

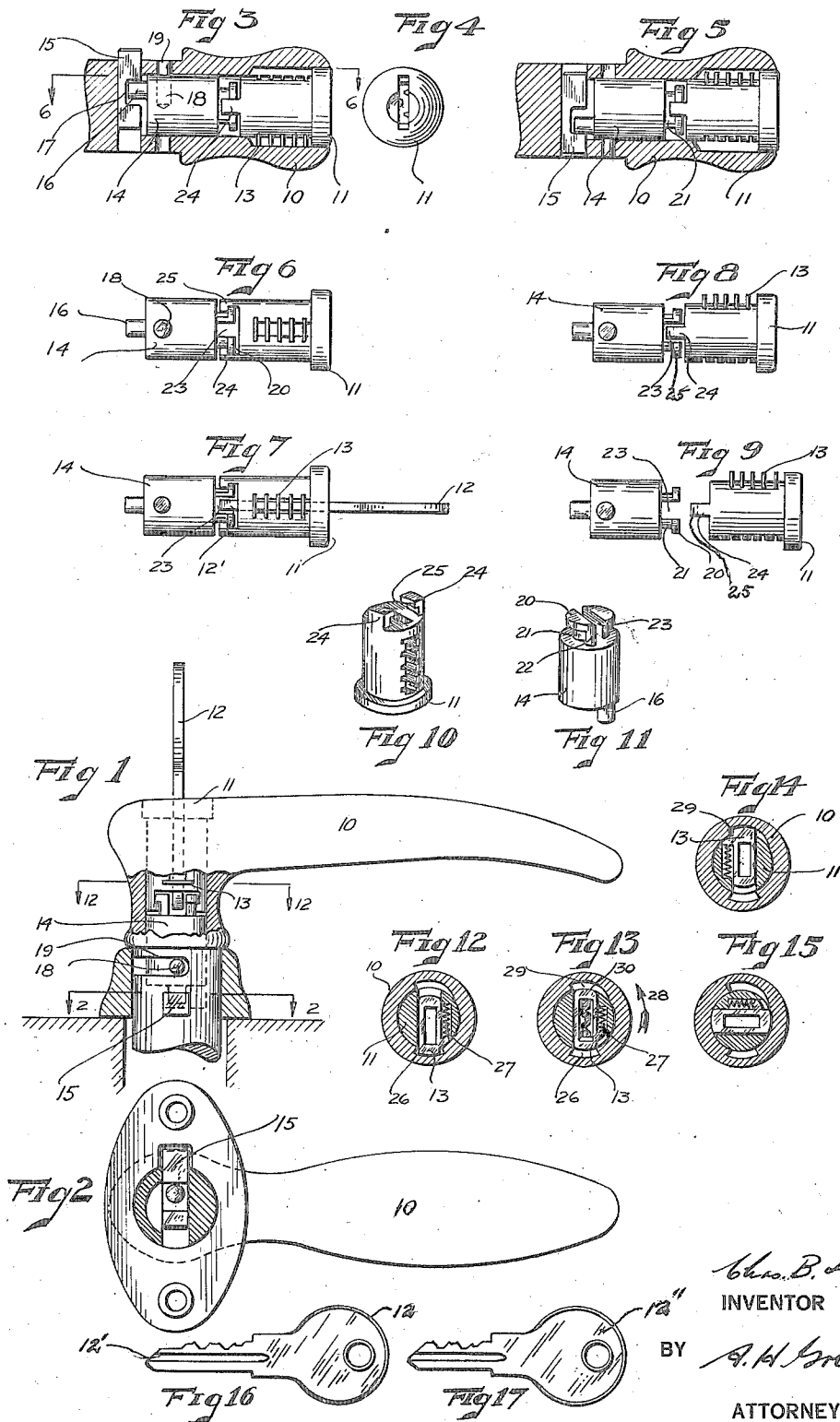
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LOCK

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LOCK

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This invention relates to cylinder lock plugs of the tumbler controlled type in which the tumblers are maintained within the plug, so that the plug as a unit may be assembled into a locking mechanism by merely sliding the plug into a plug bore provided in the locking mechanism.

My invention relates especially to plugs of the type adapted to be inserted into the locking handle of an automobile for controlling the mechanism which locks the handle relatively to the car.

Developments in the automobile industry have been such that it has become desirable for automobile manufacturers to assemble their locking mechanisms relatively to the automobiles, and then insert the plug into the mechanisms as a last final step. Thus as regards automobile locking handles, the handles are assembled relatively to the automobile, and the last step on the assembly line involves merely the inserting of the plugs into the plug bores provided in the handles. Similarly, automobile manufacturers desire to be able to remove a plug from a handle with great facility without disassembling the lock or without removing the handle. My invention is capable of carrying out both these desired functions.

In prior art devices, it has been the custom to use all sorts of plug retaining mechanism, such as cam mechanisms, spring mechanisms, or pawl controlled mechanisms. These mechanisms are operable either by keys inserted in the keyway of the plug, or by tools inserted through holes in the handle, whereby the mechanisms indicated may be operated to release the plug relatively to the handle. My invention is an improvement over the prior art devices in that its full utilization does away with the use of any springs, pawls or other non-positive mechanisms for controlling the insertion, retention, and removal of a plug. Fundamentally, the principle of my invention embodies the free-mounting of a plug relatively to a handle or other device, but the connecting of the plug to the lock operating means it is intended to actuate, by some sort of separable connection, so that it is possible to release the plug relatively to the lock operating means and thus release it relatively to the handle.

While preferably the connection between the plug and the lock operating means is in the form of a bayonet joint releasable without tools, other equivalent means which will readily occur to those skilled in the art may be used.

In other words, my invention involves the novel embodiment of a device wherein the plug is held

relatively to the handle by an indirect connection with the handle or its bore, rather than by a direct connection as in the prior art.

For a clear description of my invention, I refer to the drawing, wherein Fig. 1 is a partial section of a handle showing the locking mechanism relatively thereto. Fig. 2 is a partial section taken along the line 2—2 of Fig. 1, showing the handle which would not be seen in the position in which the section is taken. Fig. 3 is a section of the handle taken longitudinally and showing the plug and locking mechanism arranged relatively thereto. Fig. 4 is a front view of the plug. Fig. 5 is a section similar to the section in Fig. 3 showing the plug and locking mechanism in unlocked position. Fig. 6 is a view of the plug and adaptor along the line 6—6 of Fig. 3. Fig. 7 is a view similar to Fig. 6 showing the key in position. Fig. 8 is a view similar to Fig. 6 showing the plug rotated 90° to permit separation of the plug relatively to the adaptor. Fig. 9 illustrates the separation of the plug relatively to the adaptor. Figs. 10 and 11 are perspective views respectively of the plug and the adaptor. Fig. 12 is a section along the lines 12—12 of Fig. 1. Figs. 13, 14 and 15 are similar sections showing the plug in various positions in the handle bore. Figs. 16 and 17 are views of the long and short keys used in the assembly and removal of the plug.

Referring now more particularly to the drawing, reference numeral 10 indicates the usual type of automobile locking handle, having located therein a plug 11 operable by a key 12 to set the usual series of tumblers 13 so that the key may operate through an adaptor 14 to withdraw a handle locking bolt 15 so as to release the handle for turning movement. Insofar as the broad aspects of the invention are concerned, the above described apparatus is common to all handle locks, of the present type.

Referring now more particularly to Fig. 3, the bolt 15 for locking the handle relatively to its mounting is shown in the locked or projected position. The adaptor 14 fits in the handle bore and is equipped with a pin 16 which rides in a slot 17 in the bolt and acts to retract or project the same. The adaptor is shown equipped with a pin 18 which operates in a slot 19 of 180° in the locking handle so as to limit the rotation of the adaptor to 180°. This pin will also limit the adaptor against end-wise movement in the handle. While I prefer this method of retaining and limiting the movement of the adaptor in the handle, it is clearly understood that any other

method will be quite sufficient to carry out the objects of this invention.

As is seen more particularly in Figs. 6 to 11 inclusive, the adaptor is equipped with an offset portion 20 having a peripheral groove 21. This groove 21 is equipped with a shoulder 22 at one end thereof for a purpose which will be explained presently. It will be noticed also that the offset portion 20 is slotted diametrically at the point 23 for the accommodation of the end 12' of the key 12, (Figs. 1 and 7). It is only by the operation of the end of the key that the adaptor may be rotated as will appear presently. The plug 11 in turn is equipped with a pair of L shaped arms 24 having holding shoulders 25 which are the approximate width of the slot 23 in the adaptor head 20. These shoulders are adapted to enter the peripheral groove 21 of the adaptor and hold the adaptor and plug against relative endwise movement as is explained below.

The operation of the means which have been described so far, is as follows: It will first be readily observed from above that the plug 11 has no connection whatsoever with the handle itself; the only connection which enables it to remain in the handle and not to be withdrawn from the same is its connection with the adaptor 14. In order to insert the plug within the handle, it is necessary to use a short key 12'', which is not equipped with the extension 12' as viewed in Figs. 7 and 16. This is due to the fact that in order to make the connection between the adaptor and the plug, the plug must be movable relatively to the adaptor. It is readily understood that the only method available for actuating the adaptor is by means of the key 12 through its extension 12'. By using the short key 12'' not having this extension 12', it is clearly seen that the plug may be moved relatively to the adaptor 14. The adaptor is held by friction with the bolt handle bore, so that it remains in any position to which it is set.

In order to insert the plug, it is lined up relatively to the adaptor, as shown in Fig. 9. The short key 12'' is then inserted to retract the tumblers 13, so that the plug may be moved into the handle bore. The L shaped members 24 and their holding shoulders 25 will ride into the slot 23 in the adaptor head 20 as seen in Fig. 8. The adaptor lug 22 will then permit relative movement of the plug 90° in one direction relatively to the adaptor, so that the shoulder portions 25 will ride into the peripheral groove 21 of the adaptor head as seen in Fig. 6, for preventing relative longitudinal movement between the plug and the adaptor.

It will be understood, of course, that once the short or assembling key 12'' is withdrawn, only the regular long key 12 will be used. Since this key has portion 12' extending into the slot 23, it will be understood that in actual operation the adaptor and the plug will always move with one another, so that there will be no relative movement, such as is necessary to free the plug relative to the adaptor.

It will be readily understood, of course, that to free the plug 11 from the handle, the above operation must be reversed. In other words, the short key is inserted in the plug in its position of Fig. 6 relatively to the adaptor 14. Rotation of the plug from the position of Fig. 6 to the position of Fig. 8 will bring the locking shoulders 25 into the slot 23. Longitudinal movement of the plug 11 relatively to the adaptor 14 is then possible from this position of Fig. 8 to the position

of Fig. 9, wherein the plug is in a position outside of the handle.

It is sometimes desirable to be able to remove the plug without the use of a special key. This is especially true in cases where it is desirable to remove the plug after it has been rotated by its regular key to an unlocked position. My invention provides means for accomplishing this desired result. For the purpose of illustrating the invention, as regards this point, I will now refer to Figs. 12 to 14 inclusive. It will be seen in Fig. 12 that the tumblers 13 rest in the tumbler locking groove 26 in the handle or cylinder for maintaining the plug locked relatively to the cylinder. Fig. 13 illustrates the insertion of the regular key which withdraws the tumblers 13 from the groove 26 so that the plug may be rotated. Rotation of the plug will be in the direction of the arrow 28 to the position of Fig. 14. In viewing Fig. 14, which is the unlocked position 20 of the plug, wherein the bolt 15 has been retracted out of locking engagement, it is readily noticeable that the tumblers 13 will now be held in an upward position and resting in a groove 29 quite similar to the locking groove 26. However, this locking groove is equipped with a camming portion 30 which is adapted, when the plug is rotated clockwise from Fig. 14 to the position of Fig. 15, to cam the tumblers entirely within the plug.

A key to align the tumblers is then not necessary to move the plug in a locking direction from the unlocking position of Fig. 14. Thus, in this modification, it is possible to move the plug a definite distance, which in this case is 90°, from the position of Fig. 14 to the position of Fig. 15, without the use of a key. It will be understood that the adaptor will remain in the particular position in which it has been set, and that the plug will thus be permitted to move 90° relatively to the same. From previous explanations, it will be understood that this relative rotation will be sufficient to bring the L shaped members 24 and their locking shoulders 25 opposite the slot 23 as viewed in Fig. 8. Outward movement as seen in Fig. 9 is then possible to remove the plug. Insertion of the plug in this modified construction is the opposite of the procedure just described.

I have thus provided means entirely independent of the handle, such means being operable between the plug and the locking means it controls, for maintaining the plug within the handle, where the plug may be inserted and extracted freely with relation to those locking means. While I have shown one embodiment of my invention, I consider the invention to be of broad and sweeping scope, and I do not wish to be limited to the particular modification, since many variations of the same will be apparent to anyone skilled in the art.

I claim:

1. In a lock, an adaptor, a tumbler controlled plug, means of connection between said plug and adaptor adapted to prevent relative axial movement between said plug and adaptor, said means being rendered ineffective by predetermined movement of said plug relative to said adaptor while said plug is in operating position in said lock.

2. In a lock, an adaptor, a tumbler controlled plug, said plug and adaptor being key operable to predetermined positions, separable means connecting said adaptor and plug against relative longitudinal movement and operable to permit separation of said plug and adaptor while said plug is in its operative position in the lock.

3. In a cylinder lock having a plug bore, an adaptor in said bore adapted to operate the locking mechanism, means for securing the adaptor against removal from said bore, a key plug in said bore for operating said adaptor, and a connection between said plug and adaptor to prevent endwise movement of the plug relatively to the adaptor, said connection being of a type readily formed and released whereby said plug is readily removable from and insertible into its bore.

4. In a lock having a plug containing bore, lock mechanism operating means, a plug in said bore, separable means for connecting said plug to said lock mechanism operating means to maintain said plug in said bore, said separable connecting means being operable by predetermined relative movement between said plug and said lock mechanism operating means while in said bore to separate said plug from said lock mechanism operating means.

5. In a locking handle having a bore there-through, lock mechanism operating means in said bore, a removable plug in said bore, and a bayonet joint connection between said means and said plug adapted to be controlled by movement of the plug when in the bore.

6. In a lock, an adaptor, a tumbler controlled plug for controlling the movement of said adaptor, said plug being mounted for free rotary movement relatively to said adaptor, and a bayonet joint connecting said plug against longitudinal movement relatively to said adaptor and adapted to be made when said plug and adaptor are in the lock.

7. In a lock, an adaptor, a tumbler controlled plug, said adaptor and plug being key operable to designated positions, said plug and adaptor being rotatable relatively to each other, means of connection between said plug and adaptor, said means of connection being controlled by said relative rotation while said plug and adaptor are in the lock.

8. In a lock, an adaptor, a tumbler controlled plug, said adaptor and plug being key operable to designated positions, said plug and adaptor being rotatable relatively to each other, means of connection between said plug and adaptor, said means of connection being made and broken by said relative rotation in the lock.

9. In a lock, an adaptor, a tumbler controlled plug, said adaptor and plug being relatively rotatable, said plug being key operable by a key having an extension adapted to rotate said adaptor simultaneously with said plug, means preventing endwise movement of said plug relatively to said adaptor, said means being rendered ineffective by rotary movement of said plug relatively to said adaptor while in the lock.

10. In a lock, an adaptor rotatable for operating the mechanism of said lock, a key slot in said

adaptor, said adaptor being rotatable by a key inserted in said slot, a tumbler plug for controlling the rotation of said key, said key being adapted to traverse the key plug for setting its tumblers and then enter said adaptor slot, separable means of connection between said plug and adaptor, said means of connection being separable by relative movement in said lock between said plug and adaptor.

11. In a lock, an adaptor rotatable for operating the mechanism of said lock, a key plug having tumblers, key slots in said adaptor and plug, and a key adapted to enter said plug key slot to set its tumblers and to extend into said adaptor for operating the same, separable means of connection between said plug and adaptor, said means of connection being separable by relative movement in said lock between said plug and adaptor.

12. In a lock, an adaptor rotatable for operating the lock mechanism, a key plug having tumblers and held in axial alignment relatively to said adaptor, means whereby said parts are capable of relative rotation but are normally held against relative axial movement, key slots in each of said devices, said slots being traversable by a relatively long key to set the plug tumblers and rotate said adaptor and plug simultaneously, said plug when rotated relatively to said adaptor by a relatively short key being operable to release the means connecting it to the adaptor.

13. In a lock, an adaptor, a tumbler controlled plug, said adaptor and plug being mounted for relative rotation, said plug being rotatable by a key having an extension, means on said adaptor cooperable with said key extension whereby said adaptor is operable simultaneously with said plug, means of connection for preventing endwise movement of said plug relatively to said adaptor, said plug being operable by a key not having said extension whereby said plug may be rotated relatively to said adaptor, said means of connection being rendered ineffective by said relative rotation.

14. In a lock having a bore, an adaptor retained in said bore, a key plug having tumblers and mounted in said bore and axially aligned with said adaptor, means formed on the adjacent ends of the plug and adaptor comprising a bayonet joint whereby relative rotation of said plug and adaptor while in the bore will join the adaptor and key plug against relative endwise movement so as to retain the key plug in the lock, said key plug being rotatable by a key adapted to set the tumblers, and the adaptor being rotatable with the key plug by an extension on said key so as to maintain said bayonet joint connection.

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