March 28, 1939. A. L. MUREN 2,151,791

RADIATOR OR CONDENSER

Filed Oct. 29, 1937 3 Sheets-Sheet 1

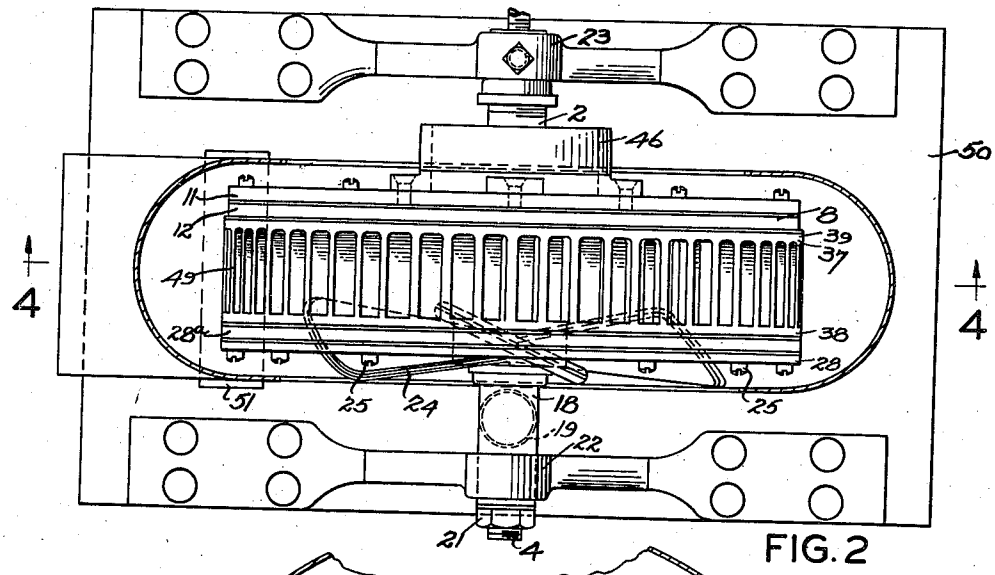


FIG. 2

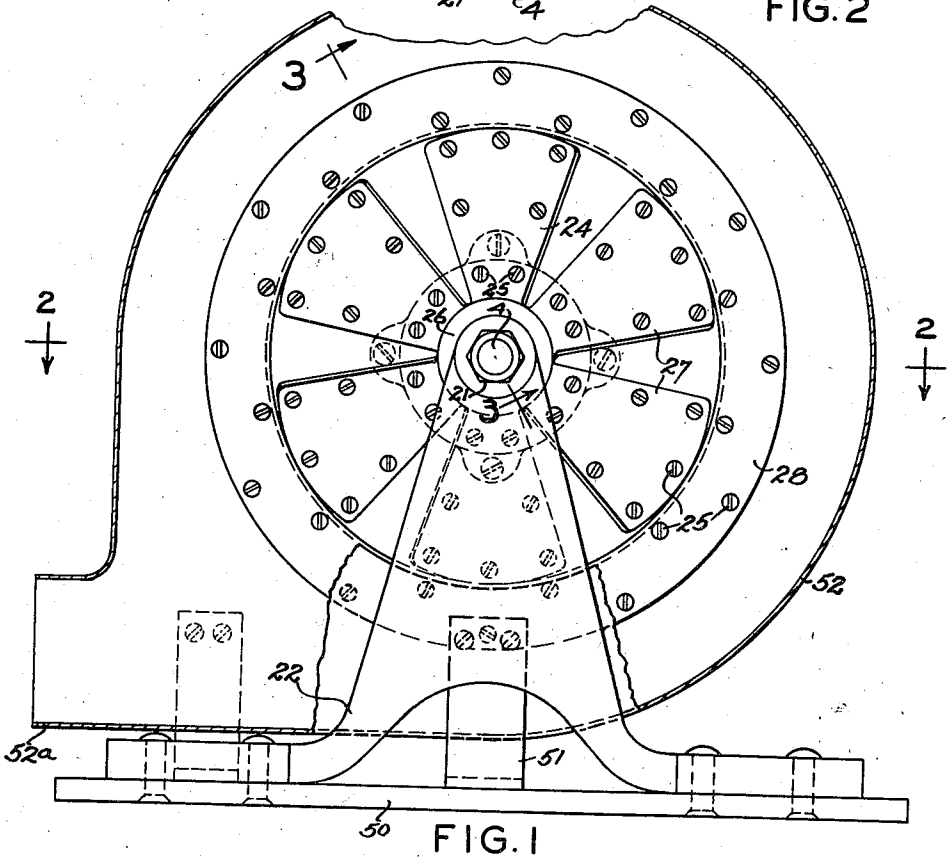


FIG. 1

INVENTOR.
Albert L. Muren

BY

Gerald F. Baldwin
ATTORNEY.

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RADIATOR OR CONDENSER

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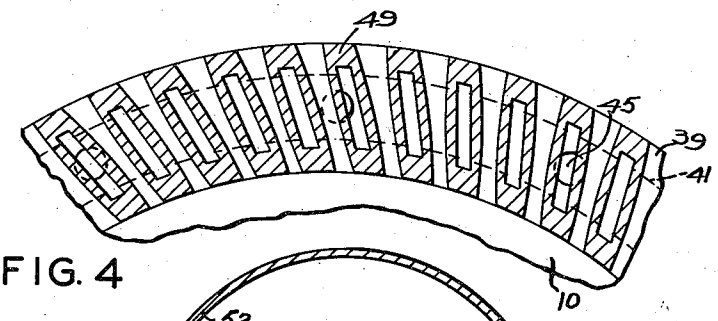


FIG. 4

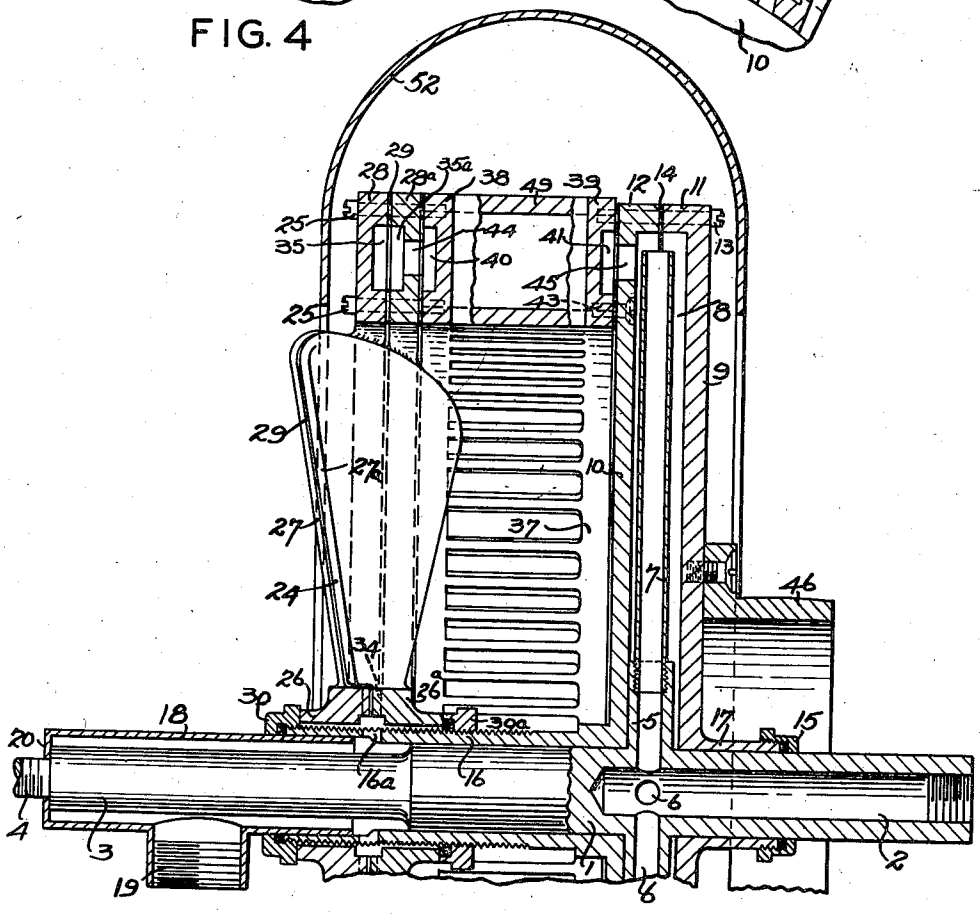


FIG. 3

INVENTOR.
Albert L. Muren

BY

ATTORNEY.

March 28, 1939. A. L. MUREN 2,151,791

RADIATOR OR CONDENSER

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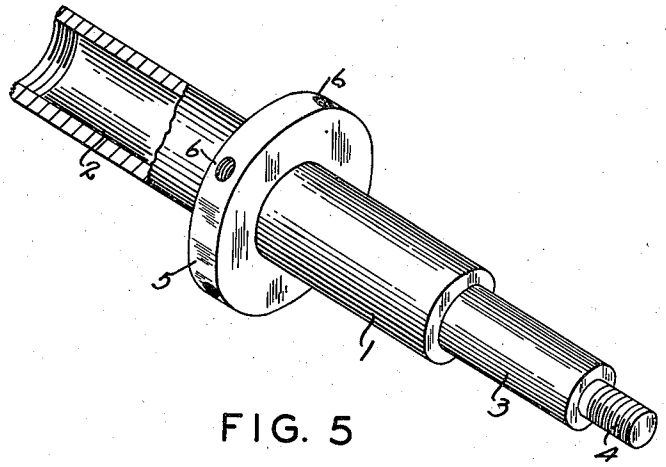


FIG. 5

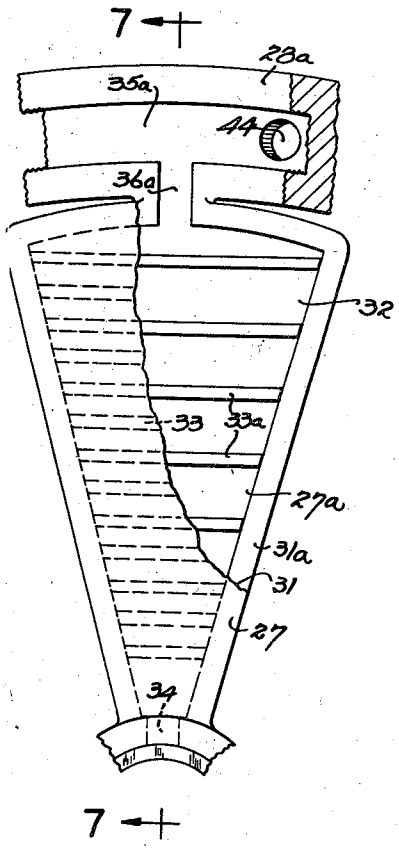


FIG. 6

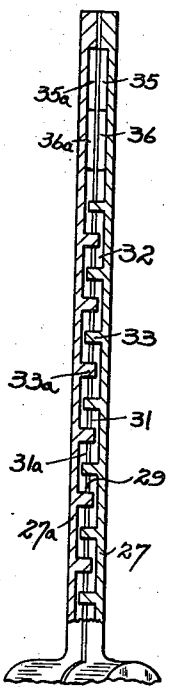


FIG. 7

INVENTOR.
Albert L. Muren

BY

Gerald F. Baldwin
ATTORNEY.

Patented Mar. 28, 1939 2,151,791

UNITED STATES PATENT OFFICE

2,151,791

RADIATOR OR CONDENSER

Albert L. Muren, Dearborn, Mich.

Application October 29, 1937, Serial No. 171,638

8 Claims. (Cl. 257—260)

This invention relates to improvements in radiators or condensers. It is an object of the invention to provide a radiator or condenser which also serves as a pump and discharges the cooled liquid under pressure and at high velocity.

Another object of the invention is to provide a radiator or condenser having an air duct provided around it through which air heated by the transfer of thermal units from the cooled liquid is discharged in considerable volume and at high velocity.

A further object of the invention is to provide a radiator or condenser which, when employed on an automobile, takes the place of a radiator, fan, pump and heater; in this instance the radiator also has the advantage that only a relatively small amount of liquid is required, thereby necessitating the use of only a small quantity of anti-freeze solution during the winter; and again the warmed air discharged therefrom has the advantage that it cannot be contaminated by exhaust fumes.

Having thus briefly stated some of the major objects and advantages of the invention, I will now describe a preferred embodiment thereof with the aid of the accompanying drawings, in which:

Figure 1 is a side view of the invention.

Figure 2 is a plan view thereof showing the air duct in section on the line 2—2 of Figure 1.

Figure 3 is an enlarged section on the line 3—3 of Figure 1.

Figure 4 is an enlarged section on the line 4—4 of Figure 1 showing the transverse ring passages.

Figure 5 is an enlarged perspective view of the shaft.

Figure 5 is an enlarged view of one fan blade showing one side of the blade broken away.

Figure 7 is a section on the line 7—7 of Figure 6.

Referring to the drawings, 1 designates a shaft which is tubular as shown at 2 from one extremity for a portion of its length. Towards its opposite extremity the shaft is of reduced diameter as shown at 3, and terminates in an externally threaded end of further reduced diameter. Formed integral with the shaft 1 around its tubular portion 2 is a collar 5 through which a plurality of radial passages 6 are formed which terminate in the bore of the tubular shaft portion 2. Each of the passages 6 is internally threaded at its outer extremity to receive a pipe 7.

8 denotes a closed vessel mounted around the shaft 1 into which the collar 6 and the pipes 7 project. The vessel 8 consists of a plate 9 mounted around the tubular portion 2 of the shaft adjacent one side of the collar 6, and a disc 10 also mounted around the shaft and in contact with the opposite side of the said collar. Around the annular margins of the plate 9 and disc 10 are laterally disposed flanges 11 and 12 respectively which bear against one another and are held together as by screws 13. 14 denotes a joint of suitable material between the said flanges 11 and 12. Extending outwardly around the tubular shaft portion 2 from the plate 9 is a hub 17 threaded around its outer circumference to receive a gland nut 15. Extending outwardly from the disc 10 is a hub 16 which extends over the reduced shaft portion 3 for a part of its length. The hub 16 is externally threaded for the greater portion of its length, and formed radially therethrough intermediately of its length are a plurality of openings 16a.

18 denotes a sleeve which extends into the hub 16 and is concentrically spaced around the reduced portion 3 of the shaft. Formed in the sleeve is a laterally disposed inlet connection 19, and provided across the outer extremity of the sleeve is an apertured transverse wall 20 which fits around the further reduced extremity 4 of the shaft and is secured against the shoulder formed around the inner extremity of the said reduced portion 4 as by a nut 21. The shaft 1, which remains stationary, is supported by bearings 22 and 23, the former supporting the shaft portion 2 and the latter the sleeve 18.

24 denotes a fan unit consisting of two similar parts secured to one another as by screws 25. Each fan part consists of a boss 26, or 26a, a plurality of blade portions 27, or 27a, and an outer annular flange 28, or 28a. Between the two portions of the fan unit suitable jointing material 29 is inserted. The two bosses 26 and 26a are mounted for rotation upon the hub 16 which turns with them. 30 and 30a denote gland nuts in threaded engagement with the hub 16 and bearing against the outer faces of the fan bosses 26 and 26a to prevent the escape of liquid flowing through the openings 16a formed through the hub 16. The margins 31 and 31a of the two blade portions 27 and 27a form a joint to provide a closed chamber 32 between each pair of blade portions. These chambers are preferably baffled as by walls 33 and 33a which project alternately from the blade portions 27 and 27a respectively, and the inner extremity of each chamber 32 is connected by an aperture 34 formed through adjacent sides of the boss portions 26 and 26a to register with the hub openings 16a.

Formed in the adjacent faces of the flange portions 28 and 28a are opposed annular grooves 35 and 35a which together form an enclosed channel into which opposed slotted passages 36 and 36a are provided from the outer extremity of each blade chamber 32. Mounted between the fan unit 24 and the plate 10 is a ring 37. The latter consists of two spaced ring flanges 38 and 39 having annular grooves 40 and 41 respectively formed around their outer faces intermediately of their width and connected by a plurality of integral transverse tubular members 49. The screws 25 which hold the flanges 28 and 28a of the fan unit together also secure the grooved flange 38 to the flange 28a thus closing the annular groove 40; and the screws 13 which secure the flanges 11 and 12 to one another also secure the ring flange 39 to the disc 10. The latter and the said ring flange 39 may also be additionally held together as by screws 43. Thus the outer face of the disc 10 closes the annular groove 41. Formed through the base of the annular groove 35a in the fan flange 28a are a plurality of apertures 44 opening into the adjacent ring groove 40, and through the disc 10 other apertures 45 connect the ring groove 41 with the interior of the vessel 8. Secured to the outer face of the plate 9 is a pulley 46 by rotation of which the vessel 8, ring 37 and fan unit 24 are rotated around the sleeve 18 and shaft 1.

Mounted on the base 50 on which the bearings 22 and 23 rest is an annular casing 52 of substantially U-shaped section which is secured thereon as by straps 51. The annular margins of this U-shaped casing are spaced laterally and inwardly from the peripheries of the plate 9 and fan flange 28. This casing receives the air discharged from the fan between the tubular members 49, and discharges it through a duct 52a integral with the casing to which suitable piping may be connected if desired.

The operation of my radiator or condenser is briefly as follows: Steam or hot liquid or fluid passes through the inlet 19 into the sleeve 18, and from the latter through the hub apertures 16a into the fan blade chambers 32 through the inlets 34. Due to the rotation of the fan, the liquid is thrown centrifugally through the chambers 32 wherein its passage is retarded by the baffles 33 and 33a. In this manner the liquid is brought into direct contact with the air cooled sides of the blades. From the chambers 32 the liquid passes through the passages 36—36a which are arranged in opposed pairs and lead into the enclosed channel formed between the opposed pair of annular grooves 35 and 35a. From this channel the liquid flows through the openings 44 into the ring groove 40, through the transverse tubular members 49, the ring groove 41, and the apertures 45 into the vessel 8. Here it may be pointed out that the disc 10 to which the ring 37 is secured is solid behind the fan blades 27—27a and therefore the air discharged by the latter towards the disc passes outwardly between the tubular members 49. Consequently the liquid passing through the latter is again brought into heat transfer relation with relatively cool air from the fan.

Rotation of the chamber or vessel 8 into which the cooled liquid is discharged causes the latter to form a ring of increasing depth against the internal periphery of the vessel. As the thickness of this ring of liquid exceeds the distance of the open ends of the pipes 7 from the vessel periphery the liquid enters the latter and is discharged therethrough and through the open end of the hollow shaft 2. Moreover it may be remarked that the greater the speed at which the fan and vessel are rotated the greater is the pressure under which the liquid is discharged from the stationary pipes 7.

In order to prevent the immediate re-passage of air, when heated, through the fan, I prefer to provide the casing 52 into which it is discharged from the ring 37 and to provide the duct 52a to which pipes (not shown) may be attached and through which the air may be delivered to some distant point. Moreover when the device is employed in place of an automobile radiator, pump and fan, the air discharged from the duct 52a may be piped to a heater thereby further increasing the utility of the invention.

While in the foregoing the preferred embodiment of the invention has been described and shown, it is understood that the construction is susceptible to such alterations and modifications as fall within the scope of the appended claims.

What I claim is:

1. In a cooling device, the combination of a hollow bladed fan, a vessel coaxial therewith, means through which liquid to be cooled is introduced in the fan blades adjacent their inner extremities, means for rotating the fan and vessel, passages extending from said blades adjacent their outer extremities connected to said vessel through which the liquid cooled as it travels outwardly through the fan blades flows into the vessel, the cooled liquid being held centrifugally against the inner periphery of said vessel, stationary pipes in said vessel having open ends extending towards the vessel periphery into which the cooled liquid passes when the annular depth of the liquid delivered into the vessel is sufficiently greater than the distance to the open pipe ends from the annular bore of the vessel, and means connected to said pipes through which the liquid is discharged.

2. In a cooling device for liquids, the combination of a hollow bladed fan, a vessel coaxial therewith and spaced therefrom, tubular members extending between the fan adjacent the blade peripheries and the vessel, means through which liquid to be cooled is introduced into the fan blades adjacent their inner extremities, means for rotating the fan and vessel, the rotation of the fan being adapted to throw the liquid centrifugally through the blades for cooling, said tubular members forming passages through which the liquid is delivered from the blades into the vessel, the fan rotation being adapted to discharge air outwardly between the tubular members to further cool the liquid passing through the latter, the cooled liquid being held centrifugally against the inner periphery of the vessel, stationary pipes in said vessel having open ends extending towards the vessel periphery into which the cooled liquid passes when the annular depth of the liquid delivered into the vessel is sufficiently greater than the distance of the open pipe ends from the annular bore of the vessel, and means connected to said pipes through which the liquid is discharged.

3. In a device of the character described, the combination of a shaft, means supporting the latter, a fan mounted around the shaft, said fan having hollow blades, means through which liquid to be cooled is introduced into the blades adjacent their inner extremities, a closed vessel mounted around the shaft coaxial with the fan, means for rotating the fan and vessel around the shaft axis, passages connecting the interior of the

blades adjacent their outer extremities with the interior of the vessel through which the cooled liquid passes into the vessel, open-ended stationary pipes in the vessel, and tubular means connected to the pipes through which the liquid from the vessel is discharged when the annular depth of the liquid in the latter is sufficiently greater than the distance of the open pipe ends from the bore of the vessel.

4. A device of the character described comprising the combination set forth in claim 3, wherein the fan and vessel are spaced from one another, and a plurality of annularly disposed tubular members connected to the fan and vessel to rotate therewith form portions of the passages through which the liquid flows to the vessel, the fan being adapted to discharge air outwardly between the tubular members to further cool the liquid passing therethrough.

5. A device of the character described comprising a stationary shaft, means supporting the shaft, a fan having hollow blades mounted for rotation around the shaft, means through which liquid to be cooled is introduced into the hollow blades adjacent their inner extremities, a closed vessel mounted around the shaft, passages connecting the interior of the blades adjacent their outer extremities with the interior of the vessel through which the liquid passes, means for rotating the fan and vessel, stationary pipes within the vessel having open ends extending towards the vessel periphery to receive liquid cooled in its flow through the fan blades and passages, and means connected to said pipes through which the liquid is discharged.

6. A device of the character described comprising the combination set forth in claim 5, wherein the shaft is tubular from one extremity, and the pipes extend into the tubular shaft portion and are connected with the bore thereof which bore constitutes the means through which the liquid is discharged.

7. A device of the character described comprising the combination set forth in claim 3, wherein the means through which liquid is introduced into the fan consists of a sleeve concentric with and spaced around the shaft, said sleeve having an inlet passage thereinto, a hub on the fan which is radially apertured, a boss on the closed vessel extending through the fan hub, said boss being apertured to register with the fan hub apertures and connecting the latter with the interior of the sleeve.

8. A device of the character described comprising a unit mounted for rotation consisting of a hollow-bladed fan, a ring having a plurality of circularly arranged transverse tubular members, and a closed vessel, means for admitting liquid to be cooled into the inner extremities of the hollow blades, means through which the liquid is discharged from the outer extremities of the hollow blades into the tubular members, means connecting the tubular members with the interior of the closed vessel through which the liquid flows, means for rotating the unit, stationary pipes in said vessel, means connecting said pipes with the exterior of the vessel, and the wall of the vessel adjacent the ring being solid whereby air discharged from the fan flows outwardly between the transverse tubular members.

ALBERT L. MUREN.