July 11, 1961 J. T. RAUSCH 2,991,770

PISTON COOLING MEANS

Filed July 15, 1959 2 Sheets-Sheet 1

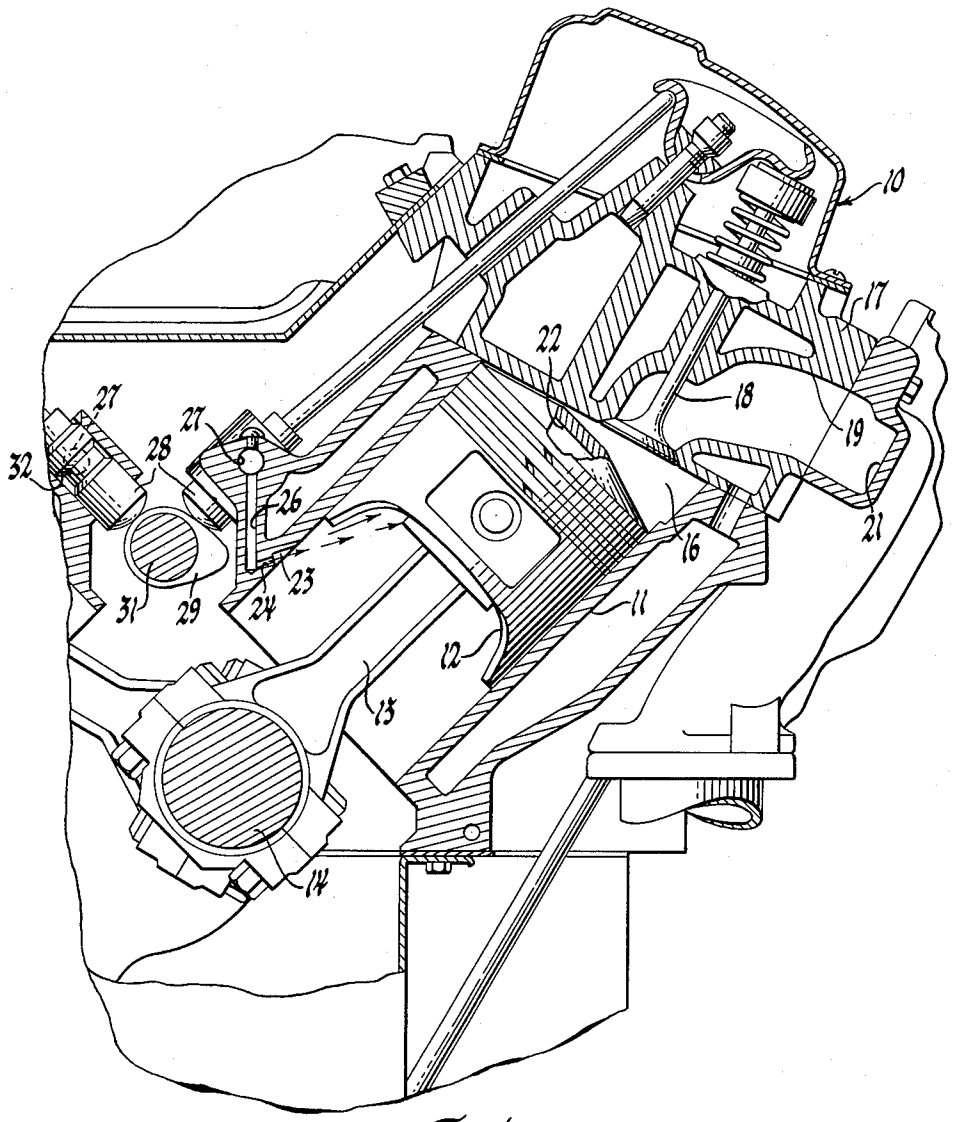


Fig. 1

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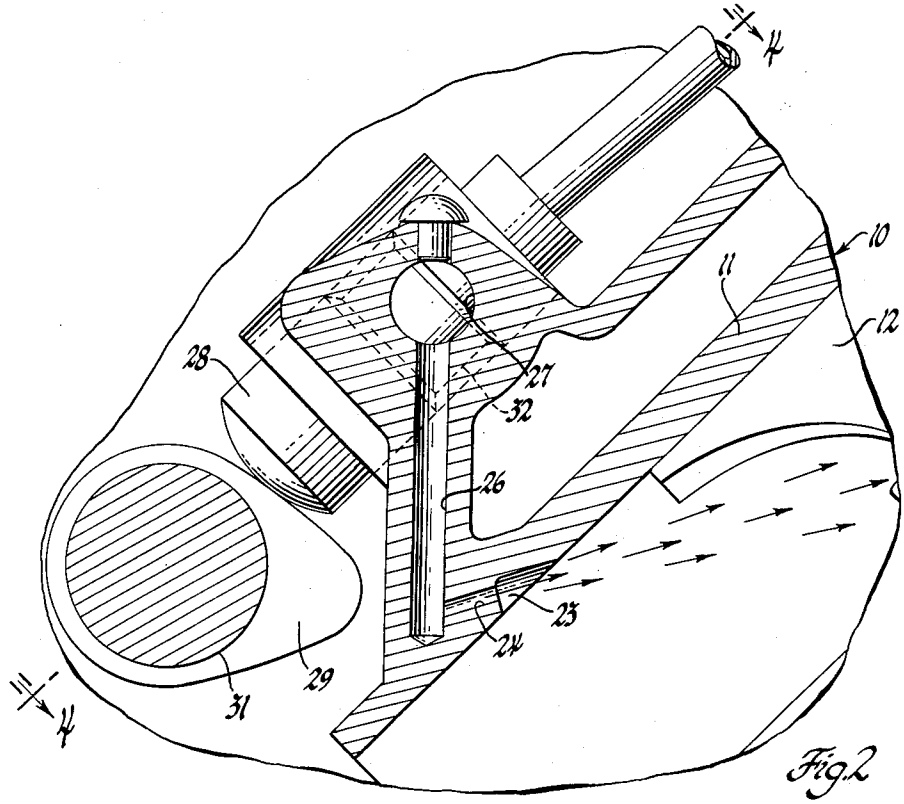


Fig. 2

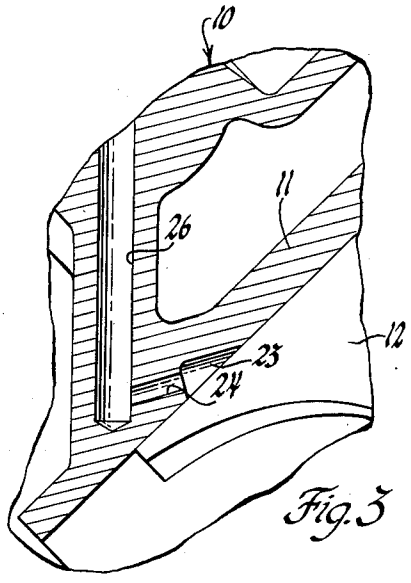


Fig. 3

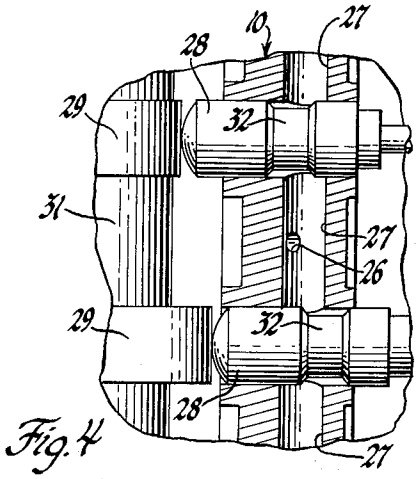


Fig. 4

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2,991,770

PISTON COOLING MEANS

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2 Claims. (Cl. 123—41.35)

This invention relates to internal combustion engines, particularly to cooling the pistons of internal combustion engines and the like.

It is proposed to cool the pistons of internal combustion engines with jets of oil intermittently directed toward the head ends of the pistons. The jets of oil are metered quantities of oil supplied by the oil supply system for the engine and timed by the operation of the pistons of the engine. The jets are projected from ports uncovered by the pistons as the pistons approach outer dead center positions in the cylinders. The jets expand the oil under pressure in the lubrication system through metering devices which direct the jets through the inner open ends of the pistons and upon the head ends or other walls of the pistons.

In the drawing:

FIGURE 1 is a fragmentary cross sectional view of a V-type multicylinder internal combustion engine that may be employed for automotive or other purposes.

FIGURE 2 is an enlarged fragmentary view of one of the cylinders of the engine disclosed by FIGURE 1, and with the piston of the cylinder positioned beyond a port in the cylinder where a jet of oil from the lubricating system of the engine is being discharged upon the piston.

FIGURE 3 is a similar enlarged fragmentary view of the cylinder but with the piston thereof closing the cooling oil supplying port.

FIGURE 4 is a fragmentary longitudinal view through one of the main oil galleries of the engine, and disclosing a pair of valve lifters and a cooling oil supply passage, all communicating with the gallery.

The engine **10** embodying the invention has cylinders **11** in which pistons **12** are reciprocated by connecting rods **13** connecting the pistons **12** with the crankshaft **14** of the engine. The pistons are adapted to compress explosive charges into combustion chambers **16** formed between the cylinders **11**, the pistons **12** and heads **17** for the cylinders of the engine. The charges are adapted to be ignited in the combustion chambers **16** at the end of the compression stroke of the pistons, and after which the pistons are moved away from the heads of the engine and toward the inner dead center position of the piston by expansion of the charges on the exhaust stroke. The outward movement of the pistons will discharge the products of combustion from the engine through exhaust valves **18**, exhaust passages **19**, and exhaust manifolds **21**.

When the engine is operating under full power conditions the walls of the pistons tend to become excessively heated, this being particularly true of the head end walls of the pistons indicated at **22**. This excessive heating often causes the walls of the pistons to crack and perhaps even to break, thus rendering the engine inoperative. In order to prevent excessive heating of the piston walls it is proposed to supply oil to the interior surfaces of the pistons, particularly to the inside surfaces of the end walls **22**. To accomplish this it is proposed to provide ports through which the oil may be discharged upon the inner surfaces of the pistons, there being one of the ports **23** for each cylinder of the engine. It is considered preferable to locate the ports **23** so that they will be uncovered by the piston somewhere between the inner and outer

dead center positions of the pistons, perhaps in the vicinity of 90° before the outer dead center position of the pistons. The ports **23** are adapted to be supplied with oil by metering passages **24** which communicate through supply passages **26** with one of the main oil galleries **27** employed in supplying oil to the valve actuating mechanism of the engine. Such actuating mechanism may include valve lifters **28** which are operated by the cams **29** of the camshaft **31** of the engine, the camshaft being driven in timed relation by the crankshaft **14** of the engine. The valve lifters **28** may be supplied with oil by the galleries **27**, in the present instance the lifters being located along the length of the galleries and in such a way as to intersect the galleries. Grooves **32** are formed in the valve lifters in such a way as to at all times communicate with the galleries **27**, thereby to provide a continuous flow of oil in the galleries from one end thereof to the other. It is proposed to locate the oil supply passages **26** in such a manner as to communicate with the galleries **27** between the pairs of valve lifters **28** for each cylinder **11** of the engine. The passages **26** therefore will be supplied at all times with oil under the full-lubricating oil pressure of the engine, as this pressure is employed in lubricating the valve lifters **28** and other associated parts of the valve actuating mechanism of the engine. The metering orifices **24** terminating in the ports **23** meter the oil to such an extent as to maintain the desired pressure in the galleries **27** and increase the velocity of the oil to provide the jets of oil discharged by the ports **23**. The position of the orifices **24** and the ports **23** is such that when the ports are uncovered by movement of the pistons of the engine, the jets of oil will be discharged on the inner walls of the pistons, preferably although not necessarily on the end walls **22** of the pistons. Such jets of oil when discharged on the walls of the pistons will cool the walls, thereby preventing overheating of the pistons under full or excessive loads on the engine **10**.

The claims:

1. An internal combustion engine having a reciprocating piston in a cylinder and an oil passage adjacent said cylinder, said oil passage being supplied with lubricating oil under pressure employed in lubricating the moving parts of said engine, and piston cooling means for said engine, said piston cooling means comprising a port in the wall of said cylinder, said port being connected to said passage and being uncovered by said piston during the reciprocating movement of said piston, said port when uncovered by said piston being positioned to discharge a jet of oil inside said piston and against the inner surface of the walls of said piston employed in supporting said piston in the cylinder and in expanding and exhausting the products of combustion burned in and exhausted from said cylinder, said oil being employed in cooling the walls of said piston during the operation of said engine.

2. An internal combustion engine as defined by claim 1 and in which said port embraces jet means directed toward the outer end of said cylinder and metering the oil supplied by said passage and projecting said oil from said port at a velocity sufficient for said oil to reach the outer end of said piston when said piston is in outer dead center position in said cylinder.

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