Nov. 7, 1939. R. HOFFMAN 2,179,041

CIRCULATING OIL HEATER

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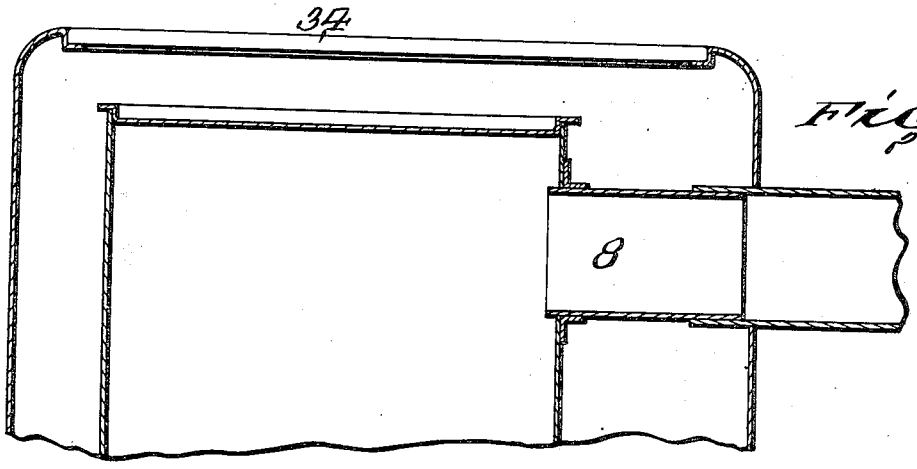


Fig. 1.

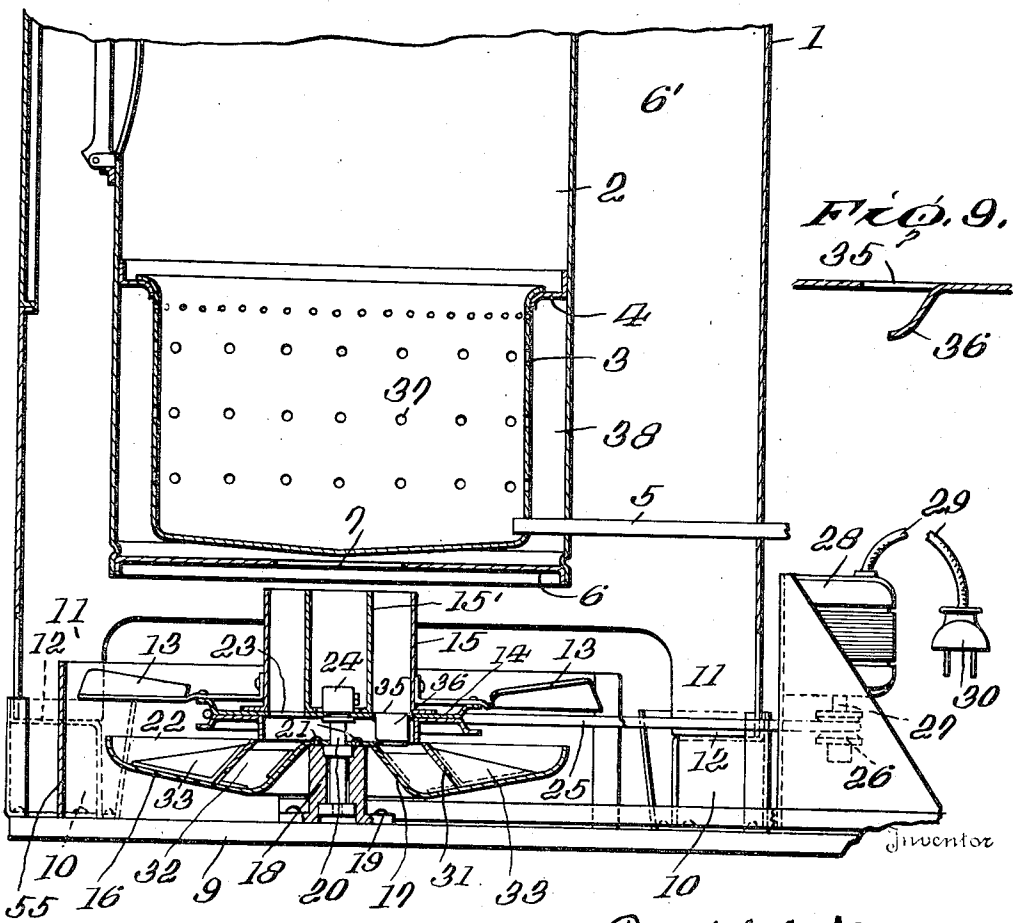


Fig. 9.

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Fig. 2.

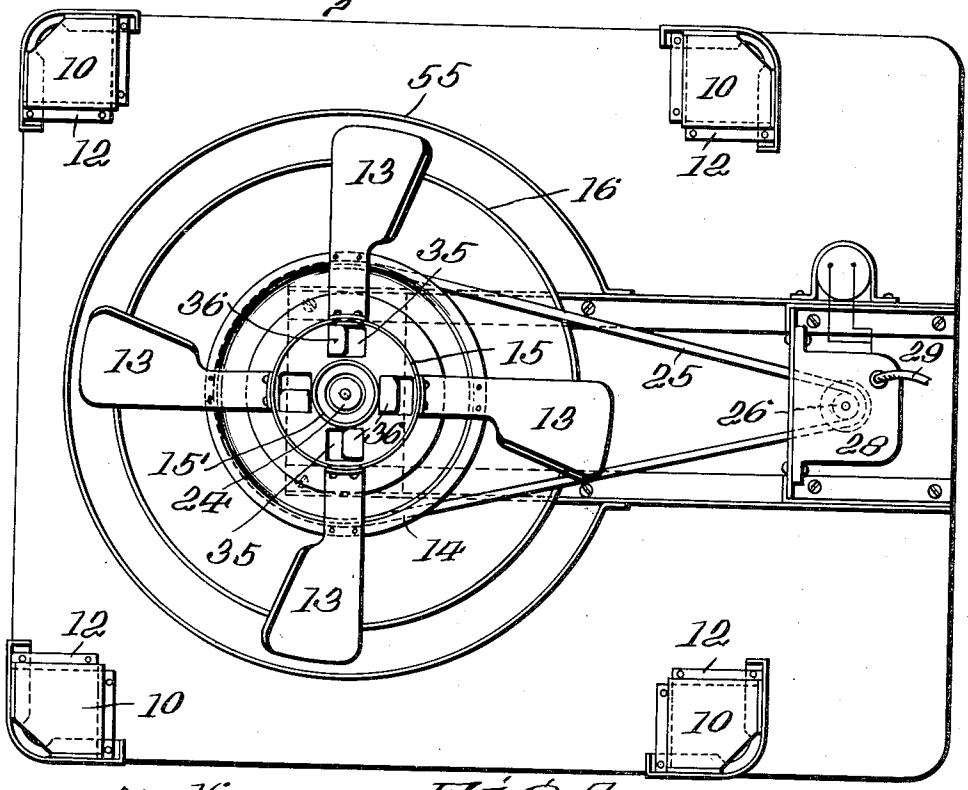


Fig. 4.

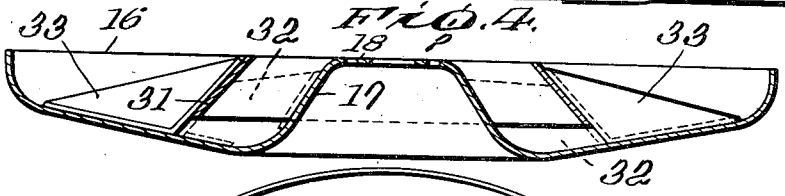
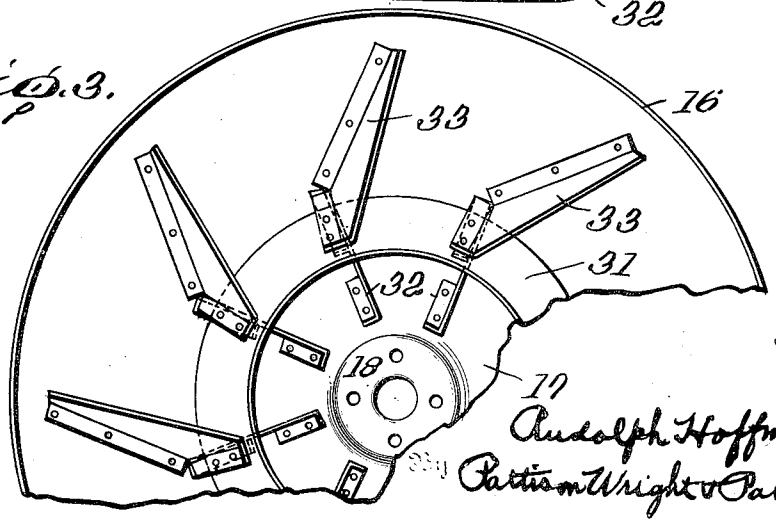


Fig. 3.



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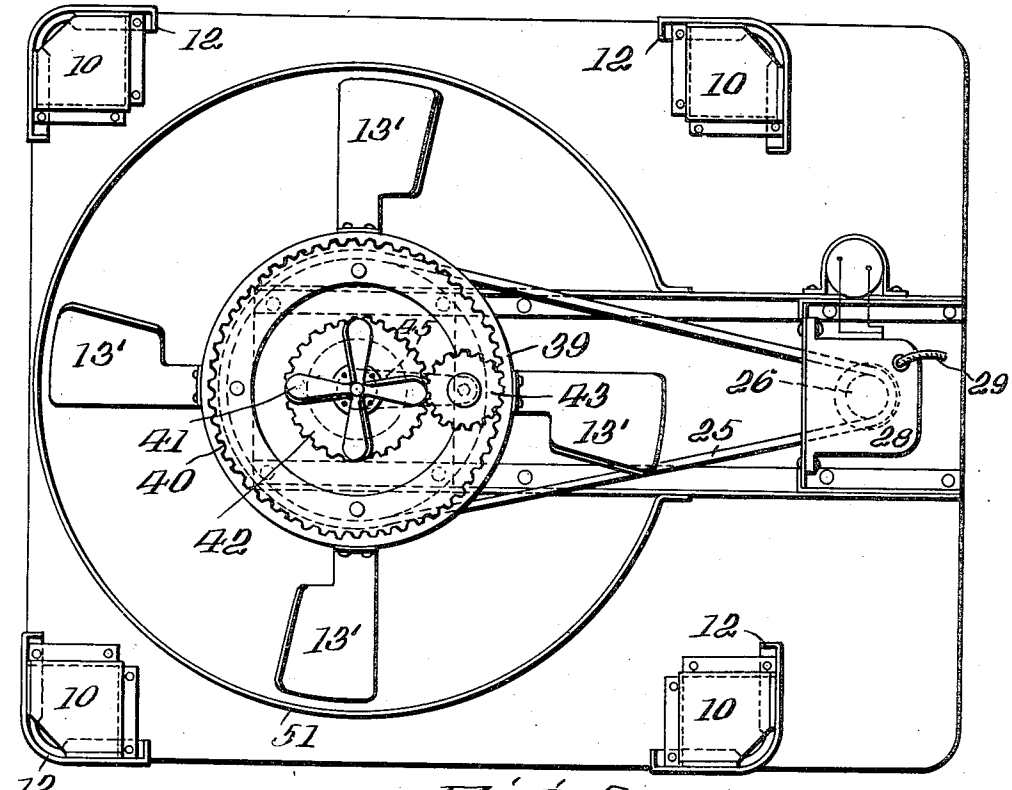
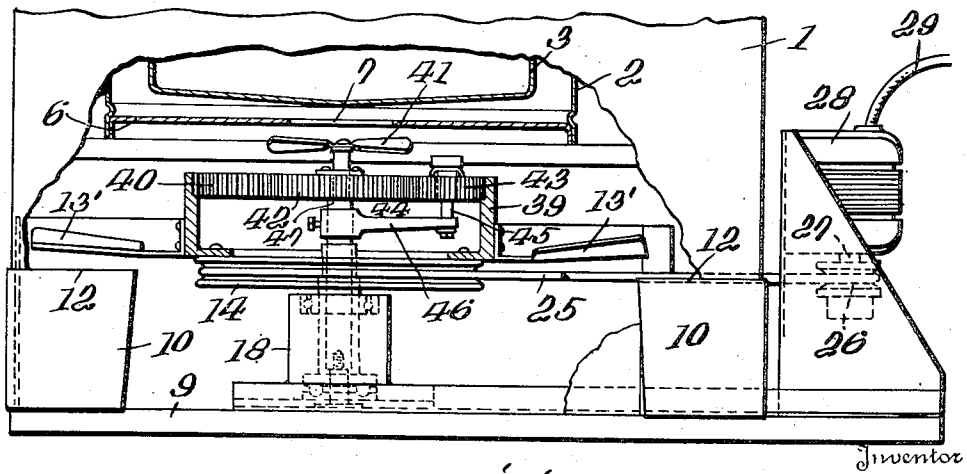


FIG. 5.



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FIG. 6.

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Fig. 7.

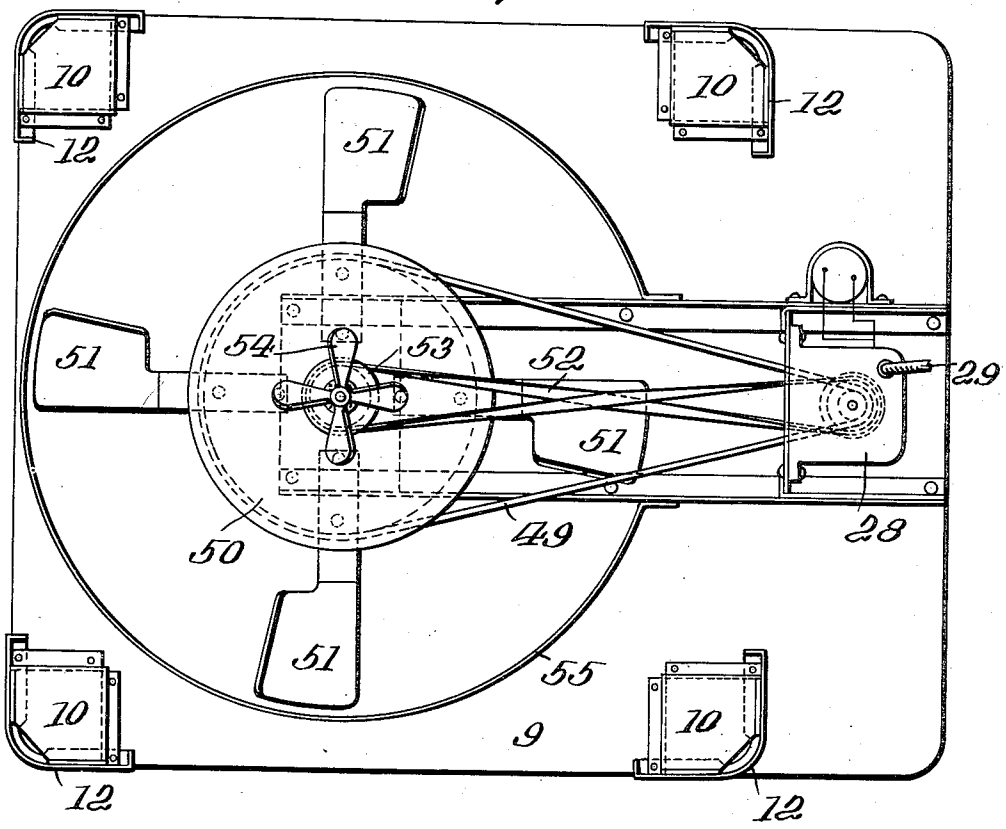
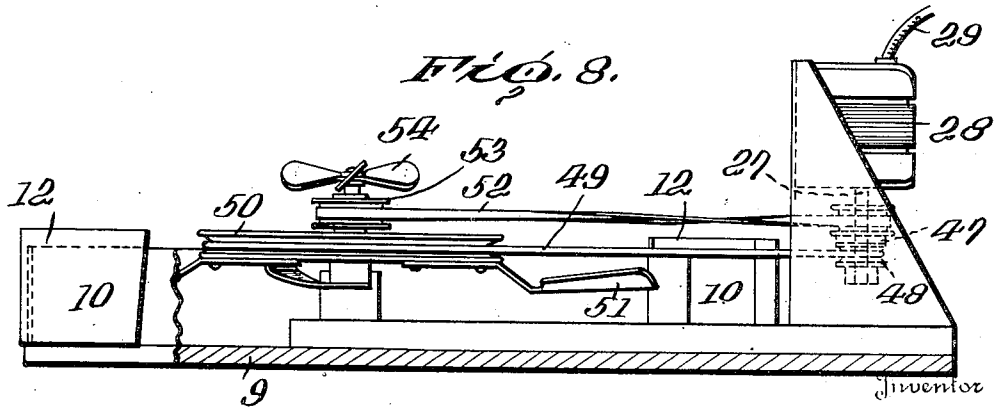


Fig. 8.



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CIRCULATING OIL HEATER

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Application July 18, 1938, Serial No. 219,877

10 Claims. (Cl. 126—93)

This invention relates to improvements in circulating oil heaters and it pertains to a heater adapted to heat one or more rooms of a house and referring generally it is that type of heater which comprises a housing containing an oil burner and means whereby the air is circulated by the heater substantially uniformly throughout the room containing the same.

Heaters of the above type, as heretofore made, do not heat the room uniformly, because they do not contain any construction for controlling the circulation of the air heated thereby. It is found that in heaters of the general class herein described the heat ascends rapidly to the upper portion of the room, because the heater lacks any means or construction for circulating the heat therefrom first to the floor of the room and ascending to the upper parts of the room. The heater which forms the present invention contains means for forcing some of the heat first to the floor of the room which warms the floor and then ascends to the upper portion of the room. A heater not thus provided with any means for first forcing the heated air to the floor of the room, the heated air ascends quickly to the upper portion of the room and leaves that portion of the room adjacent the floor unheated until all of the air of the room has been heated. Therefore, the heater embodying the present invention first quickly heats the air adjacent the floor of the room rather than first heating the air above the heater in the room, as heretofore constructed.

A further object of the present invention is to provide an air circulating means which is a unit that will receive the ordinary oil heater, that is to say, the old type of oil heater can be placed on top of the air circulating medium without any change in the heater itself, as will be described and shown hereinafter.

In the accompanying drawings:

Figure 1 is a vertical section of an oil heater and an air circulating means applied thereto which embodies the present invention.

Fig. 2 is a plan view of the air circulating mechanism which is shown in Fig. 1.

Fig. 3 is a cross section of part of the air circulating mechanism shown in Fig. 2.

Fig. 4 is a separate vertical sectional view of the combined pan and cone arrangement which are located in the bottom portion of Figs. 1, 2 and 3.

Fig. 5 is a top plan view of a modified form of air regulating mechanism which is shown in Figs. 1, 2 and 3.

Fig. 6 is a vertical central sectional view of the circulating mechanism shown in Fig. 5.

Fig. 7 is a top plan view of another circulating mechanism showing a further modification of the mechanism shown in Figs. 1, 5 and 6.

Fig. 8 is a vertical sectional view showing parts of the mechanism which is shown in Fig. 7.

Fig. 9 is a sectional view showing part of the intake fan shown in Figs. 1 and 2.

Referring now particularly to Figs. 1, 2, 3 and 4, the heater generally to which the present invention is applied will be described. This heater comprises an outer housing 1, an inner burner drum 2, which contains a burner 3, which is located in the lower end of the said drum 2, and is supported on a ring 4. This burner is of the well-known type having perforated walls, as shown and its bottom being slightly concaved. An oil supply pipe 5 has its inner end extending within the said burner and oil is supplied through the said pipe and the oil level within the burner is controlled in any well-known manner. The burner drum has its bottom 6 provided with an opening 7. This burner described thus far is well-known to the art. The burner drum is separated from the surrounding housing 1, as shown and the burner drum has an outlet flue 8 at its upper end, which flue is connected with the outside of the building and is ordinarily connected with a chimney.

The base 9 is provided to receive the circulating mechanism—which will be presently specifically described—on which it is mounted. This base is a zinc-covered board and is of a form adapted to receive the housing 1 and is of an area substantially equal to the horizontal area of the housing. It will be observed that the base has projecting from it four pedestals 10 which are located in positions corresponding to the feet 11 of said housing, the lower ends of the feet resting in sockets 12 formed in their tops and into which said feet 11 extend. The said base also includes an air circulating mechanism consisting essentially of fan blades 13, which are riveted to a pulley 14 and also to the wall of a large tubular member 15 which extends vertically. Below the said tubular member 15 and the fan blades 13 is a pan-shaped member 16, the center of the pan projecting upwardly forming a conical member 17, which is at its center fastened to a support 18 that is permanently attached to the base member 9 by suitable rivets or screws 19. This support 18 forms a journal for a short shaft 20 that extends upwardly into the tubular member 15. From the drawings it will be observed that this

support 18 extends upwardly in the conical portion 17 of the pan and that the upper end is attached at 21 to said support 18. This pan-shaped member has its upper end 22 located on a horizontal line with the upper end of the support 18 and which brings the outer portion of the pan under the fan blades 13. The said short shaft 20 has its upper end extending into the tubular member 15 and through the bottom 23 of said tubular member and this bottom is attached to the upper end of the said shaft 20 by means of a suitable clamp 24. For the purpose of rotating the said tubular member and the fan blades carried by it a belt 25 passes around the pulley and out through and beyond the housing 1 and around a smaller pulley 26 which is attached to a shaft 27 of a well-known electric motor 28. Electrically connected with said motor is an electric conductor 29 carrying at its outer end a suitable member 30 that is adapted to enter an electric socket—not shown—attached in the wall of the room containing said heater. From the above description it will be understood that the electric motor rotates the pulley connected with the out-flared lower end of tube 15 and the pulley in turn rotates the fan blades 14, to which is attached the tubular member 15 that is also rotated.

The pan-like member 16 carries also a conically-shaped member 31, which extends within the pan and has its lower end separated from the bottom as clearly shown in Fig. 4. This conical member extends parallel or separate from the conical-shaped portion 17 of the pan and the space between the conical-shaped members 31 and 17 forms a cone-shaped passageway 32 having its upper end in communication with the tubular member 15 and its lower end in communication with the said pan-shaped member 16. Also located in this pan-shaped member are a plurality of fins 33 which extend outwardly from the cone-shaped member 31. This fin member 33 is suitably welded or otherwise connected with the bottom of the pan 16 and with the cone-shaped member 31.

The fan blades 13 are set at the proper pitch and the said fan is rotated in the proper direction to cause the air to be drawn through the grill member 34 at the top of said housing 1, through the space 6', housing and the burner drum 2 and the downwardly drawn air is forced out between the housing 1 and the base 9 on to the floor of the room containing the heater. Part of the downward flow of air is caught in the spaces or pockets between the fin members 33 and the cone member 31 and it is deflected under the edge of the said cone member 31 and in an upward direction into the tubular member 15 and through the openings 35 formed in the bottom 23 of said tubular member. For the purpose of insuring a sufficient amount of air for the burner 3, the bottom 23 of the tubular member 15 is provided with a plurality of said openings 35 and each opening is provided with a fan blade 36, which blades draw the air that is trapped in the pan through the openings 35, the tube 15, the opening 7 to against the bottom of the burner and around the said burner and through the perforations 37 made in the wall of the said burner. It will be observed that the space 38 between the burner drum 2 and the burner 3 has its upper end closed by the member 14 so that all the air flowing through the opening 7 of the burner drum flows through the openings 37 into the said burner 3.

From the foregoing it will be understood that two oppositely flowing currents of air are provided in this heater, one movement of the air being downward caused by the fan blades 13, and the other movement of the air for the burner 3 being upward and this upward flowing current is caused by the shape of the pan 16 and its location in respect to the fan is through the tubular member 15 to the burner 3, as previously described. The upward flow of air is accelerated by the small fan blades 36 also previously explained.

One modification of the invention, previously described, is shown in Figs. 5 and 6 of the drawings and it consists in providing a ring member 39 having suitable gear teeth 40 at its periphery and the upper end of said shaft 20 extends upwardly to a point beyond the upper end of the ring 39 and carrying a small fan 41, which small fan provides the upward reverse current of air. The upper extended end of the shaft 20 carries a gear wheel 42 and said gear will be in engagement with a miter gear 43, which has its outer periphery in engagement with the said teeth 40 on the ring 39 and its inner periphery 44 in gear with the teeth of the wheel 42. The miter gear 43 is journaled on a support 45, which has its outer end supported by an arm 46 which is attached to a suitable stationary member 47.

From the above description it will be noted that the rotation of the member 39 by the belt 25 rotates the fan blades 13', and this member 39 through the idler miter gear 43 in turn rotates the gear 42 that carries the fan blades 41.

The modification shown in Figs. 7 and 8 consists in elongating the electric motor shaft 27 and placing thereon two pulleys 47 and 48 around which a belt 42 passes and the said belt passing over a pulley 50 to which the fan blades 51 are attached and that a second belt 52 passes around a pulley 53 and rotating the small fan 54. The belt 52 is placed in crosswise form so that the fan 54 is rotated in a direction reverse to the direction of the rotation of the fan blades 51.

It will be understood that in the operation of this burner some of the hot air of course rises from the upper end of the structure and in respect to that air drawn downward through the said structure I find in the operation of the burner that the effects can be felt as far as eight to ten feet on each side of the burner, which causes the air to be distributed in the room and causes a faster circulation of the hot air in the room.

It will also be understood that the unit containing the fans can be constructed to be attached to any form of heater now in use.

Instead of using the gear teeth on the inner side of the upper end of the member 39, in Fig. 5, and instead of using the gear teeth on the idler 43, the gear teeth can be omitted and the parts driven by friction alone.

Instead of using the two belts, as shown in Fig. 7, the same result can be obtained by turning the angle of the blades 41 in the proper direction to cause the air to move upward through the heater.

Having thus described my invention, what I claim is:

1. A room oil heater comprising a housing having an open lower end and an air passage through its upper end, a burner located in the lower portion of said housing and apart from it to form a surrounding air passage, an air circulating unit at the lower end of said housing, said circulating

unit comprising two oppositely acting fans one fan communicating with the said passage way of the said housing and causing a downward movement of air through said passage and the other fan centrally arranged in respect to the first-mentioned fan, the second mentioned fan communicating with the said burner and producing an upward draft of air to insure proper combustion of the said burner.

2. A room oil heater comprising a housing having open lower and upper ends, an oil burner placed within and at the lower portion of said housing, and an air circulating mechanism consisting of a fan having blades located under the outer edge of said burner and forcing air downward through the said housing and out of its lower end and a second relatively smaller fan located centrally in respect to the blades of the first-mentioned fan and the blades of the centrally arranged fan producing an upward draft which is delivered to the said burner for causing proper combustion of the oil in said burner.

3. A room oil burner comprising a housing having open lower and upper ends, a burner drum located within the housing and separated from it to form a surrounding air passage, a burner in the lower end of said burner drum, a circulating unit consisting of a mechanism on which the heater housing is supported, said mechanism comprising a fan for causing a downward draft through the said housing and out of its lower open end and a fan for supplying an upward draft of air at the center of the housing below the said burner and having communication therewith for providing sufficient air to cause the proper combustion by said burner.

4. A room oil heater comprising a housing having open lower and upper ends, a burner drum within the said housing and separated from it forming a surrounding air passage, a burner within the said drum, an air circulating mechanism below the lower open end of the housing, a supporting base at the lower end of said mechanism, said mechanism including fan blades causing a downward draft of air through the drum and out its lower end and a member below the fan blades having an open top a part of which is in communication with the said burner drum and a part receiving air from said fan, thereby causing an upward draft to the said burner drum and burner therein for insuring proper combustion of said burner.

5. A room oil heater comprising a housing, a burner within the lower portion of said housing and separated from it to form a surrounding air passage, the lower and upper ends of the housing being open, a circulating mechanism located in the lower open end of the said housing, said mechanism comprising a base having upwardly projecting supports receiving the feet of the housing and supporting it above said base, an air circulating unit supported on said base and communicating with the open lower end of the housing, a fan having blades located under the outer portion of the burner and causing a downward draft through the said housing, an enlarged tubular vertically extending member located at the center of said fan and having its upper end open and in communication with the said burner, the lower end of the tubular member connected and rotating with said fan and a smaller fan located within the said tubular member and causing an upward draft of air to the said burner for maintaining combustion thereof.

6. An air circulating unit for room oil heaters which contain an oil burner, the said circulating unit comprising a small centrally arranged fan communicating with the said oil burner for producing an upward draft of air for said burner, and a larger fan surrounding said smaller fan, a vertically arranged tubular member enclosing said small fan, a conical pan-shaped open top member located beneath said fans and in communication with the fan blades of the small and the large fans, said pan-shaped member having conically arranged members forming a passage outside of the conical members and its upper end communicating with the lower end of said tubular member, and said pan-shaped member having upwardly extending fins located beyond the outer wall of the conical member whereby a downward draft of air is provided through the said housing and an upward draft of air is produced through the conical member to the burner for providing proper combustion thereof.

7. A room oil heater comprising a housing, a burner within the housing at the lower portion thereof and apart from the wall of the said housing to form a circulating air passage within said housing, an air circulating mechanism beneath the lower portion of said housing comprising a large fan and a small fan, a supporting ring to which the blades of the large fan are attached, operating power connected with said ring, a small miter gear supported within the upper end of said ring which is provided with inwardly extending gear teeth, an idler gear between the said ring and the small gear, a fan connected with the small gear and an upwardly projecting arm supporting a bearing for the said idler gear the inner end of said arm supported against movement, the said large fan blades producing a downward current in the housing and the blades of the smaller fan producing an upward current of air to the said burner.

8. A room oil heater comprising a housing having open lower and upper ends, a burner within the housing separated from said housing to form an air passage between the burner and the housing, an air circulating mechanism below the lower portion of said housing and communicating therewith, said circulating mechanism comprising a large fan and a centrally arranged small fan, a motor operatively connected with said fans for rotating them, the blades of the large fan causing a downward current of air through said housing and the blades of the small fan causing a central upward current of air to said burner the parts arranged and operating for the purpose herein set forth.

9. The combination with a heater housing having open upper and lower ends and containing therein a burner drum of smaller diameter than said housing and forming a space between the drum and said housing, a burner in the lower end of the housing, an air circulating unit located in the lower end of said housing, said unit containing a fan having communication with said housing and circulating air downwardly in said space and through the open end of said housing to the floor and also an air deflector below said burner and circulating air centrally and upwardly into said drum and to said burner for maintaining combustion therein.

10. An improved room oil heater comprising two separate units first a unit consisting of a housing having open upper and lower ends, a burner drum within said housing and of less diameter than the housing and forming a surrounding air circulating space, and a burner in the

lower end of said drum, and a second unit consisting of an air circulating mechanism detachably fitting in the open lower end of said housing and containing an air circulating mechanism embodying a fan within said open end of the housing and creating a downward current through the said passage formed in the first unit, the second unit also embodying an air circulating means also located in the lower end of the first unit and producing an upward current of air communicating with said burner for producing proper combustion therein whereby the first and second units are detachable for the purpose set forth.

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