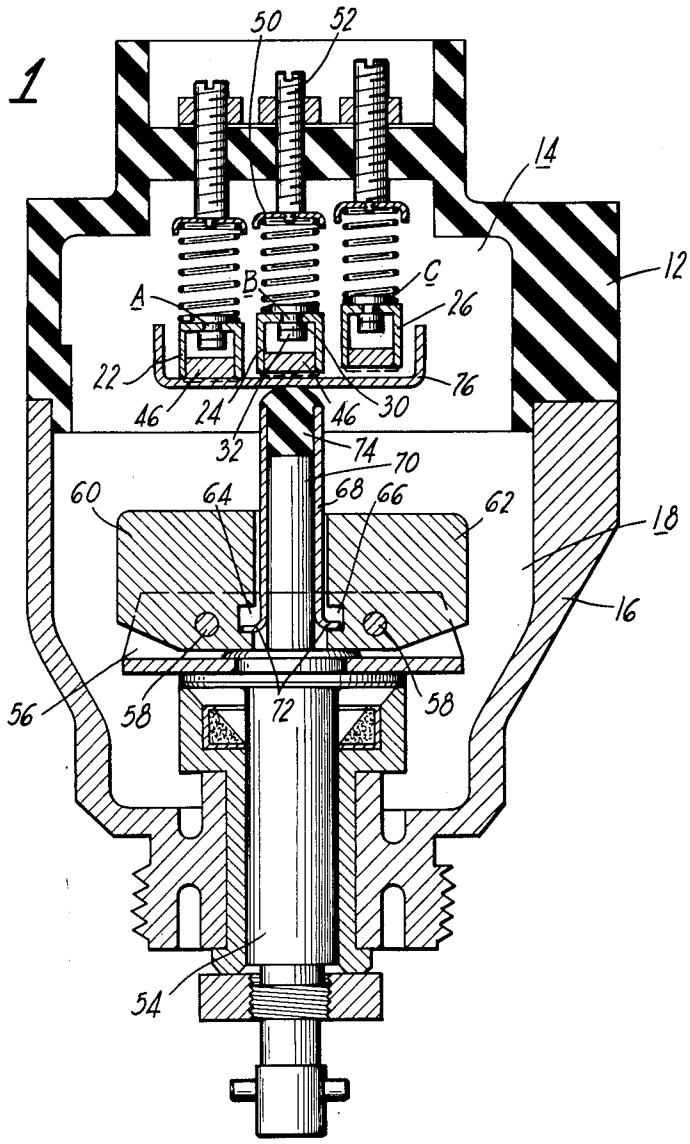
Dec. 9, 1952 M. L. CRIPE 2,621,267

SWITCH MECHANISM

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Fig. 1



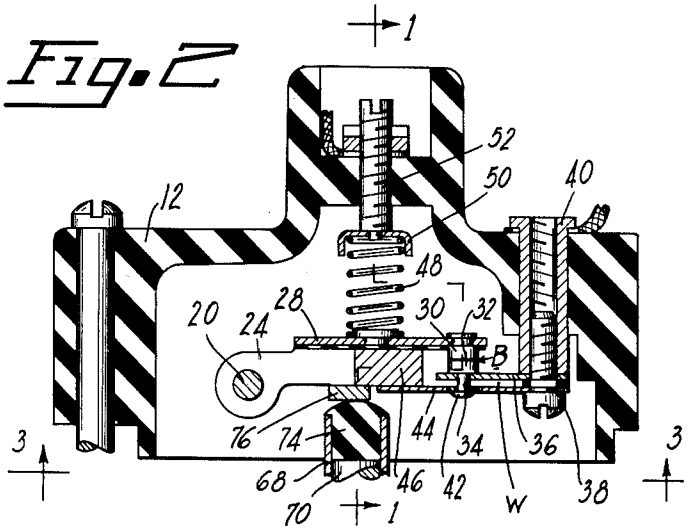
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SWITCH MECHANISM

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Fig. 2



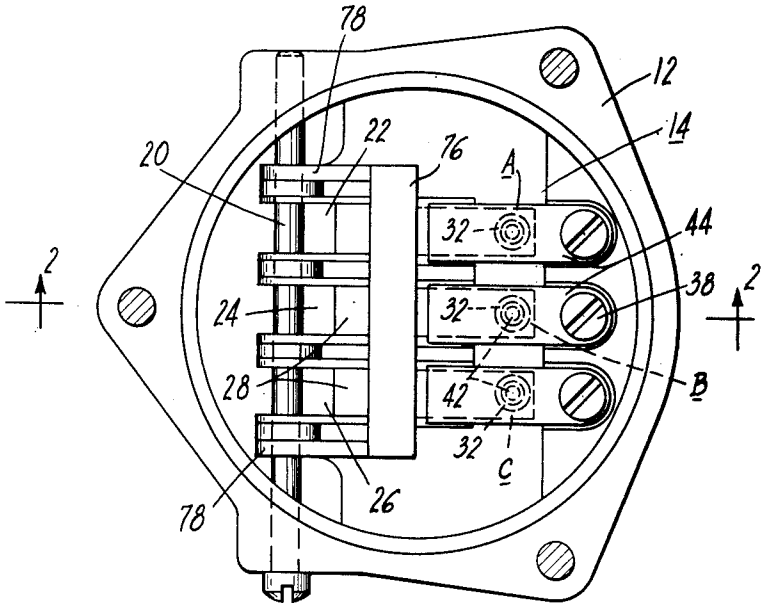


Fig. 3

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SWITCH MECHANISM

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5 Claims. (Cl. 200—80)

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This invention relates in general to improvements to snap switches and particularly to a governor operated switch of this type.

My invention relates to a governor actuated contact making and breaking switch designed for use in the power plant of an automotive vehicle or in connection with any device or mechanism where it is desired to coordinate a control device with the speed of a moving part; for example, the switch mechanism of my invention may be employed to control an automotive transmission operating mechanism known as an overdrive control the switch being operated in accordance with the speed of the vehicle.

Various types of governor actuated switches have been designed in an effort to meet the demand for such a device, however, such switches have been open to many objections such as the inability to obtain a quick making and breaking of the controlled circuit; and a failure to effect a quick operation of the switch results in an arcing of the contacts thereof. It is accordingly one of the principal objects of my invention to provide a switch mechanism which may be quickly broken, that is a mechanism including means for quickly separating the relatively movable contacts of the switch.

Another object of my invention is to provide a switch mechanism suitable for use in a mechanism for operating either the friction clutch of an automotive vehicle or the change speed transmission thereof, or both of said controls, said switch mechanism being automatically and very quickly operated to interrupt the electrical circuit when the speed of the vehicle reaches a certain factor.

A further object of my invention is to provide a simple and compact governor operated snap action switch unit of relatively few parts.

The above and other objects and features of the invention will appear more fully hereinafter from a consideration of the following description taken in connection with the accompanying drawings where one embodiment of the invention is illustrated by way of example.

Figure 1 of the drawings is a sectional view, taken on the line 1—1 of Figure 2 of said drawings, disclosing details of the governor operated switch mechanism of my invention;

Figure 2 is a sectional view, taken on the line 2—2 of Figure 3, disclosing the details of one of the switches of the switch mechanism of my invention; and

Figure 3 is a plan view, taken on the line 3—3 of Figure 2, disclosing the switch portion of the mechanism of my invention.

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My improved governor operated snap switch mechanism consists essentially of a two-part casing an upper portion 12 thereof housing a switch mechanism 14 and a lower portion 16 of the casing housing a governor mechanism 18 for operating said switch mechanism.

Describing now the details of the switch mechanism of my invention a shaft 20, journalled in the casing section 12, serves as a pivotal support for three channel shaped support members 22, 24, and 26, Figure 3, the side walls of said members being extended to provide arms having openings therein to receive the shaft. The latter members serve as supports for the movable contacts of the switch mechanism and the switch parts mounted in and cooperating with each of said members duplicate like parts of the adjoining member. In other words there are provided, by the members 22, 24, and 26 and parts cooperating therewith, three identical switches indicated in Figures 1 and 3 by the letters A, B, and C; and this being true but one of said switches is described in this specification.

Referring now to Figure 2 disclosing the details of the switch B, a top portion 28 of the support member 24 serves as a mounting for a movable electrical contact member 30 secured thereto; and this portion 28 of the switch support member is of a material which will conduct electricity. As disclosed in Figure 2 the portion 28 is preferably insulated from the parts of the mechanism in contact therewith.

The contact 30 is moved away from and into abutment with a fixed electrical contact member 32 secured to a pin 34 which slidingly extends through an opening in a stop member 36. The latter member, which is of electrically conductive material, is secured, by a screw 38, to an electrical conductor 40 mounted in the switch casing 12; and the pin 34 is fixedly secured, by a head portion 42, to a yieldable armature member 44 secured to the stop 36 and conductor 40 by the screw 38. As is disclosed in Figure 2 the screw 38 and pin 34 are insulated from the armature 44. The inner end of the armature underlies a permanent magnet member 46 nested within and secured to the switch support member 24. The latter member is biased downwardly by a spring 48 of electrically conductive material said spring being interposed between the upper face of said member and a cup shaped member 50 secured to the lower end of a screw 52; and both the screw 52 and cup member 50 are of electrically conductive material. The screw 52 is thread-

edly mounted in the switch casing 12 thereby providing means for varying the load exerted by the spring 48 upon the switch support member 24. There is thus provided, by the spring 48, means for biasing the switch contact member 30 into abutment with the contact member 32 to maintain the switch B closed; and when said switch is closed the electrical current flows through the switch and cooperating parts via screw 52, cup 50, spring 48, member 28, contacts 30 and 32, stop 36, screw 38 and conductor 40. The bendable armature 44 provides a yieldable support member for the fixed contact 32 of the switch mechanism of my invention.

The switch B, and the switches A and C of like construction, are opened by the operation of the governor mechanism 18 disclosed in detail in Figure 1. This governor mechanism includes a driveshaft 54 drivably connected to say the propeller shaft of an automotive vehicle; and to the upper end of the shaft 54 there is fixedly connected a channel shaped plate 56. Pins 58, mounted in the side walls of the plate 56, serves as supports for centrifugal weights 60 and 62 which are provided, respectively, with notches 64 and 66.

A hollow thrust pin 68, slidingly mounted on a support pin 70 secured to the plate 56, is flared out at its base; and a flange 72 provided by this construction, fits within the recesses 64 and 66 of the centrifugal weights. A plug 74 of insulating material provides a cap portion for the pin 68; and said cap abuts a relatively narrow U-shaped follower plate 76 which is pivotally mounted, by arm 78, upon the shaft 20. It follows therefore that the follower plate is pivotally mounted upon the casing section 12. As is disclosed in Figure 1 the switch support members 24 and 26 and cooperating parts are so mounted within the casing that said members are spaced at slightly different distances from the follower plate 76 when the parts of the mechanism are in their switch closed position; and in this position of the parts of the mechanism the side walls of the switch support member 22 are in contact with the follower plate. With this construction the switch support members are spaced at different distances from the top of the switch casing, all as is defined in certain of the appended claims. There is thus provided, by the above described switch construction, means for successively opening the switches A, B, and C with an operation of the governor mechanism 18.

Describing now the complete operation of the governor operated switch mechanism constituting my invention, with the driveshaft 54 at rest the parts of the mechanism assume the positions disclosed in the several figures of the drawing. Then at a certain R. P. M. of the shaft 54 the centrifugal weights 60 and 62 rotate outwardly a certain distance thereby moving the follower plate 76 outwardly a certain distance to open the switch A. Then at a certain increase in R. P. M. of the shaft 54 the switch B is opened; and a further certain increase in the R. P. M. of said shaft results in an opening of the switch C.

Describing now the operation of the switch B, which description will surfice as a description of the operation of switches A and C, it is to be noted particularly that in the off position of the parts of the switch mechanism, Figure 2, the armature 44 is attracted to and is in contact with the horseshoe magnet 46. Then when the governor 18 is operative to open the switch B the follower plate 76 pushes the support member 24 upwardly said member rotating in a counterclockwise direction, Figure 2, about the shaft 20. During the first increment of this movement the armature 44 remains in contact with the magnet 46 and the then abutted electrical contacts 30 and 32 move upwardly as a unit the pin 34 sliding through the guide and stop member 36. Then when the force necessary to continue the bending operation of the armature exceeds the force exerted by the magnet 46 the armature leaves the magnet and the contact 32 leaves the contact 30, said operation being effected with a snap action; and in all probability this breaking operation of the switch takes place after the armature contacts the stop 36 a space W between the stop and armature being great enough to make the operation possible. In this operation the potential energy stored up in the bent armature 44 serves to separate the contacts 30 and 32 with great speed this operation being defined above as a snap action operation; and this speedy separation of said contacts serves to prevent an undesirable arcing at said contacts. It is apparent therefore that the switch mechanism of my invention includes a plurality of normally made switches which are successively broken the breaking of each switch being very quickly effected; and the timing of the breaking operation is in large measure determined by the spacing of the switch support member from the governor operated follower plate 76.

With the switch mechanism of my invention the switches A, B, and C are successively remade with a deceleration of the governor driveshaft 54. Explaining the latter operation of the several switches by an explanation of the operation of the switch B, the reduction in the speed of the shaft 54 permits the member 24 to be rotated in a clockwise direction, Figure 2, by the expanding operation of the spring 48; then when a certain critical speed of said shaft is reached the member 24 is so positioned as to make possible an operation of the magnet 46 to attract the armature 44 thereby effecting a movement of the contacts 30 and 32 into abutment with each other to close the switch.

There is thus provided, by the governor operated switch mechanism of my invention, a simple, compact and easily serviced switch mechanism of relatively few parts the objectionable arcing of the mechanism being reduced to a minimum.

Although only one embodiment of the invention has been illustrated and described, various changes in the form and relative arrangements of the parts may be made to suit requirements.

I claim:

1. A switch mechanism including a casing, a shaft journalled within said casing, a plurality of movable switch contact members pivotally mounted on said shaft, a plurality of fixed switch contact members secured to said casing and cooperating with the aforementioned movable switch contact members to provide a plurality of switches the parts of the mechanism being so constructed and arranged as to space the several switches at different distances from the top of the switch casing when the switches are closed; together with governor means housed within the casing and operative to successively open said switches, and magnet means, including a plurality of armatures, for biasing said switch

contact members into engagement with each other, the several armatures being fixedly connected to the fixed contacts of the several switches.

2. A switch mechanism including a casing, a shaft journalled within said casing, a plurality of movable switch support members pivotally mounted on said shaft each of said support members serving to support a switch contact member, a plurality of fixed switch contact members secured to said casing and cooperating with the aforementioned movable switch contacts to provide a plurality of switches the parts of the mechanism being so constructed and arranged as to space the several switches different distances from the top of the casing when the switches are closed; together with governor means, including a follower plate, contactable with the switch support members and operative to successively open said switches, and magnet means, including a plurality of armatures, for biasing the switch contact members into engagement with each other, the several armatures being fixedly connected to the fixed contacts of the several switches.

3. A governor operated switch mechanism including a casing comprising two parts, a switch mechanism housed within one of said casing parts comprising a shaft journalled within said casing part, a plurality of movable switch contact members pivotally mounted on said shaft said members being spaced at different distances from the top of said casing part, other switch contact members mounted on said casing part, the construction and mounting of the switch contact members being such as to provide switches wherein both of the two contacts of each switch move together as a unit during a part of the operation of breaking the switch and move relative to each other during the remainder of the operation of breaking the switch and during the operation of making the switch; together with means mounted within the other casing part and operable, by virtue of the aforementioned spacing of the movable switch parts, to successively actuate the several switches to effect an opening operation thereof.

4. A switch mechanism comprising a casing, a switch, including a movable contact member pivotally mounted on said casing and a fixed contact member, means including a magnet comprising a permanent magnet portion secured to the movable contact member and a flexible armature portion to which the fixed contact member is secured, for biasing said contact members into engagement with each other to thereby close the switch; and governor operated means, including a follower plate pivotally mounted on the casing, for moving said contacts away from each other to open the switch.

5. A governor operated switch mechanism comprising a casing member, a switch mechanism housed within said casing member including a plurality of switches spaced at different distances from the top of said casing member when the switches are closed each of said switches including a movable switch contact and another switch contact cooperating therewith; together with yieldable means, constituting a part of the mounting for the latter switch contact, making possible a movement of the two switch contacts as a unit prior to their separation in the operation of breaking the switch; magnet means, including an armature member secured to each of the contacts of the switch member for biasing the two switch contacts of each switch into engagement with each other, and means operative, by virtue of the aforementioned spacing of the several switches, to successively effect an opening of the several switches of the switch mechanism.

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