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C. B. HART

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DUAL ENGINE MANIFOLD PRESSURE BALANCING DEVICE

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Charles B. Hart
INVENTOR.

INVENTOR.

BY

BY *J. C. Swicker*
his ATTORNEY.

his ATTORNEY.

UNITED STATES PATENT OFFICE

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DUAL ENGINE MANIFOLD PRESSURE
BALANCING DEVICE

Charlie B. Hart, Odessa, Tex.

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2 Claims. (Cl. 60—97)

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This invention relates to improvements in dual engine manifold pressure balancing devices and more particularly to such devices as are used for the synchronization of internal combustion engines of the character in which a gaseous charge of fuel is drawn in by suction into the combustion chamber of each of a pair of interconnected engines.

It has been proposed heretofore to control the operation of a pair of engines but such controls as were proposed usually have required the use of identical engines and carburetors or the operation by outside mechanism of a control for the supply of fuel to the engines. Such devices have not been satisfactory because identical engines are not always available to be interconnected and the use of outside actuating mechanism adds complexity to the structure that renders it undesirable.

The object of this invention is to simplify and improve motor synchronizers for this purpose to enable them to function accurately on engines of different sizes and without the necessity for any outside actuating force other than the action of the suction created in the intake manifold of the engine.

This object is accomplished according to a preferred embodiment of the invention by connecting a synchronizer unit, so as to act responsively to the relative suction created in the intake manifolds of the engines so as to actuate the throttle valve of one engine from the action of the other, whereby both engines will function to apply a proportionate amount of power to the load.

This embodiment is illustrated in the accompanying drawing in which:

Fig. 1 is a diagrammatic side elevation of the synchronizing control applied to a pair of engines; and

Fig. 2 is a longitudinal section through the control unit with parts in elevation.

Referring to Fig. 1, the numerals 1 and 2 indicate a pair of internal combustion engines which may or may not be identical in size and capacity but are adapted to be connected together with a common element to which power is to be applied. These engines are of the character of internal combustion engines in which a gaseous fuel mixture is drawn by motion into the cylinders of the engines through an intake manifold, indicated, respectively, at 3 and 4, for internal combustion in the cylinders. A carburetor for each engine is shown respectively at 5 and 6 to supply the gaseous fuel mixture to the intake manifold.

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Each engine is controlled by a throttle valve which is shown as located within the inlet side of the intake manifold as indicated respectively at 7 and 8. In the form shown, these throttle valves are of the usual butterfly valves ordinarily employed for the purpose. The throttle valve 7 for controlling the operation of the first or master engine 1, preferably has a manual control, shown as a rod 9, attached thereto for operating the said throttle valve.

The synchronizer includes a control unit generally indicated at 10 and shown in detail in Fig. 2. This unit is constructed with an internal cylinder 11 closed at opposite ends by heads 12 and 13 threaded into opposite ends of the cylinder. The head 12 has a mounting stud 14 fixed therein and adjustably connected with a stationary part, such as a bracket 15 on a side of the engine, as shown in Fig. 1.

Operatively mounted in the cylinder 11 is a piston 16, having double seal piston rings 16' effectively sealing the space between the piston and cylinder. A piston rod 17 extends outwardly from the piston 16 through a packing gland 18 in the head 13. The outer end of the piston rod 17 is connected with an arm 18' attached to the throttle valve 8 of the second engine 2, as shown in Fig. 1.

One end of the control unit 10 is adapted to be connected through a tube 19 with the intake manifold 3 of the first engine 1, in open communication therewith, which tube 19 extends to a coupling 20 carried by the head 12 of the control unit. The coupling is in a form of a T and is in open communication with the adjacent end of the cylinder 11 and through which coupling 20 and tube 19 open communication is established between said end of the cylinder 11 and the intake manifold 3. A valve 21 is connected with the opposite side of the coupling 20 to admit air into the tube 19 and cylinder 11 when desired.

The opposite end of the cylinder 11 is connected through a tube 22 with the intake manifold 4 of the second engine 2. The tube 22 is connected also with a coupling 23, shown as in the form of a T, in open communication with the adjacent end of the cylinder 11. An air valve 24 is also connected with the coupling 23 adapted to admit air thereto when desired.

The engines may be provided with vacuum gauges as indicated respectively at 25 and 26. These gauges are connected through tubes 27 and 28 to the respective intake manifolds 3 and 4, so as to indicate on the gauges the respective degrees of vacuum present in the intake mani-

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folds and thereby to show the relative values of the operation of the engines, whether or not they are pulling the same or desired proportions of the load.

Each of the vacuum lines 19 and 22 has a control valve therein, as designated 29 and 30, respectively, to regulate the amount of suction communicated to the cylinder 11. Thus, by closing off one of the control valves 29 and 30, and opening the corresponding air valve 21 or 24, the operator may control the openings of the throttles in proportion to the power ratio of the respective engines. In this way, the second motor may be set at a different speed or power ratio from the first engine.

In the operation of this synchronizer, it will be evident that the engine 1 is controlled manually by the manipulation of the control rod 9 to regulate the supply of fuel from the carburetor 5 through the intake manifold 3 into the cylinders of the engines, the gaseous fuel mixture being drawn through the manifold by the suction created in the cylinders of the engine.

The amount of suction present in the manifold 3 is a function of the amount of power created by the operation of the engine, and will be communicated through the tube 19 to the end of the cylinder 11 acting therein on the piston 16. As the suction increases due to a reduction of power in the engine 1, the suction will move the piston 16 to the right in Fig. 2, tending to close the throttle valve 8 of the second engine. The piston 16 is controlled by the balance of suction created on opposite sides thereof, as communicated to opposite ends of the cylinder 11 from the respective intake manifolds 3 and 4.

Thus it will be evident that the position of the throttle valve 8 will be directly in proportion to the position of the throttle valve 7 when the engines 1 and 2 are of the manifold-suction type. Any variation in the amount of suction present in the respective manifolds which indicates a variation of power output, will be communicated to the cylinder 11 acting therein to move the piston 16 and adjust the throttle 8 accordingly. This adjustment will be in proportion to the setting of the valves 29 and 30, either to equalize the throttles, or to adjust the throttle of the second engine in proportion to the ratios of the respective engines.

I claim:

1. A dual engine manifold pressure balancing device for a pair of engines comprising a cylinder, heads at opposite ends of said cylinder, a piston slidably mounted in the cylinder, means for connecting the piston to a throttle valve on one of said engines, a tube connected to one

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end of said cylinder adapted to be connected to a manifold on one of said engines, a second tube connected to the opposite end of said cylinder adapted to be connected to a manifold on the second of said engines, a control valve in said first-mentioned conduit, a control valve in said second-mentioned conduit, each of said control valves being constructed to regulate the effective manifold pressures acting upon said piston whereby the manifold pressures of the engines are maintained in equilibrium and the control may be prevented from hunting by either of the control valves, and bleeder valves in each of said tubes for independently admitting air to each end of said cylinder.

2. A dual engine manifold pressure balancing device for a pair of engines comprising a cylinder, heads threadably secured in opposite ends of said cylinder, a piston slidably mounted in the cylinder, a connecting rod carried upon said piston and extending through one of said heads, a packing gland threadably secured to said last-mentioned head and receiving said piston rod therethrough, a rod secured to one of said heads for mounting said cylinder on one of said engines, means on said connecting rod for connecting said rod to a throttle valve on one of said engines, a tube connected to one head of said cylinder adapted to be connected to a manifold on one of said engines, a second tube connected to the opposite head of said cylinder adapted to be connected to a manifold on the second of said engines, a control valve in said first-mentioned tube, a control valve in said second-mentioned tube, each of said control valves being constructed to regulate the effective manifold pressures acting upon said piston whereby the manifold pressures of the engines are maintained in equilibrium and the device may be prevented from hunting by either of the control valves, and bleeder valves in each of said tubes for independently admitting air to each end of said cylinder.

CHARLIE B. HART.

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