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3,417,452

TUMBLER LOCK BLIND HOLE PIN ASSEMBLY APPARATUS

Filed March 29, 1966

2 Sheets-Sheet 1

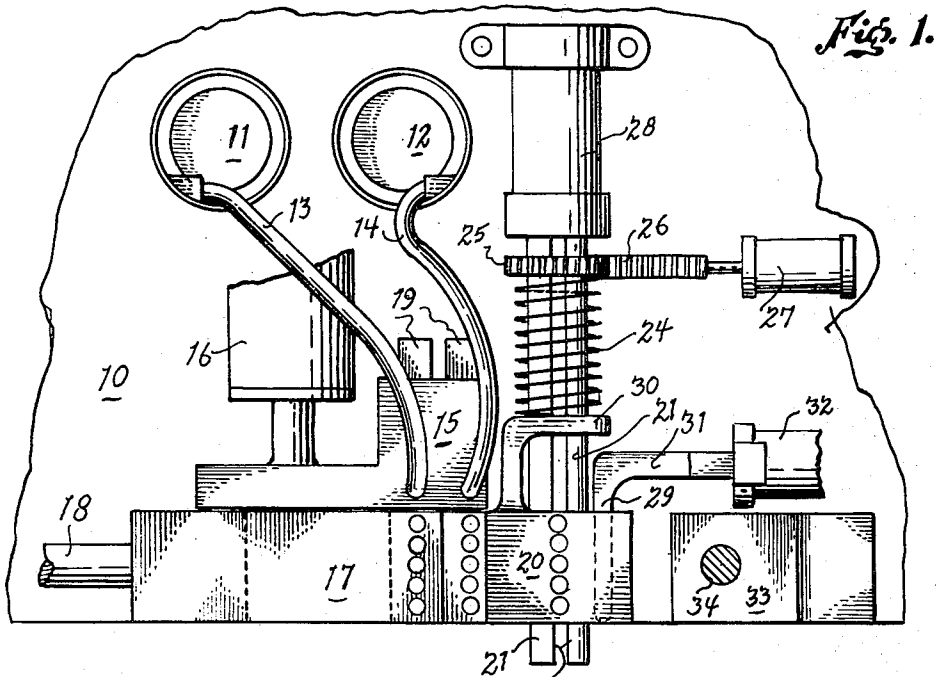


Fig. 1.

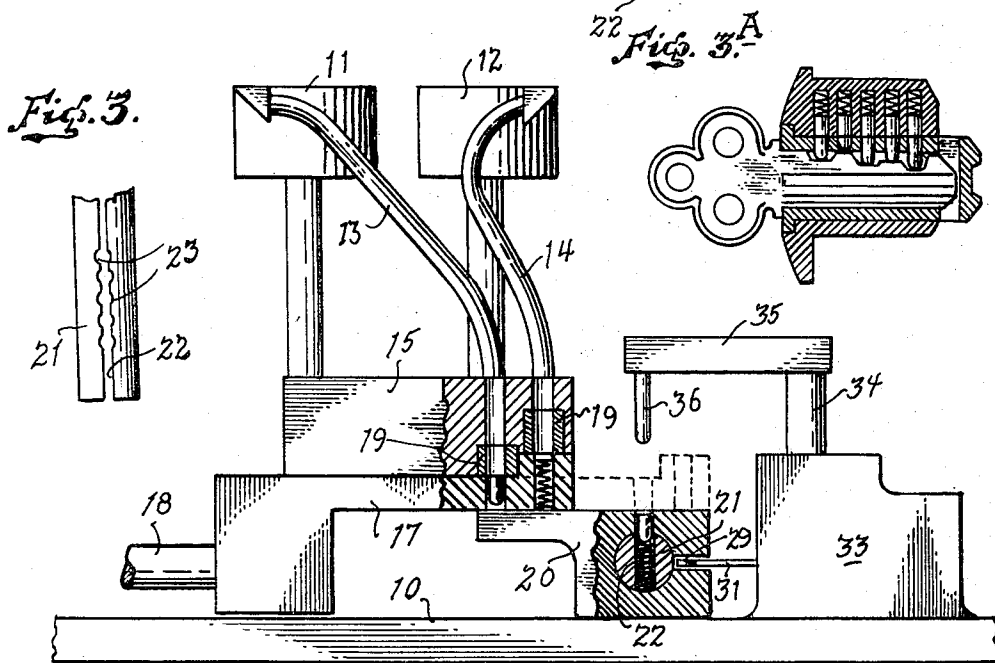


Fig. 3.

Fig. 3-A

Fig. 2.

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2 Sheets-Sheet 2

Fig. 4.

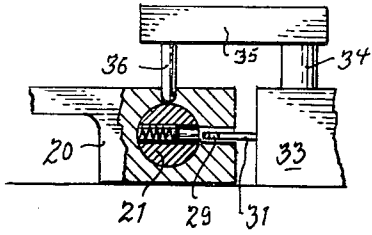


Fig. 5.

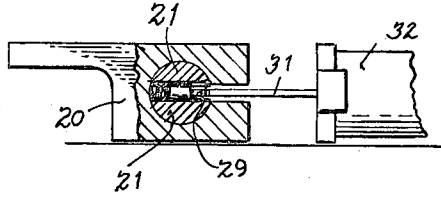


Fig. 6.

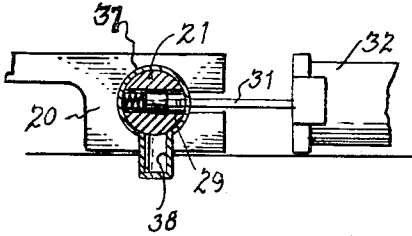


Fig. 7.

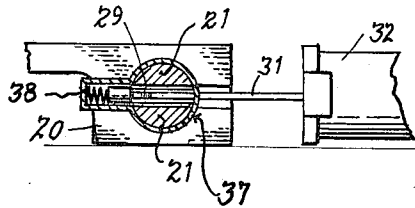


Fig. 8.

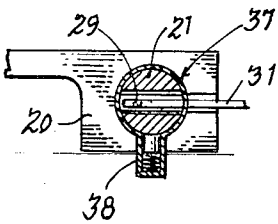


Fig. 9.

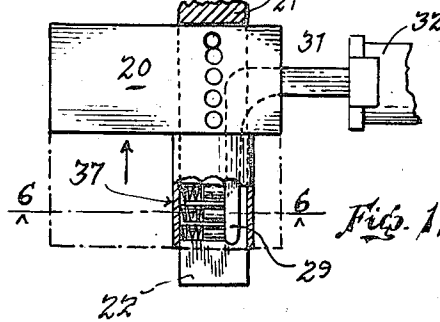
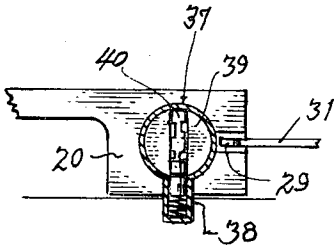
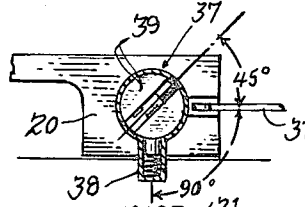


Fig. 10.

Fig. 11.

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1

2

3,417,452

**TUMBLER LOCK BLIND HOLE PIN
ASSEMBLY APPARATUS**

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3 Claims. (Cl. 29—208)

ABSTRACT OF THE DISCLOSURE

This invention provides apparatus by which driving pins and springs are assembled in a tumbler lock cylinder of the type having blind driving pin and spring accommodating holes by which the springs and driving pins are inserted in the lock cylinder through the key plug accommodating opening therein. The arrangement consists of means for positioning the driving pins and springs in a slotted mandrel having dimensions corresponding to the key accommodating plug of the lock and subsequently maneuvering the lock cylinder about the mandrel in such manner that a key plug with preselected key bit engaging tumbler pins may be assembled to complete the lock.

My present invention relates to apparatus for the manufacture of tumbler locks and more particularly to the insertion of the driving pins and springs in a tumbler lock cylinder having the so-called blind pin and spring accommodating holes.

An object of the invention is to provide an apparatus by which the driving pins and springs of a blind hole tumbler lock cylinder may be assembled for the reception of a cooperating key plug having preselected key bit engaging tumbler pins as a complete assembly operation for tumbler locks of the character defined.

Other objects and advantages will be in part evident to those skilled in the art and in part pointed out hereinafter in the accompanying description taken in connection with the accompanying drawing, wherein there is shown by way of illustration and not of limitation a preferred embodiment of the invention.

In the drawing:

FIGURE 1 is a diagrammatic plan view in outline showing elements of the device as employed in accordance with the invention,

FIGURE 2 is a similar diagrammatic view in elevation of the device as shown in FIGURE 1,

FIGURE 3 is a fragmentary view showing details of the mandrel as contemplated by the invention,

FIGURE 3A is a view in section showing a conventional blind hole tumbler lock cylinder with a key plug and bit engaging pins in their shear line producing positions,

FIGURES 4 and 5 illustrate two initial steps in the process of assembly,

FIGURES 6 and 7 show subsequent steps with the lock cylinder in position to receive the springs and driving pins thereof,

FIGURES 8 and 9 show further steps in the assembly operation, and

FIGURE 10 shows the lock cylinder and key plug in their finally assembled relation, and

FIGURE 11 is a plan view of the apparatus as shown in FIGURE 6 showing a section indicating line 6—6 along which FIGURES 6 to 10 are taken.

Two problems are presented in the assembly of tumbler locks of the type having aligned pins which when associated with a proper key will provide a shear line between the driving pins and the tumbler pins carried by the key plug of the lock which will permit a turning of the key

plug when in operation. The practice in assembling the housing or cylinder of tumbler locks at the present time follows two methods of procedure; in accordance with one of these methods the cylinder is provided with driving pin and spring accommodating holes that are open at the outer ends to permit the insertion of the pins and springs therein, following which these open holes are closed by a spring retaining clip. In accordance with another method the driving pin and spring accommodating openings of the lock cylinder are of the so-called blind hole type which necessitates the insertion of the driving pins and springs into the lock cylinder through the key plug opening. Some manufacturers, following the blind hole method, have resorted to the practice of drilling the lock cylinder from the outside with the proper number of pin and spring accommodating holes and then plugging these drilled holes at their outer ends to thus avoid the necessity for the spring retaining clip.

The prior art teaches several methods for this purpose, the latest of these being shown in the patent to Maese in which attention is also directed to other prior methods as shown in Patent No. 1,437,822, dated Dec. 5, 1922, and Patent No. 2,012,911, dated Aug. 27, 1935. Each of these prior disclosures requires in one form or another a dummy plug, a dummy lock cylinder or both to complete the assembly operation. My present invention requires no dummy plug or dummy cylinder and is particularly adapted for use as a complementary to the apparatus and method of my prior patent, No. 3,226,811, dated Jan. 4, 1966, in which there is disclosed and claimed a method and apparatus for the loading of the key plugs of a tumbler lock, which as therein set forth involves the selection of and insertion of pins of different lengths in the different pin holes of a lock key plug which will conform with the bits of a particular key.

As distinguished from the first above cited method as taught by Maese, I insert the driving pins and springs into the blind holes of a lock cylinder from the inside and through the key plug opening without the use of a dummy cylinder or dummy key plug as is required by Maese. While the showings of the above prior art patents have some similarities in detail, I have in my present invention greatly simplified the operation and have provided for the assembly of a complete lock with an apparatus employing more closely related mechanical and manually controlled functions which will greatly reduce the time required in the assembly of a conventional tumbler lock having the so-called blind hole cylinder.

For a more detailed description of the invention, reference will first be made to FIGURES 1, 2 and 3 of the accompanying drawings for description of the apparatus aspect of my invention, and later to the remaining figures of the drawings for a detailed description of the operations involved in the complete assembly of a tumbler lock.

As will hereinafter appear my present invention, particularly with respect to the selection and distribution of the driving pins and springs as employed in a blind hole lock cylinder, follows to a degree the corresponding operations as taught in my prior patent. Except for different hoppers for each of the several different lengths of pin as employed in a lock key plug, my present invention requires a supporting base 10 with only one pin supplying hopper 11 and one spring supplying hopper 12, each of which are mounted at an elevated point above a bench or base 10. Leading from the pin supplying hopper 11 there is a flexible pin guiding tube 13 and leading from the spring supplying hopper 12 there is a flexible spring guiding tube 14. These pin and spring supplying tubes 13 and 14 terminate in a pin and spring carrying member 15 that is adapted and arranged to be moved laterally by a pneumatic piston means 16 and over a pin and spring

transferring member 17 that is controlled by a piston rod 18 from a pneumatic cylinder not shown. For transferring the pins and springs from the member 15 there are slidable single pin accommodating members 19 which may be operated to discharge the pins and springs one at a time in the manner described in my above identified patent. Associated with the pin transferring member 17 there is a pin positioning member 20 that is mounted to slide along a mandrel 21 which, as here shown, has a vertically extended bisecting slot 22 which as is more clearly shown in FIGURE 3 has a number of oppositely disposed recesses 23 at each side of the slot 22 for positioning the springs and driving pins for register with the tumbler pins carried by a related key plug, as illustrated in FIGURE 3A. As shown in FIGURE 1, this slidable member 20 is biased into its initial position by a compression spring 24 that abuts against a rack gear 25 carried by the mandrel 21. Associated with the rack gear 25 there is a rack 26 by which the mandrel 21 may be turned by a pneumatic cylinder means 27, as will be hereinafter pointed out. The mandrel 21 is journaled for this turning movement upon a fixed supporting bearing 28 that is secured to the base 10. To permit the sliding of the pin positioning member 20 along the mandrel 21 and also provide a clearance for a pin displacing blade 29, the member 20 has an outwardly disposed spring engaging abutment 30 which will permit a lateral movement of a pin and spring displacing blade 31 into the slot 22 of the mandrel 21 by a pneumatic cylinder means 32, as will be hereinafter described. This pneumatic cylinder 32 may be mounted as a separate unit upon the base 10 or it may be carried as a part of a fixed supporting member 33 that also carries a vertically movable piston rod 34, omitted in FIGURE 1, but shown in FIGURE 2 which has an overhanging arm 35 with depending pin and spring depressing fingers 36 which become operative after the spring and driving pins have been deposited in the pin positioning member 20 and the mandrel 21, as shown in FIGURE 2.

When in operation the pin and spring transferring member 17 will move to the right, as shown in FIGURE 2, with two distinct stops, the first of which permits the dropping of the springs into the pin position member 20 and the slot 22 of the mandrel 21. Then at its second stop the member 17 will deposit the pins over the springs as previously delivered. Following this the pin and spring transferring member 17 will return for the reception of other pins and springs for another hole in the lock cylinder. At this stage of the operation after all of the springs and driving pins thus positioned in the pin positioning member with the springs uncompressed the pins will extend beyond the perimeter of the mandrel 21. As a next step the pin and spring depressing fingers 36 will move downwardly until the pins are in a position to form a shear line with the positioning member 20 and permit a turning of the mandrel 21.

To complete the description and explain further the operation of my invention, reference is now made to the remaining figures of the drawings wherein the step by step operations are illustrated. After the driving springs and tumbler pins have been deposited by the pin positioning member 20 and the mandrel 21 as shown in FIGURE 2, the spring depressing fingers 36 carried by the overhanging arm 35 will move downwardly to compress the springs 22 and position the tumbler pins into a shear line establishing condition between the pin positioning member 20 and the mandrel 21. With the tumbler pins in this position, the mandrel 21 will then be turned within the pin positioning member 20, through an arc, for example, of ninety degrees (90°) as shown in FIGURE 4. At this point, the spring displacing blade 29 will move in the lateral slot of the member 20 to compress the springs in the slot 22 of the mandrel 21 as shown in FIGURE 5. It is here important to note that the blade 29 is formed as a right angle extension of the blade 31

and is of such dimension that its outer edge will be well within the cylindrical limits of the mandrel 21. As the next step with the tumbler pins and driving springs compressed as shown, the operator will place a lock cylinder, designated by the numeral 37, with blind or bottom hole in cavities 38 over the mandrel 21 as is shown in FIGURE 6. In connection with this showing, attention is directed to the showing in FIGURE 11 wherein the pin positioning member 20 is in its displaced position upon the mandrel with the lock cylinder 37 thus moved over the mandrel 21 to a point where its blind or bottom holes 38 will be brought into a position to receive the driving springs and tumbler pins as shown in FIGURE 7. The point to be here noted is that the extending blade portion 29 of the blade 31 is so dimensioned that the lock cylinder 37 will extend freely thereover and into the lock cylinder where the driving springs will be held with a shear line to permit a reverse rotation of the lock cylinder as shown in FIGURE 7. At this point the pin positioning member 20 with the lock cylinder 37 positioned in alignment with the mandrel 21, the cylinder 37 will be moved along the mandrel against the bias of the spring 24 as shown in FIGURE 11. This will place the springs and pins in confinement within the cylindrical portion of the lock cylinder 37, but with its blind or bottom holes 38 out of alignment therewith.

With the lock cylinder 37 held against the pin positioning member 20 in this displaced position, the lock cylinder 37 will then be rotated about the mandrel 21 to bring the blind or bottom holes thereof 38 into alignment with the springs and pins within the slot 22 of the mandrel whereupon a further spring and tumbler pin displacing movement of the blade 29 and the pins will be held in a second shear line establishing position outside the limits of the mandrel 21 for a reverse rotation of the lock cylinder 37 to bring the tumbler pins out of alignment with the slot 22 of the mandrel 21, as shown in FIGURE 8 of the drawings. With the lock cylinder and the tumbler pins in the position as here shown, the key plug 39 will be placed in alignment with the mandrel 21 but with its key slot out of alignment with the tumbler pins as shown in FIGURE 9. The lock cylinder 37 can then be withdrawn from the mandrel 21 and over the key plug 39 with its properly assembled springs and tumbler pins. Then key plug 39 can be rotated as indicated in FIGURE 9 through an arc of approximately 135° to complete the assembly with the tumbler pins in the blind or bottom holes 38 of the lock cylinder 37 as shown in FIGURE 10 of the drawings.

While I have, for the sake of clearness and in order to disclose my invention so that the same can be readily understood, described and illustrated a specific form and arrangement, I desire to have it understood that this invention is not limited to the specific form disclosed, but may be embodied in other ways that will suggest themselves to persons skilled in the art. It is believed that this invention is new and all such changes as come within the scope of the appended claims are to be considered as part of this invention.

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

1. In an apparatus for assembling the driving pins and springs in a blind hole tumbler lock cylinder for use with a key plug of conventional form, the combination of hoppers for delivering springs and driving pins to a pin delivery means, a pin and spring delivery means, a pin and spring transferring means adapted to move with a step by step motion for depositing the springs and pins from said delivery means successively into a number of pin and spring receiving chambers of a pin positioning member, a pin and spring positioning member having spaced holes for the reception of springs and pins delivered by said transferring means, mandrel with a slot extending completely therethrough having pin and spring positioning recesses corresponding with the spacing of the

5

openings in said pin positioning member, means having pin engaging fingers for compressing the springs delivered to said positioning member and moving the driving pins into a shear line position to permit a turning of said mandrel within said pin and spring positioning member, said pin and spring positioning member also having a slot for alignment with the slot in said mandrel when said mandrel is turned in said spring and pin positioning member, a second spring compressing means operating in said latter slot adapted and arranged to engage the pins carried by said mandrel when said mandrel is turned within said pin and spring positioning member to align the blind holes of the lock cylinder with the pin and spring carrying slot of said mandrel, and characterized by the fact that when the lock cylinder is turned upon said mandrel to align the blind holes thereof said latter spring compressing means will operate to move the springs and pins from said mandrel and into the blind holes of the lock cylinder.

2. The invention as set forth in claim 1, characterized by the further fact that following the positioning the pins and springs into the lock cylinder, said second spring compressing means will operate to hold the springs and pins in the blind holes of the lock cylinder in a shear line position for a turning and withdrawal of the lock cylinder from the mandrel and over a complementary tumbler pin carrying key plug to complete a lock assembly.

3. In a device for inserting the springs and driving pins into blind spring and pin accommodating holes of a lock cylinder, the combination of a turntable mandrel having a bisecting slot extending diametrically there-through with pin and spring positioning recesses in the

6

sides of said slot, means surrounding said mandrel having spaced openings for positioning springs and driving pins in the recesses of the slot in said mandrel, said means also having a narrow slot through which a spring compressing and pin displacing blade may operate to compress the springs positioned in the slot of said mandrel, a pin displacing blade having a right-angled portion of a length sufficient to engage with and hold all of the pins within the circumferential limits of said mandrel, whereby a lock cylinder with blind holes may be placed over said mandrel with its blind holes out of alignment with said slot and subsequently rotated about the mandrel to position the blind holes thereof into alignment with the slot of the mandrel, whereupon a further operation of said pin displacing blade will force the driving pins and springs from the mandrel and into the blind holes of the lock cylinder for withdrawal of the lock cylinder from the mandrel and over a complementary key plug to complete a lock.

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U.S. Cl. X.R.

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