

TITLE OF INVENTION

AUTOMATIC SORTING ASSEMBLY FOR USE IN FOOD COURT

BACKGROUND OF THE INVENTION

1. Field of the Invention

- 5 This invention relates generally to a sorting device or assembly which used in food court to automatically sorting up the tray from dinning wear on the tray, and in particularly, the sorting device is applicable to hawker centres, schools, restaurants and industrial cafeterias which handle large volumes of dining ware to provide efficient service.

2. Prior Art

- 10 U.S. Pat. Nos. 3,653,507 and 3,675,770, respectively, describe means for sorting silverware as an operation apart from the sorting of other items of tableware. As explained in

U.S. Pat. No. 3,882,443, entitled "Silverware Feeder Construction", discloses mechanisms which work well under regulated conditions, often do not operate efficiently when peak conditions develop.

- 15 China Utility Patent No. CN 203539285 U, entitled "Sorting mechanism of bowl washing machine" relates to a sorting mechanism of a bowl washing machine. The sorting mechanism achieves full-automatic sorting of chopsticks, dishes, cups and bowls and comprises a machine frame, sorting plates, a baffle, a separator and a stirring device, wherein the sorting plates, the baffle, the separator and the stirring device are installed on the machine frame.
- 20 US Patent No. 3956109, entitled "Automatic silverware sorting construction " relates to an apparatus for sorting silverware including a hopper for collecting the silverware in bulk amounts and a vibrating bed for gradually discharging the silverware and conveying it to a sorting stage for dividing the different types of silverware.

- One problem existing with respect to sorting trays and dining wear that used in food court or
- 25 hawker center is that the tray and dining wear are mixed and additional labours are needed to sorting out the dinning wear for cleaning. In some cases, the tray and dining wears are being left on the tables in food court and few workers are needed to sorting out before the dinning wears are ready for use. Depending on man power can be more complicated and also increases expense and inefficiency.

- 30 **SUMMARY OF THE INVENTION**

It is a general object of this invention to provide an automatic sorting assembly for use in food court, wherein the tray to hold the dinning ware are separated from each other.

It is a more particular object of this invention to provide an automatic sorting assembly for separating dining ware including plates, cups, bowls, forks and spoons and the like, said apparatus comprising:

(a) a tray with embedded RFID chip for holding/supporting dining ware;

(b) a conveyor means on a horizon platform for transporting the dining ware placed on the tray toward a sorting end of the platform, wherein the tray is grabbed by a grapping device and is flipped in a substantially 90 degree to despatch the dinning were to a collecting chute;

(c) a tray piling trolley to collect the tray after the tray is flipped and disengaged from the grapping device;

thereby when the tray with the dinning wear on the tray is being placed onto the conveyor means, the conveyor means is triggered to move and transport the tray until the discharge end of the platform, where the dining wear is collected at the collecting churn and the tray is piled up at a tray collecting trolley.

Yet still another objection of the present invention is to provide an automatic sorting assembly, wherein the dinning wear is dropping from the tray onto the collecting chute via an opening on the platform.

A further object of the present invention is to provide an automatic sorting assembly, wherein a pair of photo sensors are mounted at the edge of the platform and are used to trigger the movement of the conveyor means when the tray is being placed onto the conveyor means.

Still a further object of the present invention is to provide an automatic sorting assembly, further comprising a payment device being linked to the RFID on the tray and the photo sensors posited at the edges of the conveyor means, wherein a cash or the like is being delivered when the conveyor means receives a tray.

Yet still another object of the present invention is to provide an automatic sorting assembly, wherein an alarm is triggered when the tray on the trolley is fully loaded or the dinning wear in the collecting churn is fully loaded.

Another object of the present invention is to provide an automatic sorting assembly, wherein the collecting chute is positioned beneath the platform at the discharge end thereof, allowing

the dinning wear to be conveniently dropped off if the tray is being flapped over by the grabbing means.

Still another object of the present invention is to provide an automatic sorting assembly, wherein the conveyor means is maintained in a substantially horizontal position with the
5 dinning ware being initially placed in a horizontal position on the tray.

It is a further object of this invention to provide an automatic sorting assembly, wherein the operation of sorting of tray and dinning ware is carried out in a highly efficient manner.

Another main object of the present invention is to provide a method of separating a tray which holds dining ware using a sorting assembly having a conveyor means positioned on a
10 platform, a grabbing means, a collecting chute and a tray collecting trolley, comprising the steps of:

- (i) placing the tray onto the conveyor means of the assembly to trigger the movement of the conveyor means;
- (ii) grabbing the tray by the grabbing means positioned at one end of the platform;
- 15 (iii) flipping the tray to dispatch the dining ware into the collecting chute; and
- (iv) automatically piling up the tray upon being flipped onto the tray collecting trolley.

These and other objects of this invention will appear hereinafter and for purposes of illustration, but not of limitation, specific embodiments of the invention are shown in the accompanying drawings in which:

20 **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a view of a preferred embodiment of the automatic sorting assembly in accordance with the present invention.

FIG. 2 is a side view of the automatic sorting device in accordance with the present invention; and

25 FIG. 3 is the top view of the automatic sorting device in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE PRESENT INVENTION

The present invention generally relates to an apparatus for sorting out the tray being used to hold dining wear such as bowl, plate, forks and spoons, cup, dish and chopstick, etc in food court, hawker centres, school canteen and factory sites.

As shown in FIG.1, there is shown a perspective view of an automatic sorting assembly for sorting the tray and the dining wear on the top of the tray in accordance with the present invention. In the preferred embodiment of the present invention, the sorting assembly denoted by numeral 100 comprises a platform 11, a conveyor means 10 positioned on the platform 11 substantially in horizontal position, a tray 12 with embedded RFID chip (not shown) for holding/supporting dining ware such as bowl, plate, forks and spoons, cup, dish and chopstick, etc, wherein the conveyor means being located on the horizon platform 11 for transporting the dining ware placed on the tray 12 toward a sorting end 58 of the platform 11, wherein the tray 12 is grabbed by a grapping device (not shown) and is flipped in a substantially 90 degree to despatch the dinning were to a collecting chute 70, and wherein the collecting chute 70 is removable from the assembly 100; a tray piling trolley 60 to collect the trays 12 after the trays 12 are flipped and disengaged from the grapping device. When the trays 60 with the dinning wear on the trays 12 are being placed onto the conveyor means 10, the conveyor means 10 is triggered to move together with the trays 12 and transport the trays 12 until the discharge end 58 of the platform 11 where the dining wear is collected at the collecting chute 70 and the trays are piled up at the tray collecting trolley 60.

A touch screen LED 30 is linked to the sorting assembly 100 where it can function as advertising displace and a payment return device upon returning the tray 12 by placing the tray 12 onto the conveyor means 10. The payment can be made by three modes, cash payment, cashless payment by bank into a bank account or to a credit card account. Three options are available to the user of the sorting assembly 100. On top of the LED 30, a warming light 50 and a Router 40 are provided. The blinking of the warning light 50 indicates the maximum number or volume of the trays 12 being piled out or the dinning ware being collected, and that the collected trays 12 and the dinning ware should be transferred away for cleansing.

In the present invention, the dinning wear is dropping from the tray 12 onto the collecting chute 70 via an opening (not shown) on the platform 11. A pair of photo sensors (not shown) are mounted at the edge of the platform 11 and are used to trigger the movement of the conveyor means 10 when the tray 12 with dining wear is being placed onto the conveyor means 10.

The touch screen LED 30 is a payment device being linked to the RFID on the tray 12 and the photo sensors positioned at the edges of the conveyor means 10, wherein a cash or the like is being delivered when the conveyor means receives a tray 12. The mode of payment is

optional to the person who uses such sorting assembly. If a cash selection is made, a coin will drop from one of the window to the user.

FIG. 2 is a side view of the automatic sorting device in accordance with the present invention; and

5 FIG. 3 is the top view of the automatic sorting device in accordance with the present invention.

In accordance with the present invention, the warning light with an alarm sound is triggered when the tray 12 on the trolley 60 is fully loaded or the dinning wear in the collecting chute 70 is fully loaded. The dinning ware collecting chute 70 is positioned beneath the platform 11 at the discharge end 58 thereof, allowing the dinning wear to be conveniently dropped off if the
 10 tray 11 is being flapped over by the grabbing means 42 (as shown in FIG. 3). The grabbing means 42 hold the tray 12 at the edge of the tray 12 and is then flipped over by the controlling of a control unit (not shown).

The conveyor means 10 is maintained in a substantially horizontal position with the dinning ware being initially placed in a horizontal position on the tray 12.

15 In operation, a tray 12 with dining ware such as plate, bowl, cup, spoon etc is placed horizontally onto the conveyor means 10 positioned on the platform 11. The photo sensors placed at the side of the conveyor means 10 are triggered when a tray 12 is detected and the conveyor means 10 will move horizontally. At the discharge end, the grabbing means at the end of the platform 11 will hold the tray 12 and flip the tray 12 to first discharge the dinning
 20 wear. All the dining wear like spoon, fork, cup, bowl and plate etc on the tray 12 will be collected at the collecting chute 70.

The grabbing means 42 will flip the tray 12 to 180 degree and the tray 12 will be dropped to the trolley 60 for collection. The operation of the conveyor means 10, the handling of the tray 12 on the trolley is done automatically when the photo sensors is triggered. In this case, the
 25 dining wear on the tray is thus separated from the tray 12 and are ready to go for cleansing.

Many components of the sorting assembly are made from stainless steel which could be lasted for an extended period.

The particular means for achieving separation of the knives comprise barrier means located on a table structure with all of the silverware being moved against the barrier means. The
 30 barrier means are formed with laterally extending openings which permit the passage of knives past the barrier means. The design is such that the forks and spoons are restrained by the barrier means so that these items can continue movement over the table and are then dropped

onto a separate structure which sorts the forks and spoons. The respective pieces of silverware are then collected in separate containers for subsequent handling.

5 In accordance with the present invention, a hopper (not shown) can be used for collecting dining ware in bulk amounts. The hopper is mounted on a support (not shown) mounted on the underside of the platform so that dining ware dumped into the hopper will be collected.

The conveyor means 10, in the present preferred embodiment is supported by a platform 11, and is also be supported by any frame which can allow the movement of the conveyor means 10.

10 It will be understood that various changes and modifications may be made in the above described construction which provide the characteristics of the invention without departing from the spirit thereof.

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CLAIMS:

I. An automatic sorting assembly for separating dining ware including plates, cups, bowls, forks and spoons and the like, said apparatus comprising:

- 5 (a) a tray with embedded RFID chip for holding/supporting dining ware;
 - (b) a conveyor means on a horizon platform for transporting the dining ware placed on the tray toward a sorting end of the platform, wherein the tray is grabbed by a grapping device and is flipped in a substantially 90 degree to despatch the dinning were to a collecting chute;
 - (c) a tray piling trolley to collect the tray after the tray is flipped and disengaged from the
10 grapping device;
- thereby when the tray with the dinning wear on the tray is being placed onto the conveyor means, the conveyor means is triggered to move and transport the tray until the discharge end of the platform, where the dining wear is collected at the collecting churn and the tray is piled up at a tray collecting trolley.
- 15 2. The automatic sorting assembly as set forth in Claim 1, wherein the dinning wear is dropping from the tray onto the collecting chute via an opening on the platform.
 3. The automatic sorting assembly as set forth in Claim 1, wherein a pair of photo sensors are mounted at the edge of the platform and are used to trigger the movement of the conveyor means when the tray is being placed onto the conveyor means.
 - 20 4. The automatic sorting assembly as set forth in Claim 1, further comprising a payment device being linked to the RFID on the tray and the photo sensors posited at the edges of the conveyor means, wherein a cash or the like is being delivered when the conveyor means receives a tray.
 5. The automatic sorting assembly as set forth in Claim 1, wherein an alarm is triggered
25 when the tray on the trolley is fully loaded or the dinning wear in the collecting chute is fully loaded.
 6. The automatic sorting assembly as set forth in Claim 1, wherein the collecting chute is positioned beneath the platform at the discharge end thereof, allowing the dinning wear to be conveniently dropped off if the tray is being flapped over by the grabbing means.

7. The automatic sorting assembly as set forth in Claim 1, wherein the conveyor means is maintained in a substantially horizontal position with the dining ware being initially placed in a horizontal position on the tray.

8. A method of separating a tray holding dining ware using the sorting assembly as set forth in Claim 1, comprising the steps of:

- (i) placing the tray onto the conveyor means of the assembly to trigger the movement of the conveyor means;
- (ii) grabbing the tray by the grabbing means positioned at one end of the platform;
- (iii) flipping the tray to dispatch the dining ware into the collecting chute; and
- 10 (iv) automatically piling up the tray upon being flipped onto a tray collecting trolley.