Jan. 17, 1961 W. C. EDGLEY 2,968,195

CONTROL MECHANISM

Filed April 2, 1959 2 Sheets-Sheet 1

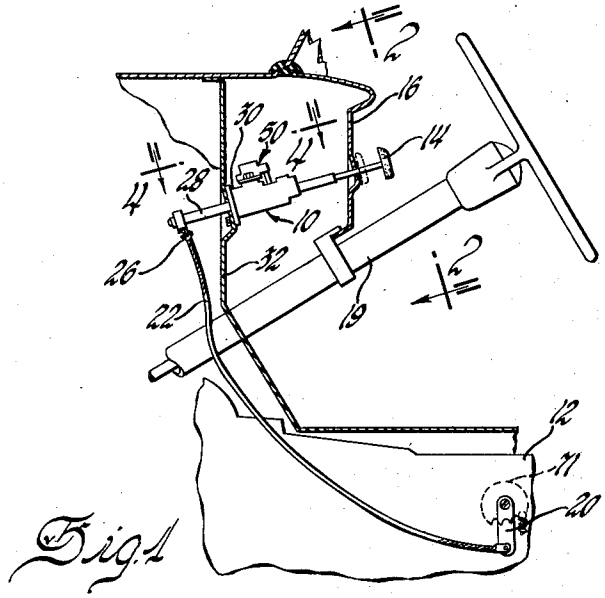

Fig. 1

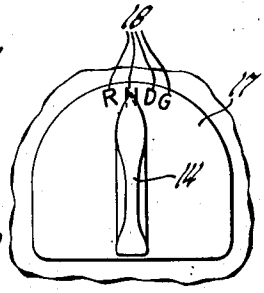

Fig. 2

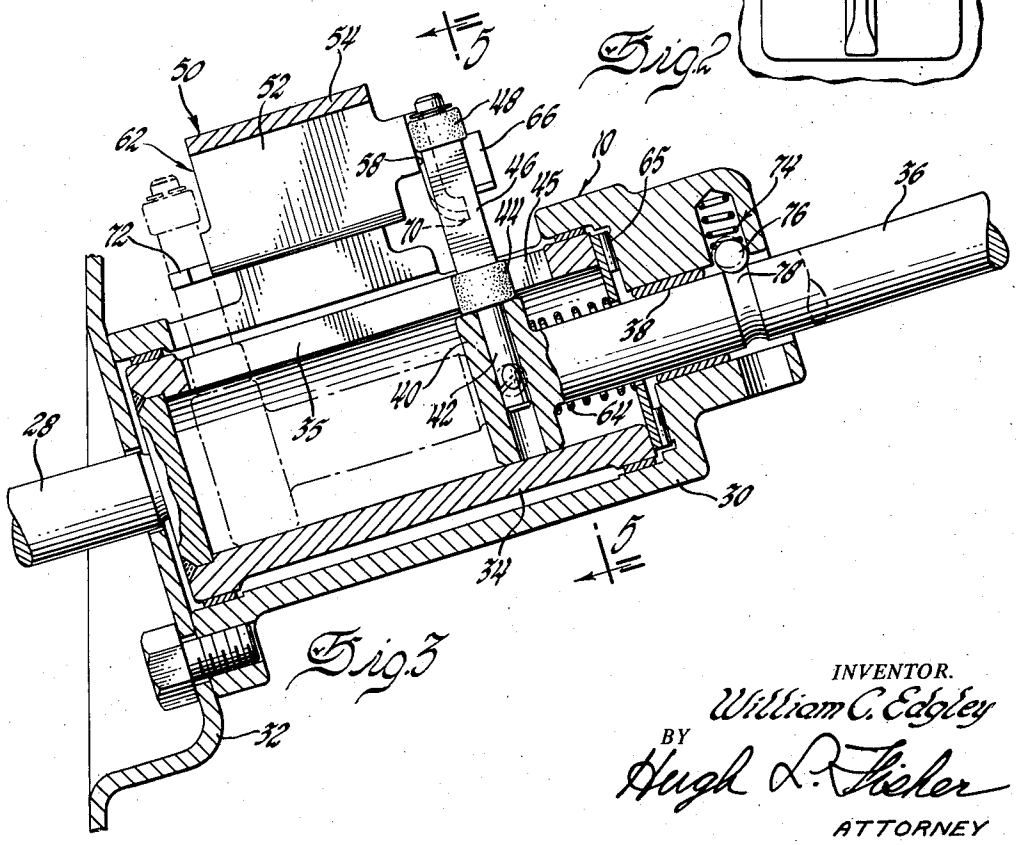

Fig. 3

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Jan. 17, 1961 W. C. EDGLEY 2,968,195

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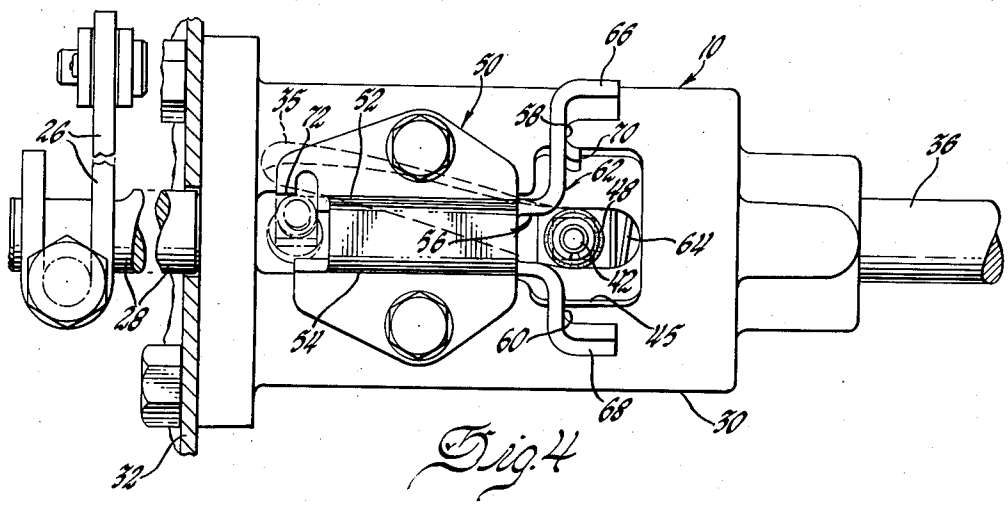

Fig. 4

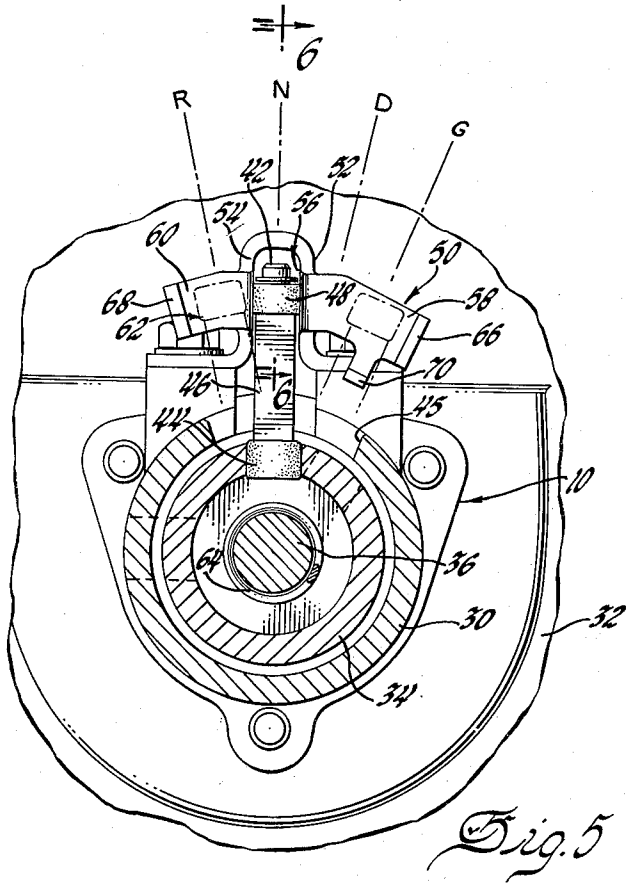

Fig. 5

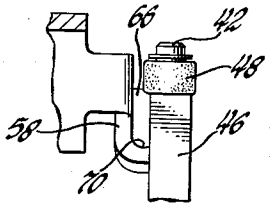

Fig. 6

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CONTROL MECHANISM

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10 Claims. (Cl. 74—473)

This invention relates generally to control mechanisms and particularly to control mechanisms suited, although not exclusively, for use with vehicle transmissions.

In general, any control mechanism such as that for automatic vehicle transmissions must be capable of operation by a selector that requires simplified movements, i.e., the selector should have movements that conform to some conventional pattern easily understood by the average vehicle operator. Among such very simple movements are those requiring e.g., a push, a pull, or a turn, of a selector. Additionally, if it is necessary to avoid one of the selector settings during particular phases of operation, it is essential then that provision be made for preventing the operator from inadvertently moving the selector to this setting when undesired. An example of this is an automatic transmission that has a positive type lock effect in a Park setting. Obviously, if the positive lock could be rendered effective by placing the selector in the Park setting with the vehicle moving, damage to the transmission could result.

Other considerations in any control mechanism are that the components should be suited for manufacture according to accepted mass production techniques without sacrifice or compromise as to performance and accuracy. Also, the need for conserving space particularly when a control mechanism is mounted in the vicinity of the vehicle instrument panel, should be considered as well as the leverage requirements for rendering the selector operation relatively effortless.

With the foregoing in mind, the invention seeks to provide a control mechanism that employs a single selector with varied uncomplicated control movements, that translates these varied movements into a single output movement, that through a novel arrangement affords considerable leverage in a minimum of space, that has stop provisions for preventing undesired movements and that is structurally simplified so as to be especially suited for mass production techniques.

More specifically, it is the objective of the invention to afford a control mechanism in which a selector therefor is revolved for one series of settings and is shifted for another setting.

In carrying out the invention, according to a preferred embodiment thereof, a selector element is arranged for both rotary and shiftable movements to different settings. To transfer these movements and translate them into a single rotary movement of an output, a cam drum is utilized that has a helical slot therein. Also, a track device is provided that has a guide track for rotary movement and a guide track for shiftable movement with appropriate stops along each track. To cause the cam drum to always revolve the output, a drive member is joined to the selector and arranged so as to have revolvably stationed thereon one roller for engaging the helical slot and another roller for engaging the guide tracks of the track mechanism.

When the selector is revolved to the different settings afforded, the track roller will traverse the guide track

that prevents shiftable movement within limits defined by the stops and in so doing will cause the cam drum to be revolved due to the drive engagement between the cam roller and the helical slot; hence, the output will be revolved by the cam drum to positions corresponding to each of the settings of the selector element in the rotary plane of movement. Because of an inhibitor in the plane of rotary movement, it is necessary to shift the selector element slightly before proceeding to one of the transmission settings, thus safeguarding against accidental operation.

When the selector element is positioned in a particular one of the settings in the rotary plane, the selector element can be shifted since the track roller will be aligned with the shiftable movement guide track so as to permit this shiftable movement while preventing any rotary movement. As a result, the cam roller will travel along the cam drum helical slot, thus revolving the cam drum and accordingly the output to a position corresponding to this setting. At the extent of shiftable movement, the selector element can be revolved slightly so that the drive member will move into an offset and thereby maintain this setting. Also, a detent is provided so as to offer a slight restraint to movement to this latter setting so that the setting cannot inadvertently be obtained should the condition arise.

By having the cam roller travel along the helical slot during shiftable movement to this latter setting, considerable leverage can be afforded and utilized to advantage, particularly when this latter setting corresponds to an automatic transmission Park setting, since it is often difficult to remove or disengage a positive lock of the type commonly used.

The foregoing and other objects and advantages of the invention will be apparent from the following description and the accompanying drawings in which:

Figure 1 illustrates a control mechanism for demonstrating the invention combined with a transmission;

Figure 2 is a view looking in the direction of arrows 2—2 in Figure 1 and showing a selector button and a dial for the control mechanism;

Figure 3 is a sectional view of the control mechanism;

Figure 4 is a plan view of the mechanism looking in the direction of arrows 4—4 in Figure 1 and showing particularly a track device therefor;

Figure 5 is a sectional view along line 5—5 of Figure 3; and

Figure 6 is a fragmentary view looking in the direction of arrows 6—6 in Figure 5 and showing the relationship between the track device and a track roller.

Referring to Figure 1, the numeral 10 denotes a control mechanism incorporating the principles of the invention and illustrated as installed in the driver compartment of a vehicle for operating a transmission 12. As viewed, a selector button 14 extends through a portion of an instrument panel 16 for the vehicle and lies opposite a dial 17 joined to the instrument panel 16. The dial 17 has displayed thereon a series of legends 18 representing the Reverse, Neutral, Drive, and Grade Retard settings for the transmission 12. The selector button 14 is preferably positioned close to the steering column 19 so as to be easily accessible to the vehicle driver. Connection between the control mechanism 10 and an external control lever 20 for the transmission 12 is made through a control cable 22. The lower end of the control cable 22 is attached to the external control lever 20, whereas the upper end is appropriately joined to a lever 26 (see Figure 4) in turn attached to an output shaft 28 for the control mechanism 10.

As best shown by Figure 3, the control mechanism 10 is provided with a housing 30 that may be attached to the vehicle in any suitable way, e.g., to a fire wall

32 ahead of the driver compartment. Journaled within the housing 30 is a cam drum 34 that is provided with a helical cam slot 35, more apparent in Figure 4. At the lower end of the cam drum 34, the output shaft 28 is made integral therewith or otherwise secured thereto so as to revolve therewith. Axially aligned with the output shaft 28 is an input shaft 36 rotatably supported in housing 30 by a bearing 38. The upper end of the input shaft 36 has attached or otherwise secured thereto the selector button 14, whereas the lower end is provided with an annular flange 40 slidingly fitted inside the cam drum 34. A drive pin 42 is joined to the flange 40 and extends transversely of the axis of the input shaft 36. The drive pin 42 has revolvably supported thereon a cam roller 44 positioned so as to be within the confinement of the helical cam slot 35 and extends outwardly through a T-shaped opening 45 in the housing 30. A spacer 46 separates the cam roller 44 from a track roller 48 also revolvable on the drive pin 42 so as to position the track roller 48 opposite a track device viewed generally at 50.

The track device 50 is depicted in Figures 3, 4, 5, and 6 and is attached to the upper part of the housing 30. Although the track device 50 may be formed in several parts, it is shown here as being made from a one-piece stamping and comprises two side rails 52 and 54 that together form a guide track 56 for shiftable movement of the drive pin 42. The spacing of the side rails 52 and 54 is such that the track roller 48 can move therebetween freely without interference with the rolling action thereof. At the upper end of the track device 50, the side rails 52 and 54 are bent outwardly to form, respectively, flanges 58 and 60. The flanges 58 and 60 then together provide a guide track 62 for rotary movement of the drive pin 42, and the track roller 48 will roll therealong being urged into engagement with the flange faces by a spring 64 interposed between the flange 40 on the input shaft 36 and a thrust bearing 65 positioned against the housing 30 as seen in Figure 3.

The external terminal end of the flanges 58 and 60 are further bent laterally of the flanges 58 and 60 to form stops 66 and 68. The relationships of the stops 66 and 68 with respect to the track roller 48 is best depicted in Figure 5, for as can be seen, the track roller 48 will engage the stops if the drive pin 42 is revolved far enough in either a clockwise or counterclockwise direction. Also, as seen in Figures 5 and 6, a portion of the flange 58 is extended at the bottom edge thereof outwardly a predetermined distance so as to provide a Grade Retard inhibitor 70. Hence, when the selector button 14 is revolved from the Drive setting to the Grade Retard setting, the selector button 14 must be pulled outwardly far enough to clear the inhibitor 70 before the selector button 14 can be revolved to the Grade Retard setting. Since the Grade Retard setting is normally used for braking, then this inhibitor 70 will insure that the Grade Retard setting is not inadvertently established during normal rotary movements of selector button 14.

As so far described, it can be seen that when the selector button 14 is revolved, the track roller 48 will roll along the guide track 62 and in this way prevent shiftable movement except for that necessary to pull the selector button 14 outwardly and move past Grade Retard inhibitor 70 to the Grade Retard setting. With the cam roller 44 positioned within the helical cam slot 35 in the cam drum 34, the cam drum 34 will be caused to revolve the same angular amount as the selector button 14 and accordingly the output shaft 28 and the lever 26 will be rotated the same amount. This will exert a pull or push on the cable 22 and the cable 22 in turn will rotate the external transmission lever 20 to the selected transmission setting. All of the transmission settings are sensed by the operator through a suitable detent such as that shown at 71 positioned within the transmission 12 so as to coact with the lever 20. The amount of feel exerted by the detent 71 is just sufficient to indicate to the operator that the selector button 14 is in the chosen setting. If desired, the detent 71 can be placed elsewhere, e.g., arranged relative to the output shaft 28 and lever 26.

Now, when the Park setting is desired, and the driver wishes to engage an appropriate transmission parking lock (not shown), the selector button 14 is revolved to the Neutral setting. In the Neutral setting the track roller 48 will be aligned with the guide track 56 as shown in Figure 5. The driver then may push the button 14 forwardly and the drive pin 42 along with the track roller 48 and cam roller 44 will move downwardly to the dotted line position illustrated in Figure 3. Since the guide track 56 prevents rotary movement of the selector button 14, the cam roller 44 in traveling along the helical cam slot 35, will cause the cam drum 34 to revolve counterclockwise as viewed in Figure 5 some angular amount greater than that needed to establish Reverse setting. So as to hold the selector button 14 in the Park setting, an offset 72 formed at the termination of the guide track 56 is provided so that the selector button 14 can be turned slightly clockwise into engagement with the offset 72, the angular distance being far enough so as to move past, and out of alignment with, the guide track 56. The button 14 can then be released and will remain in this Park setting. When the driver wishes to disengage the transmission parking lock, the selector button 14 is revolved in the opposite direction away from the offset arm 72 and back into alignment with guide track 56. The selector button 14 then can be pulled outwarly and returned to the Neutral setting, and of course, the cam drum 34 will be revolved back to the corresponding position. The relationship between the cam drum slot 35, cam roller 44, and the rotational axes will determine leverages for this pulling movement.

A detent 74 is provided so that the driver will sense resistance to any shiftable movement of the selector button 14. Again this feel is intended to insure against inadvertent operation. The detent 74 comprises a ball 76 that is spring biased into annular groove 78 formed on the input shaft 36. Therefore, when the selector button 14 is being revolved, the detent 74 will prevent the possibility of the track roller 48, when in a Neutral setting, moving partially into the guide track 56 and also will require a slightly additional amount of effort on the part of the driver to start shiftable movement on the selector button 14 to the Park setting. Additionally, when the selector button 14 is moved to the Grade Retard position, the detent 74 will resist slightly the outwardly shiftable movement needed further insuring that the Grade Retard setting is not established when not desired.

From the foregoing it can be seen that the control mechanism 10 has a minimum number of parts and that leverage is afforded through the use of the helical cam slot 35 for operating the positive type transmission parking lock. The driver is protected against inadvertent operating in a very economical way without special complicated safety devices. Moreover, the push-pull-turn movements of the selector button 14 are all conventional ones and require no special driver education. Moreover, these push-pull-turn movements are all translated into rotary movement of a single output and therefore permit the use of conventional internal transmission control structures.

The invention is to be limited only by the following claims:

1. In a control mechanism, the combination of a selector element arranged both for rotary and longitudinally shiftable movements to a plurality of settings, an output, and means for transferring the movements of the selector element to the output, the movements transferring means including means for restricting the selector element to rotary movement when revolved and to shiftable movement when shifted longitudinally so as to cause

the output to be always revolved during the longitudinally shiftable and rotary movements of the selector element to positions corresponding to the plurality of selector element settings.

2. In a control mechanism; the combination of a selector element arranged both for rotary and longitudinally shiftable movements to a plurality of settings; an output; and means for transferring the movements of the selector element to the output; the movements transferring means including a rotatably mounted cam member drive connected to the output and having a cam surface, a guide surface, and a drive member connected to the selector element, the drive member coacting with the guide surface and cam surface so that the selector element is restricted to rotary movement when revolved and to longitudinally shiftable movement when shifted longitudinally thereby causing the cam member to revolve the output to different positions corresponding to each of the plurality of selector element settings.

3. In a control mechanism; the combination of a selector element arranged both for rotary movement to a series of settings and longitudinally shiftable movement to another setting; an output; and means for transferring the movements of the selector element to the output; the movements transferring means including a rotatably mounted cam member drive connected to the output and having a cam surface, a guide mechanism provided with plural guide surfaces, and a drive member drive connected to the selector element, the drive member coacting with the plural guide surfaces so that the selector element is restricted to rotary movement to different ones of the series of settings when revolved and to longitudinally shiftable movement from one of the series of settings to said another setting when shifted longitudinally thereby causing the cam member through coaction between the drive member and the cam surface to revolve the output to positions corresponding to the series of settings and said another setting.

4. In a control mechanism; the combination of a selector element arranged both for rotary movement to a series of settings and longitudinally shiftable movement to another setting; an output; means for transferring the movements of the selector element to the output, the movements transferring means including a rotatably mounted cam member drive connected to the output and having a cam surface, a guide mechanism provided with plural guide surfaces, and a drive member drive connected to the selector element, the drive member coacting with the plural guide surfaces so that the selector element is restricted to rotary movement to different ones of the series of settings when revolved and to longitudinally shiftable movement from one of the series of settings to said another setting when shifted longitudinally thereby causing the cam member through coaction between the drive member and the cam surface to revolve the output to positions corresponding to the series of settings and said another setting respectively; and detent means for resisting longitudinally shiftable movement of the selector element to said another setting.

5. In a control mechanism; the combination of a selector element arranged both for rotary movement to a series of settings and longitudinally shiftable movement to another setting; an output; means for transferring the movements of the selector element to the output; the movements transferring means including a rotatably mounted cam member drive connected to the output and having a cam surface, a guide mechanism provided with plural guide surfaces, a drive member drive connected to the selector element, the drive member coacting with the plural guide surfaces so that the selector element is restricted to rotary movement to different ones of the series of settings when revolved and to longitudinally shiftable movement from one of the series of settings to said another setting when shifted longitudinally thereby causing the cam member through coaction between the drive member and the cam surface to revolve the output to positions corresponding to the series of settings and said another setting; and means for releasably holding the selector element in said another setting.

6. A control mechanism for a transmission comprising, in combination, a selector element arranged both for rotary movement to a series of transmission settings and for longitudinally shiftable movement to a transmission Park setting; an output connected to the transmission; and means for transferring the movements of the selector element to the output; the movements transferring means including a rotatably mounted cam member drive connected to the output and having a cam surface, a track device having plural guide tracks, and a drive member drive connected to the selector element, the drive member coacting with the cam surface and the track device so that the selector element when revolved causes the drive member both to traverse one of the plural guide tracks thereby restricting the selector element to rotary movement to different ones of the series of transmission settings and to cause the cam member to revolve the output to positions corresponding to the series of transmission settings and so that the selector element when shifted longitudinally causes the drive member both to traverse another of the plural guide tracks thereby restricting the selector element to longitudinally shiftable movement from one of the series of transmission settings to the Park setting and to traverse the cam surface so as to revolve the output to a position corresponding to the Park setting of the selector element.

7. A control mechanism for a transmission comprising, in combination, a selector element arranged both for rotary movement to a series of transmission settings and for longitudinally shiftable movement to a transmission Park setting; an output connected to the transmission; and means for transferring the movements of the selector element to the output; the movements transferring means including a rotatably mounted cam member drive connected to the output and having a tapered cam surface, a track device having rotary and longitudinally shiftable movement guide tracks, and a drive member drive connected to the selector element, the drive member coacting with the tapered cam surface and the track device so that the selector element when revolved causes the drive member both to traverse the rotary movement guide track thereby restricting the selector element to rotary movement to different ones of the series of transmission settings and to cause the cam member to revolve the output to positions corresponding to the series of transmission settings and so that the selector element when shifted longitudinally causes the drive member to traverse both the longitudinally shiftable movement guide track thereby restricting the selector element to longitudinally shiftable movement from one of the series of transmission settings to the Park setting and the tapered cam surface thereby revolving the cam member and the output to a position corresponding to the Park setting of the selector element.

8. A control mechanism for a transmission comprising, in combination, a selector element arranged both for rotary movement to a series of transmission settings and for longitudinally shiftable movement to a transmission Park setting; an output connected to the transmission; and means for transferring the movements of the selector element to the output; the movements transferring means including a rotatably mounted cam member drive connected to the output and having a helical shaped cam surface, a track device having rotary and longitudinally shiftable movement guide tracks, a drive member drive connected to the selector element, rollers spaced apart and revolvable on the drive member, one of the rollers being in engagement with the cam member surface and the other arranged to engage the track device guide tracks, and means for urging said one roller into engagement with the track device guide tracks, the drive member co-

acting with the helical cam surface and the track mechanism so that the selector element when revolved causes said other roller to traverse the rotary movement guide track thereby restricting the selector element to rotary movement between different ones of the series of transmission settings and to cause the cam member to revolve the output to positions corresponding to the series of transmission settings and so that the selector element when shifted longitudinally causes said other roller to traverse the longitudinally shiftable movement guide track thereby restricting the selector element to longitudinally shiftable movement from one of the series of transmission settings to the Park setting and said one roller to traverse the helical cam surface and revolve the cam member and the output to a position corresponding to the Park setting of the selector element.

9. A control mechanism for a transmission comprising, in combination, a selector element arranged both for rotary movement to a series of transmission settings and for longitudinally shiftable movement to a transmission Park setting; an output connected to the transmission; and means for transferring the movements of the selector element to the output; the movement transferring means including a rotatably mounted cam member drive connected to the output and having a helical shaped cam surface, a track device having rotary and longitudinally shiftable movement guide tracks, a drive member drive connected to the selector element, rollers spaced apart and revolvable on the drive member, one of the rollers being in engagement with the cam member surface and the other arranged to engage the track device guide tracks, biasing means for urging said one roller into engagement with the track device guide tracks, the drive member coacting with the helical cam surface and the track mechanism so that the selector element when revolved causes said other roller to traverse the rotary movement guide track thereby restricting the selector element to rotary movement between different ones of the series of transmission settings and to cause the cam member to revolve the output to positions corresponding to the series of transmission settings and so that the selector element when shifted longitudinally causes said other roller to traverse the longitudinally shiftable movement guide track thereby restricting the selector element to longitudinally shiftable movement from one of the series of transmission settings to the Park setting and said one roller to traverse the helical cam surface and revolve the cam member and the output to a position corresponding to the Park setting of the selector element, and means for limiting the extent of rotary movement of the selector element, the movement limiting means including a stop for requiring that the selector element be shifted longitudinally a predetermined amount before rotary movement to another of the series of transmission settings.

10. A control mechanism for a transmission comprising, in combination, a selector element arranged both for rotary movement to a series of transmission settings and for longitudinally shiftable movement to a transmission Park setting, an output connected to the transmission; and means for transferring the movements of the selector element to the output; the movements transferring means including a housing, a cam drum revolvably mounted within the housing and drive connected to the output, the cam drum being provided with a helical slot in the periphery thereof, a track device joined to the housing, the track device having a guide track for longitudinally shiftable movement and a guide track for rotary movement, a drive member drive connected to the selector element, the drive member having revolvable thereon a first roller positioned so as to be within the cam drum helical slot and a second roller arranged to engage the guide tracks, and a spring for biasing the second roller into engagement with the guide tracks, the rotary movement guide track being provided with stops at each end so as to coact with the drive member to limit rotary movement of the selector element, the longitudinally shiftable movement guide track being provided with an offset for coacting with the drive member so as to hold the selector element in the Park setting, the drive member coacting with the cam drum slot and the track device so that during rotary movement of the selector element the drive member second roller traverses the rotary movement guide track thereby restricting the selector element to rotary movement between different ones of the series of transmission settings and causing the cam drum to revolve the output to positions corresponding to the series of transmission settings and during longitudinally shiftable movement of the selector element the drive member second roller traverses the longitudinally shiftable movement guide track so as to restrict the selector element to longitudinally shiftable movement from one of the series of transmission settings to the Park setting thereby causing the drive member first roller to traverse the helical slot and revolve the cam drum and the output to a position corresponding to the Park setting of the selector element, the selector element being held in the Park setting by a partial rotation thereof so as to cause the drive member to move into the offset in the longitudinally shiftable movement guide track.

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