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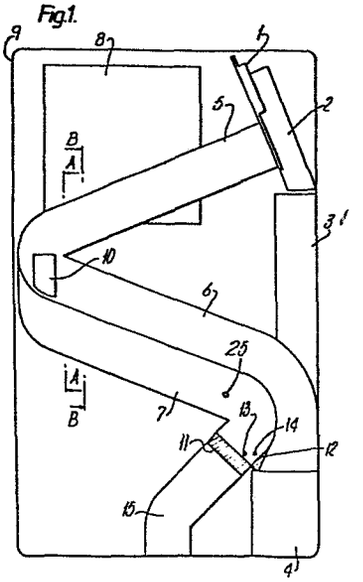
(54) **Coin handling mechanism.**

(57) A coin collecting mechanism having a coin storage chute and a refund chute. Coin path selection is effected by an electromechanically operated ramp mechanism under control of a coin validator so that in the unpowered state automatic refund of inserted coins occurs. Two methods of emptying the coin storage chute are disclosed; a single pin system used with a square ledge stop and a dual pin system for use with a "V" ledge stop. A rubbish rejection channel is also included so that such items as match sticks, lollipop sticks and small coins or tokens cannot enter the system and cause the mechanism to jam.

Fig.1.



EP 0 062 972 A2

The present invention relates to coin handling mechanisms and in particular but not exclusively to such mechanisms for use with coin collecting telephone apparatus.

According to the present invention a coin handling mechanism includes a coin storage chute having planar front and back members arranged when in use to maintain an inserted coin in an approximately vertical plane said coin storage chute also having a base member upon which the edge of an inserted coin may rest, said base member being inclined to the horizontal such that an inserted coin will tend to move from the entry of the coin storage chute towards an exit thereof, means adjacent the exit of the chute to prevent an inserted coin from leaving the chute so that a plurality of inserted coins may be held therein in escrow, control means responsive to an electrical signal to cause electromechanically operable means to release each coin (if any) held in escrow in turn, and steering means to cause each coin so released to take a selected one of a plurality of paths.

One of the plurality of paths may be to a refund path of the mechanism. A further chute is preferably provided said further chute having its entry adjacent the entry of the storage chute and having its exit adjacent the refund path, selection means adjacent the entries of the chutes operable to determine which of the chutes an inserted coin enters.

The storage chute and further coin chute may be preceded by a single coin chute having coin validation means associated therewith arranged to forward signals to the control means.

The selection means may be arranged when the apparatus is unpowered to direct all inserted coins to the further coin chute.

The storage chute may be arranged to hold a plurality of coins in escrow with each coin in contact with respective adjacent coins (if any), said mechanism also including means between the exit of the storage chute and an exit of the mechanism arranged to separate a coin nearest to the exit of the mechanism from the immediately following coin (if any).

Said means to separate may be in the form of a turnstile having a plurality of fingers and said turnstile may be free to rotate under the influence of gravity on the weight of a coin entering the turnstile.

Electromechanically operable stop means may be included to prevent rotation of the turnstile until a coin already between a predetermined two of the plurality of fingers of the turnstile has been released from the mechanism.

Said stop means may be a pin arranged to co-operate with any one of the plurality of fingers of the turnstile. The pin may be arranged to respond to control means which also control coin releasing means at the exit of the mechanism.

Alternatively the means to separate may be a pin electromechanically operable to prevent the immediately following coin moving towards the exit.

According to a feature of the present invention a coin path selection mechanism having an entry point and a plurality of exit points comprises a planar back member on which first, second and third coin chutes are mounted, each of said coin chutes having a respective entry point and a respective exit point with the exit point of said first chute being at least partially connected to the entry point of said second chute and being adjacent to the entry point of said third chute, and deflection means having at least two positions and located at the conjunction of the three coin chutes, the

exit of the first chute and the entry of the second chute being substantially in the same plane such that in a first position of said deflection means an inserted coin will pass from the exit of the first chute to the entry of the second chute, the entry of the third chute being in a different plane to the exit of the first chute such that in a second position of said deflection means an inserted coin will pass from the exit of the first chute to the entry of the third chute.

The deflection means is preferably an electro mechanically operable ramp member which may be arranged when operated to cause an inserted coin to pass over the edge of a ledge along which coins entering the second coin chute would otherwise travel.

The electromechanically operable ramp member may be arranged to be substantially parallel with the back member in either the operated or the non-operated position such that an inserted coin may be arranged to enter either the second or the third coin chute when the mechanism is unpowered.

According to a second feature of the present invention a coin storage chute having a back member, a coin guideway which is mounted on the back member and which is capable of holding a plurality of coins, said guideway being positioned such that an inserted coin will tend to move from an entry of the guideway towards an exit thereof, a ledge which is located in or adjacent the guideway and which is arranged such that the edge of an inserted coin may rest to prevent the coin leaving the exit of the guideway, releasing means arranged to release the coin (if any) nearest said exit, and said releasing means comprises an electromechanically operable lever arranged such that in the non-operated position, the front of said lever is behind the plane of the back member and, in the operated position, the front of the lever is forward of the plane of the back member, said lever also being

arranged such that in transition from the non-operated position to the operated position the lever causes the edge of an inserted coin (if any) nearest the ledge to move over the edge of the ledge such that the coin (if any) leaves the storage chute.

The lever is preferably mounted closer to the ledge than half the diameter of the smallest coin for which the storage chute is intended so that only the edge adjacent the ledge of an inserted coin is pushed forward off the ledge.

In accordance with an extension of the second feature of this invention the coin storage chute has a plurality of exits each having a respective ledge and each ledge having a respective lever associated therewith, the ledges being positioned such that an inserted coin rests with its edge against each of the ledges, said levers being arranged such that any one of the levers in transition from the non-operated position to the operated position causes the edge of an inserted coin to move over the edge of the ledge associated with that lever so that the coin leaves the storage chute by a selected exit.

Preferably there are two ledges mutually at right angles to each other and the levers are arranged to cause a coin resting against the ledges to leave the mechanism either to enter a coin collection chute or to enter a coin refund chute.

According to a further feature of the present invention a coin handling mechanism includes a coin path having a planar back member arranged to support a face of an inserted coin, and a coin guide member which is attached to the back member in at least two places and which is spaced apart from said back member, the width of said coin guide member being less than or substantially equal to the width of the edge of the largest coin for which the path is intended, said back member

including an aperture substantially parallel with said guide member, said aperture being arranged such that items other than coins exceeding a preset minimum diameter will fall so that such items do not enter subsequent apparatus to which the coin path may be connected.

The coin guide member is preferably of thin strip material held to the back member in tension.

Coin handling mechanisms in accordance with the invention and including the features outlined above will now be described with reference to the accompanying drawings of which:-

Figure 1 is a front elevation of a mechanism in accordance with the invention;

Figures 2A and B are part cross sections on the lines AA & BB respectively of the mechanism of Figure 1;

Figure 3 is a front elevation of an alternative layout of the mechanism of Figure 1;

Figure 4 is a schematic diagram showing an extension of the mechanisms of Figures 1 and 3;

Figure 5 shows in greater detail an electro-mechanical ramp mechanism used in the mechanisms of Figures 1, 3 and 4;

Figure 6 shows in greater detail a lever mechanism used in the mechanism of Figures 1, 3 and 4 and

Figures 7 and 8 show respectively a front elevation and a plan of a coin chute which may be used in the mechanism of Figures 1, 3 and 4.

Referring to Figures 1, 2A and 2B the mechanism comprises a coin slot 1 capable of accepting coinage of any denomination suitable for the apparatus, a rubbish rejection mechanism 2 as hereinafter described arranged to cause such items as small sticks to leave the mechanism by way of a rubbish chute 3 which is connected to a refund cup 4 and coin validation chute 5, coin reject chute 6 and coin storage chute 7.

The coin validation chute 5 has a plurality of coin value and validity checking mechanisms (not shown) which provide signals indicating the value and validity of inserted coins to a control circuit card 8. The coin validation chute 5 and control circuit card 8 are commercially available items and may be of the kind known as an "in line validator" available from Mars Money Systems Ltd.

All of the items 1 to 8 may conveniently be mounted on a fixed back plate 9 which may be fitted into a case (not shown).

The control circuit 8 determines from the information received whether an inserted coin is acceptable to the mechanism. If an inserted coin is not acceptable to the mechanism it passes, without intervention of the control circuit 8 from the coin validation chute 5 to the reject chute 6 and is deposited in the refund cup 4.

Should the coin be acceptable to the mechanism the control circuit 8 causes an electromechanically operable ramp 10 to move from the flat (unoperated) position shown in Figure 2A to the ramped (operated) position indicated by chain dot lines. Thus an inserted coin on reaching the junction of the validation chute 5 and the reject chute 6 does not fall from the chute 5 to the chute 6 but passes over the face of the ramp 10 into the coin storage chute 7.

Since the back plate 9 is approximately vertically mounted inserted coins will travel towards the exit of the storage chute 7. The first inserted coin held in the storage chute 7 will rest with one edge against a ledge 11 and another edge against a second ledge 12. Subsequently inserted coins will be stored in tandem with each coin in contact with the immediately preceding coin. The depth of the chute (i.e. from the

front face to the backplate 9) is such that coins are prevented from double stacking in a face-to-face manner.

When it has been determined which coins (if any) are to be collected in response either to timing signals generated internally or in response to external signalling received over a line (not shown) either a collect pin 13 or a refund pin 14 is operated.

The pins 13, 14 extend through respective apertures in the backplate 9 and are electromechanically operable such that in the non-operated condition each is flush with or behind the front face of the backplate 9. In operation the pins 13, 14 extend forward of the front face of the backplate 9 by a sufficient distance to cause the respective edge of the first coin to pass over the respective ledge 11, 12. Thus, if the collect pin 13 is operated, the edge of the first stored coin passes over the ledge 11 and by way of a further coin chute 15 to a collection box (not shown). Similarly, if the refund pin 14 is operated, the respective edge of the first stored coin passes over theledge 12 so that the inserted coin falls into the refund cup 4. Subsequently stored coins may be similarly handled.

It will be appreciated that if the mechanism is unpowered any inserted coinwill pass by way of the chute 5, ramp 10 unoperated and chute 6 to the refund cup 4.

It will also be realised that the chutes 5, 6, 7 and 15 may be integrally formed from a plastics material by injection moulding for example and may subsequently be attached to the backplate 9.

Referring now to Figure 3 items having a similar function to the apparatus of Figure 1 are similarly designated. In this mechanism the reject chute 6 and the storage chute 7 are separated from the backplate 9 by different distances. Thus the collect chute 6

is forward of the storage chute 7 and the ramp 10 is arranged to be in the ramped position when not operated and flush with the backplate in the operated condition. With the ramp 10 not operated an inserted coin passes to the forward chute 6 when leaving the validation chute 5 and thence to the refund cup 4. When the ramp 10 is operated (i.e. the front face of the ramp is flush with the front face of the backplate 9) an inserted coin enters the storage chute 7 and travels towards the exit thereof. If the coin is the first to be inserted its edges rest respectively against the closed end of the chute 7 and a ledge 16 which is indicated by a thickened line. A single coin release pin 17 is provided to release coins from the storage chute 7 by causing the edge of the first coin held in the store to pass over the ledge 16. A second ramp mechanism 18 responsive to the control signals previously referred to is arranged to direct a coin so released either to the refund cup 4 or by way of the chute 15 to the collection box (not shown).

One problem which may be encountered with the release of coins from the coin storage chute 7 of either Figure 1 or Figure 2 occurs if coins of different kinds having substantially different weights are stored in tandem. When the first coin is released the subsequent coin may follow over the ledge 11, 12 or 16 because of the contact between the two coins.

Referring also to Figure 4 an extension to the mechanism of Figure 1 is shown, which may also be adapted for the mechanism of Figure 2, which overcomes this problem by separating the first coin from the following coins.

The coin storage chute 7 terminates at a turnstile 19 having segment separating members or fingers 20

shown with its coverplate removed. The turnstile 19 is rotatable on a spindle 21 when a stop pin 22 is released. The stop pin 22 may be linked electrically or mechanically to the refund pin 14 and the collect pin 13.

Thus when a first coin leaves the storage chute 7 it enters segment A of the turnstile 19 and if the stop pin 22 is released will cause the turnstile 19 to rotate due to the weight of the coin until the coin is released at segment C to rest against the ledges 11, 12 as hereinbefore described.

A less costly implementation of coin separation may be achieved by providing a coin stop pin 25 (Figure 1) which is arranged to be forward of the backplate 9 when both of the release pins 13, 14 are flush with the blackplate 9 thus preventing any tandem-stored coins from reaching the exit of the storage chute 7. When either of the pins 13, 14 is operated the coin stop pin 25 may be arranged to retract by electrical or mechanical linking so that the next coin if any may pass to the exit point and rest against the ledges 11 & 12.

Referring now to Figure 5 the ramp mechanism comprises an electromechanical relay 26 having an energizable coil 27 surrounding a soft iron core 30, a yoke 28 and an armature 29 pivotally moveable on the yoke 28. A mounting bracket 31 is attached at one end to the yoke 28 and at the opposed end to the rear of the backplate 9 of the coin handling mechanism of Figure 1 or Figure 2. An operating member 32 of resilient material is attached to the armature 29 and is arranged such that when current flows in the coil 27 to provide a magnetic field which causes the armature 29 to tend to move towards the face of the iron core 30 the operating member 32 moves towards the base of the ramp plate 10 and towards the backplate 9 against the resilience of

the material of the operating member 32. The ramp member 10 being pivoted on a pin 33 which is attached to the back plate 9 moves in response to the movement of the operating member 32.

When the current is disconnected from the coil 27, the armature 29 under the influence of the resilient material of the operating member 32 tends to return to the non-operated position (as shown). The operating member 32 therefore returns to its non-operated position allowing the ramp member 10 to return to its non-operated position under gravitational influence.

If the ramp member 10 is required to be in the ramped position when the relay 26 is unpowered then the operating member 32 is extended to act on the opposed side of the pivot 33, the ramp member 10 being suitably extended above the pivot.

The relay 26 may be for example of the kind often referred to as a Post Office '3000' type relay.

Referring to Figure 6 the relay 26 functions in a similar manner to that of Figure 5. The operating arm 32 is replaced by an actuating lever 34 whose spring action at the section attached to the yoke 28 and the armature 29 is similar. When the armature 29 is attracted towards the face of the iron core 30 the pin of the actuating lever 34 extends through an aperture 35 provided in the backplate 9.

It will be appreciated that for the mechanism of Figure 1 where two pins 13, 14 are required in close proximity a double armature type relay of known kind may be used to reduce space requirements.

It will also be realised that where a stop pin is required (25 Figures 1 & 2 or 22 Figure 4) in addition to the release pin the actuating lever 34 may be extended to provide this facility without providing a further relay or using significantly increased

electrical power.

Referring now to Figures 7 & 8 the coin entry chute 2 of the apparatus of Figures 1 and 3 is arranged to prevent items such as match sticks entering the coin validation chute 5. The coin entry chute comprises a coin runway 35 along which inserted coins may travel and which is attached to a mounting plate 36 by rivets 37. The coin runway 35 is a narrow strip of material and is spaced apart from the mounting plate 36 by the depth of washers 38.

The lower section of the coin entry chute consists of a collecting funnel 39 arranged to gather any article which falls from the runway 35 and cause it to pass by way of the rubbish chute 3 to the refund cup 4.

The coin entry chute is mounted such that any coin inserted in the coin slot 1 has its face supported by the mounting plate 36 and will roll towards an exit aperture 40. Coins or washers which have a diameter less than a dimension determined by an aperture 41 will tend to fall through that aperture and be gathered by the collecting funnel 39 and thence to the rubbish chute 3.

Similarly coins or washers whose width is less than a dimension determined by the washers 38 will fall between the runway 35 and the mounting plate 36 to be gathered by the collecting funnel 39.

It will be appreciated that items such as match sticks, lollipops sticks and paper which may be pushed through the coin slot 1 will fall from the narrow coin runway 35 into the collecting funnel 39.

Other coins having a diameter and width acceptable to the coin entry chute travel along the coin runway 35 and pass through the exit aperture 40 into the entry of the validation chute 5.

It will be realised that if the coin slot 1

permits the insertion of oversize coins a second check on their diameter may be arranged at the exit aperture 40 such that oversize coins do not pass through but fall over the end of the runway 35 into the collecting funnel 39.

The mounting plate 39 may be provided with a chamfered edge 42 at the entry side of the exit aperture 40 such that coins on the runway 35 which are supported by the mounting plate 39 pass through the aperture 40 more readily.

CLAIMS

1. A coin handling mechanism including a coin storage chute having planar front and back members arranged when in use to maintain an inserted coin in an approximately vertical plane, said coin storage chute also having a base member upon which the edge of an inserted coin may rest, said base member being inclined to the horizontal such that an inserted coin will tend to move from the entry of the coin storage chute towards an exit thereof, means adjacent the exit of the chute to prevent an inserted coin from leaving the chute so that a plurality of inserted coins may be held therein in escrow, control means responsive to an electrical signal to cause electromechanically operable means to release each coin (if any) held in escrow in turn, and steering means operable to cause each coin so released to take a selected one of a plurality of paths.

2. A coin handling mechanism as claimed in Claim 1 in which one of said plurality of paths is to a refund path of the mechanism.

3. A coin handling mechanism as claimed in Claim 2 also including a second coin chute the entry of which is adjacent the entry of said coin storage chute and the exit of which is adjacent said refund path, and selection means adjacent the entries of the chutes operable to determine which of said chutes an inserted coin enters.

4. A coin handling mechanism as claimed in Claim 3 also including a single coin chute with its exit adjacent the entries of said coin storage chute and said second coin chute, said single coin chute having an associated coin validation means arranged to forward an electrical signal or electrical signals indicative of the value and/or validity of an inserted coin to cause the selection means to select a particular one of said chutes for an inserted coin to enter.

5. A coin handling mechanism as claimed in Claim 3 or Claim 4 in which, if the apparatus is unpowered, said selection means is arranged to direct inserted coins (if any) to said second coin chute and thence to the refund path of the mechanism.

6. A coin handling mechanism as claimed in any preceding claim in which said coin storage chute is arranged to hold a plurality of coins in escrow with each coin in contact with respective adjacent coins (if any), and said mechanism also includes separation means between the exit of said storage chute and an exit of the mechanism arranged to separate a coin nearest to the exit of the mechanism from the immediately following coin (if any).

7. A coin handling mechanism as claimed in Claim 6 in which said separation means comprises a turnstile which has a plurality of fingers and which is free to rotate under the influence of gravity of the weight of a coin entering the turnstile.

8. A coin handling mechanism as claimed in Claim 7 in which mechanically or electromechanically operable stop means are provided, said stop means being arranged to prevent rotation of said turnstile until a coin (if any) previously between a predetermined two of said plurality of fingers has been released from the turnstile.

9. A coin handling mechanism as claimed in Claim 8 in which said stop means is a pin arranged to co-operate with any one of said plurality of fingers of said turnstile.

10. A coin handling mechanism as claimed in Claim 6 in which said separation means is a mechanically or electromechanically operable pin arranged in one position to lie between a coin nearest the exit of the mechanism and an immediately following coin (if any).

11. A coin handling mechanism as claimed in Claim 9 or Claim 10 in which said pin is arranged to respond to an electrical signal or electrical signals from control

means which also controls said steering means.

12. A coin path selection mechanism having an entry point and a plurality of exit points comprising a planar back member on which first, second and third coin chutes are mounted, each of said coin chutes being a respective entry point and a respective exit point with the exit point of said first chute being at least partially connected to the entry point of said second chute and being adjacent to the entry point of said third chute, and deflection means having at least two positions and located at the conjunction of the three coin chutes, the exit of the first chute and the entry of the second chute being substantially in the same plane such that in a first position of said deflection means an inserted coin will pass from the exit of the first chute to the entry of the second chute, the entry of the third chute being in a different plane to the exit of the first chute such that in a second position of said deflection means an inserted coin will pass from the exit of the first chute to the entry of the third chute.

13. A coin path selection mechanism as claimed in Claim 12 in which the deflection means is a ramp member arranged in the first position to be substantially parallel with said planar back member such that an inserted coin passes to the entry of said second chute, and arranged in the second position to cause an inserted coin to pass over the edge of a ledge along which coins entering the second coin chute would otherwise travel.

14. A coin path selection mechanism as claimed in Claim 13 in which the ramp member is electromechanically operable and is biassed to the first position such that when the mechanism is unpowered an inserted coin will enter the second chute.

15. A coin path selection mechanism as claimed in Claim 13 in which the ramp member is electromechanically operable and is biassed to the second position such that

when the mechanism is unpowered an inserted coin will enter the third chute.

16. A coin storage chute having a back member, a coin guideway which is mounted on the back member and which is capable of holding a plurality of coins, said guideway being positioned such that an inserted coin will tend to move from an entry of the guideway towards an exit thereof, a ledge which is located in or adjacent the guideway and which is arranged such that the edge of an inserted coin may rest to prevent the coin leaving the exit of the guideway, releasing means arranged to release the coin (if any) nearest said exit, and said releasing means comprising an electromechanically operable lever arranged such that in the non-operated position, the front of said lever is behind the plane of the back member and, in the operated position, the front of the lever is forward of the plane of the back member, said lever also being arranged such that in transition from the non-operated position to the operated position the lever causes the edge of an inserted coin (if any) nearest the ledge to move over the edge of the ledge such that the coin (if any) leaves the storage chute.

17. A coin storage chute as claimed in Claim 16 in which said lever is mounted closer to said ledge than one-half of the diameter of the smallest coin for which the chute is intended so that only the edge adjacent the ledge of an inserted coin is pushed off the ledge.

18. A coin storage chute as claimed in Claim 16 in which said guideway has a plurality of exits each of which has a respective ledge and each ledge having a respective lever associated therewith, the ledges being positioned such that an inserted coin rests with its edge against each of the ledges, said levers being arranged such that any one of the levers in transition from the non-operated position to the operated position causes the edge of an inserted coin to move over the edge of the ledge

associated with that lever so that the coin leaves the storage chute by a selected exit.

19. A coin storage chute as claimed in Claim 18 in which two ledges are provided mutually at right angles to each other and the two levers are arranged respectively to cause an inserted coin to leave the storage chute by a respective one of two exit paths.

20. A coin handling mechanism including a coin path having a planar back member arranged to support a face of an inserted coin, and a coin guide member which is attached to the back member in at least two places and which is spaced apart from said back member, the width of said coin guide member being less than or substantially equal to the width of the edge of the largest coin for which the path is intended, said back member including an aperture substantially parallel with said guide member, said aperture being arranged such that items other than coins exceeding a preset minimum diameter will fall so that such items do not enter subsequent apparatus to which the coin path may be connected.

21. A coin handling mechanism as claimed in Claim 20 in which the coin guide member is a strip of material held to the back member in tension.

22. A coin handling mechanism as claimed in Claim 20 or Claim 21 in which the exit of the storage chute is substantially of equal size to the diameter of the largest coin for which the mechanism is intended and arranged such that coins having a larger diameter fall from the coin guide member and do not enter subsequent apparatus to which the mechanism may be connected.

23. A coin handling mechanism substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.

24. A coin handling mechanism substantially as hereinbefore described with reference to Figure 3 of the accompanying drawings.

25. A coin path selection mechanism substantially as hereinbefore described with reference to Figures 1 and 6 of the accompanying drawings.

26. A coin path selection mechanism substantially as hereinbefore described with reference to Figure 1, 3 and 5 of the accompanying drawings.

27. A coin handling mechanism including a coin separation mechanism substantially as hereinbefore described with reference to Figure 4 of the accompanying drawings.

28. A coin handling mechanism including a coin path substantially as hereinbefore described with reference to Figure 7 and 8 of the accompanying drawings.

Fig.1.

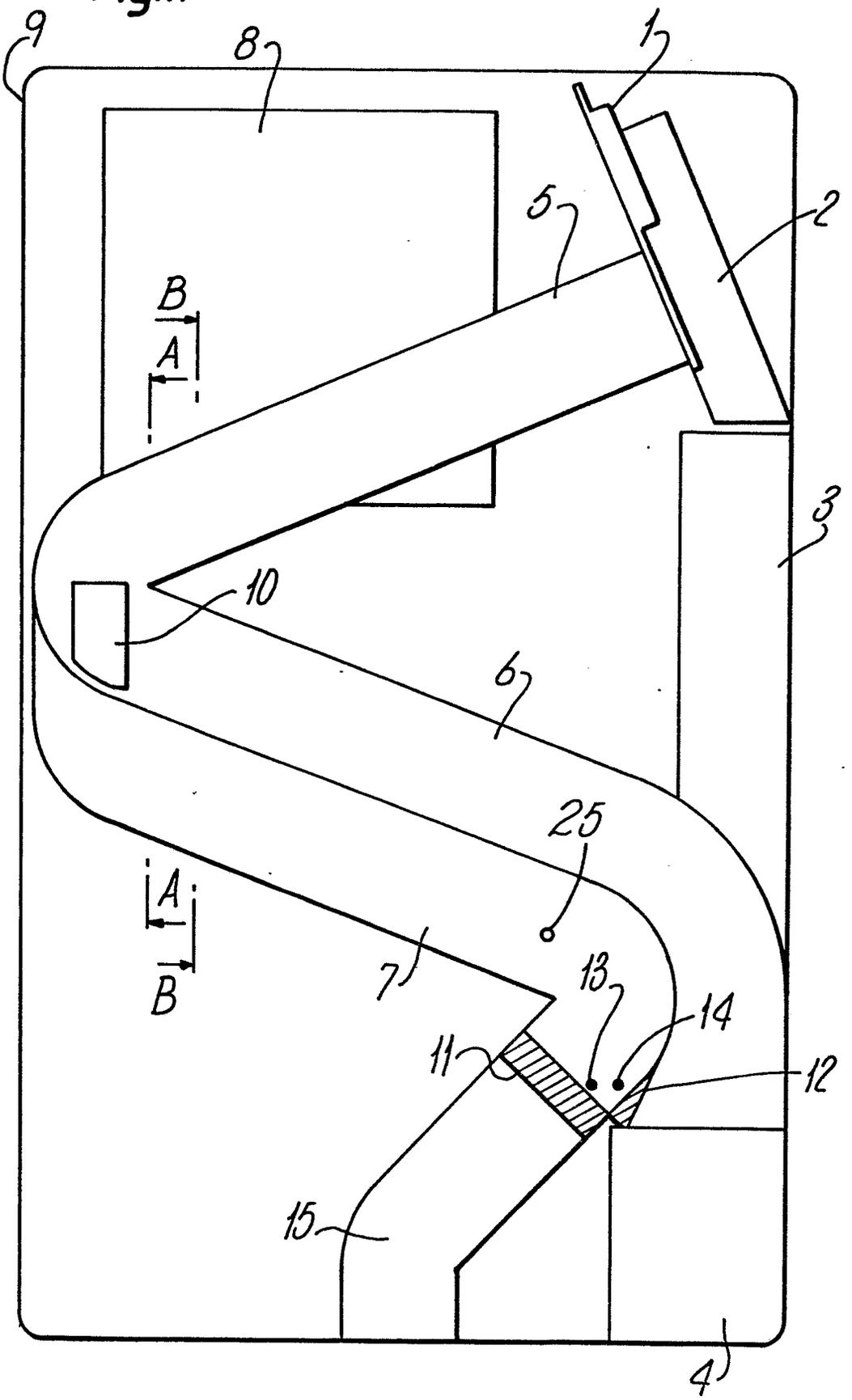


Fig.2A.

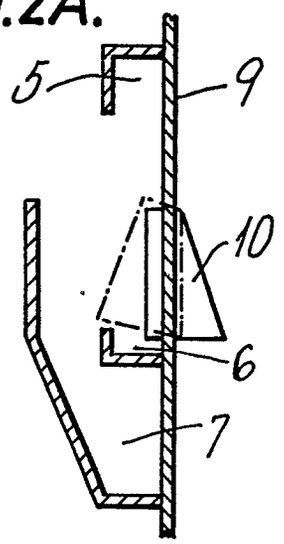


Fig.2B.

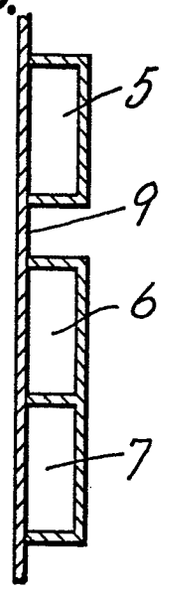


Fig.4.

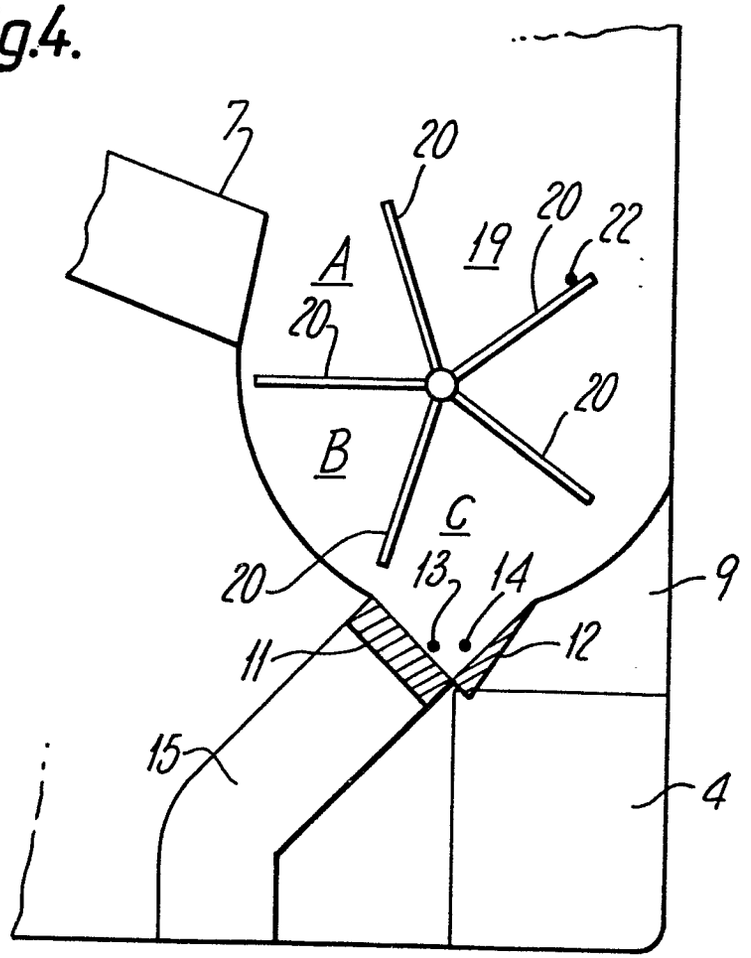


Fig.3.

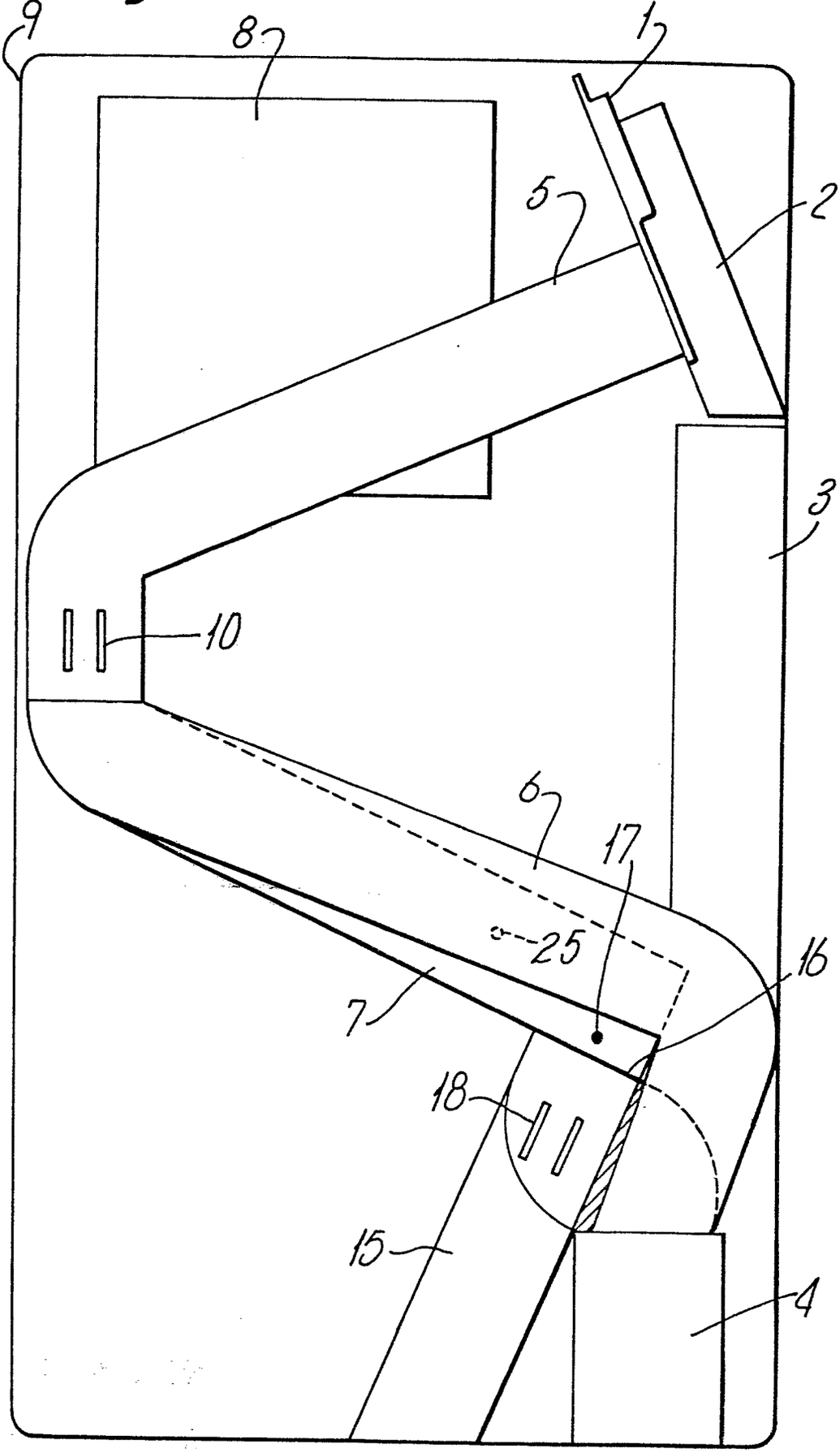


Fig.5.

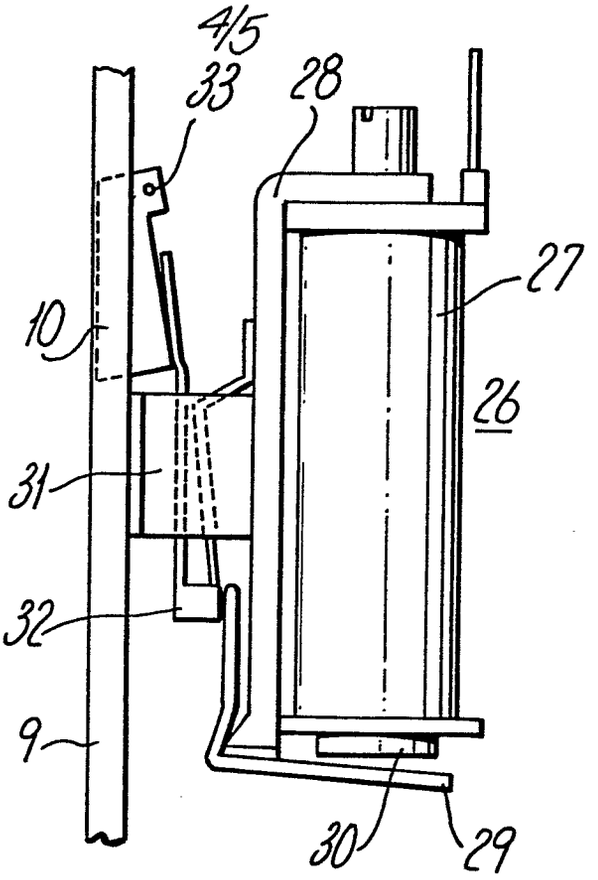


Fig.6.

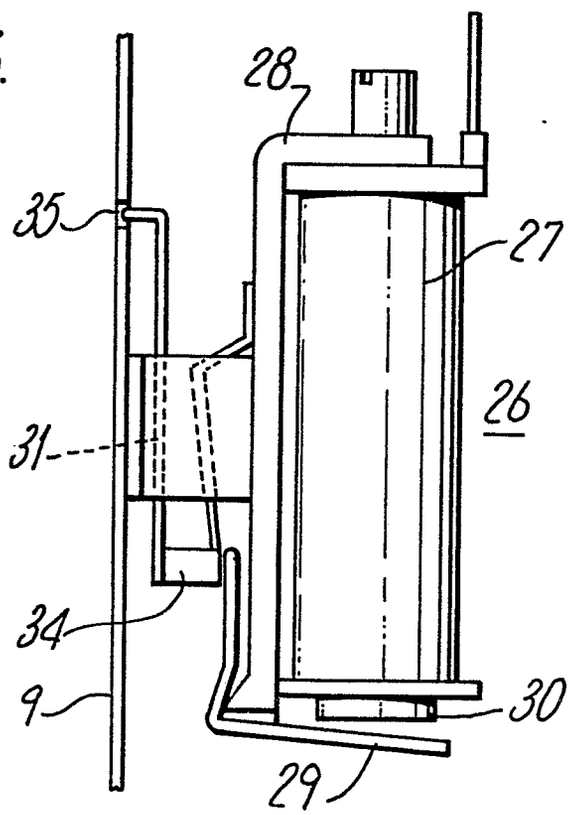


Fig.7.

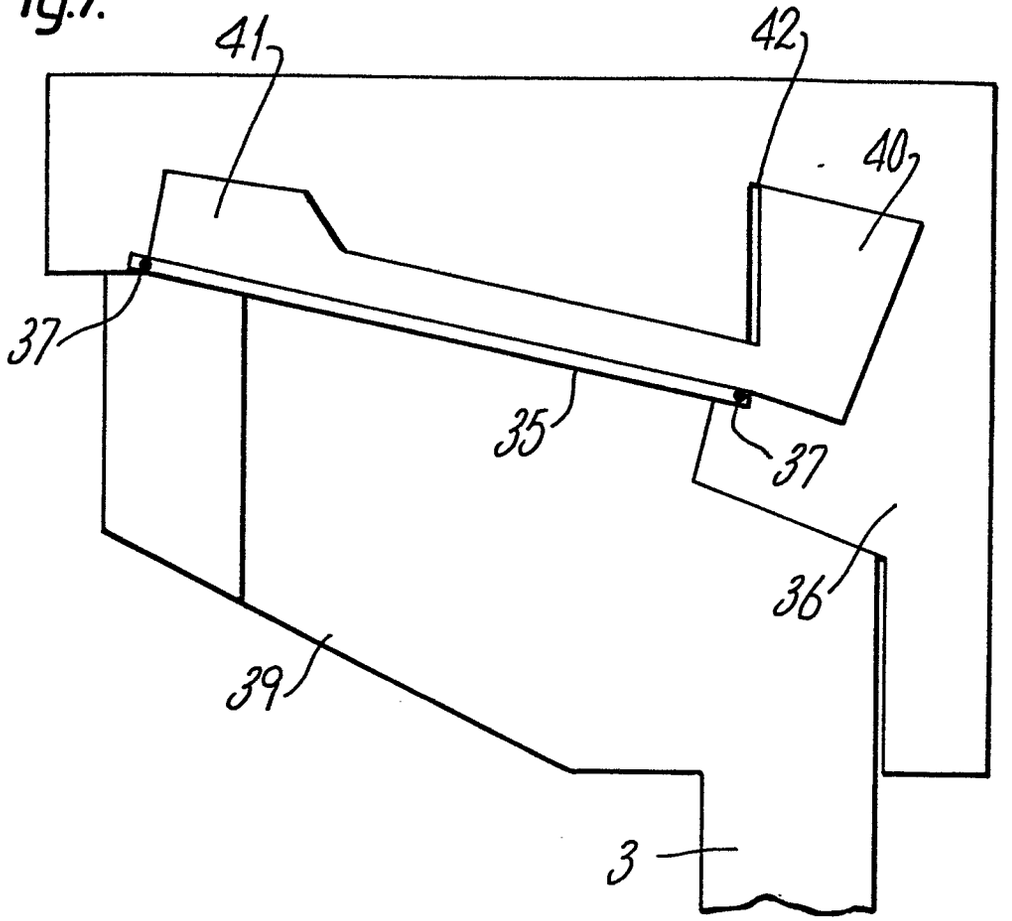


Fig.8.