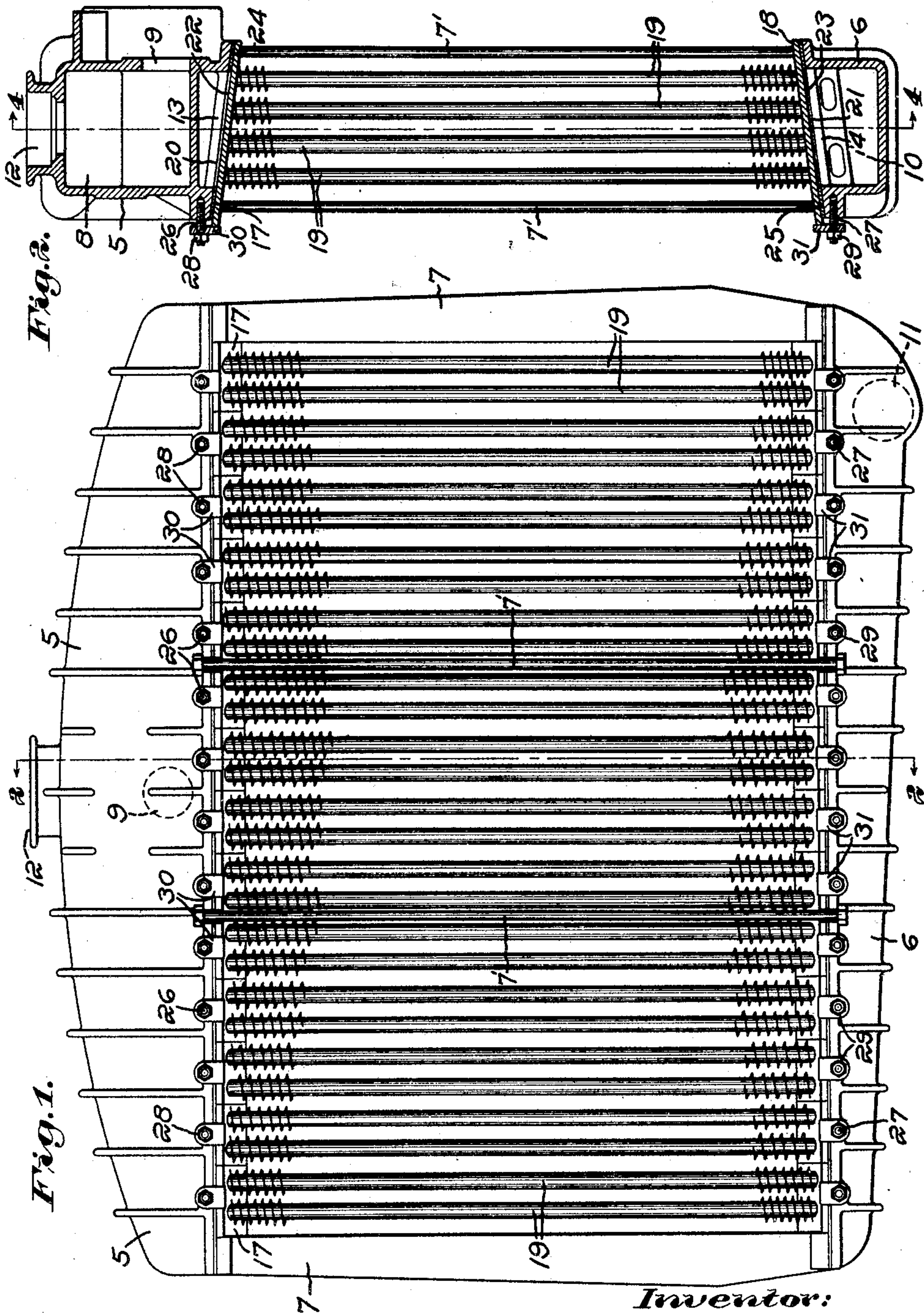


Jan. 2, 1923.

1,441,034.

A. C. SCHULZ.
SECTIONAL RADIATOR.
FILED JAN. 15, 1916.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 3.

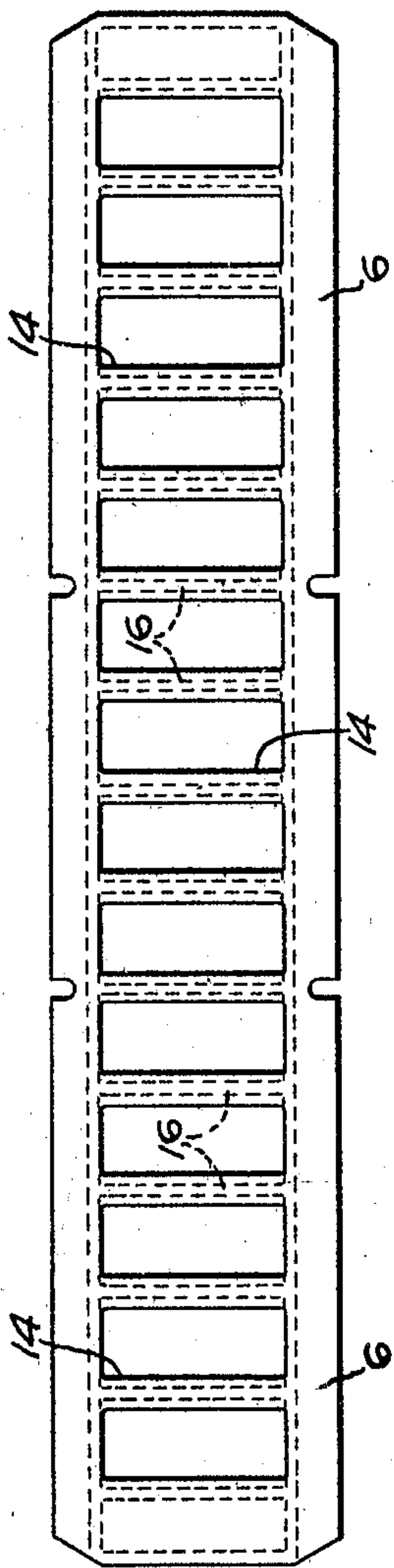
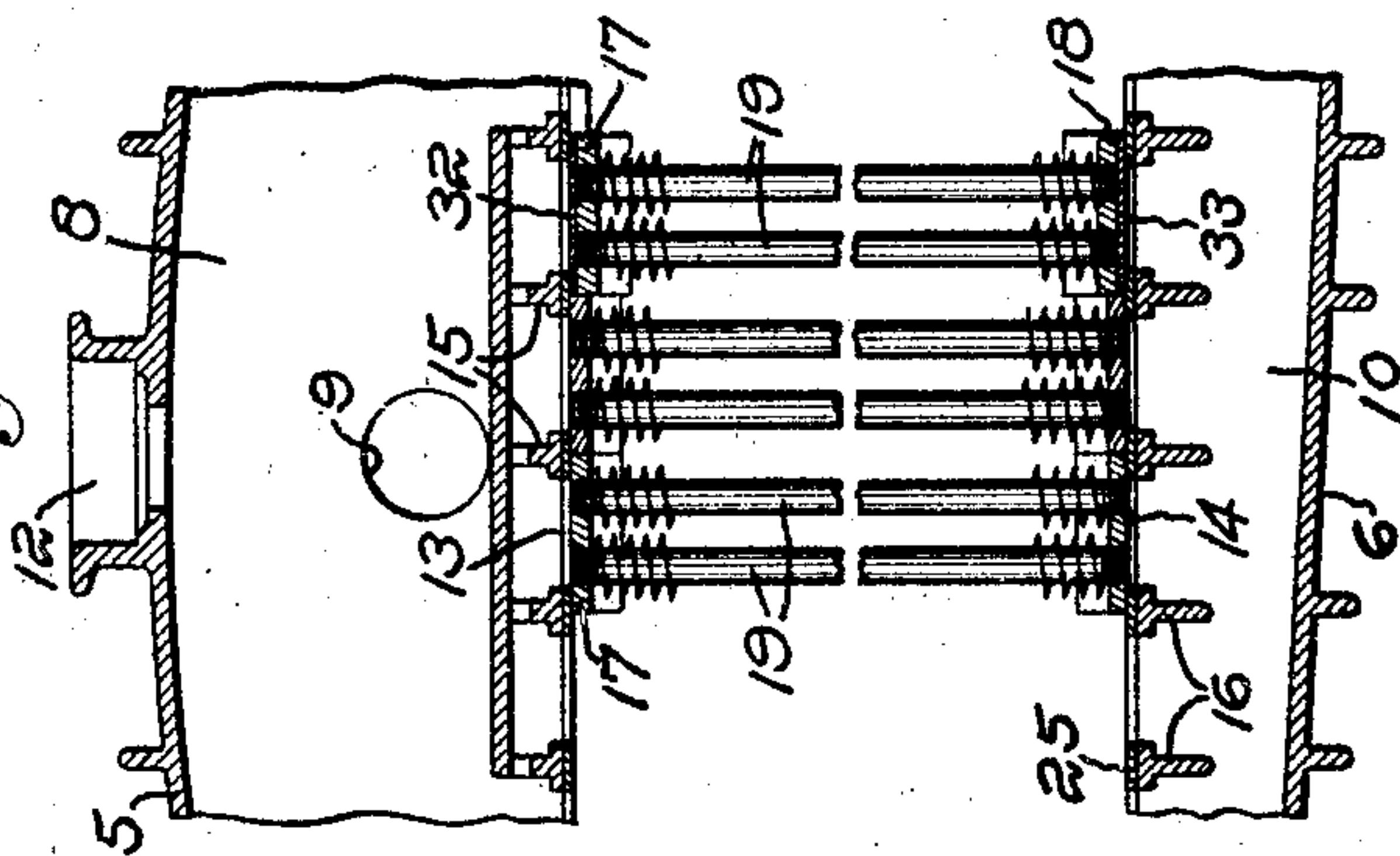


Fig. 4.



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Patented Jan. 2, 1923.

1,441,034

UNITED STATES PATENT OFFICE.

ALBERT C. SCHULZ, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE LOCOMOBILE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF DELAWARE.

SECTIONAL RADIATOR.

Application filed January 15, 1916. Serial No. 72,331.

To all whom it may concern:

Be it known that I, ALBERT C. SCHULZ, a citizen of the United States, and a resident of Bridgeport, county of Fairfield, and State of Connecticut, have invented an Improvement in Sectional Radiators, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to radiators, in which a cooling medium is circulated for the purpose of dissipating the heat, and is more particularly concerned with a sectional radiator having provision for the convenient removal and repair or replacement of an injured section, or the stopping off of a certain injured section temporarily until the repair or replacement of the same by a new one can be effected. While susceptible of general application, my invention is particularly useful in connection with cooling systems of internal combustion engines, such as those of motor vehicles, aeroplanes, and in other similar situations where light weight is an important consideration, and the chance of injury by collision or by being struck by a missile is very great. It is evident that under such conditions of use, the ability to make a hasty repair is a great advantage.

My invention will be best understood by reference to the following description, when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a front elevation of a sectional radiator embodying my invention;

Fig. 2 is a vertical sectional view on line 2—2 of Fig. 1;

Fig. 3 is a plan of the lower reservoir; and

Fig. 4 is a detail sectional view on line 4—4 of Fig. 2.

Referring to the drawings, and to the embodiment of my invention which I have selected for illustration, I have there shown a radiator comprising two reservoirs 5 and 6 which, in the present example, are placed one above the other, and are connected by uprights 7, constituting tie pieces rigidly connecting the reservoirs. If desired, the

reservoirs may be further tied together by other uprights 7', in the form of tie-rods disposed adjacent the front and rear faces of the radiator intermediate the uprights 7 and serving to prevent distortion of the intermediate portions of the reservoirs. The upper reservoir 5 is provided with a chamber 8 having an inlet 9 for the entrance of the cooling medium, usually water, and the lower reservoir 6 is provided with a chamber 10, having an outlet 11 for the cooling medium. The upper reservoir is herein provided with a usual filling aperture 12 for the introduction of the cooling medium into the system.

The reservoirs 5 and 6 are provided respectively with opposed apertures 13 and 14, there being several such apertures in each reservoir, the apertures of the upper reservoir being separated from each other by ridges or walls 15, and the apertures 14 are similarly separated by ridges or walls 16, which, however, do not separate the reservoirs into a number of compartments, but are cored out to provide a free circulation of the cooling medium, thereby preventing the formation of what may be termed steam pockets.

The upper and lower reservoirs 5 and 6 are connected by one or more, herein a plurality of cooling sections, which may be of any suitable type, either cellular or tubular, the latter, however, being shown as an illustrative form. Each such section, as herein shown, comprises an upper header 17, a lower header 18, and one or more, herein a plurality of, vertical tubes 19, whose upper and lower ends are respectively secured to the upper and lower headers, the latter being perforated for that purpose, whereby communication is established between the reservoir by way of the opposed apertures 13 and 14, with which the tubes directly communicate.

In order to maintain the cooperative relation between the cooling sections and the reservoirs, I have herein provided means for producing a relative thrust between the sections and reservoirs lengthwise of the cooling sections,—or, in other words, by providing means for causing the sections to press against opposed surfaces of the reservoirs. In the present instance, this is accomplished by providing the reservoirs 5 and 6 with op-

posed converging surfaces 20 and 21, in which the apertures 13 and 14 are formed, by similarly providing the headers 17 and 18 with converging surfaces 22 and 23, and providing means for forcing the cooling sections toward the point of convergence of such surfaces, thus producing a wedging action which results in a thrust tending to press the reservoirs apart. Since, however, the reservoirs are firmly tied together, the result must be a forcing of the opposed surfaces of the cooling sections, and the reservoirs toward each other.

As herein shown, I have provided strips of packing material 24 and 25, interposed between the opposed surfaces of the cooling sections and the upper reservoir on the one hand, and the opposed surfaces of the cooling sections and the lower reservoir on the other hand, such packing material being provided with apertures corresponding to the apertures in the reservoirs, whereby tie joints are maintained without interfering with the circulation of the cooling medium. In the specific example shown, as a means for forcing the headers against the packing strips and the latter against the reservoirs, I have provided upper and lower threaded members 26 and 27, herein in the form of studs threaded into the upper and lower reservoirs, and provided with nuts 28 and 29, cooperating with clamps 30 and 31, the latter engaging the front ends of the headers 17 and 18, it being understood that each cooling section is provided with its own individual clamping means, whereby, should any injury to that section occur, it may be removed by simply loosening the nuts and swinging the clamps out of engagement with the headers, whereupon the injured section may be withdrawn in a forward direction.

The section may now be repaired or replaced by a new one, as circumstances may require, and if there is not sufficient time to make a repair, or if a new section is not at that moment available, the communication between the reservoirs afforded by the injured section may be temporarily interrupted by the use of a pair of thin plates 32 and 33, inserted between the opposed surfaces of the reservoirs and the inner section, the latter being forced into place between the plates, thus stopping off that particular section temporarily, this being obviously a feature of great practical advantage. Another mode of stopping off an injured section temporarily is to remove the same, plug the ends of the damaged tube, and return the section to its place, the remaining tubes of such section then continuing to act as before.

While I have herein shown and described one form or embodiment of my invention for illustrative purposes, and have disclosed and discussed in detail the construction and arrangement incidental to one specific appli-

cation thereof, it is to be understood that the invention is limited neither to the mere details or relative arrangement of parts, nor to its specific embodiment herein shown, but that extensive deviations from the illustrated form or embodiment of the invention may be made, without departing from the principles thereof.

Having thus described my invention, what I claim and desire by Letters Patent to procure is:

1. A radiator comprising, in combination, two reservoirs having opposed apertures, means to prevent relative displacement of said reservoirs in opposite directions, one or more cooling sections having passages forming a means of communication between said reservoirs by way of said opposed apertures and providing terminal bearing surfaces to surround the margins of said apertures, means to produce a motion in a direction transverse to said passages, and means to utilize said motion to exert an endwise thrust against said section or sections to hold the same in cooperative relationship with said reservoirs.

2. A radiator comprising, in combination, two reservoirs having opposed apertures, tie means for holding said reservoirs from moving apart, one or more cooling sections having passages forming a means of communication between said reservoirs and providing terminal bearing surfaces to surround the margins of said apertures and means cooperating with said section or sections adapted to position the same transversely with reference to said passages between the reservoirs and to utilize the transverse positioning to develop an endwise thrust of the same between the reservoirs.

3. A radiator comprising, in combination, two reservoirs having opposed apertures, means to prevent relative displacement of said reservoirs in opposite directions, one or more cooling sections having passages forming a means of communication between said reservoirs by way of said opposed apertures and providing terminal bearing surfaces to surround the margins of said apertures and means cooperating with said section or sections for removably positioning the same between the reservoirs adapted to develop an endwise thrust endwise of the sections.

4. A radiator having, in combination, two reservoirs having opposed apertured converging surfaces, one or more cooling sections having a passage or passages forming a means of communication between said reservoirs by way of the opposed apertures, and having similar converging surfaces opposed to those of said reservoirs, and means for forcing said section or sections toward the point of convergence of said surfaces to maintain tight joints between said reservoirs and said section or sections.

5. A radiator having, in combination, two reservoirs having opposed apertured converging surfaces, one or more cooling sections having a passage or passages forming a means of communication between said reservoirs by way of the opposed apertures, and having similar converging surfaces opposed to those of said reservoirs, and means including threaded members for forcing said section or sections toward the point of convergence of said surfaces to maintain tight joints between said reservoirs and said section or sections.

6. A radiator having, in combination, two reservoirs having opposed apertured converging surfaces, one or more cooling sections having a passage or passages forming a means of communication between said reservoirs by way of the opposed apertures, and having similar converging surfaces opposed to those of said reservoirs, and means including threaded members and cooperating clamps for forcing said section or sections toward the point of convergence of said surfaces to maintain tight joints between said reservoirs and said section or sections.

7. A radiator comprising, in combination, upper and lower reservoirs the upper reservoir having a plurality of apertures in its under side and the lower reservoir having a plurality of apertures in its upper side, means to prevent relative displacement of

said reservoirs in opposite directions, a plurality of cooling sections having passages forming a means of communication between said reservoirs by way of said opposed apertures, means for producing a thrust cross-wise of said section or sections, and means for translating said cross-wise thrust into a thrust lengthwise of said section or sections to secure the latter to said reservoir.

8. A radiator comprising upper and lower reservoirs having opposed apertures, means to resist relative displacement of said reservoirs in opposite directions, one or more sections having terminal headers having surfaces adapted to overlie the margins of said apertures and to surround said apertures, conduits extending between said headers and opening through the same to provide communication with said apertures, said surfaces constituting terminal boundaries for said sections whereby they may be laterally inserted between said reservoirs, packing for the margins of said apertures, and means to hold said sections in position pressed against said packing.

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

ALBERT C. SCHULZ.

Witnesses:

F. G. ALBORN,
DELMAR G. ROOS.