

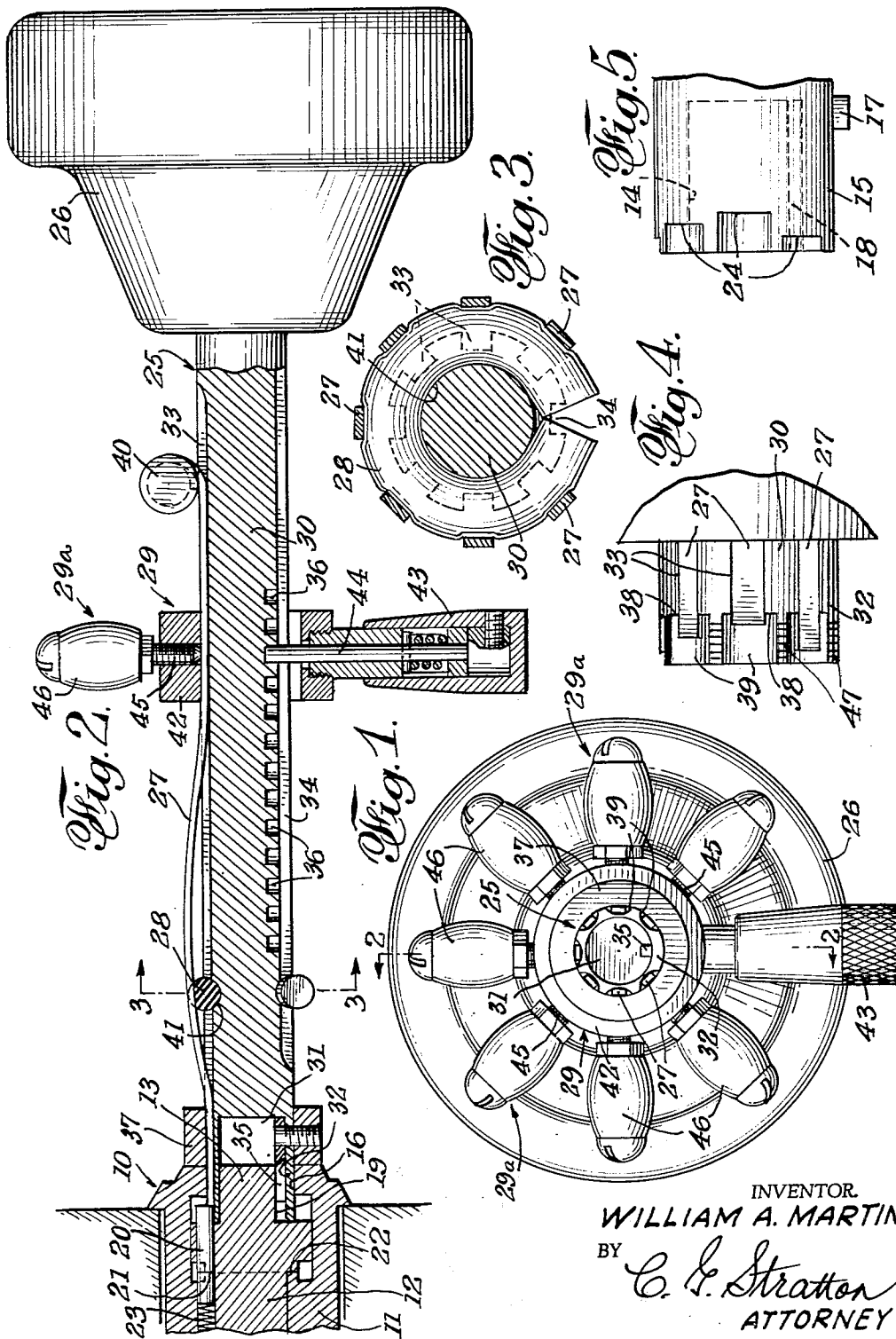
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SERVICING TOOL FOR BARREL-TYPE LOCKS

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SERVICING TOOL FOR BARREL-TYPE LOCKS
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This invention relates to a tool for servicing barrel-type locks, particularly for opening the same, as when the key therefor is lost.

An object of the invention is to provide a lock-servicing tool that, at the time the same has aligned the lock tumblers so the plug may be turned and the lock opened, assumes a condition in conformation to a key that would ordinarily open the lock, if available. Accordingly, the tool may now serve as a master from which a key or keys, to replace the lost key, may be made.

Another object of the invention is to provide a tool as characterized above with means enabling, by inspection, to show the tumbler pin code of the lock that had been opened by the tool.

This invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The foregoing objects of the invention are realized in a hand tool that, by its handle, may be manipulated so that a set of tumbler-engaging fingers, conforming to the arrangement of the tumblers of a lock, and which are under light frictional drag, are initially entered into the end of a tumbler lock to engage and inwardly depress the tumblers against the bias of their springs. The handle may then be used to oscillate the tool around its axis so that circumferentially arranged seats in the end of the tool and having end shoulders, may, as they move back and forth across the ends of the tumblers, receive the ends thereof under projection of their springs. As a result, the tumbler dividing lines gradually become aligned or in register with the parting line between the barrel and the plug of the lock. Such jiggling movement of the plug and the tumblers eventually results in all of the dividing lines of the tumblers becoming aligned with said parting line, releasing the plug for rotating in the barrel. The mentioned fingers retract to different endwise positions according to the lengths of the tumblers and they may be locked in such positions to provide a pattern for producing a duplicate key or keys. For the latter purpose, the tool provides graduations that serve as a code which may be used for producing such keys.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description and which is based on the accompanying drawing. However, said drawing merely shows, and the following description merely describes, one embodiment of the present invention, which is given by way of illustration or example only.

In the drawing, like reference characters designate similar parts in the several views.

FIG. 1 is an end view of a service tool according to the present invention.

FIG. 2 is a longitudinal sectional view thereof as taken on the plane of line 2—2 of FIG. 1.

FIG. 3 is an enlarged cross-sectional view as taken on the line 3—3 of FIG. 2, the tool being shown in operative engagement with a barrel-type lock.

FIG. 4 is a similarly enlarged side elevational view of the lock-engaging end of the tool, showing different positions assumed by the tumbler-engaging means of the tool after a lock-opening operation.

FIG. 5 is a similar view of the end of a key that opens

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the lock to which the tool has been applied, the latter view being here used for comparative purposes with relation to FIG. 4.

The barrel-type lock 10 shown in FIG. 2 conventionally comprises a barrel 11 in which is disposed a rotational plug 12 that has a pilot end 13 that fits within an end bore 14 of a key 15 (FIG. 5). The barrel 11 has an end bore 16, the same and the plug end 13 defining an annular space into which the key 15 may be entered. A lug 17 on the key engages the outer end face of the lock barrel. A key 18 in the bore 14 of the key 15 engages a key slot 19 in the plug end 13. Therefore, if the plug is free to turn in the barrel 11, the key 15 will turn it. The lock is provided with a complement of tumblers 20 that keep the plug from turning unless the dividing lines 21 of all the tumblers are aligned with the parting line 22 between the barrel and plug of the lock. Since, in practice, there are seven tumblers 20 in the lock, and most or all of them have their dividing lines 21 differently located relative to the outer ends of the tumblers, the same must be depressed different distances against the bias of tumbler-projecting springs 23 to bring all of the tumbler-dividing lines 21 in register with the parting line 22. Only then can the plug 12 be turned because one section of each tumbler is wholly in the barrel 11 and the other section wholly in the plug 12. The key 15, shown in FIG. 5, is provided with a set of shoulders 24 of different lengths, accordingly. Thus, when the key is inserted in the lock as rotationally oriented by the key 18 in the keyway 19 of the plug, said shoulders 24 depress the pins different distances to bring all of the pin-dividing lines 21 in register with the parting line 22. Thus, the key may be turned to turn the lock plug 12. The present tool embodies means to duplicate the locations of the shoulders 24 in the end of the tool for the dual purpose of opening the lock and providing a means for enabling duplication of a key to open said lock.

The tool that is illustrated comprises, generally, an elongated body 25, a handle 26 at one end of said body for manipulating the same, a set of tumbler-engaging fingers 27 arranged longitudinally around the outer surface of the body and conforming to the arrangement of the tumblers of a lock 10 to be serviced by the tool means 28 carried by the body 25 to impose light frictional drag on the fingers 27, adjustable means 29 to vary the flexure tension of the fingers according to the requirements of the lock to be serviced, and means 29a to lock the fingers 27 in the different retracted positions assumed thereby during operative engagement with a lock to bring alignment of the tumbler dividing lines 21 and the barrel and plug parting lines.

The body 25 is shown as a round-sectioned rod 30 that has the knob-like handle 26 at one end and, at the opposite end, is provided with a blind bore 31 that defines an annulus 32 of a diametral size similar to the size of the key end, as in FIG. 5. For a seven-tumbler lock, said rod 30 is provided with seven longitudinal splines 33 circumferentially spaced according to the circumferential spacing of the tumblers 20 of lock 10. An eighth spline 34 is aligned with a key 35 in the bore 31, a set of uniformly spaced seats 36 in the rod 30 opening in said spline 34. Spaced from the end of the rod 30 that has the bore 31, is provided a collar 37 that closes over the splines 33. Said collar is located relative to the rod end, the same distance that the lug 17 is spaced from the end of key 15, said collar serving the same purpose as said lug.

As can best be seen in FIGS. 1 and 4, the end of the annulus 32 is provided with shoulders 38 that are all alike and are spaced from the end of the annulus a distance at least as great and preferably greater than the shoulder 24 of the key 15 that is farthest spaced from the end of said key. As can be seen, the shoulders 38 form the ends

of seats 39 into which the outer ends of tumblers 20 enter when the annular end 32 of the rod is inserted in the lock, as limited by the collar 37.

The fingers 27, one in each spline 33, are preferably of rectangular cross-section of a size to freely slide along said splines. The forward ends of the fingers extend through the bore in collar 37. The rearward ends are formed as handles 40 to facilitate return of the fingers to their maximum projected position, i.e., with the ends thereof flush with the end of the annulus 32. Said fingers are flexible, as indicated in FIG. 2.

The means 28 is shown as a ring of rubber or rubber-like material that is located in a transverse groove 41 spaced rearwardly from the collar 37, said ring having an outer diameter materially larger than the diameter of rod 30, as may be seen in FIGS. 2 and 3. Whether ring 28 is endless or made up of a length of round-sectioned rubber, the same is arranged to be beneath the fingers 27 which, therefore, are flexed outwardly after passage through collar 37 in a rearward direction. It will be clear that said ring imposes a light drag on said fingers, especially since the same are flexed back into the splines 33 by the means 29, the drag friction being varied according to the location, along the rod 30 of said means 29.

In this case, the means 29 is shown as a collar 42 slidably fitted on the rod 30 and through the inner diameter of which the rearward ends of the fingers are passed. It will be seen that the fingers are bowed out due to their engagement over the ring 28. Spring detent means 43 having a retractable locking pin 44 is carried by collar 42 so the pin 44 extends in a radial direction for engagement in both spline 34 and a selected seat 36. When projected, as shown, the pin 44 locks the means 29 in adjusted position along the rod 30 to vary the flexure tension of the fingers, and when retracted, said pin still retains engagement with the spline 34, thereby retaining the collar 42 against rotation relative to said rod 30 so that the means 29a remain radially oriented with the fingers 27 locked thereby.

Said means 29a are shown as a set of screws 45 that are arranged to impinge on the fingers and are threadedly engaged in radial seats in the collar 42. Manipulating handles 46 on the ends of said screws provide for manual loosening or tightening of the screws to release or unlock the fingers.

Operation

The fingers 27 are first all slid toward the forward end of the tool and care is taken that the screws 45 of the means 29a are loosened. The adjustment of the tension of the fingers 27 cannot always be initially determined and a change of adjustment of the means 29 may be required before the tool will successfully open the lock. In any case, the forward end of the tool is entered into the lock, as limited by the collar 37. During such introduction of the tool end, the ends of the fingers 27 will engage against and inwardly depress the tumblers against the bias of their respective springs 23. In all cases, the flexure tension of the fingers will cause them to resist retraction, thereby causing the finger ends to fully compress said springs 23. If, by withdrawing the tool from the lock and inspecting the finger ends, it is seen that the same are materially retracted, the means 29 is shifted forwardly to increase the flexure tension. The tool is again applied and is ready for tumbler-releasing manipulation when it is seen that all of the tumblers have been depressed to bring the dividing lines 21 thereof beyond the parting line 22 between the barrel and plug of the lock.

Now, the handle 26 is used for oscillating the tool body 25 to cause the seats 39 in the annulus 32 to move back and forth across the ends of the tumblers. This movement is of the jiggling type and sets up intermittent releasing movement on the ends of the tumblers that are carried by the lock plug 12. As a result, the bias of

the springs 23 becomes effective to project the tumblers in an outward direction and, by pressing on the ends of the fingers 27, slides the same rearwardly even though lightly frictionally resisted by the ring 28.

The retractive movement of the tumblers is quite slow, but gradually first one, then another and finally all of the tumblers will become retracted until their dividing lines 21 are all aligned with the parting line, freeing the plug 12 for turning by the tool. The tumblers release in order, those with the shortest tumbler ends on the plug first. When a tumbler reaches release position, the end thereof carried by the lock plug, during the jiggling movement, wipes across the end of the inner tumbler section. Thus, the latter tumbler end is held retracted by the inner face of the plug 12 at the parting line 21. As a consequence, said inner tumbler end cannot advance and waits at lock-releasing position until all of the other tumblers have achieved lock-releasing position.

Since, when the lock opens, the ends of the fingers 27 have retracted positions that, respectively, have the same relationship to the end of the tool body as have the shoulders 24 relative to the end of key 15, the tool now conforms to the key. By taking up on the means 29a, the screws 45 lock the fingers 27 in this position. Hence, the tool may now serve as a pattern for producing a duplicate key or keys. In any case, the graduations 47 (FIG. 4) show the finger end relationship to the end of the tool body 25. These graduations show the code which may be used for cutting additional keys. FIG. 4 shows four of the seven fingers, the positions of which show that the code numbers thereof, from the bottom up, are 2, 6, 4 and 2.

While the foregoing has illustrated and described what is now contemplated to the best mode of carrying out the invention, the construction is, of course, subject to modification without departing from the spirit and scope of the invention. Therefore, it is not desired to restrict the invention to the particular form of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A servicing tool for barrel-type locks that have a set of circumferentially arranged spring-urged tumblers that lock to and release the plug from the barrel thereof, said tool comprising
 - (a) an elongated body with an annular end for keying engagement with the lock barrel,
 - (b) a set of longitudinal splines in the body,
 - (c) a set of fingers slidably mounted in said splines with their ends directed toward the end edge of the annular body end for engagement with the ends of the lock tumblers, and
 - (d) a friction ring carried by the body and over which the fingers are bowed during retractive movement of said fingers under bias of the spring-urged tumblers.
2. A servicing tool for barrel-type locks that have a set of circumferentially arranged spring-urged tumblers that lock to and release the plug from the barrel thereof, said tool comprising
 - (a) an elongated body with an annular end for keying engagement with the lock barrel,
 - (b) a set of longitudinal splines in the body,
 - (c) a set of fingers slidably mounted in said splines with their ends directed toward the end edge of the annular body end for engagement with the ends of the lock tumblers,
 - (d) a friction ring carried by the body and over which the fingers are bowed during retractive movement of said fingers under bias of the spring-urged tumblers, and
 - (e) adjustable means carried by the body to lock the fingers against sliding movement in the splines of the body.
3. A servicing tool for barrel-type locks that have a set

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of circumferentially arranged spring-urged tumblers that lock to and release the plug from the barrel thereof, said tool comprising

- (a) an elongated body with an annular end for keying engagement with the lock barrel, 5
 - (b) a set of longitudinal splines in the body,
 - (c) a set of fingers slidably mounted in said splines with their ends directed toward the end edge of the annular body end for engagement with the ends of the lock tumblers, 10
 - (d) a friction ring carried by the body and over which the fingers are bowed during retractive movement of said fingers under bias of the spring-urged tumblers, and
 - (e) a fixed collar around said annular end and through the bore of which the fingers extend, said collar being longitudinally spaced from the end face of the body. 15
4. A servicing tool for barrel-type locks that have a set of circumferentially arranged spring-urged tumblers that lock to and release the plug from the barrel thereof, said tool comprising 20
- (a) an elongated body with an annular end for keying engagement with the lock barrel,
 - (b) a set of longitudinal splines in the body, 25
 - (c) a set of fingers slidably mounted in said splines with their ends directed toward the end edge of the annular body end for engagement with the ends of the lock tumblers,
 - (d) a friction ring carried by the body and over which the fingers are bowed during retractive movement of said fingers under bias of the spring-urged tumblers, 30
 - (e) a fixed collar around said annular end and through the bore of which the fingers extend, said collar being longitudinally spaced from the end face of the body, 35 and
 - (f) adjustable means carried by the body to lock the fingers against sliding movement in the splines of the body.
5. In a servicing tool for barrel-type locks that have 40 spring-urged tumblers to lock to and release the plug from the barrel thereof,
- (a) An elongated body,
 - (b) a flexible finger mounted on said body with an end thereof directed toward the end of one of the lock tumblers and retractively slidable under bias of the tumbler when the body is in key engagement with the lock, 45

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(c) means to hold spaced portions of the finger in sliding engagement with the body, and

(d) a friction member interposed between the tool body and the finger intermediate said finger-holding means.

6. In a servicing tool for barrel-type locks that have spring-urged tumblers to lock to and release the plug from the barrel thereof,

(a) an elongated body,

(b) a flexible finger mounted on said body with an end thereof directed toward the end of one of the lock tumblers and retractively slidable under bias of the tumbler when the body is in key engagement with the lock,

(c) means to hold spaced portions of the finger in sliding engagement with the body, and

(d) a friction member interposed between the tool body and the finger intermediate said finger-holding means,

(e) said body having a longitudinal spline therein and the finger being slidably engaged in said spline.

7. In a servicing tool for barrel-type locks that have spring-urged tumblers to lock to and release the plug from the barrel thereof,

(a) an elongated body,

(b) a flexible finger mounted on said body with an end thereof directed toward the end of one of the lock tumblers and retractively slidable under bias of the tumbler when the body is in key engagement with the lock,

(c) means to hold spaced portions of the finger in sliding engagement with the body,

(d) a friction member interposed between the tool body and the finger intermediate said finger-holding means,

(e) said body having a longitudinal spline therein and the finger being slidably engaged in said spline, and

(f) adjustable means to releasably lock to the body the end of the flexible finger that is remote from the lock-engaging end of the body.

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