Sept. 15, 1959 W. J. WILLIAMS 2,904,651

SPEED AND TEMPERATURE CONTROLLED SWITCHING MECHANISM

Filed Feb. 5, 1958

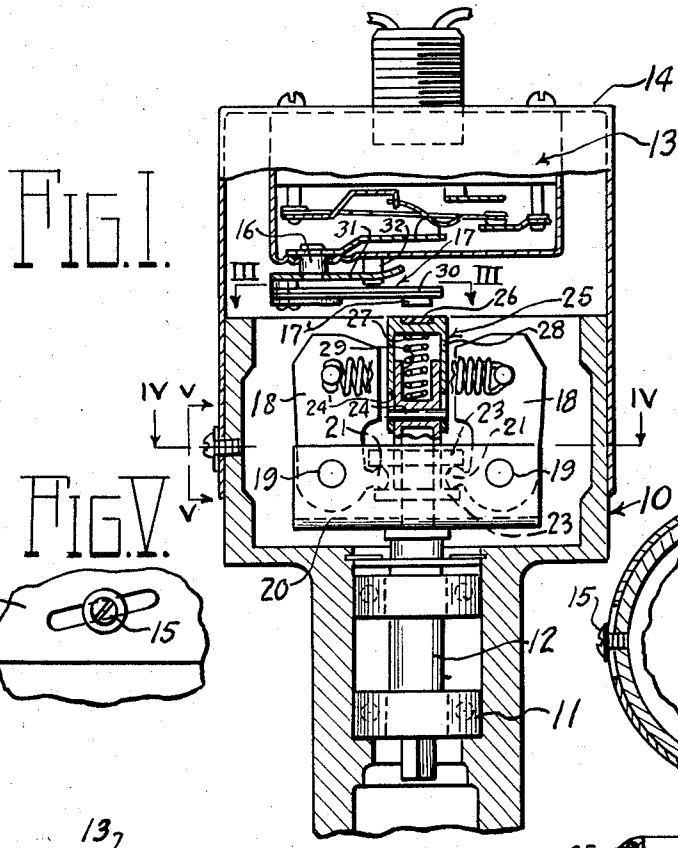



FIG. I.

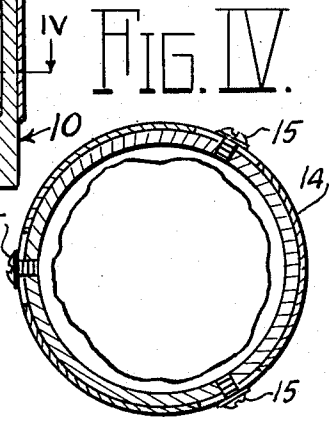



FIG. IV.




FIG. V.

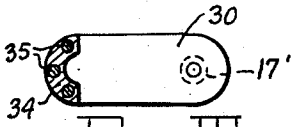



FIG. III.

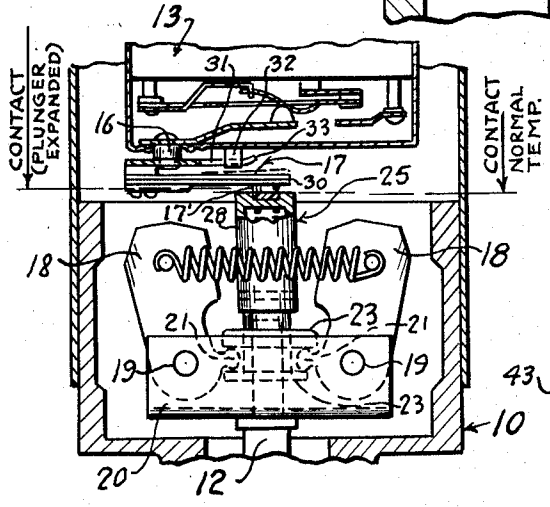



FIG. II.

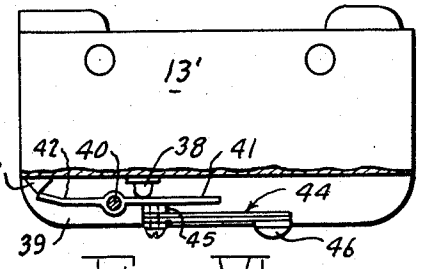



FIG. VI.

INVENTOR.
William J. Williams
BY
Edmund B. Whitcomb
ATTORNEY

United States Patent Office

2,904,651

Patented Sept. 15, 1959



2,904,651

# SPEED AND TEMPERATURE CONTROLLED SWITCHING MECHANISM

William J. Williams, Wilmette, Ill.

Application February 5, 1958, Serial No. 713,506

7 Claims. (Cl. 200—80)

This invention relates to a combined speed and temperature controlled mechanism for operating electrical switches for various installations and has for its object to provide a governor-controlled switching element, in combination with a temperature-controlled means for effecting an accurate operation of a switch mechanism at a predetermined speed, irrespective of large variations in temperature, so that notwithstanding such variations in temperature, the switch actuation shall be at the exact speed desired.

More specifically, my invention includes the use of a lever system in which a part will move toward or away from a part of the governor mechanism in accordance with temperature changes to compensate for such temperature changes over a large range, whereby a very high degree of accuracy may be obtained in the actuation of a switch at predetermined speeds, regardless of such substantial changes in temperature.

It is a further object of the invention to interpose in a governor-controlled switch actuating mchanism a temperature varying means to offset inaccuracies in the predetermind or desired speed at which the switch mechanism would otherwise be actuated, due to substantial changes in temperature. Moreover the action herein provided is adjustable for any desired speeds.

Further objects and advantages are within the scope of this invention such as relate to the arrangement, operation and function of the related elements of the structure, to various details of construction and to combinations of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent from a consideration of the specification and drawings of a form of the invention, which may be preferred, in which:

Figure I is a vertical sectional view showing the governor mechanism at zero speed position;

Figure II is a vertical sectional view, partly in elevation, showing the parts at a predetermined or desired speed of rotation of the governor at which the switch is to be operated;

Figure III is a plan view of a detail of the temperature controlling element;

Figure IV is a section of line IV—IV of Figure I;

Figure V is a partial elevational view on line V—V of Figure I; and

Figure VI is a vertical elevational view of a modification of my invention.

Referring to the drawings, **10** is a lower governor housing part adapted to provide a bearing **11** for the governor shaft **12** as indicated. The switch mechanism broadly is indicated at **13** and is carried on the under-



side of the top of the upper housing part or cover member **14**, which is adjustably fixed to the lower housing **10**, as shown in Figures IV and V. This adjustment is provided in the inclined slot and set screw **15** as shown. The switch mechanism **13** shown in the embodiment of Figures I to V is a special hermetically sealed type of micro-switch. A combined switch actuator and depending pivot member **16** is actually flexibly fixed in the bottom face of the sealed casing of the micro-switch **13**. This rivet or pin **16** also is adapted to be fixed to and operated by my improved lever system **17** with the temperature compensation incorporated therein, which lever system is in turn actuated by a governor part or plunger so that the operation of member **16** is controlled at a predetermined desired speed by the governor mechanism, and also by the means to compensate for temperature variations, as indicated above.

The governor mechanism shown may be of various types and is provided with the flyweights **18** pivoted as at **19** to a suitable bracket or base, **20**, rotated by the governor shaft **12**. The weights **18** have the cam members **21** adapted to ride in the groove between the two collars **23**, which is connected to the specially constructed and operating extendable and retractable plunger **25**, the position of which is dependent on variations in speed. This plunger member **25** consists of two telescoping portions in the upper portion of which the button or contact element **26** is carried by an outer sleeve **28** telescoping on a central portion of said plunger **25** which has an upper cylindrical recessed portion **29** for receiving the spring **27**. Above the collar **23**, a transverse pin **24** is fixed to and protrudes externally of the plunger member **25** so that the sliding sleeve **28** having closed ended slots **24'** therein may receive said protruding ends of said pin **24'** to guide and limit the travel of sleeve **28** relative to the plunger member **25** under the action of the preloaded spring **27**, whose tension is made such that in the first operation of the device the entire element **25** operates as a unit and the telescoping parts are not collapsed. However when a part of the switch actuating elements come in contact with the switch base, further upward pressure by the governor would cause the spring **27** to collapse and the sleeve **28** will slide downwardly, so that further increase in speed will greatly reduce the pressure on the operating parts.

The button element or contact member **26** is of special material or is preferably made of a tetrafluoroethylene resin.

To move the switch actuating pin member **16**, I fix thereto a temperature controlled lever member arranged with its free end extending over the upper end of the plunger **25**. This special lever **17** includes means whereby upon an increase or decrease of temperatures, for example, the end of the plunger **25** will still contact the free end of the switching lever system **17** at a fixed desired predetermined point, so that the switch will be operated at the predetermined desired speed. An increase in temperature naturally expands the parts. Hence the plunger **25** would otherwise contact the switching lever at an earlier speed if the temperature of all parts were substantially increased. In the embodiment of Figures I–V, I provide a bi-metallic member **30** arranged so that for a desired speed, this element will move the part or contact block **17'** which contacts the plunger tip **26** away from said plunger if the temperature increases, and this bi-metallic member **30** is arranged to exactly compensate

for these changes in temperature. If the temperature drops, the reverse occurs.

More specifically, by connecting the bi-metallic member 30 to the rivet or pin 16, attention is called to the transverse arm 31 fixed to rivet 16, guided by depending guides 32, said arm 31 having an upturned end 33 to form a stop against the bottom of switch member 13. The other end of arm 31 has on its underside a semi-circular spacing washer 34 to which the bi-metallic lever 30 is riveted by three rivets 35 as indicated in Figure III. The other end of lever 30 carries the contact block 17' as indicated above. Hence there is a continuous fixed connection from block 17' through bi-metallic lever 30, washer 34 and arm 31 to the depending switch actuating rivet or pin 16.

In Figure VI the switch assembly 13' has a sliding depending switch actuating pin 38. The switch assembly 13' may have depending side walls 39 as indicated to which a cross pivot 40 is secured. This pivot 40 pivotally supports a switch actuating lever 41, having one arm 42 adapted to contact a stop 43 on the base of the switch assembly. The other side of lever 41 is arranged to carry the bi-metallic temperature compensating lever 44, and to this end it will be seen that I have a post 45 carried by said switch lever 41 depending therefrom so that the bi-metallic lever 44 is fixed to said post at one end of said lever 44. The other end of bi-metallic lever 44 has the governor contacting portions 46 as shown.

It is apparent that, within the scope of the invention, modifications and different arrangements may be made other than is herein disclosed and the present disclosure is illustrative merely, the invention comprehending all variations thereof.

What I claim is:

1. A combined speed and temperature controlled switching unit including a speed controlled governor mechanism; an extendable and retractable member associated with said governor and arranged to be moved into various positions dependent upon the speed of said governor; a switch having an operating member; a switch operating lever system interposed between said switch and governor positioned members and arranged to actuate the switch, said lever system including a temperature compensating element whereby said switch is operated by said governor mechanism at predetermined speeds notwithstanding temperature variations over a wide range of temperature changes.

2. A combined speed and temperature controlled switching unit including a speed controlled governor mechanism; an extendable and retractable member adapted to effect operation of the switch, said member associated with said governor and arranged to be moved into various positions dependent upon the speed of rotation of an element of said governor; a switch having an operating member; switch operating means interposed between said switch member and said extendable and retractable governor member to actuate the switch; said switching means including an element whose position is varied by temperature changes, said element adapted to compensate for temperature changes in the operation of said lever means whereby said switch is operated by said governor mechanism at predetermined speeds notwithstanding temperature variations over a wide range of temperature changes.

3. A combined speed and temperature controlled switching unit including a speed controlled governor mechanism; an extendable and retractable plunger adapted to effect operation of the switch, said plunger associated with said governor and arranged to be moved into various positions dependent upon the speed of rotation of an element of said governor; a switch having an operating member extending toward said plunger; a switch operating lever adapted to contact said switch member to actuate the switch; a bi-metallic leaf element responsive to temperature changes attached to said lever adapted to be contacted by the speed controlled plunger and arranged to compensate for temperature changes in the operation of said lever by said plunger, the unit arranged whereby said switch is operated by said governor mechanism at predetermined speeds independently of temperature variations over a wide range of temperature changes.

4. A combined speed and temperature controlled switching unit comprising a governor mechnism; a telescoping two part extendable and retractable switch operating plunger; said governor mechanism having fly-weight and spring return means associated with said plunger to determine the position of said plunger dependent upon the speed of rotation of an element of said governor mechanism; a switch having an operating pin extending toward said plunger; a pivoted switch operating lever arranged to actuate said switch pin; a bi-metallic leaf responsive to temperature changes attached to said lever; said telescoping two part plunger having a preloaded spring interposed between said parts; a wearing button carried by said plunger adapted to be contacted by said leaf to actuate said switch lever, the mechanism arranged whereby said switch is operated by said governor mechanism at predetermined speeds independently of temperature variations over a wide range of temperature changes.

5. A combined speed and temperature controlled switching unit including a two part enclosing casing a speed controlled governor mechanism located in one of said casing parts; an extendable and retractable member associated with said governor and arranged to be moved into various positions dependent upon the speed of said governor; a switch carried by the other of said two part casing, said switch having an operating member; a switch operating lever system interposed between said switch and governor positioned members and arranged to actuate the switch, said lever system including a temperature compensating element whereby said switch is operated by said governor mechanism at predetermined speeds notwithstanding temperature variations over a wide range of temperature changes, and means whereby said two parts of said casing may be adjusted toward and away from each other to vary the speed at which said switch lever is actuated by said governor controlled extendable and retractable member.

6. A combined speed and temperature controlled switching unit including a speed controlled governor mechanism; an extendable and retractable member associated with said governor and arranged to be moved into various positions dependent upon the speed of said governor; a spring for normally holding said member in retracted position; a switch having an operating member; a switch operating lever system interposed between said switch and governor positioned member and arranged to actuate the switch, said lever system including a temperature compensating element whereby said switch is operated by said governor mechanism at predetermined speeds notwithstanding temperature variations over a wide range of temperature changes, the construction arranged whereby at zero speeds a space is interposed between said extendable and retractable member controlled by the governor speed and said switch operating lever system thereby avoiding wear on the parts until a pre-determined speed is reached and the centrifugal force of the fly-weights overcomes the pressure of said spring.

7. A combined speed and temperature controlled switching unit including a speed controlled governor mechanism; an extendable and retractable member associated with said governor and arranged to be moved into various positions dependent upon the speed of said governor; a spring for normally holding said member in retracted position; a switch having an operating member; a switch operating lever system interposed between said switch and governor positioned member and arranged to actuate the switch, said lever system including a temperature compensating element whereby said switch is operated by said governor mechanism at predetermined speeds

notwithstanding temperature variations over a wide range of temperature changes, the construction arranged whereby at zero speeds a space is interposed between said extendable and retractable member controlled by the governor speed and said switch operating lever system thereby avoiding wear on the parts until a pre-determined speed is reached and the centrifugal force of the fly-weights overcomes the pressure of said spring and means to adjust and lock said lever system in various positions relative to said retractable member.



**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 1,632,565 | Schmidt | June 14, 1927 |
| 2,412,347 | Mardis | Dec. 10, 1946 |
| 2,457,192 | Williams | Dec. 28, 1948 |
| 2,810,032 | Laas | Oct. 15, 1957 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 769,887 | Great Britain | Mar. 13, 1957 |