SAFETY FOOT CONTROL

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ABSTRACT

A foot control such as a switch or valve of the treadle-operated type is provided with a guard cover inclosing the sides and top of the treadle and a movable abutment or stop normally retaining and locking the treadle in normal elevated unactuated position, the abutment or stop being disengageable by inward movement of a pivoted trip lever disposed at the inner end of the guard cover and treadle for actuation by the toe of the operator and being accessible only by insertion of the foot of the operator between the treadle and guard cover from the outer open end thereof. An additional safety measure may be the use of dual return springs for the treadle and stop.

8 Claims, 3 Drawing Figures
SAFETY FOOT CONTROL

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates to foot controls such as switches or valves of the treadle-operated type which are commonly used in industry for controlling machinery such as punch presses, shears, cutting, staking and bending machines, and the like. Such controls are normally placed on the floor or similar supporting surface for actuation by the foot of the operator, thus freeing the operator’s hands for other functions.

Because of the usual location of the control on the floor or the like it is very easily susceptible to being inadvertently stepped upon or impinged upon by falling objects causing actuation of the treadle and unexpected operation of the machine being controlled. In some instances the control may be actuated merely by accidently bumping or kicking it, or if the control is dropped while being moved or relocated. This creates a very dangerous situation and constitutes an intolerable safety hazard.

Accordingly, it is an object of the invention to provide a foot control of the treadle-operated type which is constructed to overcome the hazards referred to, namely, which is not susceptible to inadvertent or accidental activation under normal conditions of use.

Another object is to provide a foot control of the type referred to which in addition to being constructed for safe use, is so arranged that normal operation is not interfered with and the operator is not required to make any awkward or unusual movements in order to actuate the control.

A further object is to provide a safety feature as described which is fully automatic in operation and requires no act of the operator to cause the safety feature to function. Included in this object is the provision of a safety feature which is dependable in operation and will not malfunction under normal conditions of use and which cannot be readily rendered inoperable either purposely or inadvertently.

An additional object is to provide a safety device of the type referred to which is of rugged and durable construction so as to provide a long trouble-free service life, and yet which can be applied to a foot control at reasonable cost.

Other objects will be in part obvious and in part pointed out in more detail hereinafter.

A better understanding of the invention will be obtained from the following detailed description and accompanying drawings illustrating a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a perspective view of an exemplary foot control which has been provided with a preferred embodiment of the safety features of the invention, the guard cover and treadle being partially cut away to show certain of the parts;

FIG. 2 is a side view thereof partially in cross section and showing the movable parts in normal unactuated position; and

FIG. 3 is a partial side view and partially in section similar to FIG. 2 but with the movable parts in actuated condition.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings in detail, a foot control in which a preferred embodiment of the safety features of the present invention has been incorporated is shown as comprising a base 10 preferably formed of cast metal having an upwardly opening compartment section 11 and a forwardly extending ledge or platform 12. The base is provided with anti-skid rubber feet 13 which together with the weight of the control is normally sufficient to hold the control in desired position on the floor or other supporting surface. However, openings 14 are also provided for the reception of screws or bolts or other fastening means by which the control may be movably anchored on a floor or supporting surface.

Within the compartment section 11 is a valve or switch shown somewhat diagrammatically at 15 for connection to an associated machine or other device to be controlled, the connection (not shown) being adapted to be made through the rear access opening 16. Pivoted mounted on the base 10 is an outwardly extending treadle 20 disposed above the ledge or platform 12 and also preferably made of cast metal. The treadle 20 has a tread portion 21 which is serrated on its upper surface, and two integral side arms 22 which are secured by set screws 23 (one shown) to the opposite ends of a shaft 24 which extends through the compartment section 11 and is journalled in the side walls thereof. Each side arm 22 has a projection 25 adapted to engage against a boss or shoulder 26 on the base 10 to function as a stop limiting upward pivoting movement of the treadle 20.

Within the compartment section 11 and secured to shaft 24 for movement therewith is an actuating arm 31 which is adapted to actuate the valve or switch 15 when the treadle is depressed. As will be obvious, depression of the treadle 20 causes turning movement of the shaft 24 and corresponding pivoting movement of the actuating arm 31.

The treadle is urged to the raised position shown in FIGS. 1 and 2, and as limited by the stops 25, by a spring 32 which is held in captured position by being seated on the circular boss 33 formed in the ledge or platform 12 and having its upper end received in a circular recess 34 on the underside of the tread portion 21 of the treadle 20. A second return spring 35 is provided within the compartment section 11 being seated at its lower end in a recess 36 and engaged at its upper end against a lever 37 secured to shaft 24 by screw 38. In the preferred embodiment both spring 32 and spring 35 are designed to have sufficient force to return the treadle to the unactuated position shown in FIGS. 1 and 2 so that even though one of these springs should break or otherwise fail, the mechanism will return to the unactuated position and will still continue to operate until a suitable repair or replacement can be made.

The cover of the control is a metal casting 40 having a rear cover portion 41 configured to fit over and close the compartment section 11. A gasket 39 is disposed between the compartment section 11 and cover portion 41 which is secured thereto by screws 42. Extending forwardly from the rear cover portion 41 is an enlarged guard cover portion 43 in the form of a cow which completely incloses the side edges and top of the treadle 20 providing access to the treadle only through the end opening 44.

In accordance with the invention, a stop is provided which normally holds and locks the treadle in its raised unactuated position. In the preferred embodiment the
stop comprises a pair of hardened steel bars 50 each being independently mounted on the lower end for pivoting movement on a rod 51 which extends through and is supported by ribs 52 formed on the upper surface of the ledge or platform 12. A cylindrical separator 53 on the rod 51 between bars 50 maintains the bars 50 in spaced apart position adjacent the ribs 52. The bars 50 are dimensioned so that when the bars are in upright position, the upper surfaces 54 thereof will fit under and engage the rear edge portion of the tread section 21 when the treadle 20 is in fully raised position. The treadle 20 which, as previously mentioned, is preferably formed of cast metal, is also preferably hardened in the area which is engaged by the bars 50 to prevent wear. Each bar has an inverted L-shaped upper extension 55 which is engaged by a coil spring 56 urging the bars 50 to the holding or locking position shown in FIGS. 1 and 2. The upper extensions 55 also bear against a trip plate 60 formed of sheet metal with edge extensions 61 bent inwardly to form downwardly depending arms which are pivotally mounted on the opposite ends of rod 51. The trip plate 60 by reason of being engaged by the extensions 55 on the bars 50 which in turn are urged to locking position by the springs 56, is thereby also urged to the forward position shown in FIGS. 1 and 2. Forward movement is limited by engagement of arms 61 with the rear edge of the tread section 21 of the treadle 20. The upper portion 62 of the trip plate 60 is forwardly inclined both for clearance purposes and for facilitating engagement therewith by the toe of the operator's foot.

The operation of the control and safety features will be apparent from the foregoing description in connection with the following explanation. When the parts are in the normal locked position as shown in FIGS. 1 and 2 of the drawing, the treadle cannot be depressed because of the engagement of the bars 50 underneath the edge of the tread portion 21 blocking any downward movement of the treadle. However, if the trip plate 60 is thrust rearwardly or inwardly, then the bars 50 are moved or pivoted rearwardly to the inclined position disengaging the treadle 20 so that it may be depressed to actuated position as shown in FIG. 3 of the drawing. The full inclosure of the treadle by the cowl shaped guard cover 43 except for the end opening 44 will normally protect the control against actuation such as by a directly falling object, but this is not sufficient in the event the exposed end of the treadle is engaged or the control is subjected to a sudden jar or shock. However, by reason of the additional safety features of the invention, the control cannot be actuated even though the exposed end of the treadle is struck inadvertently such as by being engaged by a heel or toe or it subjected to shock because of the locking action of the bars 50. In order to actuate the control, the operator has to perform two related movements which are, first, to thrust his foot under the cowl shaped cover above the treadle portion 21 and press inwardly on the trip plate 60 to release the bars 50 from locking position and, second, while holding the trip plate 60 in releasing position, pressing downwardly on the treadle to pivot the same and actuate the switch or valve. These are easy and simple movements for the operator to perform causing no appreciable interference with the normal use of the control. Upon release by the operator, the parts immediately return to original locked position. Because of the inner location of the bars 50 and trip plate 60 it is substantially impossible to cause them to be actuated inadvertently or for the operator to inadvertently or deliberately render the safety features inoperative, thus insuring full protection against accidental tripping or actuation of the control.

As will be apparent to persons skilled in the art, various modifications, adaptations and variations of the foregoing specific disclosure can be made without departing from the teachings of the present invention. We claim:

1. In a foot control of the type having a base and a treadle mounted on the base for movement between a raised and a depressed position, a guard cover extending over the treadle, a retractable stop normally engaging under the treadle to prevent depression of the treadle, and a movable trip plate at the inner end of the treadle engageable by the toe of the operator's foot when placed between the treadle and guard cover, the trip plate being operatively connected to the stop to remove the stop from beneath the treadle when the trip plate is moved inwardly by the toe of the operator.

2. In a foot control as set forth in claim 1 wherein the treadle is pivotally mounted on the base and the guard cover is in the form of a cowl inclosing the top of the treadle and permitting access to the treadle only from the outer end thereof.

3. In a foot control as set forth in claim 2 wherein the stop is a bar pivotally mounted at one end on the base for pivoting movement between an upright position engaging under the treadle to prevent depression thereof and an inclined position permitting the treadle to be depressed.

4. In a foot control as set forth in claim 2 wherein the stop comprises a pair of bars independently mounted on the base for pivoting movement between an upright position engaging under the treadle to prevent depression thereof and a retracted position disengaging the treadle to permit depression thereof, and a separate spring for each bar urging it to said upright position.

5. In a foot control as set forth in claim 2 wherein the stop comprises at least one bar pivotally mounted on the base for movement between a position engaging under a rear edge of the treadle to prevent depression of the treadle, and a rearwardly retracted position disengaging the treadle to permit depression thereof, the trip plate is pivotally mounted on the base and extends upwardly adjacent the rear rear edge of the treadle, and the bar is provided with a projection engaging the rear surface of the trip plate to cause the bar to be pivoted to retracted position when the trip plate is moved rearwardly of the treadle.

6. In a foot control as set forth in claim 5 wherein the treadle is formed of metal which is hardened in the area engaged by the bar stop.

7. In a foot control as set forth in claim 5 wherein a pair of separate return springs are operatively connected to the treadle for biasing the treadle in an upward direction, each of said springs being of sufficient force to move the treadle to fully raised position independently of the force of the other spring.

8. In a foot control as set forth in claim 2 wherein the trip plate is pivotally mounted on the base and extends upwardly at the rear of the treadle, and the stop comprises at least one bar pivotally mounted on the base for movement between an upright position engaging under the treadle to prevent depression thereof and a rearwardly pivoted position releasing the treadle for depression thereof, a portion of the bar being engaged behind the trip plate to cause the bar to be pivoted to treadle releasing position when the trip plate is pivoted rearwardly relative to the treadle.