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Electronic lock for windows and doors
Elektronisches Schloss für Fenster und Türen
Serrure électronique pour portes et fenêtres

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The present finding refers to an electronic lock for windows and doors. It is well known that there are different types of locks on the market which comprise a cylinder defined by a stator inside which there is a rotor which is rotated through the use of a key. In particular, in electronic locks, the cylinder sometimes comprises a mechanical blocking device with a pin code and an electromechanical blocking device with an electronic code so that when the mechanical code and the electronic code of the cylinder correspond to those of the key, it is possible to rotate the rotor inside the stator. Consequently the substitution of a locking cylinder allows the quick and easy transition from a lock with a mechanical or electromechanical blocking device or only with an electromechanical blocking device and vice versa. In this way the stator can equally receive, for example, either a rotor with an electromechanical blocking device or conversely a rotor with only a mechanical blocking device or a rotor with both electromechanical and mechanical blocking device. Consequently, the substitution of a locking cylinder allows the quick and easy transition from a lock with a mechanical blocking device to one with an electromechanical and mechanical blocking device, and vice versa, without replacing all the parts of the cylinder thereof. It should, however, be noted that all electronic locks of this kind have an actuator which is activated by a very small amount of energy and for this reason it should be totally free from friction and/or mechanical constraints, which would, in time, compromise its correct functioning. In view of all the reasons mentioned above, these locks usually have the blocking element located between the stator and the rotor and this is always kept well away from the actuator and from any of its connection parts, in order to avoid any contact points with said actuator and any negative friction and/or mechanical constraints. Such a lock is for example disclosed in WO 03/100199 A1. For this reason, a spring is normally used to this end to act directly or indirectly on the blocking element in order to separate it from the actuator. In the case of direct action on the blocking element the spring must be of a particular shape and must consequently be purposefully made for this use since it is not available on the market. Normally, in the case of indirect action a pivot shaft is used to act on the blocking element under the force exerted by the spring, here of a traditional type. Consequently such a lock inevitably has a large number of components, giving rise to a more complicated manufacturing and assembling process, which results in increased production and sale costs. A lock according to the pre-amble of claim 1 is disclosed in EP 1 134 335 A2. The aim of this finding is to remove the drawbacks set forth above of the known art. In order to achieve this, an important aim of this finding is to provide an electronic lock for windows and doors which has a simplified structure and assembly while it still offers a high level of reliability over a long period of time. It is also the aim of this invention to produce a lock that can be manufactured and sold at low cost due to the very limited number of its components. It is furthermore the aim of this finding to produce a lock with very low impact on the manufacturing systems in use for cylinders with a mechanical blocking device. This, and all other aims, are achieved by an electronic lock for windows and doors as defined by claim 1. Further characteristics and advantages of the invention will be better highlighted by the description of a preferred, but not exclusive, embodiment of high-flexibility lock for windows and doors according to the finding, illustrated in the attached drawings for illustrative purposes only, wherein:

- Figure 1 is a cut-away longitudinal side view of the cylinder of the lock according to the finding;
- Figure 2 is a top cut-away longitudinal view of the cylinder of the lock according to the finding;
- Figures 3 and 4 are a view along section 3.3 of figure 1 showing the opening and closing system of the lock according to the finding;
- With reference to the figures described above, the lock according to the finding comprises a cylinder (1) comprising in a manner known per se a stator (2) inside of which a rotor (3) is located, its rotation being effected when a key is inserted therein (key not shown).
- The exemplified cylinder comprises a traditional mechanical blocking device denoted by 5 with vertical flat key and pins aligned in the stator and in coplanar alignment with the opening of the rotor in which to insert the key. In particular, such solution requires that the key hole be positioned vertically although this also applies to a horizontal key hole.
- Furthermore, the cylinder also has an electromechanical blocking device denoted overall by 6 displaying an electronic code so that when the mechanical code and the electronic code of the cylinder (1) correspond to those of the key, it is possible to rotate the rotor (3) inside the stator (2).
- In particular, the rotor (3) has a seating (30) on one or both of its sides where the electromechanical blocking device (6) sits, displaying a compartment (10) housing an actuator (11), a first electronic circuit (12) and a straight line motion mechanism (13) able to engage and disengage a blocking element (14) with a cavity (15) inside the stator (2).
In one or more areas of cavity (15) a permanent magnet (30) is advantageously placed (of any shape but preferably cylindrical) which is connected to the blocking element (14) in its own seating facing said element.

In this way, as highlighted in fig. 3 and 4, the blocking element (30) is always kept separate from the cam (17) which integrally rotates with the actuator (11).

Therefore the cam (17) is never subjected to friction or other mechanical constraints and consequently the actuator (11) can be activated even when the amount of energy is very limited.

The blocking element (14) is conveniently made of metal which is sensitive to magnetic attraction exercised by the permanent magnet in order for it to be attracted by the latter.

The cavity (15) where the permanent magnet/s (30) is/are located can be made directly in the stator or created with an insert (31) of a different material, one that is more resistant than that of the stator.

Instead of the permanent magnet/magnets (30) a part of the insert (31) or of the cavity (15) can be magnetised to achieve the same function of the permanent magnet.

In a preferred solution the straight line motion mechanism (13) comprises a spindle (16) which is activated by the actuator (11), such as for example a motor or an electromagnet with one end connected to cam (17), the rotation of which blocks or releases the blocking element (14) from the magnet (30) as noted.

The latter is defined for example by a pin moving along a guide (18) of the body (10) so as to engage and disengage with cavity (15) of the stator (2).

The cam (17) displays a semi-cylindrical seat (19) which is elongated and joined to that of pin (14).

Clearly, the cavity (15) is located on the inner surface of the stator (2) so as to be facing the guide (18) of the body (10), in such a way that the rotation of the cam (17) (fig. 3) keeps the pin (14) inside the cavity (15) thus blocking the rotor inside the stator, while, conversely, when the pin (14) is facing the semi-cylindrical seat (19), the rotor is free to rotate inside the stator since the pin is moved into seat (19) thus overcoming the magnetic force of the magnet (30).

The operation of the lock for windows and doors according to the finding appears evident from everything that has been described and illustrated.

In particular, once the key has been introduced in the rotor and therefore the mechanical code and the electronic code of the key and of the cylinder correspond, cam (17) rotates and through the rotation of the rotor in the stator the pin (14) is disengaged from the magnet (30) and from the cavity (15), thus enabling the opening of the lock.

Furthermore, the lock according to the finding is provided with a mechanical resetting mechanism able to block the electromechanical blocking device, preventing the rotation of rotor (3) when the key is removed from the rotor (3).

In practice, the mechanical resetting group rotates the cam (17) causing it to block the pin or blocking element (14) against the magnet (30) and therefore inside the cavity (15) of the stator.

In this way the rotor (3) cannot turn in the stator (2) and the lock cannot be opened.

It has been noted that the lock of the invention proves particularly useful to display a permanent magnet which always keeps the blocking element (14) away from the cam (17) so that the actuator (11) can remain unaffected.

The finding thus conceived can undergo several modifications and variations, all within the scope of the inventive concept, as defined by the appended claims. Furthermore, all the details can be replaced by elements which are technically equivalent.

In practice, the materials used and the dimensions can be changed according to demand and technological advances.

Claims

1. Electronic lock for windows and doors comprising a cylinder (1) with a stator (2) inside which a rotor (3) having a cavity (15) is located; its rotation being activated when a key is inserted in said rotor (3), said cylinder (1) comprising at least one mechanical blocking device and at least one electromechanical blocking device with an electronic code; said electromechanical blocking device has a blocking element (14), a rotating actuator (11), a body (10) containing said actuator (11), a first electronic circuit and a spindle (16), activated by said actuator (11), connected to a cam (17) to move said blocking element (14) along a guide (18) of said body (10) to engage and disengage with said cavity (15) of said stator (2), said blocking element (14) being a pin, said cam (17) having a semi-cylindrical seat able to move said pin along said guide (18); characterised in that, said blocking element (14) is made of material sensitive to magnetism, said lock comprises magnetic means (30) to maintain said blocking element (14) between said rotor (3) and said stator (2) within said cavity (15) thereof and that said magnetic means (30) keep said blocking element (14) always separate from said cam (17) integrally rotating with said actuator (11).

2. Electronic lock for windows and doors according to claim 1, characterised in that said magnetic means comprise at least one permanent magnet (30) located in a respective seat of said cavity (15).

3. Electronic lock for windows and doors according to claim 1, characterised in that said magnetic means comprise at least one magnetised part of said cavity (15).
4. Electronic lock for windows and doors according to claims 1 or 2, characterised in that said rotor (3) displays a seat on at least one of its sides which is able to seat said electromechanical blocking device.

5. Electronic lock for windows and doors according to one or more of the previous claims, characterised in that said cavity (15) is located in said stator (2) and faces said guide (18) of said body (10).

6. Electronic lock for windows and doors according to one or more of the previous claims, characterised in that it comprises a mechanical reset group adapted to block said electromechanical blocking device preventing the rotation of the rotor (3) when the key is removed from the rotor (3).

Patentansprüche

1. Elektronisches Schloss für Fenster und Türen, umfassend einen Zylinder (1) mit einem Stator (2), innerhalb dessen ein Rotor (3), aufweisend einen Hohlraum (15) untergebracht ist, wobei dessen Drehung aktiviert wird, wenn ein Schlüssel in den Rotor (3) eingeführt wird, wobei der Zylinder (1) mindestens eine mechanische Verriegelungsvorrichtung umfasst, wobei die elektromechanische Verriegelungsvorrichtung mit einem elektronischen Code und mindestens eine elektromechanische Verriegelungsvorrichtung ein Verriegelungselement (14), einem Drehantrieb (11), einen Körper (10), enthaltend den Antrieb (11), einen ersten elektronischen Kreislauf und eine Spindel (16) umfasst, die vom Antrieb (11) aktiviert wird, verbunden mit einem Nocken (17), um das Verriegelungselement (14) entlang einer Führung (18) des Körpers (10) zu bewegen, um mit dem Hohlraum (15) des Stators (2) in Eingriff zu gelangen und sich von diesem zu lösen, wobei es sich beim Verriegelungselement (14) um einen Zapfen handelt, wobei der Nocken (17) eine halbzyllindrische Aufnahme aufweist, in der Lage, den Zapfen entlang der Führung (18) zu bewegen, dadurch gekennzeichnet, dass das Verriegelungselement (14) aus einem Material besteht, das auf Magnetismus reagiert, wobei das Schloss Magnetmittel (30) umfasst, um das Verriegelungselement (14) zwischen dem Rotor (3) und dem Stator (2) in dessen Hohlraum (15) zu halten, und dadurch, dass die Magnetmittel (30) das Verriegelungselement (14) stets separat vom Nocken (17) halten, sich fest verbunden mit dem Antrieb (11) drehend.

2. Elektronisches Schloss für Fenster und Türen nach Anspruch 1, dadurch gekennzeichnet, dass die Magnetmittel mindestens einen Permanentmagneten (30) umfassen, der in einer jeweiligen Aufnahme des Hohlraums (15) untergebracht ist.

3. Elektronisches Schloss für Fenster und Türen nach Anspruch 1, dadurch gekennzeichnet, dass die Magnetmittel mindestens einen magnetisierten Teil des Hohlraums (15) umfassen.

4. Elektronisches Schloss für Fenster und Türen nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass der Rotor (3) eine Aufnahme an mindestens einer seiner Seiten aufweist, die in der Lage ist, die elektromechanische Verriegelungsvorrichtung aufzunehmen.

5. Elektronisches Schloss für Fenster und Türen nach einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass der Hohlraum (15) im Stator (2) untergebracht und der Führung (18) des Körpers (10) zugewandt ist.

6. Elektronisches Schloss für Fenster und Türen nach einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass es eine mechanische Zurücksetzungsgruppe umfasst, die angepasst ist, um die elektromechanische Verriegelungsvorrichtung zu verriegeln, wobei die Drehung des Rotors (3) verhindert wird, wenn der Schlüssel aus dem Rotor (3) entfernt wird.

Revendications

1. Serrure électronique pour fenêtres et portes comprenant un cylindre (1) avec un stator (2) à l’intérieur duquel est situé un rotor (3) comportant une cavité (15) ; sa rotation étant activée lorsqu’une clé est introduite dans ledit rotor (3), ledit cylindre (1) comprenant au moins un dispositif de blocage mécanique et au moins un dispositif de blocage électronique et une broche (16), activée par ledit actionneur (11), reliée à une came (17) pour déplacer ledit élément de blocage de (14) le long d’un guide (18) dudit corps (10) pour se mettre en prise avec et se désengager de ladite cavité (15) dudit stator (2), ledit élément de blocage (14) étant une tige, ladite came (17) comportant un siège semi-cylindrique pouvant déplacer ladite tige le long dudit guide (18), caractérisée en ce que, ledit élément de blocage (14) est constitué d’un matériau sensible au magnétisme, ladite serrure comprend des moyens magnétiques (30) pour maintenir ledit élément de blocage (14) entre ledit rotor (3) et ledit stator (2) à l’intérieur de ladite cavité (15) de celui-ci et en ce que ledits moyens magnétiques (30) maintiennent ledit élément de blocage (14) toujours séparé de ladite came (17) pivotant intégralement avec ledit actionneur.
2. Serrure électronique pour fenêtres et portes selon la revendication 1, caractérisée en ce que lesdits 5 moyens magnétiques comprennent au moins un aimant permanent (30) situé dans un siège respectif de ladite cavité (15).

3. Serrure électronique pour fenêtres et portes selon la revendication 1, caractérisée en ce que lesdits moyens magnétiques comprennent au moins une partie magnétisée de ladite cavité (15).

4. Serrure électronique pour fenêtres et portes selon la revendication 1 ou 2, caractérisée en ce que ledit rotor (3) exhibe un siège sur au moins un de ses côtés pouvant placer ledit dispositif de blocage électromécanique.

5. Serrure électronique pour fenêtres et portes selon l'une ou plusieurs des revendications précédentes, caractérisée en ce que ladite cavité (15) est située dans ledit stator (2) et fait face au dit guide (18) dudit corps (10).

6. Serrure électronique pour fenêtres et portes selon l'une ou plusieurs des revendications précédentes, caractérisée en ce qu'elle comprend un groupe de réinitialisation mécanique prévu pour bloquer ledit dispositif de blocage électromécanique empêchant la rotation du rotor (3) lorsque la clé est retirée du rotor (3).
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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