

Dec. 13, 1932.

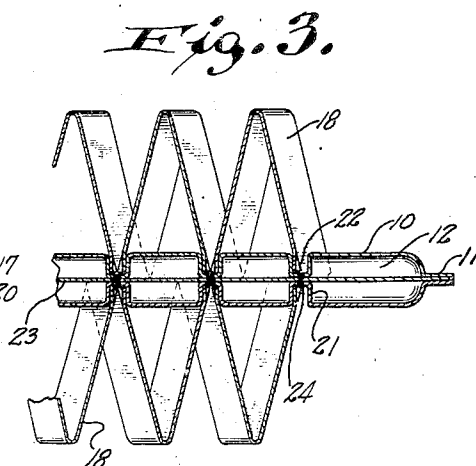
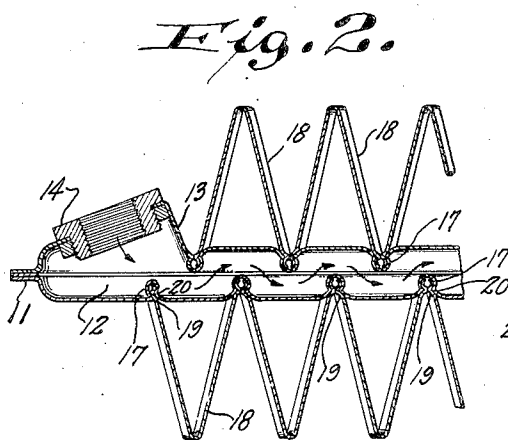
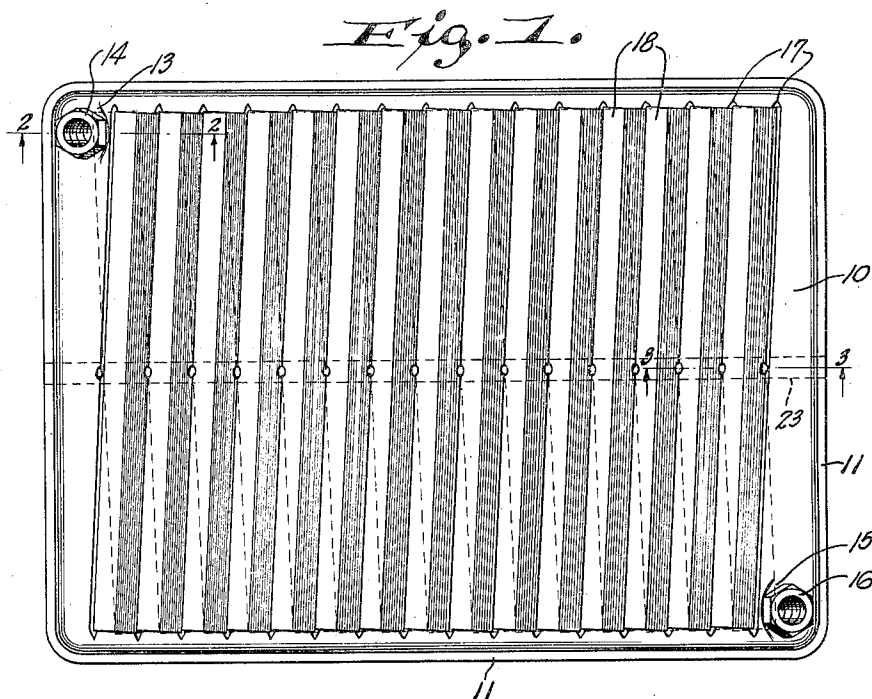
H. N. SHAW

1,890,625

RADIATOR

Filed July 7, 1930

2 Sheets-Sheet 1



INVENTOR.

Harold N. Shaw

BY

Morsell, Fenney, & Morsell
ATTORNEYS.

Dec. 13, 1932.

H. N. SHAW

1,890,625

RADIATOR

Filed July 7, 1930

2 Sheets-Sheet 2

Fig. 4.

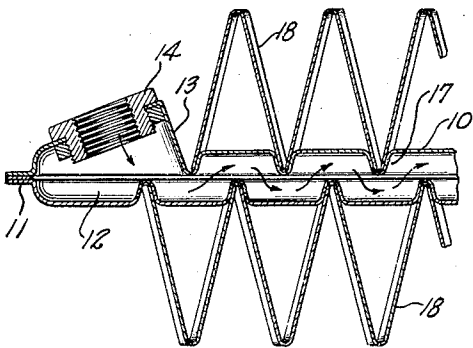
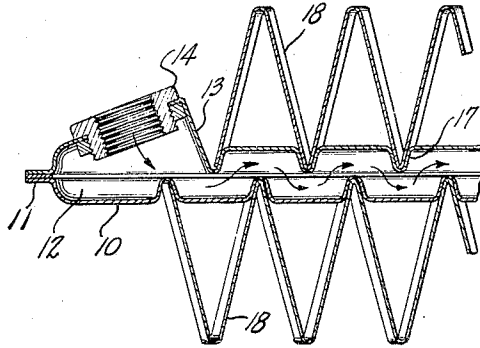


Fig. 5.



28 *Fig. 6.*

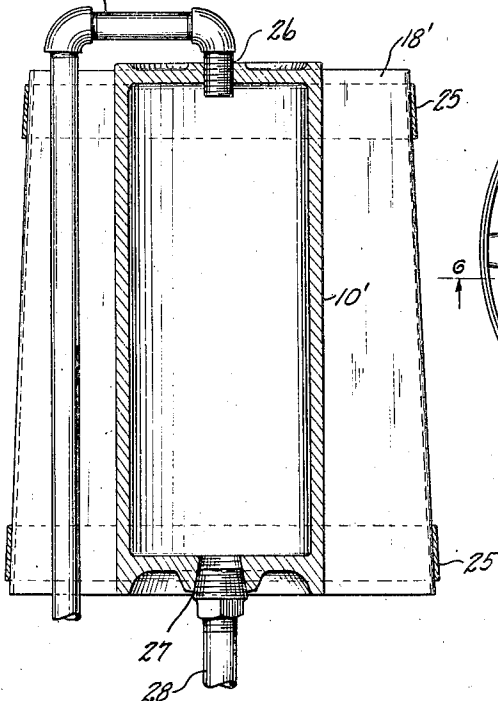
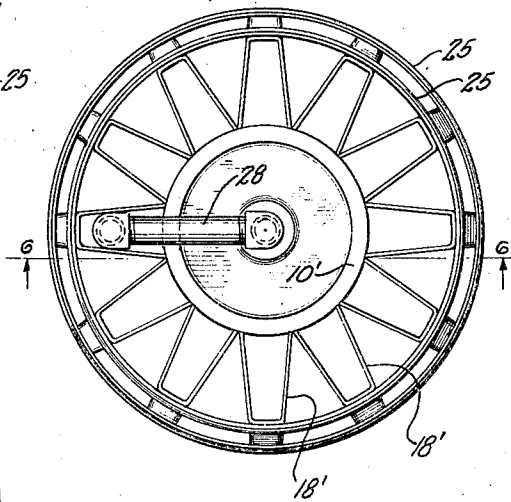


Fig. 7.



INVENTOR.

INVENTOR.
Harold N. Shaw

BY

Morsell, Tenney, & Morsell
ATTORNEYS.

ATTORNEYS.

UNITED STATES PATENT OFFICE

HAROLD N. SHAW, OF MILWAUKEE, WISCONSIN

RADIATOR

Application filed July 7, 1930. Serial No. 465,873.

This invention relates to improvements in radiators.

Heretofore, the majority of radiators utilizing heat radiating fins have embodied a circular or rectangular core with continuous fins wound edgewise thereon, or with separate circular fins positioned in spaced apart relation around the core. In either case, the fins were radially extending, and the inner or core-contacting portions were necessarily of less width than the outer portions. Thus considerable heat was dissipated before it reached the outer portions of the fins, and the latter portions were therefore only partially effective for heating purposes. Furthermore, in prior devices the contact between the fins and the core has been very poor. In some cases L-shaped fins have been utilized, the flanges being soldered to the core to secure a better contact. In this type, however, the fins must be very short, or the core or pan will buckle under steam pressure.

It is one of the objects of this invention to provide an improved radiator, of the type utilizing heat radiating fins, in which said fins are formed and secured to the core in a novel manner to insure ruggedness of construction, even with thin fins, and to provide an efficient contact between the fins and the pan.

A further object of this invention is to provide a radiator of the type described in which the outer edges of the fins are of no greater length than the inner or core contacting edges, thus insuring even distribution of heat throughout all portions of the fins.

A more specific object of the invention is to provide an improved radiator in which the fins are substantially V-shaped, and are secured in such a manner within grooves in the pan or core that the joint is placed under a shearing strain as distinguished from a tensile strain.

A further object of this invention is to provide a radiator in which the fin grooves on one side of the pan cross the grooves on the other side at the central portion of the pan, and in which said grooves are welded together at the crossing points to increase the ability of the pan to withstand buckling.

A further object of the invention is to provide a radiator in which normal circulation of the steam or water in the pan is permitted and short circuiting is prevented, to insure contact of the heating medium with all portions of the pan surface.

A further object of this invention is to provide a radiator in which free air circulation is permitted over and around all portions of the fins.

A further object of this invention is to provide a radiator which is comparatively simple and inexpensive to manufacture, durable in construction, efficient in operation, and well adapted for the purpose described.

With the above and other objects in view, the invention consists of the improved radiator, and all its parts and combinations as set forth in the claims, and all equivalents thereof.

In the accompanying drawings, in which the same reference numerals designate the same parts in all of the views:

Fig. 1 is a side elevation of the improved radiator;

Fig. 2 is an enlarged, fragmentary sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged, fragmentary sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a view similar to Fig. 2 showing a modified form of the invention;

Fig. 5 is a similar view showing an additional modification;

Fig. 6 is a vertical sectional view of a modified form of radiator of the drum type taken on line 6—6 of Fig. 7; and

Fig. 7 is a plan view of the form illustrated in Fig. 6.

Referring to the drawings the pan or core 10 is formed of two half sections, preferably of brass, said sections having edge flanges 11 which are welded together. Between the two sections a steam or water chamber 12 is formed. One of the sections is formed at an upper corner with an inclined apertured boss 13 to which a bushing 14 is soldered to provide an opening for connection with an inlet pipe. A similar boss 15 and bushing 16 is provided in a lower corner for connection with an outlet pipe.

The sides of the pan are provided with a plurality of depressed portions or parallel grooves 17 which project inwardly approximately half of the depth of the pan. The grooves on one side of the pan are inclined in the opposite direction from the grooves on the other side, so that the grooves on the two sides cross one another at intermediate points as shown in Fig. 3. If desired the grooves on the two sides of the pan may be arranged to cross each other at more than one point.

Substantially V-shaped fins 18 preferably constructed of copper or brass have grooves 19 formed near their inner edges. Said edges fit within the grooves 17 of the pan, and said grooves 17 have projecting ribs 20 which engage the grooves 19 of the fins to lock the inner edges of said fins to the pan, as shown in Fig. 2. Solder is also preferably utilized in the grooves 17 to additionally secure the edges of the fins in place. If desired, the groove lock may be omitted, and solder alone utilized as in the modified form shown in Fig. 4. Due to the depth of the grooves, there is a relatively large contact between the fins and the pan to insure proper heat transfer to the fins, and furthermore, there is a soldering area of substantial size which will withstand a maximum shearing strain comparable to the tensile strength of the fins.

The interlocking grooves 19 and ribs 20 are preferably intermittent or broken so that the grooves 19 of the fins can be inserted in the spaces between the ribs 20 and then slid along to bring the grooves into interlocking engagement with the respective ribs. With the ribs and grooves $\frac{1}{4}$ inch long and spaced $\frac{1}{4}$ inch apart, a sliding movement of $\frac{1}{4}$ inch will accomplish the desired locking.

Points on the grooves 17 of the pan and sockets on the fins may be substituted for the ribs 20 and grooves 19. These locking points and sockets may be formed by a suitable machine after the fins are in place, but before the two halves of the core are assembled.

At the points where the grooves 17 on the two sides of the pan cross one another, the grooves are spread out into substantially rectangular form as at 21 (see Fig. 3). The fins are also spread back at these points as indicated at 22 to permit a spot welder contact. It is ordinarily considered difficult to spot or seam weld brass or copper, but in the present invention this is accomplished in a novel manner. A strip of thin material 23, which has a relatively high electrical resistance, such as iron, stainless steel, or nickel chromium, is placed within the chamber 12 between the enlarged cross over points of the grooves. The welds 24 are produced by heat developed in the intermediate material, said heat penetrating through the brass side portions. Thus, the grooves at the cross over points are effectively welded together to increase the ability of the pan core to with-

stand steam pressure without buckling. As a further result of the welded cross over points of the grooves, the steam or water within the chamber 12 is free to pass from end to end of the core, at the top and bottom thereof, but not at the center where the grooves cross. This insures free steam or water passage, but prevents short circuiting, as the center of the pan is open only to vertical movement of the fluid.

While the inclined cross over grooves are the preferred construction, due to the above pointed out advantages, a fairly efficient construction is possible without the cross over feature. It is therefore not desired to be limited to this particular form as the grooves and fins on the two sides of the pan may be arranged parallel to one another, limiting the path for the heating fluid to the ends of the grooves only. With this construction, the grooves may be welded together at one or more points or along their entire length where high steam pressures are encountered.

In Fig. 5, a modification is illustrated in which the fins are continuous, with the inner apexes soldered in the grooves. This construction might be desirable from a manufacturing standpoint as the continuous fins can be produced more economically by automatic machinery than the separate fins.

In Figs. 6 and 7, a form of the invention is illustrated in which a drum type of core 10' is utilized. The V-fins 18' are arranged to extend longitudinally around the circumference thereof. Said fins taper upwardly on the core as shown. The fins have their inner edges soldered to the drum, and are further held in position by means of bands 25 which are driven down over and around the fins as shown. The drum is provided with upper and lower openings 26 and 27 respectively, to which steam or water pipes 28 may be connected.

In use, the heat in the steam or hot water within the core is transferred to the walls of said core, and is then conducted to the fins. Air circulating around the radiator will sweep the outer surface of said fins, and will pass through the triangular openings formed between the fins and the core, thereby becoming heated. Due to the shape of the fins, a large heating surface is presented, and very efficient results are produced with only a small percentage of the cross section of the air path obstructed by the radiator.

Although the invention is more particularly adapted for heating purposes, it may readily be utilized for refrigerating, drying, air condensing and ventilating.

Only two forms of drum have been shown, but it is obvious that the particular shape of this member may be varied and that other changes and modifications may be made in the construction without departing from the spirit of the invention.

It is further to be understood that the expression "substantially V-shaped" as used in the claims covers fins which are constructed in any similar manner so as to provide outwardly extending return bends.

From the above description it may readily be seen that the improved radiator is very strong and efficient in construction, due largely to the novel shape of the fins, and to the method of firmly securing said fins to the core. It may further be seen that the device will provide for economical heating, and may be installed in relatively small size, inconspicuous units, because of the large area of heat radiating surface provided by the novel type of fins.

What I claim is:

1. A radiator comprising a core adapted to receive a heating fluid, substantially V-shaped fins projecting from said core, said fins being adapted to conduct heat from said core and to transfer the same to the surrounding air, said core being formed with grooves therein for receiving the edges of said fins, locking means in connection with said grooves, and complementary locking means in connection with the fins.

2. A radiator comprising a pan-like core having a plurality of grooves inclined in one direction on one side thereof and having a plurality of grooves inclined in the opposite direction on the other side, the rear of said grooves on the two sides crossing one another within the core, means for securing said grooves to one another at the cross over points, and fins projecting outwardly from said grooves.

3. A radiator comprising a pan-like core having a plurality of grooves inclined in one direction on one side thereof and having a plurality of grooves inclined in the opposite direction on the other side, the rear of said grooves on the two sides crossing one another within the core, means for securing said grooves to one another at the cross over points, and substantially V-shaped fins projecting outwardly from said grooves.

4. A radiator comprising a pan-like core having a plurality of grooves inclined in one direction on one side thereof and having a plurality of grooves inclined in the opposite direction on the other side, the rear of said grooves on the two sides crossing one another within the core, said grooves being welded to one another at the cross over points, and fins projecting outwardly from said grooves.

5. A radiator comprising a pan-like core having a plurality of grooves inclined in one direction on one side thereof and having a plurality of grooves inclined in the opposite direction on the other side thereof, the rear of said grooves on the two sides crossing one another within the core, a strip of thin material having a relatively high electrical resistance within the core extending between

the cross over points of the grooves, said cross over points being welded thereto, and fins projecting outwardly from said grooves on each side of the pan.

6. A radiator comprising a pan-like core having a plurality of grooves inclined in one direction on one side thereof and having a plurality of grooves inclined in the opposite direction on the other side thereof, the rear of said grooves on the two sides crossing one another within the core, said grooves being enlarged at the cross over points, a strip of thin material having a relatively high electrical resistance within the core extending between the cross over points of the grooves, said cross over points being welded thereto, and fins projecting outwardly from said grooves on each side of the pan.

7. A radiator comprising a pan-like core having a plurality of grooves inclined in one direction on one side thereof and having a plurality of grooves inclined in the opposite direction on the other side thereof, the rear of said grooves on the two sides crossing one another within the core, said grooves being enlarged at the cross over points, a strip of thin material having a relatively high electrical resistance within the core extending between the cross over points of the grooves, said cross over points being welded thereto, and fins projecting outwardly from said grooves on each side of the pan, the edges of said fins being spread back at the enlarged portions of the grooves.

8. A radiator comprising a core adapted to receive a heating fluid, said core having grooves formed therein, and said grooves having inwardly projecting ribs, and fins projecting from said grooves, the inner edges of said fins being formed with grooves for inter-locking engagement with the ribs in the grooves of the pan.

9. A radiator comprising a core adapted to receive a heating fluid, said core having grooves formed therein, and said grooves having inwardly projecting ribs, and substantially V-shaped fins projecting from said grooves, the inner edges of said fins being formed with grooves for interlocking engagement with the ribs in the grooves of the pan.

10. A radiator comprising a core adapted to receive a heating fluid, fins projecting from said core for conducting heat therefrom, said core having fluid inlet and outlet openings therein, and fittings for said openings which are positioned so as to incline outwardly away from the fins.

11. A radiator comprising a core adapted to receive a heating fluid, said core having a plurality of grooves therein, heat transferring fins each having an edge positioned within one of said grooves, and a soldered joint between a portion of the side of each fin adjacent the inner edge thereof and a side of

the groove, said joint being thereby under shearing stress when the core is under pressure.

12. A radiator comprising a pan-like core having a plurality of grooves on each side thereof which project inwardly toward one another within the core, means for securing the rear of said grooves on the two sides of the pan to one another, and fins projecting outwardly from the grooves.

13. A radiator comprising a corrugated core, heat transferring fins having ridges positionable within the corrugations of said core, locking means in connection with the corrugations of the core, and complementary locking means in connection with the fins which are brought into engaging position by a sliding movement of the fins within the corrugations of the core.

14. In a radiator having a pan-like core for receiving a heating fluid, means within said core for obstructing horizontal flow of fluid through an intermediate portion thereof to prevent said fluid from short-circuiting during its circulation through the core.

15. A radiator comprising a core adapted to receive a heating fluid, substantially V-shaped fins projecting from said core, said fins being adapted to conduct heat from said core and to transfer the same to the surrounding air, said core being formed with substantially V-shaped grooves with the sides of each groove diverging outwardly to provide a V-shaped opening between said sides, each groove being therefore capable of reception of the inner portions of the converging sides of two V-shaped fins, and means for securing said sides of the fins within the grooves and adjacent the sides thereof.

16. A radiator comprising a core adapted to receive a heating fluid, fins projecting from said core, said fins being adapted to conduct heat from the core and to transfer the same to the surrounding air, said core being formed with grooves therein for receiving the edges of said fins, locking means in connection with said grooves, and complementary locking means in connection with the fins.

In testimony whereof I affix my signature.
HAROLD N. SHAW.

53

60

65