Aug. 1, 1961 D. B. ELFES ET AL 2,994,312

SINGLE CHOKE FOR MULTIPLE CARBURETORS

Filed Oct. 10, 1958 4 Sheets-Sheet 1

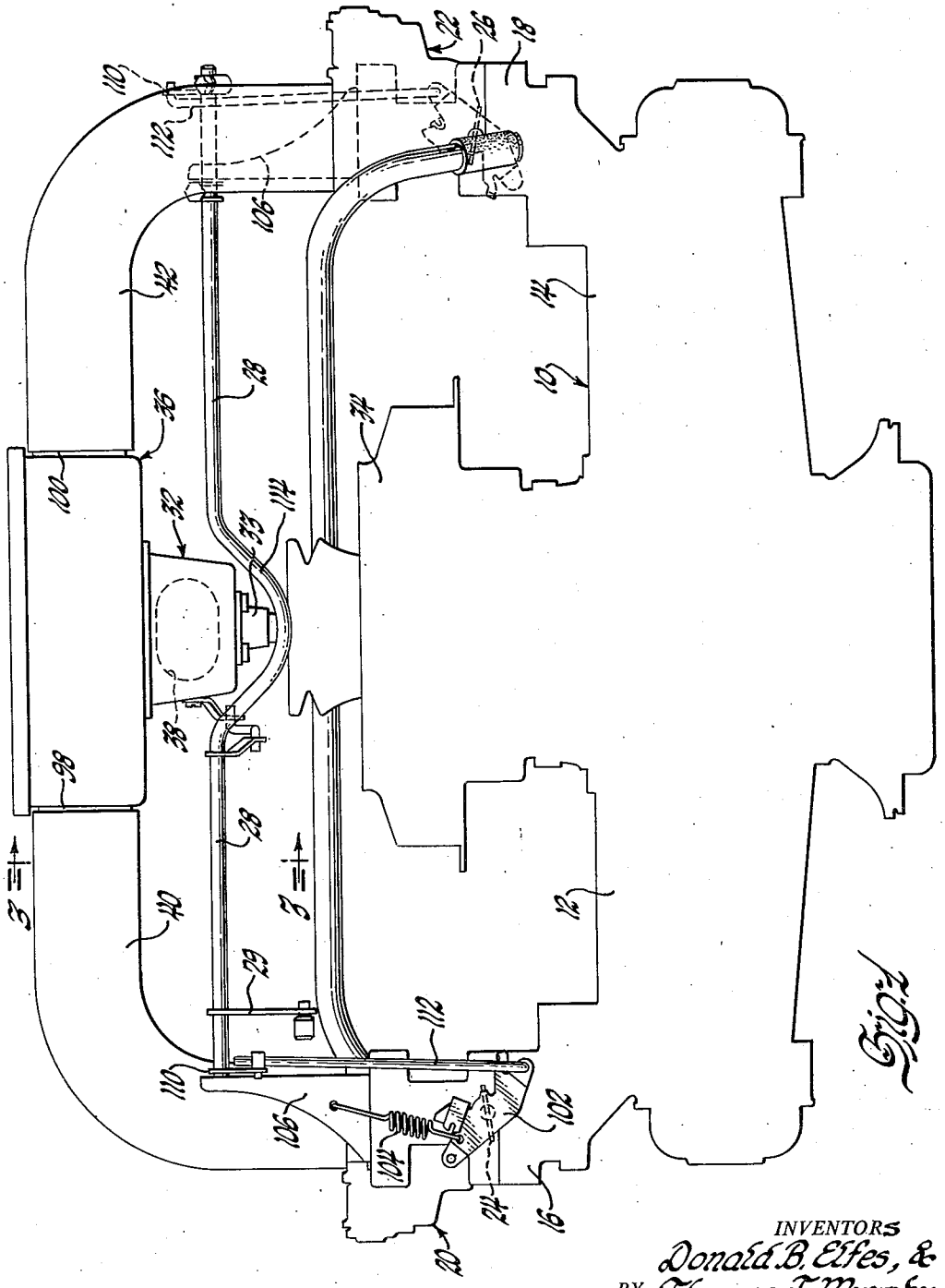


Fig. 1

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4 Sheets-Sheet 2

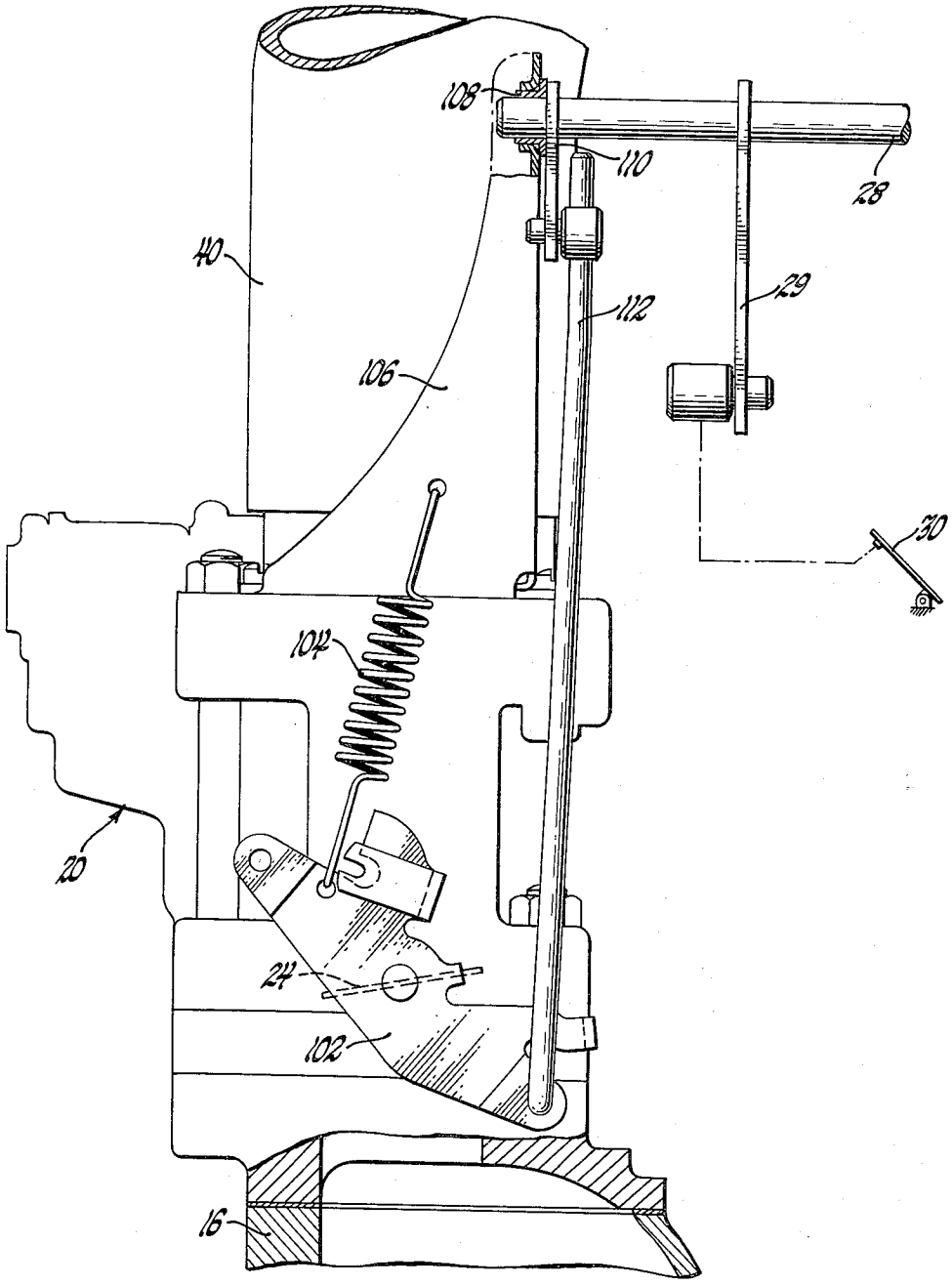


Fig. 2

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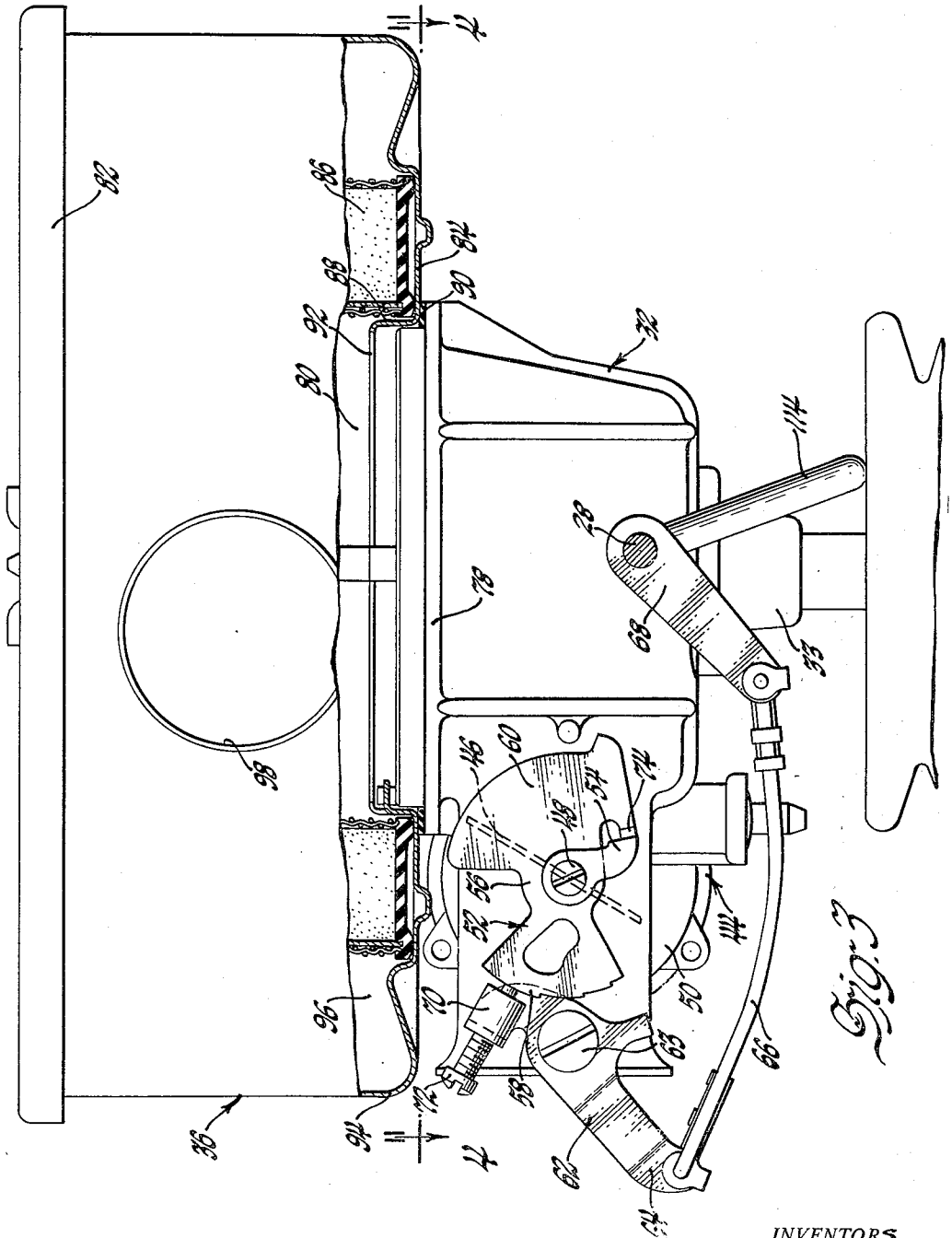


Fig. 3

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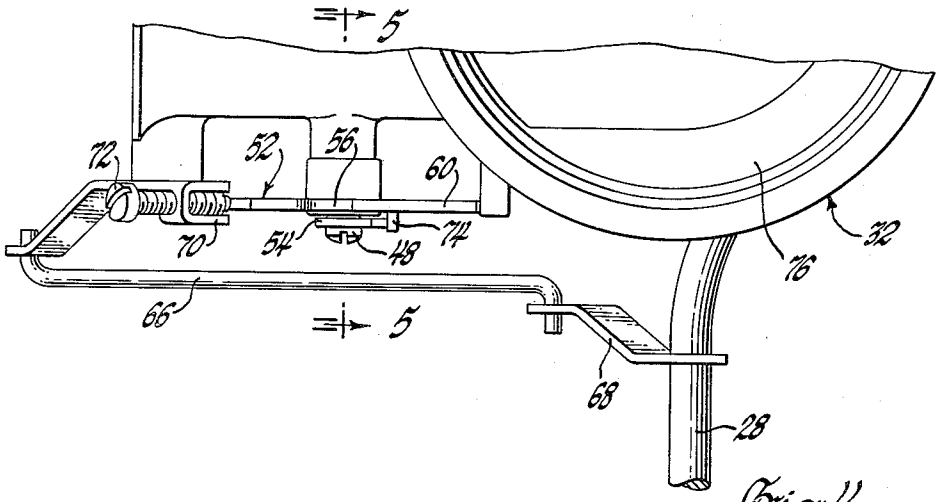


Fig. 4

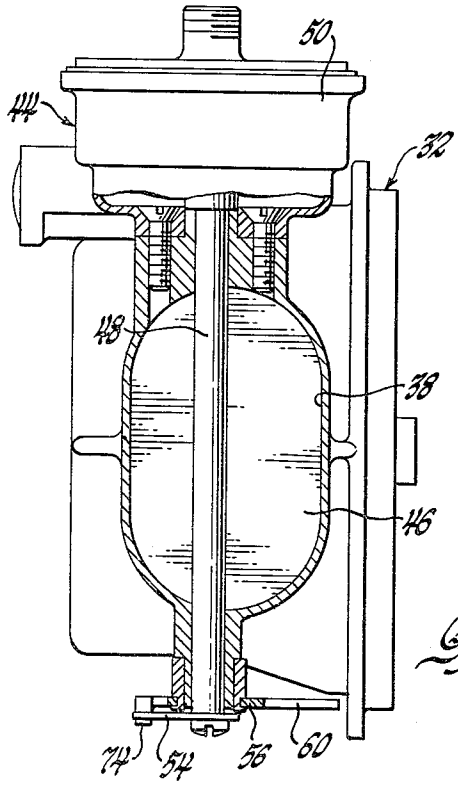


Fig. 5

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2,994,312

SINGLE CHOKE FOR MULTIPLE CARBURETORS

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6 Claims. (Cl. 123—119)

The present invention relates to a unique charge forming device for an internal combustion engine. More specifically the present invention relates to an engine utilizing a pair of carburetors mounted in spaced relation thereon and further which carburetors are controlled for enrichment purposes by a single choke device.

Utilization of a single choke mechanism for a pair of spaced carburetors is achieved in the present invention through a unique air horn and air cleaner arrangement which is constructed in such a way that the air horn is actually disposed anteriorly of the air cleaner permitting a single choke mechanism to be disposed in the air horn which in effect chokes or restricts the quantity of air supplied to the engine in advance of the air inlet for the air filter device.

While it is generally old to provide a single choke mechanism for a plurality of carburetors, as shown in Olson et al. 2,771,282, this has been relatively easy to achieve since most of such carburetors are formed in a common casing and have a common air inlet posteriorly of the associated air cleaner.

The engine with which the present charge forming device is adapted to be incorporated requires that the individual carburetors be considerably spaced from one another in order to supply widely spaced banks of cylinders. In addition, it is necessary with this type of engine that each of the individual carburttors provide choke means for providing an enriched fuel-air mixture under cold operating conditions. If individual choking mechanisms are provided for each carburetor, an extremely difficult problem arises insofar as coordinating the actuation of each choke mechanism in order that the respective banks of cylinders may be provided with the same fuel-air mixture. Due to inevitable manufacturing variations between the choke devices, it would be extremely doubtful that adjustment of the individual choking devices could be achieved to insure identical fuel-air mixtures for the cylinder banks supplied by each of the carburetors.

Accordingly, the present unique charge forming system has been provided in which a common air cleaner is disposed between the individual carburetors for supplying fluid air thereto and further in which an air horn assembly is mounted adjacent the intake of the air cleaner in such a way as to permit a choke mechanism to be disposed within the air horn for controlling the fuel-air ratio to each of the individual carburetors by controlling the air flow on the intake side of such air cleaner. It is apparent that in this way several economies are affected including the use of a single air cleaner and choke mechanism for a plurality of relatively widely spaced carburetors. Further, proper engine operation is assured in that equal fuel-air mixtures are supplied to the respective banks of cylinders supplied by each of the individual carburetors.

Other objects and advantages of the present invention will be apparent from a perusal of the detailed description which follows.

In the drawings:

FIGURE 1 is an end elevation showing the subject carburetion system mounted on an engine;

FIGURE 2 is an enlarged view of one of the carburetors of FIGURE 1;

FIGURE 3 is a view along line 3—3 of FIGURE 1;

FIGURE 4 is a fragmentary view along line 4—4 of FIGURE 3; and

FIGURE 5 is a view along line 5—5 of FIGURE 4.

For illustrative purposes, the present invention is shown mounted upon an opposed cylinder type engine indicated generally at 10. Engine 10 includes opposed cylinder blocks 12 and 14 each of which includes an inlet manifold 16 and 18 disposed thereon. In order to supply a combustible mixture to each of the inlet manifolds, carburetors 20 and 22 are respectively mounted thereon.

While they form a part of the overall combination of elements constituting the charge forming system, carburetors 20 and 22 do not, per se, constitute a part of the present invention. The carburetors, as illustrated, are of the single throat type and respectively include throttle valves 24 and 26. Throttle valves 24 and 26 are operatively interconnected for unison operation through a control rod 28. Control rod 28 includes a lever 29 fixed thereto and which in turn is suitably articulated to an accelerator pedal 30 in any well known manner.

Carburetors 20 and 22 are of identical construction and are intended to supply identical fuel-air mixtures to their respective cylinder banks 12 and 14 during all operating conditions. While such is not shown in detail in the drawings, it is to be assumed that each carburetor includes conventional sources of fuel including a float controlled fuel chamber and means for supplying fuel from the fuel chamber to various portions of the induction passages such as main and idling fuel nozzles as well as an accelerator pump.

As best seen in FIGURE 1, an air horn assembly 32 is disposed upon a flanged supporting plate 33 mounted upon a raised portion 34 of engine 10. Air horn 32, in turn, supports an air cleaner 36 thereupon. Air is inducted through an air inlet passage 38 formed in air horn 32. Air is then filtered in air cleaner 36 and supplied through conduits 40 and 42 to the respective carburetors 20 and 22.

As already noted, for reasons of economy as well as accuracy of operation of the individual carburetors, the present charge forming system utilizes a single choke mechanism indicated generally at 44 and disposed in inlet passage 38 of air horn 32. Referring to the more detailed views of FIGURES 3–5, it will be seen that the air horn inlet opening or passage 38 is of generally a flattened or elliptical cross section. A correspondingly shaped choke valve 46 is disposed within intake passage 38 and is fixed to a shaft 48 extending transversely thereof. Choke valve 46 is mounted off-center on shaft 48 so as to tend to open in response to air flow through passage 38.

Shaft 48 is adapted to be rotated by any suitable means in order to control the quantity of air flow into the air horn and thereby to control the fuel-air ratio. While the choke may be manually controlled, it is preferred to use an automatic choke actuating mechanism 50. Choke mechanism 50 may be of the type shown in Patent 2,705,-484, Jorgensen et al. For the purposes of the present invention it will suffice to note that the automatic choke mechanism 50 includes a temperature responsive element fixed to choke shaft 48 and thereby adapted to urge choke valve 46 in a closing direction with a force inversely proportional to engine temperature. As described in detail in the aforenoted Jorgensen application, the operation of the temperature responsive element is modified by a manifold vacuum controlled piston member, not shown.

Referring particularly to FIGURES 3 and 4, a throttle fast idle cam device is shown generally at 52 and is disposed on the opposite side of the air horn relative to the automatic choke device 50. While the automatic choke device 50 and the fast idle cam device 52 are shown on opposite sides of the air horn, it is apparent that if such is desired they may be disposed on the same side of the air horn assembly.

The fast idle cam device 52 includes a lever 54 fixed to choke shaft 48 for rotation therewith. A fast idle cam

member 56 is loosely mounted on choke shaft 48 proximate lever 54. Fast idle member 56 includes a cam surface having a plurality of steps 58 of progressively decreasing size formed thereon and a weighted portion 60 adapted, due to gravity, to rotate the fast idle cam in a clockwise direction.

A lever 62 is pivotally supported at 63 upon air horn 32 and includes an arm 64 having a link 66 articulated thereto. The other end of link 66 is articulated to a lever 68 fixed to throttle actuating rod 28. Thus as the operator depresses accelerator pedal 30 to open the respective carburetor throttles 24 and 26, lever 68, as seen in FIGURE 3, is rotated in a counterclockwise direction imparting, through link 66, a similar counterclockwise rotation to lever 62. Lever 62 includes another arm 70 upon which a cold idle adjusting screw 72 is mounted. Screw 72 is disposed proximate the stepped cam surface 58 of member 56 and is adapted, when the engine is cold, to engage with the aforenoted stepped surface.

The operation of the fast idle device is as follows: when the engine is cold, choke valve 46 will be in a closed position, as shown in FIGURE 3, in which case lever 54 will engage with a tang 74 formed on the weighted portion 60 of member 56 urging the latter member in a counterclockwise direction. This action moves the high step of the cam into engagement with the throttle screw 72 to insure that the throttle valves do not close beyond a predetermined amount when the engine is cold. As the engine warms, choke valve 46, being unbalanced and hence air flow responsive, will begin to move in a clockwise or opening direction whereby lever 54 will move away from tang 74 permitting the member 56 to be rotated by gravity in a clockwise direction presenting progressively lower steps of the cam surface to throttle screw 72 and thereby permitting the throttle to assume a progressively more closed position. In this way engine idling speed is reduced as the engine warms.

When the engine becomes fully warmed, member 56 is rotated in a clockwise direction sufficiently to move the cam surface 58 completely out of engagement with throttle screw 72 after which the idle setting of the throttle valves 24 and 26 will be controlled by a conventional curb idle control screw not shown.

As best seen in FIGURE 4, the air horn assembly includes an air chamber 76 which is supplied from air inlet passage 38. Air chamber 76 is open at the top and provides an outlet for the air drawn in through the air horn assembly. The air horn casting is provided with an annular flange 78 adapted to provide a seat for air cleaner 36 as seen in FIGURE 3.

It will be seen in FIGURE 3 that air cleaner 36 includes a central air chamber 80 formed by upper and lower walls 82, 84 and an annular filter member 86. Lower wall 84 of the silencer air cleaner assembly is recessed to provide an annular shoulder 88 adapted to seat upon air horn flange 78 through a suitable gasket member 90. The recessed portion of lower wall 84 is cut away to provide an inlet opening 92 generally coextensive with the outlet opening formed in the upper wall of the air horn assembly.

Outer casing wall 94 coacts with walls 82, 84 and filter 86 to define a silencer chamber 96. Diametrically oppositely disposed outlet openings 98 and 100 are disposed in casing wall 94 and communicate with conduits 40 and 42 leading to carburetors 20 and 22. Thus air will flow in through air horn intake passage 38 passing through chamber 76 upwardly into the central chamber 80 of the air cleaner silencer assembly where the air will then flow radially outwardly through the filter element 86, silencer chamber 96 to outlets 98 and 100.

In general the linkage mechanism through which each carburetor throttle is controlled by rod 28 is the same, therefore, it will suffice to describe the control for throttle 24 as shown in FIGURE 2. A lever 102 is fixed to throttle 24. A spring 104 is connected to one arm of lever 102 and anchored at its other end to a bracket 106.

Bracket 106 is suitably supported upon carburetor 20 and has a bearing 108 formed thereon to support one end of rod 28.

A lever 110 is fixed to rod 28 adjacent bracket bearing 108. A link 112 is articulated to levers 102 and 110 whereby rotation of rod 28 by accelerator pedal 30 imparts a similar movement to throttles 24 and 26.

A U-shape bend is provided in rod 28 at 114 to permit the rod to clear air horn assembly 32.

We claim:

1. A charge forming device for an internal combustion engine comprising a pair of carburetors mounted in spaced relation on said engine, each of said carburetors supplying a fuel-air mixture to a different group of the cylinders of the engine, each of said carburetors including a throttle valve, rod means interconnecting said throttle valves for unison operation, an air horn assembly mounted on said engine intermediate said carburetors, said air horn assembly including inlet and outlet openings, an air cleaner-silencer assembly mounted upon the air horn assembly and including an air inlet chamber communicating with the outlet opening of said air horn assembly, a pair of outlets formed in said air cleaner silencer assembly, a conduit member connecting each of said outlets with one of said carburetors for supplying filtered air thereto, and a choke valve mechanism disposed in said inlet opening for controlling the quantity of air supplied to each carburetor in accordance with engine temperature.

2. A charge forming device for an internal combustion engine comprising a pair of carburetors mounted in spaced relation on said engine, each of said carburetors supplying a fuel-air mixture to a different group of the cylinders of the engine, each of said carburetors including a throttle valve, rod means interconnecting said throttle valves for unison operation, an air horn assembly mounted on said engine intermediate said carburetors, said air horn assembly including inlet and outlet openings, an air cleaner-silencer assembly mounted upon the air horn assembly and including an air inlet chamber communicating with the outlet opening of said air horn assembly, a pair of outlets formed in said air clearner-silencer assembly, a conduit member connecting each of said outlets with one of said carburetors for supplying filtered air thereto, a choke valve mechanism disposed in said inlet opening for controlling the quantity of air supplied to each carburetor in accordance with engine temperature, and lever means interconnecting said rod means and the choke mechanism to limit the closing movement of the throttle valves until the engine is warm.

3. A charge forming device for an internal combustion engine of the type having two groups of cylinders disposed on different sides of the engine center line, a separate intake manifold for each group of cylinders, a carburetor mounted on each manifold and adapted to supply a fuel-air mixture thereto, each carburetor including a throttle valve, rod means interconnecting the throttle valves of each carburetor for unison operation, an air horn assembly mounted on said engine intermediate said carburetors, said air horn assembly including inlet and outlet openings, an air cleaner-silencer assembly mounted upon the air horn assembly and including an air inlet chamber communicating with the outlet opening of said air horn assembly, a pair of outlets formed in said air cleaner-silencer assembly, a conduit member connecting each of said outlets with one of said carburetors for supplying filtered air thereto, and a choke valve disposed in said air horn assembly inlet opening for controlling the quantity of air supplied to said carburetors.

4. A charge forming device for an internal combustion engine of the type having two groups of cylinders disposed on different sides of the engine center line, a separate intake manifold for each group of cylinders, a carburetor mounted on each manifold and adapted to supply a fuel-air mixture thereto, each carburetor includ-

ing a throttle valve, rod means interconnecting the throttle valves of each carburetor for unison operation, an air horn assembly mounted on said engine intermediate said carburetors, said air horn assembly including inlet and outlet openings, an air cleaner-silencer assembly mounted upon the air horn assembly, said air cleaner-silencer assembly including an air inlet chamber in comunication with the air horn assembly outlet opening, an annular filter element surrounding said chamber, an outer wall radially spaced from said filter element and defining an annular outlet chamber therewith, a pair of outlets formed in said outer wall and communicating with said outlet chamber air cleaner-silencer assembly, a conduit member connecting each of said outlets with one of said carburetors for supplying filtered air thereto, and a choke valve disposed in said air horn assembly inlet opening for controlling the quantity of air supplied to said carburetors.

5. A charge forming device as set forth in claim 1 in which the axis of said rod intersects said air horn assembly, said rod including a distended section adjacent the air horn assembly permitting the rod means to be rotated in non-interfering relation to said assembly.

6. A charge forming device for an internal combustion engine of the type having two groups of cylinders disposed on different sides of and equally spaced from the

engine center line, a separate intake manifold for each group of cylinders, a carburetor mounted on each manifold and adapted to supply a fuel-air mixture thereto, each carburetor including a throttle valve, rod means extending transversely of said center line and interconnecting the throttle valves of each carburetor for unison operation, an air horn assembly mounted on said engine intermediate said carburetors, said air horn assembly including inlet and outlet openings, the axis of said inlet opening being disposed above and algned with said center line, an air cleaner-silencer assembly mounted upon the air horn assembly and including an air inlet chamber communicating with the outlet opening of said air horn assembly, a pair of outlets formed in said air cleaner-silencer assembly, a conduit member connecting each of said outlets with one of said carburetors for supplying filtered air thereto, and a choke valve disposed in said air horn assembly inlet opening for controlling the quantity of air supplied to said carburetors.

References Cited in the file of this patent

UNITED STATES PATENTS

1,614,106	Criqui	Jan. 11, 1927
2,033,211	Tice	Mar. 10, 1936
2,172,957	Firth	Sept. 12, 1939
2,871,843	Hamilton	Feb. 3, 1959