

TICKET MACHINE AND INTEGRATED MODULE WITH COIN HANDLING AND SINGLE JOURNEY TICKET VENDING FUNCTIONS

5 FIELD OF THE INVENTION

The present invention relates to ticket vending machine, and more particularly to an integrated module with functions of coin handling and single journey ticket vending and a ticket machine with the module.

10 BACKGROUND OF THE INVENTION

In recent years, with the rapid development of economy and city construction, traffic congestion has become increasingly prominent in various cities. The development of rapid rail transit has become an important means to solve traffic congestion and improve the quality of people lives. More and more cities build or plan rail transit systems. Automatic Fare Collection System is the main body to implement the rail transit ticketing system and to realize management and control of rail transit ticketing operating system, and therefore is indispensable for rail transit; and ticket vending machine, as an important part of the front-end equipment of Automatic Fare Collection System, plays an important role in the whole AFC (Automatic Fare Collection) system.

A traditional ticket vending machine includes a coin handling module and a single journey ticket vending module. The coin handling module mainly receives, validates, refunds, changes, replenishes, and clears coins. The single journey ticket vending module mainly realizes ticket supply, ticket valuation, ticket issuing, ticket clearance and other operations. The two modules are arranged separately and placed above the change outlet, and

occupy a larger space inside the ticket vending machine, resulting in a larger size of the ticket vending machine, which is contrary to the current market demand for miniaturization.

5 SUMMARY OF THE INVENTION

An object of the embodiments of the present invention is to provide an integrated module with functions of coin handling and single journey ticket vending. It can simultaneously handle coins and single journey tickets with simple structure and less space occupancy.

10 Another object of the embodiments of the present invention is to provide a ticket machine, which realizes a ticket vending function and simplifies the structure with more compact volume.

To achieve the above object, the present invention provides the following technical solutions:

15 On one hand, the invention provides an integrated module with coin handling and single journey ticket vending functions comprising a coin validator, a money and ticket handling module, and a change outlet for receiving coins and single journey tickets. The money and ticket handling module is connected with the change outlet through an outlet of a second
20 diverter, and another outlet of the second diverter is connected with a coin container.

As a preferred technical solution for the integrated module with coin handling and single journey ticket vending functions, the money and ticket handling module comprises a coin handling module and a single
25 journey ticket vending module. A first diverter is arranged below the coin validator. The coin handling module is connected with the coin validator through one outlet of the first diverter and another outlet of the first

divertor is connected with the second divertor. The coin validator is also connected with the change outlet through a void coin channel.

As a preferred technical solution for the integrated module with coin handling and single journey ticket vending functions, the coin handling
5 module comprises a coin hopper and a coin dispensing channel. Two ends of the coin dispensing channel are respectively connected with the coin hopper and the second divertor.

As a preferred technical solution for the integrated module with coin handling and single journey ticket vending functions, the single journey
10 ticket vending module comprises a ticket hopper and a single journey ticket channel, and the single journey ticket channel is connected with the change outlet.

As a preferred technical solution for the integrated module with coin handling and single journey ticket vending functions, the integrated
15 module further comprises a single journey ticket container and a coin supplement container. The single journey ticket container is arranged above and connected with the ticket hopper and the coin supplement container is arranged above and connected with the coin hopper.

As a preferred technical solution for the integrated module with coin
20 handling and single journey ticket vending functions, the integrated module further comprises a single journey ticket handling board for reading, writing and outputting single journey tickets, and the single journey ticket channel is arranged on the single journey ticket handling board.

25 As a preferred technical solution for the integrated module with coin handling and single journey ticket vending functions, the single journey ticket handling board comprises first handling board and second handling

board interlocked together, grooves correspondingly arranged on the first handling board and second handling board form the single journey ticket channel.

As a preferred technical solution for the integrated module with coin handling and single journey ticket vending functions, the single journey ticket channel comprises a ticketing channel and a void ticket channel. The ticketing channel is connected with the change outlet. A void ticket outlet and a ticket clearance outlet are arranged on the void ticket channel.

- As a preferred technical solution for the integrated module with coin handling and single journey ticket vending functions, sensors and solenoid valves are respectively arranged at the intersection of the ticketing channel and the void ticket channel, on the ticketing channel, at the void ticket outlet and at the ticket clearance outlet.
- On the other hand, the invention provides an automatic ticket machine comprising the integrated module with coin handling and single journey ticket vending functions as described above.

The present invention has the following beneficial effects. This solution integrates device for handling coins with device for handling single journey tickets, so that the functions of receiving, validating, refunding, changing, replenishing, and clearing coins, as well as operations such as single journey ticket supply, ticket valuation, ticket issuance and ticket clearance can be performed in the same module, so to avoid separately setting up a coin handling module and a single journey ticket vending module to achieve the above functions, which makes the product with a simple overall layout and occupies less space, thereof contributes to miniaturization of the ticket machine.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is further described in detail below according to the drawings and embodiments.

5 FIG.1 is a perspective view of the integrated module with functions of coin handling and single journey ticket vending of the present invention.

FIG.2 is a front view of an integrated module with functions of coin handling and single journey ticket vending of the present invention.

FIG.3 is a perspective view of the internal structure of an integrated
10 module with functions of coin handling and single journey ticket vending of the present invention.

FIG.4 is a front view of the internal structure of an integrated module with functions of coin handling and single journey ticket vending of the present invention.

15 FIG.5 is a perspective view of a divertor of the present invention.

FIG.6 is a perspective view of a coin hopper (ticket hopper) of the present invention.

FIG.7 is a perspective view of a coin supplement container of the present invention.

20 FIG.8 is a perspective view of a single journey ticket container of the present invention.

FIG.9 is a perspective view of a single journey ticket handling board of the present invention.

FIG.10 is an exploded view of a single journey ticket handling board of
25 the present invention.

FIG.11 is a flowchart of void coin handling of the present invention.

FIG.12 is a flowchart of successful transaction handling of the present

invention.

FIG.13 is a flowchart of cancelling transaction handling of the present invention.

FIG.14 is a flowchart of change handling of the present invention.

5 FIG.15 is a flowchart of cycle change handling of the present invention.

FIG.16 is a flowchart of coin clearing handling of the present invention.

FIG.17 is a schematic of single journey ticket handling of the present invention.

In the figures:

- 10 1. Coin validator, 2. First divertor, 3. Second divertor, 4. Void coin channel, 5. Coin hopper, 6. Coin dispensing channel, 7. Ticket hopper, 8. Single journey ticket container, 9. Coin supplement container, 10. Single journey ticket handling board, 101. First handling board, 102. Second handling board, 11. Ticketing channel, 12. Void ticket channel, 121. Void
15 ticket outlet, 122. Ticket clearance outlet, 13. Sensor, 14. Solenoid valve, 15. First horizontal support plate, 16. Second horizontal support plate.

DETAILED DESCRIPTION OF THE INVENTION

In order to make the technical problems solved by the invention, technical
20 solutions adapted and technical effects achieved by the invention clearer, the technical solutions of embodiments of the present invention will be further described in detail with reference to the attached drawings. Obviously, the described embodiments are only a part but not all of the embodiments of the present invention. Based on the embodiments, all
25 other embodiments obtained by those skilled in the art without creative work shall fall in the scope of the invention.

In the description, terms "connect", "joint", and "fix" should be

understood in a broad sense, unless otherwise expressly specified and defined. It can be e.g., fixed connection, detachable connection, or integrated. It can be mechanical or electrical connection. It can be connected directly, or through an intermediate medium. It can be the
5 internal connection of two elements or the interaction between two elements. For those skilled in the art, the specific meanings of the above terms in the invention can be understood according to specific situations.

In the present invention, unless otherwise expressly specified and defined, a first feature "above" or "below" a second feature may include that the
10 first and second features are in direct contact, or contacted by another feature between them. Moreover, a first feature is "on", "above" and "on top of" a second feature may include that the first feature is directly above and diagonally above the second feature, or simply means that the level of the first feature is higher than that of the second feature. A first feature is
15 "below", "under", and "beneath" of a second feature may include that the first feature is directly below and diagonally below the second feature, or simply means that the level of the first feature is lower than that of the second feature.

As shown in FIGs. 1 to 17, this invention provides an integrated module
20 with coin handling and single journey ticket vending functions. The integrated module includes a coin validator 1, a money and ticket handling module and a change outlet for receiving coins and single journey tickets (not shown in the figure). The money and ticket handling module is connected with the change outlet through an outlet of second
25 diverter 3. Another outlet of the second diverter 3 is connected with a coin container (not shown in the figure).

This solution also includes a module housing arranged inside with a first

horizontal support plate 15 for supporting the coin validator 1. The coin validator 1 and the first divertor 2 are arranged above the first horizontal plate support plate 15, and the change outlet is arranged on a side of the module housing.

- 5 This solution integrates device for handling coins with device for handling single journey tickets, so that functions of receiving, validating, refunding, changing, replenishing, and clearing of coins, as well as operations of single journey ticket supply, ticket valuation, ticket issuance and ticket clearance are performed in the same module, so to avoid
10 separately setting a coin handling module and a single journey ticket vending module, which makes the product with simple overall layout and occupies less space, thereby contributes to miniaturization of the ticket machine.

Specifically, the money and ticket handling module in this embodiment
15 includes a coin handling module and a single journey ticket vending module. A first divertor 2 is arranged below the coin validator 1. The coin handling module is connected with the coin validator 1 through one outlet of the first divertor 2. Another outlet of the first divertor 2 is connected with the second divertor 3. The coin validator 1 is also connected with the
20 change outlet through a void coin channel 4.

The coin handling module includes a coin hopper 5 and a coin dispensing channel 6. Two ends of the coin dispensing channel 6 are respectively connected with the coin hopper 5 and the second divertor 3.

The single journey ticket vending module includes a ticket hopper 7 and a
25 single journey ticket channel connected with the change outlet.

In this solution, a second horizontal support plate 16 is also arranged in the module housing. The coin hopper 5 and the ticket hopper 7 are

arranged side by side on the second horizontal support plate 16 and located between the first horizontal support plate 15 and the second horizontal support plate 16.

As a preferred solution of the integrated module with the functions of coin handling and single journey ticket vending, this embodiment further includes a single journey ticket container 8 and a coin supplement container 9. The single journey ticket container 8 is arranged above and connected with the ticket hopper 7 and the coin supplement container 9 is arranged above and connected with the coin hopper 5. The single journey ticket container 8 and the coin supplement container 9 are arranged side by side above the first horizontal support plate 15. The single journey ticket container 8 is located above the ticket hopper 7 and the coin supplement container 9 is located above the coin hopper 5.

A vertical support plate (not shown in the figure) is arranged between the first horizontal support plate 15 and the second horizontal support plate 16. The void coin channel 4, the second diverter 3 and the change outlet are located on one side of the vertical support plate. The coin hopper 5 and the ticket hopper 7 are located on the other side of the vertical support plate.

The coin hopper 5 is connected with the second diverter 3 through a coin dispensing channel 6 passing through the vertical support plate.

The integrated module with coin handling and single journey ticket vending functions described in this embodiment further includes a single journey ticket handling board 10 for reading, writing and outputting single journey tickets. The single journey ticket channel is arranged on the single journey ticket handling board 10. Specifically, the single journey ticket handling board 10 includes first handling board 101 and

second handling board 102 interlocked together. Grooves correspondingly arranged on the first handling board 101 and the second handling board 102 forms the single journey ticket channel.

The single journey ticket channel includes a ticketing channel 11 and a
5 void ticket channel 12. The ticketing channel 11 is connected with the change outlet. A void ticket outlet 121 and a ticket clearance outlet 122 are arranged on the void ticket channel 12.

Specifically, a sensor 13 and a solenoid valve 14 are respectively arranged at the intersection of the ticketing channel 11 and the void ticket
10 channel 12, on the ticketing channel 11, at the void ticket outlet 121 and at the ticket clearance outlet 122.

The sensor at the intersection of the ticketing channel 11 and the void ticket channel 12 is for controlling ticket valuation. When it detects that a single journey ticket in the position, ticket valuation is performed. When
15 the ticket valuation is completed or failed, the single journey ticket enters the corresponding channel. Operation continues.

When ticket valuation is successful, the solenoid valve at the ticketing channel is opened and the single journey ticket enters the ticketing channel. When the single journey ticket passes the sensor in the ticketing
20 channel, the sensor is triggered and controls the corresponding solenoid valve to close.

When ticket valuation fails, all solenoid valves on the void ticket channel 12 connected to the void ticket outlet 121 are opened and the single journey ticket enters the void ticket outlet from the ticket valuation area.
25 When the single journey ticket passes the sensor at the void ticket outlet, the sensor is triggered and controls the corresponding solenoid valve to close.

At ticket clearance, all solenoid valves connected to the ticket clearance outlet of the void ticket channel 12 are opened, and the single journey ticket enters the ticket clearance outlet from the ticket valuation area. When the single journey ticket passes the sensor at the ticket clearance outlet, the sensor is triggered and controls the corresponding solenoid valve to close.

The process of coin handling in this solution is as following:

1. Process of void coin handling. Shown in Fig. 11 is the flowchart of void coin handling. When coin validator 1 recognizes a void coin, the coin is directly put to the change outlet through the void coin channel 4.
2. Process of successful transaction. Shown in Figure 12 is a flowchart of a successful transaction handling. When coin validator 1 recognizes a valid coin and the transaction is not cancelled, the coin enters the first diverter 2 from the coin validator 1 and is redirected by the first diverter 2 to the side of second diverter 3, then redirected by the second diverter 3 to the side of coin container, thereby stored in the coin container.
3. Process of transaction cancelling. Shown in Figure 13 is a flowchart of cancelling a transaction. When coin validator 1 recognizes a valid coin, but the transaction is cancelled, the coin enters the first diverter 2 from the coin validator 1, and is redirected by the first diverter 2 to the side of second diverter 3, and is redirected by the second diverter 3 to the side of change outlet, then to the change outlet, and return to user.
4. Change handling. As shown in Figure 14, change handling is performed after a successful transaction. After a successful transaction, if there is change, the coin hopper 5 is actuated. The change in the coin hopper 5 enters the second diverter 3 through coin dispensing channel 6, and is redirected by the second diverter 3 to the side of change outlet,

then is redirected to the change outlet for the user.

5 5. Cycle change handling. As shown in Figure 15, cycle change mode is to use coins from a successful transaction in subsequent change process. This mode improves the use efficiency of coins and reduces the workload of replenishing coins. In this case, coin validator 1 recognizes a qualified coin. Then the coin enters first divertor 2, then redirected to the coin hopper 5 side, then enters the coin hopper 5 for subsequent change handling.

10 6. Coin clearing handling. As shown in Figure 16, coin clearing process is removing all coins in the coin hopper 5. In this process, coins enter the second divertor 3 from the coin hopper 5 through the coin dispensing channel 6, then are redirected to the coin container and are collected by people.

15 The basic operation of the single journey ticket channel is to transfer a single journey ticket from one channel to another by controlling the solenoid valve 14, and to assign value and verify the ticket. When there is a ticket in the read-write area, reading, writing and valuation to the ticket can be performed. Reading, writing, and valuation can be started once the ticket enters the read-write area from the single journey ticket channel. In
20 addition, reading, writing and valuation of a single journey ticket does not involve the operation of the solenoid valve 14. Tickets can be transferred to the ticketing channel 11 or the void ticket channel 12 at the same time. In this solution, the intersection of ticketing channel 11 and void ticket channel 12 is the read-write area.

25 Figure 17 is a schematic of a single journey ticket handling. As shown, the basic process of single journey ticket handling is as follows: A single journey ticket enters the read-write area for reading, writing and valuation.

When the ticket valuation is successful, the solenoid valve 14 in the ticketing channel 11 is opened, and the single journey ticket moves into the change outlet through the ticketing channel 11.

When ticket valuation fails, the solenoid valve 14 on the side of void ticket channel 12 and void ticket outlet 121 are opened. The single journey ticket gets out through the void ticket outlet 121 for recycling.

When remaining tickets in the ticket hopper 7 is to be cleared, the solenoid valve 14 on the side of void ticket channel 12 and ticket clearance outlet 122 are opened. The remaining tickets get out through the ticket clearance outlet 122 for recycling.

This patent also provides an automatic ticket machine with an integrated module with coin handling and single journey ticket vending functions as described above.

In the description, it should be understood that terms "upper", "lower", "left", "right", and other orientations or positional relationships are based on the orientations or positional relationships shown in the drawings, and are only for convenient description and simple operations, rather than to limit the invention. In addition, terms "first" and "second" are only used to distinguish them in description and have no special meaning.

In the description of this specification, the description with reference to the terms "an embodiment", "example", etc. means that a specific feature, structure, material, or characteristic described in connection with the embodiment or example are included in at least one embodiment or example of the present invention. In this specification, the schematic expressions of the above terms do not necessarily refer to the same embodiment or example.

In addition, it should be understood that although this specification is

described in terms of embodiments, not every embodiment includes only one independent technical solution. This description of the specification is only for the sake of clarity. Those skilled in the art should take the specification as a whole and the technical solutions in the embodiments
5 can also be appropriately combined to form other implementations that can be understood by those skilled in the art.

The technical principles of the present invention have been described above with reference to specific embodiments. These descriptions are only for explaining the principle of the present invention, and cannot be
10 interpreted in any way as limiting the scope of protection of the present invention. Based on the explanation here, those skilled in the art can think of other specific embodiments of the present invention without creative work, and these modes will be within the protection scope of the present invention.

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Claims:

1. An integrated module with coin handling and single journey ticket vending functions, comprising:
a coin validator,
5 a money and ticket handling module, and
a change outlet for receiving coins and single journey tickets,
the money and ticket handling module is connected with the change outlet through an outlet of a second diverter, and another outlet of the second diverter is connected with a coin container.
- 10 2. The integrated module with coin handling and single journey ticket vending functions as claimed in claim 1, wherein the money and ticket handling module comprises a coin handling module and a single journey ticket vending module, a first diverter is arranged below the coin validator, the coin handling module is connected with the coin validator
15 through one outlet of the first diverter, another outlet of the first diverter is connected with the second diverter, the coin validator is connected with the change outlet through an void coin channel.
3. The integrated module with coin handling and single journey ticket vending functions as claimed in claim 2, wherein the coin handling
20 module comprises a coin hopper and a coin dispensing channel, and two ends of the coin dispensing channel are respectively connected with the coin hopper and the second diverter.
4. The integrated module with coin handling and single journey ticket vending functions as claimed in claim 3, wherein the single journey ticket
25 vending module comprises a ticket hopper and a single journey ticket channel, and the single journey ticket channel is connected with the change outlet.

5. The integrated module with coin handling and single journey ticket vending functions as claimed in claim 4, further comprising a single journey ticket container and a coin supplement container, the single journey ticket container is arranged above and connected with the ticket
5 hopper and the coin supplement container is arranged above and connected with the coin hopper.
6. The integrated module with coin handling and single journey ticket vending functions as claimed in claim 4, further comprising a single journey ticket handling board for reading, writing and outputting single
10 journey tickets and the single journey ticket channel is arranged on the single journey ticket handling board.
7. The integrated module with coin handling and single journey ticket vending functions as claimed in claim 6, wherein the single journey ticket handling board comprises first handling board and second handling board
15 interlocked together, grooves correspondingly arranged on the first handling board and the second handling board form the single journey ticket channel.
8. The integrated module with coin handling and single journey ticket vending functions as claimed in claim 7, wherein the single journey ticket
20 channel comprises a ticketing channel and a void ticket channel, the ticketing channel is connected with the change outlet, a void ticket outlet and a ticket clearance outlet are arranged on the void ticket channel.
9. The integrated module with coin handling and single journey ticket vending functions as claimed in claim 8, wherein sensors and solenoid
25 valves are respectively arranged at the intersection of the ticketing channel and the void ticket channel, on the ticketing channel, at the void ticket outlet and at the ticket clearance outlet.

10. An automatic ticket machine, comprising the integrated module with coin handling and single journey ticket vending functions according to anyone of claims 1-9.