

March 26, 1940.

J. A. FREMON

2,194,469

PIN TUMBLER LOCK

Filed April 4, 1935

2 Sheets-Sheet 1

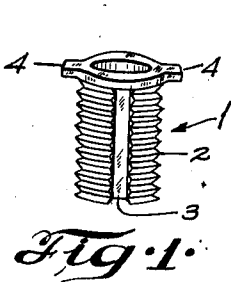


Fig. 1.

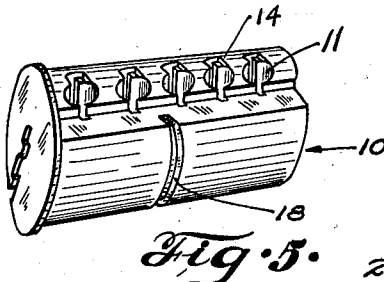


Fig. 5.

Fig. 9.

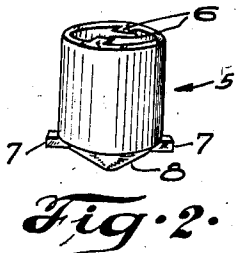
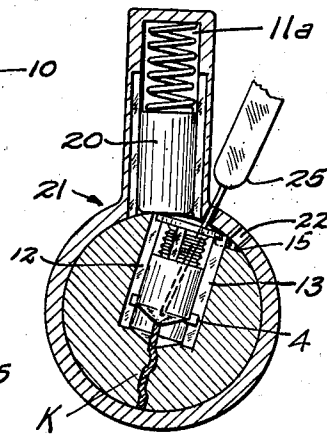


Fig. 2.

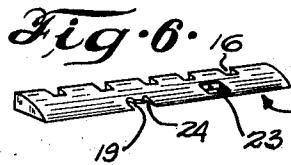


Fig. 6.

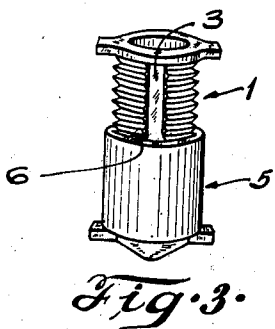


Fig. 3.

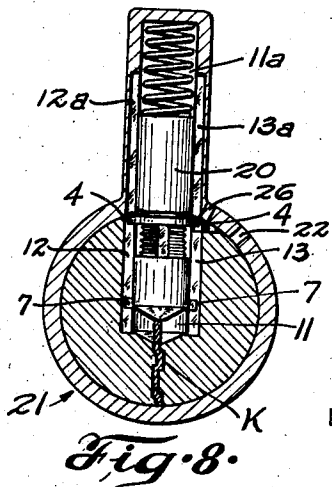


Fig. 8.

Fig. 10.

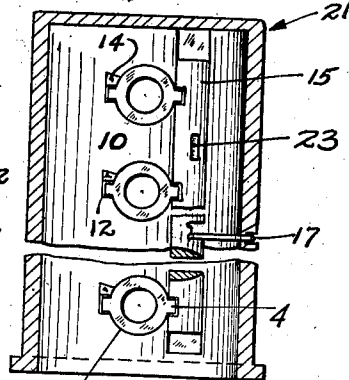


Fig. 11.

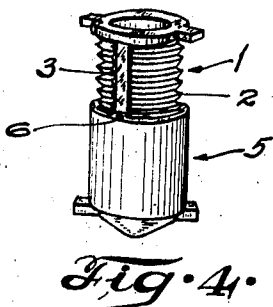
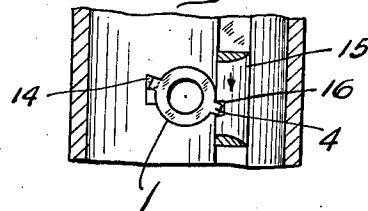
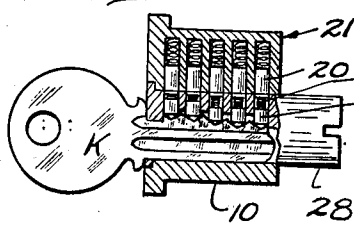


Fig. 4.

Fig. 7.



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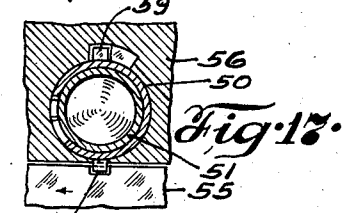
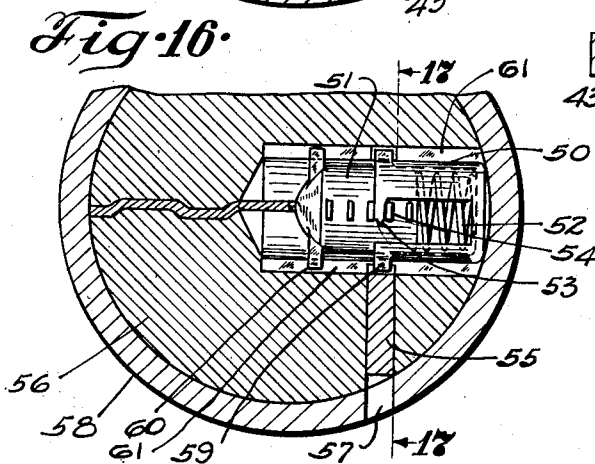
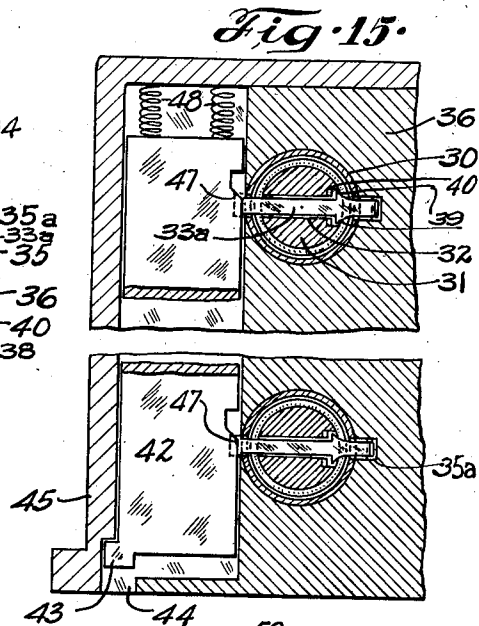
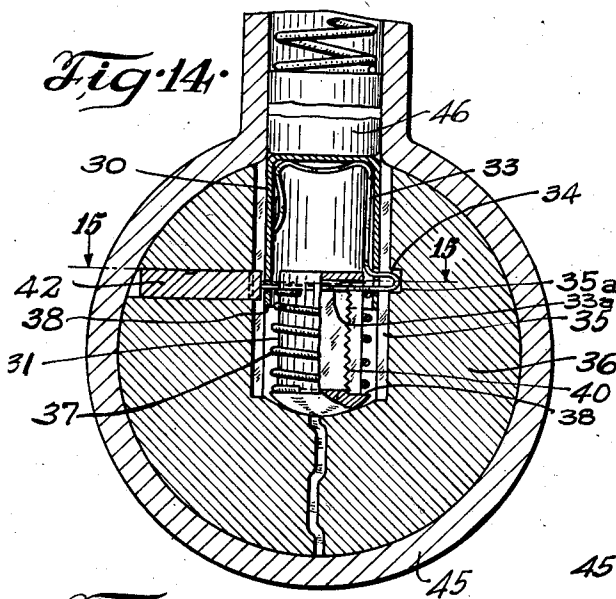
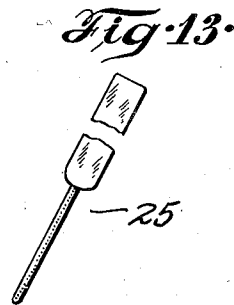
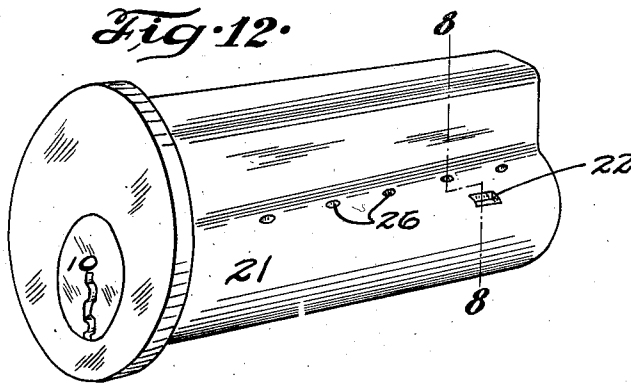
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2 Sheets-Sheet 2



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PIN TUMBLER LOCK

Jules A. Fremon, St. Louis, Mo.

Application April 4, 1935, Serial No. 14,560

32 Claims. (Cl. 70—364)

My invention relates to pin tumbler locks and consists in novel construction of a pin unit by itself which may or may not be associated with novel plug and case structure according to whether or not all features of the invention are to be utilized.

One object of the invention is to simplify the fitting of the key to the lock or, more specifically, to set the pin tumblers to cooperate with a given key.

Another object is to make possible the use of a standard pin tumbler, and thereby eliminate the production of a huge quantity of pin elements of different lengths, without any restriction upon the number of different combinations possible in a given series of locks.

Another object of the invention is to facilitate the changing of a lock combination so that it can no longer be operated by one key but may be operated by a different key, a more specific object being to make possible the changing of the lock from one combination to another by a merchant or, in some forms of the invention, by a user, and without requiring the experience, tools, or stock parts usually required by locksmiths.

The invention includes, for example, a pin tumbler having an upper and a lower part for engaging the driver and key, respectively, which parts are adjustable axially of the tumbler to vary its length and therefore the distance it will raise the driver. The tumbler structure also includes means for securing the tumbler parts in different relations to each other and, preferably, elements for readily releasing such means to produce a new relation of the tumbler parts mentioned above. In the preferred form of the invention, the tumbler parts may be adjusted to different relative positions repeatedly without removing any of the tumbler parts from the plug and without removing the plug from its case.

The above stated objects and general structure just mentioned are embodied in the devices illustrated in the accompanying drawings, in which—

Figure 1 illustrates the upper part of one form of a pin tumbler unit.

Figure 2 illustrates the lower part of the same unit.

Figure 3 illustrates the two parts assembled with each other in a position in which they are relatively immovable axially of the tumbler.

Figure 4 illustrates the two parts assembled with each other in a position which permits their relative adjustment axially of the tumbler.

Figure 5 illustrates a plug body into which the tumblers are inserted.

Figure 6 illustrates a bar applied to the plug and used for moving the tumbler parts from the position shown in Figures 3 and 10 to the position shown in Figures 4 and 11 and back again.

Figure 7 is a longitudinal vertical section through a lock case and plug with pin tumblers, drivers, and key shown assembled and in position whereby the plug may be rotated in the case.

Figure 8 is a vertical transverse section through an assembly as illustrated in Figure 7 and is taken on the line 8—8 of Figure 12.

Figure 9 is a similar section showing the plug rotated to a position in which the tumbler parts may be released from each other.

Figure 10 is a top view of part of a plug and tumbler assembly, the plug case being shown in section and the elements in the normal assembled position.

Figure 11 is a corresponding detail view but showing the elements moved to the position taken in which the relation between the tumbler parts may be changed.

Figure 12 is a perspective view of the case showing openings through the wall thereof whereby the re-setting of the pin tumblers may be effected by a tool applied from the exterior of the case. A suitable tool for this purpose is shown in Figure 13.

Figure 14 corresponds to Figure 8 but illustrates a modified form of the invention.

Figure 15 is a horizontal section taken on the line 15—15 of Figure 14.

Figure 16 is similar to Figure 14 but illustrates another modification of the invention.

Figure 17 is a detail section taken on the line 17—17 of Figure 16.

The tumbler parts shown in all of the figures may be telescoped one within the other, and in Figures 1 to 12 both the parts are tubular, the tumbler upper part 1 having a series of peripheral projections in the form of ridges 2 substantially throughout its length and interrupted by a pair of longitudinal grooves 3 located at opposite sides of the part. A pair of guiding ears 4 project from the upper portion of the part. Part 1 is open from end to end.

The tumbler lower part 5 has a smooth interior except for a pair of inwardly projecting lips 6. Guide ears 7 projects laterally from part 5 and correspond to ears 4 on part 1. The bottom 8 of the part is closed and may be of conical shape to more easily ride over the key bits.

The outside diameter of the body of part 1 corresponds to the inside diameter of the body of part 5 and lips 6 correspond to grooves 3 and

ridges 2 whereby the two parts may telescope freely when in the position shown in Figure 4, and may be rotated relative to each other at various points to the position shown in Figure 3 and when so rotated cooperate to form a rigid tumbler unit.

The spacing of ridges 2 may correspond to the usual variations in length of the ordinary pin tumblers which equal the usual variations in height of keys now in general use in this type of lock, but such spacing of the ridges is not essential.

The tumblers are assembled in a plug 10 rotatable in a case 21 in the usual manner except as described below. Plug 10 and case 21 have a series of holes 11, 11a for receiving the tumblers in the usual manner, but these holes have lateral extensions in the form of channels 12 and 13, 12a and 13a, adapted to receive the guiding ears 4 and 7 on the tumbler parts and thereby hold the two parts in the relation shown in Figure 3 in which they comprise rigid tumbler units.

The upper end of each left hand channel 12 in the plug is enlarged longitudinally of the plug, as at 14. A portion of the plug adjacent the upper ends of the right hand channels 13 is cut away and replaced by a slidable bar 15. This bar has a plurality of notches 16 adapted to align with the right hand channels 13, as shown in Figures 8 and 10, or to be moved towards the front of the plug a short distance, as indicated in Figure 11. Notches 16 engage right hand ears 4 of the tumbler upper parts to rotate the latter from the position shown in Figure 10 to the position shown in Figure 11. At the same time, the lower parts 5 of the tumbler are held against rotation. Accordingly, the tumbler parts are rotated from the assembled relation, shown in Figure 3, to the assembled relation shown in Figure 4 and may be moved lengthwise of each other.

Bar 15 is yieldingly held in its normal position on plug 10 by a spring 17 seated in a recess 18 on the plug and in niche 19 in the bar.

When a key K fitting the lock setting is inserted in the plug, all the pin tumblers are raised to the position shown in Figures 7 and 8, lifting the drivers 20 to the top surface of the plug, and the plug may be rotated in the case 21 to the position shown in Figure 9 in which bar 15 is abreast of an opening 22 in case 21 and a tool 25 may be inserted through opening 22 into an opening 23 in the bar to slide the bar along the plug from the position shown in Figure 10 to the position shown in Figure 11. Spring 17 accommodates such sliding movement by yielding and slipping into niche 24. This releases the tumbler parts from each other.

If the key is now withdrawn from the plug, the tumbler lower parts 5 drop to the bottom of the holes 11 in the plug.

Tumbler upper parts 1 will be held in elevated position by the engagement of their ears 4 with the flat surface of the plug upon which bar 15 slides and with the shoulders at the bottoms of the enlargements 14.

Any other key having a cross-section corresponding to the original key may now be inserted in the key slot and the key bits will raise the tumbler lower parts 5 to positions which have no necessary relation with their original positions. To insure the movement of plug parts 5 to rest upon the newly inserted key, tool 25 may be inserted through holes 26 in the case, aligned with the pin tumblers, which bar will project through the tumbler upper parts 1 (Figure 9) and en-

gage the bottom of the tumbler lower parts 5 to thrust them downwardly. Bar 15 is then retracted to the position shown in Figure 10 and the tumbler parts are secured to each other in their new relation. The plug may be rotated to the position shown in Figure 8 and the key withdrawn, whereupon the drivers will overlap the joint between the case and the plug in the usual manner, and the lock will now be responsive only to the last mentioned key.

The rotation of the plug mentioned heretofore refers to the rotation between the two positions illustrated in Figures 8 and 9 merely for the purpose of effecting a change in the lock combination. It is to be understood that the plug may be rotated in the usual way to any necessary extent to throw the bolt (not shown) which will engage or be connected to the inner portion 23 of the plug in any ordinary manner.

Figures 14 and 15 illustrate a pin tumbler comprising telescoping parts normally held in rigid assembly by suitable securing means, but when the securing means is released the two parts of the pin will normally extend themselves to form a pin of maximum length. In this structure the pin top or cap part 30 is the larger in diameter and the pin base part 31 is smaller in diameter and has a diametral slot 32 extending throughout the major portion of its length. A flat spring 33 is seated in the cap 30 and projects laterally therefrom at 34 through a hole in one side of the cap to fit into a channel 35 in the plug 36 to guide the pin and prevent its rotation in the plug hole. From 34 the spring is doubled on itself and extends transversely of the pin through the slot 32 in the lower part 31 and through an opening in the opposite side of cap 30. A coiled spring 37 surrounds the lower part 31 and is compressed between the horizontal portion of spring 33 and a shoulder 38 on part 31. The horizontal part 33a of this spring has teeth 39 opposing a series of corresponding teeth 40 disposed lengthwise of part 31.

A bar 42 is slidably mounted in a slot therefor in plug 36 and the forward outer end of this bar includes a lug 43 disposed to project through an opening 44 therefor in the forward end of the plug 46 and case 45.

When a proper key has been inserted in the plug so as to lift the pin tumblers and the drivers 46 to the position shown in Figure 14, bar 42 may be slid rearwardly by pressure on lug 43 applied through the opening 44 to the position shown in Figure 15 in which its cam faces 47 have engaged the left hand ends of spring parts 33a to move the latter to the right into notches 35a and disengage teeth 39 and 40. If the key is now withdrawn, springs 37 will automatically press lower parts 31 downwardly. A new key may be inserted and lower parts 31 raised according to the biting of the key. Pressure on lug 43 is then released. Springs 48 return bar 42 to its original position, which releases spring parts 33a from the abnormal position shown, and permits the spring 33 to resume its normal shape engaging teeth 39 and 40 and securely holding the two tumbler parts in the new adjusted relation. They will maintain this relation until they have been again adjusted by another operation, as described above, involving the use of a proper key to get the elements into shiftable position and then using a new key to adjust the elements to a new position.

In the arrangement shown in Figures 1 to 13, inclusive, it will be necessary to take the case

out of the lock in order to gain access to opening 22, and possibly openings 26, in order to change the tumbler combination. This arrangement may be preferable, particularly in hotels, apartment houses, and other places where it is not desired that the changeable nature of the lock be apparent or that the changing of the combination be effected too readily.

In the arrangement shown in Figures 14 and 15, the lock combination can be changed more quickly because the pin part releasing bar is more readily accessible. This arrangement may be preferred in many instances, particularly where an owner may desire to change the combination of his lock quickly and without removing the case from the door. With this arrangement it is not even necessary to rotate the plug to a pin releasing position as in the previous form.

Figures 16 and 17 illustrate another form of pin tumbler structure in which the pin parts 50 and 51 are assembled similarly to the parts shown in Figures 14 and 15 but the spring 52 for automatically extending the parts when they are released from each other is housed wholly within the upper part 50. The elements for holding the two pins in assembled relation are engaged and disengaged by relative rotary movement of the parts, somewhat as in the first construction described above. A finger 53 on part 50 may be projected in between two lugs 54 on part 51 by suitable rotary movement of part 50 by a bar 55 slidable in the plug 56 by means of a pin (not shown) inserted through the hole 57 in the case 58. The pin tumbler parts are provided with ears 59 and 60 sliding in suitable channels 61 in the plug to hold the parts against relative rotation except when such rotation is intended.

In all forms of the invention, present standard types and sizes of plugs, cases, drivers, driver springs and keys may be retained.

In all forms of the invention, it is unnecessary in the course of manufacture to assemble predetermined pin tumblers and corresponding keys as is now the required practice. Fitting of keys to the locks, or vice versa, may be accomplished after manufacture and assembly of the lock is completed, and may be deferred until the lock is sold at retail. In the course of manufacture, all the tumblers will be set to some standard length, probably the maximum length, which will result in the tumblers completely filling the plug holes so that the plug might be freely revolved without the insertion of a key. In this condition, the lock would be properly described as being a dummy lock and that status may continue, if desired, up to the time the lock is sold at retail, when, depending upon the requirements of the retail customer, the lock may be fitted to a key which the customer may already have (providing only that such key is of the uniform cross-section required for the key-way plug but irrespective of the key biting), or the lock may be fitted to a new bitted key or matched set of bitted keys which the retailer will carry as a stock of merchandise separate and apart from the stock of locks.

Any number of locks may be fitted to one single key at any time. Thus it will be possible for the retailer to deliver directly over the counter to his customer one or more matched locks with any desired number of keys, thereby affording to the usual and ordinary retail dealer and customer a lock service which, under present merchandizing methods, is available only at added cost and the delay incident to handling special orders to

the factory or by having the tumblers removed and replaced by locksmiths. Furthermore, a person having acquired a lock of this construction may thereafter procure without difficulty, delay, or unusual expense, as many locks as he may require, all fitted to the key which he already has, and consequently "matched" with those locks which are under his control.

The value and utility of practical, inexpensive means to effect changes in the setting of the pin tumblers after the lock has been placed in service and without disassembling the cylinder is well known by those who are conversant with the art.

The style and number of the grooves, positioning ears, the shape and extent of the pin tumblers, and other means for releasing or guiding the pin tumbler parts and other details illustrated may be modified in many ways other than as indicated in the accompanying drawings and above description.

While I have only illustrated and described pin tumblers above, it is obvious that the pin drivers may embody the invention and it is to be understood that my formal claims are not limited to tumblers unless so stated.

It is to be understood that I contemplate the exclusive use of all modifications of the invention embodying the essential features disclosed herein and coming within the scope of my claims.

I claim:

1. A pin tumbler lock pin unit having opposite ends for engaging a driver and key respectively and comprising parts with their longitudinal axes substantially coinciding and extending substantially through the centers of their opposite ends, said parts being adjustable, and means for securing said parts to each other to vary the length of the unit to accommodate different key bits.

2. In a key lock tumbler pin, a key-engaging part, a driver-engaging part, said parts having their longitudinal axes aligned and releasable means for securing said parts to each other in different relative positions to form a rigid tumbler unit of variable length.

3. In a pin tumbler lock, a driver, a tumbler pin, said driver and pin having their longitudinal axes substantially coinciding and extending substantially through the centers of their opposite ends, and means for repeatedly changing the height of the tumbler pin seat for said driver without disassembling the tumbler pin.

4. In a key lock, a tumbler pin having a key-engaging part and a driver-engaging part axially aligned therewith, and means for repeatedly varying the distance between the bottom of said key-engaging part and the top of said driver-engaging part.

5. In a key lock, a pin tumbler comprising telescoping parts, there being interengaging elements on the opposing sides of said parts securing said parts in selected telescoped position.

6. In a key lock, a pin tumbler comprising telescoping parts, the inner of said parts having outwardly projecting means and the outer of said parts having inwardly projecting means, said means being engageable and disengageable by relative rotary movement of said parts whereby said parts may be telescoped or may be held against telescoping movement as desired.

7. A structure as specified in claim 6 in which one of said parts has open ends and the other of said parts has a closed outer end whereby a tool may be inserted through the first mentioned

part and engage the bottom of the second mentioned part to extend said tumbler when the holding means are arranged to permit such movement.

8. In a key lock, a rotatable plug, a pin tumbler comprising a plurality of parts having interengaging elements normally holding said parts against relative movement lengthwise of the tumbler, and means for disengaging said elements from each other, to adjust the relative position of said parts lengthwise of the tumbler, without removing said tumbler from said plug.
9. In a key lock, a rotatable plug, a pin tumbler therein comprising a plurality of members having one relative position in which they are held in fixed relation and having another relative position in which they may move relatively longitudinally of the tumbler axis, and means in said plug for moving said members from one of said positions to the other.
10. In a key lock, a rotatable plug having a key slot, a member movable in said plug, there being a pin tumbler recess in said plug, a pin tumbler slidable in said recess, said pin tumbler being adjustable as to length, and means controlled by said member for holding said pin tumbler against adjustment as described.
11. In a key lock, a rotatable plug, a pin tumbler comprising parts movable relative to each other longitudinally of the tumbler to vary the length of the tumbler, and means for securing said parts in fixed relative position, said means being releasable, when said plug is rotated out of locked position, to permit relative movement of said parts.
12. In a key lock, a case, a plug rotatable therein, a driver normally holding said plug against rotation, a pin tumbler for moving said driver to non-functioning position and comprising parts movable relative to each other to vary the over-all length of the tumbler, interengageable elements on said parts for holding said parts against such movement, and means in said plug normally holding said elements in engaged position, and operable when said plug is turned out of locked position, to disengage said elements and provide for said movement.
13. In a key lock, a rotatable plug having a radial hole for a pin tumbler, there being a channel in said cylinder at the side of said hole and extending longitudinally thereof, and a pin tumbler movable axially of said hole and comprising a plurality of parts each having an element projecting into said channel to hold said parts against relative rotation in said hole.
14. In a key lock, a rotatable plug having a radial hole for a pin tumbler, there being a channel in said cylinder forming an extension of one side of said hole and paralleling the same, and a pin tumbler movable axially of said hole and comprising a plurality of parts each having an ear projecting into said channel to hold said parts against relative rotation in said hole, there being a recess in said plug adjacent to said hole and channel, and movable means in said recess having elements forming a continuation of said slot.
15. In a key lock, a rotatable plug having a radial hole for a pin tumbler, there being a channel in said cylinder forming an extension of one side of said hole and paralleling the same, and a pin tumbler movable axially of said hole and comprising a plurality of parts each having an ear projecting into said channel to hold said parts against relative rotation in said hole, there being a recess in said plug adjacent to said hole and channel, and movable means in said recess having elements for engaging one of said ears to hold it in line with said channel or to move it to rotate the corresponding part relative to the other of said parts.
16. In a key lock, a plug, a pin tumbler therein comprising a plurality of parts which are rotatable relative to each other, about their axis, from a position in which they are interengaged to resist relative axial movement to a position in which they may move axially of each other, said plug including elements holding one of said parts against rotation about its axis, and means for rotating the other of said parts in said plug.
17. In a key lock, a plug, a pin tumbler comprising a cup-like lower part and an upper part slidable therein, means on said parts normally interengaged to hold said parts against sliding movement, said means being disengageable by relative rotary movement of said parts, an element on said plug for holding one of said parts against rotary movement, and means slidable on said plug for rotating the other of said parts to disengage said means.
18. In a lock of the class described, a case, a plug rotatable therein, a tumbler pin comprising a plurality of parts and having a position in said plug where said parts are relatively movable longitudinally of their axis and having another position in said plug where said parts are relatively immovable longitudinally of said axis, and means for manipulating said parts from one of said positions to the other without removing said plug from said case.
19. In a lock of the class described, a plug, a tumbler pin comprising a plurality of parts and having a position in said plug where said parts are relatively movable longitudinally of their axis and having another position in said plug where said parts are relatively immovable longitudinally of said axis, and a member slidable along said plug for moving said parts from one of said positions to the other.
20. In a pin tumbler lock of the class described, a plug having a pin tumbler receiving recess, a portion of said plug being cut away adjacent to the wall of said recess, and a member movable relative to said plug and forming a continuation of said wall in place of said removed portion.
21. In a pin tumbler lock pin unit, parts having oppositely facing end elements, means yieldingly moving said end elements relative to each other axially of the other, and a device for positively holding said parts against such movement.
22. In a key lock, a case, a plug rotatable therein, a pin tumbler in said plug comprising telescoping parts, means yieldingly moving said parts relative to each other axially of the tumbler, a device normally positively holding said parts against such movement, and means operable from the exterior of the plug for rendering said device inoperative.
23. In a key lock, a case, a rotatable plug therein having a pin tumbler recess, a pin tumbler slidable in said recess and comprising a plurality of parts which may be adjusted during the functioning life of the lock to different relative positions longitudinally of the tumbler, and means for temporarily holding one of said parts immovable in said plug while the other part is being adjusted relative to said first-mentioned part.

24. In a key lock, a case, a rotatable plug therein having a pin tumbler recess, a pin tumbler slidable in said recess and comprising a plurality of parts normally interengaged to hold them against relative axial movement whereby they form a rigid tumbler unit, means for temporarily holding one of said parts in a given position, and means for moving the other of said parts to disengage said first-mentioned part and to assume a different relative position longitudinally of the same.

25. In a key lock, a case, a rotatable plug therein having a pin tumbler recess, a pin tumbler slidable in said recess and comprising a plurality of parts normally interengaged to hold them against relative movement whereby they form a rigid tumbler unit, means for holding the driver engaging part against movement in the plug when the parts are in unlocked position, and means for disengaging said parts and moving the key-engaging part relative to said driver-engaging part.

26. In a pin tumbler, a driver member, a tumbler member, one of said members comprising a plurality of parts with their longitudinal axes substantially coinciding and extending substantially through the centers of their opposite ends, said parts being adjustable relative to each other longitudinally of the pin axis, and cooperating elements on said parts normally holding said parts against relative movement axially of the tumbler and driver members.

27. In a lock of the class described, a case, a plug rotatable therein, a tumbler pin slidable axially in said plug, and comprising a plurality of parts, said parts being held against rotary movement in said plug when said plug is in one position, and means for rotating said parts relative to each other when said plug is in another position, said parts being movable relative to each other along their longitudinal axes when said plug is in the latter-mentioned position but not

when said plug is in the first-mentioned position.

28. In a lock, a rotatable plug having a key receiving elongated passage, a pin tumbler lock pin unit extending at right angles to said passage and comprising parts constructed and arranged for successive adjustments lengthwise of the pin tumbler to vary the over-all length of the unit, and a driver engaging the outer end of said unit.

29. A pin tumbler lock pin unit having opposite ends for engaging a driver and key, respectively, and comprising a plurality of parts with their longitudinal axes coinciding and extending substantially through the centers of their opposite ends, said parts being relatively longitudinally adjustable, and cooperating elements on said parts holding said parts against relative longitudinal movement.

30. In a key lock, a case, a plug rotatable therein, a tumbler pin mounted in said case and plug and comprising a plurality of cooperating parts adjustable relative to each other longitudinally of the pin axis, a driver engaging the end of said pin, and means for adjusting the relative position of said parts along said axis without removing said plug from said case.

31. A pin unit for a pin tumbler lock having opposite ends for engaging a driver and key, respectively, and comprising parts with their longitudinal axes substantially coinciding and extending substantially through the centers of their opposite ends, said parts being adjustable in opposite directions relative to each other longitudinally of the pin axis during the useful life of the lock to vary the length of the unit.

32. A unit lock pin having opposite ends for engaging a driver and key, respectively, comprising telescoping parts, one of said parts consisting of a cylindrical tube and receiving the other of said parts, and readily releasable means for holding said parts against telescoping movement.

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