The present invention relates to an overdrive governor switch generally used and adopted in motor vehicles and the like for throwing in the overdrive system when exceeding a certain set speed.

The object of the present invention is to provide a simple compact and useful device of this type which may be readily mounted wherever desired on the machine or vehicle to which it is to be applied.

One of the features of the present invention is that the adjustment for which the overdrive may be operated is readily made for any speed desired and the positive action of the device is such that it will operate consistently when the desired speed has been reached.

In the present invention, a snap switch of the kind commonly called a "microswitch" wherein a plate having a longitudinal central slot is bowed inward by pressure in the plane of the plate at the end of the slot so that a pressure against the plate in a critical region will snap the plate from one bowed position to the reverse bowed position is employed. The critical region for the operation of the plate is a circular region at a point along the slot.

In the present invention, a freely movable pin extends through this slot, the pressure of which is adjustable by a spring in back of the pin which projects from an enlarged shoulder surrounding the pin while the pin itself fits into a recess of a cap covering the shaft of the centrifugal governor positioned on the other side of the plate. The length of the pin, therefore, spaces the top of the cap from the shoulder so that the plate has a clearance on either side which makes it necessary for some definite play or motion for operation of the switch by the governor. This space may be a matter of thousandths of an inch whereby the cap or the shoulder will have to move a definitely established distance for throwing the plate from one bowed position to another for operation of the overdrive switch. There can be no fluttering, therefore, and the change over is definitely established.

A further advantage of the present system is that it is simple in its construction and substantially direct in its operation since the centrifugal action of the motor speed directly brings into play the overdrive switch for operating the overdrive circuit mechanism.

The full advantages and improvements in the present invention will be more readily understood from the specification set forth below when taken in connection with the drawings, in which:

Figure 1 shows a section through the overdrive governor switch.

Figure 2 shows a section taken on the line 2—2 of Figure 1, and

Figure 3 shows a perspective view of the pivot plate mounting the centrifugal weights.

In the drawings, the complete device is housed in a casing 1 through the lower end of which as viewed in Figure 1, extends a central bearing sleeve 2 in which a spindle or shaft 3 is journaled which is spirally grooved at 3' in such a direction of rotation that no oil can rise upward into the mechanism in the rotation of the shaft 3. The spindle or shaft 3 which extends outward through the lower end of the housing is connected to the drive mechanism by means of which the spindle 3 is rotated.

At the upper end of the spindle 3, there is provided a slightly narrower neck element 4 which fits in a dished plate 5 to which the upper end of the spindle 3 is secured by any suitable means, as for instance, by an arbor extending plate or collar 7. Beyond this, the spindle 3 is made to have a smaller diameter and extends upward into a plunger or capped bushing 8 which is made of nylon or other similar durable material. The end of the plunger or shaft projecting into the nylon bushing is shown at 9. The dished plate 5 is dished in a somewhat rectangular center section with a surrounding flat flange 10 which at its sides has upwardly projecting small plates or tabs 11, 11', within which rest counter-weights 12 riveted by means of rivets 13, 13', to base plates 14 and 14' which along their center lines on each side of the pin 9 overlap one another as indicated by the inner ends of the tabs 15 and 16.

The plates 14 and 14' which are the base for the counter-weights are the same construction, but positioned to face one another as shown more specifically in Figure 3. Each plate 14 and 14' has at its facing edges one offset positioned tab 15 and 16; the tab 15 offset from the plate 14' and extending over the end of the plate 14 and the tab 16 offset from the plate 14 and extending over the end of the plate 14 whereby the facing edges of the plates 14 and 14' are interlocked for movements of the inner edges of the plates 14 and 14' both up and down.

The dished member 5 thereby acts somewhat like a pivot for the counter-weights 12, 12 at the inner rounded edge 11' of the tab 11 in which the edge of the pivot plates 14 and 14' engage and are pivotally secured. The nylon bushing 8 which caps the end 9 of the spindle or shaft 3 is provided with a small recess 17 on its top surface to receive the rounded projecting end 18 of a spring fluidly flanged lower convex capping member 20 at the bottom of which in the center is the projecting pin 18 previously mentioned.

Surrounding the stud 19 is a helical spring 21, which bears against the outwardly projecting flange of the cap 20. At the other end, the spring fits into a covering cap 22 which is threaded into the outer sleeve 23, the lower end of which is secured to a plate 24 which covers the upper end of the housing. The plate 24 has a gasket 25 beneath it and is secured to ears 26 of the housing by means of screws 27 which may be placed at desired positions around the circumference of the plate 24. Other suitable securing means such as rolling the edge of the plate or housing or welding the two together may be used.

The dished cap 20 of the pin 18 bears against a spring member 28. This member is shown in detail in Figure 2. The spring 28 is secured at its ends by rivets 29 and 30 to the plate 24 and has a central slot 31 extending from a point somewhat beyond the center of the spring longitudinally of the length of the spring to the other end of the spring. This latter end is capped by a bar 32 which may be folded over the end of the spring and is secured to the end of the spring as a fixed solid connection. In this construction, the end covering plate or element 32 provides a slight bowing of the spring 28 narrowing the slot 31 slightly at its open end so that the spring 28 is somewhat dished as shown in Figure 1.

The sides of the spring or plate member 28 are interlocked by means of ribs 33 and 34. The construction of this type of spring follows along the lines of a snap action of a microswitch known as the "Mu-Switch."
As indicated in Figure 1, the spring 28 is dished so that the free end at 32 slopes upwards towards the inner side of the covering plate 24. It may touch it or almost touch, although this is not essential.

The cap 20 is adjusted in the desired position by means of the adjustable screw 22 which is turned downwards until the convex cap 20 exerts the desired compression on spring 28 in the position opposite the center of the spring.

In the operation of the system just described, when the spindle or shaft 3 is rotated beyond a certain speed, the weights 12 will be tilted outward with the inner locked ends of the plates 14 and 14' tilted upwards under which conditions the caged bushing 8 will be compelled to move upwards by pressure against the washer 35 by means of the plates 14 and 14' over which the washer 35 is positioned. The washer 35 extends under the bushing 8 so that when the plates 14 and 14' are raised at their inner ends, the upper surface 36 of the bushing 8 in which the cap 17 is positioned bearing against the pin 18 will force the pin 18 and the plunger 19 upwards against the action of the spring 21 and thereby raise the inner section of the spring 28. This action on the inner section of the spring 28 in the neighborhood of the circle 37 representing the area of the face 36 at the top of the bushing will make the center of the plate 34 rise and thereby make the end plate or contact bar 37 move quickly downward to come in contact with the stationary contact element 38 which will complete the necessary electrical circuit for bringing in the overdrive mechanism. When the speed has fallen below the selected adjustment, the bushing 8 will drop down because the weights will return towards their centers and the connection between the contacts 32 and 38 will open, thereby cutting out the overdrive mechanism.

One side of the switch connection may be grounded while the other side is brought out through proper terminal sleeves 39 and 40 through which the wire 41 is connected which forms the other side of the circuit.

In the mechanism which has just been described it will be seen that the arrangement provides a very sensitive control and that the adjustment for the point of overdrive operation is controlled entirely by the adjustment of the set screw 22 which provides the necessary and desired pressure exerted on the plunger 19 to establish the initial position and pressure on the spring member 28.

Having now described my invention, I claim:

1. An overdrive governor and switch in combination comprising a housing having a drive shaft extending therein, a plate supported on said drive shaft to be rotated therewith, a pair of engaging pivot plates supported on said plate and engaging one another at adjacent edges, a pair of counterweights rigidly secured to each of said pivot plates, said supporting plate having turned flanges at the sides engaging the sides of said counterweights for holding them in place during rotation of said shaft, a collar mounted in said pivot plates and surrounding said shaft, a free bushing forming a cap for the end of the shaft bearing on said collar, a snap acting switch having its operating point positioned to engage the free end of said bushing, and means exerting a selected pressure in the vicinity of the operating point of said snap acting switch in the direction of said bushing establishing a rotation velocity of said shaft for the operation of said switch.

2. In an overdrive governor switch, a drive shaft, a pair of governor weights pivotally supported on said drive shaft in a plane perpendicular to the axis of the shaft, said weights moving upwardly and away from the shaft in response to rotation of the shaft, means mounted coaxially with said shaft and adapted to be moved axially of the shaft by movement of the weights in response to rotation of the shaft, a switch of the snap switch type having a snap plate with a hole therethrough at the point of operation, a spring tensioned pin having a surrounding shoulder offset from the end of the pin, said pin projecting through said hole, a recess in the top of said means mounted coaxial with said shaft to receive the end of the pin projecting through the hole in the plate, the face of said shoulder and the surface of said means being spaced apart from one another at all time during the operation of said switch, said snap switch being operable by the movement of said means mounted coaxially with said shaft toward said shoulder.

3. In combination a centrifugally operated governor having a shaft with a cap thereof moveable axially by the operation of said governor, a snap switch having an operating plate positioned just over said cap, a pin having an enlarged shoulder backed by a spring with the pin projecting through a hole in said operating plate and the end resting in a recess in said cap spacing the top of said cap from said shoulder with the plate in between the shoulder and the top of the cap, said plate and snap switch being operable by contact of the shoulder or the surface of the cap with the plate.

4. In an overdrive governor switch, a drive shaft, a supporting plate mounted on said drive shaft and perpendicular therewith, a pair of pivot plates having abutting inner edges and pivotally connected at their outer edges to said supporting plates tabs formed on the inner edges of at least one of the pivot plates and engaging the other causing said pivot plates to pivot together on the supporting plates, governor weights secured on said pivot plates causing the inner edges of the pivot plates to move upwardly when the shaft is rotated, a sleeve slidably mounted on the end of said shaft and supported on the inner edges of the pivot plates whereby upward movement of the inner edges of the pivot plates causes the sleeve to move upwardly on the shaft.

5. In an overdrive governor switch having a housing, a drive shaft, a capped sleeve covering the end of said shaft, and means including governor weights for raising said sleeve; apparatus consisting of a leaf spring bowed at the center with a longitudinally located slot and having an electrical contact at one end, the bowed center of the spring engaging one end of the sleeve, said spring secured to the housing at the other end, means having a pin and a shoulder with the shoulder positioned on one side of said spring and the pin projecting through the spring and adapted to contact the end of said sleeve engaging the spring, and means for adjusting tension on said means having the pin and shoulder against said spring.

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