

May 12, 1959

W. S. FISHER ET AL
CARBURETOR CONTROL SYSTEM

2,886,022

Filed Nov. 19, 1956

3 Sheets-Sheet 1

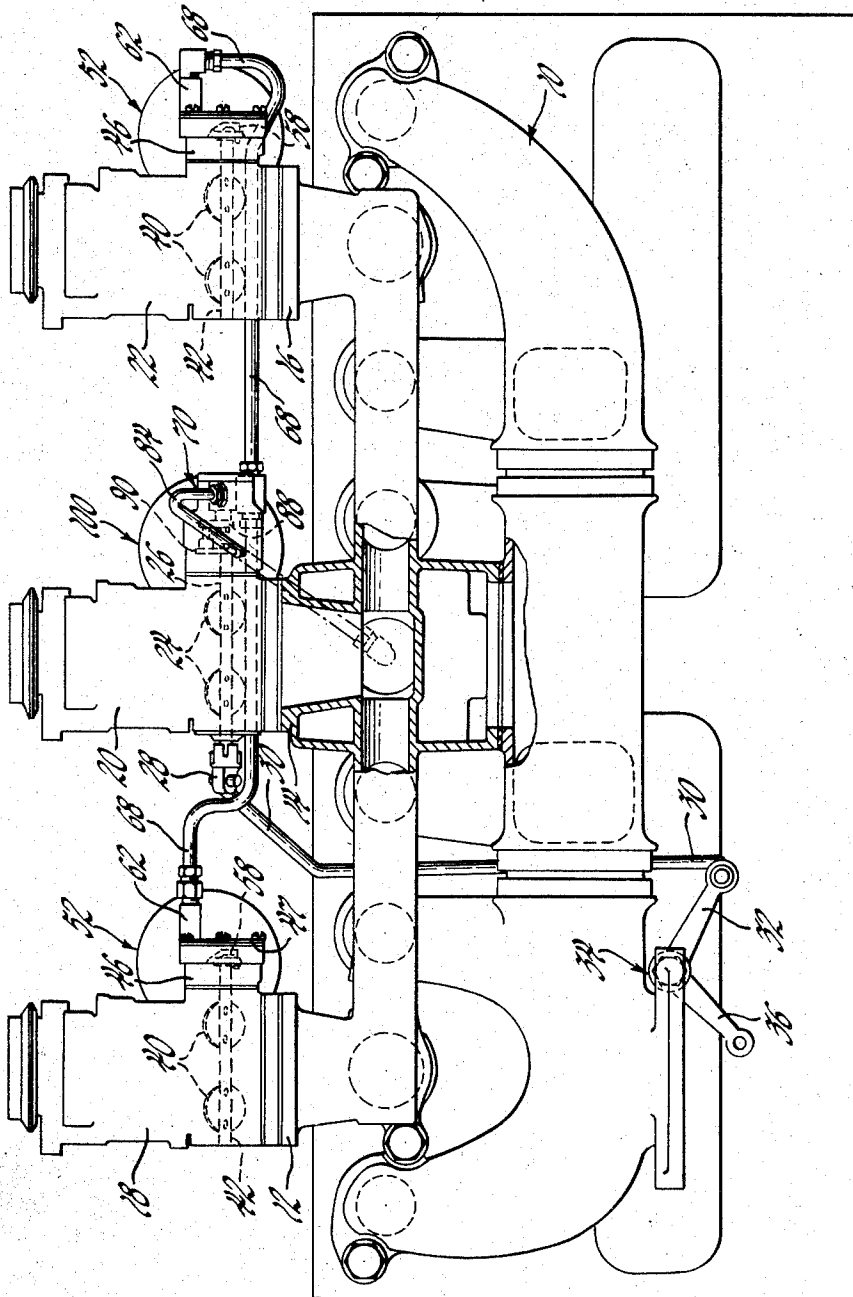


FIG. 1

INVENTORS.
*Walter S. Fisher &
BY Wallace M. Kennedy*
R. F. Barnard
ATTORNEY.

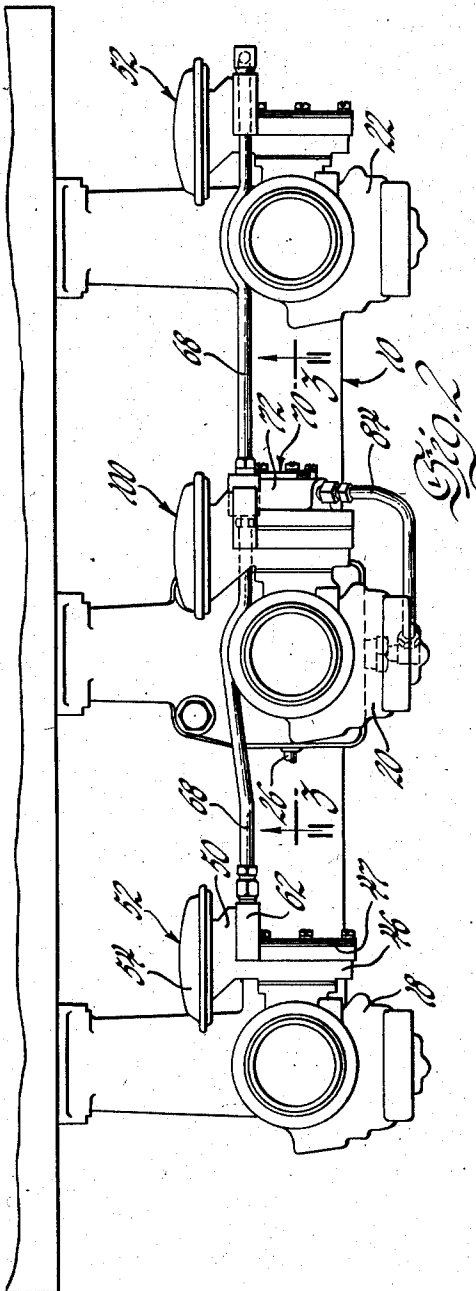
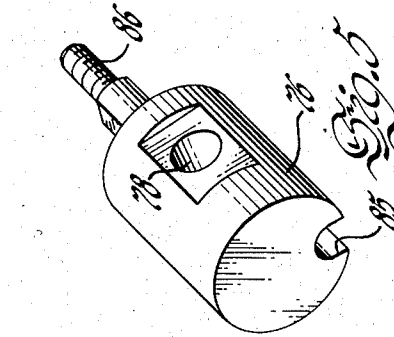
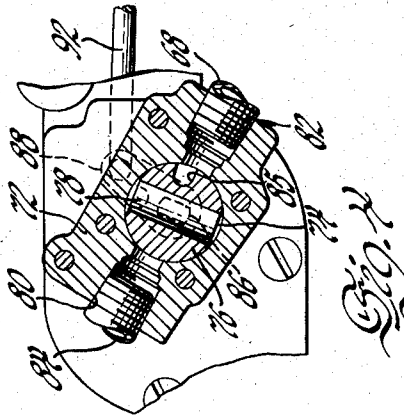
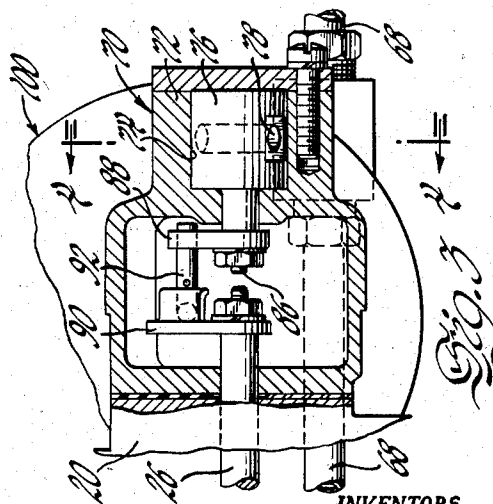
May 12, 1959

W. S. FISHER ET AL
CARBURETOR CONTROL SYSTEM

2,886,022

Filed Nov. 19, 1956

3 Sheets-Sheet 2



INVENTORS.
Walter S. Fisher &
BY Wallace M. Kennedy
R. F. Barnard
ATTORNEY.

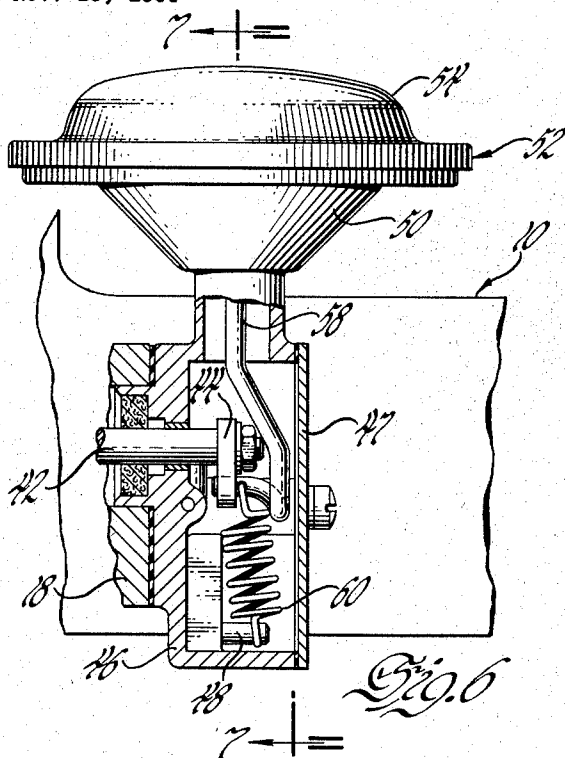
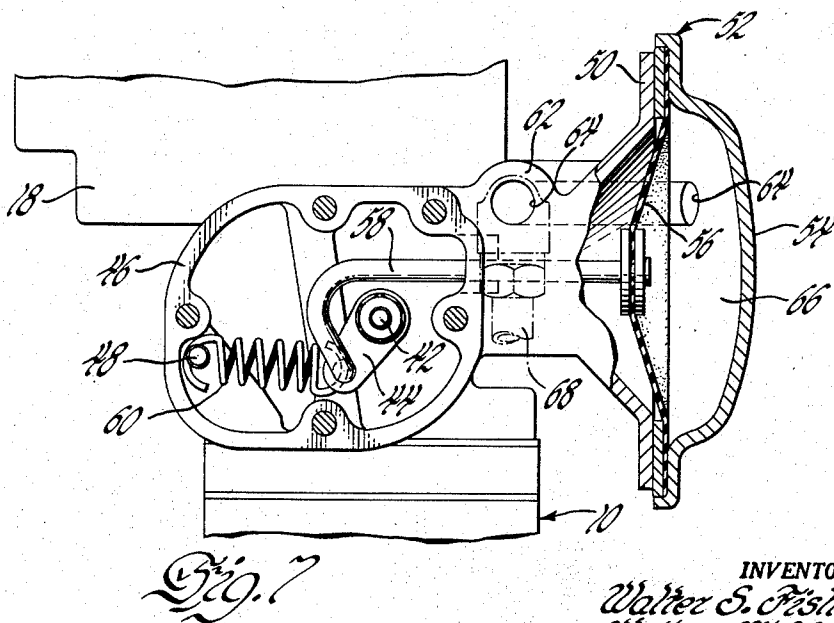
May 12, 1959

W. S. FISHER ET AL
CARBURETOR CONTROL SYSTEM

2,886,022

Filed Nov. 19, 1956

3 Sheets-Sheet 3



INVENTORS.

Walter S. Fisher &
BY Wallace M. Kennedy

R. F. Barnard
ATTORNEY.

1

2,886,022

CARBURETOR CONTROL SYSTEM

Walter S. Fisher, Birmingham, and Wallace M. Kennedy, Bloomfield Hills, Mich., assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application November 19, 1956, Serial No. 623,220

6 Claims. (Cl. 123—127)

The present invention relates to a carburetor control system in which a plurality of carburetors are utilized in supplying a combustible charge to an internal combustion engine.

It has long been a problem in large displacement engines to provide carburetion means having sufficient capacity to satisfy the engine and yet which means were not unduly expensive. The large displacement type engines have also normally been low production engines and therefore the special carburetion devices utilized therein were inevitably expensive. This situation in general has been approached from the point of view of using a plurality of smaller and less expensive carburetors having interconnected controls. Heretofore, however, such compounded carburetor arrangements have not worked out too satisfactorily. The problems have been manifold in endeavoring to compound carburetors and have included the satisfactory operation as well as continuing high cost due to the provision of appropriate controls.

Accordingly, the present invention is directed to a carburetion system which may utilize a plurality of less expensive type carburetors and in which one, or a master, carburetor is manually controlled and the remaining, or slave, carburetors are power actuated in accordance with engine load and operator demand. In this device the throttle valves of the slave or power actuated carburetors are controlled by servo mechanisms which are actuated by manifold vacuum. Thus, the degree of throttle opening is proportional to engine manifold depression. While the power actuated throttles are actuated by manifold vacuum, their actuation is overcontrolled by the manually actuated throttle which controls means preventing manifold vacuum from actuating the power throttles until such time as the manual throttle indicates a need for power to be supplied by both the master and slave carburetors.

In the present device a governor means is provided for preventing the engine from operating at excessive speeds. The governor is uniquely arranged on the master or manually actuated carburetor so as to overcontrol its throttle valve and thereby the vacuum force available to the slave carburetors.

In order to further reduce the cost of such installation and further since the manual carburetor is the only one active during the low speed or low power requirement operation, the present installation requires only a choke mechanism on the manual or master carburetor rendering the same unnecessary on the remaining carburetors. As will be seen from a perusal of the detailed description which follows the result of the subject carburetor arrangement is a relatively simple control arrangement involving a minimum of parts.

In the drawings:

Figure 1 is an elevational view of the subject carburetor arrangement;

Figure 2 is a plan view of the subject carburetor arrangement;

Figure 3 is a view along line 3—3 of Figure 2;

2

Figures 4 and 5 are detail views of the throttle controlled vacuum valve;

Figure 6 is a detail view of the power actuated throttle servo mechanisms; and

Figure 7 is a view taken along line 7—7 of Figure 6.

For illustrative purposes and representing a preferred form of the subject invention, an engine inlet manifold is shown at 10 and includes a plurality of risers 12, 14 and 16 upon which are respectively mounted carburetors 18, 20 and 22. While the basic number of carburetors which may be used is variable, a most satisfactory arrangement has been found in utilizing three carburetors, as shown, which includes the master or manually controlled carburetor 20 and the slave or power actuated carburetors 18 and 22 disposed on either side thereof. The carburetors, per se, may be of any well known type and may also be either single or multiple throat types. In the present case the carburetors are of the dual or two barrel type, as are now well known in the art, which yields an air flow the equivalent of six single throat carburetors. The details of the carburetors, per se, except insofar as they will be specifically hereinafter alluded to, constitute no part of the present invention and accordingly will not be described in detail.

Manually controlled master carburetor 20 includes throttle valves 24 fixed upon shaft 26 for rotation therewith. Disposed exteriorly of carburetor 20 and fixed to an extension of shaft 26 is a lever 28 to which is articulated a control rod 30, the other end of which is similarly articulated to one arm 32 of a bell crank lever 34 pivotally mounted on the engine block. The other arm 36 of lever 34 is adapted to have an accelerator pedal control lever, not shown, articulated thereto. Thus, throttles 24 are manually controlled through the actuation of the accelerator pedal.

Carburetors 18 and 22 are identical with each other, accordingly, it will suffice to describe the operation of one of said carburetors inasmuch as the same description and operation obtains in the case of the remaining carburetor. Power actuated carburetor 18 includes throttle valves 40 mounted on a shaft 42. As seen in Figures 6 and 7, a lever 44 is fixed to one end of throttle shaft 42 exteriorly of the carburetor and disposed in a casing 46. A cover 47 is removably secured to casing 46. A stud member 48 is disposed in casing 46.

Formed as an extension of casing 46 is one part 50 of a servo housing indicated generally at 52. The other part or cover of the servo casing is shown at 54. A diaphragm member 56 is adapted to be peripherally clamped between parts 50 and 54. Centrally mounted to diaphragm 56 is one end of a rod 58, the other end of which is bent so as to be articulated to throttle lever 44. A spring 60 is connected intermediate casing stud 48 and rod 58, as seen in Figures 6 and 7, and urges throttle lever 44 in a clockwise or throttle closing direction. With the engine inoperative or operating under conditions not requiring actuation of the power actuated carburetor, throttles 40 are closed and the diaphragm 56, rod 58 and lever 44 are in the positions shown in Figures 6 and 7. A boss 62 is formed on servo casing part 50 and has a passage 64 formed therein adapted to communicate with the servo chamber 66 formed by diaphragm 56 and casing part 54. When manifold vacuum is admitted to chamber 66 diaphragm 56 is moved to the right, moving rod 58 therewith and causing throttle lever 44 to be rotated in a counterclockwise direction to open the throttles 40 to a position in which manifold vacuum balances the closing force of spring 60.

Vacuum is supplied to passage 64 through a conduit 68, the other end of which is connected to a valve mechanism 70 mounted on the manual or master carburetor 20. As shown in Figures 1 and 3, the valve mecha-

nism 70 comprises a valve casing 72 having a cylindrical opening 74 formed therein and within which opening is disposed a rotatable valve member 76. Valve member 76 includes a longitudinal passage 78 formed therethrough. Disposed in valve casing 72 and communicating with opening 74 are inlet and outlet passages 80 and 82. Conduit 68 is connected to the outlet opening 82 while the inlet opening 80 has one end of a conduit 84 connected thereto, the other end of which conduit is connected to the inlet manifold 10. It will be seen that as the valve member 76 is rotated so that passage 78 is in alignment with inlet and outlet openings 80 and 82, manifold vacuum will be admitted to conduit 68 to open the power actuated throttles 40 to an extent determined by the magnitude of the aforesaid vacuum. A longitudinally recessed groove 85 is formed in the periphery of valve 76 to bleed servo chamber 66 when the valve cuts off the vacuum thereto. Groove 85 is vented to the atmosphere in any convenient manner.

Inasmuch as the manually controlled carburetor 20 is sufficient to supply combustible mixture to the engine during low or normal speed operation or when the engine load requirements are low, it is desirable that the power actuated or slave carburetors 18 and 22 not be in operation until the load requirements exceed the capacity of carburetor 20. To this end, the rotatable valve member 76 is controlled by the manual throttles 24 through a mechanism now to be described. Valve 76 includes a shaft 86 fixed thereto. Shaft 86 projects from the valve casing 72 and has a lever 88 suitably fixed thereon. Similarly manual throttle shaft 26 extends axially from carburetor 20 and has a lever 90 fixed thereon. A connecting rod 92 is articulated between throttle and vacuum valve levers 90 and 88 in such a way that actuation of the manual throttles 24 also causes a rotary movement to be transmitted to valve 76. It is apparent, therefore, that by suitably adjusting the positions of the various levers the opening of valve 76, to admit vacuum to the throttle servo housing 52, may be made to occur at any degree of opening of the manual throttles desired. In the present installation it has been found satisfactory to supply power needs to arrange the valve controlling linkage mechanism such that valve 76 will admit vacuum to conduit 68, by aligning passage 78 with openings 80 and 82, when the manual throttles are three-fourths open. After valve 76 is open to convey vacuum, the degree of opening of throttles 40 will be dependent upon the amount of manifold vacuum available. To illustrate, if the manual throttles were three-fourths opened and the vehicle were to ascend a steep grade it might happen that manifold vacuum would decrease to a value insufficient to overcome throttle springs 60 and throttles 40 would remain closed. On the other hand, should the manual throttles be three-fourths open under normal operating conditions, manifold vacuum would be sufficiently high to open the throttles 40 to supplement the combustible mixture being furnished by the manual carburetor 20.

In order to insure that the engine with which the subject carburetor arrangement is utilized is not run at excessive speeds, it is desirable to have a governing mechanism thereon. With the present carburetor arrangement it is necessary only to provide a single governing mechanism 100 mounted on carburetor 20 and governing the actuation of manual throttles 24. The governor, per se, constitutes no part of the subject invention and may be of the type shown in Patent Number 2,664,867, Hartzell et al. The governing mechanism 100 is suitably connected to the manual throttle shaft 26 so as to move the latter toward a closed position when the vehicle speed exceeds a given value. The general function of the carburetor in relation to the throttle being the same as that described in the aforementioned Hartzell patent. The governing mechanism 100 is connected directly to valve 76 through the valve actuating link-

age 90, 92, 88 so that when the governor begins to operate to close the manually controlled throttles 24, the power actuated throttles 40 will be disconnected from their vacuum source and hence closed by springs 60.

We claim:

1. An internal combustion engine comprising an inlet manifold, a plurality of carburetors for supplying combustible mixture to the manifold, each of said carburetors including a throttle valve, means for manually controlling the throttle valve of one of said carburetors, and power actuated means for controlling the throttles of the remaining carburetors, said power actuated means being responsive to engine load and operator demand whereby the manual carburetor alone supplies the combustible mixture during low engine load requirements, and an engine speed responsive governor operative to close said manually controlled throttle and said power actuated throttles.

2. An internal combustion engine comprising an inlet manifold, a plurality of carburetors for supplying combustible mixture to the manifold, each of said carburetors including a throttle valve means for manually controlling the throttle valve of one of said carburetors, and servo means for controlling the throttles of the remaining carburetors, a conduit connecting said servo means to said inlet manifold permitting manifold vacuum to actuate said servo connected throttles, valve means for controlling the flow of vacuum through said conduit, said manually controlled throttle being operatively connected to the valve means for controlling the servo connected throttles in accordance with the position of the manual throttle, said power actuated means being responsive to engine load and operator demand whereby the manual carburetor alone supplies the combustible mixture during low engine load requirements, and an engine speed responsive governor operative to close said manually controlled throttle when engine speed exceeds a given value, said governor being operatively connected to said valve for closing the latter when the governor commences functioning.

3. A carburetor control system for an internal combustion engine comprising an inlet manifold, a plurality of carburetors for supplying combustible mixture to said inlet manifold, a throttle valve disposed in each of said carburetors, the throttle valve of one of said carburetors being manually controlled, a governing mechanism associated with said manually controlled carburetor and adapted to move said manually actuated throttle valve toward a closed position when the engine exceeds a given speed, servo mechanisms operatively connected to each of the remaining throttle valves, means resiliently urging the servo actuated throttles toward a closed position, passage means communicating said servo mechanisms to said inlet manifold whereby engine vacuum is adapted to move the associated throttles toward open position, a valve mechanism in said passage means adapted to control the flow of vacuum in said passage means, and means operatively connecting said manually operated throttle valve with said vacuum controlling valve, during low engine load operation said valve being positioned to block the flow of air through said passage means and to bleed said servos to atmosphere, said vacuum controlling valve means being movable by said manual actuated throttles to a position communicating manifold vacuum to said servo mechanism after said manual throttles have been opened a predetermined amount.

4. A carburetor control system for an internal combustion engine comprising an inlet manifold, a plurality of carburetors for supplying combustible mixture to said inlet manifold, a throttle valve disposed in each of said carburetors, the throttle valve of one of said carburetors being manually controlled, a governing mechanism associated with said manually controlled carburetor and adapted to move said manually actuated throttle valve toward a closed position when the engine exceeds a given

5

speed, servo mechanisms operatively connected to each of the remaining throttle valves, means resiliently urging the servo actuated throttles toward a closed position, passage means communicating said servo mechanisms to said inlet manifold whereby engine vacuum is adapted to move the associated throttles toward open position, a valve mechanism in said passage means adapted to control the flow of vacuum in said passage means, and means operatively connecting said manually operated throttle valve with said valve mechanism during low engine load operation, said valve mechanism being positioned to block the flow of air through said passage means and to bleed said servos to atmosphere, said vacuum controlling valve means being movable by said manual actuated throttles to a position communicating manifold vacuum to said servo mechanism after said manual throttles have been opened a predetermined amount, means operatively connecting said governing mechanism and said valve mechanism whereby said valve is closed when said governor commences functioning.

5. An internal combustion engine as defined in claim 4 in which said valve means comprises a casing having inlet and outlet openings adapted to communicate respectively with the inlet manifold and the servo means, a rotatable valve element having a first passage therein adapted to register with said openings to admit manifold vacuum to said servo means and a second passage adapted to register with said outlet opening to bleed said

6

servo means to atmosphere, and linkage means operatively connecting said manual throttle and the rotatable valve element.

6. An internal combustion engine comprising an inlet manifold, a plurality of carburetors for supplying combustible mixture to the manifold, each of said carburetors including a throttle valve, means for manually controlling the throttle valve of one of said carburetors, and servo means for controlling the throttles of the remaining carburetors, a conduit connecting said servo means to said inlet manifold permitting manifold vacuum to actuate said servo connected throttles, valve means for controlling the flow of vacuum through said conduit, said valve means comprising a casing having inlet and outlet openings adapted to communicate respectively with the inlet manifold and the servo means, a rotatable valve element having a first passage therein adapted to register with said openings to admit manifold vacuum to said servo means and a second passage adapted to register with said outlet opening to bleed said servo means to atmosphere, and linkage means operatively connecting said manual throttle and the rotatable valve element.

References Cited in the file of this patent

UNITED STATES PATENTS

2,355,716	Ericson et al. _____	Aug. 15, 1944
2,362,879	Bicknell _____	Nov. 14, 1944
2,722,206	Ball _____	Nov. 1, 1955