April 19, 1955 J. G. JAMIESON ET AL 2,706,393

COMBINATION LOCK DEVICE

Filed Oct. 29, 1952 4 Sheets-Sheet 1

Fig. 1

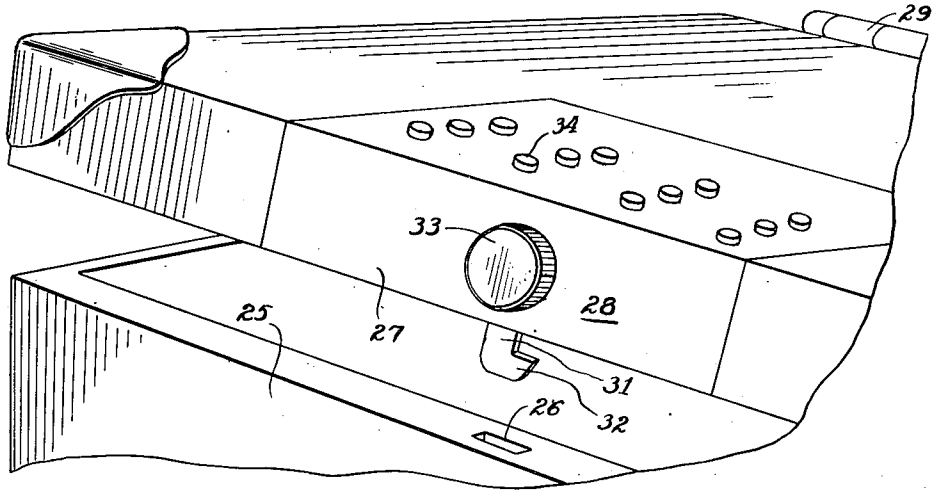


Fig. 2

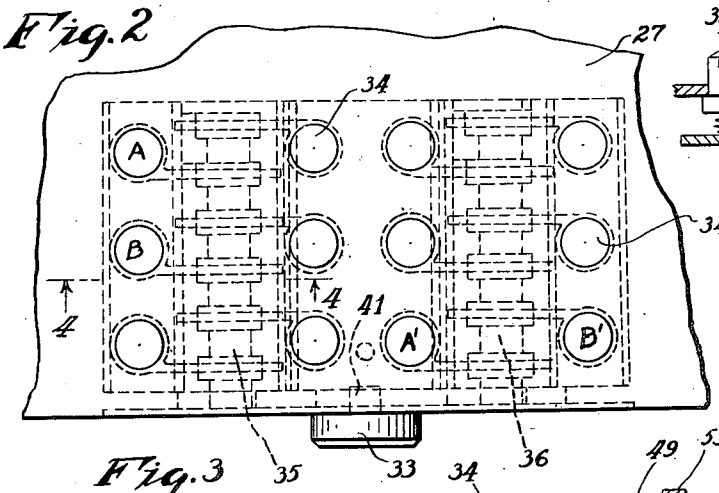


Fig. 4

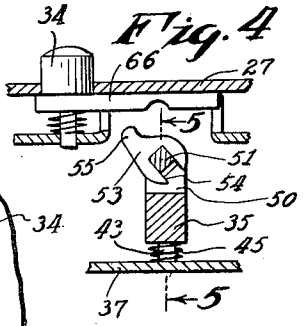


Fig. 3

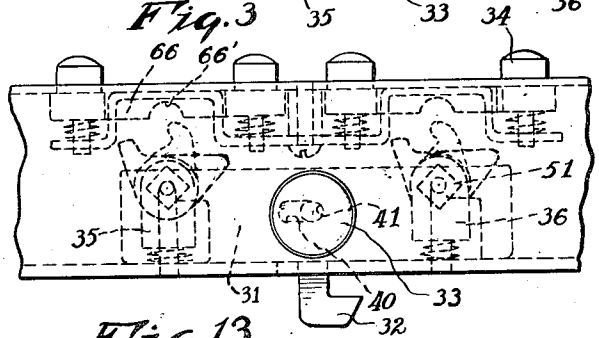


Fig. 5

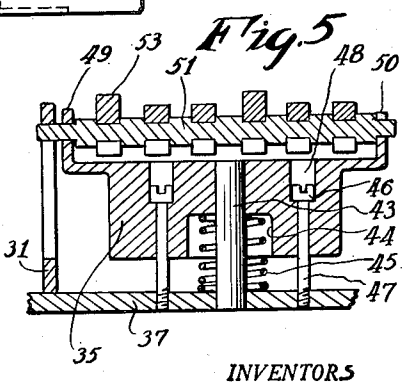


Fig. 13

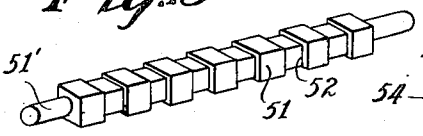
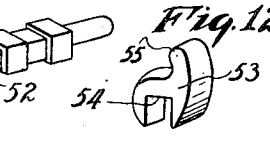


Fig. 12



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COMBINATION LOCK DEVICE

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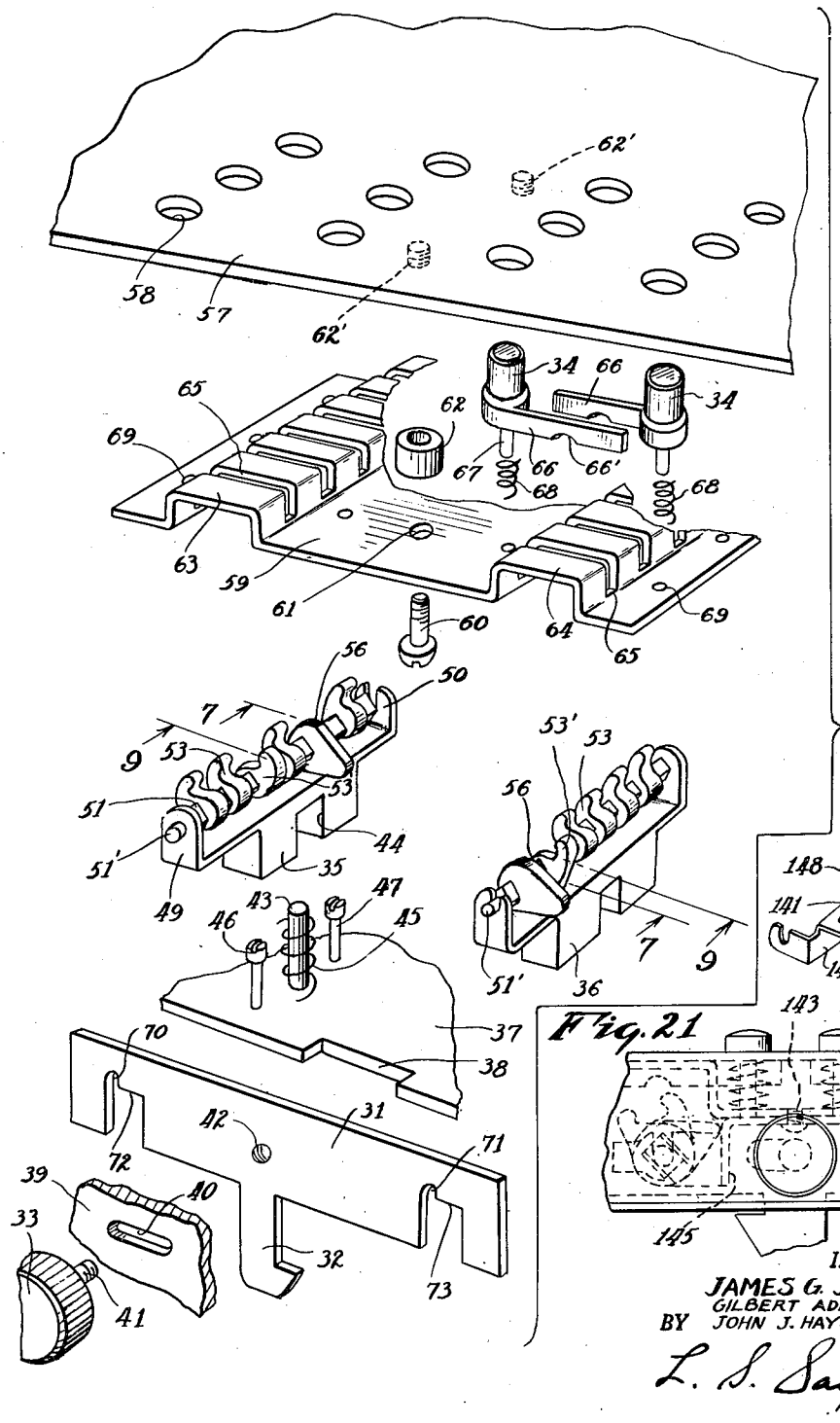

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COMBINATION LOCK DEVICE

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Fig. 7

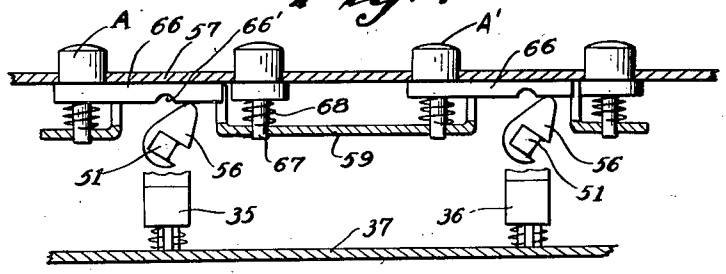


Fig. 8

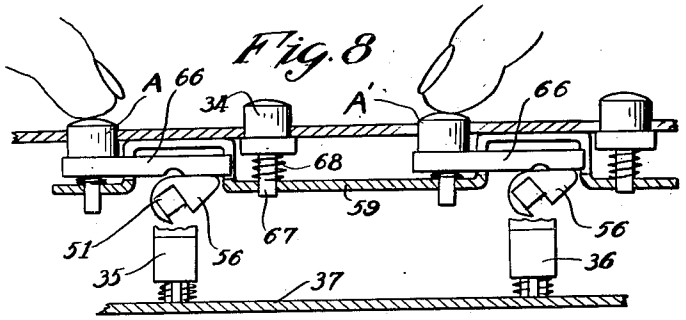


Fig. 9

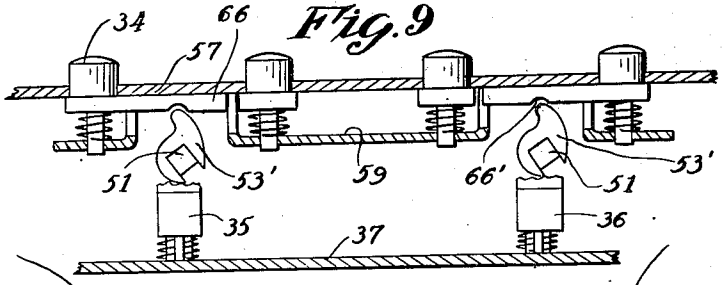


Fig. 10

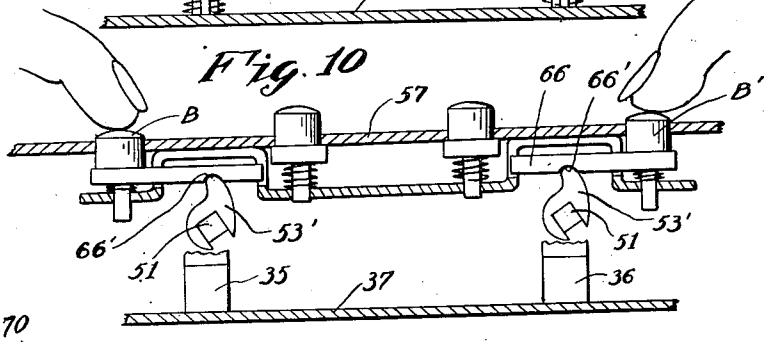
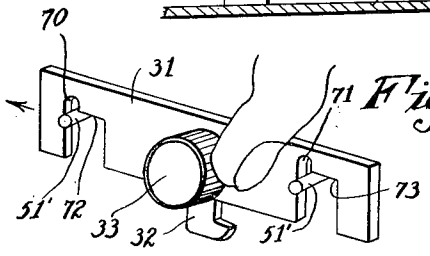


Fig. 11



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COMBINATION LOCK DEVICE

Filed Oct. 29, 1952 4 Sheets-Sheet 4

Fig. 14

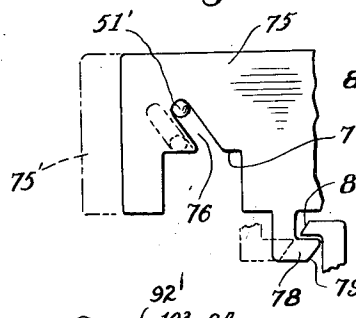


Fig. 15

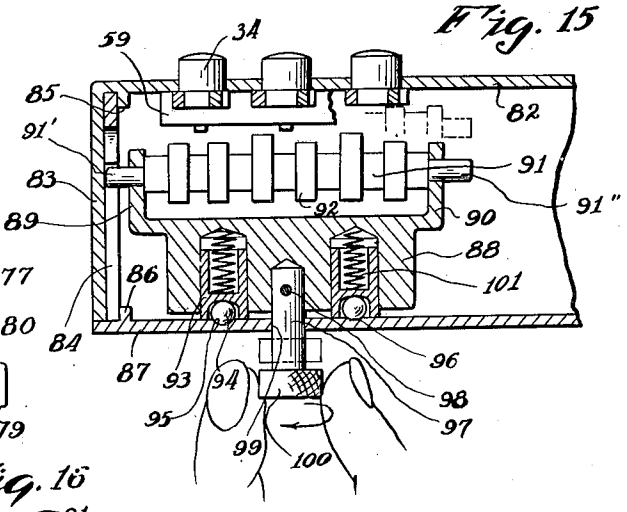


Fig. 16

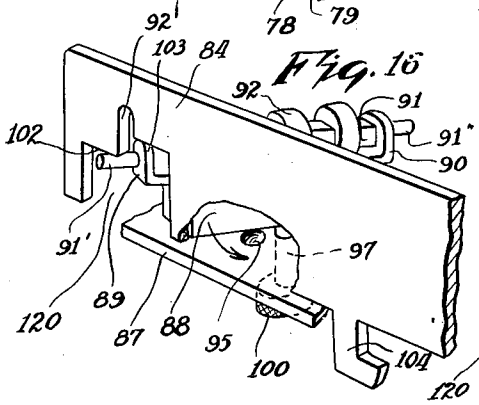


Fig. 17

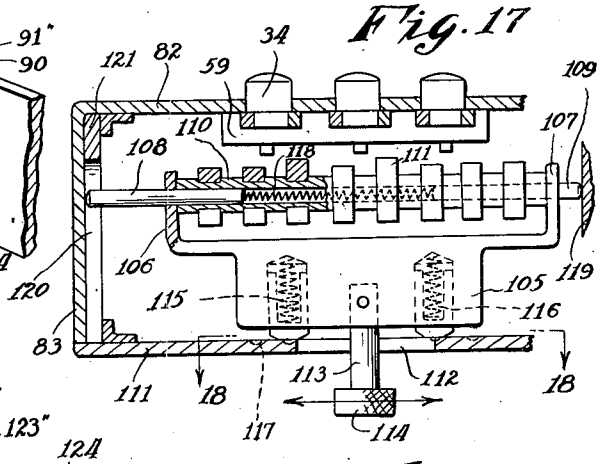


Fig. 19

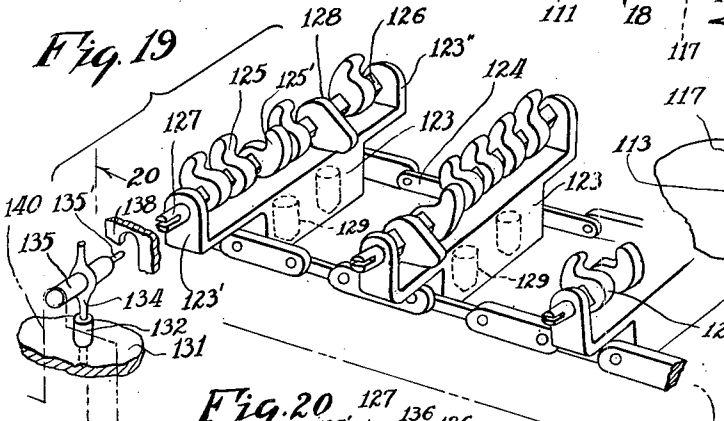


Fig. 18

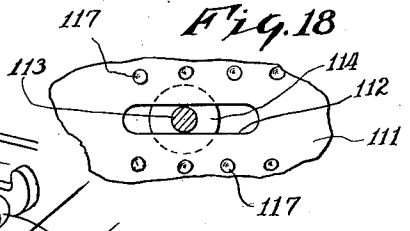
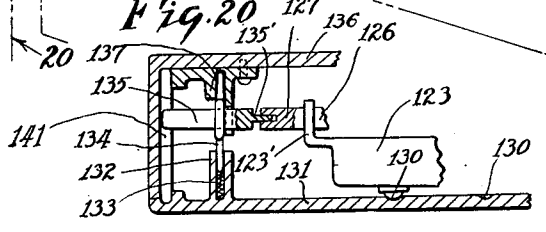


Fig. 20



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United States Patent Office 2,706,393 Patented Apr. 19, 1955

2,706,393

COMBINATION LOCK DEVICE

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Application October 29, 1952, Serial No. 317,396

6 Claims. (Cl. 70—315)

This invention relates to combination lock devices.

It is an object of the present invention to provide in a combination lock device adapted to be operated by selected push buttons in accordance with a pre-arranged set-up of operating elements which can be easily adjusted upon the retaining shaft, one at a time and without losing control of the others lying upon the shaft.

It is another object of the invention to provide a combination lock device of this type having operating elements adapted to be pre-set on a shaft, means for adjusting the block which retains the shaft having the operating elements so that without altering the elements upon the shaft the same can be rearranged quickly and easily for a different combination and sequence, of operation of the push buttons.

Other objects of the invention are to provide a combination lock device of this type having interchangeable elements and adjustable block members retaining the elements which is of simple construction, inexpensive to manufacture, has a minimum number of parts, compact, easy to adjust, will have long life, convenient to use and efficient in operation.

For other objects for a better understanding of the invention reference may be had to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 is a top perspective view of a chest, employing on its cover the combination push button lock device of the present invention;

Fig. 2 is an enlarged fragmentary top plan view of the cover portion lying above the lock device and looking in plan upon the buttons thereof and with the device being shown with dotted lines thereunder;

Fig. 3 is a fragmentary and enlarged edge elevational view of the cover, the latch knob and latch, the push buttons projecting upwardly from the top of the cover and in dotted line the locking device mechanism;

Fig. 4 is a fragmentary vertical sectional view taken on line 4—4 of Fig. 2;

Fig. 5 is a fragmentary vertical sectional view taken on line 5—5 of Fig. 4;

Fig. 6 is a collective and perspective view of fragments of the cover and lock device separated from one another;

Fig. 7 is an enlarged transverse sectional view taken generally on line 7—7 of Fig. 6 with all of the push buttons elevated;

Fig. 8 is a transverse sectional view similar to Fig. 7 but with the two outer buttons pressed down to effect a clearing operation on the operating elements to turn the opener elements to their proper working positions;

Fig. 9 is a transverse sectional view taken generally on line 9—9 of Fig. 6 and showing the positions of the openers and without any of the buttons being depressed;

Fig. 10 is a view similar to Fig. 9 with two of the buttons being depressed to effect the actuation of the operating elements and the depressing of the supporting blocks therefor;

Fig. 11 is a perspective view of the edge plate and the knob therefor;

Fig. 12 is a perspective view of the operating element;

Fig. 13 is a perspective view of the element engaging shaft;

Fig. 14 is a fragmentary elevational view of a portion of the slide latch plate having an inclined upper slot so as to be automatically adjustable as the blocks containing the operating elements are depressed;

Fig. 15 is a fragmentary sectional view of a still further form of the invention where the blocks are connected to a shaft on which they may thereby be turned about to present a new arrangement of operating elements;

Fig. 16 is a fragmentary perspective view of the slide plate and of the block with the operating elements thereon in the process of being adjusted or turned to a new setting;

Fig. 17 is a fragmentary sectional view of a still further form of the invention wherein the block can be pivoted to effect an additional variation in the combination;

Fig. 18 is a fragmentary sectional view taken on line 18—18 of Fig. 17;

Fig. 19 is a fragmentary perspective view of a still further form of the invention wherein the blocks containing the operating elements are adjustable by chain means so that different blocks having different set ups of the operating elements can be presented to the push button arrangement;

Fig. 20 is a fragmentary sectional view taken generally on line 20—20 of Fig. 19 and of the connection of a latch projection with one of the shafts of the block;

Fig. 21 is a fragmentary view of a modified form of the invention where the operating elements and clearing element are supported on a common plate extending from one side of the device to the other.

Fig. 22 is a perspective view of the supporting plate.

This invention is based upon improvements upon a locking device of this general nature disclosed in the John J. Hays patent, No. 1,976,724, and relates to improvements therefor.

Referring now particularly to Figs. 1 to 13, 25 represents a chest or container in the upper edge of which is a slot 26. A cover 27 bearing combination locking device 28 is hinged to the chest bottom 29. The locking device has a latch slide 31 adapted to enter the slot 26 and have its hook formation 32 seated under one end of the slot 26. The lock has a hand knob 33 by which the slide 31 can be adjusted upon the proper selection of buttons 34 extending upwardly through the top face of the cover, being depressed in the proper sequence. The press buttons 34 are arranged in four rows of three buttons each. There are a pair of rows arranged above the respective depressible blocks 35 and 36. On the under side of the cover and forming a part of the locking device is a supporting plate 37 having a recess 38 in one edge thereof through which the hook formation 32 of the slide 31 depends. The supporting plate 37 has an upwardly extending portion 39 having an elongated slot 40 through which screw shank 41 of knob 33 passes for threaded engagement with a threaded opening 42 in the latch slide 31, Fig. 6.

On the supporting plate 37 at each block location is an upstanding stud post 43 on which the block is vertically adjustable. The underside of the block has a recess 44 which receives a compression spring 45 surrounding the stud post 43 and reacting against the inner side of the plate 37 to lift the block against heads 46 of stop screws 47 lying within recesses 48 of the block.

On the opposite ends of each block are upstanding bearing bracket portions 49 and 50 opposing one another and in which is journalled at its opposite ends thereof square shaft 51. The shaft 51 has a plurality of squared recesses 52, evenly and longitudinally spaced from the shaft and adapted to receive from any one of four directions about the shaft, operating elements 53 having recesses 54 for receiving the shaft, Fig. 12, and offset upstanding projections 55. There are five of these operating elements 53 disposed on the shaft and one of them, as indicated at 53', is disposed in reverse manner and angularly displaced at 90 degrees therefrom. The sixth operating element on the shaft 51 as indicated at 56 is of different shape from the operating elements 53 and may be designated as a clearer, for receiving the first buttons that are pushed to properly angle the shaft for engagement of the proper buttons with the elements 53' which may be designated as the opener elements. These elements are arranged on the block 36 in a different manner generally from the arrangement of the elements on the block 35. It will be understood that these elements can be rearranged, as desired, in which the location of

the clearer elements 56 and the opener elements 53' are differently arranged.

Secured to a top plate 57 having holes 58 through which the buttons 34 respectively project, is a push button supporting plate 59. This supporting plate 59 is made secure with the top plate 57 by screws 60 passing through holes 61, only one being shown, and through a spacing collar 62 for engagement with threaded openings 62' in the top plate 57.

This supporting plate 59 has parallel channelled portions 63 and 64, each of which portion having a plurality of longitudinally spaced transverse 65, across which extend eccentric arms 66 respectively associated with the push buttons 34. Each push button has depending projections 67 surrounded by a coil spring 68 which extends through a guide hole 69. The spring 68 acts to return the push button to its raised position. The arms 66 of adjacent or transversely aligned buttons extend in an opposing manner from different sides of the buttons of the transversely aligned two buttons. This is to allow the buttons to be transversely aligned with one another and to conserve space. The respective blocks 35 and 36 lie within the respective inverted channel portions 63 and 64 of the button supporting plate 59 so that their operating elements can be engaged by the arms 66. Each arm 66 of the push button is provided with a notch 66' into which the projections 55 of the openers can be accommodated, while the arm 66 works on the opener element 53' to depress the block. By having the projections in the notches 66', the shaft 51 is prevented from rotating while the arms are depressed to operate upon the opener elements 53', as shown in Figs. 9 and 10.

To operate the blocks, certain of the buttons 34 can be depressed to engage with operating elements 53 through the arms 66 whereby to turn the shaft so that the operating elements 53 will be extended in the manner as shown in Fig. 4. This result is effected upon depressing any of the several buttons 34 other than the buttons marked A, B, A' or B'. The next step is to push buttons A and A' so that the shaft 51 will be positioned in the manner as shown in Fig. 8. The arms 66 of the buttons A and A' will engage the clearing elements 56 to turn them to the position as shown in Fig. 8 and to thereby align the projections 55 of the opener elements 53' with the notches 66' so that they will be ineffective to rotate the shafts 51 upon the push of the two buttons B and B', but will cause such shafts to be depressed. When the buttons B and B' are pushed together, the shaft 51 of each block will be acted upon to depress the blocks 35 and 36 against the action of springs 45. The projections 55 of the opener elements 53' which enter the notches 66' will keep the shafts 51 properly positioned as the buttons B and B' are depressed.

The shafts 51 have long extensions which normally lie in small openings 70 and 71 in the latch 31, Figs. 6 and 11. These extensions of the shaft 51 are indicated at 51'. These extensions will be out of the notches or openings 70 and 71 while the fingers are held on the buttons B and B' so that slide 33 can be operated by the thumb or another finger so that the hook formation 32 thereon will disengage from the end of the slot opening 36. The extensions 51' will slide under an edge 72 and an edge 73 to allow the slide to move in the direction of the arrow as shown in Fig. 11. This time the cover 27 can be elevated from the bottom part 25. When it is desired to again lock the cover to the bottom part 25 of the chest, the knob 33 is grasped and the slide 31 is adjusted to the right so that the hook portion 32 will enter beneath the end of the slot 26 in the chest part 25. The blocks 35 and 36 will then be elevated for the actuation of the operating elements and the shaft 51 on the next operation of the buttons.

In order to change the combination of the set up as shown, it is only necessary to pull the opener element 53' on the shaft 51, and replace it with a blocking element taken from another location. Thereafter, placing the opener element 53' in the location of the blocking element which was removed. By so changing the operating elements on the one shaft will give an entirely different combination with respect to the other shaft. Also, the operating elements can be changed on the other shaft to give a further variation.

The clearing elements 56 can be interchanged with other elements on the same shaft so as to obtain a still further variation of the sequence of operation of the buttons.

In order to avoid the necessity of having to use the knob 33 of the slide 31 in order to effect the movement thereof, there is provided a latch slide 75, Fig. 14, having an inclined small opening 76 into which the extension 51' of the shaft 51 extends. As the extension 51' moves down, it will bear against the under edge of the opening 76 which is inclined to cause the slide plate 75 to move to the dotted line position indicated at 75'. The extension 51' may be moved downwardly to leave the small opening 76 and ride on the under edge 77. The slide plate 75 has a depending hook formation 78 having an inclined edge 79 that rides downwardly on inclined edge 80 of the slot opening to cause automatically the latch slide to move into position to pass through the slot in the bottom part of the chest if the slide happens to have been in a shifted position and out of alignment with the slot 26.

Referring now particularly to Figs. 15 and 16, there is shown a modified form of the invention wherein the blocks supporting the operating element can be rotated through 180 degrees so that automatically from inside the cover by a pull of a knob an adjustment can be made of the combination operating elements. In this form of the invention, 82 represents a top plate through which upwardly project push buttons 34 that are held by the supporting plate 59. Top plate 82 has a depending end portion 83 against the inner side of which is placed a slide plate 84 which is guided by lug 85 depending from the plate 82 and lug 86 extending outwardly from button plate 87.

A block 88 having bearing portions extending upwardly and indicated at 89 and 90 to support shaft 91 having a plurality of operating elements 92 connected thereto in the same manner as above described and comprising blocking, clearing and opening elements for effecting the respective operations as above described. This shaft 91 has extensions 91' and 91'' on the opposite ends thereof, either one of which may engage with an upwardly extending narrow slot 92' in slide plate 84. In the underside of the block 88 are detent devices 93 having ball elements 94 adapted to enter depressions 95 and 96 in the plate 87 and spaced 180 degrees apart about a pivot axis of shaft 97 fixed by a pin 98 to the block 88 and which extends downwardly through an opening 99 in the plate 87 and has a turning knurled knob 100 thereon. Each detent device has a spring 101 which normally urges the upward movement of the block 88 so that the projection 91' and 91'' of the shaft 91 will normally enter the small opening 92' of the slide plate 84. With the operating elements 92 set up in one arrangement on the shaft 91, a different arrangement of the same can be immediately effected by pulling down on the knob 100 and reversing the ends of the shaft 91 and of the block 88 so that instead of the extension 91' entering the opening 92', the extension 91'' will enter the opening. At the same time this is effected the shaft extension is brought down below edge 102 of the plate 84. Normally in the sliding of the slide plate 84, the block is lowered so that the extensions of the shaft 91 can run along the edge 103 of the plate 84. Plate 84 has the usual hook formation 104. The detent balls 94 can lie in either of the depressions and thereby hold the bracket 84 against angular displacement until the knob 100 is again pulled downwardly.

In Fig. 17 and Fig. 18, there is shown a still further form of the invention wherein the adjustment or change of the block holding the operating elements can be effected by a sliding motion. A block 105 is used which is of greater length than the blocks used in the other forms of the invention. This block has upwardly extending bearing projections 106 and 107 for supporting extension rods 108 and 109 respectively projecting from a central opening within hollow shaft 110 which adjustably and replaceably receives operating elements 111 and can be arranged in any manner thereupon. This shaft 110 receives more elements than the other supporting shafts which have been used, and there are extra operating elements thereon. A bottom plate 111' has an elongated slot 112 through which extends a rod 113 depending from the bracket 105 and having a knurled knob 114 thereon. Detent devices 115 and 116 are provided in the bracket 105 and can enter longitudinally spaced depressions 117 lying at the opposite ends of the slot 112 and in the upper

face of the plate **111'**. In the hollow shaft **110** is a compression spring **118** which reacts against the projecting shafts **108** and **109** to extend them. The shaft **109** reacts against an abutment **119** and the shaft **108** is forced to opening **120** in slide **121** and against depending portion **83** of the plate **82**. It will thus be seen that an additional lock combination of the working elements on the shaft can be had by moving the block longitudinally and without having to remove the individual working elements on the shaft.

Referring now particularly to Figs. 19 and 20, there is shown a still further form of the invention wherein more than two blocks are used. These blocks are arranged in chain fashion and spaced from one another so that as the chain is moved around a given path the blocks will be changed to meet the operating arms of the push buttons. Blocks **123** are arranged on a chain linkage **124**. The chain linkage is operable about rotatable support, not shown, and can be adjusted so that the different blocks **123** can be positioned under the sets of push buttons, and at the same time the blocks can be adjusted to a position where they can be easily worked upon to alter the arrangement of working elements **125**. Each block has upstanding bearing portions **123'** and **123''** in which is journalled shaft **126** having a slotted projection **127**. The operating elements **125** are connected to the shaft **126** in the same manner as above described in connection with the other forms of the invention and can be rearranged lengthwise and angularly on the shaft. Each shaft has a clearing element **128** that can be located on different positions on the shaft and an opening element **125'**. The blocks **123** have detent devices such as shown in Fig. 17 and is operated along a plate. These detent devices will register when the blocks are properly positioned in recesses in the plate. Such a detent device is indicated at **129**, and depressions **130** are shown in a plate **131**, Fig. 20. The detent devices **129** urge the block **123** upwardly. In the base plate **131** is an upwardly extending sleeve portion **132** in which is located a spring **133** and urges upwardly the support and **134** that carries a shaft **135** with a projection **135'** that enters the slotted extension **127** of the shaft **126**. Depending from top plate **136** is a guide bracket **137** into which member **134** extends, whereby the latch member would be steadily supported. The bracket **137** has a notched portion **138** that receives the latch member **135** to hold it against angular displacement in a horizontal plane. The blocks **123** will be depressed and operated in the same manner as above described, and extension **127** of the shaft **126** being locked with the projection **135'** of the latch member **135**, will cause, as the block **123** is depressed, the latch member **135** to leave vertical slot **140** in latch slide plate **141**. It will be seen that as the blocks are adjusted by the chain link arrangement **124**, the different extensions **127** of the shafts **126** will lock with the projection **135'** of the latch member **135**. The arrangement will be different of the operating elements on their respective shafts **126** so that automatically a different combination set up is effected as the different locks are put under the different sets of buttons.

Referring now particularly to Figs. 21 and 22, there is shown a modified form of support for the operating and clearing elements. This support is a common member **140** which has central holes **141** and **142** through which screws **143** extend to fix the common support member **140** to the underside of plate **59**. This common member has turned down portions **144** and **145**. Each of these portions has laterally extending and longitudinally spaced bearing bracket formations **146** and **147** on which shaft **51** bears the operating elements **53** and clearing element **56**. The member **140** has small holes **148** through which the projections **67** of the buttons **34** may slide. As the operating elements are worked by the proper buttons **34** in the same manner as above described, the member **140** will be flexed so that the extensions **51'** of the shafts **51** will disengage from the recesses **70** and **71** of the plate **31**.

It will be seen that with this form of the invention the return spring action for the elements comes from the supporting plate **140** and by this construction the number of parts to obtain the same result has been greatly reduced. The mounting of shafts **51** and the orientation of the elements thereon can be easily effected by a simple removal of the shafts **51** from the bearing brackets **146** and **147**.

It should now be apparent that there has been provided a combination lock device operated by sets of push buttons wherein the combination can be changed by the replacement or rearrangement of the working elements on the shaft without the shaft having to be disassembled from the bracket. It will also be seen that there has been provided according to the present invention an arrangement for adjusting the blocks that support the operating elements to different locations in order to alter the combination. This is had in addition to the rearranging of the operating elements on the shafts.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. A combination lock device comprising a supporting structure, a plurality of push button elements depressibly mounted on the supporting structure, a block depressibly and adjustably mounted upon the supporting structure beneath the push button elements, a shaft latch journalled on said block, operating elements connected in spaced relationship along said shaft, certain of the elements being angled with respect to the other elements, said operating elements being replaceably connected to said shaft, whereby the elements may be differently arranged on the shaft with regard to their angular displacement relative to each other, said push button elements engageable with certain of the operating elements in sequence to turn the shaft and to depress the block, a latch slide engageable by said shaft latch and manually operable means connected to the block to adjust the same upon the supporting structure to present a different arrangement of the working elements beneath the push button elements.

2. A combination lock device comprising a supporting structure, a plurality of push button elements depressibly mounted on the supporting structure, a block depressibly and rotatably mounted upon the supporting structure, a shaft journalled on said block having latch end projections on the opposite ends of the same, a latch slide adjustably connected to the supporting structure and adapted to receive the latch end projections of the shaft to normally hold the latch slide in its latched position, a plurality of operating elements replaceably connected to said shaft at different angular positions thereon and with respect to each other, said block upon being rotated one-half turn thereby presenting opposite latch end projections of the shaft and a different arrangement of the operating elements to the push button elements without having to readjust the several operating elements upon the shaft.

3. A combination lock device comprising a supporting structure, a plurality of push button elements depressibly mounted on the supporting structure cover, a block depressibly and rotatably mounted upon the supporting structure, a shaft journalled on said block having latch end projections on the opposite ends of the same, a latch slide adjustably connected to the supporting structure and adapted to receive the latch end projections of the shaft to normally hold the latch slide in its latched position, a plurality of operating elements replaceably connected to said shaft at different angular positions thereon and with respect to each other, said block upon being rotated one-half turn thereby presenting opposite latch ends of the shaft and a different arrangement of the operating elements to the push button elements without having to readjust the several operating elements upon the shaft, and handle projection means connected with the block and extending through the supporting structure to serve as the pivot connection with the supporting structure, a knob on the outer end of the said shaft, said supporting structure having depressions therein, ball detent devices mounted within the block and engageable with the depressions in the supporting structure to hold the block in its angularly adjusted position and serving to hold the block elevated from the supporting structure and operating elements in their operative positions beneath the push button elements, said slide latch thereby being released to permit the turning of the ends of the shaft into operative engagement therewith.

4. A combination lock device comprising a supporting structure, a plurality of push button elements depressibly connected to the supporting structure, a block depressibly connected to said supporting structure and longitudinally adjustable thereover to alter the alignment of the block with the push button elements, a plurality of operating

elements mounted on the block to be respectively engaged by the push button elements, a latch projection extending outwardly from the block, a latch slide adjustable on the supporting structure and adapted to receive the latch projection, means connected to the block and extending through the supporting structure for effecting the longitudinal adjustment thereof, certain of the operating elements being engaged by certain of the button elements in a predetermined sequence, and shaft means carrying said operating elements and rotatable upon the block.

5. A combination lock device comprising a supporting structure, a plurality of block devices disposed in spaced relationship with respect to each other and adjustable over said supporting structure, a shaft journalled on each of said block devices, operating elements angularly adjustably connected to said shaft, push button elements carried by the supporting structure and depressibly in proper sequence to engage the operating elements to the shaft, detent devices urging each block device to an elevated position for engagement by the push button elements, certain of the operating elements on the shaft depending according to the arrangement of the operating elements thereupon, said detent devices serving to retain the blocks when in their proper positions against lateral displacement over

the supporting structure, each of said shafts having a coupling projection thereon, a latch projection depressibly connected to the supporting structure and having a cooperating coupling projection for engagement with the shaft coupling projection, a latch slide releasably receiving the latch projection, whereby upon pressing push button elements in predetermined sequence relative to the operating elements on the shaft, the block is depressed and likewise the latch projection thereby to release the latch projection from the latch slide and permit the movement of the latch slide.

6. A combination lock device, as defined in claim 5, and continuous chain link means interconnecting the several lock devices whereby different lock devices having different arrangement of the operating elements thereon may be presented to the several push button elements.

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