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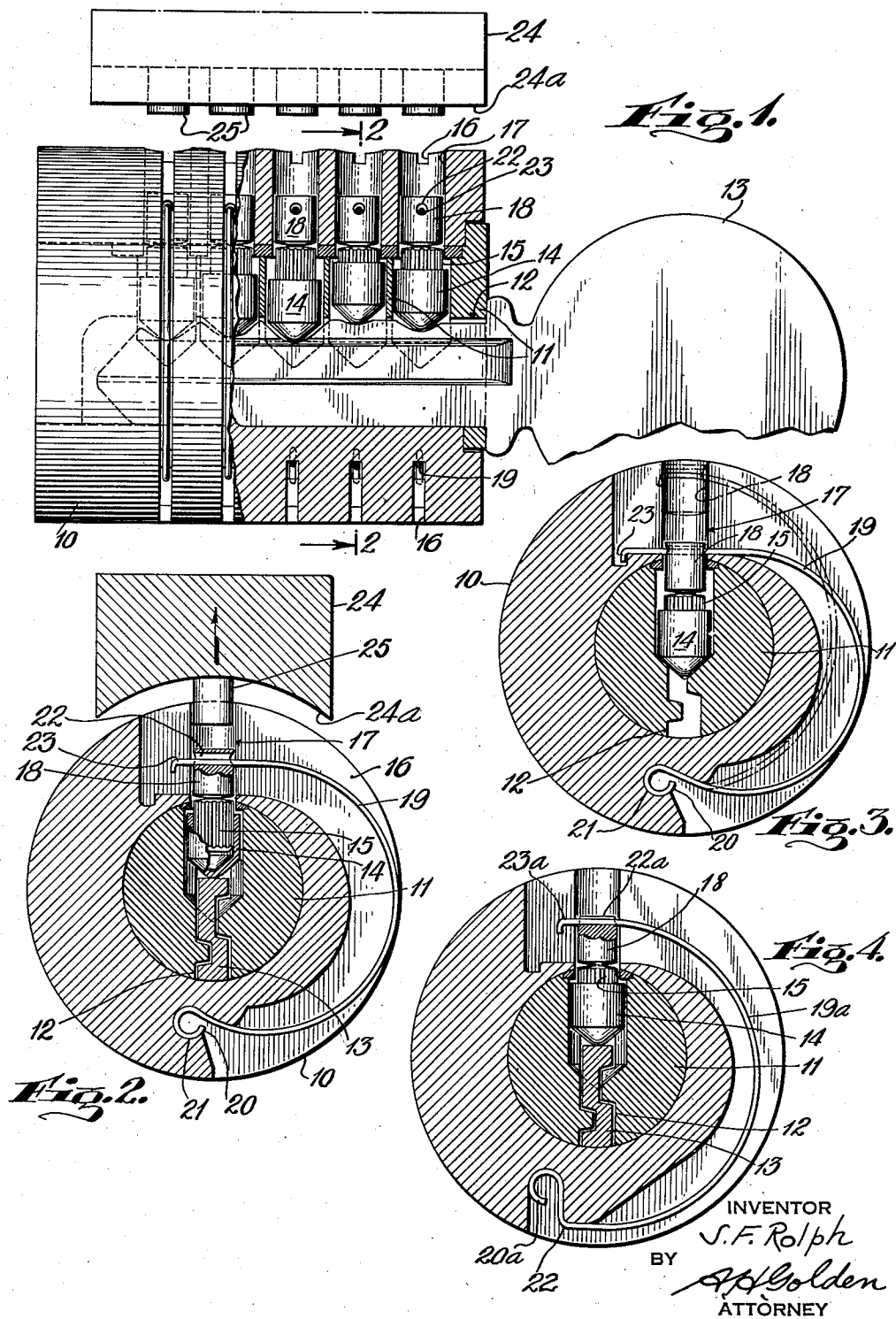
S. F. ROLPH

2,232,137

CYLINDER LOCK

Filed July 1, 1937

2 Sheets-Sheet 1



Feb. 18, 1941.

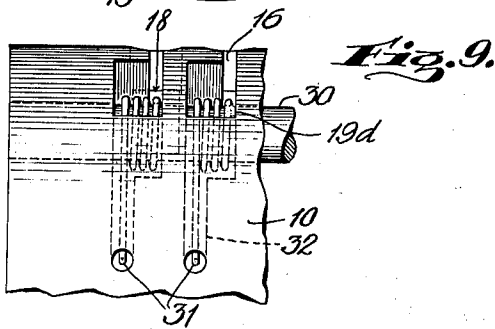
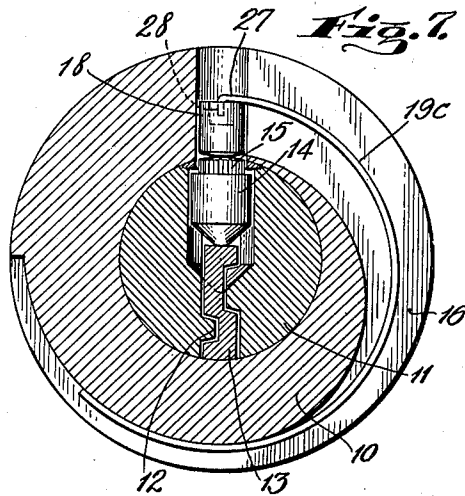
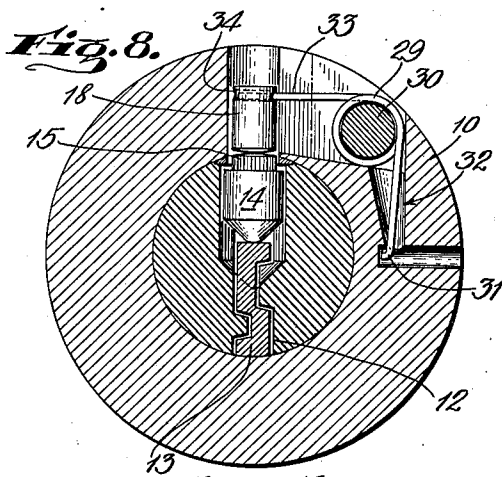
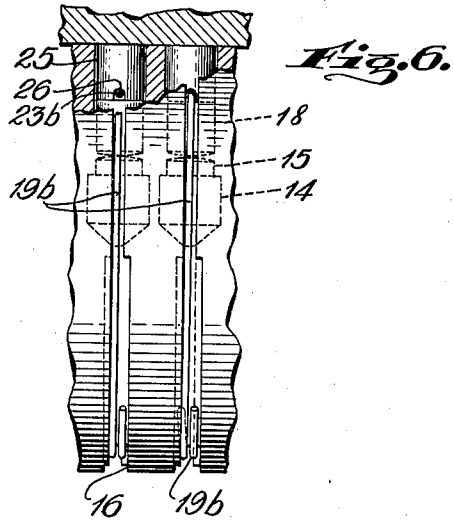
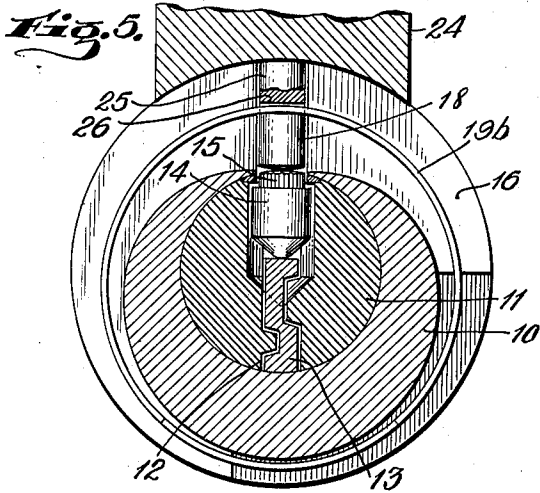
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CYLINDER LOCK

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2 Sheets-Sheet 2



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2,232,137

CYLINDER LOCK

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Application July 1, 1937, Serial No. 151,418

5 Claims. (Cl. 70—364)

This invention relates to adjustable tumbler locks, and more especially to adjustable cylinder locks of the pin tumbler type.

In the application of George W. Wilder, Serial No. 56,461, filed December 28, 1935, there is disclosed a pin tumbler lock in which each of the pin tumblers positioned by the key is formed of two parts. The two parts of each tumbler are arranged so as to readily adjustable to vary the length of the tumbler when endwise pressure is applied thereto. The key plug in the Wilder cylinder has the usual form of keyway into which a key is inserted. The adjustable tumblers, which are all of the same size initially, are placed into each of the tumbler chambers, and when contacted by the key, the ends of the tumblers will extend out of the key plug different distances, depending upon the particular bittings of the key.

With the tumblers so positioned by the key, a special tool is utilized to apply endwise pressure to the tumblers in a direction effective to compress the tumblers, so as to place the outer ends of the tumblers in alignment with the plug periphery, while the inner ends of the tumblers are in contact with the key. This is basically the contribution in the Wilder application, although there are of course additional features of importance which are set forth by Wilder.

My invention contemplates the adjustment of tumblers like those of Wilder, and in a manner somewhat similar to that of Wilder. It will be noted that after Wilder compresses the tumblers of his key plug, it is then necessary for him to insert the key plug into the cylinder lock in which it is to operate. Insertion of a key plug into a cylinder requires special skill, a special tool, and requires time.

Since cylinder locks of this adjustable type are used most frequently in automobile assembly lines, where the work must progress quite rapidly, it will be readily appreciated that the time consumed in first adjusting the tumblers to the key contour and the plug periphery, and then inserting the key plug into the cylinder, is of considerable importance. It would be eminently more satisfactory were the cylinder to be completely assembled in the factory in which the lock parts are made, the cylinder as a whole to be acted upon in the assembly line to adjust the tumblers.

My invention contributes this desired result, since I have conceived and reduced to practice a cylinder lock which may be assembled in the factory and equipped with tumblers such as disclosed by Wilder. This cylinder lock as a whole

may be placed in a tool, and the tumblers adjusted by compression in a manner similar to that disclosed in the Wilder application. In my invention, however, instead of applying endwise pressure to the tumblers per se while in a key plug as in Wilder, I apply endwise pressure to the tumblers through the drivers, while assembled in a complete cylinder, and maintain this pressure until the parting line between the tumblers and drivers is in alignment with the plug periphery.

As a further feature of my invention, I utilize a type of spring which allows for easy compression of the tumblers through the drivers, retains the drivers in the cylinder, and permits also the use of a smaller cylinder than could possibly be used with the usual form of spring.

Before referring to the drawings and particularly describing my invention, I should like to indicate that my invention is of relatively broad scope, and that I feel myself entitled to a monopoly sufficiently broad to prevent the utilization of the principles of my invention, as well as the specific form thereof herein described.

In the drawings, Fig. 1 is an elevation and partial section of a cylinder embodying my invention, and showing a tumbler adjusting tool in position to operate on the tumblers. Fig. 2 is a section taken along lines 2—2 of Fig. 1 showing a driver and tumbler in a final adjusted position, with the lower end of the tumbler in contact with a key, and with the tumbler adjusting tool being withdrawn from contact with the driver. Fig. 3 is a view taken along the same lines as Fig. 2, showing the key withdrawn, and illustrating the action of the spring. Fig. 4 is a view somewhat along the lines of Fig. 2 showing a slightly different form of spring and driver. Fig. 5 is a section taken through a cylinder along the same lines as Fig. 2, and illustrating a modification of my invention utilizing a still different form of spring and driver. Fig. 6 is a side elevation and partial section of the modification of Fig. 5. Fig. 7 is a section taken along the same lines as Fig. 2, illustrating still a further type of spring, while Fig. 8 is a section similarly taken illustrating a further type of spring and driver. Fig. 9 is an elevation of Fig. 8 illustrating the construction of a part of the invention shown in Fig. 8.

Referring now more particularly to the drawings, the cylinder lock of my invention embodies a cylinder portion 10 in which is adapted to rotate a key plug 11 having a keyway 12 into which may enter a key 13. The plug 11 is equipped with a series of tumblers having lower sleeve portions

14 and upper pin portions 15 which are corrugated and are adapted to be adjusted in their relation relatively to the sleeve portions 14 to adjust the total length of each tumbler. The corrugations of the pin portion 15 are adapted to maintain it in any particular adjusted position relatively to the sleeve portion 14. The construction of the individual tumblers is per se not my invention. Other types of adjustable tumblers may conceivably be utilized in carrying out my invention.

The cylinder 10 has a series of grooves 16, there being preferably one groove for each tumbler. The cylinder 10 contains also a series of driver bores 17, in each of which is adapted to reciprocate a driver 18. Each of the grooves 16 houses a spring 19 which is adapted to press downwardly on a driver 18, urging it against the pin portion 15 of the particular tumbler in contact therewith. In the modification of Figs. 1 and 2, the spring 19 has at one end a coil 20 which enters a specially formed chamber 21 in the cylinder 10 whereby to retain the spring 19 in its position of Fig. 2 relatively to the cylinder 10. The driver 18 of Figs. 1 and 2 is equipped with a bore 22 in which rests one end 23 of the spring 19, whereby to maintain the driver 22 against the pin portion 15 of the tumbler thereunder. The spring 19 also retains the driver in the cylinder.

As is fully set forth in the Wilder application, each of the tumblers when initially placed into the key plug 11, is of the same size. When endwise pressure is brought to bear against the pin portion 15 while the sleeve portion 14 is contacted by the key 13, the upper end of the pin portion 15 will be moved until it is aligned with the periphery of the plug 11, while the lower end of the sleeve portion 14 remains in contact with the key. I propose to accomplish this same adjustment by bringing endwise pressure against the drivers 18 by means of a tool 24 having a series of compression pins 25.

The surface 24a of the compression tool 24 is adapted to conform to the outer periphery of the cylinder 10, while the compression pin portions 25 are of such length that, together with the drivers 18, they occupy the full length of the driver bores 17 when the surface 24a of the compression tool is against the outer surface of the cylinder 10. Thus, when the tool 24 is brought down against the cylinder, the drivers 18 will move to the position shown in Fig. 3 with the tumblers properly compressed.

Fig. 3 illustrates the action of spring 19 when the driver 18 is in an upper dotted line position, and also in a lower full line position. By using the form of spring 19 illustrated in Figs. 2 and 3, it is possible to utilize a cylinder 10 of smaller size than would otherwise be possible, as will be readily appreciated. Also, the feature of retaining the spring through means of a coil portion 20 is important since this allows for easy and cheap assembly.

In Fig. 4, I show the parts of Fig. 3, but with a slightly different form of spring 19a having a retaining portion 20a which is offset as at 22 relatively to the main portion of the spring 19. In Fig. 4, the key 13 is shown against the lower end of the sleeve 14 of an adjusted tumbler maintaining the upper end of the pin portion 15 of the tumbler in alignment with the periphery of the key plug 11. The positioning of the tumbler is done, of course, against the pressure of the spring portion 23a pressing against driver 18. In Fig. 4,

it will also be noted that the driver 18 does not have a bore 22, as in the modification of Fig. 2, but rather has a groove 22a into which the end 23a of the spring 19a operates.

In Fig. 5, I show the tool 24 in compressing position relatively to a driver 18. In this modification of the invention, the compression pins 25 are grooved as at 26 for accommodating the portions 23b of the springs 19b so that pressure may be applied directly to the drivers. The springs 19b are adapted to lie in grooves 16, as in the modification of Figs. 1 and 2, there being no retaining means for the springs whatsoever. The springs are inherently retained because of their coiled position about the cylinder, as is well illustrated in Figs. 5 and 6.

In Fig. 7, I illustrate a further modification of my invention in which the spring 19c has an end portion 27 fitting into a bore 23 in the driver 18. The spring 19c is retained due to its coiled and torsional relation to the cylinder 10.

In Figs. 8 and 9, I show a further modification of my invention in which a series of coiled springs 29 are utilized, these springs being maintained about the pin 30 supported in the cylinder 10. One end 31 of each of the springs 29 passes downwardly through a pocket 32 and is properly retained relatively to the cylinder 10, as is shown in Fig. 8. The other end 33 passes through an opening 34 in the driver 18 somewhat in the manner of the spring in Figs. 1 and 2.

I believe that the construction of my invention will now be quite clear to those skilled in the art. It will be well, however, to review the invention by indicating that the cylinder herein disclosed may be assembled at a lock factory and shipped as an entire assembled whole to an automobile plant. When it is desired to fit the cylinder to a particular biting of a key, the key need only be inserted into the key plug of the cylinder and the tool 24 operated to adjust the tumblers. Thereafter, the cylinder which has already been assembled at the lock factory, and has just been adjusted at the automobile factory, need only be placed in its allotted position in the automobile passing through the assembly line. The simplicity and utility of my invention will be readily appreciated.

I now claim:

1. In a combination of the class described, a key plug, a cylinder in which said key plug rotates, tumblers in said plug adjustable in length by the application of pressure thereagainst, drivers in said cylinder cooperable with said tumblers, and through which pressure may be applied against said tumblers, said cylinder having openings therein through which said drivers are accessible for pressing said drivers downwardly against said tumblers whereby to adjust the lengths of said tumblers.

2. In a combination of the class described, a key plug, a cylinder in which said key plug rotates, tumblers in said plug adjustable in length by the application of pressure thereagainst, drivers in said cylinder cooperable with said tumblers and through which pressure may be applied against said tumblers, torsion springs mounted on said cylinder in torsional and pressure relation to said drivers, said drivers being formed so that portions of said springs bear on said drivers below the upper end surfaces of said drivers, said cylinder having openings therein through which said drivers are accessible for pressing said drivers downwardly against said tumblers whereby to adjust the lengths of said tumblers.

3. In a combination of the class described, a cylinder lock having a cylinder and a key plug, a series of aligned bores in said cylinder and key plug, a series of adjustable tumblers all of the same length in said aligned bores; a series of drivers in said aligned bores imposed on said tumblers, springs pressing said drivers downwardly, said series of bores being open to a tool adapted to apply pressure to said drivers and adjustable tumblers.

4. In a combination of the class described, a cylinder lock having a cylinder and a key plug, a series of aligned bores in said cylinder and key plug, a series of adjustable tumblers all of the

same length in said aligned bores, a series of drivers in said aligned bores imposed on said tumblers, said series of bores being open to a tool adapted to apply pressure to said drivers and adjustable tumblers.

5. In a combination of the class described, a cylinder lock having a cylinder and a key plug, a series of aligned bores in said cylinder and key plug, a series of adjustable tumblers in said bores, a series of drivers in said aligned bores imposed on said tumblers, said series of bores being open to a tool adapted to apply pressure to said drivers and adjustable tumblers.

SAMUEL F. ROLPH.