Jan. 31, 1967 M. CLAR 3,301,414

COMPACTION CONTAINERS WITH MATERIAL DEFLECTOR

Filed Dec. 14, 1965 3 Sheets-Sheet 1

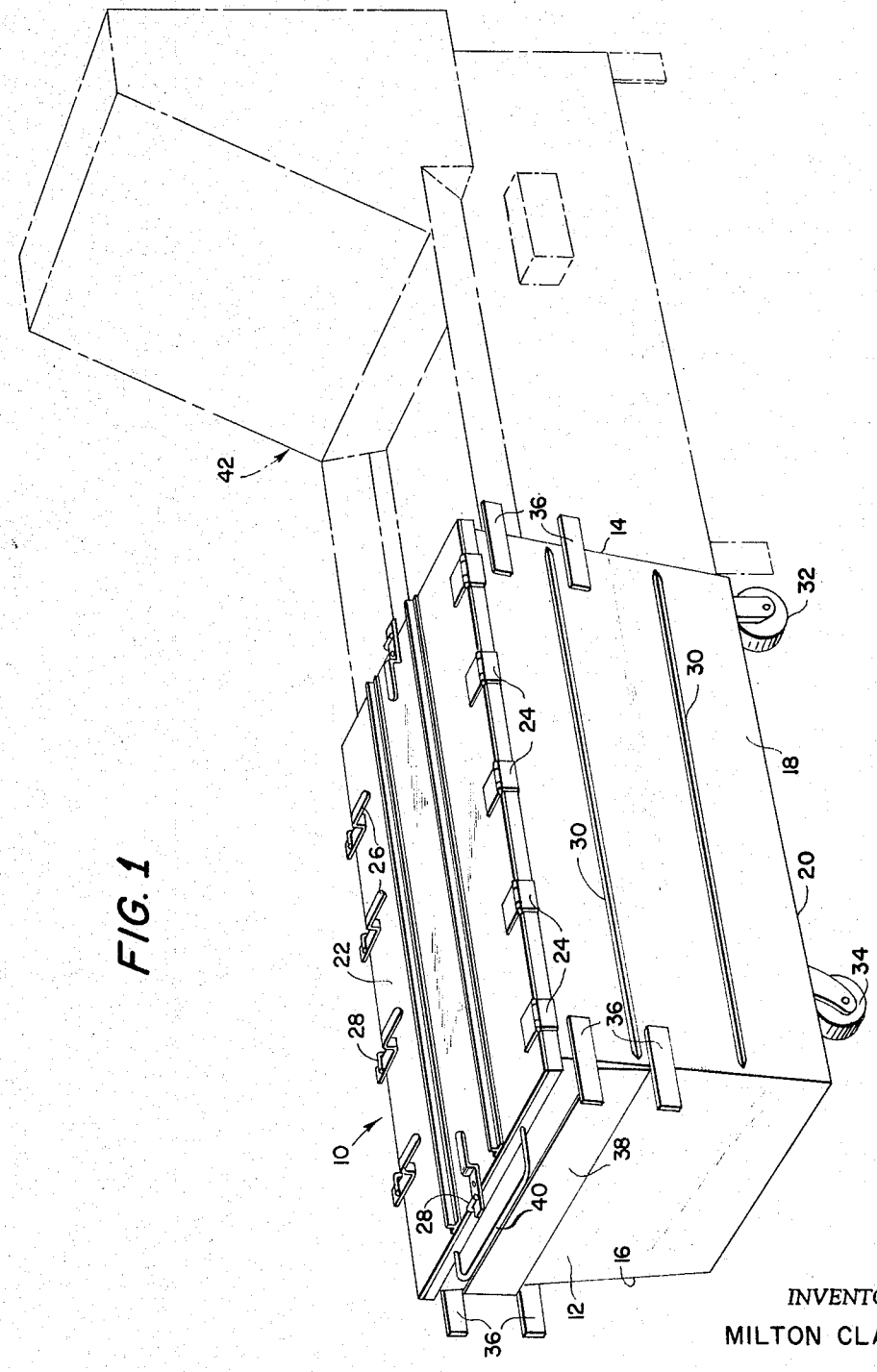

FIG. 1

INVENTOR
MILTON CLAR

BY Shapiro and Shapiro

ATTORNEYS

Jan. 31, 1967 M. CLAR 3,301,414

COMPACTION CONTAINERS WITH MATERIAL DEFLECTOR

Filed Dec. 14, 1965 3 Sheets-Sheet 2

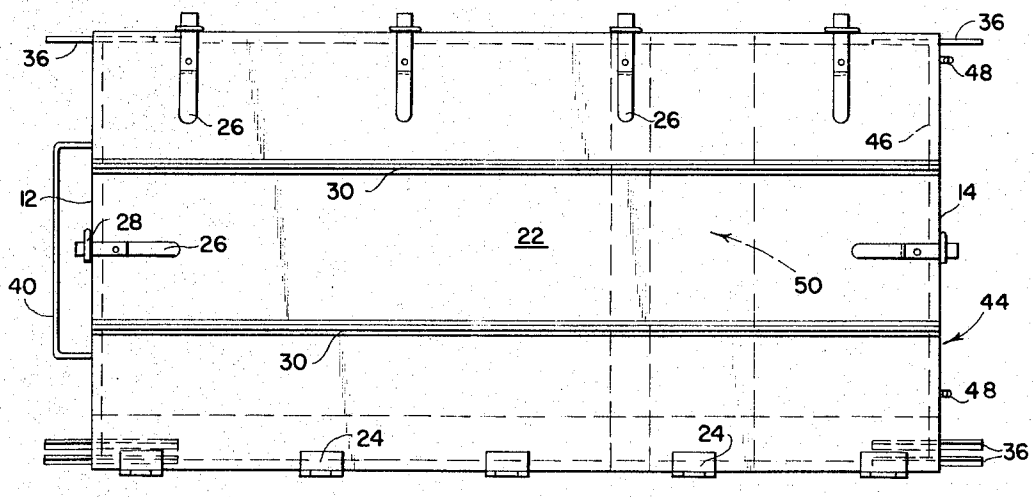

FIG. 2

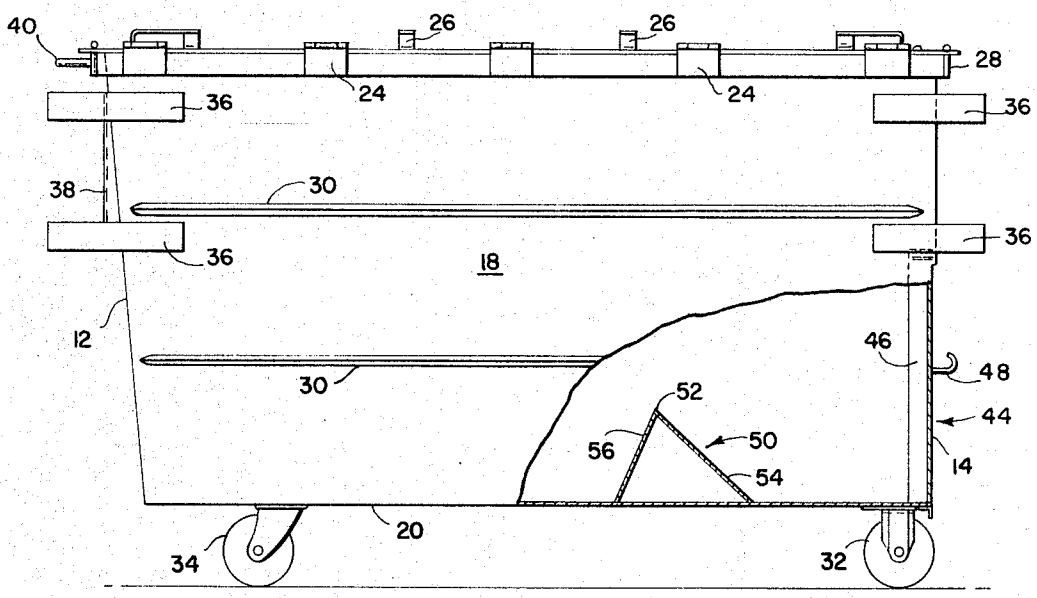

FIG. 3

INVENTOR
MILTON CLAR

BY Shapiro and Shapiro

ATTORNEYS

Jan. 31, 1967 M. CLAR 3,301,414

COMPACTION CONTAINERS WITH MATERIAL DEFLECTOR

Filed Dec. 14, 1965 3 Sheets-Sheet 3

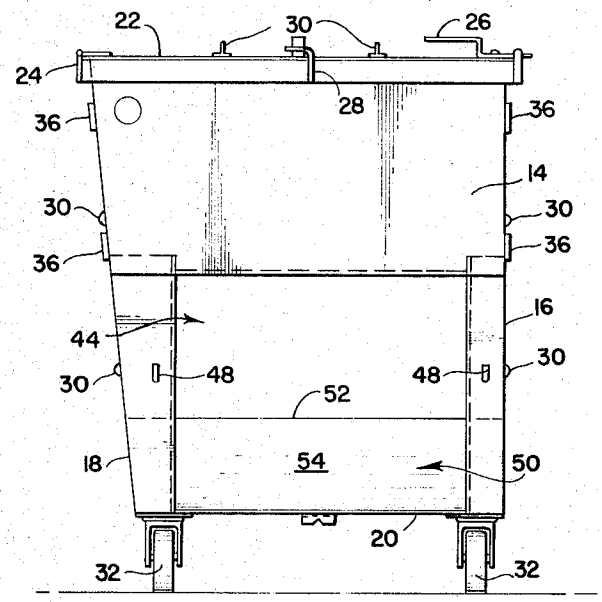

FIG. 4

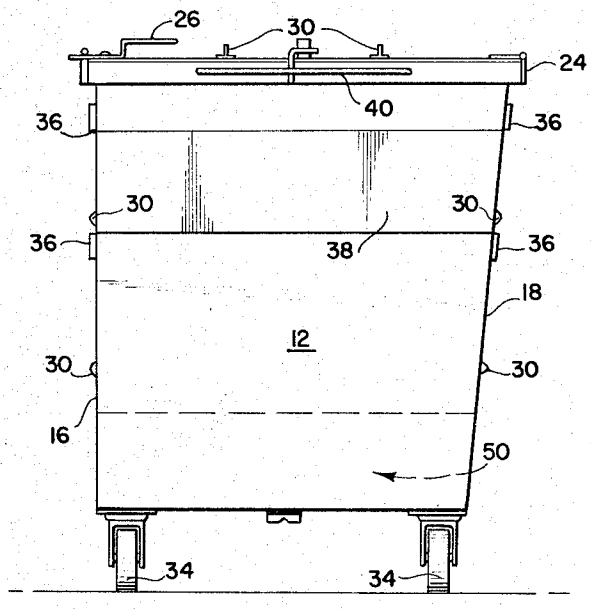

FIG. 5

INVENTOR
MILTON CLAR

BY Shapiro and Shapiro
ATTORNEYS

United States Patent Office 3,301,414
Patented Jan. 31, 1967

3,301,414

COMPACTION CONTAINER WITH MATERIAL DEFLECTOR

Milton Clar, Bethesda, Md., assignor, by mesne assignments, to Disposal Systems Development, Inc., Washington, D.C., a corporation of the District of Columbia

Filed Dec. 14, 1965, Ser. No. 513,729
10 Claims. (Cl. 214—41)

This invention relates to compaction containers and more particularly to detachable containers for use with stationary compaction apparatus.

In applicant's co-pending application, Serial No. 350,325, filed March 9, 1964, now Patent No. 3,231,107 issued January 25, 1966, apparatus is disclosed in which a container supported upon wheels is detachably connected to a stationary packer. The container is constructed and arranged so that material, such as refuse, may be moved into the container through an opening in an end wall thereof by a compaction blade forming a part of the packer and so that when filled with compacted material, the container may be separated from the packer, engaged with the lifting mechanism of a self-loading vehicle, and emptied through its top, which is temporarily opened for this purpose.

It is a principal object of the invention to provide an improved container especially adapted for use in the foregoing environment.

In order to realize fully the advantages of a stationary packer and detachable container combination, it is essential that the container be substantially completely filled before it is emptied and that the material be compacted with substantially uniform compaction density and without voids. Because of practical restrictions upon the dimensions of the compaction blade and hence the size of the outlet of the compaction chamber, the inlet opening for admitting material to the container through an end wall thereof is substantially shorter than the end wall. Accordingly, the compacted material tends to accumulate near the bottom of the container, leaving voids in the compacted material in the upper portion of the container, especially in the material adjacent to the said end wall, and resulting in wide variation of the density of compacted material and inefficient use of the container volume.

Somewhat similar problems have existed in the bodies of some compaction vehicles, and attempts have been made to solve such problems by, for example, providing an incline extending upwardly from the bottom wall of the body storage chamber to the end wall opposite the inlet opening or by providing an incline leading upwardly from the inlet opening to the bottom of the body storage chamber, which is elevated above the bottom of the incline. Such schemes have achieved some success in their stated environments but do not provide the desired solution to the aforementioned problems in detachable compaction containers of the type described above.

In a detachable compaction container it is essential that substantially the entire volume of the container be utilized to the maximum extent, because of practical limitations upon the size of the container which can be conveniently located in and moved into and out of a building in which the stationary packer may be located and which can be handled by the type of self-loading vehicle with which the container is to be used.

Because several containers are usually provided for each installation, to minimize the number of service trips required of the collection vehicle, it is important that the cost of the containers be kept reasonable notwithstanding the fact that the strength of the containers must be sufficient to accommodate the compaction loads. Also, the interior configuration of the containers must facilitate the

complete emptying of the container contents when the top wall of the container is opened and the container is inverted into the body of the collection vehicle.

The cost of providing a smoothly curved inclined baffle extending from the bottom wall of the container to the end wall opposite the inlet opening, as described in the aforementioned co-pending application, is higher than may be justified. Moreover such a construction does not provide desired pre-compaction.

An incline leading from the inlet opening of the container to an elevated bottom produces undesirable abrupt back pressures on the compaction blade, reduces the effective volume of the container, and still leaves compaction voids if prior teachings are followed.

In accordance with the improvement of the present invention, a wedge-shaped material deflector is provided interiorly of the compaction container. Because of the construction and features to be set forth hereinafter, the deflector adds little to the cost and weight of the container, does not significantly reduce the useful volume of the container, provides pre-compaction while "cushioning" the compaction blade, and provides the desired efficient utilization of the container volume.

The foregoing and other objects, advantages, and features of the invention, and the manner in which the same are accomplished will become more fully apparent upon consideration of the following detailed description of the invention taken in conjunction with the accompanying drawings, which illustrate a preferred and exemplary embodiment, and wherein:

FIGURE 1 is a perspective view illustrating the association of a container of the invention with a stationary packer (shown in phantom lines);

FIGURE 2 is a top plan view of the container;

FIGURE 3 is a side elevation view of the container partially broken away to show the internal construction, especially the deflector;

FIGURE 4 is an end elevation view showing the inlet opening of the container; and

FIGURE 5 is an end elevation view showing the end of the container opposite the inlet opening.

Referring to the drawings, and initially to FIGURE 1 thereof, a container **10** of the invention is of generally rectangular configuration and has a pair of spaced end walls **12** and **14**, a pair of spaced side walls **16** and **18**, a bottom wall **20**, and a top wall **22**. Side wall **16** may be vertical, as is end wall **14**, but side wall **18** diverges upwardly with respect to side wall **16**, and side wall **12** diverges upwardly with respect to side wall **14**, so that the horizontal cross-section of the container increases in area from the bottom to the top of the container. This facilitates emptying of the container when it is inverted.

The top wall is pivotally supported by hinges **24** at one side extremity thereof and is provided with a plurality of pivoting latches **26** which engage keepers **28** attached to the appropriate side and end walls. This arrangement of the top wall or cover is well known in the art and permits the top wall to be held closed and yet to be opened when desired for emptying the container through its top. The top wall is reinforced by longitudinal beads or braces **30**, and similar braces are used to reinforce other walls as shown. Other cover configurations, such as those having separately pivoting sections, may also be used.

The container is supported upon four wheels, a pair of wheels **32** adjacent to end wall **14** having fixed orientation and a pair of wheels **34** adjacent to end wall **12** being constructed to swivel. Other means for permitting translational movement of the container may be employed.

In order to permit the container to be lifted and emptied into the body of a self-loading vehicle, suitable elements must be provided exteriorly of the container to engage the lifting mechanism of the vehicle. Different types of

such elements are employed depending upon the type and manufacturer of the vehicle. In the illustrative form the container is to be engaged with a front loader, such as that manufactured by Hercules Galion of Galion, Ohio, having well known lifting arms or forks. These forks enter between pairs of bar elements **36** which are mounted upon the side walls and project beyond the adjacent end walls. The forks of the front loader are approximately horizontal and spaced apart a distance slightly greater than the distance between the end walls at the level of the elements **36**, so that the forks may be inserted between elements **36** at one side wall and extended along the end walls and between the elements **36** at the other side wall to embrace the container in a well known manner. Because of the slope of end wall **12** a vertical plate **38** is fixed between elements **36** at end wall **12** to provide the proper guidance of the lifting forks.

A U-shaped horizontal handle **40** projects from end wall **12** to facilitate pulling and pushing of the container.

In FIGURE 1 the container **10** is shown associated with a stationary packer **42**, which may be the type described in the aforesaid co-pending application. In general, stationary packers utilized in the refuse collection industry have a vertical compaction blade which moves horizontally along a path perpendicular to its surface and through a compaction chamber into which refuse or other material is admitted. The top of the compaction chamber may have an opening for receiving the material, the opening being closed when the blade is extended to compact the material. The compaction chamber has an opening at one end thereof through which the material is forced into an associated inlet opening of the compaction container.

The inlet opening of the compaction container of the invention is shown in FIGURE 4 at **44**. The opening is rectangular, extending upwardly from the bottom wall of the container and having less height and slightly less width than the side wall **14** of the container, which the opening penetrates. The opening may have a surrounding lip or collar **46** (see FIGURE 3) constituted by strips extending inwardly from the side and top edges of the opening and by the bottom wall of the container.

In order to maintain the container in position with the inlet opening of the container aligned with the outlet opening of the packer, suitable connector elements, such as the hooks **48** projecting from reinforced sections of end wall **14**, are provided. These hooks engage cooperating elements, such as chains or load binders, of the stationary packer as is well known in the art. The stationary packer may have a collar projecting outwardly around its outlet opening and which is inserted into the inlet opening **44** of the container when the container and the packer are connected. When the container is disconnected from the packer, a suitable closure is placed across the opening **44** in a well known manner to prevent spillage of the compacted material.

It is thus apparent that in the use of a compaction container of the type described so far, material is moved through the opening **44** by the blade of the packer, which preferably enters the container to the extent of a few inches. With successive strokes of the compaction blade, the container gradually fills up. In the absence of any internal modification of the container, the compacted material will tend to collect more or less along an extension of the path of the blade, and although eventually the level of material in the container will rise above the blade, the density of the material will be much greater toward the bottom of the container, and the material adjacent to the end wall **14** above opening **44** may actually be so loosely packed as to leave voids. Such utilization of the container is inefficient at best.

In accordance with the invention a wedge-shaped deflector **50** is provided to overcome this problem. As shown in FIGURE 3, the deflector has an apex **52** and a pair of inclines or inclined walls **54** and **56** extending downwardly from the apex to the bottom wall of the container. The walls **54** and **56** extend entirely across the container from one side wall to the other and are connected thereto as well as to the bottom wall.

The inclination of wall **56** is chosen to provide sufficient supporting or gussetting action for the deflector to accommodate the pressure exerted upon the deflector during compaction, and yet this wall does not extend greatly in the direction of end wall **12** of the container. The useful volume of the container is thus not significantly reduced by wall **56**, but the wedge is strong enough without requiring internal bracing and may be completely hollow to minimize cost and weight.

Incline **54** faces opening **44**. The lower extremity of this incline is spaced inwardly from the opening **44**, and the incline extends upwardly away from opening **44** to the apex line **52**. The angle of inclination of wall **54** must be great enough to provide desired deflection of the compacted material upwardly (and toward end wall **14** as the container becomes filled) and yet the deflector must not exert undue back pressure upon the compaction blade. For these reasons a substantial angle of inclination is employed but the lower extremity of wall **54** is spaced inwardly a substantial distance from the inlet opening **44**. Nevertheless, if the wedge were too far from opening **44**, it would not be effective to prevent voids near end wall **14**, and if the apex **52** were too high relative to the height of the inlet opening, the back pressure upon the compaction blade would be undesirably high and voids would tend to occur between the wedge and end wall **12**.

Applicant has discovered an optimum relationship between the deflector **50** and the container walls which serves all of the purposes of the invention admirably. It has been found that the distance between the apex **52** and the end wall **14** should be about one-third the total distance between the end walls. The height of the apex **52** above the bottom wall should be about 40% of the height of the opening and about 20% of the total internal height of the container. The distance of the lower extremity of wall **54** from end wall **14** should be about three-fifths of the distance of apex **52** from end wall **14**. The included angle of the wedge between wall **54** and bottom wall **20** should be about forty-two degrees, and the included angle between wall **56** and the bottom wall should be about seventy-five degrees. With this construction the container fills substantially completely and with substantially uniform compaction density. Precompaction is obtained between the deflector and opening **44**, yet the material in this region gives cushioning to reduce abrupt back pressures on the compaction blade.

In a container constructed for optimum operation in accordance with the invention, the length of the container between the top edges of side walls **12** and **14** was seventy-two inches, and between the bottom edges was sixty-nine and three-quarters inches. The height of the side walls and the end walls was thirty-nine and three-eighths inches. The width of the container between the bottom edges of the side walls was thirty-two inches and between the top edges of the side walls was thirty-five and a quarter inches. The height of opening **44** was twenty and three-quarters inches and the width was twenty-five and one-half inches. Collar **46** extended two inches into the containers. The apex **52** of the deflector was positioned twenty-four inches from end wall **14**. Incline wall **54** was eleven and three-quarters inches long from apex to lower extremity, which was fifteen and one-quarter inches from end wall **14**. Incline wall **56** was eight and one-quarter inches long from apex to lower extremity, which was eleven inches from the lower extremity of wall **54**. The height of apex **52** above the bottom wall was eight inches. The end, bottom, and side walls were formed of fourteen gauge steel, the cover of seven gauge steel, and the portions of end wall **14** on each side of the opening **44** (to which the hooks **48** were attached) were reinforced by panels of seven gauge steel. The deflector walls were formed of twelve gauge steel.

While a preferred embodiment of the invention has

been shown and described, it will be apparent to those skilled in the art that changes can be made in this embodiment without departing from the principles and spirit of the invention, the scope of which is defined in the appended claims. Accordingly, the foregoing embodiment is to be considered illustrative, rather than restrictive of the invention, and those modifications which come within the meaning and range of equivalents of the claims are to be included therein.

The invention claimed is:

1. A compaction container having a pair of spaced side walls, a pair of spaced end walls, a bottom wall, and a top wall, one of said end walls having an opening adjacent to said bottom wall through which material to be compacted may be moved and having a substantial stationary portion extending upwardly above said opening, and a deflector for said material having an incline extending upwardly from said bottom wall away from said opening, said incline having its lower extremity spaced inwardly from said opening and having its upper extremity spaced from the other end wall and from said top wall at a level well above the lower extremity of said opening, said deflector being wedge-shaped and having an apex with said incline and another wall extending downwardly therefrom, the apex of said deflector being spaced from said one end wall a distance about one-third of the total distance between said end walls, and the height of said apex above said bottom wall being about 40% of the height of said opening above said bottom wall, whereby material moved through said opening is deflected upwardly by said deflector and whereby substantially the entire volume of said container, including the portion adjacent to said one end wall, may be filled with compacted material.

2. A compaction container having a pair of spaced side walls, a pair of spaced end walls, a bottom wall, and a top wall, one of said end walls having an opening adjacent to said bottom wall through which material to be compacted may be moved and having a substantial stationary portion extending upwardly above said opening, and a deflector for said material having an incline extending upwardly from said bottom wall away from said opening, said incline having its lower extremity spaced inwardly from said opening and having its upper extremity spaced from the other end wall and from said top wall at a level well above the lower extremity of said opening, said deflector being wedge-shaped and having an apex with said incline and another wall extending downwardly therefrom, said deflector extending from one side wall to the other, and the ratio of the distances from said bottom wall to said apex along said incline and along said other deflector wall being about 11 to 8, whereby material moved through said opening is deflected upwardly by said deflector and whereby substantially the entire volume of said container, including the portion adjacent to said one end wall, may be filled with compacted material.

3. A compaction container having a pair of spaced side walls, a pair of spaced end walls, a bottom wall, and a top wall, one of said end walls having an opening adjacent to said bottom wall through which material to be compacted may be moved and having a substantial stationary portion extending upwardly above said opening, and a deflector for said material having an incline extending upwardly from said bottom wall away from said opening, said incline having its lower extremity spaced inwardly from said opening and having its upper extremity spaced from the other end wall and from said top wall at a level well above the lower extremity of said opening, said deflector being wedge-shaped and having an apex with said incline and another wall extending downwardly therefrom, the included angle of the incline with respect to said bottom wall being about 42°, the included angle of the other wall of the deflector with respect to the bottom wall being substantially greater, the distance between said apex and said one end wall being about one-third the distance between said end walls, and the distance between the lower extremity of the incline and said one end wall being about three-fifths the distance between said apex and said one end wall, whereby material moved through said opening is deflected upwardly by said deflector and whereby substantially the entire volume of said container, including the portion adjacent to said one end wall, may be filled with compacted material.

4. A compaction container having a pair of spaced side walls, a pair of spaced end walls, a bottom wall, and a top wall, one of said end walls having an opening adjacent to said bottom wall through which material to be compacted may be moved and having a substantial stationary portion extending upwardly above said opening, and a deflector for said material having an incline extending upwardly from said bottom wall away from said opening, said incline having its lower extremity spaced inwardly from said opening and having its upper extremity spaced from the other end wall and from said top wall at a level well above the lower extremity of said opening, said deflector being wedge-shaped and having an apex with said incline and another wall extending downwardly therefrom, whereby material moved through said opening is deflected upwardly by said deflector and whereby substantially the entire volume of said container, including the portion adjacent to said one end wall may be filled with compacted material, said container being supported upon wheels, said top wall having means permitting it to be opened and to be maintained closed, said container having external elements adapted to engage the lifting elements of a self-loading vehicle to permit the container to be lifted and inverted for emptying the same, at least said end walls or said side walls diverging upwardly to facilitate emptying of the container, and said container having elements for detachably connecting the container to a compaction apparatus with said opening in said one end wall adjacent to said apparatus.

5. The container of claim 4, said opening being rectangular and having a surrounding collar.

6. A compaction container having a pair of spaced side walls, a pair of spaced end walls, a bottom wall, and a top wall, one of said end walls having an opening adjacent to said bottom wall through which material to be compacted may be moved by a compaction blade and having a substantial stationary portion extending upwardly above said opening, and means for deflecting upwardly material moved through said opening to fill with compacted material substantially the entire volume of said container, including the portion adjacent to said one end wall, and for providing pre-compaction of said material and blade cushioning, said means comprising a deflector having an incline extending upwardly from said bottom wall and away from said opening, said incline having its lower extremity spaced inwardly a substantial distance from said opening and having its upper extremity at a level substantially above the lower extremity of said opening, substantially below the upper extremity of said opening, and spaced from said top wall, said bottom wall, and said other end wall.

7. The container of claim 6, the distance between the lower extremity of said incline and said opening being several fifths of the distance between the upper extremity of said incline and said opening.

8. The container of claim 7, the upper extremity of said incline being above the lower extremity of said opening and below the upper extremity of said opening by distances of several fifths of the height of said opening.

9. The container of claim 8, the height of the upper extremity of said incline above said bottom wall being about one-fifth of the distance between said top wall and said bottom wall.

10. The container of claim 9, said deflector being a wedge extending between said side walls and having a

wall extending downwardly from the upper extremity of said incline to said bottom wall, the ratio of the distances from the lower extremity of said incline to the upper extremity of said incline and from the upper extremity of said incline to the lower extremity of said wedge wall being about 11 to 8.

References Cited by the Examiner

UNITED STATES PATENTS

2,487,411	11/1949	Balbi	214—83.3
2,961,105	11/1960	Shubin	214—83.3
3,059,789	10/1962	Bowles	214—41

FOREIGN PATENTS

963,566	7/1964	Great Britain.

GERALD M. FORLENZA, *Primary Examiner.*

ROBERT G. SHERIDAN, *Examiner.*