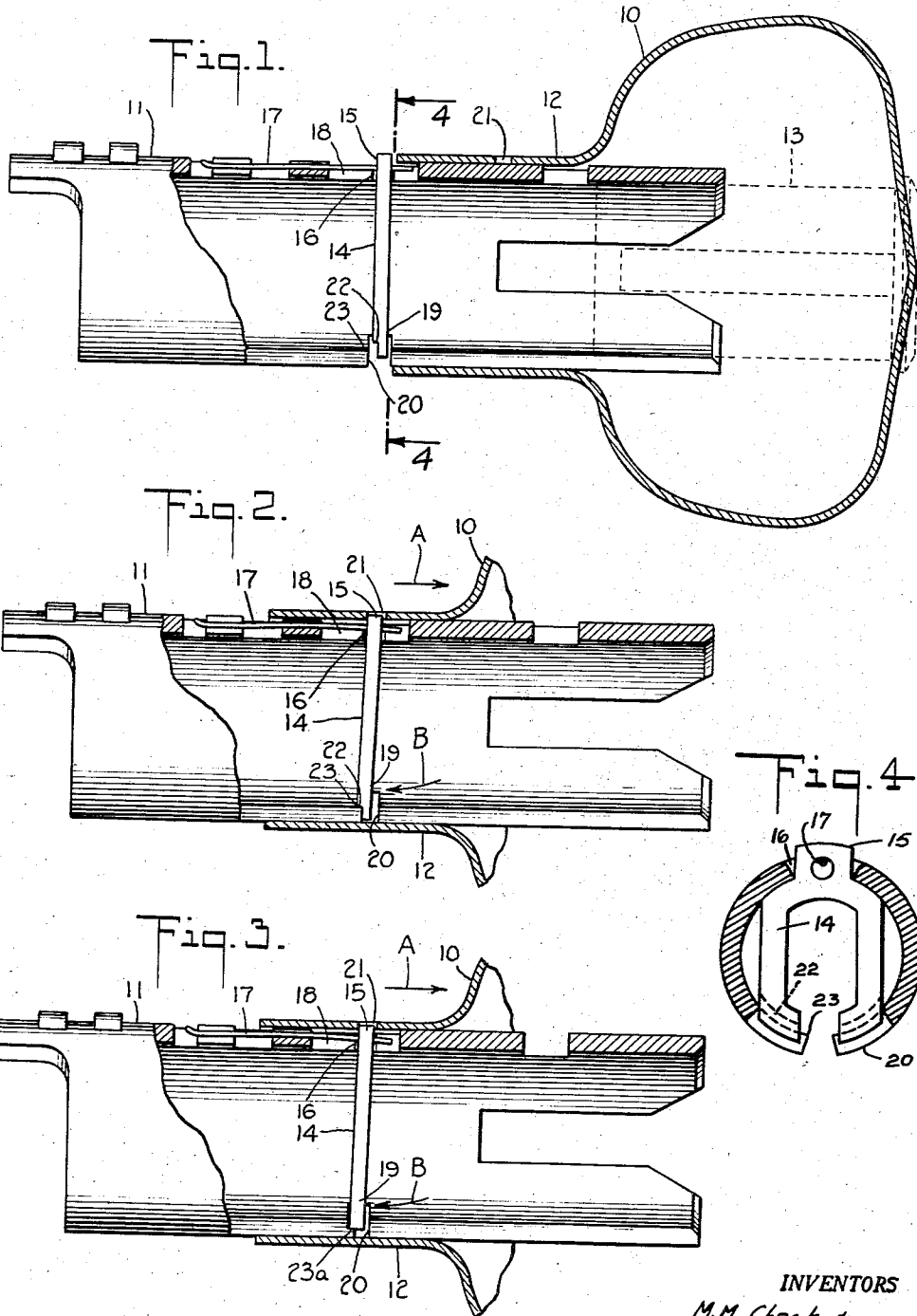


Sept. 2, 1958

M. M. CHECK ET AL  
ANTI-RAP KNOB RETAINER

2,850,313

Filed May 31, 1955



INVENTORS  
M. M. Check +  
R. W. Schmid  
BY  
A. H. Golden  
ATTORNEY

1

2,850,313

## ANTI-RAP KNOB RETAINER

Mathias M. Check, Valley Forge, and Raymond W. Schmid, Havertown, Pa., assignors to The Yale & Towne Manufacturing Company, Stamford, Conn., a corporation of Connecticut

Application May 31, 1955, Serial No. 511,844

5 Claims. (Cl. 292—352)

This invention relates to means for securing a knob to a part of a lock adapted to be operated by the knob. More particularly, our invention relates to means for securing a knob to a sleeve or similar member such as found in cylindrical locks. In this type of lock structure a relatively thin sectioned sleeve is mounted for rotation within a lock casing and a knob is adapted to be fitted on the sleeve, the knob having a sleeve portion for this purpose. There is generally provided a retainer in the form of a spring pressed plate or similar structure carried by the sleeve and adapted to enter an opening in the knob. When the knob opening is aligned with the retainer, the retainer moves automatically into the opening and may be depressed manually to release the knob from the sleeve when such action is desired.

Where the knob is adapted to be utilized on an outside door and to be locked against operation through suitable control means carried by the lock, it is important that the retainer be maintained against operation except when the locking mechanism is in unlocked condition. Otherwise the locked knob could be removed by an unauthorized person. In some locks this is accomplished by mounting the retainer so that it is accessible for operation through an access hole only when the knob and sleeve have been rotated to a particular position, rotation to this position being impossible except when the lock is unlocked and the knob is free for such rotation. In another type of structure the locking mechanism itself, and this may be in the form of a locking cylinder, prevents the depression of the retainer until the locking cylinder has been key operated. While this last type of control of the retainer is quite effective, it is undesirable because the loss of the key to the lock makes it impossible to remove the knob for replacement of the cylinder or the making of a new key. Also, the assembly of the knob is complicated and additional parts are needed.

Therefore, the best form of retaining combination is one in which the retainer is maintained inaccessible for operation until the outside knob and sleeve are rotated to a particular position in which the retainer is accessible for operation. This combination is shown in the patent application of D. L. Biblin, Serial No. 319,824 filed November 12, 1952, now Patent No. 2,800,352, dated July 23, 1957. However, it has been found, that knobs retained as set forth, are subject to attack. Thus, end pressure may be applied in a direction to remove the knob from its sleeve, thereby applying transverse pressure to the retainer. Then, by joggling the entire combination, or "rapping" it as it is called, the retainer is gradually vibrated away from the knob and entirely into the sleeve so as to release the knob. Thereafter, the knob may be removed from the sleeve and the locking mechanism operated surreptitiously.

It is the object of our invention to contribute to the art a retainer of simple construction that cannot be "rapped" out of retaining position. As a feature of our invention we so construct the retainer and sleeve, that

2

any endwise movement of the knob will cock the retainer and lock it securely against vibration out of retaining relation to the knob which it retains on the sleeve. We have found that the use of our combination effectively prevents release "rapping" of retainers and makes unnecessary the holding of the retainers in retaining position by key mechanism. This then makes possible the effective utilization of that type of retainer that can be depressed manually after the retained knob and its sleeve have been rotated to a predetermined position.

We have thus outlined rather broadly the more important features of our invention in order that the detailed description thereof that follows may be better understood, and in order that our contribution to the art may be better appreciated. There are, of course, additional features of our invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception on which our disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of our invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of our invention.

In the drawings:

Fig. 1 shows a longitudinal section of a knob mounting that utilizes our novel retainer structure.

Fig. 2 is similar to Fig. 1 but shows the cocking movement of the retainer.

Fig. 3 is a longitudinal section of a knob mounting utilizing a modified form of our retainer.

Fig. 4 is a cross section on the line 4—4 in Fig. 1.

For the purpose of describing our invention, we show in the drawings a knob mounting of the type described in the above-mentioned Biblin application, Ser. No. 319,824. In the knob mountings of that type, the knob 10 has a tubular part 12 that is fitted upon the spindle sleeve 11 and that moves endwise on the sleeve into and out of assembled position. When the knob is equipped with a key actuated lock cylinder, as we indicate in dotted lines at 13 in Fig. 1, the knob is utilized to hold the cylinder relatively to the spindle sleeve 11.

We utilize in our invention a knob retainer 14 that is mounted in a transverse position on the spindle sleeve 11. This retainer 14 is somewhat like the retainer described in the Biblin application, to which we have referred, but we do construct the retainer 14 with certain extremely novel features, as will appear in due course. The retainer 14 has an end portion 15 that is positioned in an opening 16 in one side of the sleeve 11, and is spring pressed so that this end portion 15 normally projects from the sleeve. For the particular purpose, we show in the drawings a wire spring 17 that is mounted on sleeve 11 in a slot 18, and that is engaged with the retainer 14. As shown in Fig. 1, our knob retainer 14 has an opposed end portion 19 that is normally aligned relatively to an opening 20 that we form in the spindle sleeve 11. Thus, the end portion 19 can move in opening 20 to enable the retainer 14 to be depressed against the pressure of spring 17. The tubular part 12 on knob 10 is formed with an opening 21 that moves into aligned relation to the retainer 14 when the knob 10 moves to assembled position, the arrangement being such that the spring 17 will act automatically to move the end portion 15 on the retainer into the opening 21.

Those skilled in the art will understand that the knob retainer 14 thereby holds the knob 10 assembled to the spindle sleeve 11. The retainer 14 can release the knob 10 only through movement of the end portion 15 of the retainer out of the opening 21. However, it has been found that the prior knob retainers of this class can be

moved to release position through striking or rapping upon the knob 10 while outward pressure is applied to the knob. To understand this releasing movement, it should be observed that an outward pressure on the knob will cause a certain amount of friction relatively to the retainer 14. By rapping upon the knob in a particular way, the retainer 14 may be shifted toward release position against the pressure of its spring 17, while the friction that results from the outward pressure on the knob will prevent the retainer 14 from returning toward locking position. Repeated rapping will actually cause the prior retainers of this class to move to full release position. Through our invention, we are able to utilize the outward pressure upon the knob 10 actually to lock the retainer 14 in retaining position, so that the knob cannot be removed through rapping.

In order to understand our invention, it should be observed that an outward pressure applied to the knob 10, as indicated by the arrow A in Fig. 2, will tend to cock the retainer 14 relatively to the spindle sleeve 11, as indicated by the arrow B. This is because the knob part 12 coacts with the end portion 15 of the retainer at one side of the sleeve opening 16, thereby tending to move the end 19 of the retainer in the opposed direction. We utilize this cocking tendency of the retainer 14 to place its end portion 19 out of aligned relation to the opening 20 in the spindle sleeve 11. Further, we form on the end 19 of the retainer 14 and on the spindle sleeve 11 detent surfaces 22, 23 that move into opposed relation to one another when the retainer 14 cocks. We prefer to form the surface 22 on the retainer 14 particularly as a step, clearly shown in Fig. 1, that is juxtaposed to an inner surface 23 on the sleeve 11 when the retainer 14 moves out of aligned position, as is clearly indicated in Fig. 2. Through the juxtaposed relation of detent surfaces 22, 23, the retainer 14 cannot move to release position when endwise pressure is applied to the knob 10 in an attempt to remove the knob from the spindle sleeve 11.

It is conceivable, of course, that the detent surfaces 22, 23 can be formed in other ways, and we do not wish to be limited to a step on the end 19 of the retainer 14. We may, for example, form the detent surface on the spindle sleeve 11 as a step 23a at one side of the opening 20, as shown in Fig. 3. It is important merely to realize that, in any case, our novel retainer will cock when an unauthorized attempt is made to remove the knob 10, so that the retainer cannot move to release the knob.

We believe that the construction and operation of our exceedingly novel knob retainer will now be understood, and that the very considerable value of our invention will be appreciated by those skilled in the art.

We now claim:

1. In a combination of the class described, a sleeve, a knob having a part fitting on said sleeve, a retainer carried by said sleeve and spring pressed into an opening in said knob part to retain said knob on said sleeve, said sleeve having an opening to allow movement of said retainer against its spring pressure entirely out of said knob opening to permit removal of said knob from said sleeve, and detent surfaces on said retainer and sleeve brought into juxtaposition by movement of said retainer relatively to said sleeve incidental to endwise movement of said knob while the spring pressure holds the retainer in the knob opening.

2. In a combination of the class described, a sleeve, a knob having a part fitting on said sleeve, a retainer carried by said sleeve and spring pressed into an opening

in said knob part to retain said knob on said sleeve, said sleeve having an opening to allow movement of said retainer against its spring pressure entirely out of said knob opening to permit removal of said knob from said sleeve, the attempted removal of said knob acting when said retainer is held by its spring pressure in the knob opening to cock the retainer relatively to said sleeve, and detent surfaces on said retainer and sleeve brought into juxtaposition by said cocking movement of said retainer whereby to prevent releasing of said retainer by rapping or the like.

3. In a combination of the class described, a sleeve, a knob having a part fitting on said sleeve, a retainer mounted for movement on said sleeve and spring pressed into an opening in said knob part to retain said knob on said sleeve, a part of said retainer adapted to align with an opening in the sleeve whereby to move in said opening when the retainer moves against its spring pressure out of the opening in the knob part to release the knob relatively to the sleeve, and said knob moving the retainer relatively to the sleeve to place said retainer part out of aligned relation to the sleeve opening when an attempt is made to remove the knob with the retainer held by its spring pressure in the knob opening.

4. In a combination of the class described, a sleeve, a knob having a part fitting on said sleeve, a retainer mounted for movement on said sleeve and spring pressed into an opening in said knob part to retain said knob on said sleeve, a part of said retainer moving in an opening in the sleeve when the retainer moves out of the opening in the knob part to release the knob relatively to the sleeve, said knob moving the retainer relatively to the sleeve when an attempt is made to remove the knob while held by the retainer whereby to place said retainer part out of aligned relation to said sleeve opening, detent surfaces on said part of the retainer and on a part of the sleeve juxtaposed to said sleeve opening, and said detent surfaces moving into opposed relation to one another to prevent release movement of said retainer when the retainer part moves out of aligned relation to the sleeve opening.

5. In a combination of the class described, a sleeve, a knob having a part fitting on said sleeve, a knob retainer, portions on said sleeve mounting said knob retainer for movement relatively to said sleeve, yielding means pressing said retainer on its mounting whereby to move the retainer into an opening in said knob part to retain said knob on said sleeve, said retainer adapted by yielding of said yielding means to move entirely out of said sleeve, the attempted removal of said knob from said sleeve by endwise movement acting when said retainer is held by said yielding means in the knob opening to cock the retainer on its mounting relatively to said sleeve, and detent surfaces on said retainer and sleeve brought into juxtaposition by said cocking movement of said retainer whereby to prevent releasing of said retainer by rapping or the like.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

1,621,174	Schlage	Mar. 15, 1927
2,085,154	Gredzinski	June 29, 1937
2,294,213	Schlage	Aug. 25, 1942
2,571,767	Schlage	Oct. 16, 1951

##### FOREIGN PATENTS

102,476	Australia	Dec. 4, 1936
---------	-----------	--------------