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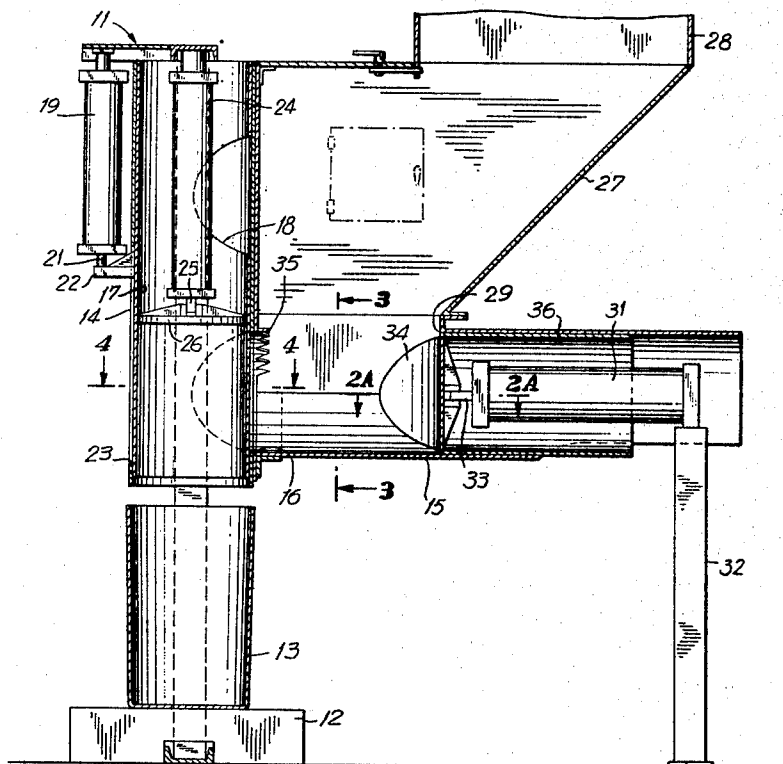
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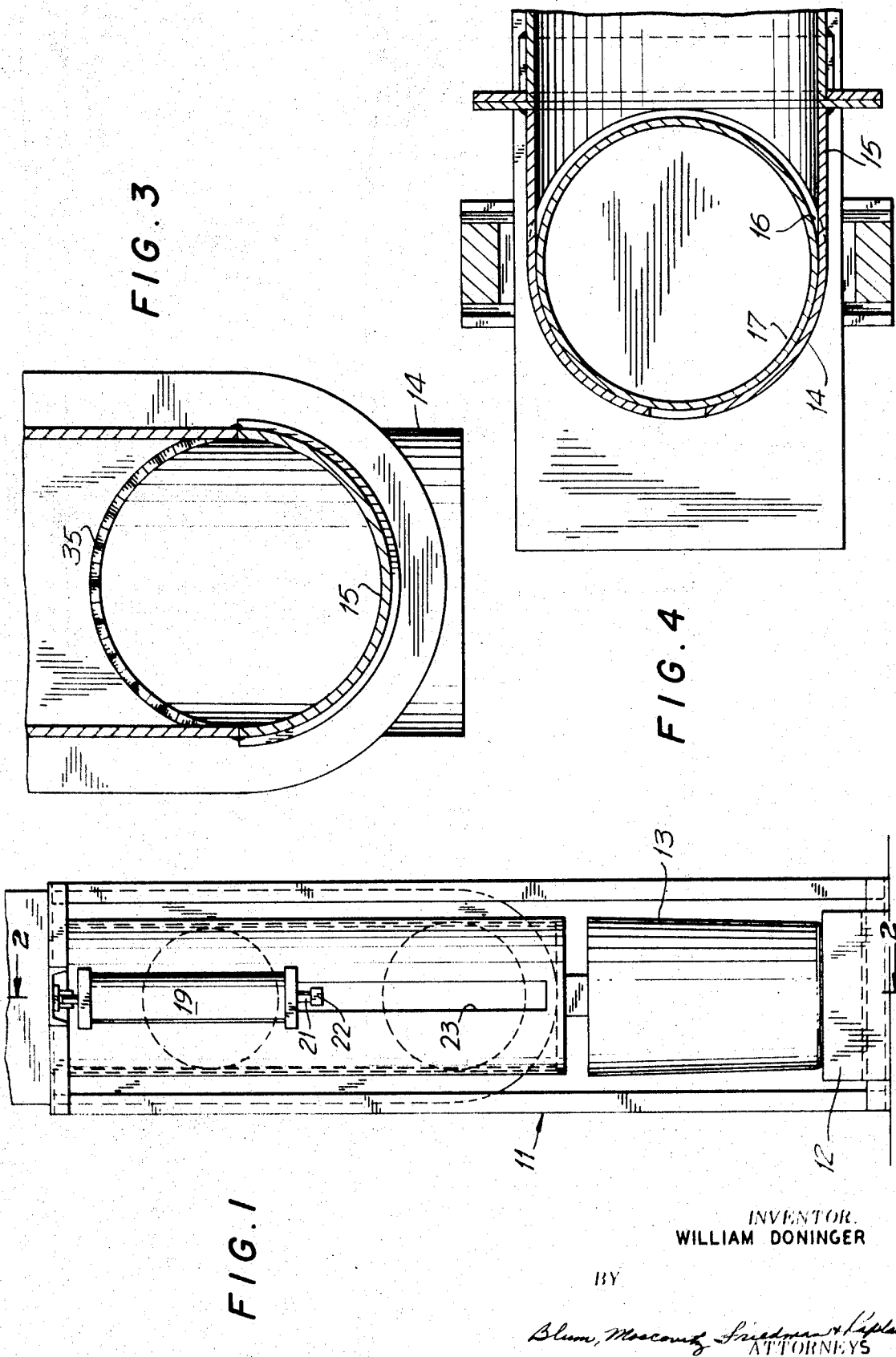
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[54] **GARBAGE COMPACTING APPARATUS**
12 Claims, 11 Drawing Figs.

[52] **U.S. Cl.**..... **100/215;**
53/124; 100/98, 100/229, 100/269; 141/73,
141/249
[51] **Int. Cl.**..... **B30b 15/30**
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97, 269, 98, 229; 141/73, 80, 249; 53/124

ABSTRACT: Garbage compacting apparatus in which garbage is delivered into a first chamber, fed from the first chamber to a second chamber formed by a sleeve which is advanced into a receptacle and compacted in the sleeve within the receptacle. On completion of compaction, the sleeve is retracted from the receptacle and the garbage is ejected from the sleeve to leave the garbage deposited in the receptacle.

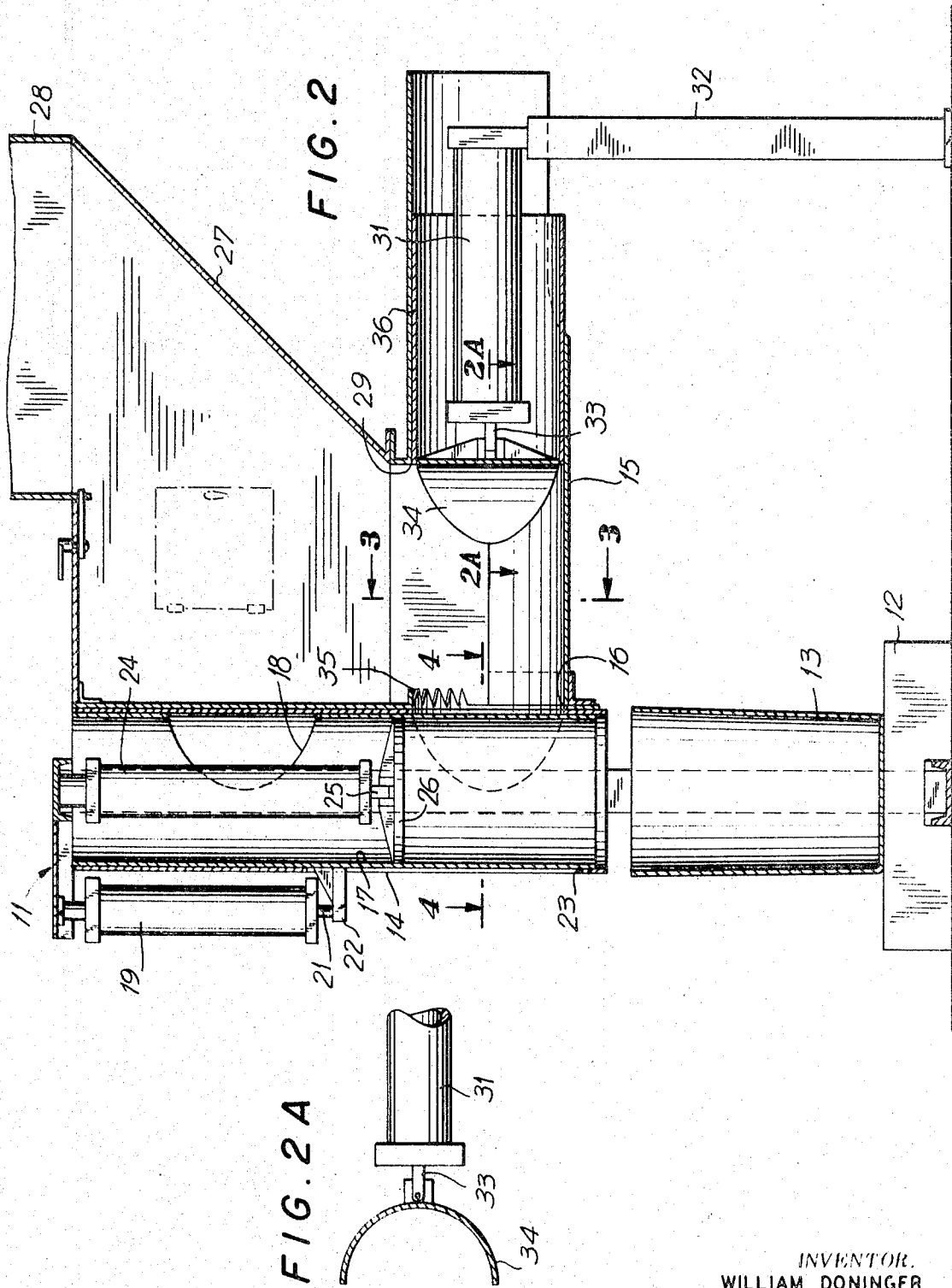




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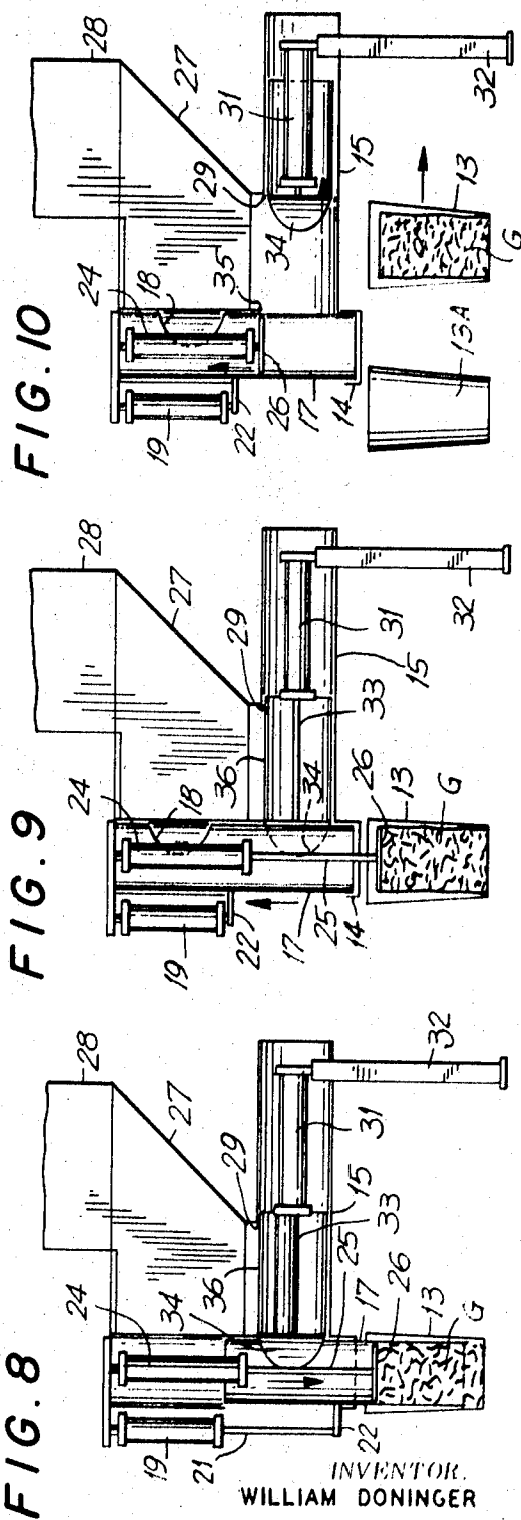
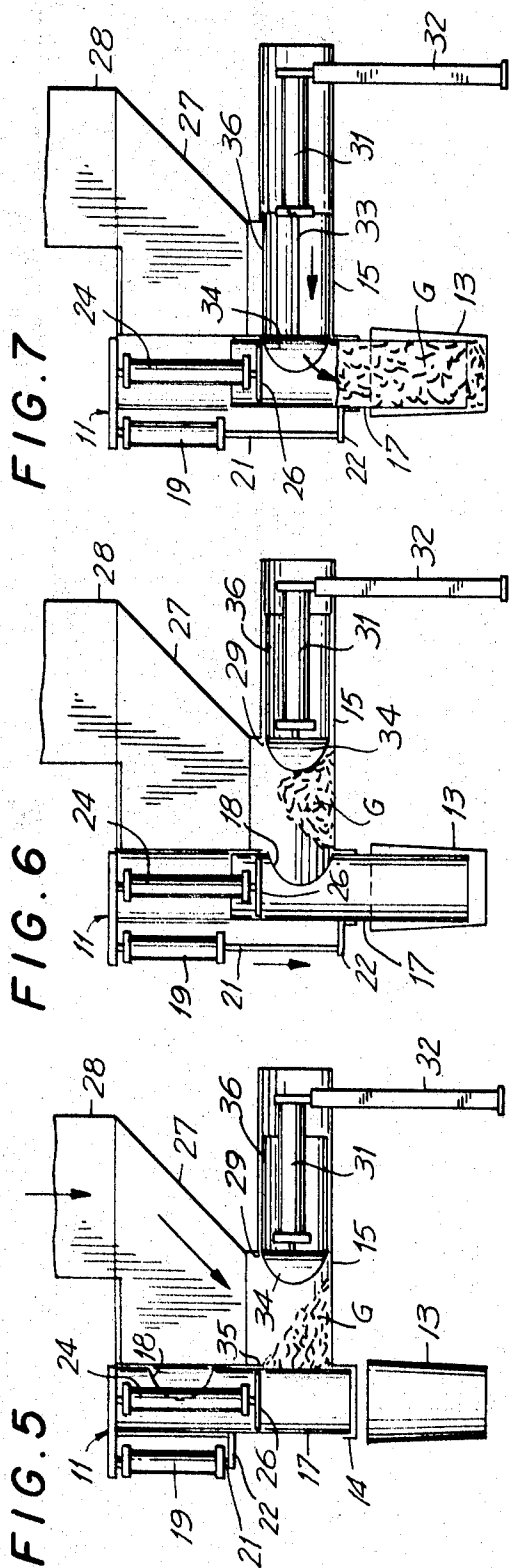
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GARBAGE COMPACTING APPARATUS**BACKGROUND OF THE INVENTION**

This invention relates generally to garbage compacting apparatus. In the art of garbage compaction, garbage has generally been compacted within the compacting apparatus and retained therein until compaction is complete. Thereafter, the compacted garbage is delivered to a receptacle for removal of the garbage. However, in delivering the compacted garbage from the compactor to the receptacle, substantial difficulty has been encountered in eliminating spillage of garbage. Quite often, the compacted garbage acts as if it is being delivered from a nozzle and the garbage spews out and expands to defeat the compaction previously accomplished.

It has also been known in the art to utilize a double chamber arrangement whereby the garbage is delivered to a first chamber and then advanced to a second chamber in which the compaction takes place. However, such devices have not overcome the aforementioned problems.

SUMMARY OF THE INVENTION

Generally speaking, in accordance with the invention, garbage which is generally delivered from a vertical chute, is caused to enter a horizontal chamber in the form of a tube or cylinder. When the loose garbage has filled such first chamber, it is advanced to a vertical chamber so that compaction may take place in a vertical direction or along a vertical axis. The second, vertical chamber is defined by a sleeve extendible from the frame of the apparatus into a receptacle which is placed under the sleeve and which will ultimately be used to carry away the compacted garbage. The sleeve is open ended and is advanced into engagement with or spaced slightly from the bottom of the receptacle and compaction of the garbage delivered from the first chamber takes place in the sleeve against the bottom of the receptacle. After the requisite number of cycles, a slug of garbage of manageable weight is compacted within the sleeve in the receptacle and the sleeve is thereafter withdrawn to leave the slug of garbage in the receptacle whereafter it is carried away and an empty receptacle is placed in its stead.

Accordingly, it is an object of this invention to provide an improved garbage compacting apparatus which will compact the garbage within a receptacle.

Another object of the invention is to provide an improved garbage compacting apparatus including means for compacting garbage in an open ended sleeve.

A further object of the invention is to provide an improved garbage compacting apparatus capable of delivering garbage compacting apparatus capable of delivering garbage to a vertically oriented sleeve which can be advanced into a receptacle such that garbage may be compacted within the receptacle.

Still another object of the invention is to provide an improved garbage compacting apparatus utilizing a first horizontal chamber and a second vertical chamber.

Still other objects and advantages of the invention will in part be obvious and will in part be apparent from the specification.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the invention, reference is had to the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a front elevational view of garbage compacting apparatus constructed in accordance with a preferred embodiment of the instant invention;

FIG. 2 is a side elevational view of the garbage compacting apparatus of FIG. 1;

FIG. 2A is a partial sectional view taken along line 2A-2A of FIG. 2;

FIG. 3 is a partial sectional view taken along line 3-3 of FIG. 2;

FIG. 4 is a partial sectional view taken along line 4-4 of FIG. 2; and

FIGS. 5 through 10 are sequential views showing the steps performed in the compaction of a complete charge of garbage.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1 through 4, a frame indicated generally at 11 is provided with a platform 12 which receives thereon a receptacle 13. The receptacle will normally be the usual type of garbage can used for retaining garbage for pickup by refuse collectors. The apparatus of the instant invention is especially suitable for use in apartment buildings where incineration of the garbage is prohibited, due to air pollution factors and thus the apparatus is especially suitable for use with the standard garbage cans or receptacles which can be carried away by the maintenance man and placed for pickup by the refuse collectors. At this juncture, it is important to note that for manual pickup, only a limited amount of garbage should be compacted for placement in a single receptacle. If the receptacle with the compacted garbage weighs more than 80 pounds, handling by the personnel involved may be difficult. In some locales, refuse collectors can refuse to handle cans weighing more than 80 pounds.

On the other hand, if the garbage is to be compacted and received in a receptacle which will be mechanically picked up, the weight limitation may not be critical.

Platform 12 can take any suitable form and the invention envisions utilization of a turntable, conveyor, or other mechanized arrangement for removing a filled receptacle from the compacting apparatus and delivering an empty receptacle in its place. However, the specific form of platform is not a part of the instant invention and thus no further consideration will be given thereto.

Mounted on frame 11 is an external sleeve 14 having its longitudinal axis vertically oriented. Extending horizontally from sleeve 14 is a sleeve 15 having its longitudinal axis horizontally oriented. The forward end of sleeve 15 communicates with sleeve 14 through a suitable aperture 16 in the surface of sleeve 14.

A slidable sleeve 17 is slidably mounted within sleeve 14 with its longitudinal axis vertically oriented. Sleeve 17 is open at the opposite ends thereof and the sidewall of sleeve 17 facing toward sleeve 15 is also provided with a suitable aperture 18 of substantially the same dimension as the cross section of sleeve 15. Aperture 18 is located proximate the top end of slidable sleeve 17 as best seen in full lines in FIG. 2.

A hydraulic cylinder 19 is mounted to frame 11 and its piston rod 21 is connected by an arm 22 to slidable sleeve 17. An elongated slot 23 is provided in the wall of sleeve 14 to permit passage therethrough of arm 22. By operation of hydraulic cylinder 19, slidable sleeve 17 can be caused to advance and retract with respect to vertical sleeve 14.

The raised or retracted position of slidable sleeve 17 is indicated in full lines in FIG. 2 wherein it will be noted that the lower portion of the wall of sleeve 17 closes off aperture 16 and the communication of the first chamber defined by sleeve 15 with the second chamber defined by sleeves 14 and 17. However, in the advanced position of sleeve 17, aperture 18 will be moved to the phantom line position shown in FIG. 2 thereby permitting communication between the first and second chambers.

A second hydraulic cylinder 24 is carried by frame 11 within sleeves 14 and 17. To the end of piston rod 25 is mounted a piston 26 which performs a compacting operation as will be hereafter described. Piston 26 is slidably mounted within slidable sleeve 17 but its movement is determined relative to frame 11, independently of the movement of sleeve 17.

A chute 27 is secured to a fixed frame member and is open at the top end thereof. For an apartment house installation, the top end of chute 27 would communicate with a main chute 28 which would receive the garbage from the various garbage

drops located throughout the building. The bottom end of chute 27 communicates with horizontal sleeve 15 through a suitable aperture 29 in the horizontal sleeve. In this manner, garbage is delivered into the first chamber defined by horizontal sleeve 15. A third hydraulic cylinder 31 is fixedly mounted with respect to sleeve 15 and it may be supported by a frame member 32. The piston rod 33 of hydraulic cylinder 31 is connected to a piston 34 which will advance the garbage from the first chamber to the second chamber.

The cross-sectional configuration of piston 34 is best seen in FIG. 2A whereby piston 34 is designed to be received in aperture 16 in vertical sleeve 14 to thereby close the aperture when piston 34 is in the advanced condition.

Horizontal sleeve 15 is also provided with a saw tooth edge 35 to aid in severing the garbage as between chute 27 and the first chamber when the garbage is being advanced from the first chamber into the second chamber by piston 34.

The means to control the operation of the mechanical elements has herein been described as a series of hydraulic cylinders. It will, of course, be understood by those skilled in the art that any other suitable mechanical devices could be utilized to accomplish the linear motion necessary for moving slidable sleeve 17 and pistons 26 and 34.

It has not been deemed necessary to show the various hydraulic connections and valves required for effecting flow of hydraulic fluid to and from the various hydraulic cylinders. With knowledge of the operation of the apparatus, as will be hereafter apparent, the operation of the hydraulic circuitry and the valve timing will immediately be apparent to those skilled in the art of hydraulics.

As understanding of the operation of the apparatus hereinabove described can best be gained from the sequential operation shown in FIGS. 5 through 10.

Referring first to FIG. 5, an empty receptacle 13 is placed beneath vertical sleeve 14. With slidable sleeve 17 in the raised position, sleeve 17 will have closed off aperture 16 to thereby prevent delivery of the garbage into the second chamber. Garbage G coming down chute 28 enters horizontal cylinder 15 through chute 27 and aperture 29. The garbage collects in the first chamber defined by horizontal cylinder 15. When sufficient garbage has collected in the first chamber to warrant the commencement of a compacting operation, hydraulic cylinder 19 is operated as shown in FIG. 6 to advance sleeve 17 substantially into engagement with the bottom of receptacle 13. As shown in FIG. 6, it may be desirable to space the leading edge of sleeve 17 slightly above the inside bottom of the receptacle to permit compaction to be accomplished along the entire bottom surface of the receptacle to thereby distribute the forces applied to the receptacle. As shown in FIG. 6, aperture 18 is moved in to a position to communicate with the first chamber and delivery of garbage to the second chamber defined by slidable sleeve 17 and receptacle 13 can now take place.

Turning now to FIG. 7, hydraulic cylinder 31 is operated to advance piston 34 and deliver the garbage G from the first chamber to the second chamber whereby the garbage falls, by gravity, to the bottom of the second chamber. Referring momentarily to FIG. 2, it is noted that extending rearwardly of piston 34 is a skirt 36 which closes off aperture 29 when the piston is advanced to prevent any garbage falling into chute 27 from entering behind the piston. In other words, when piston 34 is advanced, all garbage newly delivered to chute 27 will remain therein. Also, piston 34 and skirt 36 cooperate with saw teeth 35 to cause a severing of any long objects, such as cans, bottles, sticks, etc. that may be located partially within the first chamber and partially within chute 27.

Referring again to FIG. 7, it is noted that, in the advanced condition of piston 34, the piston closes off the opening in vertical sleeve 14 defined by aperture 16 to thereby prevent any possible movement of garbage from the second chamber, back to the first chamber.

Moving now to FIG. 8, the actual compaction of garbage takes place as a result of operation of hydraulic cylinder 24.

Piston 26 moves downwardly and tightly and under high pressure compacts the garbage located at the bottom of receptacle 13 and within sleeve 17. One charge of garbage from the first chamber to the second chamber and the compaction of such charge is normally insufficient to fill the receptacle with the optimum volume and weight of garbage. Thus, after compaction has taken place, piston 26 is withdrawn to the FIG. 6 position and piston 34 is also withdrawn to the FIG. 6 position allowing a new charge of garbage to enter the first chamber and be advanced to the second chamber by the operation shown in FIG. 7 and be compacted by the operation shown in FIG. 8. Note that sleeve 17 was not withdrawn but remained in the position shown in FIG. 6. The cycles of FIGS. 6, 7 and 8 repeat continuously until the receptacle has been filled with the desired amount of garbage. For apartment installations, the principal factor will be weight and thus suitable means can be provided for weighing each receptacle when it is in place and signaling commencement of the final steps.

When compaction is complete, sleeve 17 is withdrawn to the position shown in FIG. 9. However, piston 26 remains in the advanced position in order to strip the garbage from sleeve 17 as the sleeve is retracted. In this manner, the garbage is held within the receptacle in compacted condition thereby substantially eliminating all possibility of spillage of the compacted garbage. Note that, in the raised or retracted position of sleeve 17, aperture 18 is removed from alignment with the first chamber and thus piston 34 can be retracted at any time after retraction of sleeve 17. As the final step, piston 26 is retracted as shown in FIG. 10 and the entire apparatus has been returned to the FIG. 5 condition. The filled receptacle 13 is moved off for the garbage to be carted away and an empty receptacle 13a is moved into position for a repeat of the cycle.

An important part of the instant invention resides in the fact that, except possibly at the bottom of the container, the garbage is not compacted against the walls of the container and forced into tight engagement with the walls thereof. If compaction were to take place directly within the container, the garbage would be so tightly adhered and pressed against the walls of the container that it would be virtually impossible for the sanitation men to dump the slug of garbage from the receptacle. As is evident in FIGS. 9 and 10, the slug of garbage is spaced from the walls of the receptacle whereby the sanitation men can easily dump the slug from the receptacle.

It is contemplated that the sequence of steps described above in connection with FIGS. 5 through 10 will be performed automatically. For example, a suitable photoelectric cell would be used to indicate when the first chamber is filled in order to commence the operation. Once the operation has commenced, it would continue through to the step shown in FIG. 8 and thereafter return to FIG. 6. The steps performed in FIGS. 6 through 8 would continue to take place so long as the first chamber continually is refilled from the main chute as sensed by the photoelectric device. As noted above, when the slug of garbage compacted reaches a certain weight limit, suitable weighing means would commence the completion of the steps shown in FIGS. 9 and 10.

Numerous automatic sequencing systems could be utilized to provide various degrees of automation of the apparatus of the instant invention. Since the specific devices and circuitry are well within the skill of those in the art, it has been deemed unnecessary to disclose such circuitry and devices in detail. The apparatus of the instant invention is suitable for any degree of automation including full manual operation and thus automatic sequencing devices and circuitry are not considered to form a part of the invention described hereinabove.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above construction without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. Garbage compacting apparatus for compacting garbage within a receptacle, comprising a frame including an external sleeve, a slideable sleeve slideably mounted on said frame within said external sleeve, operating means operatively connected to said slideable sleeve for advancing and retracting said slideable sleeve respectively toward and from a wall of the receptacle, means for delivering garbage to within said slideable sleeve including access openings communicating with each of said external and slideable sleeves, and compaction means operatively associated with said slideable sleeve for compacting garbage within said slideable sleeve against said wall of the receptacle, said access opening in said slideable sleeve communicating with said access opening in said external sleeve when said slideable sleeve is in an advanced position, said slideable sleeve closing said access opening in said external sleeve when said slideable sleeve is in a retracted position.

2. Garbage compacting apparatus as claimed in claim 1 wherein said compaction means includes a piston slidably mounted within said slidable sleeve and power means for moving said piston along the longitudinal axis of said slidable sleeve.

3. Garbage compacting apparatus as claimed in claim 1 wherein said slidable and external sleeves have their longitudinal axis vertically oriented and said means for delivering garbage includes a horizontal sleeve having its longitudinal axis horizontally oriented, one end of said horizontal sleeve communicating with said access opening in said external sleeve.

4. Garbage compacting apparatus as claimed in claim 3 wherein said access openings in said slidable and external sleeves extend through the sidewalls thereof, said horizontal sleeve having an end thereof joined to said external sleeve surrounding said access opening in said external sleeve.

5. Garbage compacting apparatus as claimed in claim 4 wherein said means for delivering garbage includes a second piston slidably mounted in said horizontal sleeve and power means for moving said second piston along the longitudinal axis of said horizontal sleeve.

6. Garbage compacting apparatus as claimed in claim 5 wherein said means for delivering garbage includes a chute communicating with said horizontal sleeve through an access opening through the sidewall thereof, said second piston including a skirt overlying at least a portion of the internal wall of said horizontal cylinder whereby to close off said access opening through said horizontal cylinder when said second

piston is in an advanced position.

7. Garbage compacting apparatus as claimed in claim 5 wherein the size and configuration of the surface of said second piston is substantially that of the size and configuration of said access opening in said external sleeve whereby to close said access opening in said external sleeve when said second piston is in an advanced position.

8. Garbage compacting apparatus for compacting garbage within a receptacle comprising a frame, an external sleeve mounted on said frame, a first access opening in the sidewall of said external sleeve, a slidable sleeve slidably mounted in said external sleeve, a second access opening in the sidewall of said slidable sleeve, said sidewall of said slidable sleeve overlying said first access opening to close off same when said slidable sleeve is in a retracted position, said second access opening communicating with said first access opening when said slidable sleeve is in an advanced position, operating means acting between said frame and said slidable sleeve for effecting advancement and retraction of said slidable sleeve with respect to said external sleeve, a piston movably mounted within said slidable sleeve, power means cooperating between said piston and said frame for moving said piston, and means for delivering garbage to within said slidable sleeve through said first and second access openings.

9. Garbage compacting apparatus as claimed in claim 8 wherein said last named means includes a fixed sleeve having an end thereof joined to said external sleeve, a third access opening in the sidewall of said fixed sleeve, a second piston movably mounted within said fixed sleeve, and second power means cooperating between said fixed sleeve and said second piston for moving said piston toward and from said first access opening.

10. Garbage compacting apparatus as claimed in claim 9 wherein said second piston includes a skirt extending in a direction away from said first access opening, said skirt overlying said third access opening when said second piston is moved toward said first access opening.

11. Garbage compacting apparatus as claimed in claim 9 wherein the size and configuration of the surface of said second piston is substantially that of the size and configuration of said first access opening.

12. Garbage compacting apparatus as claimed in claim 9 wherein the longitudinal axes of said external and slidable sleeves are substantially vertically oriented and the longitudinal axis of said fixed sleeve is substantially horizontally oriented.

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