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3,049,939

CONTROL MECHANISM

Filed April 3, 1961

FIG. 3

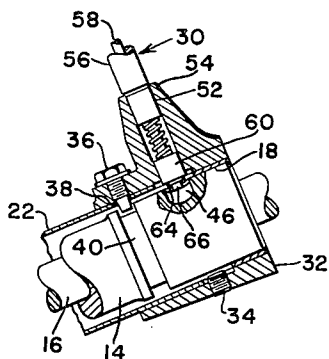


FIG. 1

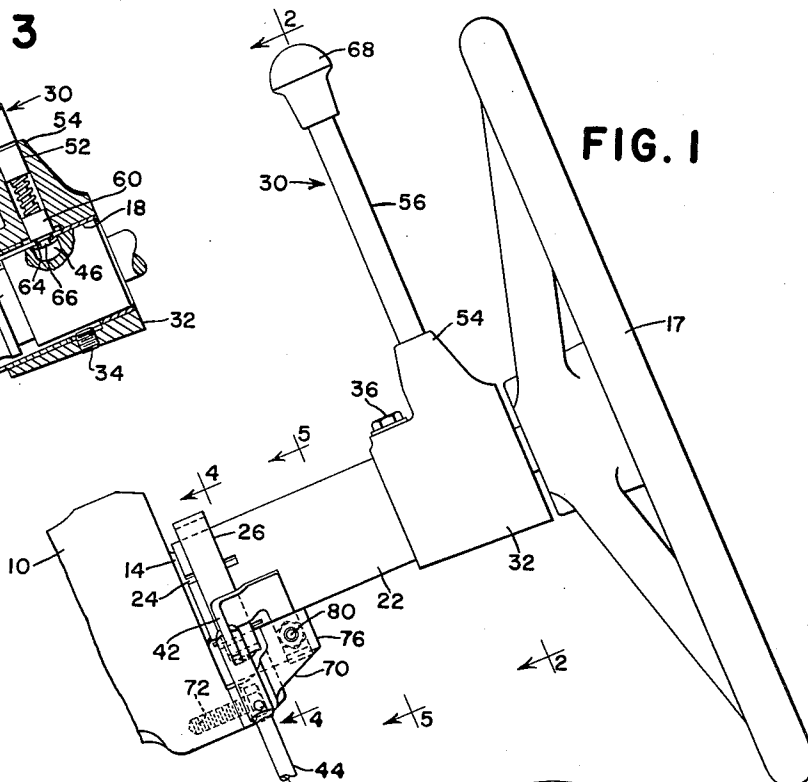


FIG. 2

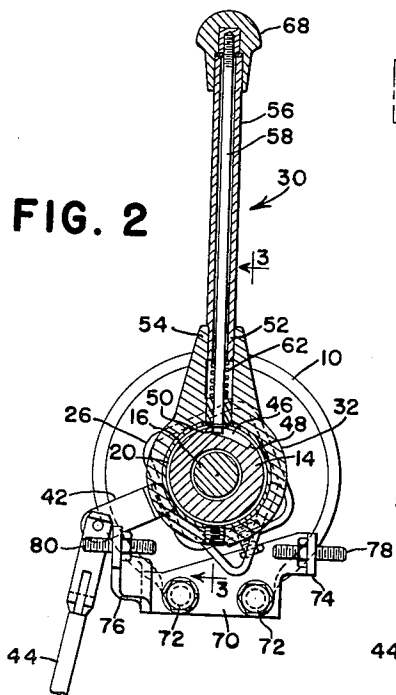


FIG. 4

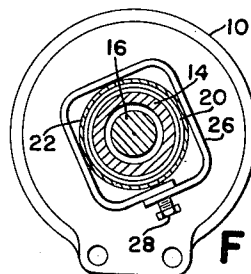
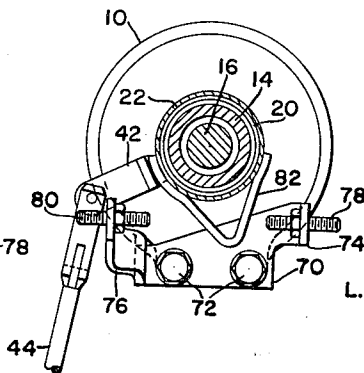


FIG. 5



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CONTROL MECHANISM

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This invention relates to control mechanism and more particularly to improvements in control mechanism having a range of movement defined at opposite ends by stops which may be overcome so that the range of movement may be exceeded or enlarged.

The invention finds particular utility in the control of a regulatable device such as a governor, for example, on an internal combustion engine, wherein a range of movement of a control lever, for example, corresponds to relatively low- and relatively high-speed settings of the governor. However, it is often desirable that overtravel be permitted at both ends of the range so that the high-speed settings may be exceeded and so that a still lower-speed position than the normal low-speed position can be obtained, as for low idling or shut-off. It is another requisite of such arrangements that the control lever or its equivalent be normally confined to the aforesaid range so that the range cannot be inadvertently exceeded at either end; that is to say, some means must be provided for deliberately overcoming the stops at opposite ends of this range.

From the foregoing, it will be seen that the present invention has for its principal object the improvement of control mechanism overcoming the problems noted above and one in which a simplified control is provided. It is an important object of the invention to provide a compact design in which the several components involved in the control mechanism may be allied with other components, such as a steering column in a vehicle, thus placing the control lever at a convenient location relative to the steering wheel.

Further objects reside in improved means for enabling frictional setting of the control lever in its range; means providing additional stops when overtravel of the range is accomplished; and such other objects and features as will appear from the following detailed description of a preferred embodiment of the invention taken in conjunction with the accompanying sheet of drawings, the figures of which are described below.

FIG. 1 is an elevation showing a typical arrangement of the control mechanism in association with the steering wheel, steering column and associated support of a representative vehicle.

FIG. 2 is a section as seen generally along the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary section as would be seen along the line 3—3 of FIG. 2 if FIG. 2 were in elevation.

FIG. 4 is a "slice" section as seen along the line 4—4 of FIG. 1, omitting structure in the plane of the section in the interest of clarity.

FIG. 5 is a "slice" section as seen along the line 5—5 of FIG. 1 and drawn after the same pattern as FIG. 4.

For purposes of orientation, the numeral 10 is employed to designate a part of supporting structure on a vehicle or its equivalent. Such vehicle will also include a main body (not shown) and an internal combustion engine, for example, (likewise not shown) which has a controllable device, here designated schematically at 12 as representative of a typical speed governor.

The support has rigidly affixed thereto in any suitable manner not material here a steering column in the form of a hollow shaft 14 within which is rotatably carried a steering shaft 16 to the upper end of which is affixed a steering wheel 17. The lower end of the steering shaft

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16 may, of course, be connected to steerable wheels on the vehicle (not shown).

The hollow shaft 14 has upper and lower ends which are provided respectively with upper and lower bushings 18 and 20, respectively, which serve to mount turnably on the shaft an external sleeve 22 which has upper and lower ends respectively adjacent to the upper and lower ends of the shaft 14. The lower end of the sleeve 22, as best shown in FIG. 1, is provided with a plurality of lengthwise slits 24 to render this portion of the sleeve relatively resilient. A clamping band 26 (best shown in FIG. 4) encircles the slit portion and by means of a set screw 28 is capable of tightening the slit portion of the sleeve 22 on the lower bushing or lower portion of the shaft 14 to establish a frictional fit therein whereby turning or angular movement of the sleeve 22 relative to the shaft 14 may be controlled; that is to say, the sleeve 22 may be turned in selective amounts and the angular position that it then achieves will be retained unless deliberately upset.

The means for turning the sleeve 22 relative to the shaft 14 comprises in this case a control lever or handle designated in its entirety by the numeral 30 and this is connected via a hub 32 to the upper end of the sleeve. As best shown in FIG. 3, the hub 32 is connected to the sleeve 22 to turn therewith by means of a set screw 34 and a cap screw 36, the latter passing completely through an aperture 38 in the upper end of the sleeve and entering freely into an annular groove 40 in the upper end portion of the shaft 14. The set screw 34 appears also in FIG. 2, but in the interests of clarity, the reference character therefor is omitted. As will be seen, the fit or relationship between the inner end of the cap screw 36 and the annular groove 40 is such as to enable turning of the sleeve 22 while preventing extreme axial displacement of the sleeve relative to the shaft 14. Turning of the sleeve 22 by the control lever or handle 30 results in control of the controllable device 12, since the lower portion of the sleeve 22 has rigidly secured thereto, as by welding, a radial arm 42 which has means in the form of a link 44 connecting it to the controllable device 12. As those familiar with the art will recognize, the governor, of which the present illustration at 12 is representative, is selectively settable as to speed by means of a governor arm (not shown). In the present case, it will be understood that the link 44 may be connected to the governor arm or to its equivalent.

From the description thus far it will be seen that the sleeve 22 may be turned about the shaft 14 and will be frictionally retained in any selected set position by the friction means 24—26—28. To this extent, the control mechanism is operative to select governor speeds in a relatively wide range. However, this range must be related to the minimum and maximum speeds of the engine, due regard being had to other factors, such as the type of vehicle in which the engine is employed, the type of loads to which it is subjected etc.

For this purpose, it is desired to establish normal low- and high-speed positions at opposite ends of an angular range through which the sleeve 22 and its arm 42 are turnable. In this case, such range is established by the provision in the upper end portion of the shaft 14 of an angular slot 46 which has circumferentially spaced opposite ends 48 and 50. In the present case, the slot 46 is preferably milled in the outer surface portion of the upper end of the shaft 14. This slot is in generally radial register with a bore 52 formed in an extension 54 of the hub 32. The handle 30 comprises a relatively elongated rigid tube 56, the inner end of which is forcibly received in the bore 52, which establishes the main portion of the control handle for accomplishing turning of the sleeve 22. Within the tube 56 is slidably received a

rod or plunger 58 which has adjacent to its inner end a collar 60 that is slidable in the bore. A coil spring 62 surrounds the rod 58 and is interposed between the collar 60 and the inner or lower end of the tube 56, and a snap ring 64 may be employed to keep the collar 60 from sliding inwardly off the projecting end portion 66 of the rod. This end portion provides a cooperative portion of the control handle 30 which is engageable with the opposite ends 48 and 50 of the slot 46. The outer end of the rod 58 has connected thereto a knob 68 which has a sliding fit with the outer portion of the tube 56. Thus, the knob 68 may be pulled axially of the handle 30 to withdraw the end portion 66 of the rod 58 from the slot 46. However, in its normal position, the end portion 66 is urged, via the spring 62, into the position shown. The relationship of the parts may be such that the inward movement of the rod 58 under action of the spring 62 is such that the inner end portion 66 of the rod does not ride on the surface of the slot 46. With the rod 58 in its normal or spring-biased position, it will be seen that the handle 30 can be used to turn the sleeve 22 back and forth through an angular range defined at its opposite ends by the stops provided by the respective end portions 48 and 50 of the slot 46, which end portions are of course, as already stated, selectively engaged by the inner end portion 66 of the rod 58. The angular length of the slot may be predetermined on the basis of the normal low-speed and normal high-speed positions in the governor 12, giving, by way of example, a low-speed of 620 r.p.m. and a high-speed of 1900 r.p.m. for the associated engine. When it is desired to overrun or overtravel either of these positions, the operator may pull outwardly on the knob 68, thus withdrawing the rod 58 so that its inner end 66 clears the outer circumference of the shaft 14, thereby withdrawing the inner end portion 66 from cooperative relationship to the stop ends 48 and 50 of the slot 46. Therefore, the sleeve 22 may be turned beyond the two positions just noted. For example, if the stop 48 is taken as the high-speed position, withdrawal of the end portion 66 enables the sleeve 22 to overrun that position to set the governor at a still higher speed, say, 2600 r.p.m. Conversely, the low speed stop 50 may be overrun by withdrawing the inner end portion 66 of the rod 58 to cause the engine to drop below the r.p.m. noted above; say, to 420 r.p.m. or to a shut-off position.

For purpose of establishing the overtravel positions, an additional set of stops is provided. In the present case, this takes the form of a bracket 70 which is secured to the support 10 as by a pair of cap screws 72. This bracket has thereon a pair of ears 74 and 76 which are provided respectively with tapped apertures to receive threaded stops 78 and 80, respectively. A stop member 82, in this case formed as part of the arm 42 which has previously been described as welded to sleeve 22, is cooperative between the two stops 78 and 80, thus establishing extreme limits on angular movement of the sleeve 22. That is to say, even though the sleeve may be moved through a range beyond that determined by the angular spacing between the slot ends 48 and 50, the angular movement is ultimately limited by contact of the stop member 82 with one or the other of the selectively adjustable stops 78 and 80.

It will be seen from the foregoing that a simple, compact and efficient control mechanism has been provided, and one that is conveniently associated with other components of the supporting structure on the vehicle. The normal range as established by the slot ends 48 and 50 is readily available and cannot be inadvertently overrun, since it requires a deliberate outward pull on the knob 68 to withdraw the rod end portion 66 from the slot. When the stops 48 and 50 are overrun, the other stops 78 and 80 become effective as maximum and minimum stops. Features and advantages other than those categorically enumerated will readily occur to those versed in the art, as will many modifications and alterations in the preferred embodiment disclosed, all of which may be

achieved without departure from the spirit and scope of the invention.

What is claimed is:

1. In control mechanism having a support and a controllable device, the combination of: a shaft having first and second axially spaced apart portions, said first portion having means thereon for the mounting thereof on the support and said second portion being of circular section and having an outer circumferentially directed slot provided with opposite ends serving as angularly spaced apart stops; a sleeve concentrically surrounding the shaft and turnable thereon and having first and second ends respectively adjacent to said first and second ends of the shaft, said first end of the sleeve having means for the connection thereof to the controllable device and said second end of said sleeve having an aperture therethrough in radial register with said slot; a hub coaxially fixed to said second end of the sleeve and having a bore therein radial to the shaft and sleeve axis and in radial register with said sleeve opening; a plunger axially slidably carried in the bore and including an outer handle part projecting radially outwardly from the hub and an inner part of smaller transverse dimension than the arcuate length of the slot and adapted to project through the sleeve opening and into said slot; and biasing means acting between the hub and the plunger for normally urging the plunger inwardly to cause said inner part to travel in the slot as the handle part turns the sleeve whereby engagement of said inner part with either end of said slot limits turning of said sleeve, and said biasing means being yieldable to outward movement of the plunger via force applied to the handle part to withdraw the inner part clear of the shaft so as to enable further turning of the sleeve.

2. The invention defined in claim 1, including: stop means acting on the plunger to limit inward movement thereof by the biasing means so as to prevent the inner part from riding on that portion of the shaft that provides the bottom of said slot.

3. The invention defined in claim 1, including: friction means cooperative between the first ends of the shaft and sleeve for retarding turning of the sleeve and for holding selected angular positions of the sleeve relative to the shaft.

4. The invention defined in claim 1, including: means mountable on the support adjacent to the first end of the sleeve and providing a pair of stops spaced apart a greater angular distance than the ends of the shaft slot; and a stop member fixed to the sleeve for selective engagement with either of said last-named stops when the plunger is withdrawn from the shaft slot so as to provide further limits on angular movement of the sleeve.

5. In control mechanism having a support and a controllable device, the combination of: a shaft having means thereon for the mounting thereof on the support and including a portion of circular section provided with an outer circumferentially directed slot provided with opposite ends serving as angularly spaced apart stops; a sleeve concentrically surrounding the shaft and turnable thereon and having means for the connection thereof to the controllable device and further having an aperture therethrough in radial register with said slot; a hub coaxially fixed to said sleeve and having a bore therein radial to the shaft and sleeve axis and in radial register with said sleeve opening; a plunger axially slidably carried in the bore and including an outer handle part projecting radially outwardly from the hub and an inner part of smaller transverse dimension than the arcuate length of the slot and adapted to project through the sleeve opening and into said slot; and biasing means acting between the hub and the plunger for normally urging the plunger inwardly to cause said inner part to travel in the slot as the handle part turns the sleeve whereby engagement of said inner part with either end of said slot limits turning of said sleeve, and said biasing means being yieldable to outward movement of the plunger via force

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applied to the handle part to withdraw the inner part clear of the shaft so as to enable further turning of the sleeve.

6. The invention defined in claim 5, including: friction means cooperative between the shaft and sleeve for retarding turning of the sleeve and for holding selected angular positions of the sleeve relative to the shaft.

7. The invention defined in claim 5, including: means mountable on the support adjacent to the sleeve and providing a pair of stops spaced apart a greater angular

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distance than the ends of the shaft slot; and a stop member fixed to the sleeve for selective engagement with either of said last-named stops when the plunger is withdrawn from the shaft slot so as to provide further limits on angular movement of the sleeve.

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