Nov. 7, 1967 C. KNUTH 3,351,045

TWO-CYCLE INTERNAL COMBUSTION ENGINE

Filed March 30, 1967

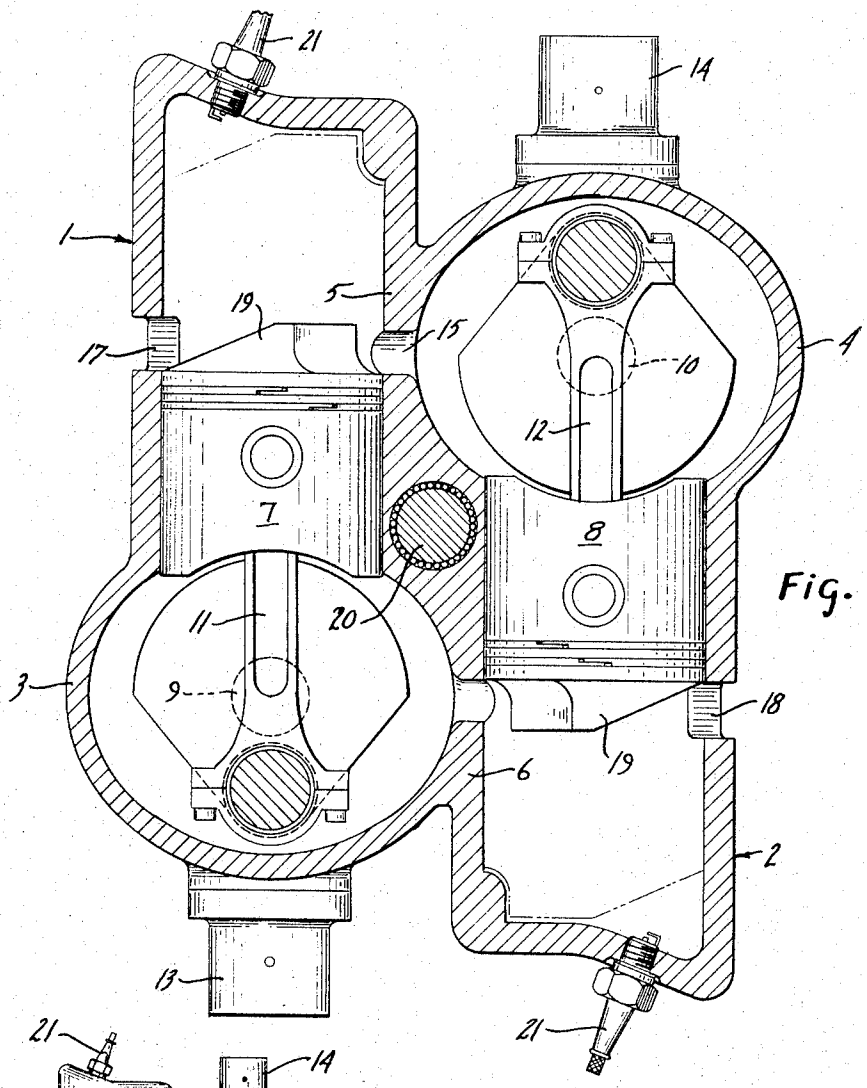


Fig. 1.

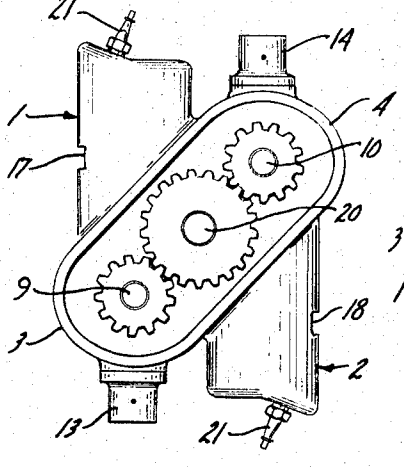


Fig. 2.

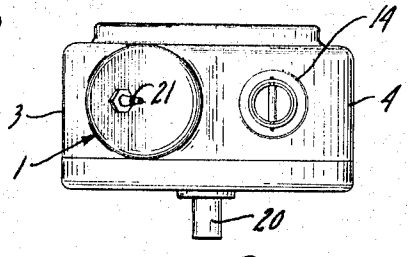


Fig. 3.

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United States Patent Office 3,351,045 Patented Nov. 7, 1967

3,351,045

TWO-CYCLE INTERNAL COMBUSTION ENGINE

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Filed Mar. 30, 1967, Ser. No. 627,211
1 Claim. (Cl. 123—52)

ABSTRACT OF THE DISCLOSURE

A two-cycle engine in which the cylinders are arranged in siamese pairs with a common wall between the crankcase of one cylinder and the opposite cylinder in each instance. A transfer opening through the common wall provides for admission of fuel-air mixture directly from the crankcase of one to the opposite cylinder. The pistons operate separate synchronized crankshafts in response to simultaneous firing of the fuel-air mixture in the two cylinders.

This invention relates to a two-cycle internal combustion engine having one or more pairs of cylinders and in which the cylinders of each pair are arranged in siamese fashion with the crankcase for one cylinder adjacent the side of the other cylinder in each instance, the engine having two separate synchronized crankshafts which may drive either a common output shaft or separate driveshafts, one for each crankshaft, geared to a common output shaft.

The invention utilizes crankcase compression for charging the cylinders with fuel-air mixture and in carrying out the invention the fuel-air mixture from one crankcase is fed directly through a port in the common wall into the adjacent cylinder.

The invention eliminates the conventional transfer passages between the crank chambers and the cylinders. The resulting reduction in crankcase compression volume improves the effective compression ratio of the pistons in the crank chambers, which in turn, results in greater pumping capacity per cubic inch of piston displacement.

The elimination of the transfer passages and the direct induction of the fuel-air charge from each crank chamber directly into its adjacent cylinder minimizes flow friction and turbulence, thus further increasing the volumetric efficiency of the engine.

The proximity of each crank chamber to its co-acting cylinder greatly reduces the time required to transfer the fuel air charge. This is particularly important at higher r.p.m. when, in order to achieve efficient cylinder charging, large volumes of fuel-air vapor must be transferred from the crank chambers into the cylinders in the very short intervals during which the transfer ports are open.

The siamesed configuration is more compact, more practical in dimensional proportions and is structurally more rigid and lighter in weight than an in-line or V engine of the same piston displacement and the same number of cylinders.

The accompanying drawing illustrates the best mode presently contemplated by the inventor for carrying out the invention.

In the drawing:

FIGURE 1 is a schematic section taken on a transverse plane axially of a pair of siamesed cylinders;

FIG. 2 is a schematic side elevation of the engine of FIGURE 1 with a portion of the housing removed; and

FIG. 3 is a schematic elevation looking toward the end of one of the cylinders.

The engine illustrated comprises two cylinders **1** and **2** arranged in siamesed fashion with the crankcase **3** for

cylinder **1** adjacent to cylinder **2**, and with the crankcase **4** for cylinder **2** adjacent to cylinder **1**.

Cylinder **1** and crankcase **3** have a common wall **5** between the same, and cylinder **2** and crankcase **4** have a common wall **6** between the same.

A piston **7** operates in cylinder **1** and a piston **8** operates in cylinder **2** to drive the corresponding crankshafts **9** and **10** by means of corresponding connecting rods **11** and **12**.

The fuel-air mixture is supplied to the crankcases by any suitable carburetor means such as the carburetors **13** and **14** for the respective crankcases **3** and **4**. The fuel-air mixture is compressed in both crankcases **3** and **4** as the pistons **7** and **8** move outwardly of their respective cylinders and toward the corresponding crankcases.

When piston **7** uncovers a transfer port **15** through the common wall **5** compressed fuel-air mix is forced from crankcase **4** through the port into cylinder **1** to charge the same. At the same time piston **8** uncovers a transfer port **16** through the common wall **6** and compressed fuel-air mix is forced from crankcase **3** through the port into cylinder **2** to charge the same.

Exhaust from cylinder **1** is through a discharge port **17** in the cylinder wall opposite to transfer port **15**, and exhaust from cylinder **2** is through a discharge port **18** in the cylinder wall opposite to transfer port **16**.

The top of each piston **7** and **8** is shaped to provide a shield **19** between the corresponding exhaust and transfer or intake ports which directs the flow of compressed fuel-air mixture upwardly and facilitates the escape of exhaust gases from the cylinder during scavenging.

The crankshafts **9** and **10** may be geared to drive a central output shaft **20**, as shown, or a separate drive shaft for each crankshaft may be geared to a common output shaft.

Suitable water cooling passages, not shown, are provided for the engine, and also suitable ignition means are provided as indicated by the spark plugs **21**.

The invention as illustrated eliminates long transfer passages for the fuel-air mix and reduces the compression volume of the two crankcases **3** and **4** which thereby results in improved pumping action for the fuel-air mix and generally higher compression ratios for the engine.

The short transfer ports **15** and **16** eliminate corners which generally increase the friction to the flow of fuel air mix to the cylinders, and provide a direct charging of the individual cylinders from the corresponding adjacent crankcase.

The direct transfer from one crankcase to the adjacent cylinder substantially reduces the time required for charging the cylinder with the fuel-air mix, a feature particularly important at high speeds.

The invention may be employed either in engines employing cross-scavenging of the cylinders as shown in FIG. 1, or in engines employing loop-scavenging of the cylinders, not shown.

The engine is more compact than conventional two-cycle engines, and has greater structural rigidity.

Various modes of carrying out the invention are contemplated as being within the scope of the following claim particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

A two-cycle internal combustion engine utilizing crankcase compression of fuel-air mixture and comprising a pair of cylinders disposed in a parallel siamese arrangement with the separate crankcase for each cylinder adjacent to and having a common wall with the opposite

cylinder, one or more exhaust ports for each cylinder in a wall other than the corresponding common wall, one or more transfer intake ports for each cylinder directly through the corresponding common wall, a piston in each cylinder adapted to uncover and cover said ports in the cycle of operation of the engine, and means driven by said pistons and connecting the same whereby the reciprocal cycle of said pistons are correlated to provide for substantially simultaneous firing of the cylinders.

No references cited.

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