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HEATER

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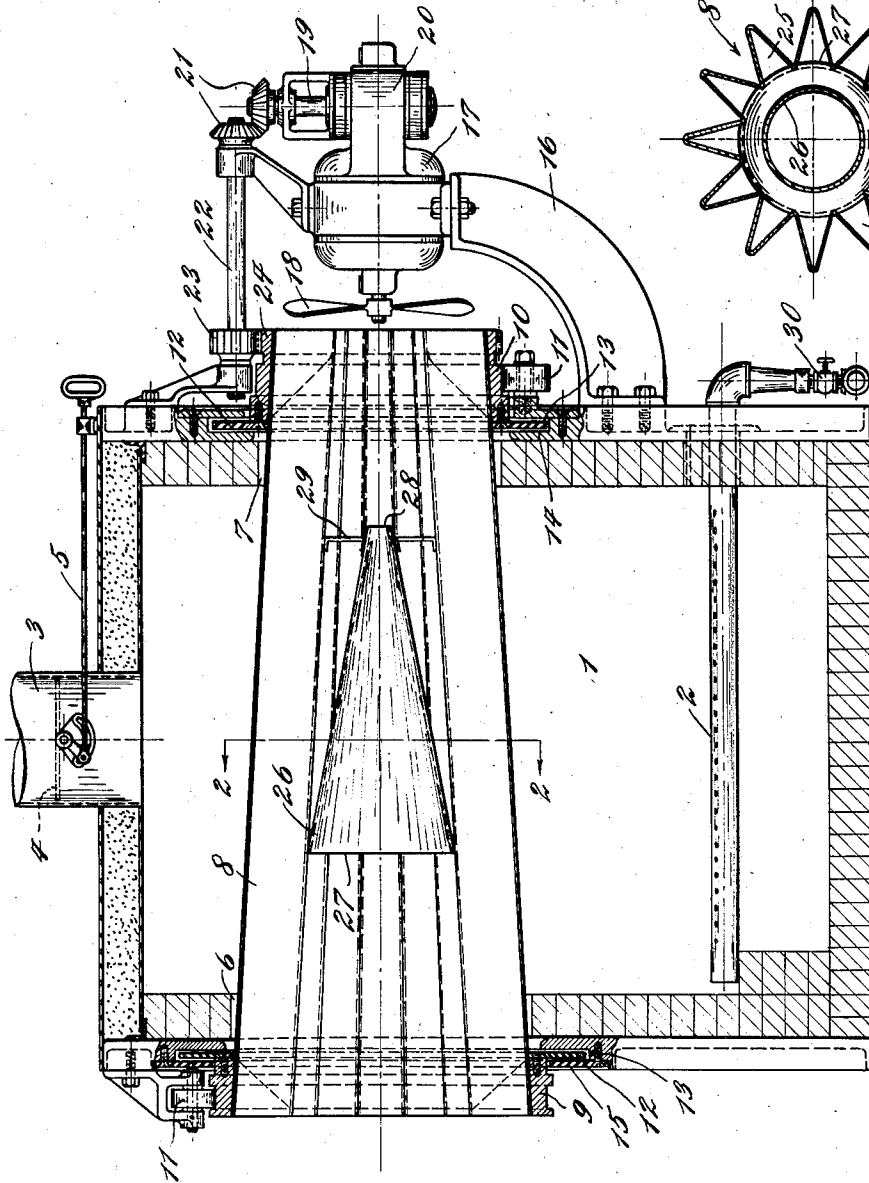


Fig. 1

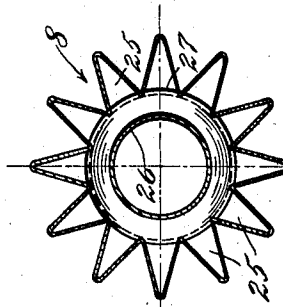


Fig. 2

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UNITED STATES PATENT OFFICE

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HEATER

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13 Claims. (Cl. 126—110)

This invention relates to a novel and improved form of heat transfer device particularly adapted for use in heating air supplied to a room, the novel features of which will be best understood from the following description and the annexed drawing, in which I have shown a selected embodiment of the invention, and in which:

Fig. 1 is a vertical sectional view through one form which the invention may take.

Fig. 2 is a section on the line 2—2 of Fig. 1.

The invention is shown as comprising a heating chamber 1 having in the bottom thereof a gas burner 2, which exemplifies any suitable means for burning fuel in the chamber. The products of combustion from the burning fuel may rise from the chamber and pass outwardly through the flue 3, their passage being controlled by means of a damper or other valve 4 controlled by a rod 5.

Extending transversely across the chamber and through openings 6 and 7 in opposite walls thereof is a pipe 8, shown as of frusto-conical shape in longitudinal cross section. This pipe is provided at opposite ends with tracks 9 and 10 which may be mounted on roller bearings 11, it being understood that, while only a single bearing is shown at each end of the pipe, a plurality thereof are used, spaced around the pipe.

Between the pipe and the adjoining walls are disposed suitable sealing means for preventing the passage of the products of combustion from the interior of the chamber to the exterior thereof. Such sealing means is exemplified by flanges 12 mounted on the pipe and received in recesses 13 in the wall. These recesses may be formed in any suitable manner and are here shown as being formed in castings 14 secured to the wall and co-operating with plates 15 secured to the castings.

Supported on a bracket 16 on one of the walls of the chamber is shown a motor 17 having on its shaft a fan 18 so positioned as to force air through the pipe from the small end forming the inlet towards the large end forming the outlet thereof, it being noted that as the air becomes heated, additional space is provided for its expansion, and it being understood that the air will pass from the large end of the pipe into the room or other space for which the air is to be provided.

While I have shown the device as used for heating air, and shall use the word "air" in the claims, it is of course to be understood that this word is not intended to be limiting in any way, as the device may be used with other gases where found applicable.

The motor 17 may conveniently be used to ro-

tate a shaft 19 through suitable gearing, the details of which are not shown, and which may be contained in a gear box 20, and the shaft 19 through beveled gearing 21 may operate a shaft 22 having thereon a pinion 23 meshing with a gear 24 secured to the track 10 on the small end of the pipe. By this means, the pipe will be continually rotated as the products of combustion pass over the outer surface thereof, thereby giving a substantially uniform heat transfer rate to all parts of the interior of the pipe.

The pipe may conveniently be formed in cross section as indicated in Fig. 2; that is to say, with its wall provided with a plurality of outwardly extending channels 25, the walls of which present added heat absorbing and transmitting surfaces to receive the heat from the products of combustion and to transmit it to the air within the pipe. In order to avoid laning the air passing through the pipe, I provide a deflector, here shown as an open truncated cone-shaped device 26, having its larger end 27 substantially in contact with the wall at the inner edges of the sides of the channels 25, and its smaller end 28 held in approximately central relation to the pipe by suitable spacing means 29, which may be any well-known form of spider or the like.

In operation, fuel may be burned in the usual way, the supply being governed as by a valve 30 so as to give the proper amount of heat in the chamber 1. The motor 17 may be set in motion, and the result will be the passage of a current of air through the pipe and, at the same time, the pipe will be rotated so that this current will receive the proper amount of heat. By regulating the speed of the motor, which, of course, can be done by usual speed regulating devices (not shown), the amount of air and the speed of rotation may be adjusted, and it will be seen that by having the motor operate the fan and rotate the pipe by direct gear connection, the amount of air will bear a certain definite relation to the speed of rotation of the pipe. It will be seen that as the air is forced through the pipe 8, it will be divided up so as to flow in a plurality of channels. One of these channels is disposed centrally of the pipe and formed by the deflector 26 through the open end of which air may flow and expand within the deflector. That is to say, the flow area of this channel increases or expands in the direction of flow of air therethrough. This central channel formed by the deflector is surrounded by a channel which, it will be noted, is gradually decreasing in flow area in the direction of flow of air. This decrease in flow area is caused by the

fact that the elements forming the cone of the deflector 26 form a greater angle to the longitudinal axis of the pipes than do the elements of the cone-shaped pipe. Looked at in another way, 5 the channel surrounding the central channel may be considered as a plurality of channels 25 which have their smallest flow area at their discharge end, which is at the large end 27 of the deflector 26. The flow areas of these channels increase towards 10 the inlet of the pipe as the channels are there open towards the deflector. The result is that the expanding air within the deflector continues to expand after it passes the end 27 thereof and is there met by the hotter air from the channels 25. 15 This air, being in the hottest part of the pipe, tends to expand more than that in the central part of the pipe, but is forced through the comparatively small discharge ends of the channels 25 or end 27 of the deflector. As it is forced 20 through these discharge ends, it will of course expand inwardly into the stream of air coming from the large end of the deflector and thus cause a thorough mixing of all air in the pipe.

While I have shown the invention as embodied 25 in a specific form, it is to be understood that various changes in details may be made without departing from the scope of the invention, and I therefore do not intend to limit myself except by the appended claims.

30 I claim:

1. A heater comprising a heating chamber, a pipe extending through said chamber, means in said chamber to heat said pipe, means for forcing 35 a current of air through said pipe, and a deflector disposed within and extending lengthwise of the pipe and adapted to gradually deflect at least part of the air passing therethrough into contact with the wall of the pipe, said wall being formed with a plurality of longitudinally extending channels into 40 which the air is thus deflected.

2. A heater comprising a heating chamber, a pipe extending through said chamber, means in said chamber to heat said pipe, means for forcing 45 a current of air through said pipe, the wall of said pipe being formed with a plurality of longitudinally extending channels through which portions of said air may flow, and means for deflecting part of the air passing therethrough into said channels.

3. A heater comprising a heating chamber, a pipe extending through said chamber, means in said chamber to heat said pipe, means for forcing 50 a current of air through said pipe, the wall of said pipe being formed with a plurality of longitudinally extending channels through which portions of said air may flow, and a conical deflector flaring outwardly in the direction of flow of air through the pipe and having its small end spaced 55 from said wall and its large end contacting with the wall adjacent the inner edges of the sides of said channels.

4. A heater comprising a heating chamber, a pipe extending through said chamber, means in said chamber to heat said pipe, means for forcing 60 a current of air through said pipe, the wall of said pipe being formed with a plurality of longitudinally extending channels through which portions of said air may flow, and a conical deflector flaring outwardly in the direction of flow of air 65 through the pipe and having its small end open and spaced from said wall and its large end contacting with the wall adjacent the inner edges of the sides of said channels.

5. A heater comprising a heating chamber, a 75 pipe extending through said chamber, means in

said chamber to heat said pipe, means for forcing a current of air through said pipe, means for rotating said pipe, said pipe increasing in flow area in the direction of flow of air therethrough, and a conical-shaped deflector disposed within 80 said pipe and adapted to deflect air against the wall of the pipe, said deflector being open and increasing in size in the direction of flow of air through the pipe, whereby said air may flow partly through the deflector and partly around it. 85

6. A heater comprising a heating chamber, a pipe extending through said chamber, means in said chamber to heat said pipe, means for forcing 90 air through said pipe, means for rotating said pipe, and means forming a plurality of channels extending lengthwise of the pipe and through which the air may flow, said channels uniting adjacent the outlet end of the pipe.

7. A heater comprising a heating chamber, a pipe extending through said chamber, means in said chamber to heat said pipe, means for forcing 95 air through said pipe, means for rotating said pipe, and means forming a plurality of channels extending lengthwise of the pipe and through which the air may flow, said channels uniting adjacent the outlet end of the pipe and one having an expanding and another a contracting flow area in the direction of flow of air therethrough. 100

8. A heater comprising a heating chamber, a pipe extending through said chamber, means in said chamber to heat said pipe, means for forcing 105 air through said pipe, means for rotating said pipe, means forming a centrally disposed channel of expanding flow area in the direction of flow of air therethrough, and means forming a plurality of channels surrounding the central channel and having decreasing flow areas in the direction of flow of air therethrough, all of said channels uniting adjacent the outlet end of the pipe. 110

9. A heater comprising a heating chamber, a pipe extending through said chamber, means in said chamber to heat said pipe, means for forcing 115 air through said pipe, means for rotating said pipe, and means forming a centrally disposed channel of expanding flow area surrounded by a channel of decreasing flow area in the direction of flow of air therethrough, said channels uniting adjacent the outlet end of the pipe. 120

10. A heater comprising a heating chamber, a pipe extending through said chamber, means in the chamber to heat said pipe, one end of said pipe being open, a motor having a shaft disposed substantially in line with said open end of the pipe, a fan on said shaft arranged to force air 125 into the pipe upon rotation of the shaft, means rotatably supporting said pipe, and means to rotate the pipe operated directly from the motor. 130

11. A heater comprising a heating chamber, a pipe extending through said chamber and having one end thereof larger than the other, with tapering walls therebetween, means in said chamber 135 to heat said pipe, means adjacent the smaller end of the pipe for forcing a current of air through the pipe, and means for rotating said pipe, said larger end of the pipe forming an outlet from which air passing through the pipe may be discharged. 140

12. A heater comprising a heating chamber, a pipe extending through said chamber and having one end thereof larger than the other, with tapering walls therebetween, means in said chamber 145 to heat said pipe, means adjacent the smaller end of the pipe for forcing a current of air through the pipe, means for rotating said pipe, said larger end of the pipe forming an outlet 150

from which air passing through the pipe may be discharged, and a conical-shaped deflector disposed within said pipe and having its smaller end disposed towards the smaller end of the pipe, said deflector increasing in size towards the larger end of the pipe at a greater rate than the flow area of the pipe increases, whereby air passing through the pipe is deflected by said deflector against the walls of the pipe.	rotatably mounted pipe extending through said chamber, means for rotating said pipe, means in said chamber and disposed on one side of said pipe to heat the same as it rotates, means for forcing a current of air through said pipe, and a deflector disposed within and extending lengthwise of the pipe and adapted to gradually deflect at least part of the air passing through the pipe into contact with the wall thereof.	80
10 13. A heater comprising a heating chamber, a	IRWIN ELLIOTT.	85
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