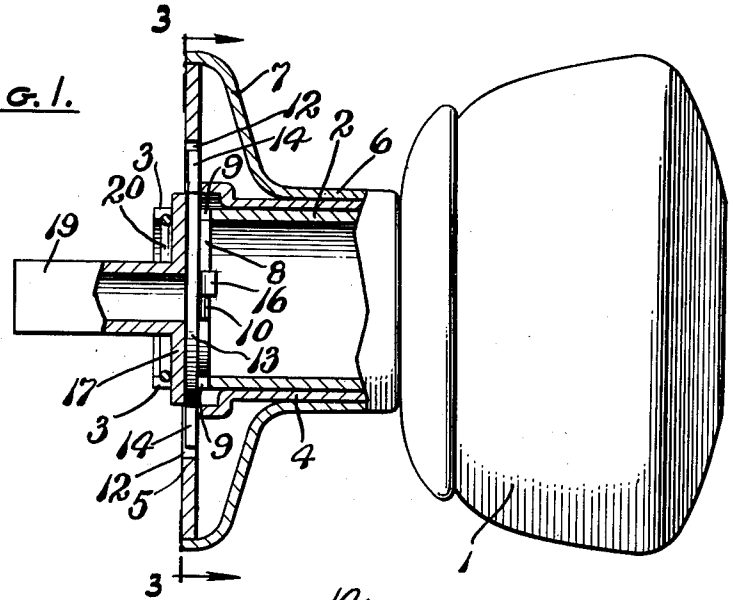
May 3, 1955 H. YOUNG 2,707,649

DOOR KNOB CONSTRUCTION

Filed Feb. 27, 1950

FIG. 1.



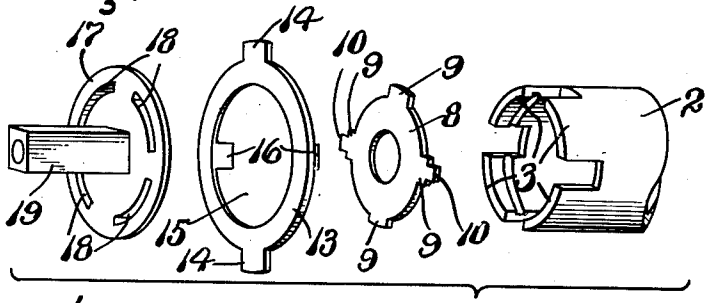


FIG. 2.

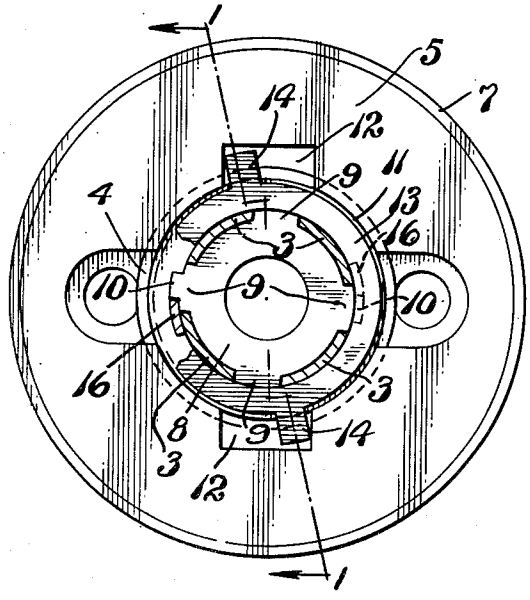


FIG. 3.

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DOOR KNOB CONSTRUCTION

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5 Claims. (Cl. 292—348)

This invention relates to a novel door knob assembly, substantially all parts of which are made as sheet metal stampings. My invention is directed to a knob structure usable in conjunction with a key operated lock. The knob assembly of the present invention is adapted to be used at a side of a door and associated with latch bolt retractor mechanism between knobs on opposite sides of the door for retracting the bolt, when the knob is turned, in either direction, through an arc of 90 degrees from its normal position.

It is desirable that the 90 degree movement in either direction from such normal position shall be complete, but not exceed to any appreciable extent the 90 degrees maximum movement. Therefore, it is necessary that the movement be stopped when such range has been covered.

It is further a serious problem in conjunction with stampings of sheet metal, particularly when they are of a cylindrical or partially cylindrical form, to maintain their dimensions in length within close tolerances. Normally tolerances of one-half a thousandth of an inch, in either direction from a selected dimension are common in mechanisms of the kind which furnish the environment for the present invention. However, to maintain such tolerances with sheet metal, cylindrical stampings of the character stated is difficult and practically impossible except at a prohibitive cost.

It is an object and purpose of the present invention to provide a knob structure which insures the proper stopping of the knob turning, substantially at the end of 90 degrees of turning from a central neutral position, in either direction from such a position, and in such structure use an element of sheet metal which may be of varying thicknesses so that a proper thickness for it may be selected in assembling the complete knob structure, which will balance the lack of close tolerances and compensate therefore. Thus, there is a substantial elimination of longitudinal movement or looseness of the knobs and the connecting means associated therewith. In this manner economy of manufacture is obtained, since the tolerances in connection with the dimensions of the parts may be greatly extended.

An understanding of the invention may be had from the following description, taken in connection with the accompanying drawing, in which:

Fig. 1 is an elevation and partial generally vertical section, substantially on the plane of line 1—1 of Fig. 3.

Fig. 2 is a perspective view of several of the sheet metal parts which are assembled and associated together in my invention, shown separated and disassembled from each other and

Figure 3 is a fragmentary end elevation and section, the plane of the view being that indicated on line 3—3 of Fig. 1, looking in the direction indicated by the arrows.

Like reference characters refer to like parts in the different views of the drawing.

The knob 1, shown in Fig. 1, may be of any suitable structure having connected with and a part thereof, a cylindrical knob shank 2 which extends from the inner side

of the knob toward a side of the door on which the knob assembly is mounted. The knob shank at its inner end portion has a plurality of equally spaced slots, four in number, from its free inner end outwardly for a short distance, leaving four arc shaped tongues 3, equally spaced around the shank as shown in Fig. 2.

The knob shank 2 passes through and is rotatably mounted in a cylindrical sleeve 4. The cylindrical sleeve 4 is integral with a circular plate 5 at its inner end which plate, upon installing on a door, is located against a side of the door. The sleeve 4 is covered by an enclosing outer sleeve 6 enlarged and flared outwardly in a skirt 7, the edge portions of which surround the outer edges of the plate 5, and the edges of which also come against a side of the door on which installed. The member provided by the sleeve 6 and skirt 7 is a common and well known enclosing or covering escutcheon, or "rose" as it is at times named.

A thin, metal disc 8 is provided with four equally spaced arms or projections 9, two of which, diametrically opposite each other, have narrower projections 10 extending therefrom. This disc is received in the knob shank 2, the width of the projections 9 being substantially the same as the width of the slots in the shank, and their outward dimension being substantially equal to the thickness of the metal from which the shank 2 is made. Accordingly, the projections 10 extend beyond the outer curved surface of the shank 2, but the projections 9 do not extend therebeyond.

The plate 5 previously described has a centrally located, generally circular opening 11 therein from which, at diametrically opposite positions, relatively wide slots 12 extend, the slots being produced by cutting from the plate 5. A ring 13 has two opposed projecting fingers 14, and a circular opening 15. From diametrically opposite inner edges of the circular opening 15, two tongues 16 are bent parallel to the longitudinal axis of the knob shank 2. The diameter of the opening 15 is slightly greater than the exterior diameter of the shank 2. Thus the ring 13 may be passed over the shank, and when assembled, is located in the opening 11 in plate 5 with the tongues 14 in the recesses 12 as shown in Fig. 3. The tongues 16 are located at the outer side of the knob shank 2, and extend outwardly, and are in the paths of movements of the projections 10 when the knob shank is turned, the disc member 8 turning with the knob shank.

The knob assembly of the present invention is designed to be used with structures known as "key-in-the-knob-locks" of the type and character shown in application, Serial No. 47,438, filed September 2, 1948, by Herbert Quigley, now Patent Number 2,642,735; or in a later application by myself, Serial No. 115,245, filed September 12, 1949. With such structures, a disc, as shown at 17, is located against the inner side of the ring 13. The disc 17 is provided with four slots 18, curved and properly positioned and of such length that the tongues 3 of the knob shank 2 may pass through them. From the disc 17 a spindle receiving member 19, square in cross-section, and having an axial opening therethrough extends inwardly. With the parts assembled as shown in Fig. 1, they are releasably secured together by a split spring wire locking ring 20, which seats in a groove in the inner faces of the projections 3. The ring 20 is located against the inner side of the disc 17.

This knob assembly may be put together as a unit and later used in the assembly of door lock mechanisms of the character referred to in the previously identified applications, or used for replacement. A supply of rings 13 of various thicknesses of sheet metal is kept available at the time of assembly. The diameters of the cylindrical parts made of sheet metal may be held to close tolerances, but their lengths cannot be, except at what is practically

prohibitive cost. The varying thickness of the ring **13** compensates for the selected lengths of the cylindrical parts of the assembled knob. Each knob assembly has, selected for it, a ring **13** of proper thickness out of a number of rings each of a different thickness of sheet metal. Each thickness of ring is made in large quantities. The use of a ring of proper thickness obviates excessive loose motion, and insures a knob assembly without objectionable slackness and loose motion, within the necessary cost limits.

In operation the knob turns the disc **17** and attached spindle one-quarter turn, or 90 degrees of arc, in either direction of turning from a central position. There is a direct connection between the knob shank and the plate **17**. The range of the movement of the knob shank is controlled by the disc **8** and ring **13** in connection with the tongues **14**, on the ring **13**, extending into the openings or recesses **12** in plate **5**. When the knob is turned, shank **2** turns with it and the disc **8**, being connected with the shank **2**, likewise turns. The disc **8** however is movable only through an arc of 180 degrees from one extreme position to the other. This is because the projections **10** come to the tongues **16** which tongues are connected to the ring **13** and the ring **13** is movable only within the limits permitted by the tongues **14** moving from one side to the other of the recesses **12** in which they are located. The movement of the ring **13** is required in order to compensate for the necessary width dimensions of the tongues **14** and **16** and the projections **10**. Otherwise, the turning movement of the knob **12** would be restricted to less than a total of 180 degrees, from one extreme position to the other, and less than 90 degrees in either direction from a central position. The structure described however, properly designed as to dimensions, insures the full 90 degree arc of movement of the knob in either direction from its normal position, or a total of 180 degrees of movement from one extreme position to the other that the knob may take.

From the foregoing description it is evident that variations in the length dimensions of parts used in the knob assembly, and in the lock with which used, may be compensated for or balanced by selecting the proper thickness or gage of the ring **13**. The ring **13** also secures the results of providing a bearing in connection with the shoulder juncture between sleeve **4** and plate **5**. At the same time it closes the annular opening between the knob shank **2** and the enlarged inner portion of the sleeve **4** shown in Fig. 1, preventing the entrance of foreign matter which otherwise might enter and interfere with the operation of the lock which, in practice, will be mounted axially in the knob **1**. The invention further provides a practical, simple, inexpensive and very efficient stop control for the turning movements of the knob, and yet permits the full necessary 90 degree of movement of the knob in either direction.

The invention is defined in the appended claims, and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. In a structure as described, a plate adapted to be located against and secured to a side of a door, said plate having an opening through it and a recess extending outwardly from said opening, a cylindrical sleeve connected with said plate in axial alignment with said opening, a cylindrical knob shank rotatably mounted lengthwise of and within the sleeve extending through the opening, a ring around said shank located in the opening having a radial projection of lesser width than the width of the recess in the plate extending into said recess whereby the ring has a limited turning movement about the longitudinal axis of the knob shank, said ring having a tongue lying alongside the knob shank, first means connected with and extending radially outwardly from the knob shank to engage said tongue to limit rotation of the knob shank, after said first means engages said tongue and said projection in said recess strikes against a side of the recess, and second means connected with said knob shank for retaining said ring in the opening in said plate.

2. A structure as defined in claim 1, said first means connected with the knob shank including, a disc within said shank having a projection extending through a side thereof beyond the outer surface of the shank, said disc being located with a side thereof in a plane substantially coincident with the adjacent side of the ring, whereby turning movement of said knob shank carries the projection on the disc to a side of the tongue on the ring.

3. A structure as defined in claim 1, said knob shank being longitudinally slotted at a plurality of spaced distances from each other for a distance from the end of the shank in the direction of the length thereof, and said first means carried by the knob shank comprising a flat metal disc located within the shank, having a projection extending radially into the slots in the end of said shank, said projection having an extension projecting radially outward beyond the outer surface of the shank for engagement with said tongue on rotation of said knob.

4. In a structure as described, a cylindrical knob shank, a knob connected thereto at its outer end, a cylindrical sleeve through which said shank passes and in which it is rotatably mounted, a plate connected to the inner end of the sleeve located in a plane at right angles to the axis of the sleeve and having a central opening through which the shank passes, said opening having diametrically opposed radially extending recesses therein, a ring around the knob shank located in said opening having a plurality of radially extending projections located one in each of said recesses, the width of said projections being less than the width of the recesses, said knob shank having a plurality of longitudinal slots at the inner end portion thereof around which the ring is located, a disc within the knob shank having radial arms seated in said slots, two of said arms, diametrically opposed to each other, having extensions projecting beyond the outer surface of the knob shank, said ring having tongues, substantially diametrically opposed to each other, extending outwardly alongside the outer surface of the knob shank, said tongues being in the rotative paths of movements of said extensions and a spindle receiving member detachably connected with said knob shank at its inner end, and at the inner side of said ring, said ring being selected from a supply of rings having different thicknesses.

5. In a handle adapted to be mounted upon a door having a latch assembly therein, the combination including: a handle assembly constituting a knob and tubular knob shank; a plate having a central opening therein, said plate mounted on said door; an arcuate recess in said plate communicating with the central opening in said plate; a tubular sleeve mounted to said plate, said knob shank being rotatably received through said sleeve; an outwardly projecting radial extension secured to said knob shank for rotation therewith; a ring surrounding said knob shank and seated in said central opening in said plate; a projection on said ring seated in said recess and of lesser width than said recess; a tongue on said ring extending along said knob shank externally thereof and adapted to be contacted by said extension upon rotation of said knob assembly; a latch operating member; means for securing said latch operating member to the end of said knob shank with said ring between said latch operating member and said extension.

References Cited in the file of this patent

UNITED STATES PATENTS

2,185,295 Floraday ---------- Jan. 2, 1940

FOREIGN PATENTS

577,759 Great Britain ---------- May 30, 1946