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PISTON FOR INTERNAL COMBUSTION ENGINES.

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1,089,823.

Patented Mar. 10, 1914.

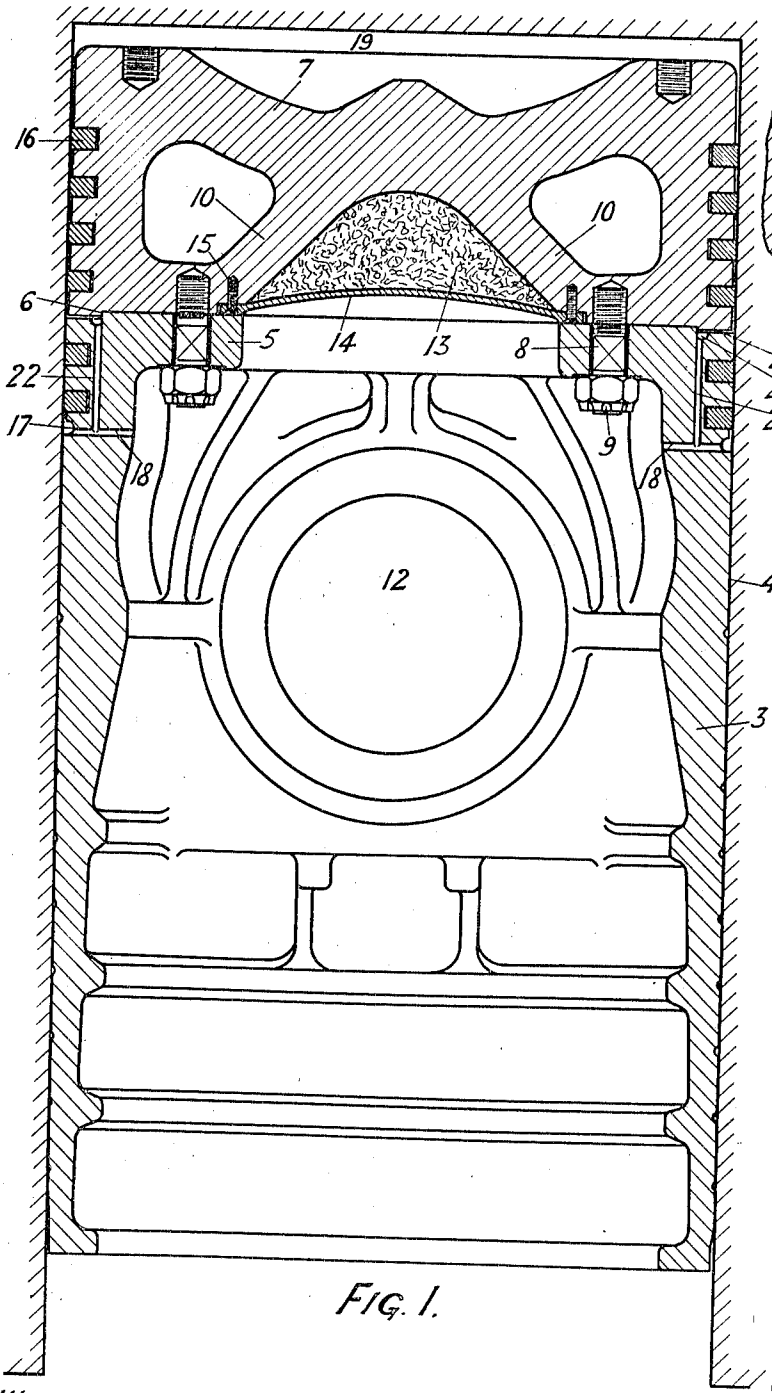


FIG. 1.

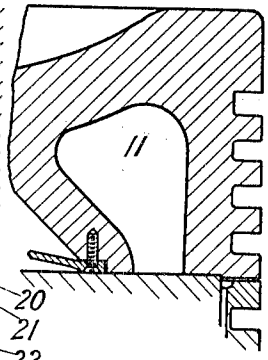


FIG. 2.

WITNESSES:

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CHARLES DAY AND GEORGE E. WINDELER, OF STOCKPORT, ENGLAND, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

PISTON FOR INTERNAL-COMBUSTION ENGINES.

1,089,823. Specification of Letters Patent. Patented Mar. 10, 1914.

Application filed June 13, 1912. Serial No. 703,396.

To all whom it may concern:

Be it known that we, CHARLES DAY and GEORGE E. WINDELER, subjects of the King of Great Britain, residing at Stockport, county of Cheshire, England, have invented certain new and useful Improvements in Pistons for Internal-Combustion Engines, of which the following is a specification.

The present invention relates to pistons for internal combustion engines, and in particular to engines operating on the constant pressure plan where crude oil is used as a fuel. In such engines it is desirable to provide the pistons with removable heads so that, when injured by the heat to which they are subjected, they can be replaced. It is also necessary in order to reduce the weight of these removable heads and to provide for the conduction of heat from the top face of the piston to the cylinder wall, to core them out, thus forming chambers. Because the head is removable a joint is necessary between it and the body of the piston. From practical experience we have found that the lubricating oil which lies on the cylinder wall in the form of a thin film, is forced through this joint and enters the cored chamber or chambers in the head where it rapidly accumulates and is carbonized, forming a hard compact mass. This mass is of course kept at a high temperature in the head and undoubtedly interferes with the transmission of heat to the cylinder walls where a large part of it is absorbed by the cooling water. After the chambers have become filled with carbon, the said heads crack or split and therefore have to be replaced. The carbon retards the dissipation of heat from the hot center to the side walls of the head which are cooled by the water chamber in the cylinder, and in our opinion, since the carbon is very hard, it prevents the free contraction of the casting, the action being similar to the effect caused in a mold when a hard baked core is used. Whether this be the true explanation or not, the fact remains that the heads do crack and split and consequently have to be renewed at considerable expense and loss of time.

We have discovered a means for preventing the lubricating oil from working into the joint between the head and the main body of the piston, thereby overcoming the objectionable cracking or splitting of the heads, and said means forms the subject matter of this application.

In the accompanying drawing which illustrates one of the embodiments of our invention, Figure 1 is a longitudinal section of a piston, and Fig. 2 is a detail section of the removable head.

3 indicates the main body of the piston, and 4 the cylinder therefor. The body is provided with an internal flange 5 that is finished on its upper surface and is provided with a shoulder 6 that serves to center the removable head 7. The head is recessed to receive the projecting shouldered portion of the body. The parts are united by stud bolts 8, the nuts of which are accessible from the underside. The nuts are provided with grooves 9 to receive cotter pins to prevent them from turning after being properly seated. The head is relatively massive in order to withstand the strain to which it is subjected on the firing stroke of the engine. It is also provided with a member 10 that serves to convey heat from the center of the head to its periphery and to the main body. Surrounding the member 10 is a chamber 11 that is cored out at the time the head is cast. This chamber is for the purpose of decreasing the weight of the head and is open on its underside so that the cored material can be entirely removed. The end or opening of the chamber terminates in the plane of the joint between the head and the main body. The joint between these parts is made as carefully as possible, but unless means are provided to prevent it, lubricating oil will work through the joint between the parts and be collected in the chamber 11 where it will carbonize and ultimately cause the head to crack or split. These means will be described later.

In order to reduce the transmission of heat from the head to the piston pin which passes through the wall 12, a body of asbestos or other heat insulating material 13 is packed into the head and confined by a plate 14. This plate is let into a shouldered recess in the head and is retained by screws 15. These screws are covered by the flange 5 so that they cannot work loose when the piston is in operation.

Both the main body and the head are provided with suitable packing rings 16, some of which are located above and the remain-

der below the joint between the head and the body. These rings, as the piston moves downward, scrape a certain amount of lubricating oil from the cylinder wall, which oil is discharged at the bottom into an annular groove 17, the latter communicating by a passage 18 with the inside of the body. This arrangement serves to prevent lubricating oil from being forced by the packing rings into the combustion space 19 at the top of the cylinder.

Referring now to the means for preventing lubricating oil from working through the joint into the chamber 11, a small annular space or passage 20 is left between the bottom surface of the head and the upper surface of the body. This is in constant communication with a small annular groove 21 formed in the upper face of the body. Communicating with this groove are axial extending passages 22 which communicate with the horizontal passages 18 opening into the space within the piston body. The piston ring located above the joint will, on the downward movement of the piston, scrape lubricating oil from the wall of the cylinder, and said oil will flow through the annular passage 20, groove 21 and passages 22 and 18 to the interior of the body where it does no harm. Said oil will not follow the closely fitting joint between the head and body because it will take the path of least resistance which is formed by the passages aforesaid. On the upward movement of the piston the ring below the joint acts as a scraper and forces the lubricating oil into the passage 20 from which it readily escapes. For convenience the passages and the holes 22 are drilled from the top to intersect the horizontal passages 18, but if desired they can be extended directly into the space within the body.

Practical experience has demonstrated that the arrangement specified will successfully prevent the entrance of lubricating oil into the chamber 11 and the damage incident thereto.

In accordance with the provisions of the patent statutes we have set forth what we believe to represent the best embodiment of our invention; but it is to be understood that the drawing is only illustrative, and that our invention can be carried out by other means.

What we claim as new and desire to secure by Letters Patent of the United States is:—

1. A piston comprising a body portion, a removable head therefor, the joint between the parts being perpendicular to the axis thereof, and means for conveying lubricating oil that enters the joint to the interior of the body portion.

2. A piston comprising a body portion, a removable chambered head mounted thereon, the body of the piston closing the entrance to said chamber, and a passage that communicates with the joint between the head and body at one end and with the interior of the body at the other for conveying excess lubricating oil from the joint to the interior of said body.

3. A piston comprising a body portion, a removable chambered head mounted on and moving with said body, the latter closing the entrance to said chamber, packing rings mounted on the piston above and below the joint between the body portion and head, and a passage that communicates with said joint, receives lubricant and discharges it into the interior of the body.

4. A piston comprising a body portion, a removable recessed head mounted thereon, a body of heat insulating material located in the recess to reduce the transmission of heat from the head to the piston pin, and a plate which holds the insulating material in place, the peripheral edge of which is located in the joint between the body and head.

5. A piston comprising a body portion having an inturned flange, a removable chambered head that engages the flanged end of the body, said head and flange acting as a means to close said chamber on one side, a member for conveying heat from the head to the body, means for uniting the head and body, an annular peripheral groove located between the head and body, a passage connecting said groove with the interior of the body, and packing rings located on opposite sides of the groove and acting to force lubricant into the groove from which it is conveyed by the passage into the interior of the body.

6. A piston comprising a body portion, a removable chambered head therefor, said body acting to close the chamber on one side, packing rings in the body and also in the head, an annular groove located at the joint between the body and head and between packing rings, a passage receiving lubricant from the groove and conveying it to the interior of the body, and a second annular groove located below the packing rings on the body which receives lubricant and discharges it into said passage.

In witness whereof we have hereunto set our hands and seals this 23rd day of May, 1912.

CHARLES DAY. [L. S.]
GEORGE E. WINDELER. [L. S.]

Witnesses:
ALEX. F. MACDONALD,
JOHN W. GILL.