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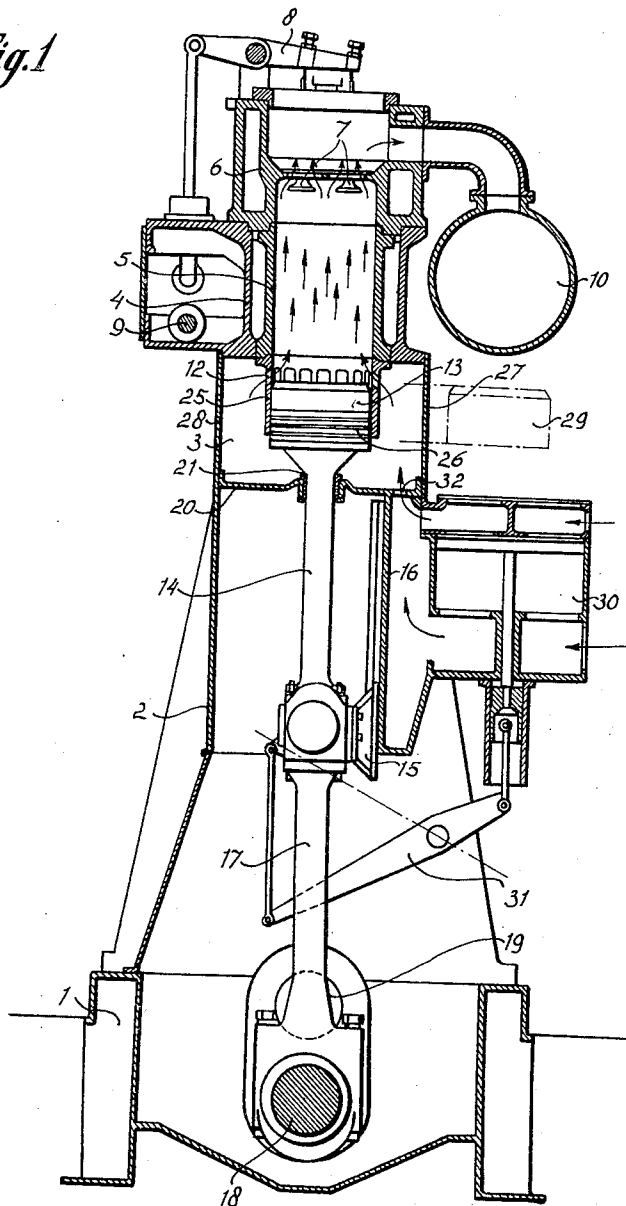
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G. J. LUGT
SINGLE-ACTING TWO-STROKE CYCLE
INTERNAL-COMBUSTION ENGINE

2,516,708

2 Sheets-Sheet 1

Fig. 1



Inventor:
Gerard Johan Lugt
by Fraser, Myers & Manley
his attorneys.

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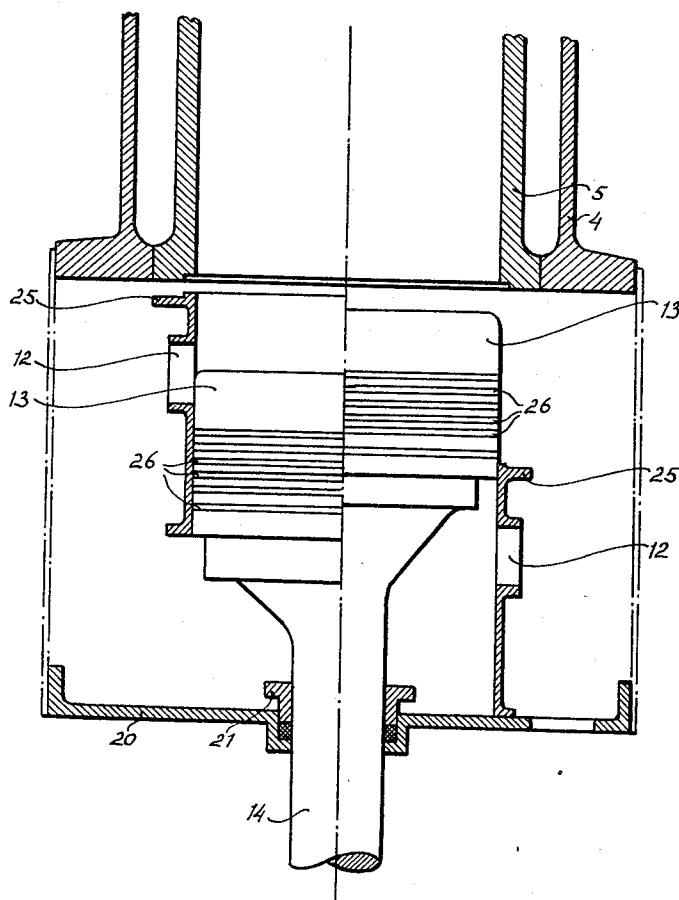
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Fig. 2.



Inventor:
Gerard Johan Lugt
by Fraser, Myers & Manley
his attorneys

UNITED STATES PATENT OFFICE

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SINGLE-ACTING TWO-STROKE CYCLE
INTERNAL-COMBUSTION ENGINEGerard Johan Lugt, Amsterdam, Netherlands, as-
signor to Werkspoor N. V., a company of the
NetherlandsApplication December 30, 1947, Serial No. 794,751
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10 Claims. (Cl. 123--65)

1

The invention relates to a single acting two stroke internal combustion engine provided with a cross head, in which each cylinder at the side of the crank shaft opens into a closed scavenging air chamber separated from the crank case by a partition, said cylinder being provided with scavenging ports within said chamber, and the outlet means of the cylinder being located at the cover side. This kind of internal combustion engine is well known and also usual for large engines, such as ship propulsion engines.

Internal combustion engines in general and especially the large engines mentioned must be readily accessible. Particularly easy dismantling and removal of different parts, also internal parts, is also of the utmost importance, as it renders replacement and repair work much easier. The invention aims at improving existing engine construction in this respect.

According to the invention therefore the end of the cylinder extending into the scavenging air chamber is made as a separate and removable part, whereas the said chamber is provided laterally to that part with closable inspection or fitting holes and the supply means for the scavenging air are situated so as to make the said holes freely accessible.

Heretofore the end of the cylinder liner in a single acting four stroke internal combustion engine of special design has been made already as a separate and removable part and in this engine the same possibility of inspection and removal of the piston exists. In two stroke engines of normal design it cannot be used, however, due to the great length of the pistons therein. It has also to be taken into consideration, that in two stroke engines the cylinder ports are situated in the separate and removable end of the cylinder. These ports of course must be connected to corresponding conduits. Due to this the possibility of easy inspection and removal is lost. When applied, however, to a two stroke engine of the above mentioned type the objections referred to will not exist, on the one hand because such engine may have a short piston and on the other hand because in this engine the end of the liner extends freely into the scavenging air chamber, with which the cylinder ports are in free communication and from which the end of the liner may be freely removed.

In the drawings an embodiment of the invention has been illustrated.

Figure 1 is a sectional elevation of a vertical engine, showing a cylinder in section, whereas

Figure 2 illustrates the piston on a somewhat

2

larger scale showing the removal and inspection thereof.

The frame of crank casing 2 is mounted on the foundation 1. A scavenging air chamber 3 is located on the casing 2 and the cylinder jacket 4 is located on the chamber 3. Within the jacket 4 the cylinder liner 5 is mounted which is attached at its top and is capable of expanding axially within the cylinder jacket 4. The cylinder is closed at its top by a cover 6 carrying the outlet members. In order to enable quick scavenging of the cylinder a large outlet is necessary, which attains its maximum opening capacity within a very short time. For this reason the outlet members are divided into four or six outlet valves which are grouped about the centre of the cover, where the combustion oil injection means is located. Due to this arrangement a larger total valve circumference is obtained than by the use of only one valve, so that the initial passage during the time the valve is lifted becomes larger.

The outlet valves 7 as mentioned are moved together by means of a lever 8, which is driven from the cam shaft 9.

The outlet chamber within the cover is connected to the outlet conduit 10.

The cylinder wall is provided with scavenging ports 12 near the lowest position of the piston 13. The piston 13 is so short that the scavenging ports 12 are opened by both the upward and downward strokes. The scavenging ports open into the scavenging air chamber 3. An engine of this type shows a very low overall height.

The piston 13 is removably connected to the piston rod 14, which ends at the cross head 15 movable along a guide 16. The connecting rod 17 connects the cross head 15 to the crank 18 of the crank shaft 19.

The scavenging air chamber 3 is closed at the bottom and thus separated from the crank case 2 by means of a partition 20. The piston rod 14 passes through a stuffing-box 21 in the partition 20.

The lower end 25 of the liner 5, which contains the scavenging ports 12 and which extends freely into the scavenging air chamber 3 is made as a separate part removable from the liner 5. It may be connected to the main part of the liner by means of bolts or studs. After detaching the said separate part 25 may be lowered until it stands on the partition 20. Then such a gap will have been formed in the liner that at least a part of the piston 13 will be exposed, so as to enable the piston rings 26 to be inspected, and if necessary removed and replaced, without removal of the

3

piston itself. The scavenging air chamber for this reason is provided with rather large plates 27, 28 by the removal of which it can be opened fully (see right hand part of Figure 2).

Sometimes it will be possible by lowering the separate end 25 of the liner to enlarge the gap in the cylinder liner to such an extent that the piston 13 after having been disconnected from the piston rod 14 can be removed sidewardly out of the engine as a whole, as indicated by dotted lines at 29. If the lower end of the liner cannot be lowered to such an extent, the piston 13 can be removed sideways from the scavenging air chamber 3 together with the said lower end 25. Also in this manner a very simple method of removing the piston is obtained. It is illustrated on the left hand part of Figure 2.

In order to permit sideward removal of the piston the plates 27, 28 of the scavenging air chamber must also remain freely accessible. Therefore, the scavenging air pump 30 is situated below the level of the partition 20. It is mounted against the guide 16 and is driven from the cross head 15 by means of beams 31. The scavenging air is supplied to the chamber 3 at the bottom through the hole 32 in the partition 20.

When scavenging air pumps are used, which are disposed separate from the engine, e. g. at the front or rear end of the engine, the scavenging air conduits, which run to the cylinders must remain below the level of the partition 20.

What I claim is:

1. A single acting two stroke cycle internal combustion engine comprising a scavenging air chamber; scavenging air supply means in communication with said chamber; a cylinder having scavenging ports affording communication between it and said chamber, a substantially closed end, an open end, and a separable part of said cylinder, at the latter's open end, extending into said chamber; the said chamber having a closable opening laterally of said separable cylinder part affording access thereto to permit its separation from the remainder of the cylinder, and the said scavenging air supply means being located in a non-blocking position relatively to said opening to render the latter accessible as a means of access to said cylinder part to permit its mentioned separation.

2. A single acting two stroke cycle internal combustion engine according to claim 1, further including a piston in said cylinder; the said scavenging air chamber and the said separable cylinder part having such relative axial dimensions that a gap is produced in the cylinder wall by such separation in an axial direction through which gap the said piston is accessible for inspection or servicing.

3. A single acting two stroke cycle internal combustion engine according to claim 2, the said gap and opening being of such dimensions that the piston may be removed laterally.

4. A single acting two stroke cycle internal combustion engine according to claim 1, further including a piston in said cylinder; the piston,

4

the separable cylinder part, the scavenging air chamber and the latter's closable opening being of such relative dimensions that said piston and separable cylinder part may be removed from the engine through said opening.

5. A single acting two stroke cycle internal combustion engine according to claim 1, the said scavenging air supply means being in communication with the said chamber at the wall of the latter which is remote from said cylinder.

6. A single acting two stroke cycle internal combustion engine according to claim 1, further including a scavenging air pump and air conducting means affording communication between said pump and the scavenging chamber; the said pump and conducting means being disposed substantially at one side of a radial plane which includes at least a part of the wall of the scavenging air chamber which is remote from the cylinder, the said pump and conducting means being at the side of said plane opposite to the side thereof where the said cylinder is located.

7. A single acting two stroke cycle internal combustion engine according to claim 6, further including a crank casing partly defined by said remote wall of the scavenging air chamber, and a crosshead guide associated with said crank casing; the said pump being attached to said guide.

8. A single acting two stroke cycle internal combustion engine according to claim 6, further including a crank casing partly defined by said remote wall of the scavenging air chamber, a crosshead, guided for reciprocation within said crank casing, the said pump being a reciprocating pumping-element pump, the axis of which extends in the direction of the axis of the said cylinder, and the said engine also including a beam, coacting with said crosshead and pump for actuating the latter.

9. A single acting two stroke cycle internal combustion engine according to claim 1, the said cylinder having outlet means at its closed end.

10. A single acting two stroke cycle internal combustion engine according to claim 2, further including a piston rod extending through a wall of said chamber remote from said cylinder, the said piston being separable from said rod and removable from said engine through said gap and opening.

GERARD JOHAN LUGT.

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