C. SONNEBORN.

HEAT RADIATOR.

APPLICATION FILED NOV. 27, 1916.

1,320,651.

Patented Nov. 4, 1919.

2 SHEETS—SHEET 1.

FIG. 2

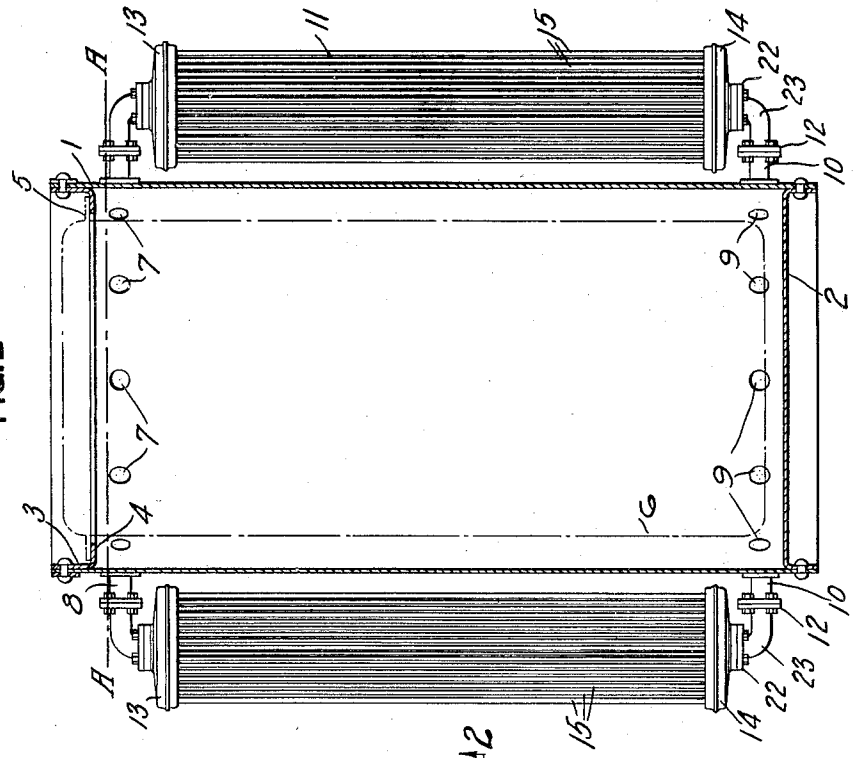
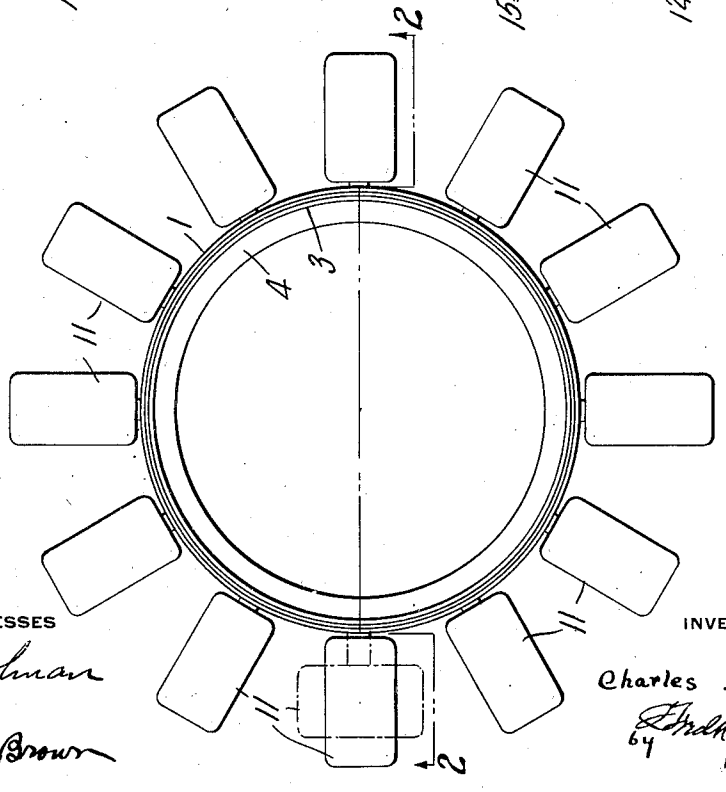


FIG. 1



WITNESSES

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2 SHEETS—SHEET 2.

FIG.3

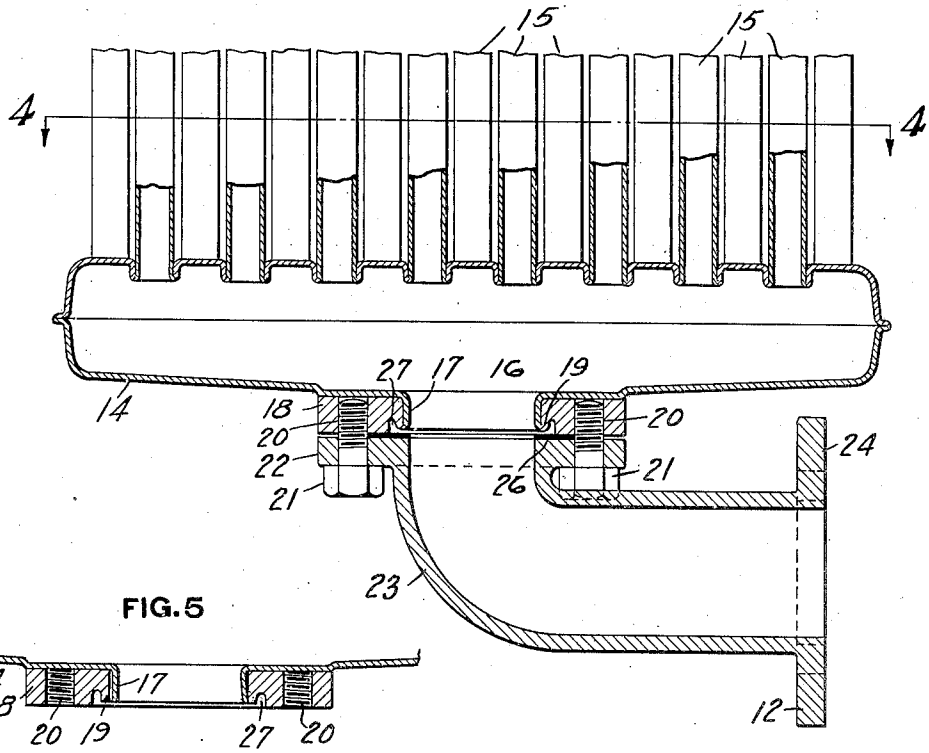


FIG.5

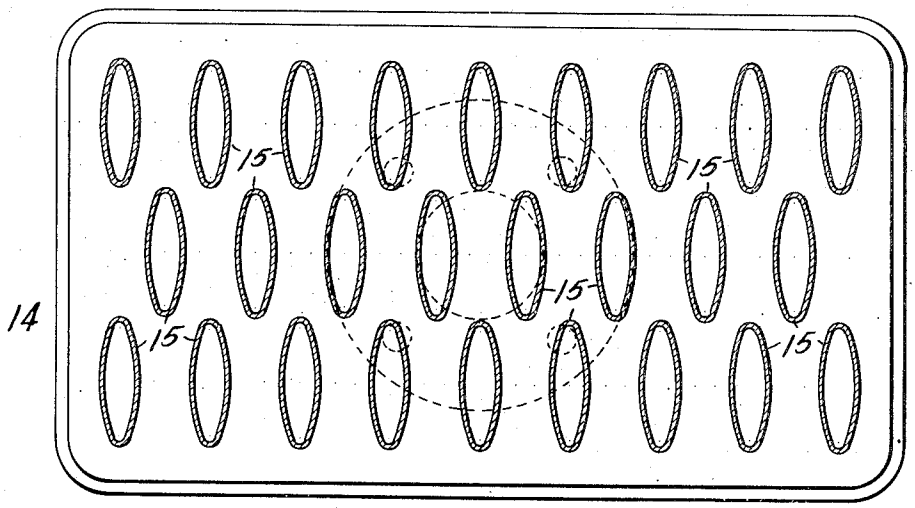


FIG.4

WITNESSES

INVENTOR

Charles Sonneborn

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UNITED STATES PATENT OFFICE.

CHARLES SONNEBORN, OF WEST PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO PRESSED METAL RADIATOR COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

HEAT-RADIATOR.

1,320,651. Specification of Letters Patent. Patented Nov. 4, 1919.

Application filed November 27, 1916. Serial No. 133,764.

To all whom it may concern:

Be it known that I, CHARLES SONNEBORN, a resident of West Pittsburgh, in the county of Lawrence and State of Pennsylvania, have invented a new and useful Improvement in Heat-Radiators, of which the following is a specification.

This invention relates to radiators, and more particularly to radiators designed for use as coolers for electrical transformers.

An object of the invention is to provide a radiator for transformers, and such devices generating heat, comprising a main tank for holding the apparatus to be cooled, and separate radiator units for attachment to the tank, such units being so made and so arranged as to present the largest possible amount of radiating surface to the atmosphere for the space occupied. A further object is to make such radiating units of sheet metal construction, of small weight, and of a form easily manufactured and assembled. Another object is to make each of such radiating units independently attachable to and detachable from the main tank, and so to make the amount of radiating surface adjustable to fit the needs of any particular use. A further object is to make the radiating units of such form that they will be completely drained upon emptying the main tank, and to support the units in a manner throwing the least possible strain upon the radiators and connecting pipes. Other uses and advantages of the construction will be apparent throughout the following specification.

Referring to the drawings, Figure 1 shows a plan view of a transformer tank equipped with radiating units; Fig. 2 is a central vertical section through the main tank on the line 2—2 of Fig. 1; Fig. 3 is a partial vertical section through one of the radiating units, showing the method of its attachment to a connecting pipe; Fig. 4 is a horizontal section through one of the radiating units on the line 4—4 of Fig. 3; and Fig. 5 is a partial section showing details of a flange attached to the radiator header.

The coils of large electrical transformers are usually immersed in a bath of oil which directly absorbs the heat originated in the transformer. This oil itself is often to be cooled by exposure to atmosphere, and this is ordinarily done by circulating it through radiators. The heated oil tends to become lighter, and therefore to move upward, consequently a circulation is caused by the heat generated in the transformer. These cooling apparatuses must be of comparatively light construction, more or less portable, and must be made of comparatively thin parts, with a large surface area exposed to atmosphere, in order to be efficient. The present invention comprises a main tank 1, having a bottom 2, and a head 3, which is cut away through its central portion, to leave an annular flange 4, upon which seats a retaining flange 5 of a transformer 6, indicated in dotted lines in Fig. 2. This main tank is filled with oil to the point shown in dotted lines A—A.

Around the top of the main tank a series of openings 7, all at the same level, are provided opening into connecting pipes 8, and about the bottom of the tank a similar series of openings 9 lead into connecting pipes 10. Between the pipes 8 and 10 the radiating units 11 described below are carried. The connecting pipes 8 and 10 are securely fastened to the main tank, so as to be integral therewith, by any desirable method, such as welding or brazing. At their outer ends they have a terminal flange 12, through which are provided bolt-holes for attachment of the flange to a similar flange in a connection.

The radiating units 11 comprise sheet metal radiators, having upper and lower headers, 13 and 14, respectively, and a plurality of oblong connecting tubes 15 therebetween. The headers are preferably made from two sheet metal plates each pressed into the form of half the header, having an exterior flange at the edge, and being welded to the other half of the header by the oxy-acetylene process, the connecting tubes being welded into one part of the header by means of tapered flanges punched therein into which said tubes are forced and then welded at their edges by the above mentioned process. The details of such construction are more fully set forth in my co-pending application No. 105,140, filed June 22, 1916, to which reference is made. The upper and lower headers of these units are made alike, having their outer wall sloping to a central opening 16 which is punched out to form an external flange 17, to which is welded a

member 18, consisting of a main body with a central opening therethrough, the opening being surrounded by a thin annular projecting rim 19, which is welded to the flange 17 of the header section, as more fully described below. The flange member 18 has threaded holes 20 therein adapted to engage bolts 21, which pass through an exterior flange 22 on the connecting pipe 23, which has two similar flanges 24, at its other end. A packing 26 is provided between the flanges 18 and 22 to secure a liquid-proof joint. There are preferably four of the bolts 21 situated radially at 90 degrees from each other, to permit the radiating units to be turned into either radial or tangential relation to the circular main tank 1, as shown at the left of Fig. 1.

In constructing the lower header for the radiating units, the outer section of this header is punched with a central opening 16 and exterior projecting rim, or flange 17. The heavy retaining member 18, which may be made by a casting or forging, has a central opening adapted to just fit over the flange 17, and this opening is bounded by a raised rim or annular flange 19, formed by an annular groove 27 on the outer face of the member 18. This retaining flange is fastened to the header section by slipping it over the flange 17, flaring that flange outward to make a tight joint, and then welding the two edges together with an oxy-acetylene torch. The details of this union are more clearly shown in Fig. 5, wherein at the left the two edges are shown in position as originally provided when the parts are first assembled, and at the right the flange of the sheet metal header is shown flared out to form a tight union preparatory to welding. The actual welded joint is shown clearly in section in Fig. 3. By this method the member 18 forms a secure element for attachment to the flange of pipe 10, and ready detachment therefrom. It also forms a substantial seating base for the radiating unit, which is thereby supported at the central point of its bottom, resulting in the least possible strain on the radiator itself, which, for this reason, may be made of very light material, not strong enough to support the unit if it were attached at one side, as has heretofore been the practice.

The sloping shape of the outer section of header to the point of support, gives an arch construction which also adds strength, as will be obvious. The units are made with top and bottom headers similar, so that they may be inverted, or placed in position without choice of ends. They are readily detachable, and easily attached in a manner making a fluid-tight joint. The use of sheet metal, rendered practicable by the method of welding the joints above described, allows a radiator of very light weight to be built up, yet with a large radiating surface in proportion to the amount of fluid contents, and the method of supporting this unit on the tank itself, permits the use of radiators of considerable height, which would otherwise not be practicable because of the difficulty in supporting such units by lateral extending connections to the tank.

By making the individual radiators detachable,—which is done by simply removing the radiator and substituting a plate to stop the opening in pipes 8 and 10,—it is possible to vary the amount of radiating surface according to the needs of the particular occasion, and consequently to render a main tank of a standard size available for use with various sizes of transformers. The units may be turned either radially or tangentially to the tank, according to the space in which the apparatus is to be mounted. Many uses and advantages of the structure will be apparent to those familiar with the art.

I claim:—

1. In combination with a sheet metal radiator header, a connecting member welded to the header by means of concentric interfitting flanges on the header and upon the connecting member.

2. In combination with a radiator composed of tubes and sheet metal header members, an external connecting member welded to the header by means of an extending flange punched out of the header section, and a concentric interfitting adjacent flange provided in the connecting member.

3. In combination with a radiator composed of tubes and sheet metal header members, an external connecting member welded to the header by means of an extending flange punched out of the header section, and an interfitting concentric adjacent flange provided in the connecting member attached to the tank by connections to the tops and bottoms of the radiating units.

4. A transformer cooler comprising a tank provided with a series of openings near its top and another series of openings near its bottom, a plurality of external radiating units spaced around said tank and each comprising an upper and a lower header, tubes therebetween, and circulating and supporting connections from a lower opening in the tank to the bottom of the lower header and from an upper opening in the tank to the top of the upper header, said connections including members separably connected.

5. In a transformer cooler, the combination with a main tank, of a plurality of separable radiating units each comprising two sheet metal headers with a plurality of tubes therebetween, and supporting and circulating connections from the main tank to the central portions of the top and bottom

walls of said upper and lower headers respectively, whereby said units can be attached and held in various positions.

6. In a transformer cooler, the combination with a main tank, of a series of separable radiating units each comprising an upper and a lower header with a series of tubes therebetween, the bottom of the lower header sloping from its margins toward its central portion, a connection from said central portion of the lower header to the bottom of the main tank, and a connection from the top of the main tank to the upper header.

7. In a transformer cooler, the combination with a main tank adapted to contain a transformer, of separable radiating units, said units comprising two similar headers of greater length than breadth, and a plurality of tubes connecting the headers, and adjustable detachable connections from the headers to the main tank whereby the radiating units may be attached and held in either radial or tangential position relative to the main tank.

8. In a transformer cooler, the combination with a main tank adapted to contain a transformer, of a plurality of separable radiating units, said units being composed of two headers of greater length than breadth and a series of connecting tubes between the headers, and connections from the outer walls of the top and bottom headers to the main tank, and means to adjust the position of the radiating units relative to the main tank to either radial or tangential position.

In testimony whereof I have hereunto set my hand.

CHARLES SONNEBORN.

Witnesses:
GLENN H. LERESCHE,
A. E. JOHNSON.