April 20, 1948. H. J. MORTON 2,439,945

ELECTRICALLY HEATED SPACE RADIATOR

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Fig. 1.

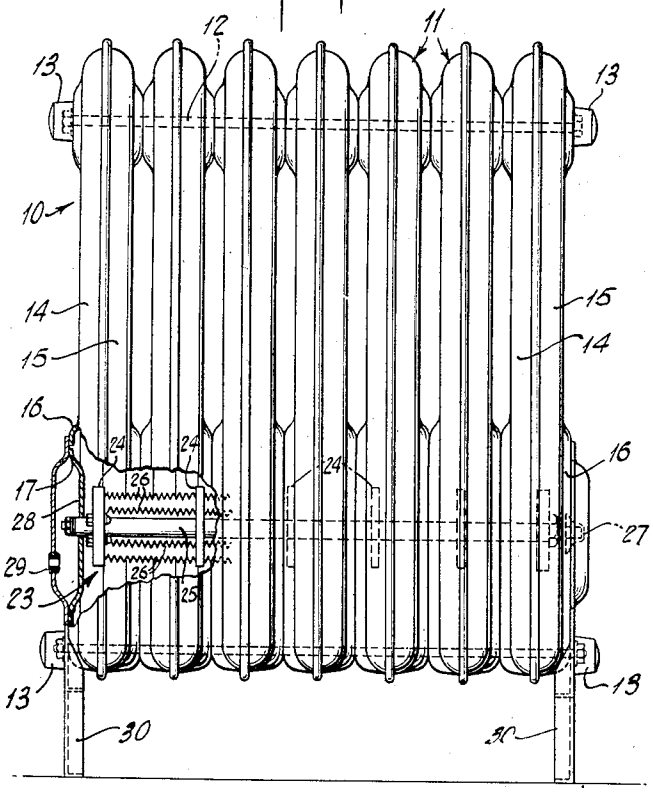


Fig. 2.

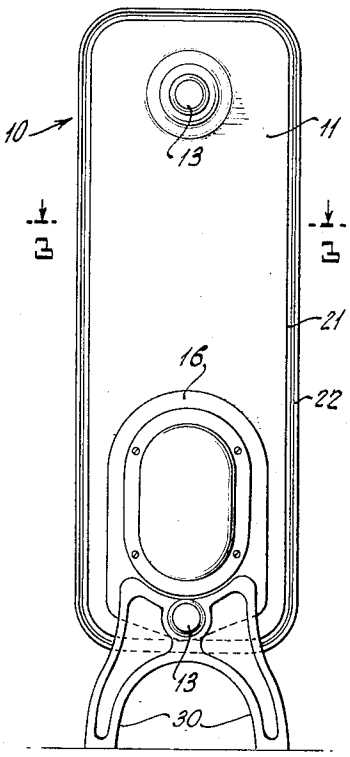


Fig. 4.

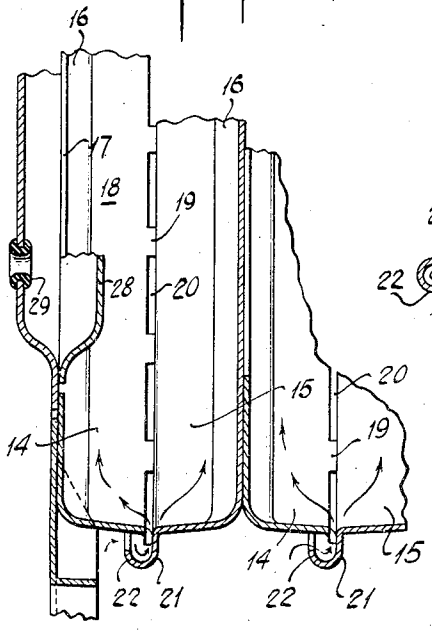
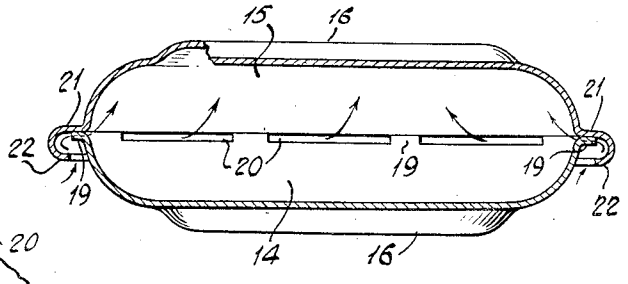


Fig. 3.



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Fig. 6.

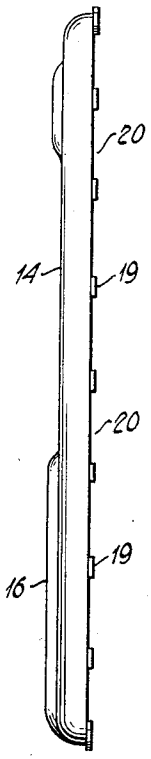


Fig. 5.

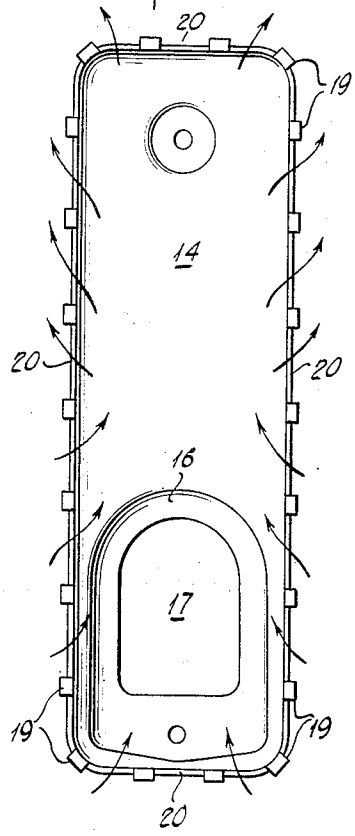


Fig. 7.

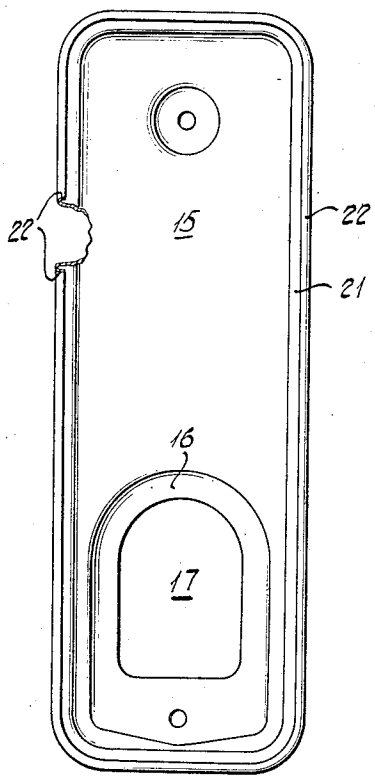


Fig. 8.

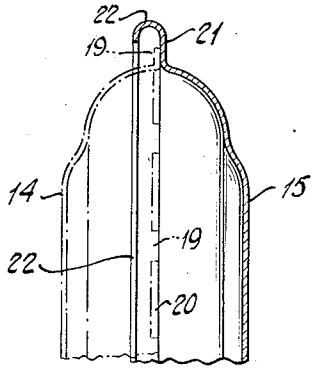


Fig. 9.

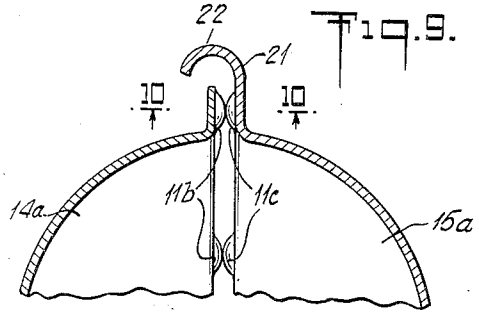
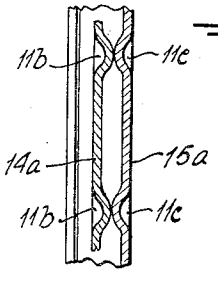


Fig. 10.



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ELECTRICALLY HEATED SPACE RADIATOR

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Application January 17, 1946, Serial No. 641,688

9 Claims. (Cl. 219—38)

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My invention relates to improvements in heating apparatus, particularly of the electrically heated space heating types.

An object of the invention is to provide a simple, efficient and reliable apparatus for supplying heat to rooms, or other spaces of building structures.

The invention has for its object to provide a radiator in which the heat produced and emitted is the result of the combined effect of convection, conduction and radiation.

The invention has for its object to provide a radiator having one or more sections having heating means at the lower portion thereof, and air passages disposed vertically of each section; certain of such passages serve as cold air inlets and other thereof as outlets for the air after the same has been heated.

The invention has for its object to provide a radiator in which each section is formed of two mating parts of opposite hand secured together along their registering peripheral edges, and having along their peripheral edges a series of air passages, certain of which communicate with the heating chamber portion of the radiator section for introducing thereto cold air to be heated, and other of which communicate with the portion of the radiator section above the heating chamber portion, and serve as outlets for the discharge of the air after the same has been heated.

The invention has for its object to provide a radiator comprising a plurality of sections each of which is composed of two correlated mating parts joined along their peripheral edges, and having along their edges a series of air passages, and a shield formed integrally with one part, and having its free edge projecting over the edge of the other part in spaced relation thereto.

The invention has for its object to provide a radiator which is preferably formed of sheet metal, and composed of two correlated parts of opposite hand pressed to shape, one of such parts having vertically related series of recesses serving as air passages, and the other of such parts being provided with a continuous flange of transversely curved form in cross-section serving as a shield extending over such air passages.

To the attainment of the aforesaid objects and ends, my invention consists in the novel features of construction, and in the combination, connection and arrangement of parts hereinafter more fully described and then pointed out in the claims.

In the accompanying drawings:

Fig. 1 is a side elevation showing a preferred form of radiator constructed according to and

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embodying my invention, partly broken away to expose the heating means.

Fig. 2 is an end view of Fig. 1.

Fig. 3 is an enlarged transverse section on the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary longitudinal sectional view of the lower portion of one end section and of an adjoining section of the radiator, on a scale comparable to that of Fig. 3.

Fig. 5 is an inside face view of one part of a radiator section showing the recesses in the edge thereof which serve to form air passages.

Fig. 6 is an edge view of the part shown at Fig. 5.

Fig. 7 is an inside face view of the cooperating part which is combinable with the part shown at Fig. 5, and showing the shield along its periphery, partly broken away.

Fig. 8 is a fragmentary edge view of the part shown in Fig. 7, and its cooperating part in dash outline.

Fig. 9 is a fragmentary transverse sectional view, showing another embodiment of the invention comprising another arrangement for maintaining the parts of each radiator section in spaced relation to provide vertically related air recesses.

Fig. 10 is a sectional view on the line 10—10 of Fig. 9.

Pursuant to the embodiment shown in Figs. 1 through 8, 10 designates the radiator as a whole, comprising a plurality of sections 11 secured together in assembled relation by tie rods or bolts 12 extending through said sections adjacent the upper and lower ends thereof, and nuts 13 on the threaded projecting ends of said tie rods.

The radiator sections 11 are preferably stamped out of sheet metal, such as steel, copper or suitable alloys, and each preferably consists of two mutually conforming parts, designated 14, 15. In the illustrated embodiment the sections are shown in the form of hollow, substantially flat, rectangular panels of opposite hand. The two parts 14, 15 are shown provided adjacent their lower ends with outwardly projecting portions 16, having openings 17 therein for establishing communication between the respective sections. The portions 16 jointly form enlarged chambers 18 when the parts 14, 15 are duly joined, in which chambers suitable heating means is disposed, as appears more fully hereinafter.

Each part 14 is provided along its edge with a series of mutually spaced peripheral flange-like projections 19, forming with the part 15 intermediate of such projections 19 a series of

mutually spaced recesses 20, serving as air passages, the lower passages as air inlets and the upper passages as air outlets. Desirably, as shown, the air passages at the upper portions of each section are preferably somewhat larger in area than the air passages at or adjacent the lower portions of the section, whereby to compensate for the increase in volume of the air as the same is heated and expanded in its transit through the radiator section.

The cooperating radiator part 15 corresponds generally in outline with that of the part 14, but of opposite hand, and is shown provided along its peripheral edge with a flange 21, the free edge 22 of which is preferably substantially semi-circular in cross-section and extends over and in spaced relation with the flange-like projections 19 of the part 14. The mutually spaced projections 19 of the part 14 engage the inner face of the part 15, and thereby form the air passages 20, the flange 21 of the part 15 serving as a shield for the air passages.

23 denotes a suitable electric heating means, shown as comprising a plurality of disks 24 of insulating material which are mounted in mutually spaced relation upon a supporting rod 25, and carry a set of electrical resistance coils 26, which may be of nichrome or other suitable resistance wire. The rod 25 is shown supported at one end in a tapered cup 27 secured to the inner side of one end section 11 of the radiator, and its other end supported in a bracket 28 secured to the other end section 11 of the radiator. One end section 11 is shown provided with a bushed opening 29 for the introduction of the cord of electrical conductors (not shown), connected to the resistance coils 26 of the heating means for connection with a suitable source of electric energy.

The heating means 23 is shown disposed longitudinally in the chamber portions 18 of the radiator sections.

It will be apparent upon energization of the heating means, the air originally within the hollow section or sections of the radiator becomes heated, thereby expanding such air and initiating upward flow of such air within the radiator, causing flow of heated air through the upper air passages of the radiator and thence distribution of heat by convection exteriorly of the radiator and thus into the atmosphere of the room or other space desired to be heated. Such energized heating means serves also to transmit heat by radiation to the walls of the section or sections of the radiator, which in turn supply heat by radiation within the room or other space, and by conduction elevate the temperature of the air of the room or other space by contact heat exchange therewith. In such operation it will be observed that the clearance afforded by the shielding flange 21 of the part 15, for the portion thereof extending in vertical direction serves to increase the discharge of heated air through the upper lateral air passages, by suction-like effect.

The shield at its portion disposed at the upper portion of the radiator section serves as protecting guard, in the circumstance that articles of wear or the like are placed upon the radiator for the purpose of drying the same, the nature of the heat transmitted by the radiator, as above explained, permitting such drying operation to be safely carried out without danger of fire or scorching.

The shield serves also to conceal from view the openings of the air passages.

Figs. 9 and 10 illustrate another embodiment wherein the peripheral edges of the cooperating radiator parts 14*a*, 15*a* are spaced in mutual relation to provide air passages. Pursuant to this embodiment one part is provided along its edge at preferably regular intervals with semi-circular projections 11*b*, and its mating part is provided with similar and like spaced registering projections 11*c*, the projections 11*b*, 11*c*, abutting one another respectively to maintain the conforming edges of the radiator parts in duly spaced relation when the same are joined to one another. Otherwise, the embodiment of Figs. 9 and 10 conforms to the above described embodiments.

The radiator is supported as may be preferred. In the usual types the radiator is supported upon a floor or the like to position the lower ends of the radiator sections above such support, as by means of feet indicated at 30, 30, in Figs. 1 and 2, and shown attached to or otherwise secured to the lower ends of the opposite end sections.

From the foregoing, it is observed that the invention in its variant embodiments provides a radiator of one or more sections, each section being formed of hollow mating parts of opposite hand and provided with vertically related openings serving as air passages, combined with electrical or other suitable heating means disposed within such hollow section or sections.

Preferred embodiments of the invention, as illustrated in the drawings, are provided in each section of the radiator with a limited series of vertically related air passages, such as a single series at each side, and the air passages thereof of predetermined restricted effective opening, whereby the flow of air through each section is positively restrained to thereby subject the air in its transit through the section to a predetermined elevated temperature, in controlling the conductive and radiating temperature of the exposed parts of the section as well as the temperature of convection of the heated air current discharged through the upper air passages of the section, thus affording a maximum total efficiency of comfort and safe heating.

Correlated with such principle of heating of conjoint radiation, convection and conduction, the sections of the radiator are preferably of duplicate construction whereby the number of sections of any given radiator designed to emit any given total emitted heat energy is selected for an electrical heating unit of a given wattage, the proper number of sections as completed units being readily added or subtracted as the case may be, the optimum total emitted heat energy, as indicated above, being predetermined to limit the conducting temperature of the exposed parts of each section to be safe if touched by children or other persons, or by pets, and proof against burning or scorching of fabric or otherwise constituting a fire hazard.

Predicated upon results of tests of embodiments of the invention affording optimum total heat emission and attaining the objectives herein set forth, the total effective extent of opening of the air passages is predetermined to yield the emission of heat energy by radiation relative to the emission of heat energy by convection in the ratio of approximately 72 to 28. In such embodiments of the invention having such total effective predetermined extent of opening of air passages the internal volume of the pre-heat

chamber, i. e., the chamber means formed jointly in the sections, relative to the total internal volume of the sections jointly is in the ratio of 1 to 2.2 approximately; the height of the preheat chamber, i. e., the chamber means formed jointly in the sections, relative to the common internal height of the section is desirably in the ratio of 1 to 4, approximately.

Whereas, I have illustrated my invention by reference to typical preferred embodiments of the invention, it will be understood that the invention is not restricted thereto and that changes or modifications may be made without departing from the invention as defined by the appended claims.

I claim:

1. A sheet metal radiator comprising a plurality of hollow, relatively flat sections, means for securing said sections in assembled relation; said sections each including two similarly shaped parts of opposite hand secured together along their edges and provided along their entire periphery with a series of air ports, a guard-shield on one of said parts co-extensive in outline therewith and extending over the edge of the other of said parts in spaced relation to the air ports between said parts for the full periphery of said one part, and heating means extending through said sections.

2. A sheet metal radiator comprising a plurality of hollow, relatively flat sections, means for securing said sections in assembled relation; said sections each including two similarly shaped parts of opposite hand secured together along their edges and provided along their entire periphery with a series of elongated air ports, enlarged portions at the lower ends of said sections forming heating chambers, a guard-shield along the edge of one of said parts co-extensive in outline therewith and extending over the edge of the other of said parts in spaced relation to the air ports between said parts for the full periphery of said one part, and heating means extending through said heating chambers.

3. A radiator section comprising two correspondingly shaped parts secured together along their peripheral edges, and provided along said edges with air ports; one of said parts being of larger outline than the other thereof and having its projecting portion extending over the edge of said other part and constituting a guard-shield disposed in spaced relation to said air ports.

4. A radiator section comprising two correspondingly shaped parts secured together along their peripheral edges and provided along said edges with a series of elongated air ports; one of said parts being of greater outline than the other thereof and having its projecting edge turned inwardly and extending over the edge of said other part in spaced relation to said series of air ports.

5. A sheet metal radiator section comprising two similarly shaped parts of opposite hand, one

part being wider than its mating part, said parts being secured together along their conforming edges and provided along their entire periphery with a series of elongated air ports, and at their lower ends with registering laterally-extended portions jointly forming an enlarged heating chamber portion, and a substantially semi-circular guard-shield formed by the extension of said one part projecting over the edge of the other of said parts in spaced relation to the air ports along the edges of said parts.

6. A sheet metal radiator section comprising two similarly shaped parts of opposite hand, one part being wider than its mating part, said parts being secured together along their conforming edges and provided along their entire periphery with a series of elongated air ports, and a substantially semi-circular guard-shield along the edge of said wider part extending over the edge of the other of said parts in spaced relation to the air ports along the contacting edges of said parts.

7. An electrically heated space radiator comprising a plurality of hollow sections, means for securing said sections in lateral sequence, each said section being formed of a pair of similarly shaped hollow parts of opposite hand secured along their conforming edges and provided with a plurality of mutually spaced openings adjacent their engaging edges for the full periphery of the edges, said openings serving as air inlets and outlets, said sections being enlarged laterally respectively adjacent their lower ends, the hollow chambers of said sections intercommunicating with one another to form a common chamber; and electrical heating means disposed within said common chamber.

8. An electrically heated space radiator as defined by claim 7 in which one of said pair of hollow parts is of greater width and height to provide extensions about the periphery of said section in adjacent relation with the air openings.

9. An electrically heated space radiator as defined by claim 7 in which one of said pair of hollow parts is of greater width and height to provide extensions about the periphery of said section in adjacent relation with the air openings, said extensions being offset in the direction of the mating section.

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