An arced-passage transfer apparatus. Same is arranged on a transfer passage between a banknote depositing module, a banknote dispensing module, and a banknote bundling module of a financial self-service device having deposit, withdraw, and bundling features, and comprises a large driving wheel, several flexible rollers, and a passage guide plate. The large driving wheel comprises at least one H-shaped wheel and at least one rubber wheel, where the H-shaped wheel and the rubber wheel are arranged on a same shaft. The flexible rollers floatingly press on the rubber wheel, and rotate in coordination with the rubber wheel to provide a driving force for transferring banknotes. The passage guide plate is used for fixing the flexible rollers to press on the rubber wheel; also, the passage guide plate and the H-shaped wheel constitute an arced passage for transferring the banknotes.
User operating interface

Main controlling module

Recycling system controlling module

Banknote withdrawal port module
Banknote depositing port module
Banknote identification module
Banknote temporary storage module
Recycling storage module
Recovering storage module
Conveying passage module
Power supply module
Banknote bundling module

Fig. 2
Banknote bundling module
Banknote withdrawal port module
Banknote depositing port module
Banknote temporary storage module
Banknote identification module
Recycling storage module
Power supply module

Fig. 3
Fig. 7
Fig. 8
Fig. 9
Fig. 10
Banknote - 3& bundling - module
Banknote withdrawal - 3S port module
Banknote temporary storage module
Identification module
Recovering Recycling Recycling Recycling Storage Storage Storage Storage Storage module module module module module
Counting banknotes sis-r Unqualified banknote entering in banknote port module
Banknote bundling module
Banknote withdrawal port module
Banknote depositing port module
Power supply module

Fig. 11
ARC-PASSAGE TRANSFER APPARATUS


FIELD OF THE INVENTION

[0002] The present application relates to the field of financial technology, and particularly to an arc-shaped passage conveying device provided in financial self-service equipment having functions of depositing, withdrawing and bundling to achieve bidirectional conveying of banknotes.

BACKGROUND OF THE INVENTION

[0003] With the development of the electronization of financial transactions in China, self-service financial transactions gradually become a main way for providing services to the customers for financial institutions.

[0004] In the past, financial self-service transaction equipment, such as the cash recycling machine, does not have the banknote bundling function. An additional separate banknote bundling device is needed for realizing the banknote bundling function, thus the integration of functions of depositing, withdrawing and bundling can not be achieved.

[0005] With the development of technology, the financial self-service equipment having integrated functions of depositing, withdrawing and bundling are developed. However in the financial self-service equipment having integrated functions of depositing, withdrawing and bundling in the prior art, three windows are arranged in the same direction, thus when being conveyed to the three windows, the banknotes need to be distributed and diverted, and the banknotes need to be conveyed to different windows in a narrow space. The banknote conveying passage near the diverting device has a relatively large curvature, and when the banknotes are conveyed in curved passage in the narrow space, the resistance on the banknotes is increased significantly, which significantly increases the probability of the banknote jam.

SUMMARY OF THE INVENTION

[0006] Embodiments of the present application provides an arc-shaped passage conveying device, which is provided in the financial self-service equipment having functions of depositing, withdrawing and bundling to effectively realize the bidirectional conveying of the banknotes, so as to reduce the phenomenon of the banknote jam.

[0007] An embodiment of the present application provides an arc-shaped passage conveying device, the device is provided on a conveying passage among a banknote depositing port module, a banknote withdrawal port module and a banknote bundling module of a financial self-service equipment having functions of depositing, withdrawing and bundling. The device includes a large driving wheel, at least one elastic roller wheel and a passage guiding plate; the large driving wheel includes at least one spool and at least one rubber wheel which are mounted on the same rotating shaft; the at least one elastic roller wheel is floatingly pressed against the at least one rubber wheel and rotates cooperatively with the at least one rubber wheel to provide a power for conveying banknotes; and the passage guiding plate is configured to fix the at least one elastic roller wheel and to press the at least one elastic roller wheel against the at least one rubber wheel, and the passage guiding plate and the at least one spool constitute an arc-shaped passage for conveying the banknotes.

[0008] The embodiments of the present application have the following beneficial effects.

[0009] 1) The number of parts is reduced, and the cost is reduced. Since in the conventional curved passage, a flat belt is used as a power medium for conveying banknotes, and a normal conveying of the belt can only be achieved by tensing the belt with a plurality of belt shafts and belt wheels to form a certain belt wrap angle. Further generally, in the belt passage, both sides of a belt clamping surface are mounted with a plastic guiding plate to form a closed banknote conveying passage. Such that the large arc-shaped passage of the present application may significantly reduce the number of parts, and has significant advantages of reducing cost and improving maintainability.

[0010] 2) The reliability of banknote conveying is improved. Due to the half-arc passage, the curvature of the banknotes is always a constant value, which is always equal to a reciprocal of a radius R of the large driving wheel. However, for forming the belt wrap angle, the curvature of the conventional curved passage constituted by belt is changed at some portions, and the larger the wrap angle is, the greater the fluctuation of the curvature is, and as viewed from one side, the conventional passage is in waving state.

[0011] 3) The driving load is reduced. In the conventional curved belt passage, the belt is wrapped on the belt wheels tightly under a certain tension, and then the belt is driven by a friction generated between the belt and the belt wheels. However, at different temperature environments, the wrapping effect of the conveying belt varies greatly due to the thermal expansion and contraction effect. In a high temperature environment, the elongating tension of the belt is reduced, thus the wrapping force and the load are also reduced, while in a low temperature environment of minus 10 degrees Celsius, the belt contracts, thus the wrapping force is significantly increased and the load is increased many-fold, which causes the driving power of the drive motor being not enough. The problem that the load of the motor varies significantly in different temperature environments is avoided by the driving wheel of the half-arc passage of the present application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a schematic side view of a financial self-service equipment provided by the present application;

[0013] FIG. 2 is a block diagram of a control relationship of the financial self-service equipment provided by the present application;

[0014] FIG. 3 is a first schematic view of a conveying path during a transaction of the financial self-service equipment provided by the present application;

[0015] FIG. 4 is a second schematic view of a conveying path during a transaction of the financial self-service equipment provided by the present application;

[0016] FIG. 5 is a third schematic view of a conveying path during a transaction of the financial self-service equipment provided by the present application;

[0017] FIG. 6 is a fourth schematic view of a conveying path during a transaction of the financial self-service equipment provided by the present application;
FIG. 7 is a fifth schematic view of a conveying path during a transaction of the financial self-service equipment provided by the present application;

FIG. 8 is a sixth schematic view of a conveying path during a transaction of the financial self-service equipment provided by the present application;

FIG. 9 is a seventh schematic view of a conveying path during a transaction of the financial self-service equipment provided by the present application;

FIG. 10 is an eighth schematic view of a conveying path during a transaction of the financial self-service equipment provided by the present application;

FIG. 11 is a ninth schematic view of a conveying path during a transaction of the financial self-service equipment provided by the present application;

FIG. 12 is a first partial enlarged schematic view of a part of the conveying path indicated by reference numeral B in FIG. 1;

FIG. 13 is a second partial enlarged schematic view of a part of the conveying path indicated by reference numeral B in FIG. 1;

FIG. 14 is a third partial enlarged schematic view of a part of the conveying path indicated by reference numeral B in FIG. 1;

FIG. 15 is a first partial enlarged schematic view of a part of the conveying path indicated by reference numeral A in FIG. 1;

FIG. 16 is a second partial enlarged schematic view of a part of the conveying path indicated by reference numeral A in FIG. 1;

FIG. 17 is a third partial enlarged schematic view of a part of the conveying path indicated by reference numeral A in FIG. 1;

FIG. 18 is a first partial enlarged schematic view of a part of the conveying path indicated by reference numeral C in FIG. 1;

FIG. 19 is a second partial enlarged schematic view of a part of the conveying path indicated by reference numeral C in FIG. 1;

FIG. 20 is a schematic view of the structure of an arc-shaped passage conveying device provided by the present application;

FIG. 21 is a schematic view of the structure of the banknote conveying arc-shaped passage provided by the present application;

FIG. 22 is a schematic view of the structure of the banknote conveying arc-shaped passage provided by the present application with a passage guiding plate being removed;

FIG. 23 is a schematic view of the structure of the arc-shaped passage provided by the present application with the passage guiding plate and an elastic pressing wheel being removed;

FIG. 24 is a schematic view of the structure of the banknote conveying arc-shaped passage provided by the present application;

FIG. 25 is a schematic view of the structure of a driving wheel of the arc-shaped passage provided by the present application;

FIG. 26 is a schematic view of the structure of the driving wheel of the arc-shaped passage provided by the present application.

DETAILED DESCRIPTION OF THE PRESENT APPLICATION

The technical solutions in the embodiments of the present application will be described clearly and completely hereinafter in conjunction with the drawings in the embodiments of the present application. Apparently, the described embodiments are only a part of the embodiments of the present application, rather than all embodiments. Based on the embodiments in the present application, all of other embodiments, made by the person skilled in the art without any creative efforts, fall into the protection scope of the present application.

Referring to FIG. 1 and FIG. 2, a financial self-service equipment 1 includes a banknote withdrawal port module 36, a banknote depositing port module 34, a banknote identification module 32, a banknote temporary storage module 30, a recycling storage module 72, a recovering storage module 70 and the recovering storage module 70 are both provided with a cashbox, a conveying path module (i.e. a banknote conveying passage) 50, a banknote bundling module 38, a recycle system controlling module 94 and a power supply module 80.

The banknote withdrawal port module 36 is used for a user to withdraw banknotes, the banknote depositing port module 34 is used for the user to deposit banknotes, and the banknote identification module 32 is used to determine whether the banknotes are qualified. The banknote temporary storage module 30 is used to temporarily receive the banknotes deposited as savings in a period before a transaction is established and to temporarily receive the banknotes determined as unqualified by the banknote identification module 32 when the banknotes being withdrawn or counted are conveyed toward the banknote bundling module 38. The recycling storage module 72 is used for receiving the banknotes deposited by the user and supplying the banknotes to be withdrawn by the user. The recovering storage module 70 is used for recovering the unqualified banknotes in withdrawal. The conveying path module 50 is used for conveying the banknotes among various modules. The banknote bundling module 38 is used for bundling the banknotes. The recycling system controlling module 94 controls actions of various modules described above so as to achieve the desired functions. The power supply module 80 supplies power to the recycling system controlling module 94. The recycling system controlling module 94 is connected to a main controlling module 92 via a bus, and the main controlling module 92 is connected to a user operating interface 90 via a bus. The user may input required information via the user operating interface 90, then the main controlling module 92 sends commands to the recycling system controlling module 94 based on the information inputted in the user operating interface 90, and then the recycling system controlling module 94 may achieve the desired functions based on the received commands.

The conveying path module (banknote conveying passage) 50 includes an upper conveying path 50a, an intermediate connecting path 50c and a lower conveying path 50b. An upper financial self-service equipment 1a is constituted by the upper conveying path 50a, the banknote withdrawal port module 36, the banknote depositing port module 34, the banknote identification module 32, the banknote temporary storage module 30 and the banknote bundling module 38. A lower financial self-service equipment 1b is constituted by the
lower conveying path 50b, the recycling storage module 72, the recovering storage module 70, the conveying path module 50, the recycling system controlling module 94 and the power supply module 80. The financial self-service equipment 1 is divided into the upper financial self-service equipment 1a and the lower financial self-service equipment 1b, thereby facilitating the maintenance of the upper financial self-service equipment 1a and the lower financial self-service equipment 1b. The banknotes are conveyed between the upper financial self-service equipment 1a and the lower financial self-service equipment 1b via the intermediate connecting path 50c.

[0042] A square annular conveying passage is constituted by banknote conveying passages among the banknote temporary storage module 30, the banknote withdrawal port module 36, the banknote depositing port module 34 and an outlet of the upper financial self-service equipment leading to the lower financial self-service equipment (which is an outlet connected to the intermediate connecting path 50c). The square annular conveying passage includes four corners, each of which is provided with a two-way diverting device or a three-way diverting device. Moreover, the banknote temporary storage module 30, the banknote withdrawal port module 36, the banknote depositing port module 34 and the outlet of the upper financial self-service equipment leading to the lower financial self-service equipment (i.e. the outlet connected to the intermediate connecting path 50c) correspondingly provided in outwardly extending directions of an upper left corner, an upper right corner, a lower right corner and a lower left corner of the square annular conveying passage, and the upper left corner and the upper right corner are both provided with a three-way diverting device, the lower right corner and the lower left corner are both provided with a two-way diverting device. Specifically, referring to FIG. 12 to FIG. 17, the three-way diverting device, provided at the upper left corner of the square annular conveying passage, includes a lifting member 601, and a two-way diverting member 602 having a path switching portion and cooperated with the lifting member 601; the three-way diverting device, provided at the upper right corner, includes a three-way diverting member 603 having three path switching portions corresponding to three different directions. And the banknote identification module 32 is placed on the banknote conveying passage between the lower right corner and the lower left corner of the square annular conveying passage.

[0043] Furthermore, referring to FIG. 21, an arc-shaped passage conveying device according to the present application is provided on the banknote conveying passage between the upper right corner and the lower right corner of the square annular conveying passage, for achieving a bidirectional conveying of the banknotes, thereby reducing the phenomenon of banknote jam.

[0044] The specific structure of the arc-shaped passage conveying device according to the present application will be described in detail hereinafter. Referring to FIGS. 21 to 26, the arc-shaped passage conveying device 3 includes a large driving wheel 701, at least one elastic roller wheel 702 and a passage guiding plastic plate 703. The large driving wheel 701 includes at least one large spool 7011 and at least one large rubber wheel 7012 which are mounted on the same rotating shaft. A plurality of elastic roller wheels 702 are floatingly pressed against the large rubber wheel 7012 and rotate cooperatively with the large rubber wheel 7012 so as to provide a power for conveying the banknotes. The passage guiding plastic plate 703 is used to fix the elastic roller wheels 702 and to press the elastic roller wheels 702 against the large rubber wheel 7012, and the arc-shaped passage for conveying the banknotes is formed between the passage guiding plastic plate 703 and the large spool 7011.

[0045] Preferably, in the present embodiment, the passage guiding plastic plate 703 is rotatably mounted on a supporting shaft, and the elastic roller wheels 702 may rotate together with the passage guiding plastic plate 703 in a direction away from the large driving wheel 701, such that the passage guiding plastic plate 703 may be opened to facilitate removing jammed banknotes.

[0046] In the present embodiment, two large rubber wheels 7012 are provided, and the two large rubber wheels 7012 and the plurality of spools 7011 are mounted on the same rotating shaft at intervals. Furthermore, four elastic roller wheels 702 are pressed tightly against a half-arc shaped surface of each of the large rubber wheels 7012 at equal intervals.

[0047] The arc-shaped passage formed by the arc-shaped passage conveying device according to the present application is a passage 506 for bidirectionally conveying banknotes, by which the upper right corner and the lower right corner of the square annular conveying passage are connected. Compared to a conventional passage having the same curvature, the half-arc shaped passage has the following significant advantages.

[0048] 1) The number of parts is reduced, and the cost is reduced. Since in the conventional curved passage, a flat belt is used as a power medium for conveying banknotes, and a normal conveying of the belt can only be achieved by tensing the belt with a plurality of belt shafts and belt wheels to form a certain belt wrap angle. Further generally, in the belt passage, both sides of a belt clamping surface are mounted with a plastic guiding plate to form a closed banknote conveying passage. Such that the large arc-shaped passage of the present application may significantly reduce the number of parts, and has significant advantages of reducing cost and improving maintainability.

[0049] 2) The reliability of banknote conveying is improved. Due to the half-arc passage, the curvature of the banknotes is always a constant value, which is always equal to a reciprocal of a radius R of the large driving wheel 701. However, for forming the belt wrap angle, the curvature of the conventional curved passage constituted by belt is changed at some portions, and the larger the wrap angle is, the greater the fluctuation of the curvature is, and as viewed from one side, the conventional passage is in waving state.

[0050] 3) The driving load is reduced. In the conventional curved belt passage, the belt is wrapped on the belt wheels tightly under a certain tension, and then the belt is driven by a friction generated between the belt and the belt wheels. However, at different temperatures, the wrapping effect of the conveying belt varies greatly due to the thermal expansion and contraction effect. In a high temperature environment, the elongating tension of the belt is reduced, thus the wrapping force and the load are also reduced, while in a low temperature environment of minus 10 degrees Celsius, the belt contracts, thus the wrapping force is significantly increased and the load is increased many-fold, which causes the driving power of the drive motor being not enough. The problem that the load of the motor varies significantly in different temperature environments is avoided by the large driving wheel 701 of the half-arc passage of the present application.

[0051] The banknote conveying passage, extending towards the banknote withdrawal port module 36, of the
three-way diverting device (including the three-way diverting member 603) provided at the upper right corner, includes a straight-passage conveying passage, connected to the banknote withdrawal port module 36, and a curve-passage conveying passage, connected to the banknote bundling module. A banknote conveying diverting device is provided at a joint of the straight-passage conveying passage and the curve-passage conveying passage so as to switch the conveying direction of the banknotes.

The specific structure of the banknote conveying diverting device will be described in detail hereinafter. Referring to FIGS. 1 and 18 to 20, the banknote conveying diverting device includes a plurality of diverting members 604 and driven wheels 606, and the plurality of triangular diverting members 604 and the driven wheels 606 are provided on a rotating shaft 607 at intervals. The rotating shaft 607 drives the diverting members 604 and the driven wheels 606 to rotate. Each of the diverting member 604 includes a path switching portion 6040, and two surfaces forming the path switching portion 6040 respectively act as a straight-passage conveying guiding surface 6041 and a curve-passage diverting guiding surface 6042. The driven wheels 606 are driven by the driving wheels (as indicated by reference numeral 605 in FIGS. 18 and 19) on the conveying passage to rotate. Under the action of the rotating shaft 607, the path switching portion 6040 of the diverting member 604 extends into the straight-passage conveying passage to block the banknote straight-passage conveying path, such that the banknotes may move along the curve-passage conveying guiding surface, and then are clamped between the driving wheel 605 and the driven wheel 606 to realize the curve-passage conveying (as shown in FIG. 18). Or, under the action of the rotating shaft 607, the path switching portion 6040 of the diverting member 604 extends from the banknote straight-passage conveying path of the straight-passage conveying passage, such that the banknotes may continue to be conveyed on the straight passage along the straight-passage conveying guiding surface (as shown in FIG. 19).

Preferably, the curve-passage diverting guiding surface 6041 of the path switching portion 6040 of the diverting member 604 has an inwardly concave curved surface, such that when the path switching portion 6040 extends into the straight-passage conveying passage to block the banknote straight-passage conveying path, a target surface of the driven wheel 606 contacting with the driving wheel 605 protrudes from the curve-passage diverting guiding surface of the path switching portion. The straight-passage conveying guiding surface of the path switching portion of the diverting member 604 has an outwardly convex curved surface, such that when the path switching portion 6040 exits from the banknote straight-passage conveying path of the straight-passage conveying passage, the straight-passage conveying guiding surface of the path switching portion 6040 protrudes from an outer surface of the driven wheel 606 facing the straight-passage conveying passage.

Further, a guiding member 608 is fixed on the outer surface of the driven wheel 606 facing the straight-passage conveying passage. The guiding member 608 has a guiding surface being substantially parallel to the straight-passage conveying passage and the guiding surface is flush with or protrudes from the straight-passage conveying guiding surface of the path switching portion. The guiding member 608 may prevent the banknotes from contacting with the driven wheel 606, thereby reducing the resistance and facilitating the smooth passing of the banknotes.

Therefore, the banknote conveying diverting device may be provided at the joint of the straight-passage conveying passage and the curve-passage conveying passage among the banknote depositing port module, the banknote withdrawal port module and the banknote bundling module of the financial self-service equipment having functions of depositing, withdrawing and bundling, so as to realize the switching of the banknote conveying direction effectively. When the banknote conveying passage is switched to the curve-passage conveying passage, the path switching portion of the diverting member extends into the straight-passage conveying passage to block the banknote straight-passage conveying path, such that the banknotes are clamped between the driving wheel and the driven wheel to achieve the curve-passage diverting conveying, that is the driven wheel and the driving wheel are used to clamp the banknote so as to increase the conveying force. When the passage is switched to the straight passage, the path switching portion of the diverting member exits from the banknote straight-passage conveying path of the straight-passage conveying passage, such that the banknotes may continue to be conveyed on the straight passage along the straight-passage conveying guiding surface, and the driven wheel is hidden within a passage wall and does not contact with the banknotes, thereby reducing the resistance.

The working process of the financial self-service equipment 1 according to the present application will be described in detail hereinafter.

Referring to FIG. 3, when needs to deposit the banknotes directly, the user puts the banknotes into the banknote depositing port module 34, and the banknotes are conveyed from the banknote depositing port module 34, and after passing through a conveying path 501, the banknote identification module 32, a conveying path 519, a conveying path 502, the intermediate connecting path 50c, a conveying path 514 and a conveying path 520, the banknotes reach one of the recycling storage modules 72. If a banknote is identified by the banknote identification module 32 as an unqualified banknote, the unqualified banknote is conveyed to the banknote withdrawal port module 36, after passing through a conveying path 503, a conveying path 504, a conveying path 509, a conveying path 510 and a conveying path 511, and is returned to the user. The process only illustrates depositing the banknotes into one recycling storage module 72, and the processes of depositing banknotes into other recycling storage modules 72 are similar to this process, thus will not be illustrated herein. Particularly, referring to FIG. 12, FIG. 15 and FIG. 19, when the unqualified banknote is conveyed from the conveying path 503 to the conveying path 505 via conveying path 504, the two-way diverting member 602 is swung clockwise to a position as shown in FIG. 12 and the lifting member 601 is lifted to a position as shown in FIG. 12. At this time, the conveying path 503, the conveying path 504 and the conveying path 505 are communicated with each other. When the unqualified banknote is conveyed from the conveying path 505 to the conveying path 510 via the conveying path 509, the three-way diverting member 601 is swung to a position as shown in FIG. 15, and at this time, the conveying path 505, the conveying path 509 and the conveying path 510 are communicated with each other. When the banknote is conveyed from the conveying path 510 to the conveying path 511, the diverting member 604 is rotated counter-clockwise to a position as shown in FIG. 19. Refer-
Referring to FIG. 4, when needs to count the banknotes, the user puts the banknotes into the banknote depositing port module 34, and the banknotes are conveyed from the banknote depositing port module 34, and after passing through the conveying path 501, the banknote identification module 32, the conveying path 519, the conveying path 503, a conveying path 517 and a conveying path 518, the banknotes reach the banknote temporary storage module 30. If a banknote is identified by the banknote identification module 32 as an unqualified banknote, the unqualified banknote is conveyed to the banknote withdrawal port module 36, after passing through the conveying path 503, the conveying path 504, the conveying path 505, the conveying path 509, the conveying path 510 and the conveying path 511, and is returned to the user. Particularly, referring to FIG. 13 and FIG. 19, when qualified banknotes are conveyed from the conveying path 503 to the conveying path 518 via the conveying path 517, the two-way diverting member 602 is swung counter-clockwise to a position as shown in FIG. 13 and the lifting member 601 is lifted to a position as shown in FIG. 13. At this time, the conveying path 503, the conveying path 517 and the conveying path 518 are communicated with each other. When the unqualified banknote is conveyed from the conveying path 503 to the conveying path 505 via the conveying path 504, the two-way diverting member 602 is swung clockwise to the position as shown in FIG. 12 and the lifting member 601 is lifted to the position as shown in FIG. 13. At this time, the conveying path 503, the conveying path 504 and the conveying path 505 are communicated with each other. Referring also to FIG. 15, when the unqualified banknote is conveyed from the conveying path 505 to the conveying path 510 via the conveying path 509, the three-way diverting member 603 is swung to the position as shown in FIG. 15, and at this time, the conveying path 505, the conveying path 509 and the conveying path 510 are communicated with each other. When the banknote is conveyed from the conveying path 510 to the conveying path 511, the diverting member 604 is swung counter-clockwise to the position as shown in FIG. 19.

Referring to FIG. 5, when the user confirms the deposit after the banknote counting is finished, the banknotes are conveyed from the banknote temporary storage module 30, and after passing through the conveying path 518, a conveying path 516, the conveying path 505, a conveying path 507, the conveying path 506, the arc-shaped passage conveying device 3 according to the present application, the banknote identification module 32, the conveying path 519, the conveying path 502, the intermediate connecting path 50c, the conveying path 514 and the conveying path 520, the banknotes reach one of the recycling storage modules 72. The process only illustrates depositing the banknotes into one recycling storage module 72, and the processes of depositing banknotes into other recycling storage modules 72 are similar to this process, thus will not be illustrated herein. Particularly, referring to FIG. 14 and FIG. 16, when the banknotes are conveyed from the conveying path 518 to the conveying path 505 via the conveying path 516, the lifting member 601 is swung to the position as shown in FIG. 14. When the banknotes are conveyed from the conveying path 505 to the conveying path 506 via the conveying path 507, the three-way diverting member 601 is swung to a position as shown in FIG. 16, and at this time, the conveying path 505, the conveying path 507 and the conveying path 506 are communicated with each other.

Referring to FIG. 6, when the user cancels the deposit after the banknote counting is finished, the banknotes are conveyed from the banknote temporary storage module 30, and after passing through the conveying path 518, the conveying path 516, the conveying path 505, the conveying path 509, the conveying path 510 and the conveying path 511, the banknotes reach the banknote withdrawal port module 36. Particularly, referring to FIG. 14, FIG. 15 and FIG. 19, when the banknotes are conveyed from the conveying path 518 to the conveying path 516, the lifting member 601 is dropped to the position as shown in FIG. 14. When the banknotes are conveyed from the conveying path 505 to the conveying path 510 via the conveying path 509, the three-way diverting member 603 is swung to the position as shown in FIG. 15, and at this time, the conveying path 505, the conveying path 509 and the conveying path 510 are communicated with each other. When the banknotes are conveyed from the conveying path 510 to the conveying path 511, the diverting member 604 is rotated counter-clockwise to the position as shown in FIG. 19.
Referring to FIG. 8, if there is an unqualified banknote being recovered into the banknote temporary storage module 30 when withdrawing banknotes, after the banknote withdrawing is finished, the unqualified banknote being recovered into the banknote temporary storage module 30 is conveyed from the banknote temporary storage module 30 and then reach the recovering storage module 70 after passing through the conveying path 518, the conveying path 516, the conveying path 505, the conveying path 507, the conveying path 506, the arc-shaped passage conveying device 3 according to the present application, the banknote identification module 32, the conveying path 519, the conveying path 502, the intermediate connecting path 50c, the conveying path 514 and the conveying path 520. Particularly, referring to FIG. 14 and FIG. 16, when the banknote is conveyed from the conveying path 518 to the conveying path 505 via the conveying path 516, the lifting member 601 is dropped to the position as shown in FIG. 14. When the banknote is conveyed from the conveying path 505 to the conveying path 506 via the conveying path 507, the three-way diverting member 603 is swung to the position as shown in FIG. 16, and at this time, the conveying path 505, the conveying path 507 and the conveying path 506 are communicated with each other.

Referring to FIG. 9, when needs to bundle the withdrawn banknotes in the banknote bundling module 38, the banknotes are conveyed from one of the recycling storage modules 72, and after passing through the conveying path 520, the conveying path 514, the intermediate connecting path 50c, the conveying path 502, the conveying path 519, the banknote identification module 32, the arc-shaped passage conveying device 3 according to the present application, the conveying path 506, the conveying path 508, the conveying path 510 and the conveying path 512, the banknotes reach the banknote bundling module 38. When the banknote identification module 32 detects an unqualified banknote, the unqualified banknote is conveyed to the banknote temporary storage module 30 after passing through the conveying path 507, the conveying path 505, the conveying path 516 and the conveying path 518. The process only illustrates withdrawing the banknotes from one recycling storage module 72 to the banknote bundling module 38, and the processes of withdrawing the banknotes from other recycling storage modules 72 to the banknote bundling module 38 are similar to this process, thus will not be illustrated herein. Particularly, referring to FIG. 14, FIG. 16 and FIG. 18, when the unqualified banknote is conveyed from the conveying path 506 to the conveying path 505 via the conveying path 507, the three-way diverting member 603 is swung to the position as shown in FIG. 16, and at this time, the conveying path 506, the conveying path 507 and the conveying path 505 are communicated with each other. When the banknote is conveyed from the conveying path 505 to the conveying path 518 via the conveying path 516, the lifting member 601 is dropped to the position as shown in FIG. 14. Referring to FIG. 17, when qualified banknotes are conveyed from the conveying path 506 to the conveying path 510 via the conveying path 508, the three-way diverting member 603 is swung to the position as shown in FIG. 17. When the banknotes are conveyed from the conveying path 510 to the conveying path 512, the diverting member 604 is rotated counter-clockwise to the position as shown in FIG. 18, and at this time, a resistance on the banknotes conveyed on the curved passage is relatively large, and the banknotes are passed through between the driving wheel 605 and the driven wheel 606 and are clamped between the driving wheel 605 and the driven wheel 606 to realize the curve-passage diverting conveying. In this way, there is sufficient power for conveying the banknotes, such that the banknotes may have a stable state and may not be tilted, thereby facilitating the banknote bundling of the banknote bundling module 38, and such design has a compact structure.

Referring to FIG. 10, when needs to convey the banknotes from the banknote depositing port module 34 to the banknote bundling module 38 to be counted directly, the banknotes are conveyed from the banknote depositing port module 34 to the banknote bundling module 38 after passing through the conveying path 501, the banknote identification module 32, the conveying path 519, the conveying path 503, the conveying path 504, the conveying path 505, the conveying path 509, the conveying path 510 and the conveying path 512. When the banknote identification module 32 detects an unqualified banknote, the unqualified banknotes are conveyed to the banknote temporary storage module 30 after passing through the conveying path 503, the conveying path 507 and the conveying path 518. Particularly, referring to FIG. 12, FIG. 13, FIG. 15 and FIG. 18, when the unqualified banknote is conveyed from the conveying path 503 to the conveying path 518 via the conveying path 517, the two-way diverting member 602 is swung counter-clockwise to the position as shown in FIG. 13, and the lifting member 601 is lifted to the position as shown in FIG. 13. At this time, the conveying path 503, the conveying path 517 and the conveying path 518 are communicated with each other. When the qualified banknotes are conveyed from the conveying path 503 to the conveying path 505 via the conveying path 504, the two-way diverting member 602 is swung clockwise to the position as shown in FIG. 12, and the lifting member 601 is lifted to the position as shown in FIG. 12. At this time, the conveying path 503, the conveying path 504 and the conveying path 505 are communicated with each other. When the qualified banknotes are conveyed from the conveying path 505 to the conveying path 510 via the conveying path 509, the three-way diverting member 603 is swung to the position as shown in FIG. 15, and at this time, the conveying path 505, the conveying path 509 and the conveying path 510 are communicated with each other. When the banknotes are conveyed from the conveying path 510 to the conveying path 512, the diverting member 604 is rotated counter-clockwise to the position as shown in FIG. 18.

Referring to FIG. 11, which illustrates another embodiment for conveying the banknotes from the banknote depositing port module 34 to the banknote bundling module 38 to be counted directly. The banknotes are conveyed from the banknote depositing port module 34 and the banknote bundling module 38 after passing through the conveying path 501, the banknote identification module 32, the conveying path 519, the conveying path 503, the conveying path 504, the conveying path 505, the conveying path 509, the conveying path 510 and the conveying path 512. When the banknote identification module 32 detects an unqualified banknote, the unqualified banknotes are conveyed to the banknote withdrawal port module 36 after passing through the conveying path 509, the conveying path 510 and the conveying path 511. Particularly, referring to FIG. 12, FIG. 15, FIG. 18 and FIG. 19, when qualified banknotes are conveyed from the conveying path 503 to the conveying path 505 via the conveying path 504, the two-way diverting member 602 is swung clock-wise to the position as shown in FIG. 12, and the lifting member 601 is lifted to the position as shown in FIG. 12. At this time, the conveying path 503, the conveying path 504 and
the conveying path 505 are communicated with each other. When the qualified banknotes are conveyed from the conveying path 505 to the conveying path 510 via the conveying path 509, the three-way diverting member 603 is swung to the position as shown in FIG. 15, and at this time, the conveying path 505, the conveying path 509 and the conveying path 510 are communicated with each other. When the banknotes are conveyed from the conveying path 510 to the conveying path 512, the diverting member 604 is rotated counter-clockwise to the position as shown in FIG. 18. When the banknotes are conveyed from the conveying path 510 to the conveying path 511, the diverting member 604 is rotated counter-clockwise to the position as shown in FIG. 19.

[0066] The above-described embodiments are only preferred embodiments of the present application. It should be noted that, for the person skilled in the art, many modifications and improvements may be made to the present application without departing from the principle of the present application, and these modifications and improvements are also deemed to fall into the protection scope of the present application.

1. An arc-shaped passage conveying device, being provided on a conveying passage among a banknote depositing port module, a banknote withdrawal port module and a banknote bundling module of a financial self-service equipment having functions of depositing, withdrawing and bundling, wherein the device comprises a large driving wheel, at least one elastic roller wheel and a passage guiding plate; the large driving wheel comprises at least one spool and at least one rubber wheel which are mounted on the same rotating shaft; the at least one elastic roller wheel is floatingly pressed against the at least one rubber wheel and rotates cooperatively with the at least one rubber wheel to provide a power for conveying banknotes; and the passage guiding plate is configured to fix the at least one elastic roller wheel and to press the at least one elastic roller wheel against the at least one rubber wheel, and the passage guiding plate and the at least one spool constitute an arc-shaped passage for conveying the banknotes.

2. The arc-shaped passage conveying device according to claim 1, wherein the passage guiding plate is a passage guiding plastic plate which is rotatably mounted on a supporting shaft and can rotate, together with the at least one elastic roller, in a direction away from the large driving wheel to be opened.

3. The arc-shaped passage conveying device according to claim 1, wherein two rubber wheels are provided, and the two rubber wheels and the at least one spool are mounted on the same rotating shaft at intervals.

4. The arc-shaped passage conveying device according to claim 1, wherein four elastic roller wheels are pressed against a half-arc shaped surface of each of the at least one rubber wheel at equal intervals.

5. The arc-shaped passage conveying device according to claim 1, wherein the financial self-service equipment having integrated functions of depositing, withdrawing and bundling comprises an upper financial self-service equipment and a lower financial self-service equipment, and the upper financial self-service equipment is provided with the banknote depositing port module, the banknote withdrawal port module and the banknote bundling module, the lower financial self-service equipment is provided with a cash box, and the modules in the upper financial self-service equipment and modules in the lower financial self-service equipment are connected via a banknote conveying passage.

6. The arc-shaped passage conveying device according to claim 5, wherein the upper financial self-service equipment is further provided with a banknote temporary storage module, and a square annular conveying passage is constituted by banknote conveying passages among the banknote temporary storage module, the banknote withdrawal port module, the banknote depositing port module and an outlet of the upper financial self-service equipment leading to the lower financial self-service equipment; the square annular conveying passage comprises four corners, each of which is provided with a two-way diverting device or a three-way diverting device, and the arc-shaped passage conveying device is provided on a banknote conveying passage between an upper right corner and a lower right corner of the square annular conveying passage.

7. The arc-shaped passage conveying device according to claim 5, wherein a banknote conveying diverting device is provided on a conveying passage among the banknote depositing port module, the banknote withdrawal port module and the banknote bundling module, and comprises:

a diverting member comprising a path switching portion, wherein two surfaces forming the path switching portion respectively act as a straight-passage conveying guiding surface and a curve-passage conveying guiding surface; a rotating shaft driving the diverting member to rotate; a driven wheel passing through the rotating shaft and abut-ting the diverting member, and being driven by the driving wheel on the conveying passage to rotate; and

wherein under the action of the rotating shaft, the path switching portion of the diverting member extends into the straight-passage conveying passage to block a banknote straight-passage conveying path, such that the banknotes may move along the curve-passage conveying guiding surface, and then are clamped between the driving wheel and the driven wheel to realize the curve-passage conveying conveying; or, under the action of the rotating shaft, the path switching portion of the diverting member exits from the banknote straight-passage conveying path of the straight-passage conveying passage, such that the banknotes may continue to be conveyed on a straight passage along the straight-passage conveying guiding surface.

8. The arc-shaped passage conveying device according to claim 7, wherein the curve-passage conveying guiding surface of the path switching portion of the diverting member has an inwardly concave curved surface, such that in the case that the path switching portion extends into the straight-passage conveying passage to block the banknote straight-passage conveying path, a target surface of the driven wheel contacting with the driving wheel protrudes from the curve-passage conveying guiding surface of the path switching portion.

9. The arc-shaped passage conveying device according to claim 7, wherein the straight-passage conveying guiding surface of the path switching portion of the diverting member has an outwardly convex curved surface, such that in the case that the path switching portion exits from the banknote straight-passage conveying path of the straight-passage conveying passage, the straight-passage conveying guiding surface of the path switching portion protrudes from an outer surface of the driven wheel facing the straight-passage conveying passage.
10. The arc-shaped passage conveying device according to claim 7, wherein a guiding member is fixed on an outer surface of the driven wheel facing the straight-passage conveying passage, and has a guiding surface being substantially parallel to the straight-passage conveying passage, and the guiding surface is flush with or protrudes from the straight-passage conveying guiding surface of the path switching portion.

11. The arc-shaped passage conveying device according to claim 2, wherein the financial self-service equipment having integrated functions of depositing, withdrawing and bundling comprises an upper financial self-service equipment and a lower financial self-service equipment, and the upper financial self-service equipment is provided with the banknote depositing port module, the banknote withdrawal port module and the banknote bundling module, the lower financial self-service equipment is provided with a cash box, and modules in the upper financial self-service equipment and modules in the lower financial self-service equipment are connected via a banknote conveying passage.

12. The arc-shaped passage conveying device according to claim 11, wherein the upper financial self-service equipment is further provided with a banknote temporary storage module, and a square annular conveying passage is constituted by banknote conveying passages among the banknote temporary storage module, the banknote withdrawal port module, the banknote depositing port module and an outlet of the upper financial self-service equipment leading to the lower financial self-service equipment; the square annular conveying passage comprises four corners, each of which is provided with a two-way diverting device or a three-way diverting device, and the arc-shaped passage conveying device is provided on a banknote conveying passage between an upper right corner and a lower right corner of the square annular conveying passage.

13. The arc-shaped passage conveying device according to claim 11, wherein a banknote conveying diverting device is provided on a conveying passage among the banknote depositing port module, the banknote withdrawal port module and the banknote bundling module, and comprises:
   a diverting member comprising a path switching portion, wherein two surfaces forming the path switching portion respectively act as a straight-passage conveying guiding surface and a curve-passage diverting guiding surface; a rotating shaft driving the diverting member to rotate; a driven wheel passing through the rotating shaft and abutting the diverting member, and being driven by the driving wheel on the conveying passage to rotate; and
   wherein under the action of the rotating shaft, the path switching portion of the diverting member extends into the straight-passage conveying passage to block a banknote straight-passage conveying path, such that the banknotes may move along the curve-passage diverting guiding surface, and then are clamped between the driving wheel and the driven wheel to realize the curve-passage diverting conveying; or, under the action of the rotating shaft, the path switching portion of the diverting member exits from the banknote straight-passage conveying path of the straight-passage conveying passage, such that the banknotes may continue to be conveyed on a straight passage along the straight-passage conveying guiding surface.

14. The arc-shaped passage conveying device according to claim 13, wherein the curve-passage diverting guiding surface of the path switching portion of the diverting member has an inwardly concave curved surface, such that in the case that the path switching portion extends into the straight-passage conveying passage to block the banknote straight-passage conveying path, a target surface of the driven wheel contacting with the driving wheel protrudes from the curve-passage diverting guiding surface of the path switching portion.

15. The arc-shaped passage conveying device according to claim 13, wherein the straight-passage conveying guiding surface of the path switching portion of the diverting member has an outwardly convex curved surface, such that in the case that the path switching portion exits from the banknote straight-passage conveying path of the straight-passage conveying passage, the straight-passage conveying guiding surface of the path switching portion protrudes from an outer surface of the driven wheel facing the straight-passage conveying passage.

16. The arc-shaped passage conveying device according to claim 13, wherein a guiding member is fixed on an outer surface of the driven wheel facing the straight-passage conveying passage, and has a guiding surface being substantially parallel to the straight-passage conveying passage, and the guiding surface is flush with or protrudes from the straight-passage conveying guiding surface of the path switching portion.