(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 329 914 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **88500057.0**

(51) Int. Cl.[4]: **E05B 27/00**

(22) Date of filing: **06.06.88**

(30) Priority: **24.02.88 ES 8800525**

(43) Date of publication of application:
30.08.89 Bulletin 89/35

(84) Designated Contracting States:
AT BE CH DE FR GB GR IT LI LU NL SE

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(54) Perfected lock.

(57) The invention deals with a lock specially conceived for hotels or for any practical situation that requires constant variations in the opening code, and the use of different keys of the perforated card type.

There are locks of the above mentioned type which incorporate a set of pins and counterpins that are moved into the opening position by means of a key and a complementary matrix, also consisting on a perforated card, and which must be replaced every time the code is changed.

The lock presented in this invention does not incorporate any such complementary key-matrix, but a single setting plate, that remains within the lock and which is able to move or immobilize a series of auxiliary parts -formed by washers or similar- to cause this washers to position themselves or not inside the pin-counterpin housings; this is done in such a way that, after the setting plate moves in one direction and any key is inserted in the slot, when the setting plate is moved again, this time in the opposite direction, the key is coded in accordance with the requirements of the key that is inserted, since the washers corresponding to all housings facing key areas where no holes or perforations are present are thus withdrawn.

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PERFECTED LOCK

PURPOSE OF THE INVENTION

This invention deals with a lock of the type that uses a perforated card as a key or opening element; this lock is, therefore, specially apt for hotels and, generally speaking, for any situation which makes it necessary or practical to modify the opening code with a certain periodicity.

The lock we are recommending in this document presents certain features which are specifically oriented towards achieving greater structural simplicity and simpler operativity in the performance of these modifications.

BACKGROUND OF THE INVENTION

It is a known fact that the structural and functional base for any lock is the interlocking of two elements, one fixed and one movable, with the latter acting as the means to open the lock. These two elements are interrelated by means of a series of pins and counterpins that play in combined holes of the fixed element and the movable element; these pins and counterpins naturally tend to lock the fixed element in respect to the movable element, through the effect of a set of springs which are coaxially installed over each pair of pin-counterpins. Unlocking takes place when a key is inserted in the lock, forcing the pin-counterpin assembly to move axially in different magnitudes for each one of the pairs and, more specifically, in concrete magnitudes that cause the union plane between each pin and its counterpin to coincide with the union plane between the fixed and movable elements, enabling the latter to rotate or move longitudinally with respect to the former. Obviously, this unlocking is only achieved when a key with the suitable code is inserted into the lock, one which is designed to cause the exact axial movement of each pin-counterpin.

In general terms, this is achieved with the help of keys whose edges are toothed or graded, so that it acts properly on each and every one of the pins and counterpins when totally inserted.

There are also locks similar to the one described in the patent of the French invention 1,279.704, which describes a perforated card as the opening key, which means that there are only two types of pins-counterpins in such a lock, arranged in several rows of pins-counterpins within the body of the lock, in such a way that only one group of them will be actuated by the card when it is inserted in the lock, while the other group will not be subject to axial movement. To achieve this, the card incorporates a series of holes that coincide with the last group of pins-counterpins, whose protruding ends fit in the holes.

On the other hand, and for a practical use, there are specific cases such as, for instance, hotel rooms, hired safes, etc., when security reasons make it desirable, and even unavoidable, to change keys for every new user, in order to prevent criminal actions based on a previous rental during which a copy of the key was made.

Conventional lock systems mean that both key and lock must be changed in those cases, which constitutes an extraordinarily complex, long and expensive solution.

With the previously mentioned French invention, it would be possible to keep the same lock, changing the distribution of the pin-conterpin assemblies and replacing the key, but it is obvious that this is not an efficient solution either.

Within the guidelines of the French patent, that is, using a perforated card as the key element to solve the problem, simplifying the procedure for changing the key or the code in a same lock, a solution exists which consists in the functional combination of the perforated card used as a key with a matrix or coding element, which would complement the card. There are two basic solutions in this context; one is of the magnetic type, where the matrix or coding element is inserted in the lock and then actuates on those pins not activated by the key, and viceversa, i.e., the key actuates on the pins not activated by the matrix-established magnetic fields; however, this is an expensive solution, due specifically to the high cost of magnetic matrixes.

One other solution, presented in the Spanish invention patent 468.558, uses the mechanical matrix or coding element in such a way that, when inserted in the lock, it actuates on a set number of pins causing them to move into an opening situation, while the remaining pins are actuated by the card used as a key, through the holes placed for that purpose in the code card; this card must also have some holes which, when fully inserted in the lock, rests on the items which exert pressure on the pins, such as balls or similar items, to prevent them to push against the matrix or code, which would cause an incorrect positioning of the pin-counterpin assemblies.

While this solution substantially simplifies the conventional problematic, it still presents important secondary problems since, although in principle each key and its corresponding matrix or coding element form a single assembly, that is, a card

whose matrix may be made independent through breaking, after the first time of use, these complementary elements, key and matrix, are physically independent and must be stored together with many others, creating important handling problems, since when used, for instance, as hotel-room keys, the number of these rooms is usually high and, when multiplied by an acceptable amount of different codes for each one of them, would mean a tremendous number of coupled cards to be stored separately; this would also mean a high risk of their being mixed up or incorrectly interchanged, giving rise to a good deal of operational problems.

In the practice, the only way to solve this problem is to use each set or key-matrix card only once, destroying it after; this implies a high cost and a strong dependency on the manufacturer or supplier of such a card.

DESCRIPTION OF THE INVENTION

The lock proposed in this invention constitutes a major step in this environment, that is, in the field of card-actuated, variable-code locks, since, as will be shortly shown, this lock does not require the classic matrix to complement each of the cards or keys to be used by it; this lock has its own means for adjusting to each and every one of the key codes to be used with it.

Specifically, the invention concentrates in the installation of an auxiliary part in each hole or joint housing where the fixed and movable elements in the lock, inside which the respective pin-counterpin sets are housed. This auxiliary part, which is a washer or similar item, may be radially removed from the relevant housing, causing the pins that were actuated upon by these auxiliary parts to present a set effective length, different from that of the pins lacking these parts. Therefore, in order to do the opening operation, a key must be inserted which has holes or perforations to correspond with all those pins which have an auxiliary part added. To change the code for this lock, that is , to enable it to be opened by a different key-card, all that will be required will be to move around the auxiliary parts, by inserting some inside the pin housing, or withdrawing others, as required by the new key.

This changing procedure is extremely easy and quick to perform.

A slot has been added for this purpose to the movable element of the lock, level with the upper end of the pins. This slot has a setting plate incorporated, on which two holes have been made to coincide diametrically with each one of the pin housings; this plate will be enabled to adopt two extreme locations within its relevant slot, in one of which locations one of its sets of holes is axially faced with the pin housings; in the other location, it is its second set of holes which is axially implanted inside those housings.

In accordance to this structuring and to the position of all the washers or auxiliary parts in one of the two sets of holes of the setting plate, said plate goes into a position in which all washers or auxiliary parts are located inside the pin housings, which present a conical or similar end that facilitates radial penetration of the washers through elastic distortion of their springs. When this happens, the insertion of any key causes the springs housed inside the housings facing the holes of said key to axialy move the set of elements implanted in those housings; the relevant washers are thus out of phase in respect to the slot in the setting plate. The plate now moves longitudinally, and only the washers corresponding to those housings in the lock that are face to face with hole-free areas in the key are radially driven and withdrawn from the lock operative housings; the lock is thus automatically programmed for this key, which is the only one that can now open it, since the insertion of a different key would cause an excessive drop of the pins provided with a washer or auxiliary part, or to an insufficient drop of the pins lacking this washer.

To reprogram the lock for a different key, it will suffice to move the setting plate in the opposite direction prior to the insertion of the new key in the lock; all the auxiliary parts will now be located in the corresponding housings of the lock and, as a consequence of this, when the new key is inserted and the setting plate is actuated upon, the auxiliary parts or washers will automatically relocate in accordance to the requirements of the above mentioned new key.

Needless to say, manipulation of the setting plate will only be possible from the end of the lock opposite to that where the key is inserted, to prevent access from outside the room or enclosure protected by the lock. The lock will preferably be protected by any conventional security method which prevents any undue handling.

DESCRIPTION OF THE FIGURES

To complement the above description, and in order to provide a better understanding of the different features of this invention, a set of illustrations is added to the descriptive document herewith. These illustrations are an integral part of the document and, in a representative but not limitative manner, represent the following:

Figure 1.- Schematic diagram of the lateral projection and section of one lock produced in accordance with the perfecting features introduced

by this invention; the lock is shown in the opening position following introduction of the suitable card-key.

Figure 2.- Similar to figure 1, after the key has been removed and the setting plate has been moved to program the lock according to the new code or key.

Figure 3.- A view of the previous figure after the new key has been inserted.

Figure 4.- A view of Figure 3 following the programming phase, i.e., after the setting plate has changed position to its primitive position of normal lock action.

Figure 5.- Vertical projection of setting plate detail.

Figure 6.- Vertical projection view of the key.

Figure 7.- Example of the practical use of the lock, applied to the locking-unlocking handle of a latch.

PREFERENTIAL MANUFACTURE OF THE INVENTION

As can be seen in the figures, particularly in Figure 1, this lock, like any conventional lock of this type, is formed by the fixed element or body (1), and a movable element or body (2); a series of housings (3) have been made in the movable element (1) which are coaxially opposed to another series of housings (4), in the movable element (1). Each one of this housings contains assemblies (3) and (4), a spring (5), a counterpin (6) and a pin (7); between each pin-counterpin (6)-(7) assembly, a cutting plane (8) has been established which, when in the open configuration, faces plane (9) which interrelates the fixed and movable elements, in order to allow the relative movement of these elements.

Also following the conventional guidelines, a slot (10) has been added at the end of housings (3)-(4) opposite to the emplacement of springs (5). This slot is used for the insertion of the key or card (11), and has a stepped section (12) on its lower edge, which acts on one hand as a stop for key penetration and on the other as a means to drive the moveable element (2) to an opening situation, through the action of the key (11) itself.

Starting from this basic configuration, and according to one of the features of the invention, each housing (4) contains the terminal ball (13) over which key (11) is to act when inserted, and a second counterpin (14) on which the ball rests; but, aside from these items, and as the main feature of this invention, an auxiliary part (15) may be added to the housing. This auxiliary part may be a washer or similar item, which may be installed inside housing (4) or to be radially removed in order to render it inoperative.

In a more specific manner, and to permit selective handling of the washers or auxiliary parts (5), the movable body (5) has a slot (16) at the level of the union plane between pins (7) and the auxiliary counterpins (14). This slot has a movable plate (17), fitted to correspond with each one of the housings (4) of the movable body (2), with a pair of 18-18′ holes, whose section coincides with that of housing (4), one of which holes is capable of receiving a corresponding washer (15) and the other one capable of allowing passage through the elements established in the relevant housing (4).

As shown is Figure 1, all pins are identical, as are the counterpins, the auxiliary counterpins, the washers and the balls.

Starting from this structuring and, specifically, from a preset code in the lock, as shown in Figure 1, in which specific washers (15) are placed within housings (4), while others are located outside, in the corresponding housing (18) of the setting plate (17); when the key is inserted in slot (10) if the key is the correct one, it moves the pins and counterpins in those housings where no washer (15) is present; thus, their planes (8) are located in correspondence with plane (9) and does not move the rest of the pins, i.e., those where a washer (15) is present, since it incorporates the respective holes (19) to correspond with the latter pins, which then keep their original location of equal plane between union plane (8) and union plane (9) between the fixed body (1) and the movable body (2); these two elements are then freed to enable opening through the drive of the movable body (2) when key (11) pushes against it as it touches upon the stepped section (12).

When a code change is required for the lock, and starting from the position shown in Figure 2 (that is to say, with no key present in slot (10), move the setting plate (17) up to the extreme setting shown in Figure 1, which is the same as shown in Figure 2. This causes all the washers (15) to be located inside housings (4); insert now a new key (11′), whose code is different to the one in key (11) used in Figure 1. When this new key (11′) is inserted, it causes movement of a movable group installed in specific and different housings (4), concretely those facing the areas of key (11′) which do not present holes (19); a new movement of setting plate (17) towards the position shown in Figure 1 is thus produced -- to correspond specifically with the position represented in Figure 4, bringing about that a new set of washers (15′) is now radially removed from their respective housings (4), driven by plate (17) and through holes (18) of the plate in which they had previously been installed. The lock is now ready to be opened by the new key (11′)

only.

In order to facilitate the insertion of the washers ot auxiliary parts (15) inside housings (4), it is necessary that the upper end on pins (7) present a conical configuration, shaped like a segment of a sphere or any other that is similar and suitable to the required purpose.

In acordance with this structuring, as shown in Figure 7, an element may be attached to the movable body (2), concretely through its lower projection (21). Such an element may be, for instance, an arm (22) which acts as a clutch on a ferrule (23), to establish connection between the square strip (24) associated with a door outer handle (25) and the square strip (26) that allows handling of this door from the inside, at any time. This connection is made through the handle not shown in the Figure, in accordance with the solution foreseen to this effect in utility model 289.551, of same applicant. It is thus evident that the front outer plate that finishes this assembly will be fitted with a key-insertion slot (28), facing the above mentioned slot (10), and that the fixed body (1) will be duly secured to the rest of the device by means of a fixed support (29). This solution is a mere example, and the lock mechanism here described and vindicated may be applied to any other type of locking assembly which requires the same performance.

As was previously mentioned, the key (11) consists of a card with perforations on one area, which is inserted in slot (10) of the locking mechanism, and a sector (30), used as a handle.

This key serves as a pushing element that moves the movable body (2) by butting against the stepped area (12) in body; it also is the means of retraction for this movable element, since the card is kept locked to it through the relevant holes (19) and balls (13); elastic retraction of the balls is not feasible in order to withdraw the key, unless when holes (4) are operationally facing the corresponding holes or housings (3), at which moment the movable element (2) has recovered its primitive position with respect to the fixed element (1).

No further description is considered necessary for any expert in the matter to understand the scope of this invention and the advantages deriving from it.

Materials, shape, size and location of the elements may be varied, as long as this change does not mean any alteration of the essence of the invention.

The terms described in this document should always be taken in a wide and non limitative sense.

Claims

1st.- A perfected lock of the type incorporating a fixed body or element and a movable body or element, the latter displacing in respect to the former and acting as the means for opening and closing proper; the fixed and movable parts presenting a series of holes that form several lines, with the fixed element holes coaxially faced to those of the movable element when in a closing position, and radially out of phase when an opening situation is involved; the combined holes constitute the housings for a spring and a pin-counterpin assembly, which define between them a plane that allows for opening to take place when it is, in turn, coplaned with the union plane between the fixed and the movable element. A slot is also defined between these two elements, located in opposition to the above mentioned plane and which houses a key in the form of a perforated card, which card causes the axial movement of a certain set of pins-counterpins against the springs, and acts on these assemblies through the action of balls. However, this lock is essentially characterized by an auxiliary part which works jointly with the each pin-counterpin assembly; this auxiliary part is a washer or similar item, capable of fitting coaxially with the corresponding pin; it is specifically located between the end of the pin opposite the spring and an auxiliary counterpin which relates said pin with the pushing ball on the side of the key; the washer may also be radially displaced to leave the housing and become inoperative. A slot is added to the movable body, in the area of union between the pins and the auxiliary counterpins. A setting plate plays in this slot, to move the washers; a special feature of this plate is that it incorporates two holes to correspond with each housing in the movable body, whose section coincides with that of the housings. One of the holes will allow the movement of the elements within the corresponding housing of the fixed and movable bodies, and the other hole will eventually house the corresponding washer; to this effect, the setting plate is susceptible to longitudinal movement in its own plane, between two extreme settings en each one of which one of the holes of its various pairs of holes is axially implanted inside the corresponding housings of the movable body; in the other setting the other hole adopts the above mentioned location.

2nd.- A perfected lock as per the first claim, featuring pins whose configuration is conical at the end corresponding to the setting plate, or any similar shape which facilitates the penetration of the washers in the previously mentioned housings; this penetration is achieved through a longitudinal movement of the setting plate and when no key is inserted in the lock. It is to be noted that, from this

situation, when a key with a different code is inserted, the new movement in the opposite direction to the setting plate drives only the washers in the housings facing the hole-free areas in key, while the washers that were previously within the housings facing holes in the key are now higher than the setting plate plane, and are not, therefore, driven by it; thus the lock is automatically adapted to the code modification, that is, to the code of the new key.

3rd.- A perfected lock, as per previous claim, featuring a setting plate which may be actuated from the area in the lock located opposite the area of insertion of the key-card; i.e., from inside the room or enclosure protected by the lock. The actuating means of these plates, with which their longitudinal and alternative movement is achieved, may also be protected by any conventional means, to prevent unauthorized handling of the setting plate.

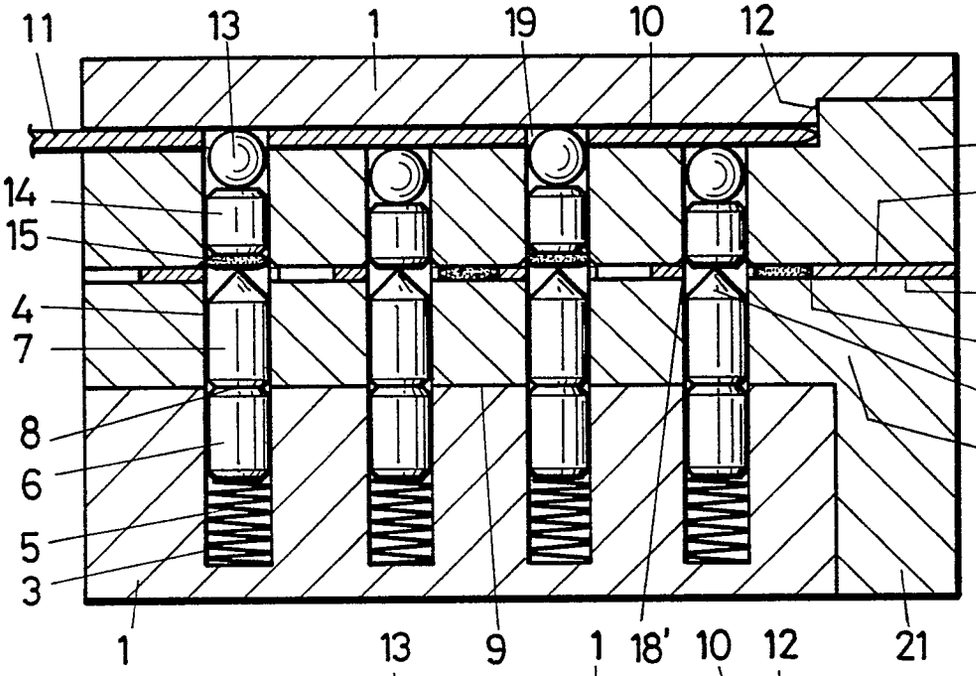

FIG.-1

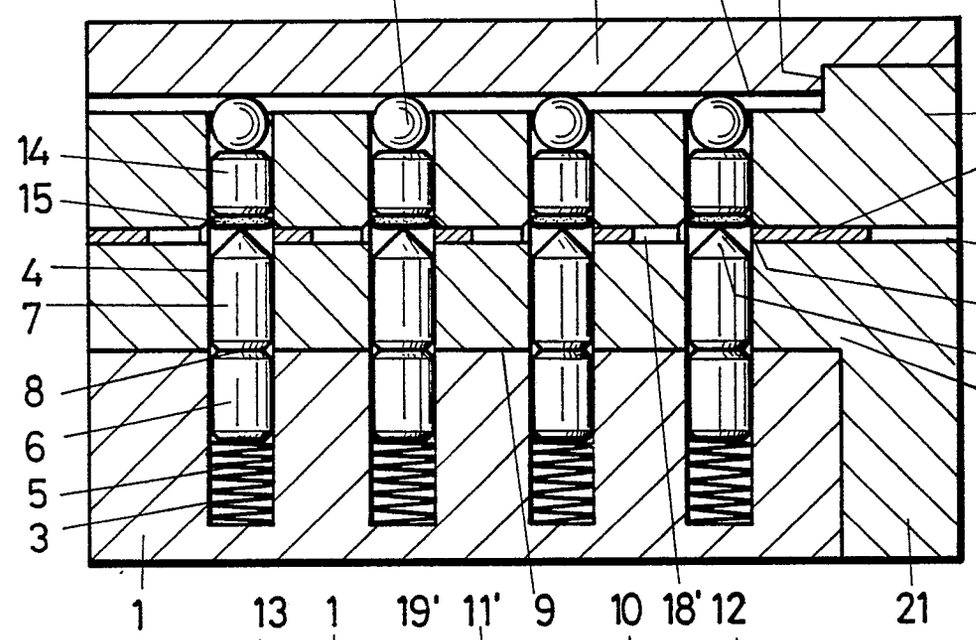

FIG.-2

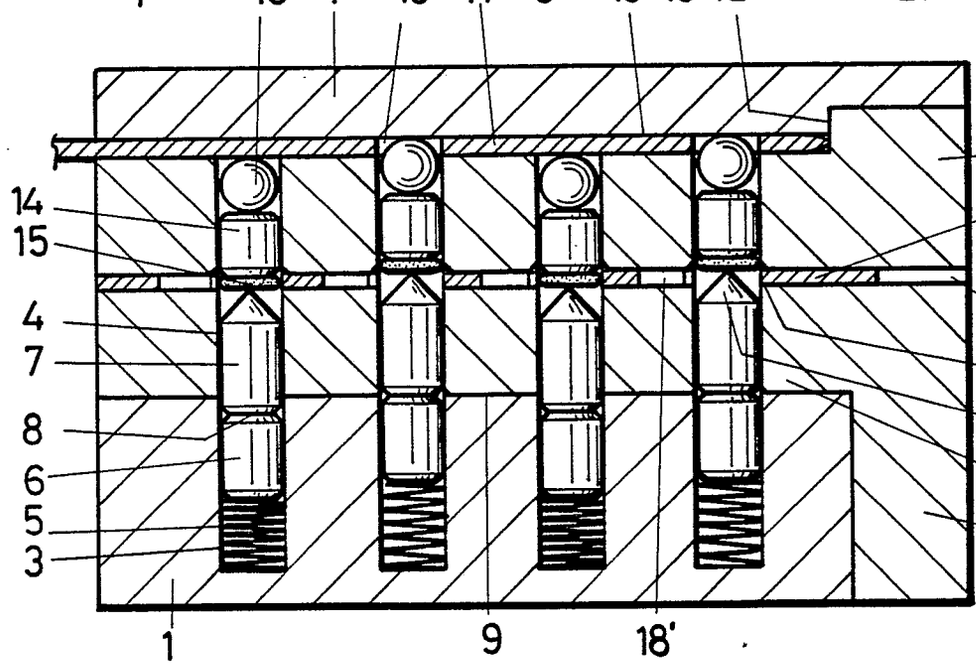

FIG.-3

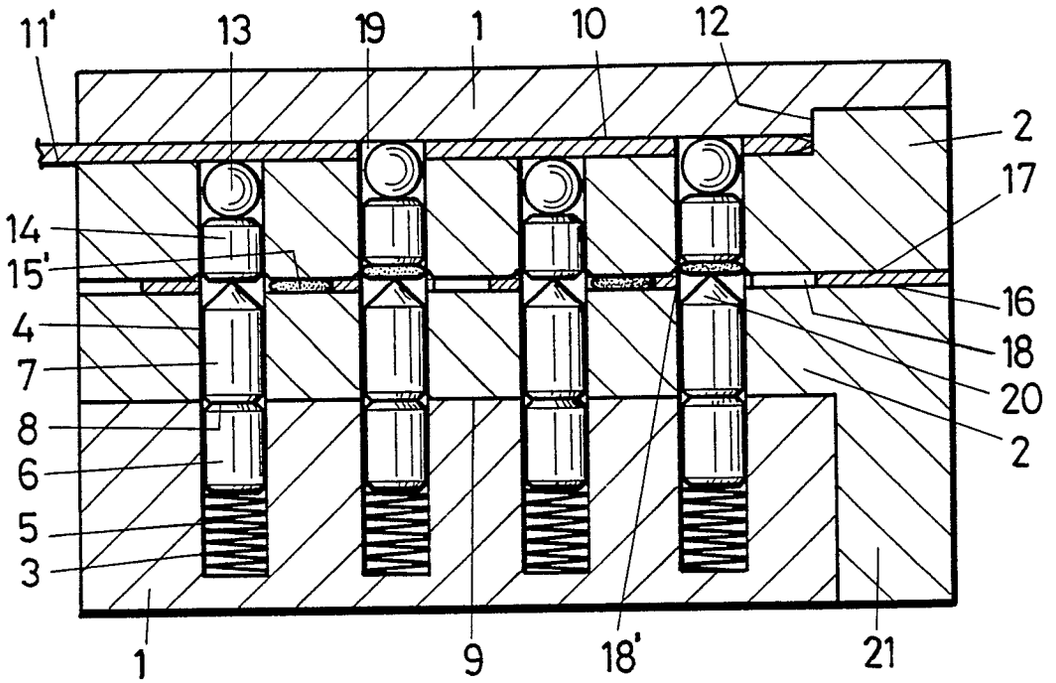

FIG.-4

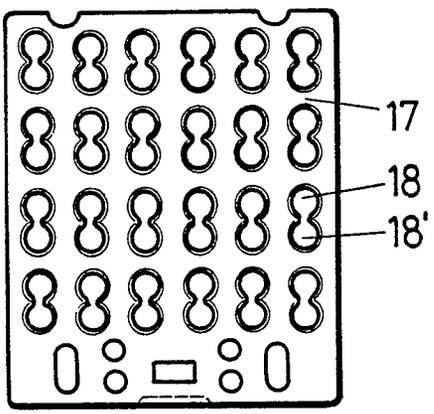

FIG.-5

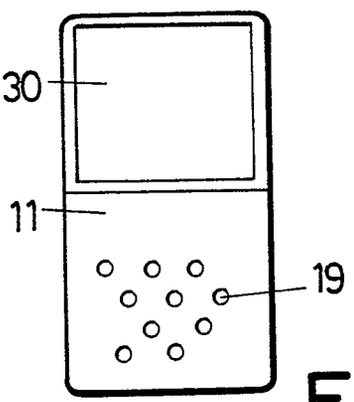

FIG.-6

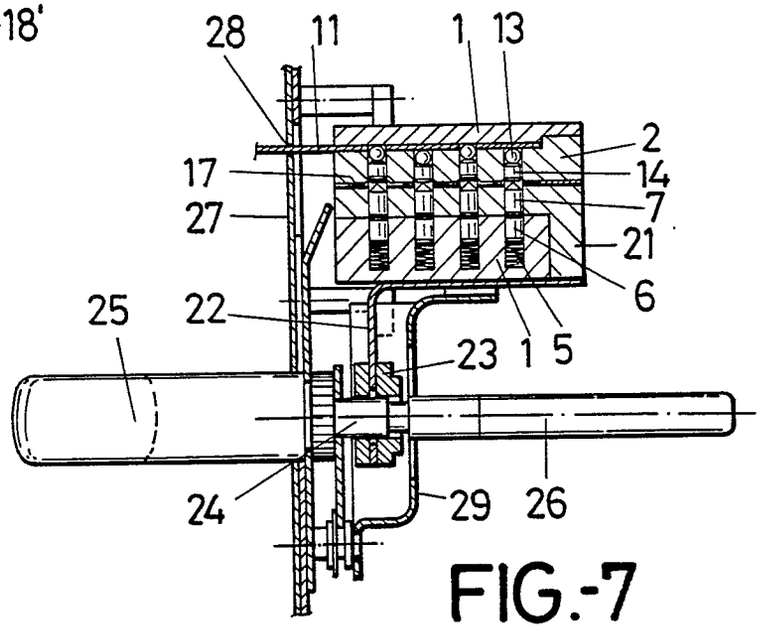

FIG.-7

European Patent Office

EUROPEAN SEARCH REPORT

Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 88500057.0

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US - A - 4 294 093 (BEST et al.) * Fig. 1-6; claims 1-14 * --	1,2	E 05 B 27/00
A	AT - B - 374 235 (EVVA-WERK) * Fig. 1 * --	1,2	
A	EP - A3 - 0 066 558 (INDUSTRIE FACE STANDARD) * Fig. 1-10 * --	1	
D,A	FR - A - 1 279 704 (MAYBY) * Fig. 1-14 * ----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

E 05 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	15-09-1988	CZASTKA

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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