

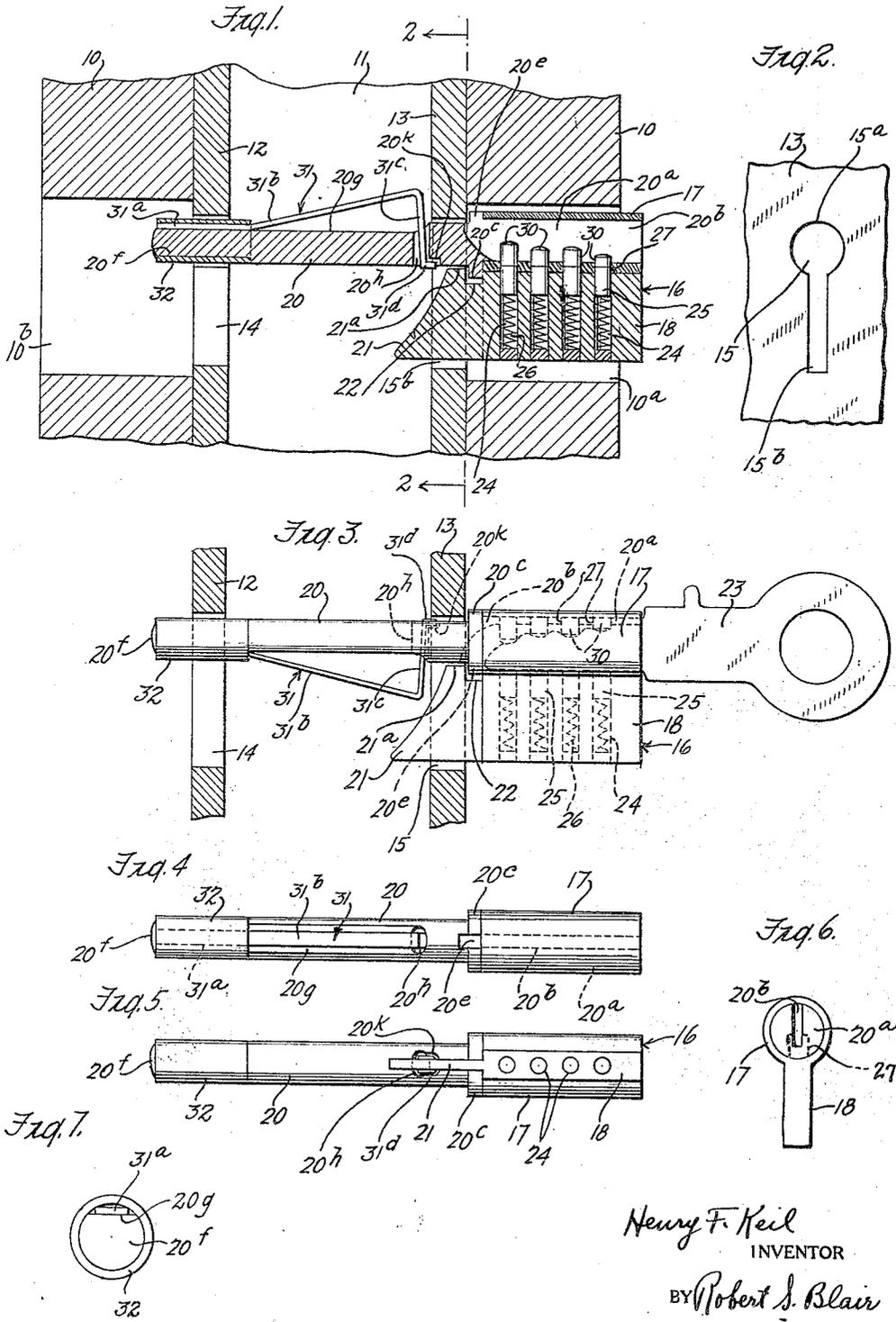
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H. F. KEIL

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KEYHOLE LOCK CONSTRUCTION

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Henry F. Keil  
INVENTOR  
BY Robert S. Blair  
ATTORNEY

# UNITED STATES PATENT OFFICE

HENRY F. KEIL, OF SCARSDALE, NEW YORK, ASSIGNOR TO FRANCIS KEIL & SON, INC.,  
A CORPORATION OF NEW YORK

## KEYHOLE LOCK CONSTRUCTION

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This invention relates to keyhole-lock construction.

One of the objects of this invention is to provide a keyhole lock of simple and practical construction, capable of rapid and inexpensive manufacture, and of thoroughly dependable action in practical use. Another object is to provide a keyhole lock of rugged, strong and durable construction. Another object is to provide a keyhole lock capable of rapid, convenient and simple manipulation in actual use. Another object is to provide a construction of the above-mentioned character having individual parts of simple and inexpensive construction and capable of rapid assembly, thus making for low cost of production. Another object is to provide a keyhole lock well adapted to meet the varying conditions of hard practical use. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing in which is shown one of various possible embodiments of my invention,

Figure 1 is a vertical sectional view showing the keyhole lock in keyhole locking position with respect to a lock mechanism carried, for example, by a door, the details of the mechanism of the door lock being omitted;

Figure 2 is a side elevation as seen from the right of the lock casing, showing the shape of the keyhole therein substantially as it would be seen along the line 2—2 of Figure 1;

Figure 3 is a view substantially similar to that of Figure 1 excepting that the keyhole lock mechanism is shown in side elevation and with the parts positioned in readiness to be withdrawn from the keyhole;

Figure 4 is a plan view of the keyhole lock as seen from above in Figure 1;

Figure 5 is a bottom plan view of the keyhole lock as seen from below in Figure 1;

Figure 6 is an end view of the keyhole lock as seen from the right in Figure 1, and

Figure 7 is an end view on an enlarged scale of the keyhole lock as seen from the left-hand end thereof in Figure 1.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Referring now to the drawing and more particularly to Figures 1 and 2, there is shown fragmentarily and in cross-section a door 10 or similar member in which is inserted a lock mechanism generally indicated at 11, the walls of the casing of which are indicated at 12 and 13. The door lock 11 may be of the type actuated by a barrel type of key and the walls 12 and 13 thereof are provided with alined keyholes 14 and 15, respectively. In Figure 2 the shape of the keyhole 15 is better shown, and it will be seen to include an upper portion 15a, generally round, adapted to receive the shank of the key and an elongated portion 15b extending away from the portion 15a and adapted to permit the passage therethrough of the bit of the key.

The door 10 is provided with suitable openings 10a and 10b to permit access therethrough of a key to either of the keyholes 14 or 15, suitable keyhole plates being employed or attached to the outer faces of the door 10, if desired.

In order to lock the keyholes 14 and 15 in the lock casing 11 against access therethrough of the lock key, I provide a keyhole lock mechanism which includes a member generally indicated at 16 and which I might term a keyhole plug; the member 16 is provided with an upper cylindrical part 17 and a shank 18 projecting radially away therefrom. The cylindrical part 17 is bored out to provide a substantially cylindrical interior space in which is rotatably journaled a solid substantially cylindrical member 20 extending rearwardly (in a direction toward the left as seen in Figure 1) from the part 17. The member 20 is provided with a portion 20a preferably cylindrical and adapted rotatably to fit inside of the cylindrical part 17, the exterior parts of

the member 20 and the bearing portion 20a thereof being preferably coaxial, conveniently of the same diameter, preferably integral, and also coaxial with the interior cylindrical bearing surface within the part 17.

The shank 18 is provided with a rearwardly extending lip 21, preferably of lesser thickness than the shank 18, and adapted freely to pass into the elongated portion 15b of the keyhole 15. The lip 21 has its upper edge, indicated at 21a (Figures 1 and 3) extended within close proximity to the cylindrical member 20 and is recessed as at 22 (Figures 1 and 3). The edge portion 21a and the recess 22 are adapted to coact with certain other parts hereinafter more clearly described in achieving and maintaining assembly of the parts.

Rotation of the member 20 within the cylindrical part 17 is achieved under the control of appropriate mechanism controlled by a suitable key indicated at 23. This mechanism may include any suitable number of tumbler devices, four being shown in the drawing purely by way of illustration and only one of which need be described in detail.

The shank 18 is provided with a cylindrical channel 24, one for each tumbler, and in the channel 24 is slidably housed a tumbler 25 urged in an upward direction, as viewed in Figure 1, by means of a spring 26. The channel 24 opens into the cylindrical bearing space within the part 17.

The portion 20a of the member 20 has a longitudinally extending slot 20b (see Figures 1 and 6) and extending radially into this slot are a plurality of cylindrical channels 27, corresponding in number to the channels 24 in the shank 18. In the channels 27 in the part 20b are inserted a plurality of coating tumblers 30, whose lengths may vary according to a predetermined key code so as to coact only with a predetermined form or shape of key.

When the member 20 and hence the part 20a thereof assumes the position shown in Figures 1 and 6 of the drawing, the plurality of tumbler channels 24 and 27 in the shank 18 and part 20a, respectively, are in alinement and the springs 24 push the tumblers 25 into the channels 27 and thus lock the part 20a and hence the member 20 against rotation with respect to the plug 16. In this position of the parts, also, the tumbler pins 25 prevent relative movement in an axial direction between the member 20 and the plug 16.

In order to effect a rotation of the member 20 with respect to the plug 16, a key 23 is inserted into the slot 20b in the part 20a and if the key is of proper contour it depresses the tumblers 30 sufficiently to bring the contacting end faces of the coating tumblers 30 and 25 into substantial alinement with the upper end face of the shank 18, thus

moving the tumblers 25 out of the channels 27 and thus permitting the part 20b and with it the member 20 to be rotated within the cylindrical parts 17.

The member 20 is provided with a ring or collar 20c adapted to abut against the left-hand end of the cylindrical part 17 and to fit substantially within the cut away portion or recess 22 in the lip 21 (see Figures 1 and 3). The collar 20c is cut away as at 20e (Figure 1) to permit the member 20 to be assembled with respect to the plug 16 by movement of the former in a direction toward the right and into the position shown in Figure 1, the part 20a entering the cylindrical part 17 and during this movement the upper edge portion 21a of the lip 21 passing relatively through the slot or cut away portion 20e of the member 20. This assembly of the parts is effected with the member 20 rotated into such a position that the tumblers 30 are uppermost, as shown in Figure 3, whence a subsequent rotation of the member 20 causes the collar 20c to ride into the slot 22 and to prevent movement of the member 20 in an axial direction relative to the plug 16.

Thus, when the member 20 is rotated so as to bring the slot 20e out of alinement with the upper edge 21a of the lip 21 (see, for example, the position of the parts as shown in Figure 1), the collar 20c rides in the slot 22 and prevents separation of the part 20 from the plug 16 during such rotary movement. If a key is inserted, such as key 23 of Figure 3, to permit rotation of the member 20 relative to the plug 16 throughout substantially 180° and into the position as shown in Figure 3, the slot 20e of the collar 20c becomes alined with the edge portion 21a of the lip 21, but the key 23 is held interlocked with the member 20, due to the action of the tumblers 30 with respect to the notched portion of the key, the handle or shank portion of the key thereupon acting to prevent movement of the member 20 in a direction toward the left with respect to the plug 16.

The member 20 (see Figure 1) extends toward the left to a sufficient extent to pass through the lock casing 11 and through the opposed keyhole 14 and this extended portion of the member 20 is preferably solid. Its extreme end portion is of reduced diameter, as at 20f, and throughout a substantial portion of the exposed part of the member 20, the upper surface thereof (as viewed in Figure 1) is milled off or flattened as at 20g.

Exteriorly of the member 20, the latter carries a spring generally indicated at 31; the member 31 may be made of any suitable strip spring material and has an extreme left-hand end portion 31a which rests upon the upper flattened surface 20g of the member 20 (see also Figure 7), a metal sleeve 32, of an outside diameter substantially equivalent to the diameter of the member 20, being force-

fitted over the reduced end portion 20f and over the end portion 31a of the spring, thus holding the spring 31 in secure assembled relation with respect to the member 20 and holding it also dependably in a direction lengthwise of the member 20.

The spring 31 has a second portion 31b which, from substantially the point where the spring 31 emerges from the sleeve 32 to a point adjacent the collar 20c is bent so as to extend progressively more distant from the member 20, as is clearly shown in Figures 1 and 3.

Adjacent the plug 16 and remote from the end portion of the member 20, there is drilled through the latter a hole 20h, the spring 31 having a third portion 31c which is bent at a relatively sharp angle to the portion 31b thereof and extends into the hole 20h (see Figure 1). The hole 20h extends preferably along a diameter of the member 20 and relatively loosely receives the portion 31c of the spring 31; the inter-relation of these parts is thus made to coact with the sleeve 32 in holding the spring 31 in assembled relation to the member 20 and to prevent relative twisting or rotation of the spring 31 relative to the member 20.

Adjacent the opening or hole 20h and at the under side of the member 20, the latter is cut away as at 20k and the spring 31 is provided with a portion 31d bent practically at right angles to the portion 31c and substantially in the direction of the axis of the member 20. The cut away portion 20k is of such a shape that the portion 31d of the spring 31 substantially fits therein (see Figures 1 and 3) when the spring 31 assumes the position as shown in these two figures.

The spring 31 is per se yieldable and its spring action is such as to tend to enlarge the acute angle included between the portion 31b of the spring and the member 20, this action being limited, however, by the portion 31d of the spring 31 which abuts against the part 20 when it seats itself in the recessed portion 20k. The portion 31d, furthermore, prevents forcible withdrawal of the portion 31c of the spring 31 in an upward direction out of the hole or opening 20h.

With the parts of the keyhole lock in the position shown in Figure 1, the tumblers 25 lock the member 20 against rotation relative to the cylindrical part 17 of the plug 16 and dependably hold the spring 31 on that side of the axis of the member 20 opposite the lip 21 of the shank 18. The device is then in readiness to be inserted into the keyhole or keyholes of a lock mechanism such as the door lock illustratively shown in Figure 1.

The left-hand end of the member 20 first enters the keyhole 15 in the lock casing 13 and upon continued movement of the device 16 toward the left, as viewed in Figure 1, the portion 31b of the spring 31 comes into en-

agement with the upper wall of the keyhole 15 and yields, being pressed downwardly and substantially against the flattened portion 20g of the member 20. At this point it might be noted that the milled off portion 20g of the member 20 provides a surface, substantially flat, so that when the portion 31b of the spring 31 is flattened down against it, the portion 31b will be brought into a position such as will permit free passage of the portion 31b with the member 20 through the rounded part 15a (see Figure 2) of the keyhole 15.

The extreme left-hand end portion of the member 20 begins to enter the rounded part of the keyhole 14 in the opposed plate 12 of the lock casing 11 as the device is moved toward the left, as viewed in Figure 1, and as soon as the right-hand end of the portion 31b of the spring 31 emerges through the keyhole 15, the inherent resiliency of the spring 31 moves the part 31b, 31c and 31d thereof into the position shown in Figure 1, securely locking the entire device against withdrawal from the keyhole or keyholes. The lip 21 of the shank 18 enters the elongated part 15b of the keyhole 15 and makes certain that rotation of the entire device about the axis of the member 20 cannot be effected.

The spring member 31 thus provides a dependable locking of the device against withdrawal and does so, moreover, by an action that is highly advantageous, for example, any pull exerted on the device 16 in a direction to remove it from the keyholes is resisted by the portion 31b abutting against the wall 13 of the lock casing 11, the portions 31c and 31d of the spring 31 holding the portion 31b dependably in removal-resisting position and against swinging in a direction to change the angle between the portion 31b and the member 20. For example, such a pull tends to swing the portion 31b of the spring 31 in a direction to enlarge the acute angle between it and the member 20 but the portions 31c and 31d are so interlocked with the member 20 as to prevent such enlargement of this acute angle. These actions of the several parts of the spring 31 are yielding to an extent sufficient to safeguard the several parts against the abnormal effects of suddenly applied forces and thus insure dependable and thoroughly efficient results in practical use.

The inherent yieldability of the several parts of the spring 31 is also of advantage from the point of view of manufacture, for it avoids the necessity of maintaining too narrow limits of manufacture tolerances and permits the coacting parts readily to accommodate themselves one to the other even though ordinary manufacturing tolerances are departed from. Thus, cost of manufacture and assembly is greatly reduced.

When it is desired to remove the device from the keyholes in order to permit the lock

11 to be operated by its intended key, an appropriate key 23 (Figure 3) is inserted into the slot 20b of the member 20 with a resultant action already hereinabove made clear. The part 20a and with it the member 20 and also the spring 31 are rotated through 180° and substantially into the position shown in Figure 3, the part 31b of the spring being thus brought into substantial alignment with the lip 21 of the shank 18, whence the entire device may be withdrawn by movement in a direction toward the right, as viewed in Figure 3. The key 23 itself is, during this action, locked against withdrawal and serves as a handle to withdraw the entire device.

The key may thereupon be removed from the entire device only upon giving the key a rotation of 180° from the position shown in Figure 3, whence the tumblers 30 become alined with the tumblers 25, the key being thereupon withdrawn and the tumblers 25 entering the tumbler recesses 27 again to lock the parts together as hereinabove described. The parts being thus positioned substantially as shown in Figure 1, the entire device is in readiness to be again inserted, when desired, into the keyhole or keyholes of a lock mechanism.

It will thus be seen that there has been provided in this invention a keyhole lock in which the several objects hereinabove noted, as well as many thoroughly practical advantages, are successfully achieved. It will be seen that the device is of simple, compact and rugged construction, is of thoroughly dependable and efficient action in use, and is capable of rapid and inexpensive manufacture. Moreover, the device, it will be seen, is well adapted to meet the varying conditions of hard practical use.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In lock construction of the character described, in combination, a plug shaped to be passed into a keyhole, a solid member projecting rearwardly therefrom and rotatable with respect thereto, said member having an opening therethrough adjacent said plug and having a reduced end portion, a spring having a portion resting against said reduced end portion, a second portion bent progressively away from said member in a direction toward said plug, a third portion bent at a sharp angle to said second portion and passing through said opening in said member, and a fourth portion bent at an angle to said third portion to prevent the latter from coming out of said opening, a ring member over

said reduced end portion of said first-mentioned member for holding said spring in place, and key-controlled means for permitting or preventing rotation of said first-mentioned member relative to said plug.

2. In lock construction of the character described, in combination, a plug shaped to be passed into a keyhole, a solid member projecting rearwardly therefrom and rotatable with respect thereto, said member having an opening therethrough adjacent said plug and having a reduced end portion, a spring having a portion resting against said reduced end portion, a second portion bent progressively away from said member in a direction toward said plug, a third portion bent at a sharp angle to said second portion and passing through said opening in said member, a sleeve member forced over said reduced end portion of said first-mentioned member and over said first portion of said spring for holding the latter in place, and key-controlled means for preventing or permitting rotation of said first-mentioned member relative to said plug.

3. In lock construction of the character described, in combination, a plug shaped to be passed into a keyhole, a solid member projecting rearwardly therefrom and rotatable with respect thereto, said member having an opening therethrough adjacent said plug and having a reduced end portion, a spring having a portion resting against said reduced end portion, a second portion bent progressively away from said member in a direction toward said plug, a third portion bent at a sharp angle to said second portion and passing through said opening in said member, and a fourth portion bent at an angle to said third portion to prevent the latter from coming out of said opening, a ring member over said reduced end portion of said first-mentioned member for holding said spring in place, said first-mentioned member having a recess adjacent said opening for accommodating said fourth portion of said spring, and key-controlled means for preventing or permitting rotation of said first-mentioned member relative to said plug.

4. In lock construction of the character described, in combination, a plug shaped to be passed into a keyhole and having a key-controlled rotatable member projecting rearwardly therefrom, said member being adapted first to enter a keyhole upon the device being inserted therein, means shaped to provide a recess extending lengthwise of said member and adjacent the rear end thereof, said member having a recess extending thereinto adjacent the forward end of said member, and a spring member shaped to provide two end portions, one end portion being received in said rear recess in said member and the other end portion being received in said forward recess, said spring member having an intermediate portion normally projecting

away from and forming substantially an acute angle with said first-mentioned member.

5 In testimony whereof, I have signed my name to this specification this 31st day of October, 1928.

HENRY F. KEIL.

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