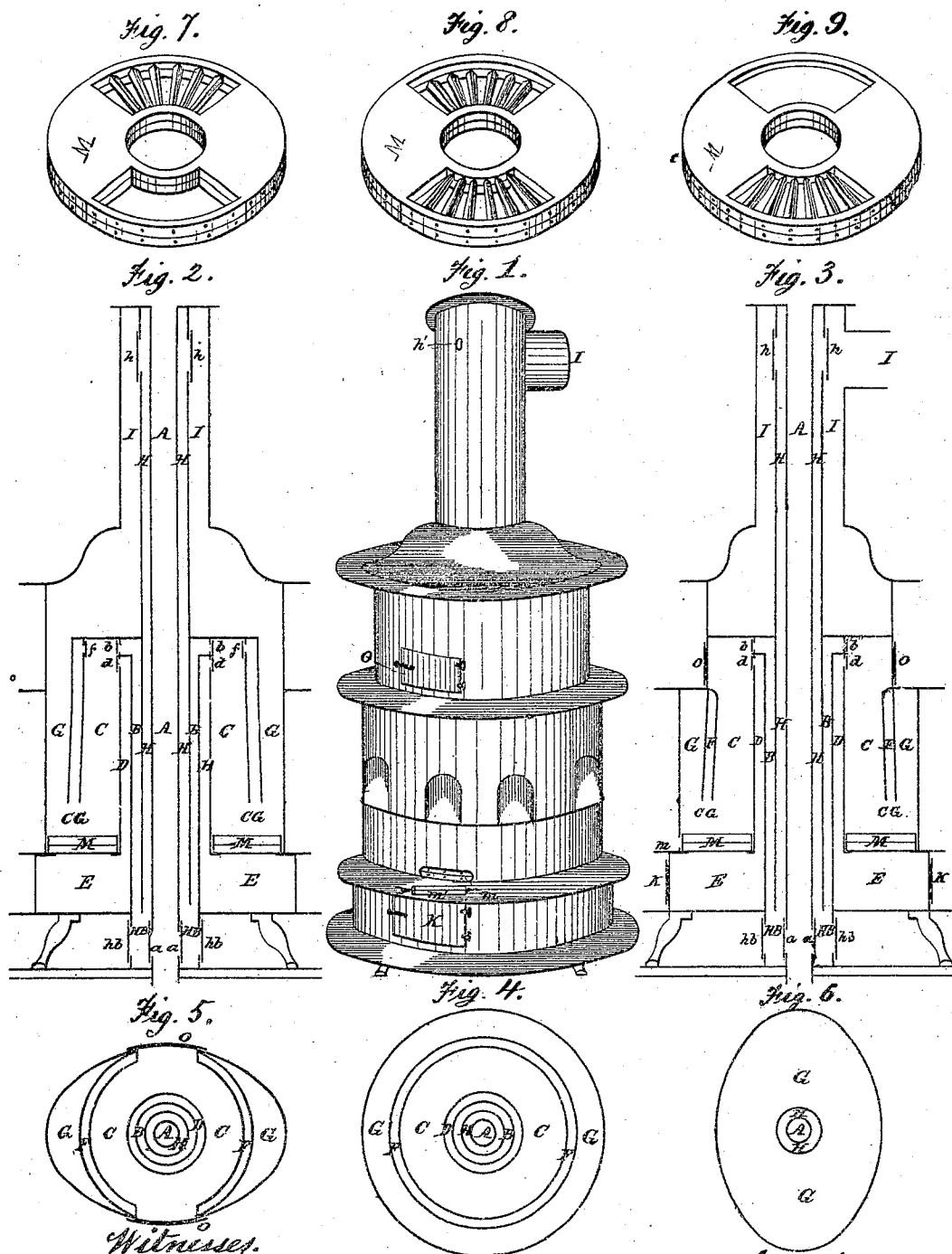


William F. Ross'
Ventilating & Radiating Heating Stove.
 No. 119,535. Patented Oct. 3, 1871.



Witnesses.
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IMPROVEMENT IN HEATING-STOVES.

Specification forming part of Letters Patent No. 119,535, dated October 3, 1871.

To all whom it may concern:

Be it known that I, WILLIAM FRAZIER ROSS, of Davenport, in the county of Scott and State of Iowa, have invented certain Improvements in Heating-Stoves, of which the following is a specification:

The nature and objects of my invention are as follows, viz: First, the combination of air-passages with a heating-stove in such a manner that they may communicate with the open air and the atmosphere of the room containing the stove, so as to let fresh air into the room at or over the stove, and remove the foul air from the room as may be required for the ventilation of the room and the combustion in the stove. Second, the combination of air-passages with a heating-stove in such a manner that all of the air for the support of combustion therein may be taken from beneath the stove into the upper part of the fuel-chamber thereof, or into an air-chamber above the fuel therein, and distributed thence so as to produce counter-currents at the surface of the fire, and at the same time a constant downward draught through the fuel in the reservoir; the object being to complete the combustion of the gaseous products of the fire at the surface thereof, and prevent ignition of the fuel in the reservoir above the fire-chamber, having more especial reference to a base-burning stove, and to the burning of bituminous coal and the smoke therefrom. Third, the arrangement of the air-chambers and air-passages in the stove in such a manner as to protect the air-supply ducts and the fuel in the reservoir above the fire-chamber from the heat and gases of the fire; also, so as to hold the fire nearer to the radiating surface of the stove; also, so as to not obstruct the radiation of the heat. Fourth, the construction and arrangement of the bottom of the fire-chamber in such a manner that it may be shifted so as to form a close bottom of one or more grates, with suitable fixed interstices or a large opening, as desired, the object being to allow, as occasion requires, that the upward draught through the fire may be shut off when the door of the ash-chamber is open, so as to avoid any counteraction of the draught down through the reservoir; that the fire-chamber may be made to hold coal-dust, sawdust, or other fine fuel which would pass through the interstices of the grates; that the ashes may be sifted through the grates; and that clinkers or other remains of

combustion too large to pass through the interstices of the grates may be removed through the large aperture.

Figure 1 is a view of a stove embodying my invention. Fig. 2 is a vertical section of the same. Fig. 3 is a vertical transverse section of the same. Fig. 4 is a horizontal section of the same midway between the doors O and the doors K. Fig. 5 is a horizontal section of the same through the doors O. Fig. 6 is a horizontal section of the same immediately above the reservoir or fuel-chamber C. Figs. 7, 8, and 9 are views of the bottom M of the fire-chamber G.

A is an air-duct formed by a perpendicular cylinder or pipe through the center of the stove, communicating at the bottom with the open air, and at the top with the atmosphere of the room containing the stove, for introducing a constant supply of fresh air into the room for the respiration of the occupants, to ventilate the room, and to support combustion in the stove, in combination with the ducts H and B, or either of them, or with any duct for exhausting air from the bottom of the room, driving impurities in the atmosphere of the room down to the bottom and out through one or more of said ducts or exhausters, in combination with the room containing the stove, and duct B or any aperture in the stove for the admission of air to support combustion—admitting a draught proportionate to the coldness of the weather and the pressure resulting from the difference between the temperature of the room and the open air—made of sheet-iron or some heat-absorbing material to separate it from duct H contiguous thereto, so that cold air in duct A may cool the air in duct H and thus suppress the draught in the latter and force more draught through duct B and the fire; thus, when the weather is colder preventing a too rapid changing of the atmosphere of the room through ducts A and H, and at the same time accelerating the combustion in the stove, and so maintaining an even temperature in the room; communicating with the open air at the bottom, so that the warmer air of the room may not escape through this channel; protected from the fire by the surrounding ducts H, B, and D, so that the fresh air may not absorb unhealthy gases from the burning fuel through heated iron plates contiguous thereto, or be warmed so as to prevent it from checking the draught in H; introducing

the fresh air into the upper part of the room and above the stove, so that it may be breathed by the occupants before it comes in contact with impurities in the lower part of the room, and so that the fresh air may be warmed by contact with the ceiling and the warmer air in the upper part of the room, and by heat radiated from the stove before it reaches the floor, thus avoiding cold currents in the lower part of the room and the raising of dust from the floor in the process of warming the fresh air. The air-duct or air-chamber A may be made of any other suitable material or in any other suitable form, and may be placed at the side or otherwise than in the center of the stove, and may be separated from duct H, and unprotected by other air-ducts, so that it shall discharge the fresh air at or over the stove into the room or apartment without bringing it into contact with the fire or with heated metal contiguous thereto, or with the atmosphere in the lower part of the room. H is an annular air-duct, for removing the vitiated air from the lower part of the room and creating a vacuum in the room for the admission of fresh air and for protecting the fresh-air duct A from the fire and unhealthy gases resulting from combustion, formed by a perpendicular cylinder or pipe around the pipe forming duct A, communicating at the bottom with the atmosphere in the lower part of the room and at the top with the smoke-pipe of the stove, and through it with the open air; made of sheet-iron or some heat-absorbing material, and exposed to the heat of the draught from the fire and discharging into the smoke-pipe, so as to promote the ventilation; operated by the heat and draught in the stove and smoke-pipe, and by the pressure of the atmosphere in the room; governed by the air in the contiguous pipe forming duct A, and regulated by the damper *h* with the rod *h'* at the top. *h b* is a damper at the bottom for the admission of air from the lower part of the room. The air-duct or air-chamber H may be made of any other suitable material or in any other suitable form, and may be placed outside of the stove or otherwise therein, or otherwise than around air-duct A, and may communicate with the atmosphere of the room either through or above the floor, directly or indirectly, and may communicate with the open air directly, or may discharge into the upper part of the stove, or into any flue or passage communicating directly or indirectly with the open air, and may be operated by the heat of the stove or smoke-pipe, or by the draught therein, or by the heat or draught in the flue into which it discharges, or by the pressure of the atmosphere, either or all of them, and may be regulated or not, or by any other means, so that it shall either be placed contiguous to the pipe forming the fresh-air duct A, be separated from duct A by a material which is an absorbent of heat, and communicate with the atmosphere of the room and the open air, substantially as described, or so that it shall be placed between the fresh-air duct A and the fire, or between the fresh-air duct A and the draught from the fire, so as to protect the fresh-air duct A from the fire or the un-

healthy gases therefrom. B is an annular air-duct formed by a perpendicular cylinder or pipe around the cylinder or pipe forming duct H, from the bottom of the stove to the top of the reservoir C, through which all of the air for combustion in the stove is taken from beneath the stove and discharged into the reservoir C over the fuel, communicating at the bottom with the atmosphere in the lower part of the room, so that it may equalize the temperature of the room by taking the air from the coldest part thereof or with the open air, so that it may support combustion without changing the atmosphere of the room; introducing the air into the reservoir C over the fuel so as to afford a draught of air down through the fuel, to retard combustion in the reservoir C, and drive the heat and gases of the fire under the bottom of F into the radiating-chamber G. *h b* is a damper at the bottom for the admission of air from the lower part of the room. *b* is a damper at the top of B in the reservoir C for regulating the supply of air, and is reached through the door O. *a* is a damper for admitting fresh air from out-doors, so as to support combustion without changing the air of the room. Duct B may be made by partitions in duct H, or in any other suitable form or of any other suitable material, and may be otherwise placed, inside or outside of the stove, so that it shall take the air from below the fuel or fire and discharge it above the same, substantially as and for the purposes set forth. C is the reservoir or fuel-chamber, into which the fuel is introduced through the doors O at either front or rear, and into the upper part of which all of the air for combustion in the stove is received, and from which it is distributed down through the fuel and through ducts D and F, so as to produce counter-currents at the surface of the fire, and complete the combustion of the gas and smoke without counteracting the draught down through the fuel. The reservoir C may be made in any suitable form or of any suitable material, and may be divided into two compartments, the air-chamber above and the fuel-chamber below, and communicating with each other, and the fuel may be introduced in any other suitable way. D is an annular air-duct, formed by a perpendicular cylinder or pipe around the cylinder or pipe forming duct B, from the upper part of the reservoir C to the ash-chamber E, communicating at the top with the upper part of the reservoir C and at the bottom with the ash-chamber E, and through it with the fire-chamber C G at the bottom, thus affording an upward draught through the fire from the same source above the fuel as that of the draught down through the fuel, so that the latter, having the shorter passage from the upper part of the reservoir C, their common source, to the radiating chamber G, their common destination, may not be counteracted by the upward draught, and so that, when fine fuel is used and air cannot pass down through reservoir C, a draught through the fire may be had from the same source through duct D and the ash-chamber E; placed between duct A and the fire so as to protect the fresh air from the fire or the gases

therefrom; and placed between duct B and the fire so as to protect the air in duct B from the heat and let it be introduced cold into the reservoir C to cool the fuel and retard combustion in the reservoir C above the fire-chamber C G. *d* is a damper at the top of D in the reservoir C for regulating the draught through duct D, and is reached through the door O. Duct D may be made in any other suitable form, and may be placed outside of the stove or, otherwise, in it, or otherwise than between duct A and the fire, or otherwise than between duct B and the fire, and may communicate with the reservoir C otherwise than at the upper part thereof; or it may be separated from the reservoir C by a perforated partition or otherwise, in such a manner that the air may pass freely between them from top to bottom, and it may communicate with the fire-chamber otherwise than at the bottom, directly or indirectly, so that it shall take air from the reservoir C and discharge it so that it may pass through the fire, or so that it shall be placed or arranged between duct A and the fire, or so that it shall be placed or arranged between duct B and the fire, substantially as and for the purpose set forth. F is an annular air-duct between the reservoir C and the radiating or heating-chamber G, from the upper part of the reservoir, above the fuel, down to the fire-chamber C G, through which air may pass from reservoir C directly down to the surface of the fire and there meet the draught from the latter and complete the combustion of the gaseous products of the fuel as they rise; also affording a supply of air from the upper part of the reservoir C to the fire when the passages through the reservoir C and the bottom M of the fire-chamber C G are obstructed, so as to support combustion without counteracting the downward pressure of the air in the reservoir; placed between the reservoir C and the radiating-chamber G so as to protect the fuel in the reservoir C from the heat of the radiating-chamber G and prevent excessive heating of the bottom of the cylinder or partition forming the reservoir C by spreading the combustion of the gas and smoke over more surface. *f* is a damper for regulating the proportion of air allowed to pass down through duct F. Air-duct F may be made wider at the bottom or may be made in any other suitable form and may be placed outside of the stove, or otherwise in it, or otherwise than between the reservoir C and the radiating-chamber G, or may be formed by a combination with duct D or with duct D and the ash-chamber E, taking the air from duct D or ash-chamber E and discharging it at the surface of the fire; or it may communicate with the reservoir C otherwise than at the upper part thereof, or it may be separated from the reservoir C by a perforated partition or otherwise, in such a manner that the air may pass freely from one to the other from top to bottom, and it may discharge the air over the surface of the fire at any part thereof, so that it shall take the air from the reservoir C and discharge it over the surface of the fire, substantially as and for the purpose set forth. C G is the fire-chamber, formed by the union of the reservoir C and the radiating-chamber G below the duct F.

M is the bottom of the fire-chamber, illustrated by Figs. 7, 8, and 9, and consists of two circular plates, one over the other, each having an opening through the center for the passage of the ducts A, H, B, and D, and so that air may pass down from the upper part of the reservoir C, through duct D, into the ash-chamber E, and each having a grate of suitable interstices on one side of the central opening and an aperture of corresponding dimensions with the grate on the opposite side of the central opening, the rims of each being finished alike with different kinds or colors of surface to distinguish the location of the grates and the large apertures, and with holes at suitable intervals, and all so arranged that either or both may be shifted or revolved, as desired, by means of the rod *m'* inserted in the holes in the rims through the slot *m*, so that the grates may be brought on opposite sides of the center, the grate of one plate and the corresponding aperture of the other being one over the other, as shown in Fig. 8, when, by revolving both together, the grates may be brought under all parts of the fire and the ashes shaken from any part of the fire-chamber, so that they may be shifted so as to bring the two grates together and the two apertures together, one over the other, as shown in Fig. 7; when, by revolving both together, the large aperture may be brought under all parts of the fire-chamber, and so let clinkers or other solid products of combustion too large to pass through the interstices of the grates drop through the large opening into the ash-chamber E; also, so that they may be shifted so as to close all of the openings, as shown in Fig. 9, and thus be made to hold sawdust, coal-dust, or other fine fuel, which would waste through the interstices of the grates if they were open, and so that the upward draught through the fire may be shut off when the door of the ash-chamber is open, and thus avoid any counteraction of the draught down through the reservoir. *m* is a slot in the side of the stove through which the bottom M of the fire-chamber may be shifted or revolved, as desired, by means of the rod *m'*, which is provided with a single point at one end and two at the other, so that either one or both of the parts may be revolved at once, as desired. The bottom M may be made without the central opening, as when neither of the air-ducts A, H, B, or D pass through it, or one of the plates may be made stationary, or the number and size of the grates and large openings may be more or less, and the edges may not be finished so as to distinguish the location of the grates and openings, or only one of them may be so finished, or they may be otherwise revolved or shifted, so that the grates have fixed interstices and so that the two parts or either of them may be shifted so as to close all of the openings and so as to open the grates, and so as to open the large apertures as desired, substantially as and for the purpose set forth; or both of the parts may consist of grates with fixed interstices and large apertures, as described, so that the grates may not be closed, but so that the grates or large apertures may be formed as desired, substantially as described; or it may consist of several parts

arranged singly or one over the other, under the fire-chamber, so that they may be shaken or revolved, substantially as set forth, and so that one of the parts may be withdrawn sufficiently to let the clinkers or other solid products of combustion drop into the ash-chamber E. E is the ash-chamber, into which the ashes are sifted and other remains of combustion deposited through M, and which receives air from the top of the reservoir C, through the duct D, and supplies it to the fire through M. K and K are close-fitting doors to the ash-chamber E, through which the ashes may be removed. O and O are doors to the reservoir C, through which the fuel is introduced and through which the dampers in the reservoir C may be regulated. I is the smoke-pipe. H B is an air-chamber formed by the union of ducts H and B under the stove, through which and damper *h b* air is taken from the lower part of the room into ducts B or H, or through which and damper *a* air may be taken from air-duct A into duct B.

I do not claim an air-duct through a stove or stove-pipe for warming air. I do not broadly claim air-passages in a stove for discharging air for combustion at the surface of the fire, or both below and above the fire from a common source, or at the surface of the fire in different directions. I do not broadly claim the construction of the

grate of a stove in two parts so as to regulate the supply of air allowed to pass through it.

I claim as my invention—

1. The fresh-air duct A, in combination with foul-air duct H and draught-duct B, or either of them, substantially as and for the purpose set forth.

2. The combination, with air-duct H, of the dampers *h* and *h b*, either or both of them, substantially as and for the purpose set forth.

3. The combination, with air-duct B, of the damper *a* and air-duct A, substantially as and for the purpose set forth.

4. The combination, with fuel-chamber C and draught-chamber *b*, of the air-ducts D F, either or both, substantially as and for the purpose set forth.

5. The combination, with fuel-chamber C, damper *b*, and duct F, of the damper *f*, substantially as and for the purpose set forth.

6. The construction and arrangement of the bottom or grate M of the fire-chamber so as to form either one opening or grates, or a close bottom, as set forth.

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Witnesses:

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