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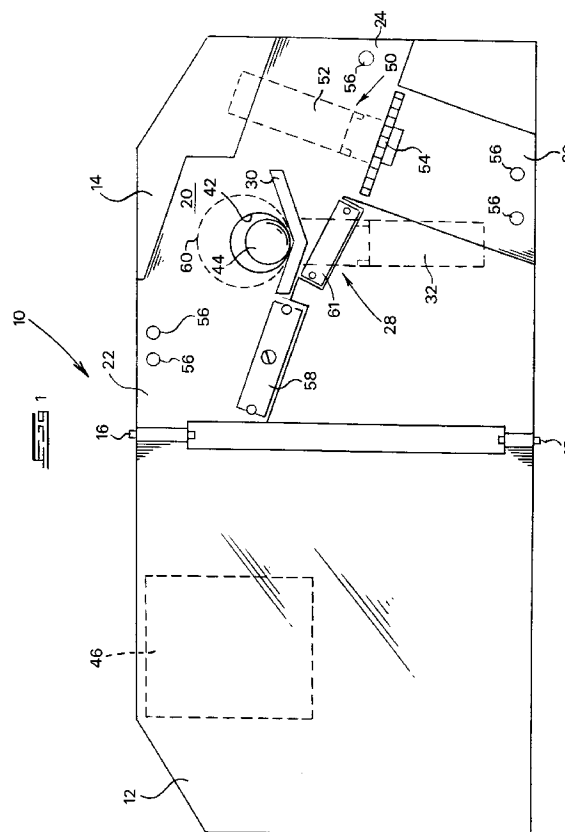
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(54) **Token validation mechanism.**

(57) The invention relates to a token validation mechanism (10) comprising a passageway (20) having an entrance (22) for receiving a token, an accept exit (26) and a reject exit (24). Token arresting means (28) are located in the passageway (20) for arresting forward movement of the token. Token damping means (42, 44) are positioned adjacent the token arresting means (30) for damping sideways movement of the token (60) for facilitating static measurement of the validity thereof by static measurement means. The token damping means comprises an inclined cage (42) housing a ball (44) arranged to impinge on the token as it is arrested. Token freeing means (28) are provided for freeing the token from the token arresting means once measurement of the validity of the token has occurred. Token steering means (49), which are responsive to a signal from the static measurement means, steer the token through either the accept exit of the reject exit, depending on the validity of the token.



This invention relates to a token validation mechanism.

Most conventional token validators have one or more inclined passages along which the token to be validated runs. One or more parameters of the moving token are measured by a linear array of sensors which line the walls of the passage. In order to accommodate the array of sensors, the passage has to be relatively long, which results in a token validation mechanism which is fairly bulky. The passage may be shortened by employing static measurement of the tokens. However, static measurement is considerably more time consuming, as the token parameters can only be measured once the token has come to a complete halt.

According to the invention there is provided a token validation mechanism comprising a passageway having an entrance for receiving a token and at least one exit means, token arresting means being located in the passageway for arresting forward movement of the token, token damping means being positioned adjacent the token arresting means for damping sideways movement of the token for facilitating static measurement of the validity thereof by static measurement means, and token freeing means for freeing the token from the token arresting means once measurement of the validity of the token has occurred.

Preferably, the token damping means comprises a cage having a token damping body housed therein, the token damping body being biased to impinge on a token as forward movement of the token is arrested by the token arresting means.

The token damping body is conveniently arranged to be displaced by a token into the cage as forward movement of the token is arrested by the token arresting means.

In a preferred form of the invention, the token arresting means comprises a cradle arranged to centre the token relative both to the token damping means and to the static measurement means.

The exit means advantageously comprised a token accept exit and a token reject exit, and token steering means, which are responsive to a signal from the static measurement means, are provided for steering the token through either the token accept exit of the token reject exit, depending on the validity of the token.

The token arresting means and the token freeing means preferably comprise a movable V-shaped cradle being carried on an arm, and actuating means for moving the cradle between a token arresting position, in which the cradle lies in the path of a token travelling through the passageway, to a token freeing position, in which the V-shaped cradle is moved out of the path of the token and away from the passageway.

The token damping body conveniently comprises a ball, and the cage is inclined downwardly towards the passage so that the ball is gravity-biased into the

path of the token.

The token steering means preferably comprises a gate, and actuating means responsive to a signal from the measurement means for moving the gate between a token reject position, in which it allows the passage of a token through the token reject exit, and a token accept position, in which it allows the passage of a token through the token accept exit.

Monitoring means, such as an optical sensor, may be provided in the token accept exit for monitoring the passage of a valid token through the token accept exit.

A preferred embodiment of the invention will now be described with reference to the drawings, in which: Figure 1 shows a front internal view of a token validation mechanism in the open position; Figure 2 shows a front external view of the token validation mechanism of Figure 1 in the closed, operative position;

Figure 3 shows a cross-sectional side view on the line 3-3 of Figure 2; and

Figure 4 shows a cross-sectional side view on the line 3-3 of Figure 2 with a token in position for measurement of the validity thereof.

The token validation mechanism 10 illustrated in Figures 1 and 2 comprises a body having a first and second hinged flaps 12 and 14 which are pivoted to one another on hinge pins 16 and 18. The flap 14 a passageway, or chamber 20 formed therein which has a entrance slot 22 for accepting a token such as a coin. Token reject and accept exit passages 24 and 26 extend from the chamber 20. Token arresting and freeing means 28, includes a V-shaped cradle 30, which is carried on an arm 32. The arm 32 is in turn pivotably connected to one end of the coil 34 of a solenoid 36 by means of stirrup 38. A leaf spring 40 biased the arm 32 and the V-shaped cradle 30 towards the closed position, as is shown in Figure 3 and 4. (The cradle could, in some applications, be biased to a normally-open position.)

An inclined tubular cage 42 extends laterally from the wall of the chamber 20 just above the V-shaped cradle 30. A ball 44, which is formed from a hard-wearing plastics material such as a polycarbonate plastic, is held captive within the cage 42. The ball could also be formed from glass or metal, for example.

A rectangular recess 46 is formed in the flap 12 for accommodating a coil arrangement for measuring one or more of the characteristics of a static coin when it is centred in the cradle 30.

Token steering means 49 comprises a gate 50 which is operated by means of a solenoid 52. The gate 50 has a downwardly slanting serrated barrier 54 which is held in the normally closed position by means of a leaf spring, and controls the passage of coins through the exit passage 26.

In use, the token validation mechanism operates as follows. A coin is inserted into the entrance slot 22,

rolls down the upper edge of a first metal, plastic or ceramic buffer block 58 and comes to rest in the V-shaped cradle 30. As the coin 60 enters the V-shaped cradle 30, it displaces the ball 44 from a position indicated in Figure 3 to the position indicated in Figure 4, in which the ball is displaced out of the chamber and up into the inclined cage 42. The ball 44 and inclined cage 42 in combination act as damping means to damp movement of the coin 60. The ball 44 absorbs some of the kinetic energy of the coin 60, causing it to come to rest far more quickly than is usual.

As soon as the coin 60 comes to rest, static measurement of one or more characteristics of the coin 60 may take place by means of the coil arrangement. The V-shaped cradle 30 acts both to arrest the coin and to locate it accurately. The ball-and-cradle arrangement is also positioned so that it dampens the movement of coins of varying sizes, which have previously been centred on the cradle 30. Consequently, the token validation mechanism is not confined to measuring the validity of coin having a specific size or denomination.

The coil arrangement is used to measure various characteristics of the coin 60 once it is stationary, such as the core and surface material from which the coin is composed, and the size of the coin. The various signals from the coil arrangement are then processed to ascertain whether the coin is valid or not. The solenoid 36 is then energised to move the arm 32 and the cradle 30 out of the path of the coin 60, which subsequently lands on a second buffer block 61, which is similar in both form and function to the first buffer block 58. If the coin is valid, the gate 54 is opened so as to allow the coin to pass through the accept exit passage 26. If the coin is not valid, the gate 54 is not opened, allowing the coin 60 to pass through the reject exit passage 24. The accept and reject exit passages may, of course, be interchanged. Optical sensors 56 are located adjacent the entrance slot 22, and in the token accept and reject exits 26 and 24, in order to monitor the progress of a coin through the passage and the exits. These sensors are so positioned that so-called "tickey-on-a-string" methods of tricking the validator mechanism are defeated.

If a counterfeit coin or token is jammed in the token validating mechanism, the first and second flaps 12 and 14 may merely be separated from one another and swung to the open position, as shown at Figure 1 so as to allow the token to be unjammed.

An advantage of the token validation mechanisms is that it facilitates the static measurement of one or more characteristics of a coin by ensuring that it comes to a halt as soon as possible. Furthermore, the token validation mechanism is able to accept coins of varying sizes and denominations, as the V-shaped cradle is arranged to centre a coin, and the ball and inclined chamber are arranged to dampen the movement of a coin of any size to facilitate a static measure-

ment thereof. Embodiments of the invention aim to allow for the rapid and consistent validation of coins and tokens, regardless of their size or denomination.

The actuating means forming part of the open arresting means preferably comprises a solenoid for moving cradle in one direction, and biasing means for biasing the cradle in the opposite direction. Likewise, the actuating means performing part of the open steering means comprises a solenoid for moving the gate in one direction, and biasing means for removing the gate in the opposite direction.

The validation mechanism conveniently has a body comprising a pair of hinged flaps which are pivotable between a closed position, in which they in combination define the passageway, the entrance and the at least one exit, and an open position, for allowing the removal of tokens which have jammed within the passageway.

Claims

1. A token validation mechanism (10) characterised in that it comprises a passageway (20) having an entrance (22) for receiving a token and at least one exit means (24,26), token arresting means (28) being located in the passageway (20) for arresting forward movement of the token, token damping means (42,44) being positioned adjacent the token arresting means (30) for damping sideways movement of the token (60) for facilitating static measurement of the validity thereof by static measurement means, and token freeing means (28) for freeing the token from the token arresting means once measurement of the validity of the token has occurred.
2. A token validation mechanism as claimed in claim 1 characterised in that the token damping means (42,44) comprises a cage (42) having a token damping body (44) housed therein, the token damping body (44) being biased to impinge on a token (60) as forward movement of the token (60) is arrested by the token arresting means (28).
3. A token validation mechanism as claimed in claim 2 characterised in that the token damping body (44) is arranged to be displaced by a token (60) into a cage (42) as forward movement of the token (60) is arrested by the token arresting means (28).
4. A token validation mechanism as claimed in any one of the preceding claims characterised in that the token arresting means (28) comprises a cradle (30) arranged to centre the token (60) relative both to the token damping means (42,44) and to the static measurement means.

5. A token validation mechanism as claimed in any one of the preceding claims characterised in that the exit means (24,26) comprises a token accept exit (26) and a token reject (24), and token steering means (49), which are responsive to a signal from the static measurement means, are provided for steering the token (60) through either the token accept exit (26) of the token reject exit (24), depending on the validity of the token.

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6. A token validation mechanism as claimed in any one of the preceding claims characterised in that the token arresting means and the token freeing means (28) comprise a movable V-shaped cradle (30) being carried on an arm (32), and actuating means (34,36,38,40) for moving the cradle between a token arresting position, in which the cradle (30) lies in the path of a token (60) traveling through the passageway (20), to a token freeing position, in which the V-shaped cradle (30) is moved out of the path of the token (60) and away from the passageway (20).

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7. A token validation mechanism as claimed in either one of claims 2 or 3 characterised in that the token damping body comprises a ball (44), and the cage (42) is inclined downwardly towards the passage (20) so that the ball (44) is gravity-biased into the path of the token (60).

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8. A token validation mechanism as claimed in claim 5 characterised in that the token steering means (49) comprises a gate (50), and actuating means (52) responsive to a signal from the measurement means for moving the gate (50) between a token reject position, in which it allows the passage of a token (60) through the token reject exit (24), and a token accept position, in which it allows the passage of a token through the token accept exit (26).

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9. A token validation mechanism as claimed in claim 5 characterised in that monitoring means (56) are provided in the token accept exit for monitoring the passage of a valid token through the token accept exit.

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10. A token validation mechanism as claimed in claim 6 characterised in that the actuating means comprises a solenoid (52) for moving the cradle in one direction, and biasing means for biasing the cradle in the opposite direction.

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11. A token validation mechanism as claimed in claim 9 characterised in that the monitoring means comprise an optical sensor (56).

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12. A token validation mechanism as claimed in any one of the preceding claims characterised in that

the validation mechanism has a body, the body comprising a pair of hinged flaps (12,14) which are pivotable between a closed position, in which they in combination define the passageway (20), the entrance (22) and the at least one exit (24,26), and an open position, for allowing the removal of token which have jammed within the passageway.

