United States Patent

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[54] **COMBINED POTENTIOMETER AND SWITCHING STRUCTURE**
4 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **338/172,** 338/146, 338/166, 338/174, 338/198
[51] **Int. Cl.** **H01c 5/08**
[50] **Field of Search** ..... 338/118, 137, 143, 146, 160, 162, 163, 166, 171—174, 198, 200, 215

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ABSTRACT: A combined potentiometer and switching structure including wiper contacts fixed to a shaft and having contacting engagement with an annular resistor and a pair of switching rings. The wiper contacts are located coincident, or in phase relation. The switching rings are each provided with an interrupted area, such areas are located in an arc complemental to the arc of the resistor and are circumferentially spaced apart a distance not greater than the length of the resistor contacting surface whereby, during rotation of the shafts, circuits connected to the switch rings are opened at different positions with respect to the resistor wiping contact. An annular supporting ring formed of electrical insulation material and provided with a central rib projecting from the inner surface thereof serves as a convenient mounting for the switch rings.

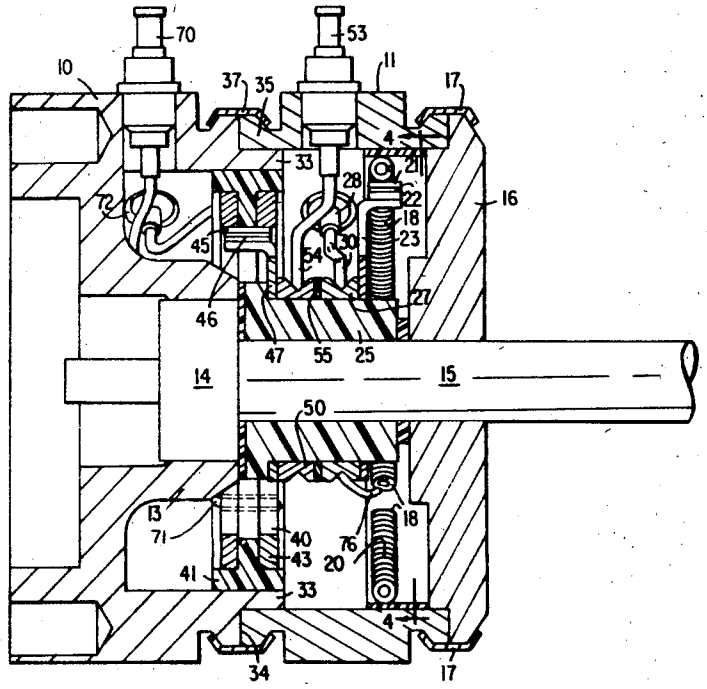


FIG. 2

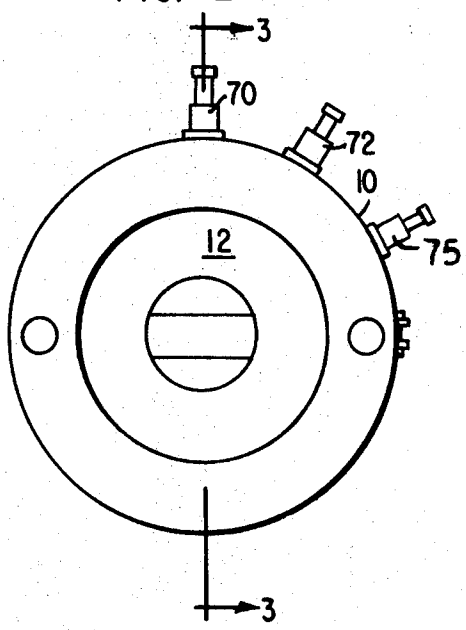


FIG. 1

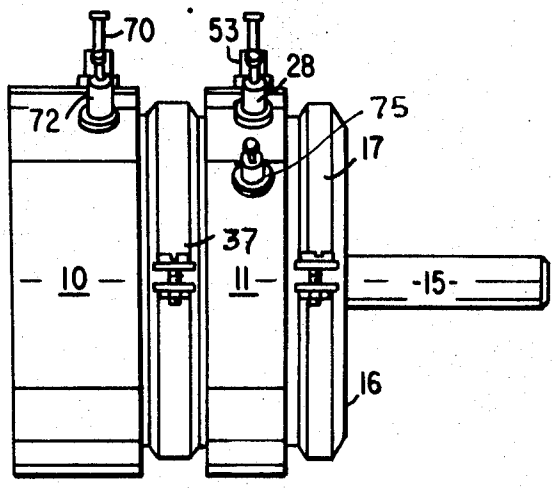


FIG. 4

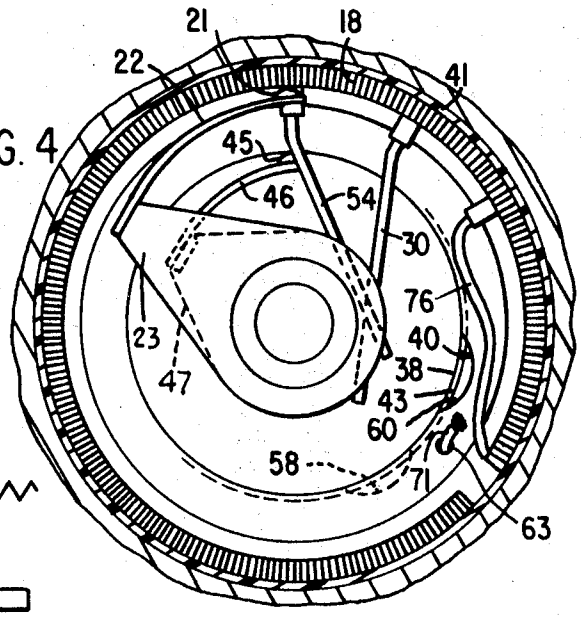
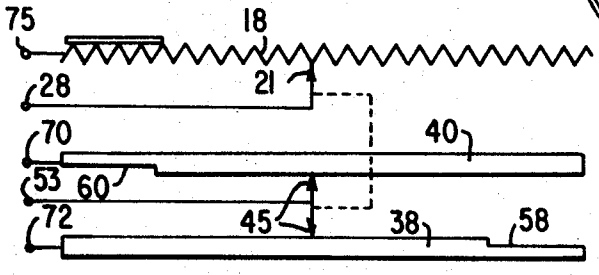


FIG. 6



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FIG. 3

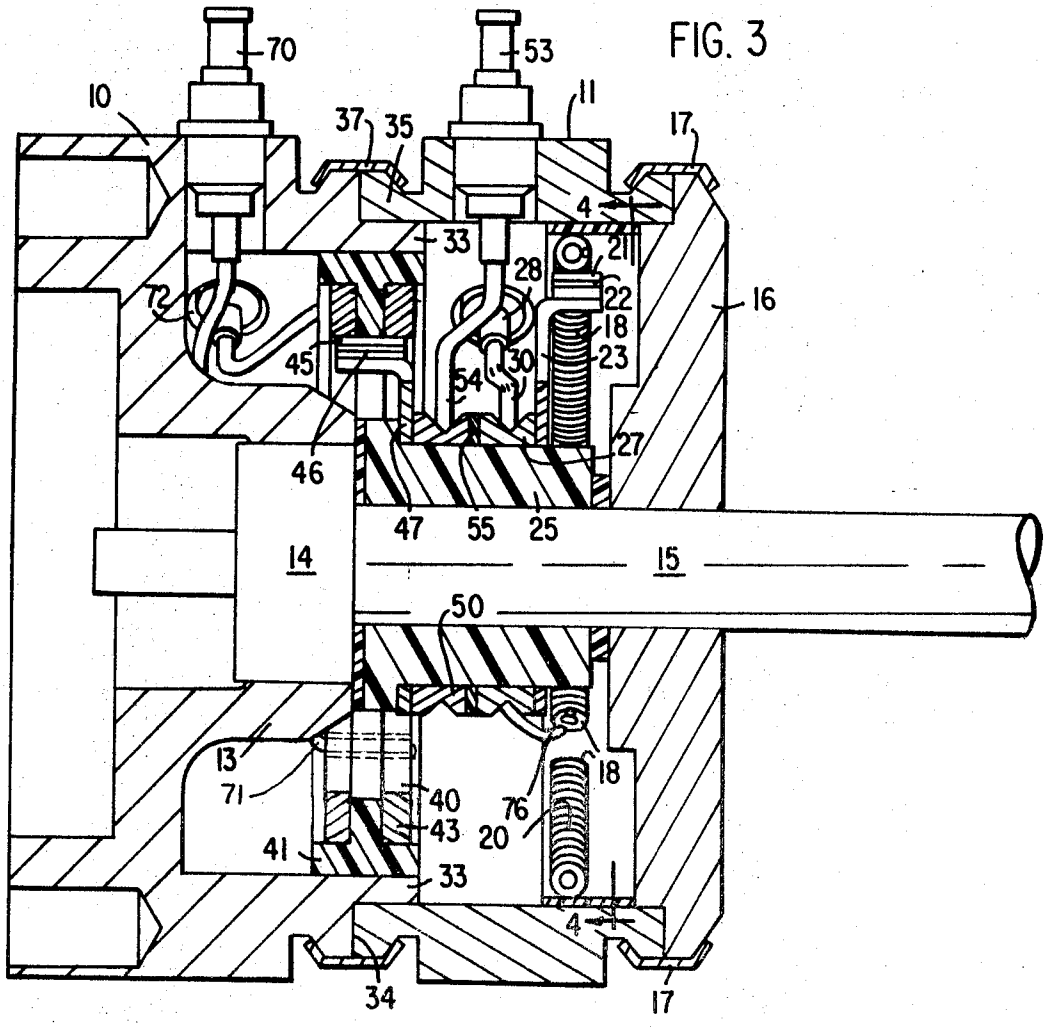
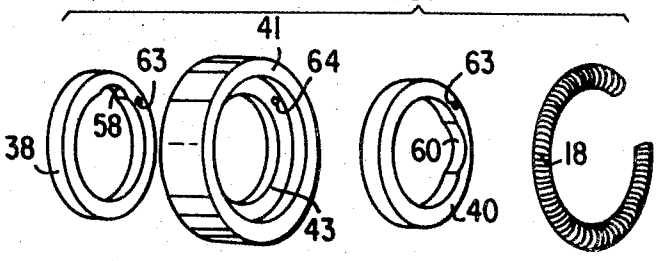


FIG. 5



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COMBINED POTENTIOMETER AND SWITCHING STRUCTURE

BACKGROUND OF THE INVENTION

It has been desirable in the past to connect switch actuators and potentiometer wiping contacts to a common shaft. When more than a single switch assembly is involved, the housing and casing structure become larger than desired. Accordingly, it is the chief object of this invention to provide a structure of the described which by virtue of special mounting means for certain of the parts permits one to obtain a small compact and efficient unit.

SUMMARY OF THE INVENTION

This invention has to do with a combined potentiometer and circuit switching structure. The potentiometer is of the conventional annular type having a circular contacting surface engaged by a wiping contact fixed to a shaft. A second wiper contact is affixed to the shaft and is phased with the resistor wiper contact. This second contact engages a pair of conducting switch rings. A circuit is formed from the second wiper contact through each of the switch rings. The switch rings are formed with interrupted areas whereby, at different positions of the resistor wiper contact, the switching circuits are opened.

More particularly, the invention is directed to a structural arrangement which is economical to manufacture and convenient to assemble to produce a device having very small overall dimensions.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a structure embodying my invention;

FIG. 2 is an end elevation looking to the right, FIG. 1;

FIG. 3 is an enlarged sectional view taken on a line corresponding to line 3–3, FIG. 2;

FIG. 4 is a sectional view taken on line 4–4, FIG. 3;

FIG. 5 is an exploded view of the switch rings and resistor illustrating the orientation of such parts; and

FIG. 6 is a schematic diagram illustrating an arrangement of the resistor and switching rings.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The apparatus consists of a casing having sections **10**, **11**. The section **10** is formed with an end wall **12**, having an inwardly extending cylindrical hub **13**. The hub **13** is provided with a central aperture forming a bearing in which an enlarged portion **14** of an actuating shaft **15** is journaled.

The casing section **11** is provided with a discoidal closure **16** which is formed with a central aperture arranged in axial alignment with the aperture in the flange **13** and forming a second bearing for the shaft **15**. The end member **16** is attached to the section **11** by a clamp ring **17**.

A resistor **18** of annular configuration is fixedly mounted in the section **11**. The inner surface **20** of the resistor is a contact surface over which a wiper contact **21** is moved. The contact **21** is fixed on one end of an arcuate spring member **22**, the opposite end of which is fixed to an arm **23** which, in turn, is fixedly secured to a sleeve **25** of insulating material fixedly secured to the shaft **15**. A collector ring **27** is attached in conductive relation to the arm **23** and is connected to a terminal **28** by a brush **30**.

The casing section **10** is formed at its inner end with a cylindrical flange **33** formed with an annular shoulder **34**. The casing **11** is formed with a circular flange **35** snugly engaging the flange **33** and abutting against the shoulder **34**. The sections are held together by a clamp ring **37**.

A pair of switching rings **38**, **40**, are fixedly mounted in the flange **33** of the casing section **10**. In the arrangement disclosed, the switching rings are mounted in an annular member **41**, fixedly mounted in the flange **33** and having a flange **43** extending radially inwardly between the switch rings **38**, **40**. The

inner contacting surfaces of the switch rings are engaged by a wiper contact **45** fixed on one end of an arcuate leaf spring member **46**, the opposite end of which is fixed to an arm **47** which, in turn, is fixed to the sleeve **25**. A collecting ring **50** is fixed in conducting relation to the arm **47**, and is connected to a terminal **53** by a brush **54**. The collector rings **27**, **50**, are separated by a ring of insulating material **55**.

The contacting surface **20** of the resistor **18** extends circumferentially less than 360°—in the structure shown about 325°. The switching rings **38**, **40**, are each formed with an interrupted area in their inner contacting surfaces. For economy in manufacture, these interrupted areas are preferably in the form of a notch **58** in ring **38**, and a notch **60** in ring **40**. The switch rings **38**, **40** are fixed in the insulating member **41** with the notches **58**, **60** spaced apart circumferentially a distance less than the circumferential extent of the effective contacting surface **20** of the resistor **18**.

The switch ring **40** is connected to a terminal **70** by wire **71** conveniently extended through the apertures **63**, **64** in the switching rings and member **41**, see FIG. **3**. The switching ring **38** is connected to a terminal **72** by wire **73**. One end of the resistor **18** is connected to a terminal **75** by wire **76**. Accordingly, a switching circuit is established from terminal **53** to terminal **70** through switching ring **40**, and a second switching circuit is established through terminal **53** and terminal **72** through switch ring **38**.

One convenient method of assembling the switch rings with the interrupted areas in the desired phase relation involves forming the rings with through apertures **63**. The member **41** is formed with a through aperture **64** in the flange **43**. The apertures **63**, **64** are aligned and a pin is extended through the apertures. The rings are pressed into the member **41**, or otherwise secured therein, and the member **41** is pressed, or otherwise secured, in the section **10**. The alignment pin is then removed and the wire **71** is run through the apertures and fixed to the ring **40**. The sections **10**, **11** are oriented and fixedly clamped together by the band **37**. This method of assembly, together with the product provided with the openings necessary to accomplish the method, are the subject of a Pat. application Ser. No. 828,617, filed concurrently with this application and assigned to a common assignee.

Another method of assembling the unit forming the subject of this invention would involve arranging the switch rings without apertures in proper position on the ring **41** with the aid of proper alignment indicia and securing same with adhesive material. An opening might then be formed in the base portion of the ring for a conductor. Such a procedure would not, of course, be as efficient as providing openings, in alignment, through the parts as described above.

In FIG. **6**, the interrupted areas in the rings **38**, **40** are indicated at **58**, **60** and as being located coincident with the ends of the resistor **18**. The wiper contacts **21**, **45** are fixed in phase relation, see also FIG. **4**. Accordingly, when the resistor wiper **21** is positioned at the right end of the resistor, the contact **45** is in register with the notch **58** in the switching ring **39**. When the resistor wiper has been moved to the left end of the resistor, the contact **45** is in registration with the notch **60** in the switching ring **40**. At intermediate positions of the wiper contacts, both switching circuits are energized.

It will be apparent the interrupted areas of the switching means may be phased to provide interruption of the switching circuits at various preselected positions of the resistor wiper contact **21**.

While I have described a preferred embodiment of the invention, it will be understood the invention is not limited thereto since it may be otherwise embodied within the scope of the following claims.

I claim:

1. A combined potentiometer and switching structure comprising a casing, a shaft journaled in said casing, a resistor fixedly mounted in the casing and having an arcuate contact surface arranged concentrically of said shaft and extending less than 360°, a resistor wiper contact fixed to said shaft and

movable along said contact surface from one end thereof to the other upon rotation of said shaft, a terminal connected to one end of said resister and a terminal connected to said wiper contact, an annular ring formed of dielectric material disposed in said casing, said ring having a central rib formed thereon, a pair of conducting switch rings mounted on said annular ring, each of said rings having a circular contacting surface arranged in concentric relation to said shaft, an arm fixed to said shaft and having a switch wiper contact means yielding engaging the contacting surfaces of said rings, said switch wiper contact means being located coincident with said resistor wiper contact, the contacting surface of each of said rings being formed with an interrupted area, said rings being fixedly mounted in said casing with said interrupted areas being spaced apart circumferentially a distance not greater than the circumferential extent of the contact surface of said resistor, a switching circuit including a wiper terminal connected to said switching wiper contact, and a terminal connected to one of said rings, a second switching circuit including said wiper contact terminal, and a terminal connected to the other of said rings, whereby one of said switching circuits is open at one position of said resistor wiper contact, and said other switching circuit is open at another position of said resistor wiping contact.

2. A combined potentiometer and switching structure as set forth in claim 1, wherein said interrupted areas in said switch rings consist of notches formed in the contacting surfaces of said rings.

3. A combined potentiometer and switching structure as set forth in claim 1, wherein said switch wiper contact means consists of a one-piece contact engaging the contacting surfaces of both of said rings.

4. A combined potentiometer and switching structure as set forth in claim 1, wherein said interrupted areas of said switch rings are located respectively complemental to the ends of the contact surface of said resistor.