

[72] Inventors **Jimmie V. Thurmond;**
William A. Ferrari, P.O. Box 14147, San
Antonio, Tex. 78214
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[54] **TRANSFER STATION EQUIPMENT FOR REFUSE DISPOSAL**
 3 Claims, 8 Drawing Figs.

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 [51] Int. Cl. **B65g 67/20**
 [50] Field of Search **214/41;**
 100/209, 229A

[56] **References Cited**
UNITED STATES PATENTS

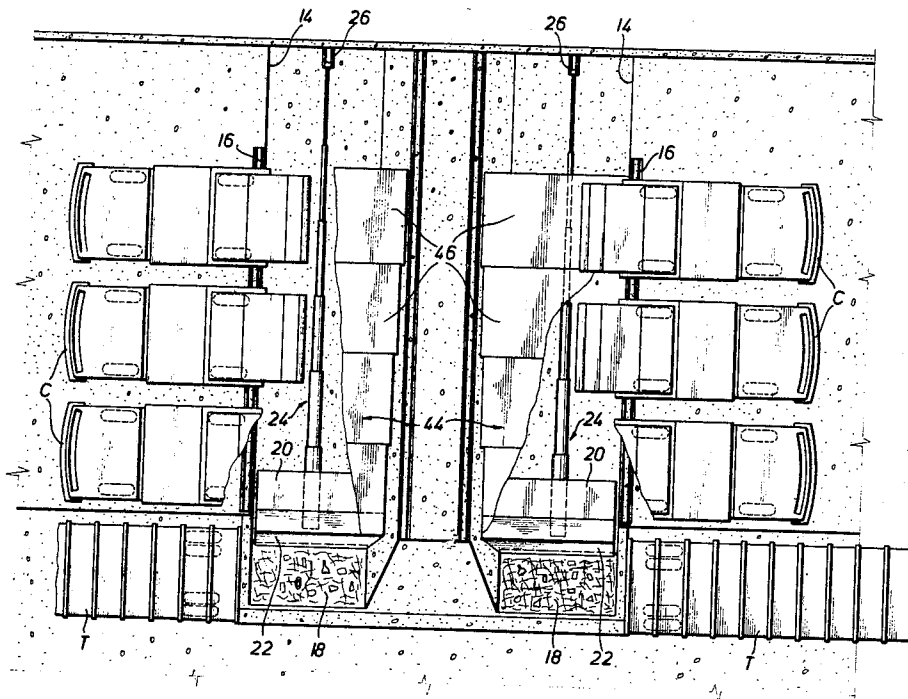
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Primary Examiner—Robert G. Sheridan
Attorney—Charles E. Lightfoot

ABSTRACT: A refuse transfer station at which short-haul collection vehicles discharge refuse to be loaded into long-haul transportation vehicles for removal to a disposal location. The station is provided with upper and lower levels and hoppers into which refuse may be dumped at the upper level to be discharged downwardly to the lower level to load the long-haul vehicles.

Elongated refuse-receiving troughs opening at one end into the hoppers may be provided at the upper level into which refuse is dumped from the collection vehicles and in which pusher blades are movably mounted to push the refuse into the hoppers, and cover means is provided for the troughs which are designed to be extended as the pusher blades are advanced and retracted as the blades are retracted to prevent the dumping of refuse behind the pusher blades.

Ram means is mounted beneath the hoppers in position to move refuse from the hoppers horizontally into the long-haul vehicles to pack the refuse therein, the ram means being positioned for movement in one direction to load one vehicle and in the other direction to load another vehicle so that two vehicles may be loaded at once by reciprocation of the ram means. The hoppers may be provided with cutoff doors to prevent the discharge of refuse from either hopper when a vehicle is being loaded from the other hopper to prevent dumping of refuse on the lower level.



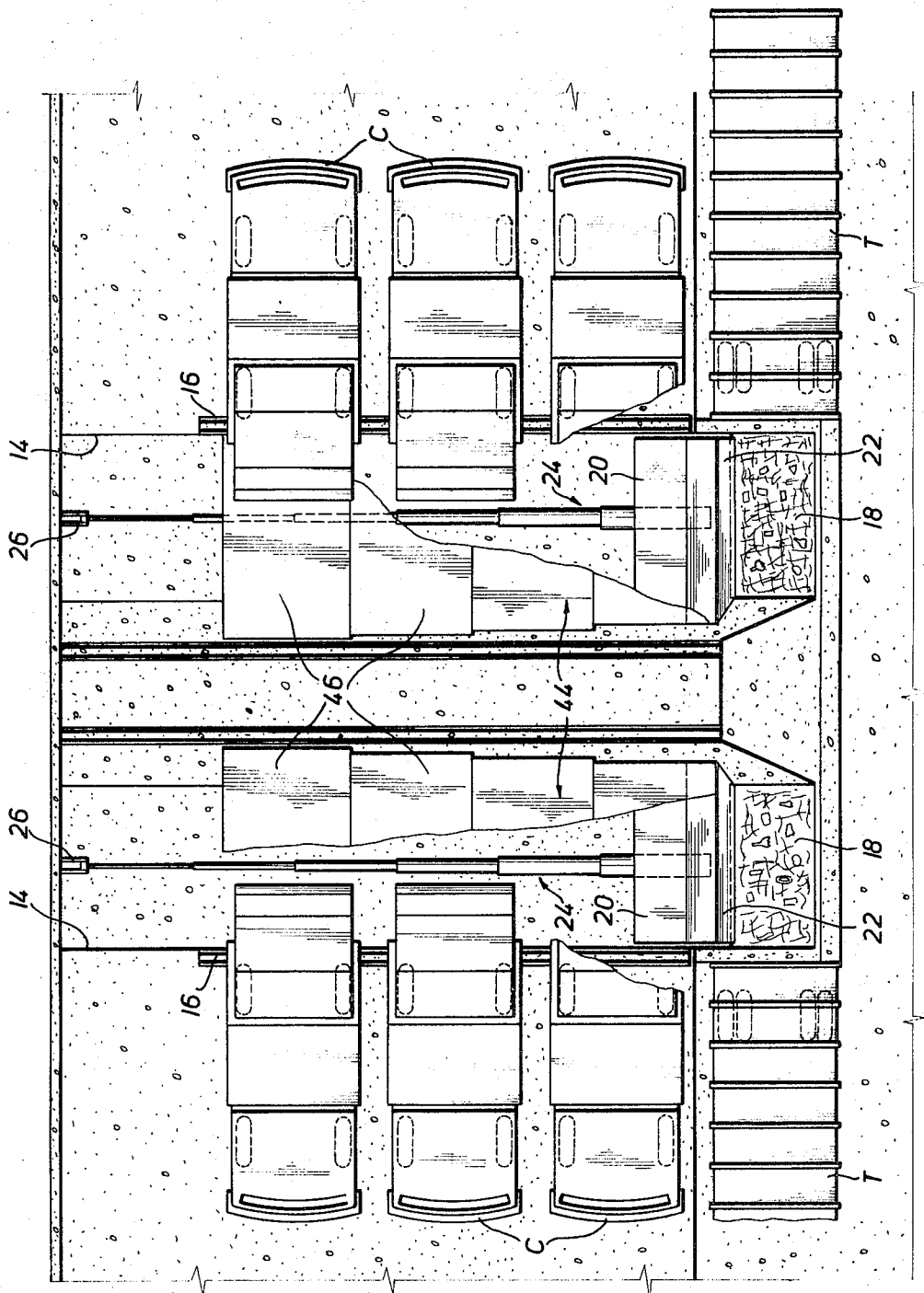


FIG. 1

William A. Ferrari
Jimmie V. Thurmond
INVENTOR.

BY
Charles E. Lightfoot
ATTORNEY

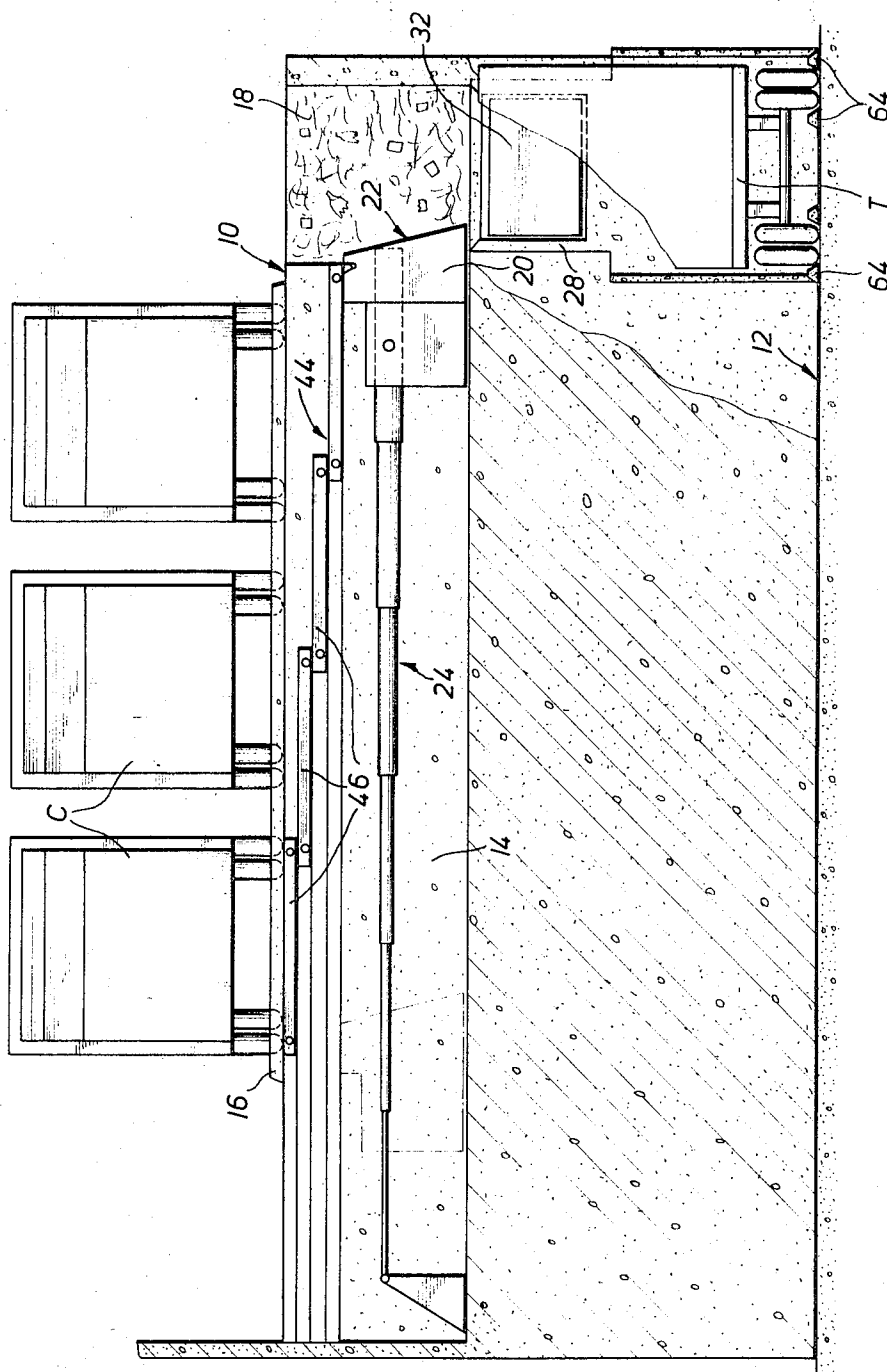


FIG. 2

William A. Ferrari
Jimmie V. Thurmond
INVENTOR.

BY
Charles E. Lightfoot
ATTORNEY

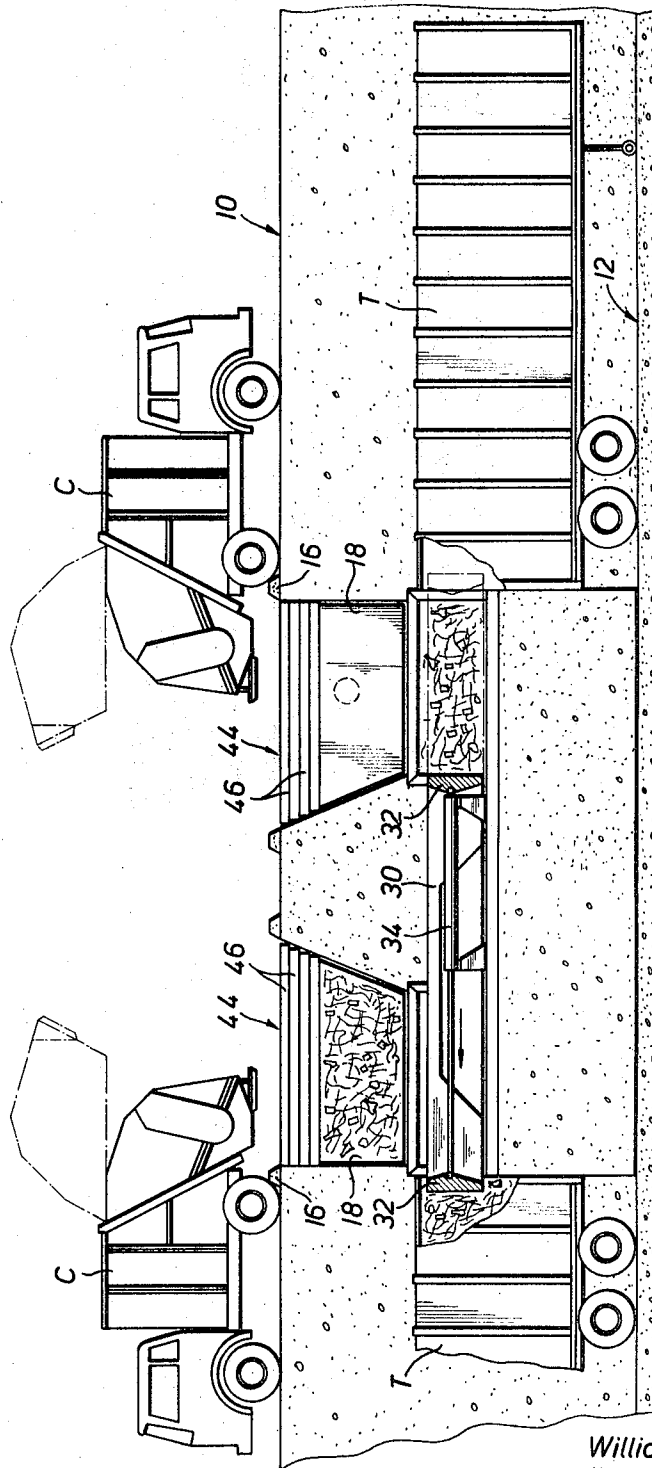


FIG. 3

William A. Ferrari
Jimmie V. Thurmond
INVENTOR.

BY
Charles E. Lightfoot
ATTORNEY

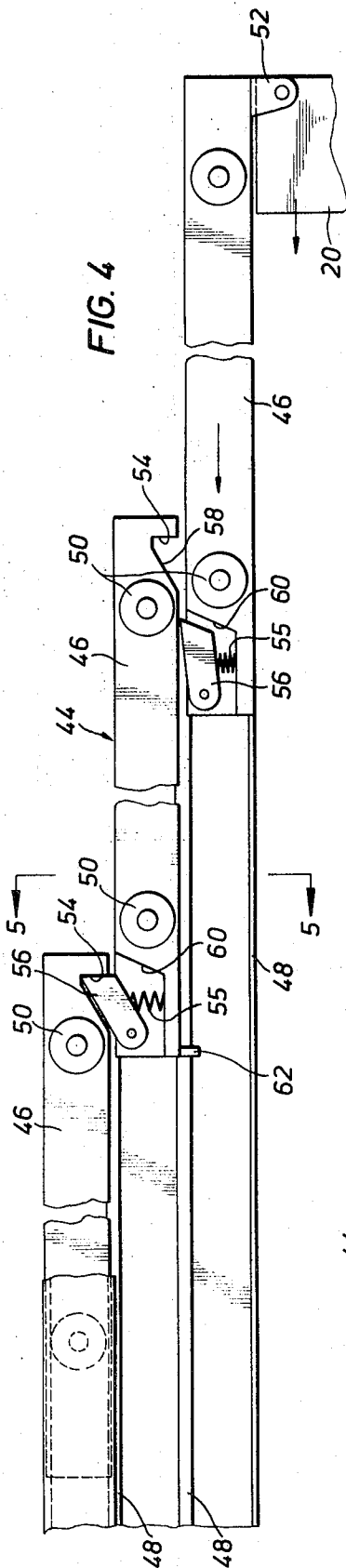


FIG. 4

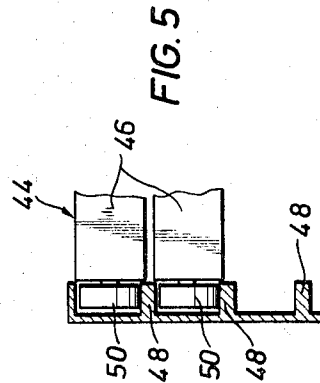


FIG. 5

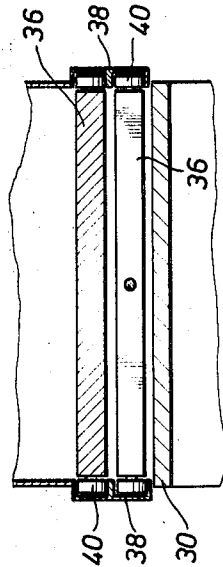


FIG. 7

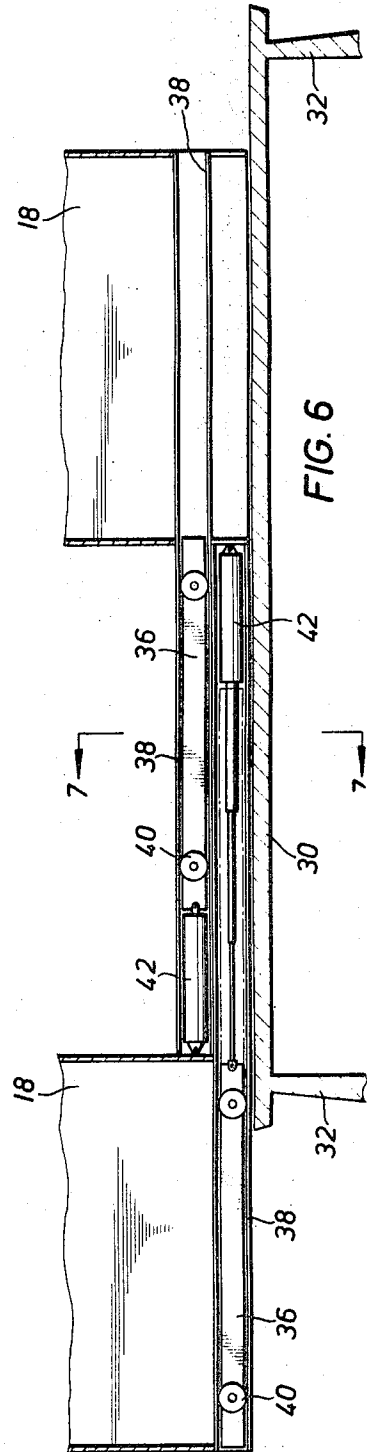
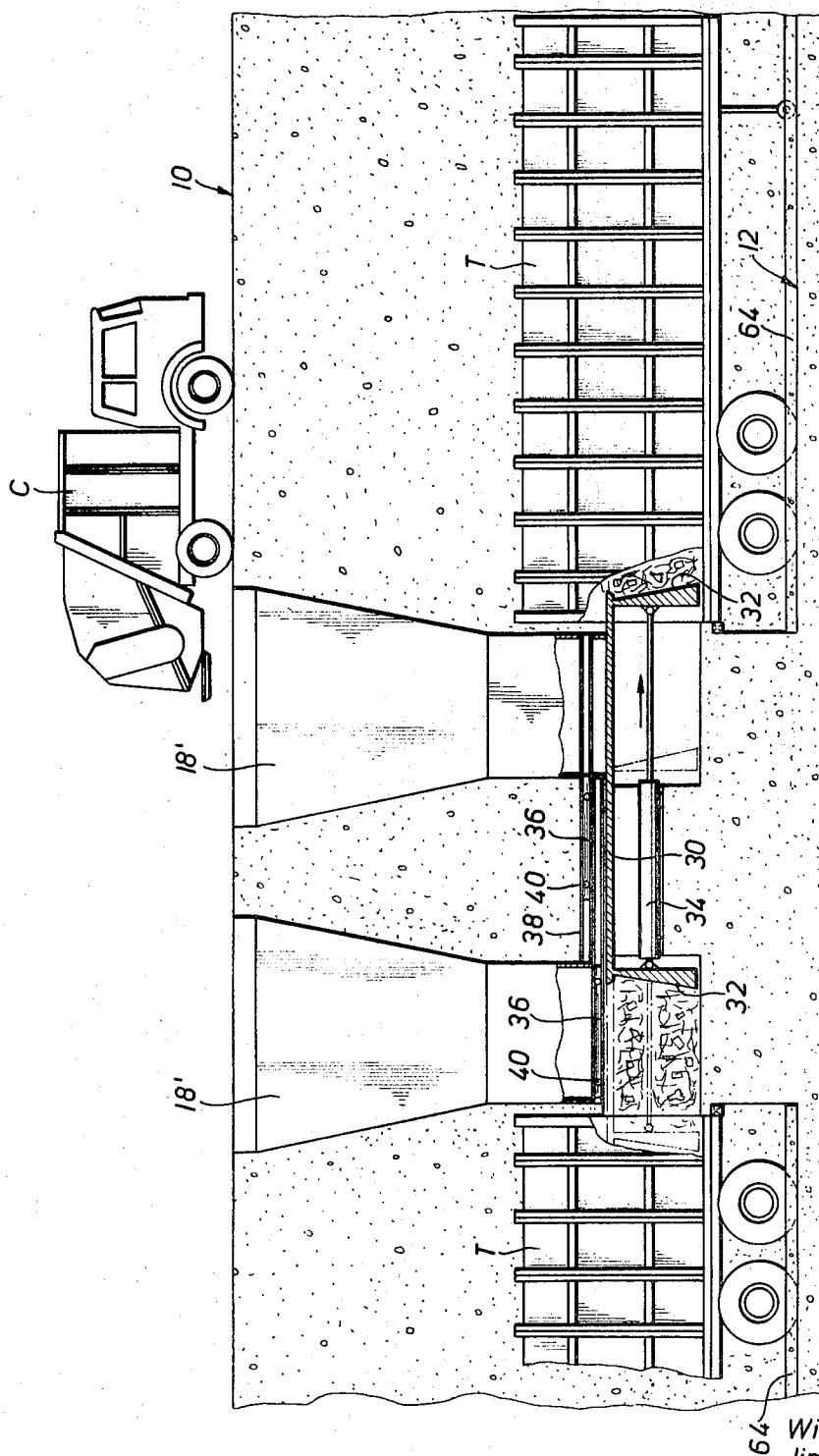


FIG. 6

William A. Ferrari
Jimmie V. Thurmond
INVENTOR

BY
Charles E. Lightfoot
ATTORNEY



William A. Ferrari
Jimmie V. Thurmond
INVENTOR.

BY
Charles E. Lightfoot
ATTORNEY

TRANSFER STATION EQUIPMENT FOR REFUSE DISPOSAL

BACKGROUND OF THE INVENTION

In the collection and disposal of refuse, and especially in the collection and disposal of garbage and other household refuse in congested areas, such as in large cities, it has become customary to make use of highly maneuverable collection vehicles of relatively small capacity, which are manually loaded and which are then driven to a centrally located transfer station where the refuse is deposited. The refuse, thus locally collected and deposited is then loaded into larger transport vehicles and transported to a disposal destination such as a remotely located dump or land fill.

By this system small collection trucks may be employed which are easily moved about through narrow street, alleys, and other congested areas where larger vehicles are difficult to maneuver, such collection vehicles being capable of efficient short-haul operation, while the larger transport vehicles are more efficiently operated for long hauls with larger loads. Refuse transfer stations for the carrying out of refuse collection and disposal systems of this kind, however, must be of large capacity to receive refuse from a larger number of collection vehicles and be equipped with refuse-handling mechanism for quickly and efficiently loading refuse into the transportation vehicles. For this purpose transfer stations, as presently operated, are often provided with receiving floors at one level, upon which the refuse is dumped from collection vehicles, and with floors at a lower level for the accommodation of transportation vehicles into which the refuse is to be loaded. Transportation vehicles of an open-topped type are sometimes used, into which the refuse is loaded from the upper level through hoppers into which the collected refuse is pushed by means of bulldozers or other handling equipment.

Transportation vehicles of the rear-loading type, having ejector blades for unloading the same, are also frequently employed, which are loaded by means of compacting equipment supplied with refuse from the upper level through hoppers and by which the refuse is packed or rammed into the transportation vehicles to secure maximum loading.

In the operation of transfer stations of this type difficulty is often encountered, due to accumulation of refuse at the upper level dumped thereon by the collection vehicles which are capable of making short collection trips frequently, while the long-haul transportation vehicles must often travel long distances to a disposal point. Moreover, the handling of the refuse in loading the long-haul vehicles is often a laborious and time-consuming task when carried out with implements of the usual kind, such as bulldozers, scoops or buckets, greatly impeding the transfer process and resulting in spilling of the refuse.

SUMMARY OF THE INVENTION

The present invention has for an important object the provision of transfer station equipment for refuse disposal station equipment for refuse disposal having upper and lower levels and hopper means for dispensing the refuse from the upper level to the lower level and including a refuse-receiving trough into which refuse from collection vehicles at the upper level may be deposited and means for feeding the refuse from the trough into the hopper means.

Another object of the invention is to provide a refuse transfer station of the kind referred to, including hopper means arranged to receive refuse from an upper level and dispense the same to a lower level and equipped with refuse compaction apparatus embodying reciprocating compaction means which is operable to simultaneously load refuse from the hopper means into two oppositely disposed transportation vehicles.

A further object of the invention is the provision in a refuse transfer station of the type mentioned of means for progressively extending cover means over the refuse-receiving trough

as the refuse-feeding means advances along the trough to deposit the refuse in the hopper means, and to retract the cover means in response to retracting movement of the refuse-feeding means, whereby dumping of refuse into the trough behind the refuse-feeding means will be prevented.

Another object of the invention is to provide means for shutting off the supply of refuse from the hopper means to the refuse-compacting apparatus to prevent accidental dumping of the refuse from the hopper means when no transportation vehicle is in position to be loaded thereby.

Briefly described the transfer station of the invention comprises a building or platform structure covering a large area and having an upper refuse-receiving area and a lower vehicle docking area. Refuse-receiving and -dispensing hoppers are provided which are open at the top to be loaded with refuse at the upper level and which discharge downwardly to the lower level. At the upper level, elongated refuse-receiving troughs into which refuse is dumped from the collection vehicles are located to discharge refuse at one end into the hoppers and pusher blades are movably disposed in the troughs to push the refuse into the hoppers.

The pusher blades are operated by extensible and retractable pressure cylinder assemblies in the troughs and extensible and retractable covers are provided for the troughs which are extended as the pusher blades advance and which are retracted as the pusher blades advance and which are retracted as the pusher blades move back to cover the trough behind the blades to prevent the dumping of refuse into the troughs behind the same.

A reciprocating ram is positioned beneath the hoppers which is actuated by a pressure cylinder and which is located to move refuse from one hopper to one long-haul vehicle upon movement of the ram in one direction, while refuse is being discharged from the other hopper at a location to be moved into another such vehicle when the ram moves in the other direction, thus permitting the loading of two vehicles at the same operation.

Each of the hoppers has a cutoff door whereby the discharge of refuse therefrom may be discontinued during operation of the ram when only one long-haul vehicle is docked for loading, thus preventing the dumping of refuse onto the lower level during loading of a single vehicle.

BRIEF DESCRIPTION OF THE VIEWS OF THE DRAWINGS

FIG. 1 is a fragmentary plan view of a preferred embodiment of the invention showing the arrangement of the transfer station and the refuse-handling equipment thereof;

FIG. 2 is a longitudinal cross-sectional view of the transfer station of FIG. 1 taken centrally along one of the refuse-receiving troughs thereof;

FIG. 3 is a transverse cross-sectional view of the transfer station of FIG. 1, taken centrally, longitudinally of the refuse-compacting ram mechanism thereof;

FIG. 4 is a fragmentary side elevational view, on an enlarged scale, of the trough cover mechanism of the invention, showing the same in a partly extended condition;

FIG. 5 is a cross-sectional view, taken along the line 5-5 of FIG. 4, looking in the direction indicated by the arrows;

FIG. 6 is a fragmentary cross-sectional view, on a somewhat enlarged scale taken centrally, longitudinally of the hoppers and compaction ram mechanism of the invention, showing the hopper cutoff door mechanism thereof;

FIG. 7 is a cross-sectional view taken along the line 7-7 of FIG. 6, looking in the direction indicated by the arrows; and

FIG. 8 is a view similar to that of FIG. 3, illustrating a somewhat different form of the refuse-transferring mechanism of the invention.

DETAILED DESCRIPTION OF A PARTICULAR EMBODIMENT OF THE INVENTION

Referring now to the drawings in greater detail, the transfer station of the invention may take the form of a large building or platform structure having a refuse-receiving floor 10 at an upper level, and a transportation vehicle docking area 12 at a lower level.

The upper level or floor of the transfer station has one or more elongated, refuse-receiving troughs 14 situated to permit the convenient backing up to the same of refuse collection vehicles, such as the vehicles C, to permit the depositing of the collected refuse into the troughs. The collection vehicles C may be of any desired type, such as the rear-loading and dumping type shown, or the like.

The upper floor may be provided with curbs or bumpers 16 along the margins of the troughs to prevent accidental backing of the collection vehicles into the troughs.

The troughs open at one end into hoppers 18, and each trough is provided with refuse-feeding apparatus, including a blade or pusher 20, movably disposed in the trough for longitudinal movement therein and formed with a downwardly inclined refuse-engaging face 22. Each of the blades 20 is moved longitudinally in the trough by a telescoping hydraulic power cylinder assembly, generally designated 24, made up of a number of telescopically arranged tubes, adapted to be extended and retracted by pressure fluid from any suitable source, under the control of suitable control mechanism of a usual type, not shown. The cylinder assemblies are disposed horizontally in the troughs and are connected at one end to the pusher blades 20 and at their other ends to any suitable anchoring means, such as the stanchions 26 which are fixedly mounted in the troughs.

By this arrangement refuse dumped into the troughs may be pushed into the hoppers 18 by extending the cylinder assemblies after which the pusher blades may be retracted by retraction of the cylinder assemblies to position the blades to allow refilling of the troughs.

The hoppers 18 open downwardly into a horizontally disposed compaction ram housing 28, which may be of generally rectangular shape, of suitable size and positioned at a convenient height for loading refuse into the transportation vehicles.

Within the ram housing a compaction ram, generally designated 30, is movably mounted for longitudinal reciprocating movement, which ram has two compaction heads or blades 32, one at each end thereof, and is adapted to be reciprocated by a pressure cylinder 34 in a well-known manner by fluid pressure. By this arrangement fluid under pressure from a suitable source, and under the control of suitable valve mechanism, not shown, may be introduced into one end of the cylinder 34 to move the ram heads 32 in one direction, while exhausting fluid from the other end of the cylinder, or in the other direction by allowing an outflow of fluid from said one end while admitting pressure fluid into said other end of the cylinder, to actuate the ram in a usual manner.

Beneath each of the hoppers 18, between the discharge openings thereof and the ram housing each hopper has a sliding cutoff door 36, which runs in trackways 38, each of the doors being provided with wheels or rollers 40 which roll along the trackways. The doors 36 are located one above the other, so that the doors may move to positions between the hoppers in superposed relation when the doors are open and to closed positions to close the lower ends of the hoppers. Each of the doors 36 is operatively connected to a pressure cylinder 42 which may be supplied with pressure fluid from any convenient source, under the control of suitable valve mechanism, not shown, whereby the cylinders may be actuated in a usual manner to open and close the cutoff doors.

In the operation of the transfer station, the collection vehicles are backed up to the troughs 14 and their contents dumped therein between the pusher blades 20 and the inlet

openings of the hoppers 18, and the refuse is then pushed into the hoppers.

With the hoppers thus loaded, transportation vehicles T, which may be of large capacity having rear end openings through which the refuse may be rammed into the vehicles, are docked on the lower area 12 with their rear end openings in horizontal registration with the ends of the ram housing 28, as shown in FIG. 3. With the cutoff doors 36 open beneath both of the hoppers, as shown in FIG. 8, the ram 30 may then be reciprocated by actuation of the cylinder 34 to load the refuse from the hoppers into both of the transportation vehicles at the same time, the refuse moving downwardly from one hopper in front of one ram head as the refuse in front of the other ram head is being pushed into one vehicle upon movement of the ram in one direction and downwardly from the other hopper in the same manner as upon movement of the ram in the other direction.

When the transportation, or long-haul, vehicles T have been loaded in this manner they are driven to a suitable disposed location and unloaded in the usual manner.

In the event that it should be necessary or desirable to load one transfer vehicle from one of the hoppers, when no vehicle is docked at the other hopper, the cutoff door 36 of the other hopper may be closed by actuation of its cylinder 42 to prevent the discharge of refuse therefrom whereby dumping of the refuse on the docking area will be prevented.

As the refuse is discharged from the hoppers, they are refilled by operation of the pusher blades 20 by introducing fluid under pressure into the cylinder assemblies 24 from any suitable source and under the control of suitable control mechanism, such as valves, not shown.

When the collection troughs have been emptied, the pusher blades may be retracted by actuation of the cylinder assemblies 24 to positions to allow the troughs to be refilled.

During the operation of the transfer station numerous collection vehicles may be backed up to the troughs 14 to deposit refuse therein, and in order to prevent inadvertent dumping of refuse behind the pusher blades when they are in advanced positions toward the hoppers, each of the troughs is provided with an extensible and retractable cover, as illustrated in FIGS. 1 to 5, which is operatively connected to the pusher blade to cover the trough as the blade is advanced and to uncover the same as the blade is retracted.

The covers, generally designated 44 are each made up of a plurality of panellike, sliding cover sections 46, of generally rectangular shape, mounted for longitudinal movement along parallel trackways 48 located one above another along the sides of the troughs in which wheels or rollers 50, rotatably carried by the sections are rollingly engaged, as best seen in FIGS. 4 and 5. The sections are disposed to be located in superposed relation when the cover is in its retracted position and to be extended one after another to cover the trough as the pusher blades advance toward the hoppers.

The lowermost cover section is connected at its forward end to the pusher blade 20, as by means of perforated lugs, such as that shown at 52 in FIG. 4, and each cover section except the lowermost section has a downwardly opening notch 54 adjacent its front end, into which a pivoted latch member 56 carried by the next lower section is movable under the influence of a coil spring 55 to connect the sections together during advance movement of the pusher blades to cause the sections to progressively move forward to cover the troughs behind the pusher blades. The bottom wall 58 of each notch 54 slopes downwardly and rearwardly away from the front wall thereof, and the latches 56 are disposed in upwardly opening recesses 60 in the sections, so that the latches 56 will be depressed as the pusher blade is retracted to allow the sections to move to their retracted positions in superposed relation. Each section, except the lowermost and uppermost also has a downwardly extending projection 62 at its rear end positioned for engagement with the rear end of a lower section to the section to move successively toward retracted positions as the pusher blade is retracted.

By this arrangement the troughs to the rear of the pusher blades will be covered as the blades are advanced to prevent dumping of refuse behind the blades and the covers are retracted to leave the troughs open in front of the blades as the blades are retracted.

A somewhat different arrangement of the transfer station equipment is illustrated in FIG. 8, wherein the troughs 14 are omitted, the hoppers 18' being open at their upper ends at the level of the upper floor 12 to permit the dumping of refuse from the collection vehicles C directly into the hoppers.

In other respects the form of the equipment illustrated in FIG. 8 is similar to that previously described and similarly operated.

In either form of the invention the ram means 30 is of inverted channel shape, or other convenient construction to prevent the falling of refuse behind the compaction heads 32 during the operation.

In operating the equipment it is preferable to load the refuse into the transfer vehicles through a rear end opening of the vehicle located close to the top of the vehicle, as shown in FIG. 3, so that the loading of the vehicle will be somewhat aided by gravity, allowing the refuse to be uniformly and tightly compacted in the vehicle.

Under some circumstances, such as where transportation vehicles of different types are likely to be used at the transfer station, or where a difference in height between the discharge openings of the ram housing and the rear floor of the transportation vehicles may occur, it may be necessary to push the refuse into the vehicles at the floor level or some other location below the top rear opening of the vehicle, and for this purpose the vehicles may be provided with a rear door structure including one or more vertically sliding panels, not shown, by which the rear end opening of the vehicle may be adjusted into accurate registration of the discharge opening of the ram housing. Also, in order to align the transportation vehicles accurately with the ram housing when docking the vehicles, spaced-apart curbs or upwardly extending projections, such as those shown at 64 in FIGS. 2 and 8 may be positioned on the docking area 12 located to serve as guiding means for the wheels of the vehicles in positioning the same in proper relation to the rams.

It will thus be seen that the invention, constructed and operated as described above provides a refuse transfer station and refuse-handling equipment therefor, by which large quantities of refuse may be effectively transferred from short-haul

collection vehicles to long-haul transportation vehicles for transportation to a disposal destination.

The invention is disclosed herein in connection with a particular construction of the transfer station and of the refuse-handling equipment thereof, which is intended by way of illustration, it being evident that various changes can be made therein within the spirit of the invention and the scope of the appended claims.

I claim:

1. In a refuse transfer station:

a collection vehicle dumping area;

a vehicle docking area at a level below said dumping area;

a trough positioned to receive refuse dumped from said collection vehicles in said dumping area;

hopper means positioned to receive refuse from one end of said trough and to discharge the same downwardly toward said docking area;

pusher means movably mounted in the trough for longitudinal movement therein in engagement with the refuse therein to push the refuse toward said hopper means;

cover means movably positioned in said dumping area for movement to a position to cover said trough behind said

pusher means upon movement of the pusher means toward said hopper means and to a position to uncover the trough in front of said pusher means upon movement

of the pusher means away from said hopper means, and including a plurality of panellike elements each positioned for movement longitudinally of said trough at a different level, the lowermost of said elements being connected to said pusher means for movement therewith; and

means on said elements positioned for coaction to cause each element to move with the next lower element upon

movement of said next lower element with said pusher means toward said hopper means to cover the trough behind the pusher means.

2. The transfer station as claimed in claim 1 including

means on said elements positioned for coaction to cause each element to move with the next lower element upon movement

of said next lower element with said pusher means away from said hopper means to uncover the trough in front of said

pusher means.

3. The transfer station as claimed in claim 2, wherein said

coacting means on said elements are positioned to allow said elements to be moved into superposed relation upon movement

of the pusher means away from said hopper means.

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