Dec. 27, 1960 W. J. BURNWORTH 2,966,328

HYDRAULIC ACCELERATOR LINKAGE FOR AUTOMOBILES

Filed April 10, 1959

2 Sheets-Sheet 1

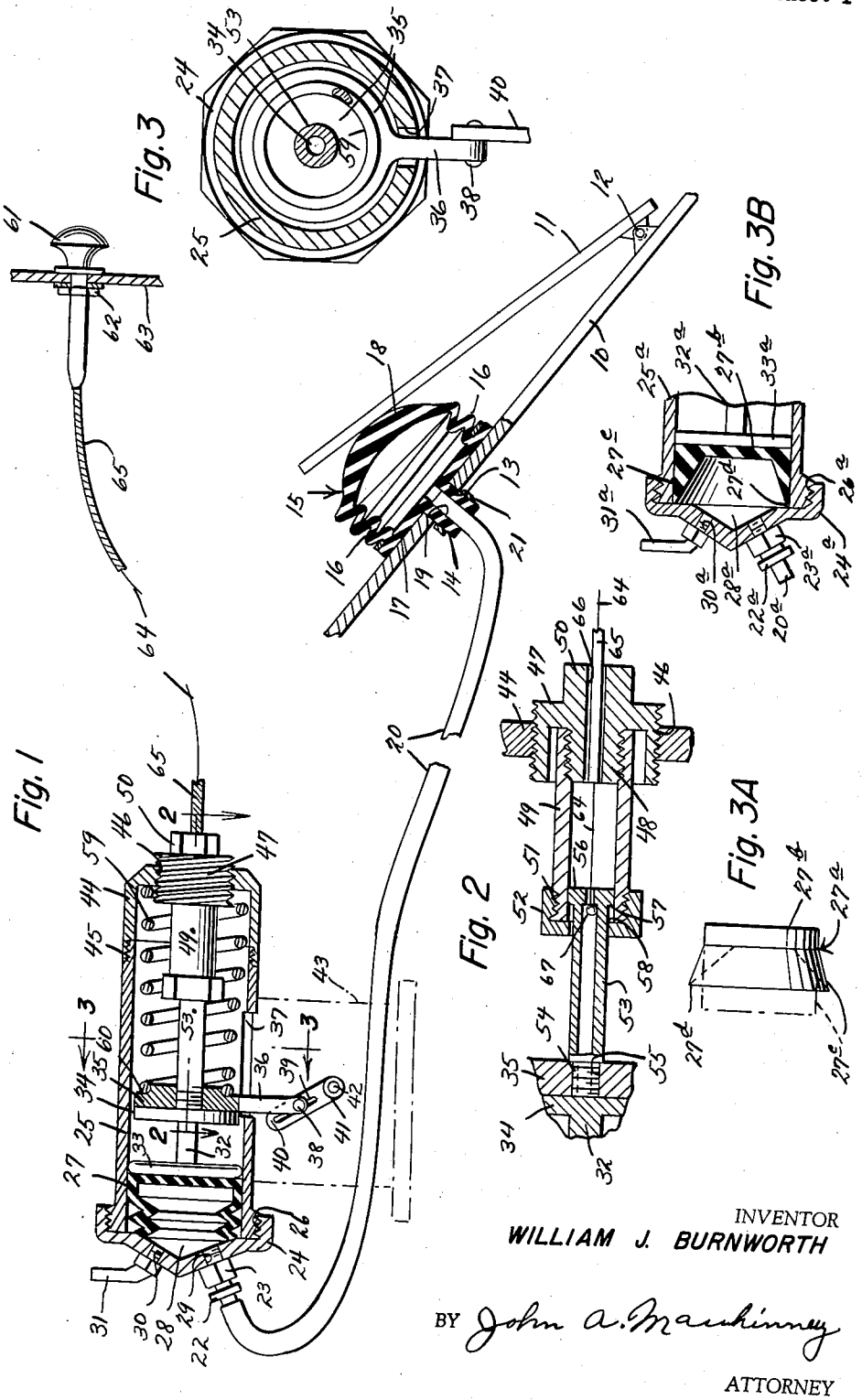


Fig. 1

Fig. 2

Fig. 3

Fig. 3A

Fig. 3B

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2 Sheets-Sheet 2

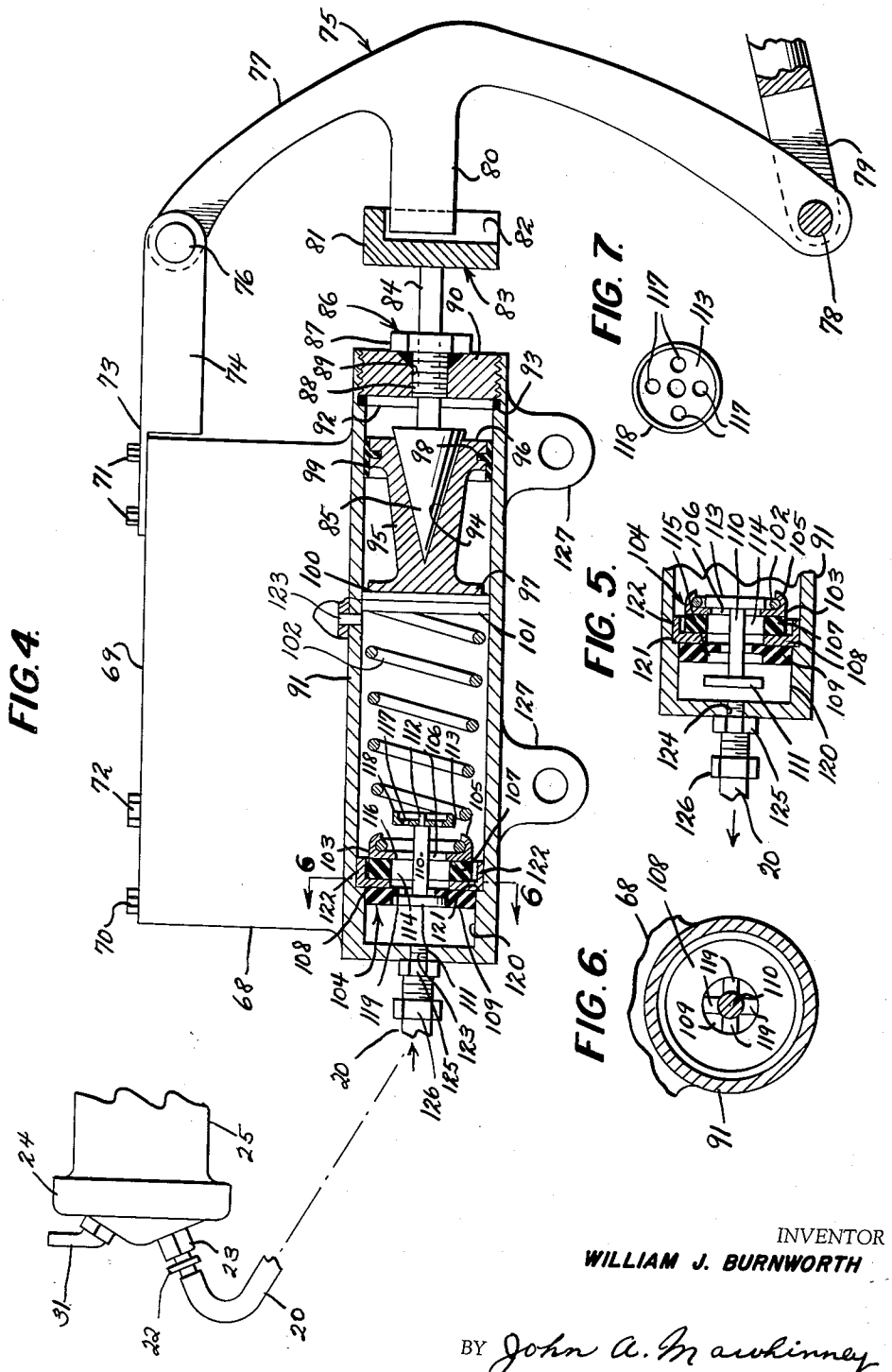


FIG. 4.

FIG. 7.

FIG. 5.

FIG. 6.

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United States Patent Office 2,966,328
Patented Dec. 27, 1960

2,966,328

HYDRAULIC ACCELERATOR LINKAGE FOR AUTOMOBILES

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Filed Apr. 10, 1959, Ser. No. 806,202

11 Claims. (Cl. 251—14)

The present invention relates to a hydraulic accelerator linkage for automobiles and the like and is a continuation-in-part of my abandoned application Serial No. 329,659, filed on January 5, 1953.

An object of the present invention is to provide a device of this character which eliminates the conventional mechanical linkage between the foot accelerator pedal and the throttle valve of the engine.

The mechanical linkage heretofore employed causes driving fatigue since only the foot and toe muscles are used, foot tension or "foot nerves" and fatigue results. The fluid cushion provided by the present invention permits the use of the leg muscles and prevents the foot tension with its resultant fatigue. This fluid cushion also provides for instant smooth action so that it eliminates the "buck-and-jump" acceleration which is caused chiefly by the numerous connections, joints and turns of the conventional mechanical linkage and rods, especially in city traffic.

The conventional mechanical linkage is unreliable and unsafe as with use it becomes loose, catches and sometimes breaks and becomes jammed, leaving the throttle valve of the carburetor in a fully open or partly open position. In the present improved device there are relatively few working parts so that the chances of becoming loose and catching are reduced to a minimum and in the event of breakage the tendency is to cut off the fuel supply rather than jam with the throttle fully open.

Another object of the present invention is to provide an improved hydraulic accelerator control which is fluid-tight and small and compact so that it is capable of being installed on any vehicle powered by a gasoline engine or other type motor. The installation can be made on vehicles already in service or on vehicles at the time of their manufacture.

A further object of the present invention is to provide a device of this character which affords independent adjustment or operation of the idler control for setting the idling position of the throttle valve, of the hand operated control for the throttle valve and of the foot operated control for the throttle valve.

In one of its broadest aspects the present invention contemplates the provision of a hydraulic throttle valve accelerator linkage comprising fluid actuated means connected to the throttle valve for opening the throttle valve, and means for closing said throttle valve.

More specifically the present invention aims to provide an improved hydraulic throttle valve control comprising a member operatively connected to the throttle valve, foot operated hydraulic means for moving said member in a direction for opening the throttle valve, hand operated means for moving said member in a direction for opening the throttle valve, and means for moving said member in the opposite direction for closing the throttle valve, said foot operated means and said hand operated means being so arranged that they can be operated independently of and without disturbing one another.

The present invention also aims to provide means for operating the hydraulic throttle valve control which means uses the brake fluid from the master brake cylinder of the vehicle to which the device is applied.

The present invention further aims to provide a device of this kind in which an expansible cup is employed and so positioned that it receives the compressed fluid and uses the force of the fluid to make the seal tighter between the cup and its cylinder to form an air-tight seal at all times, especially when the pressure of the fluid is increased.

With the foregoing and other objects in view, the invention will be hereinafter more fully described and more particularly pointed out in the appended claims.

In the drawings, in which the same parts are denoted by the same reference numerals throughout the several views,

Figure 1 is a side elevational view of the improved device constructed in accordance with the present invention illustrated as applied to an automobile and with parts in section,

Figure 2 is a sectional view taken on the line 2—2 of Figure 1,

Figure 3 is a sectional view taken on the line 3—3 of Figure 1,

Figure 3A is a side elevational view of a modified form of expansible cup,

Figure 3B is a fragmentary sectional view showing the modified form of cup applied to its cylinder,

Figure 4 is a side elevational view of another form of the invention showing the valve in closed position and with parts broken away and with parts in section,

Figure 5 is a fragmentary vertical sectional view of the modified form of the invention showing the valve in open position,

Figure 6 is a sectional view taken on the line 6—6 of Figure 4, and

Figure 7 is an end view of one of the valve heads of the valve.

Referring more particularly to the drawings, 10 indicates the conventional floorboard of an automobile or the like on which is pivotally mounted a conventional foot operated accelerator pedal 11, the pivot which is indicated at 12 being disposed adjacent one end of the pedal 11. The floorboard has an opening 13 formed therethrough, through which extends the neck 14 of a compression chamber, generally indicated at 15, which may be in the form of a bellows.

The bellows is positioned between the floorboard and the free end portion of the pedal 11 and its walls 16 may be made of oil resistant rubber or spring brass and possess sufficient resiliency to return to their normal expanded condition when the foot pressure is removed from the pedal 11. The bottom 17 of the bellows may be made thicker than the walls 16 and is substantially flat so as to rest upon the floorboard. The top 18 of the bellows is thick so as to resist deformation when foot pressure is applied thereto through the pedal 11 and the upper surface of the top 18 may be dome shaped. The bottom and top may be made of oil resistant rubber or brass or other suitable material.

The neck 14 and bottom 17 are provided with a through passageway 19 which communicates with the interior of the compression chamber and with a tube 20, one end portion of which is received by the neck 14 in which it is frictionally held by a clamping collar 21. The collar 21 encircles the neck below the floorboard and squeezes the neck tightly against the tube and also prevents escape of the neck from the floorboard and thus holds the compression chamber in place.

The opposite end portion of the tube 20 is connected by a swivel joint 22 to a nut 23 which is secured to a

cap 24 by welding or the like. The cap 24 is detachably mounted on one end of a working cylinder 25 by cooperating screw threads 26 formed on the interior of the cap and the exterior of the cylinder. A flexible cup 27 which may be made of flexible oil resistant rubber or the like is positioned within the end portion of the cylinder 25 adjacent the cap 24 with its closed bottom inwardly of the end of the cylinder and its open top communicating with the interior 28 of the cap which provides an oil chamber. The cap 24 has an opening 29 therethrough which communicates with the interior of the cap and cup and with the tube 20. A second opening 30 formed in the cap 24 opens into the interior 28 of the cap and into an air vent valve 31.

A piston or plunger 32 having two spaced apart heads 33 and 34 is slidably received by the cylinder 25. The head 33 is engaged at all times by the bottom of the cup 27 and the head 34 engages at all times a pressure plate 35 which may be in the form of a round flat disk and has a radially extending laterally offset finger 36 extending from the periphery thereof and which may be formed integrally therewith or attached thereto.

The finger extends outwardly of the cylinder 25 through a slot 37 formed in the bottom of the cylinder and the free end portion of the finger has a hole therethrough for receiving one end portion of a pin 38 and the opposite end portion of the pin is slidably received by an elongated slot 39 formed in a link 40. The opposite ends of the pin 38 are upset so that the pin cannot escape from the hole in the finger and the slot in the link.

The slot 39 terminates short of one end of the link and the unslotted end portion of the link is secured in any suitable manner as by welding or the like to a member 41 which in turn is fastened by a machine screw or the like to the throttle valve axle or shaft 42 of a carburetor 43.

A cover 44 is detachably mounted on the end of the cylinder 25 opposite to that on which the cap 24 is mounted by cooperating screw threads 45 formed on the cover and the cylinder. The cover 44 has a substantially centrally disposed screw threaded opening 46 therethrough for adjustably receiving an exteriorly screw threaded substantially cup-shaped plug 47. An exteriorly screw threaded boss 48 extends from the closed bottom of the plug inwardly of the cylinder 25 and is secured to the outer interiorly screw threaded end portion of a sleeve 49. In order to facilitate adjustment of the plug, a non-circular nut-like head 50 extends from the closed bottom of the plug outwardly of the cylinder for receiving a wrench or the like by which the plug may be rotated in either direction. The inner end of the sleeve 49 is exteriorly screw threaded as at 51 to receive an interiorly screw threaded abutment 52.

A tube 53 has its outer end portion telescopically received by the inner end portion of the sleeve 49 and has its inner end portion screw threaded as at 54 to be received by a screw threaded opening 55 in the plate 35. The end of the tube 53 which is disposed within the sleeve 49 has secured thereto a centrally apertured disk 56 which has a diameter larger than that of the tube 53 so that the outer peripheral portion of the disk extends beyond the outer face of the tube to form an annular flange 57. The abutment 52 has an inturned annular flange 58 for engaging the flange 57 when the plug 47 is rotated so as to move the plug and the sleeve to the right, looking at Figures 1 and 2 of the drawings.

A coil spring 59 encircles the sleeve 49 and the tube 53 and one end engages the inner face of the end wall of the cover 44 and its opposite end engages a shoulder or land 60 formed on the plate 35.

Hand operated means are provided for opening the throttle valve and comprises a hand throttle or knob 61 mounted in any suitable manner as by lock nuts 62 on the instrument board 63 of the automobile and a wire 64 slidably received by a flexible sheathing 65. The outer end of the wire 64 is secured to the knob 61 and the inner end portions of the wire 64 and sheathing 65 extend through a passageway 66 in the plug 47. At its inner end the sheathing 65 terminates short of the inner end of the wire 64 and the exposed inner end portion of the wire extends through the sleeve 49 and the aperture in the disk 56. The inner end of the wire extends slightly inwardly beyond the disk 56 and has formed thereon a ball or crimp 67 which is larger than the aperture in the disk.

The cylinder 25 may be attached to the engine or carburetor and for this purpose the cylinder may be provided with spaced apart flanges depending from the bottom of the cylinder.

In the use of the device, assuming that the bellows 15, the tube 20 and the cup 27 have been supplied with a suitable fluid, such as oil, which is used in a conventional hydraulically operated braking system of an automobile, when the operator of the vehicle depresses the pedal 11, the bellows 15 will be collapsed in proportion to the amount of depression of the pedal 11. This action will cause the oil to flow through the tube 20 and oil chamber 28 and into the cup 27 and increase the oil pressure in the cup 27 causing the cup and the piston 32 (which is to be noted abuts but is unattached to both the cup 27 and pressure plate 35) to move to the right, looking at Figures 1 and 2 of the drawings. The oil pressure forces the flexible walls of the cup 27 against the inner wall of the cylinder 25 sufficiently to prevent oil leakage past the cup.

The piston in turn will move the pressure plate 35 to the right and through the finger 36 will rotate the link 40 in a clockwise direction thereby turning the throttle valve shaft 42 in a direction to cause opening of the throttle valve. This action will place the coil spring 59 under compression so that when the pressure is removed from the pedal 11, the spring will move the plate 35 and the piston 32 to the left and return the cup 27 to its original position returning oil to the oil chamber 28 and excess oil into the tube 20. The bellows 15 has sufficient resiliency to return to its normal expanded condition when the foot pressure is released from the pedal 11. The parts are then in proper position for the next acceleration operation.

It will be noted that when the plate 35 is moved to the right it will carry the tube 53 with it, but the tube is freely telescopically received by the sleeve 49 and the movement of the tube does not disturb the position of the wire 64 so that the foot accelerator can be used without in any way affecting the hand throttle control. The sleeve 49 cooperates with the disk 56 to serve as a guide for the tube 53 and plate 35 during their movements.

When it is desired to use the hand throttle control, the operator will pull the knob 61 which will move the wire 64 to the right, looking at Figures 1 and 2. By means of the ball 67 the movement of the wire 64 will cause the tube 53 and plate 35 to move to the right independently of and away from piston 32 and open the throttle valve through the crank connection of finger 36 and link 40 therewith, thus without disturbing the hydraulic system. When the knob 61 is released the spring 59 will return the parts to their original closed positions.

The idling speed of the engine may be regulated by the adjustment of the plug 47. When the plug is rotated so as to move it towards the right, it will carry the sleeve 49 and the abutment 52 to the right so that the flange 58 of the abutment will be brought into contact with the flange 57 on the disk 56. Further movement of the plug 47 will cause the tube 53 and plate 35 to be moved to the right to open the throttle valve to the desired idling position of the engine.

If it is desired to move the throttle valve towards its closed position, rotation of the plug in the opposite direction will permit the spring 59 to come into play to

move the plate 35 and tube 53 in the opposite direction. These adjustments can be made without affecting the hydraulic system or the hand throttle control.

Before installing the improved hydraulic accelerator control on vehicles now in service, the old mechanical linkage will be removed.

The improved hydraulic accelerator control is designed and installed, with an appropriate mounting, at the carburetor in a position to operate the carburetor shaft with hydraulic pressure, supplied with a master brake cylinder or bellows. The brake cylinder can be installed in a position where operation with the regular foot accelerator pedal is possible.

The hydraulic accelerator control can be precision built in every detail. The internal parts are designed for minimum of strain and the pressure required for operation is not sufficient to cause breakage. The accelerator control should last the life of any vehicle on which it may be installed, with a minimum of cost and servicing. The oil cushion gives instantaneous smooth and steady operation from start to full carburetion.

Heavy equipment on construction work, on the highways and city streets, such as trucks, truck-way-cranes, carryalls, city buses with motors in the rear and airplanes require complete and safe engine control at all times which cannot be had with mechanical linkage, rods and wires. Our city streets and highways carry heavy traffic of all types of motorized equipment and the present improved hydraulic acceleration control can supply to these vehicles the safe engine control that hydraulic brakes have supplied to vehicle control.

In Figures 3A and 3B of the drawings is illustrated a modified form of cup which may be substituted for the cup 27 shown in Figure 1. This modified form of cup is generally indicated at 27*a* and comprises a closed base 27*b* and an outwardly flared open ended body 27*c*. As is illustrated in Figure 3B, the cup 27*a* may be located in the cylinder 25*a* in the same manner and position as the cup 27 is mounted in the cylinder 25 in Figure 1 and the parts of Figure 3B corresponding to those of Figure 1 have applied thereto the same reference character with the suffix *a* added thereto.

The base 27*b* of the cup 27*a* has an outside diameter equal to the inside diameter of the cylinder 25*a* so that the outer face of the base 27*b* will grip the inner face of the cylinder wall to set up an air-tight and fluid-tight seal therebetween. The outer diameter of the flared body 27*c* will be greater than the inside diameter of the cylinder and the cup is made of resilient material, such as rubber, so that when the cup is located in the cylinder, the body 27*c* will be deformed from the full line position of Figure 3A to the dotted line position of Figure 3A. The outer face of the body 27*c* will tightly grip the inner face of the cylinder wall as shown in Figure 3B to augment the air-tight and fluid-tight seal between the cup 27*a* and the wall of the cylinder 25*a*. The mold of the cup and the flared body will cause the cup to cling to the cylinder wall at all times. Merely by way of example, the outside diameter of the cup base 27*b* and the inside diameter of the cylinder may be 5/8" and the outside diameter of the flared body 27*c* may be 11/16".

The inner face of the body 27*c* of the cup is tapered outwardly from the base 27*b* towards the open end of the cup and body terminates in a sharp thin edge 27*d*. It will be noted from Figure 3B that the wall of the body 27*c* is of gradually decreasing thickness from the base 27*b* towards the edge 27*d* so that the edge and the adjacent wall portion will be easily flexed outwardly by the pressure of the fluid within the cup to ensure the tight seal.

Referring to the form of the invention illustrated in Figures 4 through 7 of the drawings, there is shown a structure which may be used in place of the bellows 15 of Figure 1, in which 68 represents the reserve oil chamber of the master brake cylinder of a vehicle. A cover 69 is removably secured to the open top of the chamber by cap screws 70 and 71. The cover 69 may be provided with the usual screw threaded filling opening which may be closed by a removable closure plug 72. A mounting plate 73 is secured to the cover 69 by the cap screws 71 and extends beyond the cover and chamber. The extended portion of the plate 73 has a depending flange 74.

A substantially T-shaped lever or arm generally indicated at 75 is pivotally connected as at 76 adjacent one end of its head 77 to the plate 74 adjacent the free end thereof. The head 77 is pivotally connected adjacent its opposite end as at 78 to a rod 79 adjacent the one end thereof. The rod 79 may extend through the floor board 10 of the vehicle and is connected to the foot accelerator pedal 11 in a conventional manner.

The lever 75 has a leg 80, the free end portion of which is received by a recess 82 formed in a block 81. The recess 82 opens through the rear face and the lower face of the block to receive the free end portion of the leg 80 to permit the necessary movement of the lever 75. The recess 82 however is of sufficient depth and height to prevent the accidental escape of the leg 80 therefrom. The block 81 forms a part of a plunger attachment generally indicated at 83 which also comprises a rod 84 and a cone-shaped member or pusher 85. The block 81 is mounted on the rear end of the rod 84 and the pusher 85 is mounted on the forward end of the rod 84. The rod 84 has a bearing 86 which comprises a nut-like head 87 and a bearing or guide sleeve 88.

The sleeve 88 is exteriorly screw threaded and is received by a screw threaded bore 89 formed through a closure plug 90 which closes the rear open end of an oil pressure cylinder 91. The plug 90 is exteriorly screw threaded and is removably received by the interiorly screw threaded open end portion of the cylinder 91. A liquid-tight sealing washer 92 is carried by the cylinder 91 forwardly of the plug 90 and is received by an annular groove 93 formed in the inner wall of the cylinder 91 at the inner end of the screw threads of the cylinder.

The cone-shaped member 85 extends forwardly into the cylinder 91 and is received by a similarly shaped socket 94 formed in the rear end portion of a plunger or piston 95 which has two spaced apart heads 96 and 97. The heads 96 and 97 are of slightly less diameter than the inside diameter of the cylinder 91. The head 96 has an intermediate peripheral groove 98 formed therein, in which is secured by a suitable adhesive the stem of a T-shaped sealing gasket 99, the top of which overlies the outer face of the head 96 and extends inwardly therebeyond. The gasket is disposed in the space between the head 96 and the inner wall of the cylinder and snugly engages the inner cylinder wall. A rubber oil seal which may be in the form of a disk 100 is secured to the inner face of the head 97 and has a diameter substantially equal to the inside diameter of the cylinder 91 so that the periphery of the disk snugly engages the inner wall of the cylinder.

An end plate 101 is secured in an appropriate manner to the end convolution at the large end of a tapered spiral spring 102 and abuts the plate 101. The end convolution of the small end of the spring is received by a cup-shaped member 103 which forms part of a valve device generally indicated at 104. The cup member 103 has a plurality of inwardly extending tangs 105 which overlie and engage the end convolution of the small end of the spring to retain it within the cup member 103. The bottom of the cup member 103 has an opening 106 therethrough and is secured by a suitable adhesive to a resilient washer 107 which may be made of rubber or other appropriate material. The washer is in turn secured in any suitable manner to one face of a rigid ring 108 which may be made from brass or other appropriate

material. A second washer **109** is secured in any suitable manner to the opposite face of the ring **108**.

The valve **104** also comprises a valve stem **110** having a valve head **111** on one end thereof and having its opposite end portion of reduced diameter as indicated at **112** on which is mounted a head **113**. The heads **111** and **113** may be secured to the valve stem **110** in any suitable manner. The valve stem extends through and is spaced from the walls of the openings in the member **103**, the washers **107** and **109** and the ring **108** so that an annular passageway **114** is provided therebetween. An annular recess **115** is formed in the washer **109** which provides a valve seat for the valve head **111** and the bottom of the cup member **103** provides a valve seat **116** for the valve head **113**. The bottom of the valve head **113** has a plurality of openings **117** and an annular flange **118** extends rearwardly from the bottom of the valve head **113**.

The ring **108** has a plurality of angularly spaced fingers **119** extending inwardly therefrom towards the valve stem **110** with the inner free edges of the fingers engaging and supporting the valve stem. The inner edges of the fingers may be arcuate to conform to the round shape of the valve stem. The forward end portion of the wall of the cylinder **91** as indicated at **120** is thicker than the remainder of the cylinder wall so that an inner rearwardly facing annular shoulder **121** is formed within the cylinder **91**. The washer **109** may be made of rubber and has a diameter substantially equal to the inside diameter of the thickened wall portion of the cylinder **91** so that the washer **109** forms a liquid tight seal with the inner face of the cylinder wall at a point just forward of the shoulder **121**. The outer periphery of the ring **108** has a plurality of angularly spaced substantially L-shaped lugs **122** extending therefrom. The short legs of the lugs extend radially from the ring **108** and are held against the shoulder **121** by the spring **102** and the long legs extend axially thereof and engage the inner wall of the cylinder to prevent the valve **104** from becoming canted within the cylinder.

The bottom of the chamber **68** and the top of the cylinder **91** has a through aperture **123** so that the brake fluid may pass from the chamber **68** to the cylinder **91** to supply the fluid necessary for the operation of the piston **32** of Figure 1. The forward end wall of the cylinder **91** has a screw threaded opening **124** for receiving the screw threaded end of a reducer **125** which forms a part of a screw on connection **126** mounted on the free end of the tube **20**. Apertured mounting flanges **127** may be provided for mounting the device on the vehicle at any appropriate location.

In the operation of the form of the invention illustrated in Figures 4 through 7 of the drawings, assuming that the engine is idling, the valve **104** will be in the position shown in Figure 4 of the drawings and the spring **102** will have moved the plunger **95** to the right looking at Figure 4 until the rear end of the pusher **85** abuts the plug **90**. At this time the valve head **111** will be seated on its seat **115** and the valve **104** will be in its closed position to prevent the oil from escaping from the tube **20** into the cylinder **91**.

If the operator of the vehicle depresses the foot accelerator pedal **11**, the arm **75** will be swung forwardly on its pivot **76** and the pusher **85** will move the plunger **95** to the left looking at Figure 4 of the drawings. This will place the fluid in the cylinder **91** under pressure and the oil under pressure will act upon the valve heads **111** and **113** to unseat the valve head **111** from its seat **115** and move the head **113** against its seat **116** to open the valve as shown in Figure 5 of the drawings. The oil will flow through the openings **117** in the head **113**, through the passageway **114** into the tube **20** and actuate the piston **32** in the manner described in connection with the form of the invention shown in Figures 1–3.

Further depression of the foot accelerator pedal will place the fluid under higher pressure and force more oil through the valve in the above mentioned manner until the pressure plate **35** has been moved to the right to its maximum position which will open the carburetor throttle to its fully open position.

When the pressure is removed from the pedal **11**, the spring **102** will move the plunger **95** to the right looking at Figure 4 until the pusher **85** engages the plug **90**. At this time the oil in the tube **20** will attempt to flow back into the cylinder **91**, but the flow of oil against the valve head **111** will push the head **111** against its valve seat **115** thereby stopping the flow of oil into the cylinder **91** and trapping the oil in the tube **20** and the chamber **28**.

Enough oil can escape past the valve in the process of closing to allow for efficient operation of cylinder **25**. As acceleration is increased more oil must enter line **20** and cylinder **25**, as acceleration is decreased the oil must escape from cylinder **25**. Since it takes only a small volume of oil to operate cylinder **25**, this excess can flow back into cylinder **91** while the valve is in the process of closing.

Trapping the oil in line **20** and chamber **28** is essential. When only slight pressure is applied on the accelerator pedal **11**, cylinder **91** will increase the volume of oil in line **20** and chamber **28** to instantly start cup **27** in motion. This is why the valve must be very sensitive to the flow of oil in either direction.

While driving, acceleration is increased and decreased constantly; during this operation the valve heads on the valve stem are traveling with the flow of oil in either direction, always opening to allow more oil to enter line **20** when required and closing in time to keep line **20** and chamber **28** full of oil at all times.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What I claim is:

1. A throttle valve and hydraulic control therefor comprising a member adapted to be operatively connected to the throttle valve, foot operated hydraulic means for moving said member in a direction for opening the throttle valve, hand operated means for moving said member in a direction for opening the throttle valve, and means for moving said member in the opposite direction for closing the throttle valve, said hand operated means comprising an element attached to said member for movement therewith independently of and away from said foot operated hydraulic means for opening the throttle valve, a manually operated device and lost-motion connection means between said element and said device for moving the element and said member in said throttle valve opening direction when said device is moved in one direction and permitting said element and said member to move in said throttle valve opening direction under the influence of said foot operated hydraulic means so that said foot operated means and said hand operated means can be operated independently of and without disturbing one another, the element of said hand operated means comprising a tube having one end secured to said member, a sleeve telescopically receiving the other end of said tube, a portion of said hand operated means being freely received by said tube and sleeve, and said lost-motion connection means comprising cooperating parts on said portion and on said tube for interengaging when said hand operated means is actuated to move said tube and member in their throttle valve opening direction but permitting said hand operated means to be undisturbed when said foot operated means is actuated.

2. A throttle valve and hydraulic control therefor as claimed in claim 1, characterized by the fact that means are provided for adjusting the idling position of the throttle valve without disturbing said foot operated means and

said hand operated means and comprising a plug rotatably mounted for axial movement in both directions and secured to said sleeve for moving said sleeve therewith.

3. A hydraulic control comprising a member, foot operated hydraulic means for moving said member in one direction, hand operated means for moving said member in said one direction comprising an element attached to said member for movement therewith independently of and away from said foot operated hydraulic means for opening the throttle valve, a manually operated device and lost-motion connection means between said element and said device for moving the element and said member in said one direction when said device is moved in one direction and permitting said element and member to move in said first one direction under the influence of said foot operated hydraulic means so that said foot operated means and said hand operated means can be operated independently of and without disturbing one another, the element of said hand operated means comprising a tube having one end secured to said member, a sleeve telescopically receiving the other end of said tube, a portion of said hand operated means being freely received by said tube and sleeve, and said lost-motion connection means comprising cooperating parts on said portion and on said tube for interengaging when said hand operated means is actuated to move said tube and member in said first one direction but permitting said hand operated means to be undisturbed when said foot operated means is actuated, and means for moving said member in the opposite direction.

4. A hydraulic control as claimed in claim 3 wherein said foot operated hydraulic means comprises an oil pressure cylinder, a plunger working in said oil pressure cylinder for causing the oil to actuate said member, a pusher engaging said plunger, an arm operatively connected to said pusher, a valve device mounted in said oil pressure cylinder for controlling the flow of the oil, and a spring interposed between the plunger and the valve device for mounting the valve device in its oil flow controlling position and for returning the plunger to its non-working position after being actuated by the pusher.

5. A hydraulic control as claimed in claim 3 further comprising a cylinder having a fluid chamber therein, said member being positioned within the cylinder, a piston working in the cylinder and operatively connected to said member, a flexible cup mounted within the cylinder between said chamber and piston to receive fluid from said chamber and operatively connected to said piston, said foot operated hydraulic means adapted to force fluid into said cup for expanding said cup to seal it against the inner wall of the cylinder and to move said piston and member in said first one direction and comprising a bellows, a pedal for collapsing said bellows, and a tube connecting said bellows to said chamber, said means for moving said member and piston in the opposite direction being a resilient means.

6. A hydraulic control as claimed in claim 5 wherein said cup is expansible and has one end open for receiving the fluid, the over-all outside diameter of the cup being such that the outer face of its wall engages the inner face of the wall of the cylinder at all times to prevent leakage of the fluid into the cylinder when the member and piston have been moved in said opposite direction and to be expanded by the fluid under pressure into tighter engagement with the inner face of the wall of the cylinder to prevent leakage of the compressed fluid into the cylinder when the member and piston have been moved in said first one direction.

7. A hydraulic control as claimed in claim 6 wherein the fluid enters the cylinder through a cap on one end of the cylinder, and the edge of the cup wall defining the cup opening freely engages the inner surface of the cap.

8. A hydraulic control as claimed in claim 3 wherein said foot operated hydraulic means comprises a cylinder receiving said member, a piston working in the cylinder and operatively connected to the member, an expansible cup operatively connected to said piston, an oil pressure cylinder having communication with said first cylinder, a plunger working in said oil pressure cylinder, a valve device for interrupting the communication between said cylinders, and resilient means between said valve device and plunger for moving said plunger to its non-working position and for mounting the valve device adjacent the point of communication between said cylinders.

9. A hydraulic control as claimed in claim 8 characterized by the fact that said valve device comprises relatively movable parts one of which is adapted to be moved to its open position during the working stroke of the plunger and to its closed position during the non-working stroke of the plunger.

10. A throttle valve and hydraulic control therefor as claimed in claim 1 wherein said foot operated hydraulic means comprises a cylinder, a piston working in the cylinder and operatively connected to said member, and an expansible cup operatively connected to said piston and having one end open, said cup having a base with an outside diameter equal to the inside diameter of the cylinder and a flared sidewall portion confined within the cylinder wall, tending when unstressed to have an outside diameter greater than the inside diameter of the cylinder.

11. A throttle valve and hydraulic control therefor as claimed in claim 10 wherein the sidewall portion has a wall which progressively diminishes in thickness from the base to the open end of the cup and terminates in a thin edge adjacent the open end of the cup.

No references cited.