

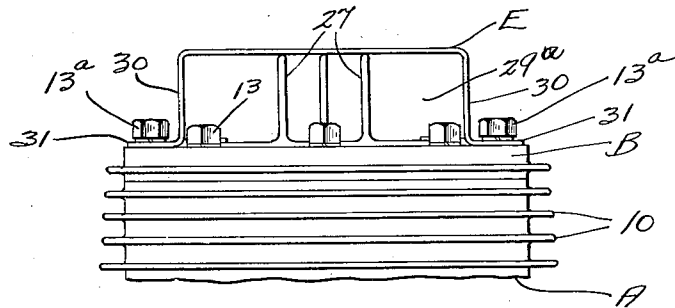
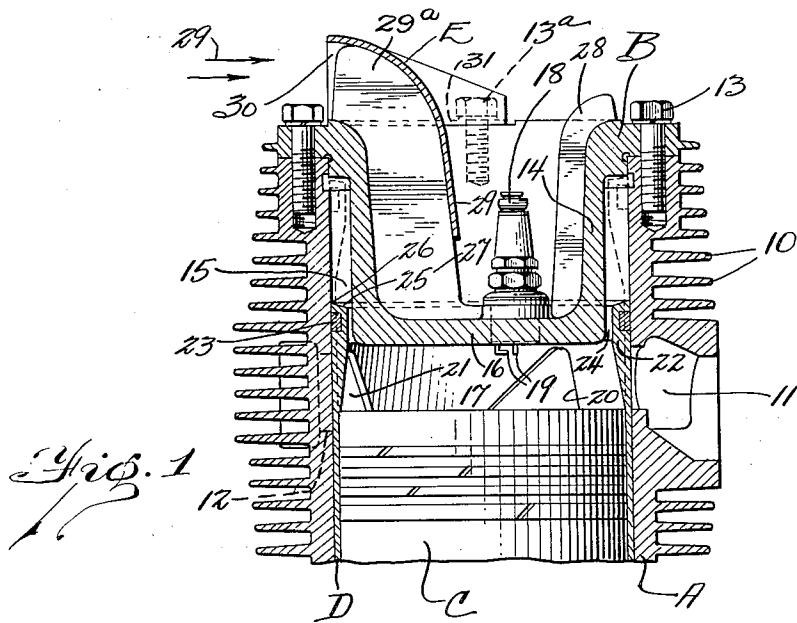
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INTERNAL COMBUSTION ENGINE

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INTERNAL-COMBUSTION ENGINE

Application filed March 23, 1928. Serial No. 264,265.

This invention relates to internal combustion engines and refers more particularly to sleeve valve and generally similar types of engines. In engines of this general class the cylinder is generally closed by a cylinder head having a portion depending within the cylinder and spaced therefrom to accommodate movement of one or more sleeve valves.

My invention is especially directed to air cooled engines although not necessarily limited thereto. In engines particularly of the air cooled type difficulty has been experienced in adequately cooling the cylinder head which is generally directly exposed to the heat of the combustion chamber. Where the heat is not dissipated sufficiently the space between the head and cylinder designated herein as the sleeve pocket becomes subjected to carbon accumulations, scoring and binding of the sleeve and rubbing surfaces, and a generally unsatisfactory performance of the engine.

My invention has among its objects the provision of means for preventing the aforesaid difficulties by permitting the heat absorbed by the cylinder head to be dissipated without contact with the sleeve or sleeves.

A further object of my invention resides in the provision of improved means for deflecting cooling air into the reentrant portion of the cylinder head.

Further objects and advantages of my invention reside in the novel combination and arrangement of parts more particularly hereinafter described and claimed.

In the drawings illustrating one embodiment of my invention,

Fig. 1 is a sectional elevation view through a typical engine cylinder illustrating my invention, and

Fig. 2 is an elevation view of the upper portion of the cylinder and associated structure.

Referring to the drawings, reference character A represents a cylinder which in the sleeve valve air cooled type is provided with cooling fins 10, fuel intake 11 and exhaust 12. B is the cylinder head seated on the cylinder and secured thereto by fasteners 13, the head having a portion 14 depending within the cylinder and spaced therefrom to pro-

vide a sleeve pocket 15. The cylinder head bottom 16 forms the top of the combustion chamber 17, one or more spark plugs 18 having terminals 19 communicating with the combustion chamber. Within the cylinder A is the usual reciprocating piston C and preferably intermediate the piston and cylinder are one or more sleeve valves, a single sleeve valve D of the combined reciprocating and oscillating type being shown for illustration. The sleeve D has the usual intake and exhaust ports 20, 21 respectively cooperating with the cylinder intake and exhaust 11, 12 for producing the customary valving cycle.

The sleeve D is for the most part preferably formed with the customary relatively thin cross-section for lightness of weight, the upper portion of the sleeve, from a point above the upper limit of travel of the piston, having its inner wall extending inwardly to provide an upper sleeve portion 22 of relatively thick cross section. This portion 22 by reason of its cross sectional dimension may be fitted with a sealing ring 23 in the outer face of the sleeve contacting with the walls of cylinder A. The portion 14 of the cylinder head is spaced not only within the cylinder but also within the sleeve with sufficient clearance 24 to prevent transfer of heat from the head to the sleeve. Thus the sleeve is free from rubbing contact with the cylinder head reentrant portion 14, the ring 23 preventing leakage of gases between the combustion chamber 17 and the cylinder intake 11 and exhaust 12. The heat absorbed by the cylinder head will travel upwardly from the combustion chamber along the portion 14 without the objectionable rubbing contact with the sleeve valve. A certain amount of carbon will tend to form in the sleeve pocket 15 since this pocket restrictedly communicates with the combustion chamber 17 by reason of the clearance 24, and in order to keep the cylinder wall clear of carbon deposit, the upper circumferential end of the sleeve may be beveled downwardly and inwardly at 25 to provide a scraping edge 26. The deposits removed will pass down the bevel 25, past the clearance 24 and thus away from the sleeve pocket and into the combustion chamber 17.

In Figs 1 and 2 I have illustrated an improved means for dissipating the heat from the cylinder head. The head B is provided with substantially radial cooling fins 27 and 28 preferably extending from the lower wall 16 and depending portion 14 upwardly beyond the cylinder head proper. A current of cooling air indicated by arrows 29 approaches the upper ends of the fins 27, this air current being afforded by the slip stream when the engine is used for aircraft or by the well known fan (not shown) or other induced draft means when the engine is used for stationary or general vehicular uses. In order to direct and confine the air current in the vicinity of the fins 27 for providing an improved cooling efficiency, I provide a deflector E having a portion 29^a extending across the air stream 29 and extending downwardly into the cylinder head at the rear of fins 27. The deflector E also preferably has opposed side wings 30 confining the air stream at the sides of the upper portions of fins 27, these wings 30 being formed with outwardly extended flanges 31 seating on the cylinder head, certain of the cylinder head fasteners 13^a also passing through the flanges 31 for removably securing the deflector E in position. Thus the air current is deflected and guided downwardly into the cylinder head in intimate contact with the fins 27, whence the air current clears the bottom of the deflector portion 29 and cools the spark plug 18. The air current then passes upwardly in contact with the fins 28 and outwardly from the cylinder head.

What I claim as my invention is:

1. In a sleeve valve engine of the air cooled type, a cylinder structure having air cooling means, a cylinder head structure closing the upper end of the cylinder and having a substantially cylindrical portion depending downwardly into the cylinder, said depending portion being spaced within the cylinder to provide an annular sleeve pocket, a sleeve valve within said cylinder, a working piston within the sleeve valve, said sleeve and cylinder having cooperating intake and exhaust ports, the upper end of said sleeve having its inner wall extended inwardly forming an enlarged upper end, a sealing ring carried in the said enlarged end of the sleeve contacting with the cylinder walls, said depending portion of the cylinder head structure being spaced within the said sleeve enlarged end sufficiently to prevent heat transfer from the cylinder head to the sleeve.

2. In a sleeve valve engine of the air cooled type, a cylinder structure having air cooling means, a cylinder head structure closing the upper end of the cylinder and having a substantially cylindrical portion depending downwardly into the cylinder, said depending portion being spaced within the cylinder to provide an annular sleeve pocket, a sleeve

valve within said cylinder, a working piston within the sleeve valve, said sleeve and cylinder having cooperating intake and exhaust ports, the upper end of said sleeve having its inner wall extended inwardly forming an enlarged upper end, a sealing ring carried in the said enlarged end of the sleeve contacting with the cylinder walls, said depending portion of the cylinder head structure being spaced within the said sleeve enlarged end sufficiently to prevent heat transfer from the cylinder head to the sleeve, and air cooling means carried by the cylinder head structure for dissipating heat therefrom.

3. In a sleeve valve engine, a cylinder structure, a cylinder head structure, sleeve valve means within said cylinder, a piston within the sleeve valve means, said cylinder head structure having a sleeve pocket forming portion depending within the cylinder and spaced from and within the sleeve valve means sufficiently to substantially prevent interchange of heat between the cylinder head and sleeve valve means.

4. In a sleeve valve engine, a cylinder structure, a cylinder head structure, sleeve valve means within said cylinder, a piston within the sleeve valve means, said cylinder head structure having a sleeve pocket forming portion depending within the cylinder and spaced from and within the sleeve valve means sufficiently to substantially prevent interchange of heat between the cylinder head and sleeve valve means, and sealing means carried by the sleeve valve means in contact with the cylinder.

5. In a sleeve valve engine, a cylinder structure, a cylinder head structure, a sleeve valve within said cylinder, a piston within the sleeve valve, said sleeve having an enlarged upper end, said cylinder head structure having a sleeve pocket forming portion depending within said cylinder and spaced from said enlarged sleeve end.

6. In a sleeve valve engine, a cylinder structure, a cylinder head structure, a sleeve valve within said cylinder, a piston within the sleeve valve, said sleeve having an enlarged upper end, said cylinder head structure having a sleeve pocket forming portion depending within said cylinder and spaced from said enlarged sleeve end, and a sealing ring in the enlarged sleeve end.

7. In a sleeve valve engine, a cylinder structure, a cylinder head structure, a sleeve valve within said cylinder, a piston within the sleeve valve, said sleeve having an enlarged upper end, said cylinder head structure having a sleeve pocket forming portion depending within said cylinder and spaced from said enlarged sleeve end, and a sealing ring in the enlarged sleeve end, contacting with the cylinder.

8. In a sleeve valve engine, a cylinder structure, a cylinder head structure, a sleeve

valve within said cylinder; a piston within the sleeve valve, said sleeve having an enlarged upper end, said cylinder head structure having a sleeve pocket forming portion depending within said cylinder and spaced
5 from said enlarged sleeve end, said sleeve pocket being in restricted communication with the engine combustion chamber.

9. In an internal combustion engine, a
10 cylinder, a piston, a cylinder head, a sleeve valve intermediate the piston and cylinder, said sleeve valve provided with an edge adapted to scrape the cylinder and remove deposits therefrom, the engine combustion
15 chamber being in communication with the cylinder walls above the said sleeve valve edge whereby the deposits removed may pass to the combustion chamber.

10. In an internal combustion engine, a
20 cylinder, a piston, a cylinder head, a sleeve valve intermediate the piston and cylinder, said sleeve valve having its upper end beveled downwardly and inwardly to provide a cylinder scraping edge, the engine combustion
25 chamber being in communication with the cylinder walls above the sleeve valve upper end whereby deposits removed by the beveled edge may pass down the beveled edge and into the combustion chamber.

30 11. In an internal combustion engine, a cylinder, a piston, a cylinder head, a sleeve valve intermediate the piston and cylinder, said sleeve having an enlarged upper end, and a sealing ring carried by the said en-
35 larged sleeve end.

12. In a sleeve valve engine, a ported cylinder structure, a cylinder head structure depending within the cylinder and spaced there-
40 within to provide an annular sleeve receiving pocket, sleeve valve means provided with ports adapted to be moved from the engine combustion chamber upwardly into said annular sleeve pocket, said depending cylinder
45 head structure being spaced within the sleeve valve means sufficiently to substantially prevent transfer of heat from the sleeve valve means to the cylinder head.

13. In a sleeve valve engine, a ported cylinder structure, a cylinder head structure depending within the cylinder and spaced
50 therewithin to provide an annular sleeve receiving pocket, sleeve valve means provided with ports adapted to be moved from the engine combustion chamber upwardly into said
55 annular sleeve pocket, said depending cylinder head structure being spaced within the sleeve valve means sufficiently to substantially prevent transfer of the heat from the sleeve valve means to the cylinder head, and
60 air cooling means for the cylinder structure and cylinder head structure.

In witness whereof, I hereunto subscribe my name this 17th day of March, A. D. 1928.

ARCHIE MACPHAIL NIVEN.