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71 Applicant: **International Business Machines Corporation**  
**Old Orchard Road**  
**Armonk, N.Y. 10504(US)**

72 Inventor: **Hada, Toshiki**  
**4417-18 Fujisawa**  
**Fujisawa-shi Kanagawa-ken(JP)**  
Inventor: **Kawai, Shoichi**  
**4-4-5 Nishikamakura**  
**Kamakura-shi Kanagawa-ken(JP)**  
Inventor: **Ogawa, Masanori**  
**1-17-11 Tsujidohshinmachi**  
**Fujisawa-shi Kanagawa-ken(JP)**

74 Representative: **Atchley, Martin John**  
**Waldegrave**  
**IBM United Kingdom Limited Intellectual**  
**Property Department Hursley Park**  
**Winchester Hampshire SO21 2JN(GB)**

54 **Coin processing apparatus.**

57 The present invention relates to a coin processing apparatus of the type which comprises a first rotating member (1) adapted to arrange on the periphery thereof by centrifugal force coins introduced thereto, means (2) for ejecting the coins arranged on the periphery of the rotating member one by one, conveying means for receiving and further conveying the ejected coins in a controlled manner, and holder means (20) for receiving and holding the coins received from the conveying means.

According to the invention the apparatus is characterised in that the conveying means comprises a second rotating member (4) having at least one cut out portion formed on the periphery thereof, the cut out portion being capable of receiving one coin, means (5) for pressing each coin ejected by the ejecting means so as to push the coin into the cut out portion or a respective one of the cut out portions, and a guide member (6) for guiding the coin in the or each cut out portion along the periphery of the second rotating member.

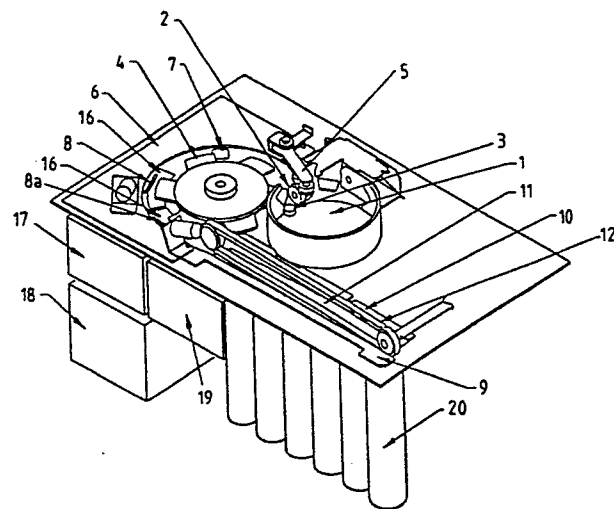


FIG. 1

**EP 0 295 862 A2**

## COIN PROCESSING APPARATUS

The present invention relates to a coin processing apparatus which includes a mechanism for receiving and sorting a large amount of coins of different denominations in a financial agency such as a bank.

In the past, this kind of apparatus has included a rotating disc or other flat surfaced member for aligning mixed coins supplied thereto and for continuously ejecting the coins through an exit port, and a sorting track provided downstream of the exit port. On the bottom surface of the sorting track, a plurality of sorting holes corresponding to the diameters for the different denomination coins were formed. The sorting process was performed by allowing the mixed coins conveyed onto the sorting track to fall into the sorting holes.

There was a disadvantage, however, that, in this type of apparatus, mixed coins were sorted only by the size of the sorting holes, so that, if damaged coins, false coins or coins of denominations other than those corresponding to the sorting holes were mixed therein, they would be sorted erroneously.

To avoid such a disadvantage, the coin processing apparatus described in Japanese Published Unexamined Patent Application No. 61-60195 includes an identification portion for identifying the truth or falsehood and denomination of coins being processed by the apparatus. A rejecting portion for removing the coins not identifiable is provided between a rotating disc for aligning mixed coins and continuously ejecting them and a sorting track in which various sorting holes are formed.

However, this arrangement has the following disadvantage:

(a) The mixed coins are aligned on the rotating disc and drawn therefrom by a roller one by one and further conveyed by an endless belt. The coins may have different diameters and thicknesses and the spacing between adjacent coins being conveyed may vary considerably (of the order of  $\pm 30 - 40\%$ ). Therefore, the respective mechanisms in the apparatus for handling the different coins must be spaced apart so as to accommodate such variation. As a result the number of coins which can be conveyed per unit time and the consequent throughput of the apparatus is necessarily reduced.

(b) Since the identification portion and the rejecting portion must be provided in a linear portion isolated from the rotating disk and the sorting track, the apparatus becomes large in size.

The object of the present invention is to provide an improved coin processing apparatus which tends to avoid the above described disadvantages of known such apparatus.

The present invention relates to a coin processing apparatus of the type which comprises: a first rotating member adapted to arrange on the periphery thereof by centrifugal force coins introduced thereto, means for ejecting the coins arranged on the periphery of the rotating member one by one, conveying means for receiving and further conveying the ejected coins in a controlled manner, and holder means for receiving and holding the coins received from the conveying means.

According to the invention the apparatus is characterised in that the conveying means comprises a second rotating member having at least one cut out portion formed on the periphery thereof, the cut out portion being capable of receiving one coin, means for pressing each coin ejected by said ejecting means so as to push said coin into said cut out portion or a respective one of said cut out portions, and a guide member for guiding the coin in said or each cut out portion along the periphery of said second rotating member.

The second rotating member can eject coins at the interval of the cut out portions and the spacing of the ejected coins can be made constant. Thus it is not necessary to establish a wide coin spacing, taking into consideration the variation of the coin spacing, thus enabling the throughput to be improved as compared with that of the prior art arrangements.

In addition, since each coin is guided at a fixed speed along the periphery of the second rotating member, the size of the apparatus can be made small by placing a coin discriminating device and the like adjacent to the periphery of the second rotating member.

In order that the invention may be more readily understood an embodiment will now be described with reference to the accompanying drawings, in which

Fig. 1 is a perspective view of a coin processing apparatus, and

Fig. 2 is a plan view of the coin processing apparatus illustrated in Fig 1.

The coin processing apparatus illustrated in Figs 1 and 2 can be used in a financial agency such as a bank to determine automatically the truth or falsehood of the coins received from the customers for deposit, etc., and store them, as well as to sort the received coins automatically based on their respective denominations. In the following description, the operation of the apparatus will be described in terms of such coin a receiving process and sorting process.

### Coin receiving process

1. When coins are introduced in a mixed state from an introducing port (not shown) positioned above the upper portion of a first rotating disc 1, the disc 1 starts to rotate in the direction of arrow A, a second rotating disc 4 starts to rotate in the direction of arrow B, a pick roller 2 starts to rotate in such a direction that it pushes out a coin in the direction of arrow C, and an endless belt 12 starts to move in such a direction that it conveys the pushed out coin in the direction of arrow D (see Fig 2).

2. The mixed coins on the rotating disc 1 are continuously pushed by centrifugal force to the inner edge of the periphery 14 of a fixed coin guide extending around the first rotating disc 1 and are then sequentially pushed out by the pick roller 2 in the direction of arrow C. The pick roller 2 is provided with a torque limiter, which reduces the wear on the roller by preventing the roller from rotating when any coins jam and stop. Further, in the vicinity of the region into which the coins are pushed out from the rotating disc 1, there is a guide 3 for regulating the position of the coin to be pushed out, whereby the coin is pushed out in the direction of arrow C, passing between the guide 3 and the periphery 14. The distance between the guide 3 and the periphery 14 is made somewhat larger than the maximum diameter of coins received by the apparatus (of the order of the maximum diameter +1mm), thereby preventing two coins from entering a single cut out portion 4b of the rotating disc 4. A roller is preferably used as the guide 3 for smooth movement of the coins and for preventing the guide 3 itself and the coins from wearing.

3. Each coin pushed out by the pick roller 2 in the direction of arrow C abuts against the outer peripheral portion 4a of the rotating disc 4 and a swinging member 5, and as a result the swinging member 5 is pressed back in the direction of the arrow (Fig 2). A roller is preferably employed as the portion of the swinging member 5 to be contacted with the coin. At this time, the coin is subjected to the force of the spring 5a acting on the swinging member 5 and the pushing-out force of the pick roller 2 and is forced into contact with the peripheral portion 4a of the rotating disc 4.

4. When the rotating disc 4 rotates in the direction B and a cut out portion 4b comes in front of a coin being pushed out, the coin is further pushed out by the swinging member 5 and the pick roller 2 and enters the cut out portion 4b. The cut out portion 4b is formed with such a shape and size that it can receive one maximum diameter coin, but cannot receive two minimum diameter coins. At this time, since the next coin being pushed out cannot enter the cut out portion 4b, it

presses back the swinging member 5 and waits for the next cut out portion 4b while it is subjected to the forces of the swinging member 5 and the pick roller 2, and is forced into contact with the peripheral portion 4a of the rotating disc 4.

By repeating the above operations, the coins are sequentially entered into the cut out portions 4b one by one and further conveyed by the rotating disc 4. The swinging member 5 may be formed in two sections as shown, or more, or only in one section, depending on the diameters of the coins to be processed. The number of the cut out portions 4b is optional, and it can be only one. The coins are conveyed while they are subjected to the force from a pushing-out surface of each cut out portion 4b of the rotating disc 4 and are in contact with an inward facing circular guide surface 6a of a guide member 6 extending around the rotating disc 4.

5. Below the rotating disc 4 are mounted a sensor 15a for initiating the operation of a coin recognition unit 7, a sensor 15b for initiating the operation of a first coin distributing unit 8, and a sensor 15c for initiating the operation of a second coin distributing unit 8a located downstream of the first unit 8. A temporary coin reservoir 17 is mounted under the first distributing unit 8, and a coin receiving portion 18 is mounted under the reservoir 17 (Fig 1). Also, under the second distributing unit 8a there is mounted a rejection box 19 for receiving false coins, etc.

6. The coins conveyed in contact with the circular guide surface 6a are sorted in terms of truth or falsehood and denomination of each coin by the recognition unit 7, and they are distributed into the temporary coin reservoir 17 by the first distributing unit 8 when they are identified as true coins. The coins identified as damaged or false coins by the coin recognition unit 7 pass by the first distributing unit 8 and are directed into the rejection box 19 by the second distributing unit 8a.

7. With respect to the coins stored in the temporary coin reservoir 17, the received amount, denomination, etc. are all displayed by an amount display (not shown), and those coins are moved into the coin receiving portion 18 by the operator's verification and direction. The operator is informed by a lamp or the like when a false coin is directed into the rejection box 19.

### (2) Sorting process

1. Same as steps 1 - 5 in the coin receiving process.

2. The coins conveyed in contact with the circular guide surface 6a are sorted by the coin recognition unit 7 in terms of truth or falsehood and denomination, and, if they are identified as true

coins, they are passed through the distributing units 8 and 8a and are conveyed in contact with a linear guide surface 9a of a guide member 9 by an endless belt 12 in the direction of arrow D (Fig 2) and are sorted by falling into holes 11 which are formed of different sizes corresponding to various denominations.

3. The coins identified as damaged or false coins by the coin recognition unit 7 are ejected downwards by the coin distributing unit 8a and stored in the rejection box.

4. Under the coin falling holes 11, there is a portion 20 (Fig 1) for accumulating coins in a set of holders on the basis of their denominations. When any holder of the coin accumulating portion 20 becomes filled up by the sorting process, the coins of that denomination may be stored in the temporary reservoir 17 to allow the sorting process of the other denominations to be continued.

In the coin processing apparatus described above, since the spacing between the coins being passed through the feed path by the second rotating disc 4 is always constant, it is possible to design an apparatus with a higher capability of processing coins, and also, since the second rotating disc 4 into which coins are introduced can be mounted adjacent to the coin accumulating portion (first rotating disc 1), the size of the apparatus can be made small.

### Claims

1. A coin processing apparatus comprising a first rotating member (1) adapted to arrange on the periphery thereof by centrifugal force coins introduced thereto, means (2) for ejecting the coins arranged on the periphery of said rotating member one by one, conveying means for receiving and further conveying said ejected coins in a controlled manner, and holder means (20) for receiving and holding the coins received from said conveying means characterised in that said conveying means comprises a second rotating member (4) having at least one cut out portion (4b) formed on the periphery (4a) thereof, said cut out portion being capable of receiving one coin, means (5) for pressing each coin ejected by said ejecting means so as to push said coin into said cut out portion or a respective one of said cut out portions, and a guide member (6a) for guiding the coin in said or each cut out portion along the periphery of said second rotating member.

2 A coin processing apparatus as claimed in Claim 1 characterised in that said second rotating member (4) is formed with a plurality of cut out portions spaced apart by equal distances.

3 A coin processing apparatus as claimed in Claim 1 or Claim 2 characterised in that the or each cut out portion (4b) has such a size and shape that it can receive one maximum diameter coin but not two minimum diameter coins.

4 A coin processing apparatus as claimed in any one of the preceding claims characterised in that said holder means is positioned adjacent to said first rotating member.

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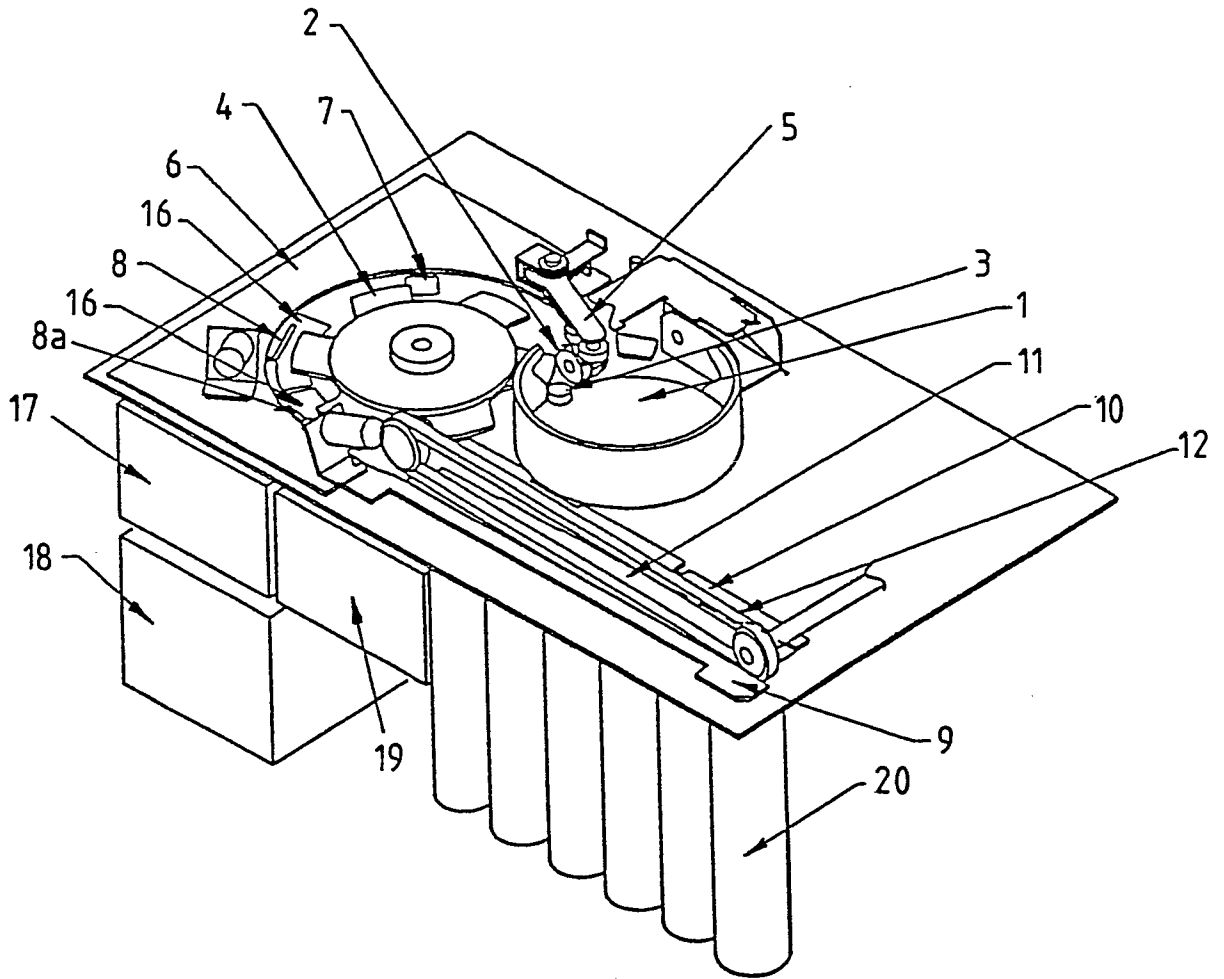


FIG. 1

