June 17, 1930. H. H. TIMIAN 1,763,726

DUPLEX CARBURETOR SYSTEM

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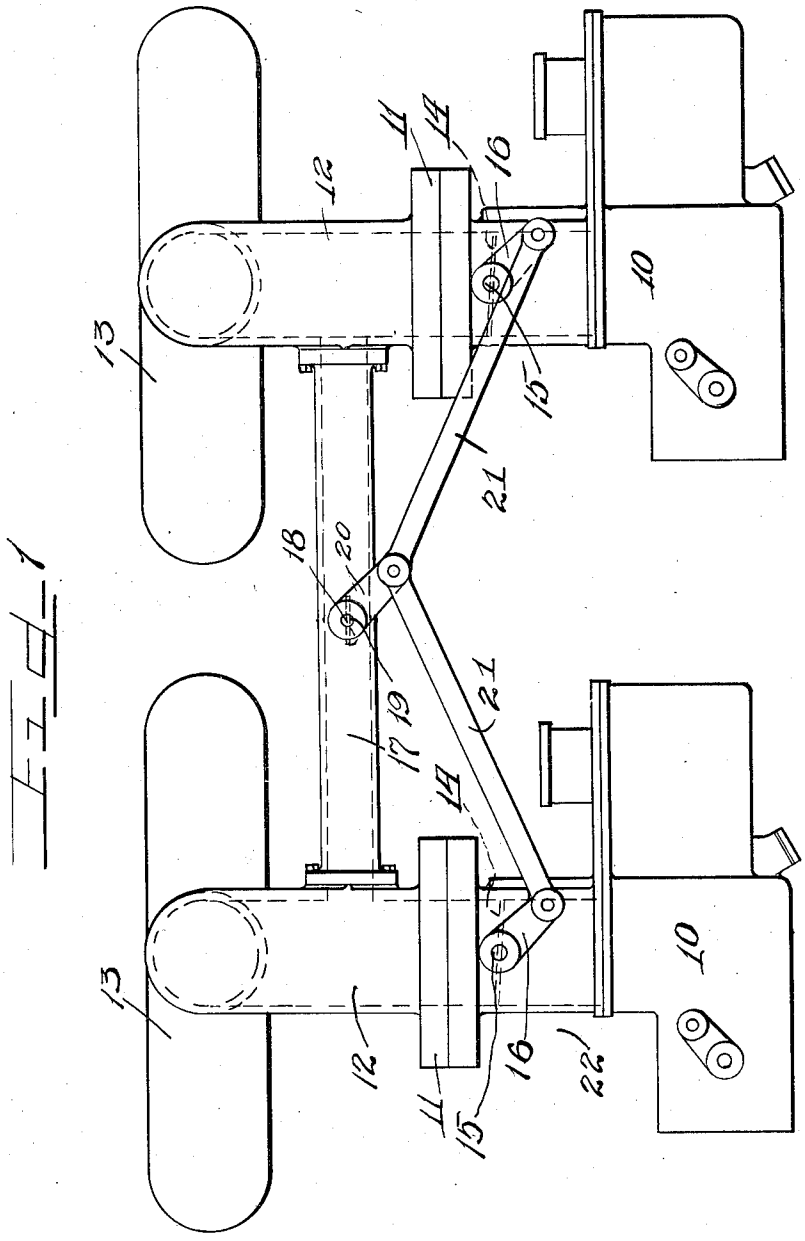


Fig. 1

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UNITED STATES PATENT OFFICE

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DUPLEX CARBURETOR SYSTEM

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This invention relates to a carbureting system for multi-cylinder internal combustion engines wherein the maximum possible power is desired at intervals together with economical operation at less than full power.

It is the principle object of this invention to provide an improved multiple carburetor system for engines of six or more cylinders. It is well known that for multi-cylinder engines wherein the utmost possible power development is desired, two or more carburetors will develop appreciably more power than a manifolding system fed by a single carburetor. At the same time the use of several carburetors militates against economical operation at part loads both because of the difficulty of securing a uniform adjustment, and because of the intermittent suction on the carburetors. It is also commonly recognized that an engine of six, eight, or more cylinders may be divided into groups of adjacent cylinders where the charging sequences are evenly spaced between the groups, i. e. alternating between them, so that if the manifolding of each group is separate each group will have an alternating pressure drop or surge when one cylinder in that group is drawing in a charge while no cylinder in the other group is similarly charging. It is therefore an object of this invention to utilize the surge or pressure drop alternately occurring between these smaller groups of cylinders to offset the pressure increase of other groups of cylinders which are at another point of the charging cycle; thus resulting in an increased fuel economy at partial loads. To accomplish this result I connect the manifolding systems of two such groups of cylinders by means of a bypass passage. The transfer of pressure so permitted results in a reduction of pressure or suction at the throttles and hence at the carburetor fuel jets.

It is another object of this invention to provide a bypass connection of the type described having control means whereby the effect of the bypass can be confined to the partial throttle openings of the carburetor range, thus providing very lean metering mixture for economical operation at medium motor speeds and loads; while eliminating the bypass effect at full throttle openings results in powerful or rich mixtures which develop the maximum power of which the particular engine is capable.

Other and further important objects of this invention will be apparent from the disclosures in the specification and accompanying drawings.

The invention (in a preferred form) is illustrated on the drawings and hereinafter more fully described.

On the drawings:

The single figure illustrates one embodiment of the present invention as arranged between two carburetors and manifolding systems for an engine.

A pair of carburetors 10 are conventionally shown as attached to flanges 11 on manifold risers 12 leading to horizontal distributing manifolds 13, which distribute the carbureted mixture to the individual cylinders of an engine. The particular arrangement shown is especially adapted to an eight cylinder engine divided into two groups of four cylinders and having siamesed intake ports, although the invention is not limited to such an arrangement and number of cylinders, so that it has been considered unnecessary to outline the engine structure.

Each carburetor has the usual throttle valve 14 on a shaft 15 as shown in dotted lines and the throttle levers 16 on each shaft must be operated in synchronism to produce a smoothly running engine.

The risers 12 of each manifolding system are connected by a bypass pipe 17 of relatively small diameter, a valve 18 being fitted in the pipe on a valve shaft 19 having a lever 20 linked to each of the throttle levers 16 by rods 21, the throttle valves 14 being in idling position when the bypass valve 18 is open, and the latter being tightly closed when the throttle valves are wide open.

The throttle valves are placed under the operators control by a conventional throttle operating linkage attached to any one of the two levers 16 or the lever 20. An op-

erating connection 22 in the illustration has been shown as connected to the left hand throttle lever 16.

The operation is as follows:

An engine of six, eight and twelve cylinders consists of several smaller units of cylinders of evenly spaced charging sequence that are commonly joined to a multi-throw crankshaft. By so choosing these groups that the charging impulses or surging in the intake manifold of one group alternates with similar impulses in another group; providing separate carbureting systems for each group, and interconnecting the separate manifolds by a controllable bypass, the engine is given new characteristics from the standpoint of maximum peak power together with maximum economy at part loads.

With two such groups of cylinders supplied from separate carburetors adjusted for maximum performance rather than economy, when the manifolds are connected by a bypass the latter causes a transfer of pressure between the manifolds because of the alternating surges therein. Such a transfer of pressure reduces the suction or pressure producing a fuel delivery from the carburetor fuel jet thus materially leaning out the mixture. By proper proportioning of the bypass and the carburetor idling characteristics a mixture will be obtained that will produce the maximum overall economy at part loads.

By connecting the bypass valve to the throttle valves in such a way as to close the bypass valve when the throttle is opened the richer mixture required for maximum performance is restored, while the opening of the bypass insures a much more economical operation of the engine when the throttles are partly closed.

It will thus be seen that I have invented an improved and simplified carbureting system that will develop maximum power when desired while also operating under conditions of maximum economy throughout the normal partial throttle openings of the carburetor range.

I am awere that numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted, otherwise than necessitated by the prior art.

I claim as my invention:

1. In combination in a multi-cylinder engine comprising a plurality of groups of one or more cylinders, separate carbureting systems for each group of cylinders, a common control for said carbureting systems, a control valve in said bypass passage and means connecting said valve to said common control adapted to operate said valve.

2. In combination, separate carburetors and intake manifolds for groups of cylinders having evenly spaced charging sequences, a bypass connecting said separate manifolds, a valve controlling said bypass, and means for simultaneously controlling said valve and the throttles of said carburetors.

3. In combination in an internal combustion engine comprising two groups of cylinders each group of which is fed by a throttle-controlled carburetion system, means linking the throttles of said carburetors to operate the same in unison, a bypass passage interconnecting said carburetion systems, a valve in said bypass passage, and means operated by said first mentioned means for closing said valve upon opening said throttles.

In testimony whereof I have hereunto subscribed my name at Indianapolis, Marion County, Indiana.

HAROLD H. TIMIAN.