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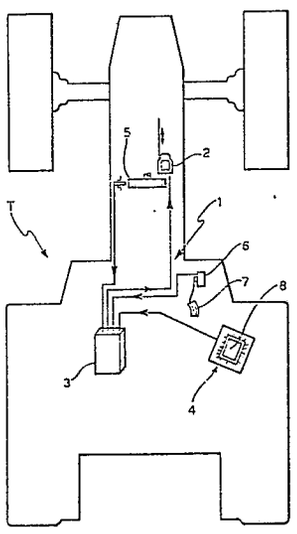
(54) A hand accelerator for tractors.

(57) A hand accelerator for tractors comprises an electrical selector (4) and an electronic regulation unit (3) connected to the selector and arranged to operate the actuator of the accelerator (2) in response to an enabling signal resulting from the manual activation of the selector (4).

FIG. 1



EP 0 349 496 A1

Description

A hand accelerator for tractors

The present invention relates to a hand accelerator for tractors, including an actuator and manual control means for the actuator.

Conventionally, the manual control is constituted by a lever connected directly, for example, through a mechanical transmission, to the actuator which provides for the regulation of the fuel supply to the engine of the tractor. As well as being difficult and inconvenient for the operator to operate, this system is sometimes unable to ensure that the accelerator is kept with sufficient stability in the condition in which it has been set, and in any case involves the need for frequent adjustment operations by the operator.

In order to avoid this problem, according to JP-A-6022049 and JP-A-61106932 the control means include an electrical selector, an electronic regulation unit connected to the selector and arranged to operate the actuator in response to an enabling signal generated by the selector as a result of its manual activation, and means for sensing the operating parameters of the tractor which depend on its pedal accelerator, the sensor means being operatively connected to memory means of the electronic regulation unit.

In this way, the hand accelerator is kept in its set condition of adjustment. The adjustment is carried out automatically by the electronic unit connected to the selector, but is rigidly linked to the operating parameters of the tractor prevailing at the time of engagement of the hand accelerator, since the electronic unit is arranged to operate the actuator so that the operating parameters stored in the memory means are kept unchanged, as a result of the activation of the selector.

The object of the present invention is to render the automatic regulation effected by the electronic unit more flexible, making it selectively independent from the actual operating parameters of the tractor.

According to the invention, this object is achieved by the fact that the selector also includes a manual variator operatively connected to the electronic regulation unit for the selective modification thereby, in the activated condition of the selector, of the values of the operating parameters of the tractor stored in the memory means.

The variator may be operable by means of a rotary knob or by means of a button for increasing/decreasing the values of the operating parameters. In this case, a digital or analog display of the values set is conveniently associated with the push-button.

Alternatively, the variator may be operable by means of digital preselectors for increasing/decreasing the values of the operating parameters, with a direct indication of the values set.

The selector may be constituted by a push-button switch or, according to a variant, by a lever switch which can be set in two different positions for activation of the hand accelerator, each corresponding to an operating mode of the actuator dependent on different values of operating parameters of the tractor which can be set by means of the variator.

The invention will now be described in detail with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 is a diagrammatic plan view of a tractor provided with a hand accelerator generally according to the invention,

Figure 2 shows the functional layout of the selector of the hand accelerator according to Figure 1,

Figure 3 shows schematically a first variant of the selector,

Figure 4 shows the functional layout of the selector of Figure 3,

Figure 5 shows a second variant of the selector of Figure 1,

Figure 6 shows the functional layout of the selector of Figure 5,

Figure 7, 8 and 9 show third, fourth and fifth variants of the selector, respectively.

With reference initially to Figure 1, a tractor, schematically indicated T, is provided with a hand accelerator device generally according to the invention, indicated 1.

The hand accelerator 1 essentially comprises an electromechanical actuator, schematically indicated 2, which in known manner, provides for the control of the fuel supply to the internal combustion engine (not illustrated) of the tractor as a result of the activation of the hand accelerator. The electrical part of the actuator 2 is connected to an electronic control and regulation unit 3 which is in turn connected electrically to a manual control member 4. The electronic unit 3 is also connected to one or more electrical detectors of operating parameters of the tractor: in the embodiment illustrated, these detectors include a speed sensor 5 and a position sensor 6 associated with the pedal accelerator 7 of the tractor.

According to the embodiment of Figure 1, the selector 4 is constituted by an electrical push-button 8 switch of monostable or bistable on-off type and has an associated indicator lamp 9. As shown in the functional diagram of Figure 2, the push-button 8 can be moved manually between an open position and a closed position corresponding respectively to the de-activated condition and to the activated condition of the hand accelerator 1, and the lamp 9 is lit in the closed condition.

The electronic unit 3 is constituted by a microprocessor provided with a memory for the storage, by means of electrical signals from the sensors 5 and 6, of values of operating parameters of the tractor T. In the embodiment of Figure 1, the values stored correspond to those prevailing at the time of activation of the selector 4, that is, of the engagement of the hand accelerator 1. The memory of the unit 3 can be reset by the disengagement of the selector 4.

In operation, once the operating condition which is to be kept constant by means of the hand

accelerator 1 has been achieved by means of the pedal accelerator 7, it is sufficient momentarily to press the push-button 8, causing the closure of the switch associated therewith.

As a result of this closure, the unit 3 receives an enabling signal and activates the electromechanical actuator 3 in dependence on the stored parameters corresponding to the operating condition which is to be maintained. From this moment, the pedal 7 can be released and the "hold" condition, indicated by the illumination of the lamp 9, is maintained by the electronic unit 3 until the push-button 8 is pushed again to disengage the hand accelerator 1. When the hand accelerator 1 is in the engaged condition, the electronic unit 3 prevents the operation of the pedal accelerator 7.

According to the invention, the selector 4 is in practice made according to one of the embodiments shown in Figures 3 to 9, which are generally similar to the embodiment described above and wherein only the differences will be described in detail, the same reference numerals being used for identical or similar parts.

In the case of Figures 3 and 4, as well as the luminous push-button 8, the selector 4 includes a manual variator 10 which is operatively connected to the electronic unit 3 and has the function of modifying, by means of the latter, the values of the operating parameters of the tractor which are stored in the memory of the unit 3, when the switch associated with the push-button 8 is in the closed condition. The variator 10, which is constituted by an increase/decrease rocker button, therefore enables the operating parameters of the tractor T to be modified during the "hold" condition operated by the electronic unit 3.

The embodiments described hitherto provide for the operation of the hand accelerator 1 in dependence on the operating parameters of the tractor T at the time of the engagement of the selector 4, in a manner which is constant or which can be modified by means of the variator 10. In the embodiments which will be described below, however, the operation of the hand accelerator 1 is independent of these prevailing operating parameters, which can be modified and/or adjusted at will. In these variants, the electronic unit 3 is in fact arranged to store values of operating parameters which are set manually by the operator and to operate the electromechanical actuator 2 correspondingly.

In the case of Figures 5 and 6, in addition to the push-button 8 with its lamp 9, the selector 4 includes a potentiometer 11 with a rotary knob. By means of this potentiometer 11, which is activated by the engagement of the push-button 8, signals are sent to the unit 3 whereby the unit 3 operates the actuator 2 to achieve and maintain the operating parameters set.

In the case of Figure 7, the selector 4 is similar to that of Figure 3: in this case, the manual variator is in fact constituted by an increase/decrease button 10 which has the same function as the potentiometer 11 of Figures 5 and 6. A digital display 12, or alternatively an analog display 13, is operatively associated with the button 10. The display 12 or 13 may also be used to advantage in the embodiments described with reference to Figures 3, 4, 5 and 6.

In the case of the variant of Figure 8, the increase/decrease button 10 is replaced by a decimal preselector unit 14 for increasing/decreasing the set values of the operating parameters with a direct indication of these values.

Finally, in the case of Figure 9, the selector 4 is constituted by a lever switch 15 which can be set from a position, indicated "Pedal", in which the hand accelerator 1 is disengaged, to two different activation positions, indicated "LO" and "HI" respectively. In this case, the electronic unit 3 is provided with two separate memories each of which stores predetermined values of operating parameters that can be selected by the positioning of the lever 15 in one or other of the two positions for the activation of the hand accelerator 1. These values can be modified, however, by means of a pair of increase/decrease buttons 10, similar to those of Figures 3, 4 and 7, each of which is activated as a result of the positioning of the lever 15 of the selector 4 in one or other of the two positions for activating the hand accelerator 1. Respective analog or digital visual displays 12 are associated with the two buttons 10.

Claims

1. A hand accelerator for tractors, including an actuator (2) and manual control means for the actuator, wherein the control means include an electrical selector (4), an electronic control and regulation unit (3) connected to the selector (4) and arranged to operate the actuator (2) in response to an enabling signal generated by the selector (4) as a result of its manual activation, and means (5, 6) for sensing operating parameters of the tractor (T) which depend on the pedal accelerator (7) thereof, the sensor means being operatively connected to memory means of the electronic regulation unit (3), characterised in that the selector (4) also includes a manual variator (10, 11) operatively connected to the electronic unit (3) for the selective modification thereby, in the activated condition of the selector (4) of the values of the operating parameters of the tractor (T) stored in the memory means.

2. An accelerator according to Claim 1, characterised in that the variator is operable by means of a rotary knob (11).

3. An accelerator according to Claim 1, characterised in that the variator is operable by means of a button (10) for increasing/decreasing the values of the operating parameters.

4. An accelerator according to Claim 3, characterised in that a digital or analog visual display (12, 13) of the set values is operatively associated with the increase/decrease button (10).

5. An accelerator according to Claim 1, characterised in that the variator is operable by means of digital selectars (14) for increasing/decreasing the values of the operating parame-

ters, with a direct indication of the values set.

6. An accelerator according to any one of the preceding claims, characterised in that the selector (4) is constituted by a push-button switch (8).

7. An accelerator according to Claim 1, characterised in that the selector (4) is constituted by a lever switch (15) which can be set in two different positions for activation of the hand accelerator (1), each corresponding to an operating mode of the actuator (2) dependent on different predetermined values of operating parameters of the tractor (T) which can be modified by means of the variator (10).

8. An accelerator according to Claim 7, characterised in that the variator is operable by means of a pair of buttons (10) for increasing/decreasing the values of the operating parameters which correspond to the two positions of the lever (15), and in that digital or analog visual displays (12) of the set values are operatively associated with the buttons (10).

9. Accelerator according to any one of the preceding claims, characterised in that the actuator (2) is electromechanical.

FIG. 1

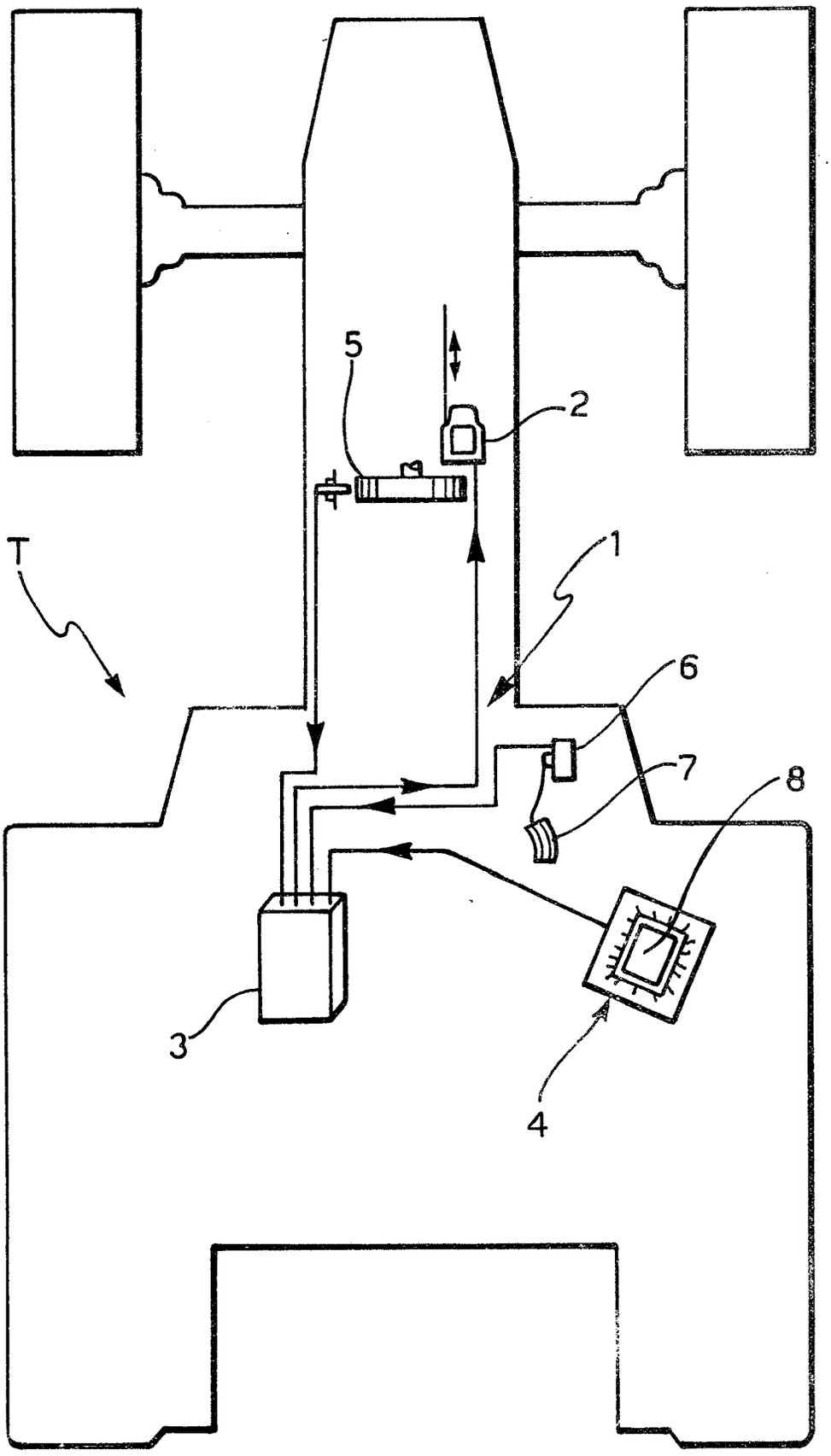


FIG. 2

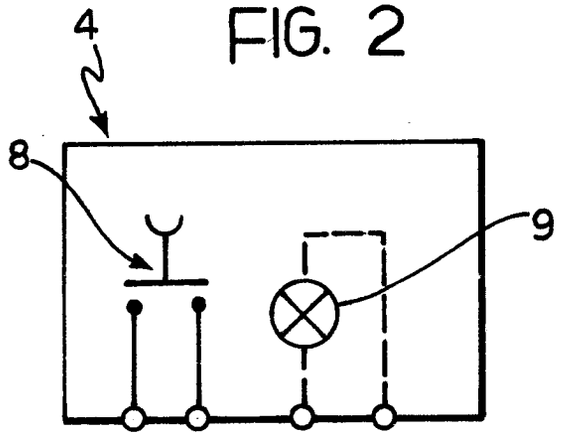


FIG. 3

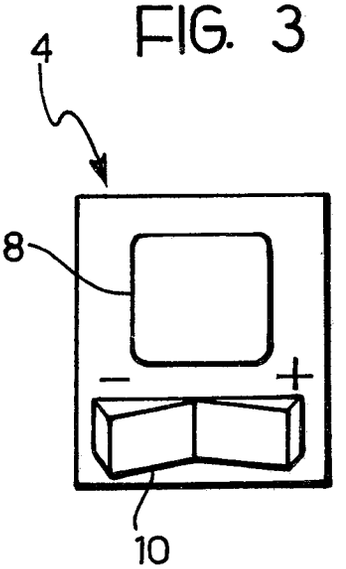


FIG. 4

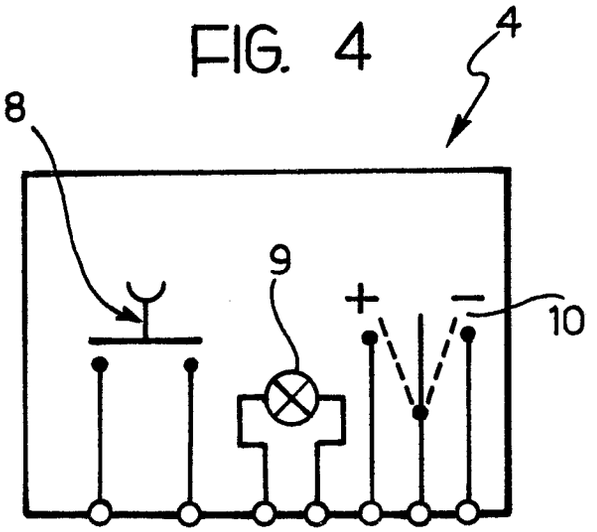


FIG. 5

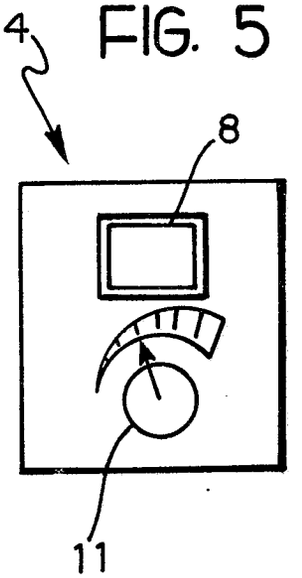


FIG. 6

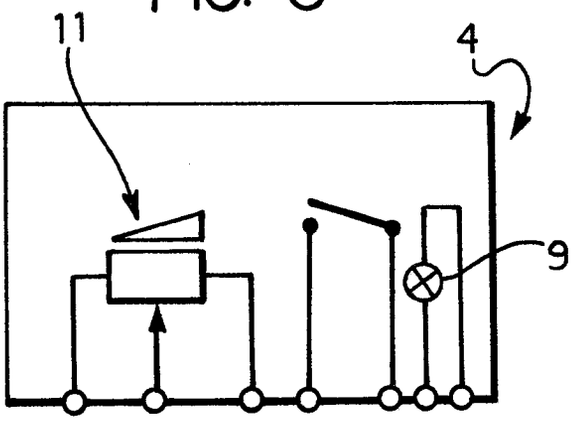


FIG. 7

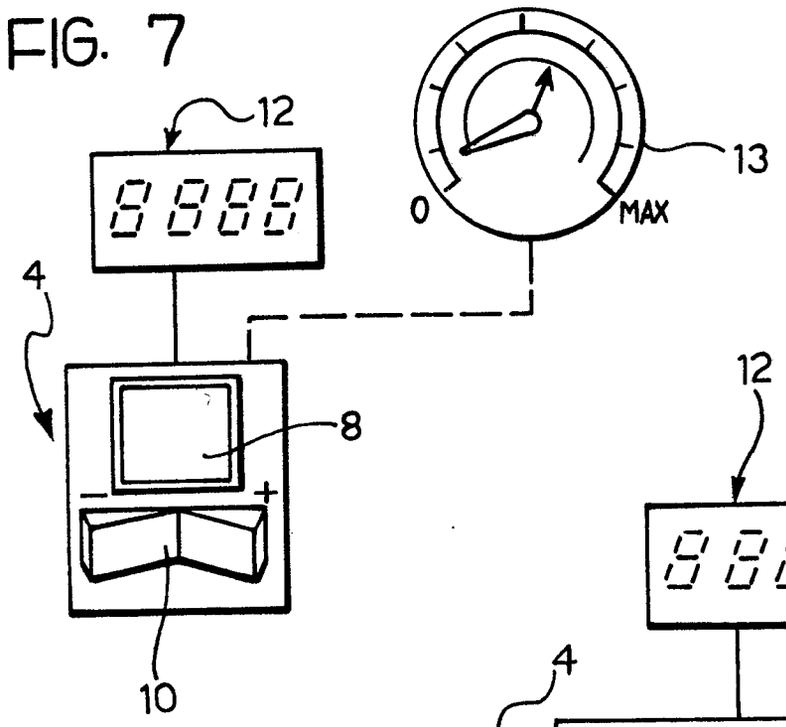


FIG. 8

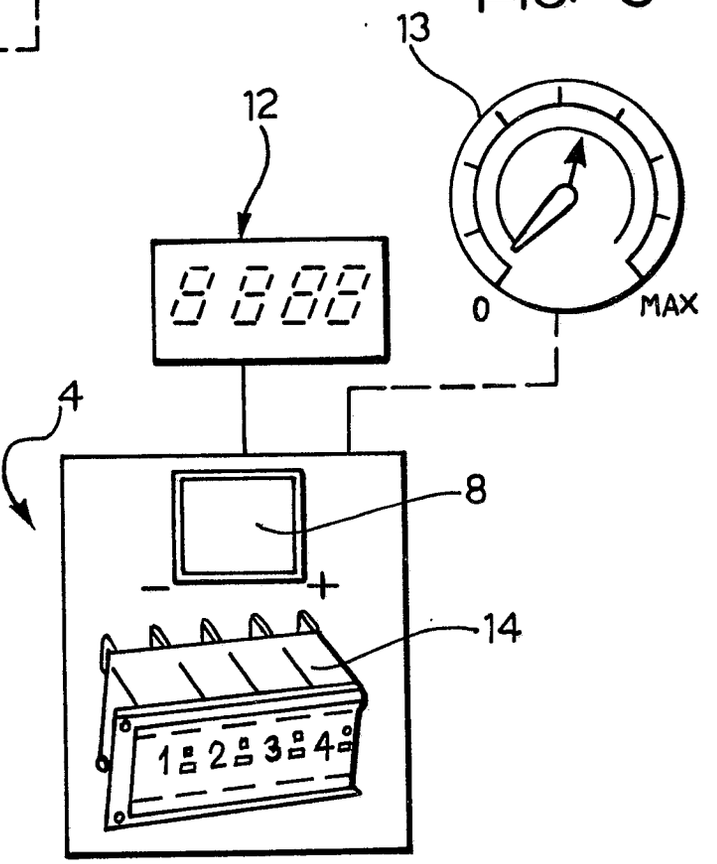
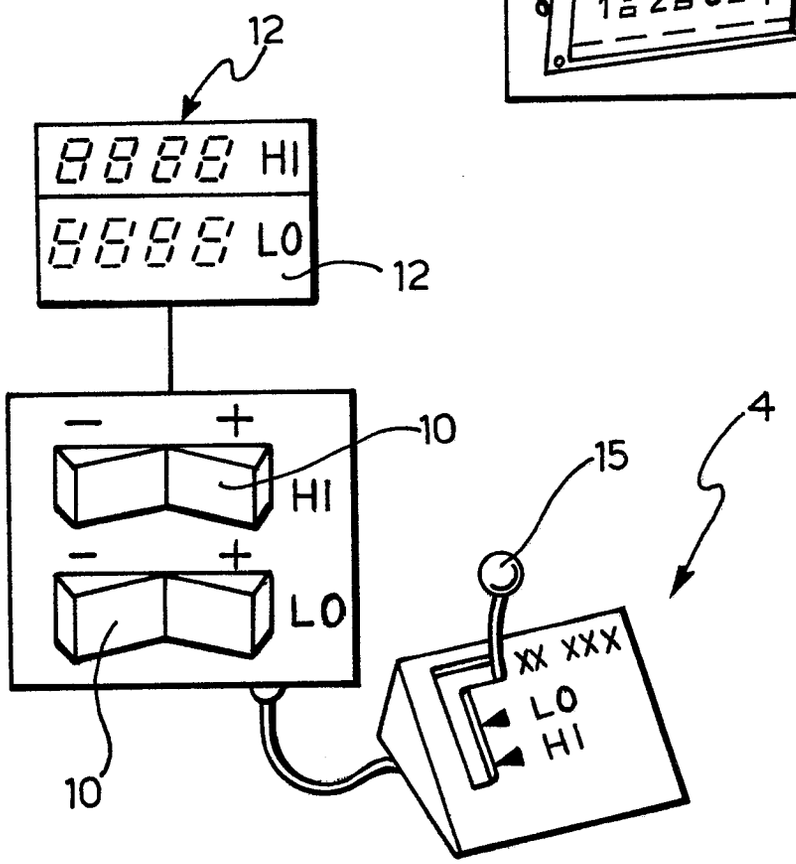


FIG. 9



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EUROPEAN SEARCH REPORT

Application Number

EP 89 83 0278

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	FR-A-2356007 (HENRY-JANCELIN) * page 4, lines 12 - 33 * * page 5, line 32 - page 6, line 10 * * page 6, line 37 - page 7, line 25 * * page 9, lines 21 - 38; figures 1, 2 *	1, 2, 6-9	F02D11/10 B60K26/02
A	DE-A-1526544 (SENN) * pages 1 - 7 * * pages 7 - 10; figures 1, 3 *	1-4, 6	
D,A	PATENT ABSTRACTS OF JAPAN vol. 9, no. 142 (M-388)(1865) 18 June 1986, & JP-A-60 22049 (KOMATSU SEISAKUSHO K.K.) 04 February 1985, * the whole document *	1, 9	
A	DE-A-3345679 (HETTICH) * pages 5 - 7; figure 1 *	7	
D,A	PATENT ABSTRACTS OF JAPAN vol. 10, no. 291 (M-522)(2347) 3 October 1986, & JP-A-61 106932 (KUBOTA LTD.) 24 May 1986, * the whole document *	9	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

F02D
B60K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	03 OCTOBER 1989	LAPEYRONNIE P.J.

CATEGORY OF CITED DOCUMENTS

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1