G. R. MOORE.

AIR-HEATING FURNACE.

No. 173,230. Patented Feb. 8, 1876.

Fig. 1.

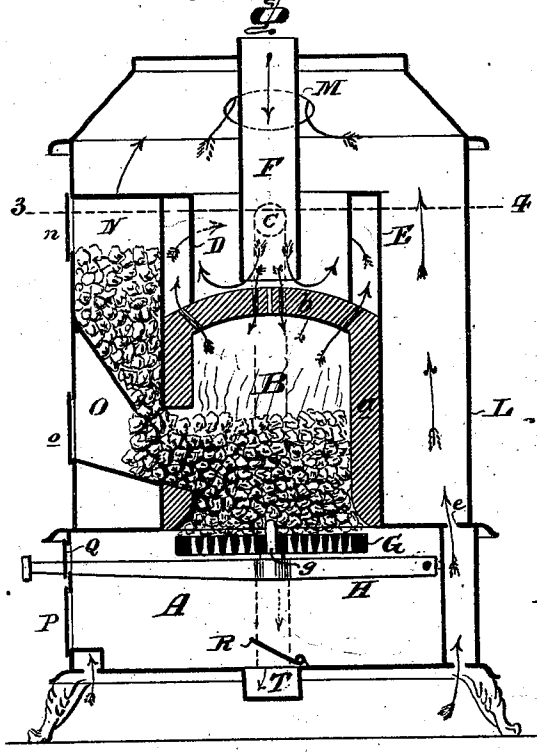



Fig. 2.

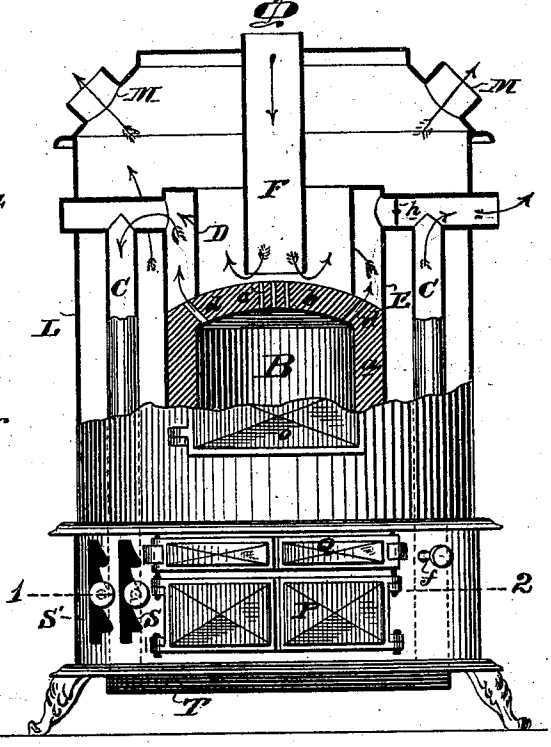



Fig. 3.

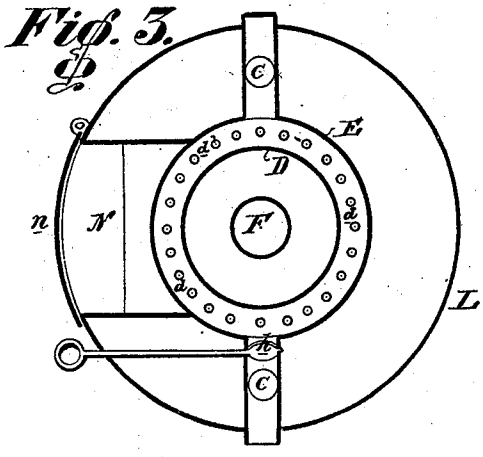
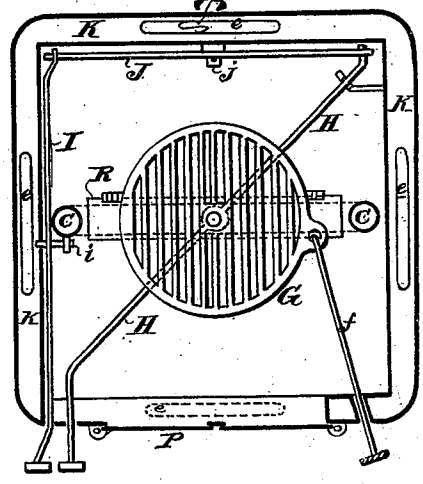



Fig. 4.

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# UNITED STATES PATENT OFFICE.

GEORGE R. MOORE, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN AIR-HEATING FURNACES.

Specification forming part of Letters Patent No. **173,230**, dated February 8, 1876; application filed December 22, 1875.

*To all whom it may concern:*

Be it known that I, GEO. R. MOORE, of the city and county of Philadelphia, in the State of Pennsylvania, have invented new and useful Improvements in Air-Heating Furnaces, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

The object of my invention is to increase the efficiency of air-heating furnaces, and to add facilities for their easier management in regard to the coal fires used in them. The drawings show an ordinary portable air-heating furnace with my improvements applied.

Figure 1 is a vertical transverse section taken at right angles with the front of the heater. Fig. 2 is in part a front view, and in part a vertical transverse section, taken at right angles with Fig. 1. Fig. 3 is a horizontal transverse section taken in the line 3 4 of Fig. 1. Fig. 4 is a horizontal transverse section taken in the line 1 2 of Fig. 2.

A is the ash-pit; *a*, fire-brick lining to the fire-chamber. B is the fire-chamber; *b*, the fire-brick arch over the fire-chamber, provided with small central apertures *c*, for carrying air into the fire-chamber to aid in the consumption of gas, also with apertures *d* all around its external circumference for draft into the smoke-flues—in this case one annular flue. *c c* are smoke-flues, and connect with the fire-chamber through the annular flue or space between the cylinders D and E, which are combined and closed at the top, and so fitted upon the arch *b* of the fire-chamber that they form a complete and sufficient flue with the pipes *c* to the chimney, as shown by the arrows. *e e* are air-passages from the base of the heater up into the main air-chamber. F is a cold-air pipe for the introduction of outdoor air directly upon the hottest place of the arch over the fire chamber. G is the grate. H is a lever running diagonally across the ash-pit, and provided with a socket at the center, which receives the grate by a pin, *g*, extending down from it. I and J are also levers, pivoted at *i* and *j*. J is loosely jointed at one end with H and at the other with I, so that when the handles of I and H are moved alike up or down the other end of H is moved in the same direction also, so that with this arrangement of levers the grate may be carried up and down evenly upon the same horizontal level, or it may be tipped either way, if desired. H passes through a guide to keep it from tipping sidewise. K shows air-spaces about the ash-pit, through which partially-heated air is fed through the apertures *e e* into the main air-chamber above. L is the outside casing of the main air-chamber. M M, flanges for pipes to conduct away the hot air. N is a coal-reservoir, connecting with the fire-chamber through the main passage from the ordinary feed-door, so that the fire may be fed in this way, partially in the manner of an ordinary magazine, when desired; *n*, door to the chamber N. O is the direct passage to the fire-chamber, and *o* is the door to the same. P is the ash-pit door; Q, small doors for opening to the top of the grate. R is a cover to the smoke-flue across the bottom plate of the ash-pit. *f* is a rod for operating the grate horizontally. *h* is a damper, to be closed when it is desired to turn the draft down through the opposite flue C and around, as shown by the arrows. S S are ratchets for holding the levers H and I whenever desired. If the fire is to be cleaned partially it can be done by use of the rod *f*, vibrating the grate horizontally; if thoroughly, the levers H and I should be used to drop the grate down to a convenient distance below the fire-chamber for operating over it with a poker. Again, if a moderate fire is sufficient and it is desired to perpetuate it; the door *o* should be closed, and through the supplemental door *n* fill up the reservoir, and the desired result will be obtained. The heavy fire-brick *b*, arching over the fire-chamber, is designed to store heat, so as to give a more uniform, equable, and longer continued result than is usual from variable and inconstant firing. As this arch is exposed to the greatest heat, it will radiate rapidly, and I direct a cold-air pipe from the outdoor air directly down upon its center. As heat radiation does not repel cold air, I obtain a rapid current, and thus keep down the heat of the arch and prevent the deoxidizing of the air. There is no diving draft in this furnace directly from the fire-chamber; but from the upper part of the annular smoke-

flue above the fire-chamber, and between D and E, there is a diving draft down C, obtained by turning the damper *h* upon the opposite side of the furnace, all of which drafts are well shown by arrows.

I claim—

1. The ash-pit A, provided internally with two vertical smoke-flues, in communication with the fire-chamber above by suitable pipes, and connected with each other at the bottom by the horizontal flue T, substantially as and for the purpose herein set forth.

2. In combination, the two inclined passages N and O, running from their respective feed-doors in the casing of the heater to the fire-chamber B, and discharging together into the side of the same, substantially as shown.

3. The fire-brick, or partially non-conducting arch *b* over the fire-chamber, and provided with smoke-flues *d*, in combination with the smoke-flue between the plates D and E, substantially as shown.

4. In combination, the annular smoke-flue between the plates D and E, and the horizontal and vertical smoke-flues C C and the cross-flue T, substantially as shown.

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Witnesses:

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