Sept. 18, 1934. E. C. SWILIK 1,973,828

FOOT OPERATED CONTROLLING MECHANISM

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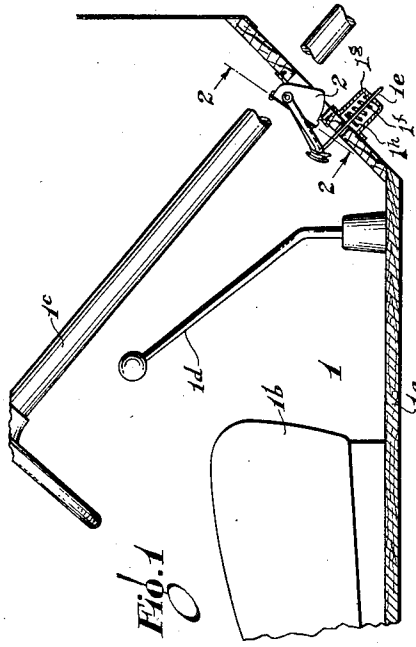


Fig. 1

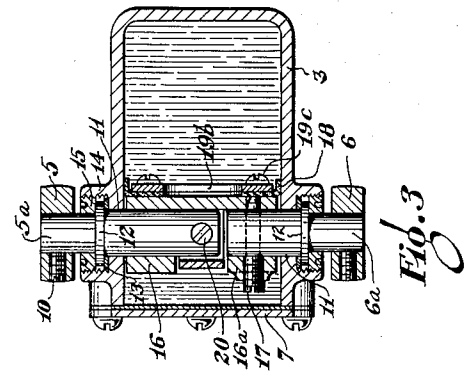


Fig. 3

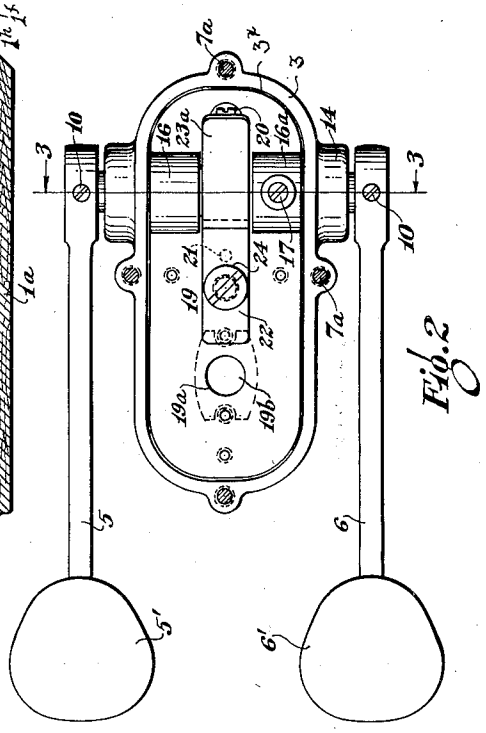


Fig. 2

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FOOT OPERATED CONTROLLING MECHANISM

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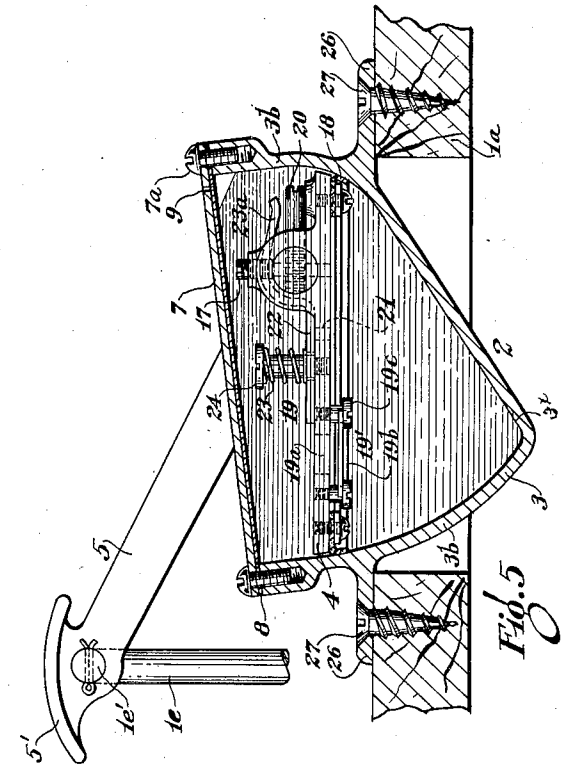


Fig. 5

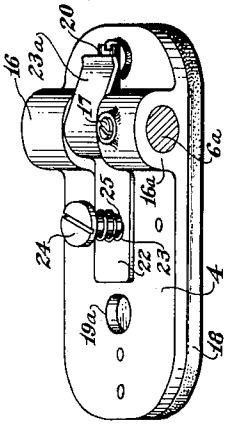


Fig. 6

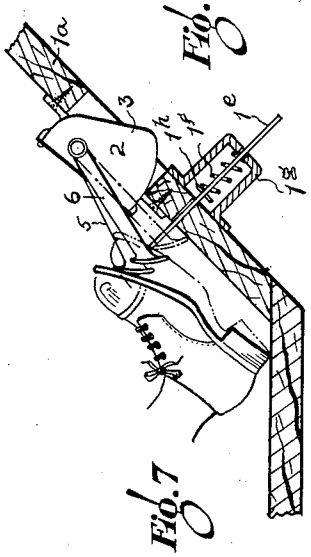


Fig. 7

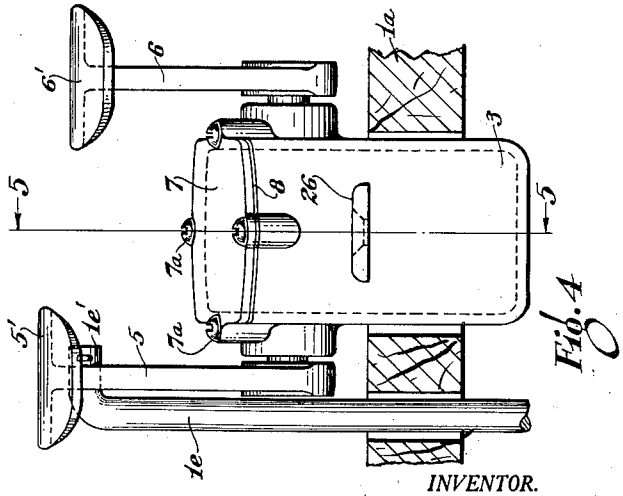


Fig. 4

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# UNITED STATES PATENT OFFICE

1,973,828

## FOOT OPERATED CONTROLLING MECHANISM

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Application August 23, 1933, Serial No. 686,402

10 Claims. (Cl. 74—512)

This invention relates to a foot operated controlling mechanism, more particularly a pair of devices co-operatively connected so that in the operation of one of said devices by a person's foot, the latter is steadied and said device is operated without requiring a twisting of the foot, whereby resulting strain on the muscles of the foot or of the person's leg is eliminated. The invention is herein illustrated as applied to an automotive vehicle, to control the supply of fuel from the carburetor thereof to the engine intake manifold.

Such vehicles are equipped with a device (usually termed an accelerator or accelerator pedal) connected with the butterfly valve of the carburetor and with such device is associated a stationary foot rest, the latter permitting the driver to effectively control and operate the accelerator irrespective of the relative movements between the vehicle body or driver's seat and the driver. In such an arrangement one side of the driver's foot engages the rest and then by a twisting motion of the foot the other side thereof is caused to engage with and push downwardly or away from the driver the accelerator, such twisting being increased in proportion to the increased movement of the accelerator. Such twisting of the foot, especially if maintained for a considerable period of time, as in driving long distances, results in causing strain in the muscles of the driver's foot and leg and this strain is often transmitted to other parts of the body.

One object of the invention is to provide an improved controlling mechanism in which the accelerator may be effectively controlled at all times without requiring twisting of the foot during operation of such mechanism.

Another object of the invention is to provide a pair of movable, foot engaging devices, interconnected and automatically controlled by pressure of the foot on one of them, whereby the foot is guided and the controlling device of the pair operated without requiring twisting of the foot.

Another object of the invention is to provide an improved foot operated mechanism of simple and economical construction and which may be readily applied to a vehicle.

Other objects of the invention will be apparent to those skilled in the art to which my invention relates from the following description taken in connection with the accompanying drawings, wherein

Fig. 1 is a fragmentary section of an automotive vehicle having applied thereto a mechanism embodying my invention.

Fig. 2 is a section substantially on the line 2—2 of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 is a front elevation of the mechanism.

Fig. 5 is a section on the line 5—5 of Fig. 4.

Fig. 6 is a perspective view of the piston member and certain parts associated therewith.

Fig. 7 is a fragmentary view showing the manner of operating the mechanism.

In the drawings, 1 indicates as an entirety a vehicle, a portion only thereof being shown, namely, the flooring 1*a*, driver's seat 1*b*, steering column and wheel 1*c*, shift lever 1*d* and rod 1*e*, which is suitably connected, by linkage, to the valve (such as the butterfly valve) of the carburetor (not shown). As will be understood, a suitable spring is connected to the rod 1*e*, linkage or valve which spring normally tends to move the rod 1*e* upwardly to a predetermined or normal position. By way of illustration, the spring, indicated at 1*f*, is shown coiled around the rod 1*e* and disposed between the bottom wall of a hanger 1*g* (through which the rod 1*e* extends) and a cross pin 1*h* carried by the rod. The spring operates on the pin 1*h* to normally maintain it against the flooring 1*a*, which limits the movement of the rod upwardly.

2 indicates my improved controlling mechanism preferably mounted in an opening formed in the flooring 1*a* and fixed to the latter in any desired manner. The mechanism 2 comprises the following: 3 indicates a casing forming a chamber 3*x* adapted to be substantially filled with a suitable liquid, such as oil. In actual use of my mechanism I have used lubricating oil having a viscosity of S. A. E. 10, but the viscosity of the liquid may be varied. 4 indicates a piston member movably mounted in the chamber 3*x* and controlled and operated in the manner later set forth. 5 indicates a movable device connected with the rod 1*e* for operating it downwardly against the tension of its controlling spring 1*f*, such connection being preferably made by bending the upper end of the rod 1*e* laterally at 1*e'* and extending such end through an opening formed in the device 5 (see Fig. 4). 6 indicates a movable device forming a rest and steadying member for the driver's foot. The devices 5 and 6 are correlated and interconnected with each other and the piston member 4 so that in operating the rod 1*e* against the tension of its spring or upon relieving pressure on the rod 1*e* to permit return thereof, the foot remains horizontal and swings normally about a horizontal axis without twisting. By preference, the devices 5, 6, consist of pedals fixed

to shafts 5*a*, 6*a*, respectively, mounted co-axially in the side walls 3*a* of the casing 3, one thereof, to wit, shaft 6*a*, being connected to the piston member to swingably support it in the chamber 3*x*.

The casing 3 is open at its top, such opening being closed by a plate 7 held in place by screws 7*a* and sealed by a suitable gasket 8. The plate 7 is formed with a small opening above the level of the liquid to relieve pressure in the casing due to expansion of the liquid. Each of the pedals 5, 6, is adjustably connected to the adjacent shaft by a set screw 10 whereby they may be set in side by side relation, or in angular relation, as shown, as desired. Each shaft 5*a*, 6*a*, is mounted in the adjacent side wall of the casing 3 as follows: The shaft extends through and rotates in an opening 11 formed in casing side wall and is provided with a collar 12 arranged to engage a gasket 13. Each side wall, surrounding the adjacent opening 11, is provided with an annular boss 14 the internal wall of which is threaded to receive a threaded ring 15. The ring 15 is tightened against the collar 12 and thus maintains the shaft against endwise movement and also its collar 12 against the gasket 13, so that the bearing opening 11 is sealed. The piston member 4 is formed with integral lugs 16, 16*a*, formed with aligned openings into and through which extend the shafts 5*a*, 6*a*, respectively. The shaft 6*a* is secured in the lug 16*a* by a set screw 17, so that the pedal 6 and piston member 4 are rigidly (but adjustably) connected and move together about the axis of the shaft 6*a*, whereas the shaft 5*a* rotates in the lug 16 to a limited extent, as will later appear. By providing the piston member 4 with a lug 16 and extending the shaft 5*a* therethrough, the piston member is supported at both its sides and the inner ends of the shafts are held in alignment.

The piston member 4 is of a shape and size to fit the inner walls of the casing 3 and around its perimeter it is provided with a gasket or sealing member 18 preferably formed of leather to form a seal against leakage of the liquid around the member 4 from one side thereof to its other side. Due to the fact that the piston member 4 swings about the axis of the shaft 6*a*, the end walls 3*b* of the casing 3 are curved about such axis.

19 indicates a valve arranged to permit the liquid in the casing 3 to pass or flow from the lower side of the piston member to the upper side thereof. The valve 19 is normally closed so that the piston member 4 is held against movement by the liquid therebelow and prevents downward movement of the pedal 6; but by opening the valve 19, the liquid is free to flow through it, so that if pressure is applied to the pedal 6, the latter may be moved downwardly so long as the valve 19 remains open. The valve element of the valve 19 is operatively connected to the pedal 5 so that following the first part of or initial movement of the pedal 5 downwardly, the valve 19 is opened, the effect of which is to permit the pedal 6 to move downwardly with the pedal 5, as above set forth; also, the pedal 5 is operatively connected to the piston member 4, so that when foot pressure on the pedal 5 is relieved (foot pressure also being relieved on the pedal 6), the pedal 5 swings upwardly under the influence of the spring acting on the rod 1*e* and the pedal 5 in turn swings the piston member 4 and pedal 6 upwardly to normal position, as limited by the rod 1*e*.

The connections above referred to may be separate from each other, but in the preferred arrangement they are combined or inter-related so that a single element, indicated at 20, fixed to the shaft 5*a*, may effect operation of the valve in the opening direction thereof and operation of the piston member in its return movement. The element 20 may comprise a pin threaded into and extending radially of the shaft 5*a* parallel to the inner end of the piston member 4, that is, on that side of the shaft 5*a* remote from the pedal 5. In this arrangement, the pedal 5 may be operated downwardly independently of the piston member 4 and pedal 6, but if such member and pedal have been operated or pressed downwardly, then in the upward movement of the pedal 5 (by reason of the relief of foot pressure thereon), the pin 20 will engage the piston member 4 and move it and the pedal 6 upwardly. The lugs 16, 16*a*, are spaced so that the pin 20 may be arranged between them and centrally of the piston member.

The piston member 4 is provided with a by-pass valve 19' to permit flow of the liquid to the lower side of the piston member 4 when the piston member 4 swings upwardly under the influence of the spring connected to the rod 1*e*, as already set forth. The by-pass valve 19' comprises a relatively large opening 19*a* formed in the piston member 4 and a plate 19*b* mounted to slide loosely upon pins 19*c* on the lower side of the piston member 4. The pressure of the liquid in the downward movement of the piston member serves to maintain the plate over the opening 19*a* to close it and such pressure in the upward movement of the piston member serves to move the plate away from the opening. As the opening 19*a* is relatively large the liquid readily flows therethrough so as not to retard the return movement of the piston member.

The valve 19 comprises a port 21 formed in the piston member 4, the upper face of the latter surrounding the port 21 forming a valve seat for a valve member 22. The valve member consists of a flat plate normally held against its seat by a spring 23 and an arm 23*a* at one end, the spring being coiled around a headed pin 24 extending through an opening 25 formed in the valve member 22 and rigidly threaded into an opening formed in the piston member 4. The spring 23 is disposed between the head of the pin and valve member. The opening 25 is somewhat larger than the pin 24 so that the valve member may swing or tilt relative to the pin 24. The arm 23*a* is bent upwardly and outwardly to overlie the shaft 5*a* and extended beyond the latter so that its free end is disposed in the path of movement of the operating element or pin 20, so that upon downward operation of the pedal 5, the pin 20 will engage the arm 23*a* and through it lift the valve member 22 and open the valve port 21. This operation will permit movement of the piston member 4 if pressure is applied to the pedal 6. When the valve member 22 is operated, its outer end fulcrums on the piston member. The end of the arm 23*a* is spaced from the pin 20 a slight distance, which permits a limited movement of the pedal 5 prior to opening of the valve 19. This permits the operation of the pedal 5 to supply fuel to the engine while simultaneously preventing operation of the pedal 6, so that the latter acts as a stationary foot rest. Upon movement of the pedal 5 beyond the position in which the pin 20 engages the arm 23*a*, then both pedals may be

operated together to the extent permitted by the accelerator rod 1e, but upon relief of foot pressure in any operated position of the piston member 4, if the pedal 5 swings upwardly relative to the pedal 6 far enough to permit closing of the valve 19, then the pedal 6 is held against downward movement and becomes in effect a stationary foot rest.

The set screw 10 for the pedal 5 permits it to be adjusted on the shaft to any desired angular position relative to the pedal 6, whereas by bending the arm 23a upwardly the movement of the pin 20 before engaging the arm 23a will be increased. If desired, the arm 23a may be provided with an adjustable stop, such as a screw threaded through an opening therein.

In the preferred arrangement the pedal 5 is disposed in angular relation to the pedal 6, so that the travel of its foot engaging portion 5' downwardly to the horizontal plane of the foot engaging portion 6' of the pedal 6 equals the movement of the pin 20 from its normal position to the position at which it engages the valve member arm 23a. In this initial movement of the pedal 5 the foot moves vertically without twisting. If the driver finds it necessary to steady his foot, he may cause it to engage the pedal 6, which being held against downward movement, forms a rest and steadying device. If the downward movement of the foot is continued, the pin 20 effects opening of the valve 19, so that both pedals move downwardly together, with the result that more fuel is admitted to the engine and no twisting of the foot is required. If, after both pedals have been moved downwardly to any driving position, the jolting of the vehicle or rocking of the vehicle body makes it desirable to steady the foot, slight relief of pressure on the pedal 5 will permit it to swing upwardly relative to the pedal 6. Such relative movement will permit the valve 19 to close, the effect of which is to lock the pedal 6 against further downward movement, so that the latter immediately becomes a stationary foot rest to steady the driver's foot. It will thus be seen that while the pedal 6 is movable with the pedal 5 it is automatically controlled by the pedal 5 and locked in any one of various positions, at the will of the driver, so that constant undue twisting or lateral movement of the foot is reduced to a minimum or an unnoticeable degree measured by the travel of the pin 20 into engagement with the arm 23a. Thus where driving requires (a) the pedal 5 to be maintained at an extreme advanced position, the foot remains horizontal and (b) movement of the pedal 5 to an extreme advanced position and repeated relief of pressure thereon, such operations may be effected by raising the foot while maintaining it horizontally. If the driver finds it desirable to steady his foot during these operations, a slight, unnoticeable lateral foot movement relieves pressure on the pedal 5 and immediately locks the pedal 6 against movement downwardly.

The spring 23 is provided with sufficient tension, so that pressure upon the pedal 6, less than an undue amount, cannot force the liquid through the port 21 and open the valve 19 to permit movement of the piston member 4 downwardly.

The walls of the casing 3, (preferably its front and rear walls 3b) are provided with integral lugs 26, which are fixed to the flooring 1a by screws 27.

To those skilled in the art to which my invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. My disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

What I claim is:

1. In a foot operated controlling mechanism, the combination of a pair of related, movable devices arranged to be engaged by the foot of an operator and moved downwardly from predetermined positions, one of said devices being spring operated and arranged to be moved against the tension of its spring by pressure of the foot thereon independently of the other device, and means independent of said spring operated device normally operating to prevent the movement of the other device downwardly said means being controlled by said spring operated device upon operation thereof downwardly to permit movement of the other device therewith.

2. In a foot operated controlling mechanism, the combination of a casing forming a liquid holding chamber, a piston member movable in said chamber, a normally closed valve on said member, a by-pass on said member, foot engaging devices, one connected to a controllable means and spring operated in one direction and arranged to be operated in the other direction by pressure of an operator's foot thereon and the other device being connected to said member, and operating connections between said spring operated device and said valve arranged to open the latter when said device is operated by foot pressure, whereby said other device may be operated with said spring operated device.

3. In a foot operated controlling mechanism, the combination of a casing forming a liquid holding chamber, a piston member movable in said chamber, a normally closed valve on said member, a by-pass on said member, foot engaging devices, one connected to a controllable means and spring operated in one direction and arranged to be operated in the other direction by pressure of an operator's foot thereon and the other device being connected to said member, and operating connections between said spring operated device and said valve arranged to open the latter when said device is operated by foot pressure, whereby said other device may be operated with said spring operated device, said connections being arranged to permit an initial movement of said spring operated device prior to opening of said valve.

4. In a foot operated controlling mechanism, the combination of a casing forming a liquid holding chamber, a piston member movable in said chamber, a normally closed valve on said member, a by-pass on said member, foot engaging devices, one connected to a controllable means and spring operated in one direction and arranged to be operated in the other direction by pressure of an operator's foot thereon and the other device being connected to said member, operating connections between said spring operated device and said valve arranged to open the latter when said device is operated by foot pressure, whereby said other device may be operated with said spring operated device, and means operated by said spring operated device for moving said member and other device to normal position upon relief of foot pressure.

5. In a foot operated controlling mechanism, the combination of a casing forming a liquid holding chamber, a piston member movable in said

chamber, a normally closed valve on said member, a by-pass on said member, a pair of pedals having shafts mounted in the walls of said casing, one of said pedals being connected to a controllable means and spring operated in one direction and arranged to be operated in the other direction by pressure of an operator's foot thereon and the other pedal being arranged to steady the operator's foot, the shaft for the other pedal being fixed to said piston member to move it in one direction, and a device on the shaft for said spring operated pedal arranged to engage the valve member of said valve to open the latter, whereby the steadying pedal is free to move with said spring operated pedal, said device and valve member being spaced to permit initial movement of said spring operated pedal relative to the other pedal.

6. In a foot operated controlling mechanism, the combination of a casing forming a liquid holding chamber, a piston member movable in said chamber, a normally closed valve on said member, a by-pass on said member, a pair of pedals having shafts mounted in the walls of said casing, one of said pedals being connected to a controllable means and spring operated in one direction and arranged to be operated in the other direction by pressure of an operator's foot thereon and the other pedal being arranged to steady the operator's foot, the shaft for the other pedal being fixed to said piston member to move it in one direction, and a pedal on the shaft for said spring operated device arranged to engage the valve member of said valve to open the latter, whereby the steadying pedal is free to move with said spring operated pedal, said device and valve member being spaced to permit initial movement of said spring operated pedal relative to the other pedal and said device being arranged to engage said piston member in the return movement of said spring operated pedal to return said member to normal position.

7. In a foot operated controlling mechanism, the combination of a closed casing for a liquid, a pair of pedals having shafts mounted in the walls of said casing and extending therein, one of said pedals being connected to a spring operated element for a controllable means and operable by foot pressure thereon to operate said means against the tension of the spring for said element, a piston member in said casing connected to the shaft for the other pedal, a normally closed valve on said piston member arranged to prevent flow of the liquid from one side thereof to its other side whereby said other pedal is normally held stationary, a connection between said shaft for the spring operated pedal and the valve member of said valve for opening the latter when pressure is applied to said pedal whereby the other pedal is free to move therewith, a by-pass on said piston member arranged to permit return flow of the liquid whereby said member may return to normal position, and means for moving said piston member to normal position upon relief of foot pressure on said pedals.

8. In a foot operated controlling mechanism, the combination of a closed casing for a liquid, a pair of pedals having shafts mounted in the walls of said casing and extending therein, one of said pedals being connected to a spring operated element for a controllable means and operable by foot pressure thereon to operate said means against the tension of the spring for said element, a piston member in said casing connected to the shaft for the other pedal, a normally closed valve on said piston member arranged to prevent flow of the liquid from one side thereof to its other side whereby said other pedal is normally held stationary, a connection between said shaft for the spring operated pedal and the valve member of said valve for opening the latter when pressure is applied to said pedal whereby the other pedal is free to move therewith, a by-pass on said piston member arranged to permit return flow of the liquid whereby said member may return to normal position, and means for moving said piston member to normal position upon relief of foot pressure on said pedals, said return means including an element of said connections.

9. In a foot operated controlling mechanism, the combination of a casing forming a chamber for a liquid, a piston member in said chamber, oppositely related valves on said member permitting displacement of the liquid to either side of said member, respectively, one of said valves being normally closed, a pedal fixed to said member, an operating pedal and a device fixed to said operating pedal and interposed between the valve member of said normally closed valve and said piston member and arranged when said operating pedal is moved in one direction to open said valve to permit movement of the other pedal therewith and when moved in the opposite direction to engage said piston member and move it and the pedal fixed thereto to their original position.

10. In a foot operated controlling mechanism, the combination of a pair of pedals having foot engaging portions disposed in side by side relation, one pedal being connected to an operating mechanism and spring operated in one direction and operable in the opposite or forward direction independently of the other pedal to operate the operating mechanism, means normally preventing movement of the other pedal with said first mentioned pedal in the forward direction thereof, said means comprising a fluid holding chamber, a piston movable therein and connected to said other pedal and valves arranged to permit movement of said piston in either direction, and a device carried by said spring operated pedal arranged to engage and operate one of said valves to permit movement of the piston and said other pedal in one direction and to engage a portion of the piston to move it and said other pedal in the opposite direction.

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