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LUBRICATING SYSTEM FOR INTERNAL COMBUSTION ENGINES.

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1,342,273. **Patented June 1, 1920.**

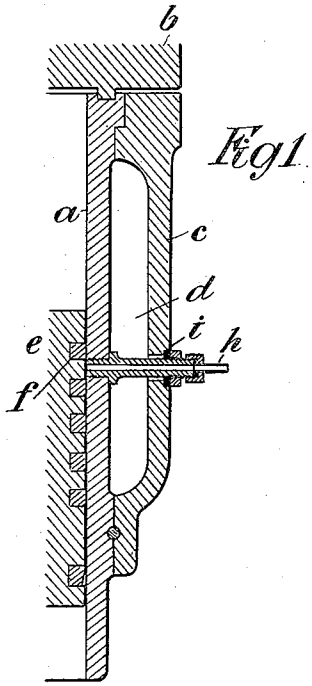


Fig 1

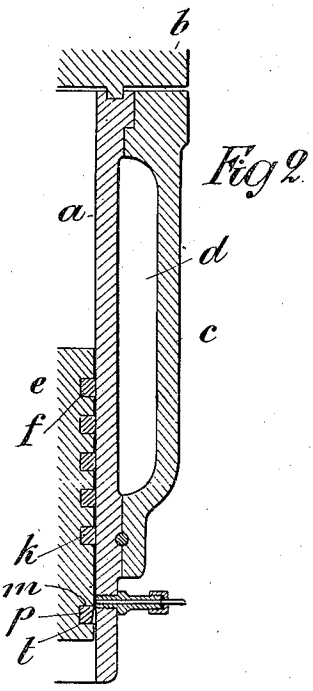


Fig 2

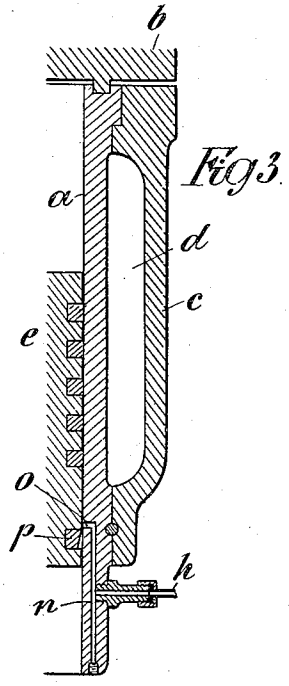


Fig 3

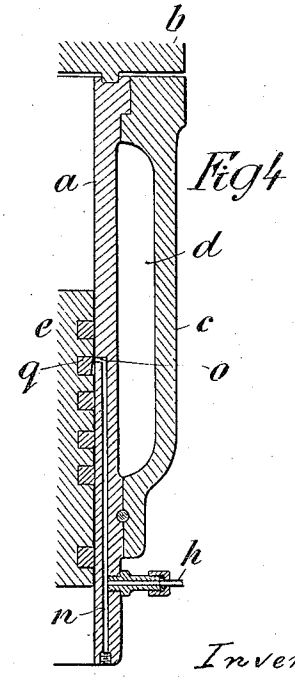


Fig 4

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LUBRICATING SYSTEM FOR INTERNAL-COMBUSTION ENGINES.

1,342,273. Specification of Letters Patent. Patented June 1, 1920.

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To all whom it may concern:

Be it known that I, HANS HENRIK BLACHE, director, a citizen of the Kingdom of Denmark, residing at No. 32 Sofieveg, Hellerup, near Copenhagen, Denmark, have invented certain new and useful Improvements in Lubricating Systems for Internal-Combustion Engines, of which the following is a specification.

In internal-combustion engines of the kind in which there is used a loose cylinder-lining which is fastened only adjacent of the cylinder head, the supply of lubricating oil to the piston is subject to some difficulties, because the lubricating oil should be supplied to the cylinder at the highest possible level. In other words, the oil should be pumped into the cylinder at so high a level, at least, that it will enter below or close to the topmost piston ring, when the piston occupies its lowest position. In order to have the oil supplied so far up in the cylinder, it is necessary to supply the oil by way of a channel passing through the cooling-water chamber. As the cylinder and the cylinder-jacket encircling the cooling-water chamber expand differently, it has obviously been necessary to place an elastic packing around the oil-supply pipe, at the point where the latter passes through the cylinder-jacket.

The above mentioned construction suffers from the drawback that it renders the removal and insertion of the cylinder-lining very difficult, and as this removal and insertion of the lining must be performed now and then, partly in order to clean the lining on the outside and partly in order to bore it on the inside, the construction has demonstrated itself to be very unsatisfactory, as the holes for the several oil-pipe nipples, usually provided along the circumference of the cylinder, may not easily be located exactly in line with the holes in the jacket.

The present invention remedies this defect by supplying the lubricating oil through a bore in the cylinder-lining below the water-jacket of the cylinder, and by providing a scraper-ring, which reaches below the oil-supply opening, when the piston is in its bottommost position, and whose scraping edge turns upward, or by boring a preferably vertical channel in the cylinder-lining, so that the oil from the supply-pipe is conveyed, through this channel, sufficiently far up in the lining, before it is directed toward the piston, by way of a channel leading to the interior of the cylinder.

The accompanying drawing illustrates both the known construction, and some manners of constructing the present invention.

Figure 1 shows a vertical section of the cylinder-lining, the cylinder-jacket and the piston, and of the known supply arrangement for the lubricating oil.

Figs. 2, 3 and 4 show similar sections of various structural embodiments of the present invention.

In Fig. 1, "*a*" indicates the cylinder-lining, which is fastened at its top, near the cover "*b*", to the cylinder-jacket "*c*". The cooling-water chamber is marked "*d*", while "*e*" indicates the piston and "*f*" the topmost piston-ring being, for the bottommost position of the piston, only slightly above the lubricating-pipe nipple "*g*", which is inserted through the jacket "*c*" and is screwed into the cylinder-lining "*a*". Between the lubricating-pipe nipple "*g*" and the jacket "*c*", there is provided an elastic packing "*i*" allowing the lining and the jacket to expand differently, without the lubricating-pipe nipple being appreciably influenced thereby. "*h*" indicates the pipe by way of which the lubricating oil is supplied.

In the constructions of the invention shown in Figs. 2 to 4, the corresponding parts are indicated in the same manner as in Fig. 1. As it appears from Fig. 2, the lubricating oil is supplied by way of a bore in the cylinder-lining below the water jacket "*c*". By this construction, the oil is lifted up into the cylinder by using, according to the present invention, a scraper-ring "*p*" located so far down on the piston, and so far below the bottommost piston ring "*k*" that it will reach below the oil-supply opening when the piston is in its bottommost position. The scraper-ring "*p*" consists, of known manner, of a resilient piston-ring turned down obliquely on the face touching the cylinder, as indicated for the face "*l*", while the top edge in the ring is sharpened. This ring will slide on top of the film of lubricating oil during the downward motion of the piston, while during the upward motion of the piston it will scrape the oil upward along the cylinder, so that the oil will be deposited far up in the cylinder, before the scraper-ring "*p*" again moves downward with the piston.

Fig. 3 shows a modified manner of con-

structing the invention. The lubricating oil is not conveyed directly into the cylinder below the water-jacket "*c*", but passes through a channel "*n*", which is bored in the lining "*d*" farther up in the cylinder, where it flows in through the horizontal channel "*o*" above the scraper-ring "*p*", which owing to the use of the channel "*n*" does not have to be located so far down on the piston as mentioned above. By means of the channel "*n*", the advantage is attained that the scraper-ring does not have to lift the oil as far up in the cylinder as it would be necessary if the channel "*n*" had been omitted. If desired, the vertical channel, or channels, "*n*" may be made so long that the oil is conveyed up to a point on the cylinder wall which is level with the topmost piston-ring, when the piston occupies its bottommost position. This is indicated in Fig. 4, where the second piston-ring from the top is replaced by a scraper-ring "*q*" of the same construction as the before-mentioned scraper-ring "*p*". By the construction shown in Fig. 4, the advantage is attained that the scraper-ring "*q*" will lift the oil clear up to the top end of the cylinder.

I claim as my invention:

1. The combination of a water-jacketed cylinder; a piston working therein and provided with a set of packing rings and with a scraper ring distinct therefrom; and a lubricant supply passage formed solely through the cylinder wall and having its inlet end located below the water jacket and its outlet end opening through the inner face of said wall at a point which is approximately opposite the scraper ring when the piston occupies its lowermost position in the cylinder, whereby said scraper ring is enabled to scrape up the lubricant entering the cylinder through the outlet end of said passage and spread it in film form far up along said inner face of the cylinder during the upward movement of the piston.

2. The combination of a water-jacketed cylinder; a piston working therein and provided with a set of packing rings and with a scraper ring distinct therefrom; and a lubricant supply passage formed vertically in the cylinder wall and having its inlet end located below the water jacket and its outlet end horizontally through the inner face of said wall at a point which is approximately opposite the scraper ring when the piston occupies its lowermost position in the cylinder, said scraper ring having an upwardly and outwardly inclined outer face to enable it to scrape up the lubricant entering the cylinder through the outlet end of said passage and spread it in film form far up along said inner face of the cylinder during the upward movement of the piston, and to slide over the film when the piston moves downward.

3. The combination of a cylinder; a piston working therein and provided with a set of packing rings and with a scraper ring distinct therefrom; and a lubricant supply passage formed vertically in the cylinder wall and opening horizontally at its outlet end through the inner face of said wall at a point which is approximately opposite the scraper ring when the piston occupies its lowermost position in the cylinder, whereby said scraper ring is enabled to scrape up the lubricant entering the cylinder through the outlet end of said passage and spread it in film form far up along said inner face of the cylinder during the upward movement of the piston, and to slide over the film when the piston moves downward.

4. The combination of a cylinder; a piston working therein and provided with a packing ring and with a scraper ring distinct from the packing ring; and a lubricant supply passage formed through the cylinder wall and opening at its outlet end through the inner face of said wall at a point which is approximately opposite the scraper ring when the piston occupies its lowermost position in the cylinder, whereby said scraper ring is enabled to scrape up the lubricant entering the cylinder through the outlet end of said passage and spread it in film form far up along said inner face of the cylinder during the upward movement of the piston, and to slide over the film when the piston moves downward.

In testimony whereof I affix my signature.

HANS HENRIK BLACHE.