

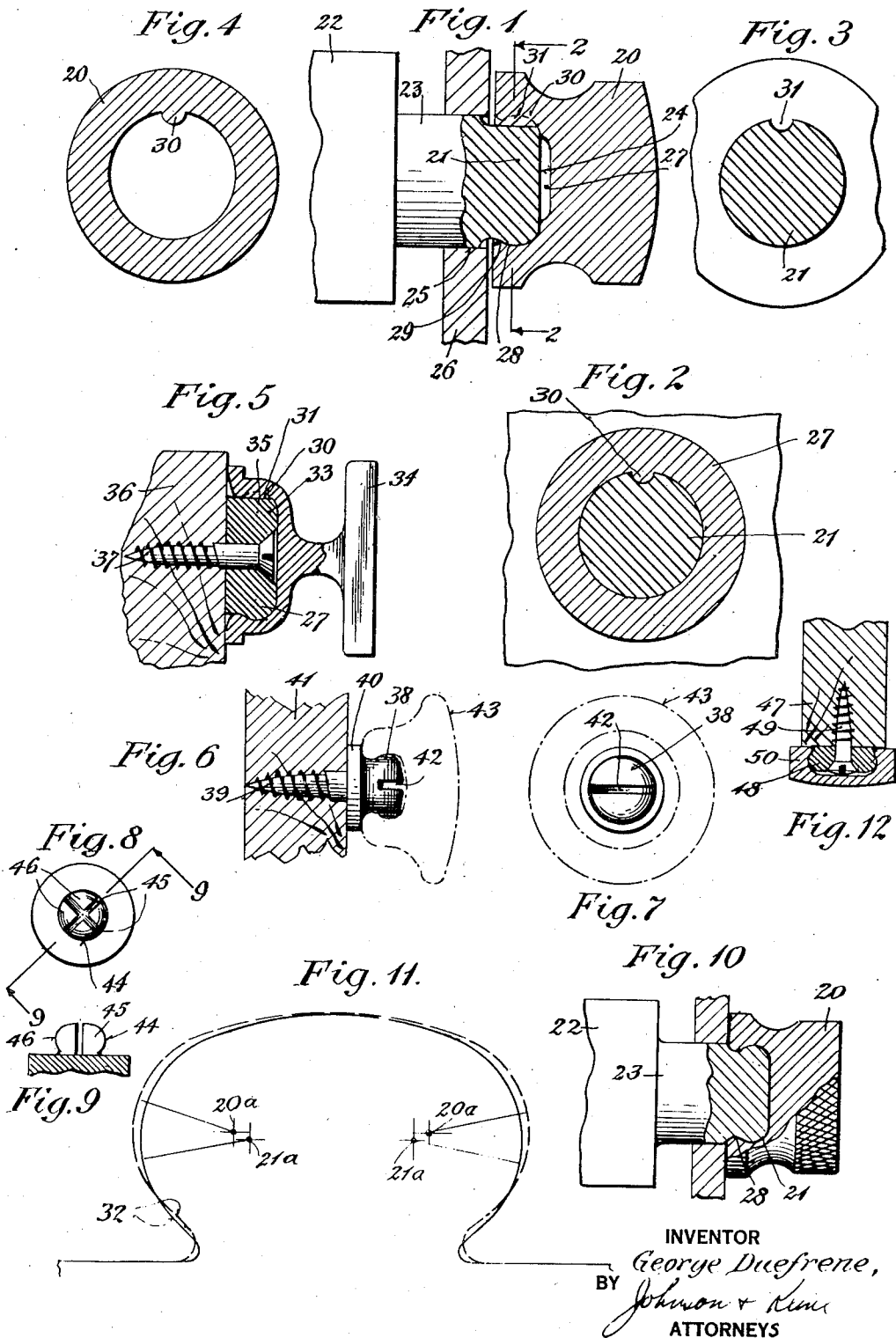
April 20, 1948.

G. DUEFRENE

2,440,170

HANDLES, KNOBS, AND MOUNTING STRUCTURE

Filed Feb. 15, 1944



UNITED STATES PATENT OFFICE

2,440,170

HANDLE, KNOB, AND MOUNTING
STRUCTURE

George Duefrene, Monroe, Conn.

Application February 15, 1944, Serial No. 522,446

17 Claims. (Cl. 16—121)

1

This invention relates to handles, knobs, and the like, and more particularly to improved constructions facilitating the mounting and removal of the knobs.

In instruments such as radios, it has been customary to provide removable knobs on the shafts of the various instruments such as rheostats, variable condensers, and the like. These have, however, involved springs or other extraneous parts to hold the knobs on their mounting means.

According to the present invention, such extraneous means are eliminated, for the connection between the knob and the end of the shaft provided by this invention is such that they depend upon the inherent resiliency of the material of which the knob or the shaft of both are formed to secure them together.

Stated more specifically, the present invention provides a knob member and mounting member therefor, the one having a bulbous head and the other a similarly shaped socket with a constricted opening, the head or socket or both being made of a hard resilient plastic moldable material and the member so made being adapted to yield to permit the bulbous head to enter the socket and be resiliently held therein against casual or unintentional removal.

A feature of this invention is the provision of a driving connection between the knob and the operating shaft whereby torque may be transferred from the one to the other.

The knob and mounting means of the present invention is also applicable for use in connection with articles of furniture, and as such the knob member may constitute a pull-push handle for use on doors or drawers of such articles. When the knob and the mounting means of the present invention are so used, the mounting means may be applied to the furniture or other support before the latter is cleaned and polished, after which the knobs may be snapped onto their supporting means. Likewise, the knobs may be removed from the supporting means at any time by the application of a pulling force accompanied by a tilting motion when, for instance, it is desired to replace one kind of knob with another, or when it is desired to remove the knobs entirely. When the knob of the present invention is used on drawers or doors, they may easily be removed by proper manipulation, and when removed will make it more difficult for the doors or drawers to be opened. This is quite a distinct advantage where there are children about who could not open the door or drawer merely by grasping the mounting means for the knob.

2

The knob and its mounting means of this invention may also be advantageously used as a finial for gliders on furniture legs etc., for it is merely necessary that the mounting means be secured to or otherwise provided on the end of the leg after which the knob, or tip as it then becomes, may be snapped onto the mounting means.

Other features and advantages will hereinafter appear.

In the accompanying drawings—

Figure 1 is a vertical section showing an embodiment of the present invention in which the knob is removably mounted on the end of an adjusting shaft or an instrument, which could, for example, be a rheostat or variable condenser.

Fig. 2 is a transverse section taken on the line 2—2 of Fig. 1.

Fig. 3 is a similar view, but showing the section through the bulbous head alone.

Fig. 4 is like Fig. 3, but shows the knob alone.

Fig. 5 is a horizontal sectional view showing the knob of the present invention mounted on a wooden structure, such as a drawer or door.

Fig. 6 is a similar view showing a modified form of the invention shown in Fig. 5, and showing the knob in dot-and-dash lines.

Fig. 7 is a front view of the mounting member shown in Fig. 6, the knob again being shown in dot-and-dash lines.

Fig. 8 is an end view of a modified form of mounting member.

Fig. 9 is a transverse section taken through the line 9—9 of Fig. 8.

Fig. 10 is a view similar to Fig. 1, but showing a construction where the knob so tightly grips the bulbous head as to require no other driving connection between the knob and the shaft.

Fig. 11 is a diagrammatic view showing the contour or profile of the bulbous head in full lines and the socket in dash lines while the parts are separated and unstressed by each other, the lines being superposed for comparative purposes.

Fig. 12 is a vertical section of a furniture leg or like article to which the device of this invention may be applied as a knob or glider.

As shown in the accompanying drawings, the device of the present invention comprises a knob member 20 and a mounting member 21. In the form of the invention shown in Fig. 1, the knob member 20 constitutes an adjusting knob for a variable condenser, rheostat or other instrument 22 which is to be adjusted. The instrument 22 has a shaft 23, and, according to the present invention, the shaft terminates in a bulbous head 24 which may be, and preferably is

3

in most situations, formed integrally with the shaft 23. The bulbous head may have an enlargement on the end of the shaft 23, but preferably it has a maximum diameter not substantially greater than the diameter of the shaft, especially when formed integral with the shaft so that the end of the shaft may be passed through a hole 25 in an instrument or similar panel 26 before the knob 20 is applied to it.

As shown in Fig. 1, the knob 20 has a cavity 27 having a constricted entrance opening 28. The surfaces of cavity 27 and bulbous head 21 are substantially the same shape. The entrance opening 28 of the cavity 27 is chamfered slightly as at 29 so that when the rounded head 21 is forced against the entrance opening 28, the bulbous head attenuates or the entrance opening of the cavity dilates, or both these actions take place, depending on whether the one, the other, or both of the cooperating parts are made of resilient material.

According to the present invention, one or the other or both of these parts may be made of hard resilient molded plastic material, such as cellulose acetate compositions, and hence when the head and socket are forced together, the part or parts which are so formed yield to permit the head to enter the socket and subsequently contracts to hold the head therein against casual separation.

Other moldable plastic materials than cellulose acetate may, of course, be used so long as they are substantially hard, and therefore sustaining and yielding and resilient enough to deform and reassume their original form, or nearly that, after the parts are united.

Thus it will be seen that with the present invention the instrument 22 may be mounted behind the panel 26 with the shaft projecting therethrough, and later the knob may be snapped over the bulbous end or head 21 of the shaft. If it is desired to remove the knob, it is merely necessary to apply a pulling force to it and at the same time a tilting force to cause the entrance opening 28 to dilate and permit the head to escape from the socket.

In the broader aspects of this invention, the knob 20 may be coupled with the shaft 21 for transmission of torque between them in any suitable way. One way of accomplishing this is to provide on the head and socket cooperating notches and projections which interengage when the knob is snapped on the head. In the form shown in Figs. 1 and 2, this is accomplished by providing a round projection or head 30 on the wall of the socket 27 which fits into and interengages with a notch 31 in the head 21. The projection 30 and notch 31 extend parallel to the axis of the shaft 23 and thus do not oppose the sliding movement of the knob over the head. Yet, when these parts are assembled as shown in Fig. 1, a positive driving connection is formed between the knob and the shaft.

However, it is not necessary in all instances to provide projections and notches on the knob and head in order to obtain a torque transmitting connection. For instance, as shown in Fig. 10, the head and socket may be perfectly circular and uninterrupted, provided the socket is made so that the material of the knob and/or the head is kept under stress when the parts have been snapped together. This may be accomplished by forming the head and socket so that in their unstressed condition they have slightly different shapes. For instance, as shown in Fig.

4

11 in which the knob 21 is represented by a solid line, the center of curvature 21a of the head is slightly lower than the center of curvature 20a of the socket, with the result that the superposed profiles overlap at 32 and would tend to occupy the same space. The result of this mutual interference is that when the parts are snapped together, the material of the socket will be forced outwardly or the material of the head will be forced inwardly, depending upon which more readily yields, and this stressed condition will be so maintained so long as the parts are together. A clamp or brake action is thereby set up between the head and the socket, and with a construction substantially as illustrated in Fig. 10, in which the diameter of the head was approximately $\frac{1}{2}$ " and the material of the head and socket was made of a cellulose acetate product known as "Tenite," the grip between the head and socket was such that a torque of 20 foot pounds could be transmitted from the knob to the shaft without slipping.

The knob of the present invention may be used with equal facility as a pull knob such as on drawers, doors, etc. For instance, as shown in Fig. 5, the knob 33 has a handle portion 34 and a socket 27 which snaps over a bulbous head 35 in the same manner that the knob 20 snaps over the head 21 in the form of the invention shown in Fig. 1. In this figure, however, the head 35 is made of a separate piece, preferably of a hard resilient plastic moldable material, and is secured to the supporting structure 36 by a wood screw 37. With this construction, the head 35 may be fastened to the door or drawer by the wood screw 37, and after the furniture is cleaned and polished the knob 33 may be snapped in place on the head. Likewise, if it is desired to clean the furniture the knob may be removed by pulling, at the same time tilting, it while holding the structure 36 firmly against movement. When the knob is so made that it is placed and maintained in the particular angular position, for instance when it is a flat handle portion 34 as shown, interlocking projections and notches 30 and 31 may be provided as in the case of the device shown in Fig. 1, if desired.

It is not necessary that the head on which the knob is mounted be made of plastic or moldable material. For instance, it may be a metal knob 38 as shown in Fig. 6, in which case it constitutes the head of a screw 39 which may or may not have a flange 40 to space the head from the supporting structure 41 as desired. The head 38 may have a screw slot 42 by means of which the screw is turned into the wood or other support 41. In this case, the knob 43 being made of hard resilient plastic moldable material, and the head 38 being made of metal, all of the yielding occurs in the knob, the head being substantially incompressible. With this construction, as with the construction shown in Fig. 5, the screw to support the knob may be inserted from the outside of the drawer or door or other support, and is covered or concealed by the knob.

As shown in Figs. 8 and 9, the head 44 may have one or more transverse slots 45, thereby facilitating the distortion of the head and permitting the segments 46 of the head to move individually toward the center of the head when the knob or cap is forced over it.

As shown in Fig. 12, the device of the present invention may also be used for finials on the ends of parts of furniture, for instance as gliders on furniture legs. As shown in this figure, the

5

furniture leg 47 has a head 48 secured to it by a screw 49, and the cap 50 is snapped over the head 49 the same as the knob 20 is snapped over the head 21 in the forms of the invention shown in the other figures. In this situation, the cap 50 need not so tightly fit on the head as to be clamped thereto against turning. The cap may be loose and substantially free-turning on the head if desired.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. A handle structure comprising a mounting member and a knob member, one of said members having a bulbous head and the other a socket to receive it, the socket being formed by a cavity having a constricted entrance opening to resist passage of the head into and out of the cavity and the center of curvature of the side wall of the head being inwardly displaced from and lower on the head than the center of curvature of the corresponding side wall of the socket, at least one of said members being made of hard resilient molded plastic material which yields to permit the forced passage of the bulbous head into the cavity and resiliently holds the same therein against casual separation to thereby secure the mounting member and knob member together.

2. A handle structure comprising a mounting member and a knob member, one of said members having a bulbous head and the other a socket to receive it, the socket being formed by a cavity having a constricted entrance opening to resist passage of the head into and out of the cavity and the center of curvature of the side wall of the head being inwardly displaced from and lower on the head than the center of curvature of the corresponding side wall of the socket, said head and socket being made of hard resilient molded plastic material which yields to permit the forced passage of the bulbous head into the cavity and resiliently holds the same therein against casual separation to thereby secure the mounting member and knob member together.

3. A handle structure comprising a mounting member and a knob member, one of said members having a bulbous head and the other a socket to receive it, the socket being formed by a cavity having a constricted entrance opening to resist passage of the head into and out of the cavity and the center of curvature of the side wall of the head being inwardly displaced from and lower on the head than the center of curvature of the corresponding side wall of the socket, said socket being made of hard resilient molded plastic material which yields to permit the forced passage of the bulbous head into the cavity and resiliently holds the same therein against casual separation to thereby secure the mounting member and knob member together.

4. The invention as defined in claim 3, in which the mounting member comprises a screw having the bulbous head formed at the end of the screw shank.

5. The invention as defined in claim 1, in which the head and socket members are circular and the head fits in the socket member so tightly as to establish a torque transmitting connection between said knob member and said mounting member when said members are assembled.

6. The invention as defined in claim 1, in which the head and socket have interengaging recesses and projections establishing a torque transmitting connection between said knob member and

6

said mounting member when said members are assembled.

7. The invention as defined in claim 1, in which the head and socket have interengaging key-like recesses and projections whereby relative rotary movement between said knob member and said mounting member is prevented when said members are assembled.

8. A handle structure comprising a mounting member and a knob member, one of said members having a bulbous head and the other a socket to receive it, the socket being formed by a cavity having a constricted entrance opening to resist passage of the head into and out of the cavity and the center of curvature of the side wall of the head being inwardly displaced from and lower on the head than the center of curvature of the corresponding side wall of the socket, at least one of said members being made of cellulose acetate material which yields to permit the forced passage of the bulbous head into the cavity and resiliently holds the same therein against casual separation to thereby secure the mounting member and knob member together.

9. The invention as defined in claim 1, in which the head is provided with an aperture through which a mounting screw may extend to fasten the head to a supporting structure.

10. The invention as defined in claim 1, in which a handle portion of the knob member is noncircular and is to be mounted in a particular angular position, and in which there is means for preventing the knob member from turning relative to the mounting member when the members are assembled.

11. The invention as defined in claim 1, in which the profile curvature of the outer surface of the bulbous head and the inner surface of the restricted cavity in unstressed conditions of the head and socket overlap whereby at least one of said parts is placed under stress when said head is located in said socket.

12. In combination with an instrument to be adjusted, an adjusting shaft connected to said instrument and an operating knob therefor, said shaft having a bulbous head on its end and said knob having a cavity provided with a restricted entrance opening forming a socket for said head, said restricted entrance opening being adapted to resist passage of the head into and out of the cavity and the center of curvature of the side wall of the head being inwardly displaced from and lower on the head than the center of curvature of the corresponding side wall of the socket, and said socket being made of hard resilient molded plastic material which yields to permit the forced passage of the bulbous head into the cavity and resiliently holds the same therein against casual separation to thereby secure the shaft and knob together.

13. The invention as defined in claim 12, in which the head and socket members are circular, and in which the head fits in the socket member so tightly as to establish a torque transmitting connection between said knob and said shaft.

14. The invention as defined in claim 12, in which the head and socket have interengaging recesses and projections establishing a driving connection between said shaft and said knob when the knob is assembled on the shaft.

15. The invention as defined in claim 12, in which the shaft projects through an opening in a panel and the largest diameter of the head is less than the diameter of the hole in the panel so that the shaft may be inserted through the

panel and subsequently have the head mounted thereon.

16. The invention as defined in claim 1, in which the top of the head is provided with a transverse slot and the bottom of the socket is provided with a transverse rib having a slot when the members are assembled to hold the mounting member and knob member against relative rotation.

17. The invention as defined in claim 1, in which the head has a transverse slot to increase its resiliency and yieldability.

GEORGE DUEFRENE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date	
630,847	Bofinger	Aug. 15, 1899	20

Number	Name	Date
726,265	Dawes	Apr. 28, 1903
815,055	Weiss	Mar. 13, 1906
859,234	Little	July 9, 1907
899,260	Parkinson	Sept. 22, 1908
1,294,273	Jagar	Feb. 11, 1911
1,387,109	Carr	Aug. 9, 1921
1,477,523	Ruttenberg	Dec. 11, 1923
1,500,389	Holmes	July 8, 1924
1,815,165	Scofield	July 21, 1931
1,832,554	Holstein	Nov. 17, 1931
2,171,361	Gits et al.	Aug. 29, 1939
2,191,294	Turner	Feb. 20, 1940
2,222,336	Domellof	Nov. 19, 1940
2,262,064	Swan	Nov. 11, 1941
2,271,266	Kost	Jan. 27, 1942
2,322,949	Lux	June 29, 1943