Oct. 9, 1951 R. C. CERF, JR 2,570,765

METHOD OF FITTING TUMBLER PINS

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FIG. 1.

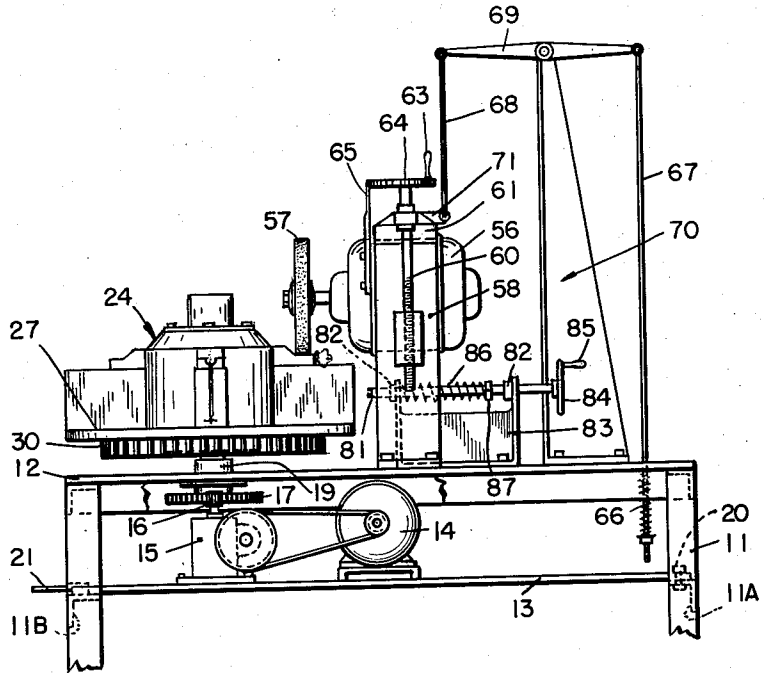


FIG. 2.

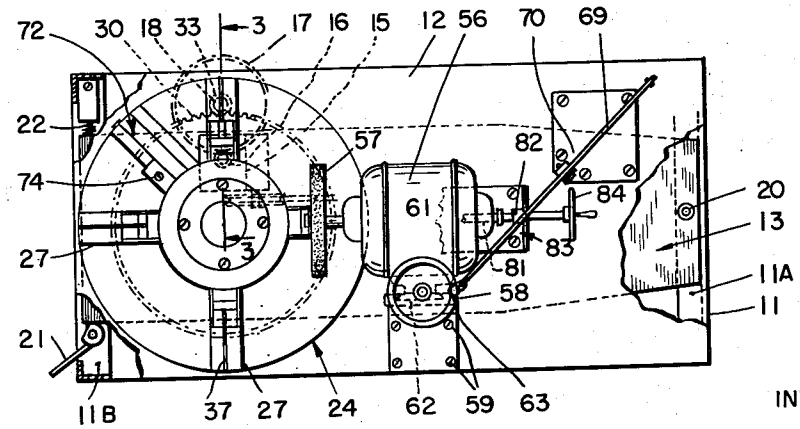
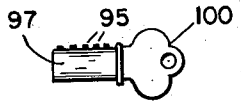


FIG. 7.



INVENTOR

ROBERT C. CERF JR.

BY

Miner R. Hartman

ATTORNEY

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FIG. 3.

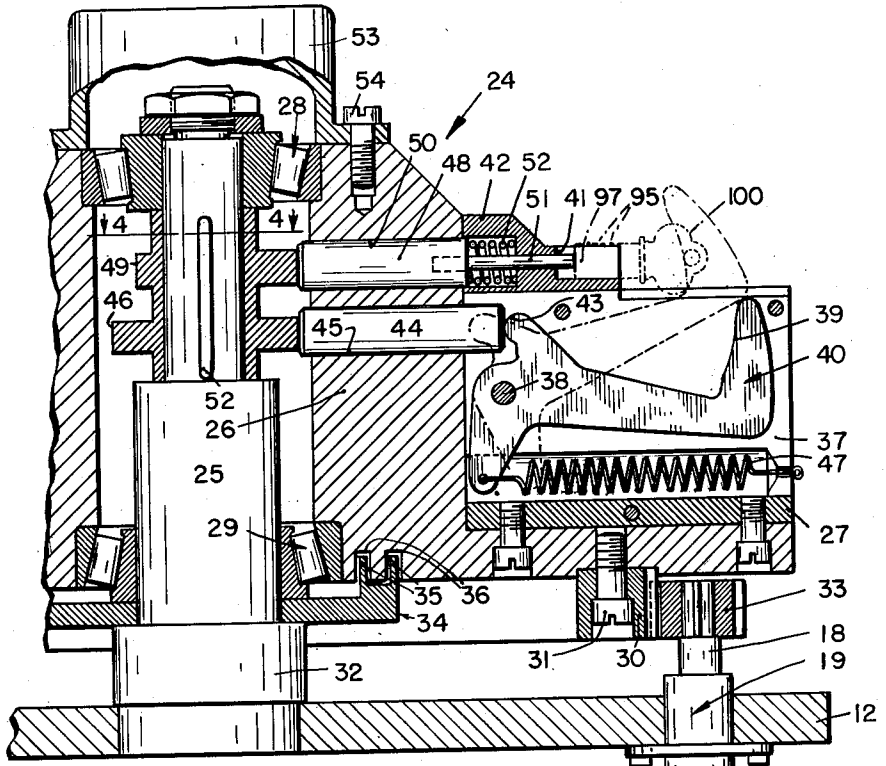


FIG. 4.

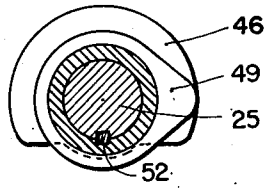


FIG. 5.

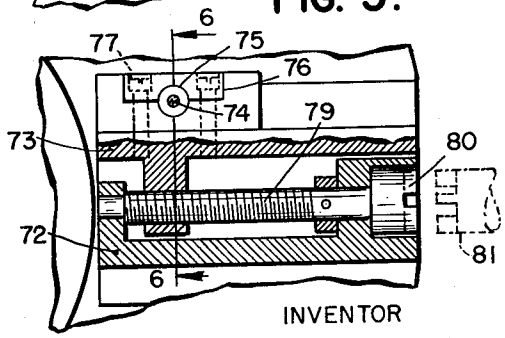
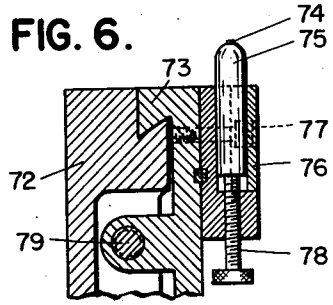


FIG. 6.



INVENTOR

ROBERT C. CERF JR.

BY

Myron L. Hartmann

ATTORNEY

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FIG. 8.

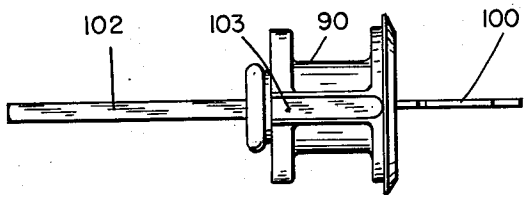


FIG. 9.

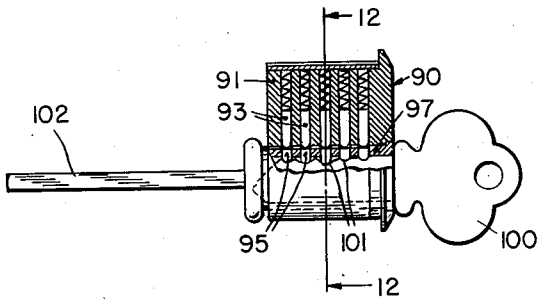


FIG. 12.

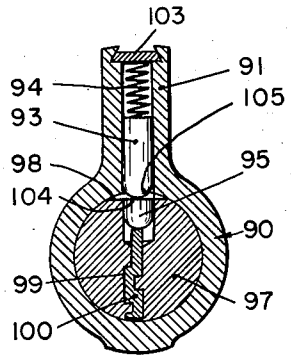


FIG. 10.

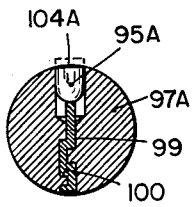


FIG. 11.

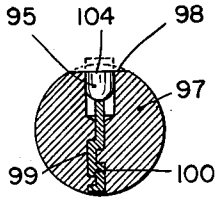
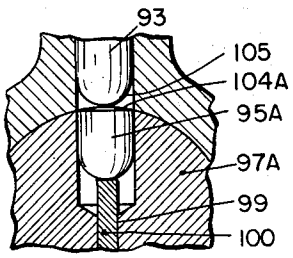


FIG. 13.



INVENTOR

ROBERT C. CERF JR.

BY

ATTORNEY

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2,570,765

METHOD OF FITTING TUMBLER PINS

Robert C. Cerf, Jr., Los Angeles, Calif., assignor to Hollymade Hardware Manufacturing Company, Los Angeles, Calif., a corporation of California

Application November 18, 1947, Serial No. 786,727

2 Claims. (Cl. 29—148)

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This invention relates to improvements in pin tumbler cylinder locks and in particular to a method for finishing and fitting the pins and key plugs of a cylinder lock.

One object of my invention is to provide an improved method for fitting pins in pin tumbler type cylinder locks. Another object is to provide a method to avoid filing and fitting pins by hand.

These and another objects are attained by my invention which will be understood from the following description and the accompanying drawings in which:

Fig. 1 is a side elevational view of my pin and plug grinding machine;

Fig. 2 is a top plan view of the same;

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is a top plan view partly in section of the wheel dressing mechanism;

Fig. 6 is a cross-sectional view taken on the line 6—6 of Fig. 5;

Fig. 7 is a side elevational view of a pin tumbler key plug with protruding pins and inserted key, before grinding and fitting;

Fig. 8 is a top plan view of an assemled cylinder lock of the removable type;

Fig. 9 is a side elevational view partly in section of the assembled lock shown in Fig. 8;

Fig. 10 is a typical cross-sectional view showing a key plug, an inserted key, and a rounded end tumbler pin, of the usual form made by hand filing;

Fig. 11 is a cross-sectional view showing a key plug with an inserted key, a hole for a tumbler pin, a land around said hole, and a flat end tumbler pin finished to a level with the land, of my improved form made by grinding;

Fig. 12 is an enlarged cross-sectional view taken on the line 12—12 of Fig. 9; and

Fig. 13 is an enlarged fragmentary cross-sectional view showing the cylinder, driving pins, key, key plug, and a hand-filed rounded outer end tumbler pin.

It has been the usual practice, in finishing the transverse sliding tumbler pins of a cylinder lock having a key plug to insert the selected notched key (which is to be used for turning the key plug and operating the lock mechanism) into the key slot, put over-length tumbler pins in the holes in the plug, and then by hand filing to finish the pins so that the outer end point is in the plane of the cylindrical outer surface of the plug. During hand filing, the pins are turned axially so that

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when finished, the plug may be turned by the key no matter in what radial position the pins may be disposed in the holes. This results in a generally rounded end 104A as shown particularly in Figs. 10 and 13, with the rounded outermost point lying in the outer cylindrical surface of the plug, and with the margin generally below the plug's cylindrical surface. Heretofore, no machine has been available to perform the filing of the tumbler pins to the proper end shape and length to be operated by a selected key. I have found that if a small level land is formed on the plug adjacent and surrounding the outer ends of the transverse holes for the tumbler pins, then the outer ends of the tumbler pins may be plane surfaces perpendicular to the axis of each hole and level with said land. When the plug is thus modified, the tumbler pins may be fitted by grinding the ends flat and perpendicular to the land. This may readily be accomplished, and with precision by grinding off the over-length tumbler pins simultaneously with the formation of the land around the holes for said pins, while keeping the notched key in place in the key slot of the plug. This may be rapidly and economically carried out by the grinder machine of my invention which is described in detail hereinafter.

Referring to the drawings, an improved transverse sliding pin tumbler cylinder lock of the removable type is shown in Figs. 8, 9, and 12, the cylinder body 90 being provided with a key plug 97 having transverse holes in which are fitted the tumbler pins 95 having flat upper end surfaces 104 level with the adjacent land 98 on the plug 97, said plug being adapted to be turned in the cylindrical opening in the body by the notched key 100 positioned in the key slot 99, only when the tumbler pins 95 are suitably positioned from their inner ends by the notches 101 in the key 100, this turning of the plug 97 actuating the latching means through the spindle 102. The tumbler pins 95 are pressed against the key notches 101 by the corresponding driver pins 93, which slide in holes in the driver pin boss 91, being held under the compression springs 94 which abut the slide cover 103 closing the outer end of the boss 91. When the plug 97 is turned to approach the position at which the key 100 may be withdrawn from the key slot 99, the driver pins 93 (whose contacting ends 105 are smoothly rounded) press at their tips upon the land 98 to give a slight clicking sound and a distinct "feel" to the fingers of the person who is turning the key. The key "pull-out" position is thus clearly and definitely indicated. With the

conventional hand filed pins 95A in a plug 97A having no land (as shown for comparison in Figs. 10 and 13), no click or "feel" is evidenced when the driver pins 93 and the tumbler pins 95A are in alignment, i. e. when the key 100 may be withdrawn, because the outer end 104A of the tumbler pins 95A, being filed to the radius of the outer surface of the plug, ride smoothly under the substantially spherical ends 105 of the driver pins 93. The provision of the land on the key plug, and the forming of flat outer ends on the tumbler pins not only solves the problem in operating the lock of positioning the plug for withdrawal of the key, but also permits the machine finishing of the plug and tumbler pins, and avoids the slow, tedious, and expensive old operation of hand filing the pins.

A preferred form of my plug and pin finishing grinder, shown in Figs. 1 to 6, consists of a frame 11 which is provided with a bed plate 12 upon which the machine is mounted, with a shelf 13 arranged below the bed plate 12 which serves to support the motor 14 and the gear reducing unit 15. The drive pinion 16 of the gear reducing unit 15 engages the main driving gear 17 mounted on the shaft 18 which is supported in the bearing 19 mounted on the underside of the bedplate 12, the shaft 18 extending through the bedplate 12. The shelf 13 is pivoted at one end by the pivot 20 to a cross member 11A of the main frame 11, the opposite end of the shelf being supported on a cross member 11B of the main frame and being movable laterally by means of the cam lever 21 acting against one side of the shelf, the opposite side being provided with a compression spring member 22 acting against the shelf and the cam lever. This arrangement, permitting the lateral shifting of the shelf 13, provides means for shifting the drive pinion 16 on the gear reducing unit 15 in and out of engagement with the main driving gear 17. The revolving head of the machine, designated generally 24, is adapted to be rotated in a horizontal plane on the main shaft 25 which is fixedly mounted on the bed plate 12. A cylindrical hub or body, which is provided with four equally spaced radial arms 27, is mounted on thrust bearings 28 and 29 which are fitted on the main shaft 25. A ring gear 30 is attached by bolts 31 to the underside of the hub 26. The ring gear 30 is arranged to be driven by the pinion 33 mounted on the end of the shaft 18. A bearing collar 32 is provided on the shaft 25 between the bed plate 12 and the thrust bearing 29 to hold the revolving head 24 above the bed plate 12, and a seal plate 34 is preferably provided, the two sealing rings 35 extending into the corresponding grooves 36 on the lower face of the hub 26 to prevent the entrance into the thrust bearings 28 and 29 of metal chips and abrasive dust. Each of the radial arms 27 of the hub 26 is provided with a radial slot or recess 37 in each of which is mounted an arm 40 having a key-holding finger 39 which at times is raised out of the slot to hold a key 100 inserted in a key slot 99 in a pin tumbler plug 97 which, in turn, is held in a hole 41 in the plug holder 42 which is mounted on the upper edge of each radial arm 27 of the hub 26. The arm 40 is pivoted to the wall of the slot by the pivot 38 and is provided with a short lever 43 which is adapted to be pressed by the cam follower cylinder 44. The cylinder 44 is mounted to slide longitudinally in the hole 45 of the hub 26, the opposite end of the cam follower 44 being in contact with a cam 46 mounted on the main shaft 25, the cam 46 having a cylindrical surface for about 225° of its circumference, the remainder of the surface being of reduced diameter allowing the arm 40 to be turned so that the key-holding finger 39 is projected out of the slot and against the end of the key 100 by the tension spring 47. The plug holder 42 is provided with the hole 41 which is adapted to receive a pin tumbler plug 97, and has an open slot on its upper side to permit the exposure of the overlength pins 95 which are to be ground off in the operation of the machine. The cam follower 48 is adapted to engage a throw-out cam 49 in a hole 50 in the hub 26, the cam 49 being also mounted on the main shaft 25. The two cams 46 and 49 are preferably made as an integral sleeve keyed to the shaft by the key 52. The cam 49 consists essentially of a minimum diameter cylindrical surface, with a single protruding portion of greater diameter, which acts against the cam follower 48 at times to push the plug 97 from the hole 41 by means of the push-out rod 51 attached to the end of the cam follower 48, a compression spring 52 being provided to press the cam follower 48 against the cam 49. A cap 53 is conveniently provided over the upper roller bearing 28 being attached to the hub 26 by the bolts 54, this cap serving to prevent the entrance of abrasive dust and metal chips to the bearings.

The typical pin tumbler plug 97 with protruding pins 95 and an inserted key 100, which constitutes the assembly on which the grinding machine is adapted to work, is shown particularly in Fig. 7. The tumbler pins 95 are arranged in five holes at right angles to the plug axis so that the ends of the pins drop into notches 101 in the key in accordance with any desired combination of notches. The overlength pins are then ground off so that the outer ends are level with an adjacent land 98 on the cylindrical plug 97. It will be clear that it is essential to have the key fully inserted in the key slot 99 of the plug 97 in order that the pins 95 may be leveled off to the surface of the land 98 and of proper length to allow rotation of the plug 97 by the key 100 in the cylindrical hole in the lock body 90.

A grinding wheel motor 56, having a vertically positioned grinding wheel 57 mounted thereon, is supported on the column 58 which is bolted to the bed plate 12 by bolts 59, the elevation of the motor and its grinding wheel being adjustable by the screw 60 which raises and lowers the bracket 61 attached to the motor, the bracket being arranged to slide up and down in the dovetail slide 62 of the column 58. The screw 60 may be turned by means of the handle 63 mounted near the periphery of the graduated dial 64. A pointer 65 is provided with its tapered end adjacent the graduations on the dial 64 so that it may be used as an index of the amount of movement up and down of the grinding wheel 57. The weight of the motor and grinding wheel is counterbalanced by the tension of the counterbalancing spring 66 acting through the rods 67 and 68 pivotally mounted at the opposite ends of the rocker arm 69 which is rockably mounted on the upright 70, the short arm 68 being attached to the attaching member 71 fastened to the screw 60. This counter balancing arrangement permits the grinding wheel to be raised slightly as it passes over the projecting ends of the pins which are to be filed off, without putting any undue strain on the grinding wheel shaft and motor. The lowest position of the grinding wheel surface

is fixed on the screw 60 which is the low point to which the grinding off of the pins and the land on the plug is carried as the plug is carried under the wheel.

The revolving head 24 is also provided with an additional radial arm 72 positioned intermediate two of the slotted radial arms 27. This arm is provided with a horizontally moving slide 73 upon which is mounted a vertically directed wheel dressing diamond 74 mounted in a holder 75 which is adjustably arranged in the clamping device 76 having set screws 77 and a vertical adjusting screw 78. When it is desired to dress the wheel, the main drive pinion 16 is disengaged from the driving gear 17 by releasing the cam lever 21, which permits the spring 22 to push the shelf 13 sidewise to disengage the main driving gear 17 so that the head 24 is no longer revolved. The radial arm 72 is manually placed under the grinding wheel 57. The lead screw 79 which actuates the slide member 73 holding the diamond 74 is engaged through its slotted head 80 by a forked rod 81 which is mounted horizontally in bearings 82 at the upper end of brackets 83, a crank wheel 84 with a handle 85 being provided on the rod 81. A compression spring 86 is provided around the shaft 81 between the bracket 83 at one end and at the other end a collar 87 attached to the shaft 81, this spring normally tending to keep the rod clear of the rotating head. When it is desired to move the diamond under the wheel, the rod 81 is engaged in the slotted head of the lead screw by pressing the crank wheel 84 in opposition to the spring. With the grinding wheel revolving in its usual manner, the diamond is passed across the wheel face to dress it to the desired true surface. The operation of dressing the wheel is carried out as often as necessary by interrupting the operation of grinding of the pins.

The method of operation of the machine will be apparent from the above description. The plugs with the keys in place and with the overlength pins in the pin holes are manually inserted in the hole 41 successively as the arms approach the grinding wheel. The cam 44 then actuates the key-holding finger 39 to raise it and press it against the end of the key so that as the pins pass under the grinding wheel, the key is firmly held in position, with the other ends of the pins in the key notches. When the plug with the pins ground off to a level surface or land pass beyond the grinding wheel, the finger 39 is released and the push-out rod 51 presses against the end of the plug to partly remove it from the hole 41 being actuated by the cam follower 48 and the cam 49. The finished assembly of

plug, pins and corresponding key is then picked up by the operator and an unfinished assembly is inserted in the vacant hole 41. The machine automatically, with a single operator, rapidly performs an operation which has heretofore been carried out by laborious hand filing. The dressing of the surface of the grinding wheel is required only two or three times per day at the most.

The advantages of my invention will be apparent. By simultaneously forming the land on the plug, and grinding the ends of the pins to that level, the finishing and key fitting operation may be performed on a semi-automatic grinding machine and laborious hand filing of the pins is avoided. The tumbler pin and plug assembly, with flat pins and the land, provides a pin tumbler cylinder lock of improved performance, and at lowered costs.

I claim:

1. The method of fitting tumbler pins in the key plug of a transverse sliding pin tumbler driver pin type cylinder lock to effect correspondence to a particularly notched key consisting of inserting overlength pins in the pin holes of said plug, holding the selected key in the key slot of said plug, and then grinding off the protruding ends of said pins and simultaneously forming a land on the side of said plug adjacent said pin holes, the outer ends of the pins being plane surfaced and made level with said land when the key is in place in the cylinder slot.

2. In the method of fitting a tumbler pin in a pin hole in the key plug of a transverse sliding pin tumbler and driver pin type cylinder lock, the step of grinding the protruding end of said tumbler pin and simultaneously forming a land on the side of said plug adjacent said pin hole, the outer end of the pin being plane surfaced and made level with said land.

ROBERT C. CERF, JR.

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