This invention relates to means for frictionally securing two telescoping parts together without the use of set screws, and other devices requiring manipulation, as for instance, the knobs of radios to the shafts of the controls of the radio apparatus. The knobs are usually ornamental and furnished to the radio manufacturer who applies them to the spindles or shafts of radio control mechanism. In knobs of this class, the springs which frictionally hold the knobs onto the shafts collapse due to undue straining beyond their elastic limit, and hence, the knobs become loose on the shafts. Oftentimes, the resiliency of the spring is wholly destroyed. This invention relates to means for preventing straining of the spring beyond its elastic limit.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawing, in which like characters designate corresponding parts in all the views.

Figure 1 is an enlarged, fragmentary, sectional view through a radio knob provided with my invention, the shaft of one of the radio controls being also shown.

Figure 2 is a sectional view through the socket of the knob, taken on the plane of 2—2, Figure 1.

Figure 3 is a sectional view on line 3—3, Figure 2.

Figure 4 is an end view of the socket member, the shaft being removed.

Figure 5 is a sectional view, similar to Figure 3, showing a modified form of the spring.

Figure 6 is a sectional view on line 6—6, Figure 5.

Figures 7 and 8 are views similar to Figures 5 and 6, of another form of the spring.

1 designates the knob, which is formed with a socket for receiving the end of the shaft. The knob and the shaft are thus one exemplification of two telescoping parts to be detachably or frictionally secured together. The knob 1 may be of any suitable form, size and construction, and the socket, of metal or other suitable material in the illustrated form of the invention, is provided in a metal socket member or bushing 3, which is forced into or embedded, or otherwise inserted in the body of the knob 1. This body may be of wood, or wood fibre, metal, bakelite, or any other suitable material, and the inserted socket omitted. In most instances, especially where a wood or fibre knob is used, it is preferable to use an inserted socket member.

The socket member 3, whether inserted or otherwise, is formed with a socket or recess 4 having a flat wall 5 on one side thereof, and a wall 6, which is usually concave, opposed to the wall 5. This concave wall, as seen in Figure 2, is made up of sides which are the chords of an arc. The end of the shaft 2 is formed with a flat side 7 opposed to the flat wall 5, and with an arc-shaped, or semi-circular side 8, which engages the wall 6 at a plurality of points, as at 9.

10 designates a flat bowed spring in the socket between the flat wall 5 and the flat side 7 of the shaft. This spring is usually arranged with its end portions engaged with the flat wall 5 of the socket, and its intermediate portion pressing against the flat side of the shaft.

The construction thus far described is old, insofar as this invention is concerned.

This invention relates to means for preventing undue collapse or straining of the spring 10. This means comprises shoulders located to limit the collapsing movement of the spring. Preferably, these shoulders are provided along the side margins of the flat wall 5 of the socket member and project under the intermediate portion of the spring, and are normally spaced apart therefrom to permit the spring to have a limited flattening or collapsing action.

11 designates the shoulders which extend inwardly from the base end of the socket member along the side margins of the flat wall 5 of the socket, and terminate short of the entrance, or the outer end of the socket. As seen in Figures 2 and 3, the spring 10 is formed with its inner end portion 12 of less width than its remaining portion, and this
portion 12 extends between the shoulders 11 and the end thereof thrusts against the flat wall 5 of the socket, or the corners formed by the flat wall 5 and the inner end wall of the socket. The intermediate or wider portion of the spring extends over the shoulders, as shown in Figure 3. The extreme outer ends of the spring engage on the flat wall 5.

As here illustrated, the free end of the spring is bifurcated by a slot 13, and the bifurcations spread laterally slightly in order that the corners 14 thereof may dig into, or frictionally engage, the side walls of the socket. The spring may also be formed with an opening 15, for a purpose to be presently described.

The socket is also provided with means for guiding the spring when being moved into the socket and slightly tensioning or flattening it so that the spring will not bulge or bow too far into the space to be occupied by the shaft and unduly resist the forcing of the knob or socket onto the shaft. This means is here illustrated as shoulders 20 extending lengthwise of the socket and opposed to the shoulders 11 forming a groove 21 between the shoulders 20 and 11, these shoulders being located above the outer edges of the inclined or concave walls 6 of the socket.

The spring 10 is forced into the socket along the grooves 21 by means of a suitable tool, and the natural tendency is to force it completely into the socket so that the inner end thereof seats in the corner at the bottom of the socket, as shown in Figure 1. The inner portion 12 of the spring extends between the shoulders 11, and the wider portion of the spring passes in the grooves 21 and the spring is slightly flattened by engagement with the shoulders 20.

In forcing the spring into the socket, the split bifurcated outer end thereof grips the side wall of the socket. When the knob is first applied, the spring may, or may not, creep toward the outer end of the socket. This feature is of no importance.

When the shaft is inserted in the socket, the spring flattens slightly, and its flattening is limited by the shoulders 11.

The split or bifurcated end may be omitted, and the spring held in the socket solely by reason of the outer edge of the spring frictionally engaging the flat wall 5 of the socket. The opening or hole 15 is for the purpose of removing the spring by a hook shaped tool, and may be omitted.

In Figures 5 and 6, the spring 16 is prevented from undue straining by angular lugs 17 projecting from the side margins of the spring 18 to limit the flattening of the spring. When this form of spring is used, the socket is provided with the shoulder 11.

In Figures 7 and 8, the spring designated 18 is of full width throughout its length, that is, it is not formed with a narrower portion 12, and the inner end edge at the inner corners of the spring rest on, or thrust against the shoulder 11 so that the inner end is in a different plane from the front end. The shoulder 11 prevents undue flattening and hence, straining of the spring beyond its elastic limit. This construction, as well as the construction shown in Figures 5 and 6, permits a maximum of stock to remain in the spring, or avoids weakening of the spring by cutting out portions thereof to form a narrower portion, as 12, Figures 2 and 3.

In any form of my invention, the spring is prevented from being collapsed beyond its elastic limit.

What I claim is:

1. The combination with two parts to be fastened together, one being a socket, and the other a shaft for entering the socket, the socket having a flat wall, of means for securing the shaft in the socket comprising a bowed spring located in the socket and frictionally held therein, and the spring having its ends coacting with the flat wall, and its intermediate portion coacting with the shaft, the socket having elongated shoulders at opposite margins of its flat wall, and the spring having one end portion extending between said shoulders and an intermediate portion of greater width than said end portion overhanging said shoulders and spaced therefrom, the outer end of the spring being of greater width than the remainder of the spring and arranged to snugly fit between opposite walls of the socket between which the flat wall is located.

2. The combination with two parts to be fastened together, one being a socket, and the other a shaft entering the socket, of a bowed spring in the socket and having its end engaged with one of the side walls of the socket, and its intermediate portion arranged to engage the shaft, the socket being formed with shoulders extending under the intermediate portion of the spring for limiting the compressing movement thereof, the outer end of the spring being of greater width than the remainder of the spring and arranged to snugly fit between the walls of the socket between which said flat wall is located.

3. The combination with two parts to be fastened together, one being a socket, and the other a shaft for entering the socket, the socket being formed with a flat wall on one side thereof and with a concave wall opposed to said flat wall, and the shaft having its end provided with a flat face on one side thereof, and an arcuate face for engaging the concave wall of the socket, a bowed spring in the socket and having its end portions coacting with the flat wall of the socket and its intermediate portion coacting with the flat side of the shaft, and means for limiting the flattening movement of the spring, said means comprising shoulders projecting from the flat.
wall and extending under the intermediate portion of the spring.

4. The combination with two parts to be fastened together, one being a socket, and the other a shaft for entering the socket, the socket being formed with a flat wall on one side thereof and with a concave wall opposed to said flat wall, and the shaft having its end provided with a flat face on one side thereof, and an arcuate face for engaging the concave wall of the socket, a bowed spring in the socket and having its end portions coacting with the flat wall of the socket and its intermediate portion coacting with the flat side of the shaft, and means for limiting the flattening movement of the spring, said means comprising shoulders projecting from the flat wall and underlying the intermediate portion of the spring, said shoulders extending from the inner end of the socket and terminating short of the outer end, the spring having an inner portion extending between the shoulders and its intermediate portion overhanging the shoulders.

5. The combination with two telescoping parts to be fastened together, one being a socket member and the other a shaft for entering the socket member, the socket member having a flat wall and the shaft a flat side opposed to said wall, of means for securing the shaft in the socket member comprising a bowed spring member having its ends engaging the flat wall of the socket member and its intermediate portion arranged to engage the flat side of the shaft, one of said members having a projection extending into the space between the intermediate part of the spring and the flat wall of the socket member for limiting the flattening movement of the spring.

6. The combination of a member having a socket for receiving a shaft, and a bowed spring in the socket, said spring having its ends engaged with one of the sides of the socket, and its intermediate portion arranged to engage the shaft, the socket being formed with shoulders extending toward the intermediate portion of the bowed part of the spring for limiting the compressing movement thereof.

7. The combination of a member having a socket for receiving a shaft, and a bowed spring in the socket, said spring having its ends engaged with one of the sides of the socket and its intermediate portion arranged to engage the shaft, the socket being formed with grooves in its sides and the bowed portion of the spring projecting at its side margins into the grooves for the purpose set forth.

8. The combination of a member having a socket for receiving a shaft, the socket being formed with a flat wall, and means for securing the member to a shaft in the socket including a bowed spring located in the socket and frictionally held therein, and the spring having its ends coacting with the flat wall, and its intermediate portion coacting with the shaft, the socket having elongated shoulders at opposite margins of its flat wall, and the spring having one end portion extending between said shoulders, and an intermediate portion of greater width than said end portion overhanging said shoulders and spaced therefrom.

In testimony whereof, I have hereunto signed my name at Syracuse, in the county of Onondaga and State of New York this 13th day of March, 1931.

ADOLPH M. HOLSTEIN.