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DOORKNOB ASSEMBLY

2,676,049

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2 Sheets-Sheet 1

FIG. 1

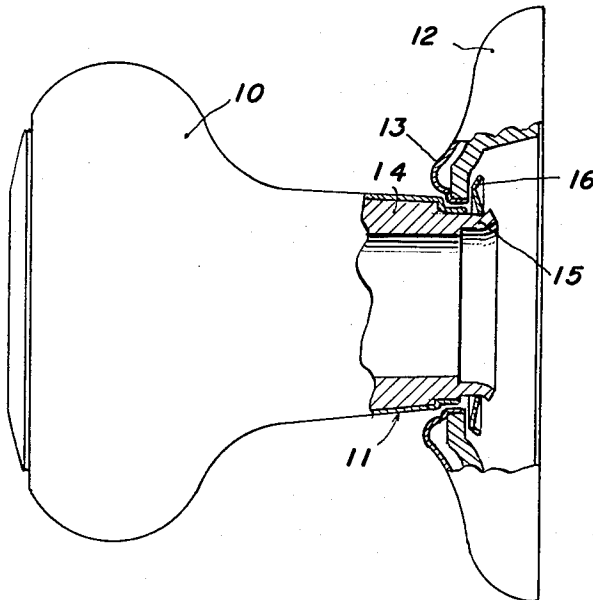


FIG. 4

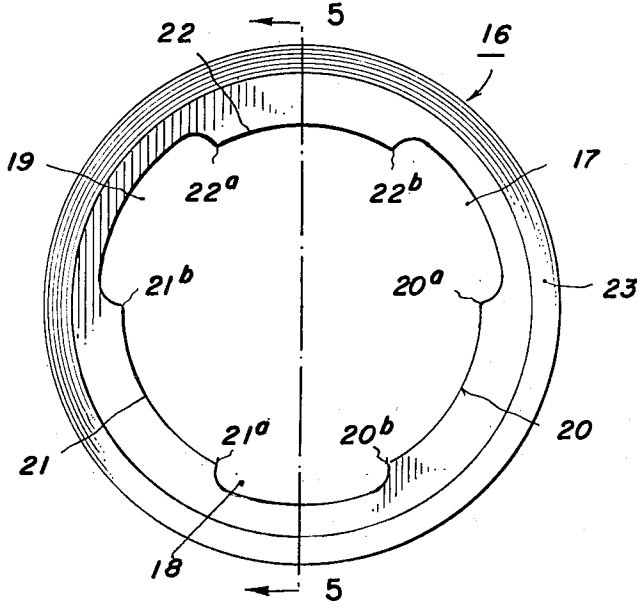
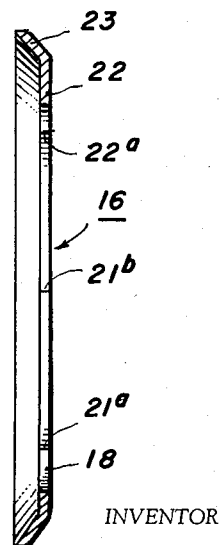


FIG. 5



INVENTOR

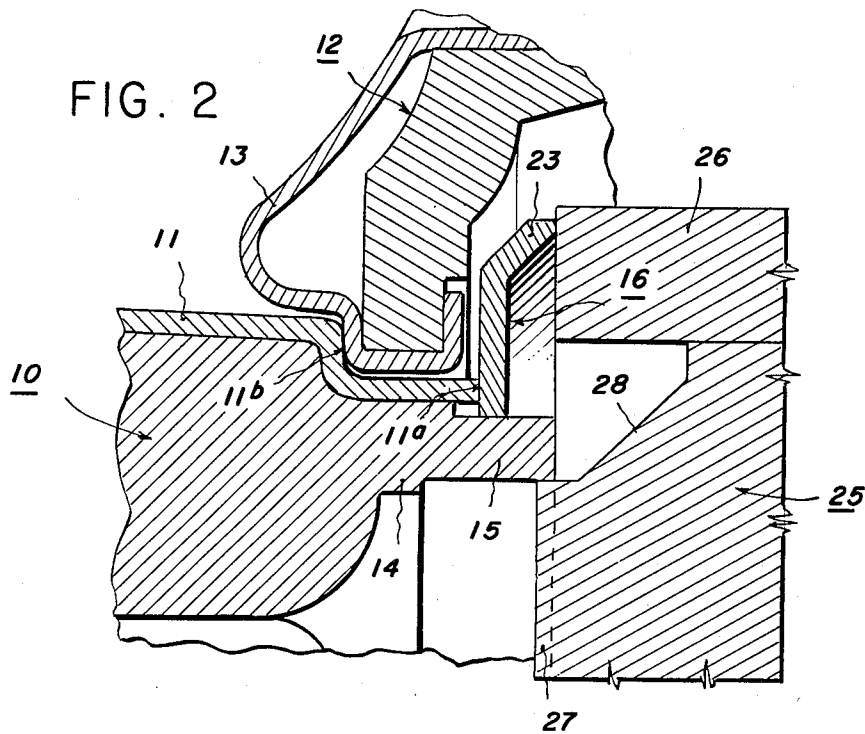
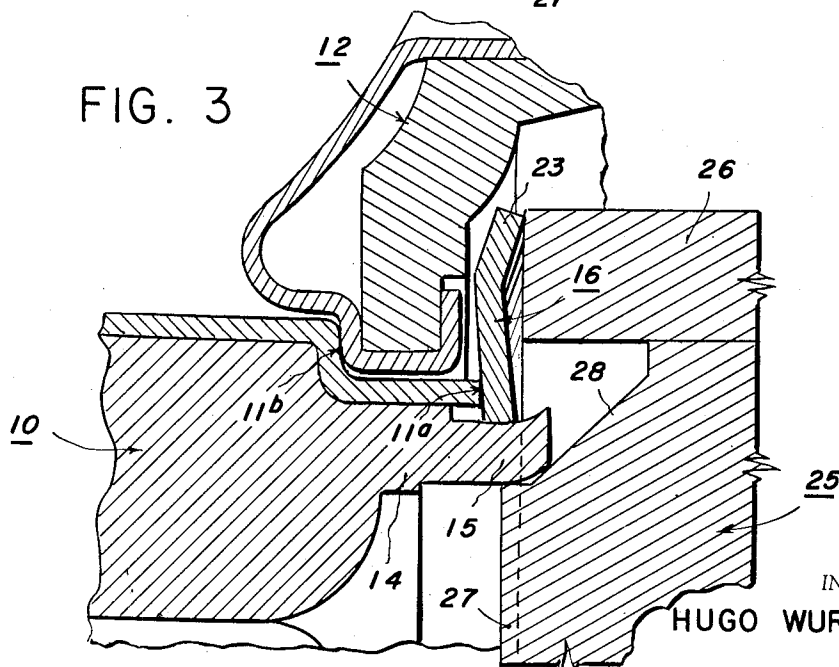
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2 Sheets-Sheet 2



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DOORKNOB ASSEMBLY

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1

This invention relates to improvements in door knob assemblies and to an improved method of producing such assemblies.

A conventional door knob assembly comprises a door knob or handle proper and a plate member, the so-called escutcheon by which the handle is operatively connected to the door. As is well known, the connection of the door knob to an escutcheon presents certain difficulties, because such parts are required to be secured in fixed axial relation, while at the same time the door knob must be capable of limited rotational movement with respect to the escutcheon so that it may operate the spindle of the door latch and/or lock mechanism usually associated with a door knob assembly.

Stated generally, a principal object of the present invention is to overcome the aforementioned difficulties in connecting the knob or handle proper and the escutcheon of a conventional door knob assembly, through the provision of a highly effective yet simplified form of connection between said parts, as well as one which is characterized by the absence of loose or unnecessary part and which provides freedom from lost motion.

More particularly, the invention contemplates the provision of a door knob assembly incorporating a highly effective form of connection between the components of the assembly, as well as a connection which can be easily made.

A more specific object of the invention is to provide a connection for securing the door knob and escutcheon of a door knob assembly in fixed axial relation while permitting relative rotation between said parts, in the form of a specially constructed retaining ring made of deformable metal, and which is so designed and arranged as to be deformed in assembly and, when so deformed, to provide an artificial shoulder capable of securing the components of the assembly against axial separation while permitting relative rotation between the components.

Yet another object of the invention is the provision of a door knob assembly employing a retaining ring form of connector between the parts or components thereof, wherein the retaining ring is provided with inwardly directed prongs which are adapted to bite into and thereby lock with the door knob component of the assembly upon axial pressure being exerted against its outer or peripheral portion, and the ring body is so formed that when the outer periphery of the ring is subjected to axial pressure in the proper direction, the prongs tend

2

to move radially inwardly and bite into the material of the knob.

A still further object of the invention is the provision of a door knob assembly employing a retaining ring form of connector characterized and functioning as in the foregoing, together with means for positively precluding the retaining ring from disassociating itself from the door knob following final assembly of the parts.

Another object of the invention is the provision of a simple and foolproof method of connecting the door knob and escutcheon components of a door knob assembly in such manner that the door knob and escutcheon are effectively secured in fixed axial relation, while at the same time the door knob may rotate with respect to the escutcheon.

The above and other objects and advantages of the invention will be apparent from the following detailed description thereof, taken with the accompanying drawings, wherein—

Fig. 1 is a side elevation, partly in section, of a door knob assembly according to the invention;

Fig. 2 is a quarter section on an enlarged scale illustrating the manner of relating the component parts of the assembly, prior to actual connection thereof being effected;

Fig. 3 is a view similar to Fig. 2 illustrating the assembly upon final connection of the parts;

Fig. 4 is a plan view of a retaining ring type of connector employed in the door knob assembly illustrated in Fig. 1; and

Fig. 5 is a section taken along line 5—5 of Fig. 4.

In the drawing, Fig. 1 is illustrative of a door knob assembly incorporating the improved connection between the shank or spindle of the door knob or handle proper, and which are collectively designated 10, and the escutcheon designated 12, with which the invention is more particularly concerned. As shown, the knob body and escutcheon, both of which may be formed as castings, are enclosed within shells 11 and 13, respectively, as is usual, the shells imparting a finished appearance. The door knob is conventionally provided with a reduced-diameter cylindrical neck 14 which, in the final assembly, is received within an opening provided in the escutcheon 12, the cylindrical surface of which provides a bearing on which the knob may turn with respect to the escutcheon, with the shoulder 11b between the knob and bearing neck providing an abutment for the escutcheon which prevents axial displacement thereof in outward

direction, i. e. towards the handle end of the knob.

As best seen in the enlarged views designated Figs. 2 and 3, the neck 14 is provided with an axial extension 15 having reduced wall diameter as compared to that of the bearing neck 14 and which is further of axial length such that it extends well inwardly beyond the line of the inner face of the escutcheon 12. Illustratively, the portion of the knob shell 11 encircling the neck 14 extends through the opening in the escutcheon plate and terminates in an edge 11a spaced a small clearance distance inwardly of the aforesaid line of the escutcheon inner face, thus to provide a locating shoulder for the retaining ring to be described.

According to the invention, the door knob 10 and escutcheon 12 are effectively secured against axial separation, but in a manner as to permit rotation of the door knob with respect to the escutcheon, by a connector in the form of a retaining ring 16 made of deformable material, preferably soft or unhardened metal, and which functions as an artificial shoulder on the door knob extension 15. Referring to Figs. 4 and 5, the retaining ring 16 is of the full circular type, the diameter of the inner edge of the ring substantially equalling the external diameter of the knob extension 15, and the outer diameter of the ring being substantially greater than that of the escutcheon opening, whereby the ring is adapted to form a shoulder effective against the inner face of the escutcheon. Along its inner periphery, the ring is formed with spaced recesses 17, 18 and 19 which define prongs 20, 21 and 22, the inner edges of the prongs thus extending as arcs of a circle of diameter corresponding to that of the axial extension 15. As best seen in Fig. 4, the ends of the recesses 17, 18 and 19 are appropriately shaped so that the prongs terminate at their ends or corners in sharp points 20a, 20b, 21a, 21b, 22a, 22b. While three prongs have been illustrated, it will be understood that two or a greater number of such prongs may be utilized, the number of prongs depending generally on the particular application.

It will also be seen from Figs. 2 and 5 that the peripheral portion 23 of the retaining ring is offset from, i. e. inclined out of the plane of the ring body, which latter is formed straight so as to extend substantially normal to the axis of the axial extension 15 of the knob.

Connection of the door knob 10 to the escutcheon 12 by means of a retaining ring form of connector as aforesaid may be readily and quickly effected. To achieve same, the neck 14 of the knob is inserted into the opening of the escutcheon to the extent permitted, as determined by engagement of an external shoulder 11b formed on the neck with the outer face of the escutcheon, which latter is appropriately indented to provide a seating recess for said shoulder. By proper dimensioning of the parts, the neck extensions 15 will project a substantial distance beyond the inner face line of the escutcheon, and the shell edge 11a will be contained in a plane having slight inward clearance with respect to the inner face line of the escutcheon. The retaining ring 16, positioned so that its peripheral portion 23 is inclined away from the escutcheon plate, is now positioned over the axial extension 15 until it bears against the inner edge 11a of the neck shell which provides a locating shoulder therefor. At this point it will be observed that the retain-

ing ring 16 is effectively centered on the axial extension 15, by virtue of the fact that the inner diameter of its prongs corresponds closely to the outer diameter of the knob extension.

Upon the retaining ring being placed as aforesaid, the parts will have the relation illustrated in Fig. 2. Axial pressure is now exerted by a punch or other suitable tool 25 against the outer periphery of the retaining ring, with the result illustrated in Fig. 3. In explanation, axial pressure exerted on the inclined outer peripheral portion 23 of the ring results in the ring deforming within the plastic range. Consequent to such deformation, the inclined peripheral portion 23 of the ring tends to straighten out, which in turn results in the prongs being forced radially inwardly by an amount such that they bite into the surface of the axial extension 15 of the knob and positively lock therewith.

According to a further feature of the invention, the retaining ring 16 is positively locked against slipping off the axial extension 15 in axial direction, as might occur when heavy axial thrust is applied to the ring by a person pulling on the door knob 10 with appreciable force. Such is simply achieved by upsetting the end portion of the axial extension 15 of the knob extending beyond the inner face of the retaining ring 16, this upsetting being applied in such manner that it causes the said end portion which as will be seen from the drawings is formed tubular, so that it flares outwardly and thus has appreciably greater diameter than that of the circle containing the arcuate inner edges of the prongs 20, 21 and 22.

Preferably, the aforesaid upsetting operation is carried out substantially simultaneously with and by the same punch utilized in effecting deformation of the retaining ring as aforesaid. Accordingly, the tool 25 is provided with an annular punch portion 26 which is adapted to exert axial pressure on the peripheral portion 23 of the retaining ring as aforesaid, and with a short-length cylindric punch portion 27 which merges into a cone-faced punch portion 28 as shown. The cylindric punch portion 27 has diameter corresponding closely to the inner diameter of the axial extension 15, and it is located axially so that it extends forwardly of and terminates to the rear of the plane of the working face of the punch portion 26. Thus, the cylindric punch portion moves into the bore of the axial extension 15 somewhat before the working face of the punch portion 26 engages the outer edge of the retaining ring 16, and effects a delay of the upsetting of the end of the axial extension 15 until some inward deformation of the retaining ring has taken place, thus insuring that the upset or flared end of said axial extension is located to the rear of the retaining ring rather than in the plane of its body portions. As seen in Fig. 3, the aforesaid arrangement provides that upon the punch 25 completing its stroke, not only is deformation of the retaining ring achieved, but also the end of the axial extension 15 is upset as shown, thus to positively prevent the retaining ring from slipping off the end of said axial extension.

Without further analysis it will be seen that the invention provides a simple yet highly effective form of connection between the knob and escutcheon components of a door knob assembly, which secures the door knob and escutcheon in axially fixed relation, while at the same time permits limited rotational movement of the door

5

6

knob with respect to the escutcheon. The aforesaid connection is moreover characterized by absence of any loose parts or parts which can become loosened, and by proper dimensioning of the parts eliminates lost motion in excess of that required to permit the knob to be freely turned with respect to the escutcheon.

In its method aspects, the invention provides a simple and foolproof method of securing the components of a door knob assembly together, both axially and for relative rotation, as well as a method which may be carried out merely by properly relating the parts and thereupon causing a punch or equivalent tool to partake of a single stroke, which latter completes the connection.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. The method of producing door knob assemblies consisting of a door knob and an escutcheon adapted to be secured in axially fixed yet relatively rotatable relationship which comprises the steps of providing a thin-walled tubular axial extension on the neck portion of the door knob, providing a retaining ring of deformable material having an outer peripheral portion which is offset to the plane of the ring inner edge, and also having along said inner edge a plurality of inwardly directed prongs whose inner edges extend as arcs of a circle having diameter corresponding substantially to the outer diameter of said axial extension, relating said knob, escutcheon and retaining ring in such manner that the axial extension projects through the neck opening of the escutcheon and beyond the line of the inner face thereof, and that the retaining ring is mounted on said axial extension in close proximity to said inner face and in spaced relation from the end of said extension, and with its offset peripheral portion being directed away from said inner face, applying pressure in axial

direction against the peripheral portion of the retaining ring, and simultaneously therewith upsetting the end of the axial extension, thereby causing said ring to straighten and, consequent thereto, the prongs to bite into the material of the axial extension, and also causing an increase in the outer diameter of the end of said axial extension inwardly of said retaining ring.

2. A door knob assembly comprising a door knob having a shank, an escutcheon for operatively securing the door knob to a door and means for connecting said door knob and said escutcheon in fixed axial relation while permitting the door knob to turn relative to the escutcheon, said means comprising a reduced-diameter neck portion extending axially from the shank and being defined therefrom by a shoulder, the neck portion extending through an opening in the escutcheon and providing a bearing for the knob and the shoulder providing an outer abutment for the escutcheon, an axial extension of lesser diameter than the neck portion extending therefrom and being defined from said neck portion by a shoulder disposed substantially on the line of the inner surface of the escutcheon, and a retaining ring of deformable material operatively mounted on said axial extension and in engagement with said last shoulder and providing an inner abutment for the escutcheon, said retaining ring having prongs extending from its inner periphery and being in the state of deformation within the plastic range in which said prongs bite into the outer surface of said axial extension.

3. A door knob assembly as set forth in claim 2, wherein said axial extension is tubular and its inner tubular end is flared outwardly so as to permanently lock the retaining ring against separation from said axial extension.

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