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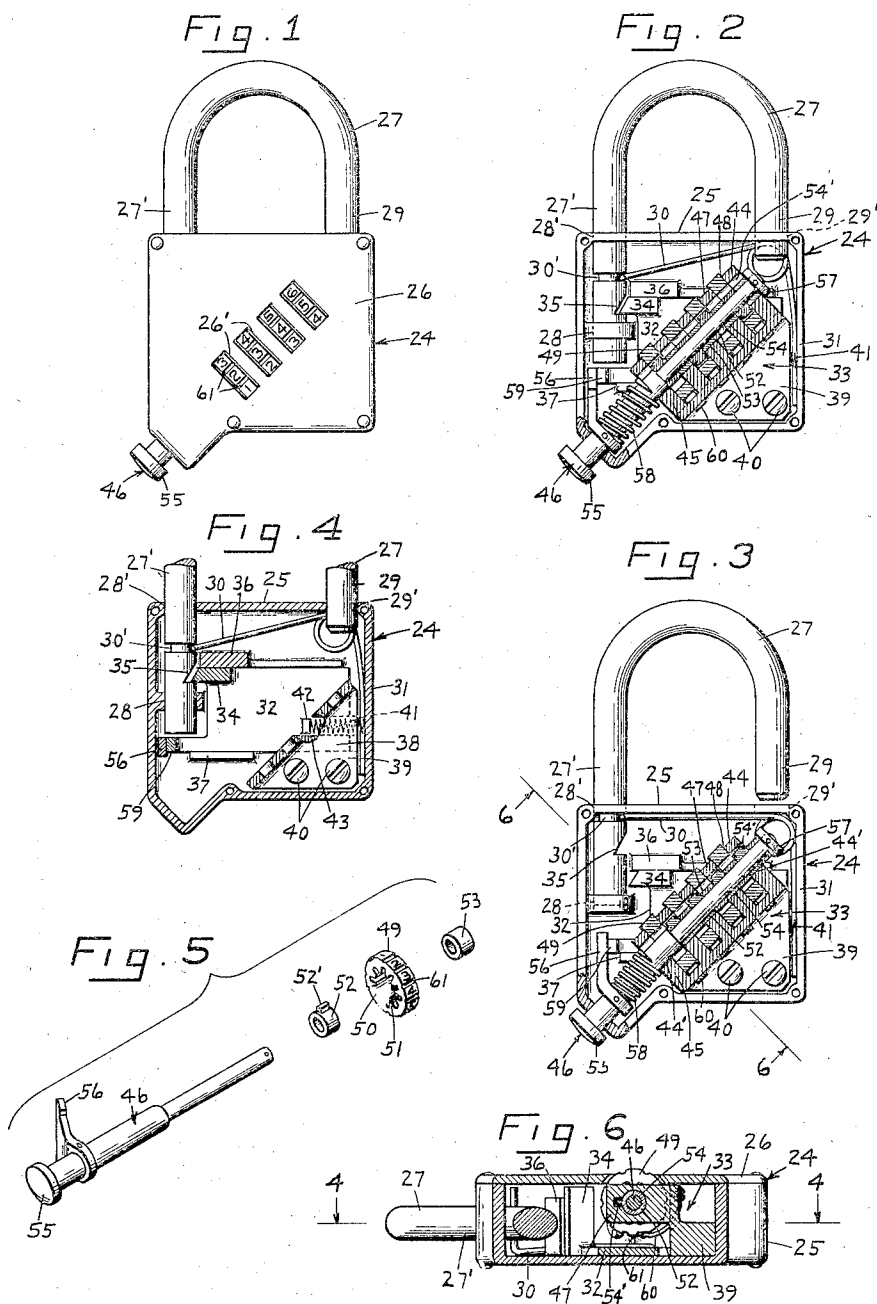
H. R. SEGAL

2,008,565

KEYLESS LOCK

Filed Jan. 27, 1934

2 Sheets-Sheet 1



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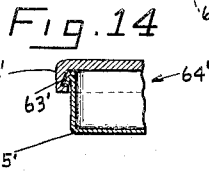
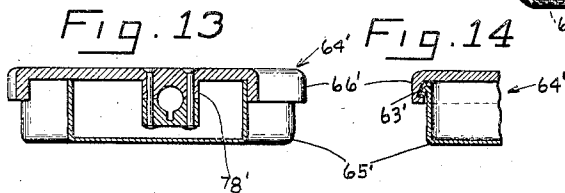
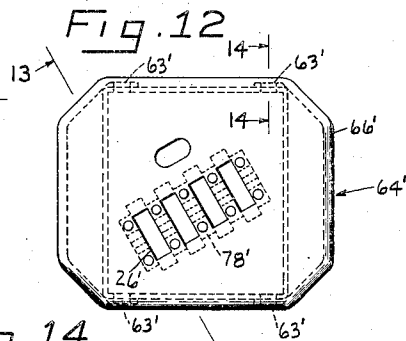
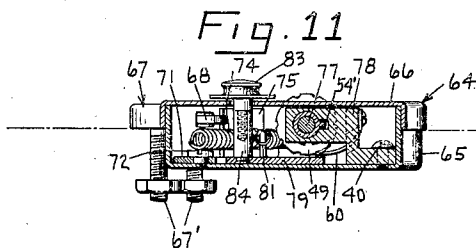
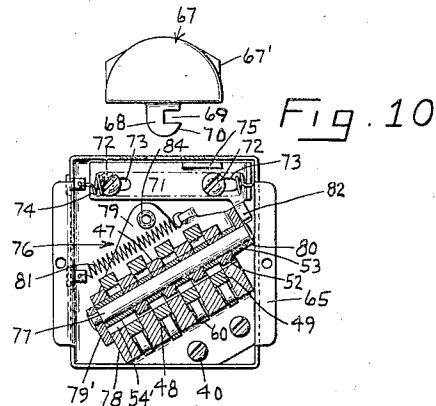
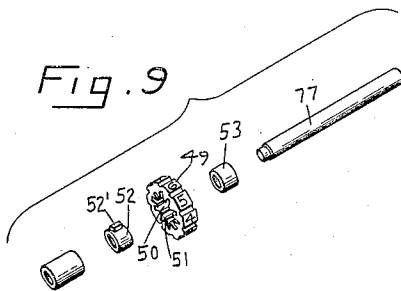
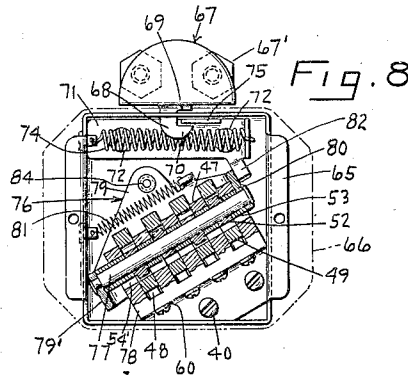
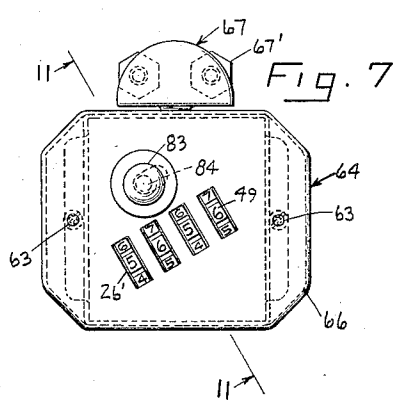
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KEYLESS LOCK

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2 Sheets-Sheet 2



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KEYLESS LOCK

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14 Claims. (Cl. 70—113)

This invention relates to improvements in keyless or permutation type lock mechanisms for use in padlocks and built-in locks on buildings, filing cabinets, safe deposit boxes, hand bags, brief cases, and the like.

It is an object of the present invention to provide a permutation type lock which is smaller and which lends itself to greater compactness than those heretofore proposed so that it may be used advantageously on very small articles by being smaller and lighter in weight, and better in general appearance than those provided heretofore, but which, despite its smaller general size, will not require smaller operating parts and consequently will not inconvenience the operator in the manipulation thereof.

It is another object of the present invention to provide a permutation type lock with controlling elements structurally devised and arranged to be sturdier and consequently less liable to breakage and failure than those heretofore proposed.

A still further object of the present invention is the provision of a permutation type lock having comparatively few and inexpensive parts.

Another object of the present invention is the provision of a permutation type lock structure in which the parts are maintained in close operating relationship in final assembly, although made only within ordinary manufacturing limits, in order to prevent a thief from finding the combination by trial and sound, as is possible when there is a difference in the cooperating relationship of the various parts.

Yet another object of the present invention is to provide a keyless or permutation type lock embodying a simple and effective structure in which the combination for opening the lock may be changed readily without the use of a screw driver or other tool.

One feature of the present invention is the provision of a keyless or permutation type lock mechanism which may be angularly disposed in a lock casing. Advantages of this angularly disposed mechanism include the possibility of using a shifting member which is greater in length than the interior width of the casing, and yet movement thereof may be accomplished substantially widthwise in the casing.

Another feature is the provision of a keyless type lock mechanism having a plurality of lock-controlling elements so constructed that the elements still in locking position cooperate to prevent finding the combination, while other elements are in releasing position.

A further feature is the provision of a casing which may be made as a die-casting having substantially integral bearings for an operating shaft, and which may be so arranged that it is merely necessary to snap a cover or shell thereon to complete the lock after the main operating parts are assembled.

Other features and advantages will appear hereinafter.

In the drawings:

Figure 1 is a plan view of one form of the present invention embodied in a permutation type padlock.

Fig. 2 is a view similar to Fig. 1, but shows the cover plate removed, and shows the combination control wheels and frame thereof in sections through the center thereof, with the various parts in the shackle locking position.

Fig. 3 is a view like Fig. 2, but shows the shackle and the lock controlling parts in the open or inoperative position.

Fig. 4 is a sectional view taken through the lock at a point about half way of its thickness, on line 4—4 in Fig. 6.

Fig. 5 is an exploded view of the spindle and spindle elements.

Fig. 6 is a sectional view taken on line 6—6 in Fig. 3.

Figs. 7 through 14 show a modified form of the present invention, in a fixed lock structure, rather than the padlock form, and of these:

Fig. 7 is a top plan view of the complete lock.

Fig. 8 is a view similar to Fig. 7, but shows the cover plate removed, and shows the controlling parts in section substantially through the center thereof.

Fig. 9 is an exploded view of the permutation wheel and spindle parts.

Fig. 10 is a view similar to Fig. 8, but shows the various parts in the unlocked position.

Fig. 11 is an oblique cross section taken on line 11—11 in Fig. 7.

Fig. 12 is a top plan view of the casing for that form of lock shown in Figs. 7 through 11 with the main outer part made in the form of a die-casting having integral bearings for the permutation wheel spindle.

Fig. 13 is a view taken on line 13—13 in Fig. 12.

Fig. 14 is a fragmentary view taken on line 14—14 in Fig. 12.

Referring now in detail to the drawings the first form of the invention, disclosed in Figs. 1 through 6, preferably comprises a casing 24 of substantially rectangular form including a main body 25 and cover plate 26 supporting a locking

member 27 which in this form of the invention is a shackle having a long leg 27' slidably and rotatably mounted in bearings 28 and 28' at one side of the casing, and having a short leg 29 adapted to enter a locking aperture 29' at the opposite side of the casing.

A spring 30 is provided which has one leg extending down along a side wall 31 of the casing 24, while the other end extends across the casing to enter a suitable slot 30' in the long leg 27' of the shackle to normally urge the shackle upwardly and outwardly of the casing until the short leg is moved out of the locking aperture 29', as shown in Fig. 3. This spring also serves to limit outward movement of the shackle when it engages the underside of the casing top wall, as may be seen best in Fig. 3.

The combination changing and lock controlling mechanism of the present invention which is about to be described is distinctly novel and should therefore be particularly noted. It is simple and economical to manufacture, is sturdy and positive in its action, and lends itself to divers forms of keyless lock constructions. In general, it comprises an interponent 32 in the form of a slide, and a lock conditioning mechanism 33 adapted to control and operate the slide in a novel manner.

The slide 32 is preferably provided with a finger 34 adapted to enter a cooperating notch 35 in the long leg 27' and thereby hold the locking member 27 in the effective position shown in Figs. 1, 2 and 4, or to release the member and permit its travel to the ineffective position shown in Fig. 3.

The slide 32 is transversely movable within the casing 24, and to this end there is preferably provided cast lugs 36 and 37 in the main body 25 portion of the casing forming a channel to locate and support the slide. The forward end of the slide is held depthwise of the casing by having the finger 34 of sufficient height to nearly engage the under side of the cover piece 26 while the rear end thereof is held against such movement by the under side of a projection 38 on a support 39 which is affixed to the casing, as by screws 40. This slide is normally urged toward the locking member 27 by a compression spring 41 which engages the inside face of the wall 31 and pushes against an up-turned ear 42 on the slide at its other end. A slot in the slide 32 and an undercut 43 on the projection 39 provide a channel or housing for the spring.

The lock conditioning mechanism 33 includes the support 39 having end walls 44 and 45 with bearings 44' and 45' forming a suitable sliding connection for a spindle or shifter 46, and is provided intermediate the end walls with dividing walls 47 and with apertures 48 adapted to accommodate a plurality of permutation wheels 49, which fit snugly but rotatably therein. A plurality of these apertures and wheels, four in the present showing, are in the one support.

The wheels 49 are provided with indicia on their periphery, and with a bore 50 having a plurality of notches 51 extending from the bore, one aligned with each of the indicia. The bore of each of the wheels is adapted to slide on the periphery of a wing collar 52 or on the periphery of a plain spacing collar 53, the collars being equal in number to the wheels and being interspersed on the spindle 46. The dividing walls 47 are each provided with a bore 54 adapted to freely accommodate the spacing collars 53 and, due to a single notch 54, accommodate the wing collar 52

only when the wing 52' thereon is properly aligned. The spindle enters a suitable bore in each of the collars and permits rotation of the collars thereon.

A knob 55 and finger 56 at the outer end, and an extra spacing collar 53 and flange collar 57 at the inner end serve to limit sliding movement of the spindle in the support 39. A spring 58 urges the spindle to the out position where the wings 52' on each of the collars 52 are in one of the notches 51 in one of the permutation wheels 49, and spacing collars 53 are in the bores 54 of the dividing walls 47. Thus, too, the spring also urges the finger 56 on the spindle to the position shown in Figs. 2 and 4, permitting the slide 32 which is associated therewith through a finger 59 to move into position to hold the locking member 27 with the finger 34 in the notch 35.

To open the lock it is merely necessary to push the knob 55 inwardly of the casing 24 if wings 52' on each of the collars 52 are properly aligned with the single notch 54' in each of the dividing walls 47, whereupon the wings 52' move from the bore 50 of the wheels into the bore 54 of the dividing walls, and the spacing collars 53 move into the bore of the wheels. In this inward movement of the knob and spindle 46, the finger 56 moves upwardly and sidewise in the casing engaging the finger 59 and pushing the slide from the position shown in Fig. 2 to that shown in Fig. 3, releasing the finger 34 from the notch 35 and thereby allowing the spring 30 to eject the locking member 27 to the ineffective position.

Small springs 60 adapted to enter suitable notches 61 in the wheels 49 centralize the indicia within slots 26' in order to facilitate setting the combination, and also hold the wheels in the original combination while the wing collars 52 are disconnected from the wheels in the dividing walls 47.

When the knob 55 is released with the locking member 27 in the ineffective position the spindle 46 and wing collars 52 return to the normal position again, and the spring 41 urges the finger 34 against the wall of the member 27. As the locking member is moved into the casing 24 again the finger 34 snaps into the notch 35, and thereafter the operator or user spins several of the wheels 49 to dis-align the wings 52' with the notches 54', and thereby locks the device.

Thereafter, the lock can be opened only by someone who knows the right combination of indicia, for it is necessary to again align the wings 52' with the notches 54' before the lock can be opened.

In order to change the combination with the structure provided by the present invention, it is merely necessary to change one or more of the indicia wheels relative to each other while the spindle 46 and wing collars 52 are in the position shown in Fig. 3, whereupon the wings 52' slide into new notches 51 in the wheels 49 aligned with the new indicia combination. The springs 60 allow the wheels 49 to be willfully turned with comparative ease.

Referring now in detail to the modified form of the invention shown in Figs 7 through 14, it should be particularly noted, since it discloses the structural and functional advantages of the present invention better than that form heretofore described, providing as it does a lock which is extremely compact and which may be made much smaller than those usually provided. This is a particular advantage when the lock is applied to small filing cases, brief cases, hand bags and

other small articles where there is but limited material in which to set the lock.

Also, the greater compactness provided by the present invention is an advantage from the standpoint of appearance, providing as it does a small, neat looking lock on small articles rather than a large, ugly looking lock. It cuts down the weight on articles such as brief cases and hand bags which are carried about. In spite of the smaller general size there is no inconvenience, since it is not necessary to cut down on the size of spacing of the permutation wheels which the user must manipulate. These manifold advantages are accomplished according to the present invention by a structure and arrangement of parts wherein the lock controlling mechanism is disposed obliquely within the casing and the various cooperating parts structurally designed to cooperate therewith.

The structure comprises a casing 64 including a body shell 65 and a cover 66 adapted to be secured to the article with which it is to be used by means of screws or rivets (not shown), while a catch 67 may be secured to the flap, slide, cover or other movable part of the article as by means of bolts and nuts 67'. The catch 67 is provided with a pointed finger 68 having a notched aperture 69 forming a hook 70. The cover 66 and body shell 65 are held together as by rivets 63.

Within the body shell 65 and underlying the cover 66 thereof is a slide 71 which is preferably located and supported for sliding movement by shoulder screws 72 secured to the body shell passing through elongated apertures 73 in the slide 71 to permit limited movement of the latter transversely relative to the body shell.

A coil spring 74 is provided to normally pull the slide 71 to the left side of the casing, as viewed in Fig. 8, in order to move a locking finger 75 on the slide into the aperture 69 so that the hook 70 portion of the catch 67 is locked relative to the main casing. This arrangement of parts is such that the pointed finger 68 on the catch, as it moves from the position shown in Fig. 10 to the position shown in Fig. 8, engages the left side of the finger and pushes it to the right against the tension of the spring 74 until the catch is fully in place, whereupon the finger jumps into the aperture, back of the hook, to lock the two parts together.

A lock conditioning and controlling mechanism 76 of novel construction is provided within the casing 64 for locking and controlling the slide 71 and catch 67. In its present preferred form, it comprises a permutation mechanism which may be of the general type hereinbefore described in connection with the first form of the invention, and including permutation wheels 49, wing collars 52 and spacing collars 53 cooperating with dividing walls 47 and wheel apertures 48 upon a modified form of spindle 77 and support 78.

This form of spindle 77 is preferably supported on a shifter plate 79 by connection to up-turned end walls 79' and 80 at opposite ends. The flat base section of this shifter is spaced to ride upon the bottom of the casing 64 while the spindle 77 slides in the support 78. A spring 81 is provided to normally pull the shifter to the left as shown in Fig. 8, in which position the permutation wheels may be rotated to align the wing collars 52 with the notched dividing walls 47.

The slide 71 is provided with an obliquely disposed finger 82 associated with the end wall 80 on the shifter 79 so that the slide 71 and finger 75 thereon are moved out of engagement with the

catch 67 whenever the shifter is moved from the locking position shown in Fig. 8 to the opening position shown in Fig. 10, as by pushing against a knob 83 on the outside end of a pin 84 which has a connection to the shifter 79 and passes through a suitable elongated slot in the cover plate 66. Thus, when the permutation wheels are properly set it is a very simple matter to push the knob 83 and release the catch. When the shifter is pulled back again by the spring 81 and the catch 67 is again held in place by the slide 71, it is merely necessary to turn the permutation wheels in order to lock the article. As with the first form of the invention, a new combination may be made by willfully turning the permutation wheels when the shifter is in the lock opening position shown in Fig. 10.

This oblique structure and oblique arrangement of parts is such that the left side or end wall 79' of the shifter travels freely into the lower left hand, free corner of the case into the effective position, while the right hand end wall 80 of the yoke travels freely into the upper right hand, free corner of the casing. Further, this oblique arrangement of parts makes possible the connection of the slide 71 to the exterior of the shifter 79, and does not necessitate a greater width of the casing in proportion to the width of the finger 82, as would be necessary if the permutation wheel frame and associated parts were disposed transversely within the casing.

The advantages of this structure will be apparent further, and obviously so, when it is realized that the transverse width of the casing may be and in the present showing is narrower than the total width of the shifter 79 exclusive of the additional width which would normally be required in order to permit travel of a transversely located shifter from the effective to the ineffective position.

If preferred, the invention may be made, as shown in Figs. 12, 13 and 14, with a casing 64' comprising a cover 66' made of a die-casting or the like and a body 65' of sheet metal, with a snap connection 63' therebetween. Thus the need for holding screws or rivets between the cover and body is obviated. Also, a support 78' for the permutation wheels 49 and associated mechanism may be cast substantially integral with the cover 66' thereby lessening the machining, quantity of parts and the cost.

Other variations and modifications may be made within the scope of this invention.

I claim:

1. In a keyless lock, the combination of a casing; a locking member movable in said casing into effective and ineffective positions; a slide associated with said member; a solely reciprocatory shifter and means including a permutation mechanism adapted to cooperate with said slide and shifter to condition the slide and shifter for coordinate movement at an angle to each other into effective and ineffective positions to lock the associated member in the effective position, and upon proper setting adapted to permit movement of said locking member to the ineffective position.

2. In a keyless lock, the combination of a casing; a locking member movable in said casing into effective and ineffective positions; a slide associated with said member; a solely reciprocatory coupling mechanism cooperating with the slide, for controlling and imparting coordinate movement to the slide at an angle to each other into effective and ineffective positions; and means

including a permutation mechanism cooperating with said coupling mechanism and the slide to lock the associated member in the effective position, and upon proper setting adapted to permit movement of said locking member to the ineffective position.

3. In a keyless lock, the combination of a substantially rectangular casing; a locking member movable in said casing, into effective and ineffective locking positions, and having a notch; a slide in said frame movable in a plane parallel with the casing into and out of engagement with the notch in said locking member; a permutation mechanism obliquely disposed in said casing; and a shifting member associated with said permutation mechanism obliquely disposed and obliquely movable in said casing and capable of moving said slide through a path at an angle to the movement or travel of the shifting member.

4. In a keyless lock, the combination of a substantially rectangular casing; a locking member movable into effective and ineffective positions relative to the casing; a slide movable into and out of locking engagement with the locking member; and a permutation type controlling mechanism, including a shifting member of greater length than the interior width of said casing, obliquely arranged in said casing and adapted to move said slide angularly relative thereto.

5. In a keyless lock, the combination of a substantially rectangular casing; a locking member, with a notch, movable into effective and ineffective positions relative to the casing; a slide movable into and out of engagement with the notch in said locking member; and a permutation type controlling mechanism, including a shifting member of greater length than the interior width of said casing, obliquely arranged in said casing for substantial widthwise movement therein and adapted to move said slide angularly relative thereto out of engagement with the notch in the locking member.

6. In a keyless lock, the combination of a casing of substantially rectangular form; a locking member movable in said casing into effective and ineffective positions; a slide associated with and adapted to control said locking member; and a solely reciprocatory permutation type controlling mechanism, including a shifting member, obliquely arranged in said casing and adapted to move said slide angularly to control the associated locking member.

7. In a keyless lock, the combination of a casing of substantially rectangular form; a locking member movable into effective and ineffective positions relative to the casing; a slide associated with and adapted to control said locking member; a permutation type controlling mechanism; a shifting member associated with said controlling mechanism, obliquely arranged in said casing and adapted to move said slide angularly relative thereto to control the associated locking member; and a knob on said shifting member passing through an opening in said shifting casing for manually moving said member and associated slide from the effective to the ineffective position upon proper setting of the permutation type controlling mechanism.

8. In a permutation lock, the combination of a casing; a locking member, with a notch, movable into effective and ineffective positions relative to the casing; a slide in said casing adapted to enter the notch and hold the locking member in the effective position; permutation wheels; a support for said wheels; a shifting member; a shaft on

said shifting member having a sliding bearing in said support and forming an axis for said permutation wheels, said shaft having retracted and advanced positions; and coupling means associated with said permutation wheels and the support therefor, adapted to permit movement of said shifting member and associated shaft from the retracted to the advanced position only when said permutation wheels are in pre-determined positions, for moving the slide out of engagement with the locking member and for permitting movement of the locking member to ineffective position.

9. In a permutation lock, the combination of a casing; a locking member, with a notch, movable into effective and ineffective positions relative to the casing; a slide in said casing adapted to enter the notch and hold the locking member in the effective position; permutation wheels each having a plurality of notches in the bore thereof; a support having apertures, and dividing walls each with a single notch adapted to support said wheels in spaced relation; a shaft; spacing collars on the shaft; lug collars on the shaft; and a shifting member adapted to support said shaft, collars and permutation wheels, having a normal retracted position wherein the lug collars are in predetermined notches of the permutation wheels and adapted to be moved to an advanced position upon proper setting of the permutation wheels to align said lug collars with the single notches of the dividing walls, whereupon it moves the slide out of the notch of the locking member and permits movement of the locking member into the ineffective position.

10. In a keyless lock, the combination of a casing of substantially rectangular form; a locking member movable into effective and ineffective positions relative to the casing; a slide associated with and adapted to control the locking member; an angularly disposed finger on said slide; a permutation type controlling mechanism; a shifting member associated with the controlling mechanism, obliquely arranged in said casing and having an angularly disposed wall cooperating with the angularly disposed finger on the slide to shift the slide and thereby render the locking member ineffective.

11. In a permutation type lock, the combination of a casing; a cover forming a part of said casing; a locking member movable into effective and ineffective positions relative to the casing; a slide carried by the casing, movable into effective and ineffective positions; a permutation type controlling mechanism for conditioning the slide carried by the casing; and a support for said controlling mechanism on said cover.

12. In a keyless padlock, the combination of a substantially rectangular casing having side walls and a top wall; a shackle, having a pair of notches, mounted for reciprocative and rotative movement in said casing into effective and ineffective positions; a permutation type controlling mechanism adapted to cooperate with one of the notches and hold the shackle in the effective position; and a compression spring having two legs, one leg engaging a side wall of the casing and the other underlying the top wall and entering a notch in the shackle, adapted to eject the shackle from the effective to the ineffective position upon release of the shackle by the controlling mechanism.

13. In a keyless padlock, the combination of a casing; a shackle, having a pair of notches mounted for reciprocative and rotative move-

ment in said casing into effective and ineffective positions; a permutation type controlling mechanism adapted to cooperate with one of the notches and hold the shackle in the effective position; and
5 a spring engaging a notch in said shackle, adapted to eject the shackle from the effective position and to limit movement thereof into the ineffective position.

14. In a keyless lock, the combination of a
10 rectangular casing; a locking member having effective and ineffective positions relative to the casing; a permutation type controlling mechanism obliquely disposed in said casing and adapted to hold the locking member in the effective position, having retracted and advanced positions; a main shaft in said controlling mechanism; and a knob on said shaft projecting
5 through an aperture in a corner of the casing for manually moving said controlling mechanism from the retracted to the advanced position.

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