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Pilch

[11] **3,841,172**

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[54] **FOOT PEDAL VALVE CONTROL FOR EARTH-MOVING EQUIPMENT**

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[52] **U.S. Cl.** **74/512**, 74/560

[51] **Int. Cl.** **G05g 1/14**

[58] **Field of Search** 74/560, 512

[56] **References Cited**

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[57] **ABSTRACT**

Foot pedal mechanism for controlling forward and reverse movements of a valve actuator for hydraulic cylinder operated devices or the like, particularly on earth-moving equipment. A vertically disposed, centrally pivoted, rocker plate having an eccentric link connector for attaching a reciprocable valve actuating cable and imparting linear motion thereto upon rotating the rocker at either side of a neutral position thereof, is provided with roller elements at its upper corners. The rollers are mounted for engagement by downwardly directed, spaced, toe portions at the fore end of a foot pedal assembly having a pivotal mounting at the rear heel end of a foot plate for limited horizontal shifting of the fore-end and a vertical movement thereof. The positional relationship of the toe portions and the rollers enables an easily applied foot pressure for a slow, steady control of rocker plate movement and operation of an hydraulic actuating valve, and thus a greater degree of precision in the operation of the moving parts of the device governed thereby. Stop means are also provided to insure a safe neutral condition of the pedal mechanism and include a stop screw adjustment which can be further utilized as a single adjusting element to vary the limits of linear travel of the valve actuator cable as may be desirable.

11 Claims, 9 Drawing Figures

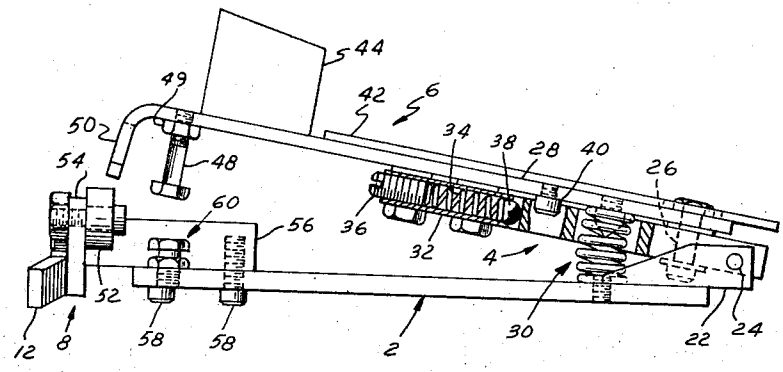


Fig. 1.

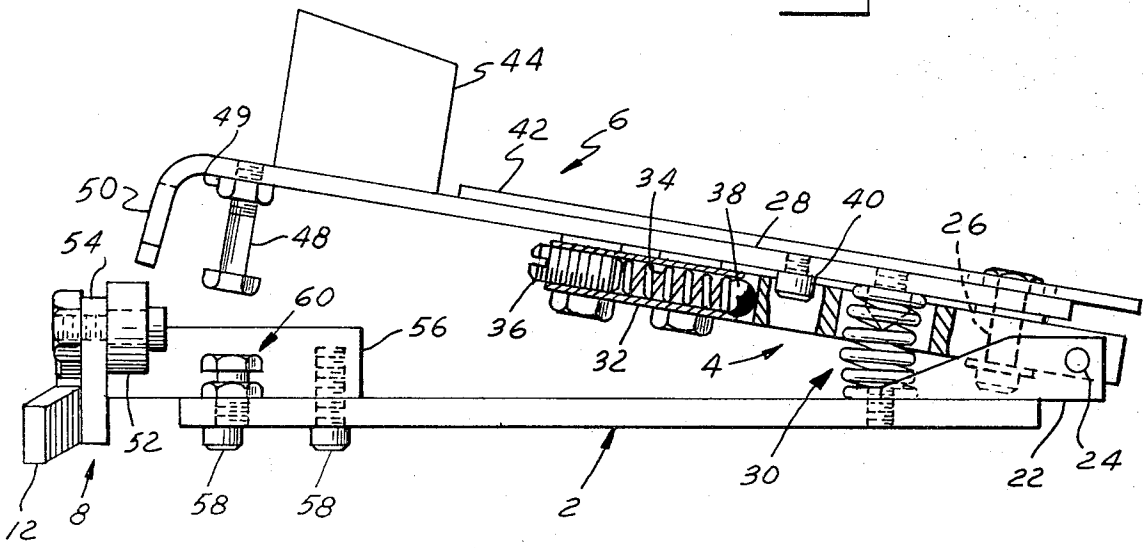


Fig. 2.

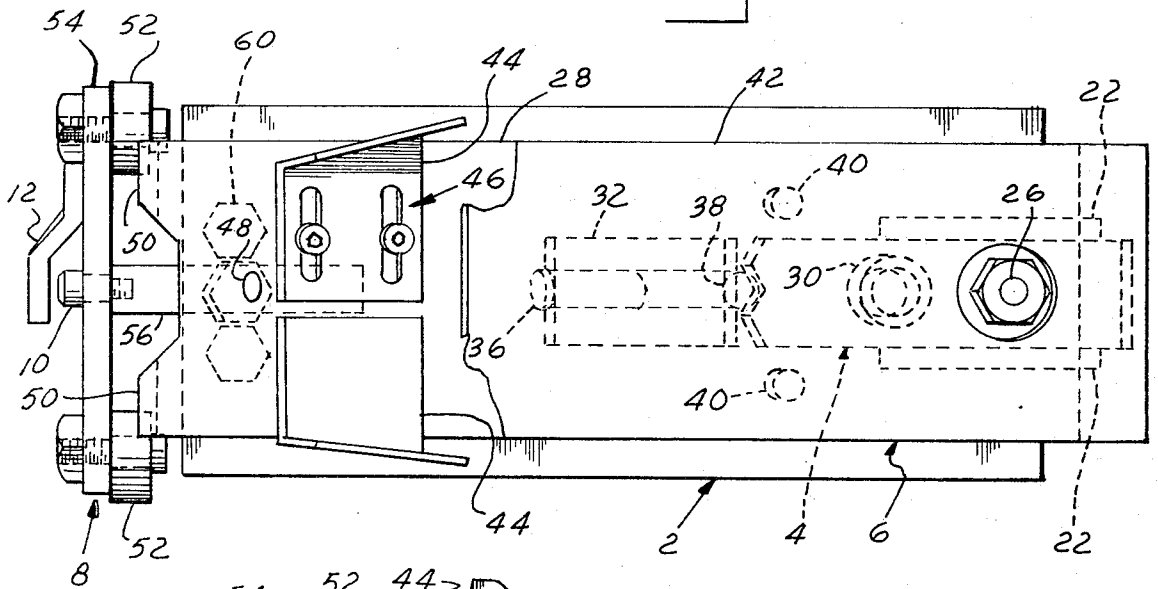


Fig. 9.

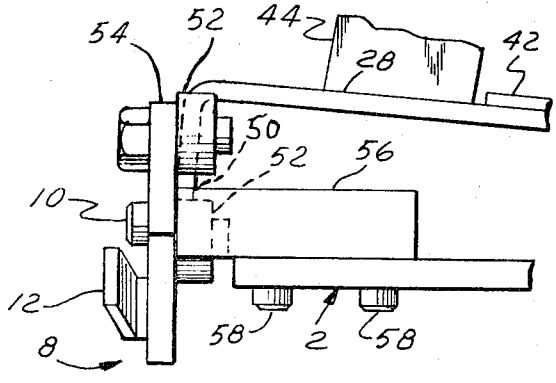


FIG. 3.

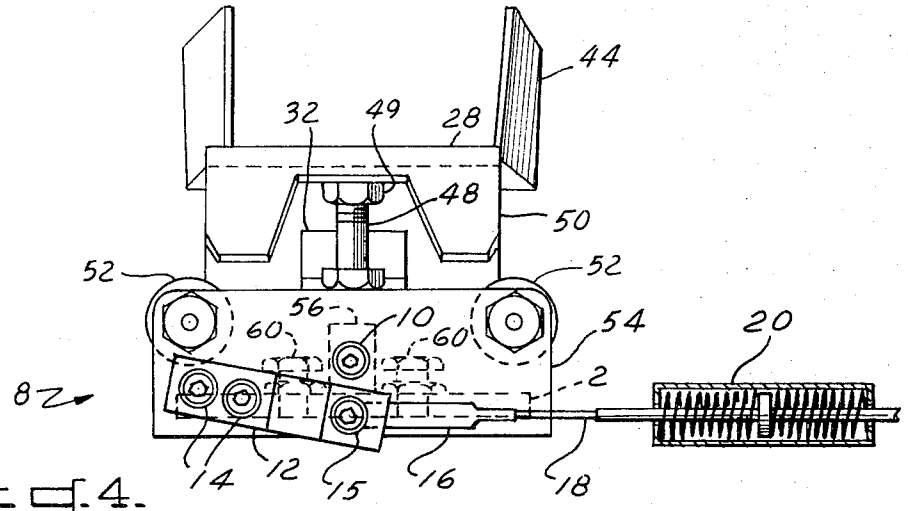


FIG. 4.

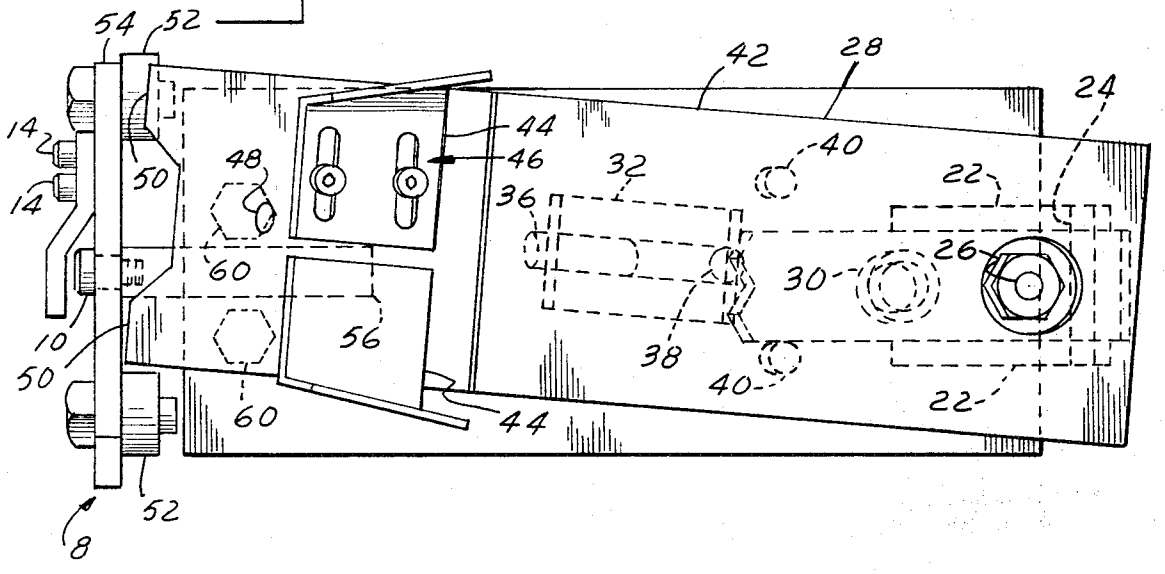


FIG. 5.

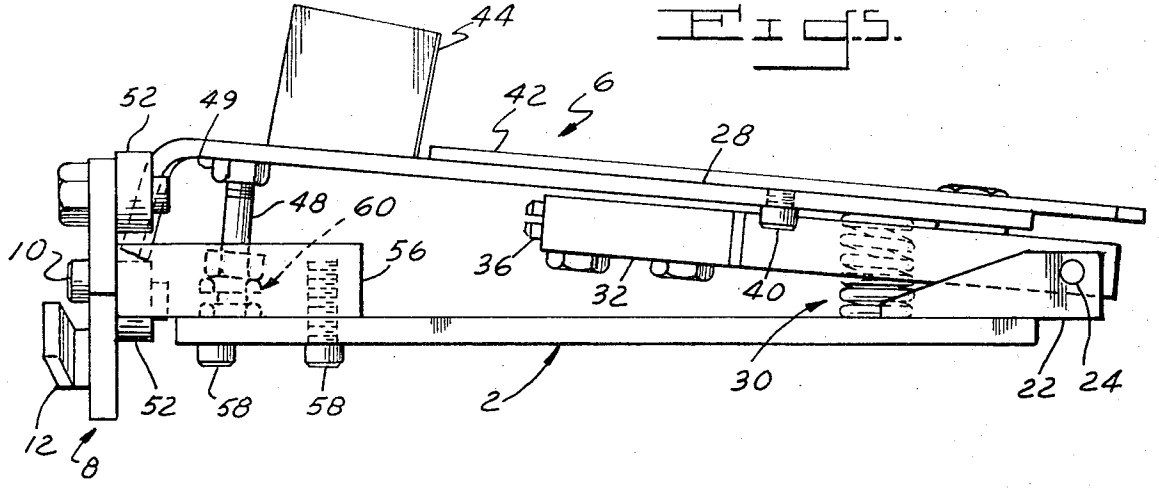


FIG. 6.

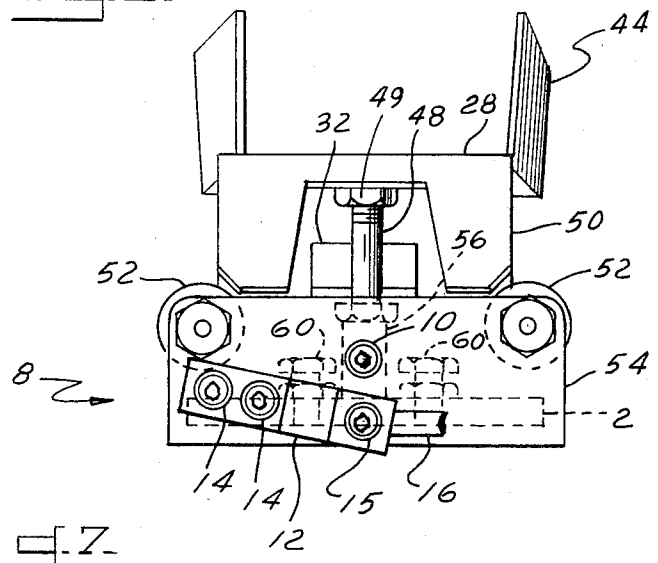


FIG. 7.

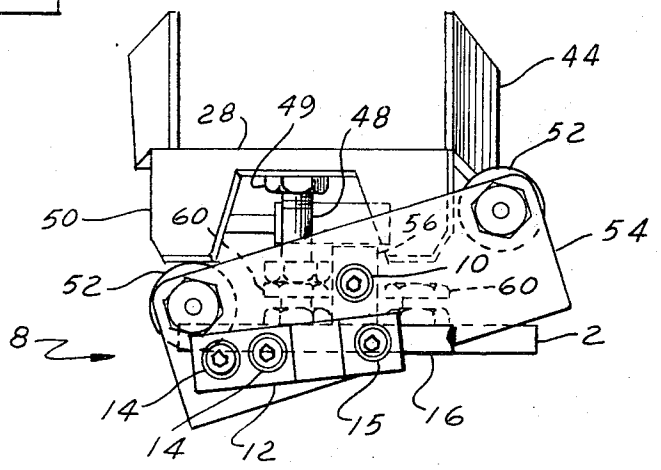
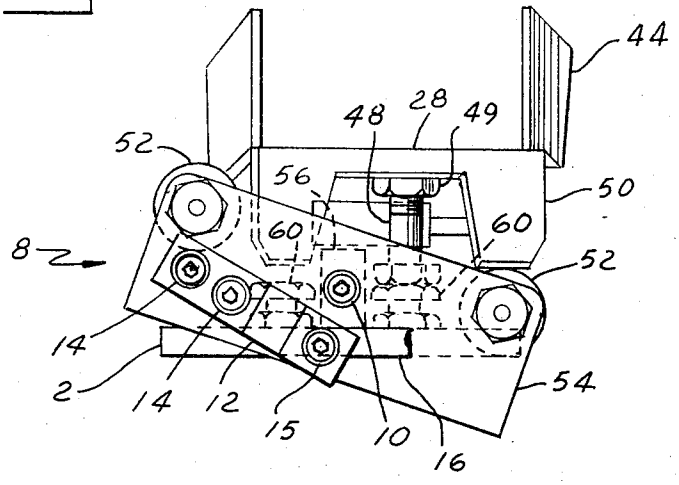


FIG. 8.



FOOT PEDAL VALVE CONTROL FOR EARTH-MOVING EQUIPMENT

BACKGROUND

This invention relates to an improved foot-pedal operated control lever device to govern forward and reverse movement of a reciprocable actuator cable or rod element along a path of linear travel, the device establishing a neutral position for the actuator centrally of said path. It is designed for operation of certain valve units but may also be used in conjunction with any other component capable of being actuated in a similar manner. More specifically, the invention, as disclosed herein, is related to providing improved foot control of a standard type of hydraulic spool valve and thereby operation of a machine component responsive to changes in the valve setting.

A primary object of the invention is to provide a foot directed control lever requiring, in contrast to devices heretofore available, far less effort of a tiring nature on the part of an operator in directing either a forward and reverse movement of a machine component and providing a degree of accuracy approaching that of hand control lever operation. Another improtant object is to provide a safe neutral position in a foot control device so as to eliminate to a large degree any chance for unintentional operation due to human error. The device is particularly advantageous for use on various types of earth moving equipment, such as back-hoes, diggers, or loaders and the like. As will be recognized such equipment normally is fitted with individual controls for a relatively large number of separate components and requires considerable skill on the part of an operator to handle the equipment efficiently. In order to achieve a steady, smoothly coordinated movement of a plurality of moving parts for carrying out a given operation, the control levers must be accurately manipulated. Hand operated levers, as will be appreciated, can generally be more accurately manipulated than foot controls. However, in view of the number of operational components involved in such machinery as the earth moving equipment referred to and an operator's difficulty in manipulating a plurality of hand controls effectively, the use of foot pedal devices is highly desirable.

Heretofore, as far as is known, foot controls for forward and reverse movement of hydraulically operated components of earth moving equipment are either of a dual type (i.e., a separate pedal for each direction) or of a rocker bar type having a transverse pivot centrally of the pedal and requiring toe pressure to move in one direction and heel pressure to move in the opposite direction. Two pedals are relatively costly, occupy more space than is otherwise desirable, require the operator to shift his foot in a tiring manner, and make it difficult to provide a reasonably operable means for a safe neutral position. The rocker type pedal requires an unnatural and tiring heel pressure for operation in one of the directions with little chance to provide slow steady movement because of the normally unnatural direction of foot movement. Further the rocker has no real safeguard in neutral against an inadvertent operation as, for example, when an operator leans forward in order to more clearly observe the work being done and unintentionally presses the pedal. Thus a rocker type provides no safe neutral condition to eliminate such chance operation. As will be readily appreciated, this not only adds to the complexities of proper operation but also

may create potentially hazardous conditions for other workmen in the vicinity of the particular machine.

The present invention provides a neat compact pedal control requiring little more space than an operator's boot, a single pedal serving to impart both a forward and a reverse movement of an operational component by pressing the fore end of a boot downwardly at opposite limits of travel of the laterally shiftable fore end, and provides a positive safe neutral position therebetween in which inadvertent operation is practially eliminated.

SUMMARY

The invention as herein disclosed contemplates a compact single pedal structure comprising a flat base, a vertically disposed rocker plate centrally pivoted at the front of the base and rotatable to either side of a neutral position thereof, a foot plate extending in overlying relation to the base, and a pivotal heel mounting arrangement at the rear of the base enabling limited vertical and horizontal shifting movement at the fore end of the foot plate by the operator's boot and against yieldable spring means normally tending to maintain a neutral condition in which the foot plate lies centrally above the base in upwardly inclined relation and with said fore end adjacent the upper edge of the rocker plate. Lateral and vertical movement of said fore end against the rocker plate at either side of the neutral position is easily applied by the operator for controlled movement of the rocker and thus of any actuator driven thereby.

On the outer face of the rocker a bracket arm is fixed and provides at its outer end a pivotal attaching means in radially spaced relation below the rocker plate axis. The arm may be linked to any component requiring forward and reverse linear movement for actuation thereof, as for example, the actuating cable of a standard type of spool valve for reciprocating an hydraulically driven piston rod which may in turn control the disposition or working stroke of some portion of the operational mechanism of a back-hoe or other type or earth moving machine.

At the upper corners of the rocker plate cam rollers are also provided and in a neutral condition the roller axes are horizontally aligned. Extending from the front edge of the foot plate and at each corner thereof is a downwardly turned toe or cam projection which, in the neutral position of the plates, overlies the inboard side of the corner roller at the corresponding side of the rocker. In the neutral position and in the absence of a positive stop, downward pressure on the foot plate brings the toe projections into a wedged condition between the roller surfaces and prevents rocker rotation in either direction. In the preferred embodiment an adjustable, positive stop arrangement is provided to prevent such contact while in the neutral condition. Thus, an operator, by chance or otherwise, is unable to place any excessive weight on the pedal and subject the rocker pivot mounting to heavy strains.

In operation the front end of the foot plate may be laterally moved to either side of the neutral center position and carry one of the toe portions into an overlying contact against the opposed cam roller while the other toe is shifted inwardly of the other roller. The rocker is thus free to rotate in the direction desired. Stop means are also preferably provided in the laterally shifted positions so as to limit vertical travel of the foot

plate and eliminate any strain on the actuating cable connections by limiting the angular travel of the rocker. In the embodiment of the invention herein disclosed the particular relationship of the parts enables provision for adjustment of a single stop pin in order to change the length of travel of an actuating cable controlled by the device.

DRAWINGS

FIG. 1 is a side elevation of a foot pedal device embodying the invention;

FIG. 2 is a top plan view of the assembly of FIG. 1;

FIG. 3 is a front end view thereof;

FIG. 4 is a top plan view similar to FIG. 2 showing the foot plate member laterally shifted to one side and vertically depressed;

FIG. 5 is a side elevation of the device as shown in FIG. 4;

FIG. 6 is a front end view similar to FIG. 3 showing the front end of the foot plate in the neutral safe position and depressed downwardly against a limit stop;

FIG. 7 is a front end view of the assembly as shown in the operative position of FIGS. 4 and 5;

FIG. 8 is a view similar to FIG. 7 with the foot plate in an operative position at its opposite limit of horizontal movement; and

FIG. 9 is a fragmentary side elevational view of the front end of the assembly showing a modification thereof.

DESCRIPTION

The foot control device shown in the drawings as a preferred embodiment of the invention comprises four major components or sub-assemblies. A base structure for suitably mounting in front of an operator's seat is provided by a plate sub-assembly indicated by numeral **2.** Next and mounted at the rear end of the base plate is a pedal support bar indicated by numeral **4.** Supported on bar **4** is a foot pedal sub-assembly indicated by numeral **6.** The pedal **6** is mounted on bar **4** for a lateral shifting movement of its fore end and, by virtue of the mounting bar **4** on the base, for vertical pivotal movement also, as controlled by movement of the operator's foot. Finally, a vertically disposed rocker plate or lever member indicated by numeral **8** is mounted at the front end of base **2** and pivoted centrally thereof for rotation as on the pin at **10** (see FIGS. **2** and **3**).

As best illustrated by FIG. **3** an attachment means for the rocker assembly **8,** and for connection to a reciprocably operated valve actuating mechanism, is shown by a bracket strap **12** fixed to the face of rocker **8** as by bolts **14.** Pivotally linked as at **15** to the outer end of the strap is a connector **16** attached as to an actuator cable member at **18.** As will be readily recognized, member **18** may be connected at its other end to actuate a valve unit, such as a conventional spool valve (not shown). The latter valve may control the movement of an hydraulically driven piston rod and thus, for example, the stroke of a working component of an earth-mover machine or the disposition of some support structure of the same. Actuating member **18** thus may be reciprocably moved to obtain variously adjusted operational conditions as desired at each limit of travel and has a neutral position between such limits. Also it will be readily understood that such spool valve mechanism may conventionally provide for an automatic spring operated return to the neutral condition. In FIG. **3** a spring return means at **20** is shown for schematically illustrating suitable provision for maintaining such neutral position of the rocker plate **8** when not otherwise actuated by the foot pedal. Cable member **18** is thus spring balanced for normally urging plate **8** to a central neutral position as in FIG. **3.**

Referring now to FIGS. **1** and **2** the connection of pedal bar **4** and base plate **2** is by means of a bracket with upstanding arms **22** suitably fixed on the rear end of the plate. Between the arms **22** the rear end of bar **4** is pivoted as on a horizontal pin at **24.** Forwardly of pin **24** the bar **4** is provided with an upright pivot post **26** set on an axis perpendicular to pin **24,** and the rear end of a main plate **28** of the foot pedal **6** is pivotally mounted on the post **26.** Thus the pedal **6** is supported not only for lateral shifting movement of the outer toe end (by post **26**), but also for a transverse movement of the front end toward and away from rocker **8** (on pin **24**).

Foot pedal **6** at its front end is, furthermore, preferably yieldably urged upwardly of rocker **8.** Forwardly of pivot **26** a throughbore in bar **4** is provided to accommodate a compression spring **30** seated against base **2** and against the underside of pedal plate **28,** being positionally held in place by suitable end plugs. This position of spring **30** provides a comfortably light resistance against the operator's toe pressure and thus assists in affording a smooth and steady operation of the pedal and rocker plate control elements.

The lateral shifting movement of the fore end of the foot plate to either side of its central neutral position (FIGS. **2** and **3**) is also against spring pressure provided by a centering mechanism tending to maintain the neutral position (FIG. **2**). As shown by FIG. **1** a spring and ball detent housing block **32** is secured to the underside of the plate **28** forwardly of bar **4.** Spring **34** is seated by an adjusting plug **36** to urge a ball **38** against the forward end face of bar **4.** As seen by FIGS. **2** and **4** the front face of bar **4** is centrally notched to receive the ball **38** and thus to urge plate **28** towards a centered condition (FIG. **2**). Stop pins **40** at each side of the undersurface of plate **28** limit the lateral pivoting travel of this plate relative to bar **4.** As will become apparent, the pedal at each limit of lateral movement will be positioned for downward movement and thus to rotate rocker **8** towards each limit of pivotal travel.

The pedal assembly **6** further includes a cover plate **42** overlying plate **28** and preferably having any suitable type of roughened non-slip boot contacting surface (not shown) so as to minimize slippage of the operator's foot. Opposed substantially L-shaped pieces **44** are also provided adjacent the fore end of plate **28** for a wedged toe engagement, one of said pieces being laterally adjustable as shown by the slotted mounting on the plate as at **46** (FIG. **2**). The convergently angled sides of the wedging members enable an operator's boot toe to be securely lodged therebetween and thus afford a more easily controlled lateral shifting of the pedal. At the underside of plate **28** and forwardly of the wedge members is a depending adjustable stop pin **48** (FIG. **1**) for limiting the downward stroke of plate **28** as will be described.

Plate **28** at its front end is downwardly angled and formed with spaced projections or toe portions at **50** (see FIG. **3**). The leading edges of portions **50** at the outer corners thereof are diagonally cut for engaging,

under certain conditions as will be explained hereinafter, roller members **52** mounted as shown at the upper corners of the rectangular plate member **54** of the rocker assembly **8.**

As above mentioned the rocker plate **54** is centrally pivoted on the pin at **10.** This latter pivot pin (see FIG. **2**) is fixed to the fore end of a mounting block **56** extending beyond the front edge of base plate **2** and suitably fixed thereto as by the bolts at **58** (see FIG. **1**).

The mounting block **56** in the assembly shown also serves as a stop seat for the depending pin **48** of the pedal plate and limits the downward travel thereof in its central neutral position as is best illustrated by FIG. **6.** At each side of block **56** on the base plate **2** an adjustable stop at **60** is for engaging the pin **48** and arresting downward movement of the pedal in each of the laterally shifted positions of the latter. Thus a positive limit is imposed on the extent to which the rocker can be pivoted in either direction and cable **18,** accordingly, cannot be urged beyond the limits set for its operational path of travel. As a result no undue stress on the cable **18** connections or on any mechanism controlled thereby can occur because of an operator's "heavy" foot. The engagement of pin **48** against the seats **60** at opposite limits of travel are shown by FIGS. **7** and **8.** It may also be noted that stop **48** is adjustably threaded into plate **28** and anchored by nut **49** and that by the simple adjustment of pin **48** the vertical stroke of the pedal can be varied to accommodate the extent of reciprocal travel of the actuating cable as may be desirable. Stops **60** on the base plate are also adjustable in the same fashion to provide still greater flexibility under special circumstances. However, the single adjustment of pin **48** for most applications will in practice provide any needed "tuning" of the limits of linear travel for an actuating cable such as cable **18** when serving to control a spool valve stem.

The full linear travel to be imparted to an actuating cable by the device as illustrated in the drawings may be appreciated from a comparison of the angular relationship of the axis of the pivotal connection at **15** of connector link **16** with respect to the rocker axis pin **10** as in FIG. **7** with the relationship of these same axes in FIG. **8.** The neutral condition in a vertically aligned relation of these axes is shown by FIG. **6.**

In the neutral position of the device, as seen by FIG. **6,** wherein the stop **48** engages the block **56** to prevent downward movement against either of the rollers **52** on the rocker plate, it will be understood by those familiar with standard foot pedal operation on loaders or back-hoes and the like that a positive safety factor is provided in the event an operator leans forward in his seat or stands up and unintentionally presses against the front end of the pedal. With the present device an operator can move around in this fashion, particularly for the purpose of more closely watching and guiding the work being done by a digger or back-hoe, for example, and without inadvertently triggering the rocker arm and mechanism controlled by it.

The stop pin **48** in striking block **56** in neutral position (FIG. **6**) and engaging either one of the seats **60** when laterally shifted (FIGS. **7, 8**), provides a preferred safety stop means. In the neutral position the stop prevents contact with the plate rollers **52** and thus any undue strain which might otherwise be imposed on the pivot pin mounting of rocker plate **54.** It allows the operator freedom from concern in this respect. More importantly, pin **48** in cooperation with block **56** greatly assists a smoother degree of control in applying pressure on the pedal when laterally displaced from the neutral centered condition in order to tilt rocker plate **54,** as will now be more particularly described.

Still referring to FIGS. **6–8** the lateral shift of the front end of the foot plate from the FIG. **6** position will carry the leading edge of one of the toes **50** into contact with its associated roller **52** on the corresponding side of plate **54** and by cam action against the roller will start to tilt the rocker plate in the desired direction. By shifting the foot plate as to the left from its centered FIG. **6** position and then downwardly, the plate **54** may then be tilted to its limit of counterclockwise rotation as in FIG. **7.** This will cause cable **18** to travel to the right. The same type of action, to cause cable **18** to travel as to the left takes place at the other side of neutral, the opposite or clockwise limit of travel being shown in FIG. **8** wherein the axis **15** of the link connection is positioned to the left with respect to axis **10** of the plate. The cam action against roller **52** may be applied gradually to rotate the plate **54** in either direction — initially by appropriate foot movement against the centering spring resistance and any resistance against rotation of the plate, and then downwardly.

Alternatively, it will be clear that the operator may, perhaps equally as well and according to individual preference, tilt plate **54** by first shifting the foot pedal laterally as from its upraised FIG. **1** position and then in a direct vertical path by pressing the toe **50** against the top of roller **52** for the full tilting action.

In any event it will be seen, in considering FIGS. **6, 7,** and **8,** that the head of pin **48** may be slidably moved horizontally across the top of block **56** to either side and that when it drops off by further depressing the foot plate, the vertical side wall of block **56** automatically prevents the foot plate from moving back towards the neutral position of FIG. **6.** In this manner pedal operation is greatly facilitated. As long as the tip end or head of pin **48** slidably abuts the side face of block **56** the operator is relieved of the need to exert any lateral pressure whatsoever. Controlled rotation of plate **54** is solely by vertical foot pressure regardless of any forces urging the foot plate to centered condition. In FIG. **7** the head of pin **48** is seen to be lodged against block **56** while in FIG. **8** it is shown as displaced somewhat therefrom, the latter condition indicating lateral travel to the extreme limit against stop **40** (see FIG. **4**) for tolerance purposes. In either case the smooth steady control of rocker plate movement depends exclusively on vertical foot movement comparable to that of a conventional automobile accelerator pedal until the tip end of the stop pin clears the top of block **56** at which position the rocker plate is at or adjacent its neutral condition. Steady slow movement is thus available for guiding a valve actuator and in turn driving a piston rod element. The rocker plate can thus be "feathered" or moved a proper minute amount in a manner comparable to the action normally achieved only through hand or "finger tip" operation of a control lever.

In the fragmentary view of FIG. **9** a modified fore end of the foot plate **28** is shown with stop pin **48** and stop seats **60** removed. It is also to be noted that the downwardly turned toe end is more sharply bent (compare FIG. **1**) and is substantially at a 90° angle. Furthermore it is disposed in a closer positional relation to rocker plate **54.** The shape and form of the parts is otherwise

as seen in FIGS. 1–8. In the FIG. 9 modification the rocker plate 54 is tilted in a manner corresponding to that seen in FIG. 5 and the changes noted provide an alternative to the stop pin 48 for limiting downward travel of the foot plate. The alternative means for insuring positive safety stop conditions in either neutral or laterally shifted positions is provided by an interlocking engagement of the toe end and rollers 52 in the neutral or the fully tilted positions.

In the fully tilted position of FIG. 9 the angled toe end and rocker plate are in "locked" relation to prevent further counterclockwise pivoting of the rocker (as viewed from the left) by reason of the arcuately raised roller 52 butting up against the outside edge of the right angled toe 52. Since the toe of foot plate 28 is prevented from further lateral movement by stop 40 (as in FIG. 4) further pivotal movement of the rocker is blocked and a limit stop provided by such toe and roller engagement. While not readily observable from FIGS. 1–8 the particular angularity and relative positioning of the toe ends 50 as there shown with respect to the rollers 52 is such that, without stop pin 48, the upper roller would pass arcuately across the front face of toe 50 upon further downward pressure on the foot plate and thus no clearly defined stop is available. It will be readily understood, of course, that provision may be made for a removable stop pin 48 in the FIG. 9 arrnagement to enable the optional use thereof as desired.

For the safety stop condition in neutral position of the FIG. 9 modification reference is made to FIG. 6. Here the toe portions 50 in neutral are seen to be displaced inwardly of the roller 52 axes and the beveled outer corners overlie the inner sides of the rollers. It will be clear that further downward movement of foot plate 28, in the absence of stop pin 48, will cause the toe portions to become wedged between the rollers. In this condition the application of further pressure vertically is ineffective to pivot rocker plate 54 one way or another. Thus, the chance for accidentally rocking plate 54 when in neutral is eliminated by the relationship of the parts, a "safety stop" feature which has been lacking in prior devices. The stop pin 48 arrangement is preferred, however, since it will also prevent any undue strain on the pivot pin mounting of the rocker as well as assisting the tilting of the rocker plate as above described.

What is claimed is:

1. Foot pedal mechanism for controlling the movement of an actuating stem member having a reciprocable path of substantially linear travel with a neutral position between the ends of said path, said mechanism comprising,

a pivoted lever member having means mounted thereon for attaching an actuator member radially of the axis of rotation thereof, said lever being normally disposed in a neutral position and rotatable at either side thereof,

a foot pedal member provided with means for limited horizontal shifting movement laterally of each side of a neutral central position thereof, and, when shifted away from said neutral position, having means for movement in a path perpendicular to said lateral motion,

said lever having surfaces engageable by said pedal and located in angularly spaced relation at opposite sides of the pivotal axis of said lever,

said foot pedal having laterally spaced lever engaging portions projecting therefrom and when shifted towards one of said limits of lateral movement carrying a projecting portion into position for engaging a lever surface and imparting rotary tilting movement to the lever by pressing said projecting portion against the lever.

2. The structure of claim 1, in which,

said foot pedal is a plate supporting an operator's foot, said lever engaging projections extend from the fore end of said plate, and

mounting means at the rear end of the plate support said fore end in upwardly inclined relation and include a vertical pivot constituting said means to impart lateral shifting movement of said fore end, and a horizontal pivot constitutes the means for imparting said perpendicular pedal movement.

3. The structure of claim 2, in which,

said projections at the fore end of the foot plate are directed from the opposite corner end edge portions thereof and, in a neutral condition of said pedal and lever, overlie the inner side edges of said pedal engaging surfaces of the lever whereby movement of said fore end directly against said lever in said neutral condition locks the fore end against further movement in that direction.

4. The structure of claim 3, in which,

said lever is a vertically disposed plate and said pedal engaging surfaces thereof are provided by a pair of rollers pivotally mounted on said lever member.

5. The structure of claim 3, in which,

said mounting means at the rear end portion of the foot plate further include spring means for holding the latter in upwardly inclined relation and spring centering means yieldably urge said foot plate into its said neutral position.

6. The structure of claim 5, in which,

a depending adjustable stop pin extends from the underside of the foot plate adjacent the fore end thereof and a seat is provided therebelow to limit the downward travel of said foot plate in its neutral position.

7. The structure of claim 6, in which,

said lever is a vertically disposed plate, said pedal engaging surfaces are provided by a pair of rollers pivotally mounted at the upper corners said plate, said fore end projections of the foot plate are downwardly directed and formed with diagonally cut outside corners closely overlying said roller surfaces inwardly adjacent and below the top thereof when the foot pedal is depressed to engage said stop/pin against said seat in neutral position, and

the stop seat in the path of said stop pin in neutral position also has vertically disposed side wall portions for slidable engagement of the tip end of said stop pin thereagainst in the laterally shifted positions of the foot plate and said tip end engagement acts as a stop means against a return of the foot plate towards its centered neutral condition,

whereby the pivotal movement of said lever plate may be controlled by vertical foot movement alone during said tip end engagement.

8. A foot pedal device for actuating a reciprocably movable cable control element for spool valves and the like, comprising

a platform base member,

a vertically disposed rocker plate pivotally mounted on a horizontal axis centrally of the front end thereof with attaching means on the plate radially of said axis for pivotally linking a cable element thereto and a roller at each upper corner of the rocker plate, said plate having a neutral rotative position in which said rollers are horizontally aligned,

a foot plate having pivotal mounting means at the rear of the platform operable to impart both vertical and horizontal movement to the front end of said foot plate in response to an operator's foot pressure, said mounting means including first spring means normally urging said foot plate into an upwardly inclined position overlying the platform base member and second spring-urged means normally maintaining said plate in a centered and neutral position of horizontal movement,

said front end of the foot plate being downwardly angled and having laterally spaced projecting portions operable to selectively engage said rollers for controlling rotation of said rocker plate at either side of said neutral position thereof.

9. The structure of claim **8,** in which,

the rollers at the upper corners of said rocker plate are mounted to extend inwardly thereof,

stop means are provided for limiting horizontal travel of the foot plate at each side of said neutral position, and

the outside edges of said spaced projecting portions at the front end of the foot plate are vertically disposed and when in neutral position overlie the upper surfaces of said rollers inwardly of the axes thereof,

whereby in said neutral position a downward movement of said projecting portions against the rollers wedges the foot plate therebetween and prevents pivoting of the rocker plate from neutral, and in a horizontally shifted position of the foot plate against the stop means, downward travel of either projecting portion against the roller opposed thereto, for pivoting the rocker plate, is limited by the degree to which the other roller may be arcuately lifted until the engagement against the outside edge of the other projecting portion prevents further movement.

10. The structure of claim **8,** in which,

a horizontal first pivot pin is mounted at the rear end of said base,

a foot plate support bar is carried by said pin for vertical pivotal movement thereof,

a vertically disposed second pivot pin is carried by said support bar forwardly of the first pin and the rear end of said foot plate is mounted thereon for lateral pivotal movement of the front end of the plate,

said first spring means is seated between said base and foot plate and said second spring means comprises a spring pressed ball detent mounted at the underside of said foot plate forwardly of said support bar with the latter having a centrally notched front end edge receiving said ball to yieldably latch said foot plate in longitudinal alignment with said support bar and stop means are provided to limit pivotal travel of said foot plate from said latched position.

11. The structure of claim **9,** in which,

a depending adjustable stop pin is carried at the underside of said foot plate adjacent the fore end thereof, and stop seats on said base are provided in the path of the pin in the neutral position of the foot plate and in the laterally shifted positions at either side thereof.

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