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H. F. LEISSNER

INTERNAL COMBUSTION ENGINE

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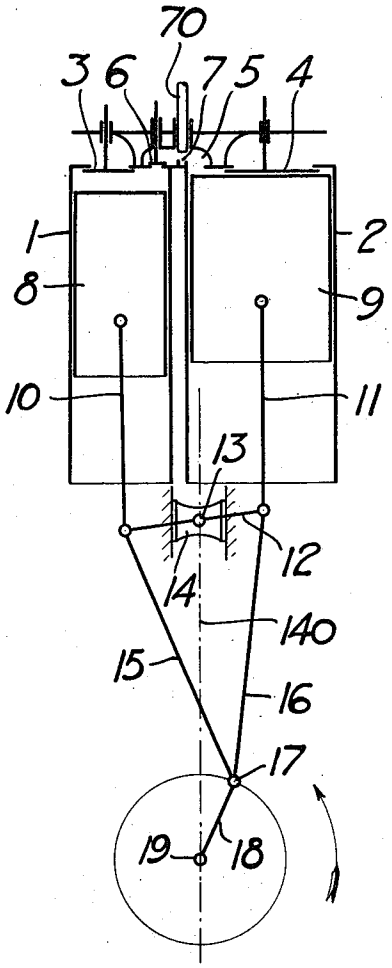

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INTERNAL-COMBUSTION ENGINE.

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This invention relates to internal combustion engines of the type in which the compression of the combustion air is effected in one cylinder and the combustion and expansion of the fuel mixture take place in another cylinder.

The object of this invention is to provide an internal combustion engine of the above said type which is simple in construction and efficient and reliable in operation.

The invention is characterised, chiefly, by the provision of means to control a connection between said two cylinders in such a way as to first establish communication between said cylinders after the compression within the compression cylinder has reached a sufficient value to raise the temperature within said cylinder to the evaporation temperature of the fuel.

In the accompanying drawing a vertical section of an internal combustion engine according to this invention is shown in a diagrammatic manner.

With reference to the drawing, 1 is the compression cylinder and 2 is the combustion and expansion cylinder. The cylinder 1 is provided at its top with an air intake valve 3 and the cylinder 2 is similarly provided with an exhaust valve 4. Extending between the cylinders 1 and 2 at the tops thereof is a passage 5 controlled by a valve 6 which may be either mechanically controlled or automatic in its operation.

Provided within the passage 5 is a cup 7 adapted to receive liquid fuel supplied through the inlet pipe 70.

The cylinders 1, 2 contain each a reciprocating piston 8 and 9, respectively, which are connected by links 10 and 11, respectively, to the opposite ends of a balance lever 12, pivoted at 13 to a cross-head 14 movable up and down along the dotted line 140. The balance lever 12 is further connected at its ends to two connecting rods 15 and 16 connected at their opposite ends to a common crank pin 17 carried by a crank 18 on the engine shaft 19.

The operation of the engine described is as follows:

When the pistons 8 and 9 are moving upwards the piston 8 will compress the air contained in the cylinder 1, the piston 9 expelling at the same time the combustion gases from the cylinder 2 through the exhaust valve 4. When 9 reaches its uppermost position, the valve 4 is closed and the valve 6 is caused or allowed to open. The piston 8, still moving upwards, will thereupon cause the compressed air to pass from the cylinder 1, through the passage 5, and into the cylinder 2. While the pistons were moving upwards a sufficient amount of liquid fuel was supplied through pipe 70 to the passage 5 or to the cup 7 therein, and the compressed air, in passing through said passage will, consequently, carry away said amount of fuel and thoroughly mix therewith.

If, according to this invention, the valve 6 is not opened until after the compression within the cylinder 1 has reached a sufficient value to raise the temperature of the compressed air beyond the evaporation temperature of the fuel but not beyond the ignition temperature thereof, a hot homogenous gas mixture will be obtained. When also the piston 8 reaches its uppermost position, the valve 6 is closed or allowed to close, the ignition of said gas mixture being effected simultaneously or substantially simultaneously by suitable means, not shown.

The passage 5 between the cylinders 1 and 2 may, preferably, open excentrically or substantially tangentially into the cylinder 2 so as to cause the gas mixture to take up a rotary movement within the cylinder 2 thereby securing a thorough mixing of the air with the fluid.

In the down stroke of the pistons 8 and 9 the combustion gases within the cylinder 2 will do work, fresh air being at the same time drawn into the cylinder 1 through the valve 3 which may be automatic in its operation.

As to the transmission of the power from the piston 9 to the shaft 19 as well as to the piston 8 it is to be noted that, with the crank pin 17 moving in the direction of the arrow, the piston 9 will reach its uppermost position before the crank pin reaches its upper dead centre, while the piston 8 will not reach its uppermost position until after the crank pin has passed beyond its upper dead centre.

What I claim is:

1. In an internal combustion engine, a separate compression cylinder adapted to receive and compress all the air used in the combustion of the fuel, a power cylinder in which the combustion and compression are

adapted to take place, pistons in the cylinders, means adapted to operate the piston of the combustion cylinder in advance of the piston of the compression cylinder, a passageway between said cylinder in open communication with the power cylinder, means to control the connection between said passageway and the compression cylinder adapted to establish communication therebetween after the power piston has completed its exhaust stroke but before the compression piston has completed its compression stroke and to cut off said communication before ignition takes place, means to introduce liquid fuel in said passageway, and a cup within said passageway to receive said liquid fuel.

2. In an internal combustion engine, a separate compression cylinder, a separate power cylinder, a piston in each of said cylinders, common means adapted to operate the piston of the combustion cylinder somewhat in advance of the piston of the compression cylinder, a passageway between the tops of said cylinders opening near the periphery of the power cylinder, said passageway being in open communication with said power cylinder, mechanical means to control the communication between said passageway and said compression cylinder adapted to establish communication therebetween after the power piston has completed its exhaust stroke and to cut off said communication before ignition takes place, a cup in said passageway, and means to supply liquid fuel to said cup.

In testimony whereof I have signed my name.

HARRY FERDINAND LEISSNER.