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

(11) EP 0 626 031 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
07.01.1998 Bulletin 1998/02

(21) Application number: **92922282.6**

(22) Date of filing: **26.10.1992**

(51) Int Cl.[6]: **E05B 35/00**, E05B 19/16

(86) International application number:
PCT/AU92/00577

(87) International publication number:
WO 93/08354 (29.04.1993 Gazette 1993/11)

(54) **MECHANICAL CARD LOCK**

MECHANISCHES KARTENSCHLOSS

SERRURE MECANIQUE A CARTE

(84) Designated Contracting States:
DE ES FR GB

(30) Priority: **24.10.1991 AU 9097/91**
03.04.1992 AU 1714/92

(43) Date of publication of application:
30.11.1994 Bulletin 1994/48

(73) Proprietor: **CARDLOK PTY. LTD.**
Gerrigong., NSW 2535 (AU)

(72) Inventor: **PREDDEY, Brian, Francis**
Gerrigong., NSW 2535 (AU)

(74) Representative: **Findlay, Alice Rosemary et al**
Lloyd Wise, Tregear & Co.,
Commonwealth House,
1-19 New Oxford Street
London WC1A 1LW (GB)

(56) References cited:
EP-A- 0 106 397
EP-A- 0 260 210
EP-A- 0 447 906
DE-A- 3 803 358
DE-B- 1 062 571
DE-C- 812 232
FR-A- 1 163 526
FR-A- 2 206 779
FR-A- 2 597 140
FR-A- 2 610 355
GB-A- 2 123 478
US-A- 2 692 495
US-A- 4 587 815
US-A- 4 627 252
US-A- 4 735 068

- **PATENT ABSTRACTS OF JAPAN, M 1052, page 75; & JP,A,02 225 780 (NAKA TECH LAB) 7 September 1990 (07.09.90), Abstract, card 40 with perforations 45.**

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 0 626 031 B1

Printed by Jouve, 75001 PARIS (FR)

Description

This invention relates to a mechanical lock system using cards.

Increasingly, electronic card systems using magnetic or otherwise coded cards and slide type readers have been used to replace mechanical locks. These are relatively expensive, both in capital costs and in frequency of maintenance.

One problem associated with key operated locks is the difficulty of re-keying the lock. If a key is lost or stolen, a locksmith is required to provide a set of new keys and alter all the common-keyed locks. Mechanical card locking systems are known from e.g. United States Patent Specification No. 4,149,394 (Sornes), which utilise a card having round holes therein. The card can be inserted into the lock, whereby biased ball bearings are displaced. If the ball bearings are displaced in a predetermined manner, the lock can be opened. A similar ring-operated lock is disclosed in United States Patent Specification No. 4,338,805 to Nygren. These arrangements all subject the card to considerable wear, and allow for operation from one side only. Further, they cannot be readily re-keyed, nor do they allow for the use of a magnetic strip in addition to the mechanical mechanism. Such arrangements only allow for one possible position for each ball or ring, and do not allow for master keying hierarchies.

United States Patent Specification No. 4,627,252 (Lo) discloses a card operated lock using a set of plates arranged to directly receive a card with notches selectively removed in the end. This lock is only operable from one side, and re-keying involves rearranging the plates. The user card directly engages the lock mechanism. This arrangement only allows for one possible position for each ball or ring, and does not allow for master keying hierarchies.

French Patent Specification No. 1,163,526 (Beaudelet) discloses a simple mechanical lock arrangement comprising a series of spring loaded locking tumblers which are capable of being displaced independently of one another in a plane perpendicular to that in which the slide bolt is displaced. The mechanism is operable by use of a key featuring a series of grooves of varying depths, with one groove provided for each tumbler. Upon insertion of the key the tumblers undergo varying displacements, with the correct combination of displacements leading to the unlocking of the mechanism. However this mechanical lock arrangement does not allow for the re-keying of the lock mechanism.

United States Patent Specification No. 4,587,815 (Gil) describes a lock for use with a sheet key having a plurality of holes therethrough. The lock comprises a plurality of plates which are independently slidable along a path generally transverse relative to the key. Each plate has a pin on its edge facing the key and an aperture therein. When the plates are moved towards the key, selected pins pass through corresponding holes. An elongate opening through all the plates is formed to indicate an unlocked position if the correct key has been inserted.

United States Patent Specification No. 2,692,495 (Verdan) discloses a complex mechanical lock arrangement operable using a key and counter-key, each in the form of a thin blade with perforations therein. The counter-key is removably housed in the lock and unlocking of the mechanism is achieved if the pattern of holes in the key matches those on the counter-key. However, whilst this arrangement does enable rekeying of the lock mechanism, it is a complex arrangement which would be difficult to manufacture and which would require frequent maintenance in order to provide satisfactory and consistent working performance.

It is therefore an object of the present invention to provide a mechanical card lock which overcomes at least partly, the disadvantages of the prior art.

The present invention is directed at a lock mechanism operable using a user card the user card having a pattern of openings therethrough, and the lock mechanism comprising a plurality of generally parallel plates slidable relative to each other, with at least some of the plates having projections for insertion through the openings in the user card, and means for enabling release of the mechanism. According to the invention, a combination card corresponding to the user card is provided to define a combination profile, the openings in the user card are in the form of slots, the means for enabling release comprise means for engaging a combination profile, and in that after the user card and the combination card are inserted in the mechanism, the mechanism is operable to slide the plates towards the user card in a direction perpendicular to its plane and insert projections into respective slots, the lock mechanism being releasable only if the user card enables the plates to be moved such that the means for engaging a combination profile are correctly positioned to engage the profile defined by the combination card, and the combination card being replaceable to re-key the lock mechanism.

The invention also provides a user card for use in a lock mechanism as defined above, the card having a plurality of substantially rectangular slots therethrough, the longitudinal axes of the slots being generally perpendicular to the direction of insertion of the card, and the depth of insertion of projections therein being dependent on the length of the slots.

The invention will now be described by way of example and with reference to the accompanying drawings, in which:

Figure 1 illustrates a simplified schematic view of an assembled lock according to a first embodiment in a cut-away view;

Figure 2 illustrates in perspective the -card and lock components of the first embodiment;

Figure 3 is a perspective view of the body and plate components of the first embodiment;

Figure 4 shows in perspective one form of the assembled lock;
Figure 5 shows a simplified schematic view of another lock mechanism;
Figure 6 shows one embodiment of a card key according to the present invention;
Figures 7a and 7b are perspective views of the plate components of the mechanism of Figure 5;
Figure 8 illustrates partly in perspective an exploded view illustrating the operation of the mechanism of Figure 5;
Figure 9 is a cut away perspective view of a second embodiment of the present invention;
Figure 10 shows a perspective view of the assembled lock according to the second embodiment;
Figure 11 is a cut away perspective view of a third embodiment of the present invention;
Figure 12 is a perspective view of an assembled lock according to the third embodiment showing the combination card shutter open;
Figure 13 is a similar view to Figure 12 showing the shutter closed;
Figure 14 shows the rear of the assembled lock according to the third embodiment;
Figures 15a to d illustrate different slide plate configurations according to the third embodiment; and
Figure 16 illustrates the cam arrangement according to the third embodiment.

Referring to Figure 1, the lock mechanism 15 is based on body 80. The body 80 includes a number of pins and recesses, whose functions will be described in more detail below, and provides the externally visible surfaces of the lock.

Body 80 supports plate 50 via pins 88, 89, 101-104 and respective recesses 55, 54, 115, 114 and 116. It can be seen that plate 50 in the assembled position is enabled to slide vertically relative to body 80. Spring 92 retains the plate 50 in position via pins 102, 103.

Body 80 also supports lock plate assembly 30, via pins 86, 87 and recesses 33, 34. As will be seen from Figure 2, lock plate assembly 30 comprises a series of similar plates 31 stacked in a laminar fashion and enabled to slide horizontally note the movement available between pins 86, 87 and recesses 33, 34.

Body 80 also includes recess 84 for insertion of combination card 40. Combination card 40 includes a shaped pattern of recesses and protrusions 41 (see Figure 2) with widths matching the thickness of plates 31 so that the plates 31 are pushed horizontally into a pattern defined by combination card 40. Spring 91 retained by pin 105 maintains the plates in position when no combination key 40 is in place.

Plate 50 supports, via pins 51 and 52, and recesses 23, 24, key plate assembly 20. Pin 90 also extend from body 80 through slot 58 to support and atign the plate assembly 20. The key plate assembly 20 comprises a set of plates arranged similarly to lock plate assembly 30, and of the same thickness but of a different cross-sectional shape.

Bolt 70 rests on plate 50 and is secured in the locked or open position by pin 57. Spring 92 retains the bolt 70 in position. Bolt 70 passes through recess 83 in body 80. Bolt 70 includes recesses 72, 73 in its upper surface which define the open and locked positions respectively. Pin 81 and slot 74 provide support and guidance for bolt 70. Opening 53 allows for movement once user card 10 is inserted in slot 85.

Referring to Figure 2, user card 10 includes various slots 11, the distance from the end 13 of each of which is predetermined, while the sideways displacement defines a particular key combination from the variety available. Preferably, the slot combinations 11, 12 at each end are mirror images to facilitate locking and unlocking from either side of the door.

The operation of the interlocking mechanism will now be described with reference to Figure 2.

User card 10 is inserted into the cavity 27 of key plate assembly 20. The plates 21 and thus lugs 22 are upward relative to user card 10, the lugs 22 pass through the recesses 11 in user card 10, causing plates 21 to realign horizontally. The mechanism for relative movement will be described below.

The thereby re-aligned plates 21 accordingly define a specific pattern in the protruding tabs 25 which extend upwardly from the plates.

Referring to the lock plate assembly 30, the combination key 40 when inserted displaces the plates 31 so as to create a specific pattern of recesses 32 in the base of the lock plate assembly 30.

If the pattern of recesses 32 and tabs 25 match, the tabs are received in the recesses and the lock released (as will be described below).

It will therefore be appreciated that for each combination card 40 there is a corresponding pattern of plates formed, and hence a corresponding pattern of slots 11 in user card 10.

The exact number of recesses, and hence plates, may be varied as desired with corresponding alternatives to the number of key plates 21 and lock plates 31.

Figure 3 shows in detail the other lock components. Referring also to Figure 2, the operation of the lock will be described.

Cam means 60 is received in recesses 56 and 82 (not shown) via seat 61. As cam means 60 is rotated clockwise, it raises plate 50 via cam 62 and hence key plate assembly 20 towards lock plate assembly 30. It also lifts pin 57 in slot 72. As the key plate assembly 20 is moved up, the lugs 22 are pushed into slots 12 of the user card 10 and hence are shifted horizontally in a pattern corresponding to the key. As cam means 60 is rotated towards the top position, tabs 25 and recesses 32 approach each other. If they match, and tabs 25 are received in recesses 32, then pin 57 is lifted clear of slot 72, the cam acts on recess 71, and the bolt 70 moves to the locked position. On further rotation, pin 57 enters

slot 73 and so retains bolt 70 in the locked or unlocked position.

Preferably, spring means (not shown) ensures that key plates 21 return to the aligned position as they are lowered, so as to not retain a record of the correct alignment of the plates for opening.

It will be appreciated that if one key is lost or otherwise "re-keying" of the lock is required, all that is needed is a new combination card 40 and a set of new user cards 10. This system may be used to enhance security in hotels, by providing each guest with a randomly selected key and combination cards.

An example of a possible external configuration is shown in Figure 4. Combination card 40 has already been placed in opening 84. User card 10 is inserted into slot 85, and knob 63 rotated. If the correct key is inserted, it will rotate from locked to unlocked or vice-versa: otherwise, it will only rotate part-way and will not move bolt 75.

Illustrated in Figures 5 to 8 is a lock mechanism which utilises a set plate configuration, wherein the combination can only be changed by replacing one or more plates. It uses a preferred stepped plate arrangement for engaging the card. The lock comprises a lock body 202 having pins 201, 203 located thereon. A lever slide plate 214 which slides up and down and is located by pins 201,203. (Slide plate 214 is also visible in Figure 8.) The lever slide plate 214 has attached to it, by means of pins 199, 205, 219, a series of card engaging means in the form of slide plates 206. As illustrated in Figure 7 and Figure 8, the slide plates 206 are located in staggered formation as this allows a greater distance between the holes 222 on card 221, illustrated in Figure 6. Slide plates 206 have a stepped portion 209 on an upper portion thereof, whilst at a middle or lower portion there are lock gates 207, one on either end of slide plates 206. Having a gate 207 on each end allows the slide plates 206 to be reversible , and so they can be arranged in alternate arrangement as illustrated in Figure 7 with steps portions 209 on the left and right hand side. The slide plates 206 are mounted on pins 199, 205, 219 which are attached to plate 4 , and as illustrated in Figure 5 a spring 208 biases slide plates 206 relative to pins 201,203 on lever slide plate 214.

The locking mechanism also includes a bolt plate 210 having a gate post or pin 211. The bolt plate 210 is locked either in the open or in the closed position when the gates 207 are not aligned. The body of the lock mechanism includes a slot 215 for the insertion of card 221 (illustrated in Figure 6). Also pivoted to the body 202 is a cam shaft 60 which (as in the first embodiment) has a dual purpose of pushing the slide plates in an upward direction and once the gates 207 are aligned, so as to open channel 230, moving the bolt plate 210 and hence bolt 211 to the locked or unlocked position. These actions are performed in this arrangement when the card 221 having the correct combination is inserted in the slot 215. The cam shaft 60 is of a shape to engage recesses 228, 224 in the plates 214 and 210, through recess 225 in lock body 202.

Operation of the locking device is as follows. A card 221 is inserted in slot 215. The card is of a reversible nature and the lock can be opened from either side. Once in position, the card has holes 222, preferably of a square or rectangular nature, which when correctly positioned allow the stepped portion 209 of each slide plate 206 to move in an upward direction until such time as a step of stepped portion 209 cannot pass through the hole 222 in card 221. The length of the slot or hole 222 in the card 221 determines the length of travel in the vertical direction which the slide plate 206 will move. When the slide plate 206 is prevented from moving any further through card hole 222 the slide plate 214 continues in an upward direction compressing respective springs 208 of those slide plates 206 which can move no further. Slide plates 206 that can move will continue to do so until such time as a corresponding step engages the side of the hole 222 on card 221. When all the step portions 209 of slide plate 206 are in the correct position, gates 207 on adjacent slide plates 206 are in an aligned orientation so as to form channel 230, allowing the gate post 211 on bolt plate 210 to move into the gate 207. A single turn of shaft 60 (e.g. by a mating knob) which can only occur when user card 221 is in its correct position will open or unlock the lock.

Once the gate post 211 is located inside channel 230 of slide plate 206 , if so desired, the user card 221 can be removed with the locking mechanism in the secured unlocked position.

The user card 221 as illustrated in Figure 6 preferably also contains a magnetic strip 223 for use in those situations where other information may be required, or possibly other locking mechanisms can be associated with the mechanical locking mechanism of the present invention. The arrangement of holes 222 allows the presence of a magnetic strip 223 without diminishing the possible number of combinations.

Possible variations include the provision of latching means to generally operate the lock, and deadlocking means to make the bolt plate 210 go through a double length movement in order to ensure deadlocking of the lock.

Combinations of these locks whilst not being variable can be changed by changing the combination of slide plates 206 . The locking mechanism has preferably 7 or 8 slide plates 206. The locking mechanism can operate with any number of slide plates 206, however, a lower number will result in a decrease in the number of combinations which are possible and thus a reduction in security level.

One of the advantages of the present invention is that the card is not worn and the lock mechanism is not worn by the action of inserting the card. Wearing occurs only when the cam shaft 60 is turned, and this does not transfer any force to the card.

The second embodiment of the invention, as shown

in Figures 9 and 10, allows for use of the stepped plate arrangement, together with a simple re-keying procedure using a combination card.

Referring to Figure 9, there is shown generally a lock 220 including a setting or combination card carriage 247 supported via pins 253 and 254 received in recesses 263, 264. Cam means 246 is defined in carriage 247.

Combination card receiving means 243 is arranged on carriage 247, and is adapted to receive combination card 244.

Plate assembly 249 comprises a number of slide plates 242 having a predefined stepwise configuration 209 on or in an upper surface thereof, as has been described in relation to the second embodiment. However, according to this embodiment each slide plate 242 also includes, remote from the stepwise configured upper surface, a tab or lug 245 engageable in a corresponding slot 256 in combination card receiving means 243.

Combination card 244 includes a number of slots or holes 265 of predetermined configuration to match the configuration of the number of lugs 245 on slide plates 242.

User card 221 as previously described includes recesses 222 , which may be of any desired configuration, but are preferably square or rectangular, which when correctly positioned with respect to the step portions 209 of slide plates 242 allow the step portions to move in an upward direction until such time as a step of the step portion cannot progress any further.

Biasing means 248 in the form of a spring biases the combination card receiving means 243 in the direction of slide plates 242 and if the combination card 244 corresponding to the user card 221 is present in the receiving means 243, the lock can be opened.

Figure 10 provides a depiction of a preferred external lock configuration, similar to Figure 4. Shutter 255 is slidable with respect to the body of lock 220, and provides added security in that it acts as a barrier to improper insertion of a combination card 244. The shutter 255 is operable and openable by user card 221 to allow ingress of a combination card 244 into receiving means 243 only if the correct user card 221 is inserted into user card slot 85. Latch mechanism 75 may be of any suitable type .

The operation of the interlocking mechanism can be described as follows.

User card 221 is inserted into slot 85 and the cam means 246 is rotated by knob 63, preferably in an anticlockwise direction. The step portions 209 of slide plates 242 pass upwardly through the recesses 222 in user card 221, causing the slide plates 242 to re-align horizontally. The re-aligned plate assembly 249 accordingly defines a specific pattern of the lugs 245 on slide plates 242 . The user card 221 thus facilitates the formation of a desired lug combination.

On matching of the correct user card/slide plate combination, shutter 255 slides open, allowing the insertion of combination card 244 into card receiving means 243. The combination card 244 has a predefined punched pattern therein, which is configured to align with the combination formed by the lugs 245 as the cam means 246 is rotated further.

Spring 248 biases the card receiving means 243 towards the lugs 245 if the correct combination card 244 is inserted into the receiver 243. On matching, the lugs 245 will pass through the card 244, allowing the cam means 246 to continue to rotate and to thereby facilitate unlocking of the lock.

It will be realised that if re-keying of the lock is for some reason required or desired, it is a simple matter of changing the combination card 244 so as to correspond to a new user card 221 combination.

A further example of a lock utilising the principles of the present invention will be described with reference to Figure 11. This example is the preferred mode of implementing the invention.

Figure 11 shows a lock mechanism 300 generally similar to the embodiment of Figure 9, utilising user cards 221 and combination cards 244 of similiar type.

The slide plate assembly 360 comprises alternating left 362 and right 361 slide plates with upper stepped projections 309. The front slide plate 369 and rear plate 368 are slightly different in their construction from the other plates as will be discussed below (see Figure 15).

The combination assembly 301 comprises a carrier 308 for receiving combination card 244, recesses 306, 307 receiving corresponding pins 302, 303, teeth 305 and projection 304. Pins 302, 303 are part of the body, which is not shown so as to enhance clarity.

Main plate assembly 350 is arranged so as to travel up and down relative to the combination assembly 301 and slide plate assembly 360, and includes cam device 320. Lock plate 340 lies parallel to plate assembly 350, and includes teeth 342 corresponding to teeth 305.

Cam device 320 (see Figure 16) includes a channel 328 for receiving a handle, cams 322 and 324 for raising and lowering respectively plate assembly 350, and cams 323 and 321 for raising and lowering respectively the lock plate assembly.

It will be understood that for correct operation to occur, combination card 244 and user card 221 are correctly inserted into their respective positions, and that they must be a corresponding pair.

In use, rotating cam device 320 initially causes cam 322 to engage fans 352 (the left side is not visible) which engage teeth 351 and start to lift main plate assembly 350. This starts to lift slide plate assembly 360 via compressible fingers 363 on each slide plate, and rollers 364. It will be understood that (after some travel) step portions 309 of slide plates 361, 362 enter the slots of user card 221 as far as possible, and that each slide plate then ceases further upward motion. This causes lugs 367 on the (as drawn) right sides on the slide plates 361, 362 to form a specific pattern.

At the same time, cam 323 engages the lock plate 340 and moves it up and to the left. This also moves,

via spring 345, the combination assembly 301.

It can therefore be seen that the combination assembly 301 is moving left and up at the same time as the slide plates 361, 362 are engaging user card 221 and forming a pattern of lugs 367. If the pattern of lugs 367 matches the pattern of slots 265 in the combination card, both parts continue their relative travel, the lugs 367 enter the slots 265 in the combination card, and the lock completes its movement to the unlocked position.

If, however, any one of the lugs 367 is in the incorrect position, the travel of the combination assembly 301 is blocked, spring 345 compresses, and teeth 305 and 342 engage so as to halt travel. It is emphasised that very little force is sufficient to cause this engagement, so that little or no wear of the combination card 244 occurs.

Moreover, there is very little force transferred to the user card 221 - merely the weak upward movement of the slide plates 361, 362.

Preferably, the slide plates 361, 362 and as much as possible of the rest of the mechanism are formed from a relatively rigid plastics material such as perspex. The cam device 320, and lock-operative parts of the lock plate 340 and combination assembly 301 are preferably formed from a metal alloy so as to provide break resistance.

Preferably, means are provided with the knob (not shown) for turning cam device 320 such that excessive force results in slippage of the knob, rather than damage to the mechanism.

The fan 352 and tooth 351 lifting arrangement provides for a smooth action when the knob is rotated.

When the knob is released and returned to the initial position, cam 321 returns the lock plate through engagement with a suitable recess (not shown), and cam 323 lowers the main plate assembly 350.

The operation of the "fingers" 363 of the slide plates 361, 362 is important to functionally implementing a reliable lock.

When the fingers 363 are rising in the recess 344, rollers 364, 365 maintain pressure on the fingers, and are forced into the upper part of recess 375 by the resilient outward force of the fingers 363. At the end of the fingers 363 travel, this force is removed and rollers 364, 365 can drop into the lower part of the recess. Extra fingers 371 on the front slide plate 369 and rear slide plate 368 ensure this occurs prior to the downward travel.

In the embodiment shown in Figure 11, any time a correct card is engaged, the combination card can be changed. The present invention, however, lends itself readily to master keying, and many possible keys may match any given combination card - particularly maid keys, and master keys (of various levels) may be employed. The more slots and options for size, the more possibilities for cards are created. Dummy slots or indentations are preferably included in the combination cards thus further increasing the difficulty of surreptitiously manipulating the lock.

In a master keyed environment, for instance a hotel, it is desirable that only authorised personnel can alter the combination key. Using an arrangement with a master key, the lock has two open positions, only one of which allows the combination card 244 to be removed. The H-shaped opening on front slide plate 369 allows, in combination with pin in shutter 380, for such an arrangement. Normal user keys leave the pin at the top, and then bottom, of the left arm of the H. The master key leaves the pin in the middle, so that the shutter 380 can be slid back (see Figures 12, 13) and the combination card changed.

The lock, shown in Figures 12 and 13, also allows for a privacy feature. As shown in Figure 14, the user card may be inserted into a slot once in the room. This engages a bevelled end of pin 381, which protrudes so as to indicate a desire for privacy. It also engages a small lug (not shown) which prevents other cards, or the maid's card, from being fully inserted. The master card may include a notch corresponding to the lug, so as to override the privacy request if necessary.

The user cards and combination cards may be formed from any suitable material, but a plastics material such as is commonly used for credit cards is preferred.

It will be appreciated that while the embodiments shown relate to one-sided key arrangements, the present invention is readily adapted to be opened from either side of the lock if desired. It will also be noted that the mechanism can be manufactured such that it can be used for either left or right hand opening doors.

Cards may be cut by any suitable means, but a computer-controlled punching system is currently preferred.

The present invention is suitable for use particularly in commercial or industrial situations, such as hotels, offices, factories, schools and the like. It is also, however, applicable for domestic use. Whilst the embodiments described relate to door latch applications, the invention can equally be used for locks of any type, subject to modifications of size, shape. etc.

Claims

1. A lock mechanism (15;220;300) operable using a user card (10;221), the user card having a pattern of openings (11,12;222) therethrough, and the lock mechanism comprising a plurality of generally parallel plates (20;242;360) slidable relative to each other, with at least some of the plates having projections (22;209;309) for insertion through the openings (11,12;222) in the user card, and means (25;245) for enabling release of the mechanism (15;220;300), characterised in that a combination card (40;244) corresponding to the user card (10;221) is provided to define a combination profile, the openings in the user card are in the form of slots (11,12;222), the means for enabling release comprise

means (25;245) for engaging a combination profile, and in that after the user card (10;221) and the combination card (40;244) are inserted in the mechanism, the mechanism is operable to slide the plates (20;242;360) towards the user card in a direction perpendicular to its plane and insert projections (22; 209;309) into respective slots (11,12;222), the lock mechanism being releasable only if the user card (10;221) enables the plates to be moved such that the means (25;245) for engaging a combination profile are correctly positioned to engage the profile defined by the combination card (40;244), and the combination card being replaceable to re-key the lock mechanism.

2. A lock mechanism (15;220;300) according to Claim 1, wherein the means for engaging a combination profile comprises lugs (25;245) extending from at least some of the plates.

3. A lock mechanism (15;220;300) according to Claim 1 or Claim 2, wherein the combination profile is defined by a plurality of slots (41;265) in the combination card (40;244).

4. A lock mechanism (220;300) according to any preceding Claim wherein the projections (209;309) are formed such that their respective depth of insertion into the user card (221) depend on the length of the slot (222) in the user card (221) through which the respective projection passes.

5. A lock mechanism (200;300) according to any preceding Claim wherein the projections (209;309) are provided on one edge of the plates (242;360) and the lugs (245) are provided on a different edge of the plates.

6. A lock mechanism (220;300) according to Claim 5 wherein the respective projections (209;309) may be provided on the one edge of the plates (242;360) at different positions.

7. A lock mechanism (220;300) according to Claim 6 wherein the plates (242;360) including projections are arranged such that alternate plates (361,362) have projections (209;309) provided towards opposite ends thereof.

8. A lock mechanism (300) according to any preceding Claim comprising a plate assembly (350) and a lock plate (340) controlled by a cam mechanism (320) operable by a user operated handle.

9. A lock mechanism (300) according to Claim 8, wherein the the handle is mechanically buffered from the plate assembly (350) such that only a limited amount of force can be operatively transferred to the user card (221).

10. A lock mechanism (300) according to Claim 8 or Claim 9 comprising a combination assembly (301) for receiving the combination card (244), such that if a user card (221) and corresponding combination card (244) are inserted in the mechanism, the mechanism is operable to move the lock plate (340) which in turn moves the combination assembly (301) via a spring (345) and the lock plate is able to move to its unlocked position.

11. A lock mechanism (300) according to Claim 10, wherein the mechanism is operable to move the plate assembly (350) which lifts the plates (360) via compressible fingers (363) thereon, such that the projections (309) are inserted in corresponding slots (222) in the user card (221) as far as possible and then the respective plates (360) cease motion.

12. A lock mechanism (15) according to any of Claims 1 to 4 comprising a plurality of intermediate plates (31) slidable relative to each other in a direction parallel to the plane of the user card (10), the means for enabling release comprising recesses (32) formed on one edge of at least some of the intermediate plates, such that insertion of the combination card (40) displaces the intermediate plates (31) to create a pattern of the recesses (32) and define a combination profile.

13. A lock mechanism (15;220;300) according to any preceding Claim wherein after insertion therein of a master user card, the combination card (40;244) may be removed or replaced.

14. A lock mechanism (15;220;300) according to any preceding Claim wherein the combination card (40; 244) includes dummy slots.

15. A user card (221) adapted to be used with a lock mechanism (220;300) according to Claim 1, wherein the card has a plurality of substantially rectangular slots (222) therethrough, the longitudinal axes of the slots being generally perpendicular to the direction of insertion of the card, and the depth of insertion of (209;309) projections therein being dependent on the length of the slots.

16. A card (221) according to Claim 15 comprising magnetic stripe means (223) for operating a magnetic card reader.

Patentansprüche

1. Sperrmechanismus (15; 220; 300) zur Verwendung mit einer Nutzerkarte (10; 221), wobei die Nutzer-

karte ein Muster von sie durchsetzenden Öffnungen (11, 12; 222) aufweist, und wobei der Sperrmechanismus mehrere allgemein parallele Platten (20; 242; 360) aufweist, die relativ zueinander verschiebbar sind, wobei zumindest einige der Plattenvorsprünge (22; 209; 309) zur Einführung durch die Öffnungen (11, 12; 222) in der Nutzerkarte aufweist, und eine Einrichtung (25; 245) zum Ermöglichen einer Freigabe des Mechanismus (15; 220; 300), **dadurch gekennzeichnet**, daß eine Kombinationskarte (40; 244) entsprechend der Nutzerkarte (10; 221) vorgesehen ist, um ein Kombinationsprofil festzulegen, wobei die Öffnungen in der Nutzerkarte in der Form von Schlitzen (11, 12; 222) vorliegen, wobei die Einrichtung zum Ermöglichen einer Freigabe eine Einrichtung (25; 245) zum Eingriff mit einem Kombinationsprofil aufweist, und daß, nachdem die Nutzerkarte (10; 221) und die Kombinationskarte (40; 244) in den Mechanismus eingeführt sind, der Mechanismus betreibbar ist, um die Platten (20; 242; 360) in Richtung auf die Nutzerkarte in einer Richtung senkrecht zu ihrer Ebene zu verschieben und zum Einführen von vorsprüngen (22; 209; 309) in jeweilige Schlitze (11, 12; 222) wobei der Sperrmechanismus nur dann freigebbar ist, wenn die Nutzerkarte (10; 221) es den Platten ermöglicht, derart bewegt zu werden, daß die Einrichtung (25; 245) zum Eingriff mit einem Kombinationsprofil korrekt positioniert ist, um in Eingriff mit dem Profil zu gelangen, das durch die Kombinationskarte (40; 244) festgelegt ist, und wobei die Kombinationskarte zum erneuten Schließen des Sperrmechanismus rückstellbar bzw. herausziehbar ist.

2. Sperrmechanismus (15; 220; 300) nach Anspruch 1, wobei die Einrichtung zum Eingriff mit einem Kombinationsprofil Nasen (25; 245) aufweist, die sich zumindest von einigen der Platten erstrecken.

3. Sperrmechanismus (15; 220; 300) nach Anspruch 1 oder 2, wobei das Kombinationsprofil durch mehrere Schlitze (41; 265) in der Kombinationskarte (40; 244) festgelegt ist.

4. Sperrmechanismus (220; 300) nach einem vorangehenden Anspruch, wobei die Vorsprünge (209; 309) derart gebildet sind, daß ihre jeweilige Einführtiefe in die Nutzerkarte (221) von der Länge Schlitzes (222) in der Nutzerkarte (221) abhängt, durch welchen der jeweilige Vorsprung hindurchtritt.

5. Sperrmechanismus (200; 300) nach einem vorangehenden Anspruch, wobei die Vorsprünge (209; 309) auf einem Rand der Platte (242; 360) vorgesehen sind, und die Nasen (245) auf einem unterschiedlichen Rand der Platten vorgesehen sind.

6. Sperrmechanismus (220; 300) nach Anspruch 5, wobei die jeweiligen vorsprünge (209; 309) auf dem einen Rand der Platten (242; 360) in unterschiedlichen Positionen vorgesehen sein können.

7. Sperrmechanismus (220; 300) nach Anspruch 6, wobei die Vorsprünge aufweisenden Platten (242; 360) so angeordnet sind, daß abwechselnde Platten (361, 362) Vorsprünge (209; 309) aufweisen, die in Richtung auf gegenüberliegende Enden von ihnen vorgesehen sind.

8. Sperrmechanismus (300) nach einem vorangehenden Anspruch, aufweisend einen Plattenaufbau (350) und eine Sperrplatte (340), die durch einen Nockenmechanismus (320) gesteuert wird, der durch einen nutzerbetätigten Handgriff betreibbar ist.

9. Sperrmechanismus (300) nach Anspruch 8, wobei der Handgriff von dem Plattenaufbau (350) mechanisch derart gepuffert ist, daß lediglich ein begrenztes Kraftausmaß auf die Nutzerkarte (221) betriebsmäßig übertragen werden kann.

10. Sperrmechanismus (300) nach Anspruch 8 oder 9, aufweisend einen Kombinationsaufbau (301) zum Aufnehmen der Kombinationskarte (244) derart, daß dann, wenn eine Nutzerkarte (221) und eine entsprechende Kombinationskarte (244) in den Mechanismus eingeführt sind, der Mechanismus betätigbar ist, um die Sperrplatte (340) zu bewegen, die ihrerseits den Kombinationsaufbau (301) über eine Feder (345) betätigt, und die Sperrplatte in der Lage ist, sich in ihre freigegebene Position zu bewegen.

11. Sperrmechanismus (300) nach Anspruch 10, wobei der Mechanismus betätigbar ist, um den Plattenaufbau (350) zu bewegen, welcher die Platten (360) über zusammendrückbare Finger (363) darauf so anhebt, daß die Vorsprünge (309) in entsprechende Schlitze (222) in der Nutzerkarte (221) so weit wie möglich eingeführt sind, woraufhin die jeweiligen Platten (360) aufhören, sich zu bewegen.

12. Sperrmechanismus (15) nach einem der Ansprüche 1 bis 4, aufweisend mehrere Zwischenplatten (31), die relativ zueinander in einer Richtung parallel zu der Ebene der Nutzerkarte (10) verschiebbar sind, wobei die Einrichtung zum Ermöglichen einer Freigabe Vertiefungen (32) aufweist, die auf einem Rand von zumindest einigen der zwischenplatten gebildet sind, so daß eine Einführung der Kombinationskarte (40) die Zwischenplatten (31) verschiebt, um ein Muster der Vertiefungen (32) zu erzeugen und ein Kombinationsprofil festzulegen.

13. Sperrmechanismus (15; 220; 300) nach einem vorangehenden Anspruch, wobei nach Einführung ei-

ner Masternutzerkarte in diesen die Kombinationskarte (40, 240) entfernt oder entnommen werden kann.

14. Sperrmechanismus (15; 220; 300) nach einem vorangehenden Anspruch, wobei die Kombinationskarte (40; 244) Dummy-Schlitze aufweist.

15. Nutzerkarte (221) zur Verwendung mit einem Sperrmechanismus (220; 300) nach Anspruch 1, wobei die Karte mehrere sich durch sie hindurch erstrekkende im wesentlichen rechteckige Schlitze (222) aufweist, wobei die Längsachsen der Schlitze allgemein senkrecht zu der Einführrichtung der Karte verlaufen, und die Einführtiefe von Vorsprüngen (209; 309) darin abhängig von der Länge der Schlitze ist.

16. Karte (221) nach Anspruch 15, aufweisend eine Magnetstreifeneinrichtung (223) zum Betätigen eines Magnetkartenlesers.

Revendications

1. Mécanisme de verrouillage (15 ; 220 ; 300) pouvant fonctionner au moyen d'une carte d'utilisateur (10 ; 221), la carte d'utilisateur présentant une combinaison d'ouvertures (11, 12 ; 222) la traversant, et le mécanisme de verrouillage comprenant une pluralité de plaques globalement parallèles (20 ; 242 ; 360) pouvant coulisser les unes par rapport aux autres, au moins certaines des plaques présentant des saillies (22 ; 209 ; 309) pour leur insertion à travers les ouvertures (11, 12 ; 222) ménagées dans la carte d'utilisateur, et des moyens (25 ; 245) destinés à permettre la libération du mécanisme (15 ; 220 ; 300), caractérisé en ce qu'une carte à combinaison (40 ; 244) correspondant à la carte d'utilisateur (10 ; 221) est prévue pour définir un profil de combinaison, en ce que les ouvertures ménagées dans la carte d'utilisateur se présentent sous la forme de fentes (11, 12 ; 222), en ce que les moyens destinés à permettre la libération comprennent des moyens (25 ; 245) destinés à coopérer avec un profil de combinaison, et en ce qu'une fois que la carte d'utilisateur (10 ; 221) et la carte à combinaison (40 ; 244) sont insérées dans le mécanisme, le mécanisme peut fonctionner pour faire coulisser les plaques (20 ; 242 ; 360) en direction de la carte d'utilisateur, dans une direction perpendiculaire à son plan, et insérer les saillies (22 ; 209 ; 309) dans les fentes respectives (11, 12 ; 222), le mécanisme de verrouillage n'étant susceptible d'être libéré que si la carte d'utilisateur (10 ; 221) permet aux plaques d'être déplacées de telle sorte que les moyens (25 ; 245) destinés à coopérer avec un profil de combinaison sont correctement positionnés pour coopérer avec le profil défini par la carte à combinaison (40 ; 244), et la carte à combinaison étant susceptible d'être remplacée pour recoder le mécanisme de verrouillage.

2. Mécanisme de verrouillage (15 ; 220 ; 300) selon la revendication 1, dans lequel les moyens destinés à coopérer avec un profil de combinaison comprennent des oeillets (25 ; 245) s'étendant à partir d'au moins certaines des plaques.

3. Mécanisme de verrouillage (15 ; 220 ; 300) selon la revendication 1 ou la revendication 2, dans lequel le profil de combinaison est défini par une pluralité de fentes (41 ; 265) ménagées dans la carte à combinaison (40 ; 244).

4. Mécanisme de verrouillage (220 ; 300) selon l'une quelconque des revendications précédentes, dans lequel les saillies (209 ; 309) sont formées de telle sorte que leur profondeur respective d'insertion dans la carte d'utilisateur (221) dépend de la longueur de la fente (222) ménagée dans la carte d'utilisateur (221) à travers laquelle passe la saillie respective.

5. Mécanisme de verrouillage (200 ; 300) selon l'une quelconque des revendications précédentes, dans lequel les saillies (209 ; 309) sont prévues sur un bord des plaques (242 ; 360) et les oeillets (245) sont prévus sur un bord différent des plaques.

6. Mécanisme de verrouillage (220 ; 300) selon la revendication 5, dans lequel les saillies respectives (209 ; 309) peuvent être prévues sur l'un des bords des plaques (242 ; 360) en différents emplacements.

7. Mécanisme de verrouillage (220 ; 300) selon la revendication 6, dans lequel les plaques (242 ; 360) comprenant des saillies sont disposées de telle sorte qu'une plaque sur deux (361, 362) possède des saillies (209 ; 309) prévues en direction de leurs extrémités opposées.

8. Mécanisme de verrouillage (300) selon l'une quelconque des revendications précédentes, comprenant un ensemble formant plaque (350) et une plaque de verrouillage (340) commandée par un mécanisme à came (320) susceptible de fonctionner grâce à une poignée manipulée par l'utilisateur.

9. Mécanisme de verrouillage (300) selon la revendication 8, dans lequel la poignée est mécaniquement isolée de l'ensemble formant plaque (350) de telle sorte que seule une force limitée puisse être transférée, en fonctionnement, à la carte d'utilisateur (221).

10. Mécanisme de verrouillage (300) selon la revendication 8 ou la revendication 9, comprenant un ensemble à combinaison (301) pour recevoir la carte à combinaison (244), de telle sorte que si une carte d'utilisateur (221) et la carte à combinaison (244) correspondante sont insérées dans le mécanisme, le mécanisme est susceptible de déplacer la plaque de verrouillage (340) qui, à son tour, déplace l'ensemble à combinaison (301), par l'intermédiaire d'un ressort (345), et la plaque de verrouillage est susceptible de se déplacer dans sa position non verrouillée.

11. Mécanisme de verrouillage (300) selon la revendication 10, dans lequel le mécanisme est susceptible de déplacer l'ensemble formant plaque (350) qui soulève les plaques (360) par l'intermédiaire de doigts (363) compressibles présents sur elles, de telle sorte que les saillies (309) sont inserées dans des fentes (222) correspondantes présentes dans la carte d'utilisateur, aussi loin que possible, et que les plaques (360) respectives arrêtent de bouger.

12. Mécanisme de verrouillage (15) selon l'une quelconque des revendications 1 à 4, comprenant une pluralité de plaques intermédiaires (31) pouvant coulisser les unes par rapport aux autres dans une direction parallèle au plan de la carte d'utilisateur (10), les moyens permettant la libération comprenant des évidements (32) formés sur un bord d'au moins certaines des plaques intermédiaires, de telle sorte que l'insertion de la carte à combinaison (40) déplace les plaques intermédiaires (31) afin de créer une combinaison d'évidements (32) et définir un profil de combinaison.

13. Mécanisme de verrouillage (15 ; 220 ; 300) selon l'une quelconque des revendications précédentes, dans lequel, après insertion, dans celle-ci, d'une carte d'utilisateur maîtresse, la carte à combinaison (40 ; 244) peut être retirée et remplacée.

14. Mécanisme de verrouillage (15 ; 220 ; 300) selon l'une quelconque des revendications précédentes, dans lequel la carte à combinaison (40 ; 244) comprend des fentes fictives.

15. Carte d'utilisateur (221) susceptible d'être utilisée avec un mécanisme de verrouillage (220 ; 300) selon la revendication 1, dans lequel la carte comprend une pluralité de fentes (222) sensiblement rectangulaires ménagées à travers elle, les axes longitudinaux des fentes étant sensiblement perpendiculaires à la direction d'insertion de la carte, et la profondeur d'insertion des saillies (209 ; 309) qui y sont ménagées dépendant de la longueur des fentes.

16. Carte (221) selon la revendication 15, comprenant des moyens à piste magnétique (223) pour faire fonctionner un lecteur de cartes magnétiques.

Fig 1.

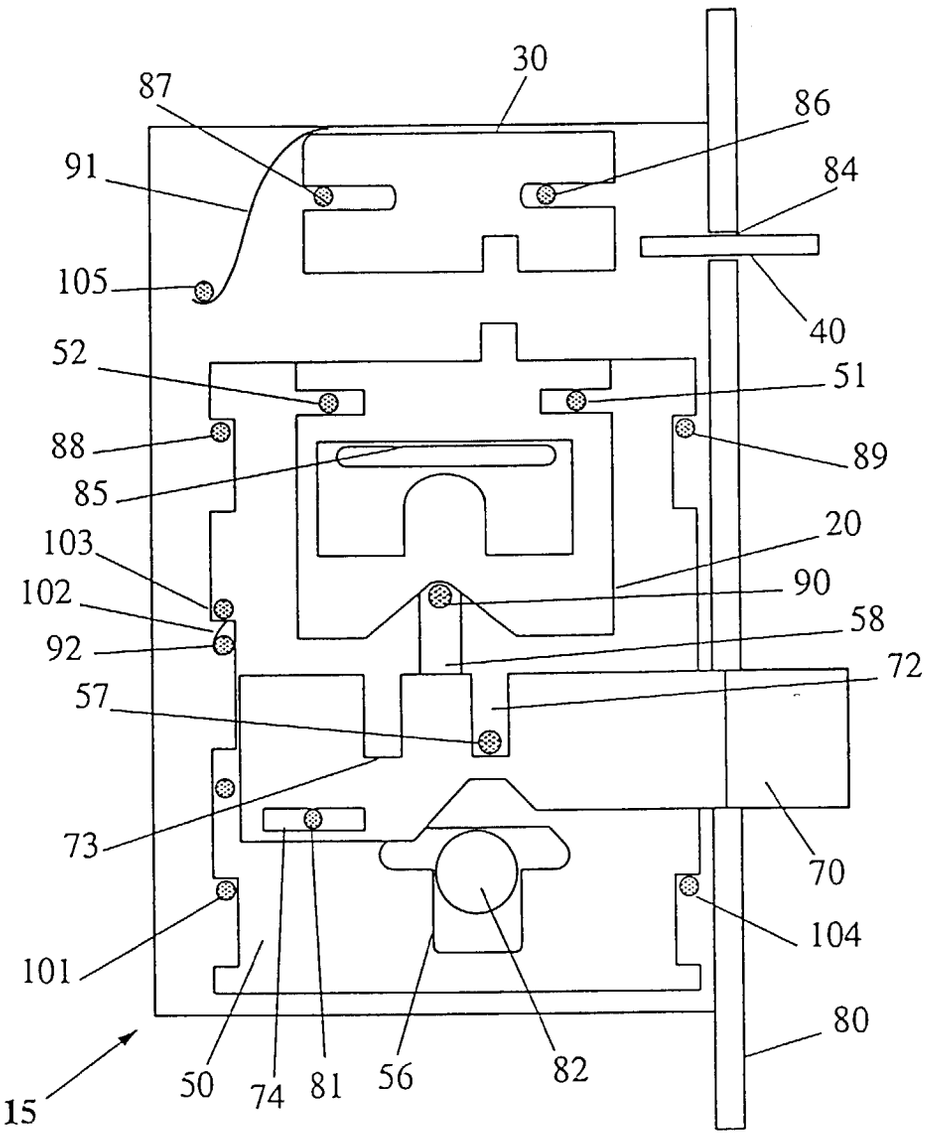

30
87
86
91
84
105
40
52
51
88
89
85
20
103
90
102
58
92
72
57
73
70
104
101
80
15
50
74
81
56
82

Fig 2.

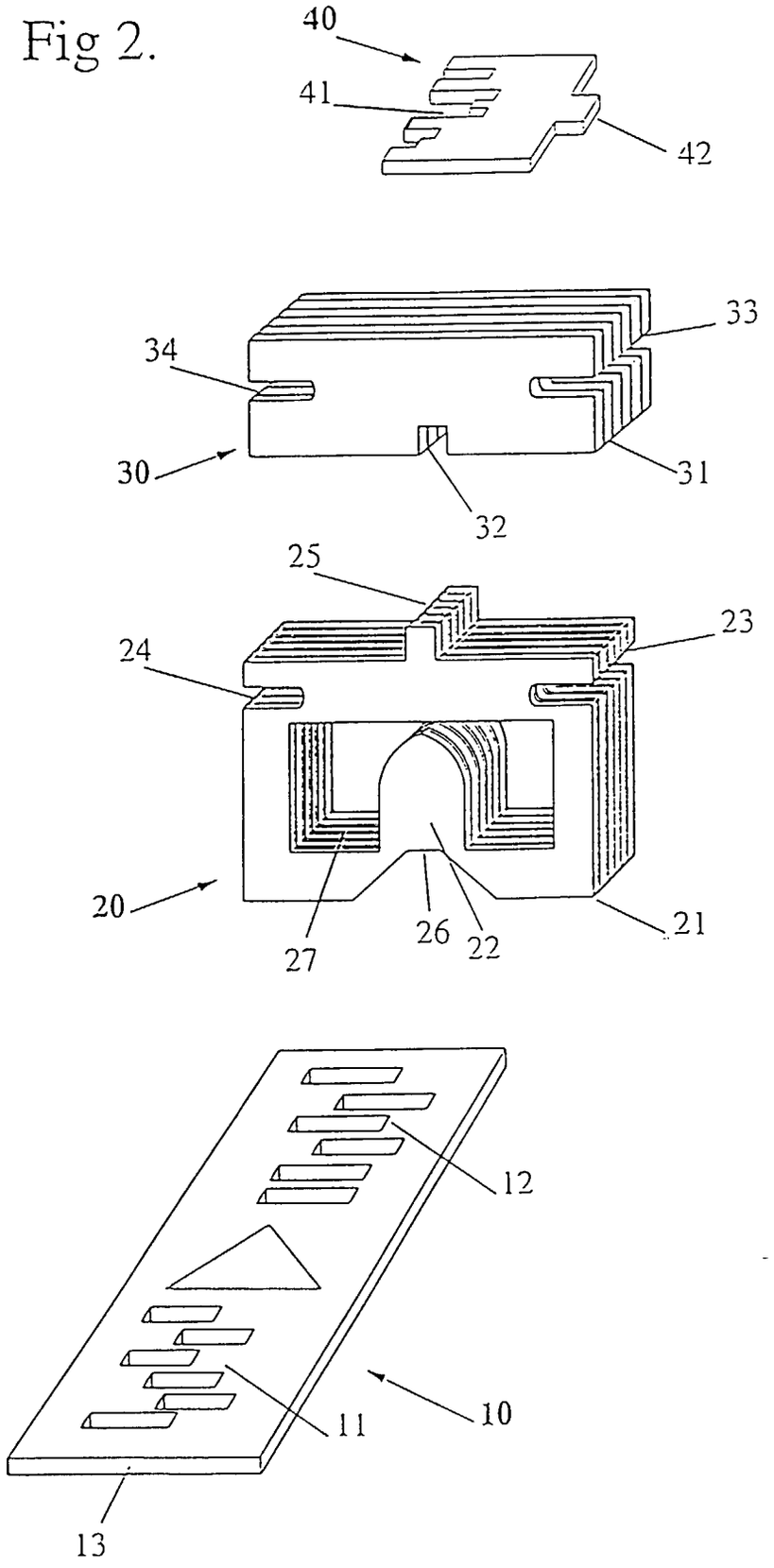


Fig 3.

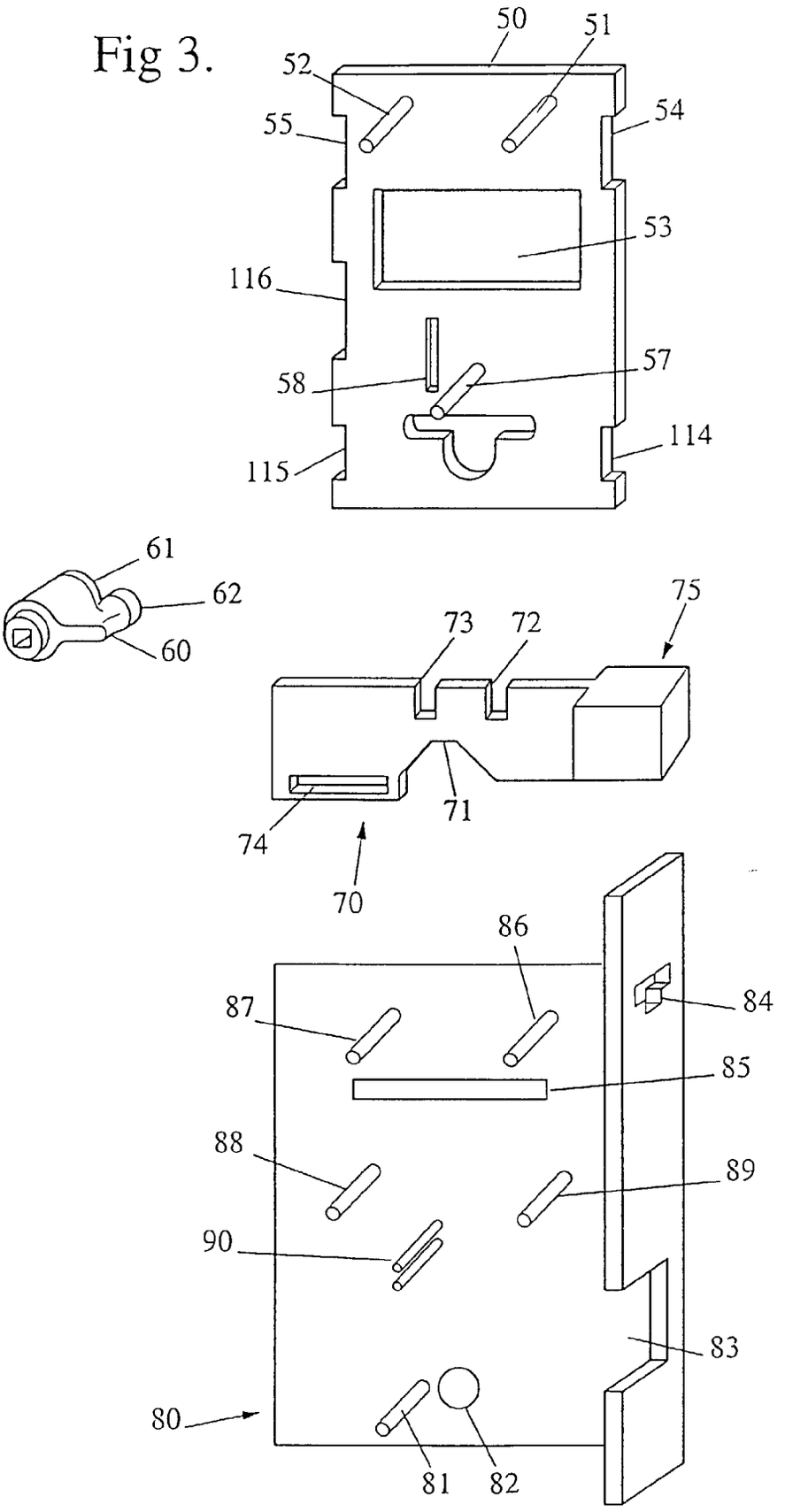
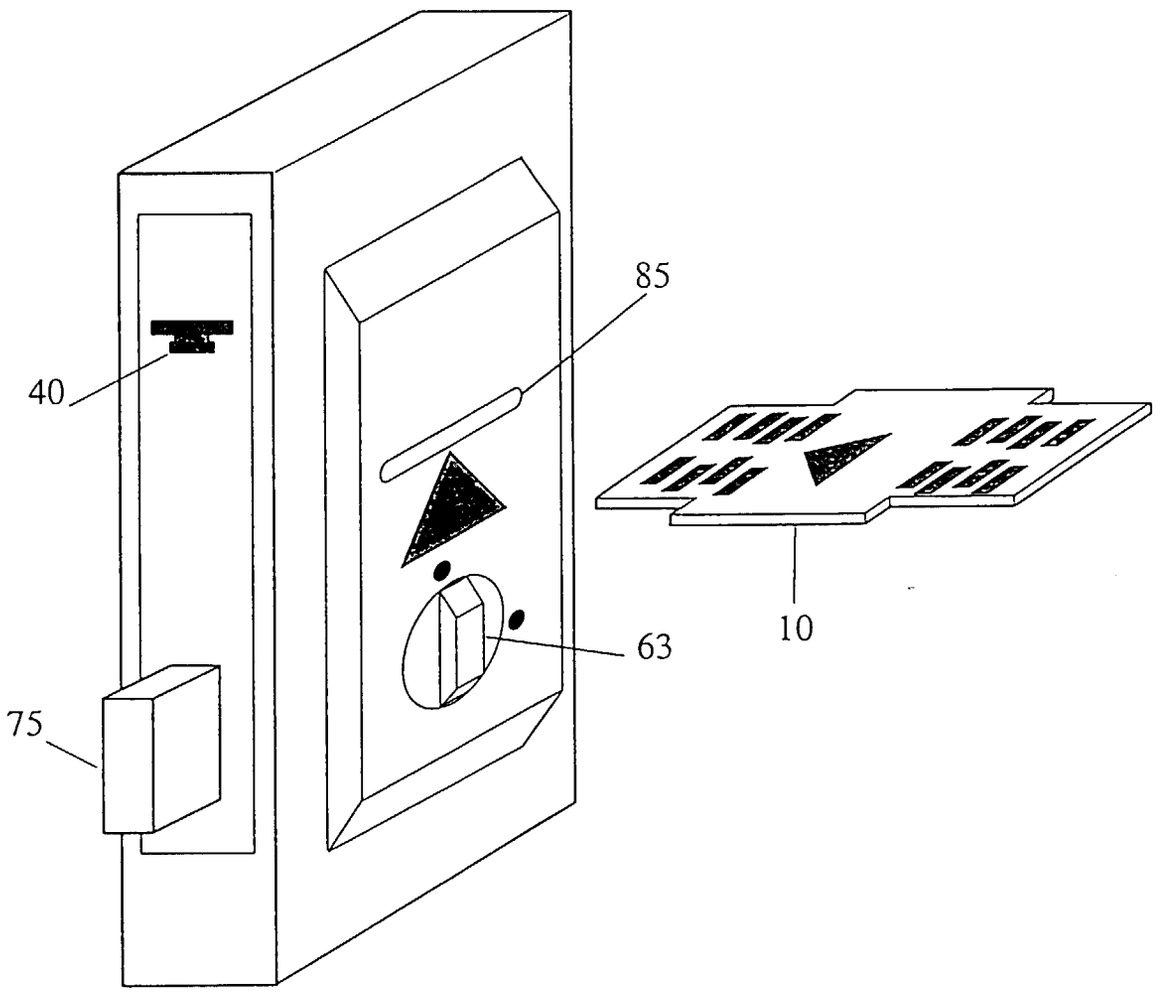

50
51
52
54
55
53
116
57
58
114
115
61
62
60
75
73
72
71
74
70
86
84
87
85
88
89
90
83
80
81
82

Fig 4.



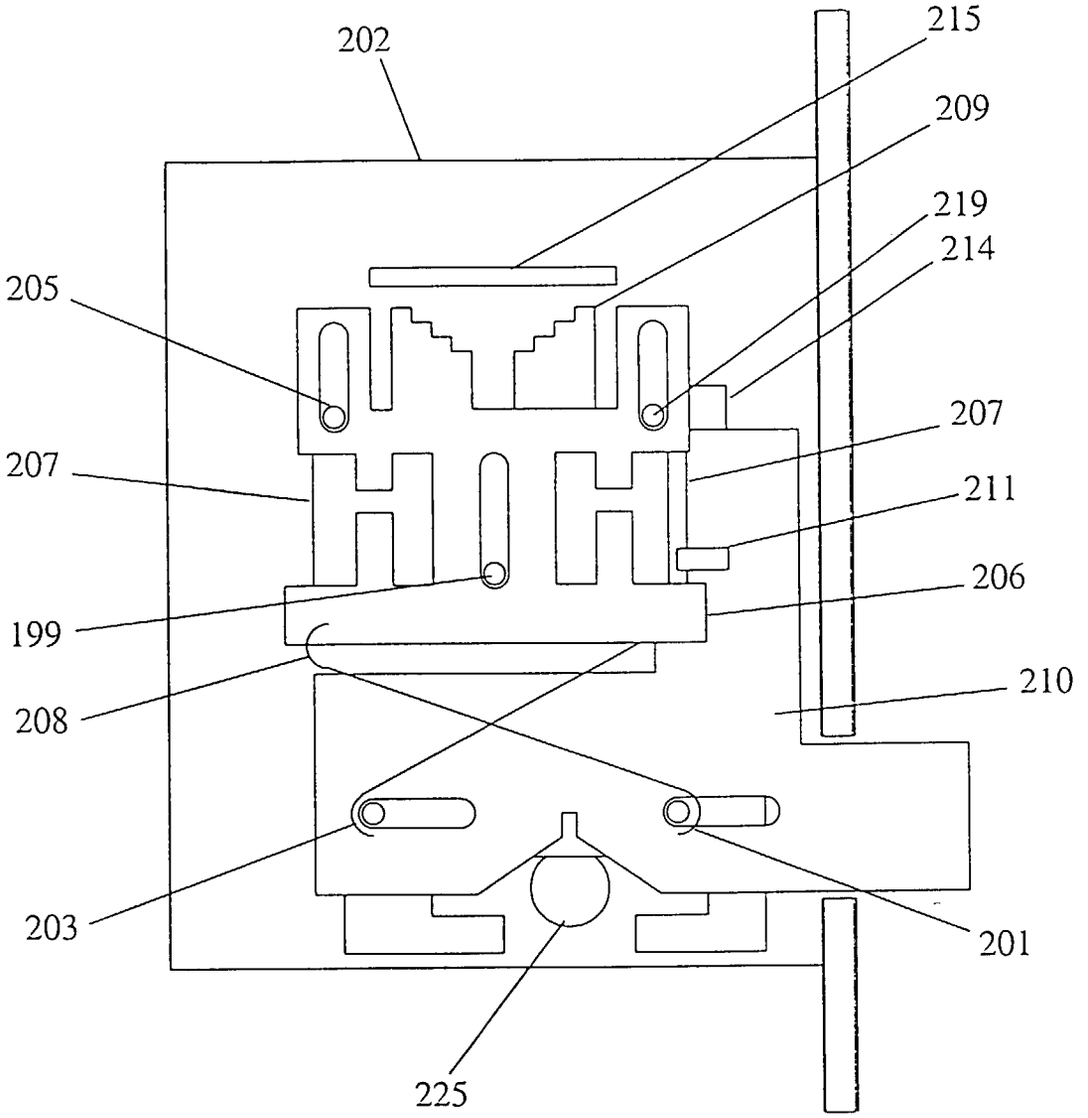


Fig 5.

Fig 6.

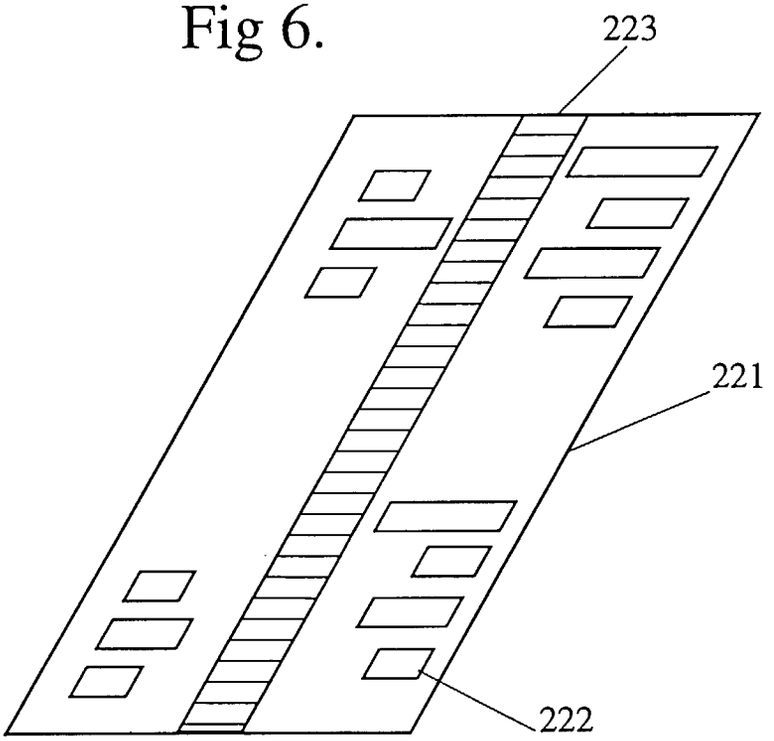
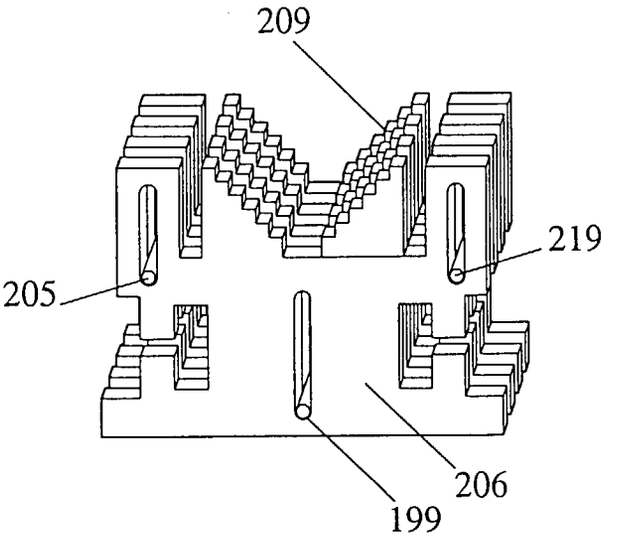


Fig 7a.



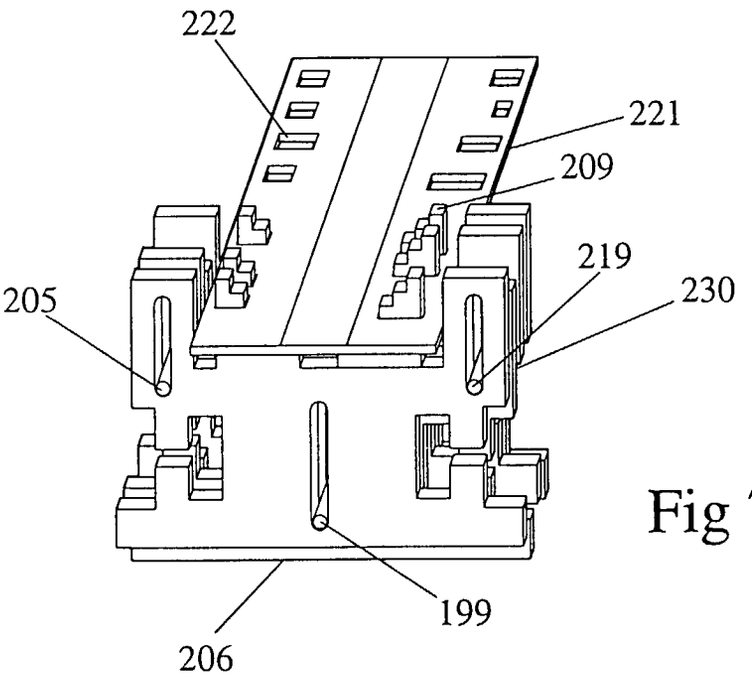


Fig 7b.

Fig 8.

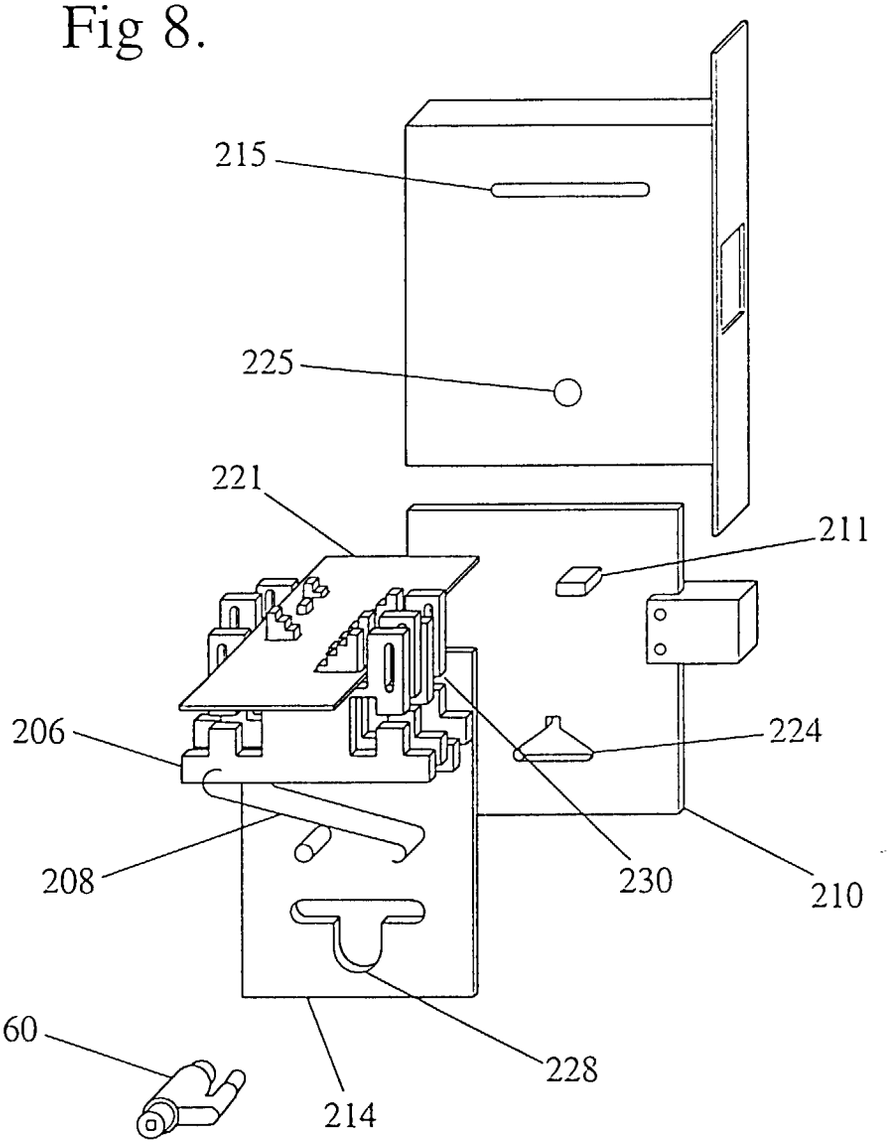
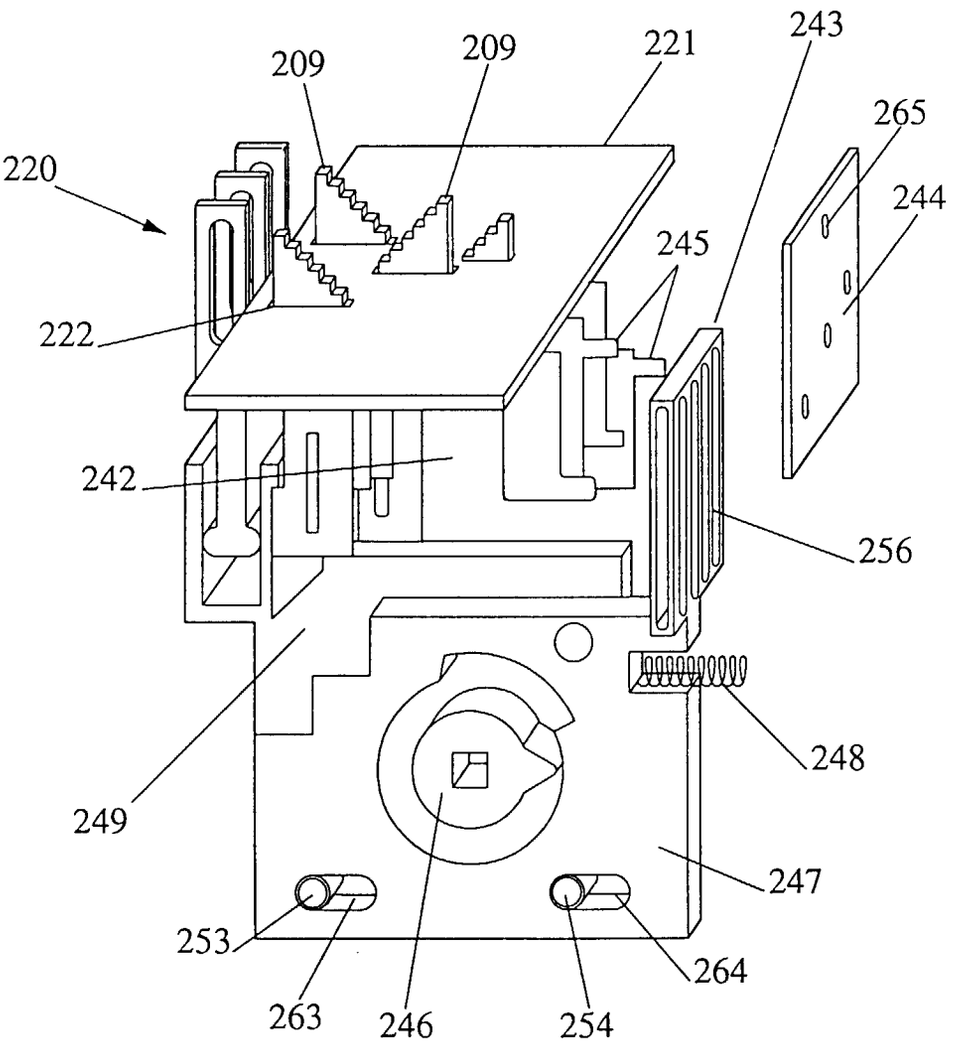


Fig 9.


209
209
221
243
265
220
244
245
222
242
256
248
249
247
253
264
263
246
254

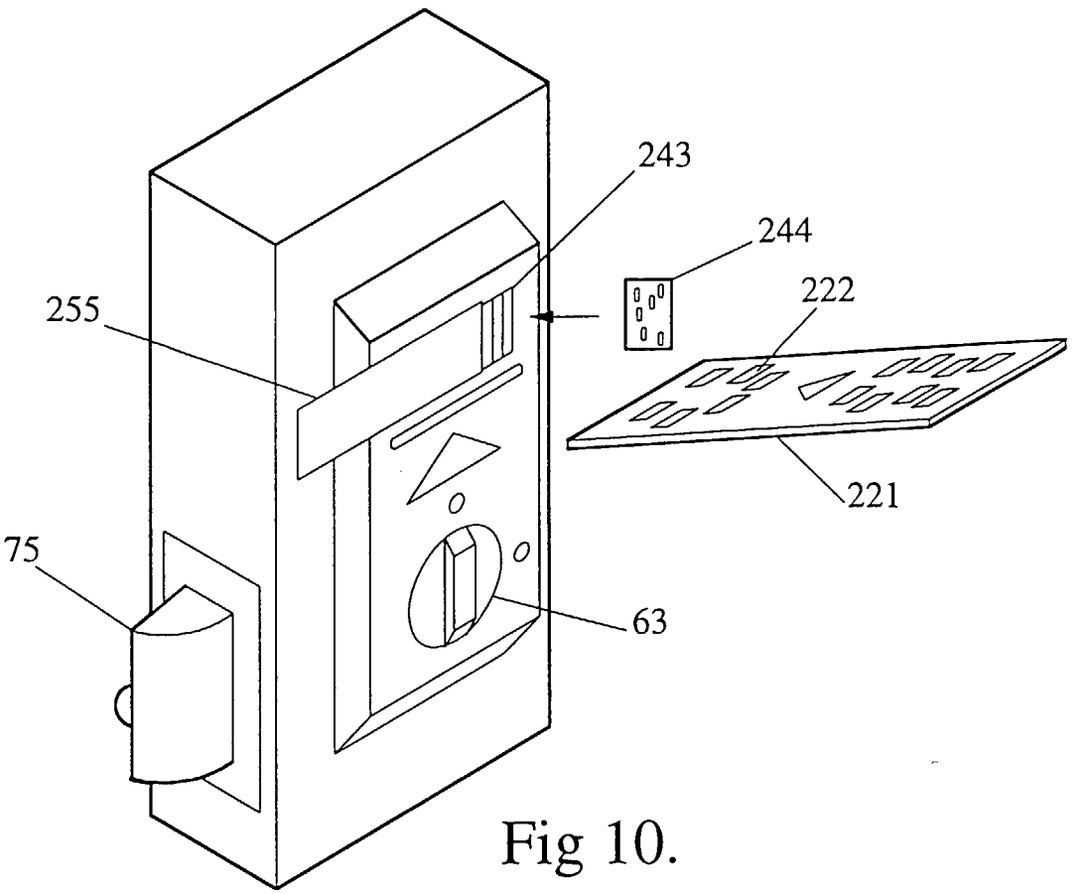


Fig 10.

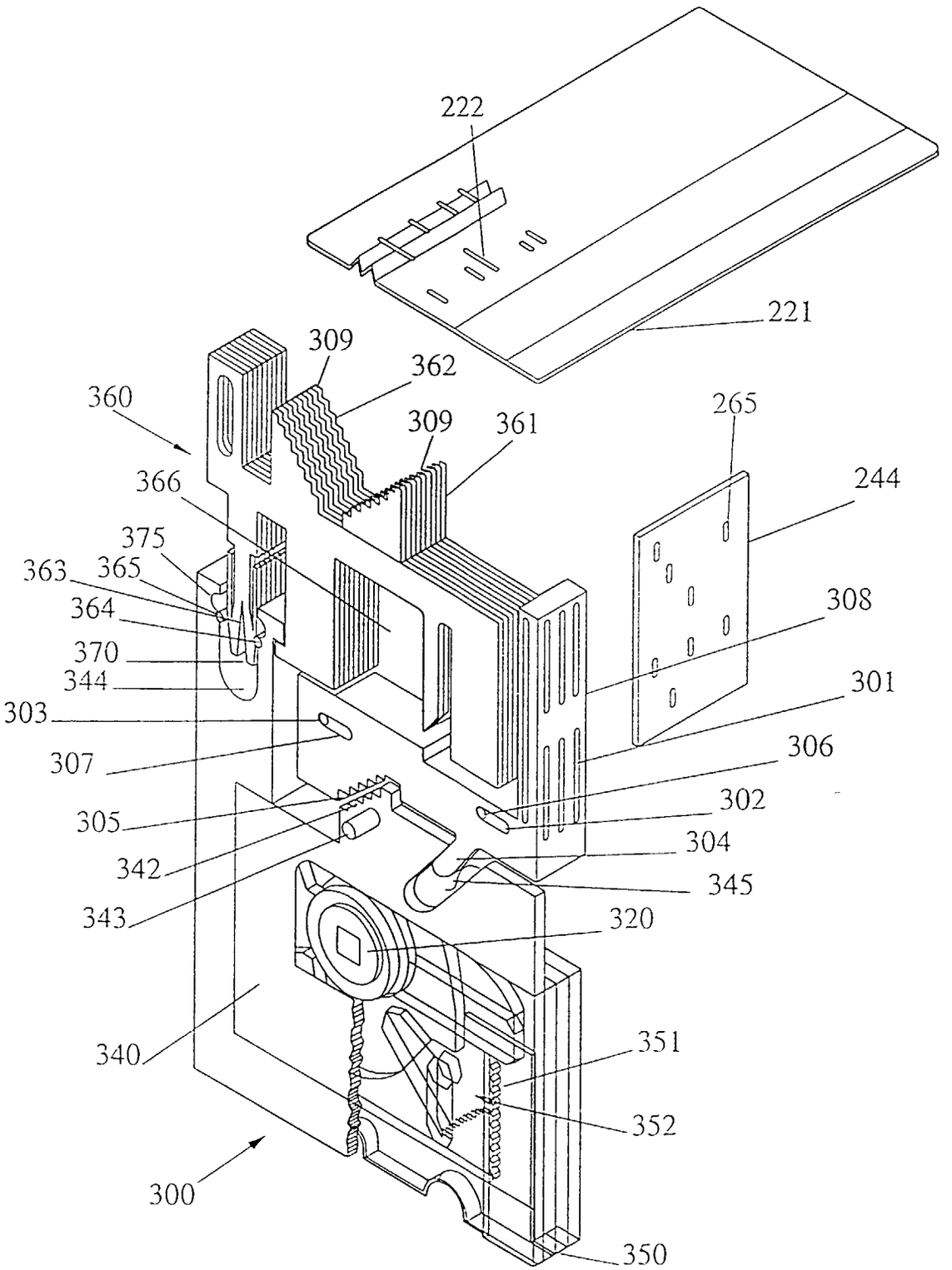

222
221
309
362
360
309
361
265
244
366
375
363
365
364
370
344
308
303
301
307
306
305
302
342
304
343
345
320
340
351
352
300
350

Fig 11.

Fig 12.

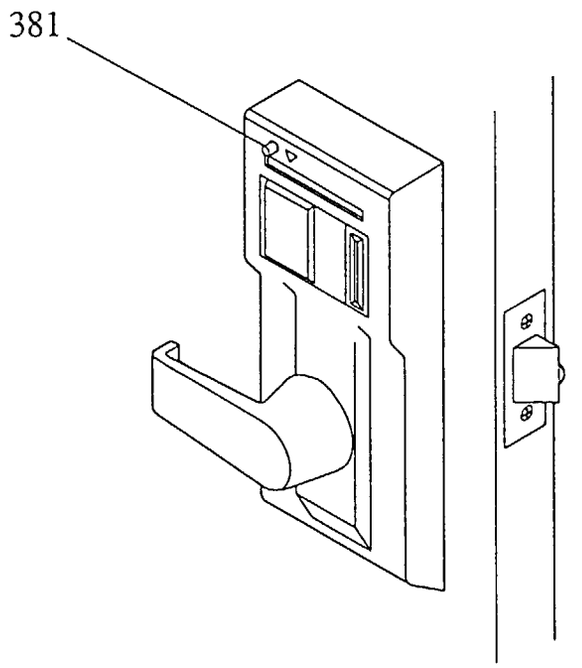
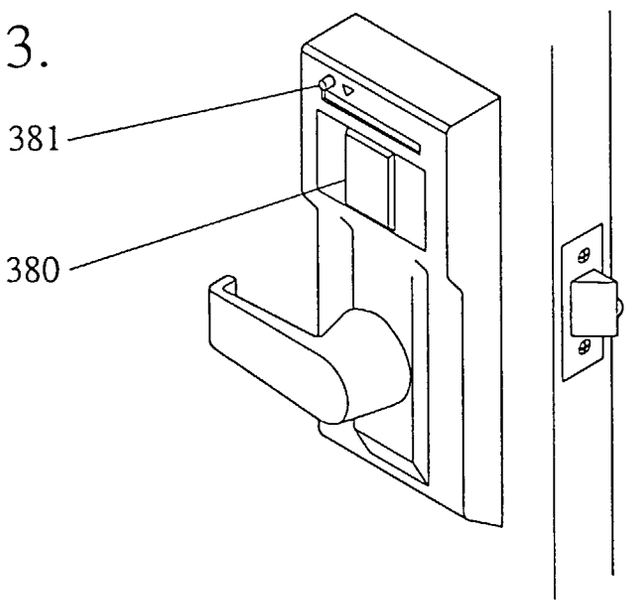


Fig 13.



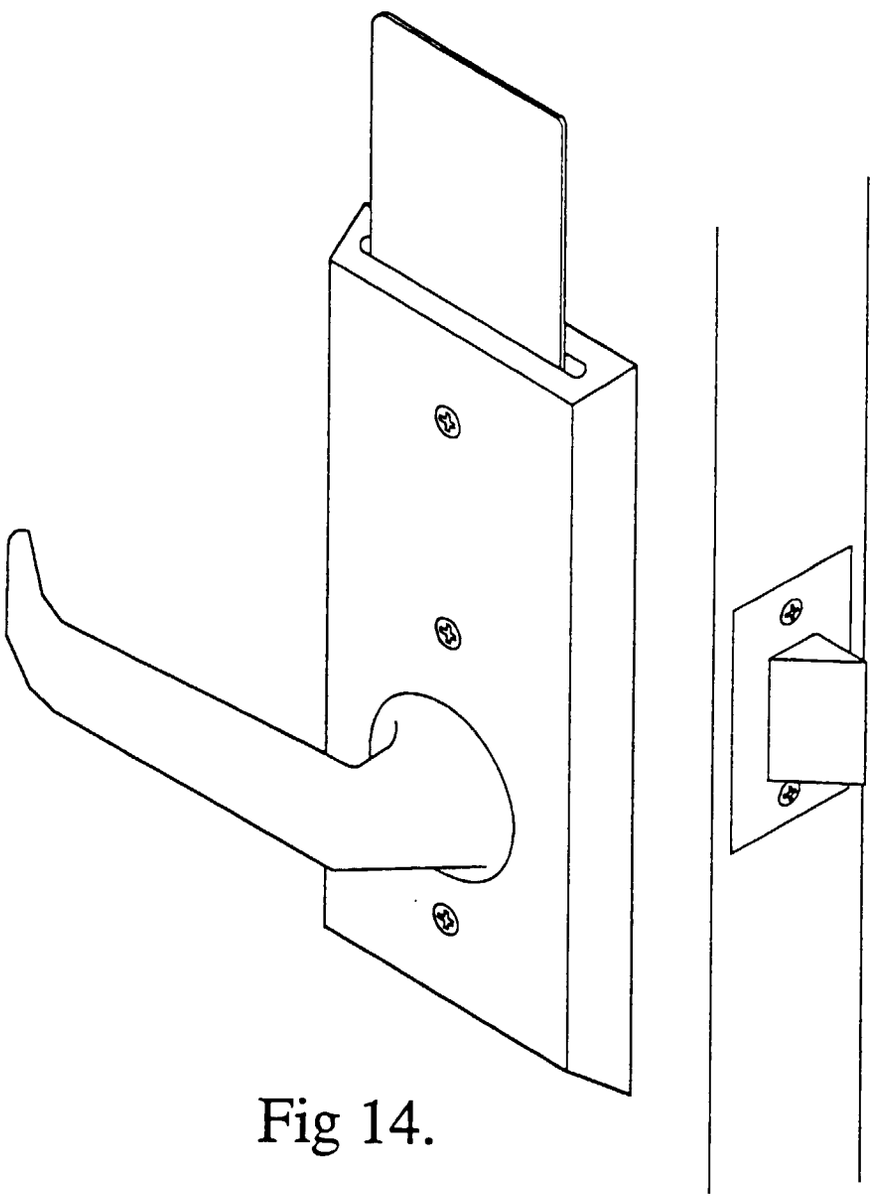


Fig 14.

Fig 15a.

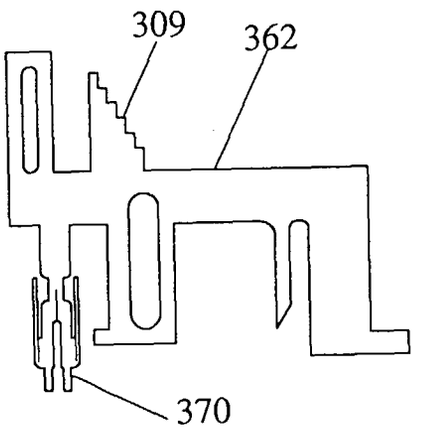


Fig 15b.

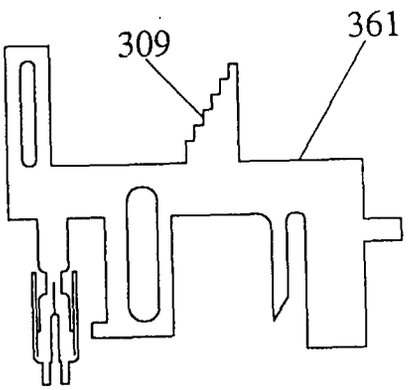


Fig 15c.

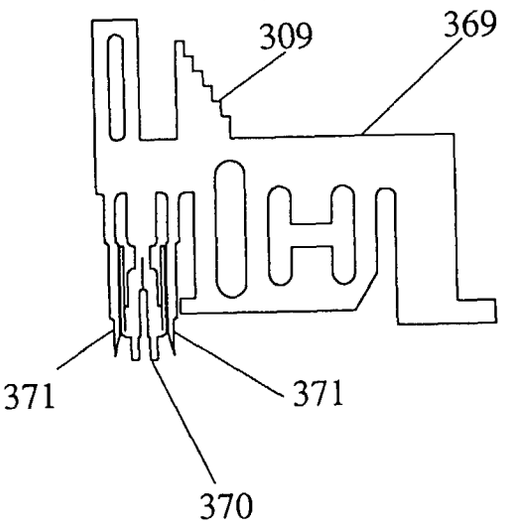
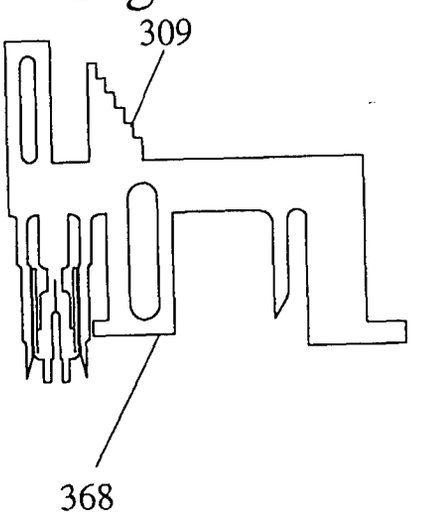


Fig 15d.



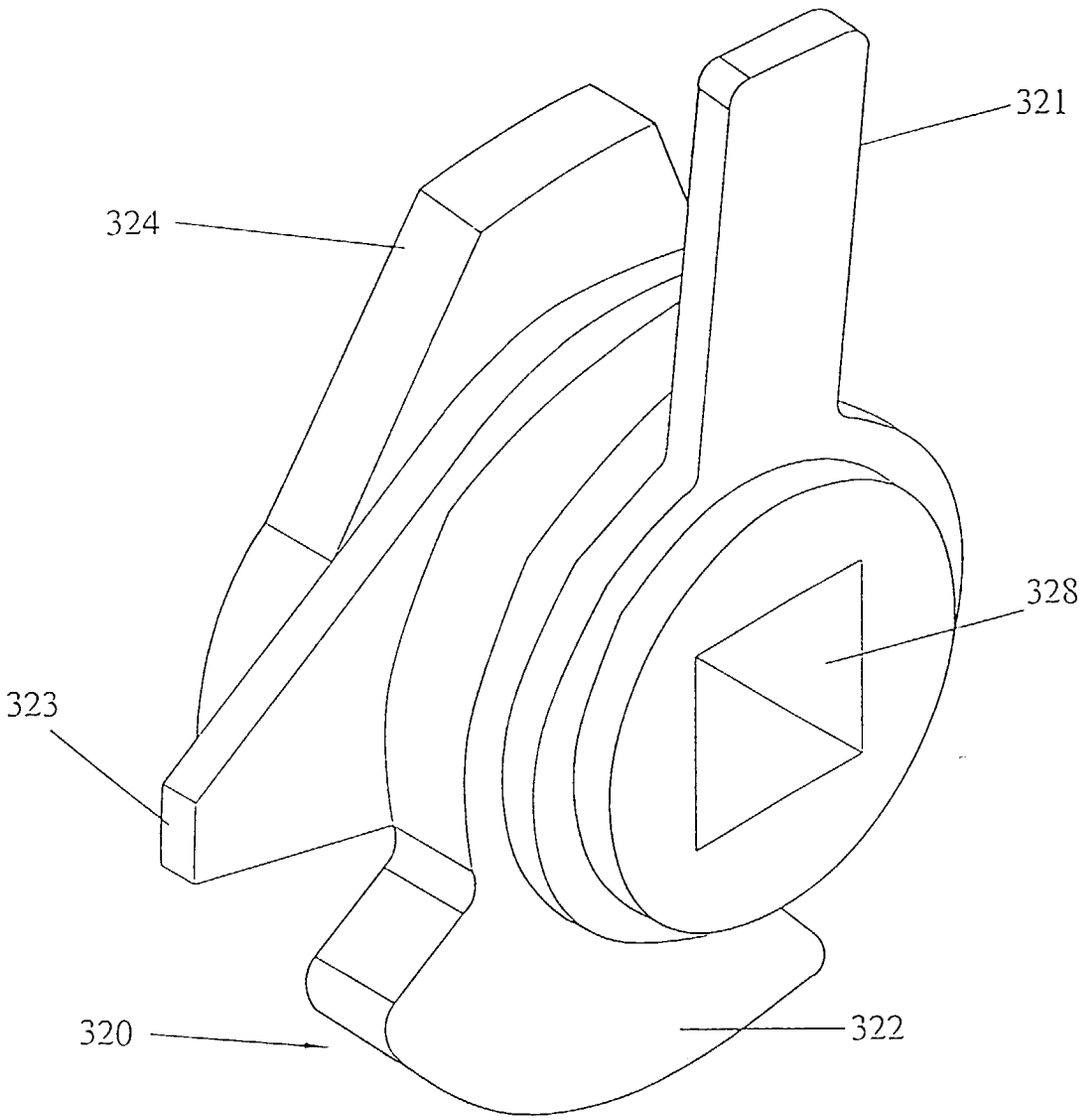


Fig 16.