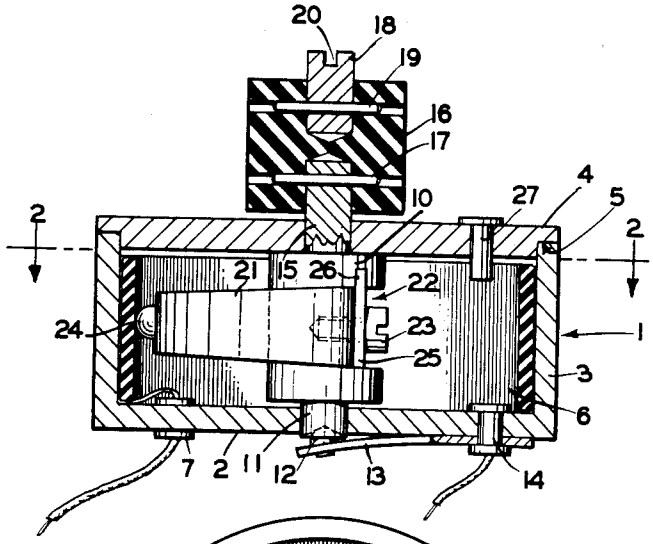
March 27, 1956 W. R. POLYE ET AL 2,740,025

MINIATURE VARIABLE RESISTOR

Filed June 19, 1953

FIG. 1



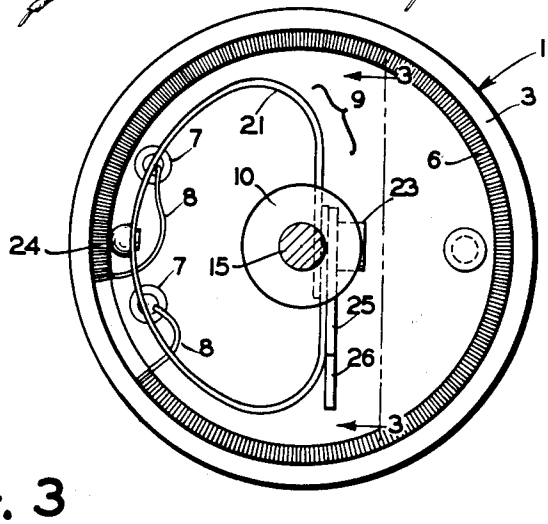
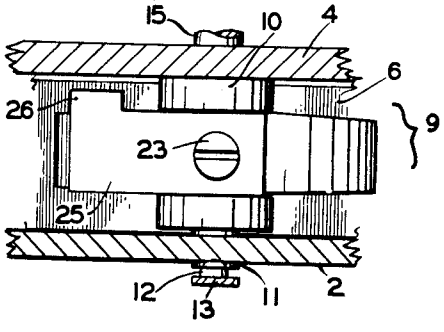


FIG. 2

FIG. 3



INVENTORS
WILLIAM R. POLYE
ANDRE P. VIRET
BY Geo. J. Hyde
ATTORNEY

United States Patent Office 2,740,025 Patented Mar. 27, 1956

2,740,025

MINIATURE VARIABLE RESISTOR

William R. Polye, River Edge, and Andre P. Viret, Tenafly, N. J., assignors to Bendix Aviation Corporation, Teterboro, N. J., a corporation of Delaware

Application June 19, 1953, Serial No. 362,916

10 Claims. (Cl. 201—48)

This invention relates to electrical miniature variable resistors, such as potentiometers and rheostats, and especially to a construction for instruments of this type adapted for effective use in extremely small sizes. Such miniature instruments are desirable for incorporation in small electrical units, such as indicating instruments, where only a very small amount of space is available in the housing.

A feature of the invention is the provision of a variable resistor construction whose parts may be readily assembled in sizes so small that the usual arrangements are impractical or undesirable. More particularly, the casing is designed for assembly without screws, and the connection to the contact arm is planned so as to eliminate the usual devices located within the casing, thereby permitting a reduction in casing size. A further feature is the provision of an advantageous arrangement for adjusting the position of the contact arm including a simple structure which insulates the arm from the adjusting element. Another feature is an improved stop arrangement for limiting the travel of the arm.

These and other features of the invention will appear from the following description in conjunction with the accompanying drawings, in which:

Figure 1 is a vertical central section through an instrument embodying the invention;

Figure 2 is a plan view with the cover and adjusting arrangement removed; and

Figure 3 is a fragmentary vertical section on line 3—3 of Figure 2.

In the illustrated embodiment a housing **1** made of suitable plastic such as Bakelite or similar insulating material, is provided with a bottom **2**, an integral cylindrical side wall **3** and a separable cover **4** tightly fitting said wall, and advantageously rabbeted at **5**, arranged for secure engagement on the wall, as by cementing. A flat resistance element **6** extends around the inner face of wall **3** and is suitably held in place, as by cement. Said element preferably consists of a wire resistance wound on a strip of fishpaper or other suitable sheet insulating material, when a substantial current is to pass through the instrument, though a strip or layer of carbon or other resistance material may be used where conditions permit. At least one end of the resistance element is electrically connected to a terminal mounted on the casing. In the form shown, the terminal **7** is in the form of a metal rivet extending through and flanged on both sides of the bottom **2**, to which an end of the wire **8** of resistance **7** is attached. Where the instrument is adapted for use as a potentiometer, as shown, the other end of wire **8** is also connected to a second similar terminal **7**. Said wire ends are preferably cemented to the housing **1** so that they will not become loose.

A contact arm assembly **9** is rotatably mounted in the housing **1**. It includes a metal spindle **10** having a lower cylindrical reduced end portion **11** extending through a bearing opening in the bottom **2** and having a slightly concave end bearing against a convex contact stud **12**

fixed to a spring arm **13** fastened to the bottom **2**, as by riveted terminal **14**. The upper reduced cylindrical end **15** of spindle **10** extends through a bearing opening in housing cover **4** and is fixed to an insulating block **15** arranged for use in manual rotation of spindle **10**. in the form shown, the spindle end **15** is cemented in a socket in block **16**, and is further held in place by pin **17**, the ends of which are inwardly spaced from the outer face of the block.

Block **16** advantageously includes an arrangement which facilitates manual operation of the contact arm assembly **9**, such as a screw driver slot. In the form shown, a short rod **18** coaxial with spindle **10** is mounted on block **16** as by cementing said rod in a socket in the block, and it may also be held in place by a short pin **19**. The upper projecting end of rod **18** is provided with a screw driver slot **20**.

The spindle **10** carries a spring contact arm **21** within housing **1**, slidably engaging resistance element **6**. In the illustrated embodiment, arm **21** comprises a metal spring strip having an end mounted in a flat-faced recess **22** in spindle **10** by screw **23**; and arm **21** may be annular in form with both ends held in recess **22** by screw **23** as shown. A convex contact stud **24** fixed to spring arm **21** bears against the inner face of resistance element **6**.

An arrangement for limiting the rotation of the contact arm assembly **9** may be provided. As shown, a laterally extending stop arm **25** is mounted on spindle **10**, and has an upward extension **26** which engages a suitable stop on cover **4**, such as stop stud **27** fitting tightly in an aperture in said cover and projecting into the path of arm **25**.

The disclosed arrangement may be used as either a rheostat or a potentiometer. For rheostat use the power circuit lines are soldered to the external ends of terminal **14** and a terminal **7**, the current passing through resistance **6**, contact arm **21**, spindle **10** and arm **13**. When used as a potentiometer, the power circuit lines are of course soldered to terminals **7**, and the voltage take-off line to terminal **14**. Since in both cases spindle **10** is in the circuit, the insulating block **16** is arranged to prevent contact by a screw driver or other object with spindle **10** or pin **17**.

The disclosed construction eliminates any structure for making take-off connections with the rotating contact arm assembly **9** inside the housing **1**, providing a compact simple construction suitable for practical service in very small sizes, rheostats of this type having an overall diameter of only half an inch having been found satisfactory in use. The construction also eliminates the use of screws engaging the plastic housing parts, such screws being objectionable and often impractical in very small sizes.

While a preferred embodiment of the invention has been shown and described, modification thereof may be made without departing from the invention.

We claim:

1. A variable resistor comprising a housing, a resistance element in the housing, a rotatable contact unit slidably engaging the resistance element and including pivots extending through the housing at opposite sides, a terminal connected to the resistance element, and an external terminal device frictionally engaging a pivot.

2. A variable resistor comprising a housing of insulating material, an arcuate resistance element in the housing, an external terminal connected to an end of the resistance element mounted on the housing, a metal spindle in the housing having end portions extending through and rotatably engaging the housing, a contact arm on the spindle slidably engaging the resistance element, a contact element mounted externally on the housing and engaging an end of the spindle, and a spindle rotating device at the other end of the spindle.

3. A variable resistor as claimed in claim 2 in which

the externally mounted contact element comprises a spring member having frictional endwise engagement with the spindle end.

4. A variable resistor as claimed in claim 2 in which the resistance element is mounted on a side wall of the housing, and the contact arm comprises a curved spring arm laterally mounted on the spindle.

5. A variable resistor as claimed in claim 2 in which the spindle rotating device comprises a drive member of insulating material engaging an end of the spindle projecting from the housing.

6. A variable resistor as claimed in claim 2 in which the spindle rotating device comprises a connector block of insulating material engaging an end of the spindle projecting from the housing, and a metallic drive element fixed to the block and provided with a drive slot aligned with the spindle axis.

7. A variable resistor as claimed in claim 2 including a second terminal connected to the other end of the resistance element, mounted on and extending through the housing.

8. A variable resistor as claimed in claim 2 including a stop arm mounted on the spindle, and a stop projecting inwardly from the housing in the path of the stop arm.

9. A variable resistor as claimed in claim 2 including a stop arm mounted on the spindle, a stop projecting inwardly from the housing in the path of the stop arm, and a common mounting screw threaded into the spindle and engaging the contact arm and stop arm.

10. A miniature variable resistor comprising a housing of insulating material having a body and a cover held in place on the body by surface engagement therewith, an arcuate resistance element in the housing, an external terminal mounted on the housing and connected to the resistance element, a metal spindle in the housing having reduced cylindrical end portions rotatably fitting in openings in the housing, a spring contact arm mounted on the spindle and slidably engaging the resistance element, a spring contact arm mounted on the housing and frictionally engaging one end of the spindle, and a spindle rotating device at the other end of the spindle.

References Cited in the file of this patent

UNITED STATES PATENTS

2,015,425	Gaubert	Sept. 24, 1935
2,059,813	Schellenger	Nov. 3, 1936
2,465,213	Dressel	Mar. 22, 1949

FOREIGN PATENTS

470,399	Canada	Apr. 26, 1949