Dec. 23, 1941. P. V. D. NEFF 2,267,039

AIR-CONDITIONING APPARATUS RADIATOR

Filed April 17, 1940

Fig. 1.

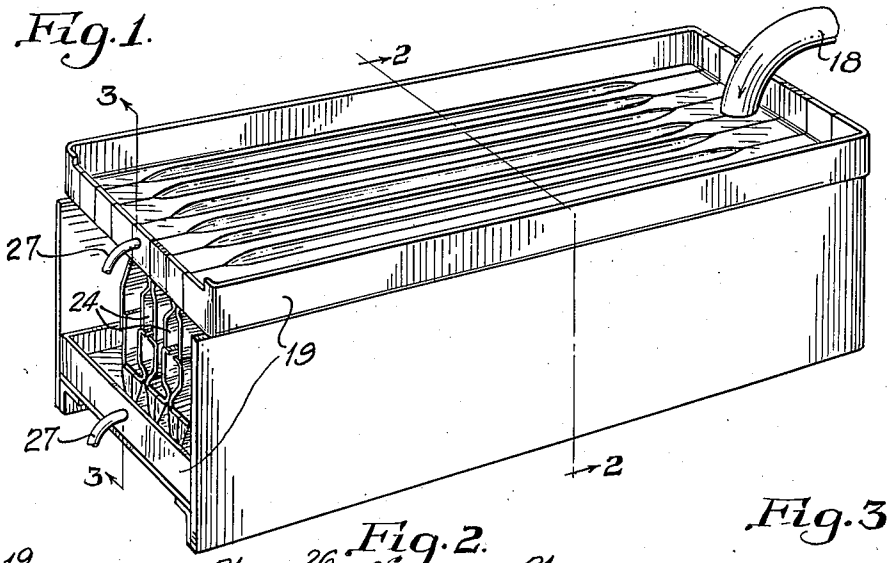


Fig. 2.

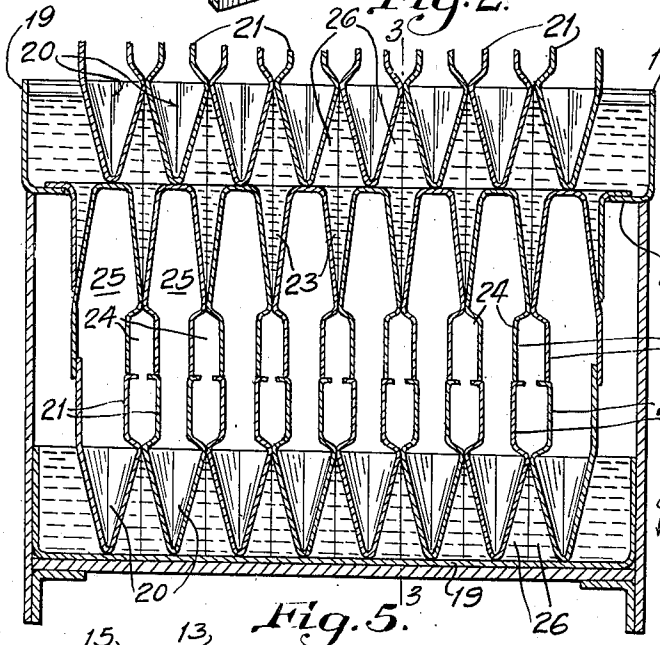


Fig. 3.

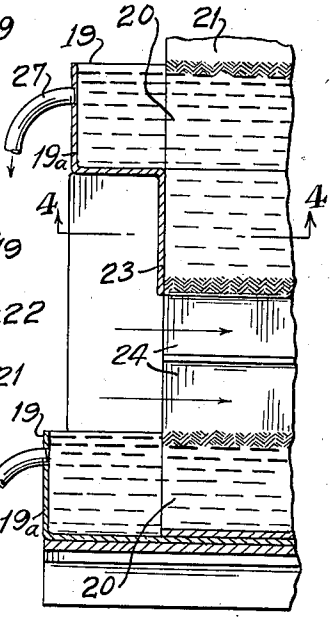


Fig. 5.

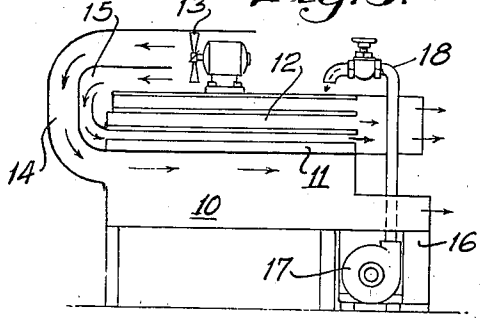
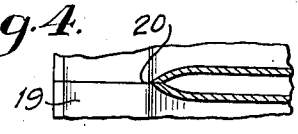


Fig. 4.



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AIR-CONDITIONING APPARATUS RADIATOR

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Application April 17, 1940, Serial No. 330,149

5 Claims. (Cl. 257—242)

My invention relates to an air-conditioning apparatus and has for its principal objects, to generally improve upon and simplify the construction of the existing forms of air-conditioning apparatus and particularly the cellular structure of the radiators thereof, further, to provide an improved form of radiator comprising a plurality of cores shaped and arranged to form adjacent air ducts and water circulation spaces, the same being arranged so as to effect exchange of temperatures within confined limits and further, to provide an air-conditioning radiator structure that may be economically produced, capable of being readily assembled or taken apart in order to facilitate the periodic cleaning of the parts of the radiator.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will be hereinafter more fully described and claimed and illustrated in the accompanying drawing in which:

Fig. 1 is a perspective view of an air-conditioning radiator constructed in accordance with my invention.

Fig. 2 is an enlarged cross section taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged vertical section taken on the line 3—3 of Fig. 3.

Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 3.

Fig. 5 is a diagrammatic view in side elevation of the air-conditioning apparatus with which my improved radiator is associated.

Referring by numerals to the accompanying drawing and particularly to Fig. 5 which illustrates diagrammatically an air-conditioning apparatus of the type that may be used for cooling and conditioning air in residences, offices, store rooms, and the like, 10 designates a housing that contains a conventional cooling rack which may be formed of wood or metal, 11 the drip pan that is disposed on top of the cooling rack contained within the housing 10, 12 the sectional radiator forming the subject matter of my invention, 13 the motor driven fan that forces air through a flue 14 to the cooling rack contained within housing 10 and which fan also forces air through a flue 15 to the radiator, 16 a tank that receives the water after it passes through the cooling rack and 17 a pump that forces the cooled water from tank 16 through a conduit 18 that delivers said cooled water to the top of the radiator.

The radiator contemplated by my invention and a preferred form of which is illustrated in cross section in Figs. 2 and 3 comprises a plurality of shallow pans 19 suitably supported in spaced relation, one above the other, and arranged between said pans are parallel air ducts that are formed by a plurality of spaced fins of thin sheet metal, preferably copper.

In the lowermost one of the pans 19 illustrated in Fig. 2, the lower portions of sheets of thin metal are bent and assembled so as to form a plurality of narrow V-shaped air ducts or conduits 20 that extend lengthwise of the pan 19 and the upper portions of the sheets of metal used in forming these ducts are extended upwardly in parallel spaced relation to form a plurality of longitudinally disposed fins 21. These fins extend a short distance above the top of pan 19 and supported on the upper edges of said fins 21 are the lower ends of similar fins 22 that form a part of the radiator core that is disposed above the core associated with the pan 19.

Fins 22 are formed from thin sheet metal and those portions of the metal above said fins are shaped so as to form substantially V-shaped water flow ducts or conduits 23, the upper ends thereof communicating with the lower portion of the water chamber within the pan 19 that is above that pan containing the air ducts 20.

As illustrated in Fig. 2, the sheet metal utilized in forming the fins 22 and the inclined walls to the sides of the water ducts 23 may be constructed so as to form the bottom of the upper one of the pans 19.

As a result of the construction just described, open-ended air ducts 24 are provided, which extend the entire lenth of the pans 19 between the fins 21 and 22 and larger air ducts 25 are formed between the pairs of fins 21 and 22 and between the water spaces 23 and the inverted V-shaped water spaces 26 that are formed between the V-shaped air ducts 20.

Where the radiator is constructed with a series of superimposed cores, the uppermost pan of each core receives the lowermost portion of the cellular structure of the core above which comprises the thin sheet metal plates that are shaped to produce the V-shaped air ducts 20 and fins 21 (see Fig. 2).

Cool water from tank 16 is driven by pump 17 upwardly through conduit 18 and discharges through suitably located outlets into the pans 19 and after filling and flowing through said pans and through the water ducts 26 and 23, said water discharges from the opposite end of the pans through suitably located outlets 27.

Air is driven by fan 13 through duct 14 into the cooling rack within the housing 10 and simultaneously air is driven by the fan through duct 15 into and through the air ducts 20, 24, and 25. The ends of the pans 19 are closed by end walls 19a and the end portions of the air ducts 20 which extend downwardly into the pans 19 are closed. The ends of the air circulation ducts 20, 24, and 25 are open.

Inasmuch as the fins 21 and 22 to the sides of the air ducts 24 are continuations of the thin sheet metal walls that form the water flow ducts 23 and 26, a very rapid exchange of heat will take place between the air flowing through the air ducts and the water passing through the water ducts so that said air will be rapidly cooled and in such condition will discharge into the room or building that is serviced by the apparatus.

The water after absorbing heat from the air circulating through the air ducts will discharge through drip pan 11 onto the cooling rack within the housing 10 and such water will in turn be cooled by the air that is driven by the fan through duct 14 and through the chamber in which said cooling rack is located.

It is to be understood that the cores of my improved radiator are separately formed and when in superimposed arrangement as illustrated in Fig. 2, said cores rest one upon the other, but are in no wise attached to each other, thus greatly facilitating the manufacture, assembly, disassembly and cleaning of the entire core structure.

Among the particular advantages of my improved air-conditioning radiator are the accomplishment of heat exchange between the air and water within confined limits, economy of manufacture and the feature of ready assembly and taking apart, which enables the complete structure to be easily and conveniently cleaned.

Thus it will be seen that I have provided an air-conditioning radiator that is relatively simple in construction, inexpensive of maunfacture and and very effective in performing the functions for which it is intended.

It will be understood that minor changes in the size, form and construction of the various parts of my improved air-conditioning apparatus radiator, may be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. An air-conditioning apparatus radiator comprising a pair of pans disposed one above the other, a plurality of pairs of thin metal walls having their lower portions disposed in the lowermost one of the pans to provide air ducts those portions of the walls within the lower pan being inclined with respect to each other and connected along their lower edges and at their ends so that said air ducts are substantially V-shape in cross section, the upper portions of which walls extend above the top of the pan in parallel relation to form open ended air ducts, pairs of walls of thin sheet metal depending from the upper pan to form water ducts parallel to said air ducts and the lower portions of which last mentioned walls are spaced apart to form parallel fins that combine with said first mentioned fins in forming air ducts.

2. In an air-conditioning apparatus radiator, a pair of pans disposed one above the other, a plurality of pairs of thin sheet metal walls arranged in the lowermost pan to provide a series of parallel air ducts the lower portions of the members of said pairs of walls being inclined with respect to each other and connected along their lower edges and ends so that the air ducts formed between said inclined lower portions are substantially V-shape in cross section, those portions of the walls above the top of the pan being spaced apart and disposed parallel with each other to form a series of separate air ducts, walls of thin sheet metal depending from the upper one of the pans to form a series of substantially parallel water ducts and the lower portions of which last mentioned walls are spaced apart to form fins that combine with the first mentioned fins in forming said separate air ducts.

3. In an air-conditioning apparatus radiator, a pair of pans arranged one above the other, a plurality of walls of thin sheet metal disposed in substantially parallel arrangement in the lowermost pan, the lower portions of which walls are inclined and disposed in pairs so as to form a series of alternately arranged parallel water ducts and air ducts, the upper portions of which walls are spaced apart to form parallel fins, a plurality of thin sheet metal walls depending from the bottom of the upper pan to from a series of parallel water ducts, the lower portions of which last mentioned walls are spaced apart to form fins that co-operate with the first mentioned fins in forming air ducts and all of said air and water ducts being longitudinally disposed with respect to the pans and disposed parallel to each other.

4. In an air-conditioning apparatus radiator, a core element comprising a pan, a plurality of thin sheet metal walls having their lower portions disposed within said pan, said lower portions being inclined and disposed so as to form a series of substantially V-shaped parallel air ducts and a series of substantially inverted V-shaped parallel water ducts and the portions of said walls that project above said pan being spaced apart to form a series of parallel air ducts that communicate with said V-shaped air ducts and also forming a series of separate air ducts.

5. An air-conditioning apparatus radiator as set forth in claim 4, with means closing the upper ends of all of said air ducts.

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