

European Patent 0413116

The invention relates to a gear-shift device according to the preamble of Claim 1.

In the case of the not previously published DE-A-38 07 881 the selector lever is movable from a first gear-shift channel into a second gear-shift channel and vice versa as its function requires. When the selector lever is in the first gear-shift channel, it cooperates with a transfer device which comprises an actuating lever mechanically transmitting the operating stages and automatically shifting gears of the gearbox. This actuating lever extends outside a housing of the gear-shift device and is orientated towards the roadway. If the selector lever is moved over into the second gear-shift channel, it is detached from the transfer device and the selector lever is not prevented from making an undesired movement, for example out of the D-position.

The object of the invention is to make such provisions on the gear-shift device in the region of the transfer device that the transfer device always cooperates reliably with the selector lever.

This object is attained according to the invention by the characterizing features of Claim 1. Further features which develop the invention are set out in the Sub-Claims.

The advantages mainly achieved by the invention are that the locking device secures the transfer device when the selector lever is moved over into the second gear-shift channel. This reliably prevents the transfer device from being moved in an undesired manner from its intended position, for example by vibration of the vehicle or by travelling resistance of the roadway acting upon the selector lever situated outside the gear-shift device. The locking device, and in particular the locking member thereof, is a simple component which can easily be arranged on the entrainment means without requiring much space. This also applies in a corresponding manner to the stationary component into which the locking member engages in accordance with the gear-shift-channel position of the selector lever.

An embodiment of the invention is illustrated in the drawing, which is described in greater detail below and in which

- Fig. 1 is a cross-section through a gear-shift device with a selector lever which can be pivoted into two gear-shift channels;
- Fig. 2 is a gear-shift diagram of the selector lever;
- Fig. 3 is a section along the line III-III of Fig. 1, and
- Fig. 4 shows a detail X of Fig. 1 on an enlarged scale.

An automatic gearbox — actuable by an electronic control unit — for a motor vehicle is controllable by a gear-shift device 1: the control unit, the automatic transmission and the motor vehicle are not shown in greater detail, reference being made in this connexion to DE-A-38 07 881 named as prior art.

The gear-shift device 1 comprises a container-like housing 2 of plastics material, light-metal casting or the like, which is U-shaped in cross-section and in which a selector lever 3 is mounted on the one hand on a pin 4 extending transversely to the longitudinal direction B-B of the vehicle and on the other hand on a pin 5 orientated in the longitudinal direction B-B of the vehicle. On account of this cardan mounting the selector lever 3 is pivotable in a first gear-shift channel 6 in the longitudinal direction B-B of the vehicle, in which various positions are selectable: P = parking, R = reverse gear, N = neutral-0, D = drive with 4th gear, 3 = 3rd gear, 2 = 2nd gear, 1 = 1st gear of the automatic gearbox. The selector lever 3 can also, however, be shifted out of position D of the first gear-shift channel 6 by way of a transverse channel 7 into a second gear-shift channel 8. The first gear-shift channel 6 and the second gear-shift channel 8 extend parallel to each other (Fig. 2), and both form a double-T with the transverse channel 7.

After the selector lever 3 has been inserted into the second gear-shift channel 8 it is likewise pivotable in the longitudinal direction B-B of the vehicle. In this case, pivoting the selector lever 3 once out of a middle position M in the plus direction (+) causes a shift upwards by one respective gear — step shifting; shifting down, also by one respective gear, is effected by pivoting the lever in the minus direction (-). After each gear-shift the selector lever 3 is automatically moved back in the plus or minus direction into its neutral middle position M.

In the first gear-shift channel 6 the selector lever 3 cooperates with an entrainment means 9 of a transfer device 10, which mechanically shifts the operating positions and automatic positions of the gearbox by means of an actuating lever 11 extending outside the housing 2 and orientated towards the roadway. The entrainment means 9 and the selector lever 3 are pivotably mounted on the pin 4, the entrainment means 9 surrounding the selector lever 3 in a positively locking manner in the first gear-shift channel 6 with a fork-like portion 12; the selector lever 3 and the transfer device 10 are operatively connected.

When the selector lever 3 is pivoted into the second gear-shift channel 8 by way of the pin 4, it is detached from the entrainment means 9 and a locking device 13 comes into operation by preventing the transfer device 10 from moving relative to the pin 4. The locking device 13 comprises a locking member 15 mounted rotatably on the entrainment means 9 by means of a horizontal pin 14 orientated in the longitudinal direction B-B of the vehicle, the entrainment means 9 extending at right angles to the pin 4. A stationary component 17 with a plate 18 extends between an upright wall 16 of the housing 2 and the entrainment means 9, the plate 18 being orientated at right angles to the pin 4 and surrounding it with a bore 19 and having an opening 20. The opening 20 is arranged opposite the locking member 15, which is pivotable from an unlocking position E into a locking position S in accordance with the gear-shift-channel position 6 or 8 of the selector lever 3 and under the action of a spring 21; in the locking position S the locking member 15 engages in the opening 20.

On both sides of a median transverse plane G-G intersecting the pin 14 the locking member 15 is provided with pawls 22, 23 which extend in a mirror image away from a thickened portion 24 surrounding the pin 14. The upper pawl 23 cooperates with the opening 20; the lower pawl 23 [sic] with a portion 25 of the selector lever 3. The spring 21 is a leaf spring which passes through the thickened portion 24 so as to avoid the pin 14, is orientated in the longitudinal direction of the pawls 22, 23 and in the unlocking position E of the locking member 15 is supported with pre-stressing on an upper support ramp 26 of the entrainment means 9; in the locking position S the spring 21 cooperates with slight pre-tensioning both with the support ramp 26 and with a further support ramp 27. In Fig. 4 the locking member 15 with the spring 21

is shown as a pre-fabricated component. The spring 21 projects accordingly beyond the pawl 22, 23 and is situated obliquely, at an angle α , to the longitudinal direction H-H of the said pawls. In the unlocking position E this arrangement results in the defined pre-stressing of the spring 21.

A spring-catch device 30, which fixes the selector lever 3 in position in the gear-shift channels 6 and 8, is provided at the end remote from a handle 28 of the selector lever 3. The spring-catch device 30 is formed by a roller 30 on the selector lever 3 and a leaf spring 31 on a component 32 fixed relative to the selector lever 3. The leaf spring 31 is held on the component 32 with the interposition of a bolt 33 and has a spring portion 34, at the free end of which are provided angled portions 35, 36 extending at an angle β to each other. In the gear-shift channel 6 the roller 30 rests on the angled portion 35, and in the gear-shift channel 8 upon the angled portion 36. A cover 38 of the housing 2 is shown at 37, the cover 38 having an opening 39 into which the component 17 projects and is secured in this way.



Claims:

1. A gear-shift device for an automatic gearbox — controlled by an electronic control unit — of a motor vehicle, with a selector lever, by the pivoting of which in a first gear-shift channel various operating stages and automatically shifting gears are selectable by means of a transfer device, the selector lever being shiftable by way of a transverse channel into a gear-shift channel which is parallel to the first gear-shift channel and in which a shift up by a respective gear can be effected with the selector lever by pivoting once from a middle position in one direction and a shift down can be effected with the selector lever by pivoting in the opposite direction, characterized in that the selector lever (3) and an entrainment means (9) — cooperating therewith in the first gear-shift channel (6) — of the transfer device (10) are mounted rotatably on a pin (4) extending transversely to the longitudinal direction (B-B) of the vehicle, and a locking device (13) comes into effect to fix the transfer device* (10) in the second gear-shift channel (8) — independent of the entrainment means (9) — of the selector lever (3).
2. A gear-shift device according to Claim 1, characterized in that the locking device (12) [sic] comprises a locking member (15) arranged rotatably on the entrainment means (9) by means of a pin (14) and pivotable from an unlocking position (E) into a locking position (S) under the action of a spring and in accordance with the gear-shift-channel position of the selector levers [sic] (3).
3. A gear-shift device according to Claim 2, characterized in that in its locking position (S) the locking member (15) engages in an opening (20) in a plate (18) of a stationary component (17) of the gear-shift device (1).
4. A gear-shift device according to Claims 1 and 3, characterized in that the plate (18) extends at rights angles to the pin (4) and surrounds it with a bore (19).

* N.B. The German text reads *Übertragungsrichtung* (transfer direction) at this point, assumed in the translation to be in error for *Übertragungseinrichtung* (transfer device).



5. A gear-shift device according to Claim 4, characterized in that the plate (18) extends adjacent to an upright wall (16) of a housing (2) of the gear-shift device (1).
6. A gear-shift device according to Claim 2, characterized in that the locking member (15) has pawls (22, 23) arranged in a mirror image and extending away from a thickened portion (24) on both sides of a median transverse plane (G-G) intersecting the pin (14).
7. A gear-shift device according to Claim 6, characterized in that the upper pawl (23) cooperates with the opening (20) and the lower pawl (22) with the selector lever (3).
8. A gear-shift device according to Claim 2, characterized in that the spring (21) is a leaf spring extending in the longitudinal direction (H-H) of the pawls (22, 23) so as to pass through the thickened portion (24) and cooperating with support ramps (26, 27) of the entrainment means (9).
9. A gear-shift device according to Claim 8, characterized in that the leaf spring (spring 21) passes around the pin (14).
10. A gear-shift device according to one or more of the preceding Claims, characterized in that the entrainment means (9) surrounds the selector lever (3) with a fork-like portion (12).
11. A gear-shift device according to one or more of the preceding Claims, characterized in that a spring-catch device (29) is provided at the free end remote from a handle (28) of the selector lever (3) for fixing the selector lever (3) in the first gear-shift channel (6) and the second gear-shift channel (8).