Oct. 27, 1936. E. O. P. THEGE ET AL 2,058,528

INTERNAL COMBUSTION ENGINE

Filed Jan. 21, 1933

Fig. 1.

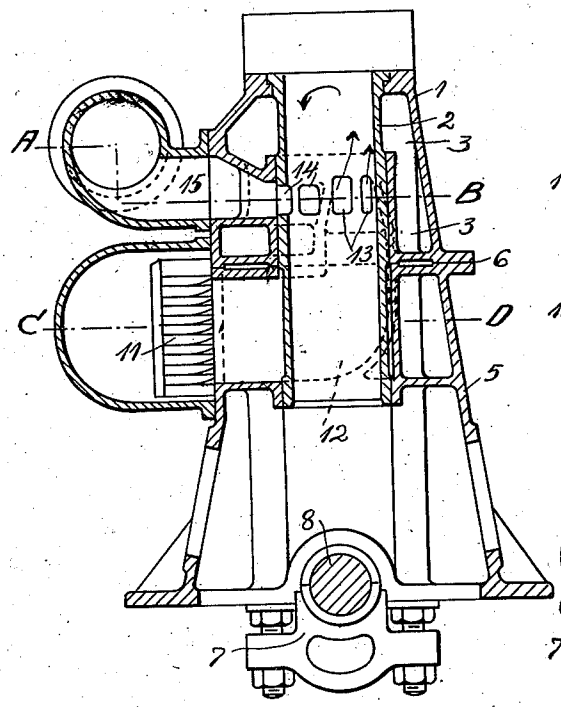


Fig. 2.

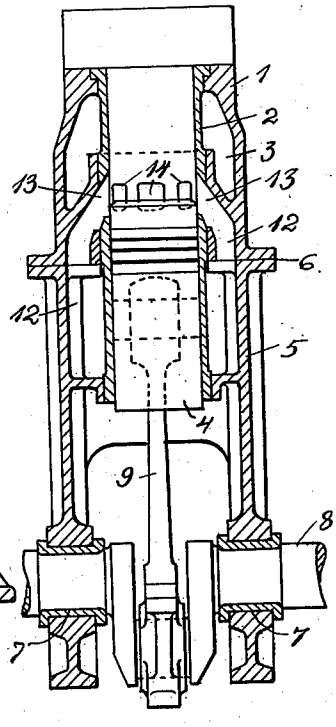


Fig. 3.

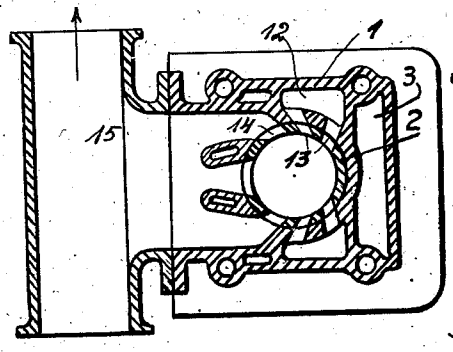
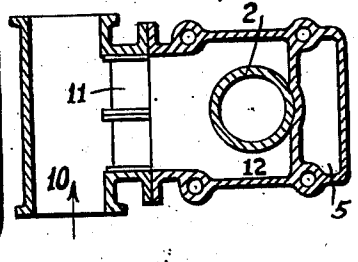


Fig. 3a.



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INTERNAL COMBUSTION ENGINE

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In Sweden December 29, 1932

4 Claims. (Cl. 123—65)

The present invention relates to internal combustion engines and has particular reference to such engines of the two stroke cycle type to which scavenging air is delivered from a receiver situated at the side of the engine.

In engines having this general form of construction, it is difficult to secure proper dimensions and curvature of the scavenging air passages when the cylinder and frame structure of the engine are cast integrally, and this is particularly true with multiple cylinder engines.

It is a principal object of the present invention to improve upon prior forms of construction of engines of this kind so as to readily and reliably secure the desired accuracy of direction of flow of the scavenging air into the engine cylinders, with a construction that is relatively cheap and provides for ease of manufacture.

To this end the cylinder structure and frame are made separately, with the scavenging air passages located partly in the frame and partly in the cylinder structure, with the transverse portions of the scavenging air passages, leading from the side of the engine, situated in the frame and with the vertically extending portions of such passages situated in the cylinder structure. By this means, the vertically extending portions, the discharge ends of which control the direction of flow of scavenging air into the cylinders may readily and reliably be machined or otherwise accurately formed, in a manner which is not practically possible from a manufacturing standpoint when the cylinder and frame structure is integrally cast.

The above general object and other and more detailed objects of the invention may best be understood from a consideration of the ensuing portion of this specification in which is described by way of example a preferred form of the construction embodying the invention.

In the drawing forming a part of this specification:

Fig. 1 is a vertical cross-section through an engine embodying the invention;

Fig. 2 is a cross-section of the engine shown in Fig. 1 and taken at right angles to the section of Fig. 1;

Fig. 3 is a section taken on the line A—B of Fig. 1; and

Fig. 3a is a section taken on the line C—D of Fig. 1.

Referring now to the drawing, reference numeral 1 designates the outer cylinder part having the cylinder liner 2 and the cooling jacket space 3 between the liner and the outer wall of the cylinder part 1. The liner 2 extends downwardly beyond the lower face of the outer cylinder part 1 sufficiently to guide the piston 4.

The cylinder part 1 is cast separately from and supported by a frame 5. The line of partition between these parts is indicated at 6 and these parts are bolted together by bolts (not shown).

The frame carries the bearings 7 and the crank shaft 8, the latter being connected to piston 4 by means of the connecting rod 9.

In the embodiment of the invention illustrated, the scavenging air passes from a receiver pipe 10 through an automatic admission valve 11, for example, of the kind disclosed in U. S. Patent No. 1,672,436, and from this valve to the scavenging air passages indicated generally at 12.

The passages 12 are formed partly in the frame 5 and partly in the cylinder structure. The parts of the channels located in the cylinder structure extend in substantially vertical direction while the parts of the passages 12 located in the frame extend transversely thereof. The vertical and transverse parts of the passages communicate with each other at the line of partition 6 between the cylinder and frame parts.

In the preferred arrangement shown, the vertical portions of the scavenging air passages are disposed at the opposite transverse side portions of the cylinder, as seen more clearly in Fig. 2, and at their upper ends terminate in the oblique and oppositely disposed ports 13. These ports are advantageously arranged in groups as shown in Fig. 3 so that the air delivered therefrom will be deflected upwardly in the lateral side portion of the cylinder opposite the exhaust ports 14 which communicate with the exhaust pipe 15, the direction of flow of the scavenging air in the cylinder being indicated by the arrows in Fig. 1.

The lower ends of the scavenging air passages in the cylinder communicate with the inner end of a transverse passage in the frame which communicates at its outer end with the receiver pipe 10.

With the constructions illustrated, the outer cylinder part 1 and the liner 2 may be and preferably are of cast iron having sufficient strength to withstand the combustion chamber pressures. The frame may be cast of the same or a different metal, for example, some light alloy, or may be fabricated of welded plate structure. The latter can readily be done since there is no cooling jacket structure necessary in the frame. By this arrangement the engine construction as a whole may be made comparatively very light.

Further with the arrangment shown, it will

be evident that the provision of scavenging air passages in the cylinder structure having the required degree of accuracy to introduce the scavenging air in precisely the direction desired may readily be accomplished since these passages may be finished before the engine is assembled and while the portions of the passages which are controlling as to the direction of introduction of the scavenging air are readily accessible for machining or other operations that may be desired.

While for purposes of illustration only a single cylinder engine has been shown, it will be appreciated that the invention is equally applicable to multiple cylinder engines and that changes and modifications in the form of construction shown by way of illustration can be made without departing from the invention, the scope of which is defined in the appended claims.

We claim:

1. In an internal combustion engine of the two stroke cycle type, cylinder structure providing a working cylinder, a frame separate from and supporting said cylinder structure, a series of exhaust ports located in one lateral side portion of the cylinder, a series of scavenging air ports distributed in and limited to the transverse side portions of the cylinder, said ports being arranged to direct scavenging air in a path of upward flow substantially confined to the lateral half of the cylinder opposite the lateral half in which said exhaust ports are located, upwardly extending scavenging air passages in said cylinder structure at the transverse sides thereof, said passages communicating at their upper ends with said scavenging ports and a transversely extending passage in said frame for said scavenging air, said transversely extending passage having an inlet end at one lateral side of the engine and having its outlet end registering with the lower ends of said scavenging air passages in said cylinder structure.

2. In an internal combustion engine of the two stroke cycle type, cylinder structure providing a working cylinder, a frame separate from and supporting said cylinder structure, a series of exhaust ports located in one lateral side portion of the cylinder, a series of scavenging air ports arranged in and limited to the transverse side wall portions of the cylinder, said scavenging air ports being arranged in mutually opposed groups for directing the air in a substantially vertical path of flow upwardly in the lateral half of the cylinder opposite the lateral side in which the exhaust ports are located, scavenging air passages in the cylinder structure at the transverse sides of the cylinder, said passages terminating at their upper ends at said scavenging ports, and a transversely extending scavenging air passage in said frame registering at its inner end with the lower ends of the scavenging air passages in the cylinder, and at its outer end terminating at the lateral side of the engine.

3. In an internal combustion engine of the two stroke cycle type, cylinder structure comprising an outer cylinder part and a separable cylinder liner providing a working cylinder, a frame separate from and supporting said cylinder structure, a series of exhaust ports located in one lateral side portion of said liner, a series of scavenging air ports distributed in and limited to the transverse side portions of the liner, said scavenging air ports being arranged in mutually opposed groups for directing the scavenging air in a substantially vertical upward path of flow substantially confined to the lateral half of the cylinder opposite the lateral side in which the exhaust ports are located, separate scavenging air passages formed in said outer cylinder part in the opposite transverse side portions of said part, said air passages registering at their upper ends with said scavenging air ports, and a transverse scavenging air passage formed in said frame and extending inwardly from one lateral side of the frame, the inner end of said transverse air passage registering with the lower ends of the air passages in said cylinder part.

4. In an internal combustion engine of the two stroke cycle type, cylinder structure comprising an outer cylinder part and a separable cylinder liner providing a working cylinder, a frame separate from and supporting said cylinder structure, a series of exhaust ports located in one lateral side portion of said liner, an exhaust conduit secured to said outer cylinder part at the same lateral side thereof as that of said exhaust ports, there being an exhaust passage in said cylinder part for placing said exhaust pipe in communication with said exhaust ports, a series of scavenging air ports distributed in and limited to the transverse side portions of said liner, said scavenging air ports being arranged to direct scavenging air in a generally vertical upward path of flow in and substantially limited to the lateral half of the cylinder opposite the side where said exhaust ports are located, separate scavenging air passages formed in said outer cylinder part and extending upwardly in each of the transverse side portions of said cylinder part, said passages registering at their upper ends with said scavenging ports, and a transverse scavenging air passage in said frame, the last mentioned passage extending inwardly from the lateral side of the engine at which said exhaust pipe is located and registering at its inner end with the lower ends of the scavenging air passages in said cylinder part.

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