(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 895 201 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.02.1999 Bulletin 1999/05

(51) Int. Cl.[6]: **G07F 7/06**

(21) Application number: **97305789.6**

(22) Date of filing: **31.07.1997**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

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(54) Empty bottle collecting apparatus having a reduced space for a bottle taking-in portion

(57) In an empty bottle collecting apparatus for identifying a profile of an empty bottle (69) with a predetermined profile at a reception hall (56) by an identifying device (60) and taking it into a bottle storing region (57) by a taking-in mechanism (70), the identifying device comprises a U-shape gate (59) having a plurality of photo-couplers (67) vertically spaced which gate is moved along the reception hall to define the profile from detection signals of the photo-couplers and a current moving distance of the gate. The taking-in mechanism comprises a single taking-in blade (71) which is rotated to take the empty bottle from the reception hall into the bottle storing region when the empty bottle is identified by the identifying device. A guide blade (73) may be provided to normally close the reception hole from the bottle storing region and to guide the empty bottle pushed by the taking-in blade into the bottle storing region.

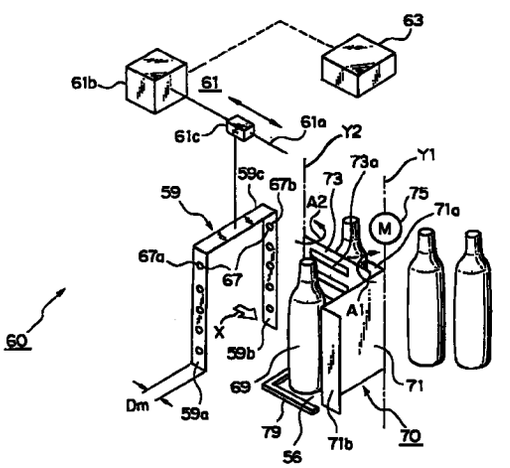

FIG. 4

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Description

[0001] This invention relates to in empty bottle collecting apparatus for collecting and storing empty bottles.

[0002] A conventional empty bottle collecting apparatus comprises a housing box with a reception opening or an entrance for insertion of an empty bottle thereinto, a bottle storing portion in the housing box for storing, as collected empty bottles, empty bottles therein, and a bottle taking-in portion in the housing box for taking the empty bottle inserted through the reception opening, as one of the collected empty bottles, into the bottle storing portion.

[0003] The bottle taking-in portion comprises a reception hall to which the empty bottle is inserted as a received empty bottle, through the reception opening, a profile identifier disposed adjacent the reception hall for identifying a profile of the received empty bottle with a predetermined profile to produce an identity signal, and a taking-in mechanism disposed at a different location adjacent the reception hall and responsive to the identity signal for taking the received empty bottle into the bottle storing portion.

[0004] JP-A-08 261,735 discloses the profile identifier used in a known empty bottle collecting apparatus in the prior art. The profile identifier comprises a movable member of a vertical groove-shape member movable towards the reception hall, a plurality of photo-couplers mounted thereon at vertically spaced positions on opposite side walls defining the groove for detecting different vertical portions of the received empty bottle, a travel distance monitoring device for driving the movable member towards the reception hall and monitoring the travelling distance of the movable member, and an identifying circuit for processing detection signals from the photo-couplers and a travelling distance monitored by the travelling distance monitoring device and identifying the profile of the received empty bottle to produce an identity signal.

[0005] A known one of the taking-in mechanism has a revolving door structure and comprises four crossed blades rotatable about the common connection. Two blades adjacent to each other are positioned along adjacent sides of the reception hall, respectively. The revolving door structure is rotated over a quarter of one revolution by a driving motor responsive to the identity signal so that the received empty bottle is pushed by one of the blades and taken into the bottle storing portion.

[0006] However, the conventional empty bottle collecting apparatus described above is disadvantageous in the following respects.

[0007] First, the movable member of the vertical groove-shape member must have a depth greater than a half of the maximum outer diameter of the empty bottle so as to correctly detect the profile of the received empty bottle. This requires a standby space for the movable member which is corresponding to about two thirds of the maximum sectional area of the empty bottle. This results in reduction of a space allocated for the bottle storing portion in a given housing box.

[0008] Second, each of blades of the revolving door structure for the taking-in mechanism must be as wide as the outer diameter of the empty bottle so as to reliably take the reception empty bottle into the bottle storing portion. This means that the taking-in mechanism requires an installation space as large as about four times the maximum sectional area of the empty bottle. This again results in reduction of the space allocated for the bottle storing portion.

[0009] Thug, the known empty bottle collecting apparatus has a relatively large space for the bottle taking-in portion in a given housing box.

[0010] It is therefore an object of this invention to provide an empty bottle collecting apparatus having a reduced space for a bottle taking-in portion thereby a bottle storing space being increased.

[0011] It is a specific object to provide a profile identifier device having a movable member for identifying a profile of on empty bottle which is capable of reducing a standby space of the movable member in the empty bottle collecting apparatus.

[0012] It is another specific object to provide a taking-in mechanism for taking an empty bottle into a bottle storing portion which is capable of reduction of an installation space of the taking-in mechanism in the empty bottle collecting apparatus.

[0013] According to this invention, there is provided an empty bottle collecting apparatus comprising a housing box (53) having a reception opening (53a) through which an empty bottle (69) is inserted, the housing box having therein a reception hall adjacent the bottle reception opening for receiving, as a received empty bottle, an empty bottle inserted thereinto through the reception opening and a bottle storing portion (57) for storing empty bottles as collected empty bottles; movable means (59) disposed at a waiting position adjacent a side of the reception hall and horizontally movable in a moving direction towards the opposite side of the reception hall; a plurality of object sensor means (67) mounted at vertically spaced positions on the movable means for sensing vertically spaced portions of the received empty bottle in the reception hall to produce detection signals, respectively, during a time when the movable means moves towards the opposite side of the reception hall; travelling distance monitoring means (61) for monitoring a travelling distance of the movable means to produce a monitoring signal which represents a current distance of the movable means from the waiting position; profile identifier means (63) for processing the detection signals and the monitoring signal and identifying a profile of the received empty bottle with a predetermined bottle profile to produce an identity signal; and bottle taking-in mechanism (70) disposed adjacent the reception hall and responsive to the identity signal for taking, as one of the collected empty bottles,

the received empty bottle into the bottle storing portion, which is characterized in that the movable means has an inverted U shape and comprises a pair of opposite vertical leg portions (59a, 59b) and a horizontal bridging portion (59c) connecting one ends of the leg portions each other.

[0014] Preferably, each of the plurality of object sensor means (67) is a photo-coupler comprising a light source mounted on one of the opposite vertical leg portions and a photo-electric transducer mounted on the other of the opposite vertical leg portions.

[0015] Preferably, the travelling distance monitoring means is provided with a driving mechanism for moving the movable means. The driving mechanism comprises a horizontal rod member (61a) extending in the moving direction, and a driving source for driving the horizontal rod member in the moving direction. The movable means is fixedly connected to the horizontal rod member.

[0016] Preferably, the travelling distance monitoring means comprises encoder means for converting a moving distance of the horizontal rod member in the moving direction into a pulse train having a number of pulses corresponding to the moving distance.

[0017] Preferably, the reception hall has a first side opposite to the reception opening, a second and a third sides opposite to each other, the movable means being disposed adjacent the second side. The bottle taking-in mechanism comprises a taking-in vertical blade (71) disposed at the third side of the reception hall and rotatable about a first vertical axis (Y1) towards the first side of the reception hole passing through the reception hall for pushing the received empty bottle to take into the bottle storing portion, and blade driving means (75) responsive to the identity signal to rotate the taking-in vertical blade.

[0018] Preferably, the bottle taking-in mechanism further comprises a guiding blade (73) disposed at the first side of the reception hall and swingable inward the bottle storing portion around a second vertical axis (Y2) spaced from the first vertical axis for guiding the received empty bottle into the bottle storing portion when the taking-in blade pushes the received empty bottle into the storing portion. The guiding blade is urged towards the first side of the reception hall to normally close the reception hall from the bottle storing portion.

[0019] In the accompanying drawings:-

Fig. 1 is a schematic plan view of a conventional empty bottle collecting apparatus;

Fig. 2 is a schematic perspective view of a bottle taking-in portion of the conventional empty bottle collecting apparatus illustrated in Fig. 1;

Fig. 3A is a schematic plan view of an empty bottle collecting apparatus according to an embodiment of this invention;

Fig. 3B is a perspective view showing an external appearance of the empty bottle collecting apparatus illustrated in Fig. 3A; and

Fig. 4 is a schematic perspective view of a bottle taking-in portion of the empty bottle collecting apparatus illustrated in Fig. 3A.

[0020] In order to facilitate an understanding of this invention, description will at first be made about a conventional empty bottle collecting apparatus.

[0021] Referring to Figs. 1 and 2, the conventional empty bottle collecting apparatus 11 comprises a housing box 13 having a bottle reception opening 14, a bottle taking-in portion 15, and a bottle storing portion 17. The bottle taking-in portion 15 has a reception hall 16 adjacent the bottle reception opening 14 for receiving, as a received empty bottle, an empty bottle 29 inserted thereon through the reception opening 14, a profile identifier device 21 and a taking-in mechanism 25 both adjacent the reception hall 16.

[0022] The profile identifier device 21 is disclosed in JP-A-08 261,735 as described above, and comprises a movable member 19 of a vertical groove-shape member, a travelling distance monitor 22, a profile identifying circuit 23.

[0023] The movable member 19 has a generally U-shaped horizontal section to define a vertical groove or channel 33 therein and is horizontally movable towards the reception hall 16 in a moving direction. The movable member 19 is provided with a plurality of photo-couplers 27 mounted at vertically spaced different positions on the movable member 19 for detecting different portions of the received empty bottle 29 when the movable member moves in the moving direction. Each of the photo-couplers 27 comprises a light emitting element 27a such as a light emitting diode and a photo-electric transducer 27b such as a photo-diode which are attached to two opposite side plates of the movable member 19 defining the groove.

[0024] The travelling distance monitor 22 comprises a horizontal rod member 22a extending in the moving direction, and a driving member 22b for driving the horizontal rod member 22a in the moving direction and monitoring a travelling distance of the horizontal rod member 22a. A supporting member 22c is fixed to the horizontal rod member 22a and fixedly supports the movable member 19 so as to move the movable member 19 together with the horizontal rod member 22a in the moving direction.

[0025] The driving member 22b has a driving source such as a stepping motor and is provided with a convertor for converting a travelling distance of the movable member 19 into an electric signal. An encoder (not shown) is usually used therefor, which comprises a photo-coupler and a rotary code plate. The rotary code plate has a hole and is rotated in synchronous with the movement of the horizontal rod member 22a through, for example, a rack and pinion (not shown)to produce a number of pulses corresponding to a moving amount or

the travelling distance of the horizontal rod member 22a together with the movable member 19. That is, the driving member 22b including the encoder produces a monitoring signal representing a current travelling distance of the movable member 19.

[0026] The profile identifying circuit 23 is responsive to a series of sensor output signals from the photo-couplers 27 and a series of pulses from the driving member 22b and identifies the profile of the received empty bottle 29 with a predetermined profile to produce an identity signal.

[0027] On the other hand, the taking-in mechanism 25 comprises four blades 25a through 25d coupled at vertical axis Y crosswise in horizontal section to form a revolving door structure. The taking-in mechanism 25 is driven by a motor 31 to rotate around a vertical axis Y.

[0028] Operation of the above-mentioned conventional empty bottle collecting apparatus 11 will hereafter be described.

[0029] The empty bottle 29 is inserted into the housing box 13 of the empty bottle collecting apparatus 11 through the reception opening 14 and placed on the reception hall 16 end between two adjacent blades 25a and 25b of the taking-in mechanism 25. Then, the movable member 19 is moved in the moving direction from its standby position illustrated in Figs. 1 and 2 towards the received empty bottle 29, as depicted by a white arrow X in Figs. 1 and 2. Thus, the received empty bottle 29 is introduced in the groove 33 of the movable member 19 from its lateral side.

[0030] When the received empty bottle 29 is introduced into the groove 33 of the movable member 19 as described above, the received empty bottle 29 successively interrupts a light beam emitted from each light source 27a towards each corresponding photo-electric transducer 27b from time to time. A time period between the emission and the interruption of the light beam input to the photo-electric transducer 27b is successively detected to produce a series of the sensor output signals. On the other hand, the travelling distance of the movable member 19 is successively detected by the encoder of the driving member 22b to produce the monitoring signal representing the current travelling distance.

[0031] In response to the sensor output signals and the monitoring signal, the profile identifying circuit 23 identifies the profile of the received empty bottle 29 with a predetermined profile to produce the identity signal. That is, when the profile of the received empty bottle 29 is coincident with the predetermined profile which is preliminarily memorized, the identity signal is delivered to the taking-in mechanism 25.

[0032] Then, the taking-in mechanism 25 is rotated as depicted by a solid arrow A in Figs. 1 and 2 to push the received empty bottle 29 towards the bottle storing portion 17.

[0033] The bottle storing portion 17 is provided with a full storage sensing switch 35 arranged at one corner thereof. When the bottle storing portion 17 is filled up by empty bottles collected therein, the full storage sensing switch 35 is activated to produce a full storage detection signal.

[0034] As described in the preamble, the above-mentioned conventional bottle collecting apparatus 11 has disadvantages, which will hereafter be described more in detail.

[0035] With respect to the first disadvantage, it is provided that the groove depth and the width of the movable member 19 and the maximum outer diameter of the empty bottle 29 are represented by Dm, Wm, and D respectively. In this event, it will be understood that Dm and Wm are given by $Dm = D/2$ and $Wm = D$ at minimum. This is because that the received empty bottle 29 must be introduced into the groove 33 at least one half of the received empty bottle so as to insure the correct detection of profile of the empty bottle 29. Therefore, the standby space Sm of the movable member 19 is given by:

$$Sm = Dm \times Wm = D/2 \times D = D^2/2.$$

On the other hand, the maximum sectional area Sb of the empty bottle 29 is given by:

$$Sb = \pi \cdot (D/2)^2 = \pi \cdot D^2/4.$$

The ratio Sm : Sb between the standby space Sm of the movable member 19 and the maximum sectional area Sb of the empty bottle 29 is given by:

$$Sm : Sb = D^2/2 : \pi \cdot D^2/4 = 1/2 : \pi/4 = 2/\pi : 1 = 2/3 : 1.$$

This results in a relatively large standby space for the movable member 19 to reduce a space allocated for the bottle storing portion 17 in a given housing box 13.

[0036] With respect to the second disadvantage, each blade of the taking-in mechanism 25 has a width Wc of a dimension as large as the maximum outer diameter D of the empty bottle 29. This means that the taking-in mechanism 25 requires an installation space as large as about four times the maximum sectional area of the empty bottle 29, because the taking-in mechanism revolves in the manner as the revolving door structure for storing empty bottles succeedingly. This again results in reduction of the space allocated for the bottle storing portion 17 in the given housing box 13.

[0037] Now, description will be made about a preferred embodiment of this invention with reference to the drawing.

[0038] Referring to Figs. 3A, 3B and 4, an empty bottle collecting apparatus 51 comprises a housing box 53 having a reception opening 53a with a closing door 53b, a bottle taking-in portion 55, and a bottle storing portion 57. The bottle taking-in portion 55 has a reception hall

56 adjacent the bottle reception opening 53a for receiving, as a received empty bottle, an empty bottle 69 inserted thereon through the reception opening 53a, a profile identifier device 60 and a taking-in mechanism 70, both adjacent the reception hall 56.

[0039] The reception hall 56 is defined by a side adjacent the reception opening 53a, a first side opposite to the reception opening 53a, a second and a third sides opposite to each other. A positioning guide 79 of an "L" shape is mounted on the reception hall 56 with a leg portion of the "L" extending along the second side while a foot portion of the "L" extending along the reception opening 53a.

[0040] The profile identifier device 60 comprises a movable member 59 disposed along the second side of the reception hall 56, a travelling distance monitor 61, and a profile identifying circuit 63.

[0041] The movable member 59 is horizontally movable towards the reception hall 56 in a moving direction. The movable member 59 is formed into an inverted U-shape gate which comprises a pair of vertical leg portions 59a and 59b and a horizontal bridge portion 59c connecting top ends of the vertical leg portions 59a and 59b. A plurality of photo-couplers 67 arc attached to the movable member 59 at vertically spaced different positions. Specifically, each of the photo-couplers 67 comprises a light source 67a such as a light emitting diode and a photo-electric transducer 67b such as a photodiode, both being attached to the leg portions 59a and 59b, respectively. The photo-couplers 67 are for detecting the different portions of the received empty bottle 69 then the movable member 59 moves in the moving direction to produce detected signals in the similar manner as in the conventional empty bottle collecting apparatus as described in connection with Figs. 1 and 2.

[0042] The travelling distance monitor 61 has a horizontal rod member 61a extending in the moving direction and a driving member 61b for driving the horizontal rod member 61a in the moving direction, both of which are similar to the horizontal rod member 22a and driving member 22b in the conventional apparatus shown in Figs. 1 and 2. The horizontal rod member 61a supports the movable member by a supporting member 61c like 22c in Fig. 2. The driving member 61b, like 22b in Fig. 2, has, for example, the encoder to produce the monitoring signal. The identifying circuit 63 is like the one 23 of the conventional empty bottle collecting apparatus in Fig. 2 and produces the identity signal.

[0043] Further description as regards the profile identifier device 60 will be omitted for the purpose of simplification of the description except the movable member 59.

[0044] The movable member 59 is formed into a U-shaped gate structure having the opposite vertical leg portions 59a and 59b carrying the photo-couplers 67 and the top bridging portion 59c. Therefore, the movable member 59 can be made with a reduced dimension Dm, such as a size of the photo-coupler, in the moving direction without disturbing correct detection of the profile of the received empty bottle 29. Accordingly, it is possible to reduce the standby space of the movable member 59 to thereby increase a space for the bottle storing portion in the given housing box.

[0045] The bottle taking-in mechanism 70 comprises a single taking-in blade 71 disposed along the third side of the reception hall 56, a guiding blade 73 disposed along the first side of the reception hall 56, and a motor 75 for rotating the taking-in blade 71 around a first vertical axis Y1 disposed near a corner of the first and the third sides. Thus, the taking-in blade 71 is swingable in a first swinging direction depicted by a solid line arrow A1 so as to push the received empty bottle in the reception hall 56 to take it into the bottle storing portion 57.

[0046] The taking-in blade 71 is provided with first and second bent ends or flanges 71a and 71b formed at both ends thereof, such that the first flange 71a is positioned along the first side of the reception hall 56 when the taking-in blade 71 is positioned along the third side of the reception hall 56, while the second flange 71b extending in parallel with but in an opposite direction to the first flange 71a.

[0047] The guiding blade 73 is swingable around a second vertical axis Y2 disposed at a corner of the first and the second sides of the reception hall 56 from its standby position shown in Figs. 3A and 4 in a direction depicted by an arrow A2 in the figures. The guiding blade 73 is accompanied with an urging member, for example, one or several turned coil spring 77 to operatively rotate the guiding blade 73 in an opposite direction to A2 when the guiding blade 73 is rotated in the A2 direction from the standby position. Any stopper is provided to prevent the guiding blade 73 from the standby position inward the reception hall 56.

[0048] When the taking-in blade 71 is positioned along the third side of the reception hall 56 or at a taking-in blade standby position as shown in Fig. 4, the first flange 71a is positioned adjacent the free end of the guiding blade 73 so that the guiding blade 73 is brought into engagement with the flange 71a by its independent rotation in the A2 direction and is prevented from undesired rotation into the bottle storing portion 57 and closes the reception hall 56 from the bottle storing portion 57.

[0049] The guiding blade 73 is provided with a plurality of slits 73a equal in number to the photo-couplers 67 and faced to the light emitting diodes 67a.

[0050] Next, operation of the empty bottle collecting apparatus 51 will be described.

[0051] Continuously referring to Figs. 3A, 3B, and 4, when a user opens the reception door 53b of the empty bottle collecting apparatus 51 and places the empty bottle 69, as the received empty bottle, on the reception hall 56. The received empty bottle 69 can be correctly positioned by the positioning guide 79 that is positioned at a region defined by the taking-in blade 71, the guiding blade 73, and the positioning guide 79. Then, the mov-

able member 59 is moved from its standby position in Figs. 3A and 4 towards the received empty bottle 69 in the moving direction depicted by a white arrow X in Figs. 3A and 4 to traverse the received empty bottle 69. While the movable member 59 is traversing the received empty bottle 69, the received empty bottle 69 interrupts the photo-couplers 67 in the manner similar to the identlfier device 21 of the conventional collecting apparatus shown in Figs. 1 and 2. Thus, the profile identifying circuit 63 produces the identity signal when the profile of the reception empty bottle 69 is identified with the predetermined profile.

[0052] Responsive to the indentity signal, the motor 75 driven to rotate the taking-in blade 71 in the swinging direction A1 to an operation terminating position depicted by a two-dot-and-dash line in Fig. 3A. During this swinging movement, the taking-in blade 71 pushes the empty bottle 69 which, in turn, pushes the guiding blade 73. Then, the first flange 71a of the taking-in blade 71 is also rotated and is not brought into engagement with the free end of the guiding blade 73 are released from the engaging condition. Therefore, the guiding blade 73 is allowed to swing around the second vertical axis Y2. Pushed by the taking-in blade 71, the received empty bottle 69 in turn pushes the guiding blade 73 in the direction of arrow A2 against the urging force by the spring 77. As a result, the empty bottle 69 is moved along the guiding blade 73 towards the bottle storing portion 57 adjacent to the taking-in blade 71. Eventually, the taking-in blade 71 reaches an operation terminating position depicted by the two-dot-and-dash line in Fig. 3A to push the received empty bottle 69 towards the center of the bottle storing portion 57. At this time, the guiding blade 73 leaves the received empty bottle 69 and comes into contact with a side edge of the second flange 71b of the taking-in blade 71, so that the guiding blade 73 is inhibited from returning towards its standby position.

[0053] After the empty bottle 69 reaches the operation terminating position in the bottle storing portion 57, the motor 75 is reversely rotated so that the taking-in blade 71 swings back towards its standby position to return to its standby position. Alternatively, the taking-in blade 71 may be returned to its standby position by the use of a spring (not shown) for urging the taking-in blade 71 towards its standby position and a cam (not shown).

[0054] When the bottle storing portion 57 is filled with the empty bottles 69, the full storage sensing switch 81 is activated to produce a full storage detection signal. In response to the full storage detection signal, an operator can remove a collection of the empty bottles 69 from the bottle storing portion 57 so as to bring it for any resource circulation system.

[0055] When the profile of the empty bottle 69 is incoincident with that of the particular object bottle preliminarily memorized, a display unit (not shown) provides an indication that the empty bottle 69 does not match the object bottle, In this event, the taking-in blade 71 does not swing and the empty bottle 69 is taken out by the user.

[0056] In the empty bottle collecting apparatus 51 described above, the width of the movable member 59 can be much reduced as far as the photo-couples 67 can be attached thereto. Therefore, a very small space is sufficient as the standby space of the movable member 59. On the other hand, the taking-in blade 71 of a single-blade structure does not rotate over a complete revolution but swings within a restricted angular range less than 180°. Therefore, the taking-in blade 71 requires an installation space as small as approximately twice the maximum sectional area of the empty bottle 69.

[0057] As will readily be understood, when the taking-in blade 71 is rotated by an angle of 90° , the installation space for the taking-in blade 71 is substantially equal to the maximum sectional area of the empty bottle 69. In the above-described structure, the taking-in blade 71 is rotated by an angle of about 135° . Therefore, the installation space for the taking-in blade 71 corresponds to about 1.5 times the maximum sectional areas of the empty bottle 69.

[0058] As described above, the empty bottle collecting apparatus 51 according to this embodiment can save the standby space of the moving member 59 and the installation space of the taking-in blade 71 as compared with the conventional empty bottle collecting apparatus illustrated in Figs. 1 and 2.

[0059] The empty bottle 69 is moved along the guiding blade 73 to be guided towards the bottle storing portion 57.

[0060] As described above, in the empty bottle collecting apparatus according to this invention, the movable member with the optical sensors attached thereto is moved in the horizontal direction towards the empty bottle and traverses the empty bottle. During this movement, the profile of the empty bottle is identified with reference to the result of detection by the photo-couplers and the travelling distance monitor. The width of the movable member is minimized as far as the photo-couplers can be attached thereto. Thus, a very small space is sufficient as the standby space of the movable member.

[0061] In the empty bottle collecting apparatus according to this invention, the empty bottle is taken into the bottle storing portion by the taking-in blade of a single-blade structure swinging around the first vertical axis. The taking-in blade of a single-blade structure does not rotate over the entire revolution but reciprocatingly swings within the restricted angular range for taking empty bottles in the bottle storing portion succeedingly. Therefore, the taking-in blade only requires a reduced space for its installation.

[0062] Thus, according to this invention, the standby space of the movable member and the installation space of the taking-in blade can be reduced as compared with the conventional empty bottle collecting

apparatus.

[0063] The guiding blade swingable around the second vertical axis serves to guide the empty bottle in a desired direction.

Claims

1. An empty bottle collecting apparatus comprising a housing box (53) having a reception opening (53a) through which an empty bottle (69) is inserted, said housing box having therein a reception hall adjacent said bottle reception opening for receiving, as a received empty bottle, an empty bottle inserted thereinto through said reception opening and a bottle storing portion (57) for storing empty bottles as collected empty bottles; movable means (59) disposed at a waiting position adjacent a side of said reception hall and horizontally movable in a moving direction towards the opposite side of said reception hall; a plurality of object sensor means (67) mounted at vertically spaced positions on said movable means for sensing vertically spaced portions of said received empty bottle in said reception hall to produce detection signals, respectively, during a time when said movable means moves towards said opposite side of said reception hall; travelling distance monitoring means (61) for monitoring a travelling distance of said movable means to produce a monitoring signal which represents a current distance of said movable means from said waiting position; profile identifier means (63) for processing said detection signals and said monitoring signal and identifying a profile of said received empty bottle with a predetermined bottle profile to produce an identity signal; and bottle taking-in mechanism (70) disposed adjacent said reception hall and responsive to said identity signal for taking, as one of said collected empty bottles, said received empty bottle into sold bottle storing portion, which is characterized in that:

   said movable means has an inverted U shape and comprises a pair of opposite vertical leg portions (59a, 59b) and a horizontal bridging portion (59c) connecting one ends of said leg portions each other.

2. An empty bottle collecting apparatus as claimed in claim 1, wherein each of said plurality of object sensor means (67) is a photo-coupler comprising a light source mounted on one of said opposite vertical leg portions and a photo-electric transducer mounted on the other of said opposite vertical leg portions.

3. An empty bottle collecting apparatus as claimed in claim 1, wherein said travelling distance monitoring means is provided with a driving mechanism for moving said movable means, said driving mechanism comprising a horizontal rod member (61a) extending in said moving direction, and a driving source for driving said horizontal rod member in said moving direction, said movable means being fixedly connected to said horizontal rod member.

4. An empty bottle collecting apparatus as claimed in claim 3, wherein said travelling distance monitoring means comprises encoder means for converting a moving distance of said horizontal rod member in said moving direction in to a pulse train having a number of pulses corresponding to said moving distance.

5. An empty bottle collecting apparatus as claimed in claim 1, wherein said reception hall having a first side opposite to said reception opening, a second and a third sides opposite to each other, said movable means being disposed adjacent said second side, and wherein said bottle taking-in mechanism comprises a taking-in vertical blade (71) disposed at said third side of said reception hall and rotatable about a first vertical axis (Y1) towards said first side of said reception hole passing through said reception hall for pushing said received empty bottle to take into said bottle storing portion, and blade driving means (75) responsive to said identity signal to rotate said taking-in vertical blade.

6. An empty bottle collecting apparatus as claimed in claim 5, wherein said bottle taking-in mechanism further comprises a guiding blade (73) disposed at said first side of said reception hall and swingable inward said bottle storing portion around a second vertical axis (Y2) spaced from said first vertical his for guiding said received empty bottle into said bottle storing portion when said taking-in blade pushes said received empty bottle into said storing portion, said guiding blade being urged towards said first side of said reception hall to normally closes said reception hall from said bottle storing portion.

7. An empty bottle collecting apparatus as claimed in claim 6, which further comprises a positioning guide (79) of an "L" shape bar disposed on said reception hall, said positioning guide bar comprising a leg portion of said "L" extending along said second side of said reception hall and a toot portion of said "L" extending along said reception opening, said positioning guide defining a correct standby position for said rcccived empty bottle cooperating with said taking-in blade and said guiding blade.

8. An empty bottle collecting apparatus as claimed in claim 7, wherein said taking-in blade has a pair of first and second flanges (71a, 71b) extending therefrom, said first flange extending from an end of said

taking-in blade in the vicinity of said first vertical axis towards said second vertical axis along said first side of said reception hole when said taking-in blade is positioned along said third side, said second flange extending from the opposite end of said taking-in blade in parallel with said first flange but in the opposite direction.

9. An empty bottle collecting apparatus as claimed in claim 8, wherein said first flange (71a) overlaps with a free end of said guiding blade (73) to prevent said guiding blade from swinging into said bottle storing portion when said taking-in blade is positioned along said third side of said reception hole, but said first flange (71a) releases said free end of said guiding blade from prevention of rotation into said bottle storing portion when said taking-in blade is rotated to take in said received empty bottle, said second flange (71b) engaging with a surface of said guiding blade after said taking-in blade pushing said received empty bottle into said bottle storing portion to prevent said guiding bLade from returning towards said reception hall prior to said taking-in blade.

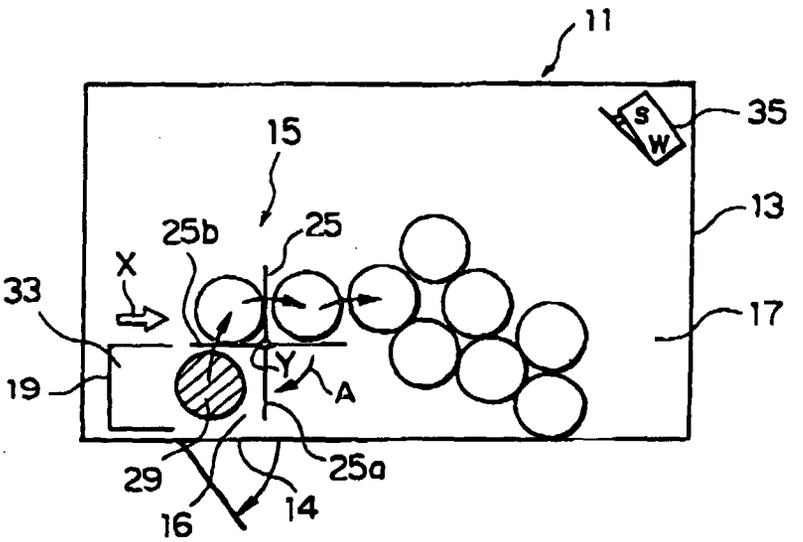

FIG. 1 PRIOR ART

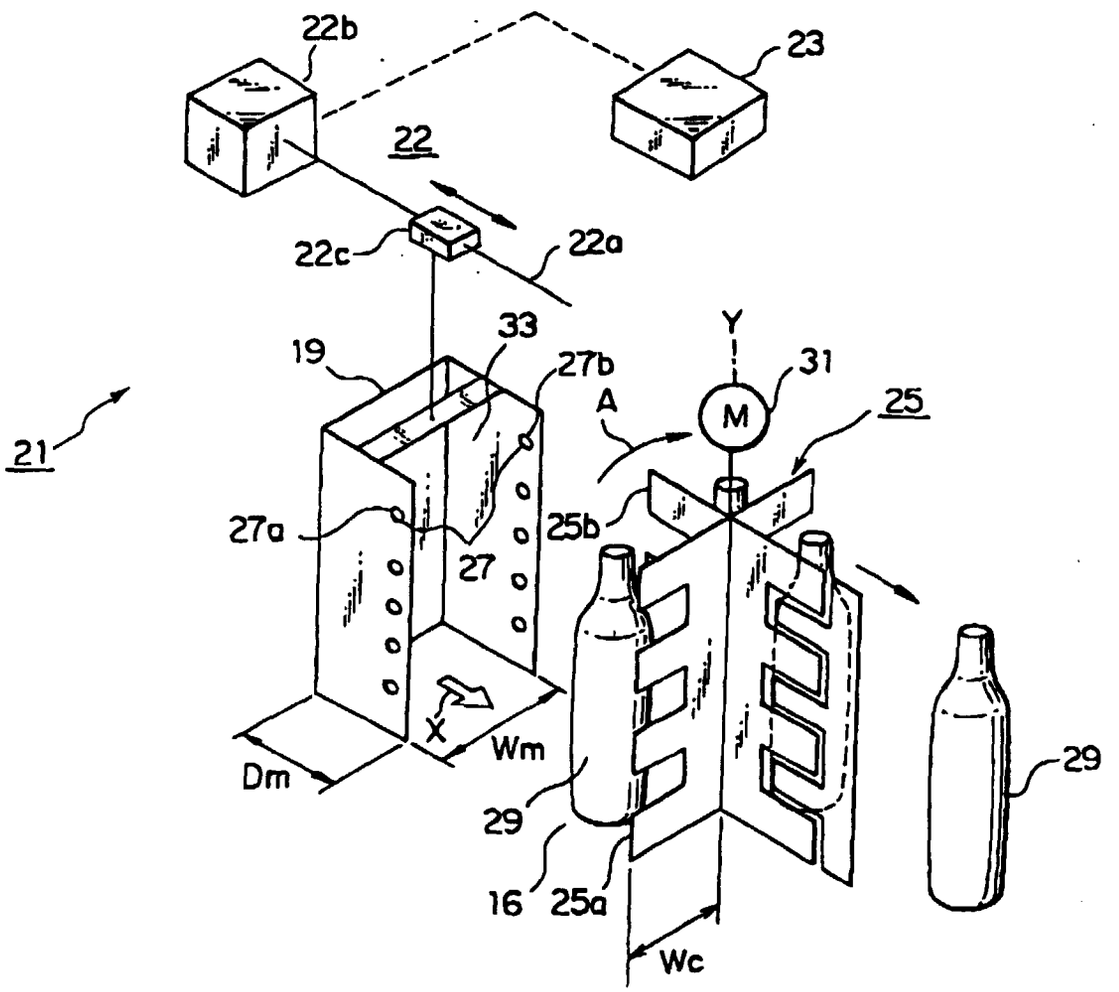

FIG. 2 PRIOR ART

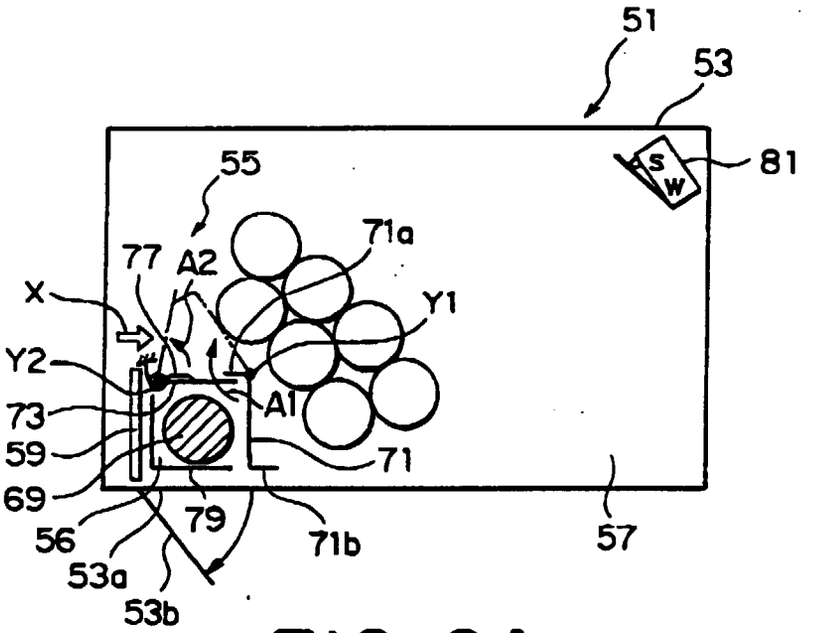
51
53
81
55
77
A2
71a
X
Y1
Y2
A1
73
59
71
69
79
56
71b
57
53a
53b

FIG. 3A

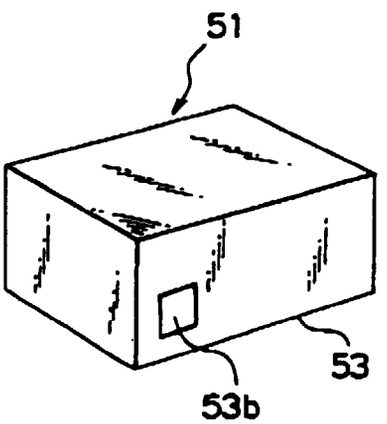
51
53
53b

FIG. 3B

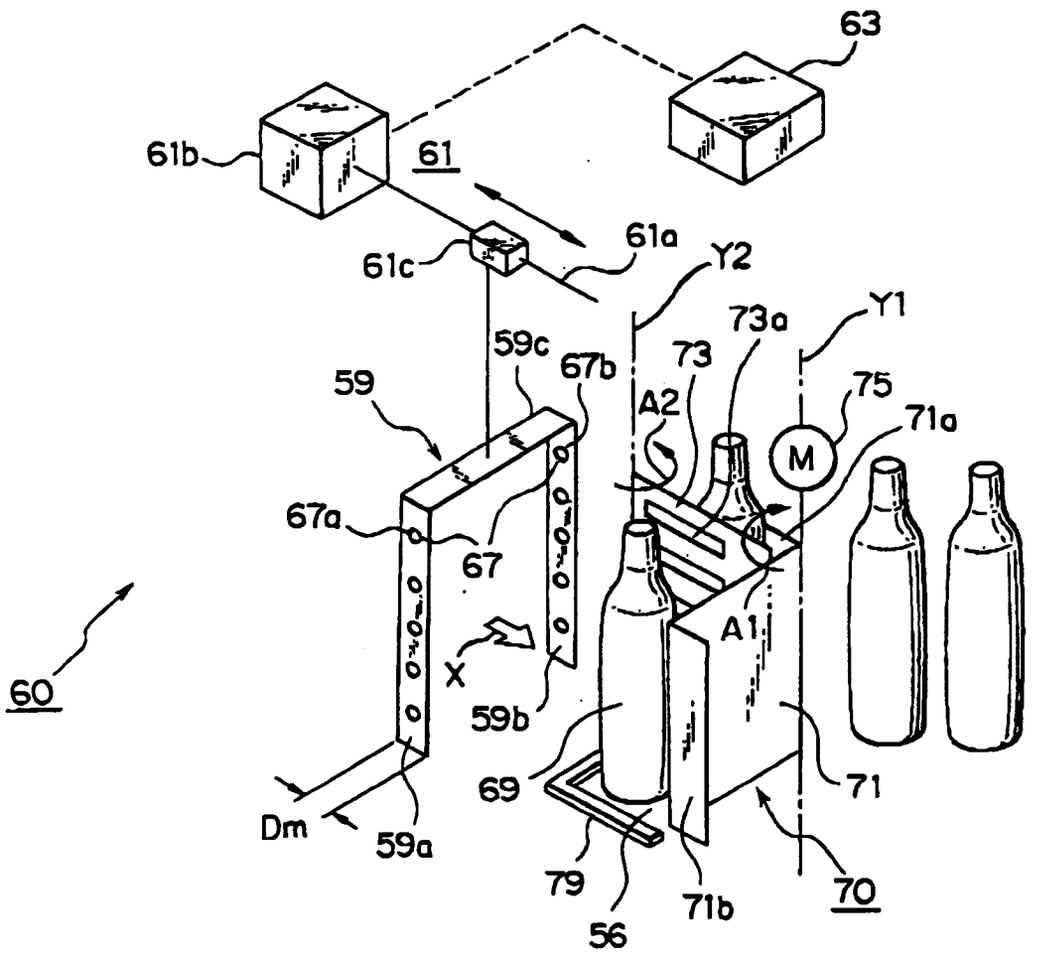
63
61b
61
61a
61c
Y2
Y1
73a
73
59c
67b
59
A2
75
71a
M
67a
67
A1
X
59b
69
71
Dm
59a
79
71b
70
56
60

FIG. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 30 5789

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	DE 44 43 406 A (TRAUTWEIN SB TECHNIK GMBH) 13 July 1995 * the whole document *	1-6	G07F7/06
A	DE 41 27 238 A (TRAUTWEIN SB TECHNIK GMBH) 18 February 1993 * claims 1,2; figure 3 *	1,3,5,6	
A	EP 0 567 732 A (TRAUTWEIN SB TECHNIK GMBH) 3 November 1993 * claims 1,2,6,9; figure 2 *	1,6-9	
A	EP 0 489 267 A (HALTON OY) 10 June 1992		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

G07F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 February 1998	Guivol, O

CATEGORY OF CITED DOCUMENTS

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