

[54] **GEAR SHIFT MECHANISM**

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[52] U.S. Cl. **35/11**

[51] Int. Cl. **G09b 9/04**

[58] Field of Search..... **35/11; 74/473 SW**

[56] **References Cited**

UNITED STATES PATENTS

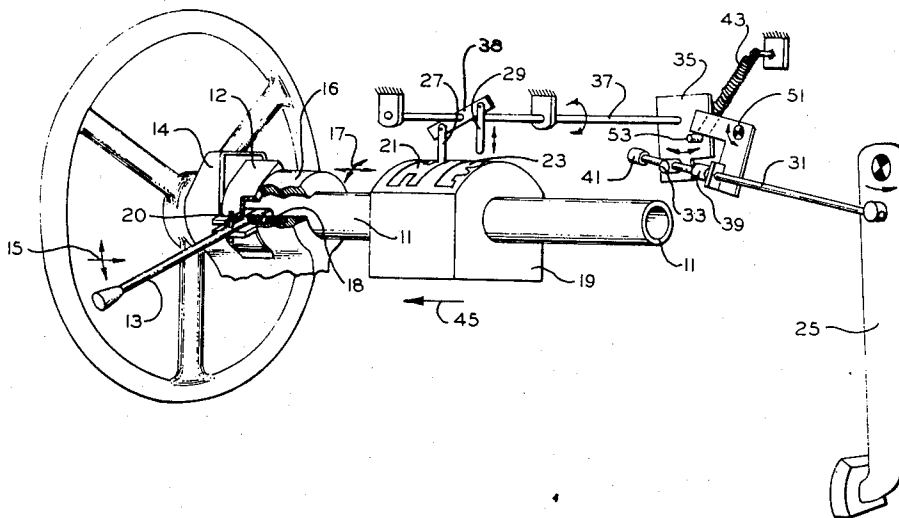
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Primary Examiner—Wm. H. Grieb
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[57] **ABSTRACT**

Gear shift and clutch simulation apparatus for use in a driver trainer in which manual and automatic shift patterns are contained in a block on the gear shift column and into one of which a pin is selectively inserted in accordance with clutch position, the clutch being in a down position for manual or an up position for automatic, by a linkage connected to the clutch pedal arm is shown. A further linkage causes the manual pin to be lifted a small amount from the block, which has deeper indentations at each shift position, in response to clutch operation to provide a realistic simulation.

6 Claims, 7 Drawing Figures



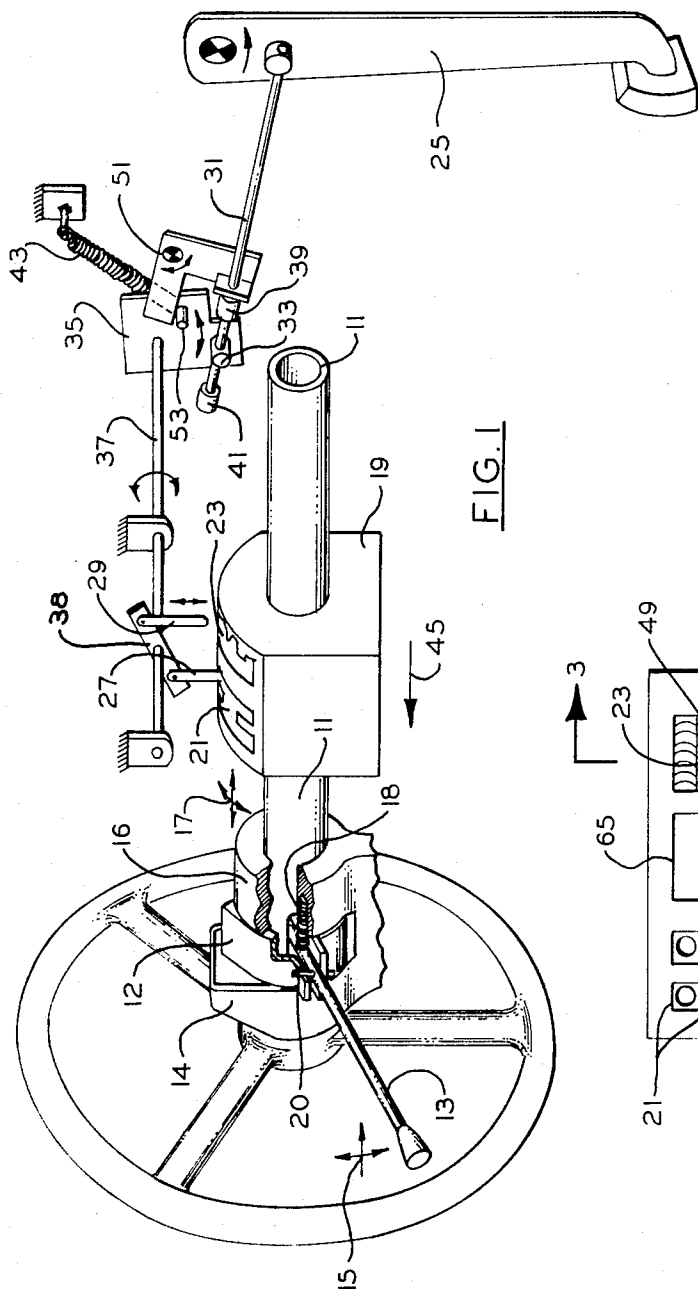


FIG. 1

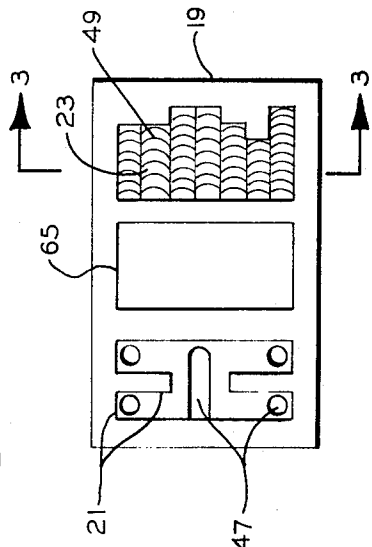


FIG. 2

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SHEET 2 OF 4

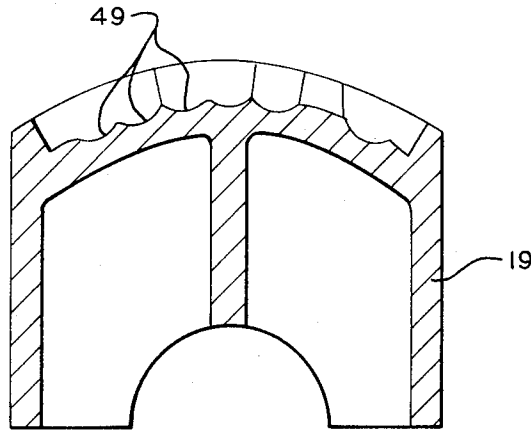


FIG. 3

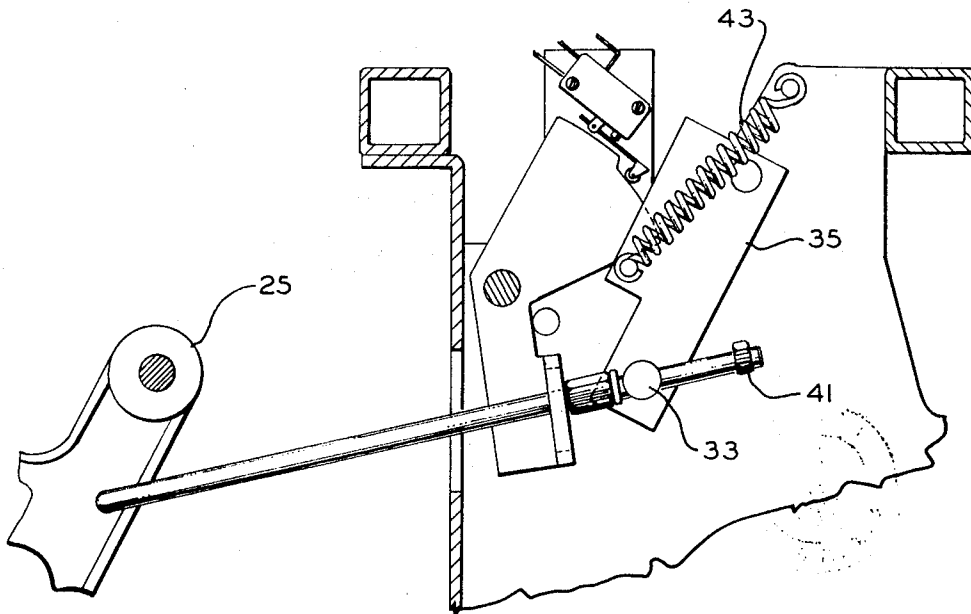


FIG. 4A

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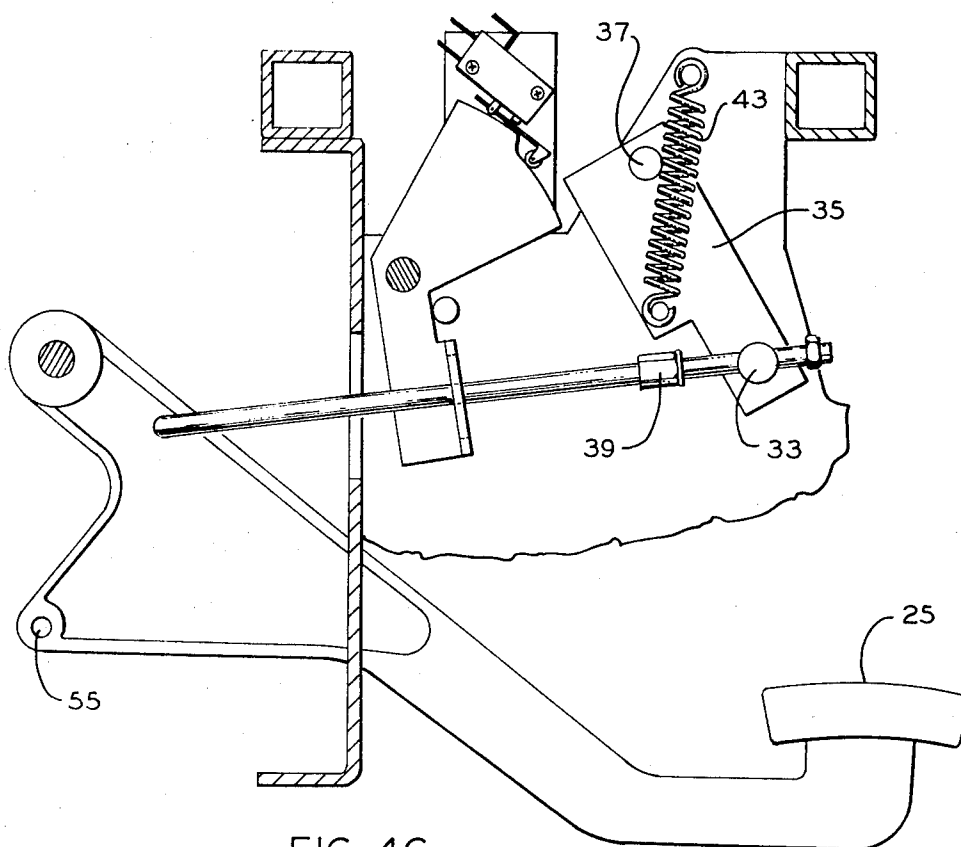


FIG. 4C

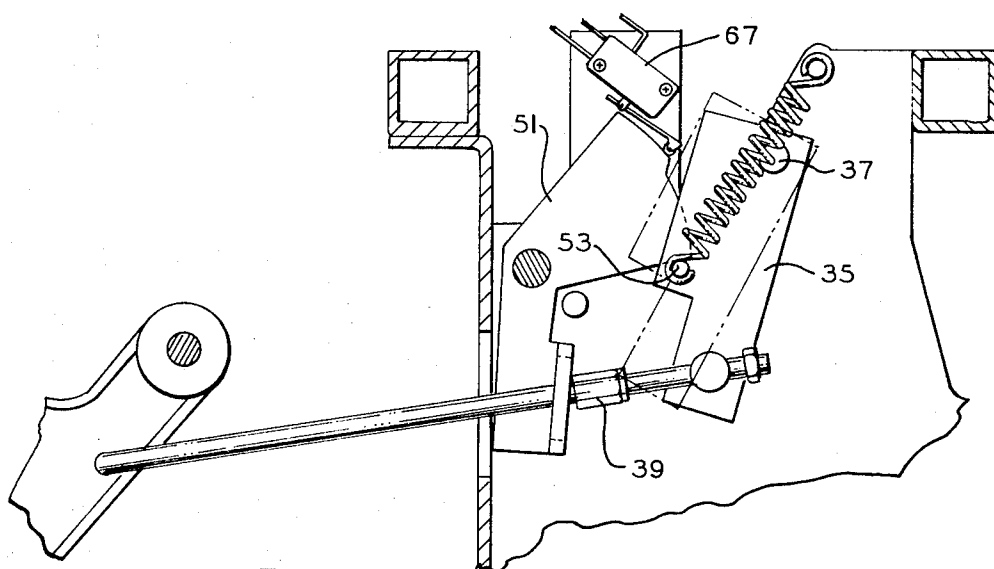


FIG. 4B

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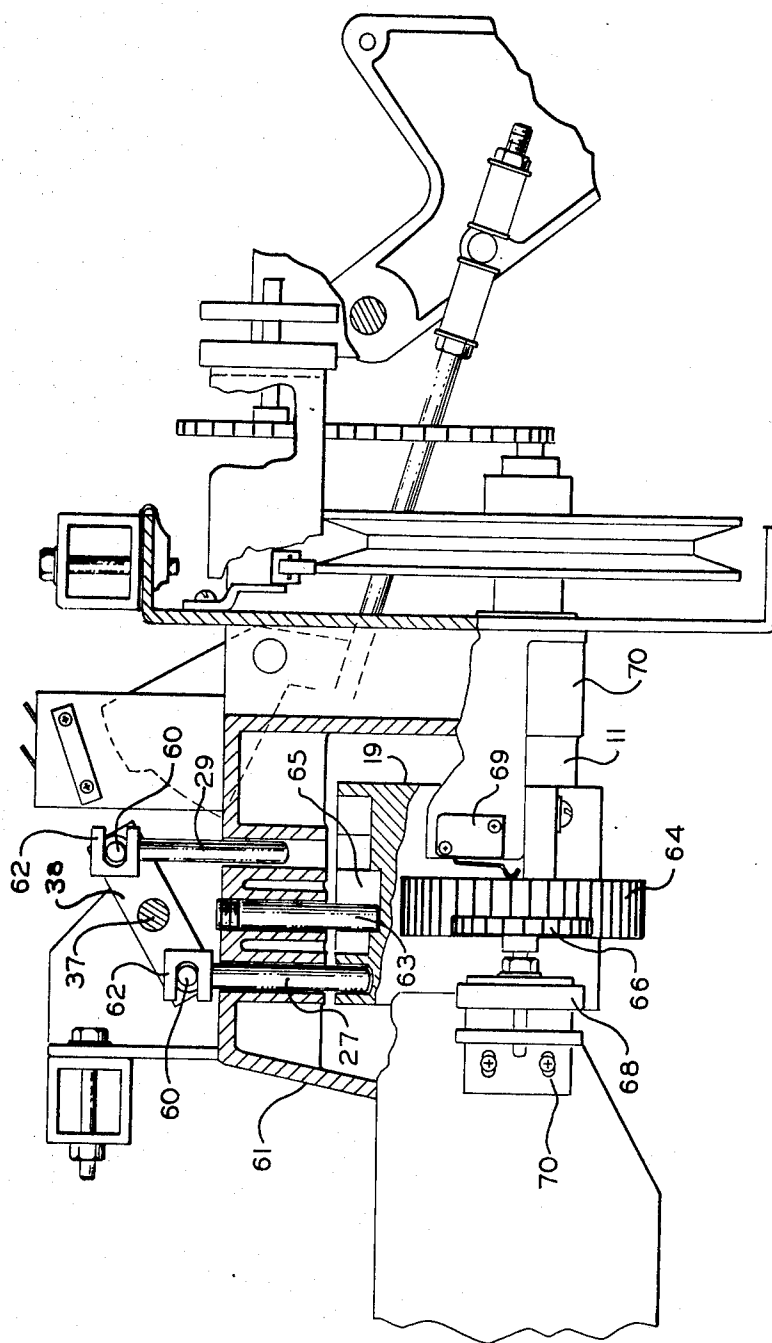


FIG. 5

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GEAR SHIFT MECHANISM

This invention relates to driver trainers and more particularly to an improved gear shift mechanism for use in such trainers.

In recent years a great deal of emphasis has been placed on driver education. In many states it is a required high school course. Teaching a subject such as driver education where experience in driving is essential, can be time consuming and costly. To help solve the problem driver trainers or simulators have been developed. Generally a plurality of simulated driver stations having steering, brake, clutch, gearshift instruments etc. are provided in a single installation. The students in the simulated "cars" all view a movie and respond to the driving situation displayed thereon. Student responses in steering, speed, braking etc. are monitored and provided to an instructor. Thus a single instructor can teach the practical aspects of driving to a relatively large number of students resulting in time and cost savings. After training in the simulator, the required time behind the wheel of an actual car is greatly reduced.

For a driver trainer to be effective it must realistically simulate the feel and response of an actual automobile to a high degree. In addition its cost must be kept as low as possible to make it an economical substitute for behind the wheel training. Since most driver trainers are used by schools, and thus purchased with tax money, improvements which reduce the cost of such trainers without reducing their effectiveness are beneficial to the public in general.

Although most present day automobiles have automatic transmissions it is still desirable to train at least some students to drive with a manual transmission. Thus a flexible trainer should have the capability of doing either. This means that two different shift patterns must be provided and that means must be provided to have or not have a clutch in the proper operating position.

The prior art apparatus for switching from one mode to the other was complex requiring separate changing of the clutch and shift mechanisms. In addition shift position was not linked to the clutch so that shift feel was not affected by clutch operation.

The present invention provides a simple apparatus which provides ease of mode change and a more realistic simulation of the feel of gear shifting and clutch operation.

It is the principle object of this invention to provide an improved driver trainer gear shift mechanism.

Another object is to provide such a mechanism which may easily be changed from manual to automatic mode.

Another object is to provide such a mechanism which has a realistic feel to the trainee.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a preferred embodiment of the present invention;

FIG. 2 is a plan view of the gear shift block;

FIG. 3 is a sectional view of a portion of the block of FIG. 2;

FIG. 4A is an elevation view of the mode change linkage in the manual mode;

FIG. 4B is an elevation view of the linkage with the clutch operated;

FIG. 4C is an elevation view of the linkage in the automatic mode; and

FIG. 5 is an elevation view of the shift block and guide pins.

In FIG. 1 a shift tube 11 is mounted and supported in a conventional manner for rotational and lateral movement by a shift lever 13 as indicated by arrows 15 and 17. Shift collar 12 is rotatable between two fixed castings 14 and 16 along with tube 11. A spring 18 shown in cutaway view is between lever 13, which is rotatable about pin 20 on collar 12, and casting 16 so that the lever 13 is spring loaded away from the operator thus causing the tube 11 to be spring loaded in the direction of arrow 45. Secured to tube 11 for motion therewith is a shift block 19, to be described in detail below, containing both a conventional pattern 21 and an automatic pattern 23. Clutch 25 is linked to a pair of pins 27 and 29 in such a manner that when the clutch 25 is in the down position as shown pin 27 will be in the pattern 21. When the clutch is rotated up out of the way pin 27 will be removed and pin 29 inserted in pattern 23.

The linkage which permits this simple change comprises a rod 31 supported by and passing through a slide 33 on a linkage member 35 affixed to one end of a rod 37 which is supported by the trainer frame and free to rotate. On the other end of rod 37 is mounted an arm 38 holding pins 27 and 29. Rod 31 has a stop 39 and a stop 41 affixed to it. As the clutch is raised it will rotate clockwise causing stop 39 to press against slide 33. Member 35 has an over center spring 43 attached between it and the frame. When rod 31 pushes member 35 past the center, spring 43 will pull it the rest of the way rotating rod 37 clockwise and inserting pin 29 in the block.

When the clutch is lowered stop 41 will push member 35 to the center with spring 43 pulling it the rest of the way to insert pin 27 in the pattern 21.

The shift mechanism is spring loaded as described above in the direction shown by arrow 45 so that either pin 27 or 29 will rest against the rear of the pattern 21 or 23 respectively of block 19. The patterns are shown in more detail in FIG. 2. The standard pattern 21 is in the form of an H. At each of the five positions i.e. the four corners and the center, is an indentation 47. Pin 27 will rest in this indentation and prevent shifting until the clutch is operated as will be described below. The automatic pattern 23 contains ridges 49 to give it the proper feel when in a particular gear. A crosssectional view of block 19 showing the ridges or indentations 49 is shown in FIG. 3. Block 19 may be made of molded plastic making it inexpensive and easy to mass produce.

The manner in which the pin 27 is lifted from the indentations 47 may be seen by reexamining FIG. 1. When clutch 25 is depressed, stop 33 will push against clutch lockout linkage 51 causing it to rotate counter clockwise. This will make linkage 51 push against pin 53 and cause rod 37 to rotate clockwise and lift pin 27

above the recess so that gears may be changed by moving lever 13.

FIGS. 4A, B and C show in more detail the mechanisms for mode change and clutch operation.

FIG. 4A shows an elevation view of clutch 25 and its associated linkages with the clutch in the down position for use of the trainer in the manual transmission model. As the clutch was lowered, stop 41 came into contact with slide 33 pushing the mode change linkage 35 past the center of the over-center spring 43. Spring 43 then caused the linkage 35 to rotate the rest of the way pushing pin 27 of FIG. 1 into pattern 21 of block 19.

FIG. 5 shows a crosssectional view of the block and the associated linkages as viewed from side opposite the view shown in FIG. 4A for the same clutch position. Pin 27 is all the way down in the block 19. Also shown here but omitted from FIG. 1 for simplicity is a guide block 61 which keeps pins 27 and 29 from moving in any direction except up and down. Pins 60 on each side of arm 38 support pins 27 and 29 which have on their ends U mounts 62 which permit lateral motion of pins 60 as rod 37 rotates and pins 27 and 29 move up and down. A pin 63 is fastened to block 61 and rides in a recess 65 (also shown on FIG. 2) in block 19 to limit its motion. Mounted on block 19 for movement therewith is a sector gear 64 engaging a gear 66 linked to rotary switches 68. Gear 66 and switch 68 are supported by a bracket 70 fastened to a fixed portion of the trainer. Various terminals on the switch are used to give electrical indication of shift position as the lever is rotated. When in manual mode a combination of rotational position and lateral position is required to indicate gear positions. Thus microswitch 69 is provided which will be closed when the tube 11 is to the right in the position shown (normally R or first gears) and open when the tube is to the left (normally second and third gears).

FIG. 4B shows the clutch depressed. Stop 39 presses against linkage 51 rotating it clockwise and pressing it against pin 53 on linkage 35 rotating it and shaft 37 counter-clockwise from the position of FIG. 4A (shown here in dotted lines). As viewed from the other side in FIG. 5 this will result in a clockwise motion of rod 37 causing pin 27 to lift a small distance from the position shown out of the recess but still within the pattern. A microswitch 67 is used along with a cam on linkage 51 to provide a switch closure when the clutch is depressed.

FIG. 4C shows clutch 25 in the up position for using the trainer in the automatic transmission mode. As the clutch rotated up, stop 39 pushed on slide 33 rotating linkage 35 past the center of spring 43. Spring 43 then

pulled the linkage 35 the rest of the way rotating it and the shaft 37 counter-clockwise. This as viewed from FIG. 5 would be a clockwise rotation which it can be seen will cause pin 27 to come up from and pin 29 to be inserted into the block 19. A pin 55 is slid through a hole in clutch 25 and aligned hole in the frame to keep clutch 25 up and out of the way when in the automatic transmission mode.

Thus a simple and inexpensive apparatus for use in a driver trainer which permits ease of change from manual to automatic mode and provides a realistic feel has been shown.

What is claimed is:

1. A driver trainer gear shift simulation mechanism comprising:

- a. a gear shift lever;
- b. mounting means supporting said lever for movement in two degrees of freedom;
- c. means defining a pair of gear shift patterns corresponding to movement of the shift lever of manual and automatic transmissions; and
- d. at least one follower member selectively movable into mating engagement with one or the other of said patterns;
- e. said shift lever being rigidly connected to one of said pattern defining means and follower member to produce movement thereof in said 2 degrees of freedom in response to movement of said lever, such movement being constrained to the one of said patterns with which said follower member is engaged.

2. The invention according to claim 1 wherein said pattern defining means comprises a single block of material with both of said patterns formed thereon.

3. The invention according to claim 2 wherein said block is rigidly attached to said shift lever for movement thereby.

4. The invention according to claim 1 wherein said follower means comprises a pair of pins, each adapted for engagement with one of said patterns.

5. The invention according to claim 4 wherein said pins are mounted on a common movable member to effect movement of one pin into engagement with its respective pattern while moving the other pin out of engagement with its pattern.

6. The invention according to claim 5 wherein said common movable member is connected to a clutch pedal in the trainer and said member is moved by movement of said pedal between operative and inoperative positions when manual and automatic transmissions, respectively, are to be simulated in the trainer.

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