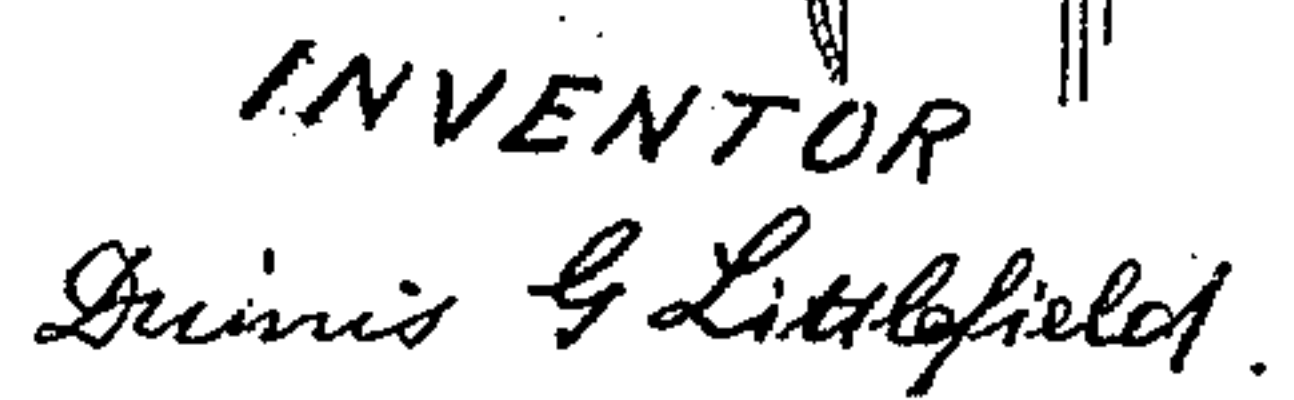


Magazine Stove.

Patented Dec. 9, 1862.



UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN STOVES.

Specification forming part of Letters Patent No. **37,103**, dated December 9, 1862; antedated November 26, 1862.

To all whom it may concern:

Be it known that I, DENNIS G. LITTLEFIELD, of the city of Albany, in the county of Albany and State of New York, have invented a new method of constructing that class of stoves using a supplying cylinder or chamber for the reserve coal, and which cylinder, together with the fire-pot upon which it rests, is surrounded by a case forming a chamber for the reception of the products of combustion as they issue from the burning fuel; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Figure 1 is a central vertical section of the stove from front to back; Fig. 2, a plan of the base, coal-grate, and register; Fig. 3, a plan of the top of the stove, the cover thereof being removed; Fig. 4, a transverse central vertical section of the upper part of the stove; Fig. 5, a plan of the fire-pot separate from the stove.

Like letters designate corresponding parts in all of the figures.

In the class of stoves above specified there are defects and imperfections which it is desirable to remedy: First, it is desirable to have the fire-grate so constructed as to dispose of the slate and other incombustible substances which accumulate at the bottom of the fire-pot without tilting the grate to empty the same, since it is better not to rekindle the fire immediately upon the grate, in order to avoid destroying it by the direct action of the burning fuel; second, it is desirable to obtain more direct and enlarged radiation from the coal that is in a state of ignition, in order to increase the heating power of the stove, or, in other words, to more completely utilize the heat produced by the combustion of the volatile as well as the fixed portions of the fuel; third, to the same end, and that more heat may be communicated through the surrounding case from the chamber surrounding the fire-pot, it is an object to devise a better method of its receiving the radiation from the fire and the fire-pot, and also of directing the products of combustion to come more directly and in a better condition for imparting their heat while in contact with the same; fourth, stoves of this class, or any stove that employs a supplying-cylinder for the reserve fuel, gen-

erate and retain within the supplying-cylinder explosive mixtures, more or less, according to to the quality of the fuel, also varying as to whether the coal is wet or dry when supplied to the said reservoir, so that when it is opened to replenish with coal the sudden intermixture of this highly inflammable gas with atmospheric air, which is drawn in at the top of said cylinder by the action of the draft through the lateral outlets of the fire-pot and up the outer chamber, a momentary explosion takes place, which, though not always dangerous, is quite annoying; hence any construction which will obviate such explosions must be considered an important attachment to this class of stoves.

To effect the last-named purpose is to remedy a positive defect; but the former purposes may be regarded as improvements. All, however, if effected, are useful and desirable.

The first object I effect by means of an improved grate, which I denominate a "mill-grate," and which is constructed substantially as follows: There is a small central grate, A, which is fixed, and is formed with radial projections *a a* on its periphery, as shown in Fig. 2. Outside of this small stationary grate is another annular grate, B, concentric with the grate A, around which it has a reciprocating movement. There are radial bars *b b* on this grate, projecting inward toward and nearly to the bars or projections *a a* of the grate A. The grate B is rotated by a lever inserted in the usual manner, by which process slate and other incombustible matter is ground into small pieces between the moving bars or projections *b b* and the fixed projections *a a*, the operation being analogous to that of a grinding-mill. The pieces fall through between the bars of the grate as fast as broken sufficiently fine, and the fire-pot is quickly cleared of these impurities without emptying the grate, although the whole grate combined is, or may be, made to tilt in the usual manner. The grate B is made more or less dishing or concave, in order that the incombustible matter may work toward the center or to the grinding-point. There may be projections on the outer edge of the grate B, as shown in the drawings, if thought best in practical use. In connection with the fire-grate I employ a register, C, outside of the fire-pot, so as to form

a communication between the chamber E and ash-pit G. This register is constructed of two plates, *c f*, the lower one being stationary and forming the bed-plate or floor of chamber E, in which plate the fire-grate is suspended, and upon which the fire-pot D rests. It has the proper register-apertures in it, while the upper plate, *c*, rests upon it, and, having corresponding apertures, serves to open and close the apertures in the lower plate, as circumstances may require. The plate *c* is moved by means of a lever placed in a socket, *g*, thereof. This register is intended for, and serves a double purpose—viz, to open the floor of chamber E to remove the ashes deposited in said chamber by the current or draft from the fire-pot, and at the same time to serve the purpose of taking up from the ash-pit the light floating dust (there being a draft up through said register) when shaking down the ashes and slag from the fire-pot. Consequently, to open said register for the purpose of preventing dust flowing out while agitating the grate, it at the same time removes the ashes from chamber E, thereby compelling the operator to remove the ashes from said chamber (which it is necessary to do to avoid burning out the fire-pot) when the only apparent motive is to prevent dust flowing out, as before mentioned. To insure this result, the lever-socket of the register-plate *c* is so situated that it must be moved aside and open the register before the lever-socket of the fire-grate can be reached.

The second general object of my invention is effected by the peculiar construction of the fire-pot D, in connection with the chamber E, which receives the products of combustion. This fire-pot is constructed with mouths or combustion-outlets in its periphery, flaring outward from the bottom upward, as shown in Figs. 1 and 5. There are more or less of these combustion-outlets of the proper or convenient size occupying the whole periphery of the fire-pot. Over and partially within these outlets are respectively placed bars *h h*, of soapstone or other suitable slowly-conducting and indestructible material, directly upon which the coal-supplying chamber H rests. The bars *h h* are held in place, each by itself, by thin plates *t t*, which are cast upon the fire-pot and project upwardly between the ends of the adjacent bars, substantially as shown in Fig. 1, so that either one or more of said bars may be removed for repairs without injury to those remaining. These bars, forming a bridge, as it were, across the outlets, and running in direct lines from point to point, tend to increase the size of the outlets, and expose more of the coal that is in a state of ignition, to radiate its heat upward into chamber E, and at the same time they serve to contract the bottom of the supply-chamber H, as shown in Fig. 1, so that the reserve coal will be partially supported or suspended thereby, and not in any way clog or jam together in the combustion-outlets. The coal thus gradually falls and rests uncon-

fined in the outlets, where the most intense combustion is intended to take place. These outlets are also lined on the outer sloping sides with soapstone or fire-brick *s s*, either at the top only, as shown in the drawings, or entirely from top to bottom, as may be desirable. They may also be lined on the other sides, if found necessary in practical use. The object of this lining is to retain a sufficiently high degree of heat within the outlets to effect a perfect combustion at those points; and to further aid in this matter, if found necessary the whole interior surface of the fire-pot, as well as the outlets, may be lined with soapstone, fire-bricks, or some other slowly-conducting and indestructible material. The outlets from this fire-pot open directly and immediately into the chamber E, and the radiation of heat from the burning coal therein proceeds upward, while that from the surface of the fire-pot radiates laterally, thereby being greatly augmented in amount, as well as in effect, since the direct radiation from the burning coal, owing to the peculiar construction of these outlets, is more than equivalent to the same direct radiation, as heretofore constructed, and consequently all the surface lateral radiation from the fire-pot itself is a gain at least over what is obtained in this class of stoves as heretofore constructed.

The third feature of my invention refers to the construction of the outer case, M, in its relation to the construction of the fire-pot described above and to the action of the products of combustion therein upon its surfaces. This improvement consists in the enlargement of the case in its lower part around the fire-pot, and thence its gradual or dome-shaped contraction upward in the portion *m*, Fig. 1, and ending with its upper portion of least diameter around the supply-cylinder. The effect of this form is twofold: First, the rounded or dome-formed portion, in being outwardly and upwardly directly opposite to the radiation from the combustion-outlets *d d* of the fire-pot, it receives the radiated heat in a direction nearly perpendicular to the surface, and consequently reflects backward or reverberates less heat and transmits more to the air around the stove; second, the products of combustion have more room for expansion and sufficient detention when first produced, and while the heat is excessive in the enlarged portion of the chamber E, and then, as they part with a portion of their heat and ascend through the more contracted upper portion, they are condensed, and thereby impart an increased amount of heat to the transmitting-case M. Thus a larger percentage of heat is evolved therefrom in all parts of the chamber E than by the ordinary construction. The dome-shaped portion *m* in other respects permits a more regular circulation of the products of combustion and a more uniform distribution of the heat, while the situation of the windows or illuminating-spaces therein is such that the light is thrown not only out-

ward, but upward, so as to illuminate the whole room. The form is also entirely consistent with elegance and beauty.

The fourth feature of my invention consists in the employment of a separate chamber, I, between the top of the supply-cylinder and the cover-opening at the top of the stove, and also above and separate from the chamber E. This chamber communicates with the exit-flue *p*, so that any air that is drawn into it under the top cover, when the stove is in operation, will pass directly to said flue, which serves to connect the chamber I with the stove-pipe L. Used in connection with this chamber, and formed outside of it, is a concentric or double flue, K, which communicates between the chamber E and the exit-flue *p*, for the passage of the products of combustion to the smoke-pipe L. There is an opening, *o*, at the front side of the stove, through the plate forming the floor of the aforesaid concentric flue and central chamber. This plate rests upon the top of the supplying-cylinder, and has an opening, *n*, through it within the chamber I, by which coal is supplied to the fire-pot and the supplying-reservoir, which opening corresponds in width with the opening *o*, through the same plate, dividing the chamber E from the flue K above it. The purpose of having said openings correspond in width is that the same cover N which closes the opening in the central chamber to the supplying-reservoir may, when drawn forward to open the supplying-cylinder, be made to close the communication between chamber E and the flue around the central chamber, I, which act, thus closing all escape at the top of the chamber E, for the passage of the products of combustion, they instantly change direction and find a passage from said chamber inward through the combustion-outlets *d d* of the fire-pot, thence up the supplying-cylinder to the chamber I, and from this to the exit-flue *p*. By this arrangement and combination all the volatile matter within the supplying-cylinder will instantly pass off to the exit flue and chimney, and in a shorter space of time than is required to open the outside cover of the stove, which connects the central chamber, I, with the external atmosphere. Another advantage is, that while the stove is in operation, and the products of combustion are passing, as above indicated, the heat is brought more to the front side of the stove, thereby more completely equalizing it, since without this construction the natural tendency of the draft is rather to the rear of the stove, toward the smoke-pipe, where there should be the least heat, because the location of the stove near the chimney or wall of the room, as usually placed, causes a reflection of the heat back to the rear side of the stove, and thus prevents so free a radiation therefrom as from the front side of the stove, where there is no near wall or reflecting-surface.

Those skilled in the art will readily see the best modes of carrying my invention into

practice, and I will now proceed to describe the operation of a stove combining these improvements. The fire is kindled within the fire-pot, having the slide N drawn forward, so as to prevent any smoke passing up the chamber E, and thus avoid smoking the windows while igniting the kindlings. The said kindlings may be permitted to burn in this manner for a short time, or until the smoke shall have passed off and they are thoroughly ignited, when the supplying-cylinder may be filled with coal and the slide N closed. As combustion takes place, all the coal within the fire-pot, up to a point just above the outlets *d d*, becomes ignited, though the combustion is slow in all parts of the fire-pot, except that portion lying near and within the outlet-mouths; hence the gases and products of imperfect combustion which are collected within the supply-chamber and the center of the fire-pot are compelled to pass therefrom in an ignited state at the combustion-outlets, aiding thereby in keeping up a vivid combustion at those points, which, being in close proximity, aid in the combustion of the incandescent coal upon the fire-grate. The gases thus utilized and spent pass up the chamber E, through the aperture *o*, to the divided flue K, and then to the exit-flue *p*. When it becomes necessary to replenish with coal, the slide N is drawn forward before opening the outer cover, R, which will permit and cause the explosive gases to pass at once to the chimney-flue, when the reservoir can be filled with coal without any liability of an explosion. The slide N is then pushed back into its usual place.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The mill-grate A B, constructed and operating substantially as and for the purposes herein specified.
2. The construction of the fire-pot D, with outwardly-projecting combustion mouths or outlets *d d*, opening immediately into and in combination with the chamber E, for the purposes herein specified.
3. The form and arrangement of the case M in relation to and in combination with the fire-pot D and chamber E, substantially as and for the purposes herein set forth.
4. Compelling the draft to pass upward through the supplying-cylinder H while kindling the fire in the stove, and immediately previous to as well as during the act of replenishing the cylinder with coal, for the purpose specified, and this irrespective of the special construction by which the same is effected.
5. The central chamber, above the supplying-cylinder H, communicating with the exit-flue *p*, whereby any air that passes into said chamber by the cover R is conveyed to the exit-flue, as specified.
6. The divided flue K, around the chamber I and forming a communication between the front of the chamber E and the exit-flue *p*, whereby the products of combustion are con-

veyed to the chimney without interfering with the action of the said chamber, and the radiation of heat from the stove is properly distributed, as herein set forth.

7. The sliding plate or valve N, so arranged that it necessarily closes the opening o from the chamber E to the flue K, when the aperture n, from the supply-cylinder H to the central chamber, I, is opened, and vice versa,

whereby the draft is directed at pleasure either up through the chamber E or the supply-cylinder H, for the purposes herein set forth.

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Witnesses:

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