

July 12, 1927.

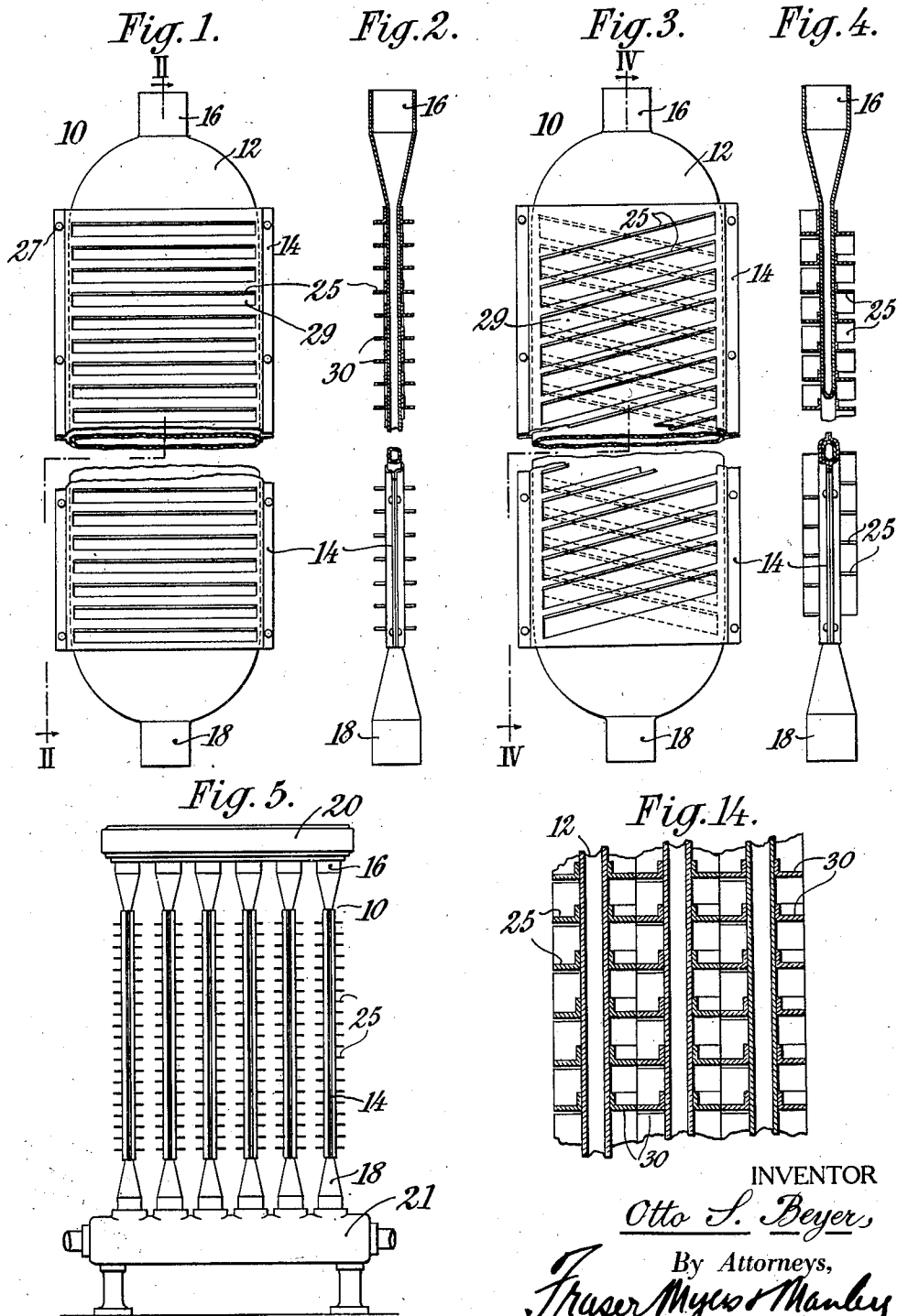
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1,635,656

COMPOSITE RADIATOR AND RADIATION INCREASING DEVICE

Filed Feb. 27, 1925

3 Sheets-Sheet 1



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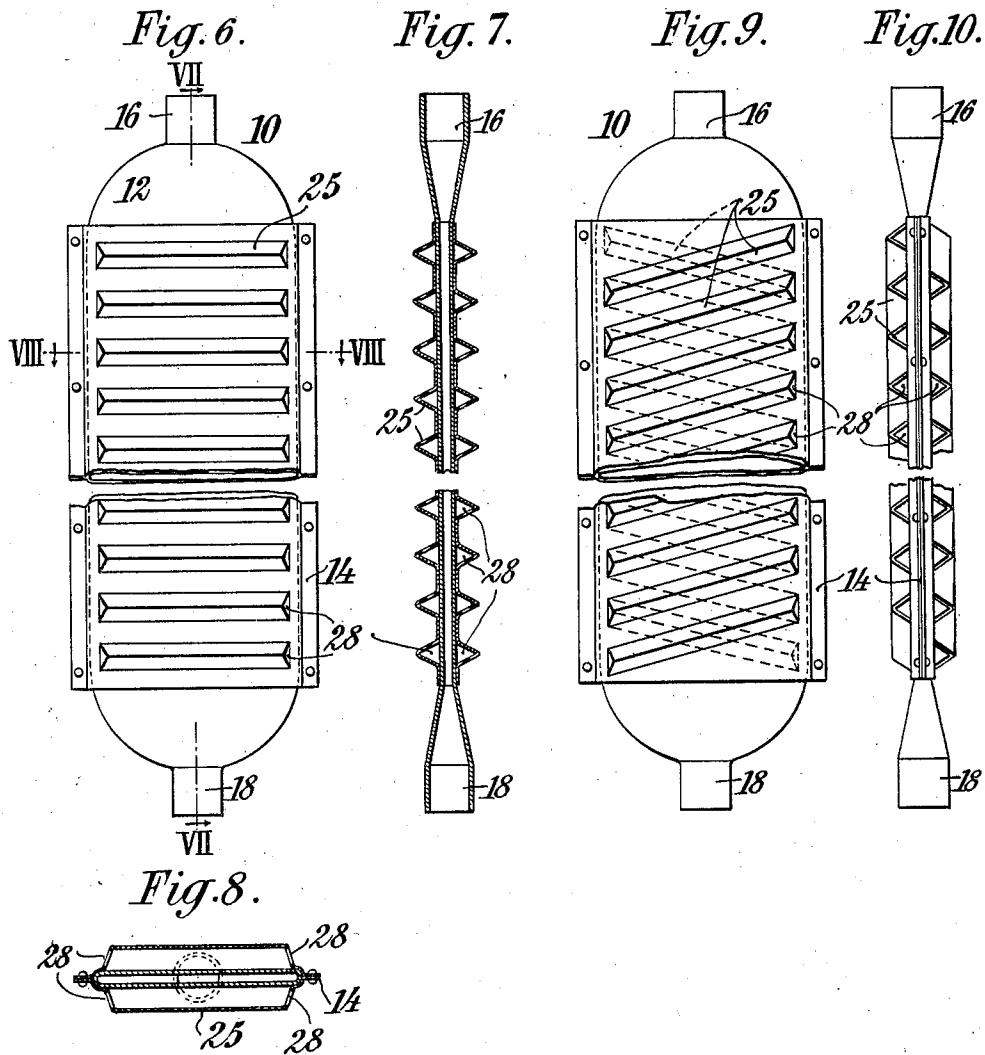
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COMPOSITE RADIATOR AND RADIATION INCREASING DEVICE

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3 Sheets-Sheet 3

Fig. 11.

XII

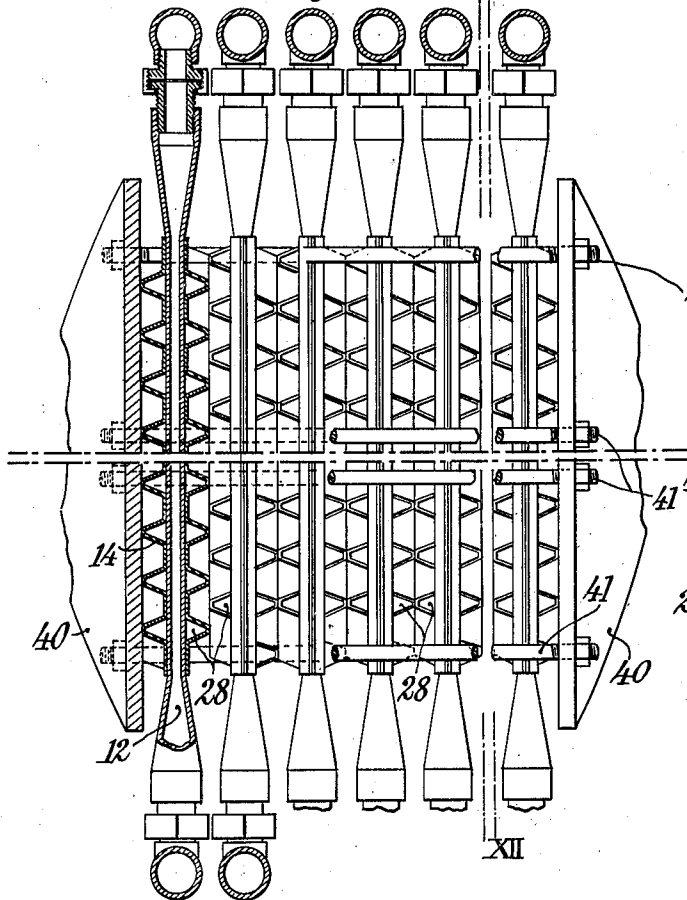


Fig. 12.

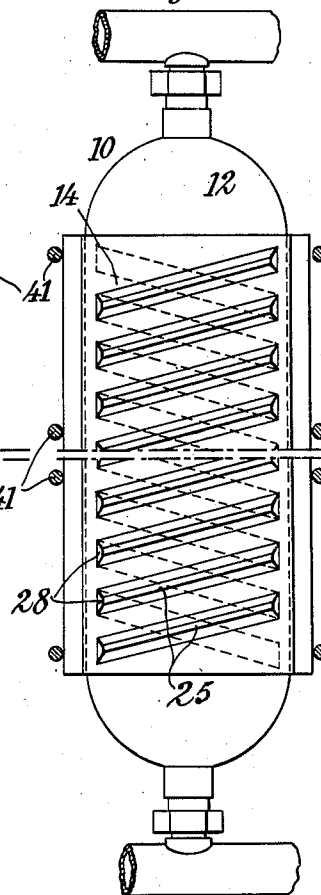
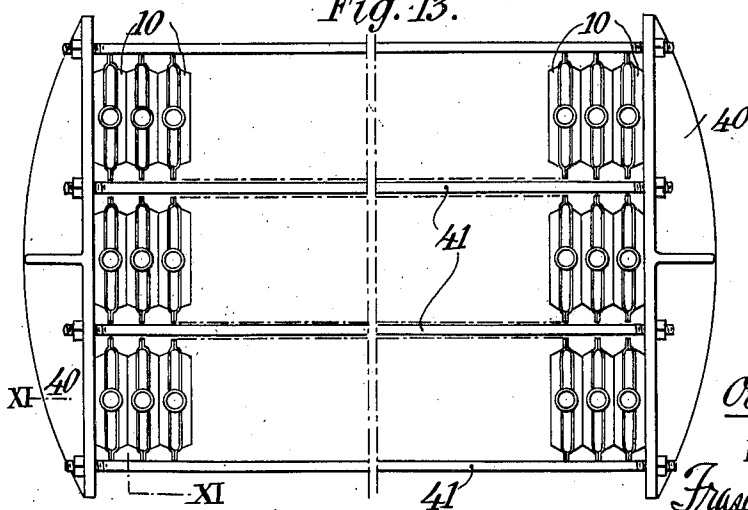


Fig. 13.



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UNITED STATES PATENT OFFICE.

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COMPOSITE RADIATOR AND RADIATION-INCREASING DEVICE.

Application filed February 27, 1925. Serial No. 12,055.

This invention relates to radiators, and to devices for use with radiator sections for increasing the radiating effect thereof, or for increasing the radiating effect and strengthening said sections, and aims to provide improvements therein.

The present invention provides a composite radiator section comprising a fluid-containing envelope, and a surrounding portion having formed thereon means for increasing the radiating surface and for baffling air flowing over said section, or for increasing said surface and strengthening said sections, particularly where the internal pressure to which said sections may be subjected is high. It further provides a composite radiator section formed of light sheet metal, in which the envelope portion is substantially seamless, as described in my Patent 1,599,510 granted Sept. 14, 1926, and my application for Patent Serial No. 730,632, filed August 7, 1924, and is designed to lighten, reduce in size, and cheapen radiators and radiator sections, as compared with the ordinary cast metal radiators now largely in use.

The invention further provides a radiator of light metal construction capable of use with relatively high pressure heating fluids.

The invention further provides radiator section parts which may be formed by the relatively cheap, rapid, efficient and comfortable method of sheet metal stamping or drawing.

The invention further provides press-formed parts generally applicable for increasing the radiating effect of radiators, or for strengthening said radiators, or for both purposes.

The several embodiments of the invention are illustrated in the accompanying drawings, wherein—

Figure 1 is a view, in side elevation, of a radiator section embodying the invention.

Fig. 2 is a view of the radiator section shown in Fig. 1, turned at an angle of 90 degrees, the view being partly in elevation and partly in section on the line II—II, Fig. 1.

Fig. 3 is a view, similar to Fig. 1, of a slightly modified form of the invention.

Fig. 4 is a view of the radiator section shown in Fig. 3, turned at 90 degrees, partly in side elevation and partly in section on the line IV—IV, Fig. 3.

Fig. 5 is a side view of a radiator composed of sections according to Fig. 1.

Figs. 6, 7 and 8 are respectively a view in elevation, a longitudinal section, and a transverse section of another embodiment of the invention, the longitudinal section being on the line VII—VII of Fig. 6, and the transverse section being on the line VIII—VIII, Fig. 6.

Figs. 9 and 10 are respectively views in front and side elevation of a modified form of the embodiment shown in Figs. 6, 7 and 8.

Figs. 11, 12 and 13 are views of an embodiment especially adaptable for use with high pressure heating fluid, Fig. 11 being a side view partly in section, Fig. 12 being a sectional view on line XII—XII, Fig. 11, and Fig. 13 being a top plan view of Fig. 11 with the upper piping removed.

Fig. 14 is a view illustrating another embodiment of radiator especially adaptable for use with high pressure heating fluid.

Referring to said drawings, numeral 10 designates a radiator section comprising an envelope portion 12 and an attached or surrounding portion 14.

The envelope portion is preferably of light gauge metal, and substantially seamless, and is conveniently described as a substantially seamless sheet metal envelope. The method of forming the substantially seamless sheet metal envelope is preferably according to one or another of the inventions described in my Patent 1,599,510, granted Sept. 14, 1926, and my application for Patent Serial No. 730,632, filed August 7, 1924. The form of envelope shown is conveniently made from a thin walled tube formed by drawing or extrusion, the closed end of which is perforated and formed with a neck 16 thereon, and the open end of which is spun and formed with a neck 18 thereon, the section being open through the necks 16 and 18 to suitable manifolds or joining portions 20, 21, as shown in Fig. 5.

The portions 14 are formed separate from the envelope, and are provided with projections 25 for increasing the effective radiating surface of the radiator sections, and for baffling the air current flowing over said sections.

The portions 14 are preferably in the form of light sheet metal shells formed by press-

ing or stamping sheet metal. The shells are conveniently formed in two portions, adapted to surround the envelope, and preferably attached at their free edge portions by rivets or the like, as indicated at 27.

As illustrated in Figs. 1 to 5, inclusive, and 14, the projections 25 are conveniently formed by pressing or bending up portions of the sheet metal, the bent-up portions being conveniently cut out on three sides, as indicated at 29. The projections are, in this form, narrow strips 30 of outstanding sheet metal running across the face of the shells of which they form a part. The projections may run straight across the shells, as indicated in Figs. 1 and 2, or diagonally across, as illustrated in Figs. 3, 4 and 14.

The effective radiating surface of the composite section is increased by the amount of surface of the strips 30. The projections 25 also act to baffle or disturb the current of air flowing over the radiator sections, so as to increase the efficiency with which heat is imparted to the air to be heated by the radiator.

As illustrated in Figs. 6 to 10, inclusive, the projections 25 on the portions 14 may be formed by embossing or drawing the surface of the sheet metal, these projections 25 being conveniently elongated transversely of the section, and running straight across as shown in Figs. 6 and 7, or across at an incline as shown in Figs. 9, 10 and 12. The ends of the projections are preferably open, as indicated at 28.

The drawn projections 25 act similarly to the cut-out projections 25, to increase the radiating surface, and also to baffle the air flowing over the radiator sections.

The shells 14 may be formed entirely by press operations on sheet metal, and may be very rapidly, readily and cheaply formed, and a composite radiator comprising a thin-walled envelope and shells 14 may be very cheaply and rapidly manufactured.

The sheet metal shells surrounding the envelopes may be used in connection with other forms of radiator sections for increasing the radiating effect of such radiators, or for strengthening the same, or for both purposes, and constitute a cheap and effective means for these purposes, capable of rapid and economical manufacture.

Figs. 11 to 14, inclusive, illustrate embodiments of the invention especially adaptable for light metal radiators using relatively high pressure heating fluid.

In these embodiments the projections 25 on the shells are made long enough (or high enough) for the projections 25 on adjacent sides of adjacent sections 14 to contact, as illustrated most clearly in Figs. 11 and 14. The projections 25 may be of any suitable form, but are preferably elongated and arranged to run diagonally of the shell, simi-

lar to the showing in Figs. 3 and 9, the projections 25 on two shells 14 in contact being preferably so arranged that the lines of contact run criss-cross, as shown in Figs. 11 and 14.

Suitable means are provided for sustaining the high pressure of the heating fluid within the sections or group of sections tending to expand the sections. This means may conveniently comprise rigid end-plates or heads 40, joined together by tension rods 41, or the like, and arranged to bear on the outer flat sides of the end sections in a group of sections arranged with the flat sides adjacent and in contact, as best illustrated in Fig. 13.

The groups of sections illustrated in Figs. 11 and 13 are well adapted to serve as heating units in industrial heating, drying and air-conditioning apparatus.

The surrounding parts 14 may, however, be so formed as to sustain deformation stresses in the envelope 12 due to high internal fluid pressures independently of adjacent sections or other means, and the projections 25, particularly in the form of transverse ribs, may constitute strengthening means, or additional strengthening means for this purpose.

Where a group of sections 12 are provided with rigid heads or end pieces 40 tied together, the shells 14 may be mere intermediate parts without connection one with another.

The invention may receive other embodiments than those herein specifically illustrated and described.

What is claimed is:

1. A radiator adapted for use with relatively high pressure heating fluids comprising composite sections, said sections each comprising a seamless light metal envelope deformable under the pressure of heating fluids used therein, and a surrounding portion adapted to restrain said deformation of said light metal envelope, said surrounding portion comprising a pressed metal shell having strengthening ribs for stiffening the same, the composite sections being so assembled that the ribs on adjacent faces of adjacent sections are in contact.

2. A radiator adapted for use with relatively high pressure heating fluids comprising composite sections, said sections each comprising a seamless light metal envelope deformable under the pressure of heating fluids used therein, and a surrounding portion adapted to restrain said deformation of said light metal envelope, said surrounding portion having ribs arranged in inclined relation to the axis of the section, and the ribs on one surrounding portion engaging and crossing the ribs on the surrounding portion of an adjacent section.

3. A radiator adapted for use with rela-

tively high pressure heating fluids comprising composite sections, said sections each comprising a seamless light metal envelope deformable under the pressure of heating fluids used therein, and a surrounding portion adapted to restrain said deformation of said light metal envelope, said surrounding portion comprising pressed metal shells entirely surrounding the section, said shells

having struck-up ribs arranged in inclined relation to the axis of the section, the ribs on the shell of one section engaging and crossing the ribs on the shell of an adjacent section to brace the sections and increase the radiating surface area thereof.

In witness whereof, I have hereunto signed my name.

OTTO S. BEYER.