

COIN DISPENSERS

This invention relates to coin dispensers, and is particularly but not exclusively concerned with coin dispensers for use in mechanisms for validating, separating and dispensing coins of different denominations.

Conventionally, coin dispensing apparatus comprises a coin tube for storing a stack of coins, and a coin slide arrangement mounted below the stack for dispensing the coins. The coin slide arrangement comprises an apertured slide mounted between the bottom of the coin tube and a base. The depth of the aperture is very slightly less than the thickness of the coins. The lowermost coin in the stack is received in the aperture and a solenoid is connected by a link to the slide so that actuation of the solenoid shifts the slide laterally so as to bring the coin over an aperture in the base and thereby dispense the coin. The power to the solenoid is then switched off and a spring retracts the slide so that it returns to its initial position, whereupon the next coin in the stack enters the aperture. Alternatively, the slide could be normally biased to the dispensing

position, and reciprocated by the solenoid so that it shifts first to a position where the lowermost of the stack of coins drops into the aperture and then back to the dispensing position.

5 Such arrangements involve a fairly large number of parts which need to be mounted accurately relative to each other to ensure reliable dispensing and avoid jamming. It may be necessary to remove the coin tube from a housing in which it is located, e.g. for
10 servicing or for security if the coin handling mechanism is being left unattended for a while, and it is usual in these circumstances to actuate the dispensing mechanism in order to dispense all the coins in the tube before removal.

15 In accordance with the present invention there is provided a coin dispenser comprising a coin store for storing coins in a stack, and a coin dispensing structure which is arranged to engage the edge of the lowermost coin in the stack and to move the coin
20 substantially transversely with respect to the stack in order to dispense the coin, the coin dispensing structure being arranged for reciprocation by a pivotally reciprocable solenoid armature to dispense the coin, wherein the pivot axis of the pivotally
25 reciprocable solenoid armature extends substantially perpendicular to the axis of the coin stack.

Preferably, the coin dispensing structure and the pivotally reciprocable solenoid armature form a unitary dispensing member. They could be integrally
30 formed, or separately formed and rigidly attached to each other.

Preferably the member is arranged to support the lowermost coin in the stack. There may thus be a single, integral unit which forms the solenoid armature and which both supports the stack of coins and is pivotable to eject the lowermost coin in the stack. Preferably, as the unit is pivoted to a position where a coin is dispensed, a surface holds the stack at a relatively elevated position until the unit is moved back whereupon the lowermost coin of the stack drops onto a further coin supporting surface.

The pivot axis is substantially perpendicular to the axis of the coin stack (i.e. normally horizontal), is preferably directly below the coin stack, and in the preferred embodiment is located beneath the centre of the coin stack.

Preferably, the coin dispensing member forms part of a sub-assembly which also includes the coin store (e.g. a coin tube), and which is removable from a housing in which the sub-assembly is normally located. The coin dispensing member thus can serve to hold the coins within the coin tube upon removal of the sub-assembly, thereby obviating the need to dispense all the coins before the coin tube is removed. The sub-assembly may include further coin stores and dispensing members for other denominations, or alternatively each of a plurality of coin stores for different denominations may form a respective sub-assembly.

The above arrangement may be modified by making the coin dispensing structure slidably reciprocable and coupled, preferably directly, to the reciprocably pivotable solenoid armature.

An arrangement embodying the invention will now be described by way of example with reference to the accompanying drawings, in which:-

Figure 1 is a section view showing part of a coin handling mechanism incorporating a coin dispenser according to the invention;

Figure 2 is a perspective view of part of a coin dispensing member of the dispenser; and

Figures 3 to 5 are side views showing different conditions of the dispenser during operation thereof.

Referring to Figure 1, a coin handling mechanism includes a housing within which are mounted a coin validator for receiving inserted coins and determining whether or not they are valid and a separator which separates the coins into different paths depending on their denominations.

The mechanism also includes a plurality of coin storage tubes 4, each for receiving from the separator and storing in a stack coins of a respective denomination. The coin handling mechanism further includes a plurality of coin dispensers each formed by a respective coin tube 4 and a dispensing arrangement 6 mounted below the coin tube 4. Each coin dispensing arrangement 6

comprises a solenoid formed by an armature 8 and a solenoid coil 10. The armature 8 forms a coin dispensing member having an upper portion 12 forming a coin dispensing structure and a lower portion 14 adjacent the solenoid coil 10. The portions 12 and 14 may if desired be formed integrally, or may be formed separately and rigidly attached together. For example, the upper portion 12 may be outsert moulded on the lower portion 14. The armature 8, or at least the lower portion 14, is preferably formed of metal laminations.

The armature 8 is pivoted at its lower end about a horizontal axis, and supports the stack 16 of coins within the respective coin tube 4. The pivot axis is mounted below, and preferably centrally of, the stack 16 and the coin tube 4.

In elevation, the coin dispensing structure 12 (shown more clearly in Fig. 2) is of generally segmental configuration, and has a first, elevated, coin supporting surface 18 which normally supports the stack 16 of coins in the coin tube 4, and a second coin supporting surface 20 at a reduced radial distance from the pivot axis as compared with the surface 18. The surfaces 18 and 20 are joined together by a curved wall 22 which acts to engage the edge of the lowermost coin in the stack 16 when the

coin is dispensed and which has a radius of curvature substantially equal to that of the coins in the stack 16 and that of the wall of the generally cylindrical coin tube 4. The height of the wall 22 is slightly less than the thickness of each of the coins.

As indicated in Figure 3, the coin dispensing member 8 is biased (by a spring 24 shown in Fig. 1) to a position in which the first coin supporting surface 18 is located underneath the stack 16 of coins.

In operation, the coin dispensing arrangement 6 is normally in the condition shown in Figure 3. In order to dispense a coin, the solenoid coil 10 is energized which causes the armature 8 to pivot anticlockwise as shown in Figure 4. The lower most coin in the stack 16 then drops onto the coin supporting surface 20, the major portion of which is substantially flat and (in the position shown in Figure 4) normal to the axis of the coin stack 16. The power to the solenoid is then discontinued, so that the armature 8 is moved clockwise as shown in Figure 5 by the spring 24. This causes the wall 22 to engage the edge of the lowermost coin in the stack and thus eject the coin to the right as shown in Figures 1 and 5, so that the coin will enter a dispensing passageway indicated at 32 via a slot 33.

The dispensing arrangement 6 and, the coin tube 4 form a sub-assembly which can be removed from the coin

handling mechanism and in particular from the housing 2 thereof for servicing or security. It will be appreciated that when this is done armature 8 retains the stack 16 of coins within the coin tube 4, and indeed because the spring 24 is part of the sub-assembly the condition of the dispensing arrangement is maintained (i.e. the coins remain supported on the surface 18 of the dispensing structure 12).

The sub-assembly is fixed in position by suitable means (not shown) such as screws or inter-engaging snap fittings.

The above arrangement could be modified so that the armature 8 is biased to the position shown in Figure 4, and so that energisation of the solenoid coil 10 causes the member to shift to the position shown in Figure 5 to eject a coin, following which the solenoid coil is de-energised and the member moves back to the position shown in Figure 4 whereupon the next coin in the stack drops onto the surface 20 of the member 8. This could be conveniently achieved by disposing the spring 24 and the solenoid coil 10 on the opposite sides of the centreline through the coin tube 4 from the arrangement shown in the drawings.

It will be appreciated from the above that the present embodiment provides an arrangement which is

simple to construct and assemble, in which there is a reduced number of parts compared with the conventional arrangement which involves a coin slide mounted between a base and a coin tube and connected to a solenoid armature via a link, and which is simple to service in that the dispensing arrangement can be removed with the coin tube 4 because it forms part of the same sub-assembly.

In the above arrangement, the coin tube 4 extends generally vertically, and gravity causes the stack 16 of coins to engage the dispensing structure 12. This however is not absolutely essential. It is conceivable that the coin tube 4 can be mounted in any other desired orientation, and if necessary biasing means formed by e.g. a spring can be used to force the stack 16 of coins against the dispensing structure 12. Accordingly, references herein to the dispensing structure 12 or the pivot axis of the armature 8 being "below" the coin tube 4 should be construed as covering the arrangement in which the dispensing structure 12 and axis are located along the axis of the coin tube 4, such that the coins in the stack 16 are urged toward the dispensing structure 12 and axis 14.

The solenoid coil 10 and armature 8 (or at least the lower portion 14 thereof) could form what is referred to as a "clapper" solenoid, which is installed in the sub-

(assembly referred to above as a single unit with the armature 8 pivotally mounted with respect to a support for the coil 10.



CLAIMS:

1. Coin dispensing apparatus comprising a coin store for storing coins in a stack, and a coin dispensing structure which is arranged to engage the edge of the lowermost coin in the stack and to move the coin substantially transversely with respect to the stack in order to dispense the coin, the coin dispensing structure being arranged for reciprocation by a pivotally reciprocable solenoid armature to dispense the coin, wherein the pivot axis of the pivotally reciprocable solenoid armature extends substantially perpendicular to the axis of the coin stack.

2. Apparatus as claimed in claim 1, wherein the coin dispensing structure and the solenoid armature form a unitary dispensing member.

3. Apparatus as claimed in claim 2, wherein the coin dispensing structure and the solenoid armature are integrally formed.

4. Apparatus as claimed in claim 2, wherein the coin dispensing structure and the solenoid armature are separately formed and rigidly attached to each



other.

5. Apparatus as claimed in claim 1, wherein the coin dispensing structure is slidably reciprocable by the pivotally reciprocable solenoid armature.

5 6. Apparatus as claimed in any preceding claim, wherein the coin dispensing structure is arranged to support the lowermost coin in the stack.

7. Apparatus as claimed in any preceding claim, wherein the pivot axis of the pivotally reciprocable solenoid armature is located substantially directly below the coin stack.

8. Apparatus as claimed in any preceding claim, including a housing for supporting a sub-assembly including the coin store, the coin dispensing structure and the solenoid armature, the sub-assembly being removable as a unitary structure from the housing.

9. Coin dispensing apparatus substantially as herein described with reference to the accompanying drawings.
