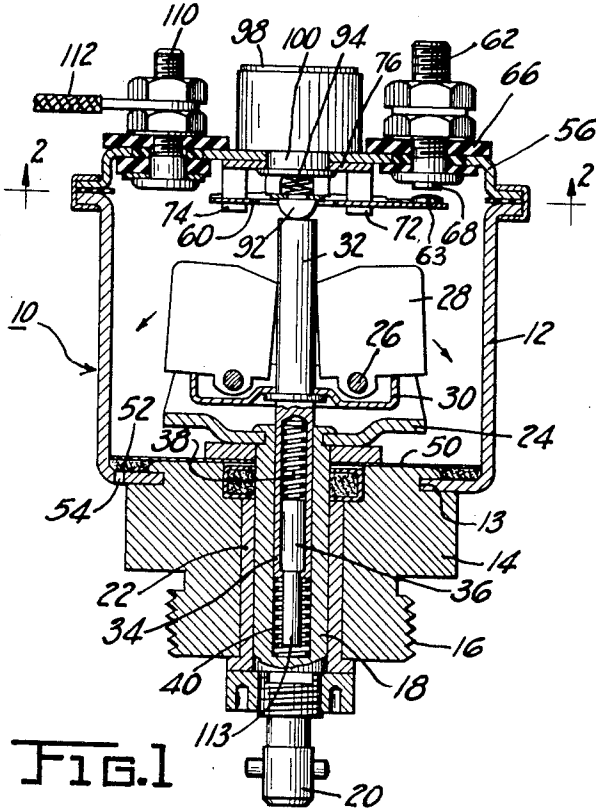
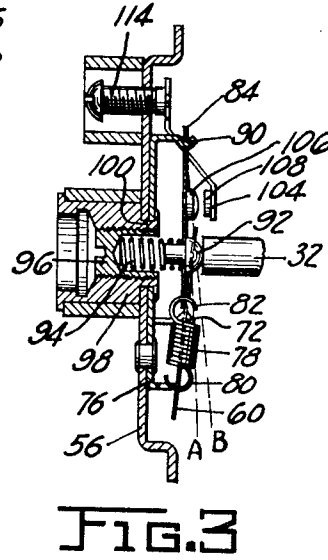
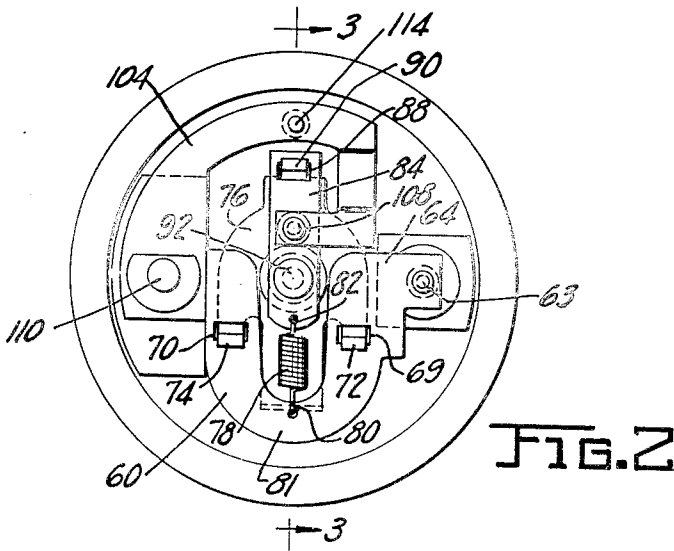


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SNAP SWITCH

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## SNAP SWITCH

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This invention relates in general to electrical control means and more particularly to a governor and switch mechanism adapted for use as a control in say, the power plant of an automotive vehicle.

It is an object of my invention to provide a simple, compact and effective governor and switch unit, the switch portion of said unit including two separate switches, one of which is closed at a certain governor speed and the other of said switches being closed at another governor speed.

Yet another object of my invention is to provide a governor and switch unit including two switches which are operated by a plurality of springs and centrifugal weights, one of said springs serving to effect the closing of said switches and certain other of said springs, which are controlled by the centrifugal weights, serving to effect the opening of said switches.

A further object of my invention is to provide a governor and switch unit comprising two separate switches which have movable contact means, the operation of which is controlled by a plurality of springs and by centrifugal weights.

Yet another object of my invention is to provide a compact governor and spring operated two stage governor and switch mechanism housed within a single casing the switch operating means of said mechanism including an overcenter spring operable in part to effect one of the stages of operation of said mechanism.

Other objects of the invention and desirable details of construction and combinations of parts will become apparent from the following description of a certain embodiment, which description is taken in conjunction with the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view showing details of the governor operated two-stage switch mechanism constituting my invention;

Figure 2 is a view, looking in the direction of arrows 2-2 of Figure 1, disclosing the switch mechanism of the governor and switch unit disclosed in said figure; and

Figure 3 is a sectional view, taken on the line 3-3 of Figure 2, disclosing details of the switch mechanism.

Referring now to Figures 1 to 3 inclusive disclosing a preferred embodiment of my invention this mechanism, hereinafter referred to as a governor and switch unit and indicated as a whole by reference numeral 10, includes a cup-shaped casing member 12, having an opening 13 in its base. A drive shaft housing member 14 secured

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at its upper end to said casing member and extending through the opening 13, may be threaded at 16 to provide means for securing the governor and switch unit to say the transmission housing of an automotive vehicle if the unit 10 is employed as a part of the power plant of said vehicle. The member 14 is bored to receive a governor drive shaft 18 having drive means 20 secured to its lower end. The shaft 18 is journaled in a bearing 22 and to the upper end of said shaft there is secured a U-shaped stamping 24. Pins 26, which are mounted at their ends within the sides of the stamping 24, serve as pivotal supports for centrifugal weights 28 and said weights, when rotated outwardly in the direction of the arrows, Figure 1, serve to move a plate 30 downwardly. This plate 30 is provided with an opening in its center through which passes the upper end of a pin 32. A lower end portion 34 of the pin 32 is slidably mounted within the interior of the drive shaft 18 and is hollowed out to receive a pin 36 and a spring 38 the latter being stronger than a spring 40 housed within the drive shaft between one end of the portion 34 and the bottom of the recess in said shaft.

A relatively thin plate 50 is fixedly mounted on the top of the housing member 14 and felt 52 or any other suitable air filter material is packed between the plate 50 and the bottom of the casing member 12. This filter is incorporated in the governor and switch unit for the purpose of cleaning the air which is drawn into said unit via an opening 54 in the base of the casing member 12; for the operation of the centrifugal weights 28 results in a partial vacuum being created within the unit and this results in the aforementioned ingress of air.

Describing now the two-part switch mechanism disclosed in the figures of the drawing, the same is mounted on the inner side of an electrically grounded cover plate 56 of the governor and switch unit; and said plate is detachably secured, by suitable fastening means, to the cup-shaped casing member 12. The switch mechanism comprises a thin flat U-shaped metal stamping 60, Figure 2, constituting a grounded movable contact member of the switch mechanism and a metal bolt 62 constituting a fixed contact member of said switch mechanism. The grounded movable contact 60, which operates as a lever, is provided with an electrical contact member 63 extending outwardly, Figure 2, and is further provided with an end portion which is enlarged at 64, all as clearly disclosed in Figure 2. The fixed contact 62 is insulated from its support by

any suitable insulating means 66 and is provided with an electrical contact member 68 contactable by the member 63. For purposes of description of operation, the switch comprising the grounded movable contact 60 and the fixed contact 62 may be defined as switch No. 1 of the two switches of the unit 10; and this switch is disclosed in my application Serial No. 442,465, filed May 11, 1942.

The U-shaped movable contact member 60 is provided with openings 69 and 70 and through these openings extend fulcrum members 72 and 74. The latter members are preferably rectangular in shape and slightly bent at their ends, thereby providing a fulcrum for the contact member 60 when said member is forced against the members 72 and 74 as it is being rocked to open and close the switch mechanism. The members 72 and 74 constitute an integral part of a stamping 76 which may be riveted to the inner surface of the cover plate 56.

Describing the means for effecting the rocking action of the movable contact member 60, that is the operation of said member when it functions as a lever, there is provided a coiled tension or so-called over center spring 78 having a hook 80 at one of its ends extending through an opening in a central part 81 of the U-portion of said contact member. The other end of the spring 78 is provided with a hook 82 which extends through an opening in one end of a rectangular shaped metal stamping 84. This stamping, which may be defined as a movable contact member, is preferably provided with a rectangular shaped opening 88 in its other end through which opening there extends a rectangular shaped support member 90. As with the aforementioned fulcrum members 72 and 74 the member 90 constitutes an integral part of the stamping 76 and is slightly bent at its upper end to provide a groove to support the end of the stamping. The central portion of the stamping 84 is provided with an opening through which extends the shank portion of a yieldable member 92 made of any suitable non-conductive material such as synthetic rubber. One end of this member 92 is preferably rounded as disclosed in Figures 1 and 3 and is contacted by the aforementioned member 32. A coiled compression spring 94, Figure 3, is sleeved, at one of its ends, over the shank of the member 92 and abuts the outer face of the contact member 84; and at its other end said spring is fitted within a screw 96 bored to receive said spring. This screw is threaded into a cylindrically shaped member 98 fixedly secured to the casing member 56 by means of a cylindrical portion 100 extending through an opening in the casing member 56 and bent over at its end to provide means not only to clamp the member 98 in place but also to secure the stamping 76 in place.

The other switch of the mechanism of my invention, which for the purposes of this description is defined as switch No. 2, includes the stamping 84 serving as a movable contact member, and a fixed contact member 104. These two members are provided respectively with electrical contact members 106 and 108, Figure 3. As is disclosed in Figure 2, the contact member 104 constitutes a curved stamping one end of which is fixedly secured to a terminal 110 having a lead wire 112 extending therefrom. As is disclosed in Figures 2 and 3, the other end of the member 104 is bent so that the contact 108 underlies the contact 106 and a pin 114, Figure 3, adjustably

mounted in the cover plate 56 and contactable with a portion of the member 104, serves as means for determining the spacing of said members 104 and 106.

Describing now the operation of the governor and the two switches operated thereby, it is to be noted that when the longitudinal axis of the overcenter spring 78 lies between the plane of the member 60 and the cover plate 56 that said spring then exerts a force having a component which pushes the central part 81 of the member 60 toward the cover plate, that is, toward the plane of said plate. This operation results in a separation of the contact tabs 63 and 68 to maintain switch No. 1 open. The parts of the mechanism are at this time in the positions disclosed in Figure 3; accordingly, switch No. 2 is also open.

Now to effect the above described open position of the switches 1 and 2, it is necessary to compress the spring 94, for as will be brought out in the description to follow said spring in its normal, that is, expanded condition serves to close both of said switches. The spring 40, aided for a time by the spring 38, performs this operation, that is, the operation of compressing the spring 94 to open the two switches 1 and 2, for the spring 40 is stronger than the resistance offered by the spring 94 and the switches connected thereto during the compression of the latter spring. It will be apparent therefore from an inspection of Figure 1 that with the centrifugal weights 28 inoperative that the spring 40 serves to compress the spring 94 thereby effecting an opening of the two switches of the mechanism of my invention.

Describing now the switch closing operation of the mechanism of my invention, and incidentally describing in greater detail the function of parts of the mechanism only briefly referred to above, it will be assumed, merely for the purposes of this description, that the governor and switch unit 10 constitutes one of the controls of the power plant of an automotive vehicle; and it will furthermore be assumed that the drive shaft 18 of said unit is rotated at a speed which is directly proportional to the speed of the internal combustion engine of said vehicle. Now the parts of the control unit 10 are so constructed and arranged and so operative that when the engine is idling, or is being operated at a speed to effect a relatively slow forward movement of the vehicle, then the spring 40 is operative to maintain the two switches of the unit open; in other words, the force exerted by the centrifugal weights is ineffective to compress the spring 40. However, at an engine speed of say 600 R. P. M., effecting say a vehicle speed of 12 M. P. H., the weights 28 will force the member 24 downwardly to compress the spring 40 and thereby permit the spring 94 to expand sufficiently to effect, through the intermediary of the overcenter spring 78, a closing of switch No. 1, that is, the switch made up of the contacts 60 and 62. In this operation, an end portion 113 of the pin 36 moves into contact with the base portion of the recess in the drive shaft 18. There is thus completed the so-called first stage operation of the unit 10.

Now to effect the second stage of operation of the mechanism, that is, the closing of switch No. 2, the engine speed is increased to say 1900 R. P. M. to effect say a vehicular speed of 25 M. P. H. At this speed of rotation of the drive shaft 18 the centrifugal weights 28 force the

pin 32 downwardly thereby compressing the spring 38, and this operation results in a continued expansion of the spring 94 thereby effecting a closing of switch No. 2, that is, the contacting of tabs 106 and 108, Figure 3. Incidentally, the position of the stamping 84 when switch No. 1 is closed is indicated by the dotted line A, Figure 3, and by the dotted line B when switch No. 2 is closed.

There is thus provided a compact, easily serviced and effective governor and switch unit which may find use in any mechanism calling for the successive closing of two electrical circuits, the closing of one circuit being effected at one speed of the governor mechanism and the closing of the other circuit being effected at another speed of said mechanism. The employment of the spring 40 and the heavier spring 38 in the mechanism of my invention makes possible the aforementioned two distinct stages of operation of the switch closing spring 94, the second stage of operation, that is, the closing of switch No. 2, being effected at a vehicular speed which is substantially higher than the vehicular speed at which the first stage of operation, that is, the closing of switch No. 1 is effected. The use of the two springs 38 and 40 of different rates makes possible the housing of said springs within a relatively small space; for to employ but a single relatively weak spring would, in view of space limitation, be impractical.

Although this invention has been described in connection with a preferred embodiment, the principles involved are susceptible of numerous other applications that will readily occur to persons skilled in the art. The invention is therefore to be limited only as indicated by the scope of the appended claims.

**I claim:**

1. A switch unit comprising a casing member and a cap member the two members housing two switch mechanisms including two separate fixed contact members secured to the cap member and lying in different planes, two separate interconnected movable contact members also secured to the cap member and positioned adjacent said fixed contact members both of said members operating as levers, one of said members being U-shaped, two fulcrum members secured to the cap member and together providing spaced apart fulcrum supports for the U-shaped contact member, an over-center operating spring member in-

terconnecting the two movable contact members and operative, with a certain switch operating movement of one of the movable contact members, to effect a switch operating movement of the other of the movable contact members, and means, mounted in the casing member, for actuating one of the movable contact members to effect an operation of the switch mechanism.

2. A switch mechanism including two separate fixed contact members lying in different planes, a U-shaped movable contact member operating as a lever and having one of its ends constructed as a switch member and adapted to cooperate with a portion of one of the fixed contact members to provide a switch said member lying in a plane extending between the aforementioned two different planes, a second movable contact member extending within the U-shaped contact member, operable as a lever member and having a portion thereof cooperating with a portion of the other fixed contact member to provide a second switch said second movable contact member also extending in a plane lying between the aforementioned two different planes; together with an over-center operating spring serving to interconnect the two movable contact members and operative, with a certain switch operating movement of one of the movable contact members, to effect a switch operating movement of the other of the movable contact members.

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