United States Patent [19]

Palmer et al.

[11] **3,753,506**

[45] **Aug. 21, 1973**

[54] **UNITIZED REFUSE TRANSFER STATION**

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[73] Assignee: **Bell & Howell Co.**, Pasadena, Calif.

[22] Filed: **May 3, 1972**

[21] Appl. No.: **249,929**

[52] **U.S. Cl.** ..... **214/16 R**, 52/194, 52/196, 100/229 A, 214/41

[51] **Int. Cl.** **B65g 67/20**

[58] **Field of Search** ..... 214/16 R, 41; 52/194, 196; 100/229 A

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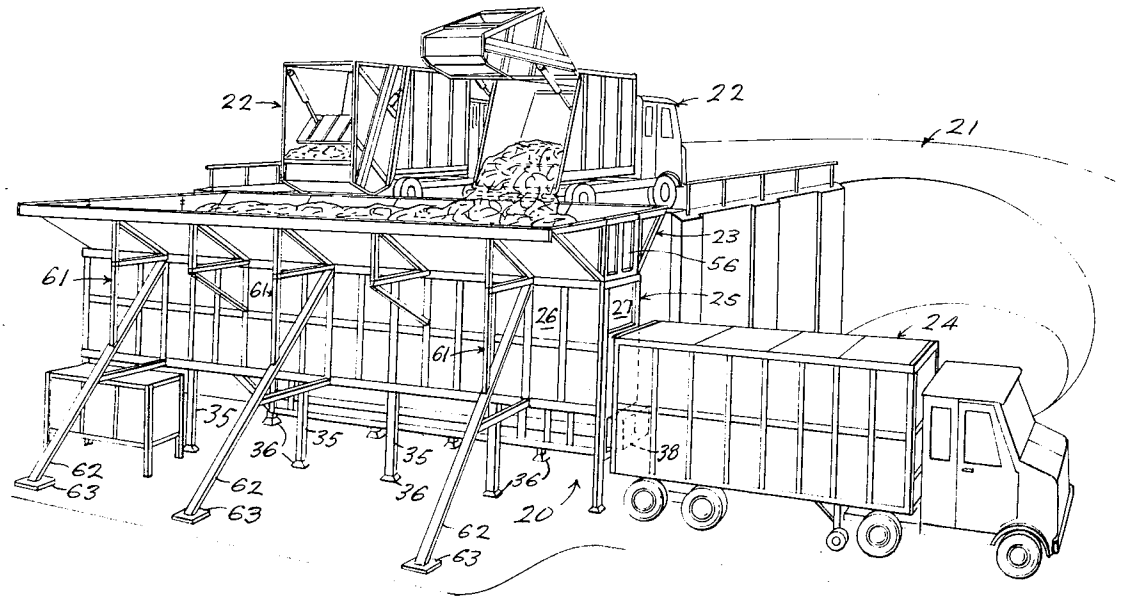
Primary Examiner—Robert G. Sheridan

Attorney—Carl F. Schaffer, Henry K. Leonard et al.

[57] **ABSTRACT**

A unitary refuse transfer station that is transportable on or as a highway vehicle from fabrication site to destination. The station comprises an elongated pit-like structure with an open top into which refuse may be dumped from route collection trucks. The main structure is originally fabricated with an outside width determined by the maximum width of a vehicle which may travel on the public highways. The pit-like structure has one or more hopper forming wings which are positioned within the structure when the entire station is being transported from factory to destination and which are swung up and out to widen its open top after positioning at the destination. Means are provided for supporting the structure at a desired ground related level. All auxiliary equipment and structural support means are also carried within the main structure during transportation. There is a transverse plate that is movable through the structure to push the refuse to one end. A compaction device has its receiving chamber at and beneath an opening in the bottom of the pit structure at that end of the structure and a ram which reciprocates through the chamber for compressing the refuse in the chamber and forcing it into a large portable container. When loaded, the portable container is moved to a dump or incinerator.

2 Claims, 12 Drawing Figures



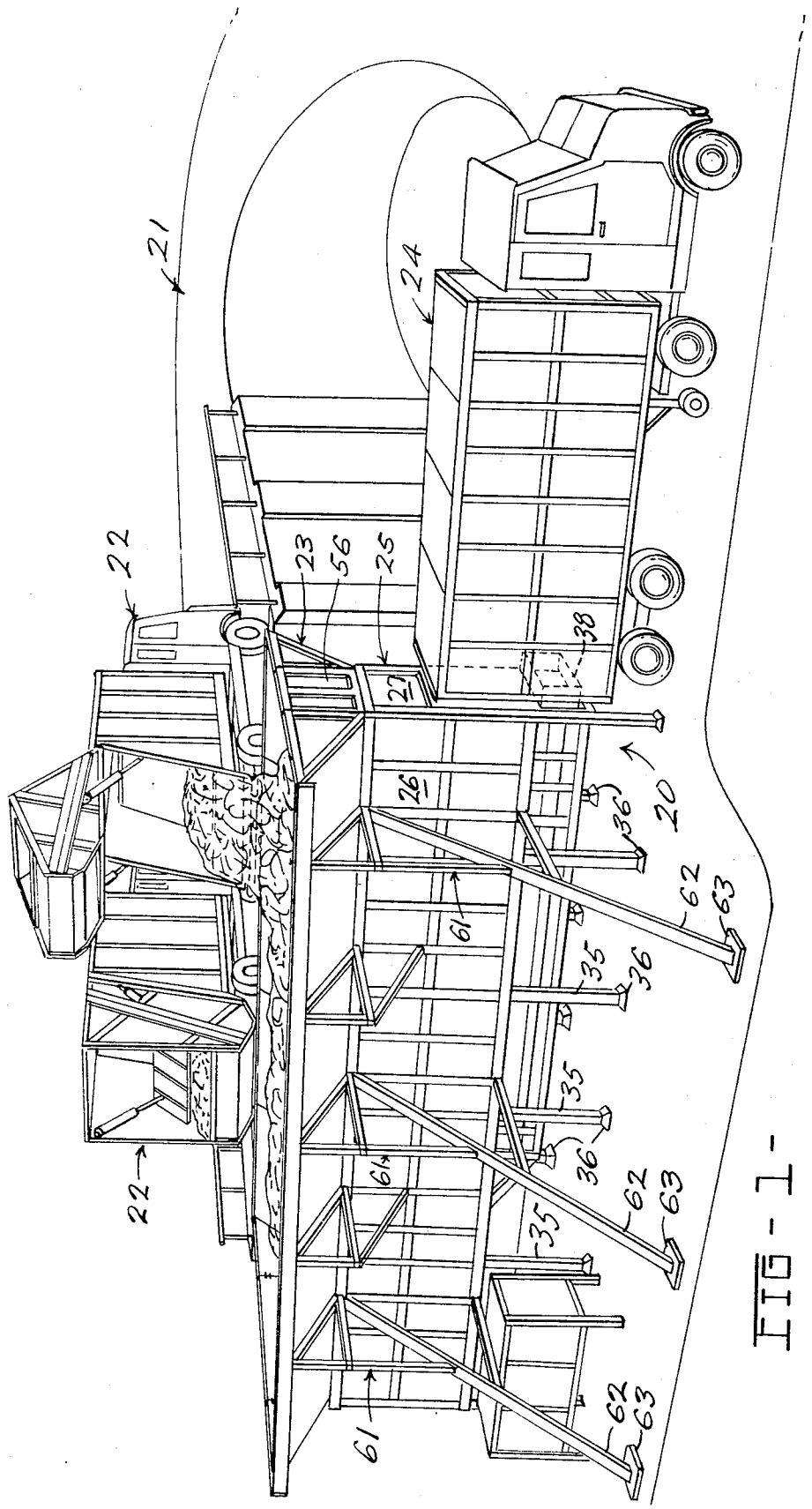

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FIG - 1 -

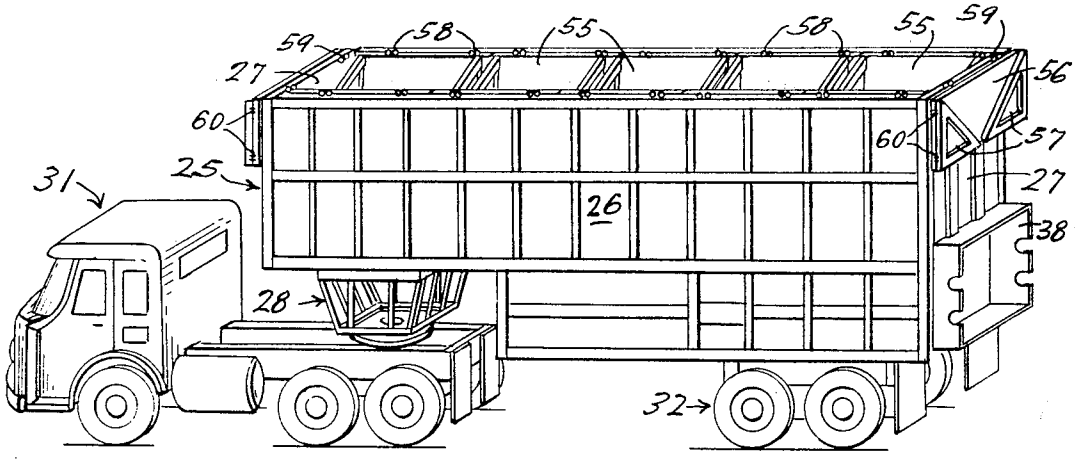


FIG-2-

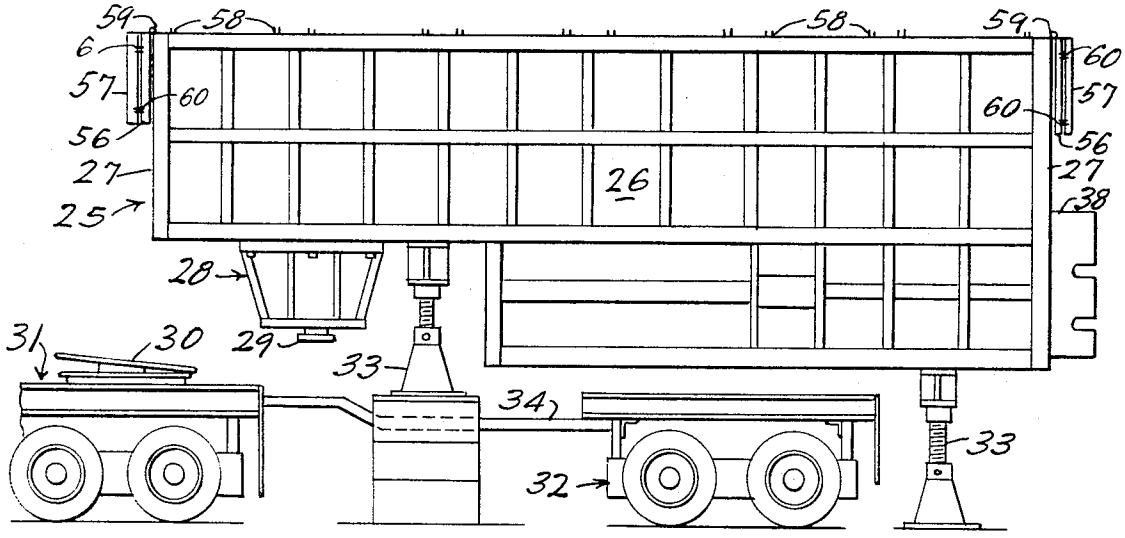


FIG-3-

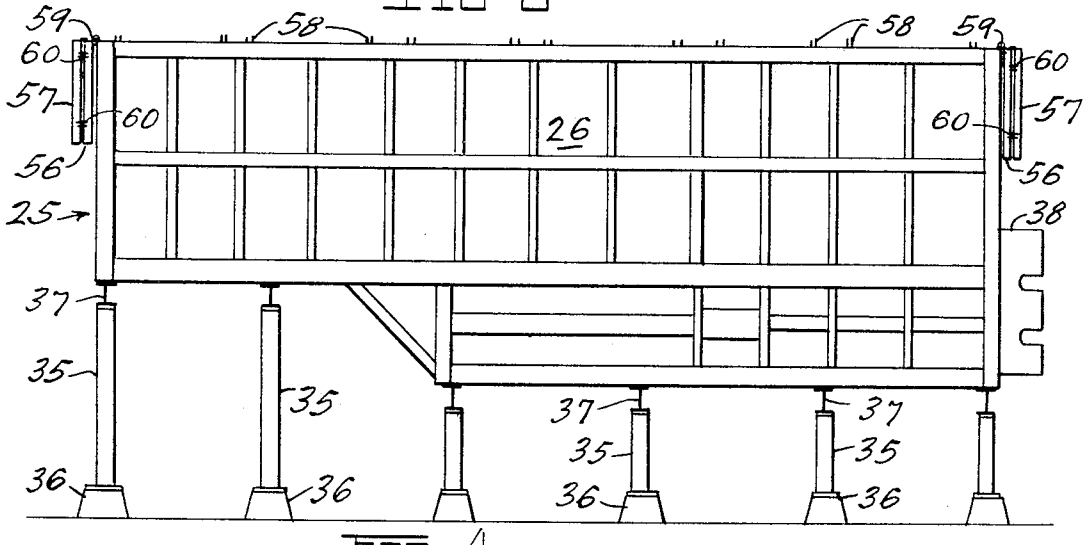


FIG-4-

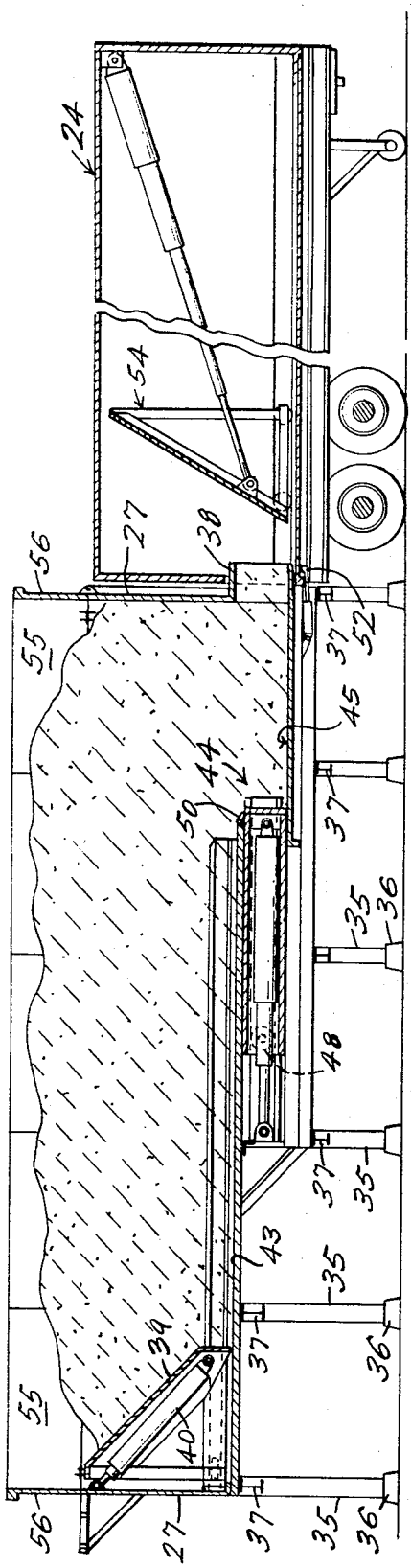

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FIG-5-

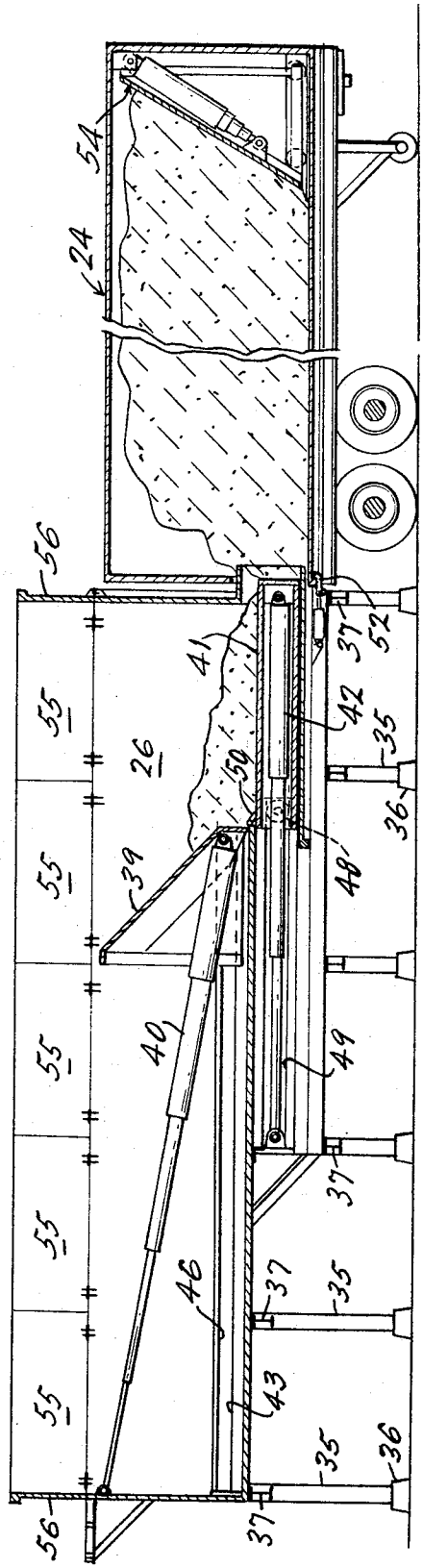

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FIG-6-

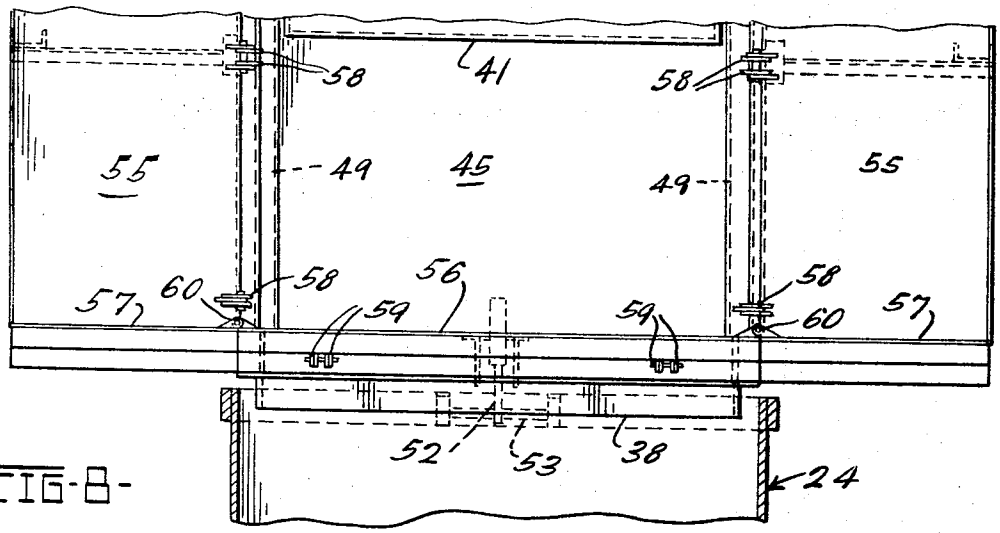

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FIG-8-

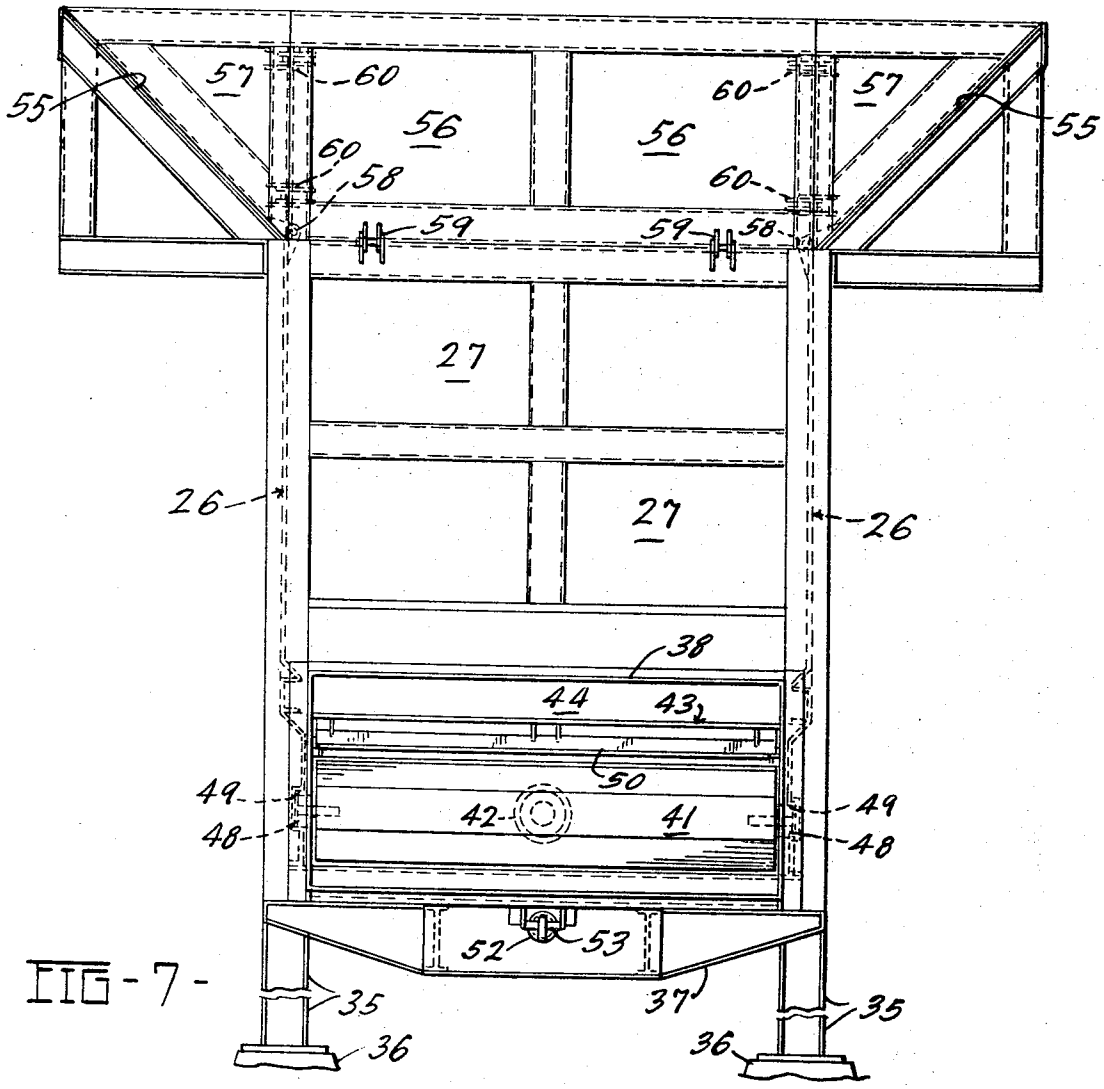

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FIG-7-

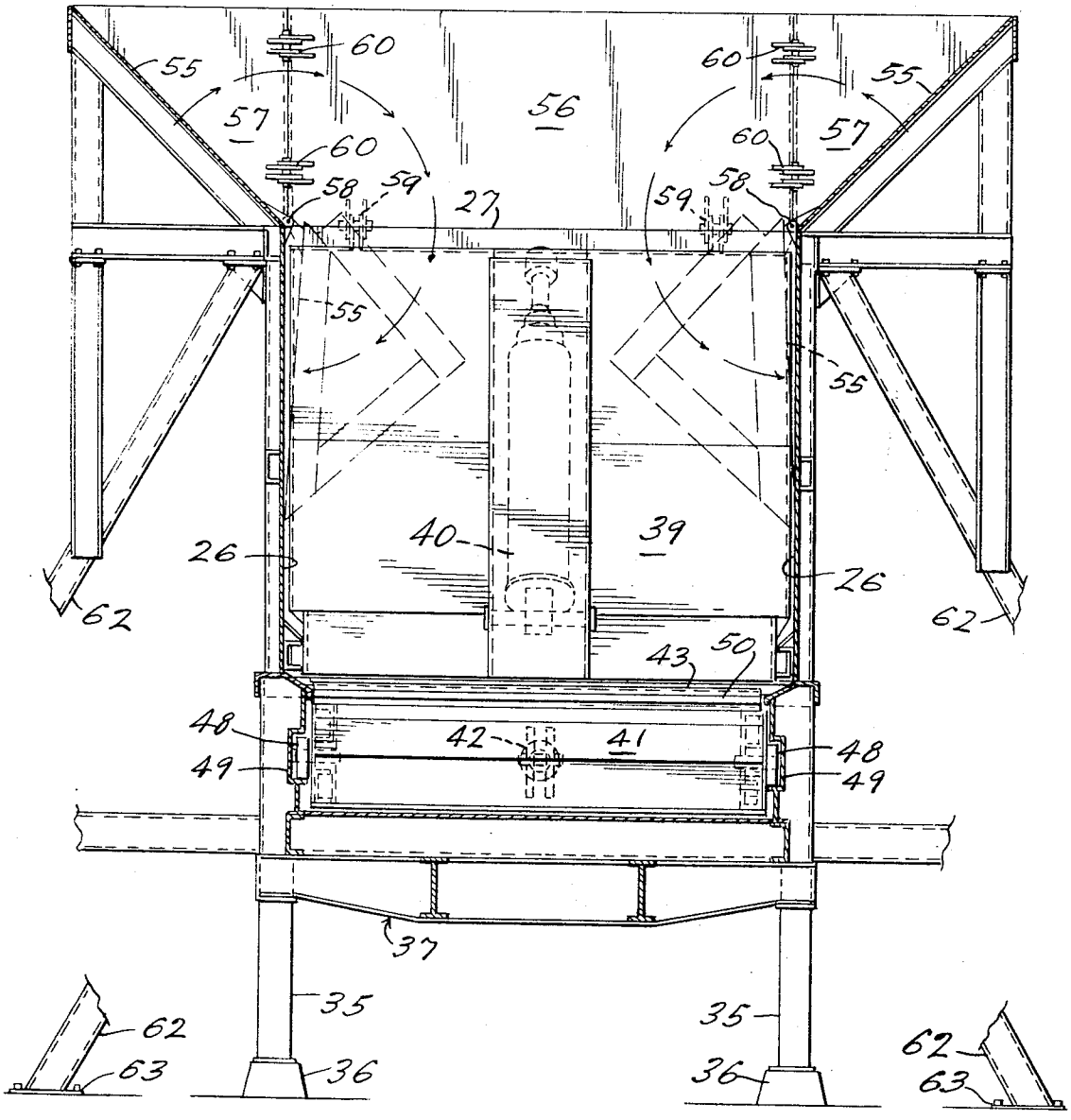


FIG-9-

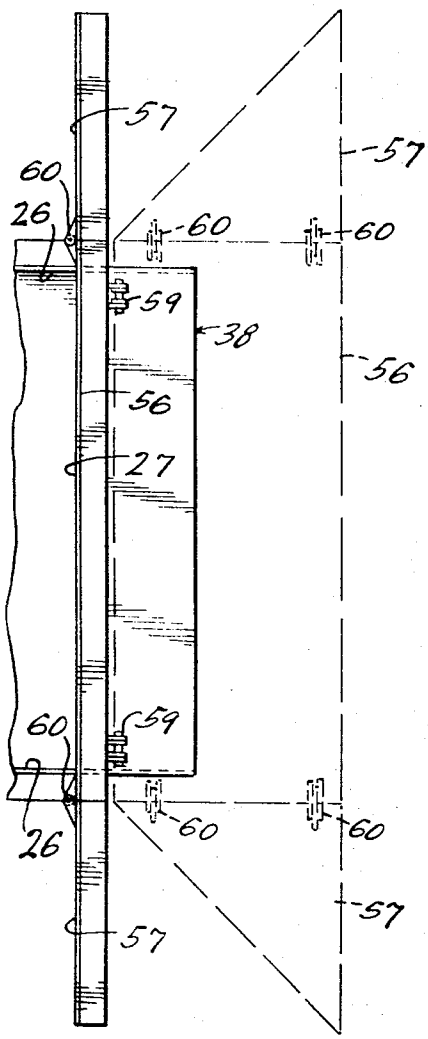


FIG-12-

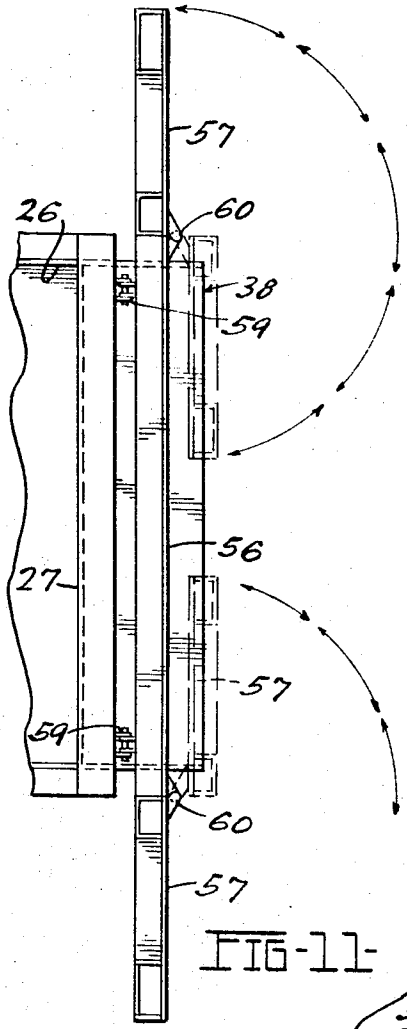


FIG-11-

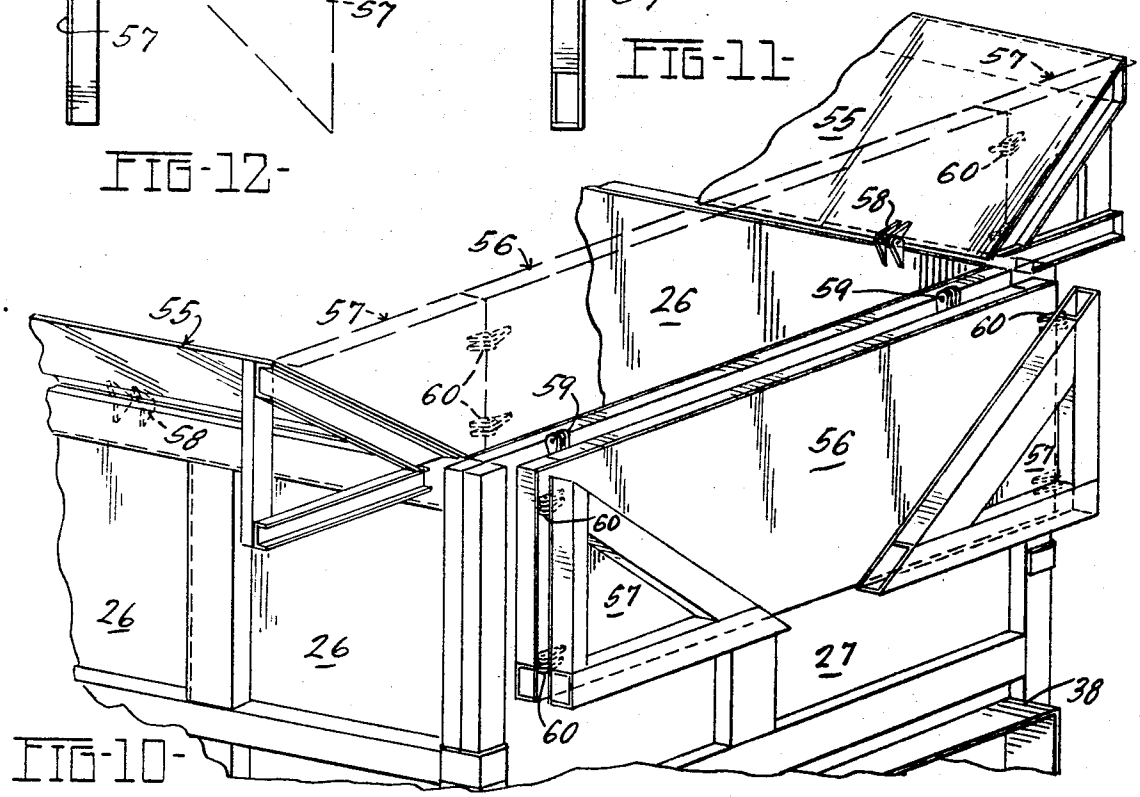


FIG-10-

UNITIZED REFUSE TRANSFER STATION

BACKGROUND OF THE INVENTION

Solid waste disposal is rapidly becoming a major problem for all industry and governmental agencies, particularly in the United States, and particularly because of the relatively recent increase in the utilization of plastic containers such as gallon jugs and the like, cardboard containers, such as the milk cartons which have replaced returnable milk bottles, literally untold numbers of cartons in which packaged materials are delivered to wholesale and retail establishments; with similar problems existing in all manufacturing and distribution areas. While the idea of recycling parts of the solid waste has been widely advocated by far the majority of all solid waste must as yet be disposed of by dumping or incineration.

Collection of the solid waste from widely dispersed sources, such as households within a major city, has presented an extremely difficult problem by reason of the volumetric displacement of discarded containers of the types mentioned above. For this reason efforts have been made to design refuse collection trucks which include mechanical or hydraulic means for at least partially compacting refuse of this type in order to increase the apparent density of the loaded refuse to minimize the displacement within the vehicles and to permit the collection of a greater weight of refuse within the definite volume of a collection vehicle.

As each collection vehicle is filled it has in the past been necessary for that vehicle to leave its collection route and to travel to a central dump or incinerator thus taking the vehicle out of duty for collection and utilizing it as a mere truck to carry collected refuse some distance. This is uneconomical because the loading and precompacting structure on the collection vehicle is not utilized during the time when the refuse is being carried to the dump or other disposal area.

It has therefore been suggested that transfer stations be established, particularly in larger municipalities, where the refuse in the collection vehicles may be transferred to a larger transportation vehicle, which need not be equipped with compaction and loading machinery, and in which the refuse may be carried to the final disposal area. Preferably, also, such transfer stations are equipped with powerful compaction mechanisms further to reduce the volumetric displacement or increase the apparent density of the refuse prior to its being loaded into a transfer vehicle such as a truck, trailer or railway car.

Such transfer stations usually comprise a large open top enclosure called a "push-pit", into which the collection vehicles dump their loads of refuse and out of which the refuse is moved into the transfer vehicle. For the most part such "push-pits" have been constructed by excavating large openings in the earth, lining the pits with reinforced concrete, which involves a substantial cost for materials and time needed to build the structure, possibly lining the concrete with steel plates or the like and installing the machinery by which the refuse dumped in is compacted and/or transferred from the pit to the transfer vehicle. In some cases discharge from such lowered or excavated pits has been rendered difficult by the contour of the surrounding ground. Conversely sometimes, ramps have been constructed up which the collection vehicle can drive to elevate the vehicles relative to a "push-pit" constructed above

ground level from reinforced concrete or reinforced steel sheets erected on the site. Transfer stations of the types described are quite expensive.

It is the principal object of the instant invention to provide a unitized refuse transfer station which can be fabricated at a central factory or assembly plant, transported from the fabrication area or site to its ultimate destination on or as a highway vehicle and erected at that final location without the necessity for excavation of pits or the utilization of reinforced concrete walls or the like to define the push-pit itself.

It is yet another object of the instant invention to provide a unitized refuse transfer station which can be built so that its maximum dimensions while moving on the road on or as a highway vehicle can be augmented after arrival at the final destination and upon erection in order to provide it with an enlarged hopper-like opening into which refuse is dumped from collection vehicles.

It is yet another object of the instant invention to provide a unitized refuse transfer station which can readily be erected after arrival at the destination site at substantially any height relative to ground level thus permitting it to be placed on the ground at a height so as to provide for direct loading into various types or different types of transfer vehicles and requiring only the erection of a ramp or similar structure in order to enable the collection vehicles to dump the refuse into the open top of the transfer station.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a view in perspective, with parts broken away showing how a unitized transfer station embodying the invention is erected in its final position and illustrating both the emptying of collection vehicles into the transfer station and the loading of transfer vehicles from the transfer station;

FIG. **2** is a view in perspective of a unitized refuse transfer station embodying the invention during the period of its transportation from the construction site to the erection site, in this instance being carried as a highway vehicle;

FIG. **3** is a view in side elevation illustrating how a unitized transfer station embodying the invention is separated from its transporting vehicle at the utilization site;

FIG. **4** is a view similar to FIG. **3** but showing how the unitized transfer station initially is erected upon support structure at the site;

FIG. **5** is a fragmentary longitudinal central vertical section through a unitized transfer station embodying the invention illustrating how refuse is transferred in the station out of the collection push-pit into a compaction device and then into a transfer trailer;

FIG. **6** is a view similar to FIG. **5** and further illustrating the transfer of refuse from the station embodying the invention into a transfer trailer;

FIG. **7** is an end view in elevation taken substantially from the position indicated by the line **7—7** of FIG. **6** and shown on an enlarged scale;

FIG. **8** is a fragmentary top plan view taken generally from the position indicated by the line **8—8** of FIG. **7**;

FIG. **9** is a transverse vertical sectional view, with some parts broken away, illustrating one of the steps in the erection of a unitized transfer station embodying the invention;

FIG. 10 is a fragmentary view in perspective illustrating some of the erection steps also partially shown in FIG. 9; and

FIGS. 11 and 12 are fragmentary horizontal views taken generally from the position indicated by the line 11—11 of FIG. 9 and showing intermediate steps in the erection of a transfer station embodying the invention as its destination.

DESCRIPTION OF PREFERRED EMBODIMENT

A unitized refuse transfer station embodying the invention is generally indicated by the reference number 20 and shown in FIG. 1 in its final erected location. The station 20, for example, may be erected at the end of a ramp 21 leading from ground level upwardly above the station 20 so that refuse collection trucks 22 can be driven up the ramp 21 and backed into position for ejecting collected refuse out of their bodies and into an open hopper-like top 23 of the station 20. Refuse thus emptied into the station 20 is transferred by means of mechanism later to be described into the body of a transfer vehicle, for example, a trailer truck 24. The transfer station 20 also includes compaction mechanism by which the apparent density of the refuse in increased substantially by compaction in order to crush items such as cartons, boxes and the like.

The transfer station 20 comprises an elongated rectangular structure 25 which is fabricated at a manufacturing site such as a central plant. The structure 25 has braced parallel side walls 26 and end walls 27. The width of the structure 25 and thus the length of the walls 27 is determined by the maximum width of a vehicle which may travel on the public highways.

As can best be seen by reference to FIG. 2, the structure 25, as fabricated, is transported to the final installation site for the unitized refuse transfer station as a highway vehicle. In the illustrated arrangement the front portion of the structure 25 is supported by a removable pedestal 28 which has a "fifth wheel" lug 29 on its lower surface. The lug is designed and adapted to be engaged with a "fifth wheel" 30 of a conventional highway tractor 31. The rear end of the structure 25 is carried by a removable suspension unit 32 while travelling en route to the destination.

When the structure reaches the position in which it is to be located, i.e. adjacent the end of a ramp 21 if one has been constructed, or in other instance, perhaps, adjacent a pit into which it is to be dropped, the entire structure 25 is elevated slightly, for example, by the use of massive jacks 33 as shown in FIG. 3. A tie bar 34 is attached between the rear of the tractor 31 and the suspension 32 and the suspension and tractor are moved out from beneath the structure 25. The pedestal 28 is then disconnected from the underside of the structure 25 and placed on the tractor 31 so that the tractor 31, pedestal 28, and suspension 32 can be returned to the fabrication plant.

While the structure 25 is elevated on the support jacks 33 as illustrated in FIG. 2, a plurality of support posts 35 and appropriate bases 36 (see FIG. 4) are positioned beneath and attached to cross beams 37 and the entire structure 25 is lowered downwardly to position on the support posts 35. The length of the posts 35 is selected to result in the height of the structure 25 above ground level being appropriate for use with the particular transfer vehicles such as the trailer 24, into which refuse is to be transferred from the station 20 for transportation to the ultimate disposal point. For example, and merely as illustrations, some transportation vehicles such as the trailer 24 are located at levels above and below those of others relative to the surface of the ground upon which they are supported. Railway box cars may have a different level above the ground than trucks and trucks different levels than trailers. The selection of the particular height of the posts 35 is determined by the vehicles into which refuse is to be transferred because a transfer vehicle, such as the trailer 24, is coupled to the discharge end of the station 20 by mating an opening in the transfer vehicle 24 with a spout 38 fabricated on the end of the structure 25.

When the transfer station 20 is en route from the fabrication site to the installation site, the support posts 35 and their bases 36 are carried interiorly of the structure 25 along with other apparatuses and mechanisms to be later described. Thus the structure 25 functions on the highway as a transportation vehicle for the many accessories which such a station requires such as motors, pumps, controls, structural steel, braces, etc. All of the elements of the transfer station which are necessary for site installation, are pre-fabricated at the fabrication site and stored in the structure 25. The structure 25 is then mounted upon its highway transportation equipment, for example the tractor 31 and suspension system 32 described above or, in other instances, upon the flat bed of an elongated truck or railway car and all of the material is carried to the installation site in one trip.

At the time of initial fabrication of the transfer station 20, its interior is provided with equipment necessary to move the accumulated refuse inside the structure 25 to its discharge end, to compact the refuse and to discharge the refuse through the spout 38 into the transfer vehicle 24. These mechanisms consist primarily of a push plate 39 (see FIGS. 5 and 6) actuated by a telescoping hydraulic cylinder 40 and a compaction unit consisting of a ram 41 actuated by a cylinder 42. The structure 27 has a floor 43 which extends along its bottom toward the discharge end leaving an opening 44 into a chamber 45 through which the ram 41 is reciprocated by the cylinder 42. By comparing FIGS. 5 and 6 of the drawings it will be seen that when the structure 25 is filled with refuse dumped therein from the collection vehicles 22, the hydraulic cylinder 40 is energized to sweep the push plate 39 through the structure 25 toward the discharge end and refuse is pushed over to the compaction chamber 45 into which it falls. The compaction ram 41 is reciprocated at a speed necessary to push the refuse out of its chamber 45 through the spout 38 and into the interior of the transfer vehicle 24. The push plate 39 is guided for its movement through the structure 25 by suitable slides 46 (see FIGS. 7 and 9) travelling in tracks 47 on the side walls 26. The ram 41 is similarly guided between its retracted position (FIG. 5) and its extended position (FIG. 6) by rollers 48 travelling in guide tracks 49.

A scraper 50 extends across the discharge end of the floor 43 and rides on the upper surface of the ram 41. The spout 38 is designed to mate in an opening 51 in the transfer trailer 24 or similar vehicle. Connection between the transfer station 20 and the trailer 24 is achieved by a latch 52, for example, which is located beneath the spout 38 and engageable with a suitable crossbar 43 (FIG. 8) or the like located on the body of the trailer 24 beneath the opening 51. When the trailer 24 is latched to the station 20, the action of the ram 41

forcing refuse from its chamber **45** into the trailer **24** also compacts that refuse against an hydraulically actuated movable ejector plate **54** interiorly of the trailer **24** and against refuse previously compacted against the plate **54.** As the trailer **24** fills, the plate **54** is gradually moved forwardly (compare FIGS. **5** and **6**). After the trailer **24** is filled with now densely compacted refuse, the latch **52** is disengaged, the opening **51** closed off and the trailer **24** driven away to a disposal site. At the disposal site the compacted refuse is ejected out of the vehicle **24** by opening its rear and running the plate **54** backwardly through the trailer **24.** In other installations, of course, transfer vehicles whose bodies tilt may also be utilized and, in such case, an ejector plate such as the ejector plate **54** would not be used. Of course, the particular type of transfer vehicle employed does not constitute a part of the instant invention and the only necessity is that that vehicle, whether it be trailer or truck or railway car, and all other vehicles utilized with the same unitized refuse transfer station embodying the invention, shall have openings **51** of the right dimensions and at an appropriate height for mating with the station spout **38.**

Referring again to FIG. **1** and to FIGS. **7–12,** inclusive, the hopper-like top **23** of the station **20** is formed by side plates **55,** end plates **56** and end plate wings **57.**

Referring first to FIGS. **2** and **10,** it will be seen that during transportation of the station **20** on the highway, the side plates **55** are swung over into the open top of the structure **25** on their hinges **58** (see also FIG. **9**). Similarly, the end plates **56** are swung downwardly exteriorly of the structure **25** on their hinges **59** and the end plate wings **57** are collapsed inwardly, exteriorly of the end plates **56,** on their hinges **60.** After erection of the structure **25** on the support posts **35,** the side plates are swung upwardly and outwardly at an approximate 45° angle relative to the vertical, to the positions illustrated, for example, in FIGS. **9** and **10,** and supporting buttresses **61** are assembled from structural beams also transported to the side interiorly of the structure **25,** to support the side plates **55.** The buttresses **61** include heavy ground engaging struts **62** (FIG. **1**), the lower ends of which are set on pads **63** at the outboard side of the structure **25.**

After the side plates **55** are swung upwardly and outwardly and their supporting buttresses **61** have been emplaced, the end plate wings **57** are swung outwardly on their vertical hinges **60** from the folded position shown in FIG. **10,** to the outboard position shown in FIG. **11.** Thereafter the end plates **56** and their wings **57** are swung upwardly on their hinges **59** so that the wings **57** overlie the ends of the side plates **55** (FIGS. **1** and **7**) and the diagonal edges of the wings **57** are bolted or otherwise secured to the ends of the side plates **55** to complete the hopper-like top **23.**

Having described our invention we claim:

1. A unitary transfer station comprising, in combination,

an elongated, pit-like structure having a bottom, parallel vertical side walls and vertical end walls,

means on said structure for removably supporting said structure on a highway vehicle,

a transversely extending, generally vertical push plate in said structure,

co-operating means for guiding said plate for movement longitudinally through said structure,

power means for moving said plate,

at least one hopper wing extending along the longitudinal upper edge of said structure and movable from a position within said structure to a position extending upwardly and outwardly from the respective edge,

a compaction device mounted by said structure, said device having a receiving hopper, an ejection opening, a ram and means for reciprocating said ram through said receiving hopper toward said ejection opening,

there being an opening at one end of the said bottom of said structure into said receiving hopper,

means adjacent said ejection opening for coupling a receiving container in mating relation thereto and

structure for supporting said station and said wing at a selected ground related level.

2. A unitary transfer station according to claim **1** which the power means for moving the push plate and the means for reciprocating the ram are hydraulic cylinders and which has a hydraulic power unit mounted on structure and connected through valving to said hydraulic cylinders.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,753,506 Dated August 21, 1973

Inventor(s) George W. Palmer and William A. Herpich

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

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

Signed and sealed this 27th day of November 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents

FORM PO-1050 (10-69)

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