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(54) **Mechanism of activating the door of a locker in the cabinet for sending and receiving mail, particularly letters**

(57) The mechanism contains a linear electromechanical servomotor (8) coupled with the door wing (4) by a system of leveraging agents. The door (4) is taller than the height of the locker. The system of agents is embedded into the partition of the top locker and composed of the following: the connector (9) of the servomotor (8) with a double-arm rocker (10), the active arm of which is equipped with the driving pin (11) interacting with the grooved cam (6) made in the exterior arm (5), which is stiffly fixed to the door (4). The cam (6) is shaped as a rounded broken line, with the longitudinal axis connecting its ends perpendicular to the plane of door (4). The servomotor (8) is fixed to the top partition with axis (04) perpendicular to the door casing. In the back position of the servomotor (8), the door is locked and the projection of the joints on the plane of the door casing situates the following in order: the driving pin axis (03), the hinge axis (01), the coupling socket axis (06) in the rocker (10), the servomotor axis (04), and the rocker extension axis (02). The driving pin (11) of the rocker (10) is weighed down with a tension spring (13), the other end of which is connected to point (z), which is located so that the axis of the tension spring (13) runs along the rocker extension axis (02) on the side of servomotor (8).

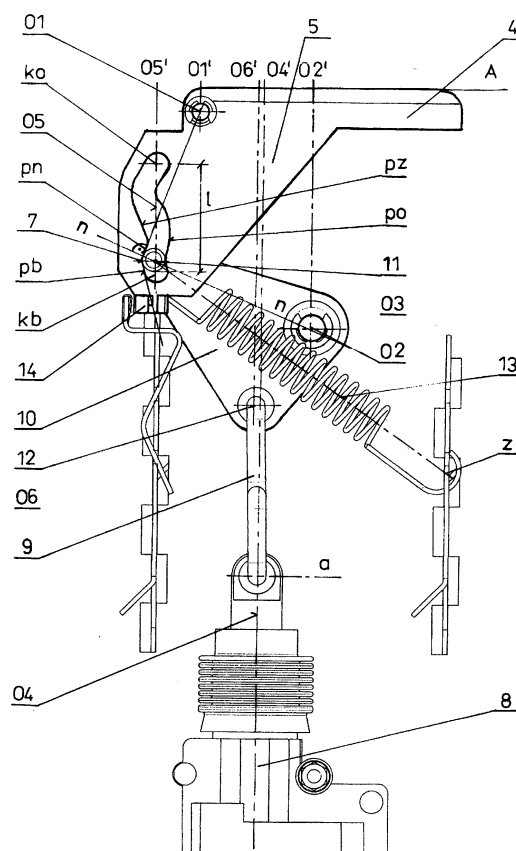


FIG. 3

## Description

**[0001]** The object of the invention is the mechanism of activating the door of a locker in the cabinet for sending and receiving parcels, particularly letters, electronically controlled with the signal of a letter and number code or a biometric code.

**[0002]** There are numerous known solutions of mechanisms activating the doors in collective letter mail cabinets. For example, the mechanism presented in description FR2941732 has an electromagnetic motor, which blocks the cam bolt in the opening of the door casing in the closed door position. In another solution, according to description DE202004008071, the bolt in the closed door position is blocked with a pivot pushed out by a servomotor controlled from the electronic system with the number and letter or biometric access code, or a transponder. It is only possible to open the lock after the servomotor's movement frees the bolt. There are also devices, for example from description FR2845718, in which the bolt of the door wing is blocked with a linear electromechanical servomotor coupled by a system of leveraging agents, which are connected with joints in the flat kinematic chain.

**[0003]** Much like in the others, the mechanism of activating the door of the locker in the sending and receiving cabinet based on this invention has a linear electromagnetic servomotor coupled with the door wing by a system of leveraging agents, connected with joints in the flat kinematic chain. The essence of the solution is that the height of the door is greater than the height of the locker, while the system of agents is embedded into the partition of the top locker and composed of the following: the connector of the servomotor with a double-arm rocker, whose active arm is equipped with the driving pin cooperating with the grooved cam made in the exterior arm, which is connected to the door. The cam, which is formed into a rounded broken line, is oriented with the longitudinal axis - which connects the end of the block and the end of the opening - generally perpendicularly to the door plane, while the servomotor is installed in the top partition with its axis perpendicular to the door casing. When the servomotor is withdrawn to its extreme internal location and the door is closed, the projection of the joints of the kinematic system on the plane of the door casing situates the following one next to the other in order: the driving pin axis, the hinge axis, the axis of the coupling socket in the rocker, the servomotor axis, and the rocker extension axis. The driving pin of the servomotor is weighed down with a tension spring, the other end of which is connected in a point, whose location allows the axis of the tension spring to run along the rocker extension axis on the side of the servomotor.

**[0004]** It is beneficial when the length of the cam exceeds that of the servomotor pitch and the area near the end of the block located farther from the hinge axis hosts its locking socket, which is marked with the pressure areas tilting towards each other and the surface of the block

end, from which the pressure surface, with the servomotor extremely back and locked doors, is directed in a way allowing the perpendicular straight line to run through the rocker extension axis or to be tilted away from it in the direction of the servomotor.

**[0005]** It is also favourable when the axes of the block end and the opening end are tilted towards the hinge axis and in opposite directions, and the cams in the middle segment are connected with a groove marked on the side of the hinge axis with the arched opening surface and the opposite closing surface.

**[0006]** As a further favourable solution, the axis of the tension spring with the door open and the servomotor situated in its extreme external location runs along the rocker extension axis on the side of the door casing.

**[0007]** The mechanism is equipped with a closed door sensor, which is favourably a hall effect sensor.

**[0008]** In the presented solution based on the invention description, the shut door is blocked by the system of levers, which is immobilised in attempts of external opening by the driver of the servomotor positioned against the body in its extreme back position. It is only possible to open the door with the servomotor, which moves forward the driving pin from the blocking area to the opening area of the cam. It is possible to close the door both with the servomotor driver and manually.

**[0009]** The invention is explained through the description of a sample execution of the mechanism in the illustration, the individual figures of which present the following: the module of the letter sending and receiving cabinet composed of six lockers from above, Fig. 2 presents the view of the mechanism with the door open from above, Fig. 3 presents the mechanism fragment with the door closed from above, whereas Fig. 4a, 4b, and 4c present the following positions of the mechanism: closed door, semi-closed door, and open door.

**[0010]** The height  $h_1$  of the door 4 is greater than the height  $h_2$  of the locker 1. The element system of the motor of door 4 is embedded in the top partition 2 of the locker 1 and is composed of the following: servomotor 8, joint 9, and two-armed rocker 10, with the interactive arm with the driving pin 11. The driving pin 11 interacts with the grooved cam 6 executed in the exterior arm 5, which is stiffly fixed to the door 4. The cam 6 is shaped as a rounded broken line, the longitudinal axis  $O_5$  of which - which connects its block end  $k_b$  and opening end  $k_o$  - is directed perpendicularly to the plane of the door 4. The length  $l$  of the cam 6 is greater than the pitch  $s$  of the servomotor 8, and contains the closing socket 7, which is marked with the pressure surfaces  $P_n$  inclined towards each other and the surface of the block end  $P_b$ , near the end of block end  $k_b$ , which is located farther than the hinge axis  $O_1$ . With the servomotor 8 in the extreme back position "a" and closed "A" door, the pressure surface is oriented so that the straight line "n" perpendicular to it passes through the extension axis of the cam  $O_2$ . This geometry of the force system present during a break-in attempt prevents the opening of the door 4 from the outside. The

axes of the block end kb and the opening end ko in the cam 6 are inclined towards the hinge axis O1 and are situated in opposite directions. In the middle segment, the groove of cam 6 is marked on the side of the hinge axis O1 with an arched opening surface and opposite closing surface pz.

[0011] The electromechanical servomotor 8 is fixed on the top partition 2 with its axis O4 perpendicular to the door casing 3. In the position of the servomotor 8 extremely back "a" and closed "A" door 4, the projection of the joints of the kinematic system on the plane of the door casing 3 situates the following in order: the driving pin axis O3, the hinge axis O1, the coupling socket axis O6 in the cam 10, the servomotor axis O4, and the rocker extension axis 2. The driving pin 11 of the rocker 10 is weighed down with the tension spring 13, the other end of which is fixed in point "z", which is located so that the axis of the tension spring 13 runs along the rocker extension axis O2 on the side of the servomotor 8. With open "B" door 4 and the extreme external position "b" of the servomotor 8, the axis of the tension spring 13 runs along the rocker extension axis O2 on the side of the door casing 3. The mechanism is equipped with the hall effect sensor 14, which initiates a signal in the closed "A" position of the door 4.

#### Illustration legend

#### [0012]

1. Locker

2. Top partition

h2 locker height

3. Door casing

4. Door

A - closed position

B - open position

h1 - door height

O1 - hinge axis

5. Extension arm

6. Cam

O5 - cam longitudinal axis

l - cam length

kb - block end

ko - opening end

po - opening surface

pz - closing surface

7. Locking socket

pn - pressure surface

n-n - straight line perpendicular to the pressure surface

pb - block end surface

8. Electromechanical servomotor

O4 - servomotor axis

s - servomotor pitch

a - extreme internal position

b - extreme external position

9. Coupling

10. Two-armed rocker

O2 - rocker extension axis

11. Driving pin

O3 - pin axis

12. Coupling socket

O6 - coupling socket axis

13. Tension spring

z - hook

14. Sensor

15. PCB control panel

16. Installation panel

#### Claims

1. The mechanism of activating the door of a locker in the cabinet for sending and receiving parcels, particularly letters, containing a linear electromechanical servomotor coupled with the door wing through a system of leveraging agents, which are connected with joints in the flat kinematic chain, **characterised in that** its door (4) has the height (h1) greater than the height (h2) of the locker (1), and the system of agents is embedded in the top partition (2) of the locker (1) and composed of the following: the joint (9) of the servomotor (8) with a two-armed rocker (10), the active arm of which holds the driving pin (11) interacting with the grooved cam (6) executed in the exterior arm (5) stiffly fixed to the door (4), while the cam (6) in the form of a rounded broken line directs its longitudinal axis (O5) - connecting its block end (kb) and opening end (ko) - perpendicularly to the plane of the door (4), and the servomotor (8) is fixed on the top partition (2) with its axis (O4) perpendicular to the door casing (3). Furthermore, with the servomotor (8) in its extreme back position (a) and closed (A) door (4), the projection of the joints of the kinematic system on the plane of the door casing (3) situates the following next to one another in order: the driving pin axis (O3), the hinge axis (O1),

the coupling socket axis (O6) in the rocker (10), the servomotor axis (O4), and the rocker extension axis (O2). And the driving pin (11) of the rocker (10) is weighed down with a tension spring (13), the other end of which is connected to point (z), which is located so that the axis of the tension spring (13) runs along the rocker extension axis (O2) on the side of servomotor (8).

2. According to claim 1, the mechanism is **characterised in that** the length (l) of the cam (6) exceeds the pitch (s) of the servomotor (8) and the area near the end of the block (kb) located farther from the hinge axis (O1) hosts its locking socket (7), which is marked with the pressure areas tilting towards each other (Pn) and the surface of the block end (Pb), from which the pressure surface (Pn), with the servomotor (8) extremely back (a) and locked (A) doors (4), is directed in a way allowing the perpendicular straight line (n) to run through the rocker extension axis (O2) or to be tilted away from it in the direction of the servomotor (8).
3. According to claim 2, the mechanism is **characterised in that** both axes of the block end (kb) and block opening (ko) incline towards the hinge axis (O1) and are oriented in opposite directions, while in the middle segment of the cam (6), they are connected with a groove marked on the side of the hinge axis (O1) with the arched opening surface (po) and the opposite closing surface (pz).
4. According to claim 1, the mechanism is **characterised in that** with the opened (B) door (4) and extremely external position (b) of the servomotor (8), the axis of the tension spring (13) runs along the rocker extension axis (O2) on the side of the door casing (3).
5. According to claim 1, the mechanism is **characterised in that** it is equipped with a closed (A) door (4) sensor (14), which is favourably a hall effect sensor.

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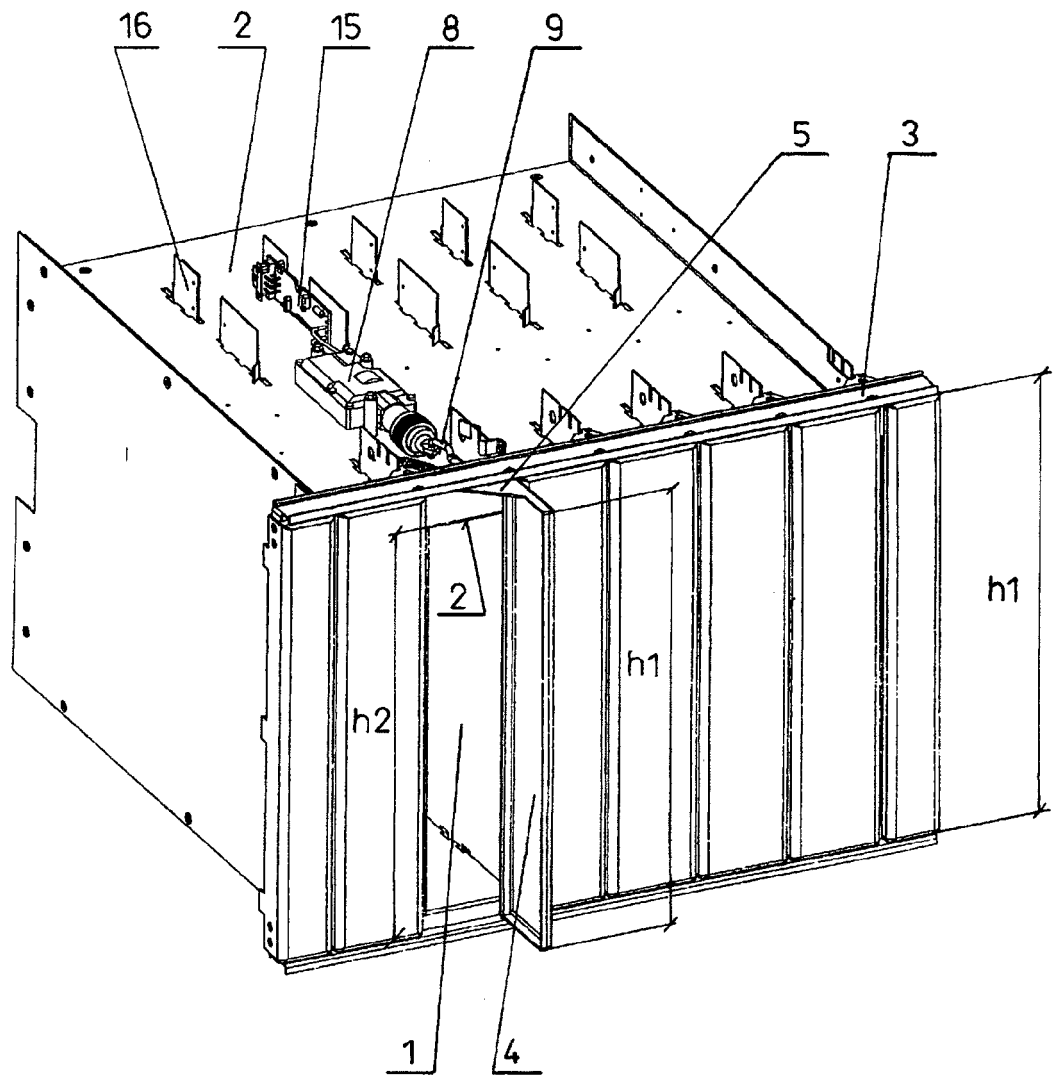


FIG.1

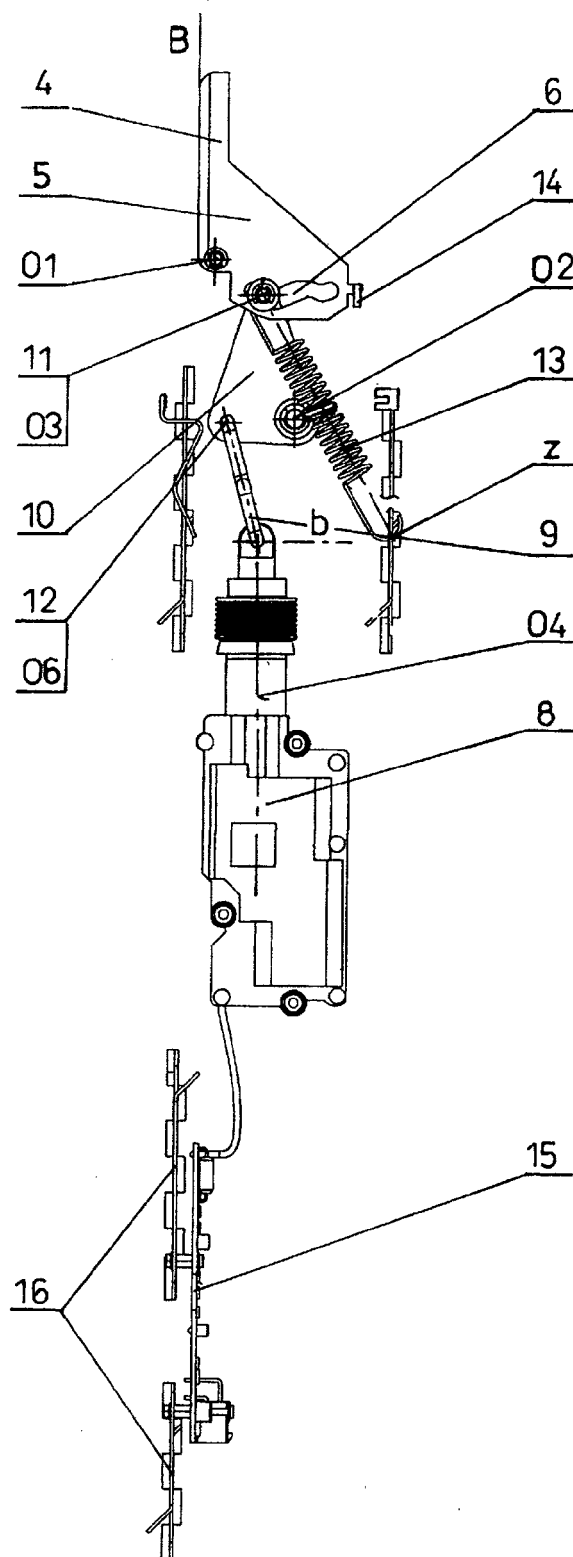


FIG.2

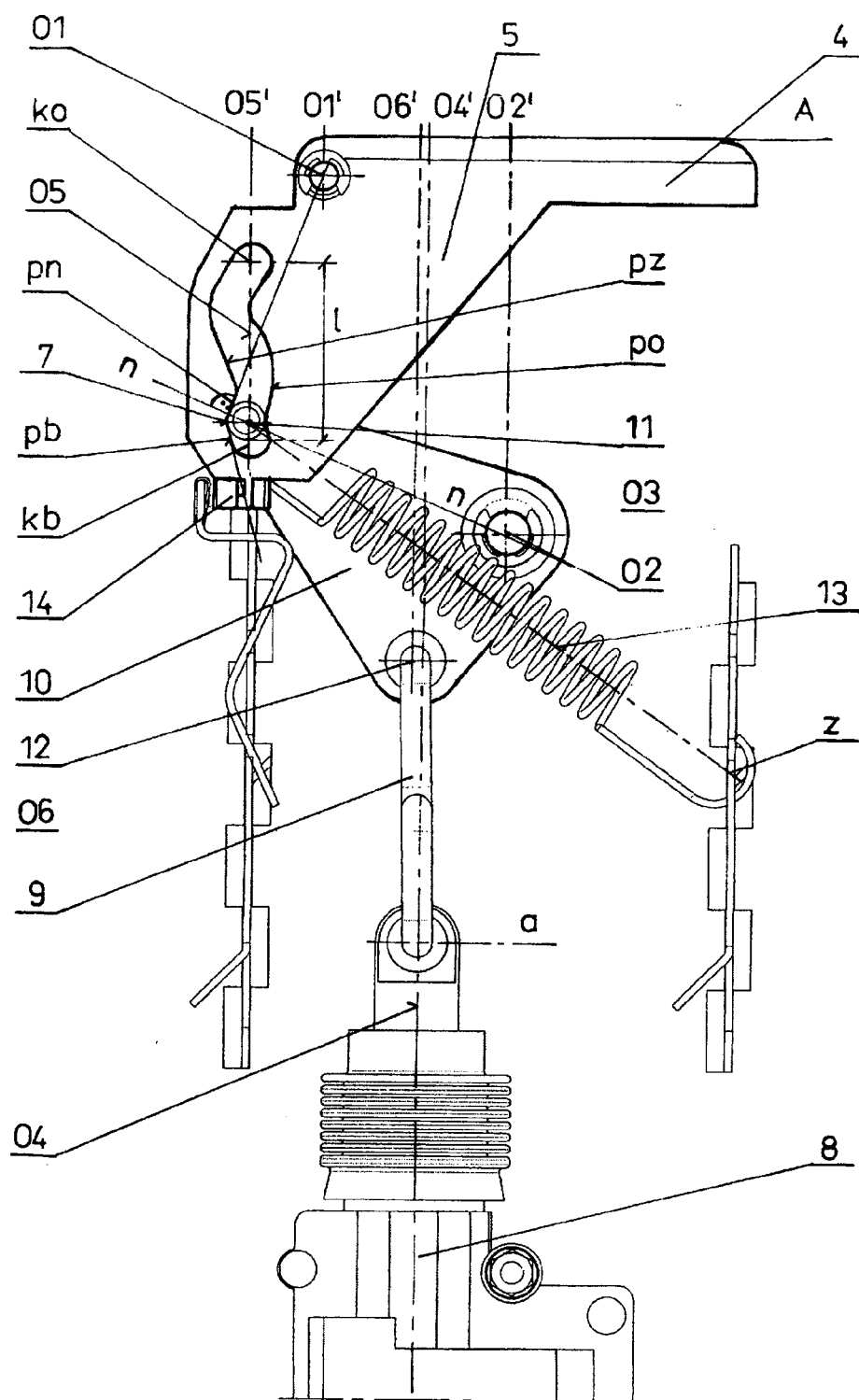


FIG. 3

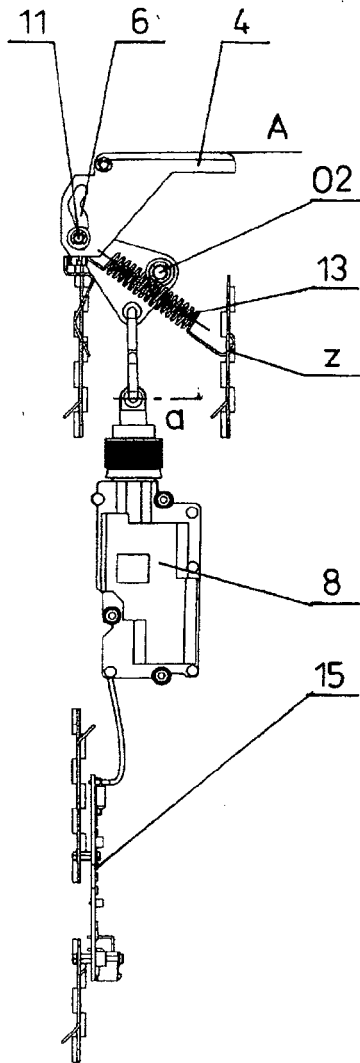


FIG. 4a

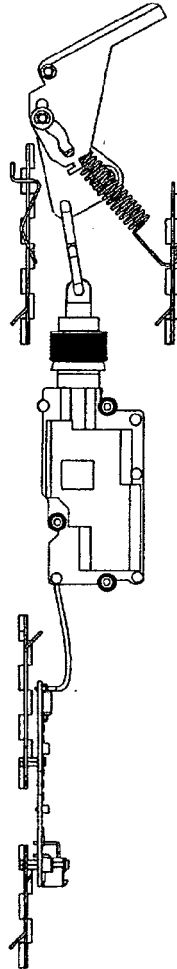


FIG. 4b

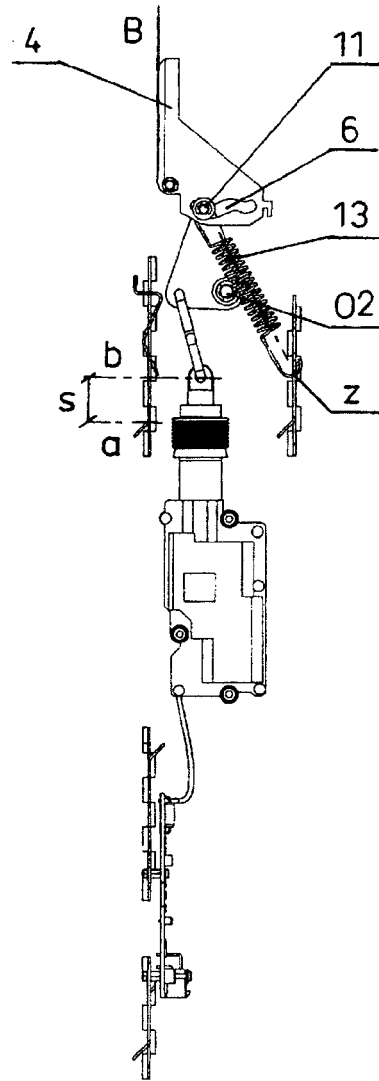


FIG. 4c





## EUROPEAN SEARCH REPORT

Application Number  
EP 13 00 4721

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 066 783 A1 (HITACTION S A [FR]) 10 January 2001 (2001-01-10) * paragraphs [0015], [0028], [0035], [0037], [0038], [0040], [0042], [0043], [0049], [0050]; figures 1-8 *	1	INV. A47G29/12 A47G29/14
A	FR 2 770 117 A1 (ELECTROBOX [FR]) 30 April 1999 (1999-04-30) * abstract; claims 1,11,13; figures 1-3 * * page 5 *	1	
A	US 5 566 991 A (YOUNG QUENTIN [US]) 22 October 1996 (1996-10-22) * abstract; figures 1-7 *	1	
A	DE 203 02 161 U1 (DEWERT ANTRIEBS SYSTEMTECH [DE]) 17 June 2004 (2004-06-17) * abstract; figures 1,4 * * paragraph [0018] *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47G E05F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 February 2014	Examiner Longo dit Operti, T
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EP 13 00 4721

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05-02-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1066783 A1	10-01-2001	EP 1066783 A1	10-01-2001
		FR 2795931 A1	12-01-2001
FR 2770117 A1	30-04-1999	NONE	
US 5566991 A	22-10-1996	NONE	
DE 20302161 U1	17-06-2004	NONE	

EPO FORM P0459

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**Patent documents cited in the description**

- FR 2941732 [0002]
- DE 202004008071 [0002]
- FR 2845718 [0002]