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P. LITTLE, JR
AIR HEATING MEANS

Filed Dec. 9, 1920

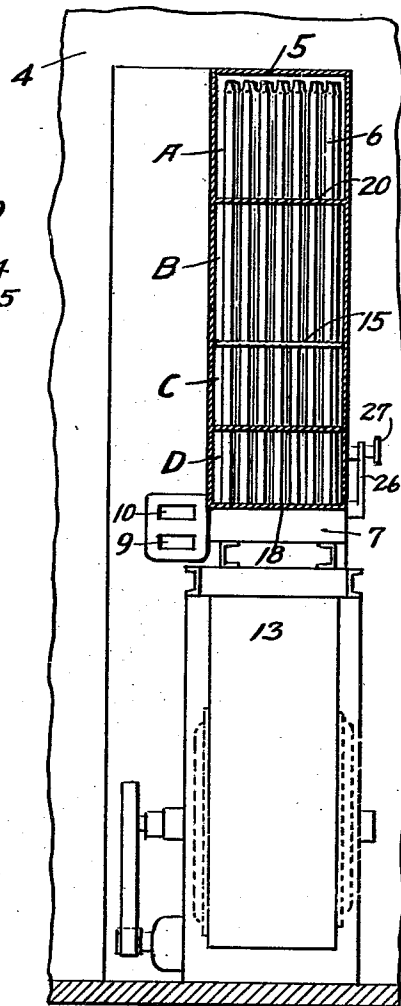
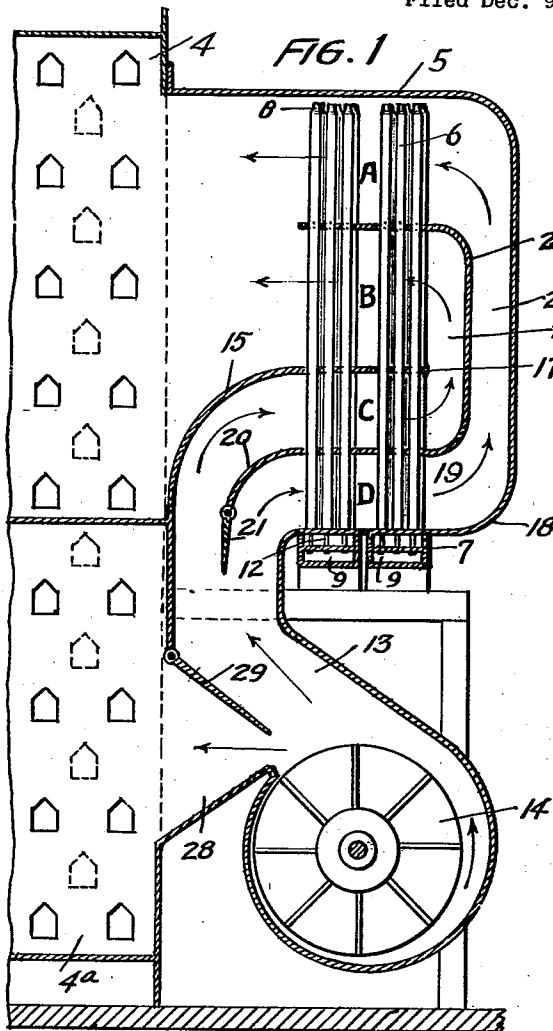
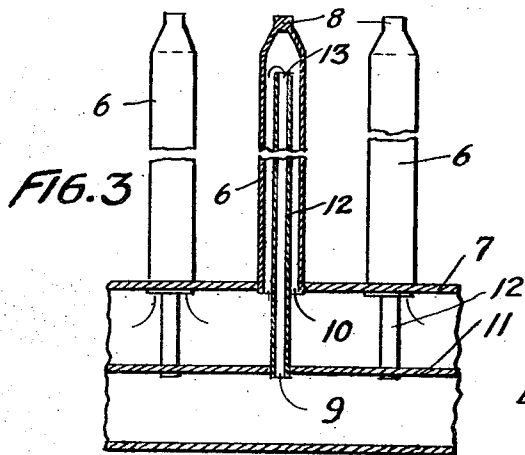


FIG. 2



INVENTOR

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HIS ATTORNEYS.

UNITED STATES PATENT OFFICE.

PHILIP LITTLE, JR., OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO THE STRONG SCOTT MANUFACTURING COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF MINNESOTA.

AIR-HEATING MEANS.

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To all whom it may concern:

Be it known that I, PHILIP LITTLE, JR., a citizen of the United States, resident of Minneapolis, county of Hennepin, State of Minnesota, have invented certain new and useful Improvements in Air-Heating Means, of which the following is a specification.

My invention relates to improved means for passing air currents produced by a fan or blower between heating elements, and more particularly where such air currents are used in connection with grain driers or like devices. The object of my invention is to provide means to heat the air more efficiently and uniformly than has heretofore been the practice, especially in heaters where certain types of steam heated pipes are used in which the heat from the steam is usually distributed more or less unevenly. My invention, primarily, consists in means for directing and distributing the air currents from a blower so that they will pass more than once through the heating chamber, and through differently heated zones thereof, thereby equalizing and increasing the temperature of the air. I accomplish this by splitting the air current and passing one stream of air first through the coolest zone of the chamber, and repassing it through the hottest zone, and at the same time passing and reversing the other stream through the more evenly heated zones. I also provide means whereby the streams of air passing through the different zones may be proportionally regulated.

My invention consists in certain constructions and combinations, as hereinafter described and particularly pointed out in the claims, with reference to the accompanying drawings, in which—

Figure 1 is a vertical section of an air heater having my improvements applied thereto, the device being shown in connection with a grain drier;

Figure 2 is a rear elevation with a portion of the walls of the heating chamber in section;

Figure 3 is a sectional detail, on a larger scale, of one of the heating bases and tubes shown in Figures 1 and 2, and to which my invention is particularly applicable.

In the drawings, 4 represents a grain drier to which a heating device is applied, and 5 is the heating chamber in which the steam heated radiators, or pipes, 6 are arranged,

preferably projecting vertically from a base 7 and being closed at the top by a welding 8 or other means. The bases 7, of which there may be as many in a complete heating unit as needed for the desired capacity, are divided in two steam compartments 9 and 10 by a partition 11. The lower compartment 9 is the primary intake for the steam, and the upper compartment 10 is a radiating chamber from which the steam is finally exhausted. The detailed construction of this heater however forms no part of the present invention but is merely shown and described as the form to which my invention is presently applied. Within the pipes 6 are arranged small pipes 12, having free outlets 13 at their upper ends. The pipes 12 pass through the compartment 10, and are connected to the primary steam compartment 9 by being screwed or otherwise fastened to the partition 11. Steam from a boiler suitably regulated, by means not shown, passes into the compartment 9, and and from thence upwards through the small pipes 12, to the top of the pipes, then downwards through the pipes 6 to the compartment 10. The incoming hot steam being thus directed to the upper ends of the pipes will cause the pipes to radiate the greatest amount of heat at the upper portion of the chamber 5, while the lower portion of the chamber will be considerably cooler. If the air were blown once through the heating chamber in a single stream and in one direction only as is ordinarily the case, it would be heated unequally and imperfectly resulting in inefficient drying and waste of heat. To overcome this defect I direct the outlet duct or throat 13 from the fan 14 inwardly below the heater, and curve it outwardly again at 15 towards and through the lower section of the heater, suitable holes being provided in the duct casing through which the pipes 6 pass.

The upper wall 15 of the duct 13 terminates at 17, or substantially at the outer edge of the heating pipe 6. The lower wall 18 preferably extends outwardly and upwards, forming the outer wall of the circulating chamber 19, and curving inwardly over the tops of the steam pipes is connected to the wall of the drier 4. The wall 15 divides the heating chamber into an upper and lower section and these sections are preferably split or sub-divided by a

central division plate or deflector 20. The division plate 20 is preferably provided, near the throat of the fan, with a deflecting valve 21 by which the air currents may be regulated to pass in the desired volume on either side of the division plate 20. From this point the division plate curves outward, generally following the direction of the wall 18, and divides the upper section of the heating chamber into the zones A and B, and the lower section into zones C and D, the zones A and D being connected by the outer duct 24 and the zones B and C being connected by the inner duct 25. The upper zones A and B are preferably of greater area than the lower zones C and D on account of the more expanded state of the air as it passes through between the hotter upper section of the pipes than during its passage through the comparatively cooler lower sections. It will be seen that as the air passes in the direction of the arrows in Figure 1 from the lowest and coolest zone D to the upper and hottest zone A it will emerge from the zone A tempered to a uniform and medium degree, and as the air passes through the zone C, which is slightly hotter than the zone D, to the zone B, which is slightly cooler than the zone A, it will emerge from the zone B tempered to substantially the same degree as the air coming from zone A. Any deviation from a uniform temperature of air coming to the drier 4 from the zones A and B may be corrected by diverting a greater or less volume of air to either the zone C or D, as conditions may require, by adjusting the valve 21 by means of the operating handle 26, connected to the valve 21 and having a suitable locking hand wheel 27. Cold air is usually supplied to the lower section 4^a of the grain drier 4, and for this purpose a diverting duct 28 is connected to the throat of the fan in which is arranged a deflecting valve 29 by means of which any desired volume of air may be passed to the drier without passing through the heater. With the application of my device I preferably make the heating pipes longer than usual with a considerable less number of base units of pipes as the uniformity of the heated air product effects a large saving and a greatly increased efficiency.

I claim as my invention:

1. An air heater, comprising a heating chamber, radiators arranged in said chamber and provided with zones of different temperatures, an air duct through which currents of air are conducted and means for deflecting said air currents first through the coolest part of the radiators and then in

an opposite direction through the hottest part of the radiators.

2. An air heater, comprising a heating chamber, radiators arranged in said chamber, an air duct extending in opposite directions through the end portions of said chamber, and a second air duct extending in opposite directions through the central portion of said chamber.

3. An air heater, comprising a heating chamber, radiators arranged in said chamber and provided with zones of different temperatures and means for conducting air first through the coolest and then in an opposite direction through the hottest part of said chamber.

4. An air heater for grain driers and the like, comprising a heating chamber, radiators arranged in said chamber, a division plate in said chamber dividing the same into zones of different temperatures, and forming an air duct extending in opposite directions through the end portions of said chamber, and a second air duct extending in opposite directions through the central portion of said chamber.

5. The combination with a grain drier having upper and lower drying sections of a fan casing arranged opposite the lower section of said drier and provided with means for directing a current of unheated air through said section, a heating chamber communicating with the other section of said drier, radiators arranged in said chamber, air ducts extending in opposite directions through said radiators, and means connecting said fan casing with said air ducts.

6. The combination with a grain drier having upper and lower drying sections, of a fan casing arranged opposite the lower section of said drier and provided with means for directing a current of unheated air through said section, a heating chamber communicating with the other section of said drier, radiators arranged in said chamber, air ducts extending in opposite directions through said radiators, means connecting said fan casing with said air ducts, and means for regulating the passage of air from said fan casing into said air ducts.

7. The combination with a grain drier of a heating chamber connected therewith, radiators arranged in said chamber, air ducts extending in opposite directions through said radiators, a fan casing connected with said air ducts, and means for regulating the passage of air from said fan casing into said air ducts.

In witness whereof, I have hereunto set my hand this 26th day of November, 1920.

PHILIP LITTLE, Jr.