

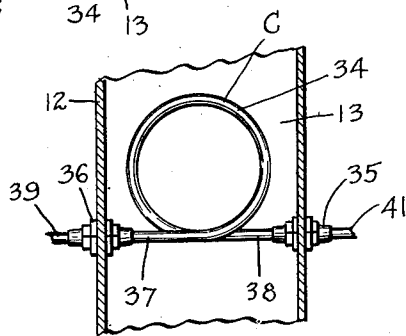
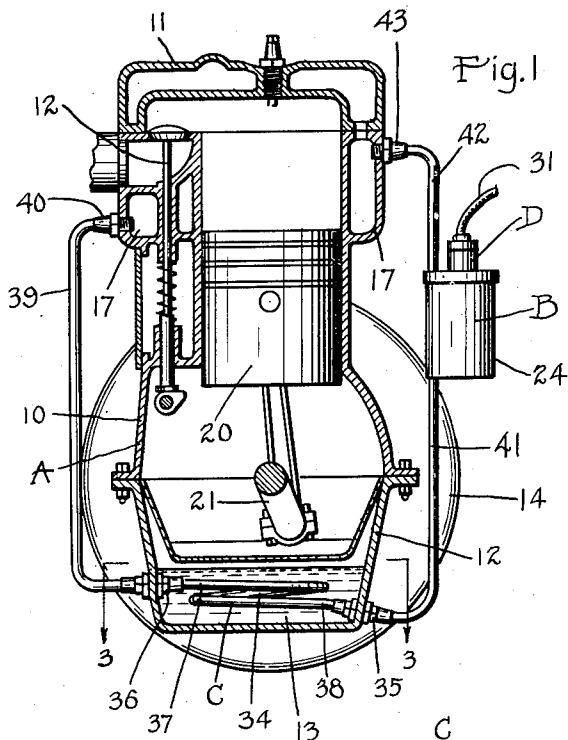
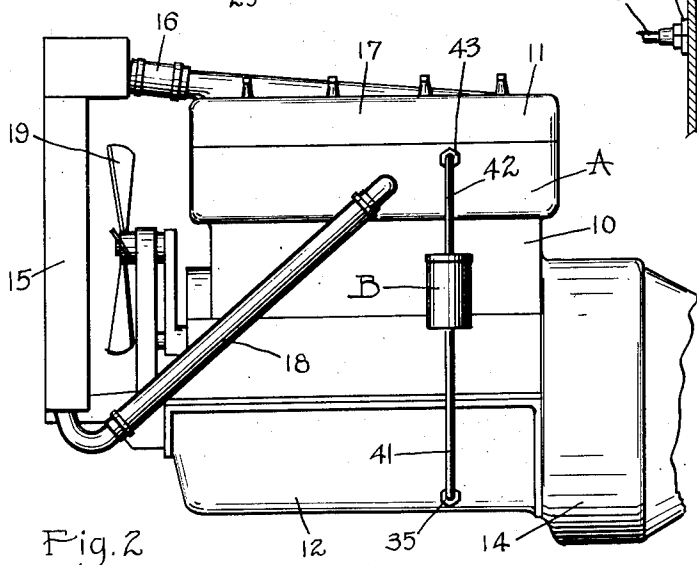
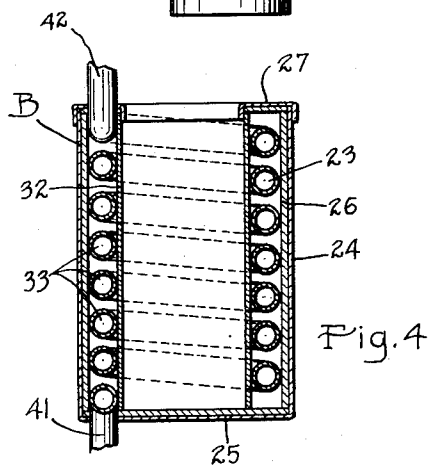
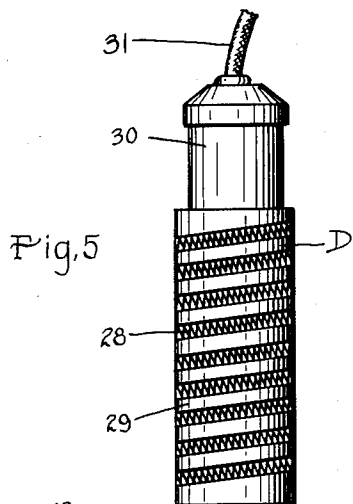
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HEATER FOR INTERNAL COMBUSTION ENGINES

Filed Nov. 18, 1925



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UNITED STATES PATENT OFFICE.

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HEATER FOR INTERNAL-COMBUSTION ENGINES.

Application filed November 18, 1925. Serial No. 69,790.

My invention relates to heating systems for internal combustion engines of motor vehicles and particularly to heating systems for raising the temperature of the cylinders of the engine by heating the cooling liquid therein to facilitate starting the engine in cold weather. An object of the invention resides in providing a device for heating only the portion of the cooling medium confined within the water jacket of the engine so as to conserve heat and reduce the time necessary to bring the cylinders up to the proper temperature.

Another object of the invention resides in providing a device for simultaneously heating the cooling liquid within the cylinders of the engine and heating the oil within the oil reservoir so that the engine may be easily turned over and the oil may be freely circulated thereafter.

A still further object of the invention resides in providing a heater positioned on the exterior of the engine and a radiating coil positioned within the oil reservoir, and to connect said heater and coil to opposite sides of the water jacket so as to cause the water to circulate from the heater across the cylinders and then through the oil reservoir and back to the heater, thereby utilizing the heat remaining in the cooling liquid after it leaves the cylinders for heating the oil.

Other objects of the invention reside in the detailed construction thereof as disclosed in the following description, claims and drawing.

In the drawing illustrating my invention in one form:

Fig. 1 is a cross sectional view of an internal combustion engine showing the application of my invention thereto.

Fig. 2 is a side elevational view of the structure shown in Fig. 1.

Fig. 3 is a fragmentary plan sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is an enlarged sectional view of one form of heater used with my invention.

Fig. 5 is an elevational view of the heating element used with the heater shown in Fig. 4.

In cold weather considerable difficulty is encountered in starting the engines of motor vehicles where the same have been allowed to stand in the cold for any length of time. This inconvenience has been partly remedied by the use of heaters by means of

which the entire cooling fluid in the radiator and water-jacket of the engine is heated, but such construction is undesirable due to the amount of heat required and in the length of time necessary to bring the cylinders of the engine up to the proper temperature. In addition, further difficulty has been experienced in the lubricating oil becoming solidified so as to cause the engine to turn over with difficulty. My invention overcomes these disadvantages by providing a heating system in which both the cylinders and the oil reservoir is heated and by means of which the cooling fluid in an engine only consisting of but a small quantity of liquid is heated up to the required temperature, thereby saving time and heat and at the same time permitting the engine to turn over easily and the oil to circulate freely when the engine is operated.

To illustrate the application of my invention, I have shown in the drawings an internal combustion engine A comprising a cylinder block 10 having a cylinder head 11 attached thereto. The cylinder block 10 is provided with a crank case 12 forming an oil reservoir 13 which communicates with the fly wheel housing 14 of the same. In front of the engine A is positioned a radiator 15 which is connected by means of an inlet pipe 16 with the top of the water jacket 17 of engine A and with an outlet pipe 18, which is connected with said water jacket at a lower portion of the same and extends downwardly towards the bottom of radiator 15. This structure together with a fan 19 forms the cooling system of the engine. Within the cylinder block 10 are positioned the pistons 20, which actuate a crank shaft 21 in the usual manner, as well as the valve mechanism 22 and other customary parts of the engine. This construction being, however, well known in the art has not been explained in detail further than to illustrate the application of the invention thereto. It will readily become apparent that the invention may be used with any of the ordinary forms of internal combustion engine used on motor vehicles.

The invention proper consists of a heater B which is placed without the engine A and is connected to a radiator C positioned in the oil reservoir 13. Both of these devices are connected to the water jacket 17 so that the cooling liquid within the water jacket 17 is caused to circulate through the

radiator C, the heater B and back through said water jacket. This has the effect of shunting or by-passing the cooling liquid in the radiator and of heating the cooling liquid in the cylinders only, as will hereinafter become more apparent.

The construction of the heater B is shown in detail in Fig. 4. This device consists of a coil of tubing 23 comprising a number of spaced convolutions 33 positioned within a cylindrical metal container 24. This container has a bottom 25 fast thereon and is open at the top and is lined with an asbestos lining 26 extending along the cylindrical walls and bottom thereof to prevent the waste of heat generated within the heater. An annular rim 27 secured to container 24 holds the coil 23 and the lining 26 in position within said container.

For use in connection with the coil 23 I employ an electrical heating element D which consists of a coil of filament of suitable resistance wire 28 wound spirally upon a core 29 of refractory substance secured to an electric light socket 30. The coil 28 is connected to conductors 31 extending from the socket 30 and by means of which the heating element may be connected to any suitable source of electrical energy so as to cause the coil or filament 28 to become heated to glowing red when the current is turned on. This heating element is adapted to be inserted into the interior of the coil of tubing 23 and is held spaced therefrom by means of a sheet of mica 32 placed within the interior of said coil 23 thereof. It will be noted that the convolutions 33 of the coil 23 are spaced so that the heat generated by the element D when positioned within the heater B heats the mica sheet 32 which causes the air in and about the space surrounding each convolution 33 of the coil of tubing 23 to become heated so as to uniformly transmit the heat to said convolutions substantially throughout the entire outer surface thereof, thereby making the heater highly efficient.

The radiator C consists of a single convolution 34 of tubing which is positioned in the oil reservoir 13 and is attached to connectors 35 and 36 secured to the walls of crank case 12 in such a manner that the cooling liquid may circulate freely through the radiator and so that the oil within said reservoir will not enter the radiator or leak out past these connections. This convolution is further arranged so that the inlet 37 thereof is positioned above the outlet 38 and so that the liquid therein will flow by gravity through the radiator, thereby removing any obstruction to the flow of the cooling liquid through the same.

The heater B and the radiator C are connected to the engine A as follows: A pipe 39 is connected at its lower end to the con-

connector 36 of radiator C and extends upwardly and along the side of engine A where it is connected to the lowermost portion of the water jacket 17 by means of a connector 40 tapped into the same. Another pipe 41 is connected at its lower end to the connector 35 of radiator 34 and extends upwardly being connected at its upper end with the bottom of coil 23 of heater B. A similar pipe 42 is connected at its lower end to the top of the coil 23 and at its upper end to the water jacket 17 by means of a connector 44 which is tapped into it on the side opposite the connector 40 and at a point above the same. In this manner a circuitous passageway is formed for the cooling liquid in the cylinder water jacket which extends through the water jacket 17, the pipe 39, radiator C, the pipe 41, heater B and through the pipe 42 back to the water jacket 17. If desired, the pipes 39 and 42 may be connected to any portions of the cooling system occupying substantially the same relative positions instead of directly to the water jacket of the engine.

In the use of the device the heating element D is connected to a suitable source of electrical energy and inserted within the heater B. This causes the coil 23 therein to become heated and the cooling liquid within it to rise. The heated liquid enters into the space within the water jacket 17 where it circulates giving off its heat to the walls of the cylinder block 10 and cylinder head 11. As the liquid cools it falls, and enters pipe 39. From this pipe it passes into the radiator C where it gives off further heat raising the temperature of the oil within said reservoir. Upon leaving this radiator it is forced up to the heater B where it is again heated and circulated as before. The cooling liquid in so circulating by-passes the liquid in the radiator so that only the portion thereof confined within the cylinder water jacket is circulated and heated. Although the usual path for the circulation of the cooling liquid of the cooling system through the pipes 16, and 18 and the radiator 15 remains unobstructed, the portion of said cooling liquid heated by the heater B does not circulate through it. This is due to the following facts: As it requires energy to force the cold water upwardly, it can be readily seen that in order that the water return to heater B through radiator 15 that the water must travel, through pipe 16, down the radiator and up the pipe 18, then through the pipe 39 and the rest of the circulating system. This imposes an added resistance to the flow of the cooling liquid through the radiator over and above the resistance to the flow through the heating system as above described and since the liquid takes the course of least resistance, the same flows only through the circulating

system. In this manner the liquid within the radiator is trapped by means of pipe 18 so that only the liquid in the water jacket is heated and circulated.

5 The advantages of my invention are manifest. The device is extremely simple and will not readily get out of order. The cylinders and oil of the engine may be quickly heated so as to permit of readily
10 starting the engine in cold weather when the same would be otherwise impossible. A great economy in fuel consumption is effected over and above other heating systems in which all of the cooling liquid in
15 the cooling system is heated.

Having described my invention in the form which I consider to represent the best embodiment thereof, I desire to have it understood that the invention may be constructed in different ways and put to uses
20 other than those disclosed within the scope of the following claims.

I claim:—

25 1. In combination with an internal combustion engine having a water jacket, a heater, a pipe connected with said heater and to the water jacket of said engine on one side thereof, and a second pipe connected to said heater and to said water
30 jacket on the other side thereof, said second pipe passing beneath said engine.

2. In combination with the water jacket and oil reservoir of an internal combustion engine, a heating system therefor comprising
35 a heating coil positioned without the engine above the lowermost portion thereof, a radiating coil positioned within said oil reservoir, a pipe connecting the upper end of said heating coil with a portion of said
40 water jacket, a second pipe connecting the lower end of said heating coil with the lower end of said radiating coil, a third pipe connecting the upper end of said radiating coil with said water jacket at a
45 point below the connection of said first named pipe with said water jacket and means for heating said heating coil.

3. In combination with the water jacket and oil reservoir of an internal combustion engine, a heating system therefor comprising
50 a heating coil positioned without the engine above the lowermost portion thereof, a radiating coil positioned within said oil

reservoir, a pipe connecting the upper end of said heating coil with a portion of said
55 water jacket, a second pipe connecting the lower end of said heating coil with the lower end of said radiating coil, a third pipe connecting the upper end of said radiating coil with said water jacket at a
60 point below the connection of said first named pipe with said water jacket on the opposite side of said engine, and means for heating said heating coil.

4. In combination with the water jacket and oil reservoir of an internal combustion engine, a heating system therefor comprising a circuitous water circulating system connected with said water jacket at one side, extending downwardly and along said
65 engine, and through said oil reservoir and upwardly along the other side, and being connected with said water jacket on the opposite side thereof at a point below said first connection thereto, said circulating
70 system including a heater positioned without the engine and a radiator positioned within the oil reservoir.

5. In combination with an internal combustion engine having a water jacket, a heater, including a coil, a pipe connecting the upper portion of said coil with the upper
80 portion of said water jacket on one side thereof, said pipe being below the upper portion of said water jacket at all points thereof, and a second pipe connecting the lower portion of said coil with the lower
85 portion of said water jacket on the opposite side thereof.

6. In combination with an internal combustion engine having a water jacket, a heater, including a coil, a pipe connecting the upper portion of said coil with the upper
90 portion of said water jacket on one side thereof, said pipe being below the upper portion of said water jacket at all points thereof, and a second pipe connecting the lower portion of said coil with the lower
95 portion of said water jacket on the opposite side thereof, said second pipe passing beneath the engine and having a radiator connected therein.

In testimony whereof, I have signed my name to this specification.

NELS SWANBERG.