June 13, 1961 P. H. VOORLAS 2,988,720

ELECTRICAL CONTROL RHEOSTAT

Filed Aug. 12, 1957

FIG. 1

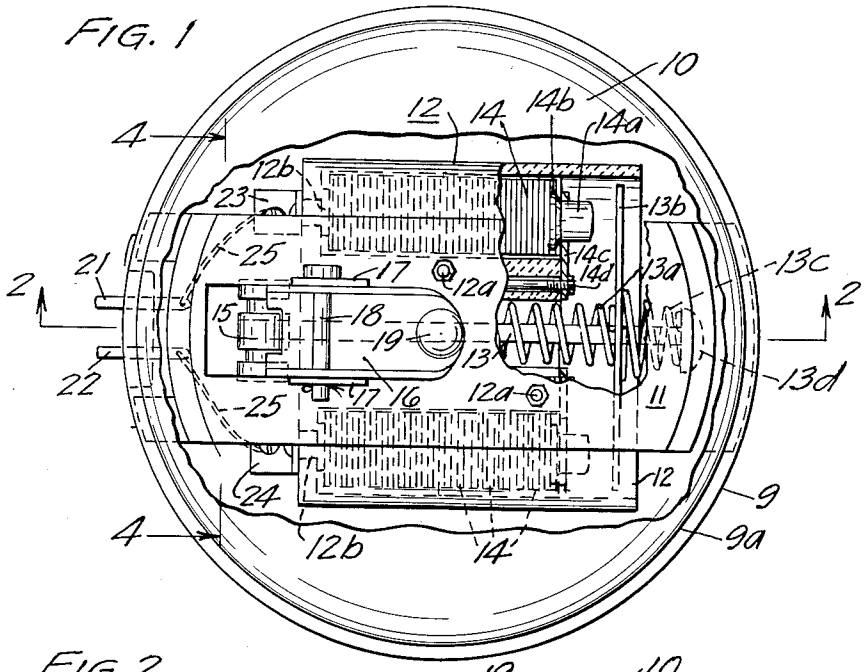


FIG. 2

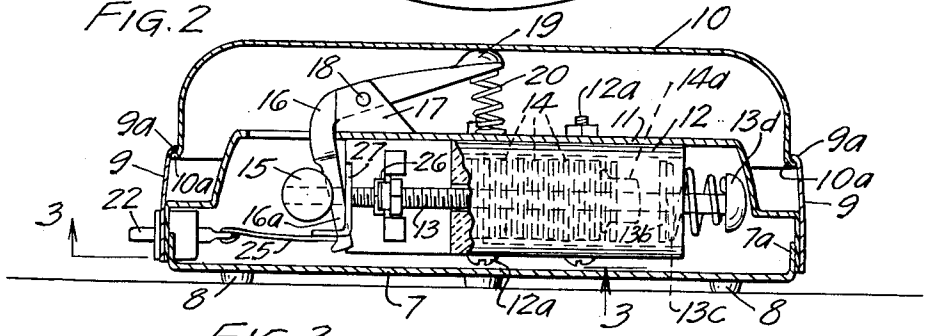


FIG. 3

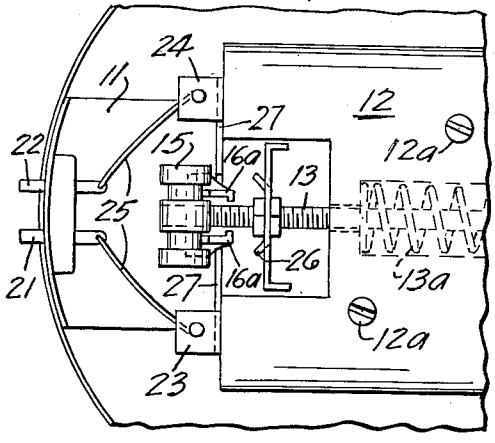
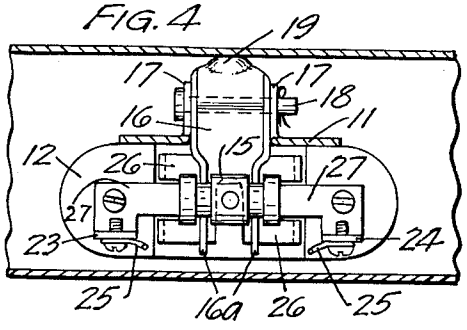


FIG. 4



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ELECTRICAL CONTROL RHEOSTAT

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This invention relates to a foot operated electrical control.

Most electrical controls which are presently in use are of the treadle type requiring that the actuating pressure therefor be applied at a particular location on an actuating lever or treadle member.

It is an object of my present invention to provide a control which is responsive to actuating pressure applied at any point around the complete circumference of the actuating cover member.

More specifically it is an object to provide a floating dome shaped, generally circular actuating member responsive to downwardly directed pressure applied at any point on the upper area thereof and provided with an actuating linkage engaged by said dome to vary the current flow to the electrical device to be controlled.

Still more specifically it is an object to provide an electrical control mechanism which in the disclosed form constitutes a rheostat unit having a novel and relatively ingenious actuating mechanism including a floating type actuating dome which is responsive for actuation to downwardly directed pressure applied to any point on the outer surface thereof.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to the same or similar parts throughout the several views, and in which:

FIG. 1 is a top plan view showing my new invention with a portion of the cover dome broken away;

FIG. 2 is a vertical sectional view taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is an enlarged fragmentary bottom elevational view of a portion of the actuating linkage taken substantially along the line 3—3 of FIG. 2; and

FIG. 4 is a fragmentary vertical sectional view taken substantially along the line 4—4 of FIG. 1.

As illustrated in the accompanying drawing, I provide a suitable base or lower housing element **7** having the feet **8**. An intermediate housing portion is defined by a generally cylindrical segment **9** having its lower portion fixed to an upstanding peripheral flange **7***a* of the base **7**. The upper peripheral edge portion of the cylindrical segment **9** is deformed inwardly to provide a retaining lip or flange **9***a* for interfitting with an outwardly deformed lip or flange **10***a* of a dome shaped member **10** which is mounted for downward shifting movement with respect to the cylindrical segment **9**, and is adapted to have any portion thereof depressed downwardly within said segment **9** for actuating the rheostat mechanism to be hereinafter described.

A mounting plate **11** is fixed to the upstanding flange portion **7***a* at its ends as by being welded thereto and is arched upwardly to provide clearance for a rheostat body **12** which is connected thereto as by the bolts **12***a* which suspend said body from an intermediate portion of said mounting plate **11**. The mounting plate **11** extends diametrically across the base **7** as best shown in FIGS. 1 and 2.

The body **12** is formed from any suitable nonconductive material such as the ceramic material illustrated and has a plurality of longitudinally disposed passages, extending forwardly from the rear end portion thereof. In the forms shown the outermost two passages are provided with suitable conductor and contact elements **12***b* against which a stack of conductive discs such as the carbon discs **14** are normally engaged with varying degrees of pressure. Each stack of carbon discs **14** has a pressure applying contact member **14***a* at the end thereof remote from the contact **12***b*, and made from any suitable conductive material such as carbon. The inner ends of the pressure applying members **14***a* are enlarged to provide a retaining and abutment flange **14***b* against which a retainer **14***c* is engaged. A pair of anchoring bolts **14***d* extend longitudinally through the ceramic body **12** and threadably engaged with the respective retainers **14***c* as best shown in FIG. 1. A central recess or passage has a diminished opening at the forward end thereof through which a plunger rod **13** is slideably mounted and has a rear portion which is enlarged to accommodate a return spring **13***a* which surrounds the plunger rod **13** which rod extends rearwardly, outwardly beyond the end of said body. A contact crossbar **13***b* is carried by the rear portion of said plunger rod **13**, and a pressure applying spring **13***c* interposed between a head **13***d* of said crossbar **13***b* resiliently holds said cross bar in engagement with return spring **13***a*. When the rod **13** is projected forwardly to compress spring **13***a* the crossbar engages the rear ends of the pressure applying contact members **14***a* and as the spring **13***c* is then compressed the pressure will be progressively increased on said members **14***a* to compress the stacks of discs **14** more tightly together and reduce the electrical resistance through each stack of disks.

In form shown, a grooved actuating bar or member **15** is connected to the forward end of plunger rod **13** as by being threadably attached thereto and said cross bar **15** is engaged by a bell crank actuator **16** having a bifurcated engagement portion **16***a* which is received in the grooves of cross bar **15** and is disposed therebehind to project said rod **13** forwardly when the upper arm of the the bell crank **16** is depressed on its pivotal mounting pin **18** which is carried by the opposed spaced apart ears **17** fixed to the top of the mounting plate **11**. A dome engaging rounded portion **19** is provided on the upper rear end of the bell crank **16** and slideably engages the central inside portion of the dome member **10**. A return spring **20** normally urges said bell crank back into normal position.

It is apparent that downward shifting movement of the dome **10** will depress the upper end **19** of the bell crank **16** and will project the plunger rod **13** forwardly. The plunger rod, of course, carries the contact crossbar **13***b* which engages the pressure applying contact members **14***a* of the stacks of discs to thus reduce the electrical resistance through said carbon discs as previously stated. The spring **13***c* compresses during projection of the plunger rod **13** forwardly to produce a yieldable, progressively increasing pressure on said discs. The return spring **13***a* causes this pressure to be released upon reelase of the upper dome shaped member **10** and works in combination with the return spring **20** to normally hold said dome in upwardly projected position.

A source of electricity is connected to the rheostat by connector prongs **21** and **22** and the current passes inwardly through one of said prongs, to one of the terminals **23** or **24** respectively connected thereto by connection wires **25** and to the respectively adjacent stack of discs **14** through the adjacent contact **12***b*. The crossbar **13***b* when engaged with the pressure applying members **14***a* interconnects the rear ends of the stacks of discs **14** and the current flows back through the other stack of discs, the contact **12***b* and back through the other connector prong in the usual manner. The contact terminals **23** and **24** have a pair of inwardly extending bypass contacts **27** which are adapted to be interconnected directly by a contact bar **26** carried by the rod **13** as best shown in FIG. 3. This contact is made at the extreme end of the

stroke of the plunger rod in a forward direction and obviously interconnects the two terminals 23 and 24 directly without causing the current to pass through the two stacks of carbon discs 14 to thus eliminate from the circuit the electrical resistance of said discs.

The operation of the rheostat disclosed is, of course, to progressively reduce the resistance by compressing the stacks of carbon discs 14 together and eventually bypassing said discs entirely by establishing direct contact between terminals 23 and 24 as stated above.

It will be apparent that downwardly exerted pressure on any portion of the cover dome 10 anywhere around the periphery thereof or at any other point on the outer surface thereof, will produce actuation of the bell crank 16 and cause the same to compact the carbon discs 14 to reduce the electrical resistance through the rheostat. This, of course, produces a relatively simple and easily actuated mechanism which is particularly adapted for use with sewing machine controls and the like. There is, of course, sufficient clearance between the lower outer peripheral edge of the cover dome 10 and the inside wall of the cylindrical segment 9 to permit free and easy shifting movement of the dome 10 or any depressed portion thereof to travel upwardly and downwardly without obstruction. As an outer portion of the dome is depressed the diametrically opposed lip or flange portion 10*a* thereof will act as a fulcrum to cause the central portion of the dome to be depressed and the bell crank to be thus actuated.

It will be seen that as provided a relatively simple yet highly efficient and easily actuated rheostat which can be operated by downward pressure on any portion of the surface of a generally circular cover dome 10 rather than requiring said pressure to be exerted at a specified location as in most treadle type rheostat mechanisms commonly used for sewing machine motor speed controls.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts shown and described in the specification, without departing from the scope of my invention which generally stated is set forth in the appended claims.

What I claim is:

1. A foot operated electric control comprising a base, a generally dome shaped and pivotable actuator element having depending peripheral portion, cooperating stop means on the peripheral portions of the actuator element and on the base and limiting upward displacement of the periphery of the actuator element, spring means urging said actuator element in an upward direction from the base and cooperating with said stop means for permitting downward tilting of said actuator element and corresponding downward displacement of one side of the actuator element at any point along the periphery of the latter, an electrical control mechanism enclosing movable means to vary the current flow therefrom and mounted on said base, and an actuating lever underlying said actuator element and engaging the same to be operated thereby, said actuating lever being connected with said movable means for varying the current flow through the mechanism.

2. The invention set forth in claim 1 wherein said actuator element is substantially symmetrically shaped, and said actuating lever engaging the actuator element substantially at the center thereof.

3. A foot operated electric control comprising a supporting structure, a generally dome and shell shaped actuator member above the supporting structure, a linkage including a first link centrally engaging the underside of said actuator member and being vertically movable, and said linkage also including a shiftable operating member moved in response to movement of said link, means mounting said linkage on the supporting structure and including resiliently yieldable means charging said link upwardly to normally urge said actuator member upwardly, an electrical rheostat including movable means connected with said operating member and also including a plurality of carbon discs arranged in a stack to be compressed by said operating means to change the electrical conductivity of the stack, and cooperating stop means on the actuator member periphery and on the supporting structure to limit upward movement of one side of the actuator member and to permit downward movement of the opposite side of the actuator member with respect to one side thereof in response to pressure at any point along the periphery thereof so as to tilt the actuator when said pressure is applied adjacent the periphery thereof on said opposite side.

4. A foot operated electrical control comprising a base, a generally dome-shaped and pivotal actuator element having depending peripheral portions, cooperating stop means on the peripheral portions of the actuator element and on the base and limiting upward displacement of the periphery of the actuator element, spring means urging said actuator in an upward direction from the base and permitting downward tilting of said actuator element and corresponding downward displacement of one side at any selected point on the periphery of the actuator element with respect to the opposite side, an electrical control mechanism enclosing movable means to vary the current flow therefrom and mounted on said base and an actuating lever underlying said actuator element and having one end thereof engaging the actuator element to be operated thereby, said actuating lever having its other end connected with said movable means for varying the current flow through the mechanism.

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