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(54) COIN DEVIATING MECHANISM FOR COIN RECEIVING AND CASHING DEVICES

(57) Coin deflection mechanism for coin reception and collection devices, consisting of a swivelling gate (4) which is driven by its own weight to a closed position, and swivels towards an open position when it receives the weight of a coin (3). The mechanism also includes a lever (6) which is suspended from a rotation shaft (7) and due to its weight tends to occupy an equilibrium position in which it bears on gate (4), locking it in its closed position. Lever (6) is removed from this equilibrium position by activating an electromagnet (9), thus freeing gate (4) so that it may be opened by action of coin (3).

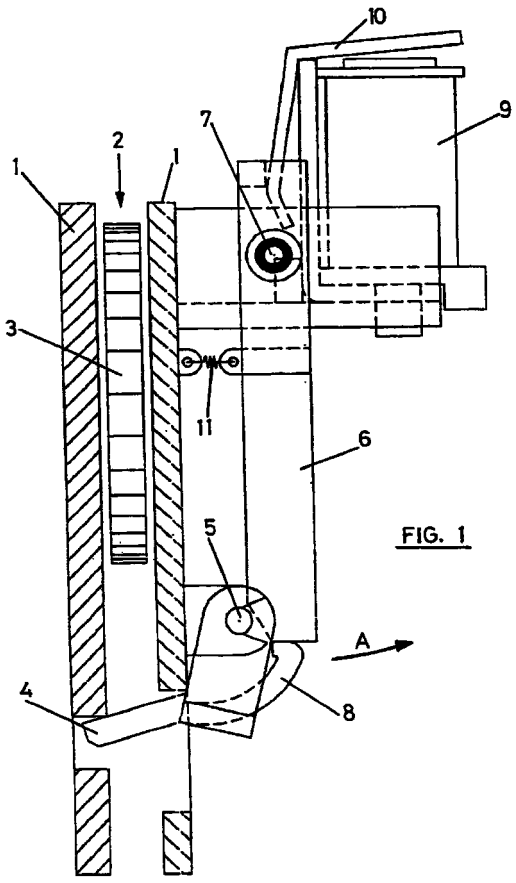

FIG. 1

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Description

[0001] The present invention relates to a coin deflection mechanism for coin reception and collection devices, meant to direct coins which travel inside the reception and collection device towards one path or another from between two possible paths.

[0002] These mechanisms are applied in coin reception and collection devices installed in machines or devices which require inserting one or more coins for their operation, such as vending machines, game machines, telephone sets, etc.

[0003] The mechanism of the invention is of the type comprising a gate which can move between two end positions, one closed which intercepts the arrival path of the coin and deflects it to a certain duct or reception area, ad another open position which frees the path of the coin so that it arrives at a second duct or reception area. The gate motion is obtained, at least in one direction, by the action of an electromagnet.

[0004] Mechanisms are already known of the above type, where motion of the gate in either direction is controlled by an electromagnet and a spring. To this effect we can cite Patents EP 0343967 and Spanish Utility Model no. 9501740.

[0005] Patent EP 0343967 describes a mechanism in which the gate is activated by an electromagnet by an intermediate lever, and the rest position is ensured by a spring. With this arrangement, in order to move the gate from the rest position the electromagnet must move the intermediate lever and overcome the resistance of the spring, so that the electromagnet must use extra energy. In addition, displacing the masses of all the moving components will make the system relatively slow. All of this makes the mechanism unsuitable for coin reception and collection devices installed in units which require a fast response and in which electrical consumption must be minimal.

[0006] In the mechanism described in Utility Model 9501740, the motion of the gate in either direction is controlled by the electromagnet by an intermediate connection rod, which requires extra energy in order to overcome the friction in the motion of the gate and the rod. Because of the gate and rod masses the system may be slow, so that this mechanism cannot be applied to coin reception and collection devices meant for units which require a fast response and in which electrical consumption must be minimal.

[0007] Also known we mechanisms of the above related type in which the opening motion of the gate is obtained by the weight of the coin travelling at the time, while the closing motion is obtained by the action of an electromagnet. Within these mechanisms we can cite Patents ES 450.859 and application WO/ES/98/00217, the latter of the same property as this application.

[0008] Patent ES 540.859 describes a mechanism in which the gate, while closed, is part of the duct along which the coin travels. The gate is opened by action of the weight of the coin, while the electromagnet is inactive, the coin being deflected to a path or reception area, while when the electromagnet is activated the gate will remain closed and the coin will continue along its path until it reaches a second duct or reception area. Despite having a small number of elements, this mechanism has the disadvantage that when the gate is to remain closed the electromagnet must receive more electrical energy the greater the weight of the coin which at the time is travelling along the gate. Additionally, the electromagnet is designed so that the gate can withstand the weight of the heaviest acceptable coin, as long as it arrives rolling along the path, so that it is necessary to ensure that the coin does not fall from a height onto the gate, as the impact would cause the uncontrolled opening of the gate.

[0009] Patent WO-ES/98/00217 describes a coin reception and collection device which incorporates a swiveling gate and a locking mechanism for it which consists of a trigger activated by an electromagnet, by means of an intermediate connection rod, which has a counterweight attached to it. This device is applicable in systems in which coins remain stationary for a given time, and so it is not applicable for a deflection system in which the coin may not stop. In addition, this mechanism would be slow and complex, due to the large number of components.

[0010] The object of the present invention is a mechanism of the second type described, which eliminates the exposed problems and which can be advantageously applied to machines and devices which require a fast response and a low energy consumption.

[0011] The mechanism of the invention consists of a small number of moving parts, so that the inertia which must be overcome to move the gate from one position to the other is minimum.

[0012] Additionally, in the mechanism of the invention the gate includes a locking system for its closed position, which ensures its operation even if the coin were to fall on the gate from a height, thus guaranteeing the deflection of the coin to the firs path or reception area. The gate is freed by an electromagnet, whose only function is to drive a rod which acts as a gate locking element, so that electrical energy consumption is kept to a minimum.

[0013] The mechanism of the invention consists of a swivelling gate which can move between a closed position, in which it intercepts the path of the coin and deflects it towards a first reception area or duct, and a second open position, where the coin travels freely until reaching a second reception area or duct, with the gate moving under its own weight to the closed position and swivelling to the open position by the weight of the coin which reaches the gate.

[0014] Th mechanism of the invention also includes a lever which is suspended from a rotation axis, about which it may swivel freely between an equilibrium position, which it tends to assume by its own weight, and an

unstable position, towards which it moves by the action of an electromagnet. This lever bears on the gate on its lower end while in its equilibrium position, locking it in its closed position in order to prevent it from opening. As the lever travels to its unstable position it frees the gate and thus allows it to be opened by a coin.

[0015] With the described arrangement, the only moving element between the electromagnet and the gate is the lever, which tends to assume its stable resting position by the action of its weight, without consuming any electrical energy. Likewise, when the gate is freed it is opened by action of the weight of the coin, without the electromagnet taking part.

[0016] Only the electromagnet must be activated in order to move the lever from its equilibrium position to the unstable position which requires a minimum effort and thus a minimal energy consumption.

[0017] As a result, as well as reducing the energy consumption, the response speed is improved, as the total mass moved by the electromagnet is very small.

[0018] Due to the speed of the system, if the electromagnet is activated before the coin arrives at the gate the gate will be unlocked while it is empty, i.e. before the arrival of the coin and without any weight bearing on it. Therefore, there will be practically no friction between the contact surfaces of the rod and the gate and electrical energy consumption is thus reduced considerably.

[0019] The moving gate returns to its resting position by its own weight, due to a slight unbalance with respect to the rotation axis. Additionally, the lever and the gate may have mutual contact surfaces in the lever's equilibrium position, which propel the gate towards its closed position, in case it had not done so at the time of activating the electromagnet because of its inertia or any other reason.

[0020] The characteristics and advantages expounded, as well as others which are characteristic of the invention may be understood better with the following description made with reference to the enclosed drawings, which show an example of a non-limiting embodiment.

[0021] In these drawings:

Figure 1 is a longitudinal section of the duct which defines the coin path, including a coin which is travelling along this duct and the deflection means of the invention, with the gate in its closed position.

Figure 2 is a view similar to figure, showing the closed position for interception of the coin path.

Figure 3 is a view similar to figure, showing the gate being freed immediately before the coin arrives at it.

Figure 4 is a section similar to figure 3, with the gate open to free the path of the coin and allow it to pass.

Figure 5 is a section similar to figure 4, showing the gate closed after the coin has passed.

[0022] In figure 1 and labelled (1) two partitions are shown which define duct (2) followed by coins (3) within the coin collection and reception device.

[0023] At a certain section of this duct (2) is the mechanism of the invention, which consists of a gate (4) which may swivel between a closed position, shown in figure 1, which intercepts coin path (2), and an open position, shown in figure 4, in which it is outside path (2) and allows coin (3) to travel and pass freely.

[0024] The mechanism of the invention also includes a lever (6) which is suspended from a rotation axis (7) and which may freely swivel about said axis between an equilibrium position shown in figure 1, in which its lower end bears on a rear projection (8) of gate (4) and locks it in its closed position, and an unstable position shown in figure 3 towards which it is moved by the action of an electromagnet (9). To achieve this, the moving armature (10) of electromagnet (9) bears on lever (6) above rotation axis (7) so that as said armature is attracted when the electromagnet is activated, lever (6) will turn in the direction indicated by arrow A of figure 1, reaching the position shown in figure 3.

[0025] With this make-up, when electromagnet (9) does not receive activation instructions, lever (6) shall remain in the position shown in figure 1, where it locks gate (4) in its closed position. In this situation gate (4) shall intercept coin (3) in its path and deflect it towards a first reception area or path.

[0026] However, after a coin is inserted in the collection and reception device and electromagnet (9) is activated, lever (6) is moved to the position shown in figure 3, freeing gate (4) which is opened by the weight of coin (3) allowing it to continue along its path as shown in figure 4.

[0027] Once coin (3) has passed gate (4) the latter returns to its closed position as shown in figure 5, for which purpose there is a slight unbalance between gate (4) and its rear projection (8) with respect to its axis of rotation.

[0028] Afterwards electromagnet (9) is deactivated so that its armature (10) assumes the position shown in figure 1, freeing lever (6), which due to its own weight recovers its equilibrium position shown in figure 1. This action may be aided by a low-tension spring (11).

[0029] When coin (3) must continue along path (2), gate (8) of figure 3 may be freed immediately before coin (3) arrives at gate (4), so that lever (6) will release gate (4) while it is empty, i.e. without the weight of the coin bearing on it, so that there will be practically no friction between the contact surfaces of lever (6) and gate (5). In these conditions the electrical energy required to activate electromagnet (9) will be minimal.

[0030] As coin (3) continues along its path through the opening of gate (4) it will reach a second reception area or duct.

[0031] With the described make-up the electrical

energy consumption of electromagnet (9) will only be that required to move lever (6) from its equilibrium position of figure 1 to the unstable position or freeing position shown in figures 3 to 5. If spring (11) is present it shall also have to overcome its slight resistance.

[0032] Aside from this, gate (4) is opened by the action of the weight of coin (3), this gate is closed by its unbalance with respect to the axis of rotation and lever (6) returns from its unstable position to its equilibrium position of figure 1 by the weight of the lever itself and, in its case, the aid of spring (11).

[0033] As can be seen in the drawings, lever (6) is provided at its lower end with a bevelled edge (12) which upon bearing on the rear projection (8) of the gate forces it to return to its resting position, in the event that due to inertia or any other reasons, such as rebounding, it had not done so after electromagnet (9) was deactivated.

[0034] After coin (3) passes the position of gate (4), whichever the selected path, the elements of the deflection mechanism shall assume the position shown in figure 1, ready to control the passage of another coin (3).

[0035] The described mechanism is provided with a minimal number of moving parts, which only consume electrical energy at the time of moving lever (6) from its equilibrium position shown in figure 1 to the unstable or freeing position of figure 3, due to the activation of electromagnet (9). All of this makes the mechanism of the invention applicable to devices which require a fast response and above all a minimal energy consumption.

[0036] Additionally, in the closed gate position shown in figure 1, where the gate is locked by lever (6), the closed position is ensured, its opening is prevented, even were coin (3) to fall from a height onto said gate.

Claims

1. Coin deflection mechanism for coin collection and reception devices, consisting of a gate which may swivel between a closed position, in which it intercepts the path of the coin and deflects said coin towards a first reception area or path, and an open position, in which the lever is outside of the coin path allowing it to pass so that it reaches a second reception area or path, this gate being driven by its own weight to the closed position and swivelling to the open position by the weight of the coin which arrives at the gate, characterised in that it comprises a lever suspended from a rotation shaft, about which it may turn freely between an equilibrium position, which it tends to assume due to its own weight, and an unstable position, towards which it is moved by the action of an electromagnet; the lower end of such lever bearing on the gate while in its equilibrium position, locking it in its closed position, while when it assumes its unstable position it releases said gate, allowing it to open by action of a coin.

2. Mechanism as in claim 1, characterised in that the lever is driven towards its equilibrium position by its own weight and by the action of a low-tension spring.

3. Mechanism as in claim 1, characterised in that the electromagnet acts on the lever above the lever's rotation axis.

4. Mechanism as in claim 1, characterised in that the activation of he electromagnet and the swivelling of the lever to its unstable position takes place before the travelling coin rests on the gate.

5. Mechanism as in claim 1, characterised in that the aforementioned lever and the gate have mutual contact surfaces while in the equilibrium position of said lever, which drive the gate towards it closed position.

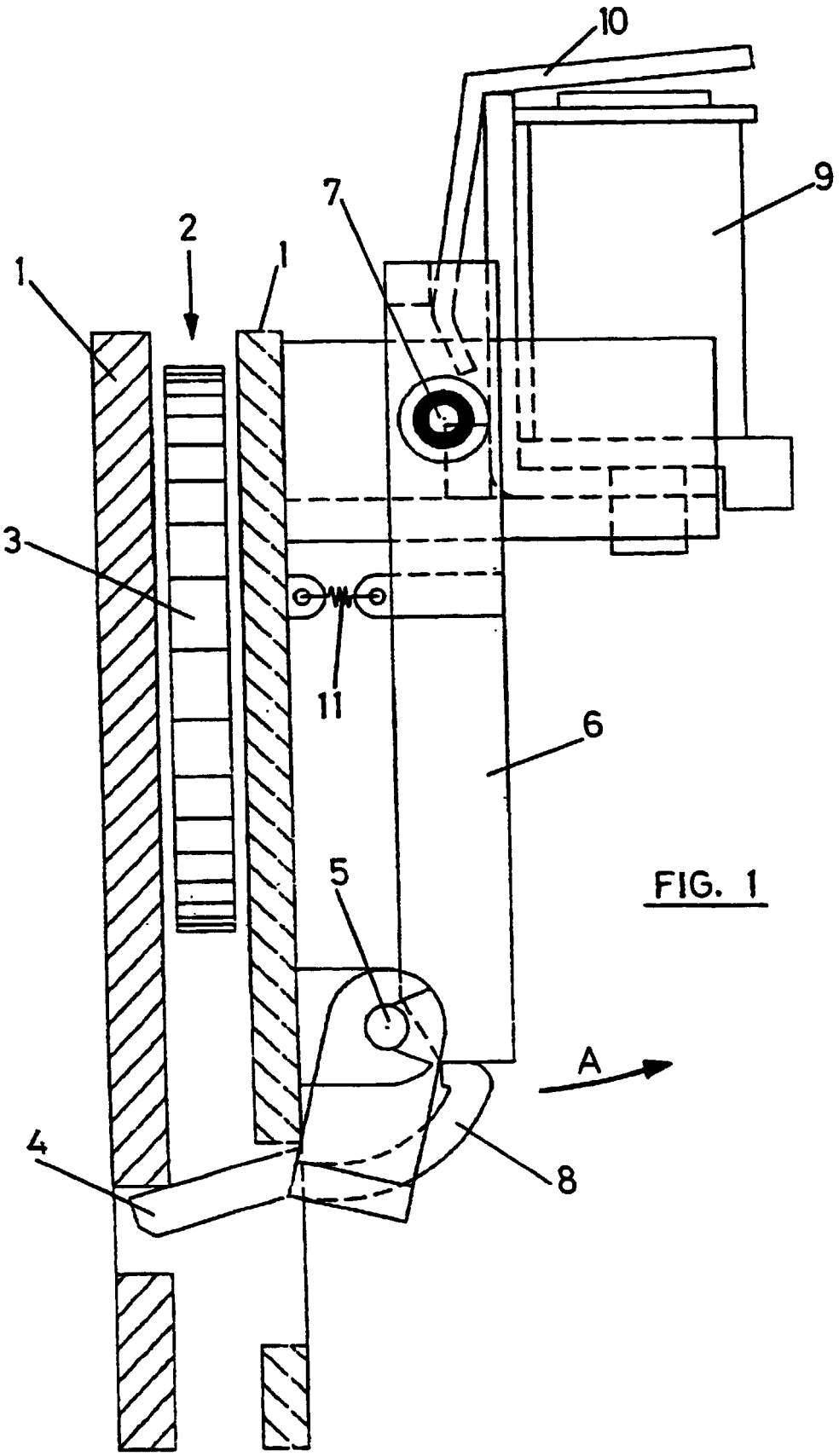

FIG. 1

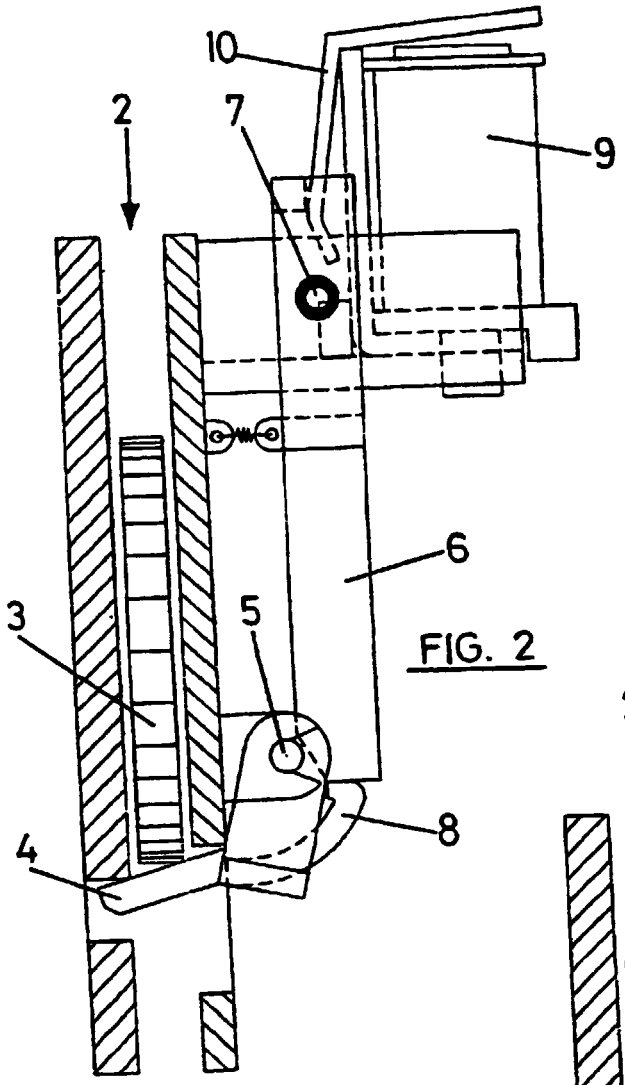

FIG. 2

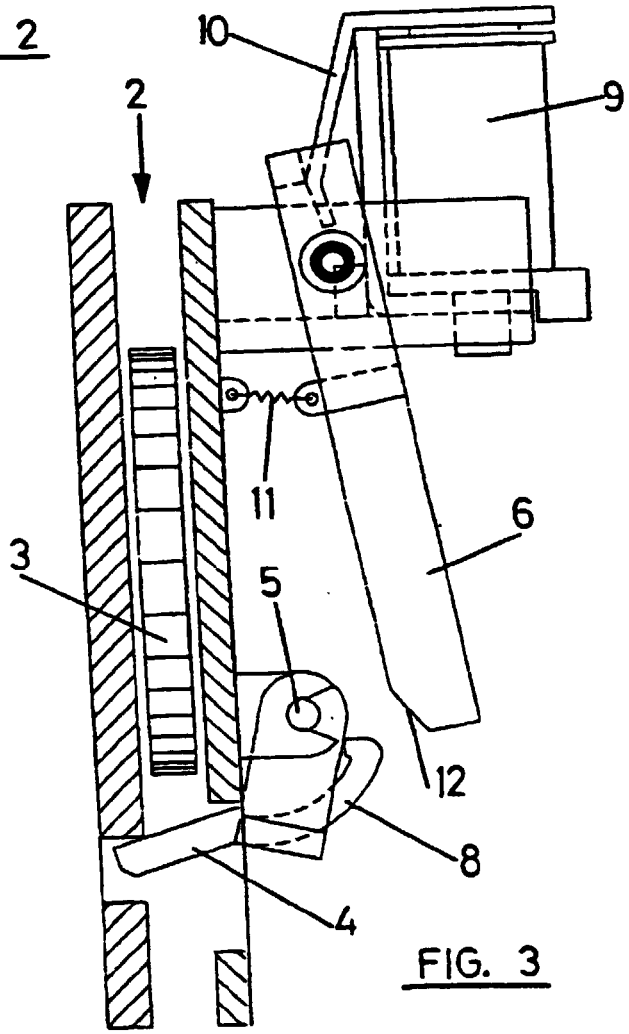

FIG. 3

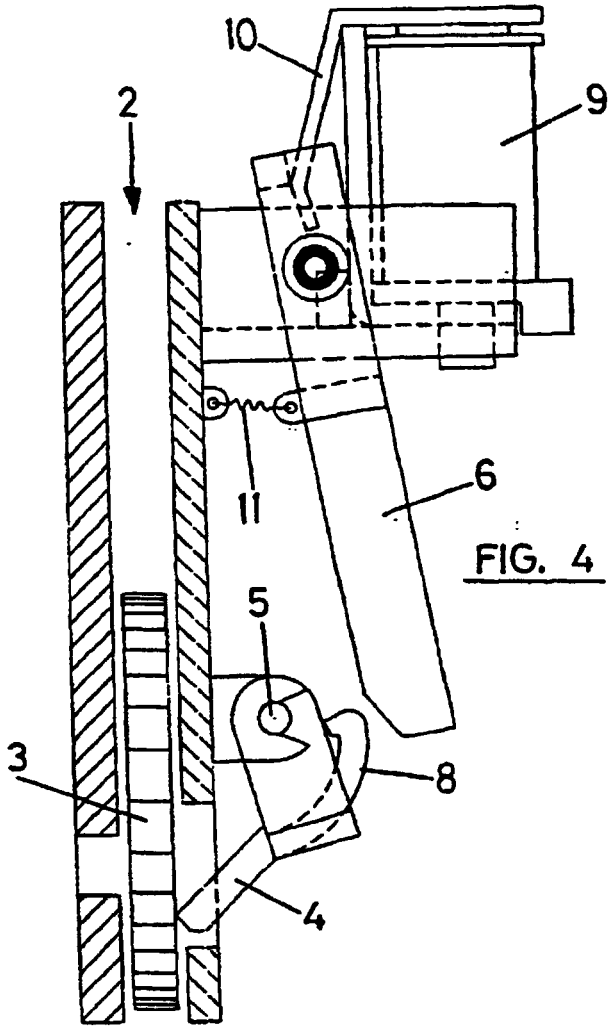

FIG. 4

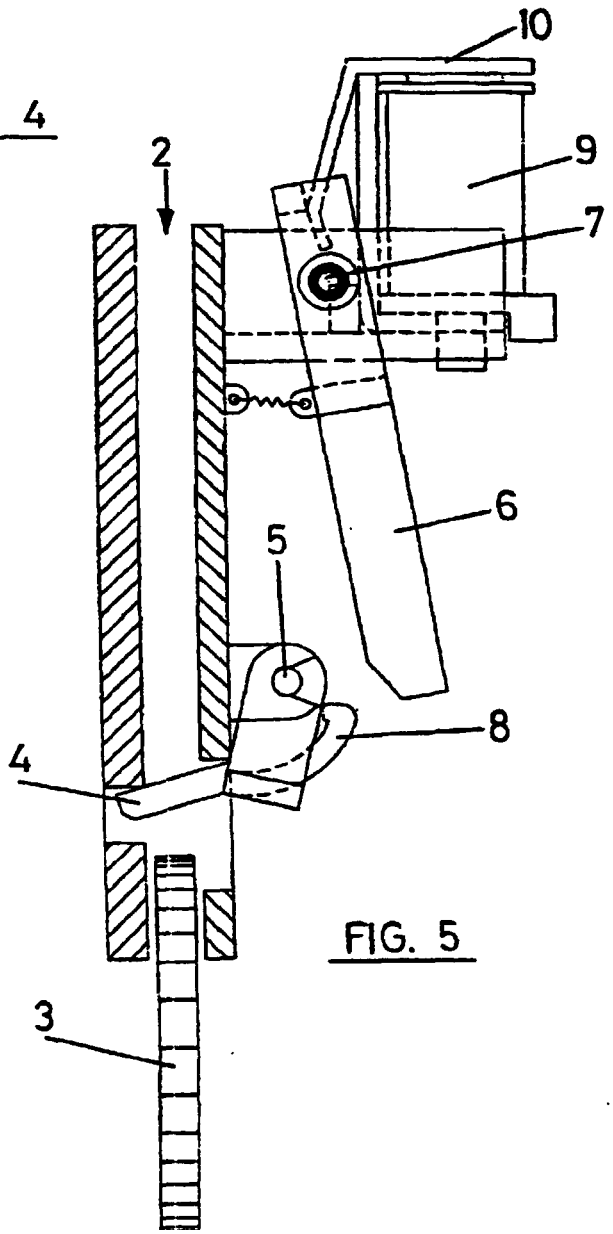

FIG. 5

INTERNATIONAL SEARCH REPORT

Interna al Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G07F1/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
13 January 2000	19. 04. 2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Navarro Farell, A.

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