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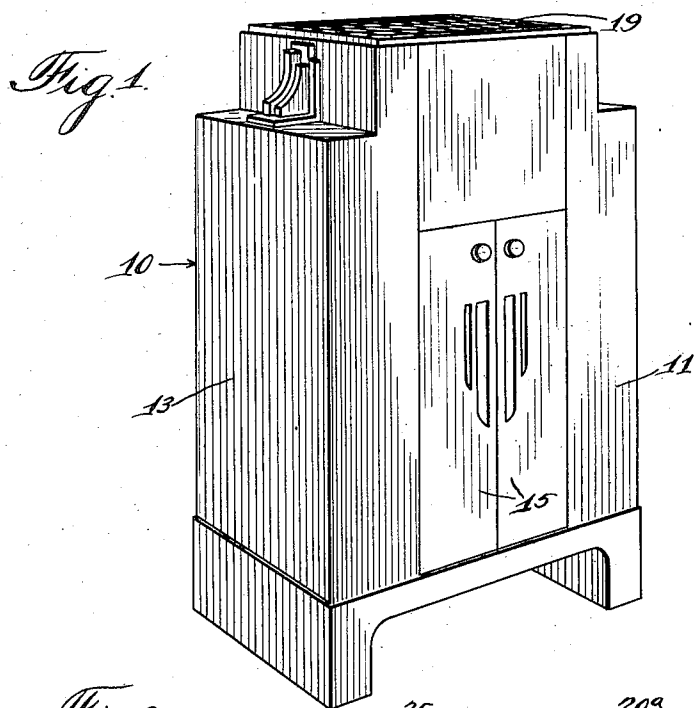
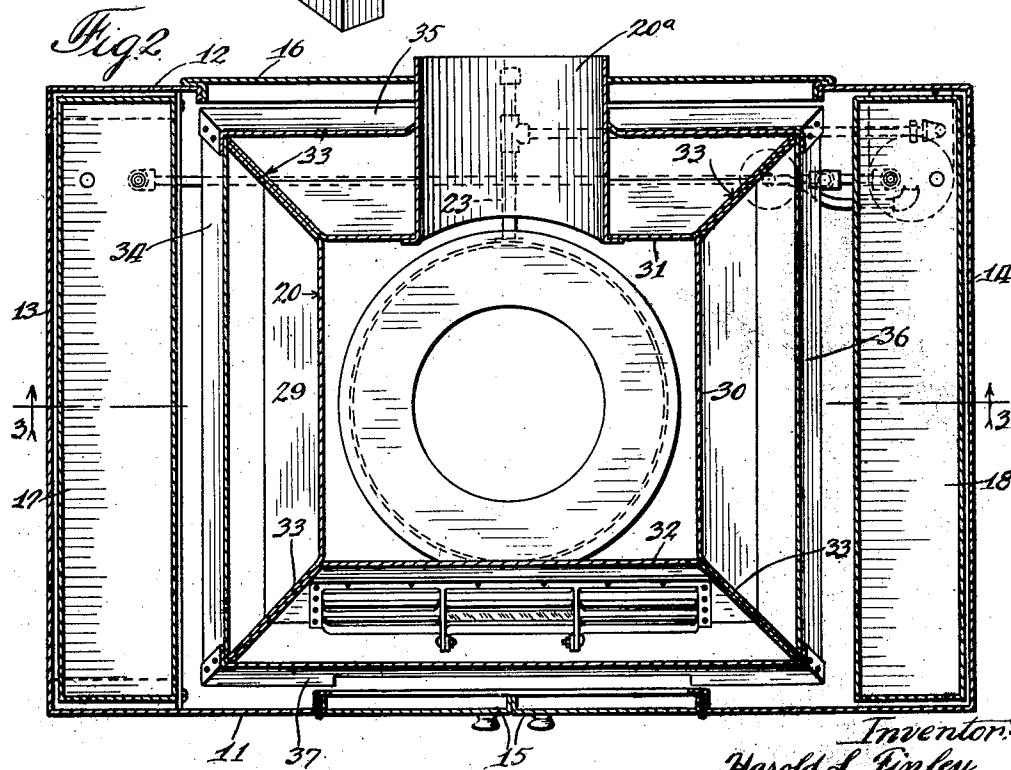
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SPACE HEATER

Filed July 20, 1934

2 Sheets-Sheet 1



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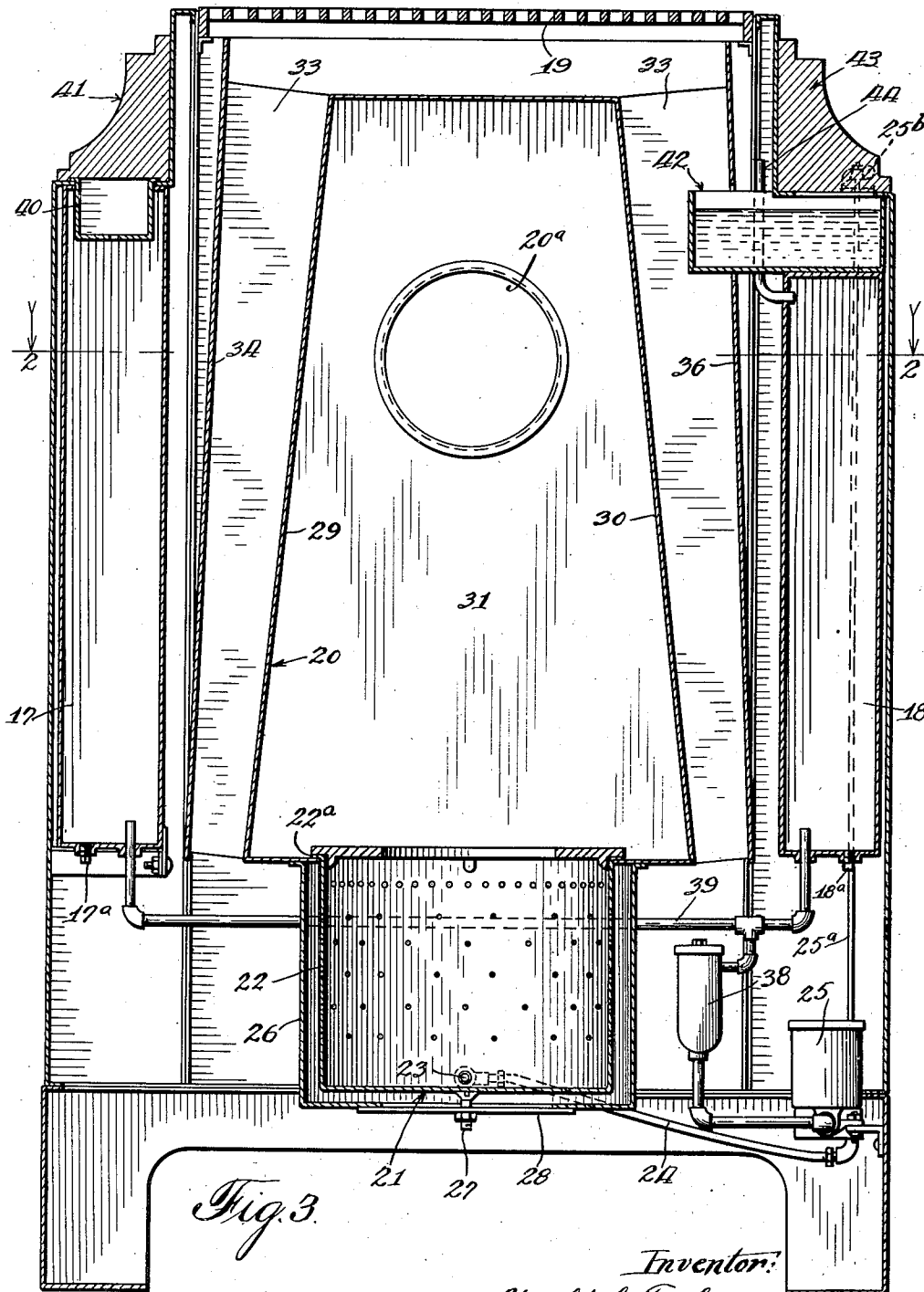
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UNITED STATES PATENT OFFICE

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SPACE HEATER

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4 Claims. (Cl. 126—93)

This invention relates to a space heater and has special reference to an apparatus of the circulating type adapted for use in heating rooms of buildings.

5 More particularly, this invention relates to a space heater comprising an outer open-ended casing for enclosing preferably a liquid fuel burner at the lower end thereof and a liquid fuel tank together with operating mechanism therefor and
10 for the burner, an inner closed drum being disposed above the burner for confining the products of combustion above the burner and having walls so constructed and arranged within the open-ended casing as to provide air passageways
15 of increased area at the upper end for directing heated air therethrough to the room or other enclosure at a uniform velocity for the efficient heating thereof.

Further, other air passageways are provided
20 between the heating means and the liquid fuel tank to air-cool the fuel in the tank and to mix with the heated air from the other air passageways at the outlet thereof from the casing to decrease the velocity, to increase the volume and to
25 lower the temperature of the heated air.

The air circulates through the present apparatus by "chimney action", the air as it is heated rising therethrough to circulate through the rooms by the velocity of this action. It is desirable in
30 this type of heater to obtain a definite relation between the temperature of the air delivered to the rooms, the velocity or speed at which it is delivered, and the volume or number of air changes per hour. Insofar as applicant is aware,
35 in the usual type of heater the air to be heated rises through a vertical passage having a uniform area throughout its length and will, therefore, be discharged at a much greater velocity at the top than the speed at which it enters the passage.
40 This results in discharging the heated air at a velocity such that the air is thrown to the ceiling, where it stratifies and is not effective in heating the lower part of the room.

The present invention contemplates the provision of an inner closed drum having side walls which converge upwardly and cooperate with the side walls of the casing to provide air passageways
45 therebetween which progressively increase in area toward the upper end of the casing so as to accommodate the normal expansion of the air without increasing the velocity thereof. The air leaving the casing is diffused at the breathing level where the most comfort is derived from the heat and is just as hot as though it had increased velocity. The air is not given a momentum such

as would tend to carry it to the ceiling, but is merely sufficient to circulate the air in a manner to accommodate the required number of air changes at a uniform temperature.

The air passageways above described may
5 preferably be formed by an enclosure within the casing that is spaced from the inner drum and likewise is spaced from the outer casing and from the fuel tanks. Air passageways are thus provided between the enclosure and the inner drum
10 and likewise between the enclosure and the outer casing. These latter air passageways direct comparatively cold air upwardly along the side walls of the casing and of the fuel tanks which mixes with the heated air from the other air passage-
15 ways adjacent the upper end of the casing to dilute or temper the same, thus decreasing the velocity and lowering the temperature of the heated air and increasing the volume thereof. The outer cabinet is also insulated from exces-
20 sive temperatures by these air passageways, thus permitting the use of exterior finishes not possible in high temperature exterior housings.

In order for the fuel tanks to be placed in the same enclosure with the burner it has been neces-
25 sary to pass rigid tests by underwriters because the fuel in such tanks can not be substantially above room temperature. It is not permissible under government regulation for the fuel in the tanks to reach a temperature of over approxi-
30 mately 20 degrees above room temperature and this condition has been satisfied in the present construction. It has been determined by practical demonstration in commercial apparatus that
35 an air cooling of the fuel tanks will obtain in the present construction, the air cooling feature likewise providing a very desired function in diluting or tempering the heated air as it passes out of the casing to decrease the velocity of the heated air and to lower the temperature thereof.
40

One of the objects of this invention is to provide a space heater of the type indicated above in which the walls of a drum for confining the products of combustion are so constructed and arranged with respect to the walls of the outer
45 casing as to provide a progressively increasing area in the passageways toward the upper end for directing heated air therethrough at a substantially uniform velocity.

A further object of this invention is to provide
50 a space heater of the type noted above in which separate air passageways are provided, one of said air passageways directing heated air therethrough to the open end of the casing and the other of said passageways directing air in con-
55

tact with tanks on opposed side walls of the casing to cool the fuel in the tanks and to mix with the heated air from the other passageways at the outlet from the casing to decrease the velocity and to reduce the temperature thereof.

It is a further object of this invention to provide a space heater of the character hereinabove recited which will efficiently heat an enclosure at a substantially uniform temperature, which construction is simple in operation and comparatively inexpensive to manufacture.

Other objects and advantages will hereinafter be more particularly pointed out and for a more complete understanding of the characteristic features of this invention, reference may now be had to the following description when taken together with the accompanying drawings, in which latter:

Figure 1 is a perspective view of a device embodying the features of this invention;

Fig. 2 is a plan sectional view of the device shown in Fig. 1, taken on the line 2—2 of Fig. 3; and

Fig. 3 is a central vertical sectional view taken on the line 3—3 of Fig. 2.

Referring now more particularly to the drawings, the device of this invention comprises an outer casing 10 preferably formed of sheet metal and of rectangular cross section. The casing, of course, may be formed of different materials and of different shapes consistent with the teachings to be derived from the details of construction to be hereinafter more fully pointed out. It is believed, however, that the particular construction illustrated and described effects an efficient transfer of heat to the air passing therethrough and, therefore, is a construction preferably to be desired.

The outer casing 10 is provided with a front wall 11, a rear wall 12 and side walls 13 and 14, the front wall being provided with doors 15 which may pivot on hinges to expose the heating means therewithin. The rear wall 12 is provided with an opening of substantial size which is enclosed by a panel 16, the panel being removable for convenience in adjusting the operating mechanism of the heating means and the controlling means therefor.

A pair of fuel tanks 17 and 18 are disposed within the outer casing 10 on the side walls 13 and 14, respectively, the tanks being supported on angle irons or other supporting means extending preferably from the front and rear walls 11 and 12, respectively. The upper end of the outer casing is reduced to form a tower portion which is enclosed preferably by a grill 19. The inner walls of the tanks are preferably substantially co-planar with the outer side walls of the tower portion so as to provide a heating area which is substantially square in plan section for uniformity of heat transfer from the usual type heaters or burners.

An inner drum 20 for confining the products of combustion above a burner 21 is suitably supported in the casing, the side walls thereof being spaced a substantially distance from the inside walls of the casing. The inner drum is preferably frustum-shaped, the upper end being closed and connected by the conduit 20a to a flue and the lower end having an opening for receiving a perforated cylinder 22 of the burner 21, the cylinder having a flange 22a for seating on the material bounding the hole of the base of the frustum-shaped drum 20 for support of the burner. The lower end of the cylinder 22 is

liquid-tight to retain a pool of oil supplied preferably from a conduit 23 extending to be connected to the side wall thereof and to have communication therewith, the conduit 23 extending to the rear end of the casing 10 and being connected through a T fitting at an intermediate portion to a conduit 24 connected to a usual float control 25. The opposite end of the conduit 23 is capped and the cap may be removed for cleaning the conduit since vaporization may occur therein depending on burner conditions. The rate of flow of liquid fuel from the float control 25 may be governed by a rod 25a extending upwardly to a manually operated indicating dial 25b disposed on the shouldered surface of the casing.

The perforated cylinder 22 permits a supply of air to be introduced to the vapor of the pool of oil on the bottom of the cylinder, the perforated cylinder being housed preferably by an enclosing cylinder 26 seated against the bottom of the frustum-shaped drum 20 and being open-ended to receive a supply of air through the bottom for the apertures of the cylinder 22. The perforated cylinder 22 preferably has a threaded shank 27 welded or otherwise secured thereto and extending therefrom through an aperture of a strip 28, the latter extending across the opening of the cylinder 26 to engage the material bounding the opening thereof. A nut threaded against the strip 28 on the shank 27 will draw the perforated cylinder 22 against the bottom of the frustum-shaped drum to prevent displacement thereof.

The frustum-shaped drum 20 is preferably formed of square cross section when viewed in plan and consists of four walls 29, 30, 31 and 32, the ends of the walls being flanged and extending outwardly and the flanges being preferably welded together or otherwise secured to form fins 33. The fins 33 are preferably greater in width at the upper end than at the lower end, the peripheral edges thereof positioning intermediate wall members 34, 35, 36 and 37. The wall members are preferably formed of separate pieces riveted or otherwise secured together and define separate sets of air passageways between the walls of the frustum-shaped drum 20 and the walls of the outer casing and fuel tanks. The intermediate walls 34, 35, 36 and 37 likewise preferably converge toward the upper end thereof, although not to the extent that the walls of the frustum-shaped drum 20 converge.

The air passageways between the frustum-shaped drum 20 and the intermediate walls conduct air from the bottom of the open-ended casing upwardly and as the air heats it expands and gradually passes outwardly at substantially the same velocity at the upper end as it enters at the lower end. The increase in area progressively toward the upper end permits such expansion and prevents the increase in velocity since the pressure of the heated air is relieved by the increase in area. The fins 33 assist in distributing the heat to the air circulated through the passageways and add structurally in positioning the intermediately positioned walls bounding the outside of the inner air passageways.

The air passageways formed between the intermediate wall members 34, 35, 36 and 37 and the walls of the fuel tanks 17 and 18 and the inner walls of the casing permit comparatively cold air to be directed upwardly against the side walls of the tanks and to mix at the upper end thereof to dilute or to temper the heated air

after its contact with the heating drum. The velocity of the heated air is thus decreased upon the mixture thereof with the comparatively cold air from the second passageways and the temperature of the heated air is lowered and the volume is increased.

The float control 25 for supplying fuel at a predetermined rate to the burner receives its supply of oil through a conduit connected with a filter 38, the filter, in turn, being connected to a conduit 39, the opposite ends of which latter extend into the bottoms of the tanks 17 and 18. The vertically extending portions of the conduits extend substantially above the bottom of the tanks in order to prevent water which may accumulate on the bottom of the tanks from passing into the conduit. Plugs 17a and 18a are provided for removal to drain off the water at intervals. A suitable vent 44 is provided at the upper end of the tank 18.

The conduit 39 permits an even distribution of the oil in both tanks 17 and 18, there being a single filler plug 40 necessary at the upper end of the tank 17 preferably enclosed by an ornamental bracket 41. A humidifying tank 42 may be provided at the upper end of the other liquid fuel tank 18, an opening for admitting water being covered by an ornamental bracket 43 corresponding in design to the ornamental bracket 41 and an open end of the tank 42 being inside of the air passageway adjacent the frustum-shaped drum 20 for passing off vapors into the air.

While but a single embodiment of this invention is herein shown and described, it is to be understood that various modifications thereof may be apparent to those skilled in the art without departing from the spirit and scope of this invention and, therefore, the same is only to be limited by the scope of the prior art and the appended claims.

I claim:

1. A space heater comprising an outer open-ended casing, a liquid fuel burner disposed in said casing at the lower end thereof, an inner drum for confining the products of combustion above said burner, a fuel tank within said casing on a side wall thereof for supplying fuel to said burner, an enclosing wall for said drum spaced therefrom and from said tank for providing air pas-

sageways adjacent said drum and for insulating said tank from the heat from said drum, the walls of said drum converging so as to direct heated air through said passageways at substantially uniform velocity.

2. A space heater comprising an outer open-ended casing, a liquid fuel burner disposed in said casing at the lower end thereof, liquid fuel tanks within and on opposed sides of said casing, a drum for confining the products of combustion above said burner, spaced walls enclosing said drum and providing air passageways therebetween and between said walls and said tanks, the last mentioned passageways air-cooling said tanks and tempering and increasing the volume of heated air from the other passageways at the exit from said casing.

3. A space heater comprising an outer open-ended casing, a liquid fuel burner disposed in said casing at the lower end thereof, liquid fuel tanks within and on opposed sides of said casing, a drum for confining the products of combustion above said burner, the walls of said drum converging upwardly, an open-ended enclosure for said drum spaced therefrom so as to provide air passageways which progressively increase in area upwardly, said enclosure also being spaced from the walls of said casing and from said tanks to provide other air passageways, said first mentioned passageways directing heated air therethrough at substantially uniform velocity, and said second mentioned passageways air-cooling said tanks and tempering and increasing the volume of heated air from said first mentioned passageways at the exit from said casing.

4. A space heater comprising an outer open-ended casing, a liquid fuel burner disposed in said casing at the lower end thereof, an inner drum for confining the products of combustion above said burner, a fuel tank on one side of and within said casing in a spaced relation from said drum and connected with said burner to supply fuel thereto, an enclosing wall for said drum spaced therefrom and from said tank for providing air passageways extending in the space between said drum and said wall and in the space between said tank and said wall for insulating said tank from the heat of the drum.

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