Aug. 9, 1932. F. B. RENTZ 1,871,008

HEATER FOR LIQUID COOLING SYSTEMS OF INTERNAL COMBUSTION ENGINES

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Fig. 1

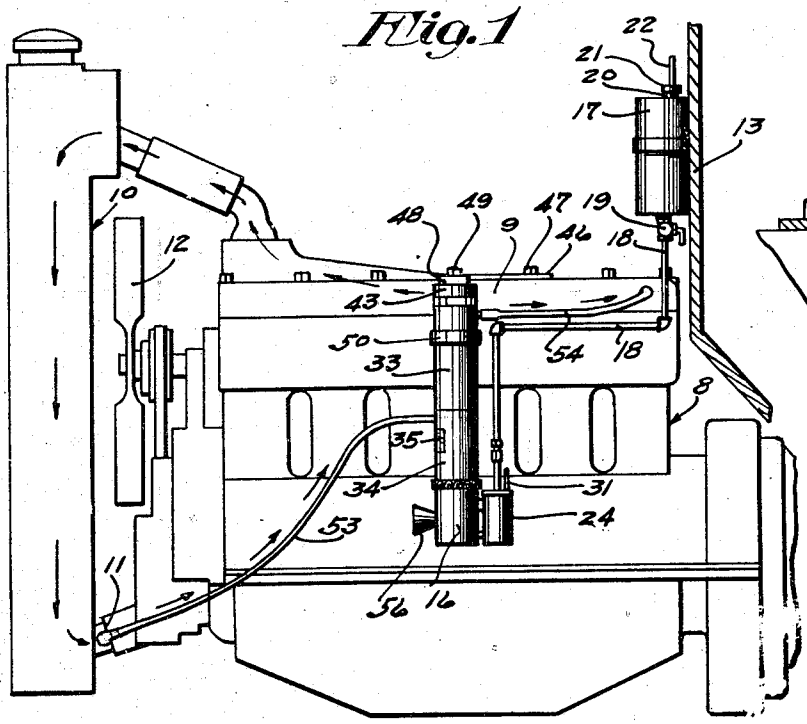


Fig. 4

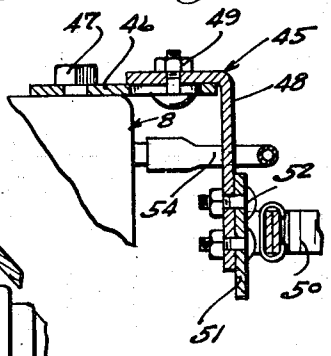


Fig. 2

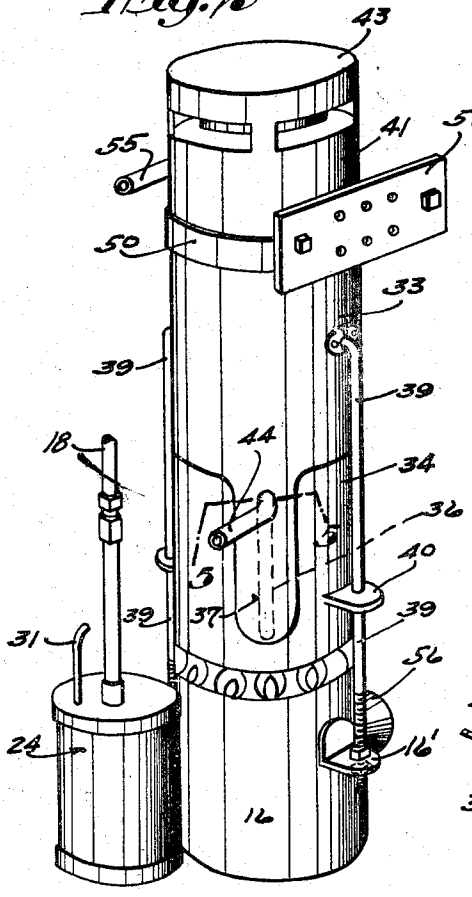


Fig. 3

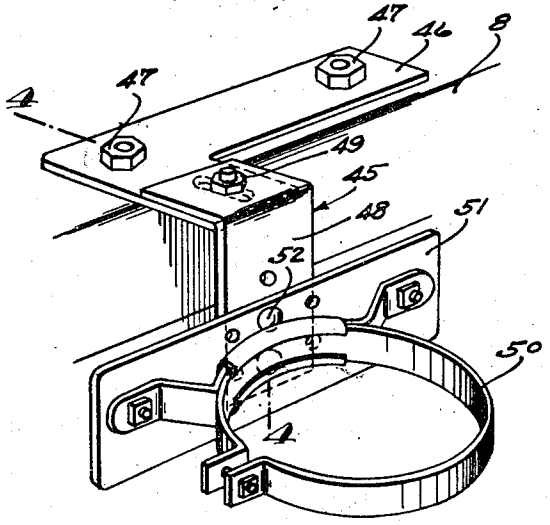
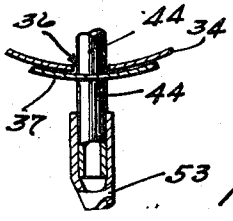


Fig. 5

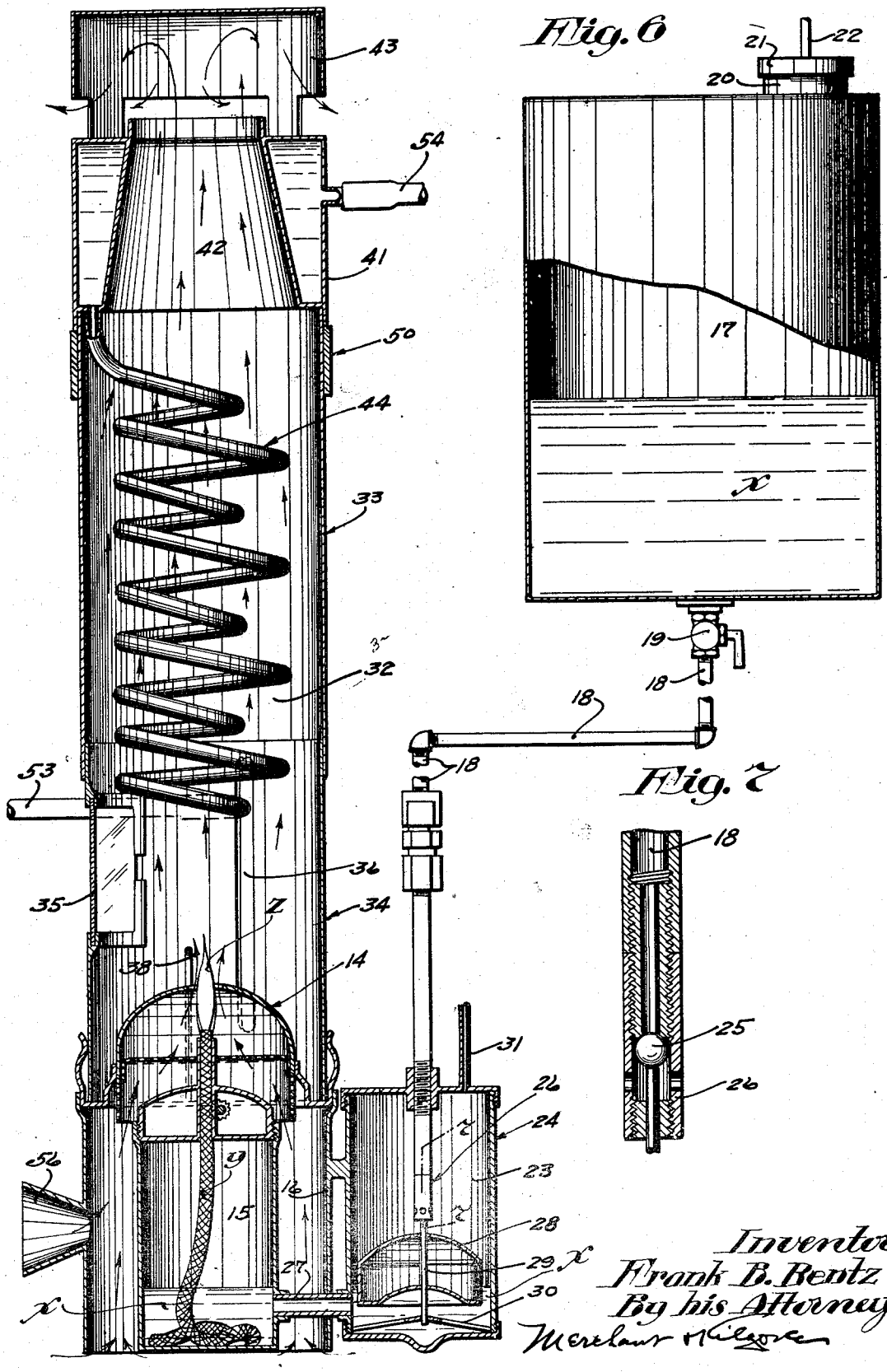


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HEATER FOR LIQUID COOLING SYSTEMS OF INTERNAL COMBUSTION ENGINES

Filed March 21, 1930 2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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HEATER FOR LIQUID COOLING SYSTEMS OF INTERNAL COMBUSTION ENGINES

Application filed March 21, 1930. Serial No. 437,792.

This invention relates to heaters for the cooling liquid of internal combustion engines and has for its object to provide such a heater that uses a liquid fuel, is highly efficient in its action, is easy to install, simple to operate and the flame of which is automatically extinguished when the engine is started. The improved heater when connected in the liquid cooling system of the engine of an automobile not only keeps the cooling liquid at a temperature that will cause the same to circulate through said system when the automobile is parked or in a cold garage and keep the engine and its lubricant warm to facilitate the starting and operation of the engine.

To the above end, generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts through the several views.

Referring to the drawings:

Fig. 1 is a left side elevation of an automobile engine showing the improved heater connected to the cooling system thereof and also diagrammatically showing a portion of the automobile dash;

Fig. 2 is a rear perspective view of the heater removed from the engine, on an enlarged scale;

Fig. 3 is a perspective view of the adjustable bracket for attaching the heater to the head of the engine block, on an enlarged scale;

Fig. 4 is a view principally in section taken substantially on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary detail view with some parts sectioned on the line 5—5 of Fig. 2, on an enlarged scale;

Fig. 6 is a view partly in left side elevation and partly in central vertical section showing the heater and liquid supply tank removed from the engine dash, on an enlarged scale; and

Fig. 7 is a detail view principally in section taken on the line 7—7 of Fig. 6, on an enlarged scale.

The numeral 8 indicates the internal combustion engine of an automobile, as an entirety, with the exception of the head 9, radiator 10, return connection 11 from said radiator to the engine, and fan 12. The numeral 13 indicates the dash of what may be assumed to be a part of the automobile in which the engine is mounted.

The burner 14 is of the kerosene lamp type and mounted on a liquid fuel supply reservoir 15 into which the wick Y of said burner extends. This burner 14 is further mounted in the upper end of a cylindrical casing 16 surrounding the reservoir 15, radially spaced therefrom and having an open bottom.

Liquid fuel X is supplied to the reservoir 15 from a fuel supply tank 17, mounted on the dash 13 of an automobile through pipe 18 leading from the bottom of said tank and having a cut-off valve 19 at the intake thereof. In the top of the tank 17 is a filling neck 20 normally closed by a screw cap 21 having a short vent pipe 22. Interposed between the delivery end of the pipe 18 and reservoir 15 is a float chamber 23, the shell 24 of which is rigidly secured to the casing 16. The pipe 18 extends into the shell 24 through the top thereof and has in its lower end a valve seat for a ball valve 25 which is normally closed against the pressure of the liquid X in the tank 17 and which valve is held in a cage 26 on said pipe. A short horizontal pipe 27 affords a communicating passageway between the reservoir 15 and chamber 23 near the bottoms thereof.

The valve 25 is automatically operated to maintain a predetermined level of fuel Z in the reservoir 15 by a float 28 in the float chamber 23. This float 28 is provided with an upright axial stem 29, the upper end portion of which is slidably mounted in a bore-like seat in the bottom of the cage 26, and the lower end portion of said stem is slidably mounted in a spider 30, on the bottom of the float chamber 23. On the top of the shell 24 is a vent pipe 31. Above the burner 14, in axial alignment therewith, is a cylindrical combustion chamber 32, in the form of a relatively long flue or chimney, and the jacket therefor comprises a main or upper section 33 and a secondary or lower section 34 hav-

ing a window 35. The jacket section 34 is telescoped into the upper section 33 thereof and normally rests on the burner 14 within the customary chimney guard thereon. By thus mounting the jacket section 34 the same may be raised or lowered to afford access to the combustion chamber 32. Formed in the jacket section 34 is a vertical slot 36 for a purpose that will presently appear and which slot is closed by a depending cover plate 37 on the lower edge of the jacket section 33 to prevent drafts that would effect the burner. A gauge pin 38, for the flame Z, is secured to the burner 14 and by which gauge the flame Z is set by the customary thumb-actuated wheel so that thereafter when the flame burns to its full height the burner will not smoke.

The casing 16 and all parts mounted therein or associated therewith are held suspended from the main jacket 33 by a pair of diametrically opposite upright hanger rods 39. The upper ends of the hanger rods 39 are rigidly secured to the jacket section 33 and the lower end portions of said rods extend through holes in lugs 16′ rigidly secured to the sides of the reservoir 16 and adjustably secured to said lugs by opposing nuts having threaded engagement with said rods. By adjusting the nuts on the rods 39 the burner 14 may be raised or lowered.

Mounted on the top of the jacket section 33 is a cylindrical boiler 41 for holding a body of water to be heated by the burner 14 and having a central upwardly tapered flue 42, which extends slightly above said boiler. The larger or lower end of the flue 42 is of a slightly less diameter than that of the combustion chamber 32. On the top of the boiler 41 and covering the flue 42 is a cowl 43.

Within the combustion chamber 32 is an upright water coil 44 of copper or other suitable metal and of novel form. The coil 44 is made up of alternated small and large convolutions, the former of which are eccentric to the combustion chamber 32, and the latter concentric therewith. This arrangement of the convolutions forming the coil 44 materially increases the efficiency of said coil by directly exposing a much larger area of the coil to the products of combustion in the chamber 32. The upper end of the coil 44 is tapped into the bottom of the boiler 41 and the lower end portion thereof extends radially through the slot 36 and a hole in the cover plate 37. As is evident, the slot 36 permits vertical sliding movement of the jacket section 34 in respect to the end of the coil 44 projecting therethrough.

An adjustable bracket 45 is provided for attaching the improved heater to the engine block head 9 and comprises an L-shaped plate 46 secured to said head on the top thereof by a pair of its attaching studs 47 and an L-shaped plate 48. These plates 46 and 48 have overlapping engagement and are adjustably connected by a slot and bolt connection 49. The heater is attached to the bracket 45 by a clamping band 50 applied around the jacket section 33 and which band has a back plate 51 adjustably secured by a pair of bolts 52 to the bracket plate 48. These bolts 52 may be inserted through any two holes in a vertical row thereof in the bracket plate 48 to vertically adjust the heater or through the holes in any one of three vertical rows of holes in the back plate 51 to horizontally adjust said heater. To secure other vertical adjustment of the heater, the same may be vertically adjusted in the clamping band 50, see Fig. 3.

A hose 53 connects the radiator connection 11 to the lower end of the coil 44 and a hose 54 leads from the boiler 41 to the water compartment in the engine block head 9. The outer ends of the hose connections 53 and 54 are slipped over a pair of nipples, one of which is tapped into the radiator connection 11 and the other into the head 9 at the back thereof. The inner end of the hose 53 is slipped over the projecting lower end of the coil 44 and the inner end of the hose 54 is slipped over a nipple 55, which is tapped into the boiler 41 near the top thereof, see Fig. 2.

To extinguish the flame Z when the engine is started, the shell 16 is provided with a funnel-like air intake extension 56, through which a blast of air from the fan 12 is delivered into the casing 16 and through the burner 14 to the flame Z, as indicated by arrows in Fig. 1.

The wick Y may be lighted by lifting the jacket section 34 and applying a match or lighter thereto and the wick adjusted to the gauge 38. As the products of combustion pass upward through the chimney section to the combustion chamber 32, the water in the coil 44 is quickly heated which starts the circulation of water from the lower part of the radiator 10 through the boiler 41, water compartment in the engine block head 9, where the water is the hottest, and from thence to the radiator 10.

The float 28 maintains a relatively shallow body of fuel oil in the float chamber 23 and reservoir 15 and the purpose thereof is to prevent splash of said fuel through the wick opening in the burner with a result of spilling and an uneven flame. The heat from the burner will also keep the air surrounding the engine warm and thereby materially assist in the starting of the engine. By adjusting the nuts on the hanger rods 39 the burner 14 may be raised and lowered to vary the length of the combustion chamber 32 and hence the distance of the flame Z from the coil 44. In very cold weather the burner 14 may be adjusted to closely position the flame Z in respect to the coil 44 to more quickly heat the water therein.

What I claim is:

1. The combination with an internal com-

bustion engine having a liquid cooling system, of a heater for the liquid in said system including a burner, a chimney-like combustion chamber leading from the burner, a boiler at the top of the combustion chamber and having a central flue leading from the combustion chamber, a water coil in the combustion chamber entirely below the boiler and leading from said system to the boiler at the bottom thereof, and a conduit leading from the boiler to said system.

2. The structure defined in claim 1 in which alternate convolutions of the coil are of different diameters and eccentric to each other.

3. The structure defined in claim 1 in which the flue is upwardly tapered and has a smaller conducting capacity than the combustion chamber.

4. The combination with an internal combustion engine having a liquid cooling system including a radiator, a lower connection leading to the bottom of the water compartment in the engine block, of a heater for the liquid in said system including a chimney-like combustion chamber, a burner at the bottom of said chamber, a boiler at the top of said chamber, a water coil in the combustion chamber between the burner and the boiler, a hose leading from said lower connection to the coil, said coil leading to the boiler, and a hose leading from the boiler to the water compartment in the head of the engine block at the back thereof.

In testimony whereof I affix my signature.

FRANK B. RENTZ.