June 6, 1961 H. DE ARMOND ET AL 2,986,953

FOOT PEDAL

Filed Sept. 29, 1958 2 Sheets-Sheet 1

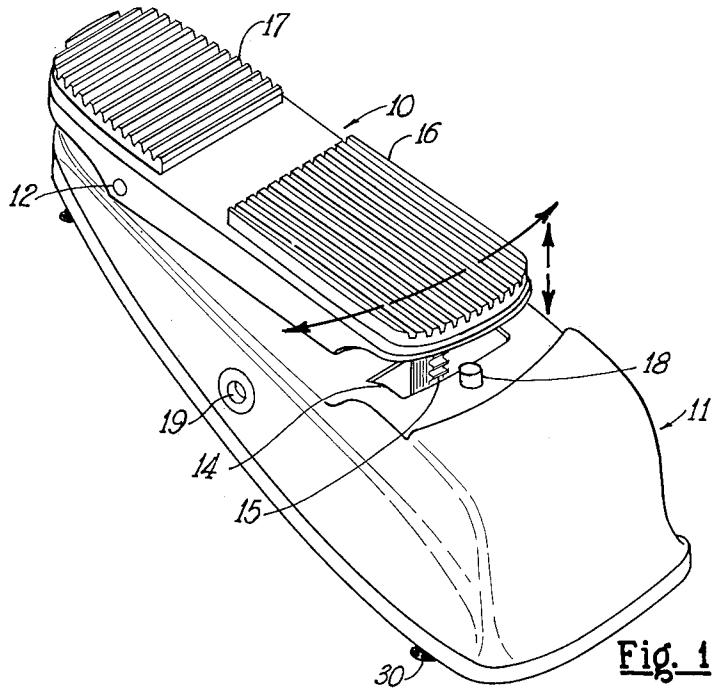

Fig. 1

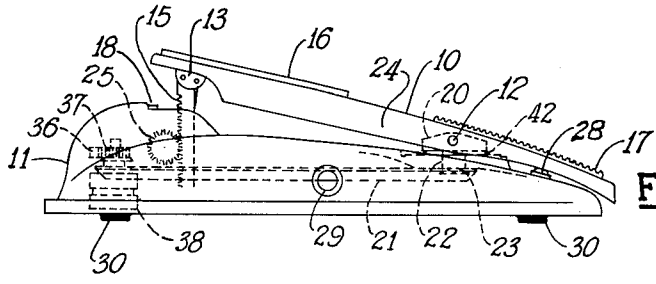

Fig. 2

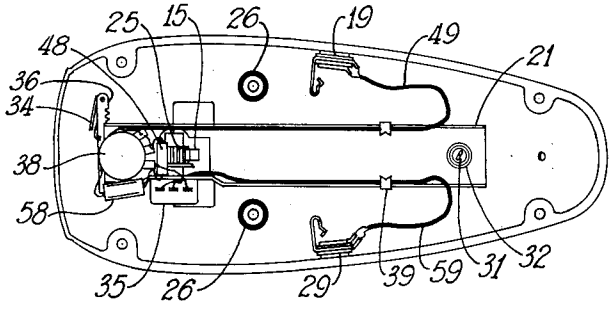

Fig. 3

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Filed Sept. 29, 1958 2 Sheets-Sheet 2

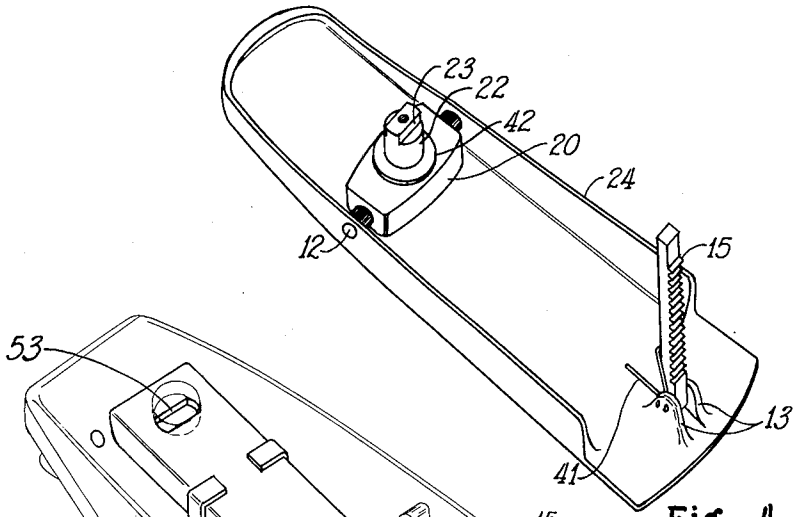

Fig. 4

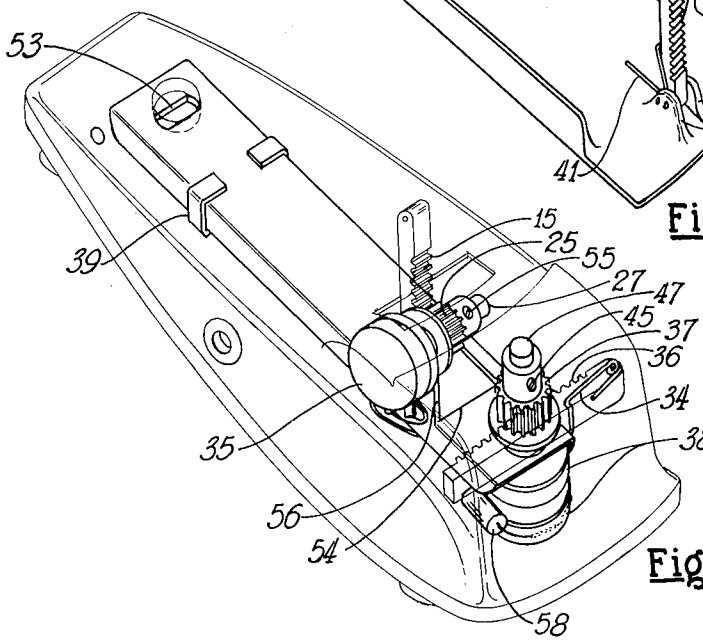

Fig. 5

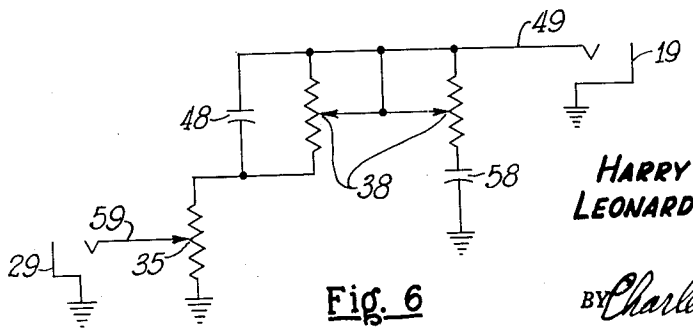

Fig. 6

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2,986,953

FOOT PEDAL

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Filed Sept. 29, 1958, Ser. No. 763,978
8 Claims. (Cl. 74—478)

This invention is related to a dual operational foot pedal adaptable to adjustment and regulation of control components, and more particularly to a dual directional pedal assembly adapted to foot regulation of control elements such as volume and tone controls in amplifiers for musical instruments.

The close regulation of volume and tone of the output of musical instruments such as electrical guitars and the like, play an important part in the presentation of musical compositions, particularly in permitting broader individualistic interpretation of compositions. Since the musician's hands are constantly occupied during playing such stringed instruments, modulation of volume and tone of the instruments have been resorted to by way of foot controls in order to permit greater breadth and depth of interpretation than has been previously possible. Foot control of such factors in music requires an exacting foot pedal having a sensitiveness of response and free of blacklash to assure that the musician's rendition can be reproduced at all times under positive control.

A broad object of the invention is to provide a two-directional foolproof control assembly adaptable to separate or cooperative dual adjustment of multiple control elements subject to manipulation by a single part of an operator's body.

Another object of the invention is to provide a dual-directional multiple control assembly for separate control components, so that by use of a single actuating means, multiple control functions can be separately regulated.

A further object of the invention is to provide a dual-directional pedal assembly associated with at least a pair of function-adjusting components responsive independently to either vertical or lateral movements of the pedal respectively.

Another and more specific object of the invention is to provide a dual-directional foot-pedal assembly adapted to positive non-slip connection and single foot actuation of two separate controls operable independently by vertical or lateral movement of the pedal respectively.

A dual function control assembly constructed according to the principles of the present invention, in brief, comprises a longitudinal treadle or foot pedal pivotally mounted on a support plate arranged for a swivel motion about an axis generally perpendicular to the pedal pivot axis. More specifically the treadle or pedal is mounted on a support member on which it is pivotally secured to permit up and down motion of its forward portion about a transverse pivot axis. The pedal support member has a generally vertical pivot axis about which it can be rotated to permit lateral movement of the pedal which it supports. Thus, the pedal can be moved up and down about the transverse axis as well as laterally about the axis for the support plate on which it is mounted. The pedal and its support member are both mounted on a housing which contains components to be adjusted by manipulation of the foot pedal. A longitudinal arm on the interior of the housing is connected directly to the pivot shaft for the pedal support member and is made to be moveable about the pivot axis for the mounting member subject to lateral movement of the pedal. This arm carries the control components to be adjusted, one being adjustable by vertical movement

of the pedal while the other is adjustable by lateral movement of the pedal.

A feature of the invention lies in the provision of a dual-directional pedal assembly adaptable to positive non-slip connection to a plurality of control components, each independently responsive to a different movement of the pedal.

Another feature of the invention is the simplicity of the pedal construction and the adaptability of the construction to rugged handling, economic production, and relatively trouble-free operation.

Although the new foot pedal is disclosed herein in relation to use for dual actuation and adjustment of electrical control components, such as potentiometers and resistors and amplifier circuits for electrical guitars and the like, it will be apparent to those familiar with the control arts that the pedal has much broader application and is adaptable to actuation and adjustment of pneumatic, electrostatic, magnetic, hydraulic, mechanical, and like control components for numerous other systems into which it might be incorporated.

Other objects and features which we believe to be characteristic of our invention are set forth with particularity in the appended claims. Our invention, however, both in organization and manner of construction, together with further objects and advantages thereof may be best understood by reference to the following description taken in connection with the accompanying drawings in which:

FIGURE 1 shows a perspective view of a pedal incorporating the features of the present invention illustrating by arrows the vertical and lateral directions in which the pedal may be manipulated;

FIGURE 2 is a side elevational view of the pedal of FIGURE 1 showing in dotted lines the operative association of the pivot support member and the internal parts which effect direct adjustment of the contained control components responsive to selective directional movement of the pedal;

FIGURE 3 is a bottom plan view of the foot pedal assembly showing the general arrangement of parts contained on the interior of the housing;

FIGURE 4 is an underneath view of the treadle showing more clearly the pivotal support member on which the treadle is pivotally mounted;

FIGURE 5 is a phantom view of the pedal housing showing the arrangement of control components therein and their manner of connection to actuating members which respond to movement of the pedal; and

FIGURE 6 is a schematic drawing of the electrical circuitry associated with the specific control components selected to exemplify the principles of the present invention.

Referring to the drawings in greater detail, FIGURE 1 shows a foot treadle **10** mounted on a housing **11** arranged to accommodate control components on the interior thereof actuable by vertical operation of the treadle as illustrated by the vertical double-headed arrow as well as by the lateral movement illustrated by the transversely extending double headed arrow.

The pedal assembly as herein described as portable in nature to permit ready conveyance from location to location, but although so illustrated herein, it will be understood that the principles of the invention are also adapted to provision of a foot pedal assembly permanently installed and operable in a fixed location.

The treadle has integrally associated therewith a rearwardly located heel tread **17** and a forwardly located sole tread **16**. The treadle is pivotably mounted on a generally horizontal pivot rod or pin **12** located forward of its rear portion to permit both heel and toe manipulation

of the treadle about the pivot 12 for more exacting adjustment of control components.

A slot-type elongated aperture extending cross-wise of the housing 11 is provided underneath the forward portion of the treadle 10 to permit passage of the control actuating member to the interior of the housing from a point of connection underneath the treadle 10. The actuating member extending from the treadle in the present instance is a toothed rack member 15 arranged to engage a pinion on the interior of the housing. The slot 14 is longitudinal in a direction transverse of the rack member to permit accommodation of the lateral movement of the rack 15 upon corresponding lateral movement of the forward portion of the treadle 10.

A forward treadle-stop 18 is located in a fixed position on the housing 11 just underneath the forward portion of the treadle 10 and is arranged to stop the vertical movement of the treadle in a forward downward direction while a back stop 28 under the rear portion of the treadle stops downward movement of the back end of the treadle. Both stops are made of a material which will withstand frictional engagement with the metal underportion of the treadle 10 when it is laterally moved against either of the stop positions. Materials found to serve successfully for such purposes are resins such as polyamides or tetrafluoroethylene which have a resiliency as well as a high impact strength, and resistance to abrasion.

The housing 11 is mounted on pads of high friction material such as rubber or neoprene fixed directly to the underside of the housing by screws threadably secured to the underpart of the housing. The high friction character of the pads allows the housing to be put in a given position and to be operated without fear of slippage during manipulation of the pedal 10 even on highly polished floors.

An aperture is provided on each side of the housing 11 to accommodate a plug-in phone-type jack connection with the electrical components on the interior of the housing 11. In this respect, one such aperture is shown in FIGURE 1 for accommodation of a plug which engages a jack 19 on the interior of the housing, while the other jack on the opposite side of the housing as illustrated in FIGURES 2 and 3, is designated by a reference numeral 29.

FIGURES 2 and 3 illustrate more clearly the internal arrangement of components and actuating elements connected to the pedal 10 for adjustment of the control components. In FIGURE 2, the pivotal support member or plate 20 for the treadle is illustrated in dotted lines and is shown in its pivotally mounted position on a vertical axis with the vertical pivot shaft 22 mounted in the housing 11. The housing 11 is provided with a journaled or bearing-type aperture for accommodation of the vertical pivot shaft 22 to permit rotational movement of the support plate 20 on the housing 11. The support plate 20 and the vertical pivot shaft 22 are more clearly shown in FIGURE 4. The treadle 10 is pivotally secured to the support plate 20 by the pivot pin 12 which extends through the support plate 20 and engages the treadle at a pair of opposed flanges 24 projecting downwardly from its lateral edges. The flanges 24 are of sufficient dimension to both accommodate the pivot pin 12 as well as to hide the support plate 20 from general view.

The lower end of the pivot shaft 22 has a longitudinal member or arm 21 secured thereto in locked relation so that upon rotation of the pedal 10 and the support plate 20 the arm 21 will also rotate laterally therewith. The locked relationship between the arm 21 and the shaft 22 is accomplished by provision of a locking embossment 23 which comprises an embossed generally rectangular projection from the shaft 22 which engages a correspondingly shaped rectangular slot 53 in the arm. The slot 53 may be seen more clearly in FIGURE 5. The arm 21 is thus engaged by the shaft 22 in locked relation by the embossment 23 and is held in positively secured relationship by a screw 31 which makes threadable engagement with the embossment 23 with a washer 32 interposed therebetween. A bearing-type washer 42 of material such as nylon is interposed between the bottom of the support plate 20 and the top of the housing 11, and a similar bearing-type washer of material such as nylon is provided in an interposed position between the top of the arm 21 and the underside of the housing 11 in the region where the pivot shaft 22 passes through the housing so that upon rotation of the treadle due to lateral movement of its forward portion, that the arm 21 and treadle rotate together smoothly about the axis provided by the shaft 22.

The arm 21 extends in cantilever fashion to the forward part of the housing 11 under the forward portion of the treadle 10. The two sets of control components to be adjusted by the vertical and lateral movement of the treadle 10 are mounted in the region of the arm located under the front part of the treadle. The toothed rack shown in FIGURE 1 extending through the slot aperture 14 extends from between a pair of spaced mounting tongues 13 located on the underside of the forward portion of the pedal 10. The rack is pivotally secured to the tongues 13 and biased by a spring 41 so that the rack is urged forwardly into engagement with a pinion 25 located in the housing interior. FIGURE 4 illustrates most clearly the manner in which the rack 15 is biased by the spring 41.

FIGURE 5 illustrates the manner in which the toothed rack 15 makes engagement with the pinion 25 and the manner of its securement of the pinion to a rotatable shaft 27 by a lock-screw 55. The shaft 27 is the adjustment member for a volume control potentiometer 35 mounted on a support projection 56 at an upper edge of the laterally pivotal arm 21. An aperture 54 of rectangular shape is provided in the arm 21 just adjacent the support projection 56 so that the spring biased pivotal rack 15 can extend therethrough from the top of the housing below the region of its engagement with the pinion 25. As may be seen by reference to FIGURES 1 and 2, the spring biased rack 15 extends from the tongue projections 13 on the underside of the forward portion of the treadle 10 down through the slot-shaped aperture 14 in the housing 11 to make engagement with the pinion 25 and then extends downward further through the aperture 54 in the arm 21. Thus, upon vertical movement of the forward portion of the treadle 10 about its pivot on the support plate 20, the volume control shaft 27 is rotated to adjust the potentiometer 35. The biasing action provided by the spring 41 assures engagement of the rack 15 with the pinion 25, regardless of the somewhat arcuate movement of the point of connection of the rack with respect to the treadle 10.

FIGURE 5 further illustrates the manner in which the second set of controls comprising a pair of tone control potentiometers 38 are arranged to be adjustable by lateral movement of the treadle 10 on the housing 11. As explained above, the lateral movement of the treadle causes a corresponding lateral movement of the arm 21 on the interior of the housing 11, which arm movement is utilized for the adjustment of the second set of control components. The pair of potentiometer components 38 are mounted in tandem on the forward portion of the arm 21 with a common shaft 47 actuating both components. The resistance portions of the components are mounted on the underside of the arm 21, and the common shaft 47 therefore extends through an aperture in the arm for engagement by a pinion 37 which is locked to the shaft by a locking screw 45. The pinion 37 thus located on the upper side of the arm 21 is engaged by a toothed rack 36 pivotally secured in a fixed side position on the interior of the housing 11.

The rack 15 is biased against the pinion 37 by a spring 34 which is bent around the pivot pin which secures the rack to the side of the housing 11. In being biased against

the pinion **37**, the rack causes rotation of the pinion **37** when the arm **21** is moved laterally responsive to lateral movement of the pedal **10**. That is, the rack **36** in being relatively fixed in position is effective to rotate the pinion as the pinion is swept across the teeth of the rack subject to lateral movement of the arm **21**. The pivotal relationship of the rack **36** in the housing **11** assures its positive engagement with the pinion regardless of the slightly arcuate movement of the pinion **37** as it sweeps across the rack **36** about the axis provided by the pivot shaft **22** of the support plate **20**.

Lateral movement of the arm **21** about the pivot shaft **22** is limited by a pair of limit stops or bumpers **26** secured to the interior of the housing **11** on each side of the arm **21**. The bumpers **26** are formed of a pair of resilient members of annular shape secured by screws to projections on the underside of the top of the housing **11**. They are located a sufficient distance apart to allow free movement of the arm **21** within the range of adjustment of the control components **38**, but resiliently halt movement of the arm **21** without jarring the control components on the arm **21** when the lateral limits of movement are reached.

To provide more solid positioning of the arm **21** within the housing interior, a support bar (not shown) can be installed between the bumpers **26** at a level such that the arm rests in slidable relation thereon. A button-like projection of material such as nylon on the top side of the arm will permit the arm to slide over such a bar with a minimum of friction while providing support against vertical misalignment.

FIGURE 6 illustrates schematically the electrical circuitry associated with the volume and tone control arrangement incorporated in a pedal assembly utilized for electrical guitars. The jack **19** on one side is connected to ground for shielding purposes while the other is connected to a lead wire **49** which in turn is joined in common to both potentiometers of the tone control section of the circuit. A filter condenser **58** also mounted on the arm **21** is connected in series with one of the tone control potentiometers **38** and ground. Another filter condenser **48** for the tone control section of the circuit is connected across the resistance of the other tone control potentiometer **38**. The jack **29** on the opposite side of the housing **11** is also connected on one side to ground for shielding purposes and on the other side to a lead wire **59**. The lead wire **59** is connected with the adjustable arm of the resistance for the volume control **35** which in turn is connected between ground and a point which is common to both the condenser **48** and one of the tone control resistances of the potentiometer components **38**. Thus, the volume is increased or decreased by vertical movement of treadle **10** while tone can be controlled by lateral movement of the treadle; one side for base, the other for treble.

FIGURE 3 illustrates with greater clarity the physical arrangement of the components in the circuit of FIGURE 6 and shows the manner in which the jacks **19** and **29** are connected by lead wires **49** and **59** respectively to the other components of the circuit. The lead wires **49** and **59** are brought from the jacks **19** and **29** respectively to the arm **21** at points near a position where the pivot axis provided by the pivot shaft **22** is located and are then run for the length of the arm **21** to the forward portion of the arm where the adjustable components of the circuit are located. The lead wires **49** and **59** are run to the arm **21** at points near the pivot for the arm **21** so that a minimum of movement of the lead wires is effected during lateral movement of the arm, thereby minimizing the mechanical action on the lead wires when the pedal is manipulated for adjustment of the components. Braided shielded lead wires for the leads **49** and **59** make a common ground for the circuitry of the assembly possible, separate from the housing of the foot pedal, thereby assuring more static-free operation of the circuitry regardless of location of the pedal with regard to external electrical equipment. A pair of metal clips **39** snapped in place at opposite edges of the arm **21**, aid in properly aligning the paths and fastening the lead wires **49** and **59** on the arm **21**.

While the invention has herein been shown in connection with a specific embodiment thereof, it will be apparent that numerous variations or modifications may be made without deviating from the inventive concepts disclosed. For example, although both of the control components incorporated in the housing for the pedal are carried by the laterally pivotal arm, the arrangement may be varied so that the arm carries only one of the components, such as the one actuated by the member extending directly from the pedal, while the other component is fixed to the interior of the housing and actuated by means associated with the lateral movement of the arm itself. Correspondingly, the component actuated by vertical movement of the treadle could be moved up and down concomitantly with the treadle and adjusted by its vertical movement with respect to the arm **21**. In other words, the components can be varied in location and means of actuation, but in all instances are adjustable by relative motion between the arm **21** and the treadle and/or the arm and the surrounding support such as the housing **11**.

Furthermore, although electrical components are shown and described herein as being actuated by the treadle, any number of other types of control components can be similarly controlled or adjusted, including, as indicated above, any one of a number including pneumatic, electrostatic, magnetic, hydraulic, mechanical and like control components. Still further, the two motions of the treadle can be made to actuate control components in two different systems, as well as systems of different types such as pneumatic and electrical systems independent of each other but yet cooperatively associated by way of foot pedal control adjustment. The pivot axis for the treadle can also be repositioned, such as further to the rear, with biasing means provided to return it to a normal position upon release of actuating forces. In view of the foregoing, it is contemplated by the appended claims to cover all such variations and modifications which fall within the true spirit and scope of our invention.

We claim as our invention:

1. A pedal assembly comprising a treadle having a first pivot axis permitting up and down motion of an end thereof, said treadle also having a second pivot axis generally perpendicular to said first pivot axis permitting lateral movement of said end of the treadle, a longitudinal member secured to the under side of said treadle at said second pivot axis moveable laterally with said treadle about said second pivot axis, said member extending from said second pivot axis a distance such that one end is located generally under said treadle end, an adjustable control component on said longitudinal member, means connecting said component to said treadle end making said component adjustable subject to vertical motion of said treadle about said first pivot axis.

2. A pedal assembly comprising a housing, a treadle on said housing having a first pivot axis permitting up and down movement of an end thereof, said treadle also having a second pivot axis generally perpendicular to said first pivot axis permitting lateral movement of said end of the treadle, a longitudinal member within said housing secured at one end to the under side of said treadle, the other end of said longitudinal member being moveable laterally about said second pivot axis subject to lateral movement of said end of the treadle, an adjustable control component on said longitudinal member, means associated with said housing making said component adjustable subject to lateral movement of said treadle about said second pivot axis.

3. A pedal assembly comprising a housing, a treadle on said housing having a first pivot axis permitting up and down movement of an end thereof, said treadle also

having a second pivot axis generally perpendicular to said first pivot axis permitting lateral movement of said end of the treadle, a longitudinal member within said housing secured at one end to the under side of said treadle, the other end of said member being moveable laterally about said second pivot axis subject to lateral movement of said end of the treadle, a pair of adjustable control components within said housing, at least one of said components disposed on said member, means connected to said treadle arranged to effect adjustment of one of said components subject to up and down movement of said treadle end, and means associated with said housing arranged to effect adjustment of the other of said components subject to lateral movement of said treadle end.

4. A pedal assembly comprising a longitudinal treadle having a first pivot axis transverse to its length permitting up and down motion of an end thereof, said treadle having a second pivot axis generally perpendicular to said first pivot axis permitting lateral movement of said end of the treadle, a longitudinal member connected at one end to the under side of said treadle and its other end being moveable laterally with said treadle about said second pivot axis subject to lateral movement of said end of the treadle, a first adjustable control component for regulation of a control function in associated means to be controlled supported on said longitudinal member generally below said end of the treadle, means for adjustably actuating said first control component connected to said end of the treadle and responsive to up and down movement of said end of the treadle, a second adjustable control component also supported on said longitudinal member for regulation of another control function in associated means to be controlled, and stationarily positioned means extending into engaging relation with moveable means associated with said second control component for adjustment of said second control component responsive to lateral movement of said end of the treadle.

5. A pedal assembly comprising a longitudinal treadle having a first pivot axis transverse to its length permitting up and down motion of an end thereof, said treadle having a second pivot axis generally perpendicular to said first pivot axis permitting lateral movement of said end of the treadle, a longitudinal member connected at one end to the under side of said treadle and its other end being moveable laterally with said treadle about said second pivot axis subject to lateral movement of said end of the treadle, a first adjustable control component for regulation of a control function supported on said longitudinal member generally below said end of the treadle, means for adjustably actuating said first control component connected to said end of the treadle and responsive to up and down movement of said end of the treadle, a second adjustable control component also supported on said longitudinal member for regulation of another control function, a pinion associated with said second control component for adjustment thereof, and a toothed rack bar positioned stationarily in engaging relation with said pinion and effective to move said pinion for adjustment of said second control component responsive to lateral movement of said end of the treadle.

6. A pedal assembly comprising a longitudinal treadle having a first pivot axis transverse to its length permitting up and down motion of an end thereof, said treadle having a second pivot axis generally perpendicular to said first pivot axis permitting lateral movement of said end of the treadle, a longitudinal member connected at one end to the under side of said treadle and its other end being moveable laterally with said treadle about said second pivot axis subject to lateral movement of said end of the treadle, a first adjustable control component for regulation of a control function supported on said longitudinal member generally below said end of the treadle, a second adjustable control component also supported on said longitudinal member for regulation of another control function, a pair of pinions each associated with a respective one of said control components, a toothed rack bar connected to said treadle engaging the pinion associated with said first adjustable control component and effective to move the pinion so engaged for adjustment of said first control component responsive to up and down movement of said end of the treadle, and a second toothed rack bar stationarily positioned in engaging relation with the pinion associated with said second adjustable control component and effective to move the pinion so engaged for adjustment of said second control component responsive to lateral movement of said end of the treadle.

7. A pedal assembly comprising a housing, a longitudinal treadle, a support member on which said treadle is pivotally mounted for up and down movement of an end thereof, a generally vertical pivot pin journaled for rotation on said housing and extending from the exterior to the interior of the housing, said support member being mounted on said pivot pin on the exterior of said housing thereby to allow lateral movement of said end of the treadle, a longitudinal arm within said housing secured at one end to said pivot pin on the interior of said housing and extending from said pivot pin to a zone where its other end is disposed generally under said end of the treadle, thereby causing said other end of the arm to move in a path about said pivot pin with said pin as an axis when said treadle end is moved laterally about said pivot pin, an adjustable control component on said arm, means connecting said component to said treadle making said component adjustable subject to vertical motion of said treadle end and allowing lateral movement of said component with said arm and connecting means upon lateral movement of said treadle end.

8. A pedal assembly as set forth in claim 7 including a second control component on said arm, and means secured to the interior of said housing connected with said second control component for adjustment thereof responsive to lateral movement of said treadle end.

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