A. B. MODINE.

DETACHABLE CORE RADIATOR.

APPLICATION FILED OCT. 7, 1918.

1,433,398

Patented Oct. 24, 1922.

4 SHEETS—SHEET 1.

Fig. 3.

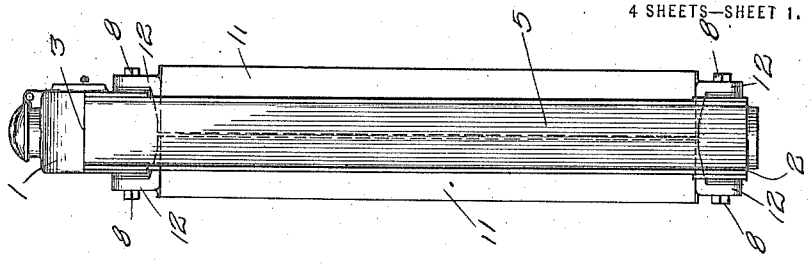


Fig. 2.

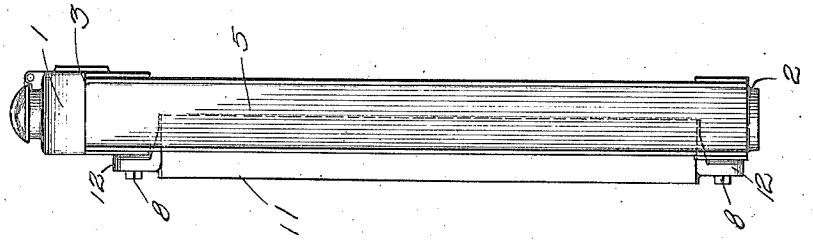
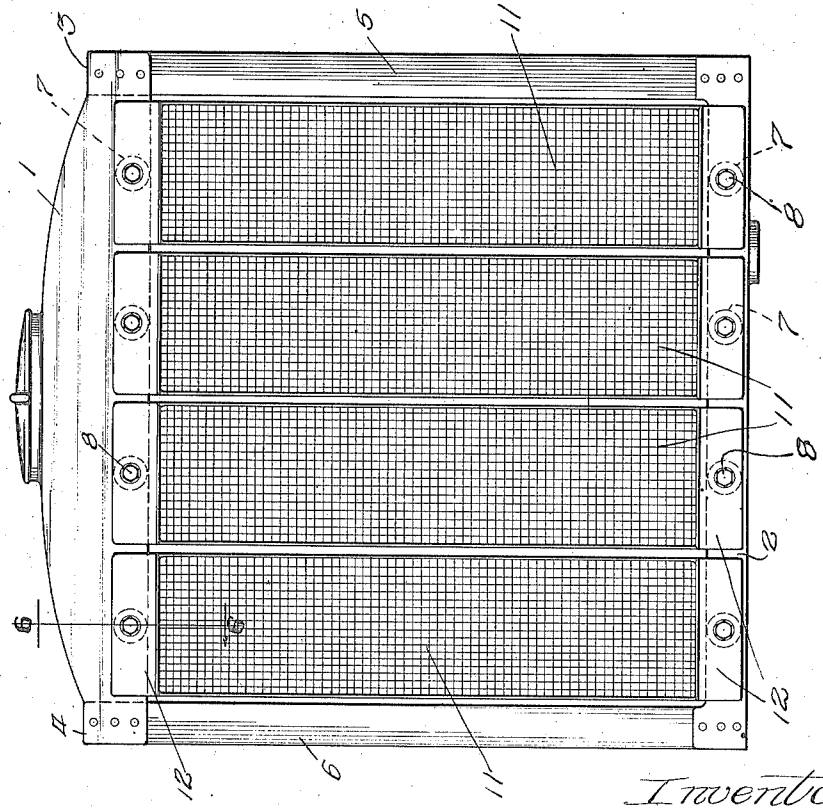


Fig. 1.



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4 SHEETS—SHEET 2.

Fig. 6.

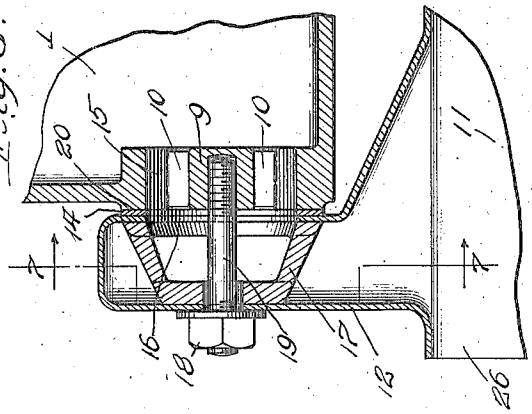


Fig. 7.

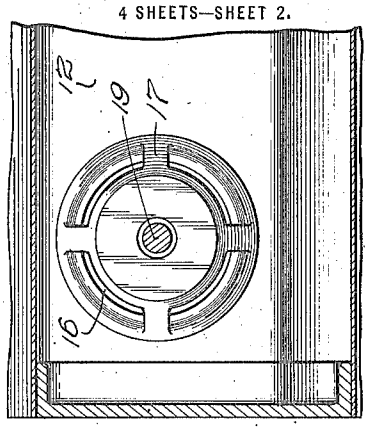


Fig. 5.

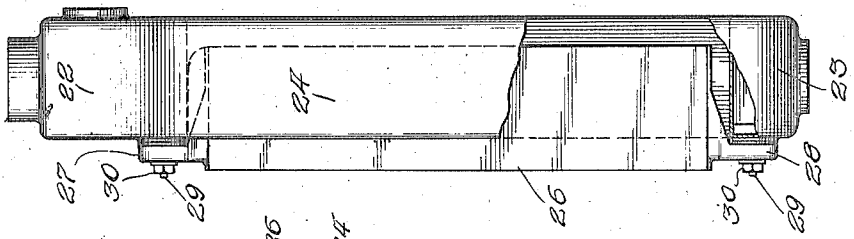


Fig. 4.

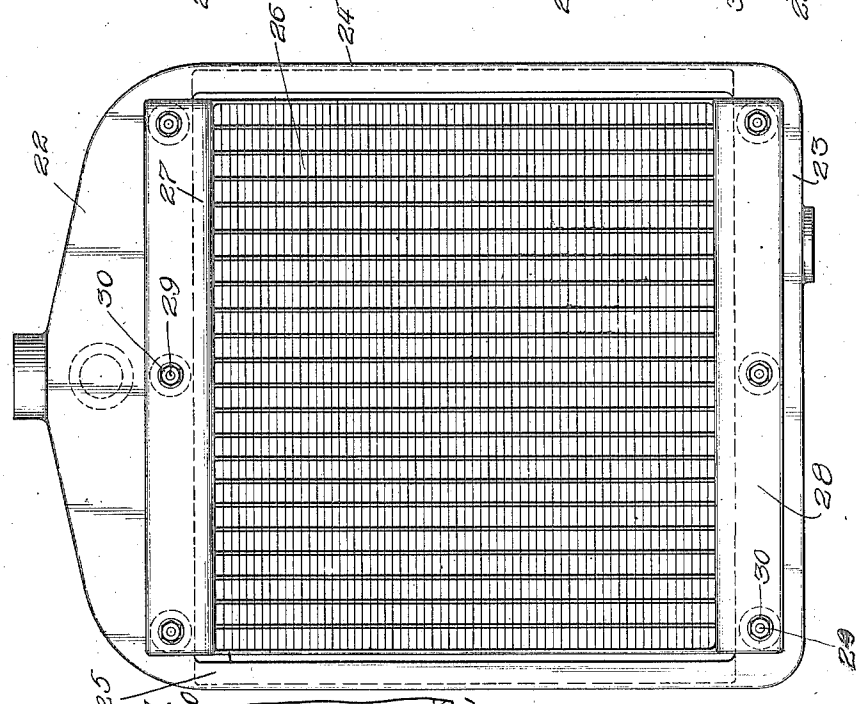
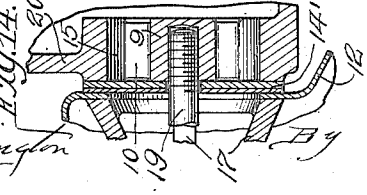


Fig. 11.



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4 SHEETS—SHEET 3.

Fig. 10.

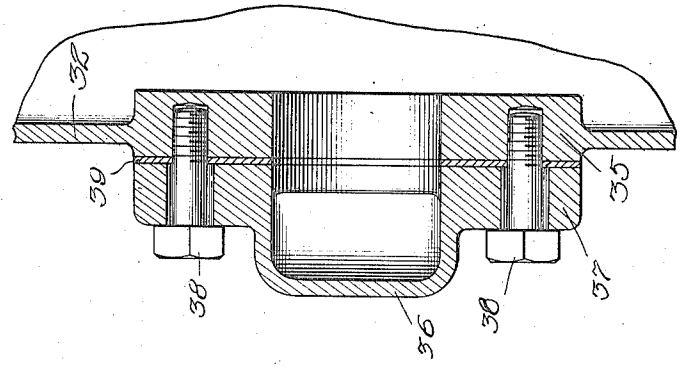


Fig. 9.

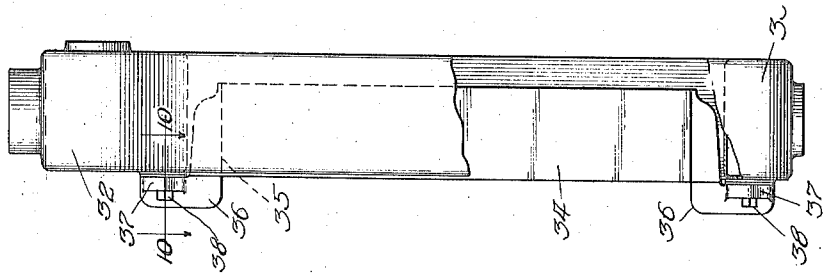
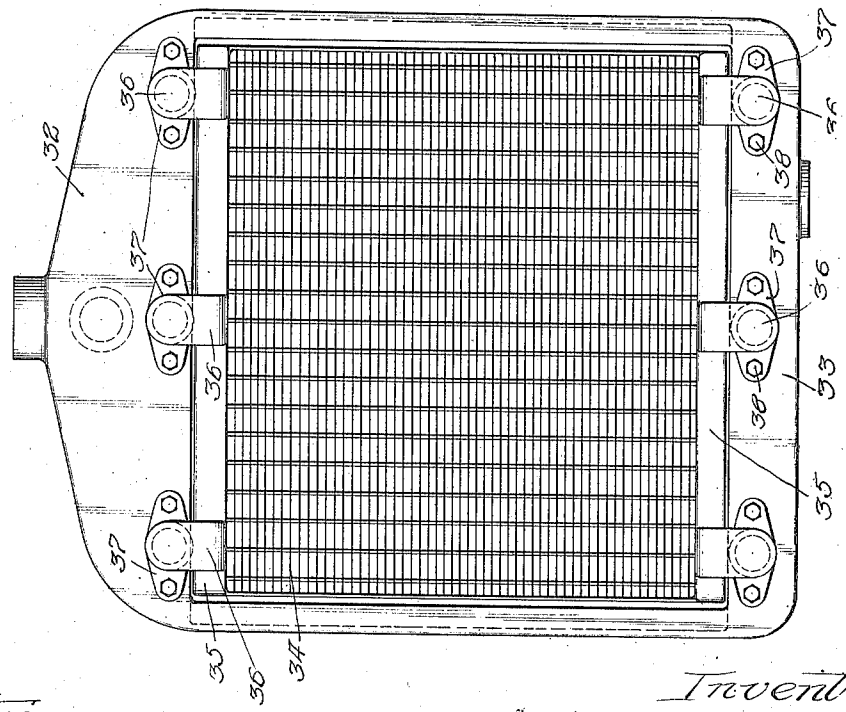


Fig. 8.



Witnesses.

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1,433,398.

Patented Oct. 24, 1922.

4 SHEETS—SHEET 4.

Fig. 13.

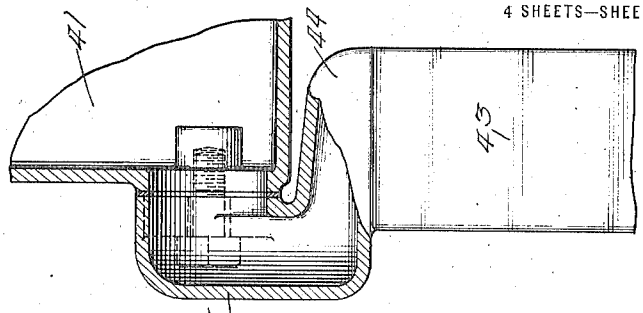


Fig. 12.

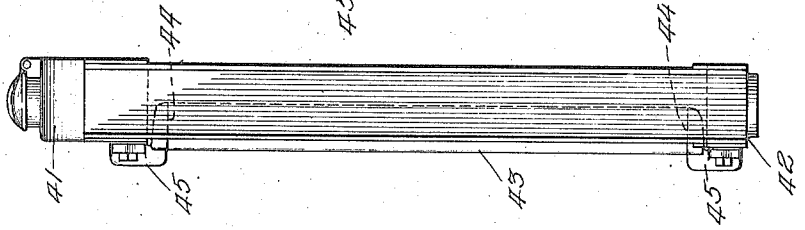
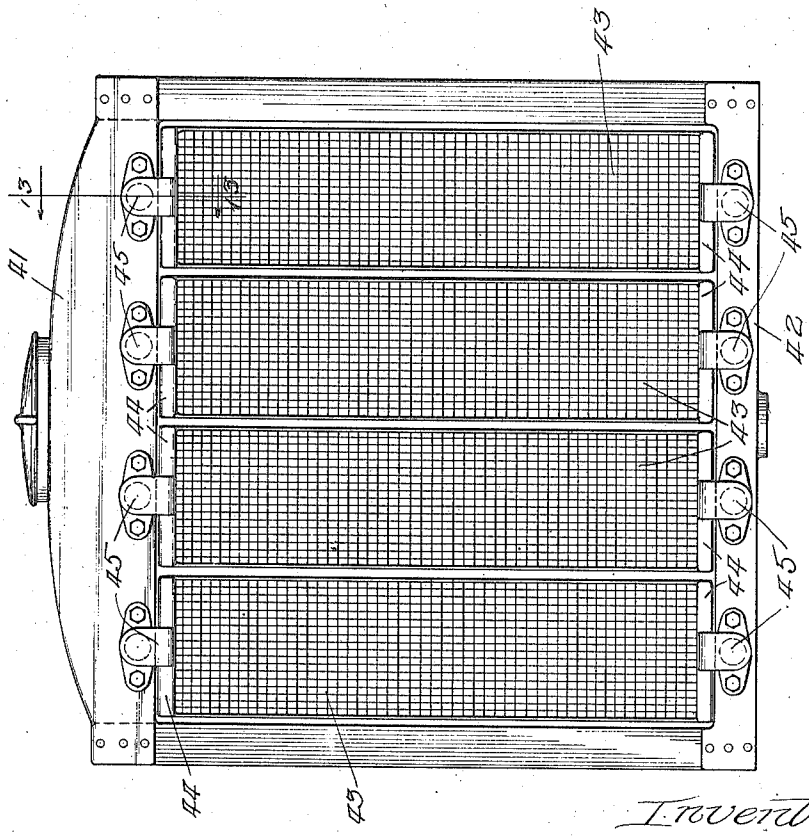


Fig. 11.



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Patented Oct. 24, 1922. 1,433,398

UNITED STATES PATENT OFFICE.

ARTHUR B. MODINE, OF RACINE, WISCONSIN.

DETACHABLE-CORE RADIATOR.

Application filed October 7, 1918. Serial No. 257,129.

To all whom it may concern:

Be it known that I, ARTHUR B. MODINE, a citizen of the United States, residing at Racine, in the county of Racine and State of Wisconsin, have invented certain new and useful Improvements in Detachable-Core Radiators, of which the following is a description.

My invention relates to means for dissipating the heat of the cooling fluid employed in internal combusion motors, air compressors and the like, as well as for condensing the exhaust in steam actuated devices.

The object of my invention is to produce a strong, reliable, efficient and durable device of the kind described wherein the stress upon the several parts due to changes in the temperature are to a great extent eliminated and complete repairs may be made easily and quickly without the employment of expert assistance.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the accompanying drawings wherein like or similar reference characters indicate like or corresponding parts:

Fig. 1 is a front elevation of my improvement.

Fig. 2 is a side elevation of the same.

Fig. 3 is a view similar to Fig. 2 showing a convenient method to increase the cooling capacity of my device.

Fig. 4 is a view similar to Fig. 1 showing a slightly modified form of my device.

Fig. 5 is a side elevation of the form shown in Fig. 4 with parts removed and broken away to more clearly show the parts.

Fig. 6 is an enlarged fragmentary section taken substantially on line 6—6 of Fig. 1.

Fig. 7 is a fragmentary section taken substantially on line 7—7 of Fig. 6.

Fig. 8 is a front elevation of another slightly modified form of my device.

Fig. 9 is a side elevation of the form of my device shown in Fig. 8 with parts removed and broken away to more clearly show the parts.

Fig. 10 is an enlarged fragmentary section taken substantially on line 10—10 of Fig. 9.

Fig. 11 is a front elevation of another slightly modified form of my device.

Fig. 12 is a side elevation of the form of my device shown in Fig. 11.

Fig. 13 is a section taken substantially on line 13—13 of Fig. 11.

Fig. 14 is a section similar to that shown in Fig. 13 showing the method of stopping off a section until renewal can be made.

In the form shown in the drawings (Figs. 1 and 2) 1 and 2 are the upper and lower receptacles respectively of a radiator, rigidly connected at their ends 3 and 4 by channel-bars 5 and 6 extending between the receptacles and riveted or otherwise rigidly secured to projecting wings or lugs extending longitudinally from the ends of the receptacles so as to form a rigid frame, the receptacles 1 and 2 forming the upper and lower member of the same. In the preferred construction the receptacles 1 and 2 are formed of cast metal having their faces in substantially a common plane and each provided with a plurality of slight bosses or projections 7 and upon their faces with openings 15 provided extending through the side wall at each boss and a hub 9 positioned substantially central of the opening and supported in position by suitable radial webs 10—10.

In the form shown the core to my improved radiator comprises a plurality of substantially similar, independent tubular members 11—11 constructed in the usual or any preferred manner with transverse cells for permitting air to pass transversely through the core and tubes or channels extending through the core longitudinally for conducting the cooling fluid.

In the form shown each member 11 is provided with a chamber 12 at each end connected with and common to all of the longitudinal tubes and covering the entire end of the member. The chambers 12 are preferably angular in form, as shown in Fig. 6 so that when the member is positioned between the receptacles the faces 14 of the chambers will extend to the bosses 7 and cover the openings 15 through the bosses. An opening 16 is provided in the face of the chamber 12 adapted to register with the opening 15 in the receptacle and a washer or distance piece 17 is provided in the chamber extending across that portion of the chamber so that the nut 18 may be tightened down against the outer face of the chamber

thereby forcing its inner face against the boss to form a fluid tight connection between the chamber and the receptacle. A ring of packing 20 or other suitable material is preferably placed between the wall of the chamber and the face of the boss to insure a fluid tight connection at this point.

In the form shown the opening at the outer face of the chamber through which the stud 19 passes is elongated sufficiently to permit the face of the chamber to slide upon the boss to compensate for any expansion or contraction due to changes of temperature in the core member, so that in operation the stresses due to variation in temperature are substantially eliminated.

In the form shown in Fig. 3 the several parts are constructed and arranged substantially the same as shown in Figs. 1 and 2 with the exception that bosses and openings are provided on both the front and rear side walls of the receptacle and core-members are provided and attached to the bosses at both the front and the rear of the receptacle as shown, to increase the cooling capacity of the radiator.

In case of puncture or other injury to any of the core sections of my radiator, the injured section may be easily removed and a new section substituted or a piece of leather, rubber or other suitable material 14′ arranged, as shown in Fig. 14 to completely cover and close the opening 15 for that section in both receptacles may be substituted for the packing 14 until a new section can be secured to perfectly renew the radiator.

In the form shown in Figs. 4 and 5 the receptacles 22 and 23 are cast integral with channel shaped members 24 and 25 rigidly connecting them at their ends. In this form the radiator core 26 consists of a single member with the chambers 27 and 28 extending entirely across the respective ends thereof the chambers being each connected to the end of all the liquid circulating tubes in the core. A plurality of suitable studs and nuts 29 and 30 connect the chambers to the side walls of the receptacles, the construction of the chambers and associated parts being substantially the same as hereinbefore described.

In the form shown in Figs. 8, 9 and 10 the receptacles 32 and 33 are constructed and arranged substantially as shown in Fig. 4 and a single core member 34 is provided, in this case having cast metal chambers 35—35 at its respective ends. Each of the chambers 35 are formed to accurately conform to the general shape of the end of the core member and are each provided with any desired number of tubular projections each having a flanged face 37 at its extremity adapted to fit against a suitable boss upon the receptacle to connect the chamber to the receptacle with suitable studs or cap-screws 38 extending through the flanges and into the wall of the receptacle to hold the chamber in position. A gasket or other suitable packing means is provided at each flange to insure a liquid tight joint between the chamber and the receptacle. The openings in the flanges through which the cap-screws or other fastening means pass is sufficiently slotted to permit the contacting surfaces to slide upon each other sufficiently to allow for free expansion of the core member.

In the form shown in Figs. 11 and 12 the receptacles 41 and 42 are constructed and connected substantially the same as shown in Fig. 1. A plurality of core members 43—43 are also provided similar to those shown in Fig. 1. The chambers 44—44 however are constructed the same as shown in Figs. 8 and 9 of cast material, extending across the entire end of the core member and common to all the liquid tubes thereof with the tubular part 45 extending to the face of the receptacle and slidably and detachably secured thereto as described in the form shown in Figs. 8 and 9.

In each of the several forms of my device it is to be noted that I provide a rigid frame with the receptacle forming the top and bottom member thereof and the core members mounted upon the frame and connected to the receptacle, the connection providing for the longitudinal expansion of the core member and also for its convenient removal and renewal.

Having thus described my improvement it is obvious that various immaterial modifications may be made in my device without departing from the spirit of my invention, hence I do not wish to be understood as limiting myself to the exact form or construction shown.

What I claim as new and desire to secure by Letters Patent is:

1. A radiator comprising two fluid receptacles, suitably spaced from each other, each having an opening in its walls, in combination with tubular cores positioned within said receptacles, said cores having extending portions forming a unitary structure therewith, and means for securing said core members in place with the extensions of one core member on one side of said receptacle and the extensions of the other member on the other side thereof.

2. A radiator comprising two fluid type receptacles, suitably spaced from each other, each having an opening in its walls, in combination with tubular cores positioned between said receptacles, said cores having extending portions forming a unitary structure therewith, and means for detachably and adjustably securing said core members in place with the extensions of one core member on one side of said receptacles and

the extensions of the other member on the other side thereof.

3. A radiator comprising two fluid receptacles, suitably spaced with each other and rigidly connected together at their ends, each having an opening in their walls, in combination with tubular cores positioned between said receptacles, said cores having extending portions forming a unitary structure therewith, and offset so as to lie against said side walls of said receptacle, and means for securing said core members in place with the extensions of one core member on one side of said receptacle and the extensions of the other member on the other side thereof.

4. A radiator comprising two fluid type receptacles, suitably spaced with each other and rigidly connected together at their ends, each having an opening in their walls, in combination with tubular cores positioned between said receptacles, said cores having extending portions forming a unitary structure therewith, and offset so as to lie against said side walls of said receptacle, and means for detachably and adjustably securing said core members in place with the extensions of one core member on one side of said receptacle and the extension of the other member on the other side thereof.

5. A radiator comprising two rigidly connected fluid receptacles suitably spaced from each other and provided with openings in the side walls of each, in combination with a tubular core having integral extending portions at each end and offset outwardly in advance of the main body portion of the core, said core positioned between the inner opposed walls of said receptacles and spaced out of contact therefrom at its opposite ends to permit relative expansion therebetween, and means for slidably securing said extending portions to said side walls of said receptacles and covering the openings therein, whereby circulation of fluid between said receptacles through said core is permitted.

In testimony whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

ARTHUR B. MODINE.

Witnesses:
BLANCHE CHALMERS,
BURTON U. HILLS.