United States Patent

[11] 3,629,992

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[21] Appl. No. **878,656**
[22] Filed **Nov. 21, 1969**
[45] Patented **Dec. 28, 1971**

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[54] **CONVEYOR ARRANGEMENT**
11 Claims, 12 Drawing Figs.

[52] **U.S. Cl.** **53/370**
[51] **Int. Cl.** **E04b 2/00**
[50] **Field of Search** 53/227, 370; 198/209

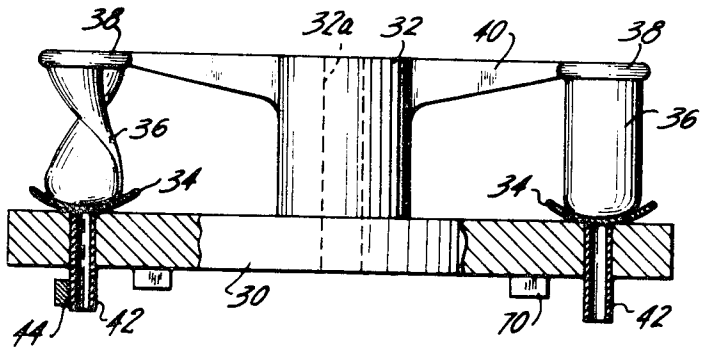
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ABSTRACT: A conveyor arrangement in which a rotatable circular platform is indexed with respect to the discharge locations of refuse compactors. A Y-shaped structure beneath the circular platform carries a plurality of wheels which support the platform while, at the same time, permitting rotational motion thereof with substantially small frictional resistance. A motor and geared speed-reduction unit supported by the Y-shaped structural frame is mechanically coupled to the platform. A closure arrangement, extending angularly along a portion of the angular path of the platform, rotates the base of a flexible container bag for the purpose of closing the bag at its neck after having been filled with compacted refuse.



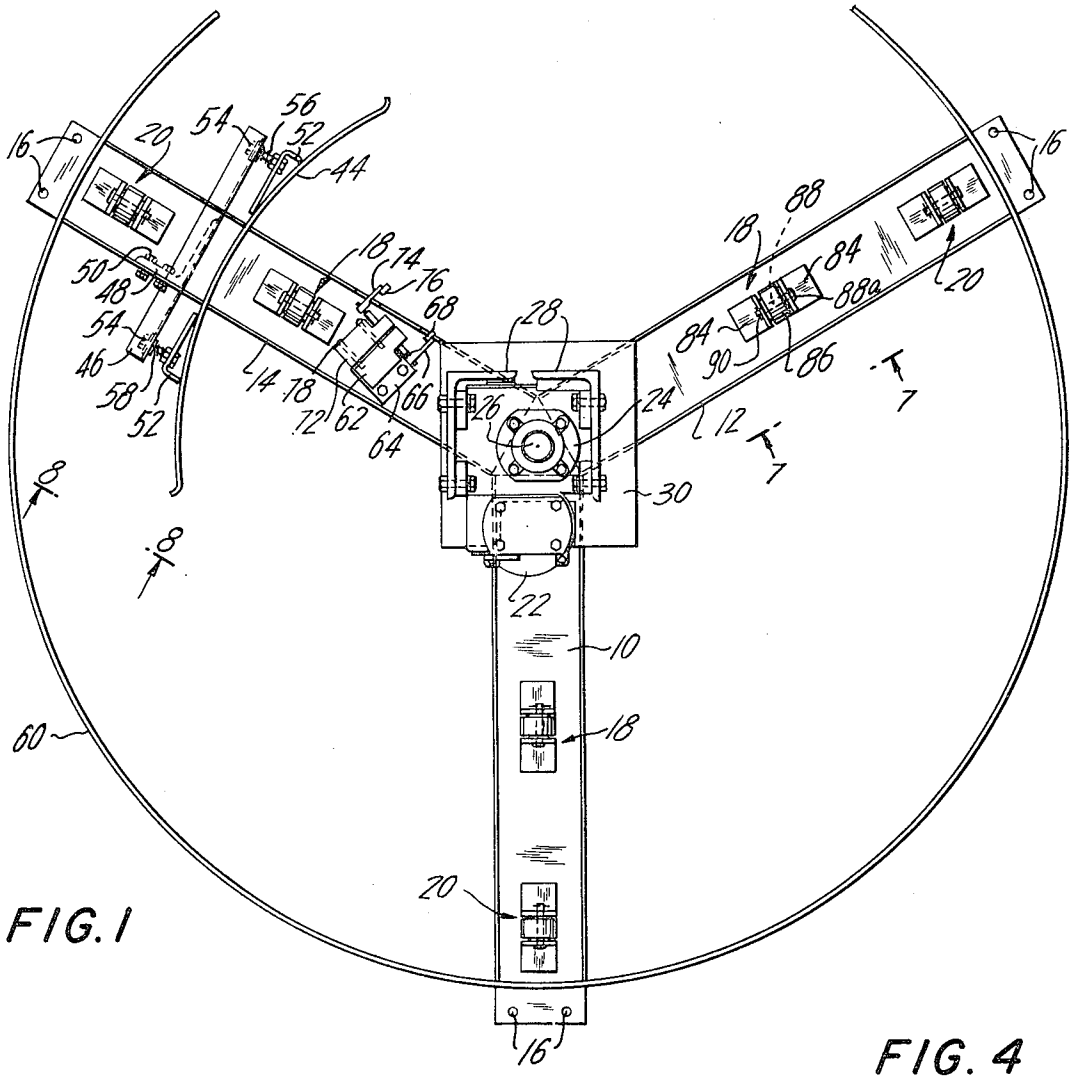
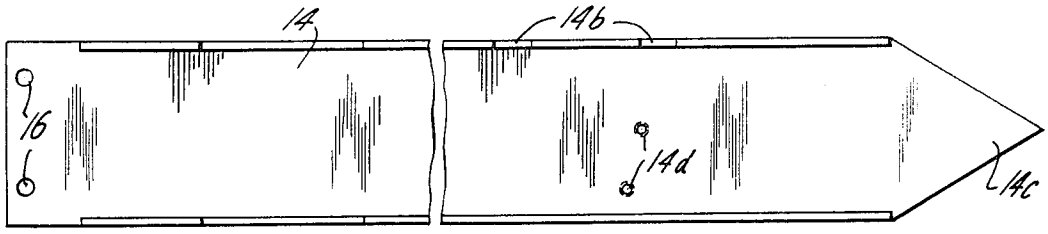


FIG. 1



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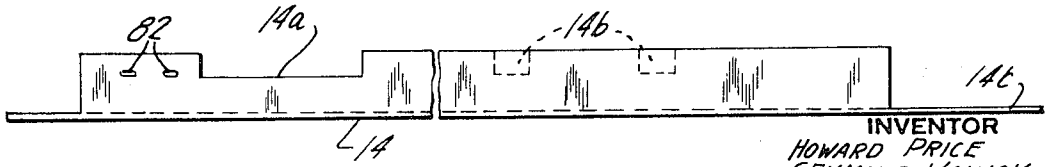


FIG. 5

FIG. 4

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FIG. 2

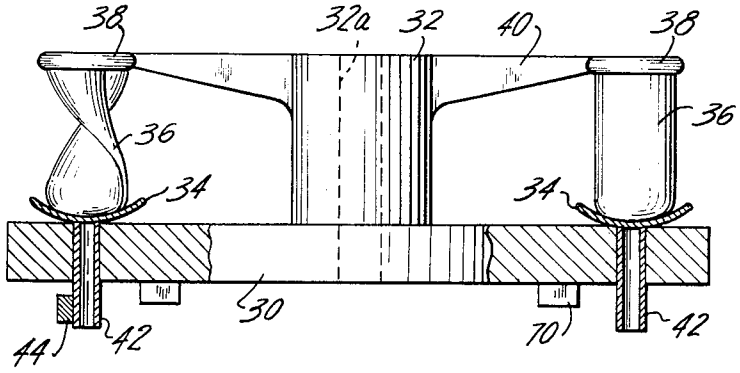
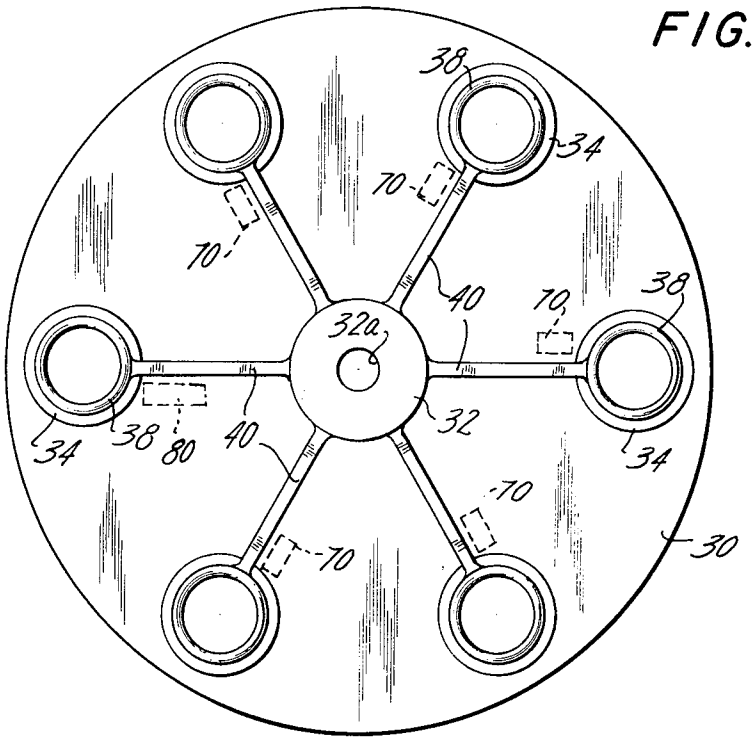


FIG. 3



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FIG. 6

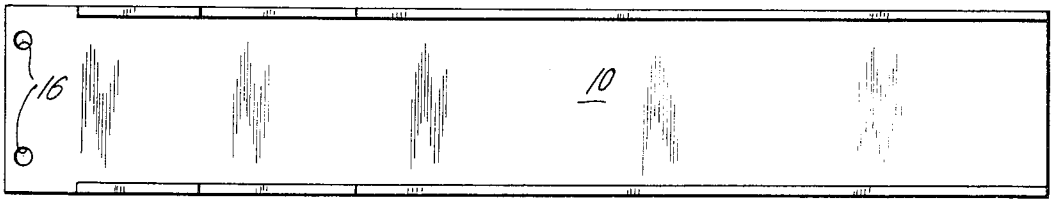


FIG. 7

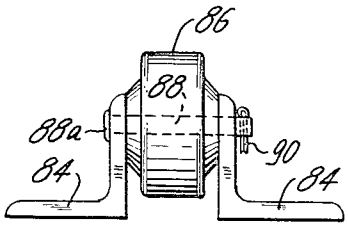


FIG. 8

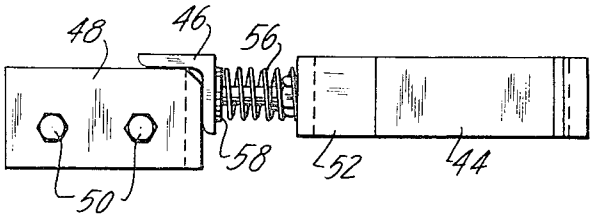


FIG. 11

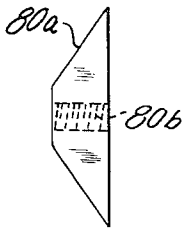


FIG. 12

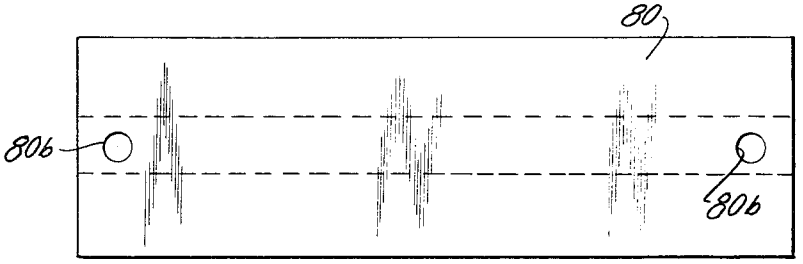
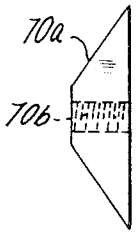


FIG. 9



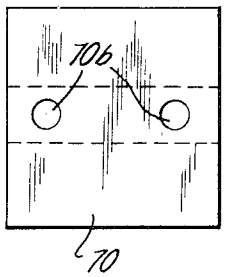


FIG. 10

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CONVEYOR ARRANGEMENT

BACKGROUND OF THE INVENTION

In the use of refuse compactors, it is essential to have available an arrangement for receiving the compacted refuse discharged from the compactor, transmit the refuse into containers, transport the filled container from the compactor station, and locate a new unfilled container at the compactor stations for receiving the subsequent discharge from the compactor. In the past, such conveyor systems were slow operating arrangements which limited the operational speed of the compactor, since it is not possible to process the refuse faster than it can be carried from the compactor. Furthermore, such conveying systems heretofore did not have provision for closing the container after filling with compacted refuse, so that such closure of the containers was required to be performed separately through manual means. Additional manual labor was also required in removing the filled containers and relocating in place unfilled containers for receiving the subsequent discharge from the compactor.

SUMMARY OF THE INVENTION

A conveyor arrangement for use with refuse compactors in which a Y-shaped structure serves as the supporting frame. The three angularly displaced arms of the Y-shaped frame carry a plurality of wheels or rollers upon which a circular conveying platform is rotatably supported. Mounted upon the frame at the center of the Y, is a motor and gear-reduction unit which provides the driving torque for the conveying platform. The shaft of the gear reducer or speed-reduction unit extends into a hub-shaped portion of the platform, and rotates the latter by being secured thereto. The platform carries a plurality of equiangularly spaced dish-shaped elements upon which the containers are located. Extending from beneath the dish-shaped elements is a circular tube section which comes into contact with a stationary bracket segment located along a portion of the circular path taken by the tube segment during rotation of the platform. When the tube section comes into contact with the stationary bracket segment, the tube is rotated so that several twisting turns are applied to the upper portion of the container for the purpose of closing the latter after filling. The upper rim of the container which may be in the form of a disposable bag, for example, is held by a stationary circular ring-shaped member. Limit switches mounted on one arm of the Y-shaped structural frame, emit signals for indexing the conveyor, and stopping further operation thereof when all containers held on the conveyor have been filled.

It is an object of the present invention to provide a conveyor arrangement for refuse compactors in which the refuse-receiving containers are sequentially brought to the discharge location of the compactor and transported from that location after being filled.

It is also an object of the present invention to provide a device functioning in conjunction with the conveyor system, so as to close the container after filling.

It is furthermore an object of the present invention to provide a conveyor arrangement of the aforementioned character which may be operated through substantially small torque and power expenditures.

A particular object of the present invention is to provide for simple indexing of the conveyor arrangement for the sequential processing of containers, and to stop the conveyor from further operation when all containers available on the conveyor have been filled.

It is also an object of the present invention to provide a conveyor arrangement for refuse compactors which will not become clogged with refuse during operation, which is simple in construction, and which may be readily serviced.

Various further and more specific purposes, objects, features and advantages will clearly appear from the detailed description given below taken in connection with the accompanying drawings which form part of this specification and illustrate merely by way of examples embodiments of the devices of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following description and in the claims, parts will be identified by specific names for convenience, but such names are intended to be as generic in their application to similar parts as the art will permit. Like reference characters denote like parts in the several figures of the drawings in which:

FIG. 1 is a plan view of the conveyor drive and control arrangement with the conveying platform removed, in accordance with the present invention;

FIG. 2 is an elevational view with parts broken away of the conveyor platform assembly operatively driven and controlled by the arrangement of FIG. 1;

FIG. 3 is a plan view of the assembly of FIG. 2, and shows the arrangement of the refuse-container holders;

FIG. 4 is a plan view of one of the arms of the supporting frame in FIG. 1;

FIG. 5 is a front view of the arm of FIG. 4;

FIG. 6 is a plan view of another arm of the supporting frame in FIG. 1;

FIG. 7 is a front view of the wheel assembly, in FIG. 1, used to support the conveyor platform;

FIG. 8 is a side view taken along line 8—8 in FIG. 1;

FIG. 9 is an end view of a switch actuating cam for indexing sequentially the conveyor platform of FIG. 2;

FIG. 10 is a plan view of the cam of FIG. 9;

FIG. 11 is an end view of a switch-actuating cam for discontinuing operation of the conveyor platform upon completion of an operating cycle;

FIG. 12 is a plan view of the cam of FIG. 11.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing and in particular to FIG. 1, the supporting structure for the conveyor arrangement, in accordance with the present invention, is comprised of a Y-shaped frame having substantially equiangularly spaced arms 10, 12, and 14. The arm 14 has a triangular end-shaped portion which mates with squared end portions of the remaining two arms 10 and 12. The arms are fabricated from structural channel and may, for example, be of steel. Each of the arms are provided at their ends with openings 16 through which the frame may be mounted firmly in place to, for example, the floor upon which the refuse compactor is mounted.

The three arms of the supporting Y-shaped structure, furthermore, are provided each with a pair of freely rotatable wheel assemblies 18 and 20. These wheel assemblies serve as the support for the rotatable circular platform upon which the refuse containers are carried.

The drive for the conveyor system is provided by a motor 22 mounted in place at the center of the Y-shaped structure, at which the three arms thereof intersect or are joined. The shaft of the motor 22 is coupled to a geared speed-reduction unit 24 having a shaft output 26, the axis of which coincides with the axis of rotation for the conveyor platform. Through means of the geared speed-reducing unit 24, the speed of the motor 22 is reduced while, simultaneously, increasing the torque of the motor output. This increased torque is used to turn the conveyor platform with containers in filled or unfilled condition. Structural angles 28 support the geared speed-reducing unit 24 and the accompanying motor unit 22, so that the output shaft 26 is held in a vertical position. A mounting plate 30 bolted to the center of the Y-shaped supporting frame structure, holds the structural angles 28 in place, and hence, locates the entire drive assembly for the conveyor.

The conveyor platform 30 is a circular plate-shaped member which rests upon the wheel assemblies 18 and 20, and is thereby freely rotatable about the central axis of the Y-shaped structural frame. The platform 30 possesses a hub-shaped member 32 into which the shaft 26 of the geared speed reducer extends. Thus, the hub 32 is bored to receive the end portion of the shaft 26, and this shaft 26 is keyed or fixed to the interior of the bore 32*a* of the hub 32. Accordingly, with rotation of the shaft 26 through operation of the motor 22, the hub 32 and hence platform 30 are rotated with the rotation of the shaft 26.

Spaced equiangularly on the upper surface of the platform **30**, are dish-shaped elements **34**. These elements serve as supports for the containers **36** which may be, for example, of the flexible plastic- and disposable-type. The container bags **36** are suspended at their upper rims, through ring-shaped holders **38**. These holders are, in turn, secured to the upper portion of the hub **32**, through brackets **40**. Thus, the ring-shaped holders **38** and brackets **40** are distributed equiangularly about the hub **32**, and correspond in number to the quantity of supporting elements **34** or the container capacity of the conveyor.

The container bags **36** are suspended from the ring-shaped portions **38** by having, for example, their upper portions coiled about the ring **38**. The bags **36** can also be suspended from the rings **38**, for example, through clamps at several locations about the circumference of the rings. The clamps, under these conditions, may be spring-loaded devices, similar to clothes pins, which clamp the upper rim of the container bags **36** to the ring **38**.

At the base of the dish-shaped member **34**, is a tubular element **42** which is secured to the dish **34** and is freely rotatable within an opening passing through the conveyor platform **30**. A portion of the tube **42** projects from beneath the lower surface of the platform **30** which is sufficiently raised by the wheel assemblies **18** and **20** above the supporting Y-frame, so that the ends of the tubes **42** clear the arms of the supporting frame as the platform **30** rotates. The tubular member **42** cooperates with a rail segment **44** stationarily held on the arm **14**, through a bracket **46** secured thereto. The bracket **46** is a standard structural angle maintained fixed to the arm **14**, through a further angle **48** bolted to one side of the channel arm **14**. Bolts **50** pass, for this purpose, through openings in both the structural angle **48** and the one side of the channel **14**.

When passing along the rail segment **44**, the tubular member **42** is pressed against the rail through the action of the spring-loaded L-shaped elements **52** supporting the rail member **44**. The spring-loading effect is realized through the application of bolts **54** carrying the coil spring **56**. The compression spring **56** tends to move the supporting elements **52** away from the structural angle **46**, and thereby force the rail segment **44** against the tubular member **42** as the latter is rotated past the rail segment. Washers **58** form the bearing surface for the end of the compression spring **56** adjacent to the angle **46**.

A circular stationary ring-shaped strip **60** is welded at the end of the arms **10**, **12** and **14**, for the purpose of maintaining the interior of the conveyor free from refuse or discards which may tend to enter during prolonged operation of the conveyor.

For the purpose of indexing the conveyor so as to present container bags in sequence to the compactor discharge location, an indexing switch **62** is provided. This switch is mounted in place on the arm **14** through a holding bracket **64**. The switch **62** is of conventional construction and actuated through an actuator arm **66** having a follower roller **68** at one end cooperating with a cam **70**. The cam portion **70** is mounted to the lower surface of the conveyor platform **30** and will actuate the roller **68** and hence the actuator arm **66** whenever the cam passes by the position of the roller **68**.

Once the actuator arm **66** is depressed through the passage of the cam **70**, in this manner, the switch **62** is actuated and thereby transmits an electrical signal which stops the motor **22** from operating. Thus, cam portions **70** are equiangularly spaced beneath the rotatable platform **30**, and are equal in number to the number of container bags which may be carried by the conveyor. Whenever the cam portion **70** actuates the switch **62**, the signal derived from this switch signifies that a container has been located in place at the compactor discharge station.

Each cam portion **70** is provided with sloping sides **70*a*** for the purpose of rolling easily over the followers **68** and thereby actuate or depress the **66** without substantial resistance.

A further switch **72** is mounted on the arm **14** and adjacent to the switch **62**. The switch **72** is similar in construction to that of the switch **62**, and has an actuator arm **74** and follower roller **76**. The switch **72** is bolted onto the switch **62** with long screws or bolts **78**, and it is held thereby in place directly adjacent to the switch **62**.

When the conveyor has rotated a complete revolution and all of the container bags have been used or filled, a second cam **80** also mounted to the lower surface of the platform **30**, passes over the follower roller **76** and thereby depresses the actuator arm **74**. As a result, the switch **72** becomes actuated and transmits a signal signifying that all of the container bags have been filled and that a cycle of operation has been completed. When this condition occurs, it is also desirable to stop the motor **22** from operating so that the conveyor comes to a standstill for the purpose of reloading with container bags for a new or subsequent cycle. For the purpose of stopping the motor rotation at this point, the cam **80** is elongated so that it also extends past the follower roller **68**. Accordingly, when the cam **80** actuates the arm **74**, it simultaneously actuates the arm **66** and thereby stops the motor from further operation.

With both switches **62** and **72** actuated in this manner, the signal for stopping the conveyor is realized while, at the same time, a signal is obtained which indicates that a cycle of conveyor operation has been completed. Only one cam segment **80** is provided beneath the platform **30**, unlike the number of cam portions **70**, and cam **80** also has inclined or sloping sides **80*a*** to facilitate actuation of the rollers **68** and **76**.

In particular, the arm **14** is fabricated from structural channel in which the sides are partially cut off to form a mounting portion with the openings **16**. Openings **82**, furthermore, are cut into one side of the channel for the purpose of admitting bolts **50** for securing the angle **48**. These openings **82** may be in the form of elongated slots to permit adjustment, in position, of the angle **48**. A rectangular-shaped cutout **14*a*** is also provided on both sides of the channel for the purpose of providing free passage for the tubular member **42** as the platform **30** rotates. Rectangular-shaped cutouts **14*b*** through one side of the channel, permit the passage of electrical wires leading to the switches **62** and **72**.

The end of the channel **14** at the center of the Y-shaped structure, has a triangular-shaped portion **14*c*** which mates with squared end portions of the remaining two arms. Thus, the end portions of the arms **10** and **12** mating with the portion **14*c***, are designed as the end of the channel **14** with the triangular-shaped portion **14*c*** removed.

The wheel assembly **18** or **20** consists of two angles forming bearing brackets **84** spaced from each other to admit the wheel **86**. The latter is freely rotatable about a pin passing through a central opening of the wheel **86** and bearing holes in the brackets **84**. A cotter pin **90** at one end of the pin or shaft member **88** prevents the latter from slipping out of the brackets **84** during the operation of the conveyor. The bearing pin **88** is provided with a head **88*a*** at the end opposite to which the cotter pin **90** is applied. The bearing brackets **84** support the freely rotatable wheel **86** at a height so that the tubular members **42** may pass freely about the stationary structural Y-frame.

The signals from switches **62** and **72** are received and processed by the compactor, not shown, and the control circuit of the compactor causes advancing of the conveyor **30** when a container **36** has been filled as registered by the compactor.

While the invention has been described and illustrated with respect to a certain preferred example which gives satisfactory results, it will be understood by those skilled in the art after understanding the principle of the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A conveyor arrangement comprising, in combination, a supporting stationary base frame; a rotatable member supported by said frame and rotatable about a predetermined axis

through said rotatable member; drive means within said stationary base frame and linked to said rotatable member for rotating said member about said axis; at least one shaft member passing through an opening in said rotatable member for supporting at one end of said shaft member a container, said shaft member being spaced from said axis and on a radius of said rotatable member in proximity of the periphery of said rotary member; stationary rail means in the path of the other end of said shaft member when said rotatable member is rotated by said drive means, said rail means being mounted on said stationary base frame and beneath said rotatable member for bearing against said other end of said shaft member protruding from said rotatable member and rotating thereby said shaft member within said opening through said rotatable member; and a ring member secured to said rotatable member and suspended above said one end of said shaft member for suspending said container above said one end of said shaft member, whereby said container is held by said ring member substantially at the open end of said container and the closed bottom of said container is supported by said shaft member, said container being twisted closed when said shaft member is rotated within said opening upon rotation of said rotatable member.

2. The conveyor arrangement as defined in claim 1 including a plurality of freely rotatable wheels mounted on said base frame and supporting said rotatable member so that said rotatable member is freely rotatable on said wheels, said wheels being angularly spaced about the angular path of said rotatable member.

3. The conveyor arrangement as defined in claim 1 wherein said stationary base frame comprises a Y-shaped structure supporting said rotatable member along three arms of said Y-shaped structure.

4. The conveyor arrangement as defined in claim 1 wherein said drive means comprises an electrical motor mounted on said stationary base frame in proximity of said predetermined axis.

5. The conveyor arrangement as defined in claim 4 including speed-reducing means mechanically coupled to said motor and linked to said rotatable member for driving said rotatable member at a speed lower than the output speed of said motor.

6. The conveyor arrangement as defined in claim 1 wherein said rotatable member comprises a circular plate-shaped member.

7. The conveyor arrangement as defined in claim 1 including a flange member at said one end of said shaft member for supporting the bottom of said container.

8. The conveyor arrangement as defined in claim 1 including spring means urging said rail means against said other end of said shaft member; and spring-retaining means mounted on said space frame for supportedly retaining said spring means.

9. The conveyor arrangement as defined in claim 1 including first switching means mounted on said stationary base frame; and cam means on said rotatable member for actuating said first switch means when said shaft member is at a predetermined angular position.

10. The conveyor arrangement as defined in claim 1 including second switching means mounted on said stationary base frame; and auxiliary cam means for actuating said first and second switching means when said rotatable member has rotated through a complete revolution.

11. The conveyor arrangement as defined in claim 1 wherein said container comprises a flexible container bag.

* * * * *