United States Patent

[11] 3,557,683

[72] Inventor **John A. Boyd**
Fairfax, Va.

[21] Appl. No. **756,754**
[22] Filed **Sept. 3, 1968**
[45] Patented **Jan. 26, 1971**
[73] Assignee **Mobilpak Corporation**
Washington, D.C.
a corporation of the District of Columbia

[54] **MOBILE COMPACTING UNIT**
11 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** **100/7,** 53/124, 100/31, 100/100, 100/218, 100/250, 100/255, 214/518
[51] **Int. Cl.** **B65b 13/00,** B30b 15/32
[50] **Field of Search** 100/3, 7, 31, 100, 218, 250, 255; 53/124; 214/518

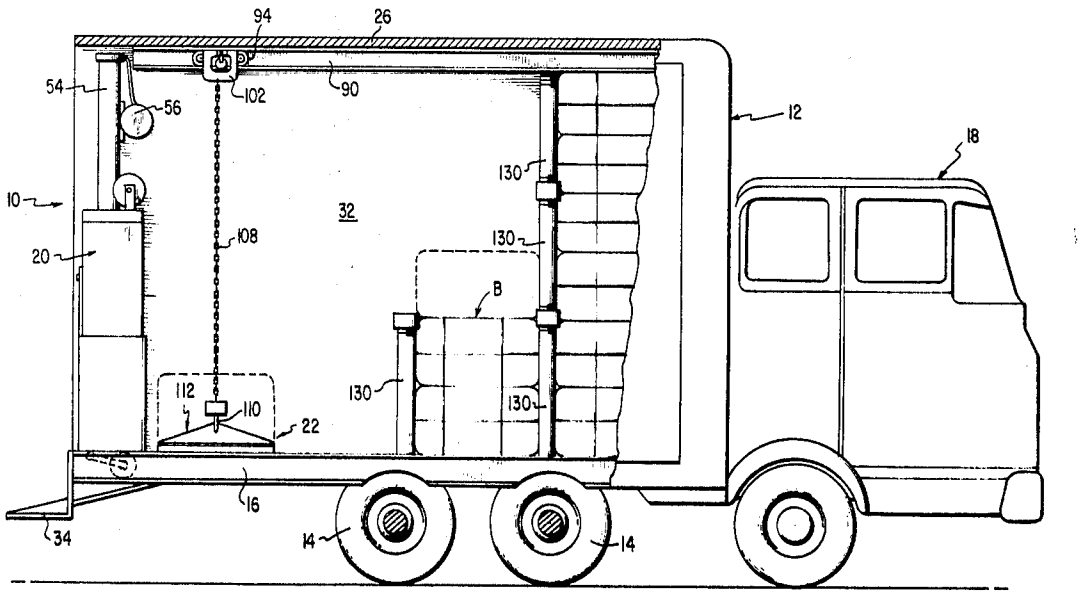
[56] **References Cited**

UNITED STATES PATENTS

387,516	8/1888	Hoop et al.	100/218
1,121,571	12/1914	Sheppard	100/218X
1,675,669	7/1928	Snyder	100/218
1,889,372	11/1932	Nolan	100/31X
2,508,877	5/1950	Walker et al.	100/250X
2,816,502	12/1957	Eismann	100/100
3,220,337	11/1965	Goland et al.	100/7
3,230,868	1/1966	Smith	100/100
3,355,044	11/1967	Nelson	214/518

Primary Examiner—Billy J. Wilhite
Attorney—Arnold, Roylance, Kruger and Durkee

ABSTRACT: A mobile unit in the form of truck or trailer having a supporting bed with compacting means mounted adjacent the rear end thereof. Trash or other materials can be introduced into the compacting means which then compacts the materials into disposable cartons or merely bales the same. A completed bale or filled carton is then ejected forwardly out of the compacting means onto a conveying means which transfers the bale or carton to a forward storage position. Subsequently, the conveying means can be used for removing the stored bales or cartons and for discharging the same from the unit.



PATENTED JAN 26 1971

3,557,683

SHEET 1 OF 3

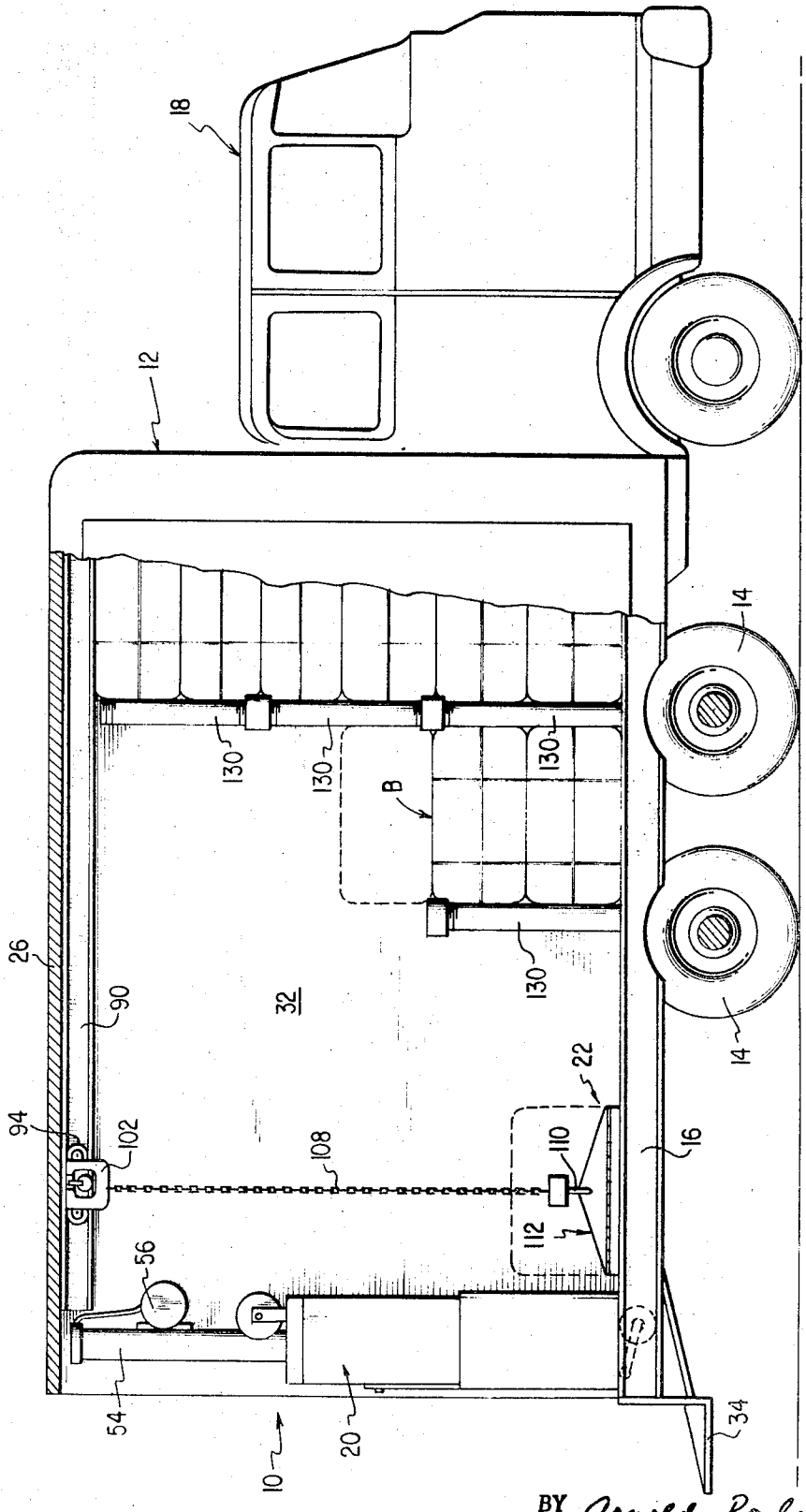
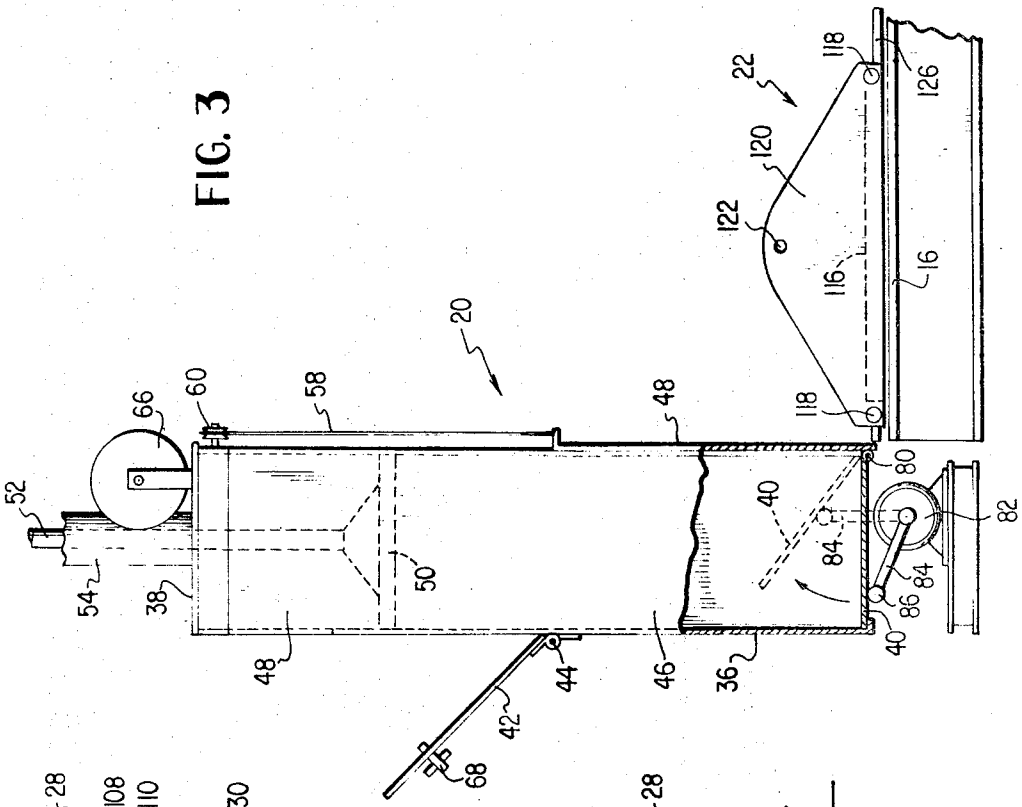


FIG. 1

INVENTOR
JOHN A. BOYD

BY Arnold, Roylance, Kruger & Dunbee ATTORNEYS.

FIG. 3



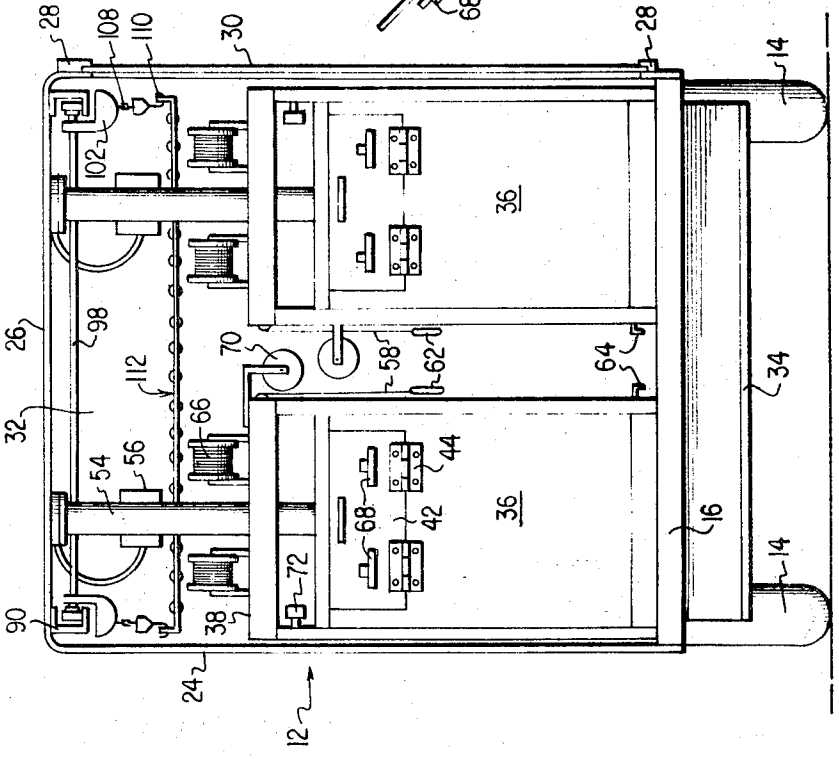


FIG. 2

INVENTOR
JOHN A. BOYD

BY Arnold, Rorlance, Krueger & Dunbee
ATTORNEYS.

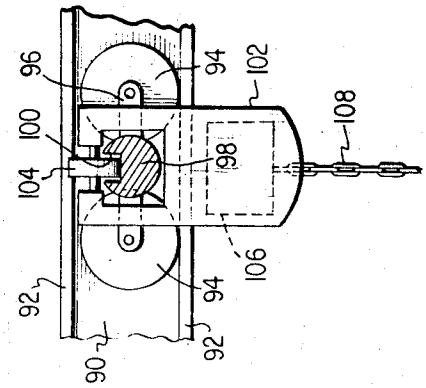


FIG. 4

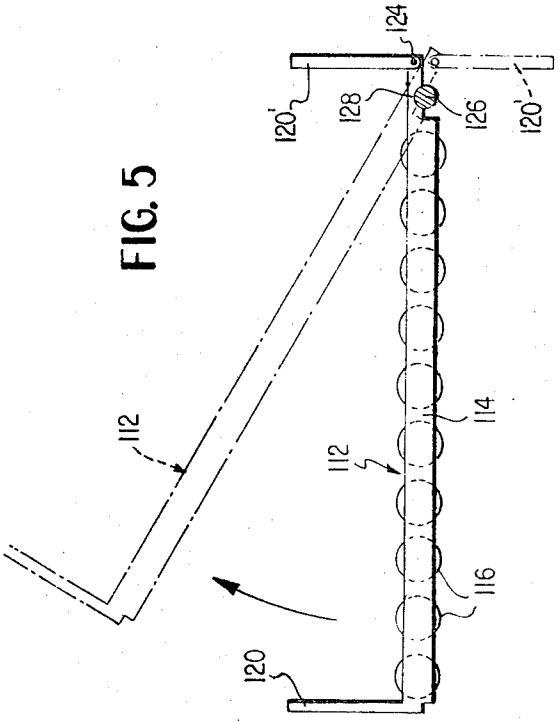


FIG. 5

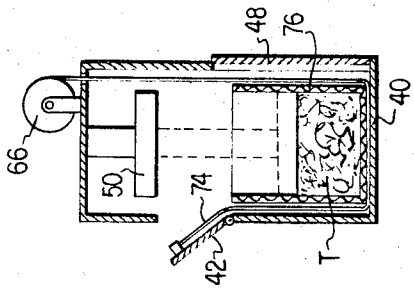


FIG. 6C

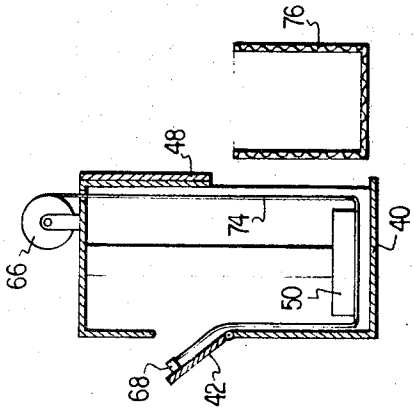


FIG. 6B

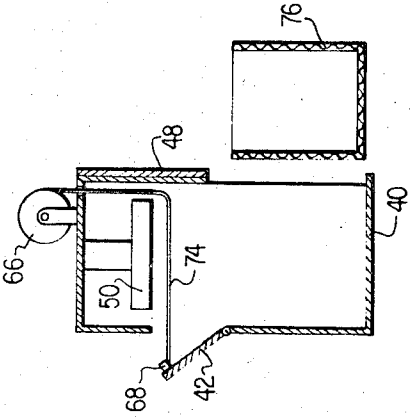


FIG. 6A

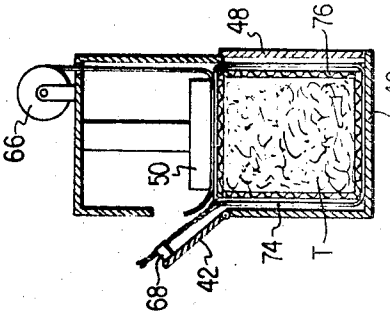


FIG. 6E

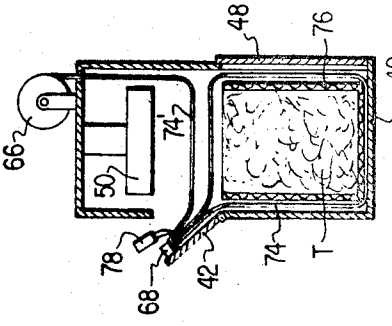


FIG. 6D

INVENTOR

JOHN A. BOYD

BY Arnold, Rayfance, Kruger & Durkee

ATTORNEYS.

MOBILE COMPACTING UNIT

This invention relates to compacting equipment of the type used for forming materials into tightly compressed bales, and more particularly it relates to a mobile unit which can be used for compacting trash or other similar materials into disposable cartons or merely into bales which are then placed in a suitable storage area on the unit. When the storage area on the unit has been filled, the unit can be moved to a suitable discharge station where the cartons or bales can be removed from the unit.

The most common form of trash collection means currently in use is the garbage or trash truck. There are two types of known units of this kind, one which merely has a chamber into which the trash is discharged and the other of which has a similar chamber but has some means for compacting trash therein. Both of these known forms of mobile trash collecting units have apparent disadvantages. In the unit where the trash is merely discharged into a large chamber, it is found that the truck is very quickly filled with trash, and as a result, the filled truck then must be driven over a sometimes considerable distance to a dump, incinerator, or other discharge station where it can be emptied. Then, the empty truck must be driven back from the discharge station to its normal route. Naturally, a procedure of this type is extremely wasteful since the truck is only in actual service collecting the trash for a small percentage of the time. During the remaining time, the truck is either being driven to, or back from, the discharge station.

This situation is improved somewhat with the other type of existing trash truck, namely, a truck wherein the trash is compacted or compressed within the discharge chamber. Since is is well recognized that bulk trash contains a great amount of air, it is also known that such trash can be compacted ten or fifteen times, or more, to thus increase the carrying capacity of the truck by this amount Thus, while this latter type of compacting trash truck does represent a considerable improvement over the previously described type, it nevertheless still has its own drawbacks and deficiencies. In particular, it has been found that if the trash is compacted or compressed too tightly within the truck, it becomes a difficult matter to dislodge the same when it is desired to empty the truck. Also, because of the fact that the compacted trash on a truck of this type really forms one "giant" bale, the weight of a bale of this type is often considerable and the bale itself cannot be moved except by large heavy duty moving equipment at the disposal site. Still further, with the long distance that must be travelled to disposal areas, it is desirable to have trash compacted tightly into small parcels, as it is collected. This makes it possible to directly transfer the the parcels to flat railroad cars for long distance hauling to disposal areas without rehandling the bulk trash and without the use of large, heavy duty machinery to make such a transfer.

Recognizing these drawbacks and deficiencies with prior art forms of equipment, it is, therefore, an object of the present invention to overcome such difficulties and deficiencies and to provide a new and improved mobile compacting unit.

Another object of the present invention is to provide a mobile unit which can compact trash or other similar materials into small, conveniently maneuverable, bales or packages which can be stored on the unit itself and which can be subsequently discharged from the unit.

Another object of the present invention is to provide a mobile trash compacting unit which can form a suitable "pellet" either in the form of a tied bale or a sealed carton, so that the pellets can be easily handled and conveyed.

Another object of the present invention is to provide a truck or trailer mounted trash packaging unit which operates efficiently and simply to form a series of small baled packages which can be stored on the truck or trailer itself and can subsequently be discharged individually therefrom.

Other objects, advantages and salient features of the present invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses a preferred embodiment thereof.

The foregoing objects are attained generally by providing either a truck or trailer having a supporting bed with ground engaging wheels thereon. Compacting means are provided at the rear end of the supporting bed, preferably in tandem, and trash or other similar materials can be introduced into these compacting means which can then be operated to compress the trash or other materials into a small tightly squeezed bale. If desired, the compacting means can receive a disposable carton, such as a cardboard box, so that the trash can be compacted directly thereinto, or, alternatively, the trash can merely be compressed into a bale. In either instance, once the bale has been completed, suitable means can be used for maintaining the bale in its compressed condition. Then, discharge means can be operated to eject the bale from the compacting means and onto a conveying means. The conveying means moves the bale forwardly to a storage position on the supporting bed. Due to the nature of the conveying means, a large number of individual bales can be stored, one upon the other, thereby greatly increasing the carrying capacity of the truck or trailer. When the storage area has been completely or substantially completely filled, the unit is taken to a discharge station where the conveying means is used to discharge the bales from the unit. Since the discharged bales are small and easily maneuverable, they can be manually transported to any desired location, easily fed into an incinerator, transported for use as fuel pellets, or so on.

Referring now to the drawings which form a part of this original disclosure:

FIG. 1 is a side elevational view, partly in section, of a mobile compacting unit in accordance with the principles of the present invention;

FIG. 2 is a rear elevational view thereof;

FIG. 3 is a side elevational view of the compacting means and conveying means used in the present invention;

FIG. 4 is a fragmentary elevational view, partly in section, of the manner in which the conveying means is mounted in the unit;

FIG. 5 is an elevational view of the conveying means in accordance with the principles of the present invention; and

FIGS. 6 (A) through 6 (E) are diagrammatic operational views showing an operational sequence in accordance with the present invention.

Referring now to FIG. 1, there is illustrated therein a unit generally designated **10** in accordance with the principles of the present invention. The unit **10** includes a truck or trailer unit generally designated **12** having ground engaging wheels **14** connected with the supporting bed **16** thereof. The truck or trailer unit **12** is transported by means of a conventional cab portion **18**. Compacting means generally designated **20** is provided at the rear end of the supporting bed **16** and conveying means generally designated **22** is juxtaposed thereto.

The trailer portion **12** of the truck, as can be seen from FIG. **2**, includes a pair of spaced apart upstanding sides **24** connected by a top wall or roof **26** which extends generally parallel disposition above the supporting bed **16**. One side **24** can be provided with upper and lower tracks **28** which accommodate a slidable door or doors **30** which give access to the interior compartment **32** formed within the trailer **12**. Preferably, the rear end of the trailer is open and a retractable platform **34** can be provided to project rearwardly from the trailer.

Compacting means **20** is in the general form of a baler having a frame **36**, a top wall **38**, a bottom wall **40**, and a rearwardly opening access door **42** normally maintained in closed position by spring urged hinges **44**. The compacting means includes a lower compartment **46** which is normally kept closed by a slidable door **48**, which, when actuated, is raised to an open position. In an upper compartment portion **48** of the compacting means, a ram **50** is normally provided, as shown in FIG. **3**, with the ram being mounted on the lower end of a piston rod **52** attached to a piston movable within an upstanding cylinder **54** extending above the top wall **38** of the compacting means. A hydraulic pump **56** is provided for forcing fluid under pressure into the cylinder **54** to raise and lower the

ram 50 into and out of the compartment 46 in the compacting means 20.

The discharge door 48 on the compacting means 20 must be connected with opening means. One suitable form of opening means is in the form of a cable 58 trained over a pulley system 60 connected to the casing or frame of the compacting means, with the cable 58 terminating in a pull ring 62. As shown in FIG. 2, one side of each of the tandem compacting means 20 can be provided with a locking projection 64 whereby, when the ring 62 is manually pulled downwardly to raise the door 48, such ring can be trained over the projection 64 to hold the door in open position. Alternatively, the door 48 could be controlled hydraulically.

It will be seen that a pair of reels 66, each containing a supply of twine, wire, cable, or the like, are provided in spaced disposition on the top wall 38 of the compacting means. These reels 66, which are rotatably mounted, provide the wire or cable for longitudinally tying a bale to be formed in the compacting means. As such, each reel 66 has a cooperating wire spinner or cable tyer 68, of any suitable conventional design, with such spinners or tyers being provided on the access door 42 of the unit. Similarly, as shown in FIG. 2, a reel 70 of the same material is provided along the side of each compacting unit 20, with the cable or wire from this particular reel being used to laterally tie a bale formed by the compacting means 20, and hence being cooperable with a conventional wire spinner or cable tyer 72 mounted on the opposite side of the compacting means.

In order to understand the manner of operation of the compacting means 20 and the tying means for a bale formed therein, attention is directed to FIG. 6. However, before describing the details of FIG. 6, it should first be stated that the present invention is adapted to package trash in a disposable carton, such as a cardboard box or, alternatively, to merely bale the trash either with or without the use of paper or cardboard end caps. Thus, while the arrangement of FIG. 6 is described in connection with a disposable carton, it will be understood that the invention is not intended to be limited to an arrangement of this type. In FIG. 6, the manner of tying the bale with the longitudinal reels 66 will be described, but it will be understood that similar operation is effected with respect to the lateral reels 70. In FIG. 6(A), the access door 42 is opened, the ram 50 is in a raised position, and the discharge door 48 is in a raised position. Assuming that reel 66 carries wire, that wire, designated 74, is fed off of the reel 66 and is connected at its free end to its associated wire twister 68 on the access door 42. Then, as shown in FIG. 6(B), the ram 50 is lowered to move the wire 74 to the bottom compartment 46 of the compacting means 20, adjacent the bottom wall 40. Thereafter, if a disposable carton 76 is to be used, such carton is manually introduced through the open discharge door 48, is fitted between the wires 74 and is introduced into the compartment 46 in the manner shown in FIG. 6(C). That is, the carton 76 fully rests upon the wire 74 with the wire surrounding both sides and the under side of the carton. Then, as shown in FIG. 6, the discharge door 48 is closed and trash T can be introduced through the open access door into the carton 76. If it were desired not to use a disposable carton 76, then a cardboard end cap or member, basically in the form of a flat sheet, would simply be installed through the open discharge door 48 to act as the barrier for the bale being formed. In operation, the apparatus shown in FIG. 6(C) uses an intermittent ram operation, that is, the trash is introduced through the open access door 42, and deposited gravitationally into the carton 76. Then, the hydraulic pump 56 is operated to energize the cylinder 54 and cause the ram 50 to descend into the carton for compacting the trash therewithin. When the carton has finally been filled with compressed and compacted trash, as shown in FIG. 6(D), the top flaps of the carton 76 can be closed, if such flaps are provided. Alternatively, a top cardboard sheet can be applied over the top of the compressed trash T. Then, it will be noted that loop 74' is pulled forwardly from the wire and is subsequently severed by any suitable severing means 78. The end of the wire 74 coming from the reel 66 thus becomes a free end while the other end of the wire 74, namely, the end of that portion of the wire surrounding the carton, is introduced into the wire twister 68. Thereafter, the wire twister 68 can be operated to twist the ends of the wire surrounding the filled carton until the same caused the wire to tightly tie the carton or package. If desired, the ram 50 can be lowered as shown in FIG. 6(E) to apply a further compressing force while the wire is being twisted. At this point, one complete bale will have been formed in each compacting means 20. This bale will either be formed with the trash completely packaged within a disposable carton 76 or, alternatively, it will be a bale having simply a top and bottom cardboard end member. In either instance, the bale itself will be tightly tied by a pair of longitudinal tie wires from the reels 66 and by at least one lateral tie wire from the reel 70. If the trash is compressed within a carton such as 76, the flaps of the carton can, if desired, be closed by taping instead of by wire 74.

Referring now to FIG. 3, it will be noted that the bottom wall 40 of each compacting means 20 is hinged by a forward hinge 80 so that the wall can swing from its solid line position of FIG. 3 to the dotted line position thereof. An ejecting means in the form of a motor 82 having a rotatable arm 84 is provided beneath the bottom wall 40 and the end of the arm 84 can be provided with a roller 86 which abuts against the bottom of the wall 40. The motor 82 need not be a conventional motor, but can be a solenoid or any other suitable form of device capable of pivoting the arm 84 through a limited arc of travel, namely, the arc between the solid line position of the arm 84 in FIG. 3 and the dotted line position thereof. Thus, once the bale has been suitably formed in the compacting means in the manner just described in connection with FIG. 6, the discharge door 48 can be raised and the motor 82 can be actuated to eject the bale forwardly out of the compacting means 20 and onto the conveying means 22. If desired, a safety switch, not shown, can be provided in a position to be tripped when door 48 is raised, thus permitting the motor 82 to thereafter be actuated.

To understand the nature of the conveying means 22, it will first be noted that a pair of channel members 90 are provided at the top of the trailer 12, preferably attached to the top wall 26 thereof, as shown in FIG. 1. The channel members 90, as shown in FIG. 4, are provided with a pair of spaced webs or flanges 92 which are adapted to support a movable conveying system forming a part of the conveying means 22. This conveying system includes a carriage formed by a pair of wheels 94 riding on at least the bottom flange 92 of each channel 90. The rod or bar 98 extends from the carriage 94, 96 on one side of the trailer to the similar carriage on the opposite side thereof. As shown in FIG. 4, the bar or shaft 98 is itself provided with an upwardly opening groove or passage 100. A pair of dollies 102 are suspended from the rod 100, by means of providing each dolly with at least one rotatable wheel 104 which rides in the groove 100. It will thus be understood that the carriages 94, 96, their connecting rod 98, and hence the two dollies 102, can all be moved forwardly and rearwardly through the trailer 12 by movement of the carriage along the channels 90. Also, each dolly 102 can itself be moved laterally across the trailer 12 by sliding along the bar 98.

The dollies 102 each include a conventional lift motor and pulley system, shown generally as 106 in FIG. 4 and thus have a depending link chain 108 which terminates in a hook member 110.

A movable track-type roller conveyor generally designated 112, as shown in detail in FIGS. 3 and 5, includes supporting frame 114, having a series of lateral rollers 116 mounted therein, and possibly longitudinal rollers 118 at opposite ends thereof. An upstanding flange 120 can be provided at one end of the frame 114 with a hole 122 therein for receiving a hook 110. The opposite end of the frame can be provided with a similar at 124 so flange 120', the latter being pivotally mounted on the frame at 124 so it can swing downwardly as shown in dotted lines in FIG. 5. A guide bar 126 extends lon-

gitudinally along the bed **16** of the truck at one side thereof, the bar **126** cooperating with a groove **128** formed adjacent one end of the track **112**, in the manner shown in FIG. **5**.

To understand the operation of the conveying means **22**, attention is directed to FIGS. **1** and **3** wherein it can be seen that the track **112** is disposed adjacent the compacting means **120**. When the arm **84** pivots the bottom wall of the compacting means upwardly, a bale designated B in FIG. **1** is tipped onto the track **112** as shown in dotted lines. Then, the dollies are moved to convey the track **112** forwardly in the trailer, with such forward movement being accomplished by sliding of the track slot **128** along the guide rod **126**. Then, the chains **108** can be operated by the dollies to lift the track **112** until the bale is raised to a proper elevation so that it can be stacked upon other bales disposed in a forward storage position as shown in FIG. **1**. The bed **16** is provided with suitable threaded apertures or collars so that stabilizing stanchions **130** can be screwed thereinto. The stanchions **130** can themselves be sectional, as shown in FIG. **1**, so that one section can be threaded into the next lower section. The purpose of these stabilizing stanchions is to assure that the stacked bales B will remain in proper position in the trailer **12**.

When the unit **10** has been completely filled with bales, it is driven to a suitable discharge station, such as a dump, an incinerator, or the like. At such location the slidable doors **30** along one side of the trailer **12** are opened to give access to the interior **32** of the trailer. The track **112** is moved from its solid line position thereof, and such movement is effected by operating only that dolly associated with the flange **120** on the track **112**. As a result, the hook **110** and chain **108** will raise, thus causing the track to pivot upwardly, although the groove **128** will still remain engaged with the sliding and pivoting bar **126**. The hook **110** is disengaged from the flange **120'**, which is allowed to swing downwardly to its dotted line position of FIG. **5**. As a result, the track **112**, in its elevated position as shown in dotted lines in FIG. **5**, forms a discharge conveyor. This enables an operator to lift the individual bales B from their storage positions and deposit the same on the track **112** whereby the rollers **116** will cause the bale to gravitationally discharge out of the truck. If desired, the bales B can feed directly into the charging chute for an incinerator or the like.

It will thus be understood that the present invention provides an arrangement which is a highly efficient, mobile and transportable trash packaging unit. The unit **10** not only receives the trash but compacts the same into a tight bale of easily maneuverable size. The bale itself is then ejected onto a conveying means which transfers the bale to a suitable storage area in the unit. The bales can then be stacked one upon the other and maintained in such stacked position by means of the stabilizing stanchions. Once the truck has completed its collections, or once the storage space has been filled, the track portion of the conveying means can be used as a discharge conveyor for enabling the bales to be quickly and easily removed from the trailer.

After reading the foregoing detailed description, it will be apparent that the objects set forth at the outset of the specification have been successfully achieved by the present invention. However, since the foregoing detailed description was merely directed to a preferred embodiment, various modifications and changes apparent to those skilled in the art may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A mobile unit for compacting trash or other similar materials, comprising:

a supporting bed having forward and rear ends;

ground engaging wheels coupled with said supporting bed to enable said bed to be rolled along the ground;

compacting means mounted on said supporting bed adjacent the rear end thereof;

said compacting means including:

a trash receiving chamber means for introducing trash into said chamber,

means for compacting the trash introduced into said chamber to form a compressed bale; and

discharge means for ejecting the compressed bale forwardly from said compacting means;

conveying means which receives an ejected bale from said compacting means and which conveys said ejected bale to a forward storage position; and

said conveying means including a movable suspension mechanism disposed above said supporting bed and a suspended bale receiving member adapted to receive the ejected bale from said compacting means.

2. A mobile unit as defined in claim **1** wherein said compacting means includes means for tying said compressed bale.

3. A mobile unit as defined in claim **1** wherein said compacting means includes a pivotable base wall and wherein said discharge means includes power means for pivoting said base wall to eject a bale resting thereon.

4. A mobile unit as defined in claim **1** wherein said suspension mechanism is movable both longitudinally and laterally of said unit.

5. A movable unit as defined in claim **4** wherein said suspended bale receiving member has an end portion engageable with a guide whereby said member can be moved to an angularly disposed position to facilitate discharging bales from said unit.

6. A mobile unit as defined in claim **5** wherein said bale receiving member includes a plurality of rollers which facilitate movement of bales therealong.

7. A mobile comprising unit for trash or the like, comprising:

a vehicular trailer having ground engaging wheels and a supporting bed;

said trailer further including sidewalls and a top wall which form a compartment within said trailer;

compacting means mounted on said trailer within said compartment;

said compacting means including:

means defining a trash receiving chamber;

access door means for supplying trash to said chamber;

ram means for compacting trash within said chamber into a bale;

binding means for binding said bale while it remains in said chamber;

discharge door means which, when opened, enables a bound bale to be discharged from said chamber; and

ejecting means for ejecting a bound bale through said discharge door;

conveying means supported within said trailer to receive an ejected bound bale and to transport the same to a storage position within said compartment remote from said compacting means;

said conveying means comprising:

carriage means movable longitudinally through said compartment;

lifting and lowering means carried by said carriage means and movable laterally of said compartment;

platform means supported by said lifting and lowering means; and

said platform means normally receiving an ejected bound bale from said compacting means;

said trailer including a storage area at least at the forward end of said compartment; and

said conveying means being operative to transfer ejected bound bales to said storage area.

8. A mobile compacting unit as defined in claim **7** wherein at least one of said sidewalls is provided with a door and wherein, when said door is opened, said platform means can be aligned with the opening and angularly disposed thereto to act as a slide conveyor for delivering bales from said storage area.

9. A mobile compacting unit as defined in claim **8** wherein said platform means includes a plurality of rollers to facilitate bale movement thereon.

10. A mobile compacting unit as defined in claim 7 wherein tandem compacting means are provided in side-by-side relation at the rear of said compartment.

11. A mobile compacting unit as defined in claim 7 further including means for mounting rigid upstanding supports in said storage area to enable said bales to be stored in stacked relation.

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,557,683 Dated January 26, 1971

Inventor(s) John A. Boyd

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 6, line 30, "comprising" should read

--compacting--

Signed and sealed this 22nd day of June 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents