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PLURAL CYLINDER TWO CYCLE ENGINE

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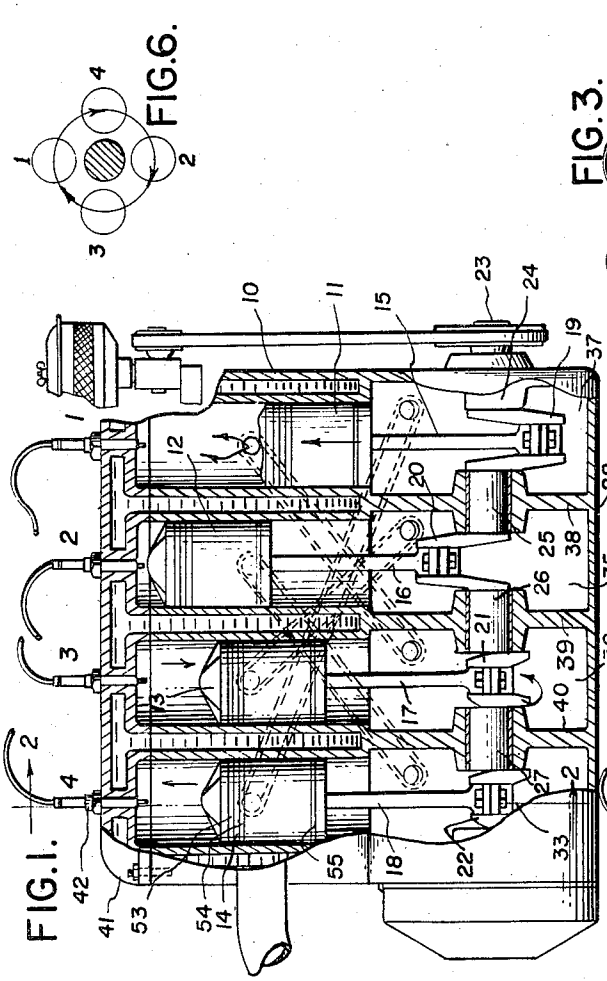


FIG. 1.

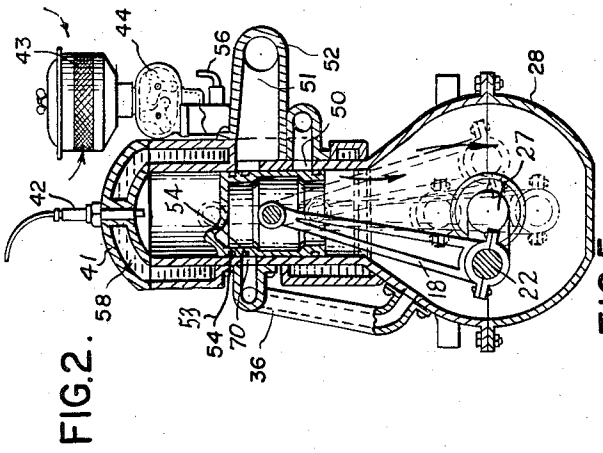


FIG. 2.

FIG. 6.

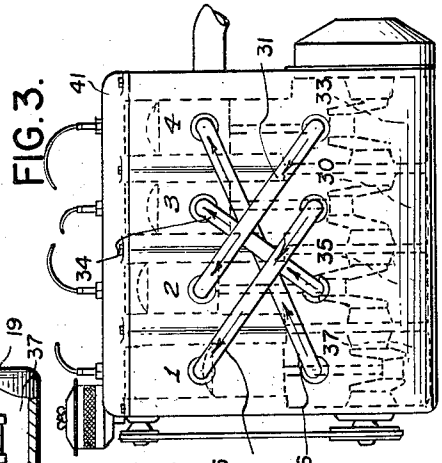


FIG. 3.

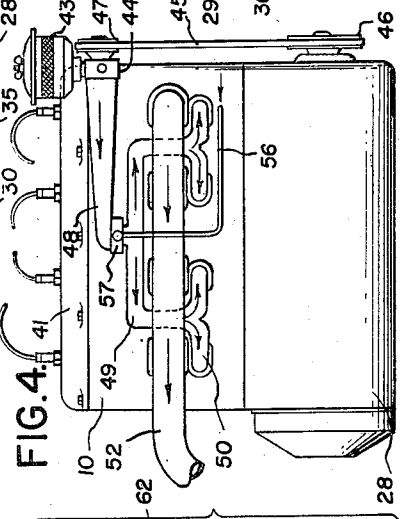


FIG. 4.

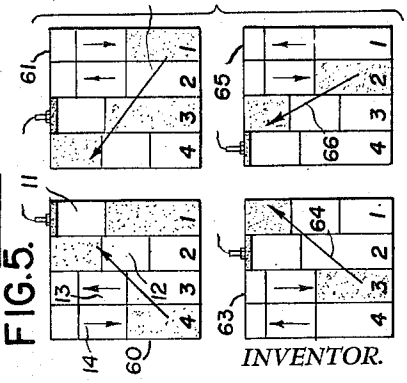


FIG. 5.

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PLURAL CYLINDER TWO CYCLE ENGINE

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1 Claim. (Cl. 123—59)

This invention relates to two cycle engines having a plurality of cylinders, and in particular a two cycle engine in which the fuel of one cylinder is supplied from a section of the crankcase in which another cylinder is positioned and, with the firing sequence of the cylinders arranged accordingly, the power stroke of one piston increases pressure in the section of the crankcase and explosion chamber of another cylinder whereby a two cycle engine of reduced weight and length develops greater power than a corresponding four cycle engine.

The purpose of this invention is to provide a two cycle engine having a plurality of aligned cylinders in which the engine is adapted to develop power similar to that of a four cycle engine of corresponding dimensions.

Various types of two cycle internal combustion engines have been provided, however, owing to the arrangement of a two cycle engine it is difficult to combine a plurality of cylinders with each cylinder developing power to correspond with that of a cylinder of a four cycle engine. With this thought in mind this invention contemplates a two cycle engine having a plurality of cylinders in line and in which the first half of the power stroke of a piston of a cylinder compresses fuel in a compartment of the crankcase, from which the fuel mixture passes to another cylinder whereby fuel under pressure is supplied to the cylinders by power developed in the engine in combination with a blower on the intake manifold.

The object of this invention is, therefore, to provide means for constructing a two cycle engine having a plurality of cylinders in which the two cycle engine develops greater power than a corresponding four cycle engine.

Another object of the invention is to provide a two cycle engine in which connections are provided from sections of a crankcase of the engine to the cylinders whereby fuel compressed in one section of the crankcase is supplied to the explosion chamber of another cylinder.

Another important object of the invention is to provide means for incorporating a fuel delivery system to cylinders of a two cycle internal combustion engine whereby the fuel is independently supplied from a section of the crankcase of one cylinder to the explosion chamber of another cylinder.

A further object of the invention is to provide an improved two cycle engine having a plurality of cylinders in which the engine is of a simple and economical construction.

With these and other objects and advantages in view the invention embodies an engine block having a plurality of cylinders, a crankcase upon which the cylinders are mounted, a piston and crank shaft assembly positioned in the cylinders and crankcase, said crankcase being divided into sections corresponding with the cylinders, fuel supply means, and individual connections from the sections of the crankcase to the cylinders.

Other features and advantages of the invention will

appear from the following description taken in connection with the drawing, wherein:

Figure 1 is a longitudinal section through the improved two cycle engine illustrating operative positions of the pistons in cylinders of the engine and showing parts at the ends of the cylinder in elevation.

Figure 2 is a cross section through the cylinder 4 at one end of the engine being taken on line 2—2 of Fig. 1.

Figure 3 is a side elevational view looking at the side of the engine on which the connections from sections of the crankcase to the cylinders are positioned, said view being taken from a point looking in the opposite direction of that of the section shown in Fig. 1.

Figure 4 is a side elevational view showing the side of the engine opposite to that shown in Fig. 3 and showing, in particular, the fuel and exhaust connections of the engine.

Figure 5 is a diagrammatic view illustrating the sequence of operations of pistons in the cylinders of the engine.

Figure 6 is a diagrammatic view showing a section through the crankshaft of the engine illustrating the relative positions of the connections of the connecting rods of the pistons to the offset sections of the crankshaft.

Referring now to the drawing wherein like reference characters denote corresponding parts the two time or cycle engine of this invention includes a plurality of cylinders as indicated by the numerals 1, 2, 3, and 4 mounted in line and positioned in an engine block 10 with pistons 11, 12, 13, and 14 in the cylinders, respectively and the pistons are connected with rods 15, 16, 17 and 18 to offset sections 19, 20, 21 and 22 of a crankshaft 23, the crankshaft being rotatably mounted in end bearings 24 and also in intermediate bearings 25, 26, and 27 and the cylinders are in communication with individual compartments of the crankcase 28 with a tube 29 connecting a receiving port 70 of cylinder 1 to a compartment 30 of cylinder 3, a tube 31 connecting cylinder 2 to a section 33 of the crankcase, a tube 34 connecting cylinder 3 to the section 35 of the crankcase and in which the cylinder 2 is located and a tube 36 connecting the cylinder 4 to a section 37 of the crankcase and from which the cylinder 1 extends.

The crankcase is provided with partitions 38, 39 and 40 which divide the crankcase into the compartments or sections 37, 35, 30, and 33, respectively.

The engine block is provided with a head 41 in which spark plugs 42 are positioned and fuel and air are supplied through an air filter 43 by a blower 44 operated from the crankshaft 23 with a belt 45 and providing a supercharger, the belt being trained over a pulley 46 on the crankshaft and also over a pulley 47 on the blower 44. The discharge of the blower 44 is connected by a tube 48 to an intake manifold 49 through which air and fuel are injected and distributed to the cylinders through connections 50. The exhaust from the cylinders is taken by exhaust connections 51 to an exhaust header 52.

The pistons are provided with piston rings 53 and 54 at the upper ends and with a single piston ring 55 spaced from the lower end, as shown in Figs. 1 and 2.

The engine is also provided with a fuel inlet connection 56 that extends to a source of fuel supply and by this means the fuel passes through the tube 48 to a carburetor 57 and from the carburetor to the intake manifold 49, from which fuel and air pass through the connections or ports 50 into the cylinders.

The engine block and head are also provided with a conventional water jacket, as indicated by the numeral 58. It will be understood, however, that the engine may be air cooled, or cooled by other means.

With the pistons in the positions illustrated in section

60 of the diagram illustrated in Fig. 5 the piston 11 of cylinder 1 is in the upper or firing position and as the piston is driven downwardly fuel under pressure is driven from the section 37 of the crankcase through the tube 36 to cylinder 4, the piston 12 in cylinder 2 is at the lower point in which the cylinder is receiving fuel from cylinder 4 through the connection 31; the piston 13 in cylinder 3, which is ascending is creating a vacuum in the lower part of the cylinder and compressing the mixture in the upper part and piston 14 in the cylinder 4 is being driven downwardly by the explosion and by this means the fuel mixture is being driven into the upper part of cylinder 2 above the piston 12. By the same means the piston in cylinder 1, traveling downwardly as shown in the section 61 of the diagram is driving fuel, as indicated by the arrow 62 into the upper part of the cylinder 4 and, as illustrated in the section 63 the piston in cylinder 3 is driving fuel from the lower part of the cylinder into the upper part of the cylinder 1, as indicated by the arrow 64 and, also as shown in section 65 the piston 12 in cyinder 2 is driving the fuel into the upper part of cylinder 3, as indicated by the arrow 66.

By this means the fuel mixture, supplied from the carburetor or other suitable means to the different compartments or sections in the lower part of the crankcase is supplied under pressure by pistons to the different cylinders and with the sequence of operations properly arranged the fuel is supplied under pressure just before the piston travels upwardly in the compression stroke whereby maximum power is achieved.

It will be understood that the fuel supply and exhaust connections may be made by conventional means and other means may be provided for supplying fuel and for carrying away the exhaust.

It will be understood that other modifications, within the scope of the appended claim, may be made in the design and arrangement of the parts without departing from the spirit of the invention.

What is claimed is:

In an internal combustion engine, the combination which comprises a cylinder block having a plurality of cylinders therein, a crankcase secured to the lower end of the cylinder block, pistons in said cylinders, inlet ports in said cylinders adapted to be uncovered by the pistons in their top positions, a blower positioned on the cylinder block, an intake manifold on the cylinder block connecting the blower to said inlet ports, said crankcase having transversely disposed partitions therein forming compartments below each cylinder which communicate with said inlet port, an outlet port in each compartment, said cylinders having receiving ports adjacent the lower ends thereof adapted to be uncovered by the pistons in the lower position, connections extended between the outlet port of the compartment of one cylinder to the receiving port of another cylinder, whereby the pressure of the supercharger in combination with the pressure resulting from the first half of the downward stroke of the piston in one of the cylinders provides another cylinder with a full charge through one of said connections.

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