

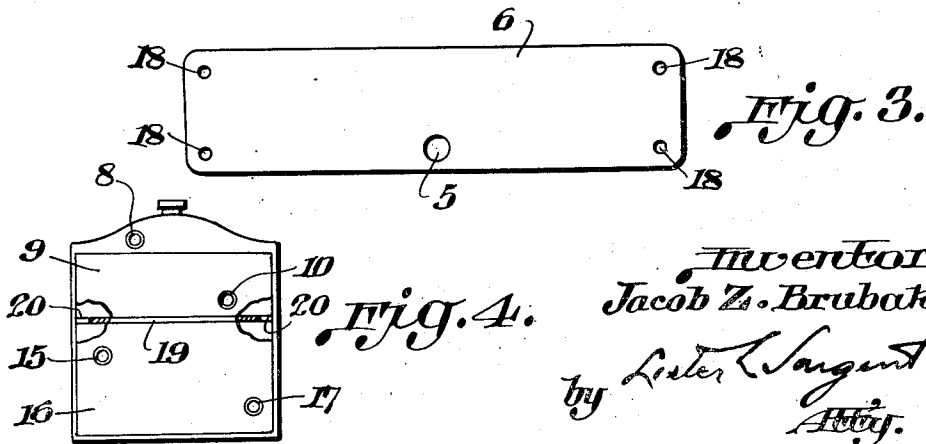
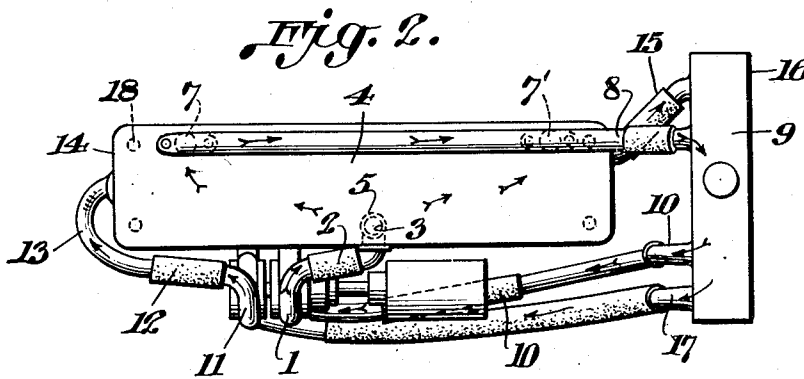
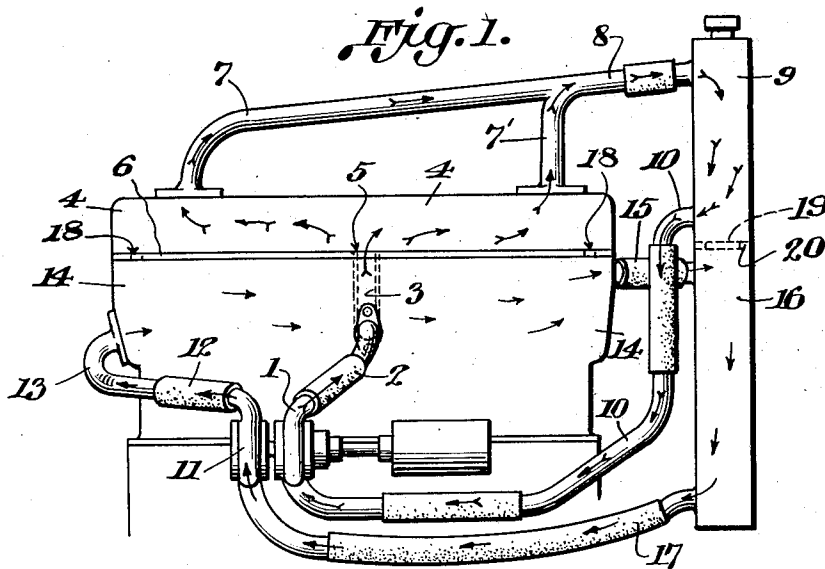
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FORCE FEED COOLING SYSTEM FOR INTERNAL COMBUSTION ENGINES

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FORCE FEED COOLING SYSTEM FOR INTERNAL COMBUSTION ENGINES

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3 Claims. (Cl. 123—170)

This application is in part a continuation of my application, Serial No. 397,279, filed October 4, 1929, patented January 20, 1931, Patent No. 1,789,540.

5 The object of my invention is to provide an improved cooling system for motors of the internal combustion engine type whereby a constant circulation of cooler water is kept up around the cylinders and of hotter water around the head of the motor; to provide a plurality of pumps whereby water is operated through force feed and there is a constant flow throughout the length of the motor and cylinder head casings, whereby various advantages, including better lubrication and better combustion of the charge are effected by maintaining the head and block of the motor at the different temperatures desirable, the latter at a cooler temperature than the head. It is also an object of my invention to provide a system that will be highly efficient for controlling the temperature of motors and cooling same and which will facilitate the operation of the engine in hot weather and will greatly increase the life of the motor.

25 I attain these and other objects and advantages of my invention by the mechanism illustrated in the accompanying drawing, in which,—

Figure 1 is a side elevation of my invention applied to an internal combustion engine;

30 Fig. 2 is a top plan view of same;

Fig. 3 is a detail plan view of the gasket 6; and

Fig. 4 is a front elevation, reduced size, of the radiator with portions broken away to show the disposition of the partition 19 and openings 20.

35 Like numerals designate like parts in each of the several views.

Referring to the accompanying drawing, I provide a pump 1 by means of which water is circulated through the conduit 2 to the cylinder block 14 and thence through a brass pipe 3 within the cylinder block and through gasket opening 5 to the cylinder head 4 whence the water flows to opposite ends of the head and through the spaced conduits 7 and 7' into the common conduit 8 leading to the top of the radiator 9 whence the water passes through conduit 10 opening out of the lower portions of the upper half of the radiator and returns to the pump 1 where it is again carried through the same course by a force feed. The radiator is separated into an upper and lower section by the preferably horizontal partition 19.

50 I provide a second pump 11 by which the water is driven through the conduits 12 and 13 into the cylinder block 14 and thence lengthwise of

the cylinder block to and through the conduit 15 into the upper portion of the lower half 16 of the radiator, the water thence flowing downwardly and out through conduit 17 to return to the pump 11 and follow the same course.

5 As illustrated in Figs. 1 and 4 of the drawing, I provide a gasket 6 which separates the head of the motor from the cylinder block, this gasket however being provided with openings 18 at each end which permits of a limited circulation of water between the head and block. I also provide a preferably horizontal partition 19 separating the radiator into an upper and lower section substantially corresponding in position vertically with the gasket 6 which separates the head from the block of the motor. The partition 19 is provided with suitable openings 20 in the ends to permit of a limited circulation of water between the upper and lower sections of the radiator. These passages 18 and 19 permit of the passage of water at a slow rate between the respective upper and lower main compartments.

Heretofore it has been the usual practice in cooling motors to have a single water jacket around the cylinders and valves, the water entering the lower part of the cylinder block and being emitted through ports from the cylinder block into the cylinder head and then into the radiator for cooling. In such a system the cylinder block and cylinder head have almost the same temperature. This is a situation which is not calculated to attain the most efficient operation of the motor. In such an ordinary cooling system a motor will develop the most power at a certain temperature due to the fact that as the temperature rises the combustion improves, while on the other hand as the temperature rises in the cylinders the efficiency of that part of the motor decreases due to the fact that the film of oil on the cylinder walls and pistons is too thin when hot to thoroughly lubricate or seal the piston rings to maintain proper compression.

In my new system the cylinder head is maintained at a temperature approximately 75 degrees hotter than the temperature maintained in the cylinder block. By providing two independent pumps I obtain two separate circulating systems constantly in operation by which water is circulated through the head and block of the motor by the force feed. Consequently I have a hot cylinder head and a well-cooled cylinder block and thereby obtain a higher motor efficiency. A further advantage attained is that the engine is easier to operate in cool weather due to the fact that the cylinder head is warmed up more

quickly than in the old system, with the result of better acceleration, and more efficient performance of the engine.

Particular attention is called to the fact that in my construction the cooler section of the radiator is at the bottom and the warmer section at the top, thus making use of the natural tendency of the hot water to rise, the water being permitted to pass up through the openings 20 in the partition 19. A similar operation occurs as between the head 4 and the cylinder block 14, the hot water being permitted to rise through the passages 18 from the block into the head 4. The system of circulation is thorough since the water circulates lengthwise through the motor, practically eliminating all dead water-pockets. The heating of the head of the motor results in better combustion while the well cooled cylinder will hold a good film of oil to lubricate and seal the piston rings and thereby obtain a better compression.

A low cylinder temperature allows a higher compression without spark rap. A cheap grade of oil in a well cooled cylinder will lubricate better than an expensive oil in a hot cylinder, also greatly reducing the consumption, and for this reason the maintenance of the block at a cooler temperature is a highly desirable result which is attained by my invention. The combination of a hot head and a well cooled cylinder results in better combustion, better and higher compression, better lubrication with less oil consumption, whereby to develop more horsepower per rating of piston displacement and resulting in a smooth and highly efficient motor.

What I claim is:

1. In a force feed cooling system for motors, the combination with the cylinder head and cylinder block of the motor of a force feed cooling system connected with the cylinder head, a force feed cooling system connected with the cylinder block, a gasket partition disposed between the cylinder block and the cylinder head, said partition having small ports to permit a limited water circulation,

a radiator having a partition dividing it into two sections, the cooling system connected with the cylinder head being connected with one of the radiator sections from which hotter water is supplied to heat the cylinder head, and the cooling system connected with the cylinder block being connected with the other of the radiator sections from which cooler water is supplied to cool the cylinders and improve lubrication thereby, and relatively small openings through the partition for the passage of water to a limited extent from one section to the other.

2. In a force feed cooling system for motors, the combination with the cylinder head and cylinder block of the motor of a force feed cooling system connected with the cylinder head, a force feed cooling system connected with the cylinder block, a horizontal gasket partition disposed between the cylinder block and the cylinder head, said horizontal partition having small ports to permit a limited water circulation, a radiator having a substantially horizontal partition dividing it into two sections, the cooling system connected with the cylinder head being connected with one of the radiator sections, and the cooling system connected with the cylinder block being connected with the other of the radiator sections, and relatively small openings through the partition for the passage of water to a limited extent from one section to the other.

3. In a cooling system for an internal combustion engine, the combination of a radiator having a horizontal partition, said partition having openings therethrough, force feed apparatus supplying hot water from the upper portion of the radiator of the cylinder head and maintaining the cylinder head at a relatively high temperature and independently operated force feed apparatus supplying cool water from the lower portion of the radiator to the cylinder block and maintaining the cylinder block at a substantially lower temperature than the cylinder head.

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