

K. G. THIMAN.  
 LOCK MECHANISM AND KEY THEREFOR.  
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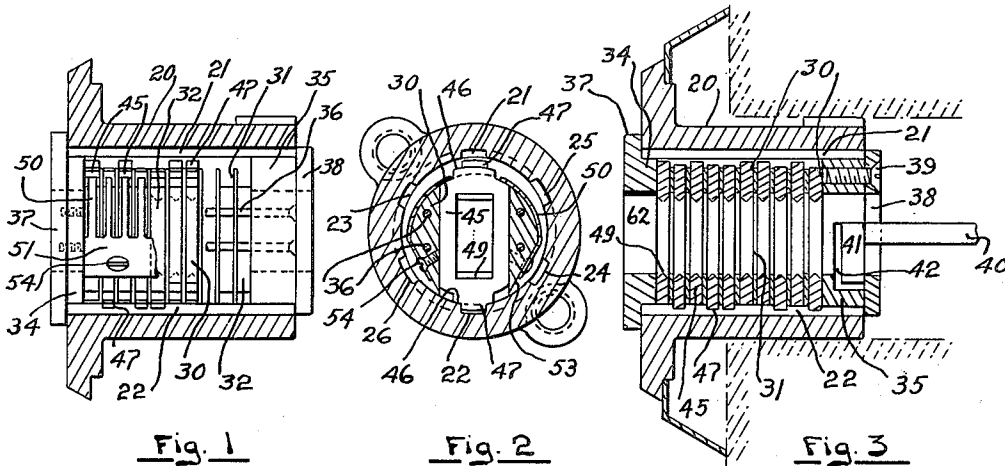


Fig. 1

Fig. 2

Fig. 3

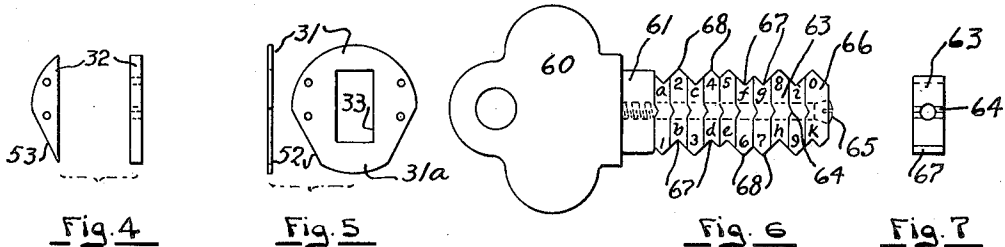


Fig. 4

Fig. 5

Fig. 6

Fig. 7

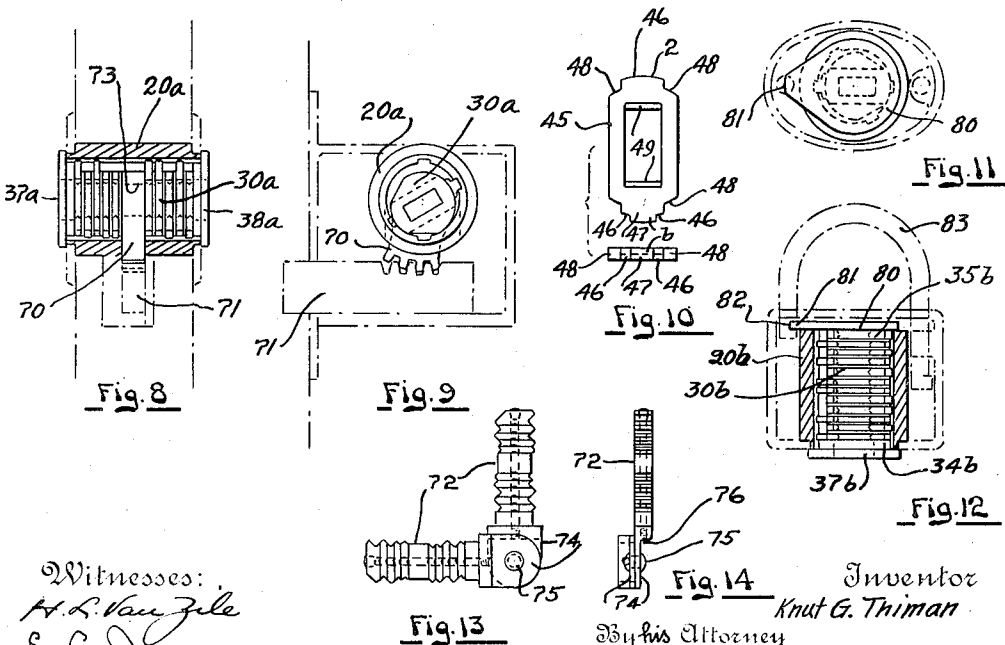


Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

Fig. 13

Fig. 14

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# UNITED STATES PATENT OFFICE.

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LOCK MECHANISM AND KEY THEREFOR.

1,107,376.

Specification of Letters Patent. Patented Aug. 18, 1914.

Application filed December 21, 1910. Serial No. 598,555.

To all whom it may concern:

Be it known that I, KNUT G. THIMAN, a citizen of Sweden, and a resident of the city of New York, borough of Manhattan, in the county of New York and State of New York, have invented certain new and useful Improvements in Lock Mechanism and Keys Therefor, of which the following is a specification.

10 This invention relates to locks.

The object thereof is to provide a locking mechanism having a wide range of applicability, and in which simplicity and cheapness of construction will be compatible with reliability of operation and immunity from tampering.

Another object of the invention is to provide a double edged key for such mechanism composed of reversible and interchangeable sections.

Further objects and features will become apparent as the description proceeds.

In the drawings forming a part of this specification, Figure 1 is a side view of the invention, portions thereof being shown in section and other parts omitted. Fig. 2 is a transverse section of the invention. Fig. 3 is a central longitudinal section of the invention. Fig. 4 comprises a front and side view of a segmental spacing block. Fig. 5 comprises a side and front view of a spacing washer. Fig. 6 is a side view of a sectional key. Fig. 7 is a front view of a key section. Fig. 8 is a side view partially in section, showing in full lines a modified form of the lock mechanism applied to a double ended type of lock recessed into a door. Fig. 9 is a front view of Fig. 8, some elements being omitted and others shown in a changed position, the conventional parts of the lock in this and the preceding view being shown by dot-and-dash lines. Fig. 10 is a front and bottom plan view, respectively, of a tumbler. Fig. 11 is a top plan view showing a modified form of the lock mechanism applied to a pad-lock. Fig. 12 is a partial central longitudinal section of Fig. 11, the operating parts belonging to the lock-mechanism being shown in this and the preceding view by full lines, and the conventional parts of the pad-lock by dot-and-dash lines. Fig. 13 is a side view of a twin-key for use in conjunction with the lock-mechanism shown in Figs. 8 and 9, and Fig. 14 is a front view of Fig. 13.

Referring to the several parts of the

drawings the numeral 20 indicates a stationary cylinder or casing provided internally with opposed upper and lower locking grooves 21 and 22. At adjacent sides of the latter are provided supplementary opposed grooves, 23—24 and 25—26 (Fig. 2). A rotatable barrel 30 inside the said casing 20, is built up of laminated sections held positively together internally and provided with spaces therebetween. Preferably the barrel consists of washers 31 and pairs of spacing segments 32 (Fig. 4) alternately disposed. Openings 33 (Fig. 5) in the said washers 31 are sufficiently large to provide clearance for a key, which will be more fully hereinafter referred to. To the said barrel 30 are secured front and rear heads, 34 and 35 respectively, by means of rods 36 which pass through the washers 31 and segments 32, and are screwed into said front head 34 as well as riveted over into said rear head 35. The front head 34 has a flange 37, formed integral therewith, which overlaps the front end of the casing 20, and the rear head 35 has a flange 38 removably secured thereto by screws 39, so that the barrel which is self-contained may be removed from the casing in its entirety without disassociation of the parts thereof. The said barrel 30 rotates truly in the casing 20 by virtue of the cylindrical portions of the said heads 34 and 35 engaging the bore of the said casing 20. The lower portions 31<sup>a</sup> of the washers 31 also conform to the bore of the casing 20 so as to afford extra bearing surface.

A bar 40 has a head 41 which is held in engagement with a slot or pocket 42 in the rear head 35, by the said flange 38. The bar 40 is connected up with the bolt of the lock as is customary in such lock-mechanism. (Fig. 3.)

The tumblers 45 are slidably received within the straight-sided recesses formed between the inner edges of the segments 32 and the faces of the washers 31 and guided solely thereby. The series of tumblers 45 are preferably disposed eccentrically relatively to the said casing 20, as also the laminated body of the barrel 30. The tumblers are of like construction and apertured for the passage of the key. They are provided at the ends with shoulders 46, either of which is adapted to bear against the lower portion of the bore of the said casing 20; and at one end each tumbler has a lock-

ing lip 47 projecting beyond its bearing shoulder and of suitable width to be received in one of the several slots 21 to 26, the shoulder opposite the said lip 47, being the wider. (Fig. 10.) A predetermined number of the tumblers are disposed with their locking lips at the bottom and the remainder with their locking lips at the top, which positions may be designated as inverted and converted, respectively.

Springs 50 bear against the tumblers so as to force all of them in one direction, holding the lips of the inverted tumblers in one of the lower grooves and the converted tumblers with their wide shoulders against the bottom of the bore of the casing and their lips away from the opposite upper groove. These springs may be termed comb-springs, because they consist of a longitudinal body part 51 and a series of parallel spring teeth or fingers (50) at right angles thereto. The tips of said fingers 50 bear against sub-shoulders 48 (Fig. 10) formed in the end portions of the several tumblers adjacent to the hereinbefore mentioned bearing shoulders 46. The washers 31 and segments 32 are beveled or chamfered as shown at 52 and 53 respectively, to provide straight inclined faces, against which the body portions 51 of the springs are held clear of the casing 15 by means of screws 54. The inner top and bottom edges of the aperture in said tumblers 45 are beveled from both sides as shown at 49. In each tumbler the beveled edges of the key-opening are equi-distant from the bearing shoulders 46 and in normal position of the parts the inner and bottom edges of all the tumblers are in alignment.

The key, as shown more particularly in Figs. 6 and 7, has two serrated or irregular edges for engagement with the inner top and bottom edges of the said tumblers 45. The construction of the key and tumblers is such that the insertion of a proper key into the barrel lifts all the inverted tumblers so as to release their lips 47 from one of the lower grooves, for instance 22, but does not change the position of the converted tumblers, whose locking lips still remain out of engagement with the upper groove, 21. Near its finger grip 60 the key has a straight portion 61 which fits a corresponding opening 62 in the front head 34 (Fig. 3) by means of which the turning of the barrel 30 is effected. The said opening 62 has an additional function of guiding or centering the key, the irregular parts of the latter merely releasing the tumblers 45. The body of the key is preferably built up of positively located sections 63, to this end said sections are provided centrally on their faces with inter-fitting grooves and ridges 64, and secured together and to the finger grip 60 by means of a screw 65 which passes

through the several sections 63 and is threaded into the finger grip portion of the key. The end section 66 of the key is thicker than the others to permit the head of the screw to be counter-sunk therein. Each section 63 is provided at its ends with a V-shaped groove 67 and a ridge 68 pointing in the same direction. The several sections can be reversed and arranged at will without disassociating the key, so that the grooves and ridges form continuous irregular zigzag lines on both of its edges. The sections 63 and the tumblers 45 may be correspondingly numbered or lettered near the ends, for convenience in keeping a record of their permutation. (Figs. 6 and 10.)

In Figs. 8 and 9 is shown a double ended barrel 30<sup>a</sup> recessed in a door. In this instance, the barrel 30<sup>a</sup> has a centrally built-in toothed segment 70 which is in engagement with a correspondingly notched bolt 71. For this form of lock a twin-key such as shown in Figs. 13 and 14 is provided, two keys being used because if the tumblers at both sides of the said toothed segment 70 were symmetrically arranged, it would greatly reduce the number of possible permutations. Each member of the twin key is provided centrally with a straight section 72 which may be arranged to directly engage an opening 73 formed in the segment 70. The shanks or bodies of the two members may be offset in opposite directions as at 76 (Fig. 14.) and provided with associated, flat finger-grip extensions 74 connected by a rivet 75 which constitutes a pivot to permit the two members to be closed or folded over each other.

In Figs. 11 and 12 the lock-mechanism is shown embodied in a pad-lock. Here the rear head 35<sup>b</sup> of the barrel 30<sup>b</sup> has a plate 80 attached thereto, from which extends a locking projection 81 that is normally received in a notch 82 in the hasp 83. It is obvious that turning of the barrel swings the said projection 81 out of the notch so as to release the hasp member.

The operation of the invention will be clear from the foregoing. The key is inserted into the barrel 30 and as it advances elevates the several tumblers 45 in the path thereof, against the tension of the springs 50. Eventually the converted tumblers, that is, those having their locking lips 47 at the top, are permitted to descend again to their original positions, where they rest with their lower or wider bearing shoulders 46 on the lower portion of the bore of the casing 20, and with their locking ends away from the upper groove. In the final position of the key, the inverted tumblers, that is, those with their locking lips at the lower ends, are held lifted so that their lips clear the lower groove of the said casing 20. The two pairs of opposed supplementary locking

grooves 23—24 and 25—26 are provided in order to permit the barrel to be locked in an in-operative position, that is, with the bolt retracted when turned in either direction according to whether the door opens from the right or left hand. Should a false key be inserted in the lock, it will either fail to elevate one or more of the inverted tumblers or will elevate one or more of the converted tumblers, or both of these things will happen. In any event the lock could not be operated. It is obvious that if there is a relative misplacement as to one of the members only, the lock cannot be opened. The additional or supplementary locking grooves receive the locking lips of one or more of the tumblers if an attempt is made to return the barrel to normal position by a key other than the proper one. The eccentricity of the barrel 30 and of the tumblers 45 with reference to the casing 20 enables the tumblers to stand clear of the upper portion of the bore thereof. By the use of the same parts a large number of different locking combinations can be produced by varying the relative number of inverted and converted tumblers as well as their order, and by correspondingly reversing and changing the position of the key-sections 63.

30 Having described my invention, what I desire to secure by Letters Patent and claim is:—

1. In a device of the character described, the combination with a casing provided with locking grooves, of a self-contained rotary barrel in said casing, said barrel being composed of laminæ held rigidly against one another, and tumblers slidably guided solely by the laminæ thereof adapted to engage with said grooves.

2. In a device of the character described, the combination with a casing provided with locking grooves, of a rotary barrel therein composed of separate sections with recesses therebetween, tie-rods passing through said sections to hold them together, and tumblers for engagement with said grooves mounted slidably in said recesses.

3. In a device of the character described, the combination with a casing provided with locking grooves, of a rotary barrel therein composed of separate sections with recesses therebetween, heads constituting journal portions for the barrel, rods tying said heads and sections together, and tumblers for engagement with said grooves mounted slidably in said recesses.

4. In a device of the character described, the combination with a casing provided with locking grooves, of a rotary laminated barrel built up of alternating washers and pairs of laterally spaced segments with tie rods passing through the washers and segments, and tumblers for engagement with said grooves held slidably in recesses formed between the

opposite inner edges of said segments and the faces of the washers.

5. In a device of the character described, the combination with a casing provided with diametrically opposed locking grooves, of a rotary barrel therein, a series of integrally formed tumblers transversely movable in said barrel, a predetermined number of said tumblers being inverted for engagement with one groove and the remainder being converted for engagement with the other groove, and springs for urging all of said tumblers in the same direction so as to hold said inverted tumblers in engagement with their groove and said converted tumblers away from their groove.

6. In a device of the character described, the combination with a casing provided with opposed locking grooves, of a rotary barrel therein, a series of transversely movable tumblers mounted in said barrel, part being normally adapted for engagement with one groove and the remainder held away from the other groove, and individual spring fingers secured to the sides of said barrel and bearing against each of the end portions of said tumblers so as to urge them all in the same direction.

7. In a device of the character described, the combination with a casing provided with diametrically opposed locking grooves, of a rotary barrel therein, a series of integrally formed tumblers transversely movable in said barrel, each tumbler having a substantially central locking lip at one end, said tumblers being in part inverted and in part converted as to their lips, and springs for urging said tumblers in the same direction with the lips of the inverted tumblers engaged with their groove and the lips of the converted tumblers clear of their groove.

8. In a device of the character described, the combination with a casing having a locking groove, of a barrel rotatable therein, transversely movable tumblers for engagement with said groove mounted in said barrel, and a comb spring having its back secured to the barrel and its teeth bearing against said tumblers.

9. In a device of the character described, the combination with a casing having opposed locking grooves, of a rotary barrel therein, a series of transversely movable tumblers with key openings mounted in said barrel, said tumblers being reversible, part being inverted for engagement with one groove and the remainder being converted for engagement with the other groove, and springs for urging said tumblers in the same direction so as to hold said inverted tumblers in engagement with their groove and said converted tumblers from their groove, the top and bottom edges being normally in alignment.

10. In a device of the character described,

the combination with a casing having opposed locking grooves, of a rotary barrel therein, a series of transversely movable tumblers mounted in said barrel, said tumblers being reversible, part being held in engagement with one groove and the remainder being normally held inoperative relative to the other groove, and individual springs for urging said tumblers all in the same direction.

11. In a device of the character described, the combination with a casing having opposed locking grooves, of a rotary barrel therein, a series of transversely movable tumblers mounted in said barrel, part of said tumblers being adapted for engagement with one of said grooves and the remainder for engagement with the other groove, and springs for urging said tumblers all in the same direction, said casing having supplementary grooves for locking the barrel therewith at adjacent sides of the first mentioned grooves.

12. A lock-mechanism and key therefor, comprising a casing, a barrel in said casing, inverted and converted tumblers reversibly contained within said barrel and having apertures with beveled top and bottom edges, and a key composed of reversible sections adjustable to correspond to the permutations of said tumblers, said sections having their upper and lower transverse edges respectively ridged and grooved in the same direction, the arrangement being such that when the ridge of a key-section is turned upmost it acts against the beveled top edge of the aperture of an inverted tumbler to lift the latter, while when the groove of a section is on top it leaves a converted tumbler idle.

13. A lock mechanism and key therefor, comprising a casing, a rotatable barrel therein, tumblers yieldingly contained within said barrel and a key having two irregular edges adapted to actuate said tumblers, said key being composed of separate reversible pointed sections held rigidly together.

14. A lock mechanism and key therefor, comprising a casing, a rotatable barrel therein, reversible inverted and converted tumblers yieldingly contained within said barrel and an adjustable key composed of uniform separate sections adapted to lift the inverted tumblers and to maintain the converted tumblers in quiescence, the key sections being provided at one adjacent face with a ridge and at the other adjacent face with a corresponding groove.

15. A lock mechanism and key therefor, comprising a casing, a rotatable barrel therein, reversible tumblers within said barrel, a built-up key composed of reversible separate sections adapted to actuate said tumblers, the key sections being provided with a groove on one face and a correspond-

ing ridge on the opposite face whereby said sections may be nested to correspond with the permutations of the tumblers and a clamping bolt passing through said sections to hold them together.

16. A lock-mechanism and key therefor comprising a casing, a barrel having a front opening mounted rotatably in said casing, tumblers yieldingly contained in said barrel, a key having a straight stem-portion for engagements with the opening in the barrel, a plurality of tumbler actuating sections built up to constitute the body of the key, each section being independently reversible and provided with interengaging means on the faces thereof, an end-section of greater thickness than the body sections and a clamping screw passing through all of said sections and having its head countersunk in the end section.

17. In a device of the character described, the combination with a casing provided with locking grooves, of a self-contained rotary-barrel therein, built up of separate sections, held positively internally thereof and having recesses therebetween, and tumblers for engagement with said grooves mounted slidably in said recesses.

18. In a device of the character described, the combination with a casing provided with locking grooves, of a rotary laminated barrel therein having end heads constituting journals and provided with retaining flanges engaging the ends of said casing, one of said flanges being removable and tumblers for engagement with said grooves held slidably between said laminae.

19. In a device of the character described, the combination with a casing barrel provided with opposed locking grooves, of a rotary barrel mounted eccentrically therein contiguous to one groove and spaced from the other, a series of transversely movable tumblers in said barrel, part of said tumblers being inverted for engagement with the former groove and the remainder being converted for engagement with the latter groove, and springs for urging said tumblers in the same direction so as to hold said inverted tumblers in engagement with their groove and said converted tumblers spaced away from their groove.

20. In a device of the character described, the combination with a casing provided with opposed locking grooves, of a rotary barrel mounted eccentrically therein contiguous to the part of the wall of the casing bearing one groove and spaced from the part of the casing wall bearing the other groove, the contiguous portion of the barrel having a curvature conforming to the casing wall, and portions of the barrel at opposite sides being chamfered, a series of transversely movable tumblers mounted in said barrel, part being adapted for engagement with

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one groove and the remainder for engagement with the other groove, and flat springs secured to said chamfered portions adapted to urge all of said tumblers in the same direction.

21. In a device of the character described, the combination with a casing provided with diametrically opposed locking grooves, of a rotary barrel therein, a series of integrally formed tumblers transversely movable in said barrel, each tumbler having bearing surfaces at both ends adapted to bear against the walls of the casing, the distance between said surfaces being less than the internal diameter of the casing, and each tumbler having a substantially central locking lip projecting beyond its bearing surface at one end, said tumblers being in part inverted and in part converted as to their lips, and springs for urging said tumblers in the same direction with the lips of the inverted tumblers engaged with their groove and the

lips of the converted tumblers clear of their groove.

22. In a device of the character described, the combination with a casing having opposed locking grooves of a rotary barrel therein, a series of transversely movable tumblers mounted in said barrel, part being held in engagement with one of said grooves and the remainder being normally held inoperative relative to the other of said grooves, said tumblers being shouldered at their end portions, and spring fingers secured to the barrel and bearing directly against said shoulders so as to urge all of said tumblers in the same direction.

Signed at the borough of Manhattan in the county of New York and State of New York this 20th day of December A. D. 1910.  
KNUT G. THIMAN.

Witnesses:

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WM. H. GEE.