United States Patent [19]

Wollersheim

[11] **3,889,588**

[45] **June 17, 1975**

[54] **MATERIAL COMPACTING DEVICE**

[76] Inventor: **Philip Wollersheim,** 3016 14th St., S.W., Calgary, Canada

[22] Filed: **Oct. 5, 1973**

[21] Appl. No.: **403,845**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 235,550, March 17, 1972, abandoned.

[52] **U.S. Cl.** **100/177;** 100/192; 214/83.3

[51] **Int. Cl.** **B60p 1/00**

[58] **Field of Search** 214/83.3, 83.36; 198/212; 100/192, 177, 178

[56] **References Cited**

UNITED STATES PATENTS

2,121,932	6/1938	Slocum	100/177
2,320,307	5/1943	Saville	198/212
2,722,884	11/1955	Seltzer	100/192
2,807,377	9/1957	Finet	214/83.3
3,070,006	12/1962	Raney et al.	100/192
3,121,387	2/1964	Fahrwenk et al.	100/192
3,279,357	10/1966	Farmer	100/177
3,348,475	10/1967	Fenster et al.	100/177

FOREIGN PATENTS OR APPLICATIONS

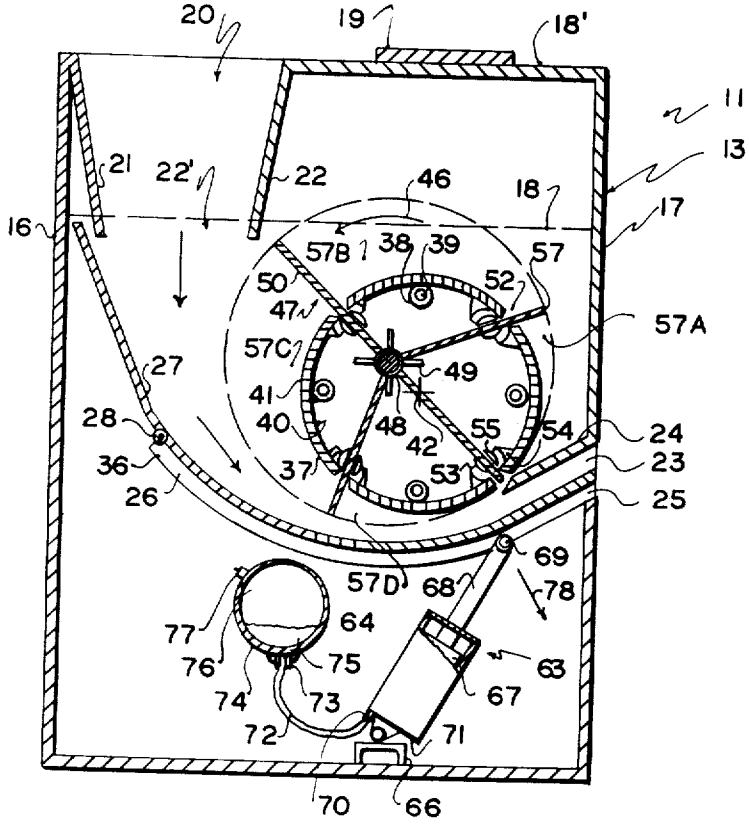
823,980	7/1949	Germany	100/177

Primary Examiner—Albert J. Makay
Assistant Examiner—Kenneth Noland
Attorney, Agent, or Firm—Stanley G. Ade

[57] **ABSTRACT**

Garbage or snow is fed into the hopper and compacted between an arcuately curved shroud and a set of vanes rotating in conjunction with a drum connected to a source of power. The vanes are mounted upon a shaft which in turn is mounted eccentrically of the axis of the drum so that the vanes extend and retract through slits in the drum wall as the unit rotates. The forms a series of chambers between adjacent vanes, the drum wall and the shroud which decrease in volume from the hopper area towards the ejection area thus compacting the material within the chambers.

4 Claims, 7 Drawing Figures



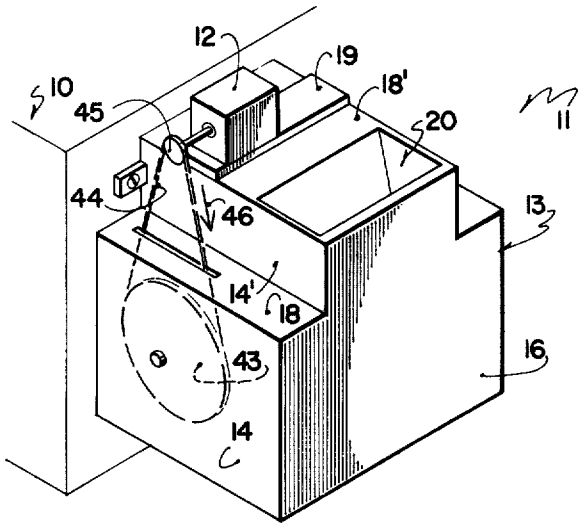


FIG. 1

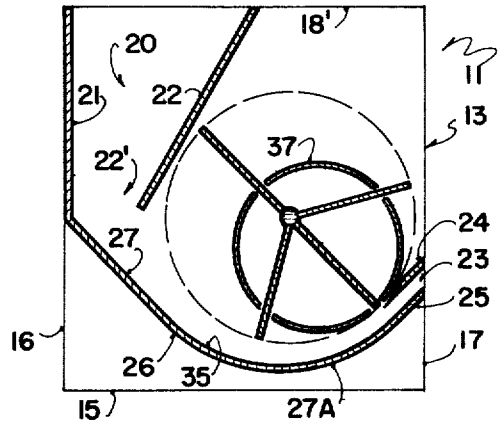


FIG. 4

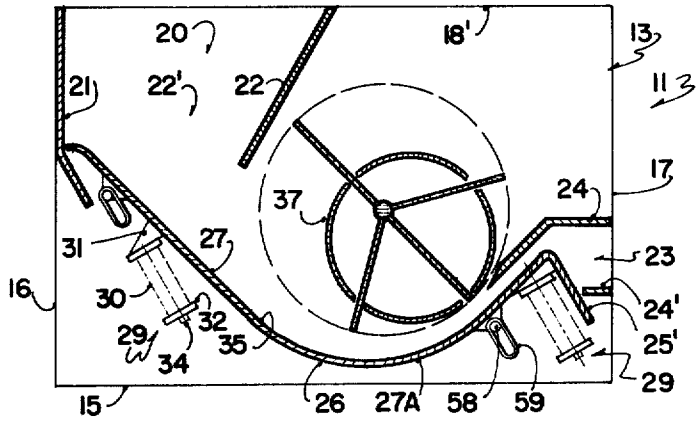


FIG. 5

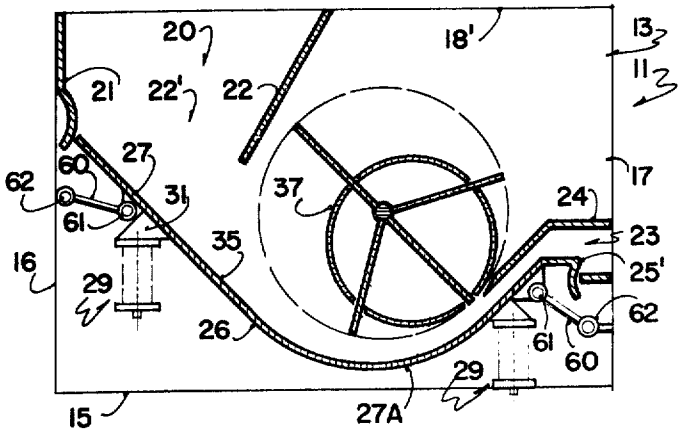


FIG. 6

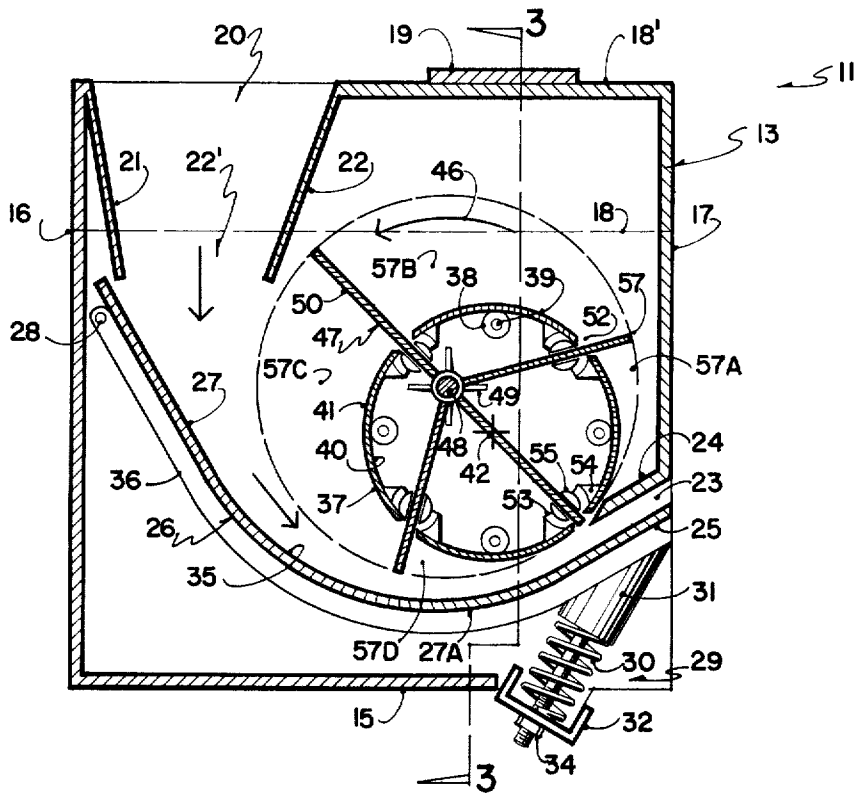

20
19
3
18'
11
13
21
22'
22
46
16
18
17
57B
38
39
57
50
52
28
47
57C
57A
27
49
41
24
40
48
55
54
36
42
23
37
53
26
25
35
31
57D
27A
30
29
15
32
34
3

FIG. 2

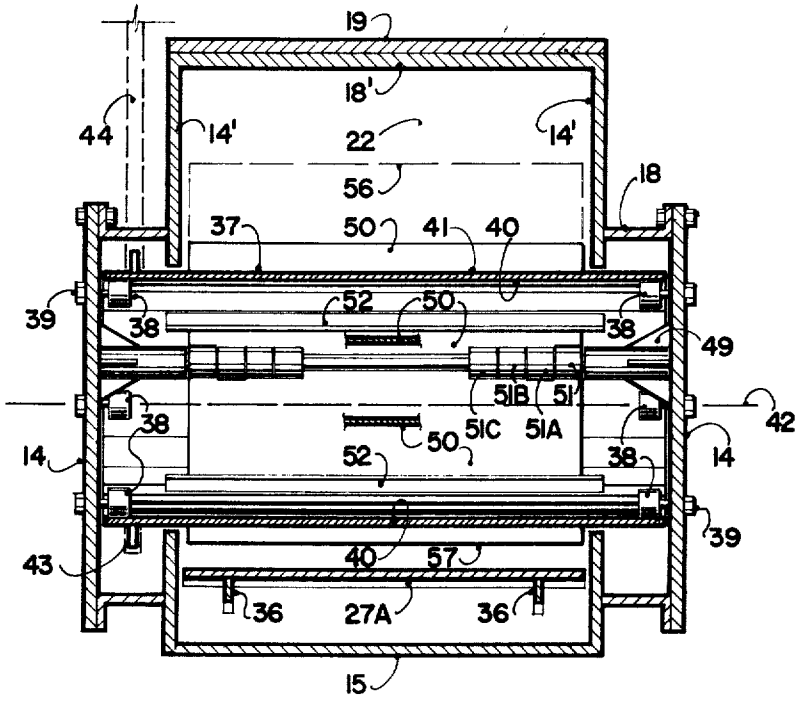

19
18'
44
14'
22
14'
56
18
37
50
41
40
39
52
50
38
38
49
51B
51
42
38
51C
51A
14
50
52
38
14
39
43
40
57
36
27A
36
15

FIG. 3

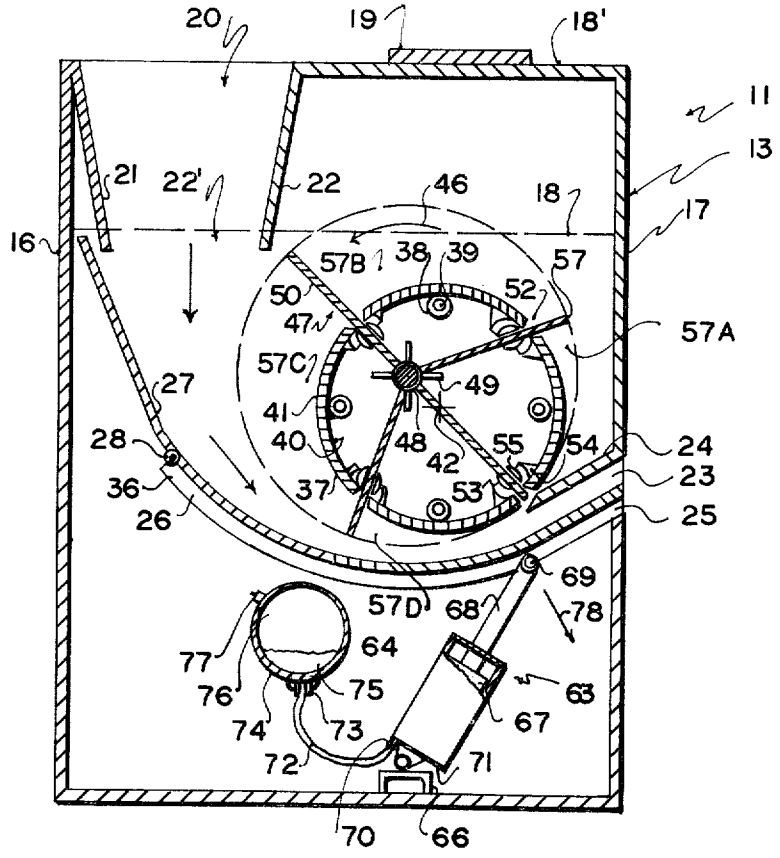

20
19
18'
11
13
21
22'
22
46
18
17
16
57B
38
39
57
50
52
47
57A
57C
49
27
41
28
40
48
42
55
54
24
36
37
53
23
26
25
69
57D
68
78
77
64
76
75
63
74
73
67
72
71
70
66

FIG. 7

MATERIAL COMPACTING DEVICE

BACKGROUND OF THE INVENTION

This invention is a continuation-in-part of my application Ser. No. 235,550 filed Mar. 17, 1972, now abandoned and relates to new and useful improvements in garbage compactors.

Although the device is directed primarily towards the compaction of garbage, nevertheless it will be appreciated that it can be used for compacting snow collected from streets or the like.

There are many garbage compacting units on the market all of which suffer from several disadvantages, the principal ones of which are extremely high cost, heavy wear and difficulty of maintenance. Furthermore, the majority of compactors are not efficient due to the fact that they normally work on plunger action so that feeding and removal of the garbage within the compacting cylinders is often difficult and is rarely continuous.

SUMMARY OF THE INVENTION

The present invention overcomes all of these disadvantages by providing a relatively simple construction which will continuously compact garbage or snow and eject same into a truck upon which the device may readily be mounted.

The principal object and essence of the invention is therefore to provide a device of the character herewithin described which will receive garbage or snow through a hopper, continuously compact same and eject it into a storage container such as a truck or the like.

Another object of the invention is to provide a device of the character herewithin described in which the degree of compaction may be controlled within limits.

A still further object of the invention is to provide a device of the character herewithin described which includes a drum rotating within a casing and having a series of vanes extending through the wall thereof, said vanes being mounted upon a shaft eccentric from the axis of the drum so that the vanes extend and retract as the drum is rotated. A curved shroud in conjunction with adjacent vanes and the wall of the drum forms chambers which receive the garbage or snow and the volume of these chambers decreases as the drum rotates thus compacting the material therewithin and ejecting same through an ejector outlet formed within the casing.

Another object of the invention is to provide a device of the character herewithin described which is simple in construction, economical in manufacture and otherwise well suited to the purpose for which it is designed.

With the foregoing objects in view, and other such objects and advantages as will become apparent to those skilled in the art to which this invention relates as this specification proceeds, my invention consists essentially in the arrangement and construction of parts all as hereinafter more particularly described, reference being had to the accompanying drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an isometric view of the rear end of a truck with the device secured thereto.

FIG. **2** is a longitudinal section through one embodiment, enlarged in scale with respect to the remaining views.

FIG. **3** is a section along the line **3—3** of FIG. **2** and enlarged similar to FIG. **2.**

FIG. **4** is a longitudinal section showing an alternative embodiment.

FIG. **5** is a longitudinal section showing a still further embodiment.

FIG. **6** is a longitudinal section showing yet another embodiment.

FIG. **7** is a view similar to FIG. **2,** but showing the preferred embodiment.

In the drawings like characters of reference indicate corresponding parts in the different figures.

DETAILED DESCRIPTION

Proceeding therefore to describe the invention in detail, reference should first be made to FIG. **1** in which **10** illustrates the rear end of a truck or the like which is conventional in construction and acts as a container for the compacting garbage.

The compactor collectively designated **11** may be bolted to the rear of the truck or built integrally as desired and a source of power **12** is mounted upon the compactor for driving same as will hereinafter be described. This is shown schematically by reference character **12** in FIG. **1** and may take the form of an electric motor, a gasoline engine or an hydraulic motor, which ever is preferred. Alternatively, of course, the drive may be taken from a power take-off arrangement (not illustrated) from the truck motor.

Dealing first with the embodiment shown in FIGS. **2** and **3,** the compactor **11** consists of an outer casing collectively designated **13.** This casing includes a pair of spaced and parallel side walls **14,** a base wall **15,** front and rear walls **16** and **17** and an upper wall **18** thus forming a substantially cubical casing as clearly shown. A further pair of side walls **14'** extend upwardly from the upper wall **18** and are situated inwardly of the side walls **14** and these side walls terminate in a further upper wall **18'** reinforced by means of a transverse plate **19** to support the source of power **12** thereupon. A hopper **20** is formed by portions of the additional side walls **14'** a front transverse plate **21** and a rear transverse plate **22,** plates **21** and **22** converging slightly as they extend from the upper wall **18'** thus forming an intake throat **22'** clearly shown in FIG. **2.**

Adjacent the base of the end wall **17** is an ejector outlet **23** formed in the wall and extending thereacross and this outlet includes an upper downwardly and inwardly inclined short flange length **24** extending clear across the upper edge of the ejector outlet **23.**

The lower wall of the ejector outlet is formed by the end **25** of an arcuately curved shroud assembly collectively designated **26,** situated within the casing. This arcuately curved shroud includes a relatively planar portion **27** situated immediately below the inlet throat **22'** of the hopper **20.**

In the embodiment shown in FIGS. **2** and **3,** this shroud is pivotally mounted to the side walls **14** of the casing by means of the transverse pivot assembly **28** and the remainder of the shroud is normally biassed upwardly by means of an assembly **29** which consists of a compression spring **30** mounted within a spring cup **31** secured to the underside of the shroud and reacting between a mounting portion **32** secured to the base **15**

of the casing so that the spring reacts between the portion **32** and the shroud **26.** A conventional screw threaded nut and bolt assembly **34** may engaged through the spring assembly **29** to adjust the tension of the spring within limits.

The shroud **26** includes the arcuately curved plate **35** and reinforcing flanges **36** upon the underside thereof.

A drum collectively designated **37** is situated within the casing adjacent the ejector outlet or wall **17** as clearly shown. A plurality of sets of rollers **38** are mounted upon bearing pins **39** extending inwardly from the side walls **14** as clearly shown in FIG. **3** and the inner surface **40** of the peripheral wall **41** of the drum engages over these rollers thus supporting the drum for rotation within the casing upon a central axis **42** which is transversely of the casing **13.**

In the present embodiment, a chain sprocket ring **43** is secured around the outer surface of the peripheral wall **41** adjacent one end thereof and between one side wall **14** and the other side wall **14'** as clearly illustrated in FIG. **3** and a chain shown in phantom by reference character **44,** extends around this sprocket ring and around a small sprocket **45** secured to the drive shaft of the source of power **12** thus supplying rotation of the drum in the direction of arrow **46.**

A set of compression or compacting vanes collectively designated **47** are provided and situated transversely within the casing. Means to mount these vanes takes the form of a fixed shaft **48** extending between the walls **14** and being braced by means of gussets **49** as shown and the axis of this shaft is eccentric from the axis **42** of the drum as clearly shown in FIG. **2.**

A plurality of planar transversely extending vanes **50** each include a bearing sleeve **51** spaced apart and secured to the inner edge thereof, said bearing sleeves bearably engaging around shaft **48.**

The individual bearing sleeves for each vane are identified by reference characters **51, 51A, 51B** and **51C.**

Transverse slots **52** are formed within the peripheral wall of the drum and the vanes **50** extend through these slots. Means are provided to bearably support the vanes through the slots and take the form of semi-cylindrical portions of tubing **53** braced upon each side of slot **52,** to the inner surface of the peripheral wall **41,** as illustrated by reference character **54.** Split bearings **55** engage within these semi-cylindrical tubes and upon each side of the vanes **50.**

From the foregoing it will be appreciated that rotation of drum **37** by means of the source of power will cause the vanes to extend and retract relative to the surface of the drum and due to the fact that the position of the shaft **48** is to one side and above the axis **42** of the drum, the greatest extension of the vanes will be as they approach the intake throat **22'** of the hopper **20.** This is illustrated in FIG. **2** in which reference character **56** shows in phantom the effective path of the outer ends **57** of the vanes **50.**

Adjacent vanes **50,** the portion of the peripheral wall **41** of the drum therebetween, and a part of the arcuately curved plate **35** of the shroud, form chambers indicated by reference characters **57A, 57B, 57C** and **57D** and it will be observed that chambers **57B** and **57C** are approximately the same volume. However, chamber **57D** has decreased in volume as it approaches the ejector outlet so that any material contained within the chambers will be compressed as it approaches the ejector outlet.

In operation, garbage or snow is fed into the hopper **20** and slides down the planar portion **27** of the shroud **26** and is picked up by the next vane **50** just approaching the hopper intake throat **22'** so that this garbage is contained within chamber **57C.** As the vanes and drum rotate, the volume of this chamber decreases rapidly and compresses the garbage or snow between the adjacent vanes, the portion of the peripheral wall **41** of the drum and the portion **27A** of the arcuately curved shroud. The compaction of the material contained within chamber **57D** is of course controlled by the compression of the spring **30** biassing this end of the shroud upwardly towards the peripheral wall of the drum. As the drum continues to rotate, the compressed slug of garbage or snow is ejected through the outlet defined by the flange **24** and the portion **25** of the shroud which of course moves away slightly from the drum depending upon the compression of spring **30.**

The drum rotates continuously and the slugs are ejected into the truck **10** or other container.

FIGS. **4, 5** and **6** show similar arrangements but with slightly different embodiments and where indicated, common reference characters have been given.

In FIG. **4,** the shroud **26** is fixed at either end to the walls **16** and **17** so that a fixed compaction is obtained.

In FIG. **5,** two pairs of rollers **58** are secured to the underside of the shroud **26** adjacent each end thereof. It should be observed that only two of these rollers (one of each pair) is illustrated. These rollers run in fixed tracks **59** secured to the side walls **14** of the casing and a pair of compression spring assemblies **29** react between the casing and the shroud in a manner similar to that hereinbefore described.

In FIG. **6,** the shroud is mounted upon two pairs of links **60** (one each of each pair only being shown) and these links are pivoted by one end thereof to brackets **61** attached to the underside of the shroud and by brackets **62** attached to the walls **16** and **17** respectively. These links are so positioned that limited vertical movement of the shroud is permitted and is controlled by compression spring assemblies **29** as hereinbefore described.

In all cases, the garbage is picked up from the hopper within the compartments and rotated with the vanes and drum so that the volume of the compartment decreases and compresses the garbage or snow and then ejects it as a slug into the storage container such as the truck **10.**

Preference should be made to FIGS. **5** and **6** which, because of the fact that the shroud moves as a unit, requires a lower flange **24'** in the case of FIG. **5** to define the ejector outlet. Also the end **25** of the shroud turns downwardly as at **25'** thus maintaining the continuity of the lower wall of the ejector outlet **23** regardless of the position of the shroud **26.**

A similar construction is shown in FIG. **6** and for the same reasons. In this one, because of the movement of the shroud due to the length **60,** the down turned portion **25'** is slightly curved once again to maintain the continuity of the lower wall of the ejector outlet **23.**

FIG. **7** shows the preferred embodiment of the shroud construction in which reference character **26** illustrates the shroud pivotted to the side walls **14** of the casing by the means of transverse pivot assembly **28** in a manner similar to that described in FIGS. **2** and **3.**

However, the means for biassing the shroud upwardly or towards the drum assembly **26**, comprises a fluid operating piston and cylinder assembly collectively designated **63** in conjunction with an accumulator collectively designated **64**.

The fluid operator includes a cylinder **65** pivotted by the lower end thereof to a cross member **66**.

A piston head **67** is situated within the cylinder and a piston **68** extends from this cylinder and is pivotally secured to the shroud intermediate the ends thereof, by means of pivot **69** engaging through the stiffening flange **36** as clearly illustrated in FIG. **7**.

A fluid outlet **70** is provided at the base **71** of the cylinder **65** and a flexible hose or conduit **72** extends from this outlet to an inlet **73** provided within the base of the accumulator tank **74**.

This tank is in the form of a pressure tank and contains fluid and air, reference character **75** illustrating the fluid with reference character **76** illustrating the air thereabove, and a charging valve **77** permits air under pressure to be charged within the accumulator tank **74**.

In operation, as the shroud tends to move in the direction of arrow **78**, the piston **67** moves downwardly within the cylinder **65** and forces fluid from the cylinder into the accumulator tank. This means that the fluid level rises within the tank and compresses the air thereabove thus increasing the resistance to movement of the shroud. When pressure is relieved from the shroud, the air pressure within the accumulator tank **74** forces the fluid back into the cylinder and returns the shroud to the original position.

Control is obtained by the initial charge of air within the tank and the pressure of this charge of air.

The advantages over the spring assembly in the previous embodiments is due to the fact that spring assembly increases its resistance far too rapidly for many applications whereas the hydraulic piston and cylinder assembly in conjunction with the accumulator gives far greater control over a wider range of movement yet at the same time allows the adjustment necessary so that the device can be used in different environments.

Since various modifications can be made in my invention as hereinabove described, and many apparently widely different embodiments of same made within the spirit and scope of the claims without departing from such spirit and scope, it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense.

What I claim as my invention is:

1. A material compacting device for use in conjunction with a storage container such as a truck; comprising in combination an outer casing, an arcuately curved shroud mounted in said casing, an intake hopper in said casing and an ejector outlet in said casing, said shroud extending between said hopper and said outlet, a drum journalled for rotation transversely within said casing and being situated towards said outlet, the peripheral wall of said drum being in close proximity with the concave inner surface of said shroud, a source of power operatively connected to said drum for rotating same and a set of compression vanes, means in said casing to mount said vanes, said means being eccentric to the transverse axis of said drum, said vanes extending through the peripheral wall of said drum and extending and retracting relative to said peripheral wall of said drum as said drum rotates, adjacent vanes, the portion of said peripheral wall therebetween and said shroud defining chambers, the volume of which decreases towards said ejector outlet as said drum and vanes rotate, said shroud being pivotally mounted to said casing by one end thereof adjacent said hopper and adjustable means adjacent the other end thereof normally biassing said shroud towards said drum thereby controlling the compaction of material within said chambers, said means normally biassing said shroud towards said drum including a fluid operating piston and cylinder assembly operatively extending between said shroud and said casing and an accumulator in said casing operatively connected to the cylinder of said piston and cylinder assembly.

2. The device according to claim **1** in which said means in said casing mounting said vanes includes a fixed shaft spanning said casing internally of said drum and being secured to the walls of said casing, sleeve bearing means secured to the walls of said casing, sleeve bearing means secured to each of said vanes and bearably engaging around said shaft, transverse slots formed in the peripheral wall of said drum, one for each of said vanes, and bearing means on the insides of said drum wall adjacent each slot for bearably supporting each of said vanes for reciprocal motion through said slots.

3. The device according to claim **1** which includes means for journalling said drum for rotation as aforesaid, said last means including a plurality of rollers journalled upon each side wall of said casing and situated within said drum, the inner surface of the peripheral wall of said drum engaging over said rollers at each end of said drum.

4. The device according to claim **2** which includes means for journalling said drum for rotation as aforesaid, said last means including a plurality of rollers journalled upon each side wall of said casing and situated within said drum, the inner surface of the peripheral wall of said drum engaging over said rollers at each end of said drum.

* * * * *