H. HOWSON.

Heating Stove.

No. 46,605. Patented Feb. 28, 1865.

Fig. 1

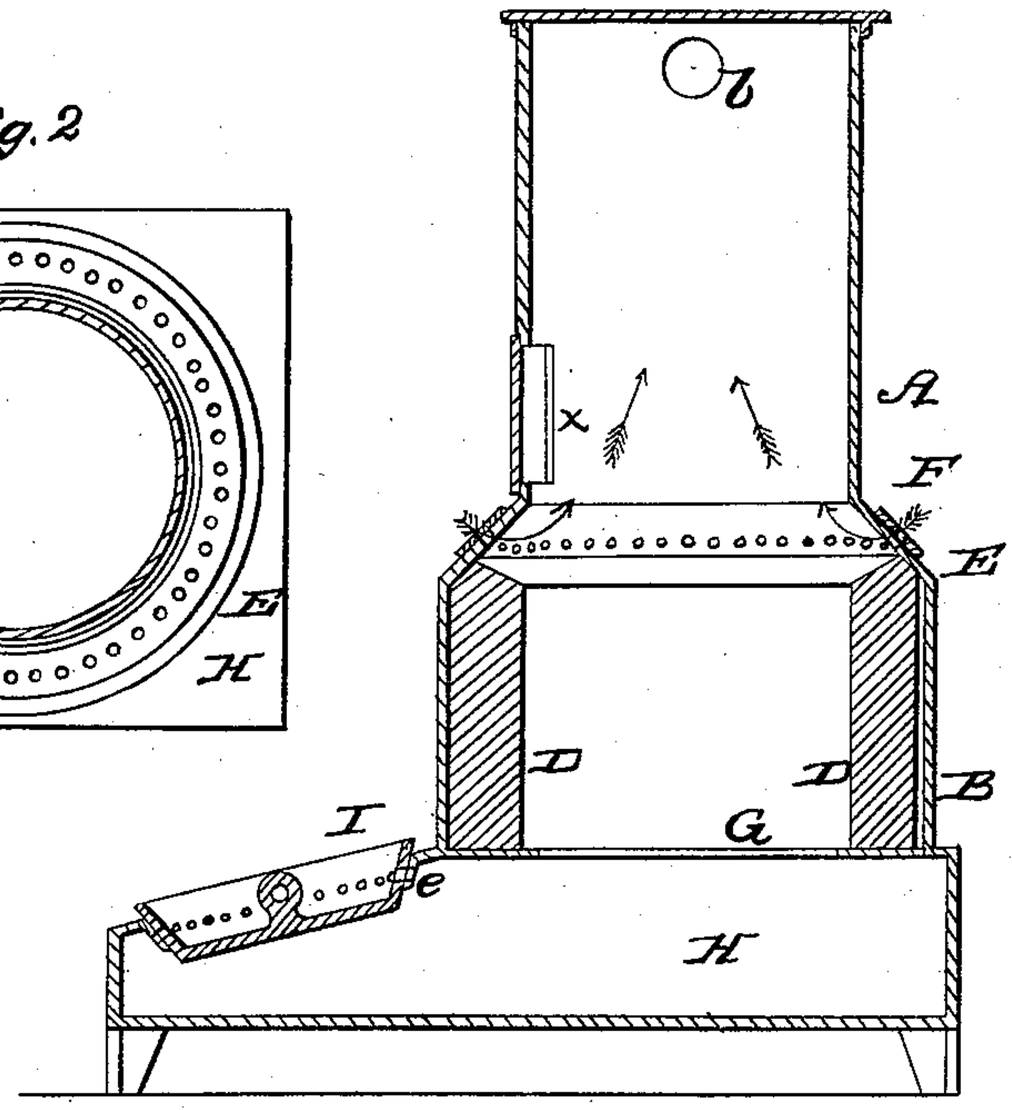


Fig. 2

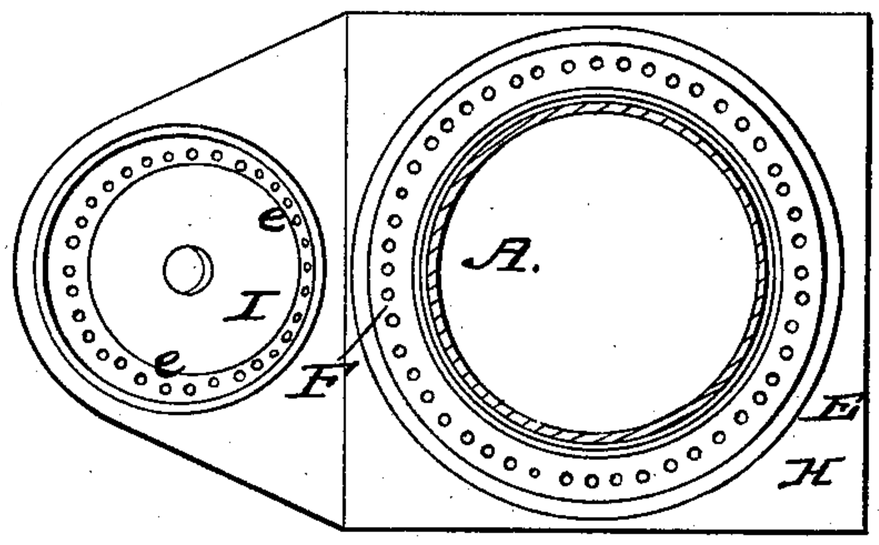


Fig. 3

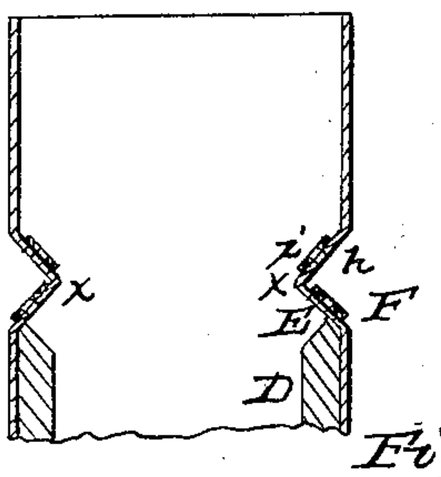


Fig. 4

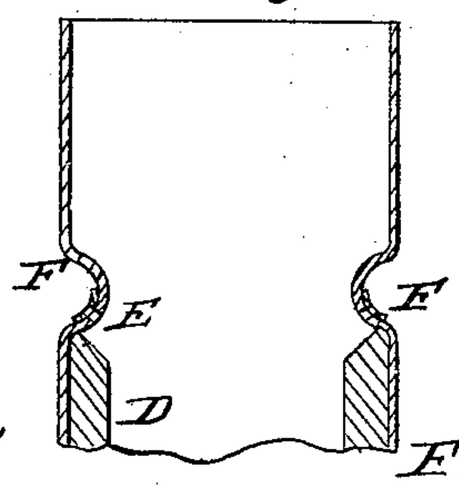


Fig. 6

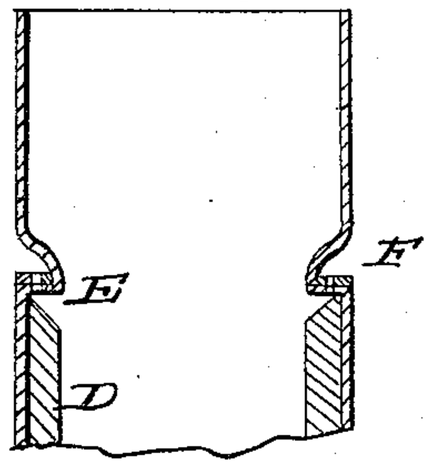


Fig. 7

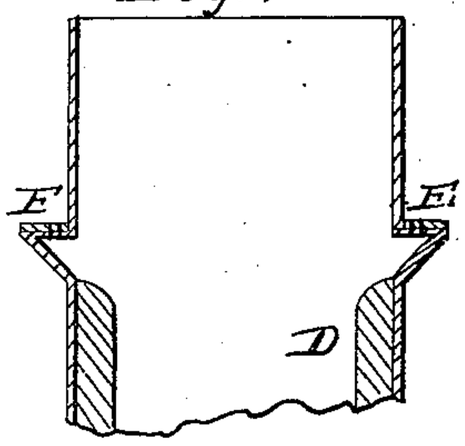
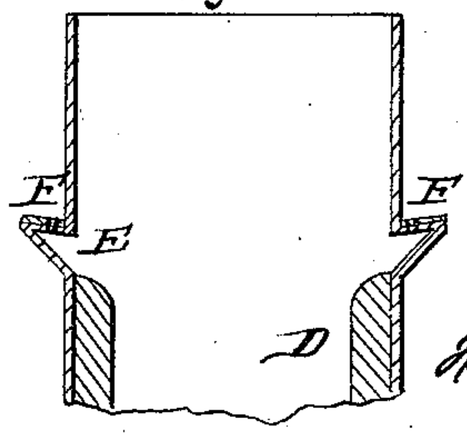


Fig. 5



WITNESSES

Chas J. Foster

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UNITED STATES PATENT OFFICE.

HENRY HOWSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO STUART & PETERSON, OF SAME PLACE.

IMPROVEMENT IN GAS-BURNING STOVES

Specification forming part of Letters Patent No. **46,605,** dated February 28, 1865; antedated February 20, 1865.

To all whom it may concern:

Be it known that I, HENRY HOWSON, of Philadelphia, Pennsylvania, have invented certain Improvements in Gas-Burning Stoves; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My improvements, which are fully described hereinafter, have been designed for the purpose of introducing in the fire-places of cylinder and other round stoves, immmediately above or on a level with the upper surface of the fuel, small jets of air in as cold a state as possible, the said jets being introduced through perforations arranged throughout the circumference of the stove, and being controlled by an annular plate or register which fits snugly to the stove, no matter how much its dimensions may vary, owing to variable expansion and contraction.

My improvements have also for their object the perfect control of the draft below the grate of the stove.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation.

On reference to the accompanying drawings, which form a part of this specification, Figure 1 is a vertical section of a cylinder-stove with my improvement, Fig. 2 a sectional plan view of the same, Fig. 3 a vertical section of part of a cylinder-stove with a modification of my improvement. Figs. 4, 5, 6, and 7 represent further modifications of the invention.

Similar letters refer to similar parts throughout the several views.

Before describing my improvements it may be well to remark that they are based upon what is now generally acknowledged to be a fact—namely, that in order to effectually consume the gases and smoke evolved from the burning fuel in stoves and furnaces it is necessary in the first instance to obtain a brisk fire by means of a draft from below, so that the gases may be in a properly heated and ignitible state, and then to introduce small jets of air in as cold a state as possible above or near the surface of the fuel, so that a plentiful supply of oxygen may be intimately mixed with the ignitible products of combustion and consume the same, the once popular error that chambers should be used for heating the air prior to introducing it in the form of jets into the fire-place above the fuel being discarded.

On reference to Figs. 1 and 2 of the annexed drawings, A represents the portion of the casing of a cylinder-stove above the fire-place, and B the portion of the casing which incloses the fire-place, or which surrounds the fire-brick cylinder D.

The two portions A and B of the casing are connected together by the inclined annular plate E, entirely round which extends one or more annular rows of small perforations.

On this annular plate E rests another plate, F, (or, as it may be more properly termed, a "damper" or "register,") of an inclined form, corresponding with that of the plate E, this register F having perforations corresponding in form, number, and arrangement with those in the plate E.

G is the usual grate, and H the ash-box, which projects beyond the cylinder B, the top of the projecting portion being in the present instance slightly inclined, as seen in the drawings, or it may be level. In the top of the projecting portion of the ash-box is a circular opening bounded by a perforated or notched annular flange, *e*, the opening being beveled so as to be larger above than below, and being arranged for the reception of the circular register, I, which is beveled at the edges to suit the opening, and which has perforations corresponding with those of the flange *e*. The cylinder of the stove has the ordinary doorway *x*, through which the fuel is introduced into the fire-place, and the usual exit opening, *b*, for the passage of the products of combustion to the chimney.

In kindling the fire in the first instance, the annular plate or register F should be so turned that no air can pass through the perforations in the plate F, and a plentiful supply of air should be permitted to pass through the grate from below either by removing the register I or turning the same until its perforations coincide with those of the flange *e*.

When a brisk fire has been kindled and the

gases evolved from the fuel are heated to a degree proper for ignition, the register F is moved so that its perforations coincide or nearly coincide with those of the beveled plate E, when the jets of air will, owing to the draft, pass through the numerous small holes, in the direction of the arrows, toward the exit-opening, and, becoming mixed with the gases and smoke, will ignite and consume the same. When the air has free access through the perforations in the register F, the draft from below may be partly cut off by turning the register I, in which case the jets of air will, owing to the diminution of the draft, take a course nearly to the center of the stove before they rise toward the exit-opening, and thus become thoroughly intermixed with the ignitible products of combustion.

It will be seen that the external air has to pass through two thin plates only before it gains access to the fire-place, and consequently that it is in a cooler state and contains more oxygen (which is the gas-igniting and smoke-consuming element) than when the air is introduced into a hot chamber or into heated distributing rings before it reaches the fire-place.

I am aware that perforated plates or registers have been heretofore used in connection with cooking-stoves, and that they have been so arranged that the external air, before it can gain access to the fire-place above the fuel, has to pass through two plates only; but I am not aware that an annular perforated plate or register has been heretofore so arranged in connection with a cylinder-stove between the top of the fire-place and sheet-iron casing that jets of air can be admitted directly to the space above or near the level of the fuel through perforations arranged entirely or nearly entirely round the cylinder.

It will be evident that there must of necessity be a difference in the temperature of the perforated plate E and that of the plate F, and that this difference of temperature must vary according to the condition of the fire in the stove. The plate E, being exposed to the direct action of the fire, will expand more rapidly than the annular plate F, and the latter would be constantly liable to fracture from this cause were it not for the inclination of both plates, this inclination being such that the moment the plate E begins to expand it will cause the annular plate F to rise, while it still remains, owing to its gravity, in close contact with the plate E, and insures a tight or a comparatively tight joint. When the plate E, through the reduction of the heat of the fuel, begins to contract, the plate F will fall to a limited extent, or, in other words, the plate F will readily accommodate itself to the difference in the contraction and expansion of the two plates.

In order that any change in the position of the register F on the plate E may not interfere with the free passage of air through the perforations, those of one plate may be made slightly larger than those of the other. The plate E may be made of cast-iron and the sheet-iron casings A and B fitted to the same; or the casing B, or even the entire casing of the stove, may be made of cast-iron in one piece with the plate E, and the clay fire-pot may be dispensed with, if desired.

It will be evident that the plates E and F admit of being highly ornamented, and can be thus made to add to the beauty and finish of the stove.

It will also be evident that the annular plate F can be made to fit perfectly tight to the plate E by grinding the two together with sand or emery and by the aid of suitable machinery.

In the modification illustrated by Fig. 3 the stove is contracted at a point just above the fire-place by an angular and annular recess, the inclined annular and perforated plate E and annular perforated register F being retained, or the stove may be still further modified by introducing a second perforated register, *i*, into the interior of the stove, so as to rest on the inclined recess *h*, formed by the annular and angular indentation. This arrangement is preferable in one respect, namely, that of insuring a more thorough mixture of the external air with the gases evolved from the fuel than the arrangement first described. So much of the smoke and gases as may not be ignited and consumed by the air passing through the lower perforations will, on passing the contracted space between the points *x x* expand laterally and meet the jets of air passing through the upper perforations, the flame caused by this admixture licking the interior of the casing A and increasing the heat of the stove.

It will, of course, be understood that the annular perforated register F, in Fig. 3, must be made in two or more pieces, connected together after they have been adjusted to their proper position.

It will now be seen that the object aimed at, and, it is believed, fully attained, is the introduction of numerous small jets of air in as cold a state as possible to the fire-place of a cylinder-stove above or nearly on a level with the surface of the fuel in the same, and the introduction of these jets at as many points as possible and throughout the entire circumference of the stove; also, to obtain perfect control of these jets of air by the use of a perforated annular plate or register, the movement of which will insure the instantaneous introduction of the jets to the fire-place or the simultaneous closing of the perforations; also, to insure the permanence and tight fitting of the register by its own gravity against the perforated plate E, no matter how the diameters of the two may vary, owing to the difference betwen the extent of their expansion and contraction. These important results can be obtained by the use of the curved annular register F, which rests on a concave annular indentation formed above the fire-place, as seen in Fig. 4.

Important results can also be attained by the modification seen in Fig. 5, which will be readily understood without description. In this case, however, the jets of air have to pass in contact with heated surfaces for a short distance before they can reach the fire-place, and therefore the modification is so far objectionable.

A perfectly flat annular perforated register may be used in the manner seen in Figs. 6 and 7, its own weight maintaining it in sufficiently close contact with the plate E.

The objection, however, above mentioned, in reference to Fig. 5, holds good in this instance, and there is this further objection that a flat annular register is apt to warp, and, consequently, the air would have a tendency to pass through the perforations when not required to do so, whereas the inclined annular register possesses within itself, owing to its form, that element of rigidity and strength which resists all tendency to warp and alter its form when exposed to different temperatures.

It is important in all stoves that the draft from below should admit of being controlled with that accuracy which cannot be attained by the ordinary doors and sliding dampers, the fitting of which is generally so imperfect that more or less space is presented through which more air than necessary can pass.

It will be seen that the beveled damper I by its own weight maintains its proper position in tight contact with the beveled opening of the ash-pit, and that by turning this damper the amount of air admitted below the grate may be regulated with the greatest nicety.

Disclaiming the introduction of jets of air into the fire-place of a stove or furnace above the fuel in the same, I claim as my invention and desire to secure by Letters Patent—

1. An annular perforated plate, E, arranged on or forming a part of a round or cylinder stove at or near the upper part of the fire-place, in combination with an annular perforated plate or register, F, when the latter, as well as the register, are so formed and so adapted to each other that any difference in the expansion or contraction of the register and plate cannot impair the former or disturb its tendency to fit by its own weight on the plate E.

2. An inclined plate, E, formed by the annular indentation of the stove immediately above the fire-place, in combination with an annular perforated plate or register, as seen in Figs. 4 and 6.

3. Two circular and indented or beveled surfaces, formed by contracting the body of the stove, in combination with two annular perforated registers, one above and the other below the point contracted, as seen in Fig. 3.

4. In combination with the ash-box, the beveled damper I, with its perforations or notches, when the said damper is adapted to the beveled opening of the ash-pit, and its notches or perforations, substantially as set forth, for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY HOWSON.

Witnesses:

JOHN WHITE,

W. J. R. DELANY.