L. FAGIN.
Heating-Stove.

No. 209,876. Patented Nov. 12, 1878.

FIG. 1.

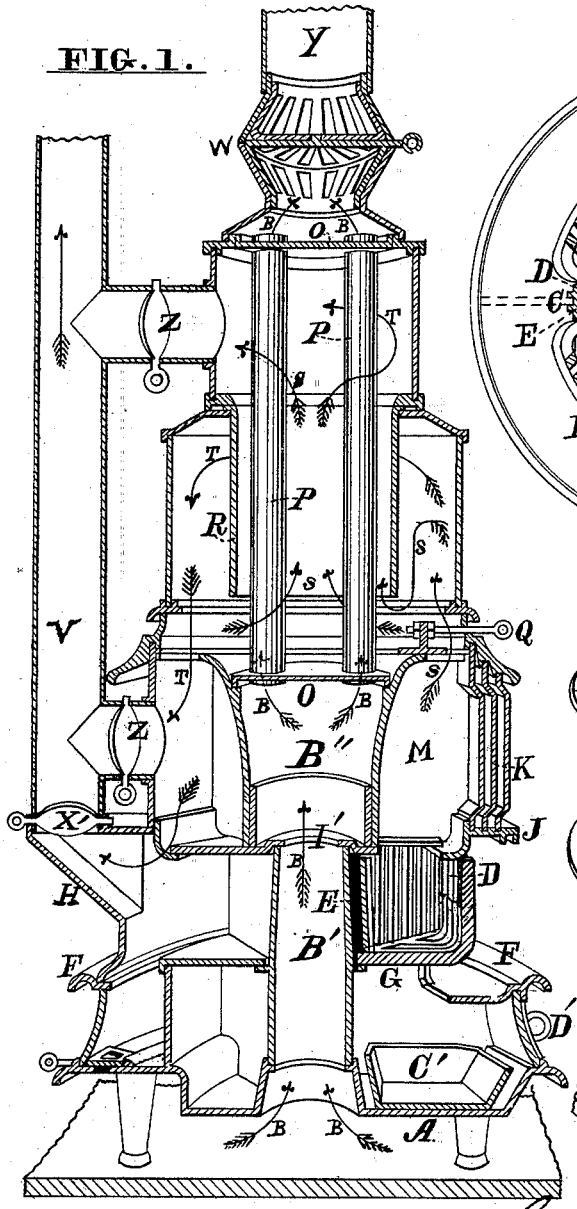


FIG. 2.

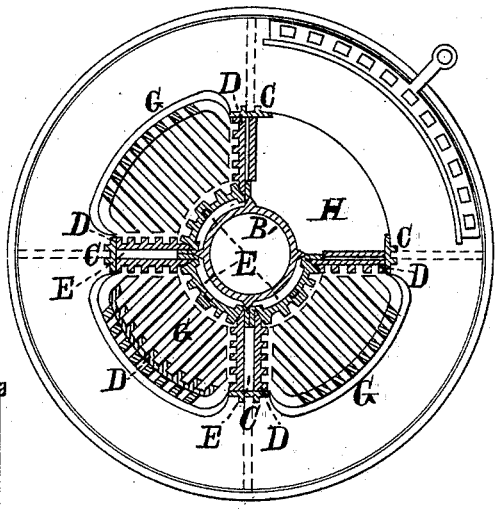
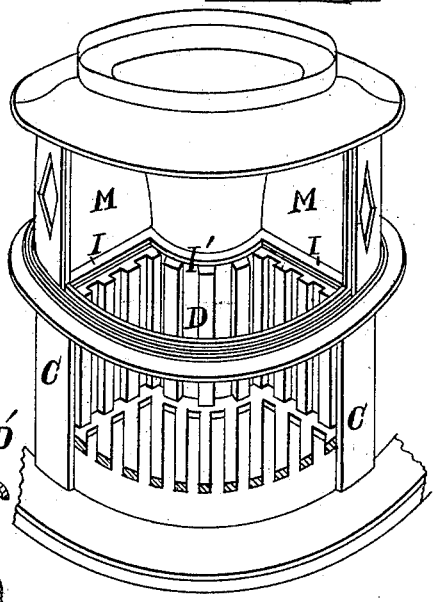


FIG. 3.



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UNITED STATES PATENT OFFICE.

LEWIS FAGIN, OF CINCINNATI, OHIO.

IMPROVEMENT IN HEATING-STOVES.

Specification forming part of Letters Patent No. **209,876**, dated November 12, 1878; application filed September 15, 1877.

To all whom it may concern:

Be it known that I, LEWIS FAGIN, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Heating-Stoves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Figure 1 represents a vertical central section of a stove embodying my improvement. Fig. 2 represents a horizontal section of the same cut through the fuel-grates. Fig. 3 represents a front view of a portion of the stove, showing the interior of the fire-chamber and front of grate-linings.

The object of my invention is to provide an improved heating-stove especially designed for the economical use of soft or bituminous coal, adapted for use in large buildings or small apartments, and for heating air for adjacent rooms, as hereinafter described.

My stove is of circular form, and may be constructed in five stories or divisions from base to top, and connected by castings provided with grooves and flanges to form close joints between the respective divisions. The lower part above the base is divided vertically into four compartments, three of which are furnished with separate fire-places and grates capable of being used independently of each other, and the fourth compartment is for the exit of the products of combustion or smoke. The stove is provided with a central air-passage through the base-plate, and extending up between the four compartments, at the upper plane of which it is cut off by a horizontal diaphragm or plate, through which four tubes extend, passing up through the upper portion of the stove. The air which passes up through this air-passage and tubes is heated and discharged through a register at the top of the stove, and it may be conveyed into other apartments of a house. The products of combustion pass from the grates through openings above them, (which are provided with dampers,) and enter the upper chamber, which I denominate a "double reverberatory chamber," through which the four air-tubes before referred to pass; thence the smoke descends into the fourth compartment, H, in the lower portion of the stove, and finds egress through the vertical smoke-flue; but provision is made for the passage of the unconsumed products of combustion from near the upper part of the dome or reverberatory chamber into the smoke-flue V, as occasion may require.

The stove embraces devices, hereinafter particularly described, for the purpose of more thoroughly and economically consuming the fuel and obtaining the greatest amount of radiating-surface within the interior, as well as from the exterior and open fire-places; also for regulating the draft. It is provided with a damper in the base-plate, beneath the smoke compartment or flue, for the double purpose of regulating the draft through the fire-chambers to the smoke-exit and to draw off the cold air from the lower portion of the room.

In Fig. 1 of the drawings, A denotes the base-plate; B′, B″, and P the air-heating passage and tubes; O, the diaphragms at the bottom and top of the tubes P; D′, the door in the base for removing ash-pan C′; F, the circular projecting hearth; G, the grates, and H a smoke-exit. M is a partition between fire-places. J is a ring or flange, having grooves for the sliding doors K of the fire-places. Corresponding grooves are also provided in the upper flanged ring above the fire-places, in which the upper edges of the doors work. Each of the fire-places is provided with a damper, Q, which is to be closed above the grates that are not in use. The reverberatory chamber for the burning of the unconsumed gas that may pass into it is divided by a pendent cylinder, R, which is open at the bottom, for the purpose of causing the flames and products of combustion (which first enter the outer annular division of the reverberatory chamber) to pass thence down and into the central division of the chamber (as indicated by the arrows) among the air-heating tubes P. W indicates a compound or double register upon the top of the stove, having two series of doors or dampers, so arranged and operated by a projecting handle as that when the vertical openings are closed the horizontal exits will be opened to allow the heated air to pass into other apartments through the pipe Y, and when the dampers are reversed the heat-

ed air will pass out into the same room in which the stove is located. It consists of a double conical-shaped register, with alternate lateral segmental open and closed spaces in the lower outer shell, registering with similar spaces and openings in a rotating inner shell or valve. A diaphragm similarly perforated extends across the widest part of the air-passage horizontally, upon which a similarly perforated valve rotates. These two valves are so connected as to operate in unison in the manner indicated, and allow the heated air to pass upward or out into the apartment, as may be desired.

The arrows designated by the letters S T indicate the direction or circuit of the products of combustion, and those designated by the letter B indicate the course of the air-currents which pass up through the stove.

The central portion B″ of the air-passage, which should be bell-shaped or conical, serves as the back of the several fire-places.

An opening is made at the back of the stove for the passage of smoke into exit-compartment H, which communicates with the exterior smoke-pipe V when the dampers Z Z are closed and damper X′ at the bottom of the smoke-pipe is opened.

In Figs. 2 and 3, C denotes the vertical fixed plates or columns at the outer edges of the partitions between the grates G. Between the back grate-linings and the central air-passage B′, and between the side linings of the grates, air-spaces E are provided. There is also a front lining, like those at the sides and back of the grates, extending but about one-third of the depth of the grate, which causes the air to arise through the bottom of the grate, and thereby equalizes the burning of the coal and gases at the upper surface of the fuel. These linings are to be cast with vertical ledges, having rectangular spaces between them upon their front sides, against which the fuel rests, to form free air-passages, through which air will rise behind, at the sides, and in front of the body of fuel, to promote combustion, whether the doors are closed or open.

At the bottom of the conical portion of tube B″ a ring, I′, having four radiating arms, I, is located. These arms and ring constitute what I denominate a "spider," to be cast separately, and serves as a joining-piece, connecting two divisions of the stove. This flat ring I′ and its arms are of the proper width to project laterally above the air-spaces E, for the purpose of deflecting the currents of air upon the fuel at or near the upper surface thereof, (when the grate is filled,) to cause the ignition of the gases before they pass out of the fire-place. The air thus introduced through the spaces E and between the cog-shaped ledges of the linings D greatly aids in the production of heat by a more complete combustion of the gases.

From the foregoing description it will be understood that the configuration of the exterior and interior of my new stove may be varied; but the important features will be retained.

The removable grates and removable linings are to be constructed as described, and the latter will have the air-spaces between the vertical ledges, which resemble the cogs or teeth of gear-wheels.

I have, by a long course of experiments, discovered that these improved grate-linings do not become choked up with fuel and ashes like ordinary corrugations, and that, when used in my combination with the back, sides, and upper part of the front of the grates, and with the air-deflecting ring I′ and its arms I, a much better effect is produced, because they insure a continuous supply of heated air to be fed to the ignited fuel all around the upper surface thereof, thereby producing a clear bright flame from the gaseous products of combustion.

The fuel is first converted into a compact mass, radiating heat for a long time, while the gases are being eliminated.

The two concentric grooves for the doors to work in permit them to occupy the same relative position in respect to the fire-places when they are thrust back to expose the fire.

The upper part of the stove, through which the four air-tubes pass, may be constructed as a single casing, and rest upon the circular ring or casting above the fire-places.

Dust-dampers may be employed to permit the dust and ashes to be carried off when the fire is agitated by a poker with the draft from the base, in which an ash-pan is usually placed.

This improved stove has proved very efficient, and especially as an equalizer of the temperature of a building in which it is used, as it produces a continuous evolution of the entire atmosphere of the apartment.

I am aware that ledged and corrugated fire-pots for furnaces and ribbed backs for fire-places and grates have long been in use, and also that the upper part of the front of the grate has been cast with interior depressions, and therefore I do not wish to be understood as asserting that these things are new; but I am not aware that cogged-tooth removable linings have before been employed in combination with the back, sides, and front of an open grate, stove, or fire-place, and arranged so that the front lining, which extends only about one-half of the depth of the grate, will insure the free ingress of air in front of the fuel from beneath, and thus prevent the clogging up of the front grate-bars.

Having fully described my invention, I claim and desire to secure by Letters Patent—

1. The separated independent grates and fire-places, arranged around a central air-heating flue, in combination with a single smoke-exit, H, substantially as and for the purpose described.

2. The vertical division of the stove into four compartments, three of which are occupied as independent fire-places and the fourth as a smoke-discharging flue, substantially as described.

3. The combination of the conical section B″ of the air-flue, which serves as a deflector

of the products of combustion, with the annular reverberatory chamber and pendent cylinder R, arranged substantially as described, for the purpose specified.

4. The air-tubes B′, B″, and P, constructed as described, in combination with the diaphragms O, substantially as and for the purpose described.

5. The combination of the vertically-ledged linings D with the projecting deflectors I I′, arranged above the air-spaces, substantially as described, for the purpose specified.

6. The cog-toothed liners D, in combination with the front, sides, and back of the grate of the stove, the front liners being applied to the upper part only of the grate, the same constructed to be applied and removed in the manner and for the purpose specified.

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