Aug. 27, 1929. A. A. GRAVELLE ET AL 1,726,293

STOVE

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Fig. 1

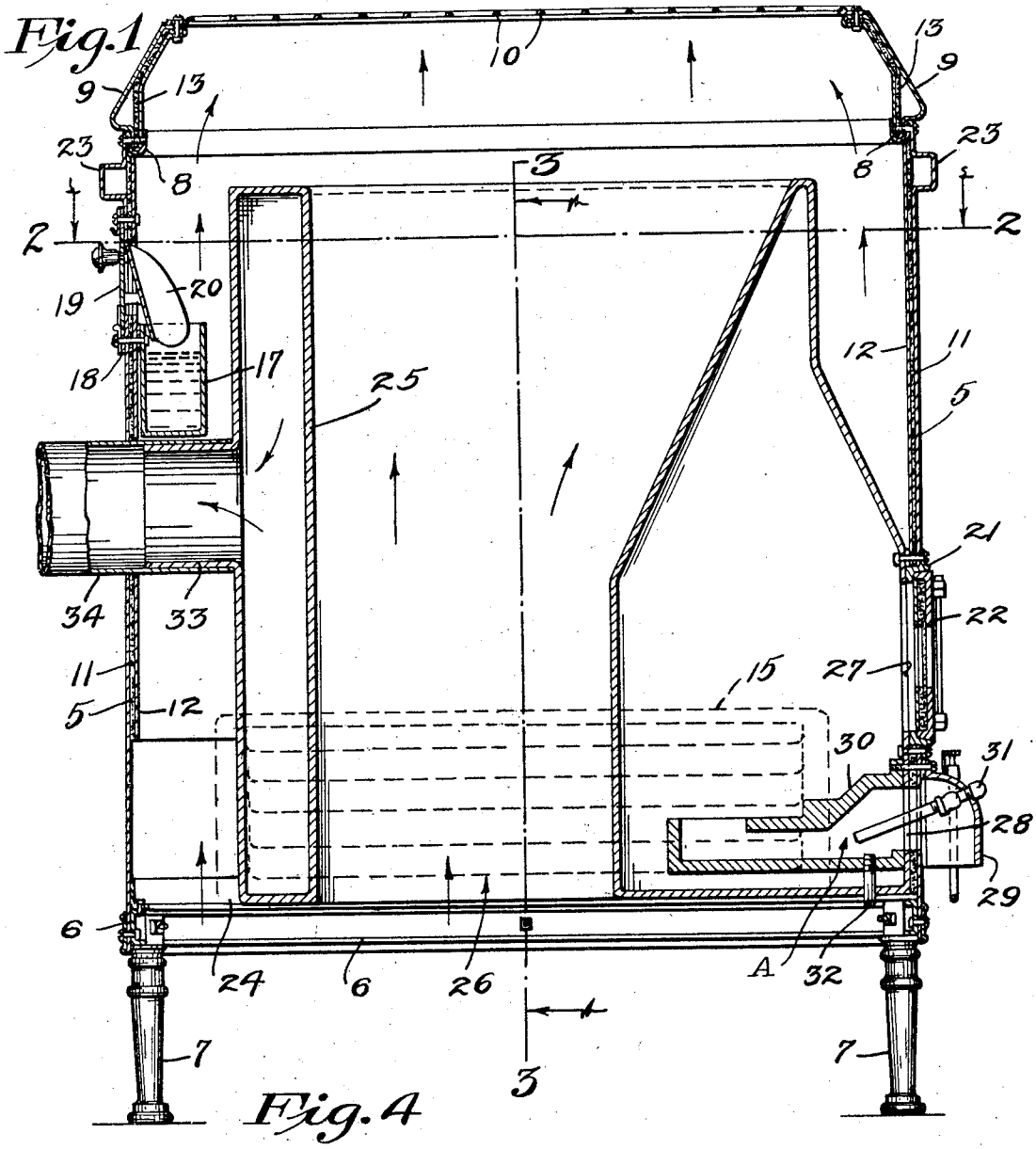
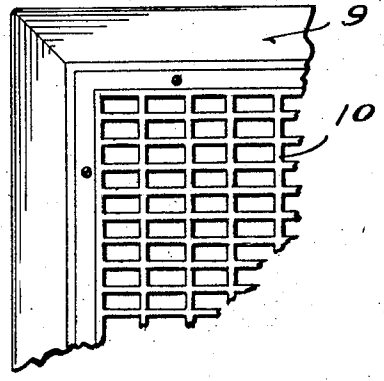


Fig. 4



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Fig. 2

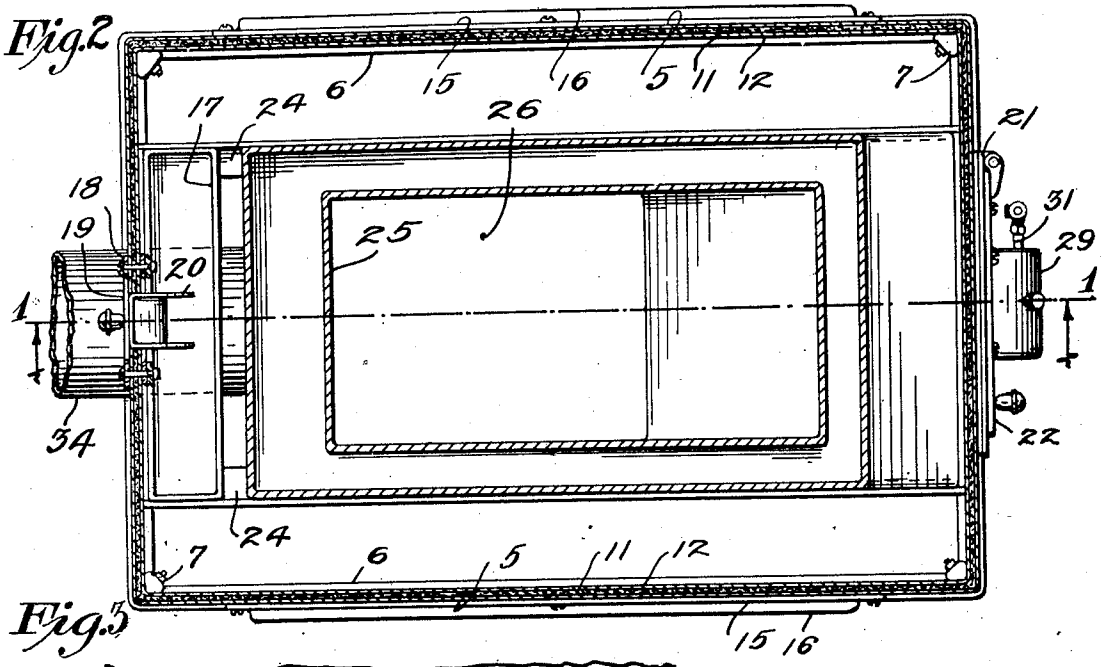
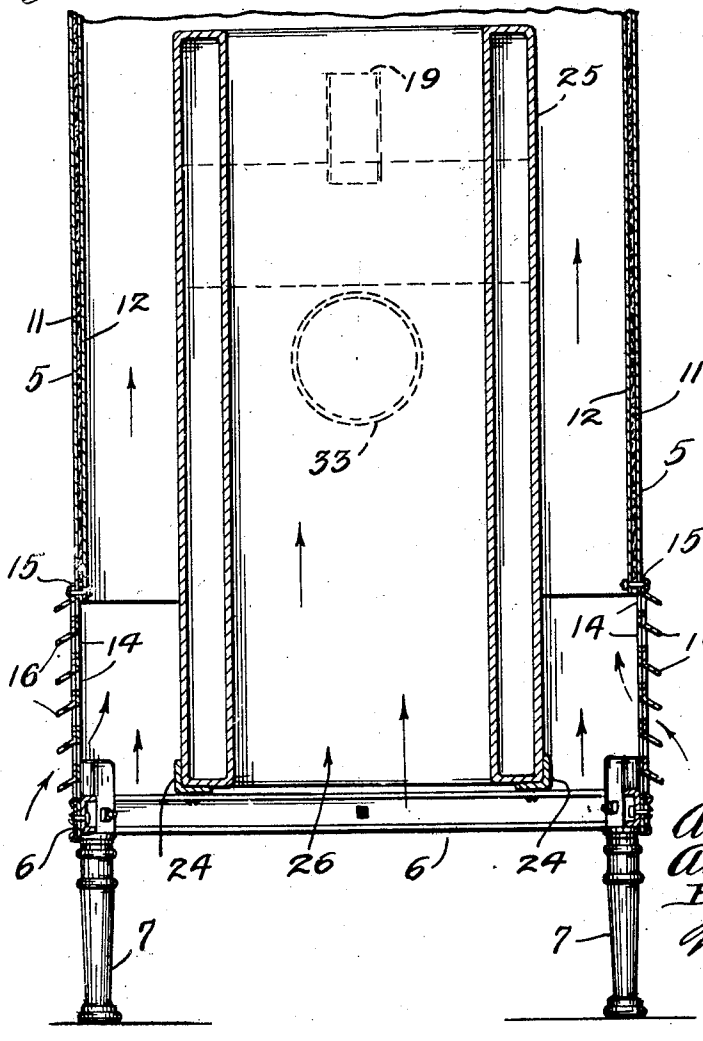


Fig. 3



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UNITED STATES PATENT OFFICE.

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STOVE.

Application filed March 17, 1928. Serial No. 262,528.

This invention relates to stoves.

It is the object of the invention to provide a novel and improved stove for use in dwelling houses, garages, work shops etc., to cause a constant circulation of a large quantity of warm air rather than a circulation of a small quantity of very hot air.

To this end, the invention consists in the novel parts and novel combinations of parts hereinafter defined in the claims and described in the following specification made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the various views, and, in which,

Fig. 1 is a vertical section through the stove from front to rear on the line 1—1 of Fig. 2, as is indicated by the arrows;

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1, as is indicated by the arrows;

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 1, as is indicated by the arrows, and

Fig. 4 is a plan view illustrating one corner of the top for the outer casing.

Referring to the drawings, a rectangular outer casing 5 is illustrated, open at both top and bottom, and being of considerably greater length from front to rear than width from side to side. The casing is approximately the same height as length and is secured at its lower end to a rectangular frame 6 formed from channel iron and this frame, in turn is supported in spaced relation from the floor or other support upon which the stove is placed by legs 7 at the four corners of the frame. The upper edges of casing 5 are reversely bent to form an annular channel 8 within which the lower edges of a top 9 for the casing may be secured. The top 9, as illustrated, is of double thickness and projects upwardly and slightly inwardly from the top of casing 5 to form a rectangular frame at its upper edge to which a grating 10 is secured. A layer of heat insulating material 11 is placed on the inner sides of the casing 5 and a light protective layer 12 preferably of metal is secured to casing 5 on the sides and ends thereof over the layer of insulating material 11. A layer of insulating material 13 will also be provided preferably between the double sides of the top 9. Adjacent the lower edges of the two sides of the casing 5, a plurality of longitudinal slots 14 are cut. Plates 15 are secured to the sides of the casing outwardly from the slotted portions thereof, and each plate is provided with a plurality of outwardly projecting fins 16 formed by bending outwardly and upwardly portions in the plate immediately outwardly from the slots 14. The layer of insulation 11 and the inner metal protective layer 12 terminate short of the upper slots 14 at the sides and rear end of the casing 5. Secured to the inner side of the rear end of casing 5 well toward the top thereof, is a water receptacle 17 and immediately above the receptacle an opening is provided in the rear end of the casing and through the layers 11 and 12 about which a frame 18 is secured, the said frame having a door 19 hinged therein. The door 19 carries a trough 20 extending inwardly into the interior of casing 5 immediately above the water receptacle 17. Water poured into the trough 20, when the door 19 is open, will run downwardly into the receptacle 17. At the front of the casing 5, a rectangular opening is provided, and a door frame 21 having a door 22 hinged thereto, fits within the opening and is secured to the casing. If desired, the upper edges of the casing 5 may be strengthened and given an ornamental appearance by the outwardly pressed channel 23 formed around the casing adjacent its upper edges.

A pair of spaced parallel angle bars 24 are secured to frame 6 and extend between the front and rear ends of the frame above the same in inwardly spaced relationship relative to the two sides of the frame. Mounted on the lower flanges of the two angle bars 24 is a combustion chamber 25. The combustion chamber is of double walled construction, is of substantially rectangular shape in cross section and extends vertically from adjacent the bottom of the casing 5 to adjacent the top thereof. The inner and outer walls of the chamber are spaced closely together at the sides and rear end thereof and at its forward end the inner wall of the casing projects straight upwardly for some distance and then extends along a diagonal line upwardly and outwardly to join the outer forward wall of the chamber at the top thereof. The front wall of the chamber 25 projects straight downwardly for some distance from the top of the chamber and then projects diagonally

downwardly and outwardly to the rear side of the front of the casing 5, whereupon it projects straight downwardly to the bottom of chamber 25 abutting the rear portion of the front side of casing 5. It will be seen that an air passage 26 will be provided from bottom to top through the central portion of the chamber 25, and this air passage will flare outwardly toward its upper end due to the diagonal disposition of the upper portion of the inner side of the forward end of chamber 25. A rectangular opening 27 is cut in the chamber 25 immediately behind the door frame 21 and in alinement with the opening therethrough, and the chamber 25 is secured to casing 5 and to door frame 21 as by bolts at its forward side. Below the door frame 21, the forward ends of casing 5 and chamber 25 are preferably provided with a rectangular opening 28, for admission of an air draft through an apron 29, secured to the outer side of casing 5, to a liquid fuel burner casing 30, secured to the rear side of the forward wall of chamber 25 and forming a portion of the liquid fuel burner A. A liquid fuel supply conduit 31 is illustrated leading into casing 30 to supply fuel thereto, and an overflow pipe 32, mounted in the casing, leads downwardly to the bottom of chamber 25. The type of fuel burner illustrated is constructed in accordance with our U. S. application for patent entitled "Liquid fuel burner" filed March 17, 1928, S. N. 262,527. It will be understood that any type of heating means may be substituted for the liquid fuel burner shown.

Chamber 25 adjacent the central portion of its rear outer side is provided with a rearwardly projecting sleeve 33, and a smoke pipe 34 is attached to the sleeve.

The construction of the various parts of the device is such that approximately the same quantity of air may be admitted for upward travel in the casing 5, from the fin openings at the sides of the casing, the bottom of the casing between the same and the outer sides of chamber 25 and through the lower end of air passage 26, as can be exhausted from the casing 5 through the grating 10.

In use, the device will be situated in a room of a dwelling house, garage, work shop or similar place, and the heating means, such as the liquid fuel burner A, will be set in operation. Products of combustion from the fuel burner will pass directly upwardly in the interior of the front portion of the combustion chamber 25 forming the fire pot thereof, and will strike the inclined portion of the inner side of the front portion of the chamber, to intensely heat the same. The products of combustion will then divide evenly, and will pass into the side sections of the combustion chamber in the restricted openings through the side sections of the chamber, to the restricted opening in the rear section of the chamber, and thence through sleeve 33 to the smoke pipe 34, as is indicated by the arrows. Due to the fact that the inner and outer walls of the sides and rear end of the chamber 25 are spaced closely together, a large quantity of heat from the products of combustion will be absorbed by the walls of the chamber 25 to cause heat to radiate outwardly therefrom. Also due to the fact that the sleeve 33 is disposed some little distance below the top of chamber 25, it will be seen that the hottest products of combustion will be held within the top of the combustion chamber and the cooler products will be drawn through the smoke pipe 34. As the combustion chamber 25 is heated up, the layers of air around the same will be heated, thereby causing the air to expand and to rise. A circulation of air will thus take place upwardly from the bottom wall of the chamber through the air passage 26 and from between the fins 16 and the lower end of casing 5 upwardly through the passages between the outer wall of the combustion chamber and the inner walls of the casing 5. As the air rises upwardly through the air passage 26, the outward flare adjacent the upper end of the passage will afford greater room for expansion of the air, thereby increasing the velocity of circulation in the upper end of the passage due to the expansion of the air as it is increasingly heated in its upward travel to create a partial vacuum in the lower end of the passage 26, to suck increased amounts of cool air into the lower end of the passage. As the heat of combustion chamber 25 increases, the velocity of circulation of air through the air passage 26 will be very materially increased, due to the flare. The air, therefore, will not be retained within the outer casing 55 for any length of time, but will rapidly circulate from the grating 10 into the room. A circulation of a large quantity of warm air will thus be created by the stove, when in operation, thereby providing a more even temperature of all the air in the room within which the stove is situated, than would otherwise be the case if but a small quantity of very hot air were circulated. Drafts of cold air near the floor of the room and drafts of hot air near the top of the room will thus be prevented. Also due to the fact that a large quantity of air is constantly in circulation in the room, the hot air will not form in layers adjacent the top of the room and the cold air form in layers adjacent the floor of the room. A very even temperature will thus be provided and as the combustion chamber provides a large radiating surface, practically all the heat from the heating means in the combustion chamber will be utilized. The layers of insulation 11 and 13 will prevent the outer sides of the casing 5 and the outer sides of the top 9 from becom-

ing intensely heated, and thus there will be no danger that persons touching the outer sides of the casing 5 and top 9 will be burnt.

The stove has been amply demonstrated in actual practice, and has been found to be very efficient in its operation. It is particularly adapted for use in connection with an oil burner mounted within the combustion chamber, inasmuch as the products of combustion from oil burners to be utilized the most efficiently must be circulated through a considerable distance before being exhausted to a smoke pipe and the present construction of the combustion casing 25 permits of a comparatively long circulation of the products of combustion in the casing 25 before being exhausted to the smoke pipe 34.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the various parts without departing from the scope of the present invention.

What is claimed is:

1. A hot air stove comprising, a rectangular casing open at both top and bottom and having its bottom spaced from a supporting surface, a closed, substantially rectangular double walled combustion chamber mounted within said casing, extending from adjacent the bottom of said casing to adjacent the top thereof, but terminating short of the top and having its sides generally spaced inwardly from the walls of said casing to provide passages within said casing for the circulation of air from the bottom to the top thereof, there being an air passage through the central portion of said combustion chamber for the circulation of additional air from the bottom to the top thereof, said casing having slots in its sides adjacent the bottom thereof for the passage of additional air to the interior of said casing, the various air passages admitting air to the interior of said casing adjacent the bottom thereof, and the air passage through said combustion chamber at the bottom thereof being in aggregate cross sectional area approximately equal to the cross sectional area of the top of said casing, and means for supplying heat to said combustion chamber.

2. A hot air stove comprising a double walled closed combustion chamber having an air passage extending centrally therethrough, the walls at the sides and one end of said chamber being narrowly spaced apart, the walls at the other end of said chamber being widely spaced apart at their lower portions to form a fire pot section and the inner wall of said last mentioned end being tapered upwardly and outwardly to the top of said chamber to form an inclined surface and to provide a flare in said air passage, means for supplying heat to said fire pot section to play directly on to said inclined surface and a smoke pipe disposed in said first mentioned end of said chamber, whereby most of the heat from said means will be absorbed by said inclined surface to heat the air in the flaring portion of said air passage, and a large portion of the balance of the heat from said means will be absorbed by said narrowly spaced side and first mentioned end walls before passage of the products of combustion to said smoke pipe.

In testimony whereof we affix our signatures.

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