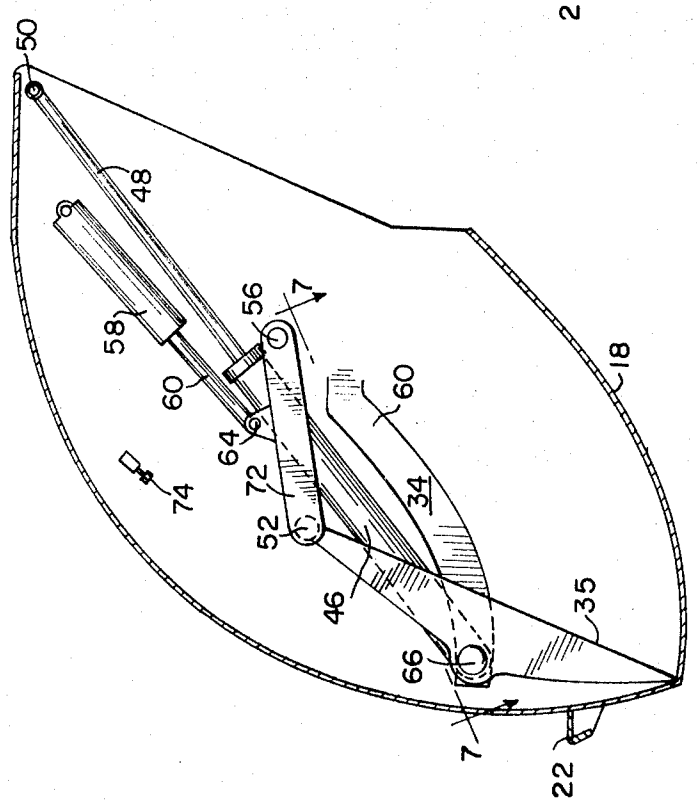

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FIG-3-

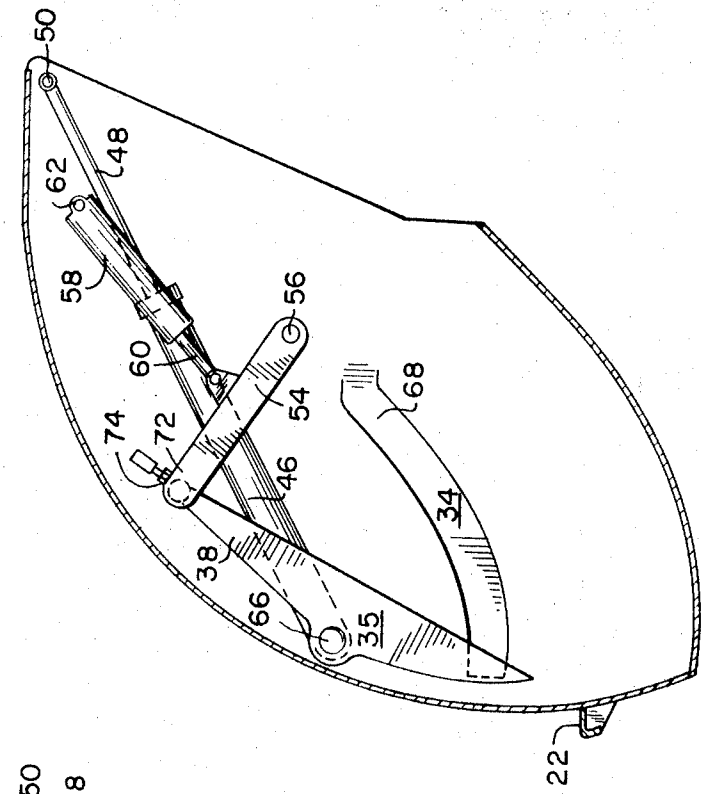

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FIG. 6.

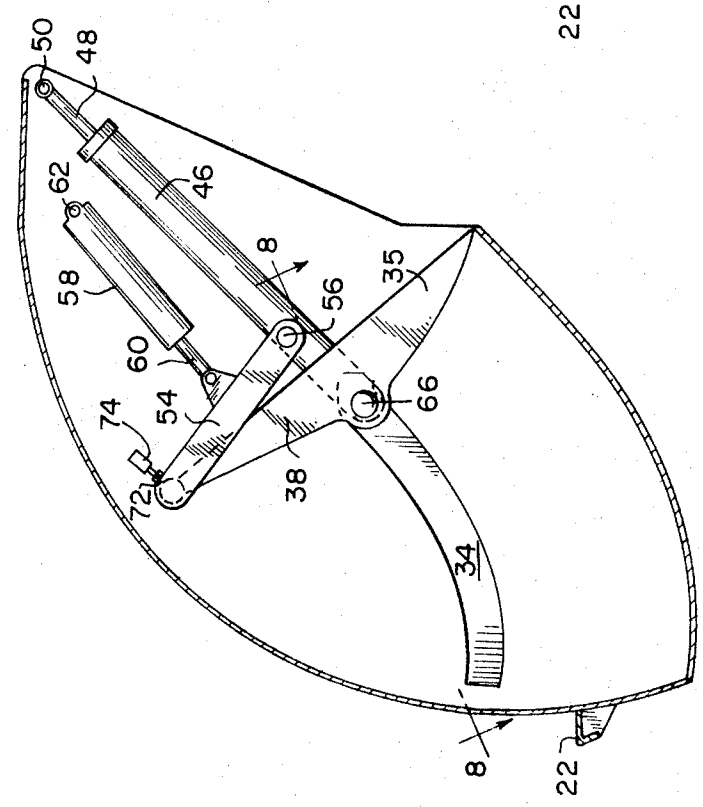

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FIG. 5.

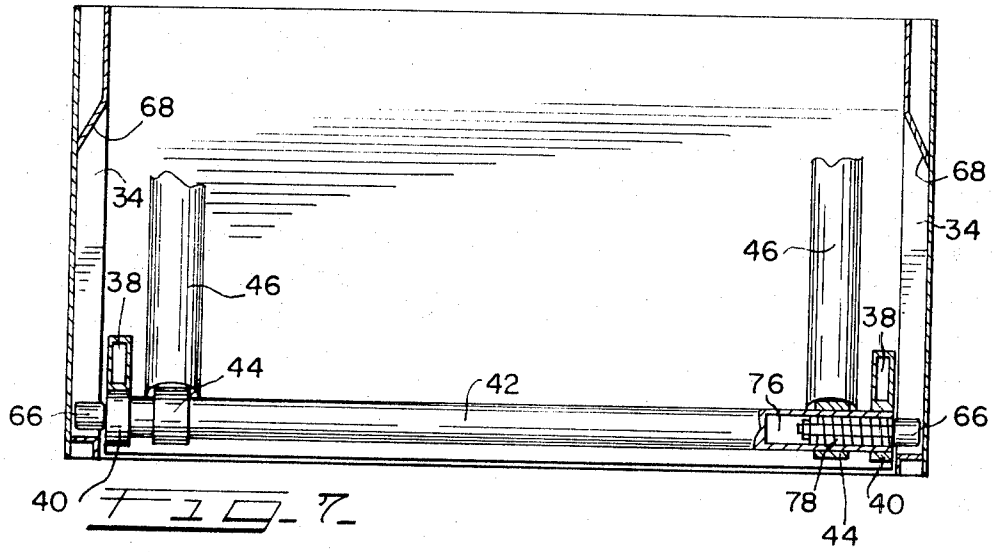

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FIG. 7

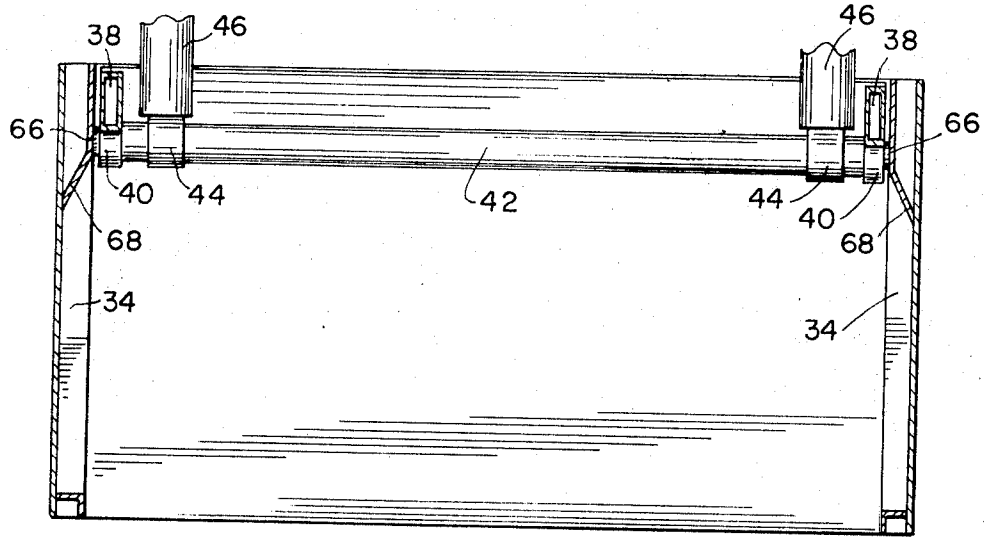

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FIG. 8

MECHANISM FOR REFUSE COLLECTION VEHICLES

The present invention relates to vehicle bodies, and more particularly, to collection vehicles having bodies with special refuse-receiving hoppers adapted to receive a load of loose material and to transfer such material to another portion of the vehicle body, with or without compaction thereof.

Vehicles having bodies of the type in question are commonly used along regular routes to pick up rubbish for removal to a remote area, and accordingly, it is desirable that such vehicles be able to compact the refuse to a substantial degree so that the truck may be fully loaded before proceeding to an unloading area. Therefore, it is important that the loader portion of the vehicle body be capable of transferring the material from the area in which it is received into the storage portion of the vehicle body with a minimum of effort and, under certain conditions, compress or compact the material to increase the load capacity of the body or to aid in transferring the load to the forward portion of the storage area of the body, or both. Vehicle bodies of the general type under consideration are well known in the prior art, and are sold in large numbers to governmental agencies, private scavenger services, and the like.

However, as is the case with a number of products which are subject to being operated in confined quarters, and which are required to operate dependably over long periods of time under extremely severe conditions, and particularly where vehicle weight and dimensional restrictions are imposed by law or by the existence of obstacles such as limbs, electrical lines, etc., and dimensions of alleys and passages wherein vehicles must operate, there is still room for improvement on existing designs. By way of example, one otherwise very successful vehicle loading mechanism has been characterized by limited blade movement in certain portions of the operating cycle, which is brought about by interference between one of the operating links and a plate guide which engages a slotted guideway or track formed within the vehicle body. Other prior art vehicles include mechanisms which are unduly complex and bulky, and which are unreliable or which unduly limit the capacity of the vehicle. An improved refuse loading vehicle is therefore one which combines a large capacity loading hopper with relatively compact dimensions and which includes simple and straightforward operating mechanisms.

Accordingly, an object of the present invention is to provide an improved mechanism for use in refuse collecting vehicles.

Another object is to provide an improved refuse collecting vehicle body having a hopper in which refuse may be loaded for subsequent removal to another portion of the vehicle body.

Another object is to provide an improved refuse loading apparatus which includes a novel arrangement of packer plate, guide means for the plate and a novel system of links and cylinders for bringing about a predetermined movement sequence of such elements of the machanism.

A further object of the invention is to provide a vehicle loading assembly which includes means for receiving a load of capactable material, means for engaging the material and for drawing it to desired position within the receiving means for discharge to a portion of an associated vehicle body.

A further object is to provide a packer plate with an associated motive system which includes a guide for a portion of the packer plate which is located co-axially of or concentrically with respect to the portion of the plate to which motion is applied by the cylinder and piston arrangement.

Another object is to provide a refuse loading mechanism wherein the characteristic motion of the packer plate is not limited by interference between various portions of the links provided for bringing about the desired motion sequence.

Another object is to provide a loading mechanism having a packer plate with an end portion adapted to closely parallel the surface of an associated hopper, a remote end serving as a packer plate pivot point, and an intermediate portion adapted to be received within a guide way during only a portion of the movement cycle of the plate.

A still further object is to provide a loading apparatus with a packer plate mounted for movement about a pivot point which is movable through a predetermined arc, and in which motive force is applied to a generally central portion of the packer plate at a point which is co-axial with a guide roller affixed to a portion of the packer plate and which is received in a guide slot, and means for moving the plate into and out of registration with the guide slot before and after passage therethrough.

Another object is to provide a loading mechanism wherein the blade or plate engaging the load is guided through one portion of its movement cycle by engagement between a guideway and a portion of the plate, and wherein the guide and the guideway are operatively disengaged during another portion of the cycle.

A still further object is to provide a refuse packing mechanism which includes a refuse receiving hopper having a pair of side walls and a bottom surface portion, guideways formed in the side walls, a packer plate movable between raised and lowered positions, guide elements receivable in the guideways, means disposed co-axially with the guides for advancing and retracting the plate, a pivot for one end of the plate, means for limiting the movement of the pivot, a link extending from the pivot to a fixed position in respect to the body, and means for moving the link through a limited arc to position the blade in a desired relation to the hopper.

The present invention accomplishes these and other inherent objects and advantages thereof by providing a vehicle loading mechanism having a hopper unit with side walls and a bottom wall portion, a packer plate disposed within the hopper and adapted to have its lower edge moved along the bottom wall for moving and compacting a load of material, pivot means for the packer plate, guideways formed in the hopper side walls, and means for moving and guiding the plate through a sequence of positions, with the plate guide and the point at which a moving force is applied to the plate for motion thereof being co-axially disposed.

The manner in which these objects and advantages are achieved in practice will become more clearly apparent when reference is made to the following detailed description of the preferred embodiments of the invention set forth by way of example and shown in the accompanying drawings, wherein like reference numerals indicate corresponding parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of the refuse loading apparatus of the invention, mounted on the rear of a vehicle body with which it is associated in use;

FIG. 2 is a perspective view, with portions broken away, showing the principal elements of the mechanism of the invention;

FIG. 3 is a side view, partly in elevation and partly in section, diagrammatically showing one position of the elements of the loading mechanism of the invention;

FIG. 4 is a view similar to FIG. 3, but showing the elements in a second position thereof;

FIG. 5 is similar to FIGS. 3 and 4, but showing the elements in a third position thereof;

FIG. 6 is a view similar to FIGS. 3–5, and showing the elements of the mechanism in a fourth position thereof;

FIG. 7 is a sectional view, taken along lines 7—7 of FIG. 3, and showing the packer plate guide mechanism in one position and showing certain features thereof; and

FIG. 8 is a sectional view, taken along lines 8—8 of FIG. 5, and showing the packer plate guide mechanism in another position thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

Although it will be understood that the invention may be embodied in different forms and that various uses may be made of the principles thereof, the invention will be described with reference to an embodiment wherein the mechanism is embodied in a loader unit attached to the rear end of a vehicle body and adapted to receive loose, compactable material in a lower portion thereof and to move the material from a lower portion of the loader upwardly and forwardly so as to transfer it into the associated vehicle body and, after the body is loaded, to compact the material within the body.

Referring now to the drawings in greater detial, FIG. 1 shows the invention to be embodied in a loader unit **10** attached to the body portion **12** of a refuse collecting vehicle **14.** The loader assembly **10** includes a hopper **16** having a curvilinear bottom wall **18,** an opening generally designated **20** for receiving refuse, and a sill **22** over which the material is emptied into the hopper **16.**

Referring now to FIG. **2,** it will be noted that the hopper **16** is formed from a pair of vertically extending sides of a double wall construction, each having an outer side wall portion **24** and an inner side wall portion **26,** and form a rear wall **28.** Each of the inner side walls **26** includes upper end lower flanges **30, 32** extending generally horizontally and defining therebetween an arcuate guideway **34** lying generally but not necessarily fully parallel to the bottom wall **18.**

Disposed within the hopper **16** is a packer plate **34** having a lower working surface portion **36** and a pair of upwardly extending control arms **38,** as well as an outer pair of mounting gears or brackets **40** through which a transverse combination plate pivot and guide rod **42** extends. Received over the exterior of the pivot and guide rod **42** closely adjacent the brackets **40** are a pair of collars **44** affixed to the end portions respectively of a pair of large diameter movable hydraulic operating cylinders **46** which are operatively connected by large rods **48** to a pair of fixed mounting pins **50.**

The plate **35** is also mounted for pivotal movement about a second, movable axis formed in part by a pair of pins **52** fixed to the ends of a pair of pivotable positioning links **54** which are in turn pivotally mounted to the inner walls **26** by pins **56.** Movement of the positioning links **54** is controlled by an assembly including a pair of smaller holding cylinders **58** and rods **60** assiciated therewith. The ends of the cylinders **58** are attached by anchor pins **62** to the hopper **16,** while the end portions **64** of the rods **60** are pivotally mounted generally centrally of the positioning links **54.** At each end of the guide and pivot rod **42** is a blade guide roller **66** which is received within the guideway **34.** As will apperar elsewhere herein, the blade guide rollers **66** are mounted for axial movement and accordingly, they may retract when forced inwardly of the rod **42** by engagement with the tapering surfaces **68** at the upper and forward ends of the guideway **34,** for reasons which will presently appear.

Referring now to FIGS. **3–6,** the operating cycle of the mechanism will be described in detail.

Assuming that a load of refuse (not shown) is disposed on the bottom wall **18** of the hopper **16,** and further assuming that it is desired to move this load into an associated vehicle body **12** lying upwardly and forwardly of the loader unit **10** against a considerable force, the cycle of upward and forward blade movement is initiated with the roller **66** positioned within the guideway **34,** and with the cylinders **46** drawing the plate **35** forward.

Upon continued application of force within the large cylinders **46,** the edge **70** of the plate **35** is moved along the bottom **18** of the hopper **16,** passing through an intermediate point such as that shown in FIG. **4,** for example. The rollers **66** remain in the guideways **34,** and since the rods **60** are gradually being moved into the cylinders **58,** the pivot axis formed by pins **52** gradually moves up and forward, keeping the plate **35** upright and the edge **70** in contact with the bottom **18.** To accomplish this the fluid is gradually released from the cylinders **58** at a predetermined rate. Finally, the plate **35** reaches a point which is farthest forward in the movement cycle as shown in FIG. **5.** Here, the entire travel of the rods **48** is taken up, and accordingly, the transverse rod **42** is not capable of further forward movement. The rods **60** associated witn the cylinders **58** are likewise contained to the fullest extent possible within their associated positioning cylinders **58.** Also, the pins **52** lie in an upward and forward position, with the end portions **72** of the positioning links **54** abutting a pair of fixed but adjustable stop units **74.** At this point, it will be understood that the guide rollers **66** have been pushed axially inwardly of the transverse rod **42** so that the rollers **66** are not confined within the tracks or guideways **34;** this release mechanism is referred to elsewhere herein.

With the rollers **66** released from the guideways **34,** when forces in the cylinders **46** are reversed and the cylinders and collars **44** forming a part thereof are moved in the opposite direction, and when an oppositely directed force is present in cylinders **58** to hold the end portions **72** of the links **54** positively against the stops **74,** the position of the pins **52** is fixed. Thus, extending the cylinders **46** away from the pivot points **50** of the rods **48** moves the plate edge **70** pivotally upwardly and to the rear of the body as shown in FIG. **6.** The disengaged rollers **66,** which are merely pushed

against the inner surfaces of the smooth walls **26** does not locate the plate **35** during this portion of the motion sequence.

However, after the mechanism has reached the position shown in FIG. **6**, extension of the rod **60** outwardly from the holding cylinders **58** will move the pivot axis formed by pins **52** downwardly and cause the guide rollers **66** to move down along the inner wall **26** in an arc until they snap into the guideways **34** which are formed by the side wall flanges **30, 32.** Once in the guideways **34,** the guide rollers **66** are free only to move in the path dictated by the configuration of the guideways **34,** and, with the cylinders being actuated as described above, thus the movement cycle just described will be repeated.

Referring now to FIGS. **7** and **8** it will be noted that the guide rollers **66** on each end of the rod **42** are retractable within bores **76** in the ends of transverse rod **42** under the force of springs **78.** The springs **78** need only be strong enough to urge the rollers **66** positively into the axially outward position of FIG. **7** where the rollers will lie within the guideways **34** and from which they cannot escape until the rollers are moved axially inwardly by endwise engagement with the cam surface **68.**

Accordingly, the provision of the recessed guideways **34** which terminate in the cam surfaces **68** insures that the rod **42,** which serves the dual purpose of receiving plate moving and pivoting forces, will always be kept in the desired locus or track during one portion of the movement sequence, and cannot be accidentally released therefrom, while at the same time insuring that the rollers **66** are released at the end of each cycle so that the packer plate **35** may be removed from constraint by the guideways **34** and repositioned at the opposite end of the track for repetition of the operating cycle.

Referring again to the operating cycle of the packer mechanism, and particularly to FIGS. **3–6,** the hydraulic control system associated with the mechanism is not shown in detail, it being understood that any form of mechanism of this type may be used and that the exact form thereof does not form a necessary part of the invention or a part thereof which is novel per se. Control mechanisms of this type are known to those skilled in the art, have been in public use, and, by way of example, are described in U.S. Pat. No. 2,649,216, and elsewhere, such as in other publications referred to in such patent.

However, in considering the operating cycle shown in the drawings, it will be noted that, assuming that operations be initiated by raising and extending the plate **35** from the position of FIG. **5** to the position of FIG. **6,** it is necessary that the forces in the holding cylinders **58** be sufficient to prevent movement of the links **54,** and thus to immobilize pivot points **52.** This involves maintaining the rod **60** in the fully retracted position within the associated cylinders **58.** However, a large force is not ordinarily required for this purpose, since the movement of the tube or rod **42** occasioned by movement of the large cylinder **46** is not ordinarily carried out against substantial resistance, other than the dead load afforded by the weight of the plate **35** and portions of the remainder of the linkage.

Once the mechanism has moved to the position of FIG. **6,** and it is desired to position the rollers **66** within the guideways **34,** the pivot points **52** must be allowed to move, and it is apparent that some further extension of the cylinder **46** is also required. Accordingly, as the position of FIG. **6** is reached, the holding pressure in the cylinders **58** is gradually released, permitting the links **54** to move downwardly about the pivot points **56,** while further extension of the cylinders **46** also take place. This operation is carried out so that the rollers **66** are received within the guideways **34** at the lower extreme thereof, so that the plate **35** can engage the entire load within the hopper.

As the plate **35** moves from the position of FIG. **3** to the position of FIG. **5,** it is clear that the plate pivot somewhat, although to a limited extent, about the axis provided by the rod or tube **42,** and that this is caused by movement of the pivot point **52** as the links **54** move through an arc. In this connection, it will be noted that the cylinders **58** are capable of exerting a force on the rod **60** to resist inward movement thereof, although this force can be overcome by the force advancing the main operating cylinders **46** toward the mounting points **50** of the rods **48.** Thus, fluid may be gradually released from one end of the cylinders **58** as the rod or tube **42** is retracted.

It will also be noted that the edge portion **70** of the blade **35** cannot undergo extensive arcuate movement about the movable pivot point **52** when the rollers **66** are disposed within the guideways **34,** since the bottom wall **18** prevents this movement. This insures that the edge **70** of the blade **35** will remain closely adjacent the bottom wall **18.** Accordingly, even if there is little or no fluid force resisting movement of the rods **60** into the cylinders **58** during packing, a combination of the engagement of the guide rollers **66** with the guideways **34** and engagement of the edge **70** with the bottom wall **18** of the loader **10** insures that movement as illustrated will take place. As pointed out earlier, one important feature of the invention is that the axis of the rod or tube **42** serves both as the pivot point for the movement of the packer plate during the time it is held within the guideways **34** and as the axis to which the compacting or retracting force is applied to the packer plate **35.**

With the pivoting and guiding point for the plate **35** being coaxially arranged or consolidated, it has been discovered that the packer plate may sweep through a larger angle in respect to the link **54** than is the case in a construction wherein different locations are provided for the plate pivot axis and for the point to which the retracting force is supplied The practical effect of this arrangement is that interference between parts of the machanism or linkage are eliminated and, in practice a one hundred percent increase in effective loading and packing area can be achieved by extending the length of the hopper framework only 22 percent, while maintaining width and height thereof the same. As pointed out, this is very important when considering that an ideal refuse vehicle is one which has a larger load capacity, but is also one which is sufficiently compact in dimensions to be subject to laws and regulations governing width and height, and which is able to be maneuvered around obstructions to large mobile equipment, such as trees, power lines and the like, and one which may be easily maneuvered even where street signs, service doors, and other structures provide movement limitations.

In addition to the foregoing advantages, the improved construction also provides a motion wherein all or a major part of the increased capacity of the receiv-

ing hopper **16** is accomplished in that portion of the hopper which is most accessible to the loading opening **20** thereof, namely, the portion just inwardly of the sill **22** and at the rear of the hopper **16** along the bottom surface **18** thereof. Other incidental advantages are also present in this construction, such as the fact that the plate moves through a more nearly horizontal arc and that the movement direction of the packing action is toward the top of the body rather than being directed toward the center or bottom thereof. In the instant construction, the blade also moves over the load more easily than in prior art constructions, and the tendency to catch material between the previously separate pivot points has also been eliminated by the consolidation or coaxial location of these points.

From a consideration of the foregoing detailed description of the preferred embodiment of the invention, it may be seen that the present invention provides an improved mechanicam for refuse collection vehicles having a number of advantages and characteristics, including those herein pointed out and others which are inherent in the invention. It will also be apparent that various modifications and changes may be made by those skilled in the art without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A mechanism for loading, receiving and transferring compactible material to an associated vehicle body, said mechanism including a hopper unit having a pair of side walls and a bottom wall portion, guideways formed in said side walls and lying generally parallel to said bottom wall portion, a packer plate having a first portion thereof adapted to engage refuse disposed within said hopper and a second portion thereof receiving plate movement control means, means extending transversely of said packer plate for mounting said plate for pivotal movement thereof, said mounting means including guide means disposed on a given axis and adapted to be received within said guideways, means for diengaging said guide means from said guideways during retracting movement of said plate, and means for applying advancing and retracting forces to said plate, said force applying means being fixed at one end thereof and having the other end thereof mounted coaxially with said given axis.

2. A mechanism as defined in claim **1** wherein said plate control means includes a linkage having one end thereof acttached to said second plate portion and the other end fixed to a part of said hopper, whereby one end of said plate describes an arcuate movement about a movable axis when said plate is retracted.

3. A mechanism as defined in claim **1** wherein said transversely extending means is in the form of a single tube receiving said guide means at least partially within the end portion thereof.

4. A mechanism as defined in claim **1** wherein said force applying means comprises a pair of double acting hydraulic cylinder and piston assemblies.

5. A mechanism as defined in claim **1** wherein said guide means is in the form of a pair of guide rollers.

6. A mechanism as defined in claim **1** wherein said guideways are formed with ramp means adjacent the forward end thereof, said ramp means being formed with the surfaces thereof extending at least partially axially inwardly of said hopper, whereby said guide means are forced out of operative association with position thereof. guideways when said guide means are in the most forward positionthereof.

7. A mechanism as defined in claim **2** wherein said linkage is actuated by at least one piston and cylinder assembly.

8. In a vehicle loading mechanism which includes a hopper unit having a pair of side wall portions, a bottom wall portion, and guideways formed within said side walls and lying generally parallel to said bottom wall, a packer plate disposed in said hopper with a lower edge portion adapted to be moved along said bottom wall, a generally central portion thereof mounted for pivotal movement about a transverse axis, guide means arranged coaxially with said axis and receivable within said guideways, means for disengaging said guide means from said guideways during retracting movement of said plate, an upper end portion of said plate attached to a portion of a moveable link having the other end thereof fixed with respect to said hopper, and means for advancing and retracting said plate by application of force thereto, the improvement comprising mounting one end portion of said advancing and retracting means coaxially of said transverse axis.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,739,927 Dated June 19, 1973

Inventor(s) Cyril R. Gollnick

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 62, "machanism" should be --mechanism--

Column 3, line 40, "detial" should be --detail--

Column 3, line 54, "end" should be --and--

Column 4, line 14, "apperar" should be --appear--

Column 4, line 46, "witn" should be --with--

Column 6, line 50, "machanism" should be --mechanism--

Column 7, line 40, "diengaging" should be --disengaging--

Column 8, line 3, "acttached" should be --attached--

Column 8, lines 21 and 22, delete "position thereof," and insert in place thereof --said--

Signed and sealed this 26th day of March 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.

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