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BY A. P. C.

J. BIECHL

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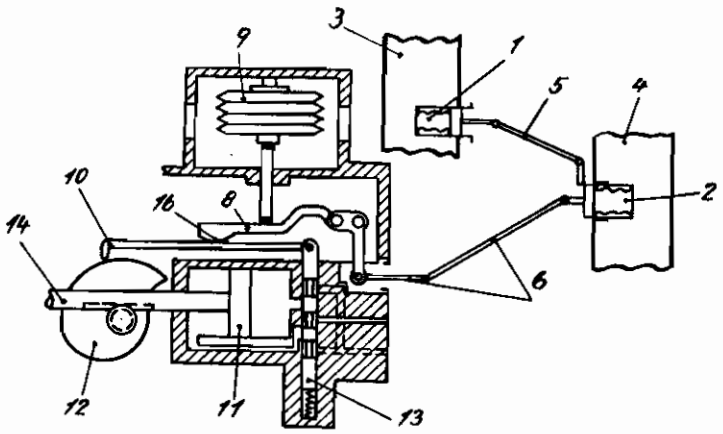

Inventor

Josef Biechl

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FUEL ADMISSION SYSTEM FOR INTERNAL COMBUSTION ENGINES

Josef Biechl, Munich, Germany; vested in the Alien Property Custodian

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This invention relates to internal combustion engines of the fuel injection type, especially those designed for aircraft, in which the air is precompressed by using a blower. In these engines it is usual when providing automatic regulation to control the fuel quantity to be delivered for each working stroke in dependence on the specific weight of the air in the intake pipe. This is done mostly in such a manner that the control piston for example of a servomoter operating under oil pressure is displaced through the action of a measuring gauge being exposed to the influence of the air condition in the charging pipe of the engine, thus releasing the pressure fluid to take the corresponding ways to the working cylinder. The delivery quantity of the injection pump is then controlled by the working piston which causes the piston valve being returned to neutral position by means of a simultaneously moved cam with the help of a resetting lever.

With this method the fuel distribution will be correct as to the quantity, the temperature in charging pipe however, which is responsible for the thermal load of the engine, is not considered as for instance with an increasing temperature of the outer air the charging pressure regulator will maintain constant the specific weight of air by increasing the charging pressure in the charging pipe of the engine. The injection pump regulating device for this reason will not influence the fuel distribution each revolution, though in this case an enrichment of the mixture is necessary to prevent a thermal overstraining with maximum output yield.

To remove this drawback the invention provides an additional influencing on the injection pump regulating device which is responsive to the specific weight of the air in the charging pipe of the engine, by a regulating value resulting from the temperature prevailing in advance of and beyond the charging blower. To meet this object there is arranged in the air intake pipe and in the charging pipe a thermostat of known construction consisting of a cylinder to one end of which a corrugated tube is fixed. This tube is closed at its end face by a piston the rod of which projects from the cylinder and is subject to longitudinal movements in accordance with changes of temperature. The two thermostats are connected by rods in such a way that the reaction of the thermostat in the air intake pipe controls the initial adjustment of the thermostat in the charging pipe and then starting from the varied initial adjustment also the thermostat in the charging pipe will be able to respond. The composed movement is used to correct the adjustment of the quantity of fuel delivered by the fuel pump which adjustment is effected by the barometric capsule by means of a further linkage.

Supposing an increase in temperature will occur in the charging pipe before reaching the rated height owing to an increased engine speed when the charging pressure remains constant this means in the case of regulating devices known hitherto which respond only to the specific weight of the air, that no variation in the fuel supply takes place as the specific weight of the air—to which the injection pump governor is responsive—is maintained constant by the charging pressure regulator. The real state of things is that the increase in temperature associated therewith causes increased thermal load on the engine which is taken into account by this invention as the fuel supply is influenced by the thermostat in the charging pipe thus being determined an enrichment of the fuel air mixture which consequently will ensue an internal cooling of the engine.

If there occurs for instance a departure from the normal ratio between the charging pressure and the temperature in the charging pipe this means that without the consideration of the temperature in the air intake and the charging pipe according to the invention, which represents a regulation in accordance with the temperature determining the thermal load on the engine, the fuel quantity delivered would be likewise unsufficient. An overloading of the engine however will be efficiently eliminated by the consideration of the temperature as regulating value according to the invention, thus maintaining notwithstanding an optimum output in every case.

The device according to the invention for utilizing the temperatures in the air intake and the charging pipe as regulating value consists as shown in the accompanying drawing of a thermostat 1 in the air intake pipe 3 and of a thermostat 2 in the charging pipe 4 which for instance are connected in such a way that the initial adjustment of the thermostat 2 is varied by the rods 5 owing to the reaction of the thermostat 1. From this new initial adjustment the thermostat 2 will respond separately and the resulting movement will be transmitted by the rods 6 to the regulating device.

This value is now taken into account in such a manner that the movements transmitted by the rods 6 is imparted through the bell crank lever 7 to a pivot arm 8. The pivot arm 8 serves as intermediate member between the barometric

capsule 9 responding to the air condition in the charging pipe and the resetting lever 10 which abuts with one end on the cam 12 connected for positive movement with the working piston 11 and is pivoted with its other end to the piston valve 13. The known regulating operation of the barometric capsule 9 on the piston valve 13 according to which the working piston 11 is displaced by the pressure fluid which causes the fuel supply of the injection pump to be varied by the piston rod 14 is no longer effected directly according to the invention but the pin 15 moved by the barometric capsule 9 abuts against the arm 8 and this arm on its part influences by means of its end 16 opposite its hinge point with the bell crank lever 7 the resetting lever 10.

From this arrangement and from the fact that the variations caused by the temperature in the air intake pipe and in the charging pipe are considered for there follows an additional influence on the effective lever arm of the barometric capsule 9 controlling through the pin 15 the piston valve 13 and thus by the correct metering of the fuel supply for each working stroke the disadvantageous straining of the engine referred to in the foregoing is eliminated.

In addition it may be mentioned that by an appropriate selection of the dimensions of the arms of the bell crank lever 7 which transmits the movement imparted by the rods 6 to the intermediate arm 8, it is possible to give the regulating value resulting as described above every desired possibility of action.

JOSEF BIECHL.