April 28, 1936. A. F. SPITZGLASS 2,038,768

INSTRUMENT

Filed May 3, 1935

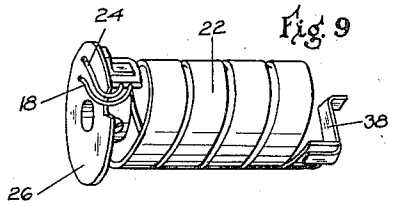



Fig. 9

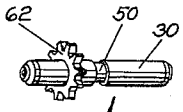



Fig. 7

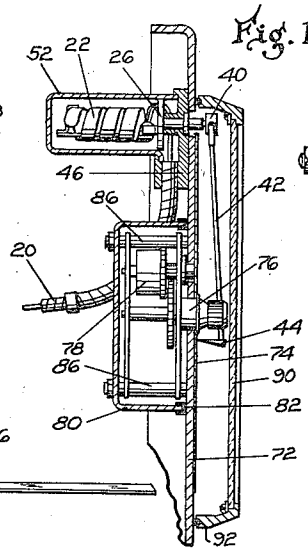



Fig. 1

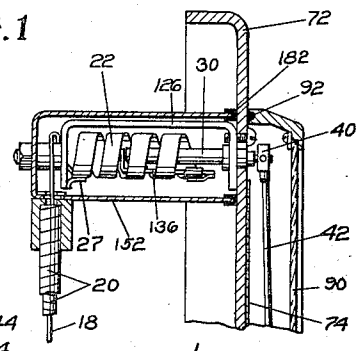



Fig 12

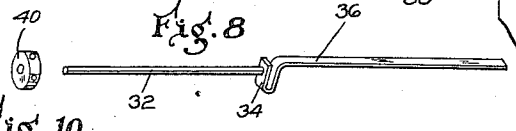



Fig. 8

Fig. 10

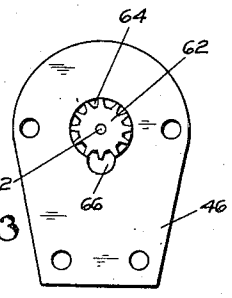



Fig. 3

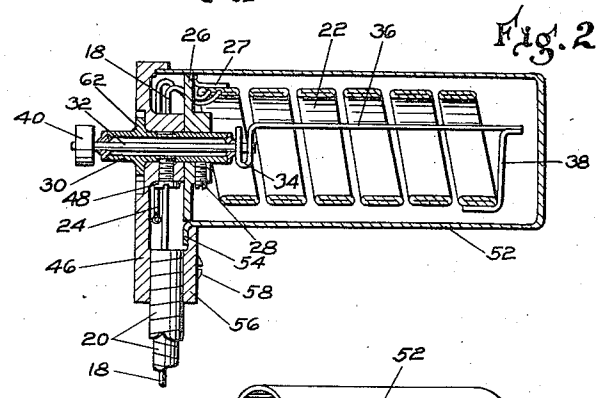



Fig. 2

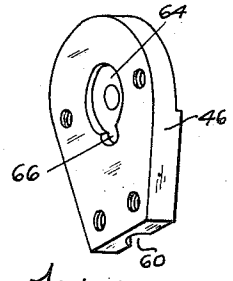



Fig. 4

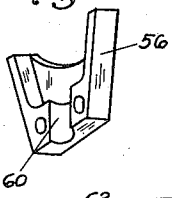



Fig. 5

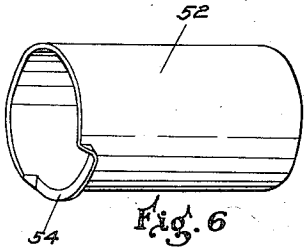



Fig. 6

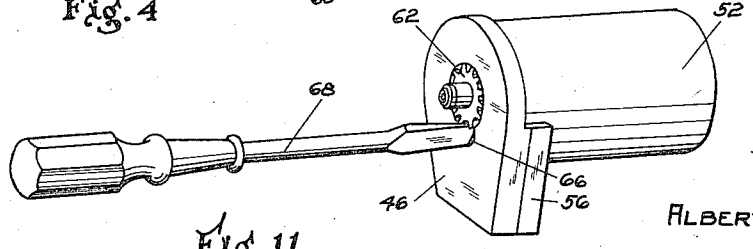



Fig. 11

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Patented Apr. 28, 1936

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# UNITED STATES PATENT OFFICE

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## INSTRUMENT

Albert F. Spitzglass, Chicago, Ill., assignor to Republic Flow Meters Company, Chicago, Ill., a corporation of Illinois

Application May 3, 1935, Serial No. 19,558

11 Claims. (Cl. 73—109)

This invention relates to instruments, and is illustrated as embodied in a novel recording or indicating thermometer having a remote control.

An object of the invention is to provide an improved housed and protected sub-assembly for the gas-filled helix or its equivalent, and the associated operating parts, preferably having a novel cup-shaped housing inclosing said parts and having a head and cap locked over its open end. The housing is especially adapted for mounting on the rear of a panel to operate a pen or indicator arm or the like mounted on the face of the panel, but it may be mounted in other ways.

Other novel features relate to a simple adjusting means arranged in a novel manner for actuation by a screw driver or the like from the front of the panel, to a novel mounting and arrangement of the operating parts, and to other improved features and desirable constructions which will be apparent from the following description of the illustrative embodiment shown in the accompanying drawing, in which:

Figure 1 is a partial vertical section through the upper part of a panel having the novel sub-assembly mounted on its rear face;

Figure 2 is a section on a larger scale through the illustrative thermometer unit, but arranged facing the other way from Figure 1;

Figure 3 is a front elevation of the unit;

Figure 4 is a perspective view of the head of the instrument casing;

Figure 5 is a perspective view of the sealing cap which cooperates therewith;

Figure 6 is a perspective view of the stamped metal housing;

Figure 7 is a perspective view of the adjusting sleeve;

Figure 8 is a perspective view of the operating shaft and its connections;

Figure 9 is a perspective view of the helix and the attached operating parts;

Figure 10 is a perspective view of the pen-carrying member on the end of the operating shaft;

Figure 11 is a perspective view of the entire sub-assembly, showing how it is adjusted; and

Figure 12 is a section corresponding to Figure 1, but showing a different embodiment of the sub-assembly unit.

The particular instrument selected for illustration in the embodiment of the invention herein described is a thermometer having a bulb intended to be placed in the space whose temperature it is intended to measure, and which communicates with the indicating and recording part of the instrument by a remote control such as a flexible tube 18 protected by means such as oppositely wound flat spiral wirings 20 forming a flexible protective casing.

The end of the tube 18 is soldered or otherwise sealed to the fixed end of a flat hollow Bourdon tube 22 which is wound to form a helix of substantial size. The bulb and the tube 18 and the helix 22 are filled in the usual manner with a gas under pressure, a gas being selected whose changes of temperature in the bulb give the desired action of the helix 22 in winding and unwinding about its axis.

In order to avoid disturbing the connection 18 in calibrating, a separate tube 24 may be attached to the fixed end of the helix 22. The instrument is then, in assembling it, deliberately filled with too much gas. In calibrating it, part of the gas is released through tube 24, and when the desired gas pressure is reached the tube 24 is pinched off and soldered shut. Thereafter corrections by way of calibration are made by introducing more gas through the tube 24 or releasing some therethrough, and each time the tube is again pinched off and resoldered.

One end of the helix 22 is soldered or otherwise fixed to a head 26 by means such as a connecting part 27 soldered to both the helix and the head 26, the head 26 being in turn secured (by a setscrew 28 or the like) to an adjusting sleeve 30. The sleeve 30 has in its ends bearings in which there is journaled an operating shaft 32. This shaft has mounted on or affixed to its end, within the helix 22, a member formed with a crank 34 having an extension 36 parallel to but spaced from the axis of the helix.

The free end of the helix has soldered or otherwise secured thereto a radial connecting arm 38 which is soldered or otherwise firmly secured to the extension 36. Thus the twisting motion of the helix 22, due to changes of temperature around the bulb, is transformed by the arm 38 and the extension 36 and the crank 34 into rotary motion of the shaft 32. As is well understood in this art, in calibrating the instrument the arm 38 may be moved along the helix 22 in such a manner as to bring into operation more or less of its length.

The operating shaft 32 has fixed at its front end a part 40 carrying any desired indicating or recording device, shown as an arm 42 carrying a pen 44.

The adjusting sleeve 30 is journaled in a central boss of a novel head 46, axial movement being prevented by a setscrew 48 extending into an annular groove 50. The head 46 has abutting there-

against a closed and preferably drawn metal seamless housing **52** which incloses the helix **22** and associated parts. The housing **52** may be formed at its edge with a depressed lip **54** engaged and locked by a closure member **56** secured to the head **46** by fastenings such as screws **58**.

If desired to make a factory assembly of the instrument, screws **58** may be countersunk and their heads covered by sealing wax or the like.

The head **46** and the closure member **56** are formed with registering grooves **60** forming a passage through which the remote control tube **18** passes, and which head and cap grip and hold the upper end of the flexible protective casing **20**, as shown in Figure 2. Thus the instrument is in itself a sealed and fully protected subassembly.

In order to facilitate the zero adjustment of the instrument, which is accomplished by turning the entire helix with the parts attached thereto, by rotating the sleeve **30**, the sleeve is provided with operating means such as a spur gear **62** seated in a circular socket **64** in the face of the head **46**. A second circular socket **66** communicates with the socket **64** so that, as shown in Figure 11, a screw-driver **68** or the like may be inserted and rotated therein, forming in effect a two-toothed gear meshing with and driving the spur gear **62**. This zero adjustment is ordinarily made when the entire assembly has been put together, and with a chart in place.

According to an important feature of the invention, an instrument such as the one described above is intended to be mounted directly on the rear face of a panel or support **72** by means of suitable screws or other fastenings, in peripheral sealing engagement therewith and with the operating member **32** extending through to the front of the panel. When so mounted, the arm **42** with its pen **44**, or an equivalent indicating or recording member, is secured in place to cooperate with a chart **74** on the face of the panel.

The chart **74**, preferably a detachable circular chart of paper, is shown rotatably mounted on the end of a shaft or other operating member **76** extending through the panel. The shaft **76** forms part of any suitable clockwork or other motor mechanism **78** of any desired type, which is housed on a tight cup-shaped casing **80** having at its edge a rubber gasket **82** in sealing engagement with the rear face of the panel. The motor mechanism is held in place by screws **86** or the like fastenings.

A glazed dished cover or door **90**, provided if desired with a rubber sealing gasket **92**, is hinged or otherwise mounted on the face of the panel, in sealing peripheral engagement therewith, and covers over the chart **74** and the arm **42** with its pen **44**. Thus the entire assembly, although having no outer casing and no separate supporting frame, is completely housed and is fully protected.

It is only necessary to drill through the panel a number of holes for the shafts **32** and **76**, for the fastenings holding the instrument and the motor mechanism, and for the fastenings for the door **90**, and the complete assembly may quickly and easily be put together, as easily in fact as one of the old instruments can be mounted on a panel.

One advantage of the new instrument is that when it is necessary to repair the recording instrument subassembly the entire instrument may readily be removed and returned to the factory. In the meantime it is replaced by a spare instrument, which has previously been calibrated at the factory, and which requires adjustment only as to its zero setting.

In the arrangement of Figure 12, the casing **152** of the instrument is open at the front, and is provided with a rubber gasket **182** in sealing engagement with the rear face of the panel, where it is held by suitable machine screws or other fastenings which pass through the panel. The tube **18** in this case communicates with the outer end of the helix **22**, and the latter is mounted on a bracket **126** which is secured to the casing **152** and to the panel **72**. The free end of the helix **22** is secured by a connection **136** to the shaft **32**.

While one illustrative embodiment has been described in detail, it is not my intention to limit the scope of the invention to that particular embodiment, or otherwise than by the terms of the appended claims.

I claim:

1. An instrument having operating means and adapted to be mounted on the back of a support comprising a cup-shaped housing surrounding the operating means of said instrument and formed at its edge with a projecting lip, a head having a flange at least partially encircling the open end of the housing, and a closure member engaging said lip and secured to said head, the head being formed to be attached to the rear face of a support in close sealing engagement therewith and the instrument having an operating member extending from inside the housing through said head and adapted to extend through the support when the instrument is mounted thereon.

2. An instrument having operating means and adapted to be mounted on the back of a support comprising a cup-shaped housing surrounding the operating means of said instrument and formed at its edge with a projecting lip, a head having a flange at least partially encircling the open end of the housing, and a closure member engaging said lip and secured to said head.

3. An instrument having operating means and adapted to be mounted on the back of a support comprising a cup-shaped housing surrounding the operating means of said instrument and formed at its edge with a projecting lip, a head having a flange at least partially encircling the open end of the housing, and a closure member engaging said lip secured to said head, the head and said closure member having registering grooves and said instrument having a connection to a remote control extending through the passage formed by the registering grooves into the exterior of said housing.

4. An instrument comprising a flat hollow tube coiled into a helix, a head to which one end of the helix is attached, a sleeve on which said head is mounted, a shaft journaled in said sleeve, a crank on the end of the shaft having an extension paralleling the axis of the helix and spaced therefrom, and an arm extending radially of the helix and connecting the end of the extension to the end of the helix.

5. An instrument comprising a flat hollow tube coiled into a helix, a support to which one end of the helix is attached, a shaft passing through said support, a crank on the end of the shaft having an extension paralleling the axis of the helix and spaced therefrom, and an arm extending radially of the helix and connecting the end of the extension to the other end of the helix.

6. An instrument comprising a flat hollow tube coiled into a helix, a head to which one end of the helix is attached, a sleeve on which said head is mounted, a shaft journaled in said sleeve, a crank on the end of the shaft having an extension paralleling the axis of the helix and spaced therefrom, an arm extending radially of the helix and connecting the end of the extension to the end of the helix, a support adjacent said head and in the center of which said sleeve is journaled and which has a radial passage therethrough, a tubular connection extending through said passage and connected to the first end of said helix, and a cup-shaped housing inclosing said helix and having its open end seated against said support, whereby said housing is closed.

7. An instrument comprising a flat hollow tube coiled into a helix, a head to which one end of the helix is attached, a sleeve on which said head is mounted, a shaft journaled in said sleeve, a crank on the end of the shaft having an extension paralleling the axis of the helix and spaced therefrom, an arm extending radially of the helix and connecting the end of the extension to the end of the helix, and a support adjacent said head and in the center of which said sleeve is journaled, said sleeve having a part for engagement with a tool to turn the sleeve in the support to adjust the position of the helix.

8. An instrument comprising a flat hollow tube coiled into a helix, a head to which one end of the helix is attached, a sleeve on which said head is mounted, a shaft journaled in said sleeve, a crank on the end of the shaft having an extension paralleling the axis of the helix and spaced therefrom, an arm extending radially of the helix and connecting the end of the extension to the end of the helix, and a support adjacent said head and in the center of which said sleeve is journaled, the sleeve having a spur gear thereon and the support having a circular socket into which one side of the spur gear extends and which socket is adapted rotatably to receive the end of a screwdriver, which thereby becomes in effect a two-toothed gear meshing with and driving the spur gear on said sleeve.

9. An instrument comprising a sleeve, a support in which said sleeve is journaled, means responsive to changes in a condition to be observed carried by said sleeve and a connection to a remote control extending through said support and connected to said means, said sleeve having a part for engagement with a tool to turn the sleeve in the support to adjust the position of said means.

10. An instrument comprising a sleeve, a support in which said sleeve is journaled, a shaft journaled in said sleeve and carrying a member for indicating a condition to be observed, means responsive to said condition and connected to said sleeve and said shaft and a connection to a remote control extending through said support and connected to said means, said sleeve having a part for engagement with a tool to turn the sleeve in the support to adjust the position of said means.

11. An instrument comprising a sleeve, a support in which said sleeve is journaled, and means responsive to changes in a condition to be observed carried by said sleeve, the sleeve having a spur gear thereon and the support having an opening into which one side of the gear extends and which opening is adapted to receive the end of a tool which engages the spur gear to turn it thereby to adjust the position of the sleeve and means relative to the support.

ALBERT F. SPITZGLASS.