Aug. 8, 1961 F. L. MALTBY 2,995,105

CONTROL AND INDICATING DEVICE

Filed May 14, 1959

FIG. 1

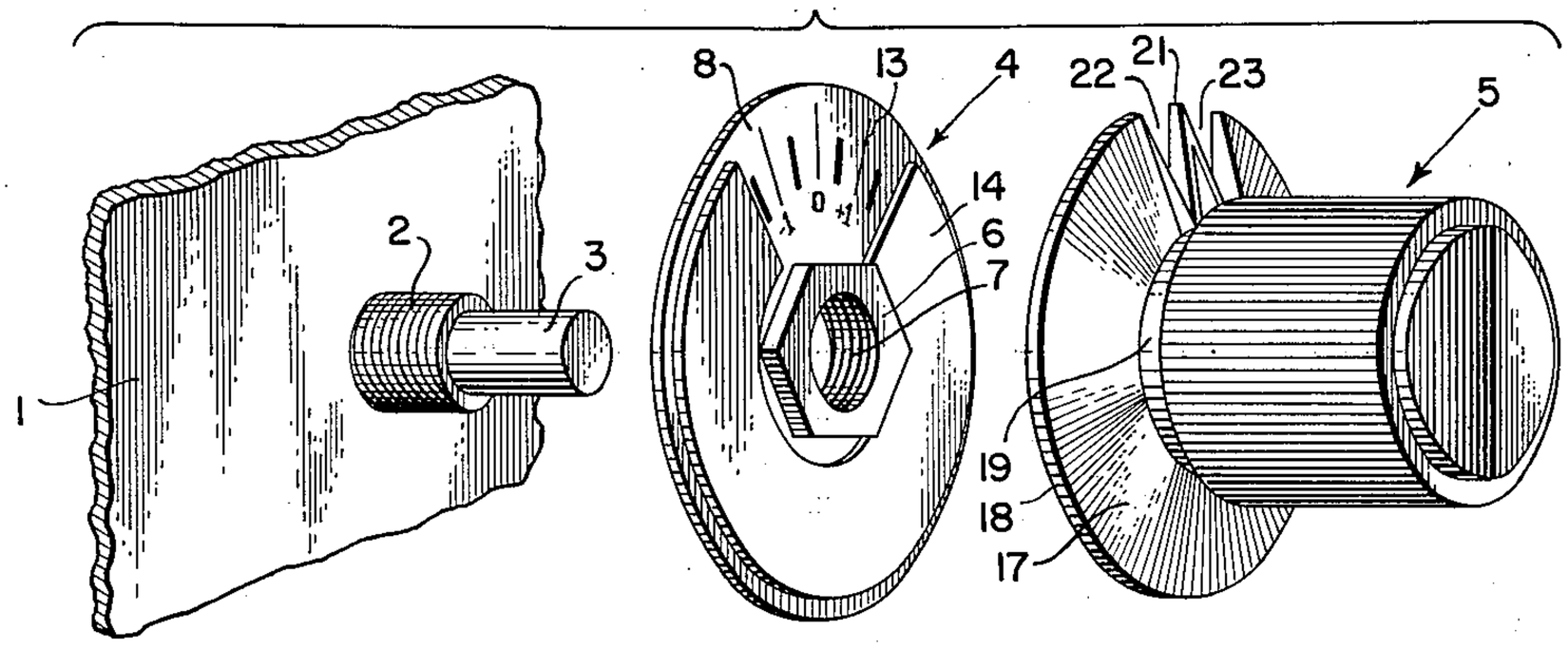


FIG. 2

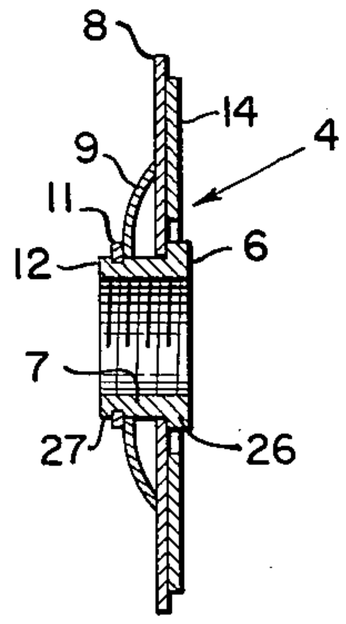


FIG. 3

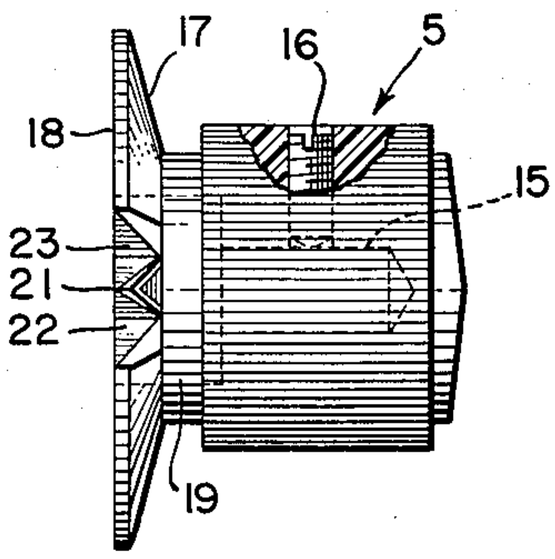
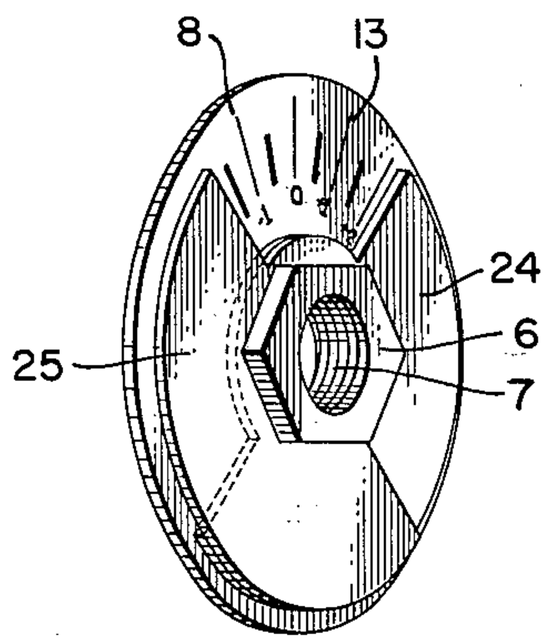


FIG. 4



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CONTROL AND INDICATING DEVICE

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1 Claim. (Cl. 116—124)

The present invention generally relates to a control knob and an adjustable dial for use with the same. More specifically, the present invention is concerned with a control knob and dial adapted for use with electrical components of the type adjusted by means of a rotating shaft.

A general object of the present invention is to provide a new and improved knob and dial characterized by simplicity of construction and ease of application.

In electrical apparatus, variable controls, such as potentiometers and capacitors, are generally adapted for panel or chassis mounting in order that they may be readily adjusted. For panel or chassis mounting, such components are provided with a threaded bushing which generally surrounds the control shaft and which is adapted to extend through a hole in the panel or chassis and be fastened thereto by a nut.

Accordingly, it is another object of the present invention to provide a knob and dial assembly which can be applied to a control element without special tools or skill and without any additional cutting of the panel or chassis on which the element is mounted.

Still another object of the present invention is to provide a dial assembly which can be applied to variable controls of the type described in addition to or in lieu of the conventional mounting nut and provide an adjustable indicating scale substantially flush with the panel or chassis.

A further object of the present invention is to provide an indicating and control device of the type described which is operable to provide an indication of the preferred range of adjustment of the control device to which it is applied.

Though not limited thereto, the present invention is particularly adapted for use as a component condition indicator. In certain electrical equipment, circuit characteristics, such as gain, frequency of operation and the like are controlled by adjustable components. Such equipment is designed to provide the preferred value of such characteristics within a specific range of component calibration. When the preferred value of these characteristics can be attained only by adjusting such components beyond this limited range, it generally indicates component deterioration or incipient component failure. It is, therefore, a still further object of the present invention to provide a knob and dial assembly adapted to indicate a deviation from the preferred range of component calibration.

Another further object of the present invention is to provide a control and indicating device in which the dial may be manually shifted with respect to the control knob and thus, easily adapted to specific applications.

Still another object of the present invention is to provide a knob and dial assembly in which the indication of the preferred range of component calibration is adjustable with respect to the dial.

The control and indicating means of the present invention comprises a knob and dial assembly. The dial assembly includes a dial plate which is integral with the conventional component mounting nut and adjustable with respect thereto. The dial assembly is adapted to include fixed or adjustable calibration limits. The preferred knob configuration for use with the dial assembly is adapted to be mounted on the control shaft of a control element and has a annular skirt extending outward therefrom adapted to substantially overlie and mask the dial plate. The dial plate and calibration limits are adapted to be

visible through a cutout portion of the annular skirt which portion includes an indicating pointer.

A better understanding of the present invention may be had from the following description when read with reference to the accompanying drawings of which:

FIG. 1 is an exploded perspective view of one embodiment of the indicating device of the present invention as applied in use;

FIG. 2 is a sectional side view taken through the midsection of the dial assembly of the indicating device shown in FIG. 1;

FIG. 3 is a side elevation of the knob shown in FIG. 1 partly broken away to show the set screw fastening means and that the knob is made of an insulating material; and

FIG. 4 is a perspective view of a modification of the dial assembly of the present invention incorporating adjustable calibration indication.

Referring now to FIG. 1, there is shown an exploded view of the indicating device of the present invention. The numeral **1** designates a chassis or panel and the numeral **2** a mounting bushing of an adjustable control element which extends through a hole in the chassis **1** and is adapted to be secured thereto by means of a nut. As shown, the mounting bushing **2** of the control element is concentric with the control shaft **3** of the device. The indicating means of the present invention comprises a dial assembly **4** and a knob **5**. The dial assembly **4** is adapted to be screwed onto the threaded mounting bushing **2** of the control element and may be utilized in addition to the conventional mounting nut or in lieu thereof. As shown in FIG. 1, it is utilized in lieu of the conventional mounting nut. In this respect, it should be noted that as a result of the novel construction of the dial assembly of the present invention when utilized with the conventional mounting nut, it adds very little thickness to the mounted assembly. By way of example, dial assemblies having a total thickness of ⅛ of an inch have been constructed. Accordingly, the dial is substantially flush with the chassis or panel to which the associated control element is mounted.

Referring now to FIG. 2 in addition to FIG. 1, the dial assembly **4** comprises a hexagonal mounting nut **6** having a hub portion **7**, the nut forming an outwardly extending flange **26** on the hub at one end thereof. A dial plate **8** is freely mounted on the hub portion **7** and maintained in frictional contact with the flange **26** formed by the nut **6** by means of a spring washer **9** which bears against the dial plate **8**. A retaining washer **11** maintains the spring washer **9** in contact with the dial plate **8**, and these elements are held on the hub **7** by staking or peening the edge **12** of the hub **7** to form an annular rim **27**. By means of this construction, the dial plate **8** is rotatable with respect to the mounting nut **6** and thus, it may be readily adjusted with respect to the control element with which it is used. As shown, the dial plate **8** may carry suitable calibration **13** and when utilized as a calibration limit indicator or other similar purpose, the dial plate **8** may also carry a calibration indicating member **14** to mask critical portions of the calibration. The calibration indication member **14** may be in the form of a thin metal member glued or otherwise affixed to the dial plate **8** or it may be in the form of a decalcomania or the like. It should be noted, however, that it is desirable that the calibration indication member **14** be of a color contrasting with the color of the dial plate **8** in order that a setting of the control element on the preferred range be apparent to one looking to the indicating means.

Referring also to FIG. 3, the knob **5** of the present invention has a central bore **15** adapted to receive the control shaft **3** of the control element. The knob **5** is adapted to be secured to the control shaft **3** by means of a set

screw **16**, which extends radially through its gripping portion. The knob **5** has an annular skirt **17** which extends outward from the gripping portion which is adapted to substantially overlie all of the dial plate **8** of the dial assembly **4**. The innerface **18** of the knob **5** is recessed at **19** to accommodate the head of the nut **6** of the dial assembly **4** when the knob is mounted on the control shaft **3**. A pointer **21** is provided on the knob **5** by cutting away triangular sections **22** and **23** of the annular skirt **17**.

For applications where it is desirable to provide for the setting of the dial plate **8** with respect to the control element on which it is mounted without removing the knob **5**, the dial plate **8** can be made to extend slightly beyond the annular skirt **17** of the knob **5**. Similarly, where it is desired not to have the dial plate adjustable once the knob is mounted, the dial plate **8** can be made slightly smaller than the annular skirt **17** of the knob **5**. When the indicating means of the present invention is utilized as a condition indicating device, the calibration on the dial plate **8** can be placed so as to be visible through the triangular cutout sections **22** and **23** of the annular skirt **17**. When utilized as a calibration limit indicator or unsafe condition indicator, the calibration indicating member **14** should also be placed so that it is completely masked by the annular skirt **17** of the knob **5**. In this manner, the turning of the control shaft **3** by means of the knob **5** beyond the desirable limits of adjustment, is readily apparent since the contrasting colors of the calibration limit indicating member **14** and the dial plate **8** are visible only through the cutout sections **22** and **23** and hence, stand out in contrast with each other. The contrast can be made even more apparent by having the dial plate **8** and the knob **5** the same color. When this is done, the color pattern which exists for off limit conditions conflicts markedly with the circular single color pattern presented by the unit for normal conditions.

Referring now to FIG. 4, there is shown a modification of the dial plate assembly of the present invention in which adjustable calibration limits are provided. This modification of the present invention is similar to that shown in FIGS. 1 and 2 with the exception that there is rotatably mounted on the hub **7** of the mounting nut **6** a pair of adjustable masking plates **24** and **25**. As shown, the masking plates **24** and **25** are mounted on the hub **7** between the dial plate **8** and the nut **6**. The masking plates **24** and **25** each have a 180° partial sector cut from

their peripheries through which a portion of the dial plate is visible. By means of the adjustable masking plates **24** and **25**, the calibration limits may be separated by any amount from 0° to 180°.

It should be noted that the control and indicating device of the present invention, while particularly adapted for use with control elements of the type mounted by means of threaded bushings which is concentric with the element control shaft, it is equally suited for use with control elements having rotatably adjusted control shafts but which are mounted by other means. In such applications, a threaded bushing having a central bore adapted to fit over the control shaft and a shoulder adapted to bear against the back of the panel or chassis can be utilized to mount the dial plate at the point where the shaft passes through the chassis or panel.

From the foregoing, it can be seen that the control and indicating means of the present invention is readily adapted for application to both new and existing equipment. Its application does not require skill or special tools. In addition, the dial assembly may be utilized in addition to or in lieu of the conventional control element mounting nut.

Having described the present invention, what is claimed as new is:

A nut and dial assembly for use with a variable control means adjusted by means of a rotatable shaft and mounted by means of a threaded bushing concentric with said rotatable shaft comprising, in combination, an internally threaded nut having a cylindrical hub portion, said nut forming an outwardly extending flange on said hub at one end thereof, a dial freely mounted on said hub, spring means mounted on said hub and biasing said dial against the flange formed by said nut, and an annular rim formed on the end portion of said hub opposite the flange formed by said nut and retaining said spring means in biasing relation to said dial, said dial being rotatable with respect to said hub.

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