United States Patent [19]

Herpich et al.

[11] **3,767,068**

[45] **Oct. 23, 1973**

[54] **PACKER BLADE FOR A REAR LOADER REFUSE VEHICLE**

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[73] Assignee: **Peabody Galion Corporation,** Galion, Ohio

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[21] Appl. No.: **228,949**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 165,517, July 23, 1971.

[52] **U.S. Cl.** **214/83.3**

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

[58] **Field of Search** 214/83.3, 503, 518

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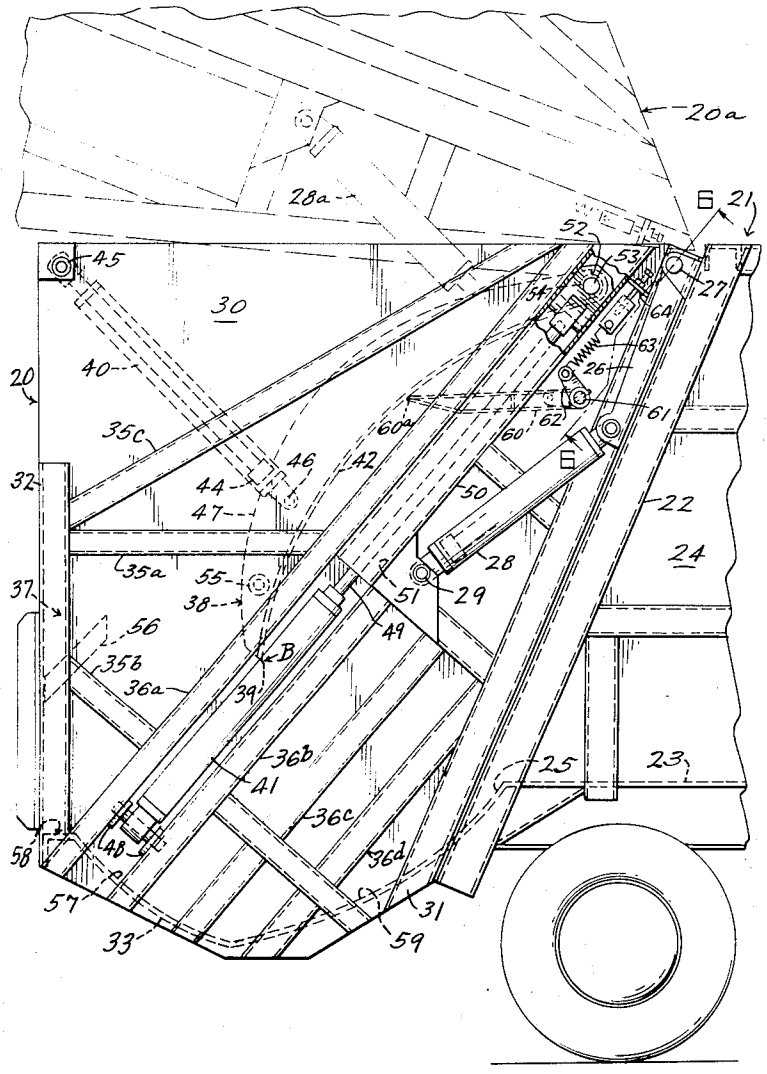
Primary Examiner—Gerald M. Forlenza
Assistant Examiner—Frank E. Werner
Attorney—Carl F. Schaffer et al.

[57] **ABSTRACT**

A packer blade for a rear loader refuse truck having parallel vertical side walls, an open rear end, and a hopper bottom adjacent the rear end. The hopper bottom has a generally V-shaped longitudinal section, with both segments being arcuately formed in longitudinal section. There are a pair of parallel, straight, downwardly and rearwardly inclined guide tracks, respectively located in the upper part of each side wall. A packer blade having a concave arcuate forward surface is pivoted at its upper end on a cross rod carried by slides which are movable along the guide tracks by power means. A pair of extensible cylinders are pivotally connected at the upper rear corners of the side walls and to a medial portion of the packer blade. The packer blade is cycled by retracting the rear cylinders, moving the slides down the guides, extending the rear cylinders and then moving the slides up the guides, to pass backwardly over refuse in the hopper, to come down behind the refuse and to sweep it forwardly along the arcuately formed hopper bottom segments and into the truck body. A fall back shield is pivotally mounted between the side walls forwardly of the extreme forward position of the packer blade and cooperates with the top portions of the packer blade to wipe refuse forwardly off such top portions.

3 Claims, 6 Drawing Figures

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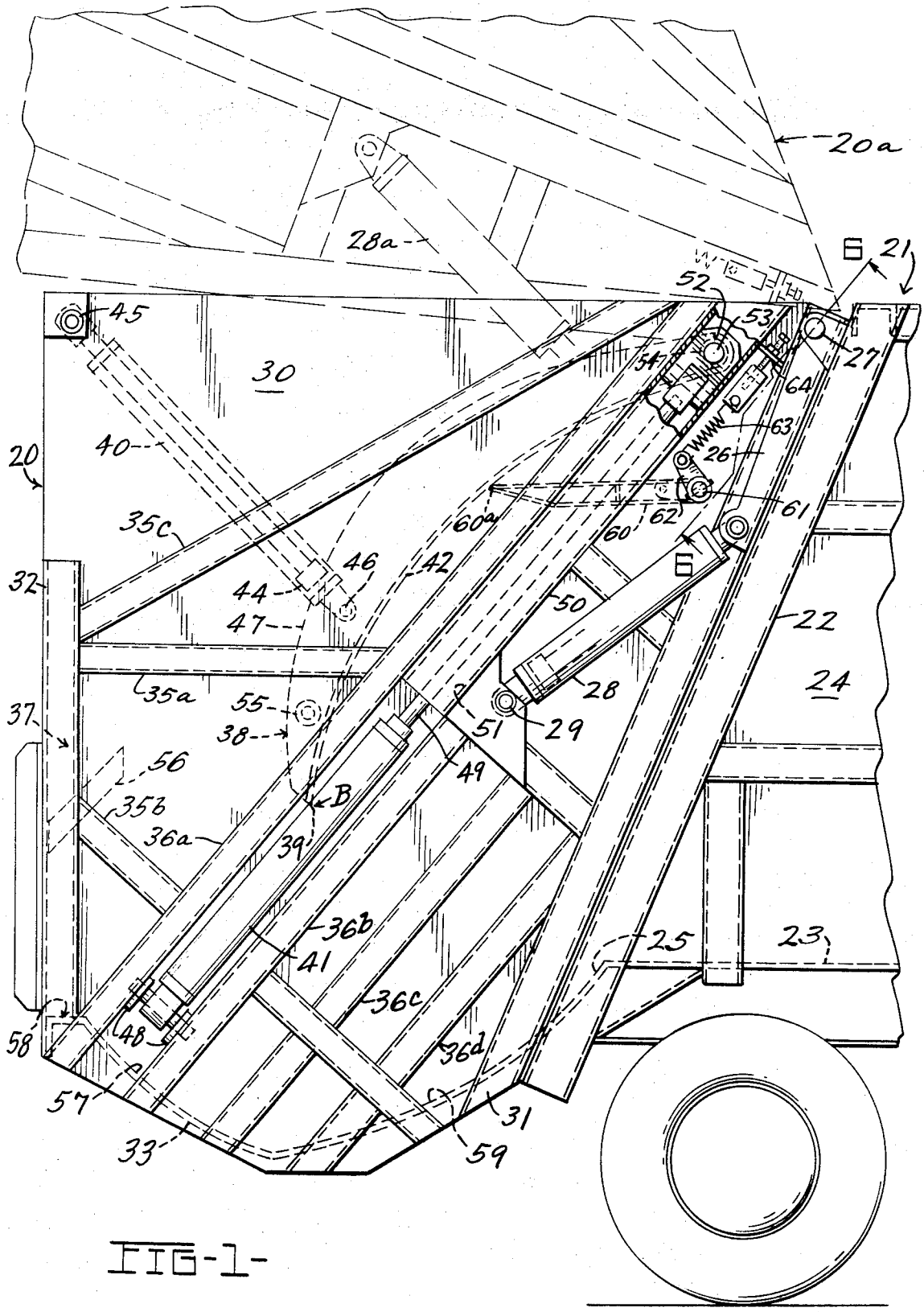

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FIG-1-

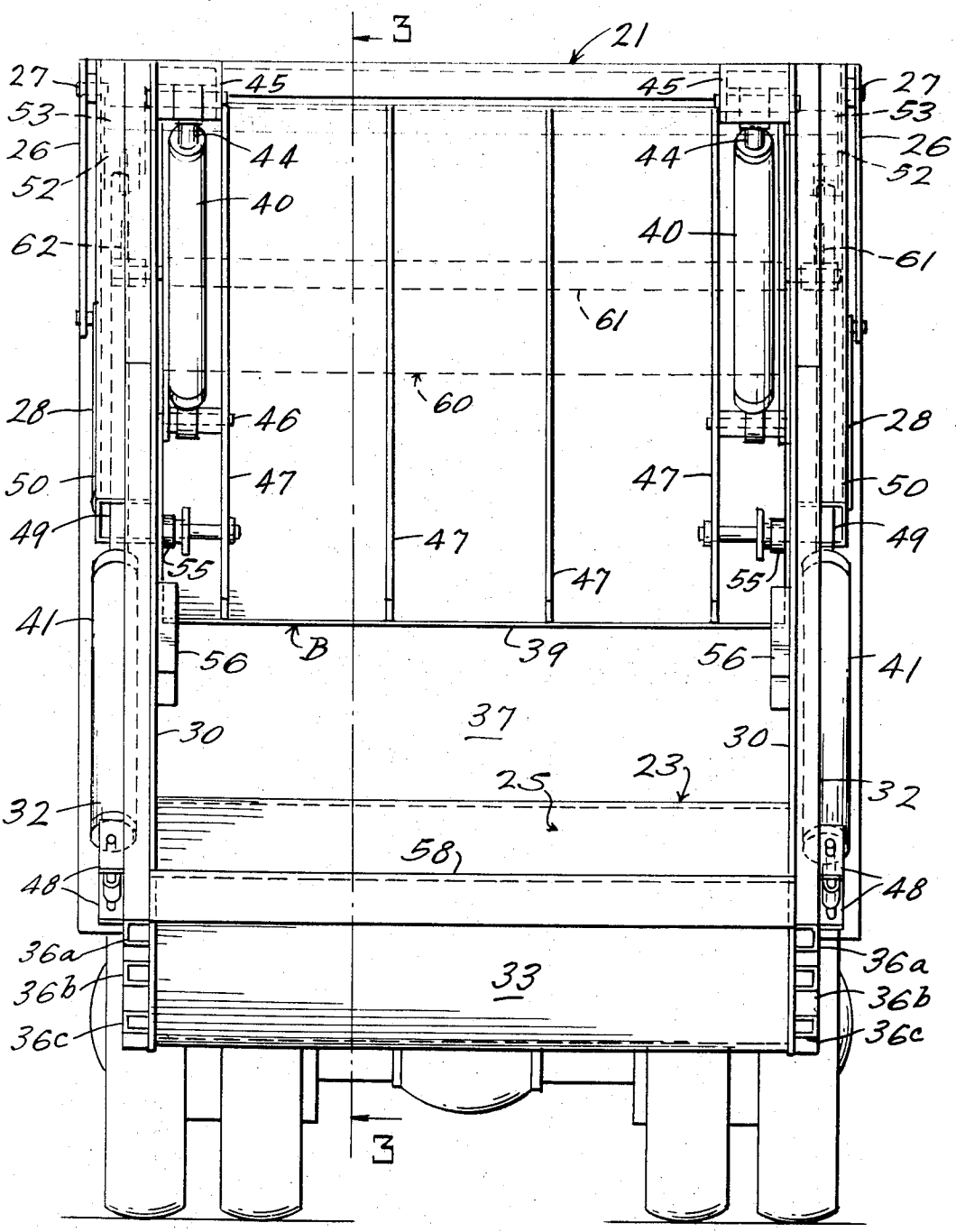

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FIG-2-

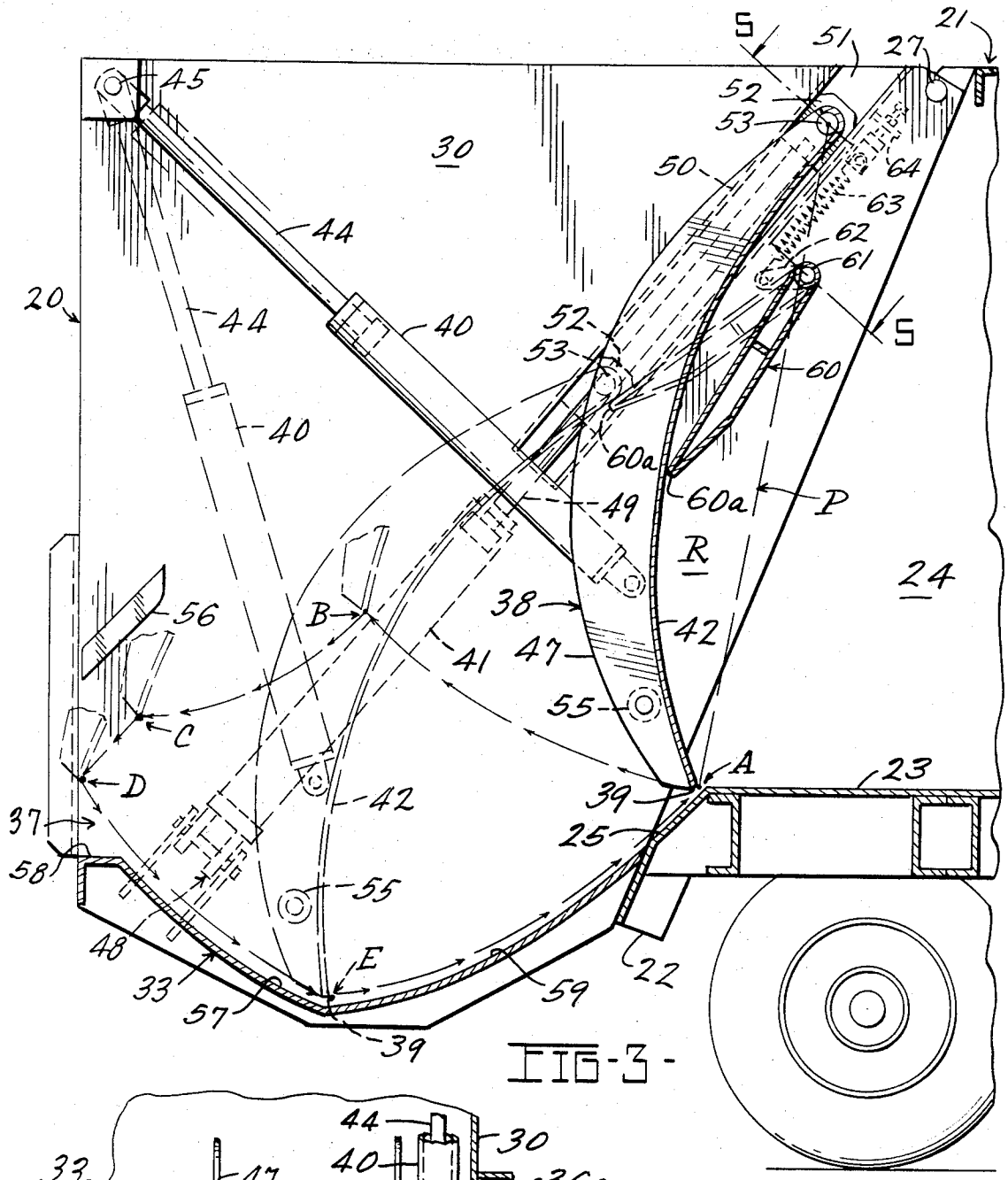

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FIG-3-

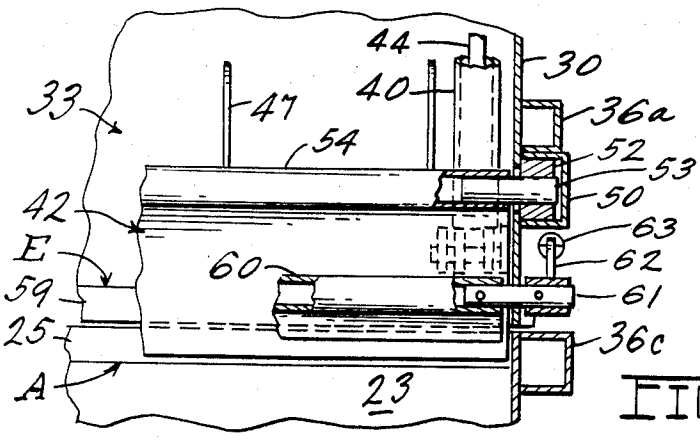

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FIG-5-

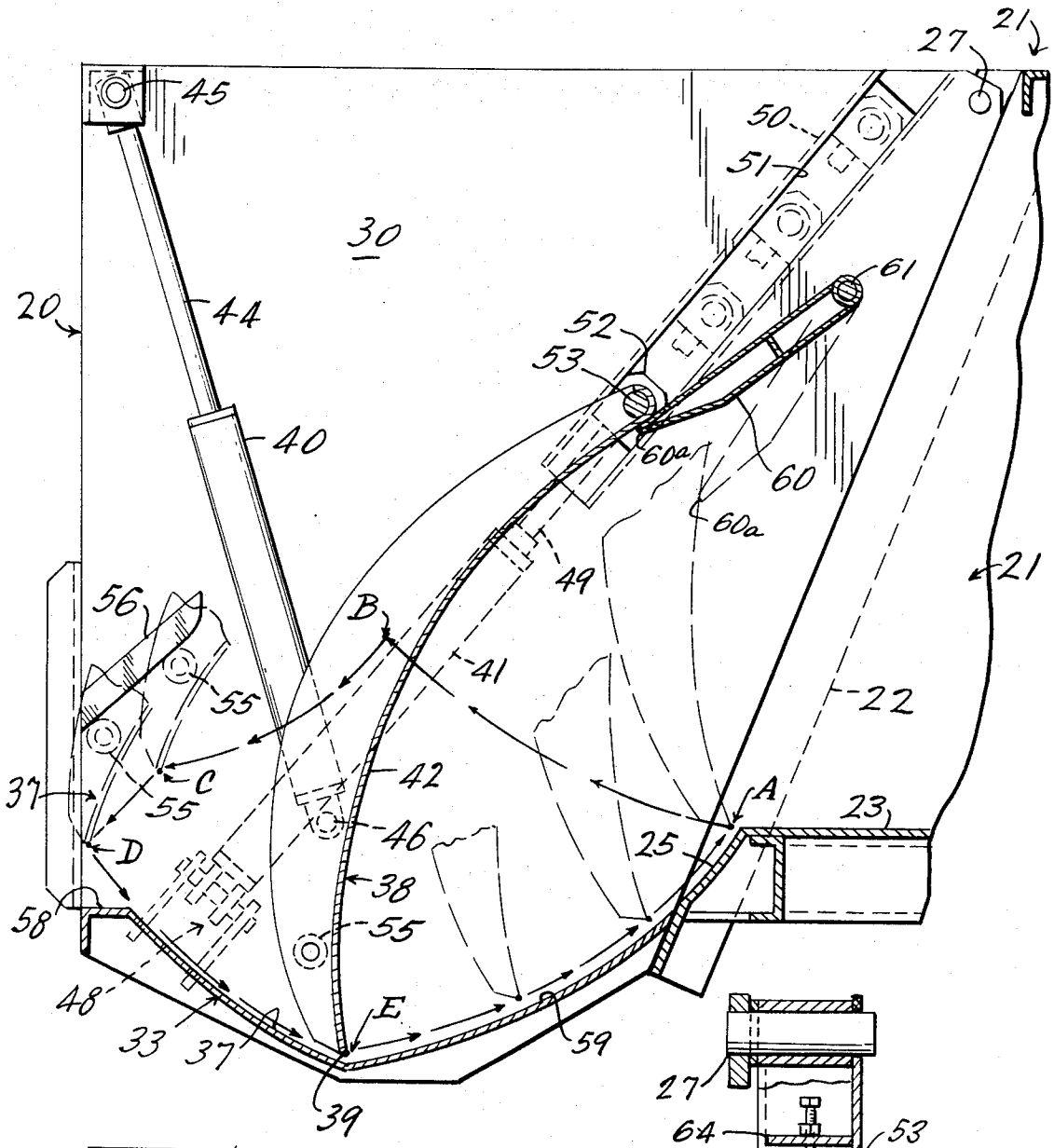

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FIG-4-

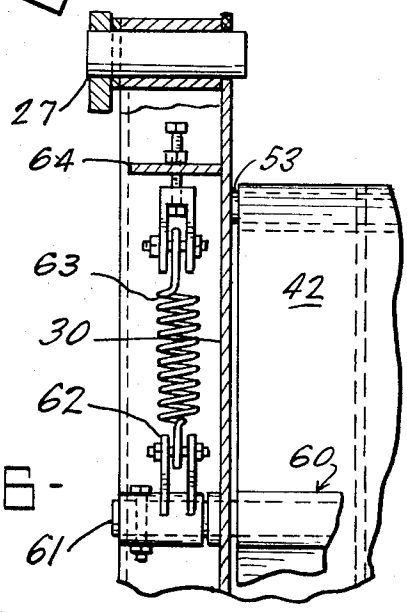

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FIG-6-

PACKER BLADE FOR A REAR LOADER REFUSE VEHICLE

This application constitutes a continuation-in-part of our copending application Ser. No. 165,517, filed July 23, 1971.

BACKGROUND OF THE INVENTION

A packer blade according to the invention is designed for use on a refuse vehicle which has an open rear end. Workers empty refuse cans through a rear loading opening into a hopper in the floor of the vehicle. When a sufficient number of refuse containers have been emptied into the hopper, hydraulic mechanisms are actuated to sweep a packer blade through the hopper to move the refuse forwardly and into the open body of the refuse vehicle. After the body has been filled, the truck is driven to a disposal center. The packer blade is elevated and the refuse emptied from the body, either by tilting the body for dumping or by an ejector plate.

Several primary criteria are important in the design of such a refuse vehicle. These are:

1. That the bottom side of the loading opening at the rear of the vehicle be at a relatively low level compared to the street level to minimize the distance which operators have to lift refuse cans.
2. That the refuse hopper have as large a capacity as possible within the maximum dimensions of the tailgate which are permissible so as to allow as many refuse containers as possible to be dumped into the hopper between cycles of the packer blade.
3. That the packer blade be actuated by means, usually hydraulic, having good mechanical advantage so that adequate power may be applied to the packer blade for moving the refuse out of the hopper, for crushing or breaking many objects usually encountered in refuse which would interfere with the packing operation.
4. That the packer blade have a cycle of operations which insures that it passes backwardly over the refuse in the hopper at the beginning of its cycle in order to avoid sweeping any of the refuse out of the rear loading opening of the tailgate during the cycle.
5. That the refuse engaging forward surface of the packer blade and the hopper bottom surfaces be arcuately contoured to minimize the possibility of refuse being jammed between such surfaces.
6. That the packer blade operating mechanism be responsive to jams. For example, if an object such as a bedspring or a massive timber were inserted part way into the loading opening of the tailgate, the packer blade would not be able to break or cut this object and the cycle would jam. Under such circumstances, the packer blade operating mechanism should respond to the jam by either elevating the packer blade to relieve the jam or by moving it forwardly away from the object which is jamming its action.
7. That in the extreme forward packing position of the packer blade, its refuse engaging surface approach a forwardly inclined, almost vertical position so as to contour the compacted refuse to reduce fall back. Additionally a fall back shield may be provided to cooperate with the top portions of the packer blade to forwardly displace refuse from such blade as it approaches its extreme forward position, and further reduce the chance of fall back.

It is therefore the principal object of the instant invention to provide a packer blade mechanism for a rear loader refuse vehicle in which the packer blade is actuated by hydraulic cylinder means or the like for movement through a cycle wherein it travels backwardly above the level of refuse in the loading hopper, downwardly behind the refuse and forwardly along the arcuate contour of the hopper bottom surfaces to move the refuse into the open rear end of the truck, the forward refuse engaging surface of the packer blade being arcuately formed in vertical section.

An additional object is to provide a refuse fall back shield that uniquely cooperates with the packer blade.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view in elevation, partly broken away, and generally illustrating a tailgate embodying the invention as mounted on the rear of a refuse truck;

FIG. 2 is a rear view in elevation of FIG. 1;

FIG. 3 is a vertical longitudinal sectional view taken generally along the line 3—3 of FIG. 2, and illustrating the position of the packer blade and its actuating mechanism at the forward end of its operating path;

FIG. 4 is a view similar to FIG. 3 but illustrating the mechanism during that portion of its path commencing at the bottom of the refuse loading hopper and en route to the forward position illustrated in FIG. 3;

FIG. 5 is a fragmentary view, partly in section and partly in elevation, taken along the line 5—5 of FIG. 3; and

FIG. 6 is a fragmentary, detailed sectional view taken along the line 6—6 of FIG. 1.

DESCRIPTION OF PREFERRED EMBODIMENT

A refuse truck tailgate embodying the invention is generally indicated by the reference number **20** and is illustrated in FIG. **1** as being mounted on the rear of a body **21** of a refuse truck. The body **21** has an open, generally rectangular rear end defined by a perimeter frame **22**, which rear end is inclined from top to bottom in a rearward direction. The body **21** has a floor **23** and side walls **24**. A body apron **25** is located at the rear of the floor **23**. The tailgate **20** is pivotally connected to the body **21** by massive ears **26** and pivot pins **27** so that it can be swung upwardly and rearwardly to the position fragmentarily illustrated in dotted lines in FIG. **1**, and indicated by the reference number **20a**, by the action of a pair of elevating cylinders **28**, one at each side of the body **21** and pivotally connected to the ears **26** and by massive pivot pins **29** to side walls **30** of the tailgate **20**.

The hopper side walls **30** are laterally spaced from each other and extend between a perimeter frame **31** at the front of the tailgate **20** and rear frame uprights **32** at the rear of the tailgate **20**. The frame **31** and frame uprights **32** also mount a hopper bottom **33** which extends across the bottom of the tailgate **20** and a top (not shown) may also be erected to close off the top of the tailgate **20**, being secured to the side walls **30**, the frame **31** and the uprights **32**. The entire tailgate structure is adequately braced and strengthened by suitable side wall frame members such as the illustrated channels **35*a***, **35*b***, **35*c***, **36*a***, **36*b***, **36*c***, and **36*d***. The side walls **30** and the rear edge of the hoper bottom **33** define between them a loading opening generally

indicated by the reference number 37 at the rear of the tailgate 20 through which refuse containers and the like may be emptied.

A heavey packer blade, generally indicated by the reference number 38, is mounted interiorly of the tailgate 20 extending across the tailgate 20 and movable through a cycle with its lower edge 39 traversing a path illustrated in FIG. 3 as consisting of five legs between the letters, thusly: A-B, B-C, C-D, D-E, and E-A. Movement of the packer blade 38 and, particularly, its lower edge 39 through the path just identified is effected by the sequential actuation of two pairs of cyclinders 40 and 41. In the arrangement illustrated in the drawings, the packer blade 38 is generally crescent shaped in vertical section, with a smoothly contoured curved forward surface 42. When lower edge 39 is at Position "A", at the forward end of hopper 33, the chordal plane of the blade surface 42 is approaching a vertical position, but is still forwardly inclined.

Pistons 44 of the power cylinders 40 are pivotally mounted to heavey pivot brackets 45 mounted at the upper rear corners of the side walls 30. The lower ends of the cylinders 40 are pivotally attached to stub pins 46 (see FIG. 2 particularly) which are welded or otherwise rigidly mounted between two vertical reinforcing ribs 47 extending downwardly across the packer blade 38 and forming a part of its structure. The point of attachment of the ends of the cylinders 40 to the stub pins 46 lies in the lower medial portion of the packer blade 38.

The power cylinders 41 are mounted, one on each outer side of its respective side wall 30, by clevises 48 located near the lower rear corners of the side walls 30 and supported by rigid cross members (not shown). The power cylinders 41 extend upwardly and forwardly toward the upper front corners of the side walls 30 and their rods 49 extend longitudinally into the open lower ends of "U"-shaped track covers 50. The track covers 50 overlie elongated track slots 51 formed on the side walls 30 between channels 36*a* and 36*b*.

The upper end of each of the rods 49 is pivotally connected to a slide block 52 which is adapted to reciprocate in the interior of the track cover 50 upon extension and retraction of its rod 49. Each of the slide blocks 52 carries and journals a shaft member 53 (see FIGS. 2 and 5) which is inserted in the end of a cross tube 53 which is welded to the upper corners of the packer blade 38. Thus extension and retraction of the power cylinders 41 and their rods 49 results in sliding the blocks 52 back and forth in the track slots 51.

Retraction and extension of the cylinders 40 and their rods 44 swings the packer blade 38 angularly around the pivot point provided by the shaft members 53.

Movement of the bottom edge 39 of the packer blade 38 from Position "A" (FIG. 3) to Position "B" along the curved leg A-B, is effected by retracting the rod 44 of the cylinder 40 to swing the packer blade 38 backwardly and upwardly. The leg A-B is thus an arcuate path swung around the center of the shaft members 53. Movement of the lower edge 39 of the packer blade 38 from Position "B" to Position "C", along the curved leg B-C, is effected by retracting the rods 49 of the cylinders 41 until rollers 55 (see FIGS. 2 and 4) mounted at each side of the packer blade 38 strike a pair of guide bars 56 one of which is mounted at each side of the tailgate 20 on the respective side wall 30.

The guide bars 56 function to guide the movement of the lower edge 39 of the packer blade 38 along a straight leg C-D downwardly across the loading opening 37. This movement is effected by continued retraction of the piston rods 49 and simultaneous slight extension of the piston rods 44 from their fully retracted positions. In moving from Position "B" to Position "C", the power cylinders 41 retract their rods 49 until the rollers 55 strike the guide bars 56. This increases the resistance to movement and automatically switches valving (not shown) to admit power oil to the now retracted cylinders 40 to extend their rods 44 slightly as the cylinders 41 continue to retract. The cylinders 40 continue to extend their rods 44 to full extended position until the lower edge 39 of the packer blade 38 reaches Position "D". This simultaneous action of continued retraction of the cylinders 41 and extension of the cylinders 40, results in pushing the packer blade edge 39 downwardly along the leg C-D, being guided by the rollers 55 in contact with the guide bars 56.

Upon reaching Position "D", the cylinders 41 have fully retracted their rods 49 and the continued feeding of power fluid to the cylinders 40 results in further extending the rods 44 to move the lower edge 39 of the packer blade 38 from Position "D" as illustrated in FIG. 5 to Position "E" as illustrated in broken lines in both FIGS. 3 and 5.

The leg D-E is arcuate, representing the movement of the lower edge 39 of the packer blade 38 around the center provided by the shaft members 53. The cooperating rear portion 57 of the hopper bottom 33 is cylindrical in shape and extends downwardly and forwardly from a rear lip 58 which defines the bottom of the loading opening 37, and the axis of generation of portion 57 is coincident with the axis of shaft members 53 at positions D-E. The hopper portion 57 may thus be considered to be one arcuate arm of a generally "V"-shaped bottom in longitudinal section.

Further movement of the lower edge 39 of the packer balde 38 from Position "E" to Position "A", along the leg E-A (see FIG. 4) is effected by extending the cylinders 41 to move slide blocks 52 along the track 51 from their lowermost position (FIG. 4) to their uppermost position (FIG. 3) while maintaining the cylinders 40 in fully extended position. The leg E-A defined by lower edge 39 is thus not truly arcuate around the center provided by the pivot pins 45 because, although the cylinders 40 swing around that center, the upper end of the packer blade 38 is carried by the slide blocks 52 moving upwardly along the inclined track 51. The shape of a forward hopper portion 59 is thus defined by the leg E-A through which the lower edge 39 of the packer blade 38 is moved during this portion of its cycle.

As can best be seen by reference to FIG. 3, this forward portion 59 of the hopper bottom 33 constitutes a second generally arcuate arm of the generally "V"-shaped hopper bottom 33 and blends into the downwardly directed body apron 25 which leads upwardly to the level of the body floor 23. Extension of the cylinders 41 to move the bottom edge 39 along the leg E-A is effected by the resulting hydraulic pressures in the control system which occur when the cylinders 40 reach their fully extended position at "E" (dotted lines FIG. 3 and solid lines FIG. 4).

The combination of the smooth arcuate forward surface 42 of the packer blade 38 with the arcuate hopper bottom surfaces 57 and 59 minimizes the possibility of

any individual rigid piece of refuse becoming jammed between such surfaces during the packing stroke. Additionally, the arcuate packer blade surface **42** imparts a rolling action to the refuse, achieving better compaction. The curvature of surface **42** may be substantially the same radius as forward hopper surface **59.**

In the event that some heavy, non-frangible item is partially inserted through the loading opening **37** so that it extends into the hopper **33,** resting on the rear lip **58** and protruding outwardly therefrom, when the packer blade **38** is moved from Position "C" downwardly to Position "D", its bottom edge **39** will strike such object. If the object cannot be broken by the power applied thereto, the resulting sharp increase in pressure in the cylinders **40,** which are extending during this movement along the leg C-D, results in transferring the hydraulic pressure to the cylinders **41** which immediately extend their piston rods **49** to "pick up" the packer blade **38** and move it forwardly above the refuse in the hopper **33.** This releases the item jammed between the lower edge **39** and the lip **58** defining the bottom of the loading opening **37.** The operator is signalled that the cycle has not been properly completed and he may remove the object which has caused the jam.

When a sufficient number of loads of refuse have been emptied into the hopper **33** and fed forwardly therefrom into the body **21,** so that the refuse in the body **21** presents sufficient resistance to the forward movement of the packer blade **38** along the leg E-A, the packer blade **38** cannot reach Position "A". This results in the cylinders **41** not being fully extended during this part of the cycle and the hydraulic pressure in their system reaches its maximum prior to the time the blade **38** reaches its forward, body-closing Position "A". This results in an indication to the operator that the body **21** is filled and no further refuse can be accumulated therein.

As was previously mentioned, the packer blade **38** is positioned so that at the end of its forward packing stroke, the chordal plane "P" of arcuate front surface **42** approaches a vertical position, but is still forwardly inclined (see FIG. 3). This helps minimize any tendency of the accumulated refuse "R" to fall back when packer blade **38** is moved rearwardly to initiate the next loading cycle.

To further minimize fall back, a fall back shield **60** may be provided. The shield **60** extends transversely between side walls **30** and is pivotally mounted between such side walls, forwardly of packer blade **38,** by pins **61** which respectively extend through the side walls. A crank arm **62** is secured to the outer end of each pin **61** and an adjustable tension spring linkage **63** operates between the crank arm **62** and a bracket **64** welded to the side wall **30.** The shield **60** is thus biased so that its bottom edge **60*a*** maintains contact with the top portions of the forward arcuate surface **42** of the packer blade **38** in all positions of the packer blade **38.** Hence the shield **60** maintains a continuos restraint on the top portions of the accumulated refuse "R".

The lower portions **60*b*** of the shield **60** taper down to an edge **60*a*.** Thus, referring to FIGS. **3** and **4,** as the blade **38** ends its forward compacting stroke, moving from Position "E" to Position "A", the shield **60** wipes downwardly along the arcuate surface **42** and effects an additional forward displacement of the refuse "R" away from the packer blade **38.** This effectively prevents fall back of the accumulated refuse when the packer blade **38** is started back on its next cycle.

Having described our invention, we claim:

1. In a refuse collecting vehicle having a floor and upstanding side walls defining a refuse receiving body with an open rear end, the improvement comprising a hopper formed in said floor adjacent said open end, said hopper having a forwardly and upwardly inclined arcuate bottom surface, a packing blade traversing the space between said side walls, power operated linkage means for moving said packing blade through said hopper with the bottom edge of the blade sweeping along the hopper floor surface to move accumulated refuse out of the hopper, said packing blade having its forward refuse engaging surface arcuately contoured in vertical cross section, the chord of said packing blade surface being substantially vertical when the bottom edge of the packing blade is positioned above the forward end of said hopper, a fall back shield pivotally mounted between said side walls forwardly of the extreme forward position of said packer blade, and resilient means for maintaining the bottom edge of said shield in engagement with the front surface of said packer blade in all positions of said packer blade.

2. A packer blade for the tailgate of a rear loader refuse vehicle, said tailgate having an open rear end, parallel vertical side walls and a hopper bottom, said hopper having a generally V-shaped longitudinal section with curved arms,

1. said packer blade extending across said tailgate and having an upper edge, a lower edge and a front face extending generally vertically between said edges,
2. the upper edge of said packer blade being reciprocal along a substantially straight track that extends between a point near the upper, forward corner of said tailgate and a point located rearwardly and at a lower level such that when said upper edge reaches the lower end of said track, said lower edge is at the apex of the V-shaped bottom of said hopper,
3. power means for reciprocating said upper edge along said path,
4. separate extensible power cylinder means pivotally connected near the upper rear corner of said tailgate and to said packer blade at a point intermediate its upper and lower edges,
5. the front face of said packer blade being generally concave rearwardly in the area between said upper edge and the pivotal connection of said power cylinder means to said packer blade relative to a line connecting said upper edge and said pivotal connection.

3. The combination defined in claim **2** plus a fall back shield pivotally mounted between said side walls forwardly of the extreme forward position of said packer blade, and resilient means for maintaining the bottom edge of said shield in engagement with the front surface of said packer blade in all positions of said packer blade.

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