

[54] **ELASTOMERIC SEALING RING FOR CYLINDER LINERS**

[75] Inventors: **Glen N. Feather, Dunlap; Harry M. Kiley; William A. Nelson**, both of Peoria, all of Ill.

[73] Assignee: **Caterpillar Tractor Co.**, Peoria, Ill.

[22] Filed: **Dec. 21, 1972**

[21] Appl. No.: **317,416**

[52] U.S. Cl. **123/41.82, 123/41.84, 123/193 CH**

[51] Int. Cl. **F02f 1/36**

[58] Field of Search **123/193 H, 193 R, 193 CH, 123/193 C, 41.84, 41.82**

[56] **References Cited**

UNITED STATES PATENTS

2,939,753	6/1960	Schilling et al.	123/193 CH X
3,363,608	1/1968	Scherenberg et al.	123/41.84
3,396,711	8/1968	Fangman et al.	123/193 CH
3,403,661	10/1968	Valentine	123/41.84
3,463,056	8/1969	Moore et al.	123/41.84 X
3,481,316	12/1969	Olson et al.	123/41.84

3,628,427 12/1971 Bailey..... 123/193 CH X

FOREIGN PATENTS OR APPLICATIONS

1,186,685 2/1965 Germany..... 123/193 CH

Primary Examiner—Manuel A. Antonakas

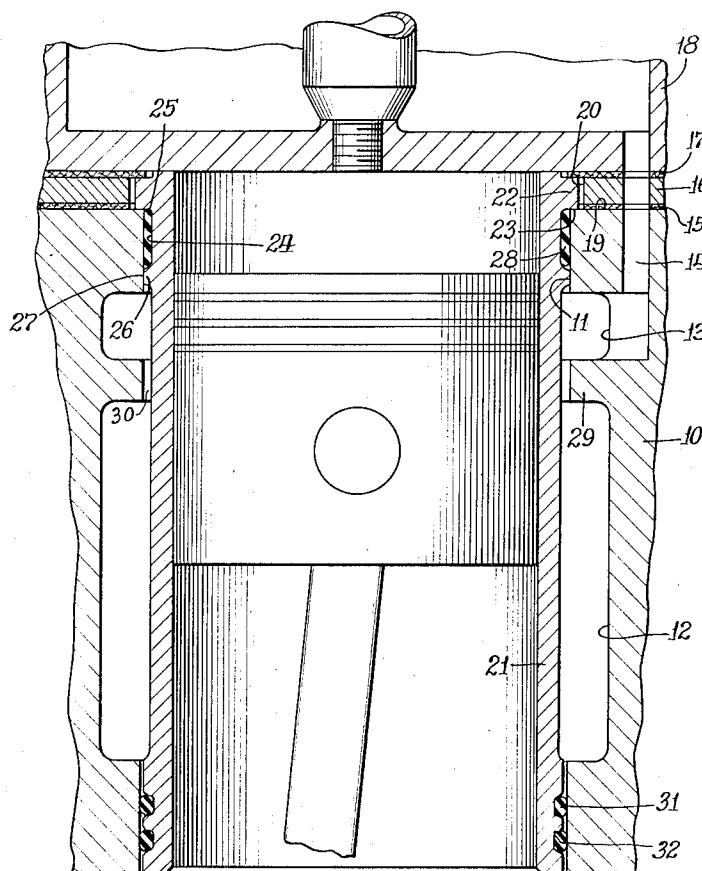
Assistant Examiner—Daniel J. O'Connor

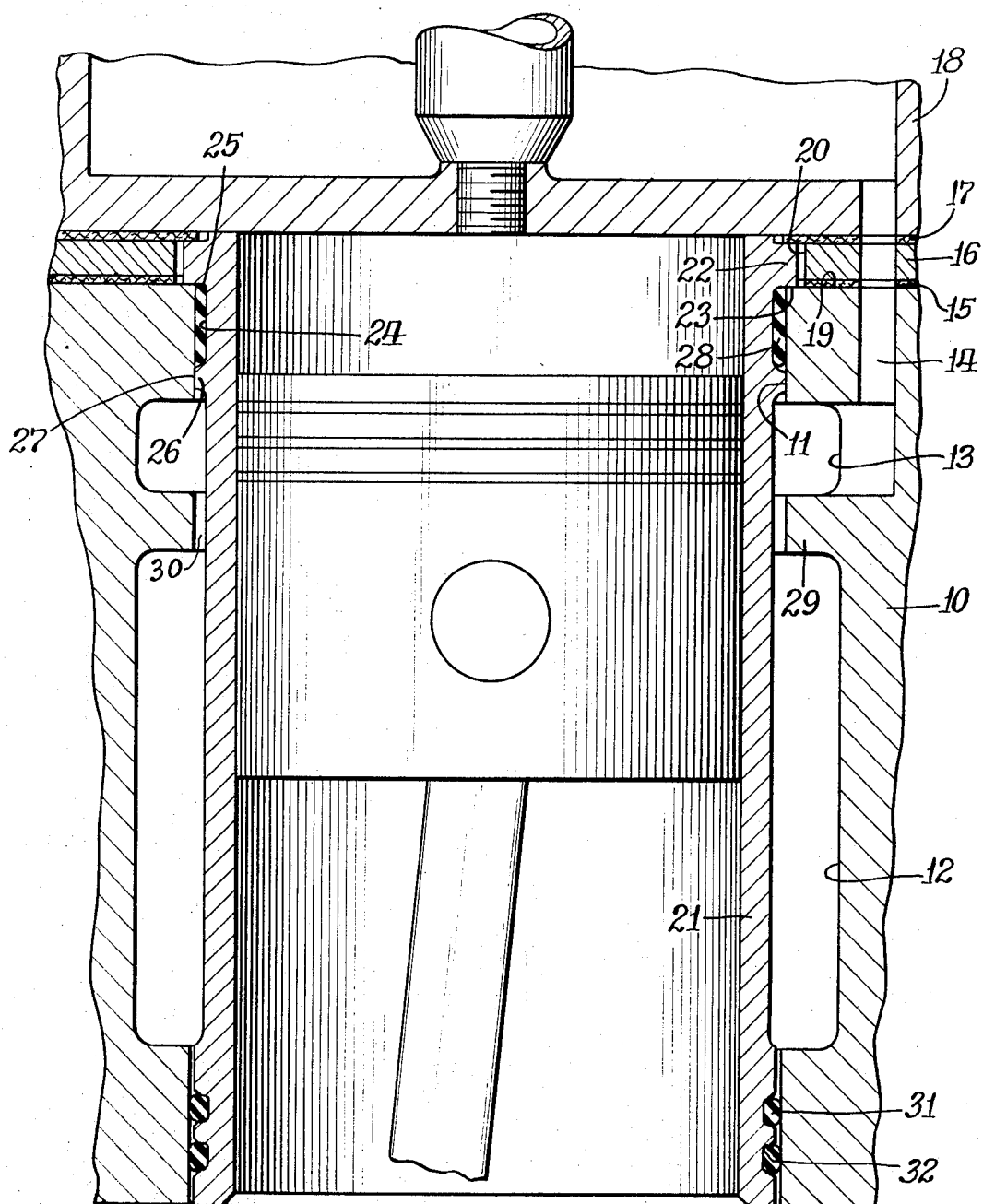
Attorney, Agent, or Firm—Phillips, Moore, Weissenberger Lempio & Strabala

[57] **ABSTRACT**

An internal combustion engine comprises a cylinder block having a head mounted thereon and a plurality of cylinder liners mounted in the block. Interconnecting passages continuously circulate a coolant through the block and head and around each liner during engine operation. An annular elastomeric seal is disposed between the cylinder block and each liner, adjacent to the head, to prevent the passage of coolant thereby. A venturi throat is defined in the passages, closely adjacent to the seal, to increase the velocity of coolant flow thereat.

1 Claim, 1 Drawing Figure





ELASTOMERIC SEALING RING FOR CYLINDER LINERS

BACKGROUND OF THE INVENTION

Conventional internal combustion engines comprise interconnecting passages formed in their blocks and heads for circulating a coolant around their cylinder liners during engine operation. Each cylinder liner normally comprises an upper, radial flange which is seated on the block. The high operating temperatures encountered at such seat tend to deteriorate same, resulting in a loosening of the head gasket. Certain chemical inhibitors, mixed into the circulated coolant, tend to accelerate such deterioration due to their corrosive effect, particularly at high temperature levels.

SUMMARY OF THIS INVENTION

An object of this invention is to overcome the above, briefly described problems by providing a strategically positioned annular elastomeric sealing means between the cylinder block and liner of an internal combustion engine. The sealing means is compressed to maintain a positive seal thereat during all phases of engine operation wherein metallic parts are subjected to thermal expansion and contraction.

In the preferred embodiment of this invention, a venturi throat, defined in coolant-carrying passages formed in the block, is positioned closely adjacent to the sealing means to increase the velocity of coolant flow therethrough.

BRIEF DESCRIPTION OF THE DRAWING

Other objects of this invention will become apparent from the following description and accompanying drawing which is a cross sectional view of a cylinder and attendant structures employed in an internal combustion engine.

DETAILED DESCRIPTION

FIG. 1 partially illustrates an internal combustion engine comprising a cylinder block 10 having a plurality of cylinder bores (one shown) defined in part by an annular wall 11 formed on the block. Annular chambers 12 and 13 are also defined in the block to circumvent the cylinder bore to form a portion of interconnected passage means for circulating a coolant through the engine during its operation. The passage means further comprises a passageway 14 aligned with openings formed through a metallic gasket 15, a spacer 16, a head gasket 17 and a cylinder head 18. Gasket 15 and spacer 16 are seated on a deck 19 of the block and have a recessed bore 20 formed therethrough which has a diameter slightly larger than the diameter of the cylinder bore.

A cylindrical liner 21 is disposed in the cylinder bore

and has an upper radial flange 22 formed thereon to have its bottom surface 23 seated on deck 19. An annular groove 24 facilitates the roll-forming of a flange radius 25 on the liner to increase the structural integrity thereat. The groove is defined between flange 22 and an axially spaced second flange 26, having an outer surface 27 of slightly smaller diameter, closely fitted within wall 11.

An annular elastomeric sealing means, such as single ring seal 28, is closely fitted within groove 24 and is compressed radially between the liner and wall 11. Thus, the ring seal prevents the leakage of coolant upwardly from chamber 13 to flange 22, notwithstanding the slight circumferential clearance defined between outer surface 27 of flange 26 and wall 11. The ring seal may comprise a suitably composed elastomeric material, such as a rubber or plastic based material, which will retain its elastomeric and thermal resistant properties over an extended period of time.

An annular baffle 29 forms a "venturi throat" 30 between chambers 12 and 13 to increase the velocity of coolant flow therethrough. Such increased coolant flow will aid in quickly dissipating heat at the hottest area of the cylinder. A pair of O-ring seals 31, disposed in grooves 32 formed at the lower end of the liner, are compressed against bore 11 for coolant sealing purposes thereat.

What is claimed is:

1. In an internal combustion engine having a cylinder block, a cylinder head mounted on said block, a cylindrical bore formed in said block, a cylindrical one-piece liner mounted in said bore and having an upper, radial flange seating on a top surface of said block and an axially spaced lower radial flange defining an annular groove therebetween, said lower flange having a free end closely fitted within said bore, interconnecting passage means defined in said block and said head around said liner for continuously circulating a coolant therethrough during engine operation, said passage means further including a venturi throat means solely defined between said lower radial flange and said liner, closely adjacent to and below said sealing means, to increase the velocity of coolant flow therethrough and further including a pair of gaskets and a spacer plate sandwiched between said gaskets, said gaskets and spacer plate mounted between said block and head and having aligned openings therein which serve as a continuation of said passage means between said block and head, an elastomeric sealing ring disposed in said annular groove and compressed between said block and said liner, adjacent to said head preventing the passage of coolant between said seating and said free end and said bore.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,853,099

DATED : December 10, 1974

INVENTOR(S) : Glen N. Feather, Harry M. Kiley, William A. Nelson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 41 delete "said lower radial flange"
and substitute --an annular baffle of the cylinder block--.

Signed and Sealed this

Twenty-fifth **Day of** *January 1983*

[SEAL]

Attest:

GERALD J. MOSSINGHOFF

Attesting Officer

Commissioner of Patents and Trademarks