Aug. 19, 1924.

1,505,571

J. LUOMA

ADJUSTABLE TUMBLER KEY LOCK

Filed May 19, 1922

5 Sheets-Sheet 1

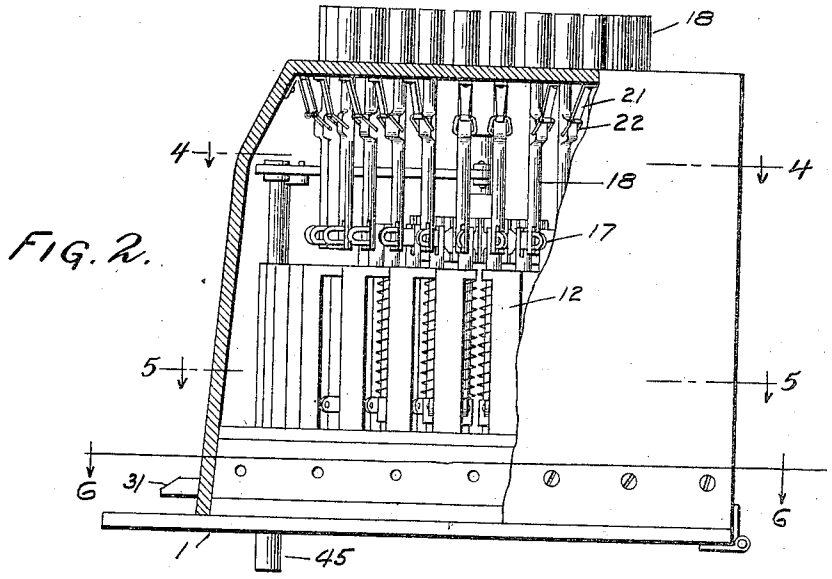


FIG. 2.

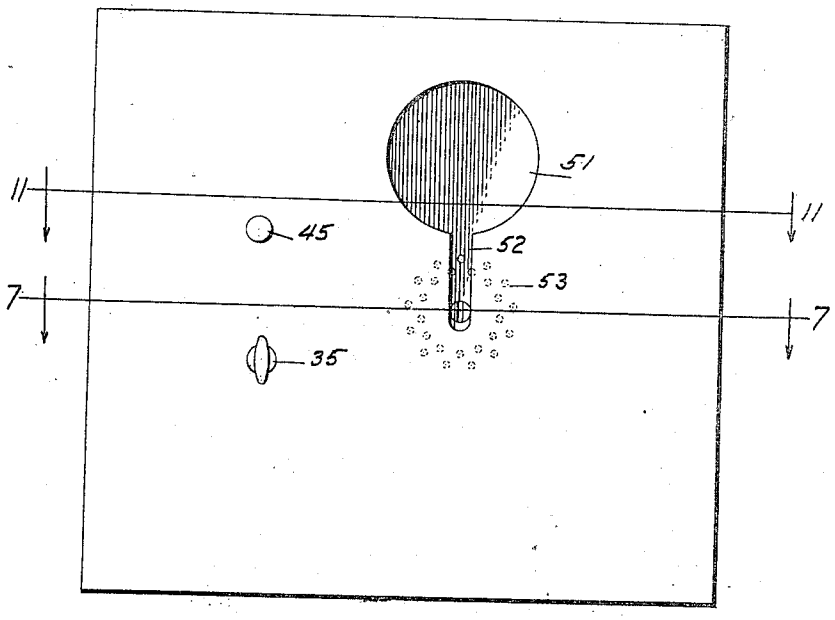


FIG. 1.

Inventor:

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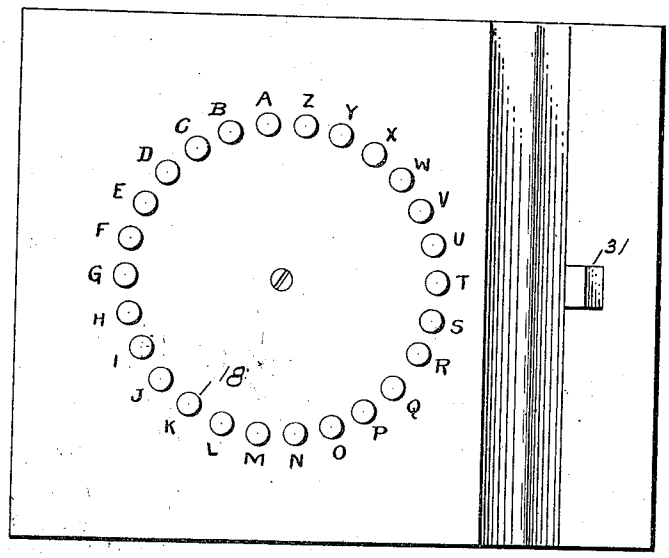
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5 Sheets-Sheet 2

FIG. 3.



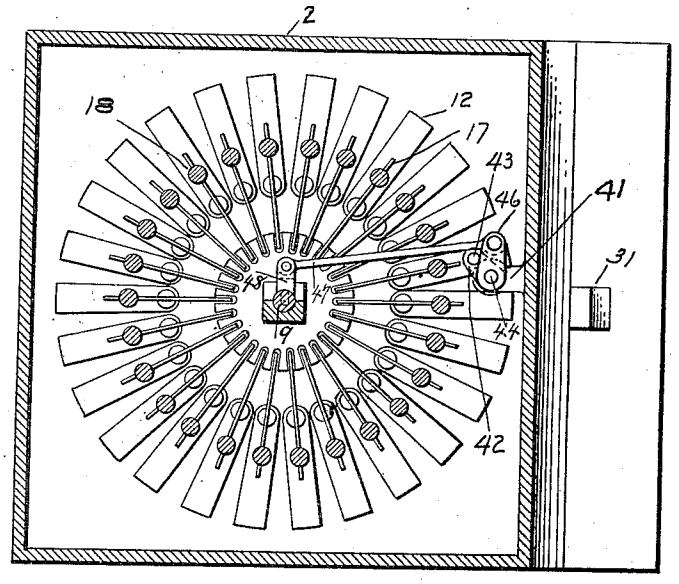


FIG. 4.

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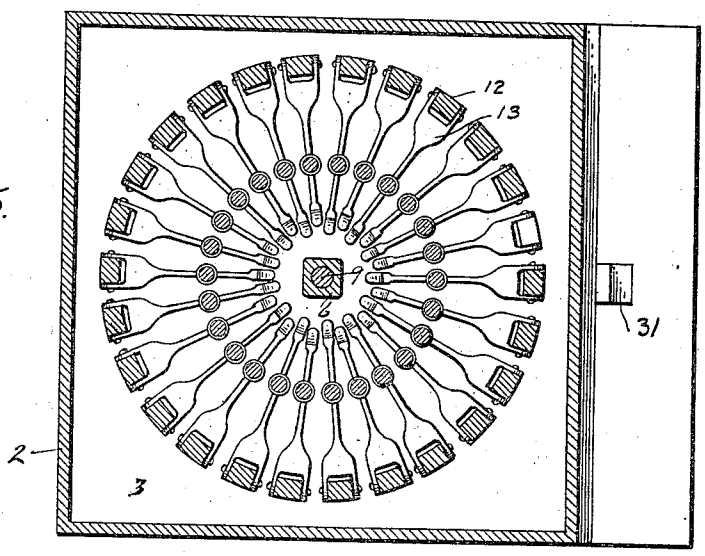
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ADJUSTABLE TUMBLER KEY LOCK

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FIG. 5.



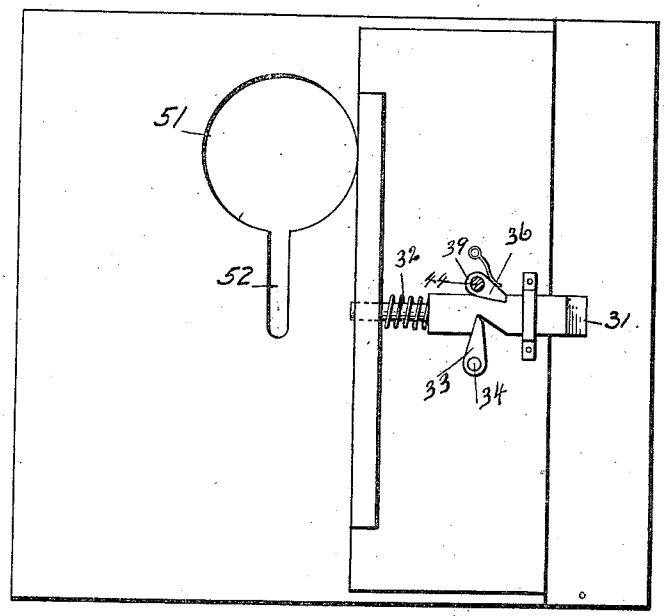


FIG. 6.

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FIG. 9.

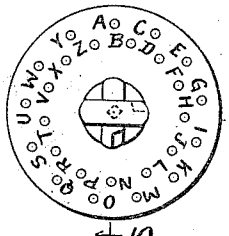


FIG. 8.

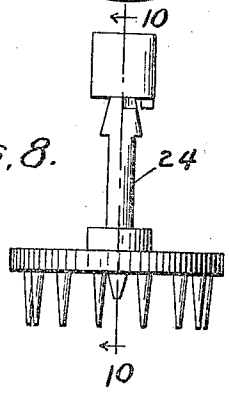


FIG. 10.

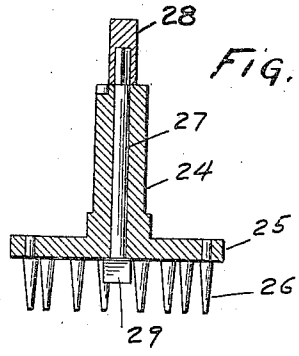
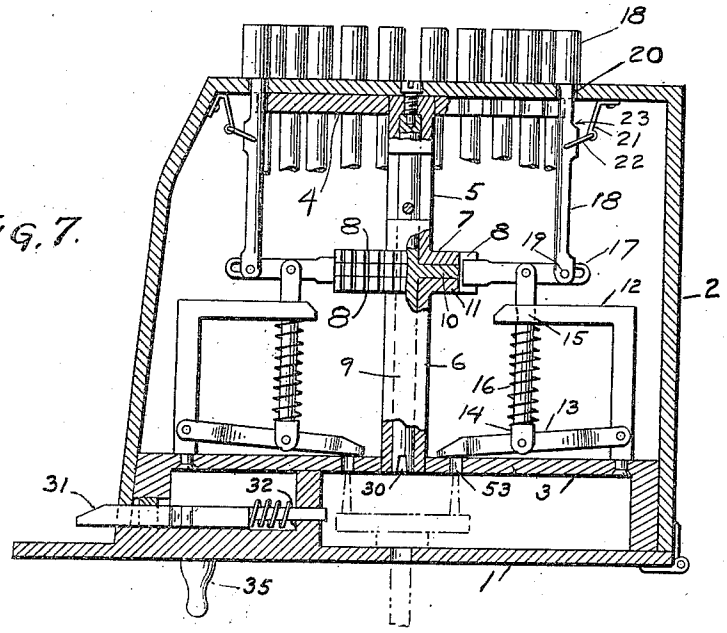


FIG. 7.



Inventor:
John Luoma

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ADJUSTABLE TUMBLER KEY LOCK

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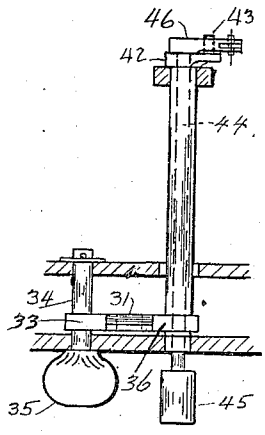


FIG. 12

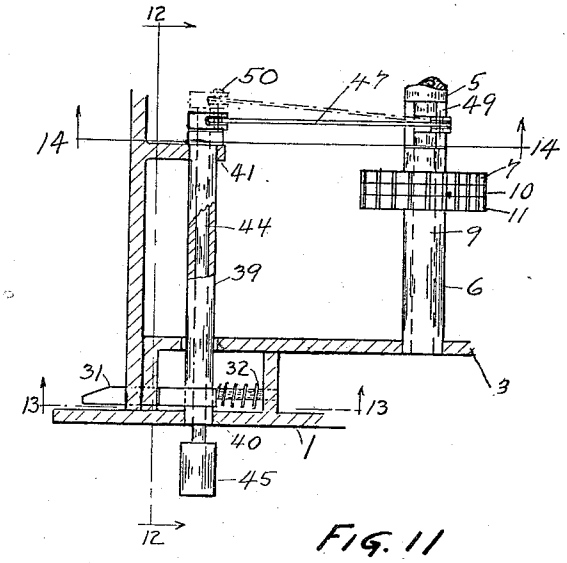


FIG. 11

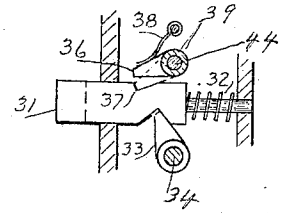


FIG. 13

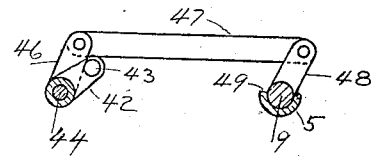


FIG. 14.

John Luoma
INVENTOR.

Patented Aug. 19, 1924. 1,505,571

UNITED STATES PATENT OFFICE.

JOHN LUOMA, OF MAYNARD BOROUGH, MASSACHUSETTS.

ADJUSTABLE-TUMBLER KEY LOCK.

Application filed May 19, 1922. Serial No. 562,935.

To all whom it may concern:

Be it known that I, JOHN LUOMA, a citizen of the Republic of Finland, and a resident at the borough of Maynard, in the county of Middlesex and State of Massachusetts, have invented a new and Improved Adjustable-Tumbler Key Lock, of which the following is a full, clear, and exact description.

This invention relates to locks of that type commonly known as permutation key locks, so arranged that to open it a predetermined combination must be manipulated, and said combination may be changed when desired.

Another object of the invention is to provide a lock of this character which is reliable, convenient in use, and composed of comparatively few parts so arranged as to occupy a small space.

With these and other objects in view the invention comprises various novel features of construction and arrangement of parts which will be more fully described hereafter and set forth in the claims appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention and wherein similar reference characters are employed to designate the corresponding parts;

Fig. 1 is an outside view of the lock.

Fig. 2 is a sectional plan of the invention showing a plan view of the operating mechanism.

Fig. 3 is an inside view of the lock.

Fig. 4 is a cross-sectional view along the line 4—4 of Figure 2 in the direction of the arrows.

Fig. 5 is a cross-section along the line 5—5 of the Figure 2 in the direction of the arrows.

Fig. 6 is an inside view of the locking-bolt operating mechanism taken along the line 6—6 of Figure 2.

Fig. 7 is a cross-section along the line 7—7 of Figure 1, showing the combination mechanism.

Fig. 8 is a side view of the permutable key for the lock.

Fig. 9 is a plan view of said key.

Fig. 10 is a sectional view of the key taken on the line 10—10 of Figure 8 looking in the direction of the arrows.

Fig. 11 is a sectional view along the line 11—11 of Figure 1 showing the bolt operating mechanism.

Figures 12, 13 and 14 are sectional views along the lines designated by corresponding numbers on Figure 11.

Referring to the drawings, numeral 1 designates a back plate designed to be securely mounted on the inside of a door. Upon said back plate are securely mounted the casing 2 and the inner plate 3. The bearing plate 4 is securely mounted upon said casing 2 and carries a sleeve 5 rigidly mounted thereupon. Another sleeve 6 is rigidly mounted on the inner plate 3. The ends of the sleeves 5 and 6 are extended to form the circular discs 7 and 11 respectively wherein the radial slots 8 are provided. Inside the sleeves 5 and 6 is the tumbler shaft 9 arranged to turn freely and extending through from the inner plate 3 to the bearing plate 4 and forming a circular tumbler disc 10 in the middle. The tumbler disc 10 is provided with radial slots to correspond with the slots 8 on the discs 7 and 11.

The permutation mechanism consists of several independent units of permutable apparatus. In the invention illustrated twenty-six of such units are chosen to provide one unit for each letter in the English alphabet. Each unit consists of the following parts: the bracket 12 rigidly mounted on the inner plate 3, the lever 13 pivotally mounted on bracket 12, the locking element 17, link 14 connecting the lever 13 to the locking element 17, said link adapted to slide through the hole 15 in the inwardly projecting extension of bracket 12 and carrying the spring 16, and the operating rod 18 connected to the locking element 17 by the pin 19. Said operating rod 18 extends through the hole 20 to the outside of the lock and is held in the position shown by the pressure of the spring 21 upon the ring 22. When the operating rod 18 is withdrawn until the stop 23 engages the edge of the hole 20, the spring 21 will hold it in such position unless pushed in.

The permutable key for the lock consists of a flat shank 24 made integral with the circular disc 25 whereupon removable pins 26 are provided. Each pin is designated

by a different letter as shown in Figure 9. Through the shank 24 is a hole wherein the shaft 27 is adapted to turn. On outer end of said shaft is securely mounted a handle 28 by means of which the shaft 27 may be turned. The flat end 29 of the shaft 27 is made to fit in the recess 30 in the end of tumbler shaft 9 so that when the key is inserted in the lock, said shaft 9 may be turned by means of said handle 28.

The bolt 31 is shifted against the pressure of the spring 32 by means of the lever 33 rigidly mounted on the shaft 34 and operated by handle 35. Before the bolt 31 can be drawn in, the locking lever 36 must be displaced from the notch 37 against the pressure of the spring 38. The locking lever 36 is rigidly mounted on the hollow shaft 39. Said shaft 39 is adapted to turn in the bearings 40 and 41 and carries the lever 42 provided with the pin 43 on its inner end. Within said hollow shaft 39 is another shaft 44 provided with a suitable handle 45 at its outer end and a rigidly mounted lever 46 at its inner end. Said lever 46 is connected with another lever 48 on the shaft 9 by means of the link 47 in such a manner as to cause the two shafts 9 and 44 to turn simultaneously. The shaft 44 is made of sufficient length so that when it is moved in until the handle 45 comes in contact with the plate 1, the lever 46 is moved into the position indicated in dot and dash lines, Fig. 11, thereby disengaging it from the pin 43. When the shaft 44 is moved to the position indicated by the full lines on Figure 11 the lever 46 engages with the pin 43 and the shaft 39 and consequently the locking lever 36 turns when the shaft 9 is turned by means of the permutable key as described.

Having thus described the mechanical construction of my invention I proceed to explain the operation. If the operating rods 18 are in the position shown in Figure 7 and the permutable key, with all pins in place, is inserted through the hole 51, and the pins inserted in the holes 53, the levers 13 will be moved inward carrying the locking elements out of the engagement with the tumbler disc 10 thereby allowing the locking lever 36 to be moved off the notch 37 by turning of handle 28, and the bolt can be shifted as explained. If however one or more of the pins are removed, the corresponding operating rods must be pulled out so that the lock may be opened with the key as described. Again, if one or more of the operating rods is pulled out, the corresponding locking elements 17 will move from the radial slots in the tumbler disc 10 to the radial slots in the discs 11 and the corresponding pins in the permutable key must be removed, because should the pins be inserted in the holes 53, the locking elements 17 would move into the radial slots of the tumbler disc 10 thus locking it in place. From these conditions the advantage of a very large number of different combinations is derived, as the user of the permutable key must know which ones of the operating rods are pulled out, to enable him to remove the corresponding pins from the key. To aid the memory of the user of the key, it will be convenient to use some combinations spelling easily remembered words, such as for instance: "Luoma."

While I have shown my invention in the embodiment which I now consider the best combination thereof, I desire to have it understood that the invention shown is only illustrative, and such changes as are within the scope of the appended claims may be made when desired. From the foregoing description, taken in connection with the accompanying drawings the advantages of the invention will be readily understood by those skilled in the art into which this invention appertains.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A lock, comprising a casing, a bolt movable in said casing, means for shifting said bolt, a spring pressed locking lever adapted to lock said bolt in door-locking position, a hollow shaft adapted to turn in said casing, said hollow shaft having said locking lever and a crank rigidly mounted thereon, a shaft within said hollow shaft having a suitable handle on its outer end and a link lever adapted to engage with said crank, on its inner end, a tumbler shaft arranged to turn in said casing, a radially notched tumbler disc and a second link lever rigidly mounted on said tumbler shaft, permutable means for locking said tumbler disc in place, and a link connecting said link levers. All substantially as described.

2. A lock, comprising a casing, a bolt movable in said casing, a spring pressed locking lever adapted to lock the bolt in door-locking position, a tumbler shaft adapted to turn in said casing, disconnective means for transmitting motion from said tumbler shaft to said locking lever for disengaging the latter, a tumbler disc rigidly mounted on said tumbler shaft, a plurality of radial notches in said tumbler disc, two stationary locking discs parallel to and on opposite sides of said tumbler disc, a plurality of radially arranged permutable locking units, each of said units consisting of a locking element movable in the radial notches of the aforementioned stationary locking discs and tumbler disc to lock or unlock the latter, an operating rod extending to the outside of the door and adapted to operate said locking element, a spring pressed lever connected to said locking element by means of a link, a permutable key arranged to move

said spring pressed lever inward to operate said locking element. All substantially as described.

3. A permutable key, consisting of a circular disc, a plurality of removable pins on said circular disc, a flat shank rigidly mounted on said disc, a shaft adapted to turn in a hole through said shank and having a suitable handle on its outer end and a head adapted for turning the tumbler shaft on its inner end. All substantially as set forth.

In testimony whereof I have signed my name to this specification.

JOHN LUOMA.