

Jan. 26, 1937.

R. E. NEWELL ET AL

2,068,693

DIAL ASSEMBLY

Filed March 22, 1935

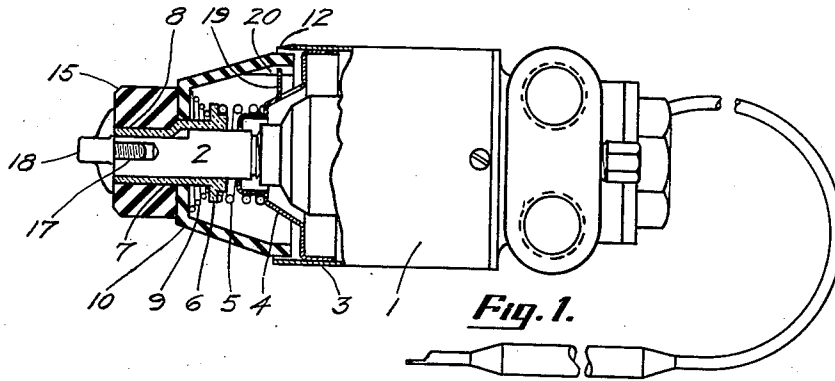


Fig. 1.

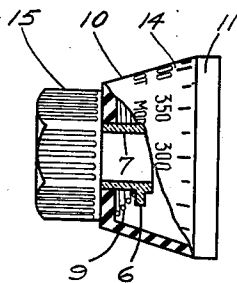


Fig. 2.

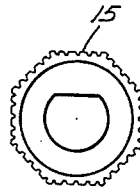


Fig. 3.

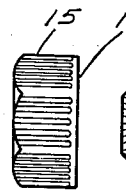


Fig. 5.

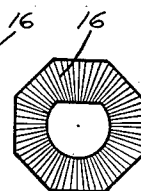


Fig. 4.

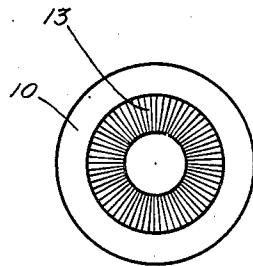


Fig. 6.

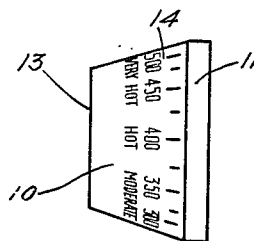


Fig. 7.

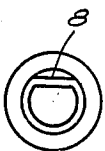


Fig. 8.

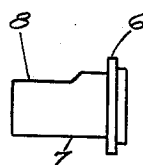


Fig. 9.

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UNITED STATES PATENT OFFICE

2,068,693

DIAL ASSEMBLY

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Application March 22, 1935, Serial No. 12,492

14 Claims. (Cl. 116—133)

This invention relates to dial assemblies of the adjustable type whose calibrations may be readily set in proper relation to the structure to which the assembly is connected.

- 5 Although our new dial assembly will be illustrated and explained in connection with a gas oven thermostat for which it is particularly adapted, it may be applied to various other structures.
- 10 On placing a dial assembly on the regulating shaft of a gas oven thermostat, the dial readings must be checked so that the thermostat will operate the gas supply valve when the oven reaches the temperature to which the dial is set. If the
- 15 thermostat operates the valve at a temperature other than that of the dial reading, the dial must be adjusted so that its reading is the same as the actual temperature at which the valve was operated with that particular setting of the thermostat. In other words, the rotary relationship
- 20 of the dial and the shaft must be changed by turning the dial without turning the shaft. Of course, after the dial is correctly adjusted, means must be provided for holding said dial
- 25 fixed in this position relative to the regulating shaft.

Heretofore, several types of dial assemblies have been provided with this adjustment in view, but they are objectional in some respects. Many of these have screws which must be loosened before adjusting the dial and then tightened, after adjustment, to hold the dial in place on the shaft. Inconvenience and difficulty arise not only in loosening screws that have become unusually tight,

30 but in holding the shaft stationary during the loosening operation and in keeping both the shaft and the dial in the desired positions while tightening the screws.

Another objection applicable to many of the dial assemblies now in use is the fact that they can not be removed from the regulating shaft, as for instance, for installation purposes, without getting out of adjustment.

It is the object of our invention to provide a dial assembly which may be easily and accurately adjusted without disturbing the thermostat setting, which may be removed from the regulating shaft and replaced thereon without readjustment being necessary, and which offers means whereby the

45 shaft and dial may normally be rotated as a unit in the usual manner.

In the accompanying drawing:

Figure 1 is a view of the dial assembly as applied to an oven thermostat, the dial assembly

55 being shown in section;

Figure 2 shows the dial assembly dissociated from the thermostat and regulating shaft, a part of the dial being broken away;

Figures 3 and 4 are end views of the knob portion of the assembly;

Figure 5 is a side elevation of the knob in Figures 3 and 4;

Figure 6 is an end view of the dial portion;

Figure 7 is a side elevation of the dial in Figure 6;

Figure 8 is an end view of the sleeve which supports the assembly; and

Figure 9 shows a side view of the sleeve of Figure 8.

As shown in the drawing, the oven thermostat, indicated generally by the number 1, is of the bellows type shown in the Patent No. 1,998,818 issued to Robert E. Newell, William B. Mackintosh and Clarence W. Robertshaw on April 23, 1935, and has its regulating shaft 2 extending therefrom. The detailed operation of the thermostat need not be entered into here, as it will be sufficient to say that rotation of said regulating shaft 2 will result in varying the temperature at which the thermostat will operate the valve governing the supply of gas to the oven burner.

Within the tubular casing 3 of thermostat 1 is a center guide 4, for the shaft 2. Concentric with the shaft 2 and with one end supported by a suitably formed portion of said center guide is a compression spring 5, the other end of which presses against flange 6 of the sleeve 7, which is an extension of an operating knob 15.

The sleeve 7 is tubular, fits over the regulating shaft 2, and extends away from said spring 5 to the end of said shaft, at which point said sleeve is flattened on one side as at 8 to exactly conform with the shape of said shaft which is also flattened on one side. Around said sleeve is a spring 9, weaker than spring 5 and situated between said flange 6 and the inner face of dial 10.

The dial 10 is cup shaped, having a rim 11 of a diameter slightly less than that of the tubular casing 3 within which it is to be rotated past a pointer 12 carried by said casing, a smaller diameter base or face 13 which has thereon small, closely spaced, radial grooves or corrugations and which has through its center an opening of a size permitting extension therethrough of sleeve 7, and a sloping portion, with temperature calibrations 14 marked thereon, connecting said rim and said face.

It is to be understood that the dial may have calibrations marked thereon and rotate past a stationary pointer, or, it may have only a single

mark or pointer thereon and rotate past stationary calibrations.

The knob 15 has a surface 16 with radial corrugations thereon arranged to engage the similar corrugations on dial face 13. Said knob may be formed of bakelite or other suitable material pressed on to the outer end of sleeve 7 to permanently fix it thereon in such a manner that thereafter said sleeve and knob are as one piece, the sleeve becoming an extension of the knob.

Since the sleeve 7 of knob 15 is flattened on one side to fit the similarly irregular shape of the shaft 2, the unitary knob and sleeve can only be placed on said shaft in one relative position with respect to rotation, and thereafter rotary movement of said knob is transmitted directly to said shaft. In the end of said shaft 2 is placed a screw 17, having a large head 18 against which the knob 15 is held by spring 5 acting on sleeve 7. The center guide 4 carries a stop 19 which cooperates with a projection 20 on the inside of the rim 11 to prevent more than one revolution of the dial, knob, and regulating shaft.

The compression spring 9 serves to hold the corrugated dial face in operative engagement with the corrugated surface of the knob, whereby said knob and dial are held together in fixed relationship under normal conditions. Thus, they may be removed from the shaft as a unit and replaced thereon with the shaft, knob, and dial again in the same relative positions, since the knob can only be placed on the shaft in one relative position with respect to rotation, as previously explained.

Other means may be used in place of the corrugations on the dial and knob faces in providing an operative connection therebetween. A friction washer, for example, placed between the knob and dial may be used successfully. However, in view of the fact that the normal use of the dial requires a fixed relation between the knob and dial, the closely spaced, radial corrugations, or similar means having projections on one face cooperating with recesses in the other face, are particularly suitable as they enable a more positively fixed relationship to be maintained than possible with a friction washer, or the like, and still permit accurate adjustment of said dial.

If pressure is exerted longitudinally to the right, as in Figure 1, on the dial 10, the spring 9 will be compressed, and the two corrugated surfaces, 13 and 16, disengaged, as the stronger spring 5 holds knob 15 stationary against the action of spring 9. On the disengagement of the two corrugated surfaces, the only remaining means of transmission to the knob of any rotary movement of said dial is through the friction of spring 9 bearing on flange 6. Since spring 5 is stronger, has a larger diameter, and is formed of larger wire, its friction bearing on flange 6 is greater than that of spring 9 and therefore, it holds the knob not only against longitudinal displacement but also against rotation under such conditions. Thus, the dial may be rotated independently of the knob and shaft.

It is to be understood that the relative strength and bearing surfaces of the two springs, 5 and 9, is important. Spring 9 must be only strong enough to hold the dial and knob together under normal conditions. Such a spring may be easily compressed by a slight pressure on the dial in the proper direction. Spring 5 must be stronger and have a greater friction bearing than spring

9, but must not materially hinder rotation of the knob, shaft, and dial for ordinary use.

The use of the dial assembly, as described, is as follows: the dial assembly is placed on the regulating shaft of the thermostat, which is connected to an oven in the usual manner. The operator turns the knob, which in turn rotates the shaft and dial, until the dial reading is, for example, 400 degrees and then ignites the oven burner. If, under such conditions, the thermostat shuts off the gas supply to the burner when the oven reaches 375 degrees, the operator presses on the dial until the radially corrugated surfaces of the knob and dial are disengaged, and then rotates it independently of the knob and shaft, which remain stationary, until the dial reading is 375 degrees. The pressure is then removed and the two corrugated surfaces are forced together into operative engagement by the spring, whereupon the knob, shaft, and dial are again in fixed, rotary relationship.

The advantages of a dial assembly of this type are many and are quite apparent in the ease and accuracy with which the dial may be readjusted, the positive manner in which the parts are held in fixed relationship for normal use, and the ability of the assembly to be removed from the regulating shaft and replaced thereon without getting out of adjustment.

Although we have shown and described a preferred embodiment of our invention, we do not intend to be limited thereby, as the invention may be otherwise embodied within the scope of the appended claims.

We claim:

1. A dial assembly comprising a dial having a central opening, a knob operatively engaging said dial and having an extension protruding through said opening, and spring means associated with said extension and dial for holding said dial and knob in operative engagement, whereby a fixed rotary relationship between said dial and knob is obtained.

2. The combination with a shaft adapted to be rotated to affect the adjustment of a device, of a dial assembly comprising a knob connected to said shaft, a dial having a central opening, said knob having an extension protruding through said opening, and spring means associated with said extension and dial for holding said dial and knob in releasable operative engagement.

3. The combination with an element adapted to be rotated in effecting a precise adjustment of a device, of a dial assembly comprising a dial having radial corrugations on the face thereof and having a central opening, a knob connected to said element and having a surface with similar radial corrugations adapted to operatively engage said corrugated dial face, said knob having an extension protruding through said opening, and a spring associated with said extension and dial for holding said corrugated surfaces in releasable operative engagement.

4. The combination with a shaft adapted to be rotated to affect the adjustment of a device, of a knob secured to said shaft, a dial having a central opening, said knob having an extension protruding through said opening, a spring associated with said extension and dial for holding said knob and said dial in releasable operative engagement, and means for holding said knob against accidental displacement.

5. The combination with a shaft adapted to be rotated to affect the adjustment of a device, of

a knob secured to said shaft, a dial having a central opening, said knob having an extension protruding through said opening, spring means frictionally engaging said extension and dial for holding said dial and knob in releasable operative engagement, and means, including a second and stronger spring having a greater friction bearing engagement with said extension than said first spring means, for holding said knob against accidental displacement, whereby said dial may be disengaged from said knob and rotated without disturbing said knob and shaft.

6. The combination with a shaft adapted to be rotated to affect the adjustment of a device, of a knob secured to said shaft, a dial, spring means connected with said knob and dial for normally holding them engaged in fixed rotary relationship, and second spring means for holding said knob and shaft against accidental displacement, whereby said dial may be disengaged from said knob and rotated independently of and without disturbing said knob and shaft.

7. The combination with a shaft adapted to be rotated in effecting a precise adjustment of a device, of a knob secured to said shaft and having a surface with radial corrugations thereon, a dial with similar radial corrugations on a face thereof adapted to operatively engage said corrugated knob surface, spring means for normally holding the two corrugated surfaces engaged in fixed rotary relationship, and second spring means for holding said knob and shaft against accidental displacement, whereby said dial may be disengaged from said knob and rotated independently of and without disturbing said knob and shaft.

8. In combination with a thermostat, a casing, a pointer carried by said casing, a shaft adapted to be rotated to affect the adjustment of the thermostat, a knob secured to said shaft at one end of said casing, a dial in indicating relation to said pointer, a spring connected with said knob and dial for normally holding them engaged in fixed rotary relationship, spring means for holding said knob and shaft against accidental displacement, whereby said dial may be disengaged from said knob and rotated without disturbing said knob and shaft.

9. In combination with a thermostat, a casing, a pointer carried by said casing, a shaft adapted to be rotated to affect the adjustment of the thermostat, a knob secured to said shaft at one end of said casing, a dial in indicating relation to said pointer and having a central opening, said knob having an extension protruding through said opening, spring means associated with said extension and dial for holding said dial and knob in releasable operative engagement.

10. In a device having an element adapted to be rotated in effecting an adjustment of said device, a dial having a corrugated face, a knob connected to said element and having a surface with similar corrugations thereon adapted to operatively engage said corrugated dial face in various rotary positions, resilient means for holding said corrugated surfaces in operative engagement,

and a stop limiting the rotational movement of said dial.

11. In a device having an element adapted to be rotated in effecting an adjustment of said device, a dial having a central opening and a face with a series of corrugations thereon, a knob connected to said element and having a similarly corrugated surface adapted to operatively engage said corrugated dial face in various rotary positions, said knob having an extension protruding through said opening, a spring associated with said extension and dial for holding said corrugated surfaces in operative engagement, and a stop limiting the rotational movement of said dial.

12. The combination with an element adapted to be rotated to affect the adjustment of a device, of a dial assembly comprising a knob removably mounted on said element and having a corrugated surface, a dial having a central opening and a face with similar corrugations thereon adapted to operatively engage said corrugated knob face in various rotary positions, said knob being arranged to permit its being mounted on said element in only one position relative thereto and also having an extension protruding through said opening, and spring means associated with said extension and dial for holding said corrugated surfaces in operative engagement, whereby said dial assembly may be bodily removed from said element and replaced thereon with all parts in exactly the same relative positions.

13. A dial assembly for use in effecting a precise adjustment of a device and comprising a first rotatable member having a central opening therethrough, a second member rotatable concentrically with said first member and having an extension protruding through said opening, one of said members having a series of recesses arranged about the center of rotation and the other member having a series of projections arranged to cooperate with said recesses at various rotary positions of said members, one of said members also having appropriate indicia marked thereon, and spring means associated with said extension and first member for holding said projections and recesses in operative engagement to insure a fixed rotary relationship between said first and second members.

14. In a device having an element adapted to be rotated in effecting an adjustment of said device, a knob member connected to and rotatable with said element, a dial member rotatable concentrically with said knob, one of said members having a series of recesses arranged about the center of rotation and the other member having a series of projections arranged to cooperate with said recesses at various rotary positions of said members, spring means connected with said knob and dial members for holding said projections in operative engagement, and a stop limiting the rotational movement of said dial member.

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