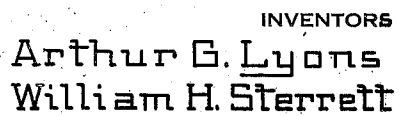


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## SPINDLE CONSTRUCTION

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This invention relates to improvements in lock constructions.

The primary object of this invention is the provision of an improved compensating door knob spindle which will permit efficient operation of a lock bolt notwithstanding the lock or knob associated parts of the lock assemblage are inaccurately placed relative to each other or relative to the door.

In the use of mortise locks in doors or other closures it is well known that if the trim, either consisting of escutcheon plates or roses, is placed on the door inaccurately, so that the same will not align properly with the roll back hubs of the lock, the solid spindle will either bind, or permit a binding of the knobs on the escutcheon plates or roses, so that the latch bolt spring will not have sufficient force to throw the latch bolt to a latching position. It is therefore an object of the present invention to provide an improved spindle construction which will permit of efficient latch bolt actuation without binding of the parts.

A further object of the invention is the provision of an improved lock spindle construction consisting of spindle ends having a universal joint connection, so as to permit efficient latch bolt actuation, and thus eliminate binding of parts ordinarily due to incorrect placement of the lock case or trim as a result of carelessness.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawing, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a cross sectional view taken through part of a door showing a lock case mortised in the door at an angle with respect to placement of the escutcheon plates or roses, and showing the improved spindle construction, by means of which the parts in such association will permit of proper knob actuation of the latch bolt without binding of parts.

Figure 2 is a view of the parts shown in Figure 1, but with a different arrangement, such as very often occurs in practice, showing one of the roses or escutcheon plates out of alignment with the roll back hub; the improved spindle construction illustrating how the lock may be efficiently assembled and operated.

Figure 3 is a fragmentary plan view of the intermediate portion of the improved lock spindle showing the universal joint connection of the spindle ends.

Figures 4 and 5 are sectional views taken on their respective lines in Figure 3 of the drawing.

Figure 6 is a perspective view showing the construction of each of the spindle ends, where the same are adjacently associated in a universal joint connection with a ferrule.

In the drawing, wherein for the purpose of illustration is shown only a preferred embodiment of the invention, the letter A may generally designate a mortise type of lock adapted to be received in a mortised relation within a door or other closure B. The improved spindle C is associated with the roll back hub parts of the lock A and adapted for assemblage with the usual escutcheon plates or roses D and knobs E.

The lock A is of usual construction, including a case 10, ordinarily of rectangular shape, having a bolt 11 therein, usually spring actuated, and having a roll back construction including hub parts 12 adapted to receive a knob spindle in order to control retraction of the bolt 11.

As shown in Figure 1 the carpenter will sometimes mortise the socket 14 at an angle to the inner and outer faces of the closure B. This occurs either as a result of carelessness of the carpenter, or sometimes as a result of placing the socket 14 at a right angle to the beveled edge 15 of the door or closure, as shown in Figure 1. Under such circumstances, where the conventional one-piece spindle is used, it is quite impossible to accurately align the escutcheon plates or roses and place the knobs efficiently so that binding of the parts will not occur.

As shown in Figure 2 of the drawing, the door B' will very often be mortised correctly at 14' to receive the lock case, but the carpenter will inaccurately place one of the escutcheon plates or roses D' so that the spindle will bind thereon or permit a binding of the door knob on the plate or rose.

The improved spindle construction C permits of proper assemblage of the lock case and actuating parts notwithstanding careless mortising or placement of escutcheon plates and roses. It consists of spindle shanks or ends 20 and 21, which are polygonal in cross section, or screw threaded, or provided with transverse openings therein. Spindle parts may be finished as to their knob receiving ends in any manner to receive any of the various knob constructions now in common use. Merely by way of illustration the spindle ends are shown as square in cross section, so that the knobs E may be slipped therein and keyed thereto as by screws or other means

22, so that turning of the knob E will result in turning of the spindle parts 20 and 21.

The spindle parts 20 and 21 are relatively connected by means which we prefer to designate  
5 as a universal joint connection, illustrated generally at 25, which will permit of relative angular motion of the spindle parts 20 and 21 in all directions, and permit of impartation of rotary motion to one of the spindle parts upon rotation of the other part. We are well aware that  
10 it has heretofore been proposed to swivelly connect two spindle parts, but such connection is not of the universal joint type, since the spindle parts are independently rotatable and do  
15 not possess the characteristic of the improved spindle of simultaneous rotary motion of the spindle parts when one or the other of the spindle parts is rotated.

Our preferred universal joint connection of the  
20 spindle parts preferably consists in providing a square or other polygonal shaped ferrule or metallic sleeve 28 which is of a nature to removably fit snugly in the hub sockets of the roll back parts 12 so that there will be no relative  
25 lost movement of the ferrule within the hub parts 12. This ferrule 28 is provided with a square cross section passageway extending therethrough and open at the ends of the ferrule, wherein the reduced tapered polygonal  
30 shaped adjacent ends of the spindle parts 20 and 21 are swivelly keyed to the sleeve or ferrule 28. It will be noted that the ferrule outer surfaces are flush with the outer surfaces of the spindle parts 20 and 21, so as to permit facile  
35 slipping of the entire spindle through the roll-back hub into proper position. That is, the ferrule is purposely made of small cross-section.

The reduced end 30 of each of the spindle parts 20 and 21 is tapered divergently from its  
40 connection at the end of the spindle part to the outer end surface thereof. Surrounding its connection with the spindle part is a shoulder 31, and at this connection the reduced extension is circular. From this connection, however, the  
45 diametrically opposed sides of the reduced extension are flattened and tapered divergently to the free end of the extension where the same is square in section, as shown in Figure 6. Each of the reduced extensions 30 is transversely apertured at 34 and receives a connecting pin 35,  
50 the ends of which project beyond the outer flat surfaces of the opposite sides of the extension.

The reduced extensions 30 of the spindle parts 20 and 21 are assembled within the ferrule 28  
55 from opposite ends thereof. The ferrule, for each of these reduced extensions 30, is provided with an opposed opening 40, adapted to align with the pin receiving passageway 34; the said openings 40 being in alignment and each relatively larger in diameter than the pin projections. When the ends of the spindles are assembled in the ferrule to respectively align the  
60 apertures 34 with the openings 40 the pins 35 are driven into place in the apertures 34 so that the projecting ends of the pins 35 loosely project into the openings 40 of the ferrule; their outer ends lying flush with the outer sides of the ferrule, as will be noted from Figure 5 of the drawing. The pins 35 fit with a forced or driven  
70 fit in the passageways 34 of the spindle parts, so that the assemblage shown in Figure 5 will be maintained.

It will be noted that the head ends 33 of the tapered spindle extension 30 are of the same  
75 size as the inner cross section of the ferrule pas-

sageway. Thus, during turning movement of the knob the strain will be imparted from the spindle end 33 directly to the ferrule, and no shearing effect whatsoever will be placed upon the projecting ends of the pins 35.

It will be apparent from the foregoing assemblage that due to the tapering of the spindle extension 35 and the loose fitting of the pin ends in the openings 40, each spindle part 20 and 21  
85 will have an angular movement relative to the end of the ferrule within which it is assembled, in all directions. The spindle parts 20 and 21 rotate together, and cannot rotate relative to each other. Thus, they are connected much in the same manner as usual shaft parts are connected with a universal joint. It will be apparent that with such an arrangement the spindle ends may swivel independently at opposite sides  
90 of the plane of the lock case so that notwithstanding the lock case is incorrectly mortised in the door the spindle ends may be correctly aligned in normal relation to the respective surfaces of the door from which they extend. This is also a real advantage in permitting the spindle ends to extend through misaligned escutcheon plates  
95 and spindle openings in the door without defacing the door. This condition is shown in Figure 2.

In assemblage of parts the ferrule 28 fits snugly in the hub parts 12, as shown in Figure 1. The  
105 spindle parts 20 and 21 may assume a position where the same are out of alignment with respect to the axis of the ferrule 28 and the axis of the hub parts 12, and yet permit of an efficient and neat assemblage of lock parts, wherein there  
110 will be no binding during operation. That is also true of the assemblage in Figure 2, although in this instance the knob cannot be assembled as neatly as desired with respect to the rose D'. There will, however, be no binding of parts as  
115 to interfere with lock bolt actuation.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the  
120 scope of the claims.

We claim:

1. As an article of manufacture a spindle construction for locks comprising a pair of spindle parts of substantially uniform polygonal cross-section, and a universal joint swivelly connecting  
125 said parts together so that they may be angularly moved relative to each other, and rotation of one impart rotation to the other part, said joint in cross section being polygonal and of substantially the same cross-sectional dimensions as each of the spindle parts.

2. In a lock spindle construction the combination of a pair of knob attaching spindle parts elongated and polygonal in cross section, a roll-back hub connecting member of polygonal cross-section, and means keying said spindle parts at opposite ends of the said member in independent pivoted relation thereon so that the said spindle parts may be angularly moved into and out of  
135 aligning relation with respect to each other and with respect to the said member, the outer surfaces of said member when the spindle parts are in axial alignment therewith being substantially flush and contiguous with the adjacent surfaces  
140 of said spindle parts from one end of the spindle construction to the other end thereof.

3. In a lock mechanism the combination of a lock mechanism including a bolt actuating roll back operating upon a fixed axis, and a roll  
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back actuating spindle construction comprising a sleeve removably keyed in non-tiltable fashion in the roll back, and spindle parts having their ends swivelly mounted in the sleeve at opposite ends of the ferrule in rotatably keyed relation with the sleeve. 80

4. In a lock mechanism the combination of a lock mechanism including a bolt actuating roll back hub having a fixed axis of rotation, a roll back actuating spindle construction comprising a sleeve removably keyed in non-tiltable fashion in the roll back hub and spindle parts having their ends swivelly mounted in the sleeve at opposite ends of the ferrule in rotatably keyed relation with the sleeve, said spindle parts being of such cross sectional dimension that the same may be slipped together with the sleeve through the roll back hub. 85

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