United States Patent [19]

McKenzie et al.

[11] **3,815,950**

[45] **June 11, 1974**

[54] **DOOR ASSEMBLY FOR A REFUSE RECEIVING HOPPER**

[76] Inventors: **Roland W. McKenzie**, R.F.D. Rt. 3, Box 67X; **Richard Stansberry**, 1114 Farley St., both of Culpepper, Va. 22701

[22] Filed: **June 18, 1973**

[21] Appl. No.: **370,607**

[52] **U.S. Cl.** **296/56**, 160/207

[51] **Int. Cl.** **B62d 33/04**

[58] **Field of Search** ..... 296/50, 56, 104, 57 A; 160/206, 207

[56] **References Cited**

UNITED STATES PATENTS

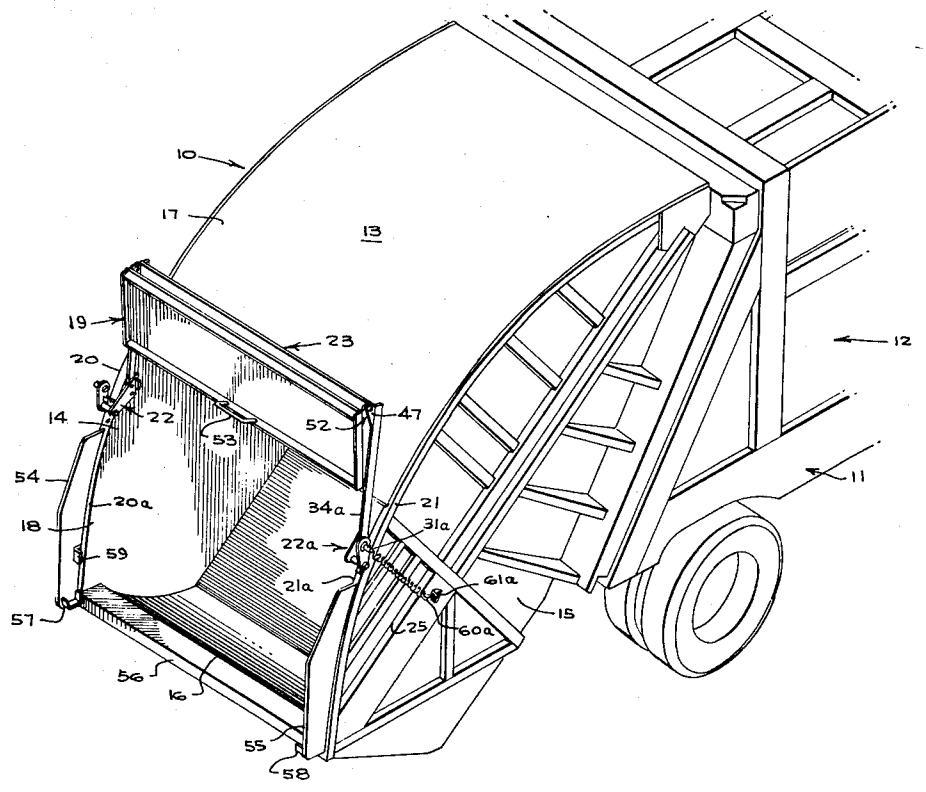
2,151,335	3/1939	Rush	296/57 A
2,573,181	10/1951	Burr	160/207
2,893,482	7/1959	Burgin	160/207
3,749,440	7/1973	Lathers	296/106

Primary Examiner—Stanley H. Tollberg
Assistant Examiner—James M. Slattery

[57] **ABSTRACT**

A door assembly for a refuse receiving hopper of a refuse vehicle, generally including a pair of arm assemblies pivotally mounted on the rear ends of the hopper side walls, a door panel secured to the arm assemblies, a pair of springs interconnecting the arm assemblies and the hopper side walls and means mounted on the hopper engageable by the arm assemblies for restricting the pivotal movement of the arm assemblies within an arc intersected by a plane passing through the connections of the spring members with the hopper side walls and the pivot axis of the arm assemblies whereby upon manipulation of the door panel in moving the arm assemblies above and below the arc intersecting plane, the springs will operate to bias the door panel in an open position disposed above the hopper opening and to a closed position disposed across the hopper opening, respectively.

12 Claims, 4 Drawing Figures



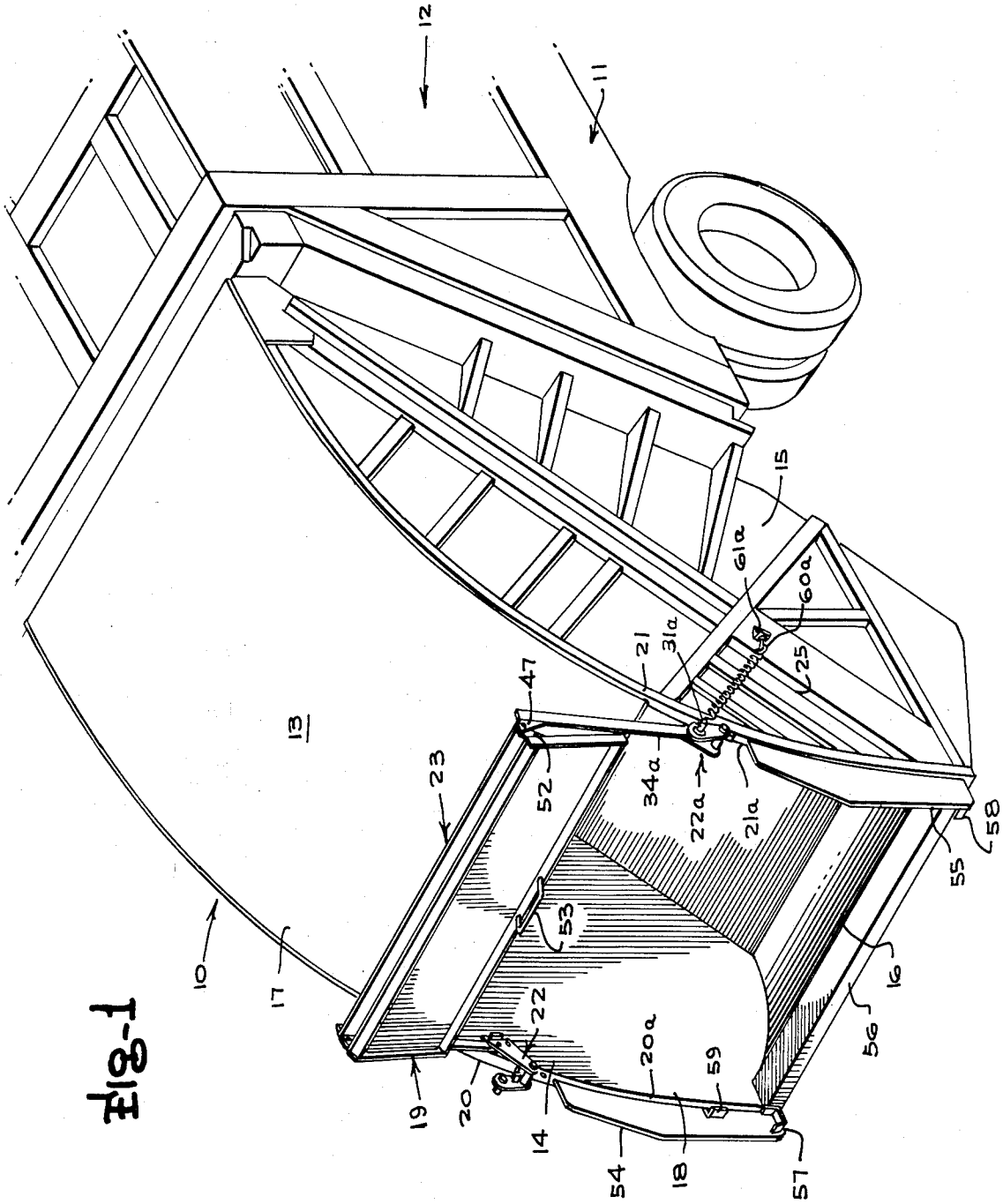
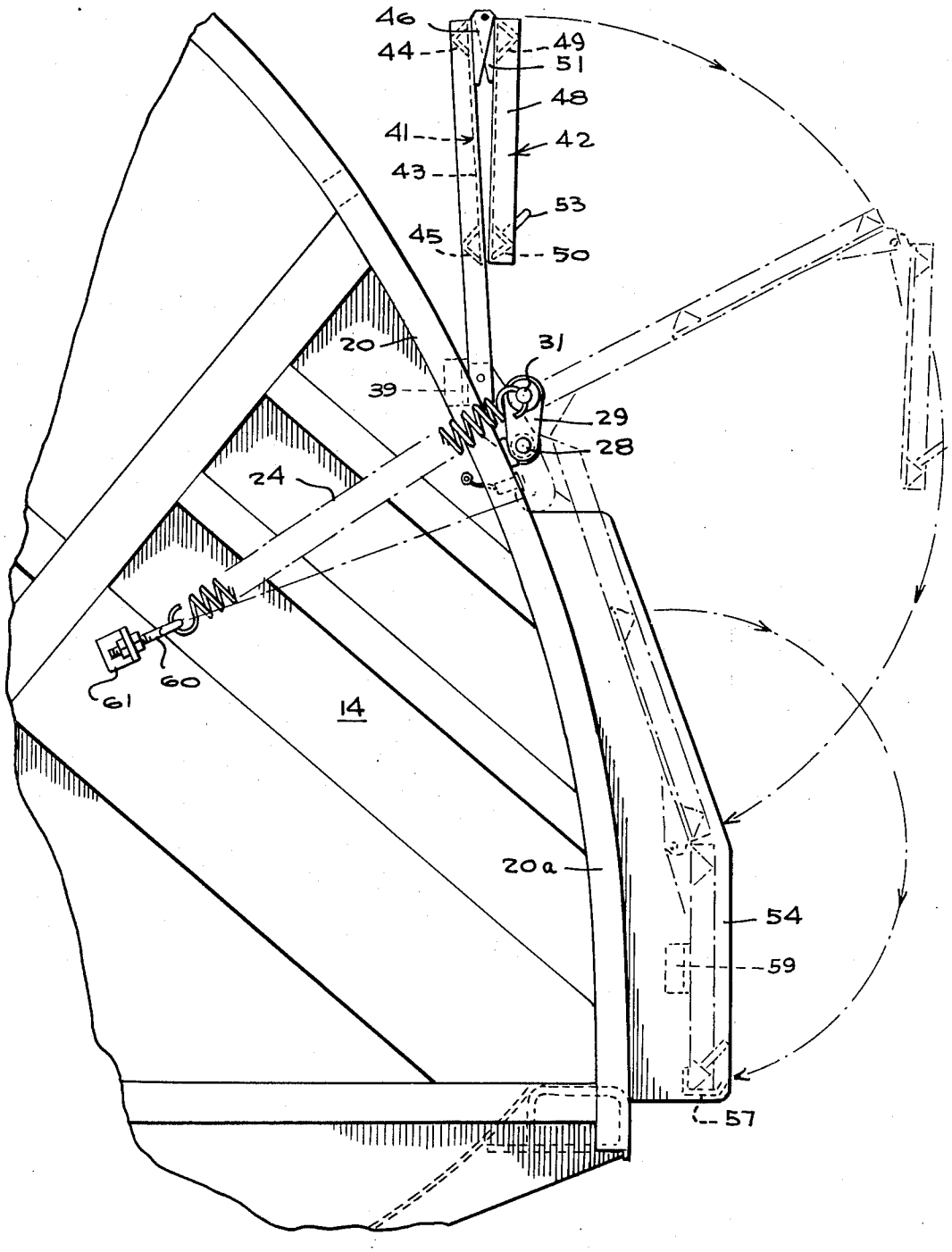

12
11
15
61a
60a
25
21
31a
47
13
23
52
34a
22a
21a
58
55
53
16
10
17
56
22
20a
59
19
20
14
54
18
57

Fig-1

Fig-2



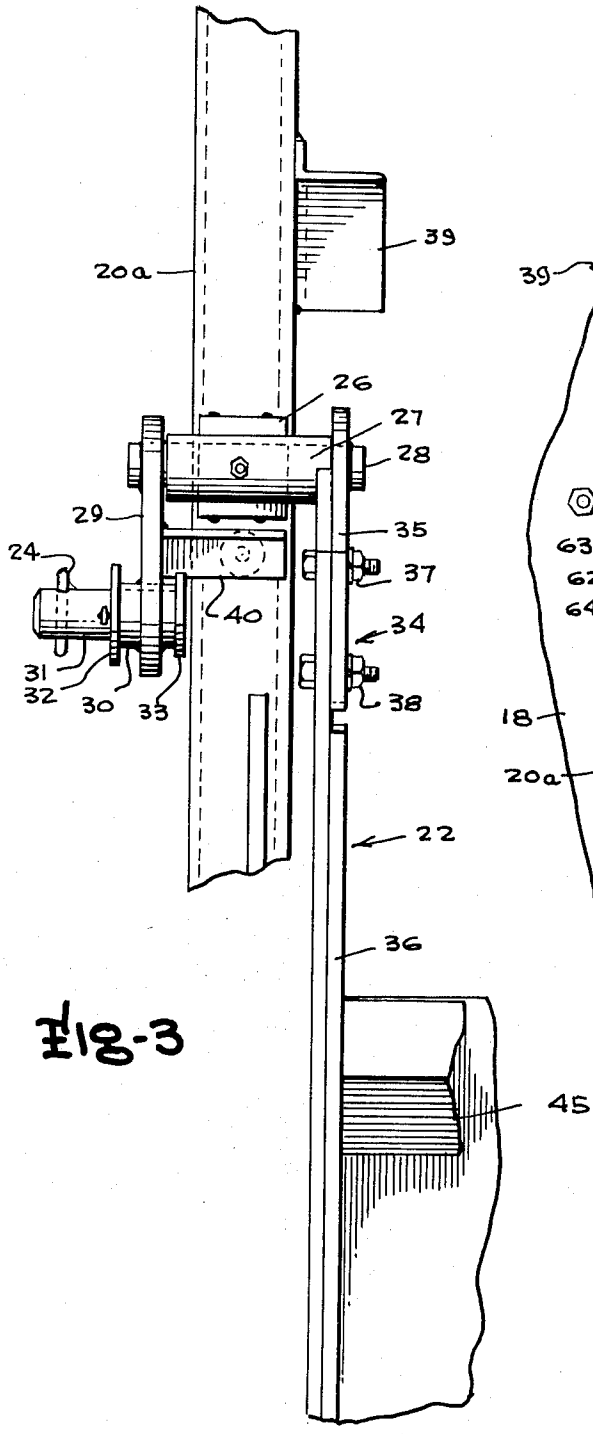

20a
39
26
27
28
29
35
24
37
40
34
31
32
30
33
38
22
36
45

Fig-3

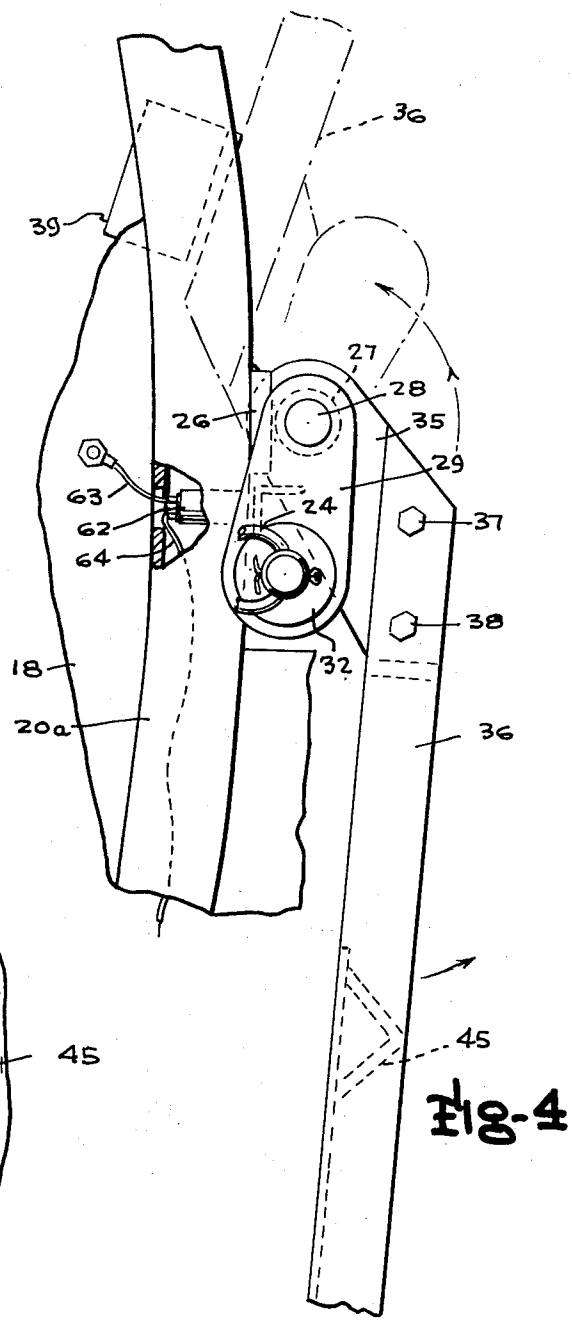

36
39
27
28
26
35
29
63
62
64
24
37
38
18
32
20a
36
45

Fig-4

DOOR ASSEMBLY FOR A REFUSE RECEIVING HOPPER

This invention relates to a refuse collecting vehicle and more particularly to a door assembly for the refuse receiving hopper of a refuse collecting vehicle.

In the prior art, there has been developed a type of refuse collecting vehicle which generally includes a refuse storage body mounted on a truck chassis, a refuse receiving hopper mounted on the rear end of the storage body and a mechanism disposed within the receiving hopper for transferring refuse from the hopper to the storage body and compacting refuse therein. Such mechanism usually includes a packer panel which is adapted to pivot and sweep the refuse forwardly from the hopper into the storage body.

Generally, in the operation of such type of refuse collecting vehicle, operators manually empty refuse from small containers into the hopper. As soon as such hopper is filled, and often while the vehicle is moving between refuse pickup locations, the mechanism within the hopper is operated to transfer refuse deposited in the hopper from the hopper to the storage body. Usually, while such mechanism is operating, the operators are exposed to the operation of the mechanism within the hopper which has resulted in a serious safety hazard.

Such a safety hazard has been sought to be eliminated by closing the hopper opening with a door to shield workmen from the operating mechanism. It has been found, however, that workmen have been inclined not to close such doors on each occasion when the mechanism within the hopper is being operated because of the effort required to close a heavy or bulky door which often is not operating properly.

Accordingly, it is the principal object of the present invention to provide a novel door assembly.

Another object of the present invention is to provide a novel door assembly for a refuse receiving hopper of a refuse collection vehicle.

A further object of the present invention is to provide a novel door assembly for a refuse receiving hopper of a refuse collection vehicle, having a packer mechanism disposed within the refuse receiving hopper.

The still further object of the present invention is to provide a novel door assembly for a refuse receiving hopper of a refuse vehicle, having a packer mechanism disposed within the refuse receiving hopper, which may be closed during the operation of the packer mechanism to shield operators from the packer mechanism.

Another object of the present invention is to provide a novel door assembly for a rear loader type of refuse collection vehicle.

A further object of the present invention is to provide a novel door assembly for a refuse receiving hopper of a refuse collection vehicle which may be manually opened and closed with minimal exertion.

A further object of the present invention is to provide a novel door assembly for a refuse receiving hopper of a refuse collection vehicle, having a packer mechanism disposed within the hopper wherein the door assembly readily may be manipulated to an open position to permit refuse deposited in small or large containers, to be manually or mechanically discharged into the receiving hopper, and then closed to shield the operators of the vehicle from the packer mechanism within the hopper while the packer mechanism operates to transfer refuse within the hopper to a storage body on the vehicle.

Another object of the present invention is to provide a novel door assembly for a refuse receiving hopper of a refuse collection vehicle which is comparatively simple in construction, relatively inexpensive to manufacture and install, and reliable and effective in performance.

Other objects and advantages of the present invention will become more apparent to those persons having ordinary skill in the art to which the present invention pertains, from the following description taken in conjunction with the accompanying drawings, wherein:

FIG. **1** is a perspective view of an embodiment of the invention installed on a refuse collecting vehicle of the rear end loader type;

FIG. **2** is an enlarged side elevational view of the embodiment illustrated in FIG. **1**;

FIG. **3** is an enlarged front elevational view of the embodiment illustrated in FIGS. **1** and **2**, having portions thereof broken away; and

FIG. **4** is a cross-sectional view taken along line **4—4** in FIG. **3**.

Referring to the drawings, FIG. **1** illustrates a refuse collecting vehicle **10** of the rear end loader type, which includes a vehicle chassis **11** having a conventional cab (not shown) mounted thereon, a refuse storage body **12** mounted on the vehicle chassis, and a loading or refuse receiving hopper **13** mounted on the rear end of the storage body. The loading hopper **13** houses a packer mechanism (not shown) which is operable to transfer refuse deposited in the hopper forwardly into the storage body **12.** The packer mechanism may be of any conventional type which is adapted to transfer refuse from the hopper into the storage body and further to compact the refuse in the storage body. The loading hopper **13** generally includes a pair of spaced side walls **14** and **15,** a bottom wall **16,** and a downwardly and rearwardly curved top wall **17** having an opening **18** provided with a door assembly **19** embodying the present invention. The side walls of the hopper receiving opening are provided with a plurality of reinforcing members including a pair of rearwardly and downwardly curved members **20** and **21** forming the upper and rear edges of the side walls and having a substantially square cross-sectional configuration. The lower ends of members **20** and **21** which define the sides of opening **18** provide a pair of door jambs **20***a* and **21***a* for door assembly **19.**

The door assembly **19** consists of a pair of arm assemblies **22** and **22***a* which are substantially similar in construction and operation and are mounted on members **20** and **21,** a door unit **23** interconnecting and rigidly secured to arm assemblies **22** and **22***a*, and a pair of springs **24** and **25** connected at one set of ends to arm assemblies **22** and **22***a* and anchored at an opposite set of ends to hopper side walls **14** and **15.**

As best illustrated in FIGS. **3** and **4,** arm assembly **22** includes a support bracket **26** mounted on door jamb **20**a, which is provided with a transversely disposed sleeve **27** aligned axially with a similar sleeve of arm assembly **22***a*. Journaled in sleeve **27** is a hinge pin **28** having the ends thereof projecting outwardly relative to the ends of sleeve **27.** An outer, radially disposed arm member **29** is rigidly secured on the outer end of hinge pin **28.** Arm member **29** is adapted to pivot in a plane

disposed outwardly and substantially parallel to hopper side wall **14.** Rigidly mounted in an opening provided in the outer end of arm number **29** is a sleeve **30** in which there is journaled an outwardly projecting connecting pin **31.** Connecting pin **31** is prevented from being displaced axially by a pair of collar portions **32** and **33** which are disposed adjacent the ends of sleeve **30.**

An inner arm member **34** is rigidly secured to the inner end of hinge pin **28,** which is adapted to pivot in a plane disposed inwardly and substantially parallel to hopper side wall **14.** Arm member **34** consists of a base arm portion **35** rigidly secured to the inner end of hinge pin **28** and an extension arm portion **36** rigidly connected to base arm portion **35** by means of a pair of bolt fasteners **37** and **38.** As best illustrated in FIG. **4,** base arm portion **35** is disposed radially relative to hinge pin **28** and further is displaced angularly relative to outer arm member **29.** Extension arm portion **36** is secured at its base end to the outer end of base arm portion **35** and further is disposed substantially parallel to outer arm member **29.**

The pivotal movement of inner arm member **34** is restricted by a stop member **39** mounted on the inner side of door jamb **20***a*, above support bracket **26,** which is engageable by an edge of extension arm portion **36,** as illustrated by the phantom lines in FIG. **4,** and an inwardly projecting stop member **40** mounted on the inner side of outer arm member **29** which is adapted to engage door jamb **20***a* when arm assembly **34** is disposed in its lowermost position.

The door unit **23** consists of a base door member **41** and a folding door member **42** hingedly connected to the base door member. Base door member **41** includes a rectangularly shaped panel **43** rigidly secured along its side edges to the inner-arm members **34** and **34***a*, a pair of transversely disposed reinforcing members **44** and **45,** and a pair of transversely spaced hinge brackets **46** and **47.** Similarly, folding door member **42** includes a rectangularly shaped panel **48** having inturned flanges along the side edges thereof, a pair of transversely disposed reinforcing members **49** and **50,** a pair of transversely spaced hinge brackets **51** and **52** hingedly connected to hinge brackets **46** and **47** by means of a pair of hinge pins, and a handle **53** rigidly secured to reinforcing member **50** intermediate the ends thereof. As best illustrated in FIGS. **1** and **2,** when inner arm member **34** and **34***a* engage stop member **39** and a similar stop member disposed on member **21,** folding door member **42** will be disposed in folding relation relative to base door member **41** and the door assembly will be disposed in an upper, open position, and when stop member **40** and a similar stop member mounted on arm assembly **22***a* engage door jambs **20***a* and **21***a*, folding door member **42** will be disposed in substantial alignment with base door member **41** and the door assembly will be disposed in a lower, closed position. When the door assembly is disposed in the upper, open position, door unit **23** will be disposed above opening **18.** However, when the door assembly is disposed in its lower, closed position, the door unit will be disposed across opening **18** thus preventing access to the interior of the hopper and exposure to the packer mechanism therein.

Door members **41** and **42** are guided downwardly to their lower positions by a pair of rearwardly projecting guide plates **54** and **55** mounted on the lower ends of the door jambs. Disposed at the lower ends of guide members and secured rigidly thereto and to the sill of **56** of the hopper opening is a pair of upwardly opening, U-shaped seating brackets **57** and **58.** Inward movement of folding door member **42** is prevented by a stop member **59** and a similar stop member mounted on the inner sides of guide plates **54** and **55,** adjacent the lower ends thereof.

Spring numbers **24** and **25** function to bias the door assembly in the open and closed positions. As best seen in FIGS. **1** and **2,** springs **24** and **25** are connected at rearward ends thereof to connecting pins **31** and **31***a* and are connected at forwardly disposed ends to eye bolts **60** and **60***a* which in turn are secured to brackets **61** and **61***a* mounted on the hopper side walls.

It will be appreciated that the door assembly as described easily can be manipulated to move it into open and closed positions. With the door assembly in the open position as illustrated by the solid lines in FIGS. **1** and **2,** springs **24** and **25** will urge the arm assemblies into engagement with stop member **39** and a similar stop member disposed on member **21** to maintain the door assembly in the upper, open position. Under such conditions, refuse may be loaded into the hopper without any interference from the door assembly.

When the hopper is filled with refuse and it is desired to operate the packer mechanism, the door assembly may be closed simply by grasping handle **53** and pulling the door assembly down to the position as indicated by the phantom lines in FIG. **2.** As the door assembly is being pivoted downwardly, once the axis of connecting pins **31** passes below a dead center point lying in a plane passing through the axis of hinge pins **28** and **28***a* and the connections of the forwardly disposed ends of springs **24** and **25** with the hopper side walls, springs **24** and **25** will operate to urge the door assembly downwardly to the lower, closed position. As the door assembly moves downwardly it will be guided by guide plates **54** and **55.** The operator need only move door member **42** against stop members **59** and **59***a* to guide the lower edge of door member **42** into seating brackets **57** and **58.**

Referring to FIGS. **1, 2** and **3,** it will be seen that the offset feature of inner arm members **34** and **34***a* relative to outer arm member **29** and a similar outer arm member of assembly **22***a* permit the base arm portion **35** and a similar portion of assembly **22***a* to be received partially within the hopper opening so that the base ends of extension arm member **36** and a similar member of assembly **22***a* will engage the stop member **39** and a similar member of assembly **22a.** Such offset feature further requires the door assembly to be brought downwardly to a lower level before the springs **24** and **25** function to bias the door into its closed position. It further will be noted that the simplicity of the door assembly construction and the biasing action of springs **24** and **25** greatly facilitates the opening and closing of the door and correspondingly results in a lesser barrier in human nature in the operation of the door assembly.

With the door assembly in the closed position as described, it is not possible for any operators to either insert any arms into the hopper or to stand on the sill of the hopper opening which possibly could result in the limbs of the operators coming into contact with the packer mechanism while it is cycling. As a means for further insuring that the door assembly will be closed

prior to operation of the packer mechanism, a microswitch **62** is provided in door jamb **20a** having an actuating plunger engageable by stop member **40** when the door is disposed in the lower, closed position. As best illustrated in FIG. **4**, one of the leads **63** of the microswitch is connected to ground and another lead **64** may be connected to a control system for the packer mechanism. Accordingly, unless the door assembly is disposed in the lower, closed position so that microswitch **62** is actuated, the packer mechanism will be rendered inoperative.

From the foregoing detailed description, it will be evident that there are a number of changes, adaptations and modifications of the present invention which come within the province of those persons skilled in the art. However, it is intended that all such variations not departing from the spirit of the invention be considered as within the scope thereof as limited solely by the appended claims.

We claim:

1. A door assembly for a refuse receiving hopper of a refuse vehicle, having a pair of transversely spaced side walls and a rear wall provided with an opening through which refuse may be charged into said hopper, comprising a pair of arm assemblies mounted on rear ends of said hopper side walls, each of said arm assemblies including a hinge pin mounted on the rear end of one of said hopper side walls and being disposed in axial alignment with the hinge pin of the other of said arm assemblies, an outer arm member rigidly connected on an outer end of said hinge pin and projecting substantially radially relative to the axis thereof, and an inner arm member rigidly connected to an inner end of said hinge pin and projecting substantially radially therefrom, at least one spring connected at one end thereof to an outer side of one of said hopper side walls and connected at the opposite end thereof to the outer arm member of one of said arm assemblies, a door panel rigidly interconnecting the inner arm members of said arm assemblies and means mounted on said hopper engageable by said arm assemblies for restricting the pivotal movement of said inner arm members within an arc intersected by a line passing through the connection of said spring member with said hopper side wall and the axis of the hinge pin of the arm assembly to which the opposite end of said spring member is attached whereby upon manipulating said door panel in moving the outer arm members of said arm assemblies above and below said intersecting line, said spring will operate to bias said door panel in an open position disposed above said hopper opening and to a closed position disposed across said hopper opening, respectively.

2. A door assembly according to claim **1** wherein said door panel is provided with a handle for manipulating said door panel between open and closed positions.

3. A door assembly according to claim **1** including a second door panel hingedly connected along a transverse edge of said first mentioned door panel whereby when said first mentioned door panel is in its upper open position said second door panel will be disposed in a substantially folded relation with said first mentioned door panel and when said first mentioned door panel is in its lower closed position, said second door panel will be disposed in substantial alignment with said first mentioned door panel, disposed across said hopper opening.

4. A door assembly according to claim **3** wherein said second door panel is provided with a handle for manipulating said door panels between said open and closed positions.

5. A door assembly according to claim **1** wherein the inner arm members of said arm assemblies are pivotable in planes disposed substantially parallel to and inwardly of said hopper side walls.

6. A door assembly according to claim **1** wherein the outer arm members of said arm assemblies are pivotable in planes disposed substantially parallel and outwardly relative to said hopper side walls.

7. A door assembly according to claim **1** wherein the inner member of each of said arm assemblies includes at least a base portion thereof displaced angularly relative to the outer arm member of said arm assembly.

8. A door assembly according to claim **1** wherein the outer arm member of each of said arm assemblies includes a base arm portion displaced angularly relative to the outer arm member of said arm assembly and an elongated extension arm portion to which said door panel is secured.

9. A door assembly according to claim **8** wherein said elongated, extension arm portion is disposed substantially parallel to the outer arm member of said arm assembly.

10. A door assembly according to claim **1** wherein said means for restricting the pivotal movement of said arm assemblies comprise stop members engageable by portions of said arm assemblies.

11. A door assembly according to claim **1** wherein at least one of said arm assemblies includes means for actuating a sensing means when said door panel is in the lower closed position.

12. A door assembly according to claim **1** wherein the inner arm members of said arm assemblies are pivotable in planes disposed substantially parallel and inwardly relative to said hopper side walls, the outer arm members of said arm assemblies are pivotable in planes disposed substantialy parallel and outwardly relative to said hopper side walls, the inner arm member of each of said arm assemblies includes a base arm portion displaced angularly relative to the outer arm member thereof and an elongated extension arm member thereof to which said door panel is secured and said means for restricting the pivotal movement of said arm assemblies comprise stop members engageable by portions of said arm assemblies, and including a second door panel provided with a handle, hingedly connected along a transverse edge of said first mentioned door panel whereby when said first mentioned door panel is in its upper open position, said second door panel will be disposed in substantially folded relation with said first mentioned door panel and when said first mentioned door panel is in its lower closed position, said second door panel will be disposed in substantial alignment with said first mentioned door panel, disposed across said hopper opening.

* * * * *