Oct. 9, 1928. 1,687,240

C. M. GARLAND

UNIT HEATER

Filed Jan. 26, 1926

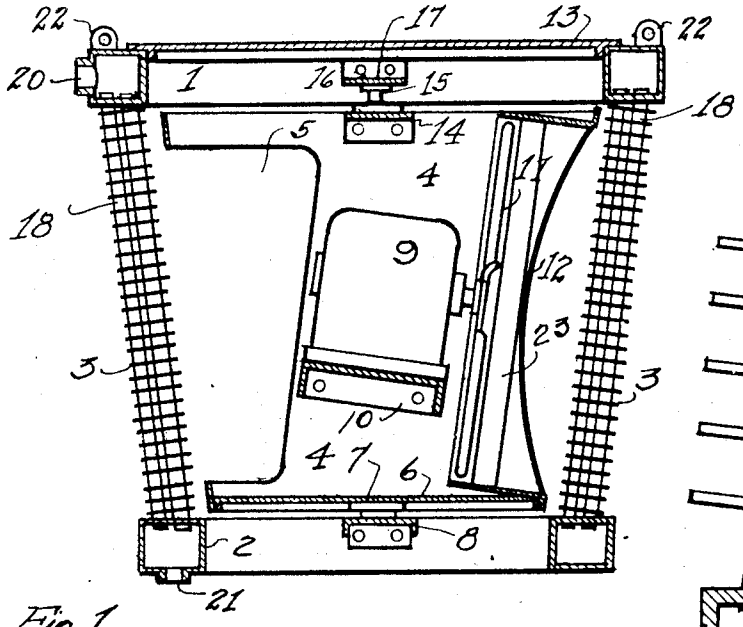

Fig. 1.

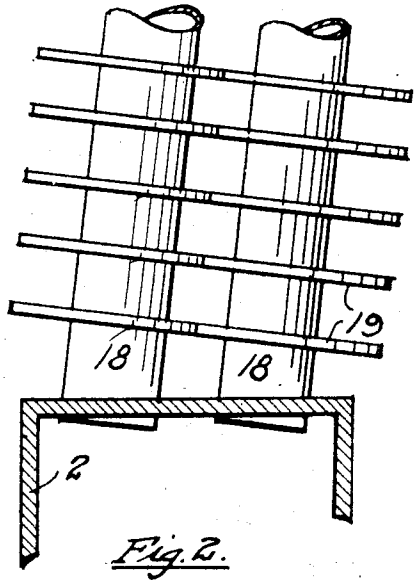

Fig. 2.

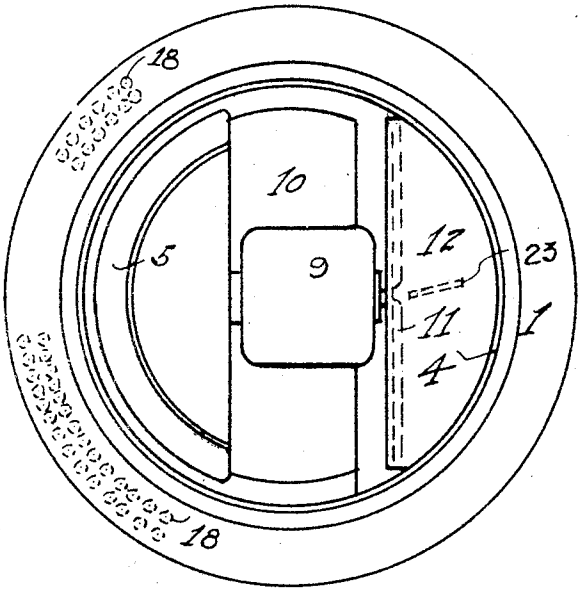

Fig. 3.

Claude M Garland.
Inventor

Patented Oct. 9, 1928. 1,687,240

UNITED STATES PATENT OFFICE.

CLAUDE M. GARLAND, OF CHICAGO, ILLINOIS.

UNIT HEATER.

Application filed January 26, 1926. Serial No. 83,942.

My invention relates to what are termed "unit heaters" which usually consist of a bank of heating elements of rectangular section with a fan placed in the rear which forces air from the room through the heating elements which are maintained at a high temperature by means of steam or hot water which is caused to circulate therethrough. Such heaters are commonly suspended from the ceilings or roofs of manufacturing buildings and are used for heating the surrounding air. Where the heating elements are arranged as above described, the air is forced out directly in front of the heater and while a number of such heaters may be used in a long building one in front of the other, yet the distribution of the hot air from the heaters is not uniform and it is not possible to obtain efficient and uniformed heating of the space from such an arrangement.

My invention has for its object the provision of a unit heater in which the heating elements are arranged to form an enclosure with a fan to force the air from this enclosure through the heating elements in all directions whereby greater uniformity and efficiency are obtained in the heating. The heating elements are preferably arranged in the form of a hollow truncated inverted cone, although they may be arranged in the form of a cylinder, square or other enclosure. A further object of my invention is to provide means whereby the heated air does not issue constantly in all directions from the heating elements but is caused to issue in the form of a stream which revolves about the center of the heating elements. This prevents the hot air being concentrated on any given spot for a long period of time which is sometimes disagreeable to workmen employed in the building, and also permits of higher air velocities and a greater heating range for each heater.

Objects and further advantages of my invention will be disclosed in the following specification and the accompanying drawings which form a part thereof. Referring to the drawings in which like numerals refer to like parts, Figure 1 shows a sectional elevation of my heater taken on the center line of Figure 3 which is a plan thereof. Figure 2 is an enlarged section of the heating elements 3, as shown in Figure 1.

Referring to Figure 1, the numeral 1 indicates an annular upper header of rectangular section provided with an inlet connection 20 and lugs 22 for the suspension of the heater. A removable cover plate 13 is used to close the opening in the header 1. A lower header 2 also of rectangular section, with a discharge opening 21 is provided. Communication is established between the upper and lower headers by means of the heating elements 3 which are preferably arranged in the form of an inverted truncated cone. The heating elements 3 may be of any suitable type such as is used for automobile radiators but preferably consist of tubes 18, as shown in the enlarged section Figure 2, which are threaded through holes in the plates or fins 19. These tubes 18 are expanded into holes in the upper and lower headers 1 and 2. The fins 19 serve to direct the discharge of air and increase the heating surface. The tubes 18 are inclined to the vertical so that the fins 19 tend to discharge the air toward the floor.

The lower header 2 is provided with a beam 8 rigidly mounted thereon and extending diametrically across. On this beam 8 is rigidly mounted the ballbearing 7, which is attached to the bottom plate 6 of a rotatable truncated cone 4. The rotatable truncated cone 4 is provided with an upper beam 14 extending thereacross and rigidly attached at the ends, thereto, on which is mounted a vertical axle 15. This axle 15 is carried in the ballbearing 16 which is rigidly attached to the underside of the beam 17 which is in turn removably attached at the ends to the upper header 1, in order to make possible the easy removal of the rotatable truncated cone 4. Through this construction the truncated cone 4 is adapted to rotate within the heating elements 3. Another beam 10 passes diametrically across the truncated cone 4 and is riveted at the ends thereto. This beam carries a motor 9 which is rigidly mounted thereon. The motor 9 carries the fan wheel 11 attached to its axle. The fan wheel 11 extends into the discharge housing 12, which is attached to the revolving truncated cone 4. Mounted in the discharged housing 12 is the driving vane 23 whereby when the motor is in operation the discharge of air through the fan causes the truncated cone 4 to revolve about the axle 15. The truncated cone 4 is provided with the large opening 5 through which air for the fan is drawn and then discharged through the discharge housing 12.

The operation of the preferred arrangement of my heater is as follows:

The heater is suspended from the roof of the building by means of the lugs 22. A

steam supplying means is connected to the upper header at 20 and the return or exhaust is connected to the lower header through a trap at 21. Electric current is turned on and the fan begins to operate drawing air in through the opening 5 and discharging it through the discharge housing 12 of the revolvable truncated cone 4. As the air passes through the fan wheel 11 it strikes the vane 23 which is arranged at an angle to the path of the air and the truncated cone 4 carrying the motor 9 is caused to rotate. By varying the angle which the vane 23 makes with the air the speed of rotation of the truncated cone 4 may be increased or decreased.

The steam or water whichever the heating medium may be enters the upper header at 20 passes down through the heating elements 3 into the header 2 out through the opening 21.

From the above description it will be seen that I have provided a heater that is simple in construction and which distributes the hot air radially about the heater thereby providing greater uniformity in the heating of buildings. While the parts shown and described are the preferred arrangements I desire it to be understood that my invention is not limited to the precise construction set forth but contains within its purview such changes as may be made within the scope of the appended claims.

What I claim and desire to secure by Letters Patent is—

1. In a heater of the type described, heating elements, means for introducing a heating medium into the said heating elements, means for discharging the exhausted heating medium therefrom, means for causing a current of air to pass between the said heating elements, means for radially directing the air therefrom, and means for causing the said radially directed air to rotate, whereby the said air is continuously discharged in successive different angular positions.

2. In a unit heater of the type described, heating elements arranged to form an inclosure, a connection for the admission of a heating medium to the said heating elements, a connection for exhausting the heating medium therefrom, and means for causing a current of air to pass from the outside between a portion of the said heating elements into the interior of the said inclosure and from the interior out between another portion of the said elements and means for continuously causing the current of air to rotate about the center of the said inclosure whereby the said current of air is continuously passing between different portions of the said heating elements.

3. In a unit heater of the type described, an upper header, an inlet connection to the said upper header, a lower header, an exhaust connection to the said lower header, heating elements establishing communication between the said upper and the said lower headers, whereby an inclosure is formed, common means for causing air to flow from the outside through a portion of the said heating elements into the interior of the said inclosure, and out through a different portion of the said heating elements, directing means for discharging the air therefrom radially, and means for causing the said directing means to rotate, whereby the said air is drawn in and passed out through successive portions of the said heating elements.

4. In apparatus of the type described, an upper annular header, a connection for the admission of a heating medium to the said header, a lower annular header, a connection for the exhaust of the heating medium from the said lower annular header, heating elements establishing communication between the said headers whereby an inclosure is formed by the said heating elements, a cover for closing the opening in the upper header, means for closing the opening in the lower header, and means for causing a current of air to pass from without between a portion of said heating elements to the interior of the inclosure and out between a different portion of the said heating elements, and means for causing the said current of air to rotate about the center of the said inclosure whereby the said current of air is caused to continuously pass between different portions of the said heating elements.

5. In a unit heater of the type described, a chamber or inclosure, heating elements forming the side walls thereof, a motor revolvably mounted in the said chamber, a fan wheel driven by the said motor, and means for causing the said motor to rotate when the said fan wheel is in operation whereby a rotating stream of air is caused to pass through the side walls thereof.

6. In a unit heater of the type described, a chamber or inclosure, heating elements forming the side walls thereof, means for closing the ends of the said chamber, a motor revolvably mounted in the said chamber, a fan wheel driven by the said motor, and means for causing the said motor to rotate about an axis of the said chamber when the said fan wheel is in operation whereby a rotating stream of air is caused to pass through the side walls thereof.

7. In a unit heater of the type described, a chamber, heating elements forming the side walls thereof, an upper header communicating with the upper end of the said side walls, an inlet for the admission of a heating medium to the said upper header, a lower header communicating with the lower end of the said side walls, a connection for the exhausting of the heating medium therefrom, and a fan revolvably mounted within the said chamber whereby a rotating current of air is caused to pass from without through a portion of the side

walls to the said chamber to the interior thereof and therefrom through another portion of the side walls of said chamber.

8. In a unit heater of the type described, a chamber, heating elements forming the side walls therefor, an upper header communicating with the upper end of the said side walls, a lower header communicating with the lower end of the said side walls, means for closing the ends of the said chamber, and a fan revolvably mounted in the said chamber whereby a rotating stream of air may be caused to pass through the side walls of the said chamber.

9. In a unit heater of the type described, an air chamber, heating elements forming the side walls thereof, means for closing one end of the said chamber, a revolvably mounted motor within the said chamber, a fan wheel driven by the said motor, means for closing the opposite end of the said chamber, and means whereby the said motor is caused to revolve when the said fan wheel is driven thereby.

10. In a unit heater of the type described, a chamber, heating elements forming the side walls thereof, an upper header communicating with the upper end of the said heating elements, a lower header communicating with the opposite end of the said heating elements, a revolvably mounted motor within the said chamber, a fan wheel adapted to be driven by the said motor, means for closing the opposite ends of the said chamber, and means for causing the said motor to revolve when the fan wheel is driven thereby.

11. In a unit heater of the type described, an annular chamber, heating elements forming the side walls thereof, an annular upper header communicating with the upper end of the said heating elements, an annular lower header communicating with the lower end of the said heating elements, a cover plate closing the opening in the said upper annular header, a revolvable member mounted within the said chamber and adapted to rotate therein, a motor mounted in the said revolvable member, a fan wheel adapted to be driven by the said motor, a discharge housing formed in the side of the said revolvable member to receive the air from the said fan wheel, an opening in the wall of the said revolvable member oppositely disposed to the said discharge housing whereby air may be drawn in through the said opening and between the said heating elements adjacent thereto on the operation of the said fan and be discharged through the said discharge housing and between the heating elements adjacent thereto, and a vane mounted in the said discharge housing whereby air discharged from the said fan causes the said revolvable member to rotate.

12. In a unit heater of the type described, a truncated conical chamber, heating elements forming the side walls thereof, an upper annular header communicating with the upper end of the said heating elements, a lower annular header communicating with the lower end of the said heating elements, a cover plate closing the upper end of the said chamber, a beam rigidly mounted in the lower header, a bearing mounted on the said beam, a revolvable sheet metal truncated cone mounted on the said bearing, a beam rigidly mounted in the upper end of the said revolvable sheet metal truncated cone, an axle carried by the said beam, a removable beam rigidly mounted in the said upper header, a bearing mounted on the said removable beam, the said axle being normally held in the said bearing whereby the said revolvable sheet metal truncated cone may rotate about the said axle, a beam mounted near the center of the said revolvable sheet metal truncated cone and extending thereacross, a motor mounted on the said beam, a fan wheel carried by the said motor and adapted to be driven thereby, a discharge housing formed in the side of the said revolvable truncated cone and adapted to receive the air from the said fan wheel, an opening in the said revolvable sheet metal truncated cone oppositely disposed to the said discharge housing, a bottom closing the lower end of the said revolvable sheet metal truncated cone, and means for causing the sheet metal truncated cone to revolve when the motor is driving the said fan wheel.

13. In a unit heater of the type described, having a hollow truncated conical chamber, heating elements forming the side walls thereof, a hollow sheet metal truncated cone within the said chamber, the said truncated cone being adapted to rotate therein, a motor mounted within the said cone, a fan wheel carried by the said motor, a discharge housing mounted in the said hollow truncated cone and adapted to receive the air from the said fan wheel, an opening oppositely disposed to the said fan wheel and in the said hollow sheet metal truncated cone, and means for causing the said sheet metal truncated cone to rotate when the motor drives the said fan wheel.

14. In a unit heater of the type described, having a truncated conical chamber, heating elements forming the side walls thereof, a hollow truncated cone rotatably mounted within the said chamber, a fan mounted in the said hollow truncated cone, a motor for driving the said fan mounted therein, a discharge housing adapted to receive the air from the said fan, an opening oppositely disposed to the said fan and in the said hollow truncated cone, means for closing the lower end of the said hollow truncated cone, and means for closing the upper end of the said chamber substantially as described.

In testimony thereof I have affixed my signature.

CLAUDE M. GARLAND.