Nov. 1, 1938. S. BRANTINGSON 2,135,323

LOCK CONSTRUCTION

Filed July 17, 1937

Fig. 1.

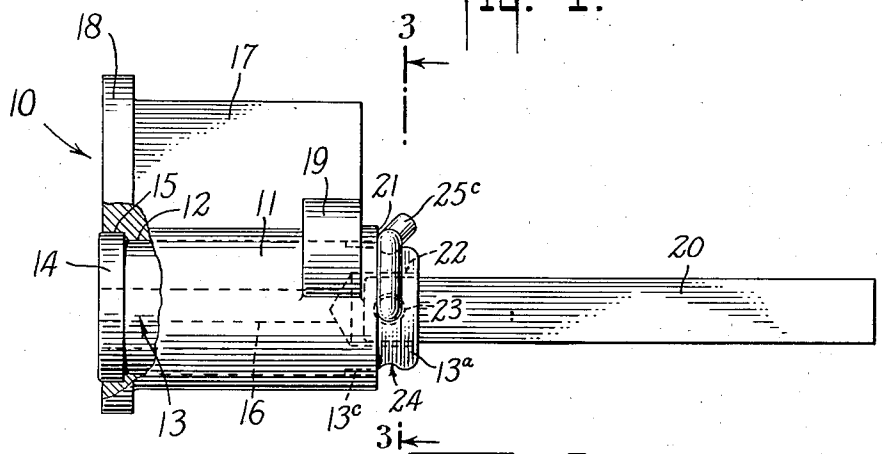


Fig. 2.

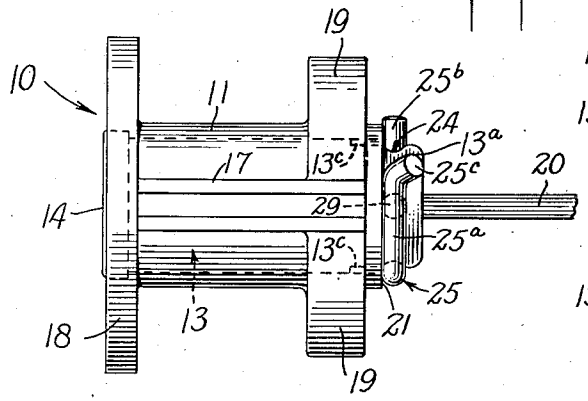


Fig. 5.

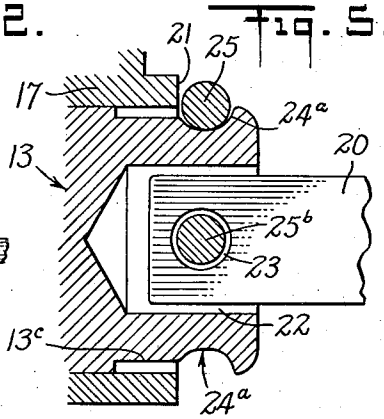


Fig. 3.

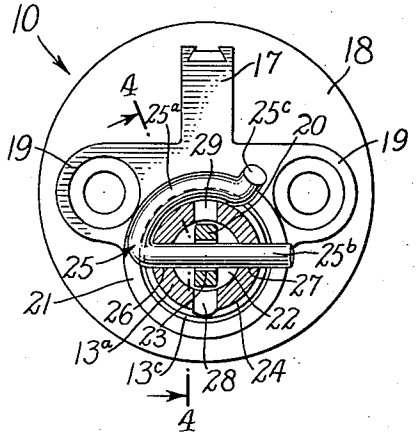
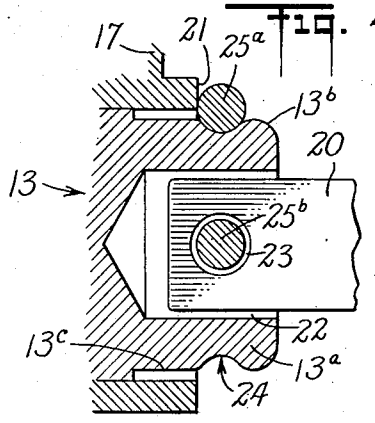


Fig. 4.



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LOCK CONSTRUCTION

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17 Claims. (Cl. 70—379)

This invention relates to lock construction.

One of the objects of this invention is to provide a lock construction that will be simple and inexpensive in construction, and durable and dependable. Another object is to provide a lock construction that will be capable of speed and ease in assembly or disassembly. Another object is to provide a lock construction in which various of the parts, usually including also relatively movable parts, may be held in operative relationship by means that are simple and inexpensive to construct, simple and easy to handle or manipulate, strong and durable, and in action both efficient and reliable.

Another object is to provide a lock construction of the so-called cylinder type and hence having a casing, key plug, and connecting or operating bar, but constructed so that the individual parts are capable of simple, inexpensive and efficient fabrication, particularly on a quantity basis of production, and so that assembly of the parts may likewise be carried on with speed, efficiency and low cost. Another object is to provide a lock construction of this type in which disassembly, as for example by a locksmith for purposes of changing the code or key-combination of the lock, may be quickly achieved without requiring troublesome handling or adjusting of relatively minute parts, without requiring such skill or precision of manipulation as might be beyond the range of skill of the average locksmith, and without risk of marring or deforming any of the parts in such a way as to make subsequent assembly or disassembly difficult or impossible. Another object is in general to improve lock constructions of this type and more particularly to improve in general the means and mode of holding various of the parts, usually including also relatively movable parts, in assembled and operative relationship. Another object is to provide an improved lock construction of the above-mentioned type that will be well adapted to meet the varying conditions met with in practice, including also such factors as manufacturing and subsequent 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 the various possible embodiments of my invention,

Figure 1 is a side elevation of a lock construction in assembled relation, certain parts being broken away or shown in section;

Figure 2 is a plan view, as seen from the top of Figure 1;

Figure 3 is an end elevation partly in section, as seen along the line 3—3 of Figure 1;

Figure 4 is a longitudinal sectional view, on a larger scale as seen along the line 4—4 of Figure 3, certain parts being omitted or broken away, and

Figure 5 is a view like Figure 4 showing a possible modified form.

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

Referring first to Figures 1, 2 and 3, there is generally indicated at 10 a casing having a lower cylindrical portion 11 bored out as at 12 to receive a key plug 13; the latter preferably has a peripheral flange 14 at its front or left-hand end that is received in the undercut 15 at the front end of the bore 12 as the key plug 13 is inserted from the left, as viewed in Figure 1. The flange 14 thus acts to limit movement of the key plug 13 toward the right, while permitting freedom of rotation relative to the casing 10.

Key plug 13 is provided with a key slot 16 which may be of usual form to receive any suitable form of key and it has appropriate tumblers or tumbler pins (not shown), such as pin tumblers, which may coact with tumblers, such as pin tumblers (not shown), arranged in the tumbler-receiving extension 17 or the casing 10. The latter may have a front flange or escutcheon plate 18, preferably circular, and it may have near its right-hand or rear end screw threaded ears 19 to receive the securing or clamping screws (not shown) for holding the lock construction in installed position. The key plug 13 has connected to it at its rear end, in a manner about to be described, a connecting or operating bar 20 which makes connection with the part or parts, such as a bolt mechanism (not shown), which are to be actuated by the movement of the key plug 13.

The right-hand or rear end of the cylindrical casing portion 11 is preferably faced off in any suitable manner, as at 21, in Figures 1 and 4, to provide an end face whose plane is at right angles to the axis of the key plug 13. Key plug 13 is preferably of a length greater than the length of the bore 12 and hence has a rearwardly

extended portion 13a. The diameter of the key plug 13 is such that it neatly and snugly fits into the bore 12 to permit appropriate movement of the former relative to the latter under the control of the proper key.

The rear or right-hand end of the key plug 13 (Figures 1 and 4) is preferably provided with a recess 22 which may be formed in any suitable manner and is preferably of cylindrical shape, being conveniently formed by the use of a drill; preferably also the axis of the recess 22 is coincident with the axis of the key plug 13. Preferably also and where the key plug 13 is to partake of only rotary movement, the recess 22 is of a depth (see Figure 4) to extend inwardly of the plug 13 (to the left) beyond the plane of the end face 21. Into the recess 22 is receivable an end of the connecting bar 20, that end being provided with an aperture 23 as is better shown in Figure 4.

The rearwardly projecting end portion 13a of the key plug 13 is provided with a groove 24 which is preferably co-related with respect to certain other parts about to be described and to the end face 21 of the casing 10; preferably the groove 24, and for convenience in manufacture, extends throughout the entire periphery of the plug end 13a and in the preferred embodiment groove 24, as is better shown in Figure 4, is in cross section arcuate and preferably is so positioned and its arcuate cross section of such a radius of curvature that, with the key plug 13 inserted into the casing 10 so that the front flange 14 snugly bottoms in the bore undercut 15, the arc of cross section of the groove 24, if continued, is tangent to the end face 21. This preferred though illustrative configuration of the parts makes it possible for me to employ, seated in the groove 24 and in co-action with the end face 21, a cylindrical or round cross-sectioned member which, if of the same radius of curvature as the groove 24, thus not only seats snugly in the latter but also makes a neat tangential or substantially tangential contact with the end face 21.

In the drawing, the above-mentioned member is shown and is generally indicated by the reference character 25 and a portion of it, namely portion 25a, is, in Figure 4, shown seated in the groove 24 and, being in the preferred form of the same radius of curvature as that of the cross section of the groove 24, is substantially tangential to the end face 21.

This member 25 which, as will presently appear, may be made of a suitably diametered or cross sectioned wire, preferably springy, has, besides the portion 25a, another portion 25b. The portion 25b is preferably straight and has a length preferably greater than the diameter of the plug extension 13a, as appears better from Figure 3, and the aperture 23 in the connecting bar 20 is of a size to permit the portion 25b to pass through it, preferably with a suitable degree of looseness of fit.

The portion 25b of the member 25 extends through suitable apertures in the end extension 13a of the key plug 13. Preferably these apertures are paired and preferably there are two pairs of such apertures. Thus apertures 26 and 27 form one pair and are preferably alined along a diameter of the key plug 13 at right angles to the plane of the key slot 16, while apertures 28 and 29 form the other pair and are likewise alined on a diameter but preferably in the plane of the key slot 16, the diameters along which the two pairs of apertures are alined being thus, as better appears in Figure 3, at right angles to each other. Also these diameters intersect recess 22 into which the bar 20, as above noted, is receivable, and preferably these apertures are drilled, preferably with the aid of a suitable jig, with a drill whose diameter is preferably twice the radius of curvature of the peripheral groove 24; also and preferably, the axes of these pairs of apertures fall in the same plane and preferably that plane coincides with a plane that extends transverse through the key plug and bisects the peripheral groove 24.

The portion 25a of the member 25, as shown in Figure 3, has a curvature such that, when seated in groove 24, it snugly bottoms in, and follows the peripheral or arcuate curvature of, the groove 24 and it is preferably of an extent greater than 90 degrees and less than 180 degrees.

Accordingly, in assembling the casing 10, key plug 13 and connecting bar 20, the plug 13 is first inserted into the bore 12 of the casing 10 so that the plug extension 13a projects from the casing and exposes the peripheral groove 24, as shown in Figure 4; then the connecting bar 20 has its apertured end projected into the plug recess 22 and is temporarily held in any suitable manner, as by the fingers of the hand, so that the aperture 23 is in alinement with one or the other of the pairs of apertures 26—27 and 28—29, illustratively, as shown in the drawing, in alinement with the pair of apertures 26—27. The member 25 then has its straight portion 25b entered into the alined apertures 26—23—27 (see Figure 3), and as the portion 25b is thus entered into position, the portion 25a may, during that entry movement, be ultimately related to the groove 29 in various ways. For example, and particularly where the springiness of the member 25 is not too stiff, the free end of portion 25a, as the member 25 moves toward the right, as viewed in Figure 3, may be held in alinement with the groove 24 which, as this movement continues, cams the portion 25a or spreads it in a direction away from the straight portion 25b, until the free end of the portion 25a rides over the crest of the key plug extension, as it is viewed in Figure 3, whence in continuing this movement to its conclusion the portion 25a becomes snugly seated in so much of the peripheral extent of the groove 24 in clockwise direction from the aperture 26 (Figure 3) as coincides with the arcuate extent, illustratively greater than 90 degrees and less than 180 degrees, as of the portion 25a itself.

Or, and particularly where the member 25 is of a stiff springiness, the portion 25a, during the movement of entering the straight portion 25b into the alined apertures 26, 23 and 27, is held in a tilted position so that the portion 25a moves into the free space between the connecting bar 20 and the right of the end face of the key plug 13, as these parts are viewed in Figure 4; when the portion 25b has completed its entering movement the curved portion 25a is then swung in counterclockwise direction as viewed in Figures 1 and 4, about the axis of the straight portion 25b, is sprung over the end 13a of the key plug 13, which for this purpose, is preferably rounded off or chamfered, as at 13b (Figure 4), and into the peripheral groove 24, where it is held, the groove 24 acting as a retaining notch.

In either case, the springiness or resilience of the portion 25a relative to the straight portion 25b causes a substantially half-cylindrical part of the key plug to be snugly and securely gripped

therebetween and the straight portion 25b becomes dependably held against retrograde movement. The preferred arrangement, in which the curved portion 25a is of an extent greater than 90 degrees (see Figure 3), also insures uniform bottoming or seating of the portion 25a throughout its extent in the groove 24 and insures also that the straight portion 25b is completely entered, in a direction toward the right in Figure 3; thus, where the portion 25b is dimensioned so that its free end projects substantially beyond the surface of the key plug end portion 13a into tangential relationship to the end face 21 of the casing, as in the preferred form, the above described spring and gripping action also insures that this free end of the portion 25b is completely projected outwardly and into the above-mentioned relationship to the end face 21.

With the parts proportioned as above described and the member 25 related to the key plug and the casing as just described, the connecting bar 20 becomes dependably connected to the key plug and with sufficient freedom or looseness to take care of any misalinement between the lock construction and the bolt mechanism with which the connecting bar 20 is to coact, and where the key plug 13 is to partake only of rotary motion, all of the parts of the member 25 that are exposed externally of the key plug 13 become positioned and held in substantially tangential relation to the end face 21; in the preferred form this latter relation exists between the curved portion 25a and the end face 21 (see Figure 4) and between the externally exposed part or parts of the straight portion 25b and end face 21, so that, in coaction with the front flange 14, end play of the key plug 13 with respect to the casing 10 is dependably prevented while appropriate freedom of rotary movement of the key plug under the action of the appropriate key is assured.

Disassembly of the parts held together by the member 25 may easily take place. For this purpose it suffices, in order to overcome the springy gripping action of the opposed portions 25a and 25b of the member 25 upon the key plug, to effect removal of the portion 25a from the peripheral groove 24 and the portion 25b from its alined apertures. This may be effected in any suitable manner, illustratively by reversing the procedure or procedures above described in connection with effecting the assembly of these parts.

Thus, for example, by exerting appropriate force upon the right-hand end of the portion 25b as viewed in Figure 3, the latter is made to move toward the left so the curvature of the key plug portion gripped by the member 25 acts to cam the portion 25a away from the portion 25b to bring about the spreading that is appropriate for effecting removal in this manner.

Or the portion 25a is forcibly swung in clockwise direction as viewed in Figure 4 about the axis of the portion 25b, the portion 25a spreading away from the portion 25b to bring the former into the free space of the angle between the end face of the key plug 13 and the connecting bar 20, whence the device 25 is moved into a direction to withdraw the portion 25b from the alined apertures in which it has been seated. If desired, in effecting this mode of manipulation, the extreme end of the curved portion 25a may be given an offset as at 25c (Figures 2 and 3) to provide a space between the offset portion 25c and the end of the casing 10 into which a suitable implement, like a screw driver, may be positioned to bring about the just described clockwise swinging and springing of the portion 25a over the end of the key plug 13.

Under some circumstances and particularly to simplify certain aspects of the construction and its functioning, the peripheral groove 24 may be shaped so that the curved portion 25a of the member 25 need not assume and retain a tangential relationship to the end face 21 of the casing; in such case the groove 24, as is better shown in Figure 5, is given any suitable cross-section or configuration, such as is indicated at 24a in Figure 5, as will give the portion 25a some play or latitude of movement in a direction away from the end face 21. As indicated in Figure 5, the groove 24a while it may have a depth commensurate with that of the groove of Figure 4 has a greater width in order that, as is also indicated in Figure 5, the portion 25a need not contact the end face 21.

With an arrangement such as that of Figure 5, the substantially tangential relationship of the straight portion 25b of the member 25 with the end face 21 will suffice.

In drilling the opposed pairs of holes 26—27 and 28—29 it is possible that the drill, which, if the drilling is effected with the key plug 13 already in the casing 10, operates substantially tangentially to the end face 21, would cause a distortion or burring of the metal at the surface of the key plug 13 and that such distortion or burring might cause a binding of the key plug 13 as it moves relative to the bore 12 of the casing 10. To prevent this from taking place, the end portion 13a of the key plug 13 is made of slightly lesser diameter than that of the bore 12 and that difference in diameters is preferably carried inwardly of the casing portion 11 to an appropriate extent, thus to provide an annular gap 13c (better shown in Figure 4), in which any such distortion or burring of the metal of the key plug thus becomes accommodated, so that binding of the key plug relative to its bore is dependably precluded.

It will thus be seen that there has been provided in this invention a lock construction in which the several objects hereinbefore noted together with many thoroughly practical advantages are successfully achieved. It will be seen that the individual parts are of simple and inexpensive construction and that their assembly or disassembly can be effected with facility and many other advantages. Moreover it will be seen that the construction is well adapted to meet the varying requirements and conditions met with in practice.

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, in combination, a casing member, a key plug member movably mounted therein, an operating bar member for transmitting movement from said key plug member, said key plug member having a recess in its rear end for receiving said bar member and having opposed apertures communicating with said recess, said key plug member having also a groove in its periphery and extending from at least one of said apertures, and a device made of springy material and having two portions, one portion of which is insertable into said opposed apertures for en-

gagement with said bar member in said recess and the other portion of which is sprung into engagement with said groove, said two portions, by the springiness of said material, gripping part of said plug member therebetween to hold said device in position.

2. In lock construction, in combination, a casing member, a key plug member movably mounted therein, an operating bar member for transmitting movement from said key plug member, said key plug member having a recess in its rear end for receiving said bar member and having opposed cylindrically-walled apertures the axis of which intersects said recess and said casing member having a rear end face the plane of which is at right angles to the axis of said plug member and to which plane the cylindrical walls of said alined apertures are substantially tangent, a cylindrical member fitted into said opposed apertures and having an intermediate portion in engagement with that end of said bar member that is in said recess and having a portion projecting externally of said key plug member and extending about the latter for more than 90 degrees to hold said cylindrical member against movement out of said alined apertures and at least a part of said projecting portion being in substantially tangential contact with said rear end face of said casing member.

3. In lock construction, in combination, a casing member, a key plug member movably mounted therein, an operating bar member for transmitting movement from said key plug member, said key plug member having a recess in its rear end for receiving said bar member and having opposed cylindrically-walled apertures the axis of which intersects said recess and said casing member having a rear end face the plane of which is at right angles to the axis of said plug member and to which plane the cylindrical walls of said alined apertures are substantially tangent, and a device made of a springy material and having two portions, one portion being substantially cylindrical and fitted into said alined apertures so that an intermediate part thereof engages that end of said bar member that is in said recess and the other portion yieldably gripping a part of said plug member between itself and first said mentioned portion to hold the latter against movement out of said apertures, said device having a part that is in substantially tangential contact with said rear end face of said casing member.

4. In lock construction, in combination, a casing member, a key plug member movably mounted therein, an operating bar member for transmitting movement from said key plug member, said key plug member having a recess in its rear end for receiving said bar member and having opposed cylindrically-walled apertures the axis of which intersects said recess and said casing member having a rear end face the plane of which is at right angles to the axis of said plug member and to which plane the cylindrical walls of said alined apertures are substantially tangent, said plug member having an external groove, and a device made of a springy material having a portion that is substantially cylindrical and fitted into said alined recesses so that an intermediate part thereof engages the bar member in said recess and a portion projecting externally of said key plug for substantially tangential contact with said rear end face of said casing member, said second portion of said device being sprung into said groove to hold said device against disengagement from said key plug.

5. In lock construction, in combination, a casing member, a key plug member movably mounted therein, an operating bar member for transmitting movement from said key plug member, and a single device holding said three members in assembled relation, one of said members and said device having means for holding said device against unintentional removal therefrom, said means comprising an arm-like springy extension of said device between which extension and said device said one of said members is yieldably gripped.

6. In lock construction, in combination, a key plug and an operating bar having an aperture at one end, said key plug having opposed wall portions between which the apertured end of said bar is received and said opposed wall portions having each an aperture, a pin having its end portions resting in said two opposed apertures and having an intermediate portion that extends through the aperture in said end of said operating bar, said pin having an extension externally of said key plug and of a length sufficient to encompass between itself and said pin a portion of said key plug and thereby to hold said pin against moving out of said opposed apertures.

7. In lock construction, in combination, a key plug and an operating bar, said key plug having spaced opposed wall portions in the space between which said bar is received and at least one of said opposed wall portions having an aperture leading to said space, a pin having a portion in said aperture and another portion projecting into the space between said two opposed wall portions and having its said second-mentioned portion in engagement with said operating bar, said pin having an extension external of said key plug and engaging a portion of the latter that comprises more than 90 degrees from one of said end portions.

8. In lock construction, in combination, a key plug and an operating bar, said key plug having opposed wall portions between which said bar is received and said opposed wall portions having each an aperture, a pin having its end portions resting in said two opposed apertures and having an intermediate portion in engagement with said operating bar, said pin having a curved pin-retaining extension that extends along more than 90 degrees of the periphery of said key plug and in a peripheral direction from one of said apertures.

9. In lock construction, in combination, a casing, a key plug movably mounted therein, said key plug having aperture means exposed in a surface thereof, and a pin received in said aperture means for coaction with said casing member to limit movement of said key plug relative to said casing, said pin having an arm-like springy extension external of said aperture means between which and said pin a portion of said key plug is yieldably gripped for thereby holding said pin against movement out of said aperture means.

10. In lock construction, in combination, a casing member, a key plug member movably mounted therein, one of said members having aperture means, a pin received in said aperture means and having a portion for coaction with the other of said members to limit relative movement between said plug member and said casing member, and an arm-like springy extension of said

pin external of said aperture means between which extension and said pin a portion of said aperture-bearing member is yieldably gripped.

11. In lock construction, in combination, a casing member, a key plug member movably mounted therein, an operating bar member for transmitting movement from said key plug member, and means for holding at least two of said members in assembled relation and comprising aperture means in one of said two members and a device having two portions, one of said portions being received in said aperture means and extending into engagement with the other of said two members and the other of which portions is external of said aperture means and is yieldable relative to said one portion and with the latter yieldably encompassing therebetween at least a portion of said aperture-bearing member.

12. In lock construction, in combination, a key plug and an operating bar, said key plug having opposed wall portions between which said bar is received and said opposed wall portions having each an aperture, a pin having its end portions resting in said two opposed apertures and having an intermediate portion in engagement with said operating bar, said key plug having an external notch positioned to one side of a plane passing through the axis of said key plug and the axis of said pin, and means in connection with said pin and receivable in said notch to hold said pin against movement out of said apertures.

13. In lock construction, in combination, a key plug having an aperture extending in the direction of a diameter of said plug and exposed in the cylindrical surface of said plug, said plug having a groove extending peripherally from said aperture and to an extent greater than 90 degrees, and a device carried by said plug and having two portions, one portion being received in said aperture and the other portion having a configuration that provides an end part that engages in said groove beyond a point spaced 90 degrees from said aperture, thereby to hold the said first mentioned portion against movement out of said aperture.

14. In lock construction, in combination, a key plug having an aperture extending substantially in the direction of a diameter of said plug and exposed in the cylindrical surface of said plug, said plug having a notch in its cylindrical surface at a point spaced substantially 90 degrees from said aperture, and a substantially U-shaped member carried by said plug and having one of its arms received in said aperture and the other of its arms engaged in said notch.

15. In lock construction, in combination, a casing member, a key plug member movably mounted therein, an operating bar member for transmitting movement from said key plug member, said key plug member having a recess in its rear end for receiving said bar member and having opposed cylindrically-walled apertures the axis of which intersects said recess and said casing member having a rear end face the plane of which is at right angles to the axis of said plug member and to which plane the cylindrical walls of said alined apertures are substantially tangent, said plug member having an external groove, and a device made of a springy material having a portion that is substantially cylindrical and fitted into said alined recesses so that an intermediate part thereof engages the bar member in said recess and a portion projecting externally of said key plug, said last-mentioned portion being sprung into said groove to hold said device against disengagement from said key plug.

16. A lock construction as claimed in claim 15 in which said second-mentioned portion of said device and said groove are respectively cross-sectioned in such manner that said groove holds said portion in substantially tangential contact with said rear end face of said casing member.

17. A lock construction as claimed in claim 15 in which said groove is proportioned relative to the remaining part in such manner that said second-mentioned portion of said device is thereby held out of tangential relationship to said rear end face of said casing member.

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