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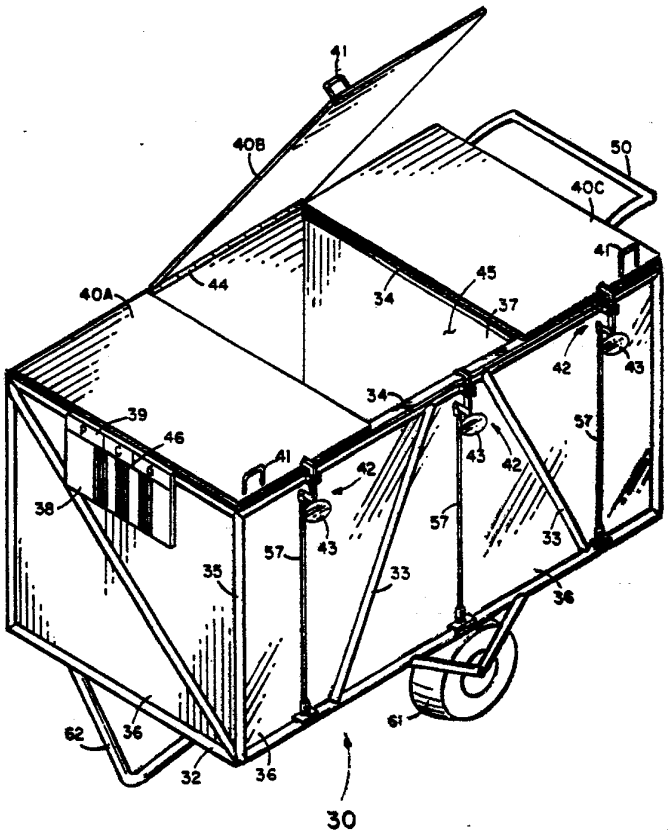
Published
With international search report.

(54) Title: CONTAINER AND PICKUP ASSEMBLY FOR COLLECTION OF RECYCLABLE MATERIALS

(57) Abstract

A container (30) for stationing at curbside has a plurality of bins (45) for receiving separated material for recycling thereof, each bin having a hinged lid (40). A pair of pickup arms (80) is provided, for use with an automated truck-mounted pickup and dump system, for engaging the container preparatory to picking up and selectively dumping the separated recyclable material in each of the bins. The bins and pickup arms include closures (42 or 50-1) and closure releases (70) for maintaining the lids closed during pickup of the container, and for selectively releasing the lids during dumping.



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CONTAINER AND PICKUP ASSEMBLY FOR COLLECTION OF RECYCLABLE MATERIALS

TECHNICAL FIELD

The present invention relates to refuse recycling separation and collection system for garbage, trash, and the like, and more particularly to a container adapted for mechanical picking up and dumping of separated materials.

BACKGROUND ART

In the past few years, a number of trash pickup trucks and containers have been developed which permit pickup of trash by a trash truck operated by one person. For example, in my United States Patent No. 4,175,903 I disclose such an apparatus and a container especially designed to facilitate the lifting of the container and the dumping of its contents. Similar apparatus has been disclosed in the following U.S. Patents: No. 2,933,210; No. 4,726,726; No. 4,543,028; No. 4,722,658; and No. 4,669,940. In more recent years, many communities have begun to require separation of garbage and trash into several groups, for example, cans, bottles, and paper. Such materials are required to be carried to curbside in separate containers and manually dumped into trash trucks having separate compartments for each type of separated material. The purpose is to be able to reclaim a large portion of such materials to thus minimize the trash disposal problem as well as to conserve national resources. To comply with these requirements, truck manufacturers have provided multiple compartment trucks. However, each separate

container must be picked up and dumped by hand into the appropriate section of the truck.

There is no known system in which the collection and dumping of the materials from a divided container into separate compartments on the truck can be accomplished mechanically. Known collection systems require two or more persons to expedite pickup. There is a need for a container for separated trash and pickup means which will reduce the labor and costs of separating and collecting materials for convenience and encouragement of recycling.

DISCLOSURE OF INVENTION

An outdoor container is provided having three bin which can be mechanically picked up and deposited in a compartmented truck having mechanized pickup capability. The contents of the outdoor container may be selectivity deposited in the truck compartments.

The outdoor container is a rectangular cart-like device preferably having a tubular framework. A handle is provided at one end and a set of wheels is provided to permit easy movement. A stand is attached at a forward end to maintain the container essentially level. The tubular framework is lined with thin sheet metal or plastic and divided, for example, into three bins, one for each of the recyclable materials. A sheet metal or plastic cover is provided for each bin. Each cover is hinged along one edge of its bin, which is maintained closed by its weight, or, alternatively, by a latch. The lids are easily openable by a user.

The end of the framework opposite the handle may include an identification plate attached to the upper lateral tubular member thereof which includes indicia

indicative of the contents of each of the bins of the container. For example, the plate may be labeled "paper", "cans", "glass", or the initials thereof from left to right indicating the material deposited in each bin. Similarly, a label may be placed on each lid indicating the contents. In addition to such indicia, in one aspect of my invention I utilize a bar code for each bin marked on the plate, and for identification of the customer for collection programs in which collections are charged for by weight.

Another part of the second element of the system is a clamping arm assembly having a pair of horizontally extending clamp arms attached to a framework and a pair of hydraulic linear actuators which move the two arms laterally inward or outward. The inside surface of each of the arms may be covered with a pad molded of resilient material having a plurality of inwardly projecting cone shaped projections as described in my U. S. Patent No. 4,175,903.

As will be described below, the clamping arm assembly is attached to and positioned by a suitable pickup arm operated from a truck. To pick up the outside container, the arms are opened laterally and extended along the longitudinal sides of the outside container. A bar code reader may be attached to the clamping arm assembly in a position to contact and read the identification plate on the front of the outside container. The clamping arms are extended by the pickup arm to the point that the bar code reader may contact the identification plate, the longitudinal extension stops, and the hydraulic actuators move the arms inward to contact the tubular framework. As will be understood, and as described in some detail in my

U.S. Patent No. 4,175,903, the resilient cones grip the container framework securely.

In a first embodiment of the invention, the container lids each include a latch that is released by a trip assembly mounted on at least one of the clamping arms. In an alternative embodiment of the invention, the arms may be moved downward until a hydraulically actuated lid closure element contacts and holds each outside container lid closed.

It is therefore a principal object of my invention to provide an outdoor container having a plurality of bins, and which is formed to be picked up mechanically.

It is still another object of the invention to provide a pair of clamping arms for clamping the outdoor container preparatory to picking up and selective dumping of the separated trash.

It is yet another object of the invention to provide an outdoor container having a plurality of bins for receiving separated, recyclable trash having lids held closed by latches, and catch release devices on the clamping arms for selectively releasing the lids for dumping of the contents.

These and other objects and advantages of my invention will become apparent from the following detailed description when read in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a first embodiment of the trash collection container assembly for use outside of a building and at curbside;

Figure 2 is a partial perspective view of a pickup arm assembly of my invention for use with the outside container assembly of Figure 1;

Figure 3 is a partial view of a pickup arm of the assembly of Figure 2 showing resilient cones attached thereto;

Figure 4 is a partial top view of the container assembly of Figure 1 and the pickup arm assembly of Figure 2 in place preparatory to picking up the container assembly;

Figure 5 shows a partial cross-sectional view of the framework of the container assembly of Figure 1 and an end view of a pickup arm of Figure 3 showing a lid release mechanism for the container of Figure 1;

Figure 6 is a perspective view of a second embodiment of the trash collection container assembly for use outside of a building and at curbside;

Figure 7 is a partial perspective view of a pickup arm assembly of my invention for use with the outside container assembly of Figure 6;

Figure 8 is a partial top view of the container assembly of Figure 6 and the pickup arm assembly of Figure 7 in place preparatory to picking up the container assembly; and

Figure 9 shows a partial cross-sectional view of the frame work of the container assembly of Figure 6 and an end view of a pickup arm of Figure 7 showing a lid closure and release mechanism.

MODES FOR CARRYING OUT THE INVENTION

Figure 1 illustrates a container to be normally stationed outside of a building and adapted to be moved to curbside for trash pickup. Outside container

30 preferably utilizes a tubular metal framework 32 having essentially rectangular sides. As will be explained below, the framework provides a means for gripping of the container 30 for lifting and dumping. Framework 32 is covered on the inner faces thereof by panels 36 which may be of sheet metal, or sheet plastic. Alternatively, the entire container 30 may be molded from plastic having ribs on the external surface thereof to provide strength and gripping surfaces. A plurality of dividers 37 is provided to divide the container 30 into a plurality of bins 45. Three bins 45 are shown although it is to be understood that the system of the invention may utilize more or less than three bins. Each bin 45 includes a hinged lid 40; for example, lid 40B shown in an open position. Each lid 40 is hinged along one edge by hinge 44. Handles 41 are provided for manual opening of lid 40. Although I have shown lids 40 hinged along a longitudinal edge of container 30, the lids may be hinged laterally. A metal channel 34 may be attached around the top periphery of tubular framework 32 and divider 37 to provide a flat mating surface for lids 40.

It is necessary for lids 40 to be maintained in the closed position during a pickup and dumping procedure. To this end, a spring loaded catch 42 is provided for each bin 45, shown in more detail in Figure 5. An operating rod 57 for each lock extends from catch 42 to a pivot bracket 60 attached to a lower element of pipe frame 32. A push plate 43 is attached to each catch 42 to permit manual release thereof for placing materials in a bin. Pressure on push plate 43 causes catch member 50 to pivot at pin 51 in bracket 53 against spring 52, releasing lid 40.

As discussed below, catch 42 may also be released by pressure against rod 57.

To permit outside container 30 to be easily moved, a pair of wheels 61 is mounted midway of container 30 with a stand 62 at one end to maintain container 30 level. A handle 50 is provided at the other end for moving container 30. The size of container 30, as well as the individual bins 45, may be selected in accordance with the expected volume of trash, frequency of collection, and relative amounts of separated trash. If the weight and size permits, casters may be substituted for stand 62 for ease of handling of outside container 30.

The outside container 30 is designed in conjunction with a clamping arm assembly 100 having a pair of container clamping arms 80A and 80B as shown in Figure 2. A frame 90 supports a set of cylinders 91 and a set of rods 92 are telescopically inserted into cylinders 91. Clamping arm mounting plates 89 are attached to the respective ends of rods 92. A hydraulic linear actuator 93A is mounted on frame 90 and connected to mounting plate 89 of clamping arm 80A while linear actuator 93B is attached to mounting plate 89 of clamping arm 80B. As will be understood, simultaneous operation of actuators 93A and 93B will cause clamping arms 80A and 80B to move inwardly or outwardly, as indicated by arrows A, in accordance with the direction of movement of actuators 93. A panel 97 may mount a bar code reader head 96 with the assembly shown in exploded view, normally mounted at the upper end of frame 90 as will be shown in more detail hereinafter. The inner surfaces of clamping arms 80A and 80B are covered with a resilient pad 87, each preferably having a plurality of resilient

conical projections 82, and arranged in orthogonally related rows and columns disposed parallel to the longitudinal edges of arms 80A and 80B, as best seen in Figure 3. Pad 87 may be formed from urethane, rubber, or the like. Additional details of pads 87 may be found in my U.S. Patent No. 4,175,903.

Outside container 30 may include a bin identification plate 38 attached to one end thereof as shown in Figure 1. The arrangement and contents of each bin may be indicated as at indicia 39 by appropriate legends. Additionally, a set of bar codes 41 may be provided on plate 38 for identifying the bin contents, and may also provide identification of the customer.

With reference to Figures 2, 4 and 5, the operation of the clamping arm assembly 100 of Figure 2 in combination with outside container 30 will be described. When a container 30 is to be picked up, the clamping arms 80A and 80B of assembly 100 are spread apart by operation of actuators 93. The arms 80 and assembly 100 are then moved forward, by a pickup arm 99, along the sides of container 30 having identification plate 38 attached thereto. When bar code reader mounting assembly 97 contacts plate 38, a limit switch 98 will open causing the forward movement of assembly 100 to cease. As may be noted, bar code reader 96 will be opposite bar codes 41. An external control system (not shown) will identify the materials in each of bins 45 of container 30.

The control system will then operate actuators 93 to close, moving arms 80A and 80B inwardly. Limit switches 101 indicate when clamping pad 87 (best seen in Figure 4) is against tubular frame 32. Alignment is not critical since the cones 82 will deform as the

tubular members 33 are gripped. As will be noted from Figure 1, tubular braces 33 are set at an angle with respect to vertical corner elements 35. Thus, angular members 33, which will prevent vertical slipping of container 30 when clamped between arms 80A and 80B.

To be able to dump the contents of each bin 45 of container 30, lids 40 must be released at the proper time. Referring to Figures 2 and 5, an actuator 70 for each respective bin 45 is mounted at an angle to clamping arm 80A that operates release arm 86, pivoted by pin 85. A horizontal bar 84 is attached to the distal end of release arm 86. After clamping container 30 as hereinabove described, an external lifting and dumping apparatus (not shown) picks up and inverts container 30 over a collection truck body. When it is required to dump a bin, the appropriate actuator 70 is energized, pressing bar 84 against rod 57, and permitting lid 40 to open by gravity.

An alternative mode of carrying out the invention is illustrated in Figure 6. As will be noted, container 30-1 is constructed as in the mode shown by Figure 1, and like reference numerals correspond to the like elements of Figure 1. In this mode, catches for lids 40 are omitted. The user accesses each bin by using handles 41, and lids 40 are normally held closed by gravity.

As will be understood, lids 40 must be held closed during the pickup, lifting and inverting operation. To this end, the structure shown in Figures 7, 8, and 9 is provided. In Figure 7, a set of closure actuator elements 70-1 is provided, each having an closure element 50-1, as best shown in Figure 9.

With reference to Figures 8 and 9, the operation of the clamping arm assembly 100-1 of Figure 7 in combination with container 30-1 will be described. When a container 30-1 is to be picked up, clamping arms 80A and 80B of assembly 100-1 are spread apart by operation of actuators 93. Arms 80 and assembly 100-1 are then moved forward along the sides of container 30-1. When bar code reader mounting assembly 97 contacts plate 38, a limit switch 98 will close causing the forward movement of assembly 100-1 to cease. As may be noted, bar code reader will be opposite bar codes 41.

A control system (not shown) will operate actuators 93 to move arms 80A and 80B inwardly. Limit switches 101 are set to indicate when clamping pads 87 are within a few inches of tubular frame 32. Arm assembly 100-1 is then lowered until closure arm 50-1 of each closure element 88 contacts lids 40 of container 30-1. Thereafter, actuators 93 operate to move arms 80A and 80B inwardly until clamping pads 87 close against vertical members 33 of Figure 6, which will be securely clamped between the resilient cones 82.

The release mechanism to permit dumping of the contents of bins 45 is described with reference to Figure 9. As previously mentioned, lid 40 is held against channel member 34 by closure element 50-1. Plate 50 is connected to actuator 70 which is mounted at an angle with respect to arm 80A. When a lid 40 is to be opened for dumping, actuator 70 is operated, moving closure element 50-1 in the direction of the arrow. As will be recognized, dumping occurs when container 30 is inverted and closure element 50-1 is moved to the position shown in phantom view in Figure

9, permitting lid 40 to open by gravity, as indicated by the dashed-line arrow.

As will now be recognized, a container and pickup arm assembly for use in an automated trash pickup system for recyclable materials has been disclosed. The container and pickup assembly has been shown in exemplary form; however, the invention is not to be limited to the specific arrangements as many variations may be made without departing from the spirit and scope of the invention. More or fewer bins may be provided, and in varying sizes and orientation. The lid closure systems may be changed to have closure devices associated with both pickup arms. Thus, the invention is to be limited only by the appended claims.

I CLAIM:

1. Apparatus for receiving separated materials for selectively dumping of said materials characterized by:

a) a container (30,30-1) divided into a plurality of bins (45), each bin for receiving one type of said separated material;

b) lid means (40,41,44) for closing each of said bins; and

c) a pickup assembly (100,100-1) for engaging said container preparatory to picking up said container.

2. The apparatus as defined in claim 1 in which said container has a plurality of ribs (33,35) on vertical exterior sur faces thereof.

3. The apparatus as defined in claim 2 in which said pickup assembly has a pair of opposed clamping arms (80A,80B) adapted to move from an open position to a closed position for engaging said ribs of said container preparatory to picking up said container.

4. The apparatus as defined in claim 1 in which each of said bins includes coding means (38,46) representative of the material to be deposited therein.

5. The apparatus as defined in claim 1 in which each bin has an essentially rectangular horizontal cross section.

6. The apparatus as defined in claim 1 which includes:

a plurality of planar lids(40), one of said lids hingedly attached to each of said bins;

lid closure means (42) for maintaining each of said lid in a closed position during pickup of said container; and

lid release means (70,86,82) for selectively releasing said lids during dumping of said materials.

7. The apparatus as defined in claim 6 in which:

said lid closure means includes catch means (50) attached to said container; and

said release means includes actuator means (70) attached to said clamping arm for selective release of said catch means.

8. The apparatus as defined in claim 6 in which said lid closure means includes:

a plurality of actuator means (70-1) mounted to said clamping arms and having lid engaging means (50-1) for holding said lids closed.

9. The apparatus as defined in claim 1 which further includes:

wheel means (61) attached to a lower portion of said container; and

a handle (50) attached to said container.

10. The apparatus as defined in claim 3 in which said pair of arms includes a resilient pad (87) disposed on each opposing surface thereof, said pad engaging said ribs of said container.

11. The apparatus as defined in claim 9 in which said pad includes a plurality of resilient conical projections (82) arranged in rows and columns.

12. The apparatus as defined in claim 4 in which said container includes:

a bin identification plate (38) attached to an end of said container;

said coding means includes a machine-readable barcode (46) for each of said bins to permit said container to be selectively dumped by an automated pickup system.

13. A trash pickup container for receiving separated materials, in combination with an arm assembly for picking up and selectively dumping said container under control of an automated system characterized by:

a) said container having a tubular framework with essentially rectangular faces, said framework lined and partitioned with sheet material (36) to define a plurality of separate bins, each bin for receiving one of said separated materials;

b) each of said bins having a lid hingedly attached to said framework for closing said bins;

c) a bin identification plate attached to an end of said framework having a machine-readable code for each of said bins to permit said container to be selectively dumped by said automated pickup system;

d) said arm assembly having a pair of opposed clamping arms adapted to move from an open position to a closed position for engaging said container preparatory to picking up said container; and

e) a plurality of lid closure actuators disposed on at least one of said pair of arms, one of said actuators for each of said bin lids for holding said lids closed during pickup of said container, wherein said each of said actuators is selectively operated for dumping the contents of a respective bin.

14. The container as defined in claim 13 in which said bins are color coded representative of the material to be deposited.

15. The container as defined in claim 13 in which each of said pair of arms includes a resilient pad having a plurality of resilient conical projections arranged in rows and columns disposed on each opposing surface thereof, said pad engaging said framework of said container.

FIG. 1

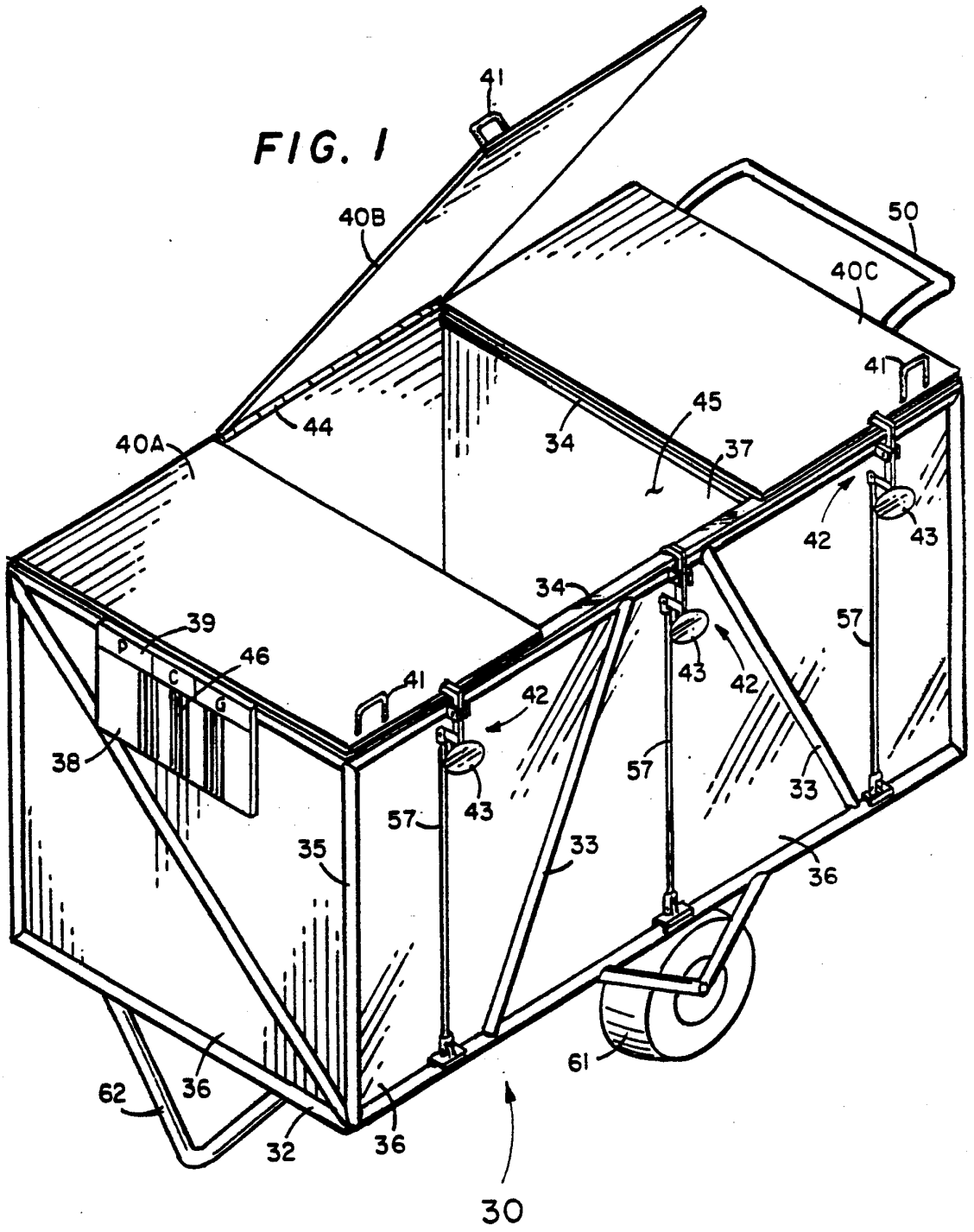
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FIG. 2

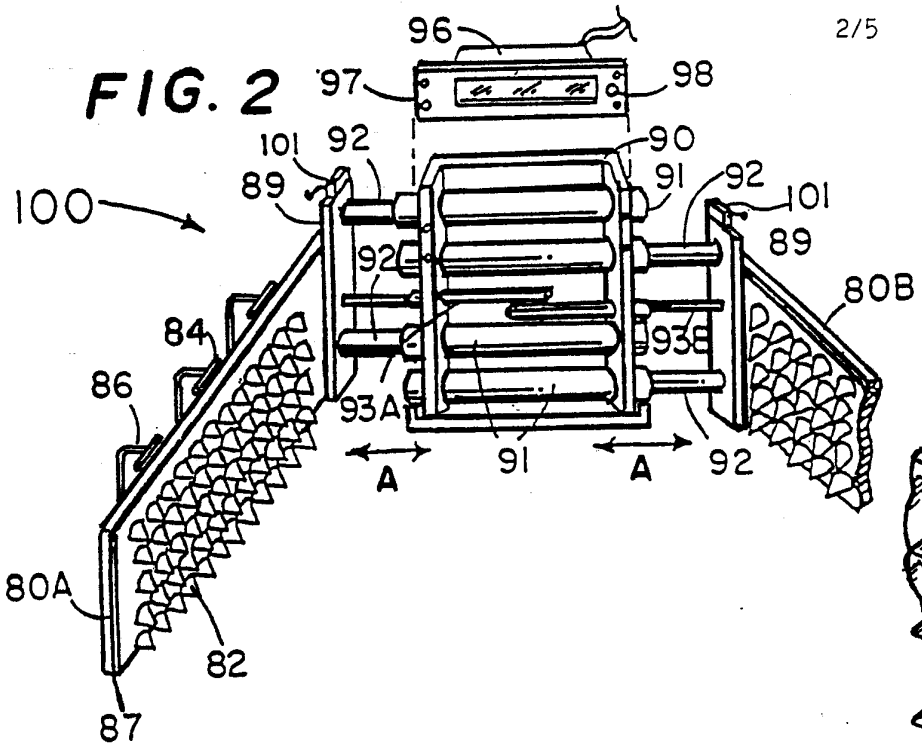

FIG. 3

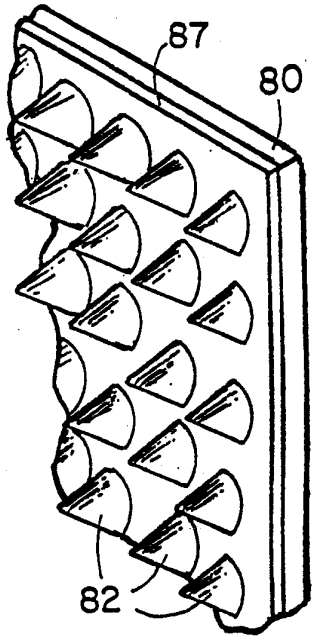

FIG. 4

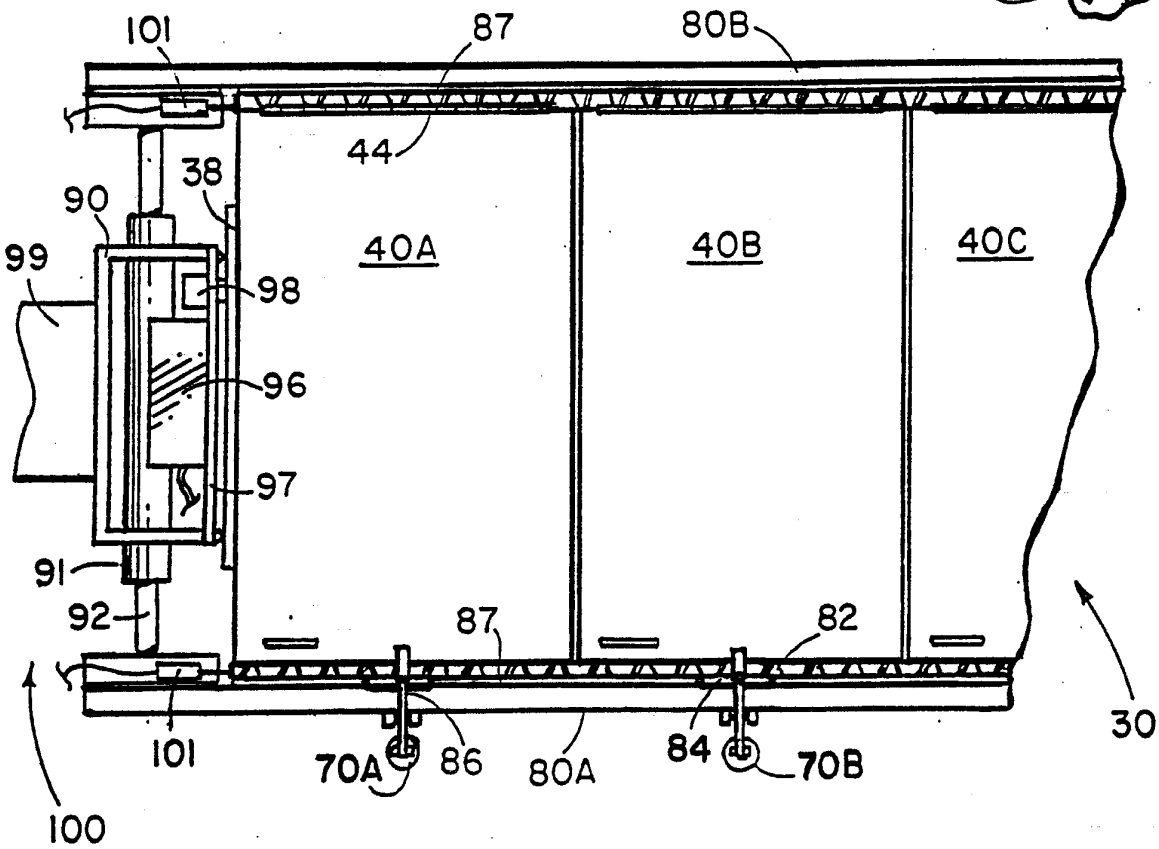

FIG. 5

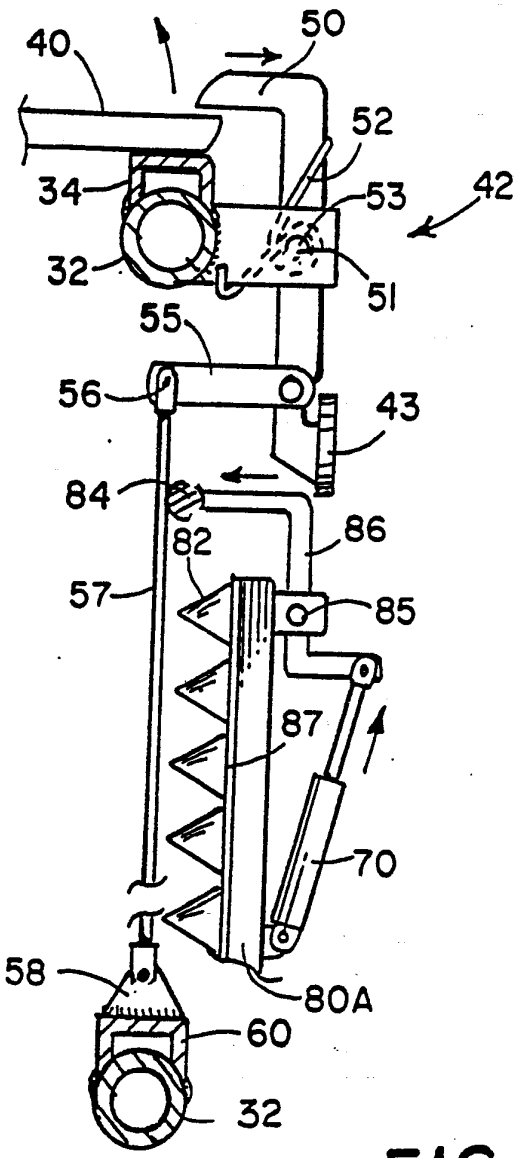

FIG. 9

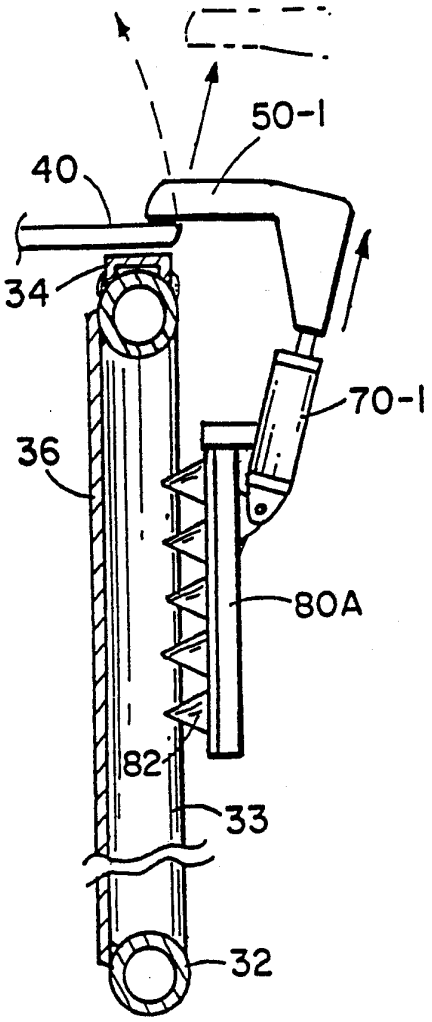

FIG. 7

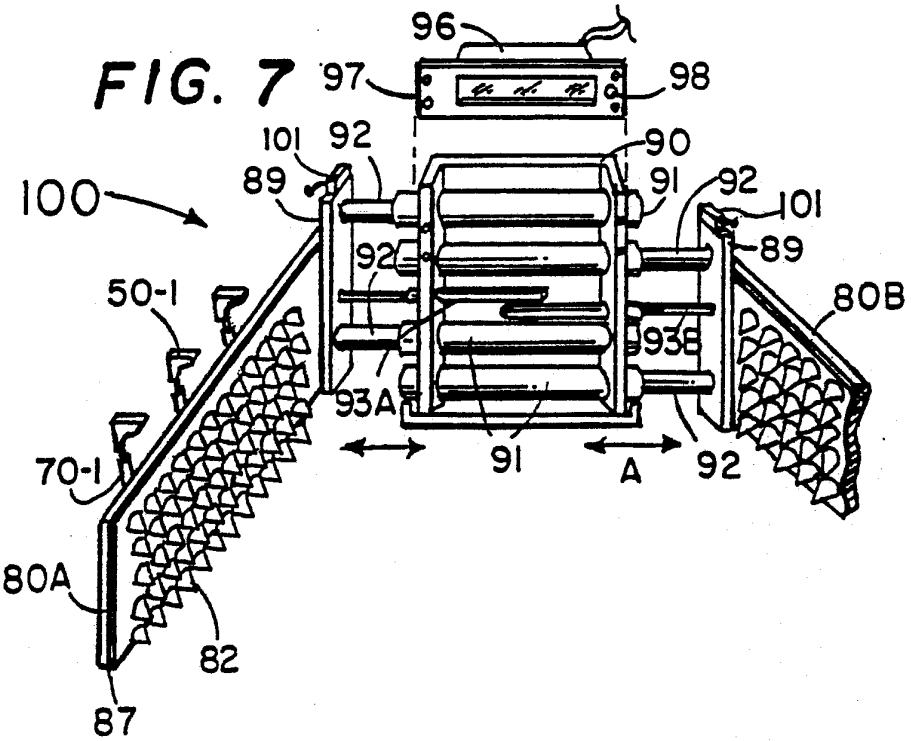

FIG. 6

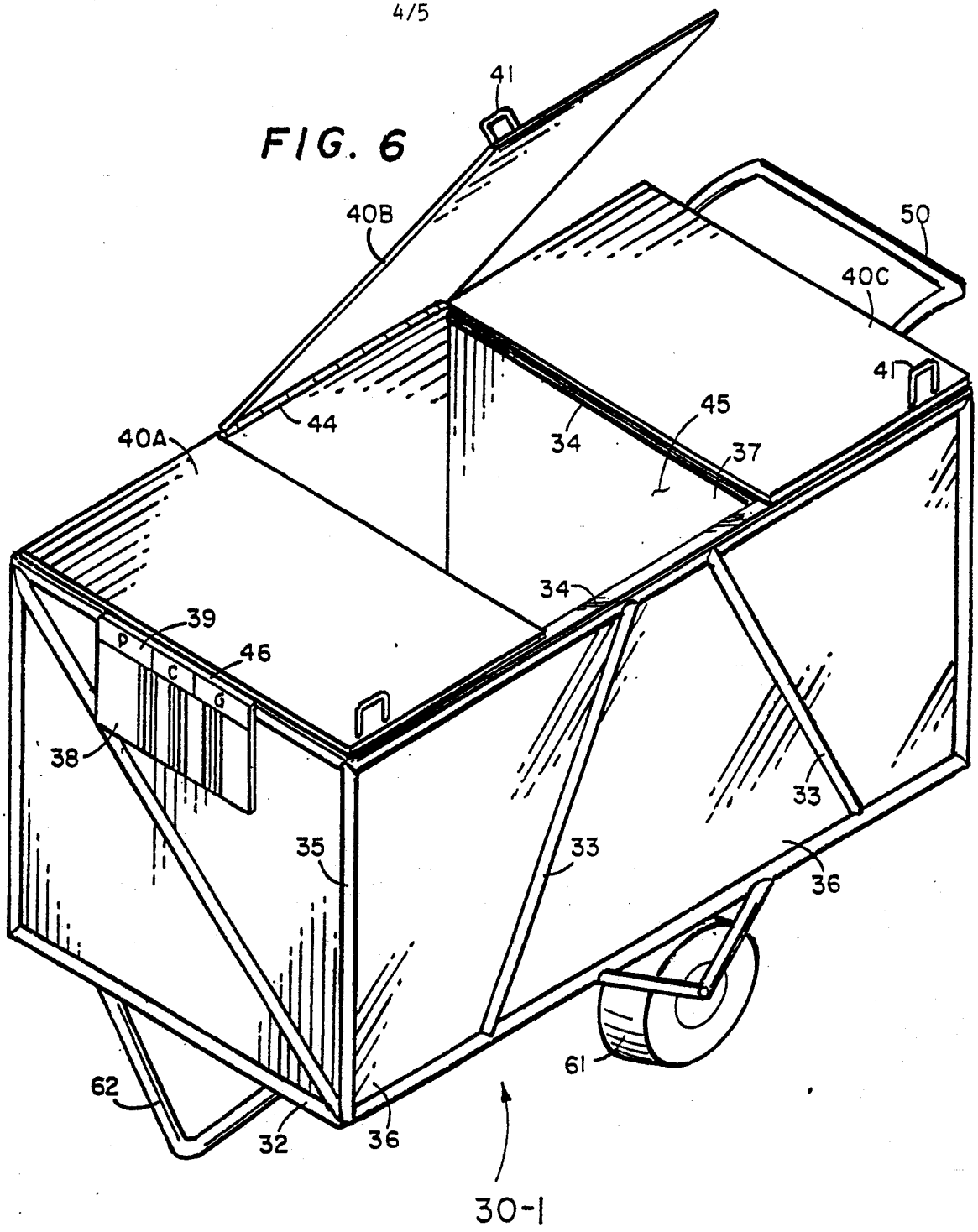
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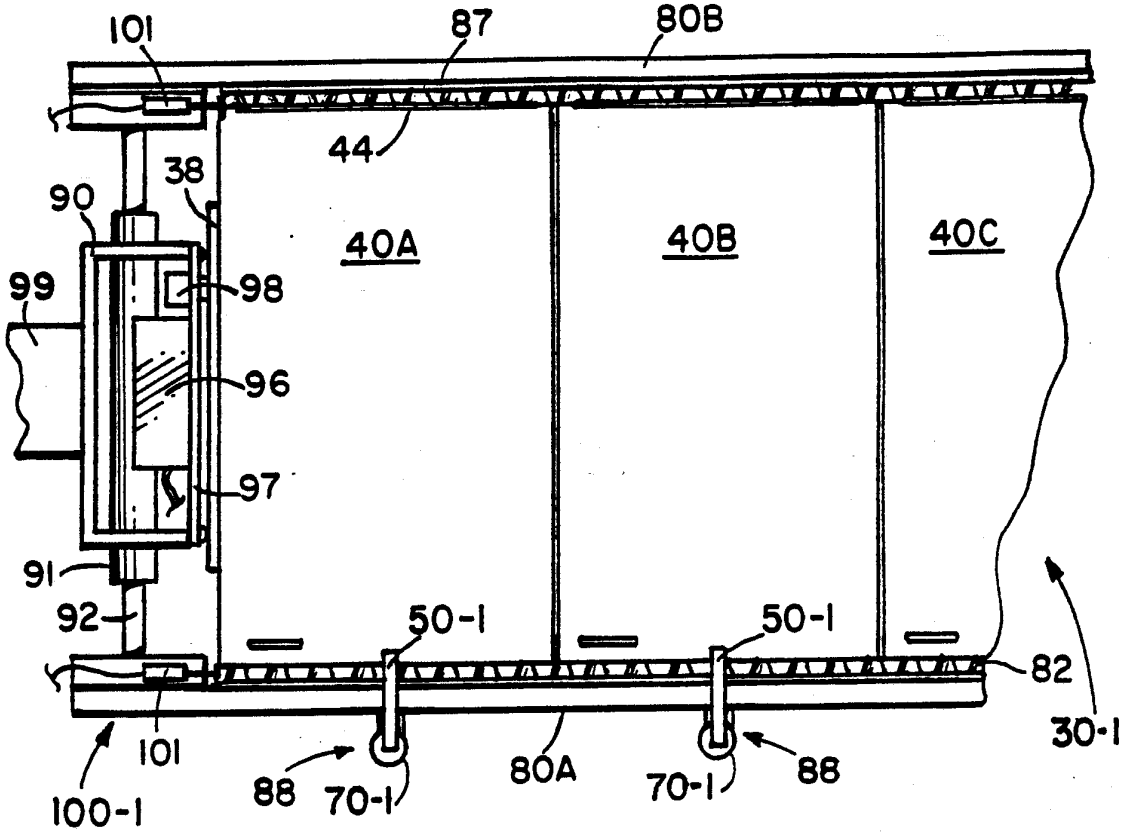
FIG. 8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INTERNATIONAL SEARCH REPORT

International Application No. PCT/US91/01870

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC(5): B65B 21/02
US CL : 414/41

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
US	414/303,406,407,408,409,411,419,420,421,546,549,555 220/908,909

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X Y	US, A, 4,113,125 (SCHILLER) 12 SEPTEMBER 1978 See figure 3A.	1,2,5 3,4,6,9-11
Y	US, A, 4,175,903 (CARSON) 27 NOVEMBER 1979 See figure 7.	3,9-11
Y,E	US, A, 5,004,392 (NAAB) 02 APRIL 1991 See figures 9A and 11.	4,12
Y	US, A, 3,315,828 (DUBO) 25 APRIL 1967 See figures 1 and 2.	6
A	US, A, 4,863,053 (OBERG) 05 SEPTEMBER 1989	
A	US, A, 4,771,837 (APPLETON ET AL.) 20 SEPTEMBER 1988	
A	US, A, 3,765,554 (MORRISON) 16 OCTOBER 1973	
A	US, A, 4,960,220 (FOA) 02 OCTOBER 1990	
A	US, A, 3,823,973 (RAMER) 16 JULY 1974	
A	US, A, 3,504,813 (WEIR) 07 APRIL 1970	
A	US, A, 3,531,554 (WURTZ) 05 MARCH 1987	

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
28 JUNE 1991	02 JUL 1991
International Searching Authority	**Signature of Authorized Officer**
ISA/US	ROBERT S. KATZ

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

A	DE, A, 3,600,603 (MATULLA) 18 SEPTEMBER 1986	
A	DE, A, 3,636,310 (LOCHEL) 28 APRIL 1988	

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [1]

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers . . . . , because they relate to subject matter [12] not required to be searched by this Authority, namely:

2. ☐ Claim numbers . . . . . , because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out [13], specifically:

3. ☐ Claim numbers_____, because they are dependent claims not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [2]

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.