

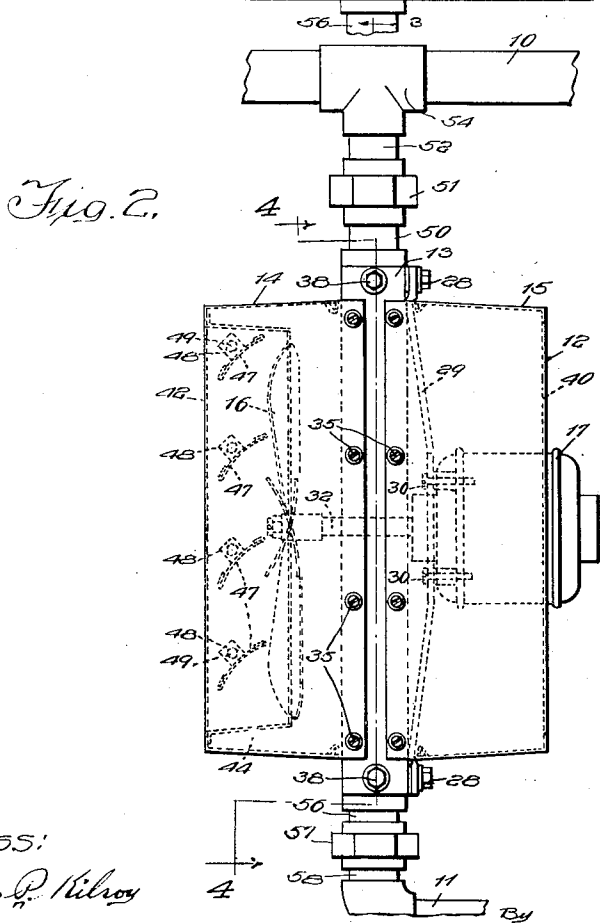
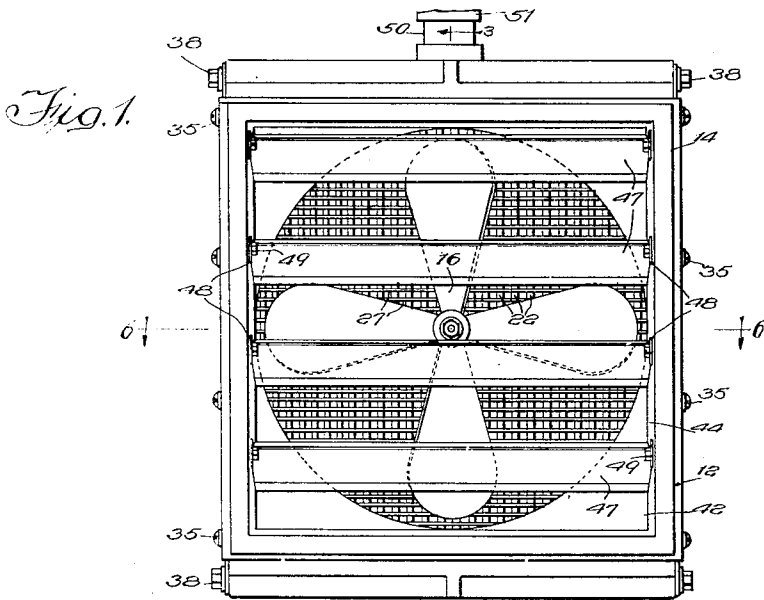
May 26, 1931.

A. B. MODINE

1,807,164

HEAT EXCHANGE UNIT

Filed March 25, 1927 4 Sheets-Sheet 1



Witness:
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Inventor:
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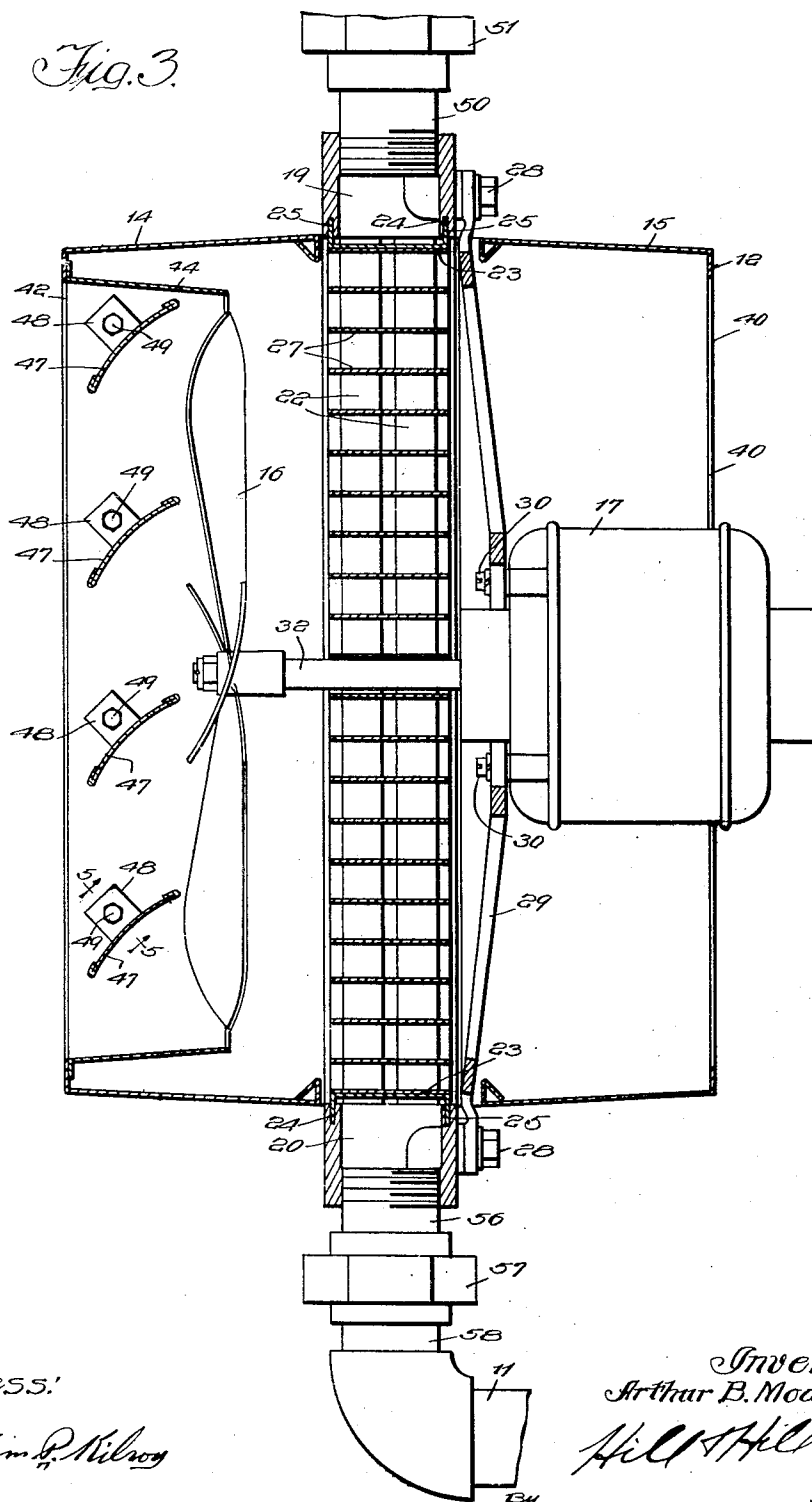
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HEAT EXCHANGE UNIT

Filed March 25, 1927

4 Sheets-Sheet 2



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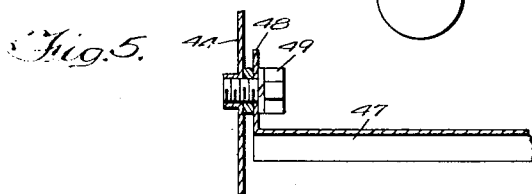
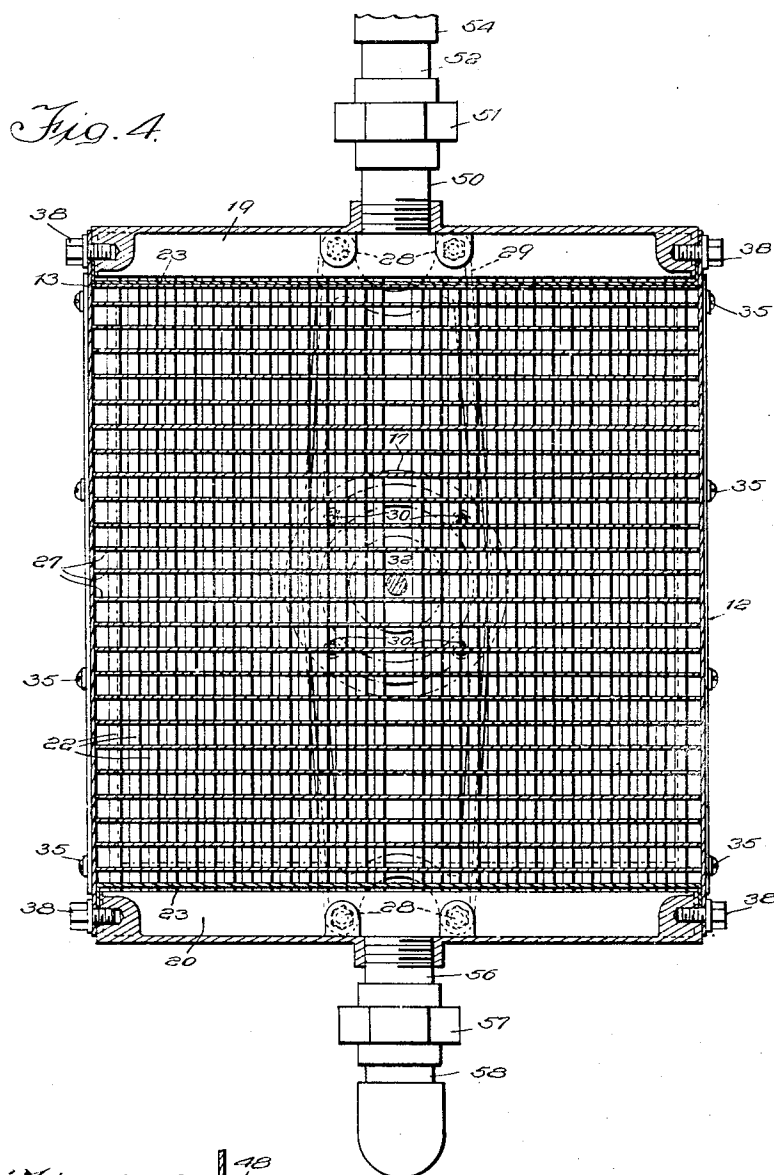
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HEAT EXCHANGE UNIT

Filed March 25, 1927 4 Sheets-Sheet 3



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1,807,164

HEAT EXCHANGE UNIT

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4 Sheets-Sheet 4

Fig. 6.

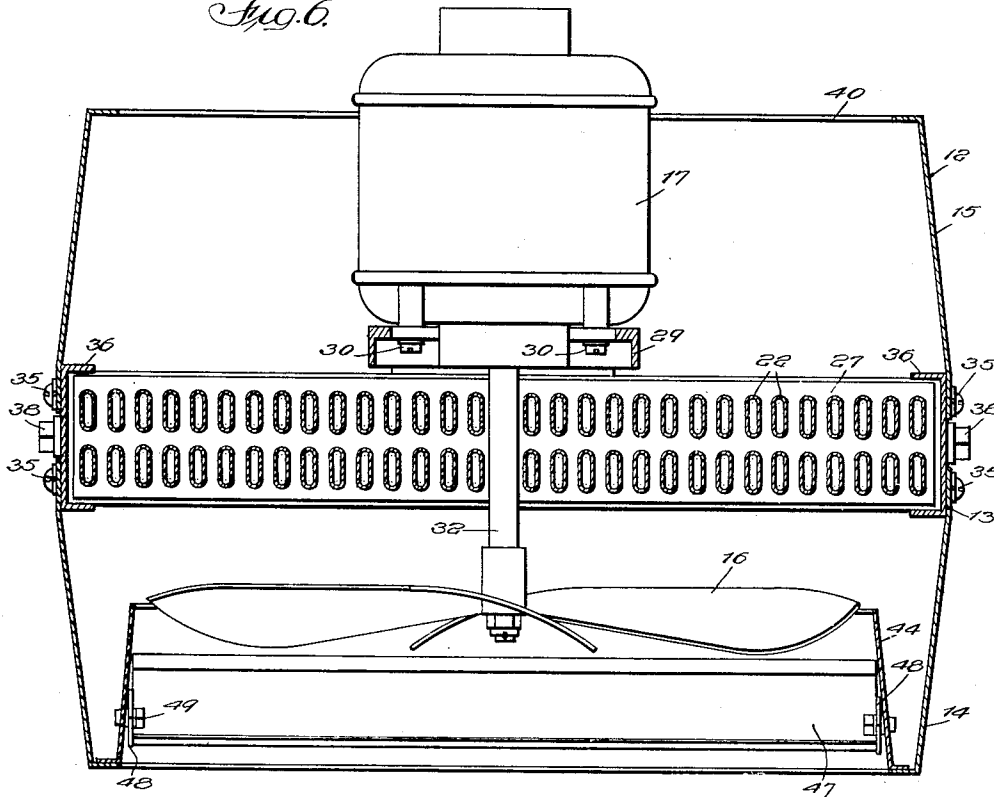
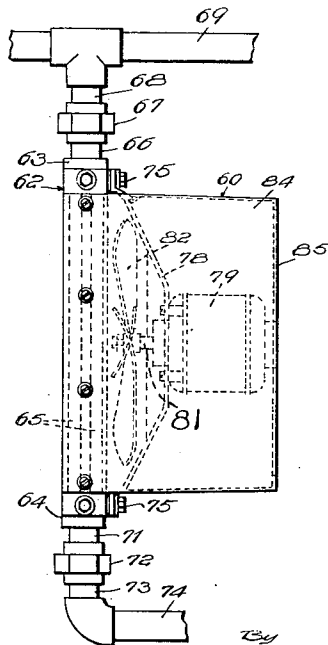


Fig. 7.



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UNITED STATES PATENT OFFICE

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HEAT EXCHANGE UNIT

Application filed March 25, 1927. Serial No. 178,489.

My invention relates broadly to heating systems and more particularly to heating apparatus of the kind shown and described in my copending Patent No. 1,726,275, granted August 27, 1929.

The invention has among its other objects the production of improved heating units of relatively light and inexpensive construction adapted to be suspended from steam pipes, or the like, to heat a room.

In the drawings I have illustrated two devices embodying the invention and each preferably comprises a radiator unit formed from two tanks which communicate with each other through a plurality of spaced tubes, pipe fittings including pipe unions being provided for connecting the tanks directly to a steam pipe, or the equivalent, and to a drain pipe, or the equivalent, in such manner that the radiator unit can be angularly adjusted around an axis of rotation. The radiator unit is suspended from the steam pipe by said fittings and a bracket preferably formed in one piece extends between and is secured to the tanks to support means for advancing a column of air through the radiator unit. Sheet metal housings are preferably provided for the air advancing means.

Many other objects and advantages of the construction herein shown will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts:

Fig. 1 is a front elevation of a device embodying the invention;

Fig. 2 is a side elevation of the improved device;

Fig. 3 is a section taken on line 3—3 of Fig. 1;

Fig. 4 is a section taken on line 4—4 of Fig. 2;

Fig. 5 is a section taken on line 5—5 of Fig. 3;

Fig. 6 is a section taken on line 6—6 of Fig. 1; and

Fig. 7 is a side elevation of a device embodying another form of the invention.

Referring for the present to Figs. 1 to 6, inclusive, wherein a preferred embodiment of the invention is shown, the reference character 10 designates a main or pipe, such as a steam pipe, which may be controlled by a valve (not shown) and may be supported by hangers (not shown), or any equivalent means, from a ceiling, wall, or the like. A return pipe is shown at 11 and it is to be understood that the return pipe may be controlled by the usual vacuum valve (not shown).

My improved heat-exchange unit is interposed between the steam pipe 10 and the return pipe 11 and is designated generally by the reference character 12. It preferably comprises a radiator unit 13, housing members 14 and 15, a fan 16 and an electrical motor 17. The radiator unit 13 preferably comprises spaced tanks 19 and 20 which communicate with each other through a plurality of spaced tubes 22, the tubes 22 being preferably formed from relatively thin sheet metal. The ends of the tubes 22 are soldered or otherwise secured in header plates 23 which are provided with integral flanges 24 soldered in grooves 25 provided in the tanks 19 and 20. To facilitate the exchange of heat from fluid flowing in the tubes 22 to the air surrounding the tubes, I preferably provide a plurality of spaced flanges or fins 27 which are apertured to accommodate the tubes, the fins and tubes being preferably soldered to each other.

Extending between the tanks 19 and 20 and secured thereto by bolts 28, or any other suitable means is a bracket 29 to which the motor 17 is secured by bolts 30, or the equivalent. As shown, the motor 17 comprises a shaft 32 which preferably projects through the radiator unit 13 and carries the fan 16 upon its outer end. Obviously, when the motor 17 is connected to any suitable source of electrical energy, it will drive the fan 16

so that a column of air will be drawn through the spaces between the tubes 22.

The housing members 14 and 15 are preferably formed from sheet metal and are preferably secured by screws 35, or the equivalent, to channel-shaped members 36 which are secured to the tanks 19 and 20 by bolts 38, or the equivalent. It may be mentioned that one end of each member 36 is secured to one end of the tank 19 and that the other end thereof is secured to one end of the tank 20.

It will be noted that the housing member 15 is provided with a relatively large opening 40 through which air is drawn by the fan 16 and that the housing member 14 is provided with a relatively large opening 42 through which the air is discharged from the improved heat exchange device. Secured to the housing member 14 is an inwardly projecting flange 44, the interior diameter of which is substantially equal to the diameter of the opening 42. The fan 16 is positioned at the inner end of the flange 44, the construction being such that the flange forms a housing for the fan.

Adjustably mounted in the passage extending through the flange 44 are a plurality of plates or vanes, each of the vanes being provided with lugs 48 which are secured to the flange 44 by bolts 49, or the equivalent. It is, of course, understood that the bolts 49 may be manipulated to secure the vanes 47 in adjusted positions to control the direction in which air is discharged from the improved heating device.

Common means is provided for suspending the radiator unit 13 from the main or steam pipe 10 and for operatively connecting the tank 19 directly to the main or steam pipe. This means preferably comprises a pipe nipple 50 which is connected by a pipe union 51 to a pipe section 52, the pipe section 52 being screw-threaded into a T-fitting 54 which forms part of the main or steam pipe 10.

The means for operatively connecting the radiator unit 13 to the return pipe 11 preferably comprises a pipe nipple 56 which is connected by a pipe union 57 to a pipe 58, the pipe 58 being in turn connected to the drain pipe 11. The arrangement is such that the pipe nipples 50 and 56 are coaxially disposed and the improved heating device may be angularly adjusted around the coincident axes of the pipe nipples, the pipe unions 51 and 57 being employed to secure it in any one of a plurality of adjusted positions. Obviously, the provision of the vanes 47 and the means provided for operatively connecting the heating device to the main 10 and the return pipe 11 provides structure whereby the device may be adjusted to project a column of air in substantially any direction.

The operation of the above described ap-

paratus is substantially as follows: Assuming that the improved heating device has been angularly adjusted around the coincident axes of the pipe nipples 50 and 56 to bring it into any desired position and that the vanes 47 have also been secured in adjusted positions, it is obvious that if steam is supplied to the heating device by way of the pipe 10 and if the motor 17 is operatively connected to a source of electrical energy, a column of heated air will be discharged therefrom through the opening 42 in the desired direction. The steam, of course, flows from the main 10 through the pipe section 52 and the pipe nipple 50 into the tank 19 and thence flows through the tubes 22 into the tank 20. Then when the steam condenses, the condensate is discharged through the pipe nipple 56 and the pipe 58 into the drain pipe 11. It is assumed that when steam is supplied to the radiator unit, the flow of fluid through the pipe 58 will be controlled by a vacuum valve (not shown). In the event, a vacuum valve is not provided, steam may flow into the drain or return pipe 11 without first condensing. The fan 16 draws air through the spaces between the spaced tubes 22 and discharges it from the device through the opening 42, the air being heated to a relatively high temperature when it passes through the spaces between the tubes 22.

Referring now to Fig. 7, wherein I have shown an improved heating device embodying another form of the invention, the reference character 60 designates the improved device generally, which preferably comprises a radiator unit 62 which is substantially identical with the aforementioned radiator unit 13. The spaced tanks of the radiator unit 62 are identified by the reference characters 63 and 64 and the tubes through which the tanks communicate are indicated at 65. Means comprising a pipe nipple 66, a pipe union 67 and a pipe 68 are provided for connecting the tank 63 to a main 69. The main 69 may be a steam pipe, or the equivalent. The tank 64 is connected by a pipe nipple 71, a pipe union 72 and a pipe 73 to a return or a drain pipe 74.

Secured to the tanks 63 and 64 by bolts 75, or other suitable means, is a bracket 78 to which a motor 79 is rigidly secured. The motor 79 comprises a shaft 81 upon which a fan 82 is mounted, the motor 79 and the fan 82 being disposed upon the same side of the radiator unit 62. Surrounding the motor 79 and the fan 82 and secured to the radiator unit 62 is a housing 84 having a relatively large opening 85 therein through which air may be drawn by the fan 82.

The operation of the device shown in Fig. 7 is similar to the operation of the device illustrated in Figs. 1 to 6, inclusive. Assuming that the motor 79 has been connected to any suitable source of electrical energy and that

steam is being supplied to the radiator unit 62 by the pipe 59, it is obvious that the column of air which will be advanced through the radiator unit by the fan 82 will be heated because of the exchange of heat through the walls of the tubes 65.

The device shown in Figs. 1 to 6, inclusive, is of symmetrical construction, the arrangement being such that the fan 16 and the vanes 47 counter-balance the weight of the motor 79 more or less. In both forms of the invention illustrated in the drawings, the bracket for supporting the motor is preferably of one piece construction so that it forms a relatively rigid support.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. In apparatus of the kind described, the combination with a radiator unit comprising spaced tanks and tubular means extending between the tanks and communicating therewith, a bracket extending between the tanks and secured thereto, of means mounted upon said bracket for advancing a column of air through said radiator unit, and common means for suspending said radiator unit from a fluid supply pipe and for operatively connecting one of said tanks directly with said fluid supply pipe.

2. In apparatus of the kind described, the combination with a radiator unit comprising spaced tanks, and tubular means extending between the tanks and communicating therewith, of a bracket extending between the tanks and secured thereto, means mounted upon said bracket for advancing a column of air through said radiator unit, and common adjustable means for suspending said radiator unit from a fluid supply pipe and for operatively connecting one of said tanks directly with said fluid supply pipe.

3. In apparatus of the kind described, the combination with a radiator unit comprising spaced tanks, and tubular means extending between the tanks and communicating therewith, of a bracket extending between the tanks and secured thereto, means mounted upon said bracket for advancing a column of air through said radiator unit, and common means including a pipe union permitting angular adjustment of and for suspending said radiator unit from a fluid supply pipe and for operatively connecting one of said tanks directly with said fluid supply pipe.

4. In apparatus of the kind described, the combination with a radiator unit comprising spaced tanks, and tubular means extending

between the tanks and communicating therewith, of a bracket secured to said radiator unit, means carried by said bracket for advancing a column of air through said radiator unit, and common tubular means engageable with one of said tanks for suspending said radiator unit from a fluid supply pipe and for operatively connecting said last-mentioned tank to said fluid supply pipe.

5. In apparatus of the kind described, the combination with a radiator unit comprising spaced tanks, and tubular means extending between the tanks and communicating therewith, of a bracket secured to said radiator unit, means carried by said bracket for advancing a column of air through said radiator unit, and common tubular means including a pipe union engageable with one of said tanks for suspending said radiator unit from a fluid supply pipe and for operatively connecting said last-mentioned tank to said fluid supply pipe.

6. In apparatus of the kind described, the combination with a radiator unit comprising spaced tanks, and tubular means extending between the tanks and communicating therewith, of a bracket extending between said tanks and secured thereto, means carried by said bracket for advancing a column of air through said radiator unit, a housing member disposed upon said radiator unit, and a plurality of adjustable means secured to said housing member for deflecting said column of air into any desired direction.

7. In apparatus of the kind described, the combination with a radiator unit comprising spaced tanks, and tubular means extending between the tanks and communicating therewith, of a bracket extending between said tanks and secured thereto, a motor supported by said bracket, the shaft of said motor extending through said radiator unit, a fan mounted on said shaft on the opposite side of said radiator unit from said motor, a housing member disposed around said radiator unit, and adjustable means secured to said housing member for deflecting in any desired direction the air issuing from said air advancing means.

8. In apparatus of the kind described, the combination with a radiator unit comprising spaced tanks, and tubular means extending between the tanks and communicating therewith, of a bracket secured to said radiator unit, a motor supported by said bracket, the shaft of said motor extending through said radiator unit, a fan mounted on said shaft on the opposite side of said radiator unit from said motor, a housing member disposed around said radiator unit, adjustable means secured to said housing member for deflecting in any desired direction the air issuing from said air advancing means, and common tubular means including a pipe union engageable with one of said tanks for suspend-

ing said radiator unit from a fluid supply pipe and for operatively connecting said last-mentioned tank to said fluid supply pipe.

9. In apparatus of the kind described, the combination with a radiator unit, of a housing member secured to said unit and projecting in opposite directions from said unit, and means supported within said housing member for projecting a current of air through said unit, an element of said last mentioned means being located upon opposite sides of said radiator unit.

10. In apparatus of the kind described, the combination with a radiator unit comprising spaced tanks and tubular means extending therebetween and communicating therewith, of a pair of housing members secured to said unit and extending on opposite sides thereof, a motor supported within one of said housing members and having a shaft extending through said unit, a fan carried by said shaft within the other of said housing members, and air deflecting means carried by said last-mentioned housing member and cooperating with said fan.

11. In apparatus of the kind described, the combination with a radiator unit comprising spaced tanks and tubular means extending therebetween and communicating therewith, of a pair of channel members connecting said tanks, a pair of housing members secured to said channel members and arranged on opposite sides of said unit, a motor supported within one of said housing members and having a shaft extending through said unit, a fan carried by said shaft within the other of said housing members, and air deflecting means carried by said last-mentioned housing member and cooperating with said fan.

12. In apparatus of the kind described, the combination with a radiator unit comprising spaced tanks and tubular means extending therebetween and communicating therewith, of a pair of channel members connecting said tanks, said tanks having lugs formed integral therewith, a pair of housing members extending on opposite sides of said unit, securing means extending through said housing members and said channel members and engaging said lugs, a motor supported within one of said housing members and having a shaft extending through said unit, a fan carried by said shaft within the other of said housing members, and air deflecting means carried by said last-mentioned housing member and cooperating with said fan.

13. In apparatus of the kind described, the combination with a radiator unit, of a housing member secured to said unit and projecting in opposite directions from said unit, means for projecting a current of air through said unit, means for supporting said air projecting means with relation to said unit, said supporting means being located between the

ends of said housing, an element of said air advancing means being located in said housing upon opposite sides of said radiator unit.

In testimony whereof, I have hereunto signed my name.

ARTHUR B. MODINE.

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