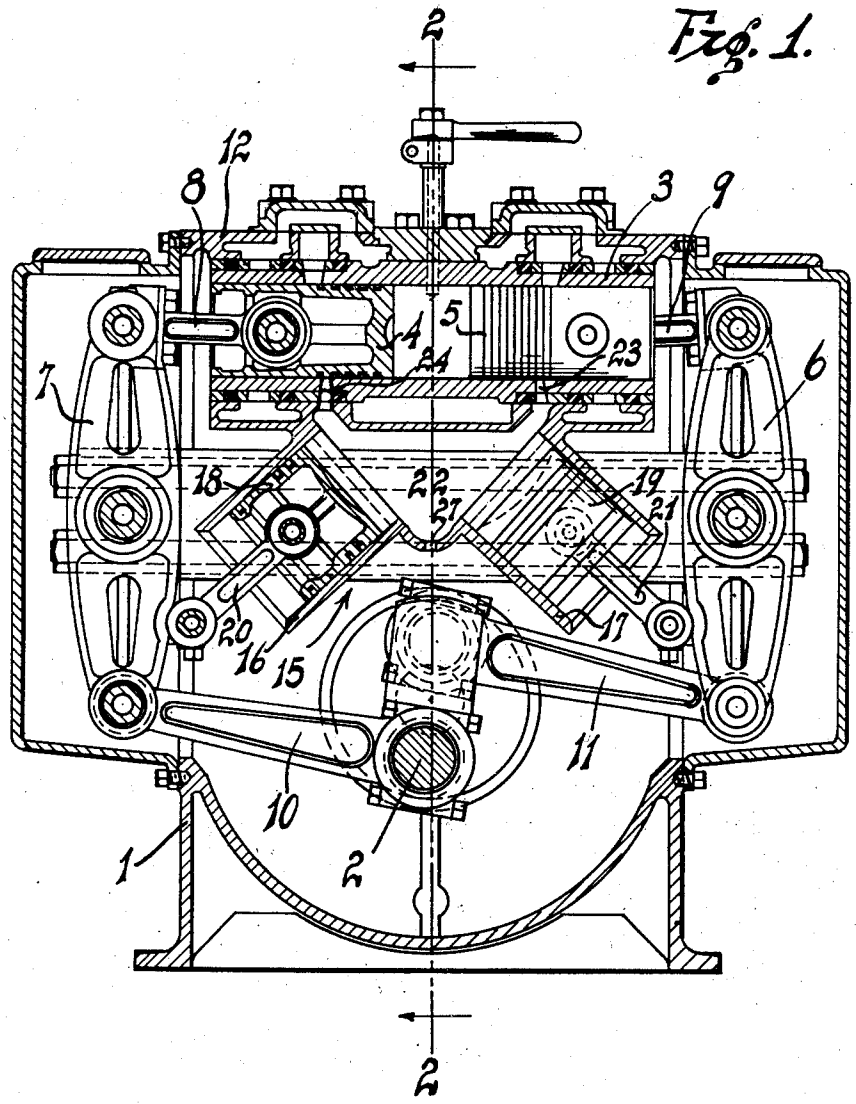
Nov. 11, 1941. A. I. ADDISON ET AL 2,262,264

INTERNAL COMBUSTION ENGINE

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Fig. 1.



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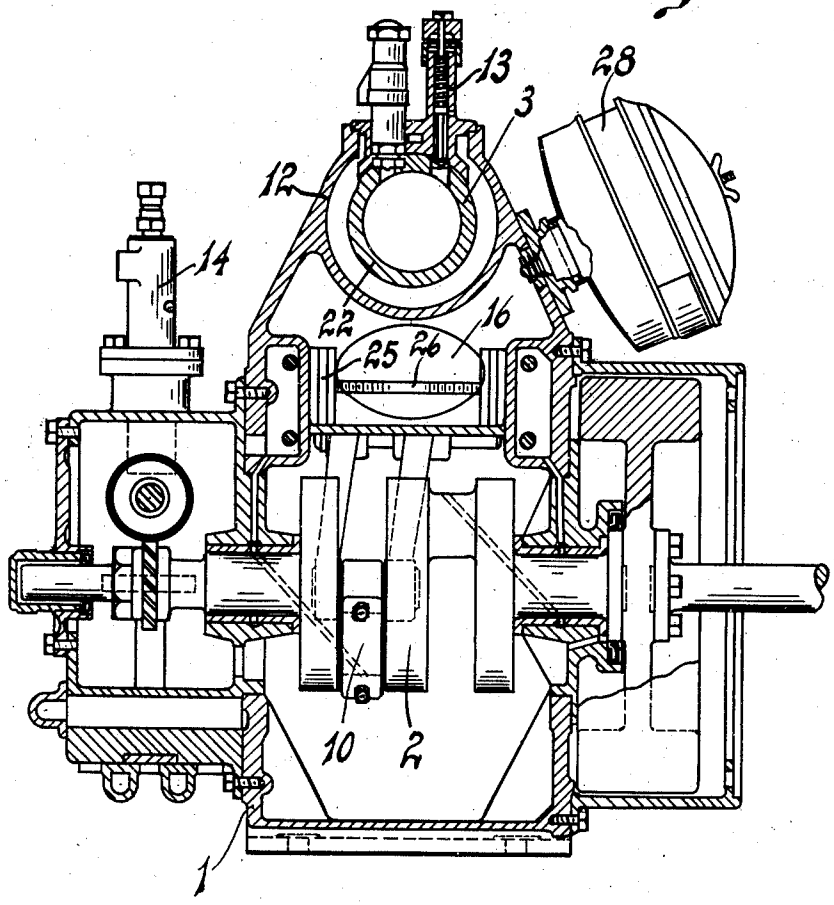
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Fig. 2.



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INTERNAL COMBUSTION ENGINE

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5 Claims. (Cl. 123—51)

This invention relates to an internal combustion engine in which the cylinders are horizontally or otherwise positioned, and the movement of opposed pistons in each of the cylinders is imparted to a crank shaft through pairs of pivotally mounted arms adjacent the ends of the cylinders.

The prime object of our invention is to provide an engine of the character stated, with an effective scavenging means, which consists of opposed pistons in air cylinders arranged immediately adjacent the power cylinder.

Another object of our invention is to provide a novel and effective means of reciprocating the opposed pistons in the air cylinders from the pivotally mounted arms, said arms being actuated by the power pistons.

Still another object of our invention is to provide a novel scavenging means for each power cylinder, consisting of pairs of air cylinders, each pair of cylinders having a common compression chamber.

A feature of our invention resides in the novel means whereby the volume of the air compression chamber may be easily and effectively altered to change the pressure of the compressed air to suit various operating conditions of the engine.

Other objects, advantages and features of invention may appear from the accompanying drawings, the subjoined detailed description, and the appended claims.

In the drawings:

Figure 1 is a vertical, sectional view of our engine.

Figure 2 is a sectional view taken on line 2—2 of Figure 1.

Referring more particularly to the drawings, our engine comprises a frame 1, in which a crank shaft 2 is journaled. The crank shaft is provided with a separate throw for each piston in the engine, and we have here disclosed a single cylinder with two pistons and, therefore, the crank shaft is provided with two throws. A cylinder 3 is fixedly mounted in the upper part of the frame 1, and is arranged substantially as shown. A pair of pistons 4, 5 are mounted in the cylinder 3 and these pistons move simultaneously in the cylinder—that is, they are of the usual opposed type.

A pair of rocker arms 6, 7 are pivotally journaled in the frame 1, the upper ends of the arms being connected to the pistons 4 and 5 by means of the connecting rods 8, 9 respectively. The lower ends of the rocker arms 6 and 7 are connected to the throws of the crank shaft 2 through the pitmans 10 and 11, respectively. The cylinder 3 may be a separate part or it may be integrally cast with the frame 1 or the cylinder assembly. We have here shown the cylinder 3 as separate from the water jacket 12.

Our engine is here shown as the Diesel type. However, an ignition type of engine may also be used and include substantially the same construction. For the Diesel type, the usual injection nozzle 13 extends into the cylinder 3 between the pistons 4 and 5. The usual pressure pump 14 compresses the fuel for the purpose of injecting this fuel into the cylinder on the compression stroke, all of which is usual and well-known. For the purpose of scavenging the cylinder 3, we provide an opposed piston air compressor adjacent the cylinder 3. In placing the compressor close to the cylinder with consequent short circuits, a greater efficiency is obtained due to the fact that the heat of compression of the air is conserved. Furthermore, in so positioning the compressor, the drive for the pistons is very effective, and also simple and compact, as will be subsequently described.

The compresser 15 consists of a pair of cylinders 16 and 17. These cylinders may be integrally cast with the water jacket 12, or may be separate and attached thereto, and are arranged immediately adjacent the cylinder 3. The cylinders 16 and 17 are in the same vertical plane as the rocker arms 6 and 7, and are inclined at an angle, as shown in Figure 1. The pistons 18 and 19 are mounted in the cylinders 16 and 17 respectively, and these pistons are reciprocated through links 20 and 21, which are pivotally attached to said pistons and to the rocker arms 6 and 7, as shown in Figure 1. The links 20 and 21 are connected to the arms 6 and 7 below the pivot point of said arms, thereby causing the pistons 18 and 19 to move upwardly on the compression stroke, as the pistons 4 and 5 are moving outwardly on the power stroke. The cylinders 16 and 17 are provided with a common compression chamber 22, which is immediately adjacent the cylinder 3, and the dividing wall of this compression chamber may consist of a part of the wall of the water jacket 12. Scavenging ports 23 and 24 extend from the compression chamber 22 into the cylinder 3. These scavenging ports are uncovered by the pistons 4 and 5, adjacent the extreme outward movement of the pistons. Thus, air is properly compressed in the compresser, and close to the extreme outward movement of the power pistons air is admitted

under pressure into the cylinder 3, thus clearing this cylinder of the burnt gases. Within the compression chamber 22 there is an unobstructed space around the mouth portions of the ports 23 and 24, allowing the compression-heated air to pass directly through them without reduction in temperature.

If it is the desire to raise the compression in the compresser, blocks 25 can be placed in the compression chamber 22, and these blocks are held in position by the bolt 26. The blocks reduce the volumetric capacity of the compression chamber and thus the compression is increased. By this means, the compression in the compresser can be increased or decreased, as desired, to provide the greatest efficiency for the engine. A small bleed port 27 in the compression chamber 22 permits accumulated oil to be blown back into the crank case or oil sump of the engine. Air is drawn into the compression chamber 22 through the air cleaner 28, which is fitted on the side of the engine, as shown in Figure 2, and opens into the compression chamber. This air cleaner is preferably of the type having a fabric or metallic filter pad, which is usual and well-known.

Having described our invention, we claim:

1. In combination with an engine, including a frame, a cylinder, a pair of opposed pistons in the cylinder, a pair of rocker arms journaled in the frame, and drive means extending from the pistons to the rocker arms, of an opposed piston air compresser arranged immediately adjacent the power cylinder, said compresser comprising a pair of cylinders, a piston in each cylinder, and a driving link extending from each piston to a rocker arm, whereby said pistons are reciprocated, said air compresser having a compression chamber common to both of said cylinders, and compression pressure adjusting blocks removably mounted in the compression chamber.

2. In combination with an engine, including a frame, a horizontal power cylinder, a pair of opposed pistons in the cylinder, a pair of rocker arms journaled in the frame, and drive means extending from the pistons to the rocker arms, of an opposed piston air compresser arranged immediately adjacent the power cylinder, said compresser being integrally formed with the water jacket of the power cylinder, said compresser including a pair of cylinders, said cylinders being arranged at an acute angle to the power cylinder, a piston in each cylinder, a compression chamber common to both cylinders, a portion of the wall of said compression chamber being formed by said water jacket said air compresser having a pair of scavenging ports extending from the common compression chamber directly through said water jacket into the power cylinder, and a driving link connecting each of the pistons in the air compresser to a rocker arm, whereby the pistons in the compresser are reciprocated.

3. In combination with an engine, including a frame, a horizontal power cylinder, a pair of opposed pistons in the cylinder, a pair of rocker arms journaled in the frame, and drive means extending from the pistons to the rocker arms, of an opposed piston air compresser arranged immediately adjacent the power cylinder, said compresser being integrally formed with the water jacket of the power cylinder, said compresser including a pair of cylinders, said cylinders being arranged at an acute angle to the power cylinder, a piston in each cylinder, a compression chamber common to both cylinders, said compression chamber being substantially prismatic in shape, said air compresser having a pair of scavenging ports extending from the common compression chamber directly into the power cylinder, and a driving link connecting each of the pistons in the air compresser to a rocker arm, whereby the pistons in the compresser are reciprocated, and compression pressure adjusting blocks removably mounted in the compression chamber.

4. In an engine, a frame, a power cylinder mounted on said frame, a pair of opposed pistons in said cylinder, an opposed piston air compressor having a compression chamber in controlled communication with the cylinders of said opposed pistons, said compression chamber having adjusting blocks therein to vary its capacity, and air compression means operated by the engine to produce in said air compression chamber the air pressures required for scavenging and ignition purposes.

5. In an engine, a frame, a power cylinder mounted on said frame, a pair of opposed pistons in said cylinder, an opposed piston air compressor having a compression chamber in controlled communication with the cylinders of said opposed pistons, said compression chamber having adjusting blocks therein to vary its capacity, and air compression means operated by the engine to produce in said air compression chamber the air pressures required for scavenging and ignition purposes, there being a compression block in each of opposite end portions of said chamber, and a threaded bolt connecting said blocks for adjusting them toward and away from each other.

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