April 19, 1932. A. B. MODINE 1,854,213

HEATING APPARATUS

Filed Feb. 23, 1929

Fig. 1.

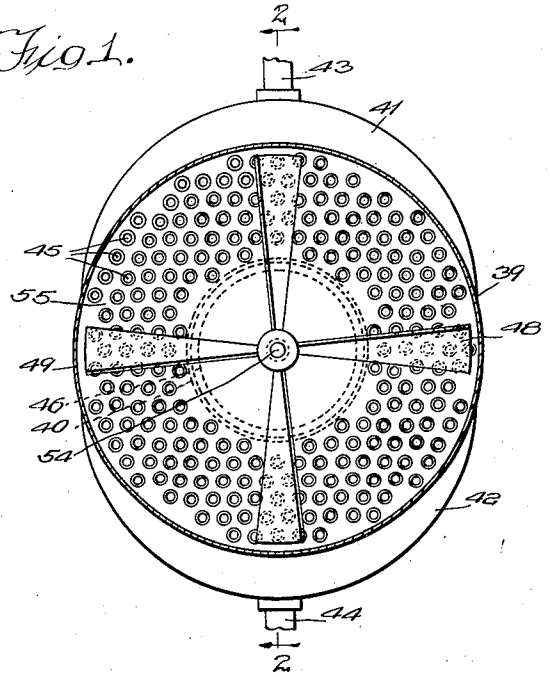
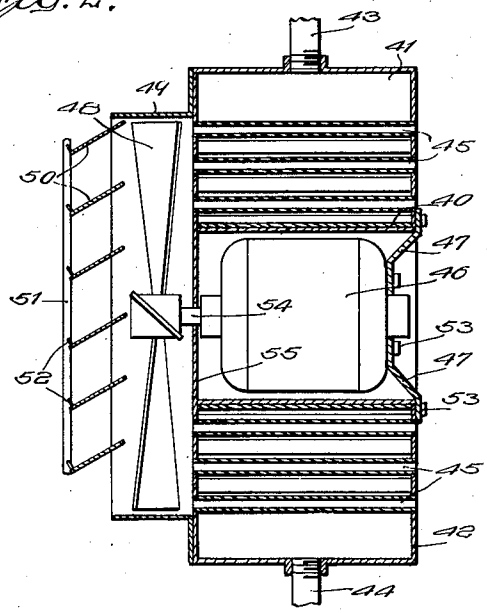


Fig. 2.



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Patented Apr. 19, 1932 1,854,213

UNITED STATES PATENT OFFICE

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HEATING APPARATUS

Application filed February 23, 1929. Serial No. 342,284.

My invention relates to an improved heat exchange apparatus adapted for heating buildings, automobiles, dryers or the like. One object of the invention is to provide improved apparatus comprising a plurality of air circulating passages interspersed by water or steam circulating passages and having means incorporated therewith for forcibly driving air through the air passages for heating the air and for circulating the heated air throughout spaces to be heated, or about and upon articles to be dried.

A still further object is the provision of improved heat exchange apparatus for controlling the direction and the volume of the heated air discharged therefrom.

Another object of the invention is to provide heating apparatus of the class described which is so constructed as to be very compact and small in size, thereby taking up very little space and particularly adapting it for installation in a vehicle.

Many other objects and advantages of the construction herein shown and described 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.

The drawings disclose structure designed to carry out the various objects of the invention but it is to be understood that the invention is not confined to the exact features shown, as various changes may be made in the scope of the claims which follow.

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

Fig. 1 is an elevational and partial sectional view of one form of the invention; and

Fig. 2 is a view along the line 2—2 of Fig. 1.

The drawings illustrate one embodiment of my invention. I have shown therein a radiator unit comprising a generally oblong shaped casing 39 adapted as a closed receptacle for a heating fluid and a plurality of air circulating tubes 45 extending therethrough. A suitable insulated cylindrical member 40 is centrally positioned in the casing 39 to provide a housing in which a motor 46 is mounted. The air circulating tubes 45 are arranged in spaced relation in a generally annular formation about the member 40. The tubes 45 are arranged substantially symmetrical about the member 40. The annular arrangement of the tubes 45 leaves an upper crescent shaped portion 41 of the casing 39 untraversed by tubes and a corresponding lower crescent shaped portion 42, likewise untraversed by tubes.

An intake pipe 43 delivers heated fluid into the crescent shaped portion 41 from which it travels around and downwardly between the tubes 45, into the crescent shaped portion 42 and out through a discharge pipe 44. The tubes 45 are preferably positioned so that the fluid in travelling downwardly travels a devious path. The fluid is thereby retarded in its motion sufficiently so that it loses the greater portion of its heat through the tubes 45.

Bars 47 are provided to support the motor 46. The bars 47 are for this purpose fastened to the wall of the casing 39 and to the motor 46 by a plurality of bolts 53. A fan 48 is operatively connected with the motor 46 by a shaft 54. An annular shaped guard plate 49 surrounds the fan 48. A deflecting device comprising a plurality of vanes 50 is mounted on the guard plate 49. The vanes 50 and the rod 51 are connected by a plurality of rings 52.

It is obvious that rotation of the fan in one direction will operate to draw air through the tubes 45 and that such air in passing through the tubes 45 is heated by the fluid contained in the casing 39 and then travels out through the guard member 49 and between deflectors 50. Rotation of the fan in the opposite direction will cause air to be drawn past the vanes 50 and driven in the opposite direction through the tubes 45. A plate 55 is positioned between the fan 48 and the motor 46 to insulate the motor from the heated air set in motion by the fan.

The upper crescent like portion of the tank which has no tubes extending transversely

therethrough permits the unimpeded flow of the heating fluid downwardly around the outside of the tubes occupying the upper half of the casing and permits a substantially uniform flow of fluid downwardly around the tubes. The lower crescent shaped portion 42 provides a receptacle towards which the fluid flows downwardly in a generally radial direction from the middle of the casing. The radial paths are less obstructed by tubes 45 and the fluid meets with less resistance to flow along these lines by reason of the surrounding portions of the tank untraversed by tubes 45. A further advantage of the generally annular arrangement of the tubes 45 through an elongated casing, is that the device can be constructed very compactly. The open space left in the middle of the casing is made sufficiently large to accommodate the motor 46.

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. A device of the class described comprising an elongated casing through which heating fluid is caused to travel, a plurality of air circulating tubes traversing said casing, said tubes being arranged in annular formation and having fluid circulating passages therebetween, the ends of said casing being generally crescent shaped and untraversed by air circulating tubes.

2. A device of the class described comprising an elongated casing through which heating fluid is caused to travel, a plurality of air circulating tubes traversing said casing, said tubes being arranged in annular formation and having water circulating passages therebetween, the ends of said casing being generally crescent shaped and untraversed by air circulating tubes, a cylindrical wall centrally mounted in said casing, an electric motor mounted within said cylindrical wall, and a fan operable by the motor to circulate air through said tubes.

3. A device of the class described comprising an elongated casing through which heating fluid is caused to travel, a plurality of air circulating tubes traversing said casing, said tubes being arranged in annular formation and having water circulating passages therebetween, the ends of said casing being generally crescent shaped and untraversed by air circulating tubes, a cylindrical wall centrally mounted in said casing, an electric motor mounted within said wall, a fan operable by the motor to circulate air through said tubes and deflecting means operable to control the direction of the flow of the air set in motion by the fan.

4. A device of the class described comprising an elongated casing through which heating fluid is caused to travel, a plurality of air circulating tubes traversing said casing said tubes being arranged in annular formation and having water circulating passages therebetween the ends of said casing being generally crescent shaped and untraversed by air circulating tubes, a cylindrical wall centrally mounted in said casing, an electric motor mounted within said cylindrical wall, a fan operable by the motor to circulate air to said tubes, and deflecting means operable to control the direction and volume of air set in motion by the fan.

5. A device of the class described comprising an elongated casing, a plurality of air circulating tubes traversing said casing said tubes being arranged in annular formation and having fluid circulating passages therebetween the ends of said casing being generally crescent shaped and untraversed by air circulating tubes, an inlet pipe opening into one of said crescent shaped ends and an outlet pipe opening out of the other of said crescent shaped ends.

6. A device of the class described comprising an elongated vertical casing through which heating fluid is caused to travel, a plurality of air circulating tubes traversing said casing, said tubes being arranged in annular formation and having water circulating passages therebetween, the upper and lower portions of said casing being generally crescent shaped and untraversed by air circulating tubes, a fluid supply pipe opening into the upper crescent shaped portion, a fluid discharge pipe leading from said lower crescent shaped portions, a cylindrical wall centrally mounted in said casing, an electric motor mounted within said cylindrical wall, and a fan operable by the motor to circulate air through said air circulating passages.

7. A device of the class described comprising an elongated vertical casing through which heating fluid is caused to travel, a plurality of air circulating tubes traversing the casing said tubes being arranged in annular formation and having water circulating passages therebetween, the upper and lower portions of said casing being generally crescent shaped and untraversed by air circulating tubes, an inlet pipe leading out of the other end of the casing, a cylindrical wall centrally mounted in said casing, an electric motor mounted within said cylindrical wall, a fan operable by the motor to circulate air through said air circulating passages and deflecting means operable to control the volume and the direction of the flow of air set in motion by the fan.

8. A device of the class described comprising an elongated casing through which heat-

ing fluid is caused to travel, a plurality of air circulating tubes traversing said casing, said tubes having fluid circulating passages therebetween, the ends of the said casing being untraversed by air circulating tubes, vertically aligned inlet and outlet passages communicating with said ends whereby fluid may be introduced to and circulated through said casing and means for advancing air through said tubes.

In witness whereof, I hereunto subscribe my name this 20th day of February, A. D. 1929.

ARTHUR B. MODINE.