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DESCRIPTION DE202011108371U1

[0001]

¹³ The invention relates to a device for increasing the compression space of piston-driven engines z. B. Gas engines, diesel engines and Otto engines in general, by inserting a suitable milled plate between the cylinder head and the upper end of the engine block, the compression space available to the engine is increased.

[0002]

²⁰ When using piston engines for Otto engine conversion of fuel gases, Otto engines or converted diesel engines are used.

[0003]

²⁵ Due to the fact that fuel gas at higher temperatures than z.

²⁶ As gasoline burns in the engine, converted diesel engines are increasingly being used as gas engines.

²⁸ When converting a diesel engine to a gas engine, the original diesel engine is fitted with a suitable ignition device and spark plugs in the cylinder head area. Furthermore, in such engines, the existing combustion chamber recesses of the pistons are usually drilled out in order to enlarge the compression space. When using piston engines, or diesel engines converted as described above, for operation with a fuel gas, the problem often arises that when a specific engine temperature is reached, which corresponds to the ignition temperature at the compression achieved, the fuel gas ignites by itself. This auto-ignition leads to uncontrollable engine operation, and in the worst case to engine self-destruction. Although the previous drilling of the combustion bowl increases the compression space, it cannot prevent self-ignition when a certain engine temperature and certain corresponding compression are reached, since drilling

- out the combustion bowl only increases the compression space by a few percentage points.
- 39 The only effective measure known to date in the event of self-ignition of the fuel gas in the engine was that the gas valve supplying the engine with fuel gas was closed immediately. Although this can prevent the motor from self-destructing, controlled operation in the sense of constant speed and constant power is not possible. The only known measure for preventing self-ignition is that the ignition angle is advanced accordingly before top dead center (TDC), where the compression of the combustion gas for self-ignition has not yet been reached even at high engine temperatures. What is achieved in this way is that the combustible gas-air mixture is ignited before self-ignition can occur. Since it is not technically possible to cool down the engine temperatures in the area of the pistons and thus the compression chamber, the mixture of fuel gas and air must be ignited by spark plugs or similar, as described above, before the critical compression is reached.
- 50 In this way, permanently controlled engine operation is possible. The disadvantage of pre-ignition is that the flame wall of the ignited combustible gas-air mixture moves in the opposite direction to the piston rushing upwards. This results in the so-called knocking of an engine, which is not only very noisy, but also increases the mechanical stress on the connecting rod bearing and crankshaft, and ultimately leads to premature mechanical failure of the bearings inside the engine. Here in particular the connecting rod bearing and the crankshaft bearing.

[0004]

- 59 The problems described can be eliminated by the device for enlarging the compression space of piston engines (VKK), in which a suitably drilled and milled spacer plate is integrated between the upper end of the engine block and the cylinder head.

[0005]

- 65 In its simplest form, this spacer plate consists of a ground metal plate that is drilled or milled at the points where the pistons, the coolant holes and the holes for the cylinder head bolts are.
- 67 This spacer plate can advantageously be produced by using the cylinder head gasket used in the engine to be converted as a template.
- 69 This ensures that all openings and bores in the spacer plate are congruent with the corresponding bores and openings in the engine block.

[0006]

- 74 If the gas composition and ignition temperature at critical compression are known, the displacement and thus the required thickness of the spacer plate in the form of the VKK can be calculated using the compression ratio and the maximum engine temperature is also known.
- 77 In this way, the required thickness of the spacer plate can easily be determined using known mathematical methods before the plate is manufactured.

[0007]

- ⁸² The device for increasing the compression space of piston engines (VKK) is installed in the engine under consideration in such a way that a cylinder head gasket is first placed on the upper end of the engine block, then the VKK, on this a second cylinder head gasket, and on this the final cylinder head.
- ⁸⁶ The cylinder head bolts should be longer depending on the thickness of the VKK and tightened with the appropriate torque.

[0008]

- ⁹¹ The rocker arm linkage of the valve control is also in its total length in order to increase the thickness of the VKK by putting on a suitable sleeve.
- ⁹³ This makes it possible to maintain the correct valve clearance. Since the pistons, due to their piston stroke, only move to just below the upper end of the engine block, wear of the VKK is not to be feared.

[0009]

- ⁹⁹ In this way it is possible to use the device for enlarging the compression chamber of piston engines (VKK) to enlarge the compression chamber in such a way that self-ignition of the combustion gas can no longer occur even at a maximum engine temperature corresponding to the ignition temperature of the combustion gas used, since the compression of the fuel gas required for this is no longer achieved at maximum engine temperature.

[0010]

- ¹⁰⁷ Advantageously, the ignition angle can be advanced to the usual 10° to 12° before TDC, which effectively and safely counteracts knocking and the associated mechanical stress in the engine.

[0011]

- ¹¹³ The latter, also in connection with the now quiet engine running, results in an increase in engine performance, which means another advantage of the VKK.

[0012]

- ¹¹⁸ The only known method of enlarging the compression space was to drill out the combustion chamber recesses of the pistons, which involved almost completely dismantling the engine.
- ¹²⁰ By using the VKK, drilling is no longer necessary, which means that no mechanical interventions in the engine itself are required to convert a diesel engine into a gas engine, and

the conversion work is reduced to a minimum.

¹²³ Reference List

□

¹²⁷ Fig. 1 1 Valve cover 2 Valve cover gasket 3 Cylinder head 4 Cylinder head gasket 5 Spacer plate (VKK) 6 Engine block 7 Front crankshaft bearing 8 Flywheel with rear crankshaft bearing 9 Oil sump