United States Patent [19]

Pirault

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[54] **TWO-STROKE INTERNAL COMBUSTION ENGINES**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **123/55 R,** 123/73 A

[51] **Int. Cl.** **F02b 33/04**

[58] **Field of Search** ..... 123/73 R, 73 A, 73 PP, 123/73 D, 197 AC, 55 R, 57 B, 56 BA, 56 B

[56] **References Cited**

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[57] **ABSTRACT**

The specification discloses a two cylinder two stroke engine in which the cylinders are arranged in V-formation. The cylinders contain pistons connected to a crankshaft located in a crankcase and fuel-air mixture in pre-compressed in the crankcase prior to admission to the cylinders. The crankcase is divided into two separate pre-compression chambers, are for each cylinder, by a sealing disc rotatably mounted on the crankshaft and in sealing engagement around its periphery with the crankcase.

7 Claims, 3 Drawing Figures

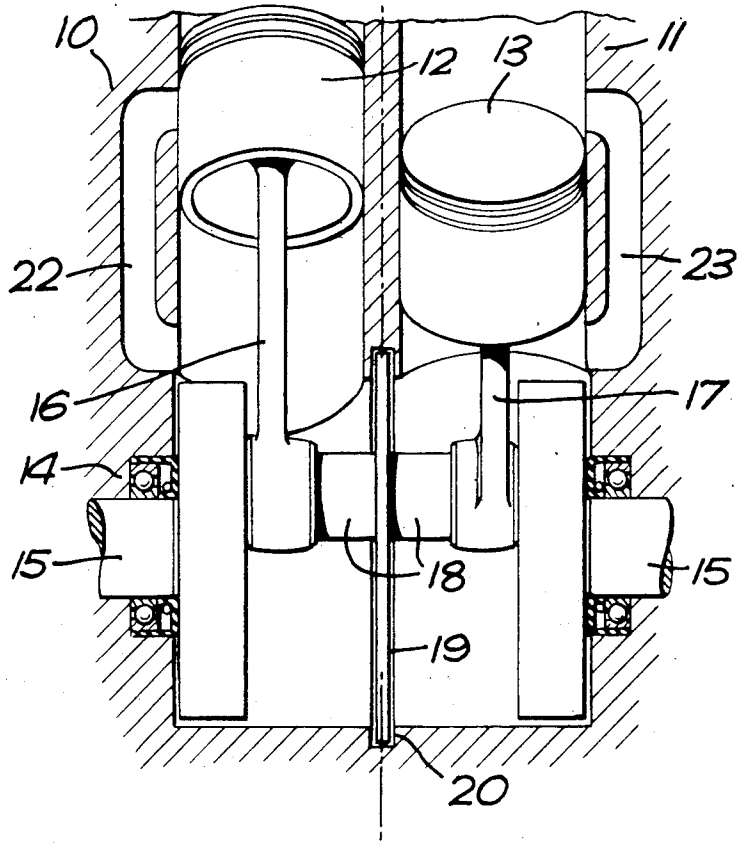


Fig. 1.

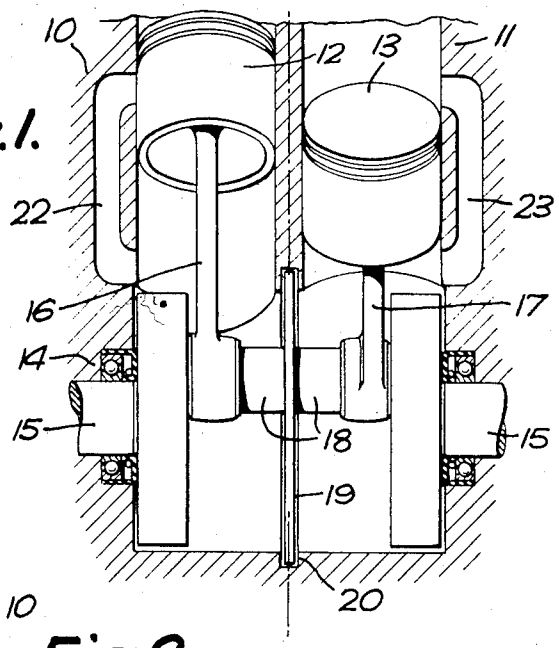


Fig. 2.

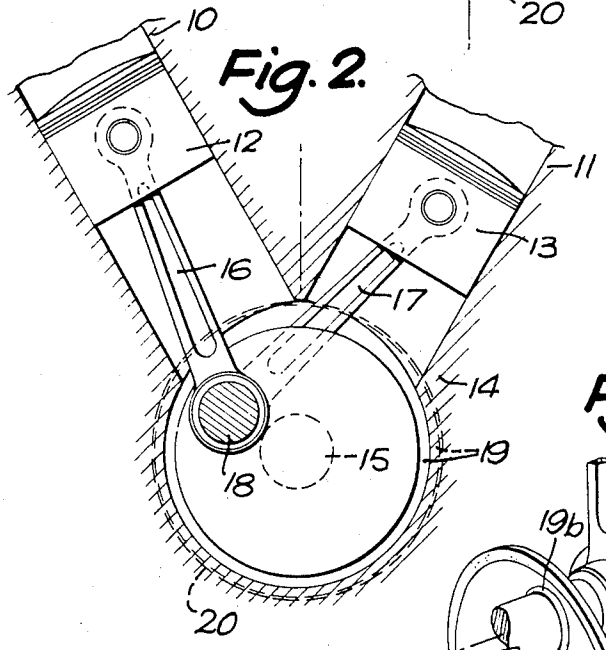
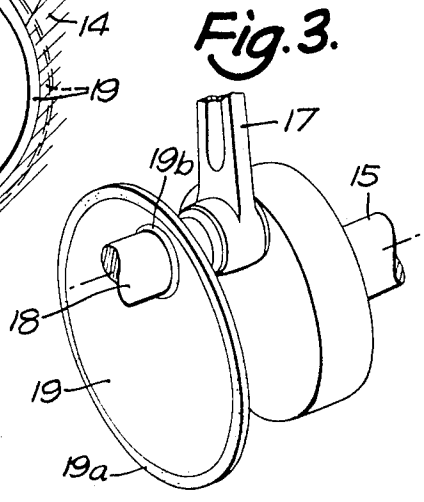


Fig. 3.



TWO-STROKE INTERNAL COMBUSTION ENGINES

BACKGROUND OF THE INVENTION

This invention relates to two-stroke internal combustion engines of the kind having at least two mutually angled cylinders containing pistons, a crankcase in which mixture is compressed before admission to the cylinders for combustion, and a crankshaft in the crankcase to which the pistons are connected.

It is usual in engines of the above kind to connect the pistons to separate crank pins of the crankshaft and to support the crankshaft in a main bearing between the crank pins. Thus the main bearing separates the crankcase into two chambers, one for each cylinder, in which mixture is pre-compressed prior to admission to the cylinders.

It is a disadvantage of this construction that the length of the engine has to be increased to accommodate the main bearing for supporting the crankshaft between the crank pins.

SUMMARY OF THE INVENTION

The invention provides a two-stroke internal combustion engine having at least two mutually angled cylinders containing pistons, a crankcase in which mixture is compressed before admission to the cylinders for combustion, and a crankshaft in the crankcase to which the pistons are connected characterised in that the two pistons are connected to a common crankpin of the crankshaft, a disc is rotatably mounted on the crank pin between the two connections and means are provided for sealing the periphery of the disc to the crankcase and permitting relative rotation of the disc with the crankshaft about the axis of the crankshaft with respect to the crankcase.

It will be appreciated that the arrangement referred to above obviates the necessity of a main bearing supporting the crankshaft between the connections of the two pistons to the crankshaft to provide a seal between the portions of the crank casing in communication with the two cylinders.

Said sealing means may comprise an annular inwardly facing channel around the crankcase in which the periphery of the disc engages and the disc may be arranged to be axially slidable on the crankshaft between the connections to the pistons so that the periphery of the disc may sealably engage one or the other side of the annular channel according to the difference in pressure in the crankcase on either side of the disc.

The outer periphery of the disc and the inner periphery of the disc around the crankshaft may be formed from a polymeric material.

In the latter arrangement the whole disc may be formed from polymeric material.

Alternatively the remainder of the disc may be formed from metal.

The polymeric material may be polytetrafluoroethylene.

Preferably the cylinders of the engine are arranged in V-formation.

The engine may have several cylinders in which case each pair of pistons is connected to a common crankpin of the crankshaft and a disc is provided on the crankpin between each pair of connections.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a part-section, part-elevation view through a two-stroke internal combustion engine;

FIG. 2 is a view looking in the direction of the arrow A on FIG. 1; and

FIG. 3 is a detailed view of part of the crankshaft of the engine.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 of the drawings shows a V twin two-stroke engine having mutually inclined cylinders **10** and **11** containing pistons **12** and **13.** The cylinders are connected to a common crankcase **14** in which a crankshaft **15** is rotatably mounted. The pistons **12, 13** are connected by connecting rods **16, 17** respectively to a common crankpin **18** of the crankshaft. A metal disc **19** is rotatably mounted on the crankpin **18** between the connecting rods **16, 17** and the periphery of the disc engages in an annular channel **20** formed around the crankcase. The outer periphery of the disc is coated with polytetrafluoroethylene as indicated at **19***a* and the inner periphery of the disc is also coated with polytetrafluoroethylene as indicated at **19***b*. As best seen in FIG. **3** of the drawings there is limited clearance indicated at **21** between the disc **19** and crankpin **18** to permit the disc to slide along the crankpin **18** for the purpose described below. The disc **19** divided the crankcase **14** into two compartments in communication with the cylinders **10, 11** respectively below the pistons **12, 13.** Fuel air mixture is drawn into the chambers in succession as the pistons **12, 13** rise in their respective cylinders and is then compressed as the pistons fall and are delivered into the combustion chambers above the pistons through passageways **22, 23** cut in the cylinder walls **10, 11** respectively.

Since the cylinders **10, 11** are arranged in V-formation the pistons **12, 13** will be out of phase with one another so that the pressure cycles in the mixture on either side of the disc will also be out of phase with one another. Thus the disc **19** will be forced along the crankpin **18** to seal with one side of the annular channel **20** or the opposite side according to which of the chambers is at the highest pressure.

It will be appreciated that this arrangement obviates the necessity of a separate main bearing for the crankshaft between the connections of the pistons **12, 13** to the crankshaft so that the engine can be made shorter than would have been possible than if an additional main bearing had been used.

Although the engine described above has only two cylinders the invention is equally applicable to engines having three or more cylinders in which case at least one pair and preferably each pair of pistons is connected to a common crankpin in the crankshaft and a disc is provided on the crankshaft between each pair of connections. I claim:

1. A two stroke internal combustion engine having at least two mutually angled cylinders containing pistons, a crank case in which mixture is compressed before admission to the cylinders for combustion, a crank shaft located in the crank case, said crank shaft having a crank pin to which both said pistons are connected, a disc rotatably mounted on and axially slidable along said crank pin between said connections, and means to seal the periphery of the disc with the crank case com-

prising an annular inwardly facing channel encircling the crank case, said periphery of the disc engaging in the channel whereby a difference in pressure on either side of the disc forces the periphery of the disc against one or the other side of the channel to form a seal therewith.

2. An engine as claimed in claim **1** wherein at least the outer periphery of the disc and the iner periphery of the disc around the crankshaft are formed from a polymeric material.

3. An engine as claimed in claim **2** wherein the whole disc is formed from the polymeric material.

4. An engine as claimed in claim **2** wherein the remainder of the disc is formed from metal.

5. An engine as claimed in claim **2** wherein the polymeric material is polytetrafluoroethylene.

6. An engine as claimed in claim **1** wherein cylinders of the engine are arranged in V-formation.

7. A two stroke internal combustion engine having at least two mutually angled cylinders containing pistons, a crank case in which mixture is compressed before admission to the cylinders for combustion, a crank shaft located in the crank case, said crank shaft having a crank pin to which both said pistons are connected, a disc rotatably mounted on and axially slidable along the crank pin between said connections and means to seal the periphery of the disc to the crank case while permitting the disc to rotate with the crank pin with respect to the crank shaft.

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