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(54) **Electric permutation lock.**

(57) Electronic-mechanical, multi-point door locking system that secures every kind of door in its closed position, which means a high security lock and it consists of the locking crook mechanism (20) with the locking tap (21), of the Central Electronic Unit of Control and Unlocking (22) and of the system of the codified access commands (23) with the electronic-like key (24) or a key-pad. Also, method by which the strength of a hinged door panel is increased, as it locks in its closed position, using the reinforcement bars (49) which are fixed across the door panel width and their projected ends are fasten into the stationery vertical strong elements of the door frame on where any breaking force of the door is transferred.

The locking crook mechanism with the locking tap is the mechanical and also the principal part of the present lock, is very small in size but it is very strong, more than one units can be fixed in the movable or in the stationary part of the door and on the most proper places which can be selected, even on unapproachable ones, and thus many locking points are provided, like to being fitted many conventional locks in the same door. The mechanism can fit to all doors, even to the existing ones, hinged or sliding, in spite of the material that are made of and also it locks automatically whenever the door closes and unlocks by electronic or mechanical way. The electronic way of unlocking ensures high security as there is only one valid access combination number among hundred thousands, or millions, possible ones by which the present lock can to unlock the door and also the Central Control Unit, which is of digital technology, is functioning by a sophisticated way against burglary, it includes alarm system, prevents the detection of the combination number and also assimilates electronically, all functions of a conventional lock. The access combination number loaded in the memory of the Electronic Control Unit is not erased during lack of power and can be set by the user as often as it desirable and the electronic-like key can be set for every

individual combination number of any present lock. Instead of the electronic key or in combination with, the access command system is also operated by a key-pad, or central alarm system, or computer, or a magnetic data card, from a remote location by cables or wireless, or by any other means that suits to a specific application. The power consumption of the present lock is extremely low and thus the power supply is by a long lasting integral battery, which is rechargeable, automatically, from mains but also is by a socket that there is on the key-hole or on the key-pad.

The present lock eliminates the disadvantages of the conventional lock, none of its critical parts is disposed to anyone and if it is used in combination with the method of the door panel reinforcement, makes any door, even an existing one, to withstand to any common way of burglary and also, as it is owning many more advantages, the frontiers for the use of a lock are extended.

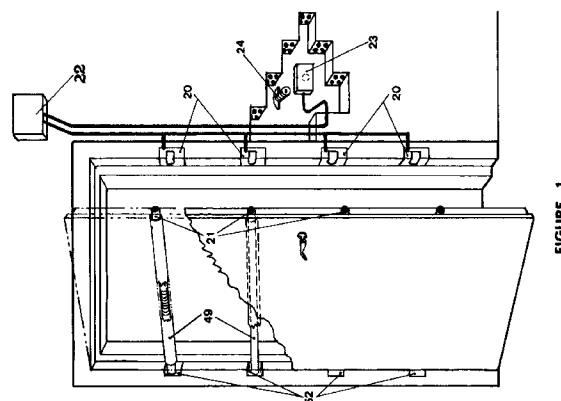


FIGURE 1

The invention concerns a mechanical locking device and electronic circuits that control and unlock this locking device and where they are functioning together, as one, they actually form a locking system that secures every kind of door panel or lid, on its closed position which means that, this locking system is a high security lock which consists of the locking crook mechanism with the locking tap, of the central electronic unit of control and unlocking and of the access system with codified commands, using a kind of electronic key or a key-pad or a magnetic data card or even a combination of them. Additionally the invention concerns a method by which the mechanical strength of the door panel can be reinforced at the same time that the door is locked and this method is based on the characteristic operational way and also on the fitting arrangement of the crook mechanism and the locking tap, which are presented in this invention.

At the present time, similar type of lock, is not known to the inventor. So, the reference on the prior art is limited itself, to the knowledge that there is for the locks which are being in use today and furthermore, any comparisons concerning the advantages of the lock of the present invention, are based on today's knowledge. According to this knowledge, all the conventional locks, either the type with locking tongue or with locking pins or bolts, used being fitted on to the movable door panel and especially, into a mortise in the door panel body, and they secure as the locking tongue or bolt is extended out of the lock body by a key and fastens into the locking cavity (locking point) which there is in the corresponding vertical element of the door frame, where this projected part of the lock, is also supported. The security against burglary that the conventional locks provide, is mainly based a) on the private lock barrel with an enclosed exclusive, unique, combination of small pins or plates and b) on the strong structure of the lock mechanism itself and on the strength of the locking point, in the frame, as well. Also it should be noticed that because of the size of the conventional lock and for a convenient use, only one lock is normally fitted in each door, which consequently provides only one locking point, unless the type of lock with toggle levers is fitted which provides additional locking points, but such type of lock is not being in wide use, especially to the existing doors, because it should be fitted on the door panel externally and having large dimensions is particularly anti-aesthetic.

The disadvantages and the weak points of today's locking systems with locks are well known, in spite of the efforts which have been done to eliminate them by various ways. Some of their most significant disadvantages are mentioning here, like the one where all breaking forces of the door, are received by only one part of the lock, by the protruded locking tongue or bolt, which consequently should have big

enough dimensions in order to stand all forces by itself and also at the same time, a great portion of it has to stay inside the lock body which acting as a load arm is counterbalancing the moment that is created by the protruding part. However, with this practice and because the locking tongue is totally retracted into the lock body, where also the private lock barrel is being located, there is a significant increase of the lock size, resulting in a series of problems, such as the considerable decrease of the strength of material, of both, door panel and door frame, where the lock is fitted and where the locking tongue fastens, in the locking point, respectively. Other problem such as the one of the restricted selection of the locations where the lock can be fitted, because it should be fitted always on the movable door panel and at a height that permits the convenient use of the key by hand, or that problem of the limit on the number of the locks which can be fitted on the same door, in order, further weakness of the door body and frame material to be avoided, or that problem where the big size of the lock, restricts both, the design and the way of construction of the door and also some times does not permit the use of such type lock, on some applications. At this point, it should be noticed that, if a breaking force is acting at the highest or at the lowest part of the door panel, then a moment is applied on the only one locking point and stresses severally the already weak part of the door panel, the one where the lock has been fitted. Unfortunately, this weak point allows the burglary by forcing the door with an iron bar. Some of the above disadvantages may be overcome only by metal doors with special strong construction, but such solution is extremely expensive with difficult application on the existing buildings. Also a main disadvantage of existing locking system is the location where the barrel of the pin combination is fitted, which although is the most important part of the lock and it is in direct relation with the security provided by the lock, however, this part is easily reached by everyone and as it might becomes useless or can be damaged easily by many ways, it is the burglar's favourite point of breaking in.

Some other weak points of the locks known today are that they can not be fitted to the sliding doors, but only to the hinged doors, because of their operating way, that when a key is lost, expensive and time wasting problems will be risen because in most cases, a lock specialist should be called to open the door and precautionary the private lock barrel or even more the lock mechanism may to be replaced, if the lock barrel is not replaceable. Another weak point concerning the existing locks is that when the door unlocks from a remote location, this can be done only by wires, it depends all ways on mains supply and provides less safety. Furthermore when we have many doors, we must carry the correspondent keys, with consequent problems.

This invention concerns a self-locking device

which can be controlled by either, electronic or mechanical way and whenever the device is used to lock a door, is functioning as a lock, by the meaning that there is for the existing locking systems with conventional locks, but also this device can be used for other applications, with small modifications of its form. The whole locking system of the present invention, e.g. both the mechanical and the electronic parts, is a self-locking lock and from now on, this will be called "the present lock" due to the main purpose which is made for. Also this invention concerns a method by which the mechanical strength of the door panel can be reinforced at the same time that the door is locked and this method is used in combination with the present lock.

The installation of the present lock, either independently or in combination with the present method of the door panel reinforcement, can be done easily on the existing doors and the disadvantages of the conventional locks are eliminated. However, the already fitted conventional lock can be stay in place, at the same door, together with the present lock, or it can be removed as it is desirable. Additionally, the many advantages and the electronic features of the present lock enable it to has a high operative flexibility and so that the field of the use of the locks is wider, ensuring at the same time high security to all applications and even more they could revise today's consideration and practice for the security of the rooms by the means of doors and locks.

Characteristically are mentioning some of the significant advantages of the present lock, such as, the very small size but the high strength of the crook mechanism, the possibility of being fitted more than one mechanisms in the same door and consequently many locking points are provided, the mechanism can be fixed either, in the movable or the immovable part of the door and in the most proper place that can be selected, regardless if this place is easy to be reached by hand or not and also the mechanism is functioning on any inclination. Further, every time the door closes, all fitted mechanisms is locked simultaneously, and they unlock all together, as well. None of the critical components can be reached by anyone, the mechanisms unlock by a combination of numbers which is set by the user and also the electronic-like key can be used to unlock any door where the present lock is fitted by changing the code number only, the present lock may to be a part of a central alarm or computer system, it can be controlled remotely by wires or wireless ensuring the same high level of security and many other advantages which will be mentioned later on.

The self locking lock as it is mentioned in the title of this invention , e.g. the present lock, is an assembly of independent mechanisms and electronic circuits which as they cooperating together, they give the characteristic function of the present lock as well.

However every single part of the assembly has its own particular characteristics, but all characteristics, of every part, as a total, are defining rightfully the characteristics of the present lock as a system. The present lock consists of the locking crook mechanism (20) with the locking tap (21), of the central electronic unit for control and unlocking (22), of the access system with codified commands (23), of the electronic-like key (24) or a key-pad and of the secondary circuits (alarm, power supply e.t.c) and the necessary wirings, as it is shown in Fig. 1. Each part of the present lock is described below, in details.

a) The locking crook mechanism with the locking tap, is the main and also the mechanical part of the present lock that locks the door and handles any of the door breaking forces. According to the application, the crook mechanism is fixed in the door frame or in the door panel while the locking tap is always fixed on the corresponding opposite part of the door, than this one where the crook mechanism is placed and they are fixed in such a way so that a short portion of the projected length of the locking tap can be inserted into the crook mechanism. Looking at figures 2,3 and 4 the crook mechanism consists of the shell (25) which is the stationary part of the mechanism and it can be fixed in either, door panel or the door frame and itself is a strong closed case, formed in a proper shape so that to surround the locking crook (27) with small clearance and also has an opening in a specific place, named the passage (26) of the locking tap which ensures the rectilinear incoming and outgoing movement of the locking tap to the crook mechanism, of the locking crook (27) which is enclosed in the shell and is able to be rotated partially around of two possible centres of turn, alternatively, and it is a disc plate which has a cut that gives to the crook a hooked shape and into this cut, the locking tap can be slid in, when the open end of the cut is aligned with the passage in the shell, of the crook pivot (28) which rests freely across the sides of the shell and it can be moved, by a horizontal and parallel to its own axis motion, from the point (A) which is considered as the main possible centre of the crook's rotation , to the point (A1) and where the distance between points (A) to (A1) is longer than the radial clearance which there is between locking crook and shell and also the pivot (28) with its axis being vertical on the crook central plane, crosses the crook in a proper point and holds it in its position into the shell, of the spring (29) which, having the one of its ends fixed in the shell, keeps the pivot (28) in its normal position (A), e.g. in the main possible centre of the crook rotation, of the crook catch (30) which is a kind of ratchet and it is hinged on the shell in such a way in order to engage or not, selectively, with a proper point of the crook, and which point is the auxiliary possible centre of turn (B) of the crook, while the engagement or disengagement of the crook catch is caused by the electromagnet (31), (or

electric motor, or conventional system with lock barrel and key) which is included in the crook mechanism although it is an electric component of the present lock and finally, of the locking tap (21) which is a mechanical part of the crook mechanism but it is not included in to the shell. The locking tap is a strong rod from which a little straight portion of one end can to slide into the cut of the crook through the passage of the shell, in such a way and position, so the axis of the incoming portion being vertical on the crook plane and parallel to the axis of the main (A) and auxiliary (B) centre of turn, while each centre, independently, can to become the instant active center of the crook rotation and also can to be the centre of a moment that produced by the force which is applied by the locking tap on the contact points with the sides of the crook cut due to the motion of the locking tap when it is going in and out of the mechanism. The rotation of the crook inside the shell is according to the direction of the locking tap motion and also to the instant active centre of turn of the crook, so that the open end of the crook cut either is aligned with the passage or not, opening or closing the open end of the passage.

The crook mechanism is characterized in that the way of operation of the crook which can to turn round of two, or more points, but only one of these points can be selected every time so to be the instant active centre for the crook rotation and the selection of each of the points, to be the instant active center, is according to the desirable direction of the crook motion inside the shell, so that, the crook is to realise or to trap the locking tap into the mechanism, is characterized in that the characteristic movement of the crook is caused by a moment with a proper direction and magnitude and which moment is created when the locking tap applies a force to its instant contact point with the one of the sides of the crook cut, during the incoming or outgoing motion of the locking tap into the cut, while the centre of this moment is the instant active centre of the crook turn, is characterized in that any breaking force of the door panel is not handled by none internal element of the mechanism, but the force is handled totally by the shell of the mechanism, indirect and through the locking tap and the wall of the crook which is pressed against the shell, is characterized in that the crook mechanism can be fitted in either movable or stationary part of the door, on any position and inclination as well and is characterized in that the locking tap is going in and out the mechanism instead of being retracted inside it.

Looking at the figures 3 and 4, the function of the crook mechanism of the present lock is easily understandable. The locking tap is been inserted into the mechanism by a rectilinear movement through the open end of the passage of the shell and enters into the crook cut, of which the open end is already aligned with the passage which in this case acts as a guide of the locking tap movement. During the insertion of the

locking tap in the crook, it meets one of the walls of the crook cut and on the contact point, a force is applied by the locking tap. This force produces a moment which having centre of application the main center of turn (A), which now is also the instant active center, forces the crook to turn according to the direction of the force. The rotation of the crook continues as far as the locking tap is going in the mechanism and until the crook catch engages the crook in the point (B) which is the auxiliary center of turn of the crook and in that position the crook is held still, e.g. in the locking position, trapping the locking tap inside the mechanism as well. If now, we force the locking tap to be moved towards the opposite direction, so to go out the mechanism, while at the same time the crook catch is still engaged the crook, then the locking tap applies a force on its contact point with the other wall of the crook cut and the moment which is produced has now centre of application on the point where the crook catch engages the crook, the auxiliary center of turn (B) which now is instant active center of the crook turn. This moment of force overcomes the resistant of the spring (29) which spring holds the crook pivot (28) in the position of the main center of turn (A), which now is inactive as the pivot is moving toward point (A1) and also it forces the crook to be moved properly, so that one of the walls of the crook cut to remain between the locking tap and the open end of the passage and at the same time to be pressed against the shell. In this position now, any further push on the door panel is transferred through the locking tap and the crook wall and is handled by the shell, while at the same time the crook is held still due to the friction generated by the over-press of the crook on the shell. If now, the locking tap is to exit the mechanism and if the crook catch is disengaged, by an electromagnet or a mechanical system, then the centre of the moment is the main center of turn (A), which is active again and as the direction of the moment is the opposite of the incoming one, the open end of the crook cut can be aligned with the passage of the shell so that the locking tap can be moved out of the mechanism. This characteristic way that the crook mechanism is functioning gives also the meaning of the term "self-locking" of the present lock.

b) The central electronic unit for control and unlocking, from now on called with the acronym CEUCU is the main electronic part of the present lock which ensures the security provided by the lock as the CEUCU is controlling the electromagnets or the electric motors to unlock the crook mechanisms only when the codified incoming data comply absolutely to the data stored in the CEUCU memory and also if at the same time there are the conditions which satisfy some additional parameters which are set selectively. CEUCU is placed indoors and adjacent the door, is based on digital technology and it is made on a board with printed circuits and microchips and includes the

partial circuits which are, the timing circuit (32) the reset circuit (33), the data identification circuit (34), the circuit that controls and secures the data (35), the coder circuit (36), the counter circuit (37) the circuit of the comparer for the exclusiveness (38) the electromagnet, trigger circuit (56), the mechanical, data memory (39), the secondary circuits of the alarm (40), the interlock circuit (41), the power supply circuit (42) and the circuit of the door handle switch (43). The above mentioned circuits are shown in block diagram in figure 5. CEUCU is characterized in that the mechanical data memory has electromechanical equivalent a number of single contact, multi-position switches, and they are so many as the digits of the combination number, is characterized in that for the unlocking of the mechanism required for each one of the digits of the combination number to be received separately, a corresponding series of digital signals with a length, strictly defined, in order to match absolutely to every individual digit of the combination number, is characterized in that in the data memory is loaded from two, to "N" series of numbers and these series of numbers are also forming the length of the combination number which can be set by the user selectively and as often as is needed, is characterized in that the operation of the data memory is based on the decimal system, is characterized in that after of a pre-set number of unsuccessful efforts of dealing the combination number, the integral alarm is energized and while the siren sounds any other function of CEUCU is stopped, is characterized in that the CEUCU has the ability to receive data from various sources and by various ways, either by wires or wireless, is characterized in that the power supply is provided by internal, rechargeable from mains, battery and if it is required, by battery from the external side of the door with a special socket which there is in the key slot or in the key-pad.

The CEUCU of the present lock which has been described above, is the basic unit and includes all the basic functions of the lock, as it is already made and tested. However, the abilities of the modern electronics are grown fast and possibly they will provide to this basic unit, a higher flexibility in the way of function and the design of CEUCU concerning the way of unlocking.

The CEUCU is functioning in such a way so that the combination number loaded in the data memory can not be detected, theoretically and practically, because the input data do not effect in the memory directly, but indirectly, through other verifying circuits which control and lock the input data and furthermore it should taken into consideration that every unlocking process starts always from the beginning and for all of the individual digits of the combination number at the same time, and for the unlocking of the mechanisms the input data have to coincide with the data loaded in the data memory. The particular function of

the CEUCU and the unapproachable place where it is placed, in the interior room, make CEUCU to be quite unbreakable.

c) The access system with codified access commands and the electronic-like key or the key-pad, is based on digital technology and the microchips with the integral circuits are being on a independent, single board. The purpose of this system is to create the necessary series of digital signals, in decimal system, by which the CEUCU is controlled, but these signals first are passing through the pass-memory in order to be converted in some series of digital data, with the exact define length that is required, so that each series of the digital data to coincide with the corresponding digit of the combination number already loaded in the data memory of CEUCU. The transfer of these signals, called now input data, to CEUCU, is by cables and in a parallel manner and for all digits of the combination number, simultaneously. The whole system of the access commands is placed out-doors and on any of the door parts, together with the special socket by which the external power supply is provided to CEUCU. Any malevolent intervention to this system, is not important for the real security, that the present lock provides. The system consists of the timing circuit (32), of the reset circuit (33), which both may to be the same one's as there are in CEUCU, of the coder-counting circuit in decimal system (44), of the programmized pass-memory (45), which consists of mechanical contact points (47) arranged in the interior of the key-slot or key-hole, where the electronic-key is inserted and of the corresponding conductive points (46) which are attached in the key (24) and these conductive points can be set accordingly, so that the pass-memory to define the length of each series of the input data (see diagram in Figures 6 & 8). The access system of codified access commands is characterized in that the way of function of the programmized pass-memory, which has the electromechanical equivalent of a system with two parallel planes and on each of them there is a set of parallel wire-contactors and the planes are arranged in such a way so that the contactors of one of the planes have a direction to transect the contactors of the other plane and in their cross- points they can selectively to make conductive connections, is characterized in that the electronic-like key which can be used on all of the same type of locks by only changing the combination number.

The Figure 7 shows with block diagram the electric equivalent of the pass-memory and the key, where the contactors from "N0" to "N9" are used for the incoming digital signals to the pass-memory, since the contactors "D1" to "D5" are used to transfer the data to CEUCU and in this example has a combination number with a sequence of five figures, that means five rows of ten figures each row that gives 99.999 possible combinations of the combination number. The black dots, show which of the contac-

tors' cross connections are conductive, so that to allow the transfer of a signal from a contactor "N" to a data contactor "D" and in this particular example they form the combination number 12.061 and if it has the same value with the five figure number which is loaded already in the CEUCU memory, then the present lock unlocks. If in a contactor "D" there are more than one conductive cross connections, then only one of them can be recognized, this particular one which corresponds to "N" contactor with the figure of the smaller value. The Figure 8 shows one of the two preferable forms of the electronic-like key, which consists of the rings (46), each of them represents the row of numbers for each one of the figures of the combination number. The circumferential area of each ring is divided in ten equal sections from which only one has a conductible material (47) and as the ring can rotate by steps, with ten steps per rotation, this section with the conductive material can stay in ten positions and in each of these positions, meets a couple of contact pins (48) making conductive connection between them. The couples of contact pins are fixed around the key-hole in circular arrangement and for each one of the ring sections separately, there is the corresponding couple of contact pins. The one of the contact pins is used for the incoming digital signals while the other is used for the outgoing data. If now, the conductive section of every ring is set to one of its ten positions and the key is inserted in the key-hole and in a specific always position, then the respective couples of contacts will be connected permitting the exact data to pass through, in order the combination number to be formed. The Figure 9 shows a key which is functioning with the same way as the one of Figure 8 but the contacts and the conductive points being on a flat arrangement and the conductive points can slide instead to rotate.

The present invention also relates a method by which the mechanical strength of the door panel is increased as the door closes and locks and the application of the present method is suitable for the doors with hinges, especially for the existing ones. The application of this method is based on the advantages of the present locking crook mechanism and particularly on the one, where more than one crook mechanisms can be fixed in the vertical element of the door frame and the corresponding lock taps are fixed in the door panel. According to this method, the reinforcing bar (49), consists of a strong metal rod (50) which can to slide without much clearance inside the tube (51) and the length of the tube is equal to the width of the door panel and the reinforcing bar is fitted across the door panel width, internally and in a height so that the rod to be aligned with the crook mechanism. The length of the rod is longer than the length of the tube, or the door panel width so that, one of the rod ends to go into a special supporting cavity that there is on the door frame, on the side of the hinges, while the other

end of the rod formed to act as lock tap of the present lock and is going into the mechanism (20) where is trapped by the crook. Also for aesthetic reasons, the end of the rod which acts as locking tap is retracted into the tube whenever the door opens and by a contrary way slides out when the door closes and it is caused by the spring (54) which is also included in the tube. According to another application the metal rod (50) is fixed within the material of the door panel and acts as a reinforcing bar, by itself, without the tube (51).

This method is characterized in that the reinforcing bar(s) run through the body of the door and its both ends fasten by strong, but not permanent way to the vertical elements of the door frame, is characterized in that the reinforcing bar can be fitted across the width of the door panel externally, is characterized in that the one of the ends of each reinforcing rod is functioning as lock tap of the present lock and it can be retracted into the tube of the reinforcing bar, is characterized in that any force stressing the door panel is transmitted, through the bar, to the door frame vertical elements, where the ends of the reinforcing bar fasten temporarily, acting as cross-beam. (see Figures 10 & 11)

The main application of the self-locking lock presented by the present invention with electronic or mechanical operation, is to lock every type of door, either sliding or hinged door, for use indoors or outdoors, regardless the material of the door, ensuring the highest level of security to the rooms protected by doors, especially in the case that the application of the present lock is combined with application of the method of the door panel reinforcement. Furthermore the main part of the present lock, the crook mechanism, can be used alone, independently from the other parts of the present lock, for many other applications, by only changing the form with a proper one and mechanical operation. For example, the crook mechanism can be used as a draw or lifting or suspension or safety hook with quick release operation, hitching ropes or wires, where the mechanism is attached on the end of the a row or wire or even, it can be fixed somewhere else and a hoop or a sling of another wire or rope comes into the mechanism, wherein it fastens. Also the ability of the present lock to unlock by an electronic way, makes the present lock capable to function as a part of an alarm system where the unlocking of the crook mechanisms on the doors can be done after or at the same time the alarm system is set off, another application of the present lock is to keep locked selected rooms of a building, for example archives or machinery rooms, by the assistant of a computer or by a main central control unit, where the access into these rooms is permitted only on a specific day time or for certain period or only to authorized persons and additionally, if the codified access system of the present lock is energized by a

magnetic data-card instead or in combination with the electronic key or the key-pad, then the passing through of persons could be checked and recorded. It is easy understandable, that the range of use of the present lock is not limited within the applications mentioned above, but it can be widen because of the abilities of the modern electronic technology.

The figures 12, 13 and 14, show a preferable shape of the crook mechanism, as it is already made and tested successfully. The reference numbers on the crook mechanism elements are corresponding to the ones that there are in the text of the crook mechanism description, while the figure 15, shows a form of the crook mechanism suitable for the application in sliding door. It is noticed that the shell has formed as a rectangular box while the original shape of the crook is changed after the removal of the nonoperational sections. Also, the little electromagnet is included into the shell.

The advantages of the self-locking lock, of the present invention, are many and they are defined by the particular characteristics and the way of function of the crook mechanism and also by the features of the electronic part of the lock that controls the crook mechanism. The present lock does not introduce none of the disadvantages that the conventional locks own, it can be fitted on the existing doors fast and easily, regardless the type or the construction of the door, across the internal side of the door panel externally or through it. The locking crook mechanisms are very small in size but they are very strong and reliable, they consist of just few components, they can be mass-produced easily and with a low cost, in simple productive lines with simple machine-tools, without special productive procedures. It can be fixed more than one mechanisms in the movable or in the stationary part of the door as well and as no any hand-operated key system is included in the mechanism, they can be placed at any unapproachable positions, ensuring higher security.

The fact of being fixed more than one mechanisms in the same door providing more than one locking points, at the most proper selected positions, reduces very much the possibility of breaking the door by a violent way, especially when the application of the present lock is combined with the method which reinforces the strength of the door panel. Another specific advantage of the present lock is that every time the door closes, all the mechanisms lock automatically, without any try by the user and also they unlock all together when the correct access number is dialled. Also, when the door is closed, the mechanisms keep the door panel still into the frame and this is very useful for the sliding doors which can not be risen by iron bar. The way that the Central Electronic Unit of Control and Unlocking is functioning, makes any effort of the access number detection or any other try useless, and also the position where it is placed,

in the interior of the protected room, is unapproachable from outside. The detection of the access number by frequency of pulses is impossible, because CEUCU is processing the data of only one combination number each time and after of a pre-set number of false processes, the integral alarm system is activated and the alarm memory light, glows. Also the access combination number is set and it can be changed by the user as often as it is necessary and it could be one of decades of thousands or hundreds of thousands possible combination numbers. The present lock includes some special functions among many others, that they assimilate electronically the way of use of a conventional lock in order to become familiar to the user easily but by a safer and more convenient, for the user, way. As an example is the interlock function which disables the access command system, it is activated by a button from the interior only and if the door is closed and assimilates the function of the conventional lock where the key is left in the key-hole, in the interior, blocking the use of the lock from outside, but additionally the present lock produces a low warning sound on any try to open the door and also this function is disactivated automatically whenever the door opens, eliminating the possibility someone to be locked out. Similarly, the handle lock function disables the internal handle button, the free-pass function overrides the access command system and the door can be open from outside by only dialling the reset-key, and so on. The electronic-like key is very small in size and very light and it can be used on all locks by only changing the combination number with the correct one. Also the control of the access system of each door can be done by a key-pad or by a magnetic data card, or by a central control unit, or by the central unit of an alarm system, or by a computer, from a remote location by cables or wireless, or by any other means for specific applications. The special little electromagnet of the crook mechanism and also the microchips of the electronic part of the present lock, which are of C-MOS technology, are demanding extremely low power and thus the power supply is by a rechargeable, from mains automatically, battery which is included to the unit and also it is able to supply the CEUCU of the present lock with power for more than one month, without any charging and for a normal use of the door as well. Additionally, power supply for the CEUCU is also provided from the exterior by a special socket which there is on the key-hole or on the key-pad, while lack of power not effects the data of the access number loaded in the memory.

Claims

1. Door locking system which consists of independent, self-functioning parts that are, the locking crook mechanism (20) with the locking tap (21) as

it is claimed in Claims 2,3,4,5,6,7 and 8 of the present invention, the Central Electronic Unit of Control and Unlocking (22) as claimed in Claim 9, of the present invention, the access system with codified commands (23) and the electronic-like key (24) as claimed in Claim 10, of the present invention and finally of the alarm and power supply circuits and the necessary wiring, characterized in that it is used as general purpose and high security lock, that it is able to operate with more than one crook mechanisms fixed on the same door where the mechanisms can be placed in the most proper selected places, for a specific application, and in any inclination, that all fitted crook mechanisms are locking automatically the door, as soon it closes and also they are unlocking all together by one stroke, that the unlocking of the crook mechanisms and also the control of the locking system are by electronic means and that the locking system can to combined its use with the method of the door panel reinforcement which is claimed in Claims 12 and 13 of the present invention (Figures 1 and 11).

2. Locking crook mechanism with locking tap which consists of a strong case, the shell (25) which is the stationary part of the mechanism and has the proper form to surround the crook with small clearance and also has an opening in a specific place, the passage (26) of the locking tap which ensures the rectilinear incoming movement in the crook mechanism, of the locking crook (27) which is a disc-like plate enclosed into the shell and has a cut that gives to the crook a hook-like shape and as the crook is able to turn inside the shell, the locking tap is inserted into the crook cut when the open end of the cut is aligned with the passage (26) of the locking tap, of the crook pivot (28) which rests freely across the sides of the shell into cut-out holes and it can be moved away from the point (A), which is considered as the main center of the crook rotation, by a horizontal only and parallel to its own axis motion and also the pivot with its axis being vertical to the central plane of the crook, crosses the later in a proper point and holds it in place into the shell, of the spring (29) which holds the pivot (28) in its normal position (A), e.g. in the main center of the crook rotation, of the crook catch (30) which is a little rocking lever, as a kind of ratchet and is knuckle jointed on the shell in such a way that to engage, with a proper selected point (B) of the crook, which point (B) is considered as the auxiliary center of the crook rotation of which the imaginary axis being vertical onto principal plane of the crook and also parallel to the axis of the main center of crook rotation, while the control of the crook catch to disengage is by electromechanical means (e.g. an

electromagnet or a stepper motor or an electric motor etc), of the locking tap (21) which is a strong rod of which a little straight portion of one end can to slide into the crook cut through the passage (26) by such a way that the axis of the incoming portion to be vertical on the crook plane and parallel to the axis of the main (A) and auxiliary (B) center of the crook rotation, characterized in that the crook mechanism can be used independently or in combination with the door locking system as claimed in Claim 1 where it is the mechanical part which locks the door and handles any breaking forces, that the locking crook (27) can turn round of two possible centers, the main center (A) and the auxiliary center (B), but only one of these centers can be selected at a time to be the instant active center of the crook rotation and the center of a moment, that the selection of the auxiliary center (B) to be the instant active center or an inactive one is by the engagement or the disengagement respectively of crook catch (30) with the crook and since the crook catch is engaged with the later, the main center (A) is also disactivated due to the movement of the crook pivot (28) towards the point (A1), that the desirable direction of the motion of the crook in order to realise or to trap the locking tap (21) into the shell, is caused by a moment of the proper direction and magnitude which has center of application the instant active center of the crook rotation and it is produced when the locking tap applies a force to its instant contact point with the one of the sides of the crook cut, during its motion into and out of the cut, that any breaking force of the door panel is totally handled by the shell of the mechanism (25) indirectly and through the locking tap and the wall of the crook, that the crook mechanism can be fixed in any position and by any inclination on either the movable or the stationary part of the door while the locking tap is fixed on the corresponding opposite part of the door and that the locking tap (21) is going in and out of the crook mechanism instead of being retracted inside it. (Figures 2,3,4,12,13 and 14)

3. Locking crook mechanism with locking tap as claimed in Claim 2 where the control of the crook catch (30) for engagement or disengagement is by mechanical means, as by a conventional lock barrel and key.
4. Locking crook mechanism with locking tap as claimed in Claims 2 and 3, wherein the locking crook (27) is held onto a plate of the proper form (55) by the crook pivot (28) which is fixed vertically on the plate and also is the axle of the main center (A) round of which the crook can turn and where the plate (55) together with the crook and

the pivot and with the crook catch (30) which also is fitted on the plate, is suspended from the point (C) of one of the sides of the shell (25) and where the suspension point is located within a proper distance, above or below, from the edges of the passage of the locking tap (26) and also within a proper distance from the crook pivot and where the spring (29) is acting on the plate (55). (Figure 16)

5. Locking crook mechanism with locking tap as claimed in Claims 2 and 3, wherein the crook pivot (28) of the main center (A) of the crook rotation is fixed across the sides of the shell (25) and only the locking crook (27) is able to be moved towards the open end of the passage by a horizontal movement and wherein the spring (29) is acting on the locking crook.
6. Locking crook mechanism with locking tap as claimed in Claims 2,3,4,5 and 7, wherein the crook catch (30) engages with more than one points of the locking crook (27) creating the corresponding number of auxiliaries centers (B) of the rotation of the locking crook rotation (Figures 12 and 14)
7. Locking crook mechanism with locking tap as claimed in Claims 2,3,4 and 6, wherein the plate (55) with the crook (27) and the crook catch (30) is held inside the shell (25) in such a way that it can slide horizontally towards the open end of the passage of the locking tap (Figure 17).
8. Locking crook mechanism with locking tap as claimed in Claims 2,3,4,5,6 and 7, wherein there are fitted side by side, more than one locking crooks (27) inside the shell (25), functioning simultaneously or independently.
9. Central Electronic Unit for Control and Unlocking (CEUCU) which, to the extent that the electronic means are concerned, ensures the security provided by the door locking system as claimed in Claim 1 and it consists of partial circuits which are, the timing circuit (32), the reset circuit (33), the circuit of data identification (34), the circuit that controls and locks the data (35), the coder circuit (36), the counting circuit (37), the circuit of the comparer (38), the electromagnets trigger circuit (56), the mechanical data memory (39), the secondary alarm circuit (40), the interlock circuit (41), the power supply circuit (42) and the circuit of the door handle switch (43), characterized in that the data memory is functioning mechanically and its electromechanical equivalent is a number of single contact, multi-position switches which are as many as the digits of the combination number,

that for the unlocking of the crook mechanisms (20) is required, for each one of the digits of the combination number, to be received separately a corresponding series of digital signals having the strictly defined length in order to match absolutely to every individual digit of the combination number, that the data memory can be set to store from two, to "N" series of ten numbers which series also assembly the length of the combination number, that the combination number is set by the user selectively and as often as it is needed, that the operation of the data memory is based on the decimal system, that after of a pre-set number of unsuccessful efforts for dealing the combination number, the integral alarm is energized and during the siren sounds any other function of CEUCU is stopped, that the CEUCU has the ability to receive data from various sources and by various ways, either by cables or wireless, that the power supply is provided by internal, rechargeable from mains, batteries and if it is required, by batteries from the external side of the door with a special socket which there is in the key-slot (23) or in key-pad. (Figures 5,6 and 7)

10. Access system with codified commands and electronic-like key (24) or the key-pad which creates the necessary series of digital signals, in decimal system, for the function of the CEUCU (22) as is claimed in Claim 9 in order the latter to unlock the door locking system as it is claimed in Claim 1 and the access system consists of the timing circuit (32), of the reset circuit (33), which both may to be the same as there are in CEUCU, of the coder-counting circuit (44), of the programmized pass-memory (45), of the couples of contact points of the pass-memory (47), arranged internally in the key-slot or the key-hole, of the conductive points (46) attached on the key, and of the key (24), characterized in that the pass-memory (45) adapts the incoming digital signals "N" to digital outgoing series of data "D", defining also the precise length for each series of data required to coincide to the digits of a specific combination number, that the length of each series of data is changed by changing the position of the conductive points (46) of the key which make the conductive connections between the selected couples of contact points (47), that the way of function of the programmized pass-memory has the electromechanical equivalent of a system with two parallel planes where on each plane there is a set of wire-contactors arranged in such a way that the contactors of the one of the planes are crossing the contactors of the other and in their cross-points they can selectively to make conductive connections and that the electronic-like key (24) can be used on all of the same type locks by only

changing the combination number. (Figures 6,7 and 8)

11. Access system with codified commands and electronic-like key as claimed in Claim 10, where the couples of the contact points (47) and also the conductive points (46) are arranged onto a plane. (Figure 9)

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12. Method by which the mechanical strength of a hinged door panel is increased whenever the door closes and locks and the application of this method is based on the advantages of the locking crook mechanism (20) as claimed in Claims 2,3,4,5,6,7 and 8 and particularly on that advantage where more than one crook mechanisms can be fixed in the stationary vertical element of the door frame while the corresponding locking taps (21) are fixed on the door panel and also this method is used together with the door locking system as claimed in Claim 1. According to this method, the reinforcing bar (49) is fixed across the width of the door panel, internally or externally and in the height of a fitted crook mechanism, consists of a strong metal rod (50) which can to slide without much clearance inside the tube (51) and the length of the latter is equal to the width of the door panel, since the length of the rod (50) is longer than the length of the tube so that, when the door closes, one of the rod ends is going into a special supporting cavity which there is on the door frame, on the side of hinges, while the other end of the rod formed and acting as locking tap (21), is going into the crook mechanism (20) wherein is trapped by the locking crook (27) and also for aesthetic reasons, the end of the rod which acts as locking tap is retracted into the tube whenever the door opens and by a contrary way slides out when the door closes and it is caused by the spring (54) which is also included in the tube (51). The method characterized in that the reinforcing bar(s) is fixed through the body of the door panel and its ends fasten by a strong but not permanent way into the vertical elements of the door frame, that the reinforcing bar can be fitted across the width of the door panel externally, that the one of the ends of the reinforcing bar is acting as the locking tap (21) of the locking crook mechanism (20), that the forces stressing the door panel are transmitted, through the reinforcing bar, to the vertical elements of the door frame, where the reinforcing bar is fasten temporarily, acting as a cross-beam and that the number of the fitted reinforcing bars may to be equal to the number of the fitted crook mechanisms when the method is used together with the locking system claimed in Claim 1. (Figures 1,10 and 11)

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13. Method of the door panel reinforcement as claimed in Claim 12, where the reinforcing bar is only the rod (50) without the tube, fixed within the material of the door panel.

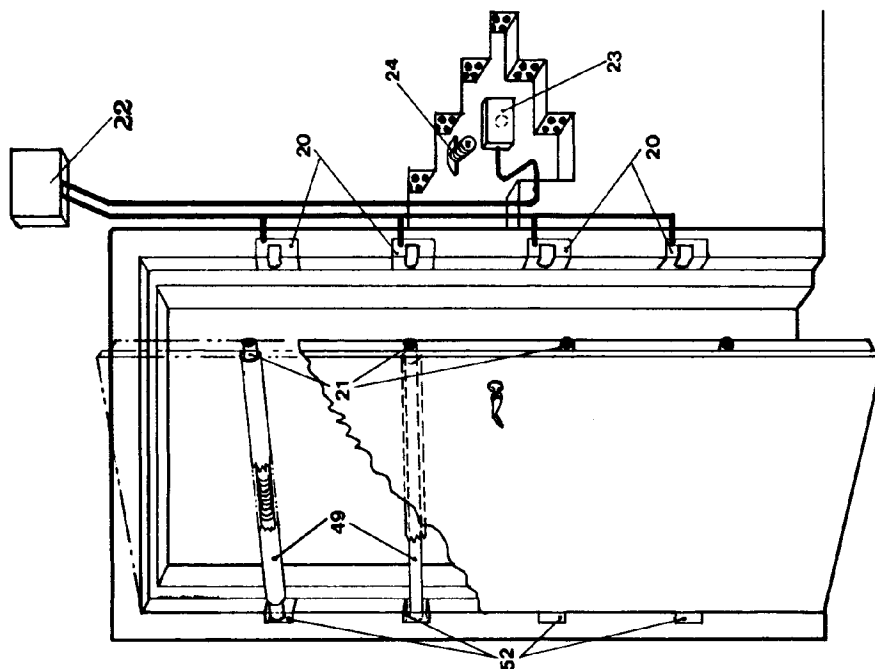


FIGURE 1

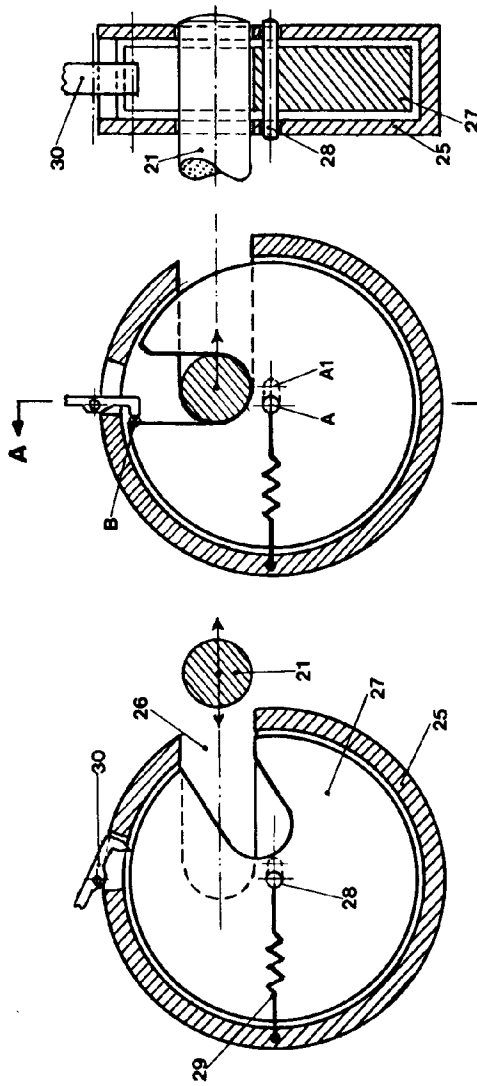


FIGURE 2
A A'

FIGURE 3

FIGURE 4

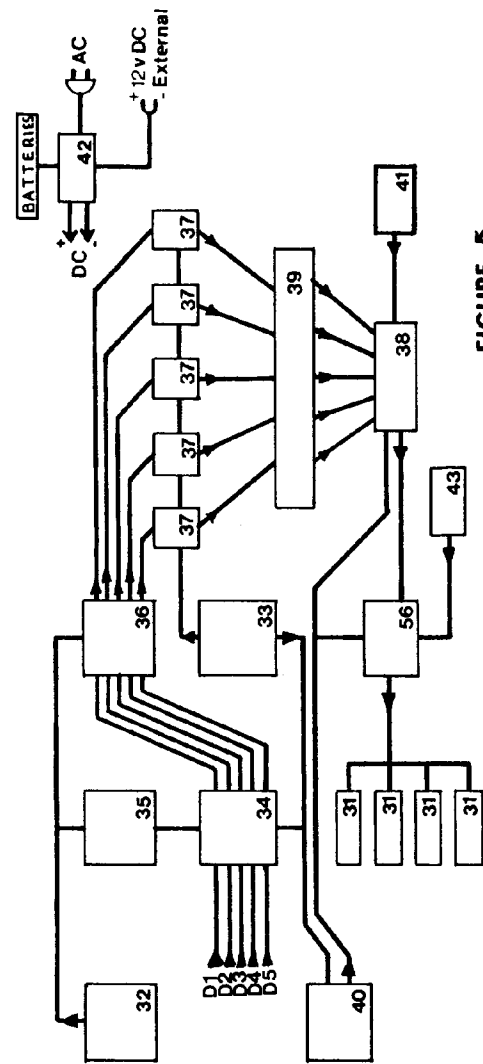


FIGURE 5

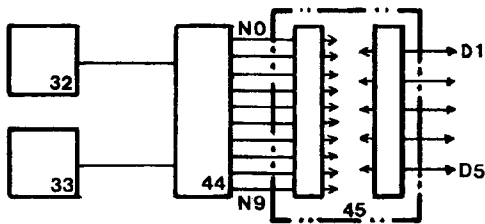


FIGURE 6

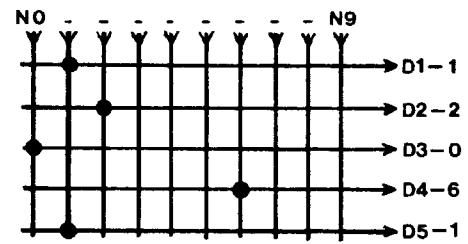


FIGURE 7

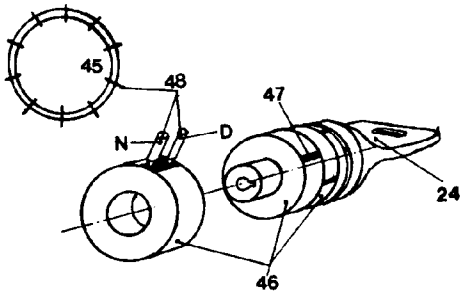


FIGURE 8

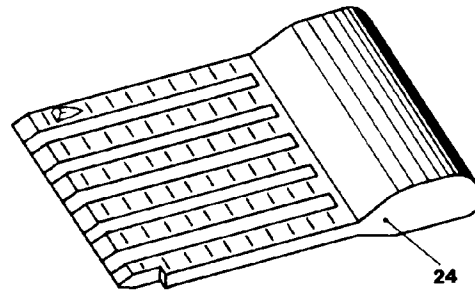


FIGURE 9

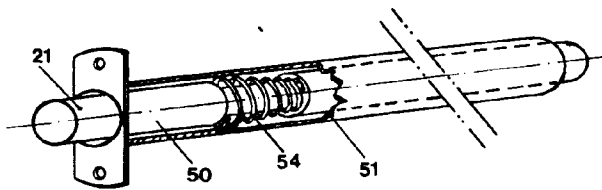


FIGURE 10

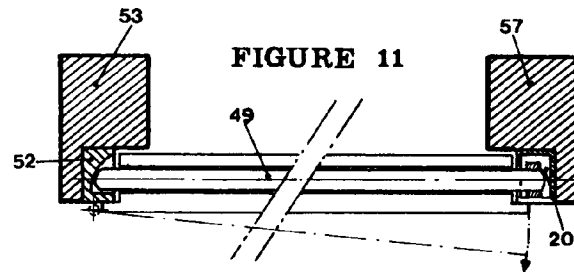


FIGURE 11

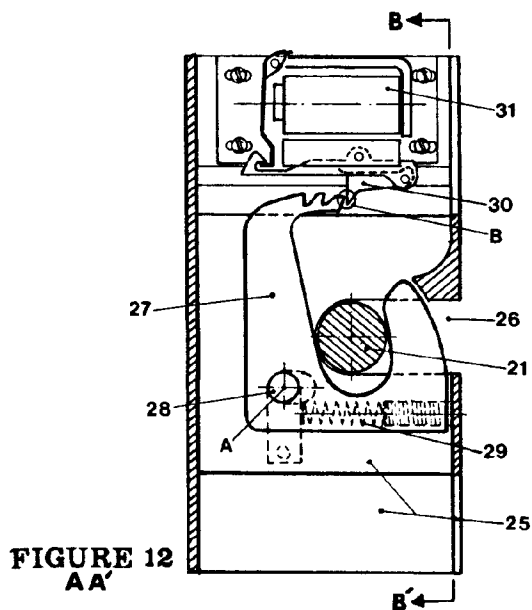


FIGURE 12
AA'

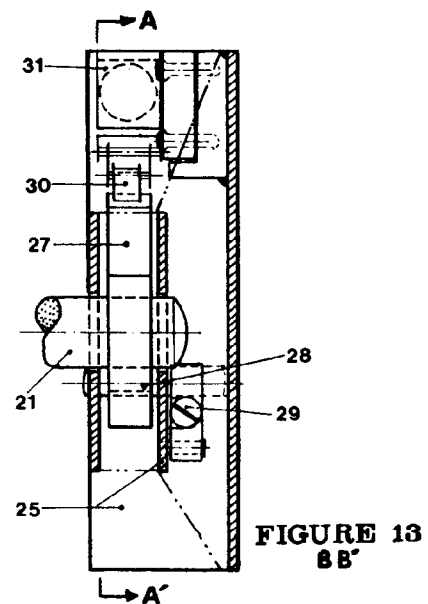


FIGURE 13
BB'

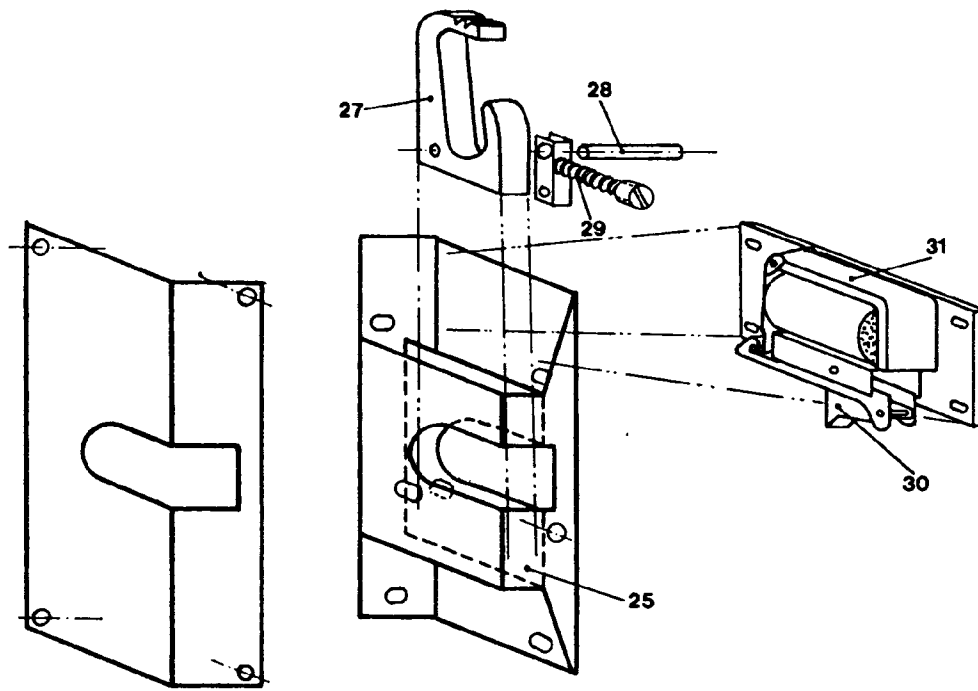


FIGURE 14

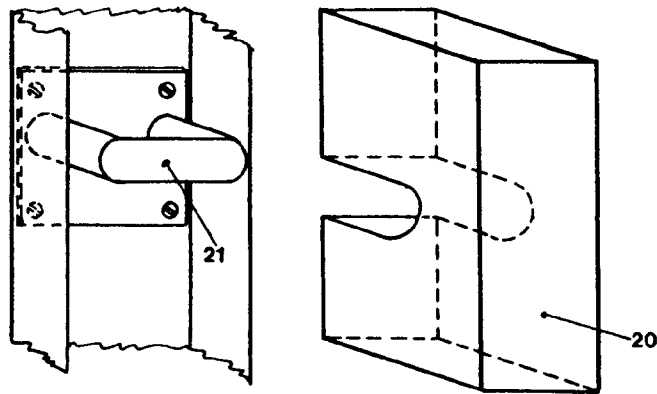


FIGURE 15

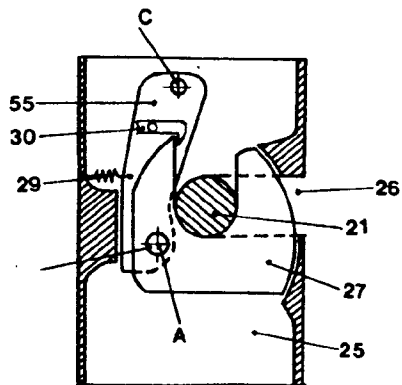


FIGURE 16

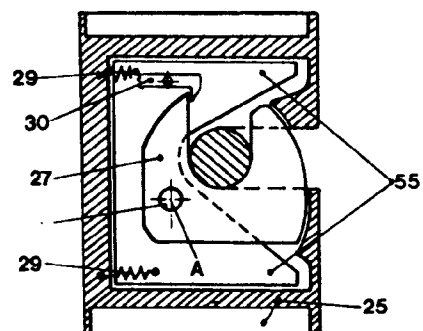


FIGURE 17