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(54) **Driver interface**

(57) A driver interface (10) for a utility vehicle is provided. The driver interface, or control handle, comprises a hand grip (12) connected to a stem (14) for moveable attachment to a control consol (16) of a utility vehicle such as a tractor. The hand grip is substantially horizontal and has affixed thereto a joystick (26) located between the resting positions of a driver's thumb and forefinger wherein the joystick is opererable by the driver's thumb. The driver interface further comprises a plurality of fingertip-operated levers (32A, 32B, 32C, 32D) operable by the driver's fingers without movement of the palm of the driver's hand.

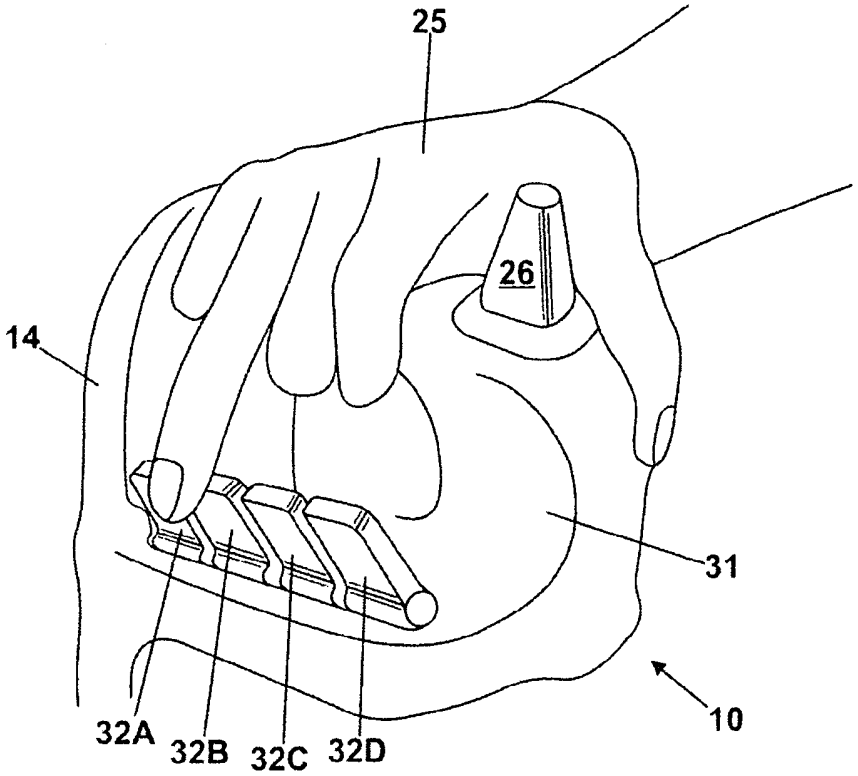

Fig. 3

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Description

[0001] The invention relates to a driver interface for a utility vehicle such as a tractor wherein the interface serves to control a plurality of functions associated with the vehicle. In particular, the invention relates to a driver interface which is operable by a driver's hand.

[0002] Utility vehicles, including agricultural vehicles such as tractors and combine harvesters, often require the driver thereof to control more than one function simultaneously. For example, the driver may wish to raise a front loader (fitted to a tractor) whilst accelerating backwards. For safety and practicality reasons, the driver of a typical tractor must always keep one hand on the steering wheel when in motion. Therefore, the simultaneous actions are preferably carried out by a single hand operation.

[0003] Multifunction control apparatus are known and are fitted to utility vehicles to enable the driver to carry out such simultaneous actions with a single hand. By way of example, EP-0,965,901 discloses a multifunctional handle for controlling a combine harvester. A palm grip is designed to be ergonomically comfortable for the driver. Two control regions are provided above and below a thumb rest area, each having various controls for operation by the thumb. Furthermore, the entire handle can be moved relative to the control consol to which it is mounted.

[0004] It is an object of the invention to provide an improved driver interface for a utility vehicle.

[0005] It is another object of the invention to provide a driver interface for a utility vehicle which has increased ergonomic comfort for the driver when in use.

[0006] It is yet another object of the invention to provide a driver interface for a utility vehicle which has increased functionality.

[0007] In accordance with the present invention there is provided a driver interface for a utility vehicle comprising a hand grip connected to a stem for moveable attachment to a control consol of the utility vehicle, the hand grip being substantially horizontal and having affixed thereto a joystick located between a driver's thumb and forefinger in their normal resting positions, the joystick being opererable by the driver's thumb and/or forefinger, the driver interface further comprising a plurality of fingertip-operated levers operable by the driver's fingers without movement of the palm of the driver's hand.

[0008] Advantageously, by providing a plurality of fingertip-operated levers in this way, the driver can exploit both the fingers and the thumb of one hand to operate various functions, simultaneously if required, on a utility vehicle. This renders the driver interface particularly suitable for operation of a tractor fitted with a front loader wherein the fingertip-operated levers operate various hydraulic rams on the front loader. Advantageously further still, a driver can operate the fingertip levers and/or joystick whilst the entire driver interface is displaced forward or backward corresponding to a control of the vehicle speed for example.

[0009] Preferably, the driver interface comprises four fingertip-operated levers positioned in line allowing each to he operated by dedicated fingers.

[0010] In a preferred embodiment the hand grip is connected substantially perpendicular to the stem. In this way, when the driver interface is mounted to a substantially horizontal consol on a utility vehicle the stem is substantially vertical and the hand grip extends transversely to the utility vehicle, for example at an angle less than 35 degrees from horizontal. The driver interface can then be moveable relative to the consol in a forwards and backwards direction. Advantageously this allows the driver's hand to adopt a substantially transverse position which is ergonomically comfortable over long periods.

[0011] The fingertip-operated levers may be mounted on a body which is connected to the stem and extends substantially parallel to the hand grip. Preferably the hand grip and body are formed on respective sides of a U-shaped moulding which is connected to the stem. Advantageously, this leaves a gap between the grip and the body in which the driver's fingertips can rest.

[0012] When fitted to a utility vehicle the forwards and backwards movement of the driver interface may control the forward acceleration of the vehicle. Therefore, a forward movement of the driver interface, perhaps from a central operating position, forced by the driver's hand may increase the speed of the vehicle, whereas a backward movement may decrease the forward speed or even cause the vehicle to move in reverse for example.

[0013] The driver interface may be moveable relative to the consol in a sideways direction.

[0014] The driver interface is preferably biased towards a central operating position relative to the consol.

[0015] Further advantages will become apparent when reading the following description of a specific embodiment of the invention with reference to the drawings in which:-

Figure 1 is a front perspective view of a driver interface in accordance with the invention;

Figure 2 is an upper perspective view of the driver interface of Figure 1;

Figure 3 is a front perspective view of the driver interface of Figure 1 shown with the driver's hand; and,

Figure 4 is a highly schematic top view of a tractor cab fitted with the driver interface of Figure 1.

[0016] With reference to the drawings, a driver interface in a form of a control handle 10 comprises a hand grip 12 and a support stem 14. The hand grip 12 serves to provide an ergonomic interface with the palm of the driver's hand so that the hand can rest on the grip 14 during operation of the vehicle, even when no force is being exerted to move the handle.

[0017] With reference in particular to Figure 4, the handle 10 is mounted on a substantially horizontal control console 16 which is located to the right-hand side of a driver's seat 18. Arrow F indicates the forward direction of the tractor shown in part in Figure 4. The tractor cab 20 further houses a steering column 21 fitted with steering wheel 22.

[0018] With reference again to Figures 1 to 3, the stem 14 is substantially vertical and the hand grip 12 extends transversely from the stem 14 at an angle of no more than 35 degrees from the horizontal. This allows a driver to rest their hand 25 on the substantially horizontally extending hand grip 12 as shown in Figure 3.

[0019] A two-axis joystick 26 is affixed to the upper surface of the hand grip 12 in a position located between the driver's thumb and forefinger when in their normal resting positions (as shown in Figure 3). The joy stick 26 is operable by the driver's thumb and/or forefinger and such action can take place without the palm of the driver's hand leaving the hand grip 12.

[0020] The hand grip 12 forms a single part, generally U-shaped, moulding which is integrated with the stem 14. This can be manufactured as one part using simple and known plastic moulding techniques. The second side of the U-shaped moulding provides a body 30 which extends between the stem 14 and the end 31 of the U-shaped region running parallel to the hand grip 12.

[0021] A plurality of fingertip operated levers 32A-32D are mounted on the body 30 and are each within reach of a respective finger of the driver's hand 25. The fingertip operated levers 32A-32D are positioned in line along the body 30 and are each pivotally mounted so as to pivot on an axis which runs generally parallel to the extending body 30. This enables simple actuation of each lever by a respective finger without the driver having to move the palm of their hand from the hand grip 12. Each lever 32A-32D returns to a central neutral position when the driver's finger is removed therefrom.

[0022] The tractor is fitted with a front loader (not shown) which comprises a plurality of hydraulic rams each serving to move a different component of the front loader. Each hydraulic ram or pair of hydraulic rams is operated by actuation of a respective lever 32A-32D or joystick 26.

[0023] The entire handle 10 can be moved relative to the console 16 by appropriate movement of the driver's hand and by means of a pivoting attachment of the stem 14 below the level of the consol 16. The acceleration of the tractor can be increased by the driver pushing the handle forward (in the direction of arrow F). Conversely the forward speed of the tractor can be reduced by the driver moving the handle 10 rearwardly beyond a central operating position shown in Figure 4.

[0024] The handle 10 is biased toward the central position by biasing means (not shown) connected to the stem 14 underneath the console 16.

[0025] Furthermore the driver interface 10 can be moved in a sideways direction which, in this example, serves to change the driving direction of the tractor.

[0026] It should be appreciated that longitudinal and/or transverse movement of the handle 10 may be translational with respect to the console 16 rather than pivotal by appropriate attachment of the stem 14.

[0027] The driver interface in accordance with the invention lends itself to a tractor fitted with a continuously variable transmission wherein the power transmitted to the wheels can be simply adjusted by appropriate movement of the driver interface 12. Despite this advantage the invention can also he applied to the control of a stepped-ratio transmission. In such a case, longitudinal movement of the handle may control a change in ratio of the transmission.

[0028] It should be appreciated that the output functionality of the various driver inputs to the device described can vary without deviating from the scope of the invention. The driver interface in accordance with the invention comprises three styles of driver input, namely movement of the handle 12, the joystick 26 and the fingertip levers 32A-D. This gives the opportunity for a highly flexible range of permutations in which the various functions of the tractor can be controlled by either of the driver inputs.

[0029] By way of example, any of the inputs may control one function from the following non-exhaustive list;

- Ground speed;
- Transmission ratio;
- Engine speed;
- Parking brake activation/deactivation;
- Elements of front loader movements; or
- Movement of an implement mounted on the front/rear linkage or otherwise.

[0030] When implemented on a combine harvester, the joystick 26 may control the unloading spout whilst the levers control the header functions and movement of the handle adjusts the ground speed for example.

[0031] Regardless of the vehicle and the functions that the interface 10 controls thereon, the driver is able to operate any combination of the inputs simultaneously, and with a single hand.

[0032] Although the embodiment described with reference to the appended drawings comprises a hand grip which is substantially perpendicular to the stem 14, it is envisaged that the hand grip 12 could instead be substantially parallel to the stem 14 without deviating from the scope of the invention. Furthermore, and in any case, the stem could instead be mounted in a horizontal manner to a side wall forming part of a console.

Claims

1. A driver interface for a utility vehicle comprising a hand grip connected to a stem for moveable attachment to a control consol of the utility vehicle, the hand

grip being substantially horizontal and having affixed thereto a joystick located between a driver's thumb and forefinger in their normal resting positions, the joystick being opererable by the driver's thumb and/or forefinger, the driver interface further comprising a plurality of fingertip-operated levers operable by the driver's fingers without movement of the palm of the driver's hand.

2. A driver interface according to Claim 1, comprising four fingertip-operated levers positioned in line and operable by respective fingers of the driver's hand.

3. A driver interface according to Claims 1 or 2, wherein the joystick is operable in two axes.

4. A driver interface according to any preceding claim, wherein the hand grip is connected substantially perpendicular to the stem.

5. A driver interface according to Claim 4, wherein the fingertip-operated levers are mounted on a body which is connected to the stem and extends substantially parallel to the hand grip.

6. A driver interface according to Claim 5, wherein the hand grip and body are formed on respective sides of a U-shaped moulding which is connected to the stem.

7. A utility vehicle comprising a control consol having attached thereto a driver interface according to any preceding claim.

8. A utility vehicle comprising a control consol having attached thereto a driver interface according to any one of Claims 4, 5 or 6, wherein the consol is substantially horizontal, the stem is substantially vertical and the hand grip extends transversely to the utility vehicle, the user interface being moveable relative to the consol in a forwards and backwards direction.

9. A utility vehicle according to Claim 8, wherein said forwards and backwards movement controls the forward acceleration of the vehicle.

10. A utility vehicle according to Claim 8 or 9, wherein the driver interface is moveable relative to the consol in a sideways direction.

11. A utility vehicle according to any one of Claims 8 to 11, wherein the driver interface is biased towards a central operating position relative to the consol.

12. A utility vehicle according to any one of Claims 7 to 11, wherein the fingertip-operated levers serve to control hydraulic-actuated functions on a front-loader attached to the vehicle.

13. A driver interface constructed and arranged substantially as hereinbefore described with reference to, and as shown in the accompanying drawings.

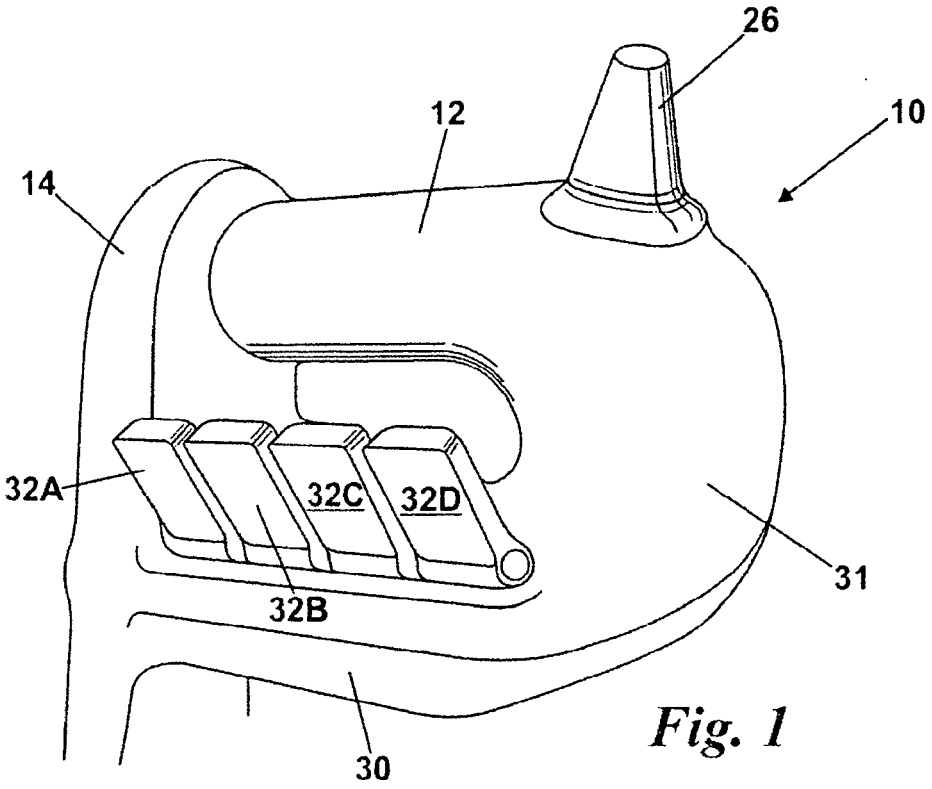

Fig. 1

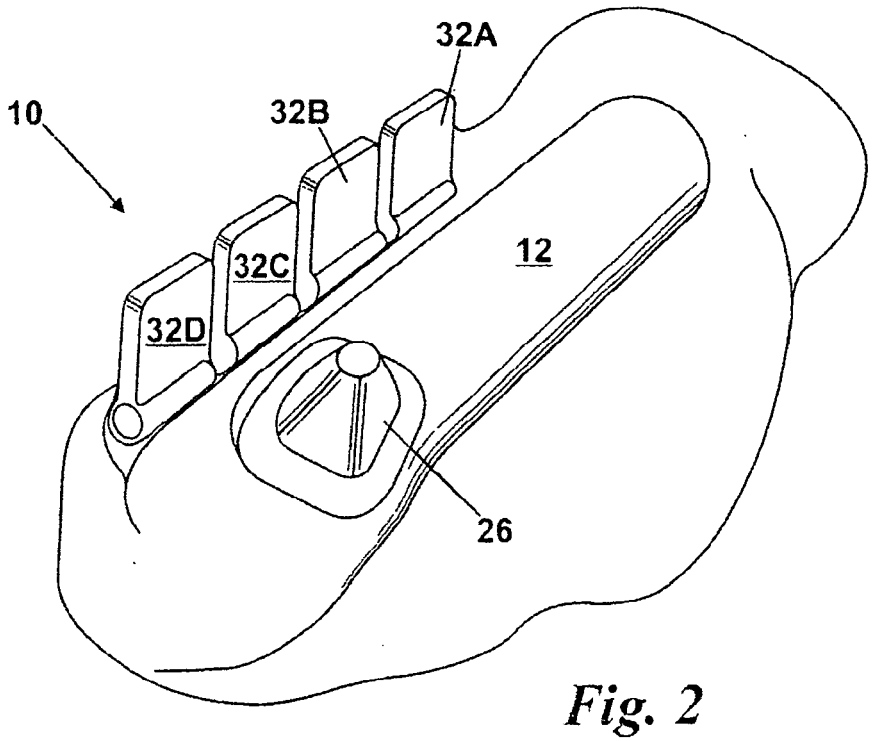

Fig. 2

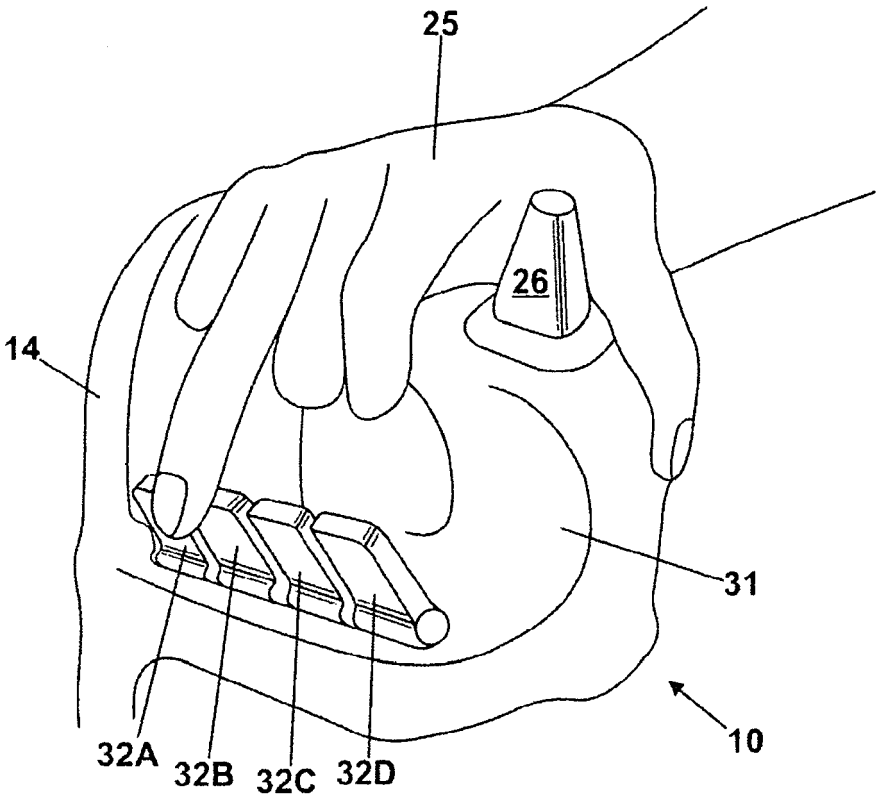

Fig. 3

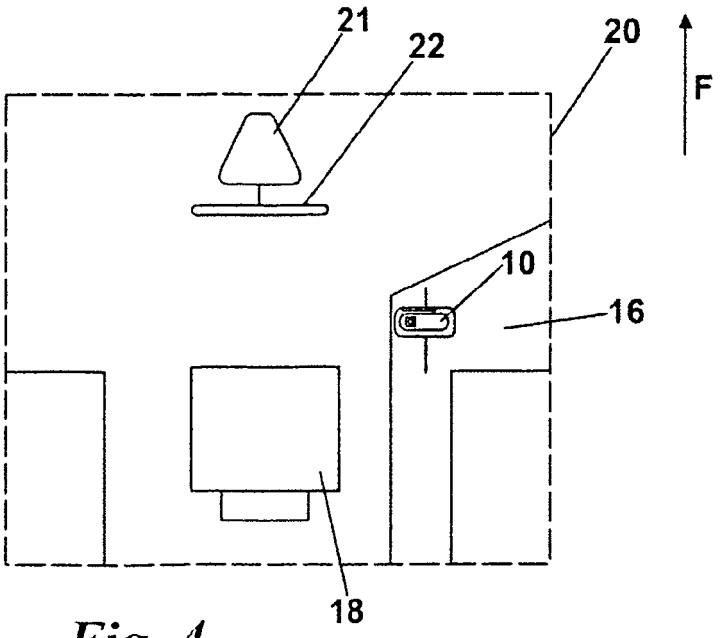

Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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