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Borrelli(10) **Pub. No.: US 2014/0041339 A1**(43) **Pub. Date: Feb. 13, 2014**(54) **METHOD AND ARRANGEMENT FOR
HANDLING COMPRESSIBLE MATERIAL**(52) **U.S. Cl.**CPC **B65B 63/02** (2013.01)USPC **53/438**(71) Applicant: **ENVIRO BALE PTY LTD**, Wingfield
(AU)(72) Inventor: **Nicola Borrelli**, Wingfield (AU)(21) Appl. No.: **13/959,920**(22) Filed: **Aug. 6, 2013**(30) **Foreign Application Priority Data**

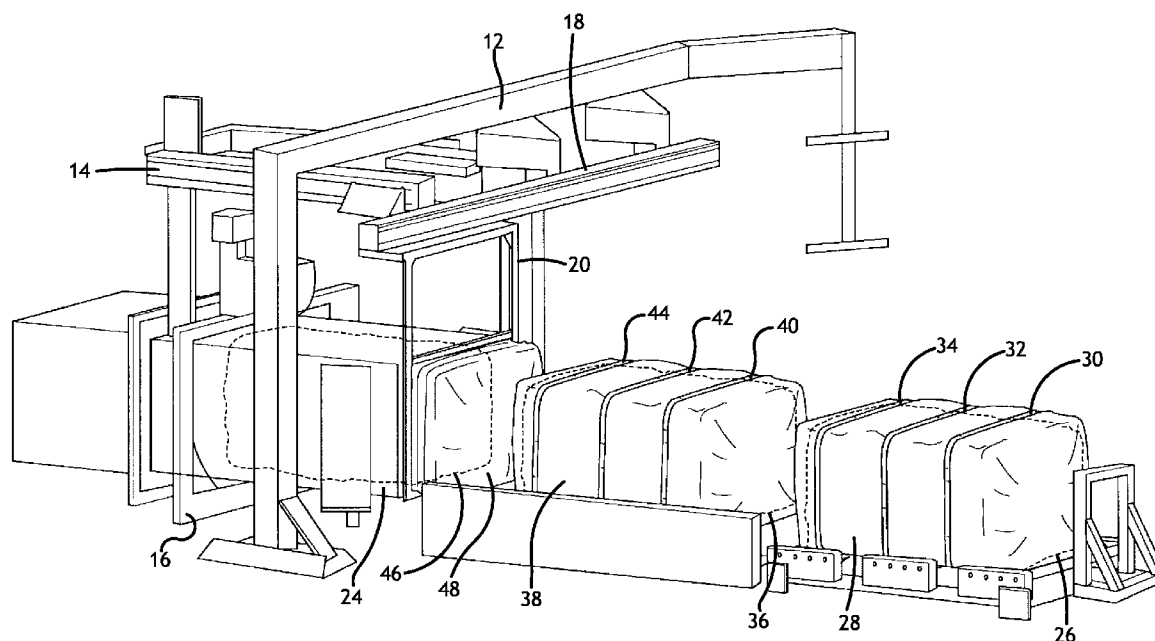
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(57) **ABSTRACT**

A method of handling compressible materials of trash including the steps of; compressing trash material into a compressed charge and then pushing the compressed charge from a compression area into a holding area and allowing the compressed charge to stabilise and settle; compressing a second charge of compressible trash material and pushing the second compressed charge from the compression area into the holding area and thereby pushing the stabilised and settled first charge from the holding area; ejecting the first charge from the holding area into a cover and as the first charge makes its way through said cover a series of wires or straps are tied around said cover.



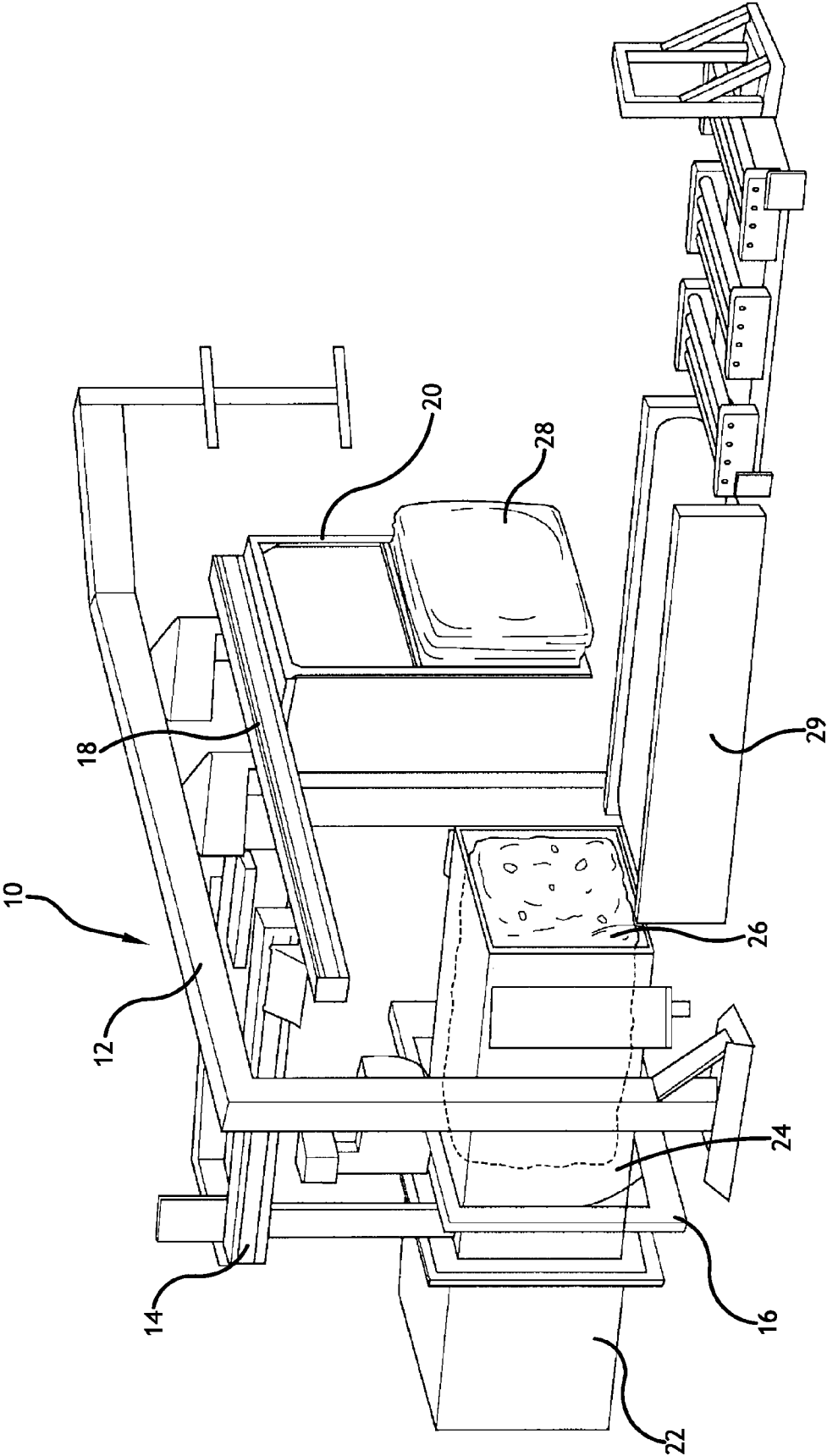


Figure 1

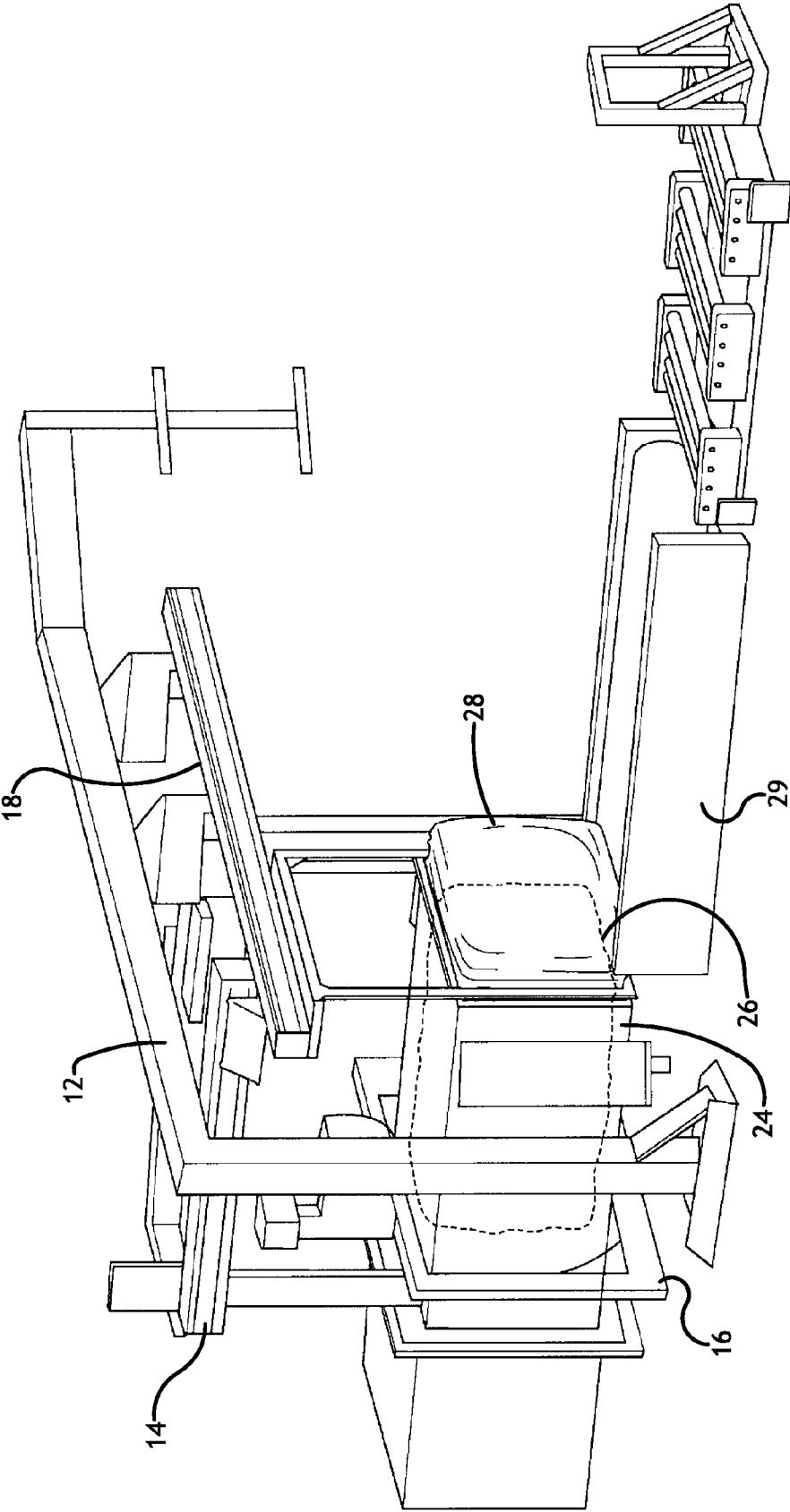


Figure 2a

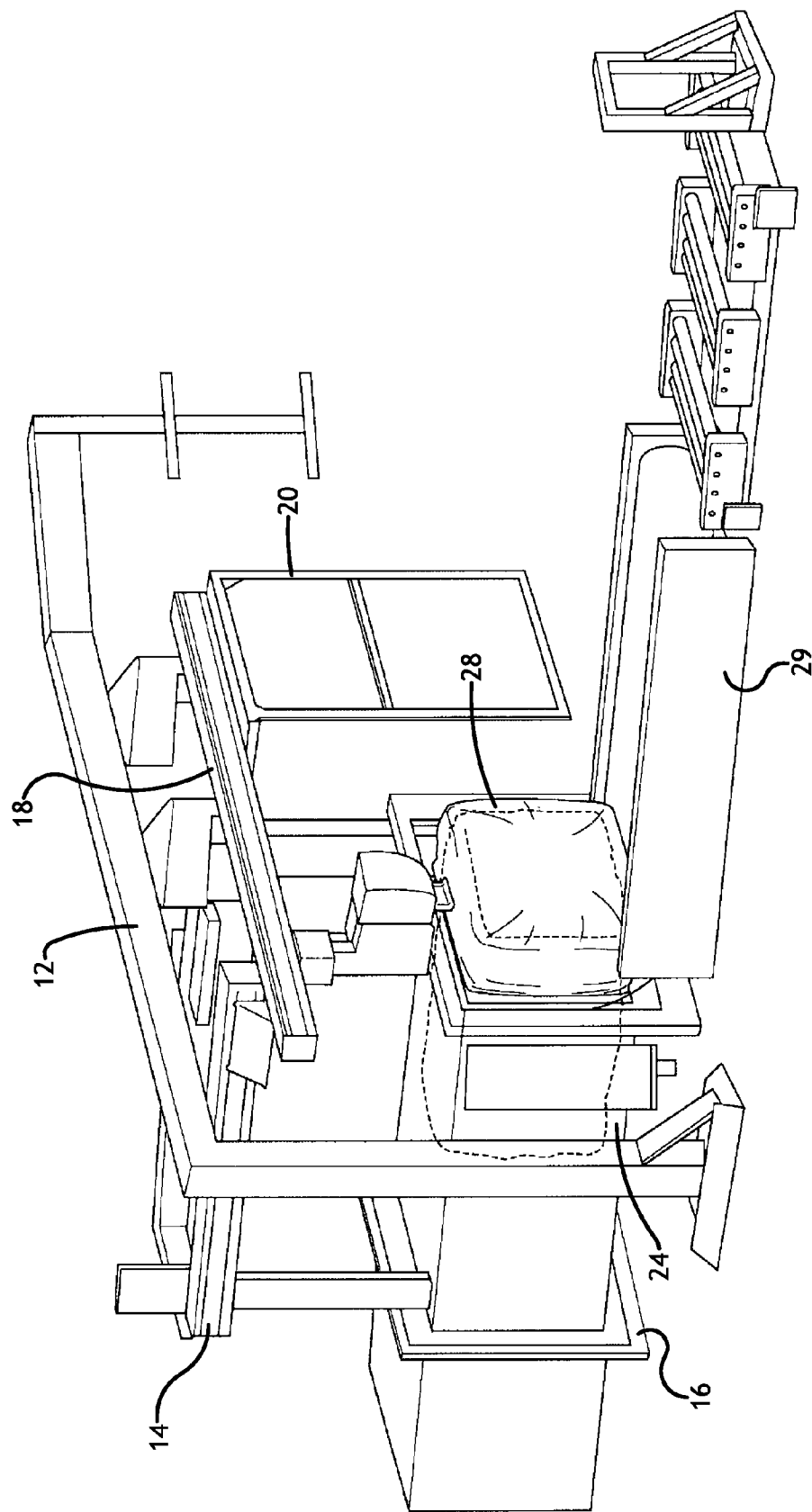


Figure 2b

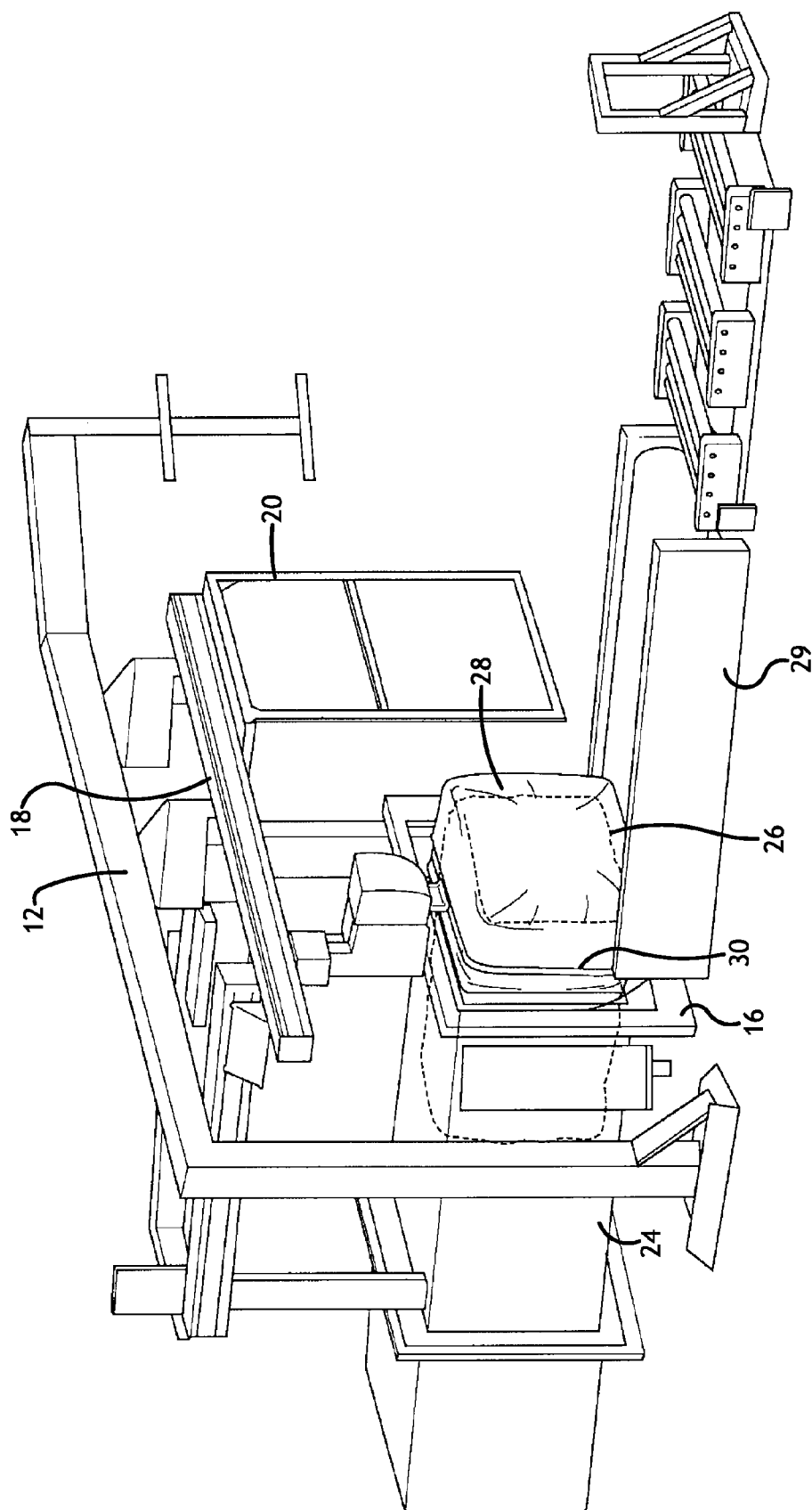


Figure 2c

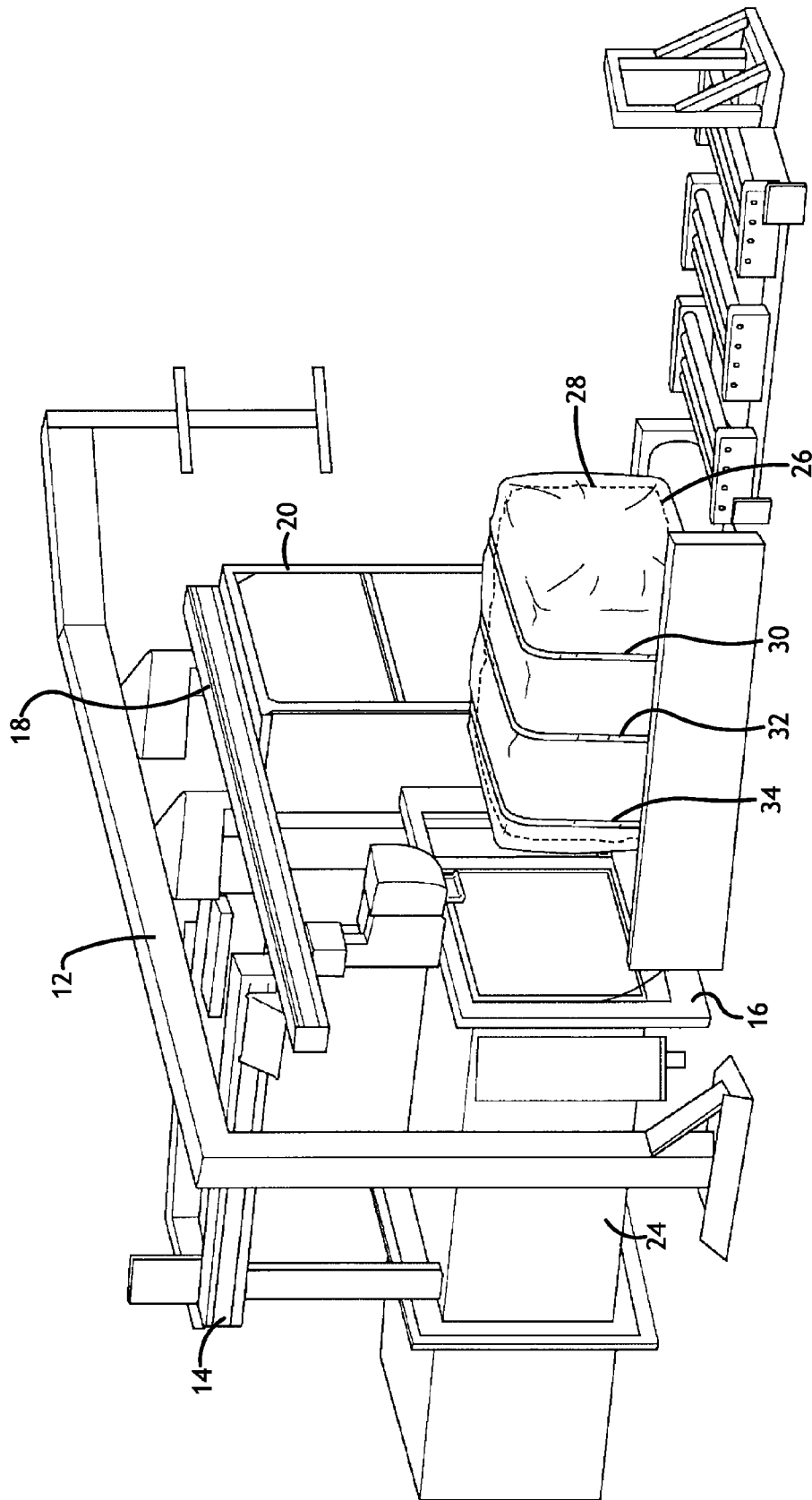


Figure 2d

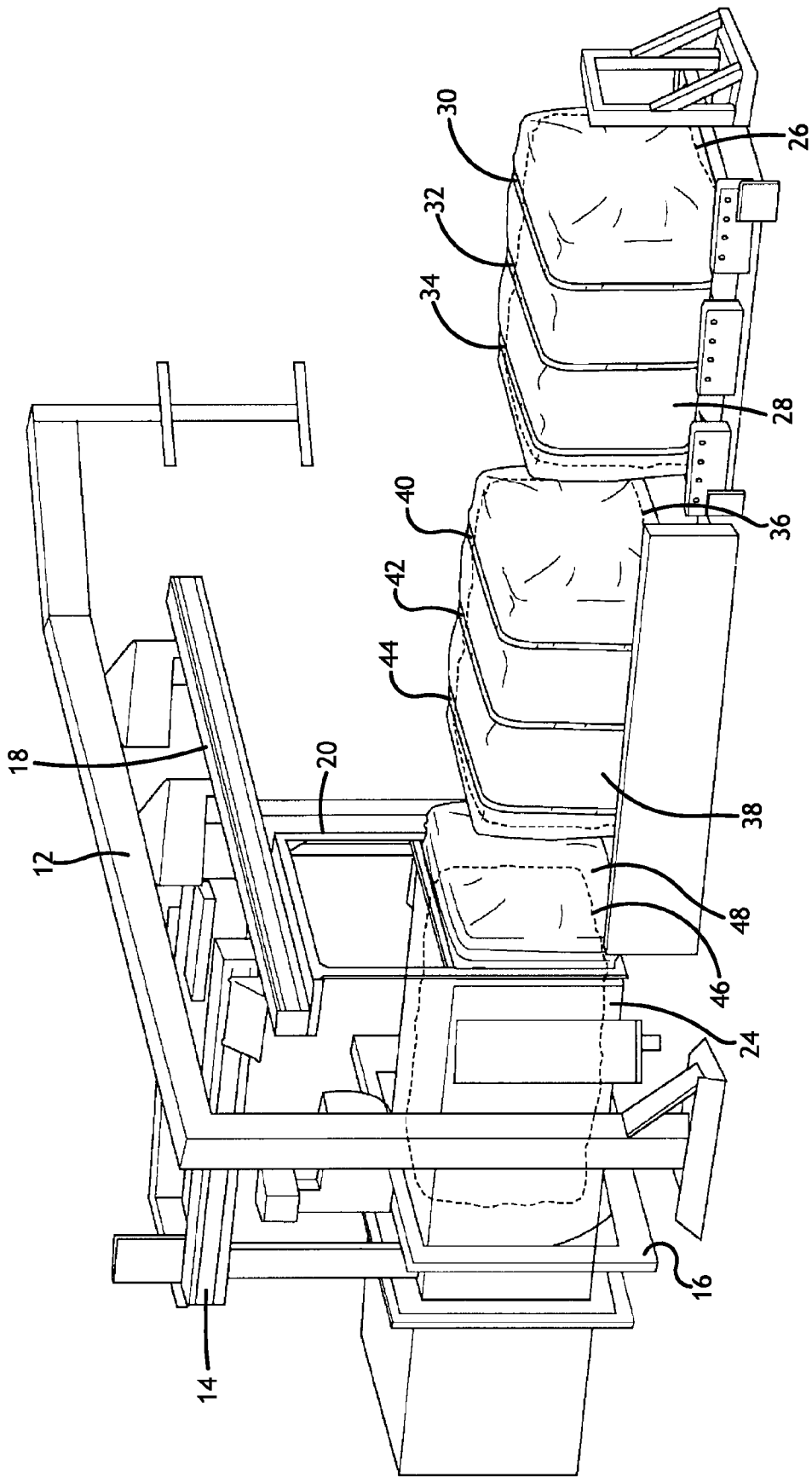


Figure 2e

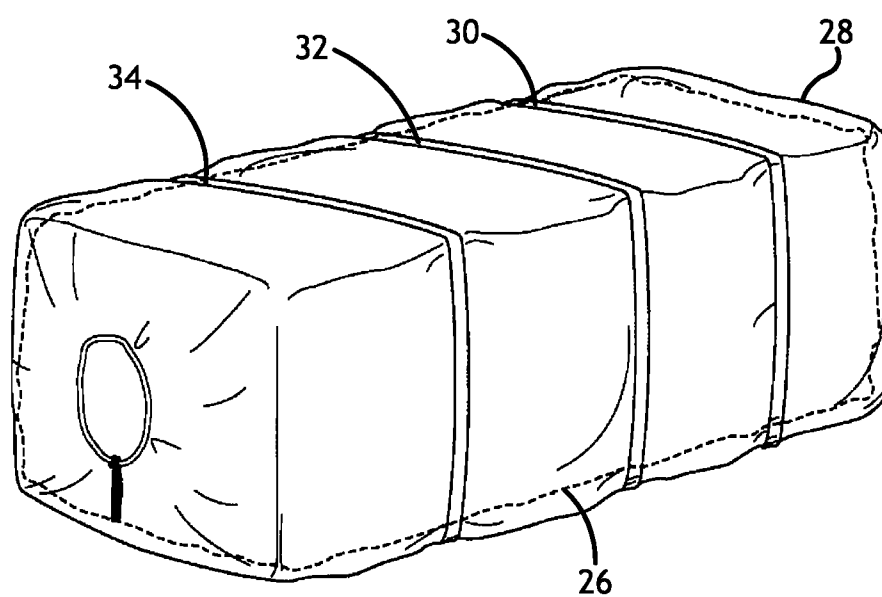


Figure 3

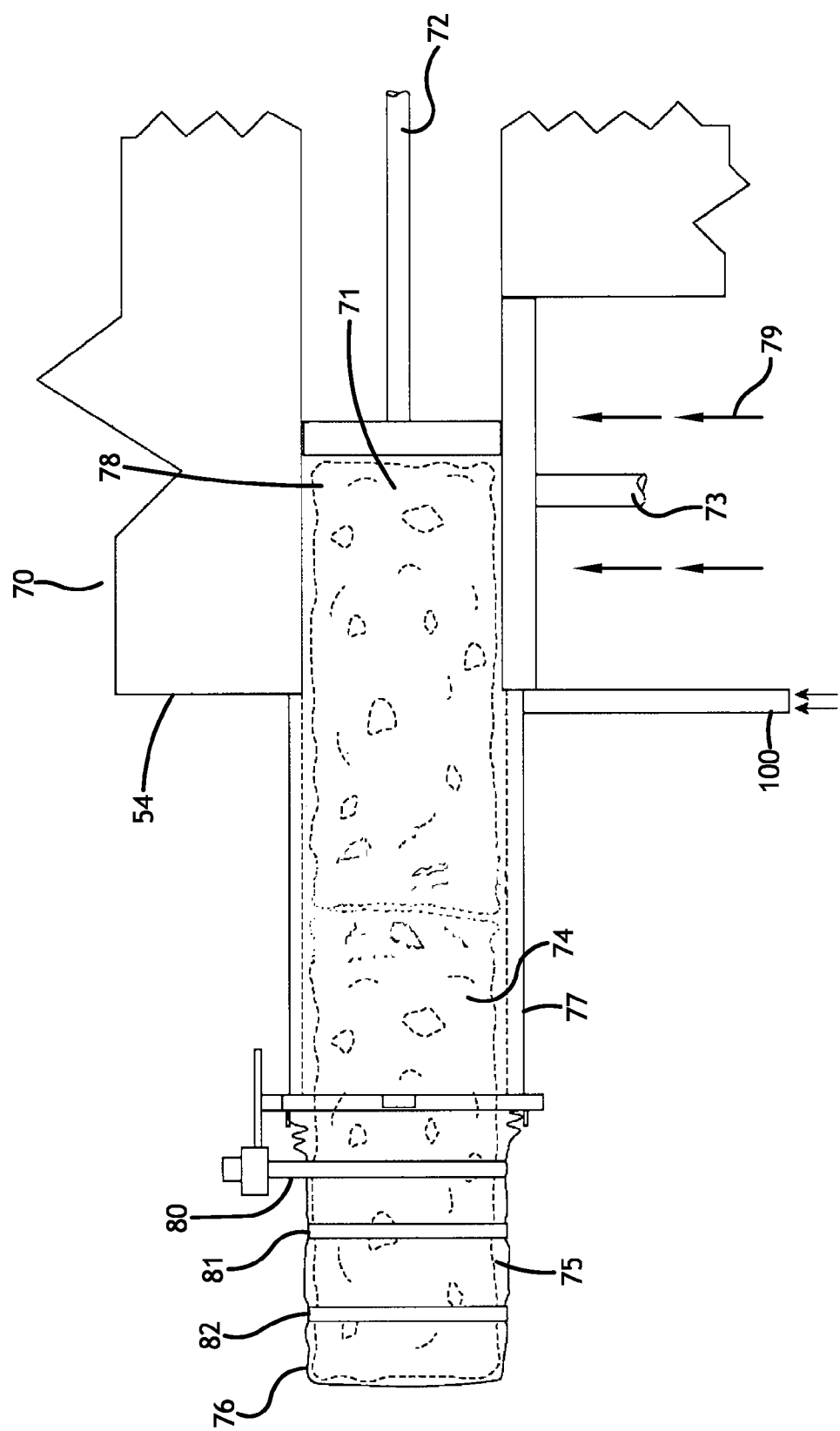


Figure 4

METHOD AND ARRANGEMENT FOR HANDLING COMPRESSIBLE MATERIAL

TECHNICAL FIELD

[0001] This invention relates to a method and arrangement for baling compressible material, notably trash, and more particularly to the improved baling method that will enhance the environmental credentials of the compressed baled trash that has been handled by the relevant arrangement.

BACKGROUND ART

[0002] One method of handling trash material in order to compress it into an appropriate bale configuration and for it to be maintained as much as possible within a compressed state was discussed in PCT Application No. PCT/AU2006/000903.

[0003] As stated in the specification trash in a very highly compressed state in the first instance, will have a tendency to relax and expand even though it may be bound by an encircling wire. If compressed bales are bagged and/or wired when taken directly from a compression area and/or under the influence of the compression means they will, when bagged or wired, be in such a configuration that, after the process is completed, the trash will relax and expand in this wire or bagged state, meaning that these compressed bales lose their general shape and become unstable when stacked one upon the other.

[0004] PCT Application No. PCT/AU2006/000903 defined a compression area where the first bale of trash is compressed, and significantly what was included was a holding area that is functionally unconnected with the compression means, as the compressed charge is pushed out from the compression area to a holding area and it is then from this holding area that it is then ejected into a bag. Advantageously the compressed bale of trash is bagged without having immediately prior thereto being held under compression within a compression area.

[0005] Advantageously that particular invention discussed in PCT Application No. PCT/AU2006/000903 avoided problems in earlier arrangements for handling compressible trash material wherein the compressed bale is bagged or wired directly from the compression area, with the resultant problem that the trash has been highly compressed in the first instance and therefore it will have a tendency to relax and expand when in the bag or once it has been wired.

[0006] Nonetheless no matter how significant the degree of compression upon trash, some forms of trash, say for example recyclable PET bottles, still seem to have this tendency to subsequently relax and expand even when they have been bagged, netted, filmed wrapped, wired or covered using other means, after the initial relaxation and expansion in the holding area.

[0007] It is to be appreciated that the word 'bag' is used in the description simply to describe one particular embodiment of the invention.

[0008] Nonetheless the use of the word tag' should be synonymous with the use of other technical equivalent cover means, including film, cardboard, netting and so forth.

[0009] Advantageously this invention seeks protection of a means of maintaining the compressed charge being ejected from the compressing arrangement through the use of both general sheet type covering which could include a film, bag, cardboard, netting and so forth combined with the use of wiring and/or strapping.

[0010] Advantageously whatever type of cover means is used its resiliency and strength and durability need not be what is generally expected in order to maintain the compressed charge in its preferred configuration thereby allowing the use of recyclable and/or biodegradable covering means because the integrity of the bound compressed bale is maintained through the unique combination of the cover means with the wiring and/or strapping.

[0011] Accordingly the covering means which could include, as introduced above, not only a bag, but alternative embodiments that would use a film, covering sheet, cardboard, netting and so forth can all be made of biodegradable and/or recyclable material which characteristically sometimes do not have the requisite durability, resiliency and/or strength to be able to maintain a compressed bale but in this invention they can be used as the ejected compressed charge is bound not only by the covering sheet but also in combination with the additional wiring and strapping.

[0012] Advantageously as the covering means is now made of a biodegradable and/or recyclable material, disposal and subsequent use of the compressed bale now has much greater options.

[0013] Accordingly as compressible material, even when appropriately baled and compressed to the highest degree possible, there is still the possibility in certain instances for expansion to take place once the bales have been bagged or wired.

[0014] With this problem therefore, bags or other covering means have to be of appropriate durability to keep the compressed trash as much as possible within that compressed configuration otherwise the bales, as referred to above, will become bloated and rounded which will lead to difficulty in being able to stack one upon the other.

[0015] At present therefore bags and other covers such as nets, film wrap and so forth used in containing the compressed trash in its appropriate bale configuration with the requisite durability and strength are often difficult to recycle and/or biodegrade.

[0016] Accordingly they present environmental obstacles and challenges in the handling of compressed trash bales.

[0017] Upon delivery of compressed recyclable trash, if such material is then encircled by a bag or other covering means which itself is not going to be recyclable and/or biodegradable therein presents a real conundrum.

[0018] Accordingly there remains a need in the relevant area of handling compressible trash material to be able to bale it effectively but maintain it in a compressed state once wrapped in a bag, film, net and so forth, but be able to use such covers that are themselves recyclable and/or biodegradable.

[0019] It needs to be pointed out that bags and other covers for encircling compressible trash material at this point of time for the most part are not durable and do not have the structural integrity to keep trash in its high degree of compression to be maintained in the compressed state and accordingly if recyclable and/or biodegradable bags are to be used, maintaining the compressed state of the trash material, say for example the use of corn starch bags, there will need to be a further intervention or feature that can work with such recyclable and/or biodegradable bags to keep the bale compressed.

[0020] It is therefore an object of this invention to provide an arrangement that will allow compressed trash that has been baled to be maintained in a compressed state while encircled with a recyclable and/or biodegradable cover such as a bag, film wrap net and so forth.

SUMMARY OF THE INVENTION

[0021] Accordingly in one form of the invention there is a method of handling compressible materials of trash including the steps of;

[0022] compressing a first charge of trash material into a compressed charge in a compression area of an arrangement effected to handle such compressible trash material;

[0023] pushing the first compressed charge from the compression area of the apparatus into a rectilinear holding area, the rectilinear holding area being substantially the same size as the compressed charge pushed into the rectilinear holding area from the compression area;

[0024] allowing the first compressed charge to stabilise and settle in the rectilinear holding area;

[0025] compressing a second charge of compressible trash material in the compression area to thereby form a second compressed charge;

[0026] pushing the second compressed charge from the compression area into the rectilinear holding area and thereby pushing the stabilised and settled first charge from the rectilinear holding area;

[0027] ejecting the first charge from the rectilinear holding area into a cover wherein the cover is arranged and positioned to receive the first compressed charge that was stabilised and settled in the rectilinear holding area;

[0028] wherein as the ejected first charge is received into the cover as the ejected first charge makes its way through said cover a series of wires or straps may be tied around said ejected first charge.

[0029] An advantage of such an arrangement is that for the first time there is a combination between both the covering and tying of the compressed trash.

[0030] As the maintaining of the compressed trash in the bale shape is achieved through not only the use of the cover but also wire that is progressively tied around the cover as the bale protrudes therethrough, means that the cover that maintain the trash within its compressed state can be made of recyclable and/or biodegradable materials.

[0031] Advantageously for the first time this method will allow the use of arrangements that effect the compression of trash into bales to use covers that will not present environmental obstacles and consequences when making available compressed trash material that will be used in recycling and/or within a biodegradable environment.

[0032] Advantageously while recyclable and/or biodegradable covers are used, such as corn starch, these bags will still be able to maintain the integrity of shape and compression of the bales once they have been ejected from the apparatus which has effected the compression of the trash material by virtue of the fact of being at the same time that the injection into the recyclable and/or biodegradable bag is taking place there is the opportunity of also tying wire around at the same time.

[0033] In preference the cover is a bag.

[0034] In preference the cover is a film wrap

[0035] In preference the cover is a net.

[0036] In preference the amount of wire tied periodically along the length of the first compressed charge being ejected from the rectilinear holding area will be dependent upon the compressible material that has been compressed into the first compressed charge.

[0037] For example some trash no matter how well the compression has effected the material into the bale configuration will see an expansion subsequently, such as PET

bottles and so forth, wherein through time the bottles attempt to reconfigure thereby placing stress upon maintaining the overall bale within its bale shape.

[0038] In these circumstances, such compressed trash material can have more wires tied around the bag as the compressed charge is passed therethrough into the bag.

[0039] Advantageously the amount of tying of the wire is associated with the material actually being compressed. The arrangement responsible for compressing the trash material can simply start and stop the ejecting of the compressed charge from the rectilinear holding area into the bag as required so that the tying of a wire across the bale can be completed.

[0040] In preference the end of the rectilinear holding area has an outer surface adapted to receive there around and over the bag being drawn out and around a compression charge as the compression charge is ejected from the holding area, thereby creating a bale.

[0041] In preference the arrangement for effecting the handling of the compressible trash material includes a bag frame structure wherein a bag is placed on the bag frame structure away from the location where the first charge is ejected.

[0042] In preference the bag frame structure is supported on an overhead tracking or rail arrangement so that it can be slid in front of the rectilinear holding area so that the bag supported on the bag frame can then be positioned about the end of the rectilinear holding area and once positioned the bag frame support can then be withdrawn from the exiting area of the rectilinear holding area.

[0043] In preference the wire is tied about the ejected charge bale from the rectilinear holding area by a tying apparatus.

[0044] In preference the tying apparatus is supported on an overhead track or rail.

[0045] In preference when the bag frame support is slid into position in front of the rectilinear holding area the tying apparatus is in a retracted position along the supporting rail.

[0046] In preference when the bag support frame is slid away from the exiting area of the rectilinear holding area the tying apparatus is in its extended position at the exiting edge of the rectilinear holding area such that once the ejected charge from the rectilinear holding area begins to be pushed into the bag the ejection from the apparatus effecting the handling of the compressible trash material can be stopped so that tying can commence.

[0047] In preference the arrangement effecting the handling of the compressible trash material is automated such that the compressed charge as it is ejected into the bag will stop periodically depending on the amount of wire that needs to be tied about the bagged compressed charge as it exits the rectilinear holding area.

[0048] In preference the bag is corn starch.

[0049] In preference the bag is transparent.

[0050] An advantage of such an arrangement is that the product of compressed trash material contained within the bag can be seen thereby assisting in identifying the material being handled.

[0051] In the past, woven and much more resilient and durable bags were required in order to maintain the compressed trash within the required bale configuration if stability of storage of the bales was to be achieved.

[0052] Advantageously however through the unique combination of both bagging and tying once the compressed

charge exits the rectilinear holding area means that recyclable and/or biodegradable bags can be used that have transparent characteristics.

[0053] In preference the rectilinear holding area is adapted to accept the compressed charge of material from a compression area of a compacting machine via an inlet at or towards a first end thereof, the holding area further comprising an outlet at or towards a second end thereof, that is smaller in area than the inlet.

[0054] In preference the rectilinear holding area at the outlet includes restrictor plates which are positioned within the outlet of the holding area at the top and bottom thereof at least, in order to effect a reduction in the distance between said top and bottom.

[0055] Advantageously this method and the associated arrangement allows for the bagging of trash facilitated by providing a compacting machine with a holding area, such that a first compressed charge may be ejected from a compression area of the compacting machine into the holding area and remain therein until a subsequent compressed charge is forced from the compression area into the holding area, such that this action will then further eject the first charge from the holding area into a bag where the bag is arranged and positioned to receive the first compressed charge.

[0056] Advantageously as the compressed charge is sent into the bag it can also be simultaneously tied thereby allowing the use of bags which are more readily recyclable and/or biodegradable.

[0057] Still further, as the holding area is separate from the compression area, the trash is given an opportunity to settle in the holding area prior to ejection into the bag. The holding area also allows a subsequent charge of trash to be used to force the charge in the holding area into a bag as it is both bagged and tied with wire as required simultaneously, rather than using a hydraulic cylinder with an unnecessary long stroke to effect this ejection.

[0058] Even though there is little or no compression of the waste material in the direction of ejection into the holding area, in some embodiments it was found that there was a continued expansion of the bale at the bale face, resulting in waste material falling from the end of the holding area. This expanding waste material is particularly problematic between the removal of the completed bale and the positioning of a further bag over the holding area as this oozing material is not captured, and merely forced to the ground, creating an unpleasant and in some instances, hazardous, mess.

[0059] Advantageously by having the holding area with the inlet of greater dimensions than the outlet and also in some embodiments the introduction of the restrictor plates positioned within the outlet of the holding area at the sides thereof such problems can be avoided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0060] In order to describe the invention now in greater detail preferred embodiments will be presented with the assistance of the following illustrations.

[0061] FIG. 1 is a schematic illustration of a trash bale forming equipment according to a preferred embodiment of the invention.

[0062] FIGS. 2a, 2b, 2c, 2d and 2e is a similar schematic representation to that in FIG. 1, however showing a sequence of steps in the simultaneous bagging and tying of wire about the compressed bale as it is ejected from the holding area into the bag.

[0063] FIG. 3 is a general perspective view of a compressed bale of compressible material that has been bagged and tied by way of the method and arrangement presented in a preferred embodiment of this invention.

[0064] FIG. 4 is a further preferred embodiment of this invention focusing on the initial compressing of the trash material as well as the stabilizing and settling of the compressed material in the holding area, along with the discharging of the compressed bale from the holding area into the bag which is undergoing both bagging and tying of wound wire.

DETAILED DESCRIPTION OF THE INVENTION

[0065] Referring now to FIG. 1 which illustrates some of the equipment designed to facilitate the means and method of handling trash in a preferred embodiment of the invention.

[0066] Visible in FIG. 1 the final stages of the trash compressing system of which the initial compression stage is discussed in greater detail in connection with FIG. 4.

[0067] The general system is referred to as (10) and includes a main support structure (12) which provides support for rail (18) to which bag support frame (20) can be slid there across to the outlet or exiting end of the rectilinear holding area (24) when a bag (28) needs to be placed on the end of the rectilinear holding area (24) and once the bag (28) has been slid in position over the outlet of the rectilinear holding area (24) the bag support frame (20) can then be slid back away along the upper rails or tracks (18).

[0068] The compression chamber (22) links with the rectilinear holding area (24) of which such interaction will be discussed in greater detail when referencing FIG. 4.

[0069] Important to this invention however is also the use of the tying apparatus (16) which is able to be slid from a retracted position to an extended position at the outlet or exiting end of the rectilinear holding area (24) by virtue of being able to be moved along upper rail or track support (14).

[0070] To best understand the operation of the system at the bagging and wiring stage schematic illustrations are prepared through FIGS. 2a, 2b, 2c, 2d and 2e.

[0071] The bale (26) is ejected from the holding area (24) where it is pushed into a bag (28) and extends along the conveyor (29) that has been positioned at the outlet or exiting end of the holding area (24) which as introduced above was achieved by having the bag frame support (20) slid across the front of the outlet of the holding area (24) and then withdrawn.

[0072] When the bag frame support has been slid in front of the outlet of the holding area (24) the apparatus (16) responsible for tying wire about the bale is in its retracted position along rail (14).

[0073] Once the bag frame support (20) has been withdrawn by way of being slid along the rails (18) the tying apparatus (16) can then be extended into its tying position at the end of the holding area (24) so that as envisaged and shown best in FIG. 2c in the illustrations as the bale (26) moves into the bag (28) strap (30) can then be wrapped around the bag also.

[0074] As the bale (26) is further ejected periodically, as best seen in FIG. 2d throughout the ejection process the automation will allow the ejection to stop momentarily while a further wire is wound about the bale as shown by virtue of wires (32) and (34) which are also then securely tied about the bale (26) to which the bag (28) encircles thereon.

[0075] FIG. 2e shows that the process is ongoing and that once a bale has been ejected and bagged accordingly, subse-

quent bales such as (36) can be bagged (38) also be wired (40), (42) and (44) respectively and the process continues on with the new bale (46) having bag (48) ready to be encircled and as it ejects itself from the holding area (24) the tying apparatus (16) will then wire as required depending on the material being compressed.

[0076] As referred to in the general description for this invention the degree of wiring will be dependent on the material being compressed.

[0077] Certain trash that has been compressed may have a greater inherent resiliency to want to expand out after compression and normally such material would require the use of woven or very durable bags in order to maintain the integrity of the shape of the compressed bale.

[0078] That means that easy to be recycled and/or biodegradable bags would not be suitable however as the maintaining of a compressed bale shape is achieved not only through a bagging process but also the introduction of the wiring means that the wire can assist in maintaining that integral compressed state despite the fact that a bag, such as corn starch and so forth, is being used in encircling the compressed bale.

[0079] FIG. 3 just shows a general perspective of how the bale (26) would look when encircled by the bag (28) which then at the same time had the wires (30), (32) and (34) tied thereabout.

[0080] It is to be appreciated however that certain bales may have more wound wire and/or less, dependent once again as introduced above, on the type of material which has been compressed and needs to remain in that substantially rectangular compressed configuration.

[0081] FIG. 4 details one embodiment of the invention as to how the trash material is originally compressed where the general arrangement is shown as (70) and includes trash material (71) that has been compressed which is achieved by virtue of the rams (73) and (72).

[0082] Ram (73) in the direction of arrows (79) is able to compress into a substantially rectangular bale configuration, trash (71) and by virtue of an earlier compressed material (74) which partly ejected and the holding area (77) that once ram rod (72) is pushed towards the holding area, that bale (75) inside the holding area is then able to enter the bag (76) wherein the tying apparatus (80) is able to apply straps (81) and (82) as the bale (75) continues out into the bag (76) which itself is being forced into the bag (76) by the fact that behind it is a more recently compressed bale (78) which is now being ejected from the compression area away from the main compressing rams (73) and (72) into the holding area (77) where the bale (78) will be able to relax and expand slightly within the rectilinear holding area (77) before then being ejected by a further formed compressed bale in the compression which would then ram or push into the bale (78) so as to eject the bale (78) out into a waiting bag to which also placed in position is the tying and/or strapping mechanism (80) which can wind wire or strapping about the bagged or wrapped bale (78) as required during the ejection.

1. A method of handling compressible materials of trash including the steps of;

compressing a first charge of trash material into a compressed charge in a compression area of an arrangement effected to handle such compressible trash material;

pushing the first compressed charge from the compression area of the apparatus into a rectilinear holding area, the rectilinear holding area being substantially the same size

as the first compressed charge pushed into the rectilinear holding area from the compression area;

allowing the first compressed charge to stabilise and settle in the rectilinear holding area;

compressing a second charge of compressible trash material in the compression area to thereby form a second compressed charge;

pushing the second compressed charge from the compression area into the rectilinear holding area and thereby pushing the stabilised and settled first charge from the rectilinear holding area;

ejecting the first compressed charge from the rectilinear holding area into a cover wherein the cover is arranged and positioned to receive the first compressed charge that was stabilised and settled in the rectilinear holding area;

wherein as the ejected first compressed charge is received into the cover as the ejected first compressed charge makes its way into said cover a series of wires or straps are tied periodically around said ejected first compressed charge.

2. The method of claim 1 wherein the cover is a bag.

3. The method of claim 1 wherein the cover is a film wrap.

4. The method of claim 1 wherein the cover is a net.

5. The method of claim 1 wherein the amount of wire or strap tied periodically along the length of the first compressed charge as the first compressed charge is being ejected from the rectilinear holding area into the cover will be dependent upon the compressible material that has been compressed into the first compressed charge.

6. The method of claim 1 wherein an exiting end of the rectilinear holding area has an outer surface adapted to receive there around and over the cover being drawn out and around the first compressed charge as it is being ejected from the holding area so that the first compressed charge becomes baled once complete encompassed by the cover.

7. The method of claim 6 wherein the arrangement for effecting the handling of the compressible trash material includes a cover frame structure wherein the cover is placed on the cover frame structure away from the location where the first compression charge is ejected.

8. The method of claim 7 wherein the cover frame structure is supported on an overhead tracking or rail arrangement so that the cover frame structure can be slid in front of the rectilinear holding area so that the cover supported on the cover frame structure is positionable about the exiting end of the rectilinear holding area with the positionable cover frame support then withdrawable from the exiting end of the rectilinear holding area once the first compressed charge has been baled.

9. The method of claim 8 wherein the wire or strap periodically tied about the ejecting first compressed charge bale as being ejected from the rectilinear holding area is by a tying apparatus.

10. The method of claim 9 wherein the tying apparatus is supported on an overhead track or rail.

11. The method of claim 10 wherein when the cover frame support is slid into position at the exiting end of the rectilinear holding area and the tying apparatus is in a retracted position along the supporting rail.

12. The method of claim 11 wherein when the cover support frame is slid away from the exiting end of the rectilinear holding area the tying apparatus is in an extended position at the exiting end of the rectilinear holding area such that once

the ejected charge from the rectilinear holding area begins to be pushed into the cover the ejection from the apparatus effecting the handling of the compressible trash material can be stopped so that tying can commence.

13. The method of claim **12** wherein the arrangement effecting the handling of the compressible trash material is automated such that the first compressed charge as it is ejected into the cover will stop periodically depending on the amount of wire or strapping that needs to be tied about the coverable first compressed charge as it exits the exiting end of the rectilinear holding area.

14. The method of claim **2** wherein the bag is corn starch.

15. The method of claim **14** wherein the bag is transparent.

16. The method of claim **1** wherein the rectilinear holding area is adapted to accept the compressed charge of material from a compression area of a compacting machine via an inlet at or towards a first end thereof, the holding area further comprising an outlet at or towards a second end thereof, that is smaller in area than the inlet.

17. The method of claim **16** wherein the rectilinear holding area at the outlet includes restrictor plates which are positioned within the outlet of the holding area at the top and bottom thereof at least, in order to effect a reduction in the distance between said top and bottom.

18. The method of claim **2** wherein the bag is transparent.

* * * * *