

Sept. 22, 1925.

1,554,924

C. H. SHAPIRO

RADIATOR

Filed Feb. 16, 1923

3 Sheets-Sheet 1

Fig. 1.

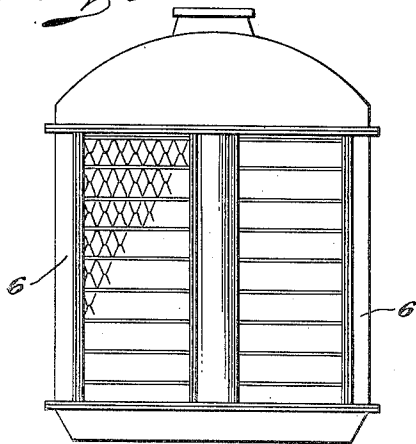


Fig. 2.

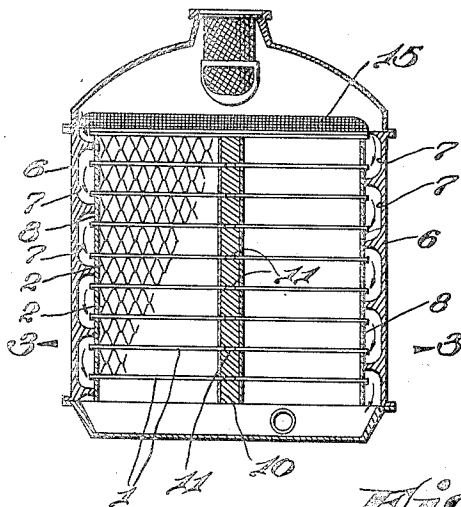


Fig. 3.

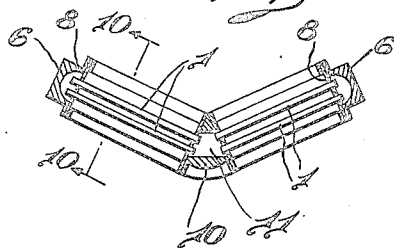


Fig. 4.

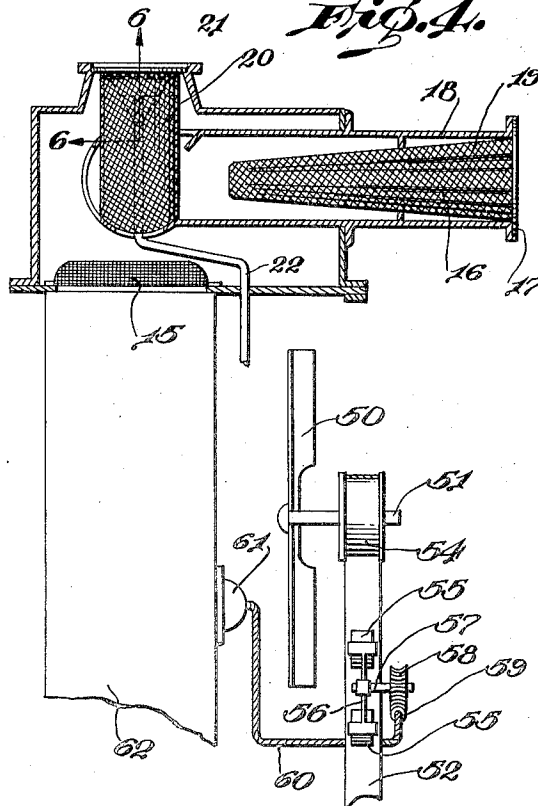
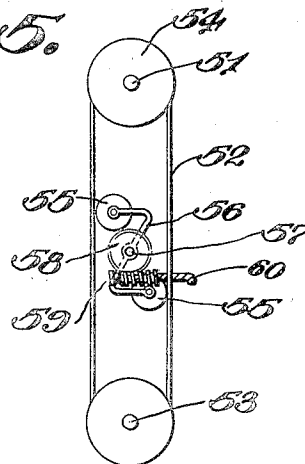


Fig. 5.



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Fig. 6.

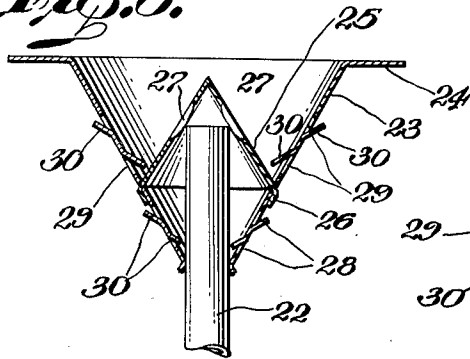


Fig. 7.

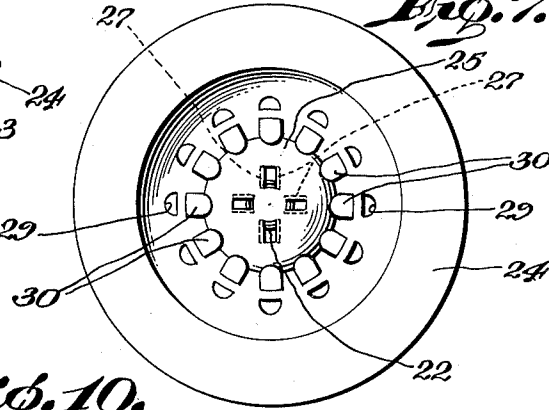


Fig. 10.

Fig. 8.

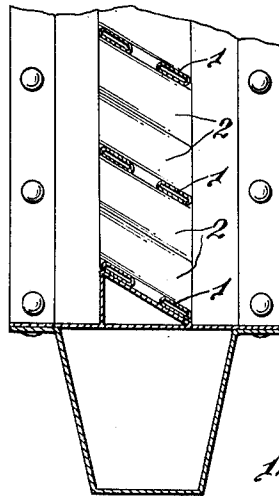
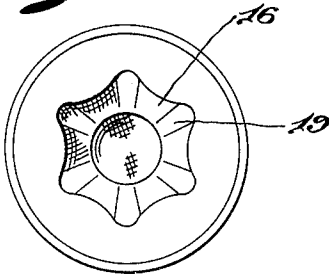


Fig. 12.

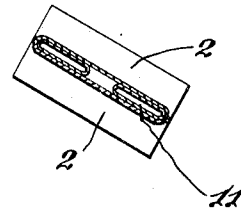


Fig. 9.

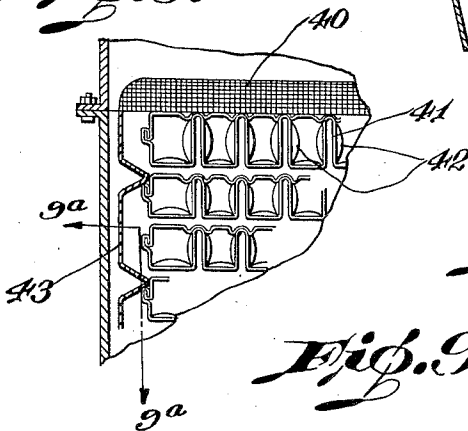


Fig. 11.

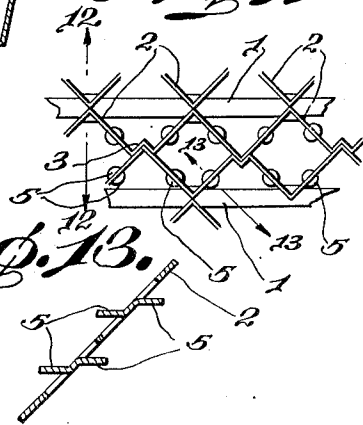


Fig. 13.

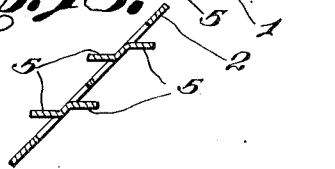
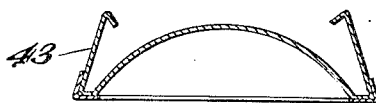


Fig. 9a



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Fig. 14.

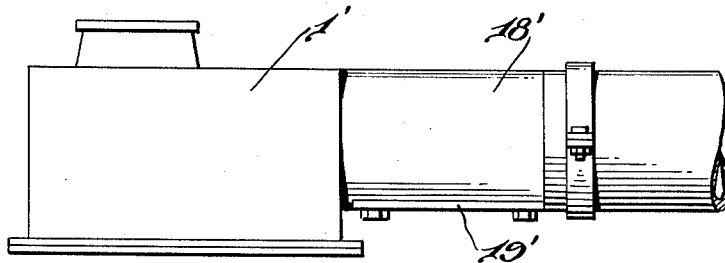


Fig. 15.

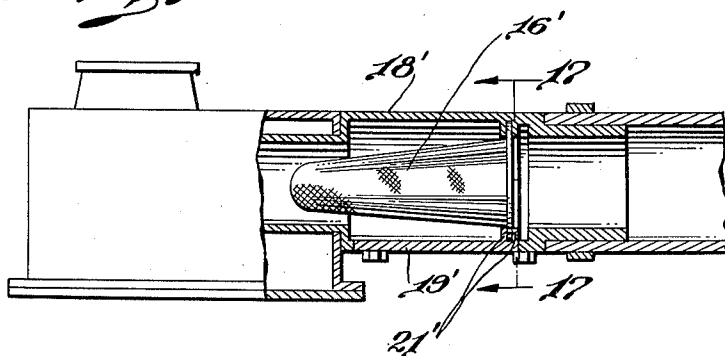


Fig. 16.

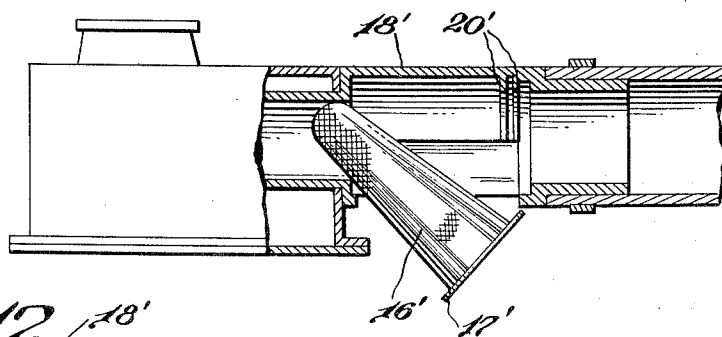
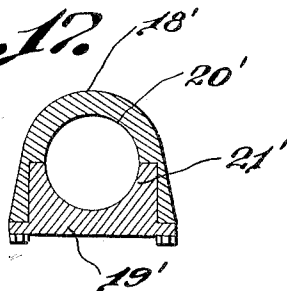


Fig. 17.



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UNITED STATES PATENT OFFICE.

CHARLES H. SHAPIRO, OF CHICAGO, ILLINOIS.

RADIATOR.

Application filed February 16, 1923. Serial No. 619,468.

To all whom it may concern:

Be it known that I, CHARLES H. SHAPIRO, a citizen of the Republic of Lithuania, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Radiators, of which the following is a specification.

This invention relates to radiators particularly designed for use upon motor vehicles, and an object of the invention is to provide a radiator structure which will cause more efficient cooling of the cooling fluid used in a motor vehicle power plant by providing more thorough circulation of the fluid through the radiator, and one which will practically eliminate liability of freezing of the radiator and permit repairing of the radiator or replacing of parts thereof, when necessary, with a minimum amount of labor.

In the present type of honeycombed or tubular radiators the water or cooling fluid travels vertically and the action of the pump to force the water through the cooling system of the motor vehicle power plant is such that the pull on the water through the radiator is uneven, while in the present invention the water or cooling liquid flows in a horizontal continuous path through the radiator structure increasing the distance of travel of the water through the radiator over the approved forms of radiators now in use, and also providing a uniform flow of water throughout the radiator.

Another object of this invention is to incline laterally the tubes or honeycomb core of which the radiator structure is formed, so that as the hot water flows to the top of the tube it will be forced to the outer or front side of the radiator where the cooling effect is the greatest. It will also be apparent that the lateral inclining of the tubes or honeycomb core will facilitate the draining of the radiator especially when the machine is parked on unlevel ground.

A further object of the invention is to provide a new and improved construction of honeycomb core especially adapted for the construction of radiators as above referred to, which core is free from crevices extending below its lower tube surface and is substantially a combination of flat tube and honeycomb.

Another object of this invention is to provide a strainer structure used in connection

with the radiator structure, which strainer structure will filter or strain the water when it is originally poured into the radiator, and will also strain the water during its circulation through the cooling system of the motor vehicle power plant, thereby preventing dirt, grit or any foreign matter which may be located in the engine water jacket from passing into and clogging up the radiator.

In cold weather, considerable inconvenience is often experienced by the radiator of a motor vehicle freezing when the engine of the vehicle is started. Such freezing is caused by the lowering of the temperature about the radiator caused by the operation of the fan before the motor heats to sufficient temperature to prevent freezing of the radiator, and an object of this invention is to provide a thermostatically controlled mechanism operable by the temperature of the radiator for controlling the operation of the cooling fan of the radiator structure.

Other objects of the invention will appear in the following detailed description taken in connection with the accompanying drawings:—

Fig. 1 is a front elevation of the radiator honeycomb type.

Fig. 2 is a vertical section through the improved radiator.

Fig. 3 is a horizontal section through the radiator taken on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged view partly in side elevation and partly in section of the radiator showing the strainers and the thermostatic fan control.

Fig. 5 is a detail view illustrating a part of the thermostat fan controlling mechanism.

Fig. 6 is a detail section on the line 6—6 of Fig. 4.

Fig. 7 is a top plan of the guard for the overflow pipe of the radiator.

Fig. 8 is an end view of a filtering screen.

Fig. 9 is a fragmentary view in section illustrating the construction of the honeycomb core.

Fig. 9^a is a detail view of one of the end members which form a portion of the invention.

Fig. 10 is a section through the tube type of core.

Fig. 11 is a fragmentary section of the tube type of core illustrating the manner of associating the spacing fins.

Fig. 12 is a section on the line 12—12 of Fig. 11.

Fig. 13 is a section on the line 13—13 of Fig. 11.

Fig. 14 is a fragmentary side elevation of a radiator showing a modified form of the filtering structure.

Fig. 15 is a longitudinal section through the modified form of the filter structure as shown in Fig. 14.

Fig. 16 is a view similar to Fig. 15 illustrating the manner of removing the filtering screen for cleaning.

Fig. 17 is a cross section on the line 17—17 of Fig. 15.

Referring more particularly to the drawings, the improved radiator illustrated in Figs. 1 to 3 of the drawings shows a type in which two radiating sections are connected and extend at obtuse angles to each other, however, the radiator structure may be formed of one straight section if desired without departing from the spirit of this invention.

The tube type of radiator comprises a plurality of tubes 1 which have suitable spacing fins 2 connected thereto in the usual manner, such as by soldering. The spacing fins are bent, as clearly shown in Fig. 11 of the drawings to provide right angular portions and each alternate right angular portion has its corner or apex bent inwardly as shown at 3 to provide a depression for receiving the corner of the spacing fin attached to the tube next thereto, thereby providing interlocking connection between the various tubes for preventing longitudinal relative movement of the tubes and also for facilitating the assembling of the radiator structure.

The spacing fins 2 have ears 5 cut therefrom and bent transversely to the fins as clearly shown in Fig. 13. The ears 5 form abutments against which the wind or breeze impinges during its passage through the radiator structure thereby increasing the cooling action of the fins and consequently of the radiator.

In an assembled radiator for motor vehicles a plurality of the tubes 1, the necessary number to provide the proper size of radiator are assembled in superposed relation and extend horizontally, in lieu of vertically as is the usual construction in approved types of radiators now in use. End plates 6 are attached in any suitable manner to the radiator structure and these end plates are provided with passageways 7 which establish communication between two adjacent tubes 1. The passageways formed in one of the end plates 6 are disposed in staggered relation to the passageways formed in the other end plate so as to provide a continuous passageway for the water or other cooling fluid through the

tubes and radiator structure so that the suction of the pump (not shown) of the cooling system of a motor vehicle power plant will be substantially uniform throughout the radiator and will cause an increased length of flow of the water through the radiator resulting in a more thorough cooling of the water or liquid. Suitable supporting plates 8 are provided for receiving the ends of the tubes 1.

In Figs. 1 to 3 of the drawings the radiator is formed of two sets of tubular sections disposed at obtuse angles one to the other and these sets are connected at their inner facing ends by a connector structure 10, preferably, formed of cast metal which is provided with transversely extending passageways 11 properly spaced to establish communication between the tubes 1 of the two sets in the radiator structure.

By particular reference to Figs. 10 and 12 of the drawings it will be noted that the tubes 1 are inclined transversely. In these views two tubes are illustrated disposed in lateral alignment to provide the core of the radiator and as previously stated, the tubes are inclined laterally towards the back of the radiator so that the hottest water or cooling fluid, as it passes through the tubes will in rising to the highest parts of the tubes be at the front of the radiator where the cooling action is greatest.

A screen or filter 15 is mounted across the top of the radiator core completely screening the inlet of the cooling fluid into the core and consequently preventing the passage of foreign material into the cooling core of the radiator. In the drawings the filtering screen 15 is rounded transversely or bulged upwardly, however, it is to be understood that the filtering screen may be flat or in any desired shape without departing from the spirit of this invention.

A second filtering screen 16 is provided at the entrance into the radiator structure from the cooling system (not shown) of the power plant with which the radiator is associated. The filtering screen 16 is substantially conical in shape, having an annular flange 17 about its open base end to permit its attachment to the inlet tube 18 of the radiator structure. The substantially conical filter 16 is provided with longitudinally extending intruded portions 19 which tend to increase the strength of the screen filter. The water or cooling liquid during its circulation through the power plant and radiator structures passes through the filter 16 and through the filtering screen 15 thereby preventing any foreign material from entering the radiator core structure.

In Figs. 14 to 17, a modified construction of the radiator and filtering screen is shown in which the hose connecting nipple 18' which is formed on the top section 1' of

the radiator structure has its lower portion 19' cut away as clearly shown in Figs. 16 and 17 of the drawings so as to permit its ready detachment from the main body of the nipple 18' to permit removal of the substantially conical filtering screen 16' for the purpose of cleaning the filter. The filter 16' has an annular flange 17' formed thereon which is adapted to engage between the parallel spaced semi circular ribs 20' formed in the nipple 18' and between the parallel semi circular ribs 21' formed on the removal section 19'. The ribs 20' and 21' register when the part 19' is attached to the nipple 18', as shown in Fig. 15 of the drawings, securely holding the substantially conical filtering screen 16' in position.

A third filter 20 is provided for filtering the water as it is initially poured into the radiator structure, and the filter 20 which is substantially cylindrical in shape extends to the inlet 21 of the radiator structure, as clearly shown in Fig. 4 of the drawings. A novel arrangement as shown in Figs. 6 and 7 of the drawings is provided for preventing the water or cooling fluid from splashing into and outwardly through the over-flow pipe 22 of the radiator structure. The structure for preventing such splashing, into the over-flow pipe, of the water comprises an inverted hollow conical member or funnel 23 which has an annular flange 24 formed thereon for supporting it as shown in Fig. 4 of the drawings. The over-flow pipe 22 extends through the apex of the funnel 23, and projects upwardly into the funnel. However, the mouth of the over-flow pipe is guarded by a substantially conical guard member 25 which is attached to the funnel 23 by means of ears 26. The substantial conical guard 25 is held slightly spaced from the upper open end of the over-flow pipe 22 by instructed portions 27, which by spacing the guard 25 from the mouth of the over-flow pipe will permit water or other cooling fluid which rises into the funnel 23 from below, through the openings 28 to flow into the over-flow pipe 22, but which will prevent water being poured into the radiator structure from passing into and flowing through the over-flow pipe. The funnel 23 is provided with the openings 28 below the connection of the funnel 23 and guard 25 and with the openings 29 above the connection of the guard and funnel. The latter openings are provided to permit the water to flow from the funnel into the radiator structure. Ears 30 formed by the cutting of the openings 28 and 29 are bent transversely in such manner as to form guards to prevent the water from splashing upwardly from the radiator structure into the funnel.

In Fig. 9 of the drawings a detail of the honeycomb type or construction of radiator

core is shown and in this construction, the general arrangement of the radiator is the same as in the tube type previously described. However, the water passageways in the honeycomb radiator are formed into a plurality of substantially U shaped portions connected as shown at 40 in Fig. 9 of the drawings. The U shaped passageways are formed by the bending of the plates 41 of which the radiator core is formed. The upper and vertical portions of the individual sheets 41 from which the core is formed are bulged outwardly at spaced points as shown at 42 to increase the water capacity of the radiator. The various sinuous passageways formed in the honeycomb radiator are connected at their ends, to provide a continuous sinuous passageway for the water through the radiator, in a general horizontal path by means of end plates 43 which may be soldered or otherwise suitably attached to the plates 41. The end plates 42 perform the same functions as the end members 6 and if it is so desired the cast end members 6 may be replaced by the pressed sheet metal end members 43, without departing from the spirit of this invention.

To prevent freezing of the radiator structure when the engine of a vehicle is first started and before the engine becomes heated, a thermostatically controlled mechanism is provided for controlling the operation of the cooling fan 50. The cooling fan 50 which is mounted upon the shaft 51 is operated or rotated through the medium of the belt 52 from a suitable power shaft 53. In the present invention the belt 52 is normally loose so that it will pass over the pulley 54 on the shaft 51 without rotating the pulley or shaft and consequently without rotating the fan. A pair of idler pulleys 55 are carried by a substantially S-shaped arm 56 which is rockably supported intermediate its ends upon a shaft 57. The shaft 57 has a worm gear 58 mounted thereon which meshes with the worm 59. The worm 59 is carried by a flexible shaft 60, the rotation of which shaft is controlled by the operation of a suitable thermostat structure 61 of any approved construction, carried by the radiator structure indicated at 62. When the heat of the radiator structure increases the thermostat 61 will operate to rotate the worm 59 which will in turn rotate the worm gear 58 and move the idler pulleys 55 into engagement with the belt 52 stretching the belt or drawing the belt taut about the pulleys 54 for causing operation of the fan 50.

It is, of course, to be understood that the invention may be constructed in other manners and the parts associated in different relations and, therefore, I do not desire to be limited in any manner except as set forth in the claims hereunto appended.

Having thus described my invention what I claim is:—

1. In a radiator structure, a core, an upper fluid receiving tank, an over-flow pipe, a funnel extending into said fluid receiving tank and about said over-flow pipe, and a protecting cone carried by said funnel and positioned over the mouth of said over-flow pipe.
2. In a radiator structure, a core, an upper fluid receiving tank, an over-flow pipe, a funnel extending into said fluid receiving tank and about said over-flow pipe, and a protecting cone carried by said funnel and positioned over the mouth of said over-flow pipe, bosses struck from said protecting cone to extend the cone from the mouth of the over-flow pipe to permit water to flow there into.
3. In a radiator structure, a core, an upper fluid receiving tank, an over-flow pipe, a funnel extending into said fluid receiving tank and about said over-flow pipe, and a protecting cone carried by said funnel and positioned over the mouth of said over-flow pipe, bosses struck from said protecting cone to extend the cone from the mouth of the over-flow pipe to permit water to flow there into, said funnel provided with ears cut therefrom and bent transversely to permit water to flow from the funnel into the tank.

In testimony whereof I affix my signature.
CHARLES H. SHAPIRO.