Nov. 14, 1933. H. T. PYK ET AL 1,934,880

COMBINED INTERNAL COMBUSTION ENGINE AND COMPRESSOR

Filed May 1, 1931

FIG. 1.

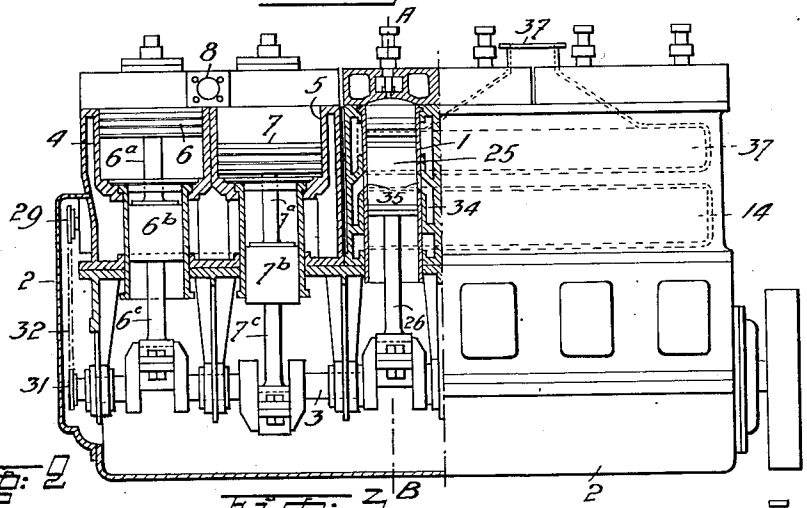


FIG. 2.

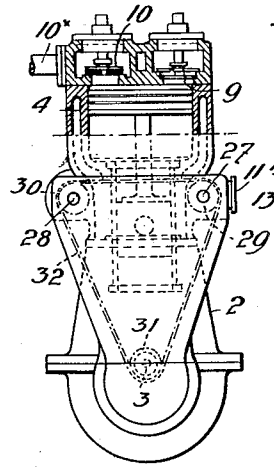


FIG. 3.

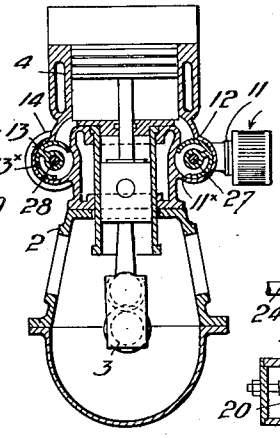


FIG. 4.

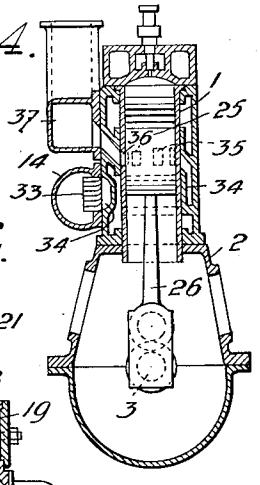


FIG. 6.

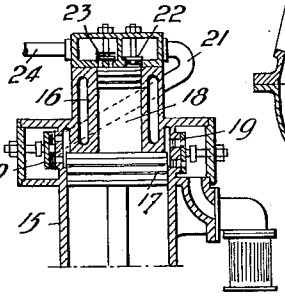
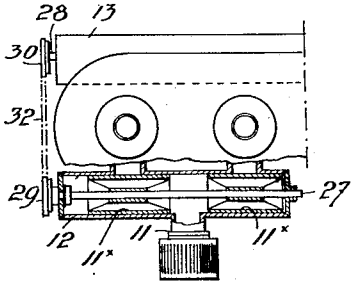


FIG. 5.



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COMBINED INTERNAL COMBUSTION ENGINE AND COMPRESSOR

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2 Claims. (Cl. 230—56)

In transportable, combined internal combustion engines and compressors for instance for driving pneumatic rock drills for road- and street-work and the like it is of importance to reduce the dimensions and the weight of the unit as much as possible, at the same time as the unit must be stable and balanced. In order to render possible the use of an engine of two-stroke cycle which is advantageous regarding the running of the unit, and nevertheless to gain a reduced unit the compressor and the scavenging pump of the engine according to this invention are combined as a double acting pump in such manner, that the pump at the one side of the piston acts as a compressor for compressing air and at the other side acts as scavenging pump of the engine of the two stroke cycle. By this the favourable fact occurs that for a suitable working pressure of the compressed air suitable dimensions of the scavenging pump regarding the scavenging of the working cylinders of the engine are gained. If the working pressure of the compressed air should be increased, while the dimensions of the combined compressor and scavenging pump are maintained at values suitable for the scavenging operation, this may be effected by effecting the compression of the air preferably in two stages.

An engine-compressor unit arranged in accordance with this invention is shown as an example in the accompanying drawing, in Fig. 1 in a side view, partially in a vertical longitudinal section, and in Fig. 2 in an end view from the left hand side in Fig. 1 and partially in a vertical cross section of the top part of one of the compressors. Fig. 3 is a cross section of the lower part of the said compressor. Fig. 4 is a cross-section on the line A—B in Fig. 1. Fig. 5 is a top view partially a horizontal section of the compressors. Fig. 6 shows in a vertical section a combined compressor, operating in two stages, and a scavenging pump.

The engine shown in the drawing has four cylinders, one cylinder 1 being shown in section in Figs. 1 and 5. The cylinders are mounted on a frame 2 and the piston 25 of each cylinder rotates by means of a connecting rod 26 a crank shaft 3 journaled in the same. On the frame also a double-acting pump is mounted having two cylinders, designated by 4 and 5. The chamber at the lower side of the pump pistons 6 and 7 respectively is closed and tightens round the piston rods 6^a and 7^a respectively. The said rods are fixed to heads 6^b and 7^b, movable in suitable guides. Rods 6^c and 7^c connect the heads to cranks of the shaft 3 of the engine, so that the compressors are driven by the engine. In the pump shown in the drawing the cylinder chambers located above the pistons respectively operate for compressing air. Air passes into the said chambers through an inlet 8 common to the cylinders and valves 9. The compressed air leaves the chambers through valves 10 and a pipe 10^x common to the cylinders and leading to a receptacle as usual. The cylinder chambers, located below the pistons 6 and 7, are adapted to compress the scavenging air necessary for the engine. This air passes at 11 through a filter to a distributing slide, for instance a rotary piston valve 11^x which is provided in the casing 12, and controls the passing of the air to the bottom chambers of the cylinders 4 and 5. The escaping compressed scavenging air is controlled by a rotary piston valve 13^x of substantially the same construction as the valve 11^x and provided in the casing 13. The said casing 13 communicates with a receiver 14, which is located coaxially to the casing 13 and in which the scavenging air is accumulated.

The shafts 27 and 28 of the said rotary piston valves are journaled in the frame 2 and provided with sprockets 29 and 30 respectively, round which and a sprocket 31 on the shaft 3 a chain 32 passes, so that the valves are rotated by the shaft 3 of the engine. The scavenging air in the receiver 14 passes in the usual manner through an automatically operating valve device 33 for instance of the construction stated in the U. S. Patent No. 1,672,436, channels 34 and ports 35 into the working cylinder of the engine, as the said ports are uncovered by the piston 25. The combustion gases pass as usual through ports 36, when uncovered by the piston 25, to an outlet 37. The engine works in the ordinary manner.

In the form of embodiment of the invention shown in Fig. 6 a cylinder 16 having a shorter diameter and adapted to effect a higher final pressure, is combined with the top part of the cylinder 15, operating as compressor of the compressed air, the said cylinder 16 being located in the extension of the cylinder 15. A plunger 18 operating in the cylinder 16, is connected to the piston 17 of the greater cylinder. Air enters the cylinder 15 through a suction valve 19 and the compressed air passes through a delivery valve 20 into a pipe 21 extending, to the admission valve 22 of the cylinder 16. The air compressed in the cylinder 16 at a second stage passes through the valve 23 into a pipe 24 extending to the receiver of the compressed air.

Owing to the arrangement shown in Fig. 6 such dimensions may be imparted to the cylinder 15 as are suitable with regard to the scavenging of the working cylinders of the engine, while at the same time the compressed air by means of the additional compressor 16, 18 may be brought to the pressure which may be considered suitable for the driving of the drill etc.

If considered necessary for a better balancing of the engine-compressor-unit the combined compressor- and scavenging-pumps may be located at opposite sides of the cylinders of the engine both in the form of execution shown in Figs. 1, 2, 3 and 5 and in the one shown in Fig. 6.

We claim:

1. In a combined two stroke cycle engine and air compressor, the provision of a piston pump including a cylinder, a piston operating therein and composed of a head and a rod, said head dividing the cylinder into two chambers, said pump compressing air on both sides of the piston, the cylinder chamber at the outer side of the piston head acting as an air compressor and the cylinder chamber at the inner side of the piston head being closed and tightened around the piston rod, and a conduit connecting the chamber last mentioned with a receptacle for scavenging air for the engine.

2. In apparatus of the character described, a piston pump including a cylinder, a piston operating therein including a head and a rod and dividing the cylinder into two chambers, said pump compressing air on both sides of the piston, the cylinder chamber at the outer side of the piston being so arranged that it operates preferably as a two stage air compressor, and the cylinder chamber at the inner side of the piston being closed and tightened around the piston rod, and a conduit connecting the cylinder chamber last mentioned with a receptacle for scavenging air for the engine.

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