Nov. 3, 1931. A. R. NOTTINGHAM 1,829,757

EXPANSION CHAMBER AND CONDENSER FOR ENGINE COOLING SYSTEMS

Filed Oct. 20, 1928

FIG. 1

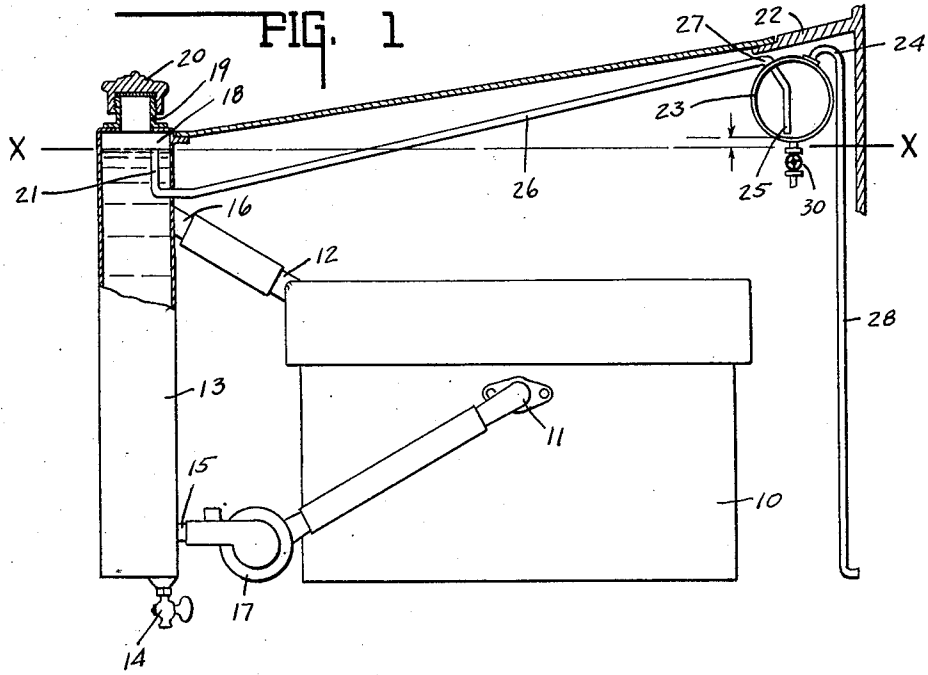
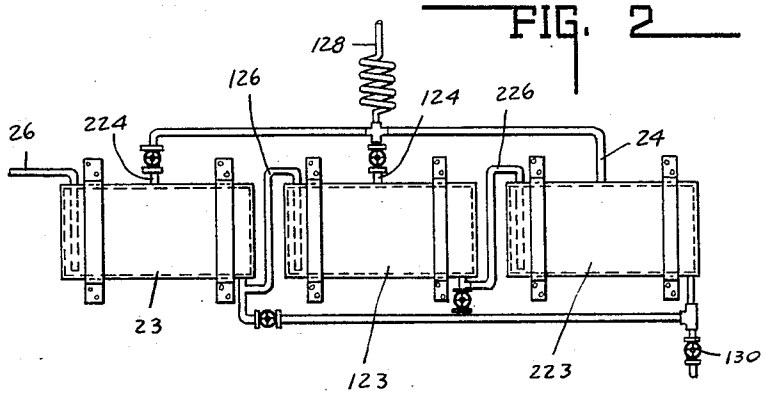


FIG. 2



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UNITED STATES PATENT OFFICE

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EXPANSION CHAMBER AND CONDENSER FOR ENGINE COOLING SYSTEMS

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This invention relates to an auxiliary expansion chamber and condenser for internal combustion engine radiators and the like.

The chief object of the invention is to prevent loss of radiator (engine cooling) liquid from overboiling and to especially conserve the supply of relatively volatile anti-freeze solutions by condensing and collecting the same and automatically returning the collections to the engine and radiator when the overboiling condition ceases or continuously when a return tube construction is utilized.

The chief feature of the invention consists in connecting the usual overflow outlet to an auxiliary vented tank or chamber substantially at or above the level of said outlet and connected therewith, said chamber having an intake near the bottom.

The circulatory system secured by the above arrangement includes pressure (overboil) filling and gravity return of the overboil including the condensed vapor, if any.

The full nature of the invention will be understood from the accompanying drawings and the following description and claim:

In the drawings Fig. 1 is a longitudinal vertical sectional view of the cooling system of an internal combustion engine equipped motor vehicle including a forced circulation system and with the invention applied thereto. Fig. 2 is a central sectional view of a plurality of interconnected condensing units shown in Fig. 1.

In the drawings 10 indicates an internal combustion engine having a water cooled head and block with an inlet 11 and an outlet 12. A radiator 13 has the conventional drain 14, the discharge 15 and intake 16. Pump 17 may be included between the radiator and engine openings 15 and 11 respectively if desired. The radiator and engine openings 16 and 12 are also connected together. The radiator may be of any conventional type, i. e. vertical flow, or the cross flow type as indicated herein or that for vapor (steam) cooling. With the cross flow type there is a head of liquid above the opening 16 through which the vapors must pass before entering the space 18 in the top of the radiator and which is provided with the usual filling neck 19 closed by cap 20 and an overflow outlet 21 at a predetermined level x—x. The above is a standard commercial construction.

The invention in its simplest form comprises a tank, chamber or condensing tube of suitable capacity having an inlet near the bottom and a vent near the top, and connecting such a device to the radiator by a restricted communication connected to the usual overflow outlet of the radiator or the equivalent.

Herein a tank type condenser is shown mounted immediately beneath the cowl 22 of the vehicle and said tank 23 has vent 24 near the top and an inlet 25 near the bottom. Herein the restricted connection 26 connects the radiator overflow outlet 21 to the tank inlet 25 and enters said tank near the top as at 27. A pipe 28 may be provided for the vent 24 if desired. When engines operate under heavy loads and for long periods the gravity return tube 29 may be utilized with or without valve 30 as desired.

The operation is as follows: The radiator and cooling system is filled with the cooling medium such as water or water including an anti-freeze compound up to a suitable level such as the overflow outlet. If below that level initial overboiling fills the radiator up to the inlet. If the system is filled above the outlet, or the overboil rises above the same, the surplus passes through pipe 26 into tank 23. Any overboiling vapor formed condenses in said tank and collects in the bottom thereof. The surplus cooling medium in tank 23 when the system is cool and has a level below the radiator overflow outlet, reverses its flow and by gravity returns to the radiator until the tank is emptied or the level in the radiator and tank are substantially the same.

When a forced circulation system includes the invention the condensing tank receives the surplus pressure pumpage and retains it as long as the pump maintains an excess pressure in the system. This tank receives any temporary surplus from the radiator due to centrifugal force by quick turning of the vehicle or to liquid expansion caused by driving for a long period in low gear, or pulling heavy loads, or by steam pocketing in

the cooling system, the latter chiefly occuring upon the engine stopping, and this last condition is one of the chief causes of loss of cooling liquid in all motor vehicles today since the pump then acts as an obstruction. In a pump or thermo-syphon system, stopping of the car eliminates the rapid cooling by air and steaming may result. When the period of operation is long and the period of stopping is covered by the overboil period—so that there is insufficient opportunity for the usual return, a continuous return tube may be added.

Fig. 2 shows a series connected arrangement wherein a plurality of inlets can be connected in series or successively disconnected as by selectively operating the several valves. The units may be connected in parallel if desired. The units can be arranged as above or tandem fashion as shown and mounted adjacent or beneath the cowl, or may be mounted in any other suitable location as beneath the sun visor.

The invention claimed is:

The combination with an internal combustion engine and a liquid cooling system therefor including a radiator having a filling neck, a closure therefor and an overflow outlet near the upper end thereof, of an air vented condenser having an intake near the bottom thereof and said intake being positioned at least as high as the level of the radiator outlet providing for gravity flow from the condenser to the radiator, and means connecting the intake and the outlet and providing a single reversible restricted communication between the radiator and condenser and permitting pressure discharge from the radiator to the condenser and gravity return of the condensate from the condenser to the radiator and both discharges simultaneously if and when necessary.

In witness whereof, I have hereunto affixed my signature.

AVON R. NOTTINGHAM.