July 19, 1932. T. M. PAUL 1,868,365

CURRENT SHUT-OFF MECHANISM

Filed Jan. 15, 1932 2 Sheets-Sheet 1

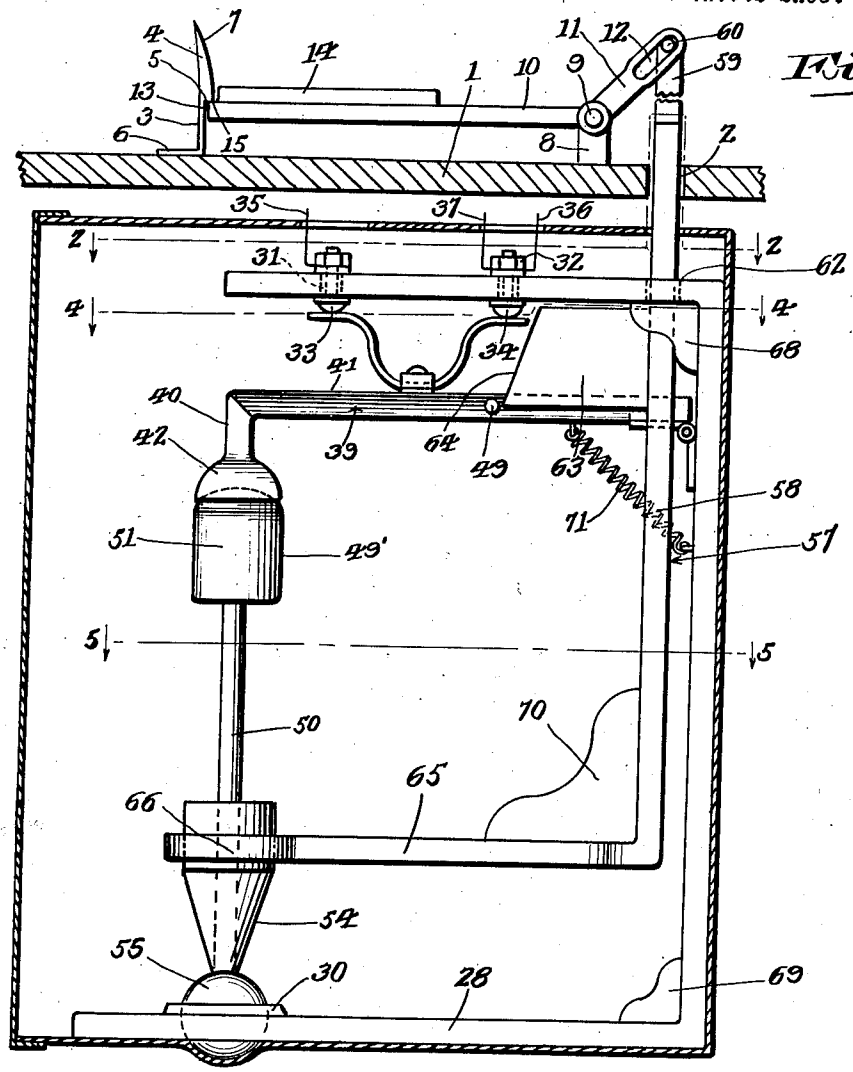


Fig. 1.

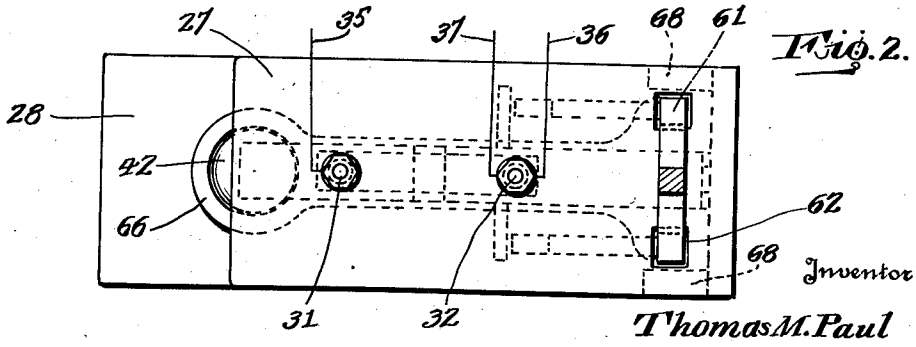


Fig. 2.

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CURRENT SHUT-OFF MECHANISM

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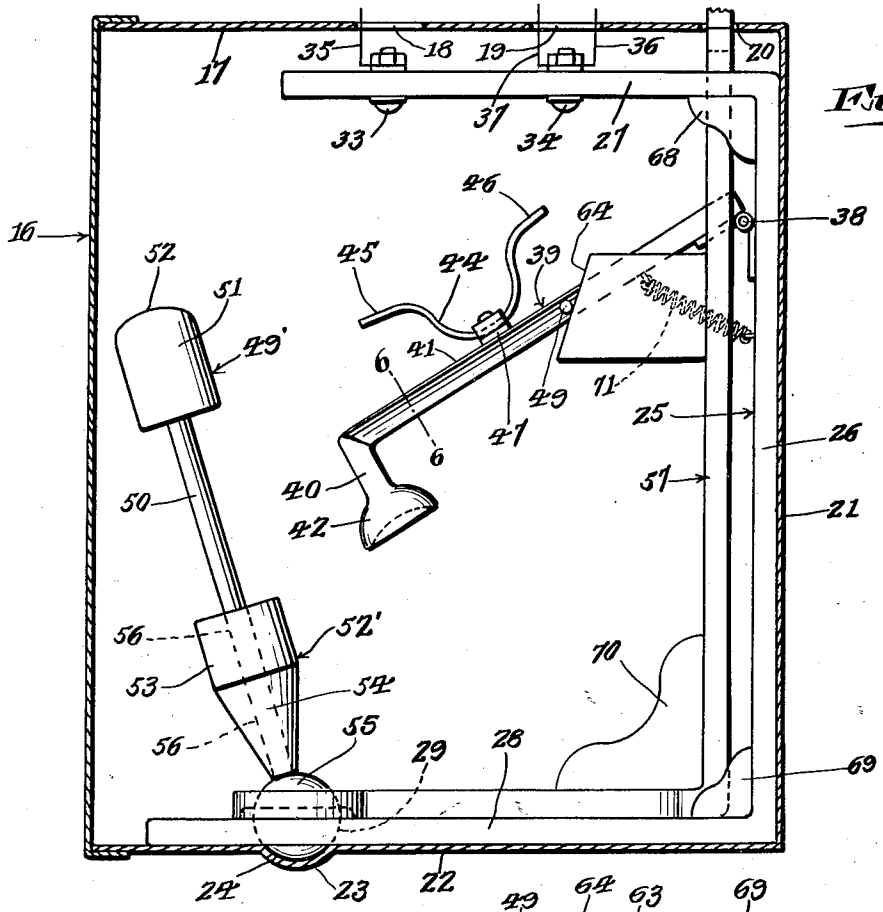


Fig. 3.

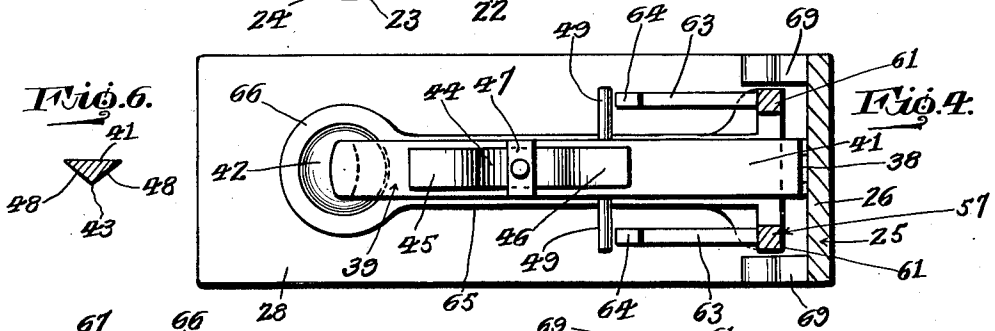


Fig. 4.

Fig. 6.

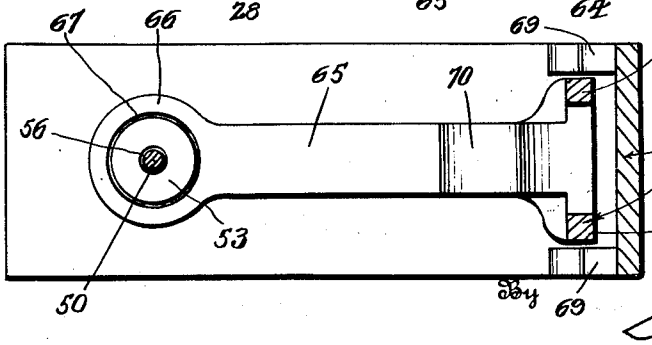


Fig. 5.

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UNITED STATES PATENT OFFICE

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CURRENT SHUT-OFF MECHANISM

Application filed January 15, 1932. Serial No. 586,793.

This invention relates to current shut-off mechanism designed primarily for use in connection with automobiles and aeroplanes of that type including an ignition system for motors of the internal combustion type, but it is to be understood that a mechanism in accordance with this invention may be employed in any connection for which it is found applicable, and the invention has for its object to automatically and instantly shut-off all current, when the vehicle collides with or is struck by an external obstruction thereby discontinuing the operation of the motor and preventing the ignition of the motor fuel to reduce to a minimum the possibility of a conflagration.

Further objects of the invention are to provide a mechanism of the class referred to for the purpose set forth which is compartively simple in its construction and arrangement, strong, durable, compact, thoroughly efficient in its use, automatic and expeditious in its action to open the ignition circuit, readily installed with respect to the vehicle, and comparatively inexpensive to manufacture.

To the above ends essentially and others which may hereinafter appear, the invention consists of such parts and such combination of parts which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is a side elevation of a shut-off mechanism in accordance with this invention, the mechanism being illustrated as releasably latched in circuit closing position.

Figure 2 is a section on line 2—2 Figure 1.

Figure 3 is a fragmentary view in side elevation of the mechanism in current shut-off position.

Figure 4 is a section on line 4—4 Figure 1.

Figure 5 is a section on line 5—5 Figure 1.

Figure 6 is a section on line 6—6 Figure 2.

The floor board of a vehicle is indicated at 1 and formed with an opening 2. Mounted on the board 1 is a latching device functioning for resetting the mechanism in circuit closing position.

The latching device includes a vertically disposed resilient latch 3 having its upper portion enlarged, as at 4 to provide a shoulder 5 intermediate the top and bottom of latch 3, and the latter has a right angularly disposed flange 6 at its bottom which is fixedly secured to board 1. The rear face of portion 4 is curved as at 7. Secured upon board 1 and spaced from latch 3 is a vertical support 8 carrying a rock shaft 9 to which is secured a lever 10 extending towards latch 3. To the shaft 9 is also secured an upstanding forwardly inclined crank arm 11 formed at its upper end with a slot 12 extending lengthwise thereof. The lever 10 is of a length to extend below shoulder 5, and the latter normally maintains the lever in parallel spaced relation with respect to board 1 and with arm 11 elevated. Secured upon lever 10, in proximity to its rear end 13 is a foot tread 14. The spacing of the rear end of tread 14 from the rear end 13 of lever 10 provides a ledge 15 which coacts with shoulder 5 to normally maintain the mechanism in the position shown in Figure 1, which is circuit closing position.

Arranged below the board 1 is a casing 16 constructed in a manner whereby access can be readily had thereto, when occasion requires. The top 17 of casing 16 is formed with openings 18, 19 and a slot 20, the latter being arranged in proximity to the forward wall 21 of casing 16. The bottom 22 of casing 16 is depressed, as at 23 to provide a concave recess 24 which opens into the casing.

Fixedly secured upon the upper face of bottom 22 and to the rear face of forward wall 21, as well as being spaced from top 17 is a stationary support 25 formed of a vertical arm 26, an upper arm 27 extending rear-

wardly at right angles to the upper end of arm 26 and a lower arm 28, of greater length than arm 27 and extending rearwardly at right angles to the lower end of arm 26. The arm 28 in proximity to its rear end is provided with an opening 29 having a curved wall forming an upward curved continuation of the wall of recess 24. Integral with the upper face of arm 28 is a collar 30 having a curved inner edge forming an upwardly curved continuation of the wall of opening 29. The recess 24, wall of opening 29 and inner edge of collar 30 provides a socket of a contour greater than half a sphere. Secured to the arm 27 and suitably insulated therefrom are spaced binding posts 31, 32 having their lower ends provided with contacts 33, 34 respectively. Leading from post 31 is a ground connection 35. Leading to post 32 is the ground connection 36 from the battery, as well as the ground connection 37 from the magneto or generator.

Hinged, as at 38 to the arm 26 of support 25, between its transverse median and its upper end is a hinged circuit controlling device 39 formed of a bar having a pair of portions 40, 41, the former being of less length, depending from and disposed at right angles to the latter. The portion 40 has its lower part 42 in the form of an inverted cup. The portion 41 is of triangular cross section to form its lower face with a knife edge 43. Secured upon the upper face of portion 41, disposed lengthwise with respect to and extending upwardly from the latter is a resilient U-shaped conductor member 44 having the upper ends of the sides thereof formed with oppositely disposed projections 45, 46 for coacting with the contacts 33, 34 respectively for closing the ignition circuit. The member 44 is insulated from portion 41. The holdfast means for securing member 44 to portion 41 is indicated at 47. Extending laterally from each side 48 of portion 41 is a pin 49. The purpose of the pins 49 will be presently referred to.

A tiltable counter-balanced holder element 49′ is employed for normally supporting the device 39, at right angles to arm 26 for maintaining conductor member 44 in engagement with contacts 33, 34 for closing the ignition circuit. The element 49′ includes a shank 50 formed at its upper end integral concentrically with the bottom of a weight 51 having a convex top 52 for extension into the cup-shaped part 42 to maintain the device 39 in normal position, as shown in Figure 1. The element 49′ also includes a base 52′ formed of a globular bottom part 53, a tapered intermediate part 54 and an upper part 55 of circular cross section. The shank 50 extends into the base to the bottom part 53 of the latter. The part 53 is positioned in cavity 24, opening 29 and collar 30. The socket formed by cavity 24, opening 29 and collar 30 coacts with the globular bottom part 53 to provide a universal joint connection between element 49′ and arm 28 of support 25. The parts 54 and 55 of the base 52 have aligning bores 56 to receive shank 50. That end of smallest diameter of the part 54 is integral with part 53.

The mechanism includes a vertically movable, gravity lowering combined retainer and shifter element 57 functioning to reset the holder element in a perpendicular position for supporting the circuit controlling device in its normal position and simultaneously with resetting the holder element shifts the circuit controlling device to a position to enable the latter to be supported by the holder element. The element 57 is capable of being shifted to and held in an elevated position by the latching device, and when in such position retains the element 49′ perpendicular.

The element 57 includes a vertically disposed rectangular frame 58 formed centrally of its top with an upstanding arm 59 provided with a lateral pin 60 which is slidably mounted in slot 12 of arm 11 whereby the latter is connected to arm 59. The frame 58 extends through slot 2. The side bars 61 of frame 58 pass through openings 62 formed in arm 27 and are arranged at the sides of the portion 41 of device 39. Projecting from the side bars 61 are cam-pieces 63 having inclined end edges 64 which ride against pins 49 for the purpose of elevating device 39 to its normal position. Formed integrally with the lower end of frame 58 and disposed at right angles thereto is a retainer arm 65 having an enlarged circular portion 66 at its free end which encompasses element 49′. The portion 66 has a circular opening 67 of a diameter greater than collar 30 and of a diameter slightly greater than the top of base 52′ of element 49′, the latter extends through opening 67. The arm 65, when element 57 is elevated, moves element 49′ to a perpendicular position to support device 39 in circuit closing position. Guides 68 and 69 are integral with support 25 for element 57. A reinforcing web 70 is provided for element 57. The guides 68 and 69 also reinforce support 25. The casing 16 is secured in position by any suitable means. The knife edge 43 on portion 41 of device 39 functions to prevent the retarding of element 49′ when the latter is shifted from normal in a direction under portion 41 due to the fact that the upper end of weight 51 of element 49′ is of convex curvature and will readily shift away from edge 43.

The universal joint connection between element 49′ and arm 28 of support 25 permits element 49′ to rotate around the edge of the socket in which bottom part 53 of base 52′ is arranged. The element 49′ can move to the right, left, forward or backward when it is

released, due to its counter-balance, which is the weight 51.

The circuit closing device includes a controlling spring 71 of the pulling type. The spring 71 is disposed at an inclination and has one end attached to the lower face of portion 41 of the bar of the circuit controlling device and its other end attached to part 26 of support 25. The function of spring 71 is to maintain the conductor member 44 clear of contacts 33, 34 when the circuit closing device is not supported in circuit closing position by the holder element.

Under normal conditions elements 39 and 49′ are in the position shown in Figure 1 and element 57 in the position shown in Figure 3. In Figure 1 element 57 has been shifted to resetting position with respect to elements 39 and 57. The weight of element 49′ coacts with the cup 42 of element 39 for the purpose of releasably maintaining element 49′ in a perpendicular position and with spring 71 assisting in such function.

When the elements 39 and 49′ are in the position as shown in Figure 1 and the element 57 in the position shown in Figure 3 and a jolt is received, the inertia throws the weight 51 clear of the cup 42 and spring 71 acting upon portion 41 will shift the circuit controlling device clear of the contacts 33 and 34 shutting off the current. The normal position of the element 57 is as shown in Figure 3. Now it will be assumed that the position of elements 39 and 49′ are as shown in Figure 3 and when pressure is applied to lever 10, element 57 will then be elevated and arm 65 thereof will cause element 49′ to assume a perpendicular position and the cams cause element 39 to assume the position shown in Figure 1, against the action of its controlling spring 71. The element 57 when it is elevated resets the elements 39 and 49′ to the position shown in Figure 1 whereby the device 39 will close the circuit. After the elements 39 and 49′ have been reset for the purpose of closing the circuit, the element 57 is released so it will assume its lowered position as shown in Figure 3.

What I claim is:

1. A current shut-off mechanism for motor driven vehicles comprising a vertically movable combined retainer and shifter element, a tiltable, counter-balanced, universally shiftable holder element normally sustained in a perpendicular position, a pair of spaced contacts for interposition in the ignition circuit of the vehicle, and a spring controlled hinged circuit controlling device normally engaging with said contacts for closing such circuit, said holder element and device having coacting means for releasably sustaining the former in a perpendicular position and the latter in circuit closing position until the vehicle is jolted, and said retainer and shifting element having means for restoring said other elements to sustaining position.

2. A current shut-off mechanism for motor driven vehicles comprising a vertically movable combined retainer and shifter element, a tiltable, counter-balanced, universally shiftable holder element normally sustained in a perpendicular position, a pair of spaced contacts for interposition in the ignition circuit of the vehicle, and a spring controlled hinged circuit controlling device normally engaging with said contacts for closing such circuit, said holder element and device having coacting means for releasably sustaining the former in a perpendicular position and the latter in circuit closing position until the vehicle receives a jolt, means for elevating said combined retainer and shifter element, said device and combined retainer and shifter element having coacting means for restoring said device to normal position when such element is elevated, and said holder element and combined retainer and shifter element having coacting means for shifting the holder element to perpendicular position when the combined retainer and holder element is elevated.

3. A current shut-off mechanism for motor driven vehicles comprising a normally lowered, vertically movable combined retainer and shifter element, a tiltable counter-balanced, universally shiftable holder element normally sustained in a perpendicular position, a pair of spaced contacts for interposition in the ignition circuit of the vehicle, a spring controlled, hinged circuit controlling device normally engaging with said contacts for closing such circuit, said holder element and device having coacting means for releasably sustaining the former perpendicular and the latter in circuit closing position until the vehicle receives a sudden jolt, and said holder element and said device having means engageable by said combined retainer and shifter element for restoring said holder element and device to sustained position when the retainer and shifter element is elevated.

4. A current shut-off mechanism for motor driven vehicles comprising a normally lowered vertically movable combined retainer and shifter element, a tiltable, counter-balanced, universally shiftable holder element normally sustained in a perpendicular position, a pair of spaced contacts for interposition in the ignition circuit of the vehicle, a spring controlled, hinged circuit controlling device normally engaging with said contacts for closing such circuit, said holder element and device having coacting means for releasably sustaining the former in a perpendicular position and the latter in circuit closing position until the vehicle receives a sudden jolt, said holder element having a convex top, and said device having a knife edge on its lower face to prevent said device from re-

tarding movement of the holder element when the latter is shifting from normal.

5. A current shut-off mechanism for motor driven vehicles comprising a normally lowered vertically movable combined retainer and shifter element, a tiltable, counter-balanced, universally shiftable holder element normally sustained in a perpendicular position, a pair of spaced contacts for interposition in the ignition circuit of the vehicle, a spring controlled, hinged circuit controlling device normally engaging with said contacts for closing such circuit, said holder element and device having coacting means for releasably sustaining the former in a perpendicular position and the latter in circuit closing position until the vehicle receives a sudden jolt, said holder element having a convex top, said device having a knife edge on its lower face to prevent said device from retarding movement of the holder element when the latter is shifting from normal, said device and combined retainer and shifter element having coacting means for restoring said device to normal position when such element is elevated, said holder element and combined retainer and shifter element having coacting means for shifting the holder element to perpendicular position when the combined retainer and holder element is elevated, said holder element having a convex top, and said device having a knife edge on its lower face to prevent said device from retarding the movement of the holder element when the latter is shifting from normal.

6. A current shut-off mechanism for motor driven vehicles comprising a normally lowered vertically movable combined retainer and shifter element, a tiltable, counter-balanced, universally shiftable holder element normally sustained in a perpendicular position, a pair of spaced contacts for interposition in the ignition circuit of the vehicle, a spring controlled, hinged circuit controlling device normally engaging with said contacts for closing such circuit, said holder element and device having coacting means for releasably sustaining the former in a perpendicular position and the latter in circuit closing position until the vehicle receives a sudden jolt, said holder element having a convex top, said device having a knife edge on its lower face to prevent said device from retarding movement of the holder element when the latter is shifting from normal, said holder element and said device having means engageable by said combined retainer and shifter element for restoring said holder element and device to normal position when the retainer and shifter element is elevated, said holder element having a convex top, and said device having a knife edge on its lower face to prevent said device from retarding the movement of the holder element when the latter is shifting from normal.

7. A current shut-off mechanism for motor driven vehicles comprising a normally lowered vertically movable combined retainer and shifter element, a tiltable counter-balanced, universally shiftable holder element normally sustained in a perpendicular position, a pair of spaced contacts for interposition in the ignition circuit of the vehicle, a spring controlled, hinged circuit controlling device normally engaging with said contacts for closing such circuit, said holder element and device having coacting means for releasably sustaining the former in a perpendicular position and the latter in circuit closing position until the vehicle receives a sudden jolt, a fixed support to which is hinged said device, and said support and holder element having coacting means to provide a universal joint connection between said element and support.

8. A current shut-off mechanism for motor driven vehicles comprising a normally lowered vertically movable combined retainer and shifter element, a tiltable counter-balanced, universally shiftable holder element normally sustained in a perpendicular position, a pair of spaced contacts for interposition in the ignition circuit of the vehicle, a spring controlled, hinged circuit controlling device normally engaging with said contacts for closing such circuit, said holder element and device having coacting means for releasably sustaining the former in a perpendicular position and the latter in circuit closing position until the vehicle receives a sudden jolt, a fixed support to which is hinged said device, said support and holder element having coacting means to provide a universal joint connection between said element and support, said holder element and said device having means engageable by said combined retainer and shifter element for restoring said holder element and device to normal position when the retainer and shifter element is elevated, a fixed support to which is hinged said device, and said support and holder element having coacting means to provide a universal joint connection between said element and support.

9. A current shut-off mechanism for motor driven vehicles comprising a normally lowered vertically movable combined retainer and shifter element, a tiltable counter-balanced, universally shiftable holder element normally sustained in a perpendicular position, a pair of spaced contacts for interposition in the ignition circuit of the vehicle, a spring controlled, hinged circuit controlling device normally engaging with said contacts for closing such circuit, said holder element and device having coacting means for releasably sustaining the former in a perpendicular position and the latter in circuit closing position until the vehicle receives a sudden jolt, a fixed support to which is hinged

said device, said support and holder element having coacting means to provide a universal joint connection between said element and support, a fixed support to which is hinged said device, said support and holder element having coacting means to provide a universal joint connection between said element and support, and guiding means on said support for said combined retainer and shifter element.

In testimony whereof, I affix my signature hereto.

THOMAS M. PAUL.