

July 5, 1966

W. J. KERR

3,258,945

TUMBLER PIN ASSEMBLY JIG AND CODING DEVICE THEREFOR

Filed July 10, 1964

2 Sheets-Sheet 1

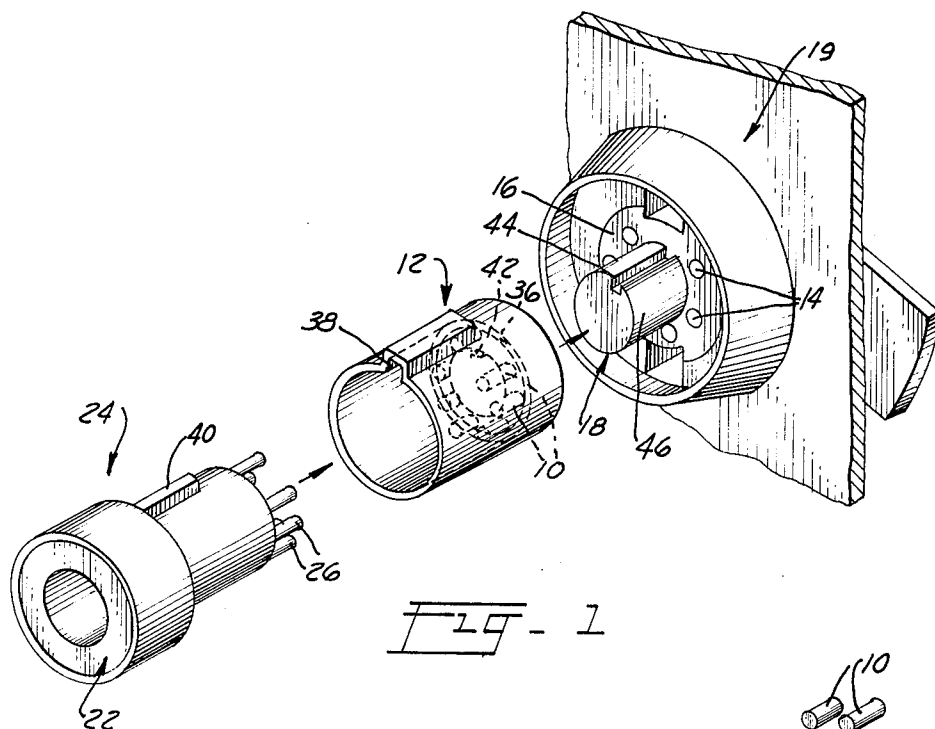


Fig. 1

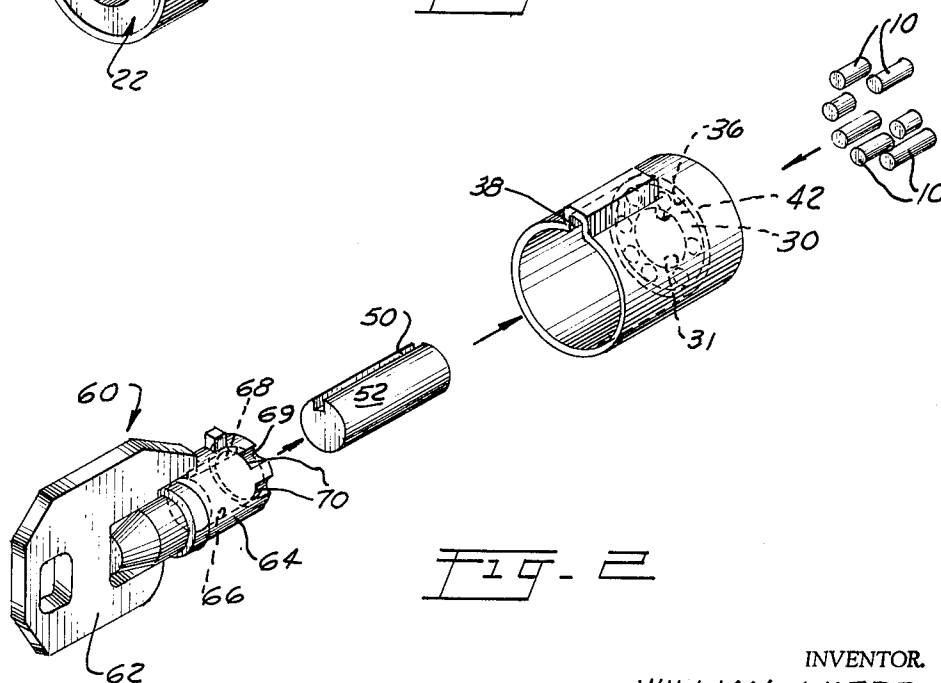


Fig. 2

INVENTOR.
WILLIAM J. KERR
BY *Norman J. Clark*
ATTORNEY

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BY *Norman P. Black*
ATTORNEY

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**TUMBLER PIN ASSEMBLY JIG AND CODING
DEVICE THEREFOR**

William J. Kerr, Glenview, Ill., assignor to Chicago Lock
Company, Chicago, Ill., a corporation of Illinois
Filed July 10, 1964, Ser. No. 381,708
5 Claims. (Cl. 70—372)

The present invention relates generally to an assembly
jig for facilitating tumbler pin change-over operations
in connection with a lock assembly of the type that em-
bodies an annular series of split pin tumblers in the
form of front shaft tumbler pins and rear barrel tumbler
pins. More particularly, the invention relates to a par-
ticular coding device by means of which an annular series
of front shaft tumbler pins may be loaded into such an
assembly jig in properly coded relationship according to
a given tumbler combination.

In my copending United States patent application Serial
No. 378,241, filed on June 26, 1964 and entitled "Assembly
Jig for Facilitating Lock Tumbler Change-Over Oper-
ations," there is shown and described an assembly jig
including a disposable shell-like holder for an annular
series of coded shaft tumbler pins for replacement pur-
poses in an axial pin tumbler type lock assembly, together
with a pusher member for pushing the pins from the
holder directly into the pin-receiving bores which are
formed in the rotatable shaft of the associated lock
assembly and have been emptied of the original shaft
tumbler pins to be replaced. In a situation where a
customer of a lock manufacturer possesses only a few
locks, it is intended or contemplated that such customer
will obtain from the lock manufacturer the necessary
number of holders containing the coded replacement shaft
tumbler pins and also that, after the lock assembly change-
over operations have been completed, the holders and
original tumbler pins will preferably be discarded. How-
ever, where the customer is the owner of a large number
of lock assemblies, for example, as a vending machine
company or operator where managerial policy dictates
that all lock combinations shall be changed frequently,
it is expedient that the service man reload the holders
with the original shaft tumbler pins according to the orig-
inal lock combination and retain the reloaded holders
for future use or an en masse change-over operation.
By such an arrangement a vending machine company or
operator may deal, for example, with only three or four
lock combinations and effect change-over operations on
all vending machine lock assemblies once every month or
so on a rotating basis, keeping different groups of vend-
ing machines on different lock combinations or, if desired,
keeping all machines on the same lock combination but
effecting combination change-over operations ever so
often.

The coding device of the present invention is inclusive
of the replacement key of the associated lock assembly,
thus basing the coding procedure directly upon the char-
acter of the key and eliminating measurement of the
individual shaft tumbler pins for length. The coding
device also is inclusive of the shaft tumbler pin holder
of the aforementioned assembly jig and it further includes
a centering and alignment post by means of which the key
and the holder may be assembled upon each other in axial
alignment preparatory to fitting the replacement shaft
tumbler pins into the holder. When thus axially aligned,
the key and the holder afford a series of pin-receiving
sockets which vary in depth according to the depth to
which the usual pin-engaging shoulders on the key are
cut. Coding is accomplished by fitting the proper length
shaft tumbler pins into the thus established sockets so
that each pin is bottomed in its respective socket and has
its outer end flush with the rim of the socket. Trial and

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error procedure is simplified by a methodical selection of
shaft tumbler pins for insertion into the sockets, the
longest pin being selected from the group repeatedly as
the group diminishes in number, all in a manner and
for a purpose that will be made clear presently.

The coding device of the present invention is thus com-
prised of but three parts, namely, the replacement key,
the shaft tumbler pin holder to be loaded, and the align-
ment post. The pusher member by means of which the
holder-retained shaft tumbler pins are ejected from the
holder directly into the bores in the rotatable shaft of the
associated lock assembly is not employed in connection
with the present coding device. Since two of the three
parts, namely, the replacement key and the holder for the
shaft tumbler pins are normal elements of a change-over
operation, possession of the third part, namely, the align-
ment post, gives the possessor complete control over what-
ever lock assemblies he may possess.

The invention thus consists in a novel combination of a
replacement key, a shaft tumbler pin holder, and an align-
ment post, the key being operable to manipulate the asso-
ciated lock assembly after the change-over operation has
been effected, the holder being operative to facilitate
insertion of the replacement shaft tumbler pins in the
bores in the rotatable shaft of the lock assembly, and
the alignment post being effective to permit assembly of
the key upon the holder in such a manner that the orig-
inal shaft pin tumblers of the associated lock assembly,
instead of being discarded, may be reloaded into the
holder in coded relationship for a future lock change-
over operation. The provision of the particular afore-
mentioned combination constitutes the principal object
of the invention.

An advantageous feature of the present invention resides
in the fact that an operator or service man after com-
pleting a given lock change-over operation in the field
such, for example, on a lock assembly that is associated
with a vending machine cabinet door in a public place
like a railway platform, may immediately thereafter
quickly and easily effect an on-the-spot reloading of the
shaft tumbler pin holder, with the shaft tumbler pins
being coded according to the original tumbler combina-
tion of the lock assembly. He may then throw the
reloaded holder into his carrying case along with other
previously reloaded holders where they will then con-
stitute replacement units for a future change-over oper-
ation when the various lock assemblies in his territory are
to be changed back to the original tumbler combination.
It will be understood, of course, that whatever key is
employed in the three-piece combination of the key, the
holder and the alignment post, will control the particular
code for the combination of shaft tumbler pins to be
effected.

Alternatively, it may be found advantageous for an
operator or service man to effect a shaft tumbler pin
change-over operation in the field at a given scene of
installation of a lock assembly, utilizing the same shaft
tumbler pins in a rearrangement in order to effect a new
tumbler combination. In such an instance, the operator
will withdraw the original shaft tumbler pins from the
lock assembly and immediately thereafter load them into
an empty holder that is properly coded for the new
tumbler combination. Thereafter, the rearranged shaft
tumbler pins may be ejected from the holder of the three-
part combination directly into the bores in the rotatable
shaft of the same lock assembly and the empty holder
retained for future use.

Numerous other objects and advantages of the inven-
tion, not at this time enumerated, will readily suggest
themselves as the nature of the invention is better under-
stood from a consideration of the following detailed
description.

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In the accompanying two sheets of drawings forming a part of this specification, one illustrative embodiment of the invention has been shown.

In these drawings:

FIG. 1 is an exploded front perspective view of a lock assembly from which the original shaft tumbler pins have been removed preparatory to effecting a tumbler combination change-over operation, such view showing a loaded shaft tumbler pin holder juxtapositioned for insertion of the replacement shaft tumbler pins into the lock assembly, and also showing a pusher member juxtapositioned for introduction into the holder to eject the new shaft tumbler pins directly into the lock assembly;

FIG. 2 is an exploded perspective view of the empty holder, the original key of the associated lock assembly and an alignment post, the three elements or parts constituting the coding device of the present invention, together with a set of original tumbler pins which are to be inserted into the holder, the parts being juxtapositioned for proper assembly upon one another;

FIG. 3 is a sectional view taken substantially centrally and vertically through the assembled key, alignment post and holder and illustrating schematically the manner in which shaft tumbler pins are introduced into the holder;

FIG. 4 is a sectional view taken transversely through the alignment post;

FIG. 5 is a sectional view taken on the line 5—5 of FIG. 3; and

FIG. 6 is an enlarged fragmentary sectional view taken substantially along the line 6—6 of FIG. 3.

The coding device of the present invention is intended for use in connection with the coded installation of shaft tumbler pins such, for example, as those indicated at 10 in FIG. 1 in a tubular holder 12, the shaft tumbler pins having previously been removed from an existing remote lock assembly where they were arranged or coded according to a desired first tumbler combination. The shaft tumbler pins 10, in their coded relationship in the holder 12, are adapted to be simultaneously ejected from the holder 12 and introduced endwise into an annular series of bores 14 in the exposed end face of an enlarged head 16 on a rotatable lock shaft 18 of a lock assembly 19, the original shaft tumbler pins having been withdrawn from the bores by means of a magnet 22 at one end of a pusher member 24. The shaft tumbler pins 10 within the holder 12 are coded according to a combination which is different from the combination of the shaft tumbler pins that were originally associated with the lock assembly 19 as a preliminary to their withdrawal from the bores 14 and consequently after the pins 10 have been inserted into the bores a different key will be required to operate the lock assembly 19. The code combination of the shaft tumbler pins 10 in the holder 12 may be the previously mentioned first combination or, it may be any other desired combination depending upon the particular key that is employed in effecting installation of tumbler pins in the holder 12. Ejection of the shaft tumbler pins 10 from the holder 12 and introduction thereof into the bores 14 is accomplished by introducing the end of the pusher member that is remote from the magnet 22 into the tubular holder 12 and causing a series of spring-pressed plungers 26 in associated relation with the pusher member 24 thereby to engage the shaft tumbler pins simultaneously and force them out of the holder and into the bores 14.

The holder 12 and the pusher member 24 constitute the two counterpart elements of an assembly jig such as has been shown and described in my aforementioned copending patent application Serial No. 378,241, and reference may be had to such application for a full understanding of the nature of these elements and the manner in which they cooperate to facilitate tumbler combination change-over operations in connection with an axial pin tumbler type lock, such as the assembly lock 19 that is illustrated herein. The holder 12, when employed in

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combination with a key which is cut according to a given tumbler combination, and with the certain or particular hereinafter described centering post by means of which proper operative alignment of the key and the holder may be effected, constitutes a coding device whereby installation of a series of shaft tumbler pins may be installed in the holder in coded relationship and according to the code combination represented by the key. The holder and the centering post are useable with keys having different combinations and, in each instance, the installation of shaft tumbler pins in the holder will be representative of the key combination. The pusher member 24 has no direct relation to the present coding device and, therefore, the details thereof have not been illustrated herein. On the other hand, practically all of the details of the holder 12 which adapt the holder for use as an element of an assembly jig capable of cooperating with the lock assembly 19, also adapt the holder for use as a coding device that is capable of cooperating with a lock-operating key. It is deemed essential, therefore, for a full understanding of the present invention that the relationship of the holder 12 to the lock assembly 19 be also understood.

The holder 12 is generally of tubular cylindrical design and, as shown in FIG. 3 of the drawings, one end region thereof is provided with an annular end wall 30. The latter provides a central opening 31 and embodies an extending or reentrant annular flange 32. An annular series of axially extending bores 34 which correspond in number and disposition to the number and disposition of the bores 14 in the enlarged head 16 of the lock shaft 18 is formed in the inturned wall 30. The outer portions of the inner ends of the bores intersect or interrupt the otherwise continuous outer periphery of the flange 32. The bores 34 are adapted to receive therein the shaft tumbler pins 10 and such pins, when received in the bores 34, are frictionally held in position by means of an elastomeric O-ring 36 which surrounds the upwardly extending or reentrant annular flange 32 and frictionally engages the limited exposed pin portions which project a slight distance radially outwardly of the outer periphery or cylindrical confines of the flange 32 as shown in FIG. 6. An outwardly offset, inwardly facing spline-receiving channel 38 is formed in the cylindrical side wall of the holder 12 and is designed for reception of an external longitudinally extending spline 40 on the pusher member 24 in order to effect alignment of the plungers 26 and the bores 34 when the pusher member 24 is inserted into the holder 12 in connection with ejection of the shaft tumbler pins 10. An internal lug 42 on the inner periphery of inturned annular end wall 30 of the holder 12 cooperates with a longitudinal groove 44 in a cylindrical pilot post 46 on the front end of the lock shaft 18 to effect alignment of the shaft tumbler pins 10 with the bores 14 when the holder 12 is employed as an assembly jig in connection with insertion of the shaft tumbler pins into bores in the enlarged head 16 of the rotatable shaft 18 of the lock assembly 19. The lug 42 also cooperates with a longitudinally extending groove 50 in the periphery or side surface of a cylindrical alignment post 52 (see FIGS. 2 and 4) when the holder is employed as an element of the present coding device as will be described in detail presently.

From the above description it will be understood that the holder 12 may be loaded with shaft tumbler pins according to a desired code combination or arrangement by manually inserting the pins endwise into the bores 34 from the exposed outer side of the inturned annular end wall 30 of the holder 12. It has long been the practice to handle shaft tumbler pins either with a pair of tweezers or with a small diameter cylindrical magnet on one end of which the pins may find stable equilibrium when coaxial with the magnet. No difficulty is encountered in manually loading the holder 12 in connection with utilization of either of these instruments, the problem being

to select the proper length shaft tumbler pins to produce the desired code combination or arrangement of the pins. Heretofore, whether a given loading operation has been performed upon an actual lock assembly such, for example, as the assembly 19 or upon the assembly jig holder 12, selection of the proper length shaft tumbler pins has been largely a matter of trial and error, pin lengths being judged by eye in comparison with the depth of the longitudinal cuts which are present in the shank or cylindrical body of the lock operating key. According to the present invention, by utilizing the alignment post 52 and a key such as the key 60 of FIGS. 2 and 3 there is provided a coding arrangement which appreciably facilitates proper coded loading of the shaft tumbler pins 10 into the holder 12 in accordance with the particular combination that is represented by the key 60, the loading being carried out with a minimum of trial and error and, in most instances, with on error or retrial whatsoever.

Referring again to FIG. 1, the lock assembly 19 is a conventional axial pin tumbler type lock that is commonly known as an "Ace" lock of the Chicago Lock Company of Chicago, Illinois. The key 60 is also conventional and includes a manipulating wing portion 62 (see FIG. 2) from which there projects a cylindrical shank or key body 64 having formed therein a central socket 66 for reception over the pilot post 46 on the front end of the rotatable shaft 18 of the lock assembly 19. An elongated internal lug or spline 68 within the socket 66 co-operates with the longitudinally extending groove 44 in the pilot post to insure proper alignment or angular relationship of the key on the post. The rim region of the socket 66 is cut back at circumferentially spaced regions to provide a series of external, longitudinally extending notches 69, the inner ends of which afford forwardly facing tumbler pin-engaging shoulders 70 as is well known in the art. The depth of the various notches 69 varies according to the lock combination and, when the key is in operative position in the lock assembly, the shoulders 70 will engage the outer ends of the shaft tumbler pins and cause the splits in the split tumblers of the lock to lie in a common plane and permit turning of the shaft with respect to the barrel of the lock assembly as also is well known in the lock art.

From the above description, it is obvious that for proper coded installation of the shaft tumbler pins 10 in the holder 12, the particular split tumbler combination which is to be effected in the lock assembly 19 must first be effected in the holder 12 by placing in the bores 34 thereof shaft tumbler pins which are of the proper length so that when they are shifted bodily out of the holder and into the bores 14 in the enlarged head of the shaft of the lock assembly 19, the relative positions of the tumblers will remain unchanged and the desired combination will be attained in the lock assembly. To effect this combination of the shaft tumbler pins 10 in the holder 12, one end of the alignment post 52 is inserted into the socket 66 in the body 64 of the key 60. The alignment post 52 is in the form of an elongated cylindrical body of a diameter substantially equal to the diameter of the socket 66 so that either end of the alignment post will enter the socket with a snug fit. A major portion of the alignment post projects forwardly of the key body 64 and this portion is projected through the central opening 31 in the inturned annular end wall 30 of the holder 12, the distal end of the key body being brought into contact with the rim of the internal inwardly extending reentrant annular flange 32. Projection of the alignment post 52 into the socket 66 and through said central opening 31 may be effected only when the lug 68 on the key and the lug 42 on the holder are aligned by means of the groove 50 in the alignment post 52. When these two lugs 68 and 42 are thus in longitudinal alignment, the various shoulders 70 on the key 60 will be aligned with the respective bores 34 in the holder and will in combination

with these bores, establish a series of sockets for reception therein of the shaft tumbler pins 10. The shoulders 70 will, in effect, constitute the bottom walls of such sockets and, therefore, the sockets will vary in depth according to the depth at which the shoulders are cut in the cylindrical body 64 of the key 60. For convenience in loading the sockets which are created by the presence of the aligned shoulders 70 and bores 34, the key will preferably be positioned vertically as illustrated in FIG. 3.

Whereas tumbler coding may be conducted by utilizing shaft tumbler pins which are all of unequal length, effective coding may be accomplished when the shaft tumbler pins for a given lock combination are made in two lengths, an interchange between any one short pin and any one long pin being sufficient to constitute an effective lock combination change-over so that a different key is required after the change-over has been made. Assuming for purposes of discussion that a given combination involves the use of four equal length short shaft tumbler pins and three equal length long shaft tumbler pins, the possible number of combinations utilizing the same shaft tumbler pins will be in excess of two hundred combinations. A key cut for a given combination utilizing such a series of shaft tumbler pins will, when operatively installed on the holder 12 by means of the centering post 52, establish three equal depth relatively deep sockets and four equal depth relatively shallow sockets.

The holder 12 is preferably formed of a transparent plastic material such as "Lucite" and, therefore, the shoulders 70 at the inner ends of the notches 69 in the outer surface of the key body 64 are readily visible through the cylindrical side wall of the holder so that the deep sockets may be distinguished from the shallow sockets. Thus, by visualizing the various sockets which are established when the key and holder are assembled upon each other and aligned by means of the alignment post 52, it is a comparatively easy matter for an operator properly to select the correct shaft tumbler pins for the various sockets and, by utilizing either a pair of tweezers or a magnetic tool, insert them in the sockets. When a given shaft tumbler pin has been properly inserted in a socket, the exposed end of the pin will lie flush with the end face of the holder and will neither protrude from the holder nor be countersunk within the inturned annular end wall 30. This flush condition of the end of the shaft tumbler pin is a clue to its proper insertion. If, by inadvertence, a long shaft tumbler pin is inserted in a shallow socket, the pin will not completely enter the holder and one end thereof will protrude so that it is available for grasping and consequent removal. On the other hand, if a short shaft tumbler pin is inadvertently inserted into a deep socket, it will be necessary to remove the key from the holder and push the misplaced pin from the holder. Such a misplacement of a shaft tumbler pin need never be encountered in actual practice if a procedure is followed whereby all three of the long shaft tumbler pins are first fitted in their respective deep sockets, thus leaving only shallow sockets for reception of the short shaft tumbler pins.

Although the holder 12 may be made of a transparent material such as "Lucite," lighting conditions at a given scene of operation may be such that the shoulders 70 are not visible through the cylindrical side wall of the holder. If the shoulders are thus not visible for this reason, or for any other reason, installation of the three long shaft tumbler pins in the holder before attempting to install the short shaft tumbler pins will avoid the possibility of introducing a short pin into a deep socket where it is not readily accessible for removal without ejecting all of the shaft tumbler pins that may have been previously installed. It is obvious that where shaft tumbler pins which are of three different lengths are employed for any given combination, the installation of the longest pins first, followed by the intermediate length pins, and finally the shortest length pins, will avoid the necessity of possible

pin ejection, the visibility or lack of visibility of the shoulders 70 notwithstanding.

It will be understood, of course, that installation of shaft tumbler pins with the key in a vertical position as shown in FIG. 3 is merely an expedient based upon convenience of operation. Each shaft tumbler pin which is inserted into the holder 12 is frictionally retained therein by the O-ring 36 so that after the installation of pins is completed the holder may be turned to any position without danger of loss of the pins.

After a given installation has been completed, the key 60 and the alignment post 52 may be removed from the holder and separated from each other.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawings or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit or scope of the invention. For example, while the holder 12 of the present coding device has been illustrated as being provided with seven axially extending bores 34 for the accommodation of axial pin tumbler type locks having seven split pin tumblers, the holder may be constructed to have a greater or lesser number of such bores, as required by the character of the locks which are to be associated therewith for tumbler change-over operations. Therefore, only insofar as the invention has particularly been pointed out in the accompanying claims is the same to be limited.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. In a tumbler pin coding device of the character described, in combination, a holder for maintaining an annular series of shaft tumbler pins in coded relationship according to pin length, and in parallelism and circumferentially spaced relationship whereby the holder may be brought into juxtaposition with a corresponding series of axially extending pin-receiving bores associated with an axial pin tumbler lock assembly and the pins ejected endwise from the holder directly into such bores, said holder including an annular end wall having a central opening designed for telescopic reception over a pilot post associated with the lock assembly to thereby align the holder and lock assembly, said wall being provided with a series of axially extending pin-receiving bores therethrough designed for reception therein of the shaft tumbler pins, a lock-operating key including a cylindrical body having an end socket designed for telescopic reception over said pilot post when the key is operatively inserted in the lock assembly, the rim region of said socket being formed with a series of longitudinally extending notches, the depth of which vary according to a given code, the number and disposition of said notches corresponding to the number and disposition of said bores in said annular end wall, and an alignment post adapted to be projected through said central opening and into said key socket whereby the notches in said body of the key may be brought into register with said bores in the end wall of the holder to thus establish, in effect, a series of pin-receiving sockets, the depth of which are a function of the depth of the associated notches and into which sockets the shaft tumbler pins are adapted to be manually inserted endwise.

2. In a tumbler pin coding device of the character described, the combination set forth in claim 1 and

including, additionally, interengaging means on said key and holder for preventing relative rotation between the key and the holder.

3. In a tumbler pin coding device of the character described, the combination set forth in claim 1, wherein said alignment post is provided with a longitudinally extending groove therein, and wherein said key socket and annular end wall are each provided with an internal lug therein designed for reception in said groove whereby the notches in the key body are maintained in axial alignment with corresponding bores in said annular end wall.

4. In a tumbler pin coding device of the character described, the combination set forth in claim 1 and including, additionally, means for frictionally retaining said shaft tumbler pins within their respective bores in said annular end wall.

5. In a tumbler pin coding device of the character described, in combination, a holder for maintaining an annular series of shaft tumbler pins in coded relationship according to pin length, and in parallelism and circumferentially spaced relationship whereby the holder may be brought into juxtaposition with a corresponding series of axially extending pin-receiving bores associated with an axial pin tumbler lock assembly and the pins ejected endwise from the holder directly into such bores, said holder including an annular end wall having a central circular opening designed for telescopic reception over a cylindrical pilot post associated with the lock assembly to thereby align the holder and lock assembly, said wall being provided with a series of axially extending pin-receiving bores therethrough designed for reception therein of the shaft tumbler pins, a lock-operating key including a cylindrical body having a cylindrical end socket designed for telescopic reception over said pilot post when the key is operatively inserted in the lock assembly, the rim region of said socket being formed with a series of longitudinally extending notches, the depth of which vary according to a given code, the number and disposition of said notches corresponding to the number and disposition of said bores in said annular end wall, and a cylindrical alignment post adapted to be projected endwise through said central opening and into said key socket whereby the notches in said body of the key may be brought into register with said bores in the end wall of the holder to thus establish, in effect, a series of pin-receiving sockets, the depth of which are a function of the depth of the associated notches and into which sockets the shaft tumbler pins are adapted to be manually inserted endwise, said alignment post being formed with a longitudinally extending groove coextensively therealong, said key socket and annular end wall each being formed with an internal guide lug receivable in said groove for maintaining said key and holder against relative rotation.

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BOBBY R. GAY, *Primary Examiner*.

P. TEITELBAUM, *Assistant Examiner*.