

June 23, 1953

A. CALCAGNO
REFUSE HANDLING APPARATUS

2,643,014

Filed June 9, 1950

3 Sheets-Sheet 1

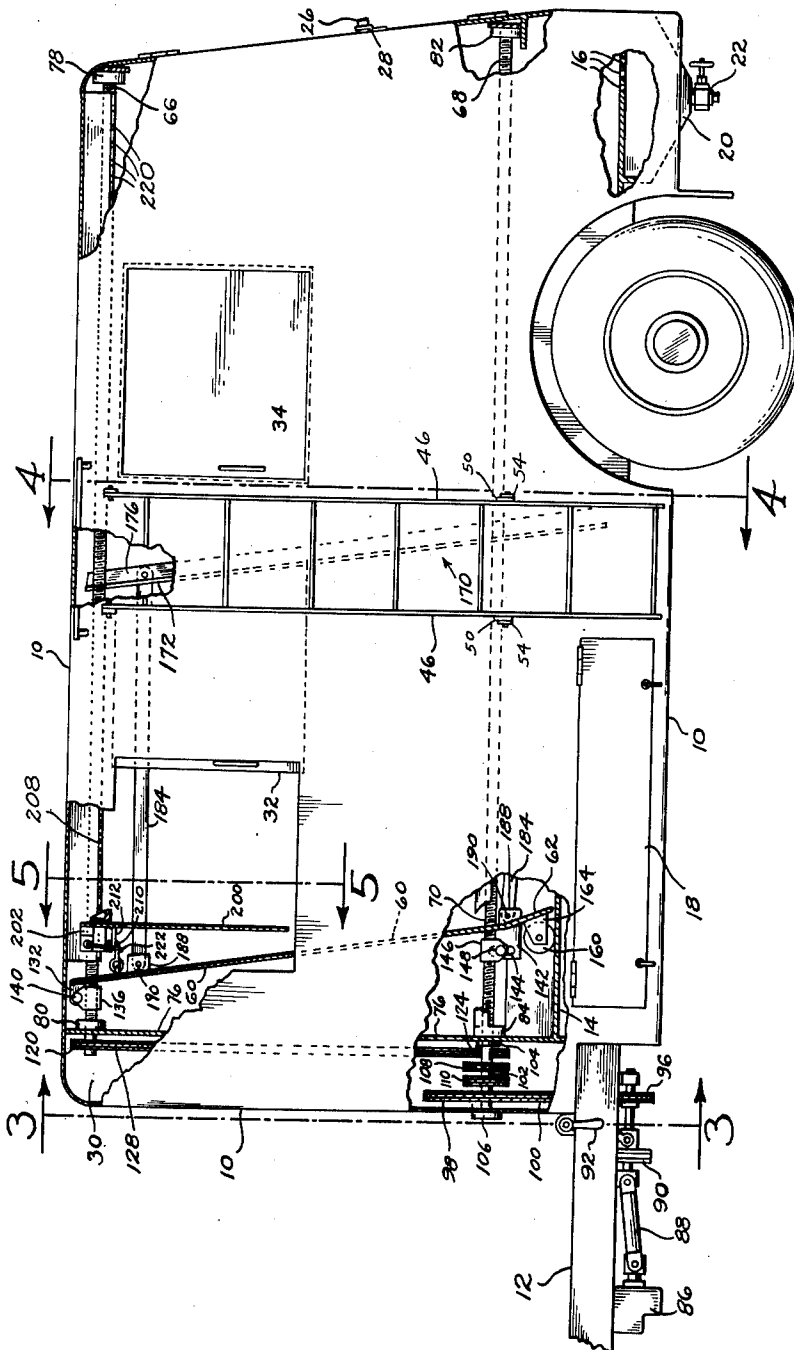


Fig. 1.

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3 Sheets-Sheet 2

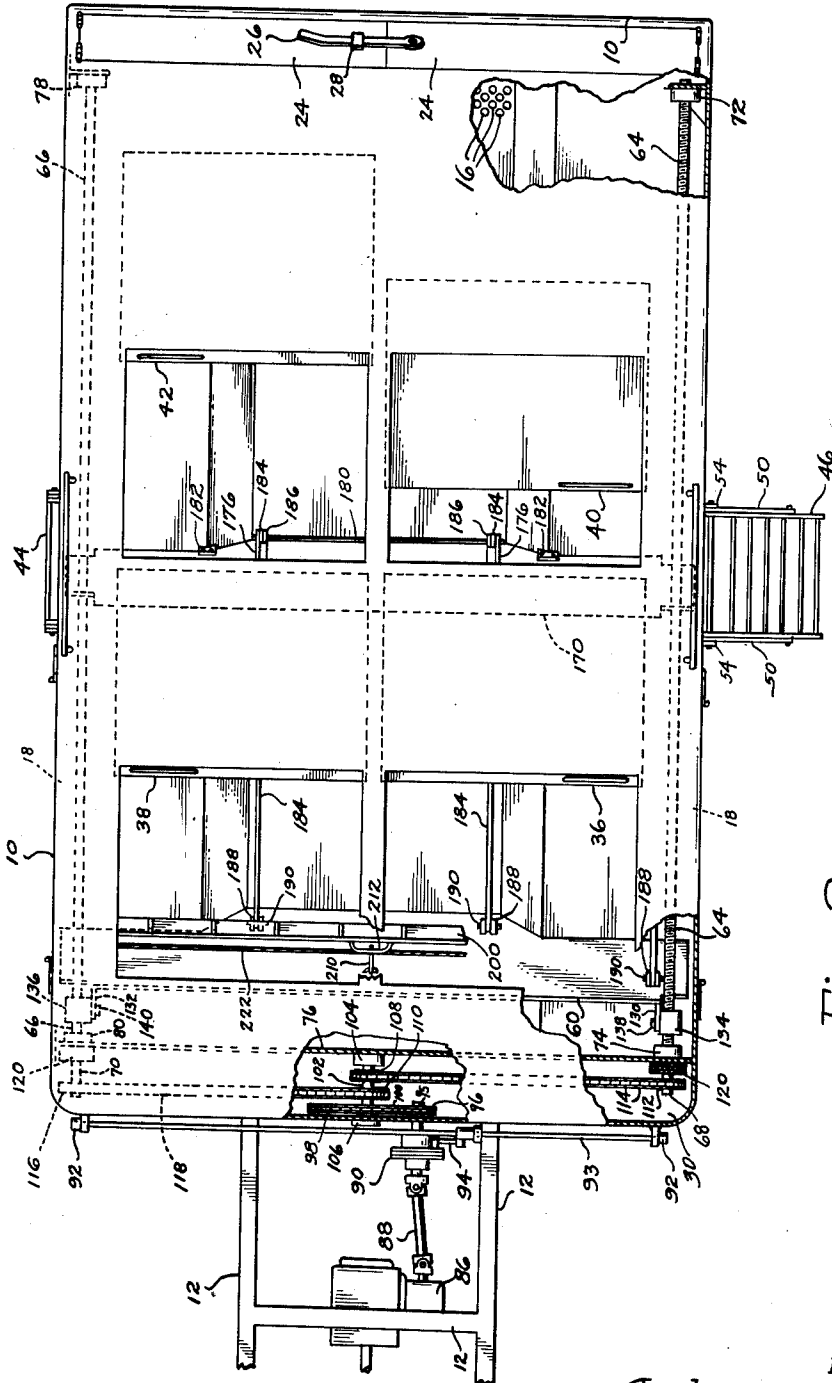


Fig. 2.

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3 Sheets-Sheet 3

Fig. 3.

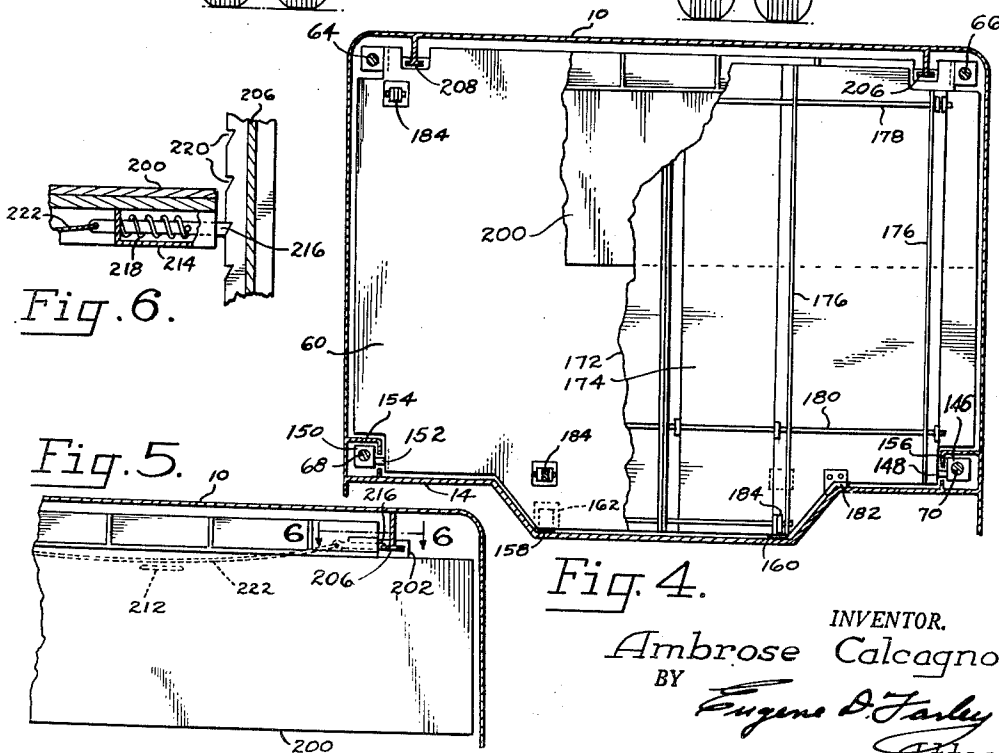


Fig. 6.

Fig. 5.

Fig. 4.

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UNITED STATES PATENT OFFICE

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REFUSE HANDLING APPARATUS

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4 Claims. (Cl. 214-519)

1

This invention relates to refuse handling apparatus for use on vehicles employed in collecting garbage, sawdust, leaves, ashes, fertilizer, snow, and other refuse materials.

It is the general object of the present invention to provide refuse handling apparatus which is fully sealed and sanitary but which may be packed full of refuse material to the limit of its capacity.

It is another object of this invention to provide refuse handling apparatus adaptable to handling refuse of different types which may be maintained segregated within the apparatus for separate disposal.

Still another object of this invention is the provision of refuse handling apparatus wherein the refuse may be compacted to a high degree and wherein the refuse contacting mechanism may also be employed to discharge the refuse from the apparatus.

Still another object of this invention is to provide refuse handling apparatus which is labor saving in that it may be loaded and unloaded easily and completely with a minimum of physical effort.

Still another object of this invention is the provision of refuse handling apparatus adapted to compress the refuse and to hold the same in a compressed condition until it is desired to release it, whereupon it may be released easily and effectively.

Another object of this invention is the provision of refuse handling apparatus having therein mechanism for compacting the refuse material and for holding it in a compacted condition, which mechanism will not be fouled or jammed by the refuse material, even though the latter contains wire, metal containers, and similar materials which are difficult to handle.

Still another object of this invention is the provision of refuse handling apparatus which is easily cleaned and efficient in use.

The manner in which the foregoing and other objects of this invention are accomplished will be apparent from the following specification and claims considered together with the accompanying drawings wherein:

Figure 1 is a view in side elevation of the presently described refuse handling apparatus, parts being broken away better to show the construction on the far side of the apparatus.

Figure 2 is a plan view of the apparatus of Figure 1, parts again being broken away better to show the construction;

Figure 3 is a view in front elevation partly in

2

section taken along the lines 3, 3 of Figure 1;

Figure 4 is a vertical sectional view taken along the lines 4, 4 of Figure 1;

Figure 5 is a fragmentary sectional view in elevation taken along the lines 5, 5 of Figure 1; and

Figure 6 is a detail view taken along the lines 6, 6 of Figure 5.

Generally stated, the presently described refuse handling apparatus comprises a body such as a truck or vehicle body having therein a transversely mounted packing plate together with means for reciprocating the packing plate longitudinally of the body. The packing plate is adjustable in that its angle of inclination may be increased or decreased as required to accommodate refuse having varying physical properties and to make certain that, during the packing operation, the refuse is elevated to the top of the body so that it fills the body completely.

The body is sealed to prevent the escape of solid matter, liquids, and unpleasant odors. It has a plurality of doors stationed forwardly and rearwardly in the top and sides for introduction of refuse material into the interior in proper relation to the packing plate, at least two of the doors being in the top and at least two being on each of the sides. Ladders pivotally attached at the top of the body on opposite sides thereof intermediate the doors afford access to the latter.

Associated with the packing plate is a holding plate which is adapted to advance with the packing plate as the latter compresses the refuse material contained in the body. However, as the packing plate is retracted, the holding plate remains in its displaced position and holds the compressed refuse, maintaining it in its compressed condition even though it is jolted by movement of the body while more refuse is being collected. However, the holding plate may be released, retracted and again advanced in conjunction with the packing plate when it is desired to compress a further quantity of the refuse. Then, when it is desired to empty the body, doors which are provided on the rear thereof may be opened and the packing plate used as a ram to expel completely the contents of the body.

To permit segregation of the refuse material, there may be provided an auxiliary packing plate mounted transversely within the body a spaced distance from the first packing plate and connected thereto by suitable means as, for example, by means of properly positioned bars. Then as the first packing plate is reciprocated within

3

the body, the auxiliary packing plate will be reciprocated correspondingly, thus permitting collecting papers and the like in front of one of the plates, while garbage and the like may be collected in front of the other.

Referring now more particularly to the drawings a body 10, which may be a truck or trailer body, is mounted upon the frame 12. Within the body is a floor 14 formed with a well having a perforated section 16. Below the body are compartments 18 for containing salvable material, tools, and the like and a tank 20. The latter is stationed below the perforated section 16 of the floor communicating with the interior of the body through the perforations. Thus it provides a means for draining liquids from the body, these being stored in the tank until such time as it is wished to remove them, when they may be drained out through valve 22. At the rear of the body are the hinged door sections 24 which may be locked in closed position by means of arm 26 with associated catch 28. At the front of the body is the compartment 30 wherein the driving mechanism may be housed in part.

To afford access to the interior of the body, there are provided a plurality of doors in the top and the two sides, these being positioned in pairs. The members of each pair may be spaced apart from each other, one being forwardly and one rearwardly on the body. Thus, in the side, there may be a forward door 32 and a rearward door 34, the former being illustrated open and the latter closed (Figure 1). There also may be a matching set of doors on the opposite side (not illustrated) if desired. Then, on the top, there may be a pair of forwardly located doors 36, 38 and a pair of rearwardly located doors 40, 42. These are illustrated (Figure 2) at least partly open better to reveal the interior construction of the body. All of the doors may be sliding doors, opening from left to right as viewed in the drawings.

To afford access to the interior of the body, particularly through the doors on the roof, there are provided one or more ladders, preferably two, 44, 46. These are pivotally attached to suitable hinges at the top of the body on opposite sides thereof and intermediate the members of the door pairs. Associated with each of the ladders 44, 46 are bracket arms 48, 50, respectively, one end of each of which is pivotally attached to its respective ladder. The other is provided with a pin or other means for engaging one of the catches 52, 54.

Thus, when not in use, the bracket arms may be folded and the ladder swung downwardly against the side of the body as illustrated in the case of ladder 44 (Figure 3). However, when it is desired to use one of the ladders, it may be swung outwardly to the position of ladder 46, each bracket arm engaging the catch with which it is associated. When the ladder is in this position, it is an easy matter to ascend to the top of the body for depositing refuse in a selected one of the top doors. From a safety standpoint, this represents an important advance over the conventional ladders which either are not attached to the body of the vehicle, being merely propped against the same when in use, or are physically attached to the body close to the sides thereof along their entire length.

Within the body, there are provided means for compressing refuse material introduced therein. Such means comprise a first packing plate 60 disposed transversely in the body and substantially codimensional with the transverse interior

4

dimension thereof. The lower portion of the plate preferably is formed with a forwardly extending or scoop portion 62, and the entire plate preferably has a predetermined degree of backward inclination. Then as the plate is advanced against refuse material within the body, the material is forced upwardly so that it completely fills the body.

Means also are provided for mounting the packing plates 60 for longitudinal movement within the body. Screw means are uniquely well suited for this application for several reasons. As compared with cable drives, a screw drive is particularly powerful, and moves the plate with a high degree of precision. In addition, it is safer, there being no danger of snapping the cables, when moving snow, fertilizer, or other heavy materials. Furthermore, there is no jamming or misaligning of the screw drive no matter what the pressure differential across the plate: the body can be made substantially airtight since the screw drive can be contained completely therein; and it is possible to adjust the screw drive to produce any desired degree of inclination of the plate.

Thus there are provided screws at the top portion and bottom portion of the body in threaded engagement with the packing plate, and means for operating the screws independently of each other. It is preferred to employ two pairs of screws, these being stationed one in each of the corners of the body to provide one pair 64, 66 at the top and another pair 68, 70 at the bottom (Figure 4). The screws are suitably mounted longitudinally of the body and are substantially parallel to each other. Thus screw 64 is rotatably mounted in bearing 72 attached to the back wall of the body and bearing 74 attached to the forward wall 76 thereof. Similarly screw 66 is rotatably mounted in bearing 78 attached to the rear wall of the body and bearing 80 attached to the forward wall. Screws 68 and 70 are mounted in analogous manner, screw 68 being rotatably mounted in bearing 82 on the back of the body and bearing 84 on the front thereof.

The manner of driving the screws is apparent particularly from Figure 2. A power takeoff 88 is mounted on the frame 12 of the vehicle and connected suitably to the transmission of the truck to which the body is attached. A coupling 88 connects the power takeoff to a clutch 90 with associated control levers 92, rod 93 and crank 94. Shaft 95 is operated through the clutch and carries a sprocket 96 which, in turn, drives sprocket 98 through chain 100.

Sprocket 98 is rigidly attached to a shaft 102 which is rotatably mounted in bearing 104 attached to the partition 76 and bearing 106 attached to the forward wall of the body.

Shaft 102 carries rigidly affixed thereto sprockets 108, 110. Sprocket 108 is connected to sprocket 112 keyed to screw 68 through chain 114. Sprocket 110 is connected to sprocket 116 rigidly attached to screw 70 through chain 118.

Screw 64 carries on its forward terminal portion a sprocket 120 which is connected through chain 122 to sprocket 124 on screw 68. Similarly sprocket 126 attached to screw 66 is connected through chain 128 to a sprocket on the forward terminal portion of screw 70.

In this manner, it is possible to drive all of the screws at a uniform rate. When clutch 90 is engaged through one of handles 92 actuating the clutch through rod 93 and crank 94, shaft 95 and sprocket 96 are rotated. This, in turn, drives sprocket 98 and shaft 102 through a suitable re-

duction ratio. Thereupon the two bottom screws 68, 70 are driven by horizontal chains 114, 118, respectively. These drive upper screws 64, 66 through vertical chains 122, 128.

Not only does this method of driving the screws make possible driving them at a uniform rate, but it also enables driving the bottom screws independently of the top screws. This may readily be accomplished, for example, by disconnecting chains 122, 128 through the appropriate links thereof provided for this purpose. Then, upon engaging clutch 90, the bottom screws 68, 70 will be rotated while the upper screws 64, 66 will remain stationary. The drive of the upper screws may be resumed, however, upon replacing chains 122, 128.

The screws described above drive packing plate 60 which is attached thereto by suitable means. Thus attached to the upper margin of the packing plate are the perforated tabs or projections 130, 132 (Figure 2). The tabs are connected to the internally threaded members or nuts 134, 136 by means of pins 138, 140 attached to the nuts and penetrating the perforations in the tabs.

The lower part of packing plate 60 is connected to screws 68, 70, in a manner similar to that described above. This construction is illustrated in Figure 1 with reference to screw 70. Projecting rearwardly from the plate 60 and affixed thereto is a perforated tab or projection 142 having therein the slot 144. An internally threaded member or nut 146 having thereon a projection 148 is in threaded engagement with the screw and disposed with the pin 148 extending through slot 144. The construction with respect to screw 68 is substantially matching and is illustrated in part in Figure 4, there being an internally threaded member or nut 150 having projecting therefrom a pin 152 which extends into a slot in a tab not shown but extending rearwardly from the back surface of plate 60 in the same manner as does tab 142.

To protect screws 68, 70 there may be provided the housing or shield members 154, 156, respectively, which enclose the screws and shield them from wire and other interfering refuse material, longitudinal slots being provided, however, for receiving the packing plate pins 148, 152.

Plate 60 is supported suitably by means of glide members, or, preferably, by rollers 158, 160 rotatably mounted on brackets 162, 164, respectively. Thus the plate 60 is mounted for movement longitudinally of the body with turning of the screws, the weight of the plate being supported by the rollers. Furthermore, the plate is adjustable to various inclinations. This is accomplished by uncoupling chains 122, 128 in the manner explained above and direct driving or reversing lower screws 68, 70 independently of upper screws 64, 66.

Associated with the first packing plate 60 is a second or auxiliary plate or ram 170. Like the first packing plate, the second packing plate is mounted transversely of the body for longitudinal movement therein. Its function is to permit segregation of the refuse material as, for example, for separating salvable paper from garbage since, in effect, it divides the body into compartments.

The second packing plate preferably is formed in two sections, 172, 174, reinforced with vertical ribs 176 and tied together by means of rods 178, 180 penetrating registering perforations in the ribs. The plate is supported by shoes or slides

182 which engage the angle of the floor formed as the latter is depressed to form the well therein.

The second packing plate 170 is driven by the first packing plate 60 and spaced apart therefrom by means of a plurality of rods 184. These preferably are disposed in pairs, one pair being at the top of the assembly and another pair at the bottom thereof. The bars 184 are pivotally attached to the rear face of the second packing plate by means of brackets 186 and to the forward face of the first packing plate by means of brackets 188 and pins 190. It will be apparent that, when the second packing plate is thus attached to the first, it will move in unison therewith. However, when pins 190 are removed, the second packing plate may be disconnected from the first and removed from the body entirely. This may be done, for example, when it is not wished to segregate the refuse and a single packing plate within the body suffices.

Also associated with the first packing plate 60 is a holding plate 200 adapted to hold and maintain the refuse in a compressed condition after it has been compacted. This member comprises a flat plate suitably reenforced and extending transversely across the body. It need extend across only the top portion, e. g. the top one-third or one-half of the body, since this suffices to hold the compressed refuse which tends to bale up after having been packed by the packing plate.

On opposite sides of the upper edge of the holding plate are guides 202, 204. These engage respectively tracks 206, 208 attached to the roof of the body and extending substantially the full length thereof. As the packing plate 60 advances toward the rear of the body, it engages the holding plate 200, pushing the latter ahead of it during the compressing operation. Upon retraction of the packing plate, the holding plate may be retracted together therewith if desired, a hook 210 being attached to the packing plate for engaging an eye member 212 attached to the holding plate.

However, when it is desired to maintain the holding plate against the compacted refuse material, latch means for releasably maintaining it in this condition are provided. As is illustrated particularly in Figures 5 and 6, there are stationed on opposite sides of the holding plate suitably positioned bracket members, one of which is indicated at 214. Slidably mounted within each bracket is a latch member 216 with which is associated a spring 218 for urging the latch member normally to an extended position.

The latch members engage notches 220 in the tracks 206, 208. Also, they are provided with means for releasing them from the notches, such as, for example, the flexible connector or cord 222 interconnecting the inner terminal portions of the latches. It will be apparent that, by pulling the cord, both of the latches will be retracted simultaneously from the notches in the tracks so that the holding plate may be moved toward the front of the body. Furthermore, because of the inclined surface provided on the notches, the holding plate may be moved toward the rear of the body without releasing the latches, the latter sliding from notch to notch as the holding plate is pushed rearwardly by the packing plate.

Operation

In operation, the presently described refuse hauling apparatus may be applied, for example, to the transporting of refuse collected by the

7

usual municipal scavenger along a route divided roughly into two sections. The first section may be one in which a relatively large proportion of paper and salvable materials and very little garbage are collected, and the second portion may be one in which garbage is collected almost exclusively. In this situation, the apparatus is driven from stop to stop along the first portion of the route with the first and second packing plates and the holding plate in the position illustrated in Figure 1, i. e. with the second plate operably associated with the first plate and the holding plate in inoperative position, coupled to the first plate by means of the hook 210.

The refuse material then is loaded into the body, the paper being introduced through the rear doors behind the second plate and the minor proportion of garbage which is collected during this portion of the route is introduced through the forward doors ahead of the first plate 60 but behind the second plate 170.

When it is desired to consolidate the paper, clutch 90 is engaged through one of lever arms 92. This drives the screws 64, 66, 68, 70 at a uniform rate, moving the two packing plates and the holding plate rearwardly and moving the paper against the rear wall of the body. After this operation, the motor is reversed and clutch 90 again engaged, whereupon the screws will be rotated in the reverse direction moving the packing plates to the forward end of the body. This leaves the paper piled against the rear doors in the rear compartment and the minor proportion of garbage still intermediate the two packing plates in the forward compartment. This sequence may be repeated as often as necessary to load all of the paper in the body.

The vehicle then is driven to the place of disposal, where the rear doors 24 are opened and the packing plates actuated in the manner described above to push the paper out through the doors.

Next the vehicle is made ready for the second phase of the collecting operation in which garbage is collected exclusively. First the two packing plates are driven toward the rear of the body, the drive being continued until the auxiliary plate 170 has been projected through the rear doors 24. The pins 190 through which the bars 184 associated with the auxiliary packing plate are connected to the first packing plate then are removed, and the auxiliary packing plate removed from the body. It may be taken out in two sections if desired, by first removing transverse rods 178, 180 which hold the two sections together.

The packing plate 60 then is retracted to its position against the front end of the body and the vehicle driven further along the collection route. At the various stops, garbage is introduced into the body through the rear side and top doors, the ladders 44, 46 being swung outwardly and used in this loading operation as desirable or necessary. When the rear portion of the body has been filled as completely as possible, the hook 210 is disengaged from eye 212, thereby disassociating the holding plate 200 from packing plate 60. The latter then is advanced toward the rear of the body by engaging clutch 90, holding plate 200 being driven together with the packing plate. This operation compresses the garbage against the rear wall of the body and also elevates it because of the angle of inclination of the packing plate until the rear portion of the body is filled completely and uniformly

8

from floor to roof. To assist in thus elevating the refuse, no matter what its character, the angle of inclination of the packing plates may be varied by disconnecting chains 122, 128 and driving screws 68, 70 either in a forward or reverse direction to advance or retract the bottom portion of the packing plate independently of the top portion in the manner explained above.

After the garbage has been compressed in the rear portion of the body, the packing plate 60 is retracted to its forward position adjacent the front wall of the body. Since holding plate 200 has been uncoupled, it will not be withdrawn during this operation but will remain firmly in contact with the compressed and baled mass. Expansion of the latter will force the holding plate toward the front of the body until the latches 216 thereon find an opposed pair of notches 220 in the tracks 206, 208 on which the holding plate slides. The movement of the holding plate then will be arrested, and the apparatus will be in position for further loading.

Such loading may be accomplished at further consecutive steps through either the front or rear doors, or both. From time to time as necessary, the added material may be compressed in the rear of the body. This is accomplished by reaching in through one of the doors and pulling on the connecting cable 222, releasing the latches and permitting the holding plate to be withdrawn until it is again adjacent the packing plate 60 ahead of the added garbage. The packing plate 60 then may be operated, compressing the garbage originally loaded as well as the added increment and, at the same time, moving the holding plate against the face of the compressed material. Then, upon retraction of the packing plate, the latches on the holding plate again will find an opposed pair of notches and will hold the plate stationary during further loading of the vehicle, but at a station which is somewhat advanced toward the front of the body over that which it assumed after the first compressing operation. This sequence may be repeated from time to time until the body is filled completely. The vehicle then is driven to the place of disposal, where the rear doors may be opened and the packing plate used as a ram for completely expelling the contents of the body.

It will be apparent that, during the foregoing operations, the body may be kept substantially sealed to prevent the escape of odors, liquids, and pieces of refuse material. The liquids will find their way to the watertight well as the bottom of the body, particularly during the compressing operation, and there they will drain through the perforated section 16 into tank 20. This tank may be drained from time to time through valve 22. In addition, the loading operation may be accomplished safely and with a minimum of effort by using the ladders pivotally attached to the top of the body in conjunction with the plurality of spaced doors at the top and sides thereof.

Thus it will be apparent that, by the present invention, I have provided refuse hauling apparatus which may be applied generally on vehicles employed in collecting refuse of diverse sorts such as garbage, papers, sawdust, leaves, snow, and the like. Furthermore, if desired, the refuse may be maintained segregated within the apparatus for separate disposal. Also, it may be compacted to a high degree within the apparatus, thereby substantially increasing the

capacity thereof, and, after the loading operation has been completed, may be discharged from the apparatus by the packing mechanism. Still further, the apparatus of my invention may be loaded in stages, the refuse being compacted after each stage for elevating it and compressing it to utilize completely the entire capacity of the apparatus, these successive operations being accomplished without fouling or jamming the compacting mechanism. These various advantages may be achieved furthermore while providing a refuse hauling vehicle which is substantially sealed, sanitary, and easily cleaned.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. Refuse handling apparatus comprising a body, a packing plate mounted transversely in the body, an upper screw and a lower screw extending longitudinally of the body, internally threaded members for attaching the packing plate to the screws in threaded engagement therewith, one of the internally threaded members being slotted and adapted to receive in the slot a pin attached to the packing plate, thereby permitting adjustment of the angle of inclination of the packing plate, and means for driving the screws independently of each other, thereby effecting the adjustment of the angle of inclination of the packing plate.

2. Refuse handling apparatus comprising a body, a first packing plate within the body, means for mounting the first packing plate for longitudinal movement within the body, a second packing plate, means for mounting the second packing plate for longitudinal movement within the body, a plurality of bars interconnecting the first and second packing plates for maintaining the same in a spaced distance apart from each other, and means associated with one of the packing plates for reciprocating the same longitudinally within the body, thereby contemporaneously reciprocating the other of the packing plates.

3. Refuse handling apparatus comprising a body, a packing plate disposed transversely within the body, means for reciprocating the pack-

ing plate longitudinally of the body, a holding plate associated with the packing plate and adapted to be displaced thereby against the compressed refuse for holding the same in compressed condition, tracks on opposite sides of the holding plate and having therein a plurality of spaced openings, latches stationed one on each side of the holding plate and adapted to engage the openings on the track, thereby maintaining the holding plate against the compressed refuse material, and means for releasing the latches, thereby permitting movement of the holding plate in a direction away from the compressed refuse material.

4. Refuse handling apparatus comprising a body, a packing plate mounted transversely in the body, screw means at the top portion and bottom portion of the body in threaded engagement with the plate, means for operating the screw means independently of each other for permitting adjustment of the angle of inclination of the plate, a holding plate associated with the packing plate and adapted to be displaced thereby against the compressed refuse for holding the same in compressed condition, latch means for releasably maintaining the holding plate in contact with the compressed refuse when the packing plate is retracted therefrom, a second packing plate mounted transversely within the body, and means for detachably securing the second packing plate to the first packing plate a spaced distance from the latter.

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