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Lewis

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[54] **CONTAINERIZED SYSTEM FOR WASTE DISPOSAL**

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[52] **U.S. Cl.** ..... **214/83.3,** 214/41 A

[51] **Int. Cl.** **B65f 3/02**

[58] **Field of Search** ..... 214/41 A, 64.2, 83.3

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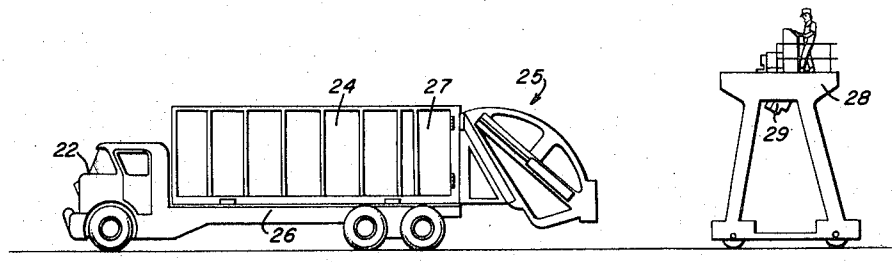
Primary Examiner—Frank E. Werner

Attorney, Agent, or Firm—Fleit, Gipple & Jacobson

[57] **ABSTRACT**

Solid wastes are collected from house to house pick-ups with a truck in which a standardized container forms an integral part of the truck body. Garbage is placed directly into the container where it is compacted by a conventional garbage truck injector. When the container is filled, it is sealed and the entire container removed from the pickup truck and transferred to a long distance transportation means. After transport to remote areas, the garbage-filled containers are emptied and returned for reuse. Alternatively, conventional garbage trucks may eject their loads into standardized containers for long distance transportation.

1 Claim, 9 Drawing Figures



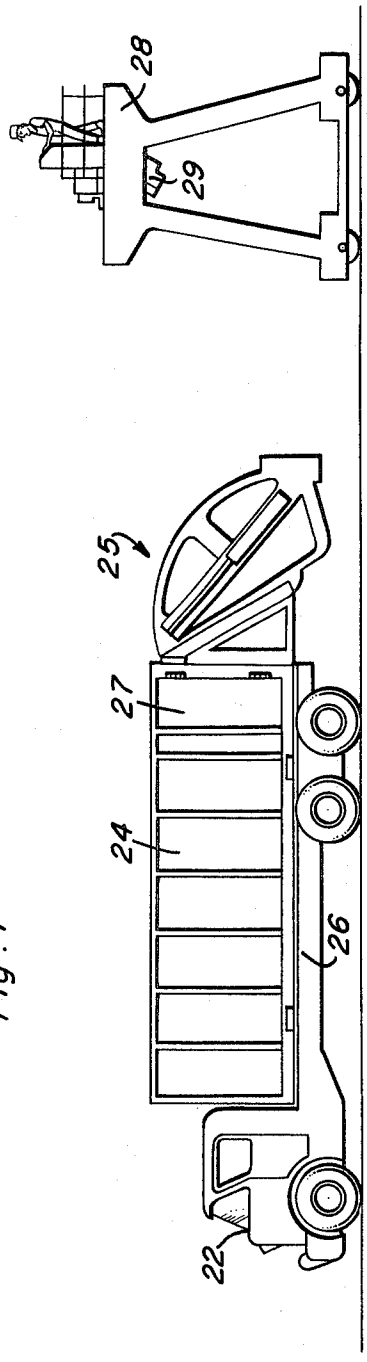


Fig. 1

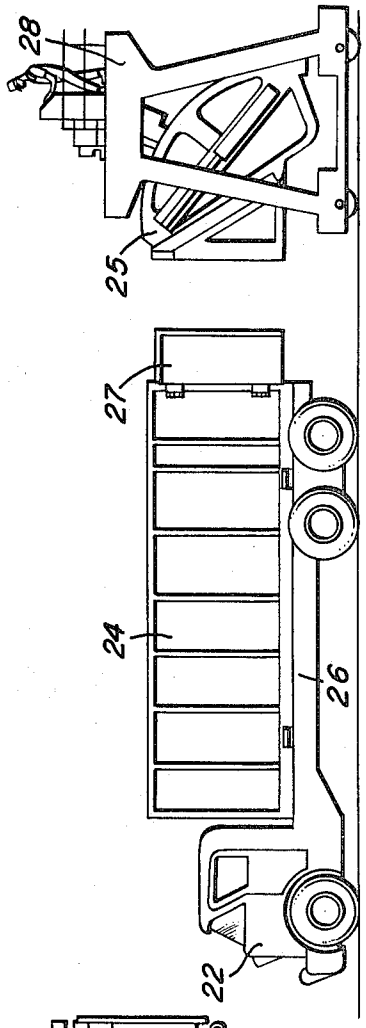


Fig. 2

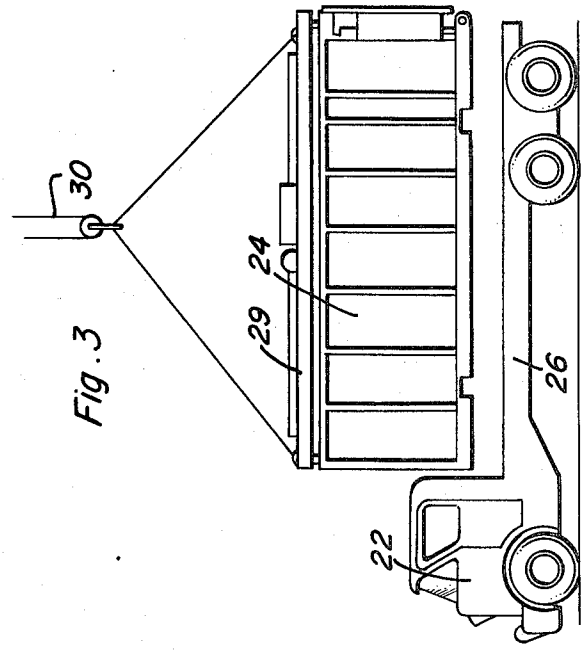


Fig. 3

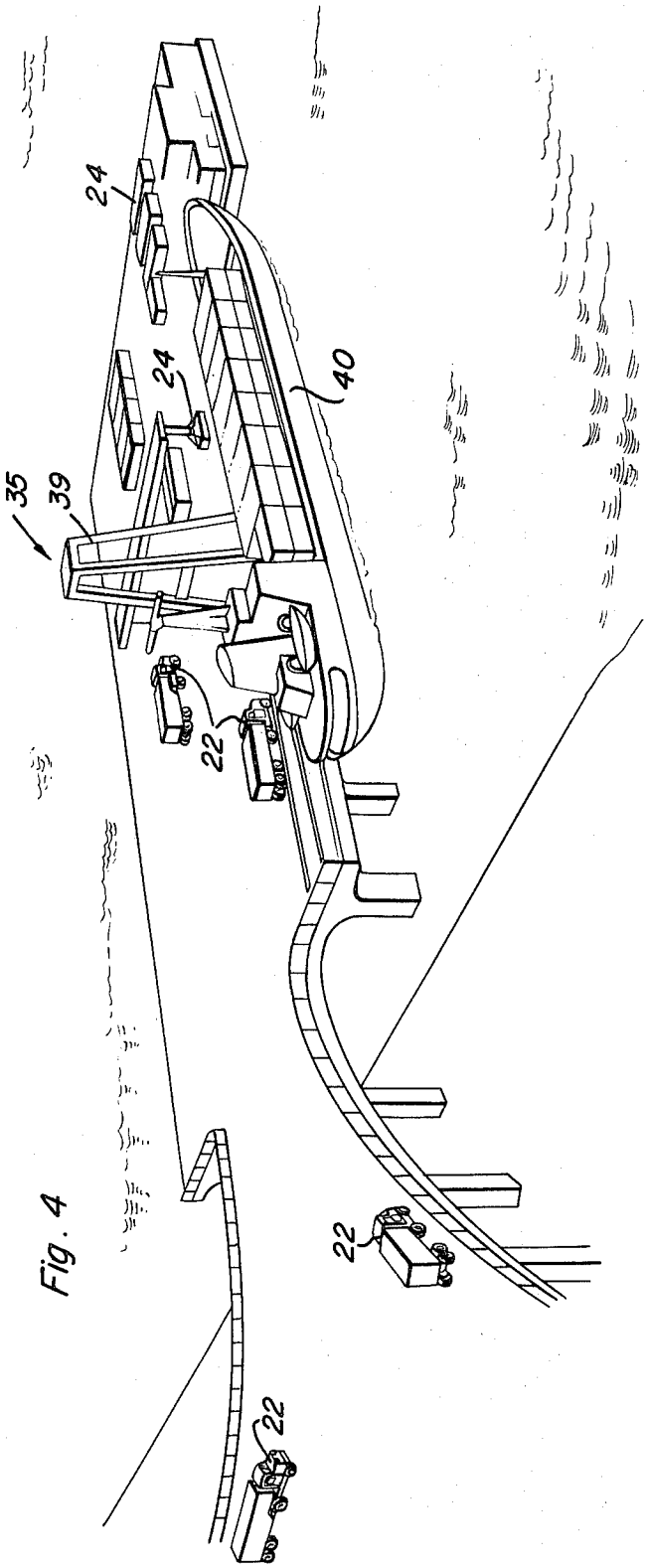


Fig. 4

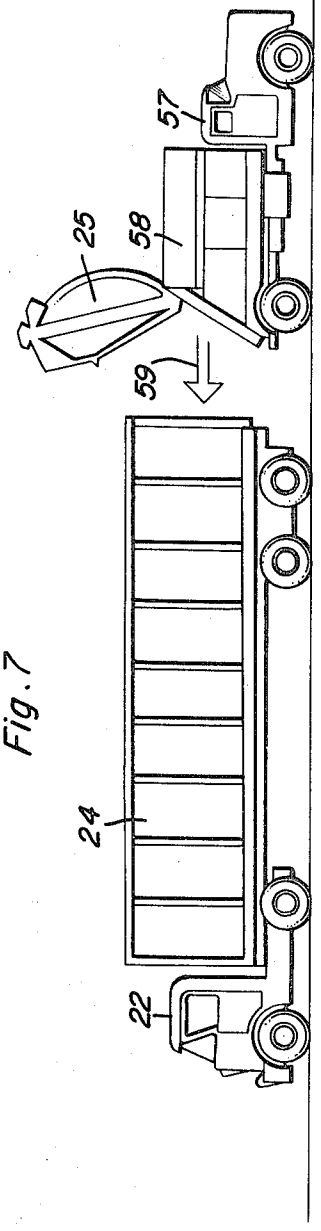


Fig. 7

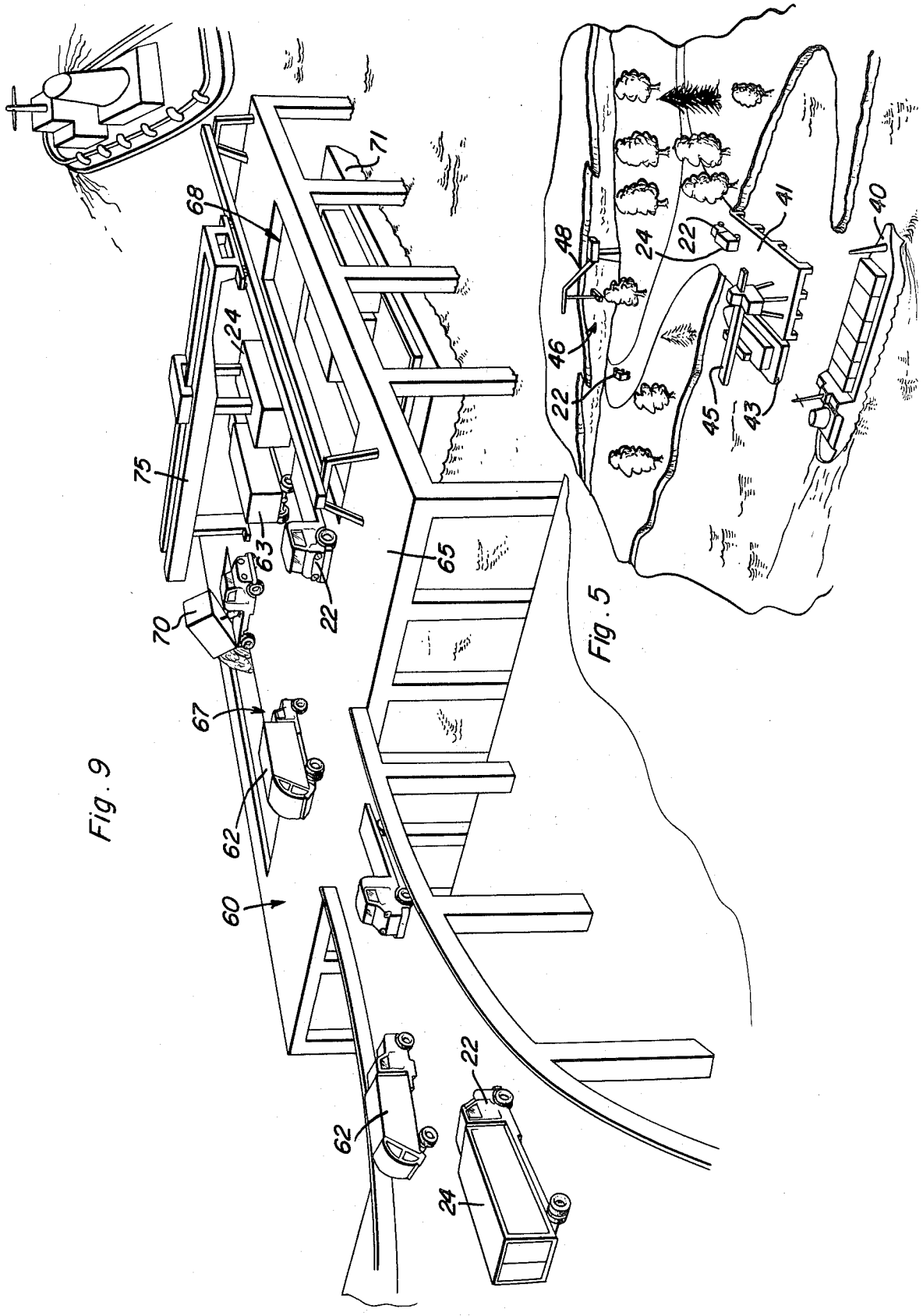


Fig. 9

Fig. 5

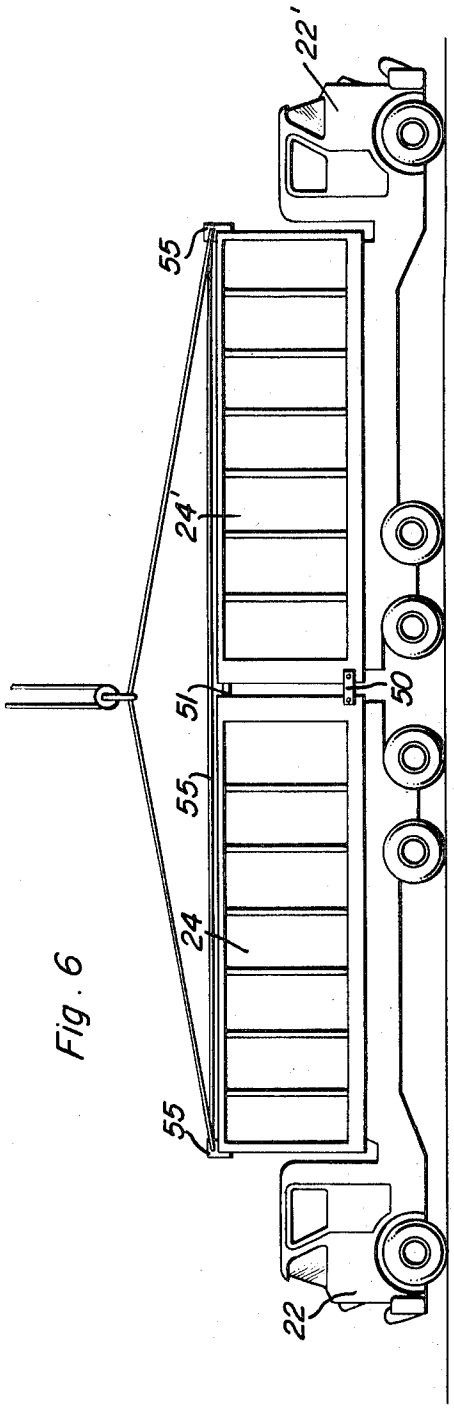


Fig. 6

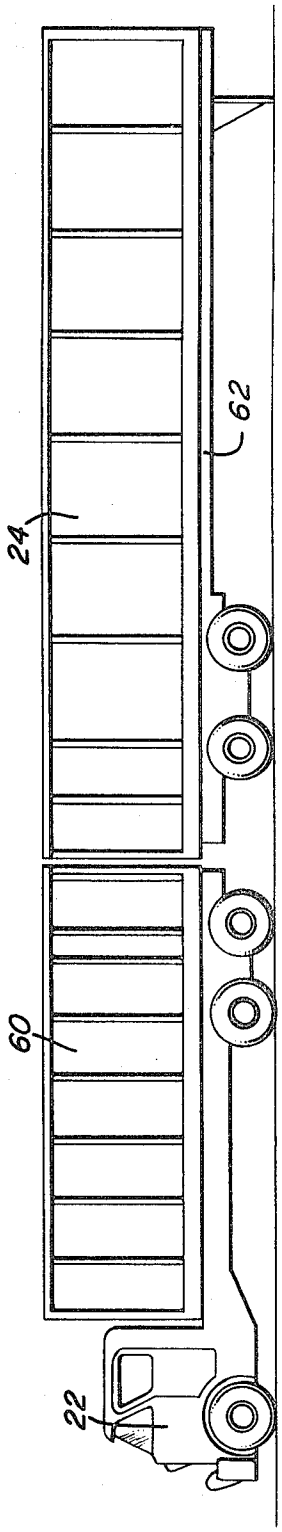


Fig. 8

CONTAINERIZED SYSTEM FOR WASTE DISPOSAL

CROSS-REFERENCE TO RELATED APPLICATION

This application is related to commonly assigned application Ser. No. 226,785, filed on even date herewith, for "A Containerized System for Waste Disposal" by N.K. Basile et al.

BACKGROUND OF THE INVENTION

The present invention relates to a sanitary and economical method for solid waste disposal.

There are three basic methods used at the present time for solid waste disposal. In one method, garbage, which is collected in house to house pickups, is transported by a garbage truck to a land fill area. The contents of the truck are emptied into the land fill area, and the empty truck returns to the metropolitan area to collect more garbage. This process is repeated over and over again until the entire land fill area is almost completely filled with garbage at which time a layer of earth is moved over the top of garbage.

A second commonly used method involves depositing the garbage in an open dump. In such a method, the garbage collected by trucks is simply deposited at a given location and left to decay by natural phenomenon. Moreover, in some dumps, the garbage is set afire so that the combustible materials contained therein are burnt. Garbage is continuously deposited in a given dump area until it is full at which time the dump is closed and additional garbage taken elsewhere.

A third commonly used garbage disposal system employs specially designed incinerators to vigorously burn the garbage. This substantially reduces the volume of the garbage, leaving an ash by-product which must be removed and disposed of in a conventional manner. Because the volume of the garbage is so drastically reduced by the burning process, the land area necessary to accommodate the ash by-product is substantially reduced.

The foregoing solid waste disposal systems are known to give rise to various problems especially in large metropolitan areas. A common drawback associated with the land fill and open dump systems is that the garbage is open to the environment. As a result, not only does the malodor from the rotting garbage permeate contiguous areas, but also the garbage makes an excellent breeding ground for mice, rats and other rodents. In addition, the garbage-filled open areas represent a significant safety hazard especially to small children unless adequate precautions are taken. While incinerator garbage disposal systems eliminate some of these drawbacks, they are unsatisfactory themselves in that they are great sources of air pollution.

Because of these drawbacks, metropolitan garbage dumps, landfills and incinerators are often located a considerable distance away from their respective metropolitan areas. However, in such situations, it is economically unfeasible for the individual garbage trucks collecting the garbage to travel the entire distance to the ultimate garbage depositing area with each load of garbage. Accordingly, the garbage collected in individual trucks is usually shipped to a central location in each metropolitan area where it is transferred to a barge, ship, train or other transportation mode for shipment to the ultimate garbage depositing area.

While the use of distant garbage depositing areas removes dumps, incineratores and so forth from the metropolitan area, extra shipping and handling costs considerably increase the per unit cost of garbage disposal. Moreover, transport of open garbage over long distances is both unsanitary and unsightly.

Accordingly, it is an object of this invention to provide a garbage removal system in which the high handling and shipping costs of long distance garbage transportation are significantly reduced.

It is another object of this invention to provide a garbage removal system in which repeated handling of the garbage is totally eliminated.

It is still another object of this invention to provide a garbage removal system in which the garbage is closed off from the environment during shipment to its ultimate location.

It is a still further object of this invention to provide a garbage removal system in which the garbage can be inexpensively transferred from one mode of transportation to another so that an individual metropolitan area can take advantage of the cheapest available shipping facilities.

It is a still further object of the present invention to provide a garbage removal system meeting the above objects which can be gradually, easily and inexpensively incorporated into already existing city garbage systems so that the changeover from presently existing systems to the inventive system can be accomplished as easily and economically as possible.

SUMMARY OF THE INVENTION

These and other objects are accomplished by the present invention in which garbage collected from house to house pickups is containerized in uniformly sized and shaped containers and the containers transported to the ultimate garbage depositing area. There, the containers are emptied and returned for reuse.

In a preferred embodiment, the garbage is immediately containerized by collecting it in a garbage truck in which the container forms an integral part of the truck body.

Alternatively, the garbage is collected in conventional trucks and then transferred to a standardized container for long distance shipment.

Because garbage is containerized before long distance shipment, garbage handling costs are significantly reduced. Moreover, since the contents of the containers are isolated from the environment during shipment, the noxious odors from decaying garbage as well as the unsightly appearance and unsanitary condition of open garbage during shipment are also substantially eliminated.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention may be more readily understood by reference to the following drawings wherein:

FIGS. 1 and 2 illustrate a garbage truck having an attached compactor and a compactor removal apparatus useful in the present invention.

FIG. 3 illustrates the process for removing a standardized container filled with garbage from the truck shown in FIGS. 1 and 2.

FIG. 4 illustrates a suitable docking system for loading garbage-filled containers onto a ship.

FIG. 5 illustrates removing the garbage-filled containers from ships at locations proximate to land fill areas.

FIG. 6 illustrates another embodiment of the invention in which two containers are joined together at their ends to form a single larger container which is integrally removed from two garbage trucks.

FIG. 7 illustrates still another embodiment of the invention in which a garbage truck having a raisable compactor transfers its contents to a larger truck having a standardized container as an integral part of its body.

FIG. 8 discloses an embodiment similar to FIG. 7 in which the contents of the container portion of a truck having a removable compactor are transferred to a standardized container; and

FIG. 9 illustrates a docking and loading system which can accommodate both conventional garbage trucks and container systems according to the present invention.

DETAILED DESCRIPTION

The present invention provides a system for gathering, handling, transporting and ultimately disposing of garbage and other solid wastes in containerized form. In this system, garbage is first collected in a garbage truck such as the one illustrated in FIG. **1.** This truck, generally indicated at **20,** is primarily composed of a truck body **22,** a standardized container **24** and a removable conventional compaction (or injection) system generally indicated at **25** attached thereto. The main truck body **22** has a main chassis **26** which is generally horizontally flat so that the bottom surface of standardized container **24** can securely rest against the top of main chassis **26.** Main chassis **26** and standardized container **24** are each provided with associating means (not shown) for removably attaching standardized container **24** to main chassis **26.**

Attached to the rear portion of standardized container **24** is a compactor (or injector) **25.** Compactors are well-known in the art, and any type of conventional compactor may be used in the present invention. However, the compactor must be adapted for attachment and removal from the standardized container. The compactor **25** is so attached to standardized container **24** with means (not shown) that enable the compactor **25** to be detached from the container when necessary. As shown in FIG. **1,** the standardized container **24** is equipped with doors **27** which are held open by means (not shown) when the compactor **25** is attached to the container.

After the garbage truck is filled with garbage, it returns to an appropriate location where the compactor **25** is removed. This operation is more fully illustrated by comparing FIGS. **1** and **2.** In FIG. **1,** the truck **22** is shown backing towards a compactor removal structure **28** equipped with compactor securing means **29** adapted to securely hold the compactor **25** when it is removed from the standardized container **24.** The truck backs towards compactor removal structure **28** until the compactor securing means **29** engages compactor **25.** At that time, the compactor is fixedly secured to the compactor removal structure **28,** and the attaching means holding compactor **25** onto standardized container **24** is actuated so that compactor **25** is released from standardized container **24.** Truck **22** then moves forward while compactor **25** remains secured in compactor removal structure **28.** The container doors **27** are closed to prevent the garbage in the container from falling out.

The truck **22** carrying the garbage filled standardized container **24** is then driven to a suitable location where the container **24** is transferred to a long range transportation means. At this location, the means securing standardized container **24** to the main chassis **26** of truck **22** are disengaged so that the container **24** can be removed from the truck. Removal of the container from the truck is more fully illustrated in FIG. **3** which shows standardized container **24** being lifted off of main chassis **26** of truck **22** by pully system **30** attached to container clamp **29.** Mechanisms for lifting standardized container are well-known in the art, and any conventional mechanism can be used in the inventive system.

After the standardized container **24** is removed from its truck, it is loaded on a ship or other long distance transportation means for transport to a remote disposal area. This operation is more fully illustrated in FIG. **4** which shows various trucks **22** carrying garbage-filled standardized containers arriving at a main dock area generally indicated at **35.** The garbage-filled standardized containers **24** are removed from the trucks **22** by crane apparatus **39** and loaded onto the deck of a ship **40.** After the ship is filled with containers, it departs for the disposal area and another ship docks to be filled with containers. As shown in FIG. **4,** a pile of empty standardized containers **25** can be located on the dock so that the empty trucks **22** can be optionally loaded on the docks with these standardized containers for the construction of a new garbage truck.

After the ship is loaded with garbage filled containers, it travels to a docking area located near the ultimate disposal location where the garbage-filled containers are transferred from the ship to the disposal area. This is more fully illustrated in FIG. **5** which shows a ship **40** containing garbage-filled containers arriving at an unloading dock **41.** At the unloading dock, a second ship **43** containing garbage filled containers **24** is being unloaded with a conventional crane **45.** The garbage-filled containers **24** are placed on flat bed trucks **22** which transport them to the land fill area generally indicated at **46.** There, another crane **48** unloads the garbage-filled containers where they are emptied and placed back on the trucks for return to the metropolitan area where they are again used to collect more garbage.

While the foregoing description has specifically illustrated the inventive system using ships as the long distance transportation means, it should be understood that any well-known mode of transportation can be used. Thus, instead of ships, the garbage-filled containers could be transported by rail, truck or barge. Moreover, more than one system of long distance transportation can be provided in a single cycle. For example, the garbage-filled containers can be transferred from the trucks **22** to railroad flat cars in the midst of a metropolitan area and transported by rail to an intermediate docking area. There, the containers can be transferred to a ship or barge for further water transportation to the ultimate disposal area.

Also, while the foregoing description has illustrated the final destination of the containers as being land fill

areas, it should be understood that the waste can be disposed of in any conventional manner. Thus, instead of emptying the containers in a land fill area, they can be emptied in an open dump or in an incinerator. Moreover, if containers can be very economically manufactured, they can be used as one-way disposable containers by leaving the garbage-filled containers at the ultimate garbage depositing area. Thus, the containers can be stacked in a land fill area or in an open dump. Further, the containers can be made from a combustible material and the entire garbage-filled containers incinerated.

Because of the many possible variations inherent in a containerized garbage removal system, greater flexibility is possible in designing waste removal systems for a particular metropolitan area. Thus, because containers can be easily and conveniently shipped on all modes of transportation, the garbage removal system can be designed to take advantage of the most available long distance hauling facilities in each area. Moreover, because the garbage is in effect handled only one time, that is, when it is picked up and placed in the original garbage truck, the manpower requirements of a typical garbage removal system are reduced. As can be appreciated by those skilled in the art, containerization represents a vast efficiency over non-containerization since repeated loading and unloading of intermediate long distance transportation means are vastly simplified. Moreover, containerization enables transportation costs to be decreased since ship productivity is markedly increased. This is due to the significant reduction in in-port time necessary for loading and unloading containerized garbage as opposed to noncontainerized garbage. Also, because of the relative ease of transferring containers from one means of transportation to another, more than one long distance transportation mode can be employed without unduly increasing the overall cost of waste removal.

Still another inherent and very important advantage of the present system is that it eliminates the handling and transportation of exposed solid wastes. Accordingly, the entire solid waste disposal system is much more sanitary than conventional systems.

Another embodiment of the inventive garbage system is illustrated in FIG. **6.** In this figure, two trucks **22** and **22'** each carrying a garbage-filled abbreviated container **24** and **24'** are arranged back to back so that the back ends of the respective containers are separated by a small space. The containers are then joined together by a container transporting and handling system comprising a lower joining means **50** and an upper spacer **51.** Such a system is known in the art and is fully described in U.S. Pat. No. 3,494,486. As shown in the figure, lower joining means **50** act to hinge together the two containers end to end at the positions shown while spacer **51** acts to keep the upper edges of the respective container ends separated by a pre-selected distance. The two containers connected together in this manner can thereby be lifted off the trucks **22** and **22'** by a suitable clamp type apparatus indicated at **55** as though they were a single integral container. The double container set is then transported and loaded into a ship or other long distance transportation means as a single unit, with the double container set being the size of a standardized container.

This ability to join two smaller garbage-filled containers into a single larger container represents a marked advantage in that container ships and railroad flat cars are specifically designed to accept containers of a standard size. Since trucks carrying very long containers would be too cumbersome for use in metropolitan areas, shorter trucks can be used for garbage pickup while larger container units can be employed for long distance transportation.

Still another embodiment of the present invention is illustrated in FIG. **7.** In the containerized garbage removal system illustrated in this figure, a garbage truck having a relatively small garbage receptacle **58** is equipped with a conventional compactor **25** adapted to swing upward so that the contents of the receptacle **58** can be removed. A pusher means (not shown) is located within the receptacle **58** to push out the garbage when the compactor is raised. When the truck **57** returns filled with garbage, it backs in the direction of arrow **59** towards truck **22** carrying an empty or partially filled standardized container **24.** When the lower edges of the receptacle **58** and standardized container **24** meet, the pusher in receptacle **58** forces the garbage contained therein into standardized container **24.** Truck **57** is then withdrawn and used again to collect more garbage. This process is repeated until standardized container **24** is filled with garbage at which time truck **22** transports the filled container to the long distance transportation means.

Still another embodiment of the present invention is disclosed in FIG. **8.** In this figure, garbage is collected in a container **60** equipped with a removable compactor **25** in the same manner as described with respect to the system shown in FIGS. **1** and **2.** However, instead of removing container **60** from truck **22,** the garbage container therein is simply transferred to a large standardized container **24** which as illustrated in the figure rests on a flat bed trailer of a conventional tractor trailer **62.** Moreover, in order to facilitate this transfer process, the container **60** may be equipped with a conventional pusher to force the garbage in container **60** into standardized container **24.** As with the system illustrated in FIG. **7,** this system allows relatively small conventionally sized maneuverable trucks to accomplish garbage pick up in metropolitan areas while further enabling larger sized, and hence more economic, standardized containers to be used for the long distance hauling of the garbage.

An advantage of the present invention is that it is readily adaptable to already existing garbage disposal systems. This is very advantageous since the considerable capital outlay necessary to provide a total workable garbage removal system need not be invested all at once. Moreover, this prevents wasting large amounts of pre-existing conventional garbage removal equipment, which can be completely amortized before being replaced with equipment necessary to carry out the inventive system.

The easy convertability from conventional systems to the present inventive system is more fully illustrated in FIG. **9.** This figure shows a dock generally indicated at **60** on which are located both conventional garbage trucks **62** and trucks **22** carrying standardized containers **24** according to the present invention. The dock is composed of a generally flat surface **65** having two holes therein generally indicated at **67** and **68.** Located beneath hole **67** is an open top barge (not shown) for receiving refuge dropped by conventional garbage truck **70** through hole **67.** Thus, conventional trash

loading is accomplished at this location. On the other side of the dock, underneath hole **68** is located a second open top barge **71** for receiving garbage-filled containers **24.** Container carrying trucks **22** drive under conventional crane **75** which lifts the garbage-filled containers **24** off the trucks and deposits them into the barge **71.** Thus, the inventive containerized system is also carried out on these same dock facilities.

The foregoing description and drawings have been presented for illustrative purposes only and are not intended to limit the present invention in any way. All reasonable modifications not specifically set forth are intended to be included within the scope of the present invention which is to be limited only by the following claims.

I claim:

1. A vehicle for receiving, containing, transporting and unloading garbage comprising: a main truck portion having a chassis adapted to receive a standardized container; a uniformly sized and shaped standardized container removably mounted on said chassis, the standardized container having an opening therein and at least one door adapted to close over and open away from said opening; a garbage compactor for forcing garbage placed in the compactor through said opening into said container when said at least one door is open; and means for lockingly removably mounting said compactor on the rear of said standardized container in cantilever fashion so that said mounting means acts as the sole means of support for said compactor and so that said compactor can be demounted from said standardized container after the garbage has been placed therein.

* * * * *