

Sept. 28, 1965

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3,208,248

WAFER TUMBLER KEY SYSTEM

Filed Feb. 6, 1963

2 Sheets-Sheet 1

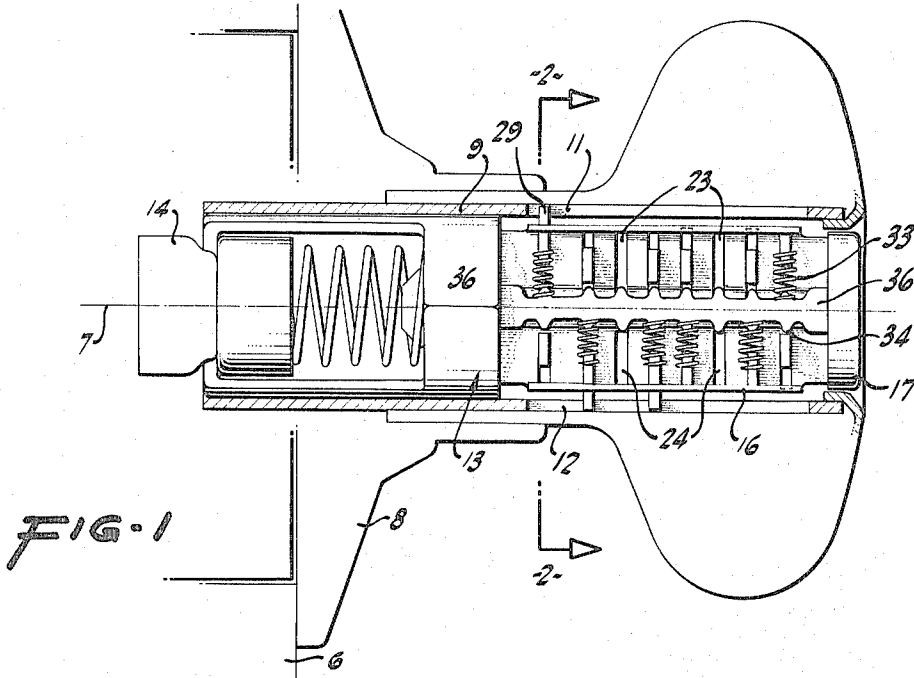


FIG-1

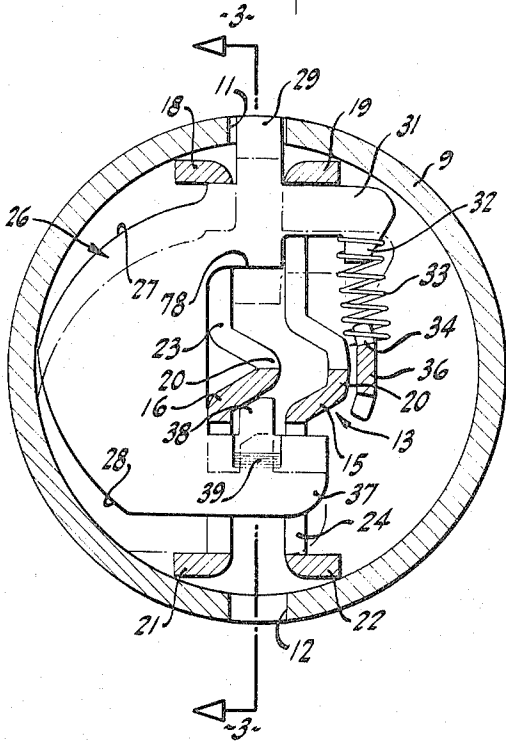


FIG-2

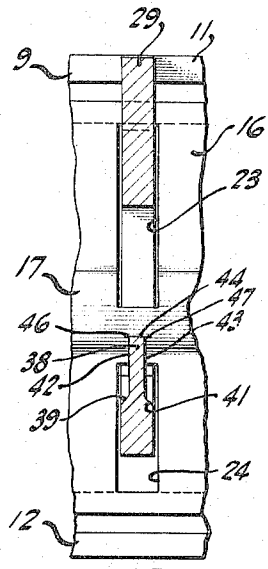


FIG-3

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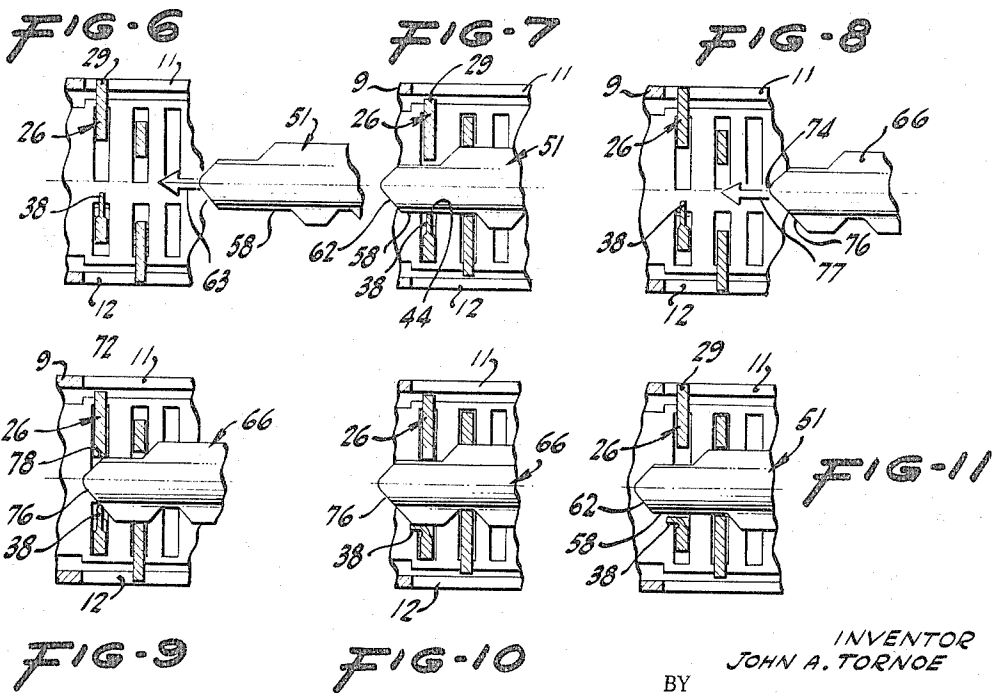
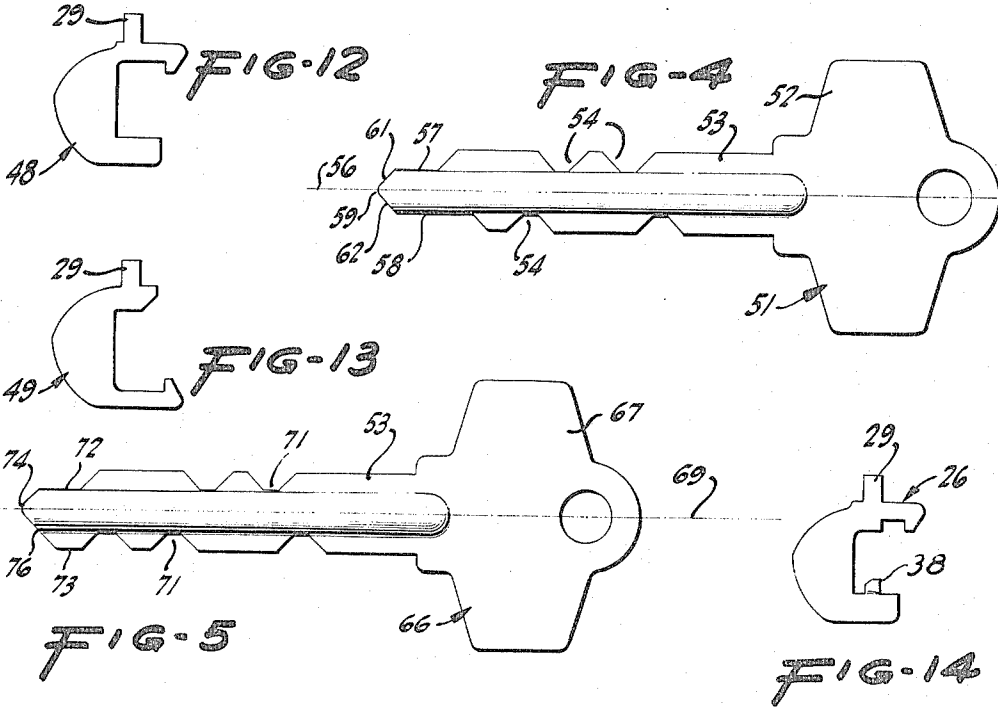
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WAFER TUMBLER KEY SYSTEM

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 Filed Feb. 6, 1963, Ser. No. 256,638
 12 Claims. (Cl. 70—383)

The invention relates to a wafer tumbler key actuated locking device useful primarily in connection with at least two keys, the first key being for primary or temporary use and being replaced by a secondary or permanent key. A feature of the arrangement is that the initial use of a secondary key conditions the locking device so that the previously useful primary key is thereafter permanently inoperative therein.

At a certain stage during the construction of a building, such as a residence, a hotel, a school, an office building, or the like, doors and key-operated locks are installed to insure the security of the building, particularly certain rooms where tools and materials are stored. Master keys are usually issued to the contractor and to workmen, such as carpenters, plumbers, electricians, and the like, during the construction. If one or more of these keys are lost, stolen or duplicated, and the key system is one not embodying this invention, then the security of the entire building is destroyed. If, on the other hand, a key system embodying this invention were employed, then the keys issued to the contractor and workmen would be of only temporary utility since the tenant, when taking possession of the building, or at any time he elects, can, by simply inserting his permanent key into the lock, render all keys previously used permanently inoperative and of no further utility.

A key system of this character may also be employed when a contractor builds one or more homes for sale and gives a listing of the homes to a number of realtors or real estate agents. Each agent is given a key of the temporary type so that he may show the homes to prospective buyers. When a home is sold, the contractor hands the new owner the permanent keys, and when they are inserted into the lock all the temporary keys are thereby rendered permanently inoperative, and neither the contractor nor the new owner need worry about collecting the temporary keys previously handed out to workmen or agents.

An arrangement for use with pin tumbler cylinder locks is shown in the copending application of Ernest L. Schlage entitled Pin Tumbler Cylinder and Key System, Serial No. 256,852, filed February 7, 1963, and assigned to the assignee hereof. The valuable features of that arrangement are also desirable in locks which do not employ pin tumbler combination elements, but rather employ wafer tumblers.

It is therefore an object of this invention to provide a wafer tumbler key system in which there is afforded the advantages of primary and secondary keying in connection with a wafer tumbler mechanism.

Another object of the invention is to provide a wafer tumbler key actuated lock which may be opened by a temporary key and later on by a permanent key which when inserted and removed from the lock thereafter renders the temporary key inoperative.

Another object of the invention is to provide a wafer tumbler key system which can readily be incorporated in locks of the sort now available on the market without radical changes therein.

Another object of the invention is to provide a wafer tumbler key system which readily can be fabricated and installed.

A still further object of the invention is to provide a wafer tumbler key system in which the appearance of

the primary and secondary keys is not markedly different to the eye of the casual observer.

A still further object of the invention is to provide a wafer tumbler key system which affords ready interchangeability with key systems previously employed.

Other objects of the invention together with the foregoing are attained in the embodiment of the invention described in the accompanying description and illustrated in the accompanying drawings.

Briefly summarized, the present invention is embodied in a wafer tumbler lock and includes a special wafer having a relatively weak portion in the path of an initial or construction key and normally operated thereby and also in the path of a secondary or owner's key and deformed by lateral pressure caused by the first insertion of the owner's key. Thereafter the permanently deformed wafer does not respond to the construction key and the wafer tumbler lock can no longer be operated thereby.

In the drawings:

FIGURE 1 is a cross section on a vertical axial plane through a wafer tumbler key system constructed pursuant to the invention, certain portions being disclosed in side elevation;

FIGURE 2 is a cross section to an enlarged scale, the plane of section being taken on the line 2—2 of FIGURE 1;

FIGURE 3 is a cross section to the scale of FIGURE 2, the section being taken on the line 3—3 of FIGURE 2;

FIGURE 4 is an elevation of a primary key constructed pursuant to the invention;

FIGURE 5 is a side elevation of a secondary key constructed pursuant to the invention;

FIGURE 6 is a fragmentary view showing in cross section on a vertical axial plane the initial introduction of a primary key;

FIGURE 7 is a view similar to FIGURE 6 but showing the key in its actuating position;

FIGURE 8 is a view similar to FIGURE 6 but showing the initial introduction of a secondary key;

FIGURE 9 is a view similar to FIGURE 8 but showing the further progress of a key;

FIGURE 10 is a view similar to FIGURE 8 but showing the secondary key in final position;

FIGURE 11 is a view similar to FIGURE 7 but showing a primary key in position after the secondary key has once been utilized therein;

FIGURE 12 is an elevation of a series wafer;

FIGURE 13 is an elevation of a combination wafer; and

FIGURE 14 is an elevation of a master wafer.

While the invention can be embodied in a number of different ways, it is shown herein particularly as it is incorporated in a wafer tumbler key lock of the general sort shown in Patent No. 1,691,529 issued November 13, 1928 to Walter R. Schlage and entitled Key Lock.

A lock of this sort is usually mounted in a door 6, for example, for operation about an axis of rotation 7. Held on the door 6 by an appropriate supporting means 8 is a cylindrical-shaped spindle 9. On the opposite sides of the spindle are formed elongated slots 11 and 12 extending therealong. Rotatably mounted within the spindle 9 and located with approximate symmetry relative to the axis 7 is a wafer unit 13 having an extending member 14 designed to interact with the latch bolt mechanism (not shown) in the usual way.

Part of the wafer unit is a pair of edge ribbed plates 15 and 16 secured together in spaced relationship and at their outer ends secured to a circle plate 17 slotted to permit the insertion of keys. The center portion of the respective plates 15 and 16 is bent or pressed longitudinally to form rounded ribs 20 which serve to guide

the key. Thus, a keyway extends for the full length of the wafer unit and corresponds in length and cross section to the particular keys utilized. The wafer unit is provided with out-turned flanges 18 and 19 as well as comparable flanges 21 and 22 affording considerable rigidity.

At appropriate intervals along its length the wafer unit is provided with a plurality of slots 23 and 24 paired in vertical alignment along the axis 7, each pair being in one of the positions for the combination. These slots are provided for the reception of the tumblers and they furthermore form guides for the tumblers to support them against sidewise displacement. Designed to slide in one of the pairs of the slots 23 and 24 transversely of the axis 7 is a wafer tumbler 26 of the sort shown in FIGURE 14. This wafer tumbler is a flat metal plate partly contoured by an arcuate surface 27 and partly contoured by another arcuate surface 28, these arcs corresponding approximately with the interior contour of the spindle 9 in either of two extreme positions of the wafer tumbler.

At the upper end, the wafer tumbler 26 has a projecting locking pin 29 which in a retracted position lies substantially flush with the flanges 18 and 19 and in a projected position of the wafer tumbler, extends well into the slot 11. Also formed near the upper end of the wafer tumbler is an extending arm 31 having a downturned spring seat 32 seated within a coil spring 33. The other end of the spring 33 rests on a lug 34 projecting upwardly from a spring bar 36 secured to the plate 15. The effect of the spring 33 is to thrust downwardly on the spring bar and to thrust upwardly on the wafer tumbler. The wafer tumbler is thus normally urged upwardly with the locking pin 29 lying within the slot 11 so that the wafer unit cannot be rotated relative to the spindle 9.

Adjacent the arcuate portion 28, the wafer tumbler 26 has an extension 37 passing through the wafer unit. On the extension 37 and disposed between the plates 15 and 16 there is an upstanding pin 38 projecting upwardly. This pin 38 is weaker than the adjacent portion of the wafer tumbler. This can be accomplished in many ways and, particularly as shown in FIGURE 3, the pin 38 is made weaker by being made less in thickness than the remainder of the wafer tumbler. The originally thick material of the wafer tumbler is reduced by inclined shoulders 39 and 41 to leave a relatively thin pin 38. The pin has parallel faces 42 and 43 well within the confines of the side planes of the wafer tumbler and also is squared off to provide an upper surface 44 meeting the faces 42 and 43 in fairly sharp corners 46 and 47.

The customary combination arrangement is to provide a plurality of wafer tumblers 48 and 49, as shown in FIGURES 12 and 13, in some or all of the other slots 23 and 24. As indicated in the above-identified Schlage patent, some of the wafer tumblers 48 and 49 are installed upright, while others are installed in inverted position and are urged downwardly by their springs 33 into the slot 12 in the lower portion of the spindle. Since the wafer tumbler 49 is reversible, that is, the locking pin 29 can project into either of the opposed slots 11 and 12, several advantages are attained. This reversibility is important as it materially increases the range of key-actuated locking combinations which may be attained. Reversibility is also of further importance as it permits the locking pins to project from opposite sides of the wafer unit into the slots 11 and 12 of the spindle 9, thus producing a double locking effect when an improper key is inserted.

As shown herein, only one of the wafer tumblers is provided with a pin 38. The wafer tumbler 26 having the weakened pin 38 is positioned in a location farthest from the circle plate 17. All of the wafer tumblers 26, 48 and 49 can be utilized in the customary fashion to afford a number of combinations.

To operate the wafer tumbler 26, there is provided a

primary or temporary key 51, shown in FIGURE 4. This is sometimes referred to as a builder's or construction key. The key has a bow 52 of the usual sort and has a shank 53 of an appropriate cross sectional configuration. The key also has a number of notches 54 positioned to afford the desired combination. At its end remote from the bow 52, the key 51 is substantially symmetrical about its central axis 56 and has two flats 57 and 58 about equally distant from the axis 56, the flat 58 being of particular importance herein. The nose 59 of the key is rounded to merge with the flats 57 and 58 by means of inclined cam surfaces 61 and 62.

The key 51 is introduced, as shown in FIGURE 6, and advances in the direction of the arrow 63 until it stops, as shown in FIGURE 7, with the flat 58 overlying the weakened pin 38. In travelling from the FIGURE 6 position to the FIGURE 7 position, the inclined cam surface 62 rides over the corner 47 of the pin and readily depresses the pin and the entire wafer tumbler 26 since the force to compress the spring 33 is less than that required to disturb the pin 38. The key comes to rest in the FIGURE 7 position with the top surface 44 of the pin 38 in abutment with the flat 58. The wafer tumbler 26 is thereby held depressed against the urgency of its spring 33 with the locking pin 29 withdrawn from the slot 11 so that the device is unlocked, it being understood that the other locking pins 29 have been retracted as the wafers to which they are attached are combined to fit the key. Repeated insertions and withdrawals of the primary or temporary key 51 produce repetitions of the described action.

When the primary key is to be rendered ineffective and no longer useful, a secondary key 66 of the sort shown in FIGURE 5 is utilized. This secondary key is provided with a bow 67 and a shank 53 in most respects identical with those of the key 51 and approximately symmetrical about a central axis 69. The key 66 has a number of notches 71 to provide the usual combinations and also has a flat 72 like the flat 57. However, the key 66 does not have a flat corresponding to the flat 58, but rather is not cut away and is left with an edge 73 of a full width or depth. Between the round nose 74 of the key and the edge 73 is a relatively long cam ramp 76.

In use, as shown in FIGURE 8, the key 66 enters the lock as shown by the arrow 77, the weakened pin 38 being in the path of advance of the cam ramp 76. The key travels as shown in FIGURE 9 into contact of the cam ramp 76 with the corner 47 of the weakened pin. Further entering movement of the key requires the exertion of considerable endwise pressure as there is no flat 58 and this extra pressure produces bending of the weakened pin as shown in FIGURE 10. This is because the wafer tumbler has been depressed by the key into its lowermost position with the lower surface of the wafer tumbler actually bottomed on the flanges 21 and 22 of the wafer unit. The wafer unit 26 can also or alternatively bottom with the arcuate surface 28 meeting the spindle 9 or the lower surface 78 (FIGURES 2 and 9) can abut the flat 72.

Since the wafer tumbler cannot move axially and cannot move transversely any farther, and since the key 66 is still advancing, the force exerted by the cam ramp 76 against the corner 47 of the weakened pin urges the pin to bend substantially at right angles to the wafer and ahead of and out of the path of further advance of the key. If the pin is sufficiently weak, it will be broken off and will fall harmlessly away from the wafer unit 13. The initial motion withdraws the locking pin 29 of the wafer tumbler 26 from the slot 11 and moves this wafer tumbler so that the key can be turned. The key 66 can be withdrawn and thereafter reused indefinitely as shown in FIGURE 10. In each instance, the wafer tumbler returns to its original position with the locking pin 29 in the slot 11 due to the urgency of the spring 33. Whenever the secondary key 66 is utilized, the cam surface 76 rides

over the remaining stub or over the bent or permanently displaced weakened pin 38 and produces the desired actuation of the wafer tumbler.

After the first use of the secondary or permanent key 66, the flat 58 on the primary key 51, as shown in FIGURE 11, rides into position over and above the stub or the bent pin 38. The key 51 does not then even come into contact with the wafer tumbler 26, or, if it does come into contact therewith, it barely does so and is ineffective to produce sufficient transverse displacement of the wafer tumbler. The wafer tumbler locking pin 29 remains in the slot 11. The temporary key is no longer of any use.

Without disassembly and replacement or at least restoration of the wafer tumbler 26, the device will not respond to the temporary or primary key 51 after the secondary or permanent key 66 has once been used.

What is claimed is:

1. In a wafer tumbler lock which is combined to be operable by a temporary key, said lock having a row of key actuated wafer tumblers, the improvement, comprising a wafer tumbler which is moved to unlocking position by a temporary key contacting a deformable part of the tumbler, said part being permanently deformed by the insertion of a second key to a position where the wafer tumbler is no longer moved to the unlocking position by the temporary key.

2. In a wafer tumbler lock which is combined to be operable by a temporary key, said lock having a row of key actuated wafer tumblers, the improvement, comprising a wafer tumbler having a pin formed thereon projecting into the keyway of the lock, and means actuated by another key when inserted in the keyway for bending the pin to establish a new combination which renders said wafer tumbler with said pin permanently inoperative by said temporary key.

3. In a wafer tumbler lock an elongated housing, a rotatable tumbler carrier mounted therein, a plurality of key actuated wafer tumblers radially movable in the carrier into and out of locking engagement with the housing, said carrier also having a keyway formed therein, a wafer tumbler having a pin formed thereon extending into the keyway, said pin and tumbler adapted to be depressed and moved out of locking engagement with the housing when a temporary key is inserted, and said pin adapted to be bent by the insertion of another key, said bending of the pin rendering said tumbler permanently inoperative by said temporary key.

4. In a wafer tumbler lock of the character described, a housing, a rotatable tumbler carrier mounted therein, a plurality of radially movable tumblers mounted in the carrier, a pair of opposed slots formed in the housing with which the tumblers are adapted to interlock, an innermost tumbler, a pin on said tumbler adapted to be engaged to depress the tumbler out of locking engagement when a temporary key is inserted, said pin being bent by the insertion of another key to open the lock, said bending of the pin rendering said tumbler permanently inoperative by said temporary key.

5. In a wafer tumbler lock of the character described, a housing, a rotatable tumbler carrier mounted therein, a plurality of radially movable tumblers mounted in the carrier, a pair of opposed slots formed in the housing with which the tumblers are adapted to interlock, an innermost tumbler, a pin on said tumbler projecting into one of the slots to interlock therewith, said tumbler being adapted to be depressed to retract the pin from the slot when a temporary key is inserted, and a second pin on said innermost tumbler extending into the keyway, said pin being adapted to be bent by another key when said other key is inserted into said carrier, said bending of the pin rendering said tumbler permanently inoperative by said temporary key.

6. A key system comprising a keyway unit having a keyway therein, a plurality of wafer tumblers carried by said unit, means for urging at least some of said wafer tumblers into locked position, a primary key for moving said locked wafer tumblers into unlocked position, and a secondary key when fully inserted into said keyway permanently deforming at least one of said wafer tumblers thereby rendering the primary key inoperative.

7. A wafer tumbler key system comprising an elongated wafer unit having a keyway therein, a wafer tumbler mounted in said unit for transverse movement between a projected position and a retracted position, means for urging said wafer tumbler toward said projected position, a bendable pin on said wafer tumbler projecting into said keyway, a primary key receivable in said keyway and engageable with said pin to move said wafer tumbler into retracted position, and a secondary key receivable in said keyway and effective upon insertion of said secondary key into said keyway permanently to bend said pin down in said keyway out of the path of said primary key.

8. A wafer tumbler key system comprising an elongated wafer unit having a keyway therein, a wafer tumbler mounted in said unit for transverse movement between a projected position and a retracted position, means for urging said wafer tumbler toward said projected position, a stop on said wafer unit for said wafer tumbler in said retracted position, and a bendable pin on said wafer tumbler projecting into said keyway in position to actuate said wafer tumbler upon the insertion into said keyway of one key and in position to be bent down in said keyway out of the path of said one key by the insertion into said keyway of a different key.

9. A wafer tumbler key system comprising a wafer unit having a keyway therein and having an axis, a wafer tumbler mounted in said unit for movement transversely of said axis between one position and a second position, a bendable pin on said wafer tumbler projecting into said keyway, a primary key receivable in said keyway and engaging said pin to move said wafer tumbler to said second position, a stop on said wafer unit, and a secondary key receivable in said keyway and engaging said pin to move said wafer tumbler to said second position against said stop and to bend said pin down in said keyway out of the path of said primary key.

10. A wafer tumbler key system comprising a wafer unit having a keyway therein, a stop on said wafer unit, a wafer tumbler mounted in said wafer unit for movement, and a pin on said wafer tumbler bendable into a permanently bent position by movement of a key inserted in said keyway when said wafer tumbler is against said stop.

11. A wafer tumbler key system comprising a wafer tumbler, a bendable pin on said wafer tumbler, means for holding said wafer tumbler with said pin in the path of an advancing key, and means on said holding means for guiding an advancing key into lateral bending engagement with said pin.

12. A wafer tumbler key system comprising a wafer tumbler having a portion cut out to accommodate a keyway, and a pin on said wafer tumbler projecting into said portion and being adapted to be permanently displaced from said portion by lateral pressure from a key advancing in said keyway.

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ALBERT H. KAMPE, Primary Examiner.