

B. S. KOLL.  
Hot-Air Furnace.

No. 104,962.

Patented July 5, 1870.

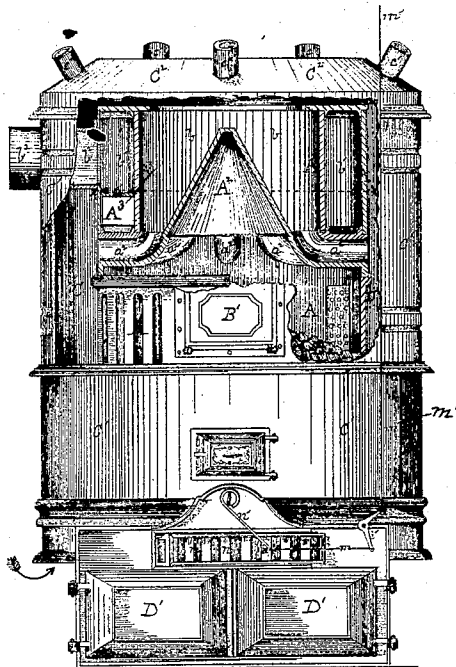


Fig. 1.

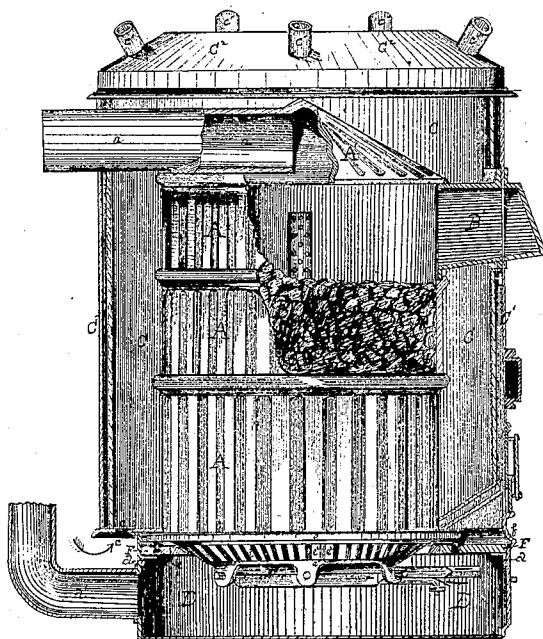


Fig. 2.

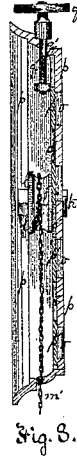
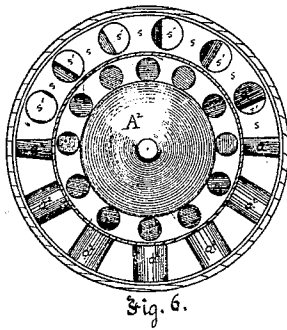
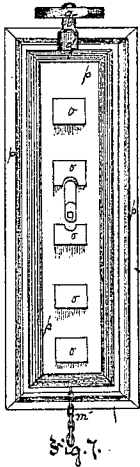
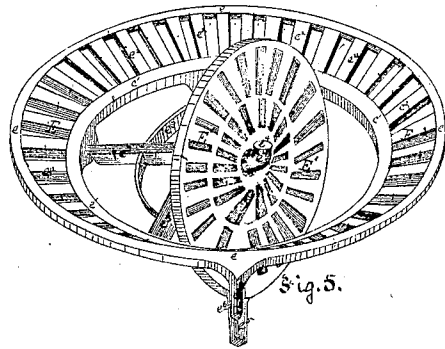
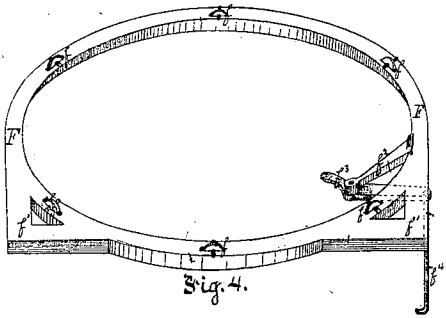
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# United States Patent Office.

BENJAMINE S. KOLL, OF PITTSBURG, PENNSYLVANIA.

Letters Patent No. 104,962, dated July 5, 1870.

## HOT-AIR FURNACE.

The Schedule referred to in these Letters Patent and making part of the same

To all whom it may concern:

Be it known that I, BENJAMINE S. KOLL, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Hot-air Furnace; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, in two sheets, making a part of this specification, in which—

Figure 1 is a front elevation, partly in section, illustrative of my improvement;

Figure 2, by a like view, further illustrates it in a somewhat modified form;

Figure 3 is a plan view of the indicator;

Figure 4 is a perspective view of the bearing-ring, on which operates the grating shown in Figure 5;

Figure 6 is a sectional view of fig. 1, in the line  $x x$ ; and

Figures 7 and 8 are enlarged face and sectional views of the indicator.

Like letters of reference indicate like parts in each.

My invention relates to that class of furnaces known as warm-air furnaces, for heating dwelling-houses, public halls, churches, and other structures, and the nature of it consists in an improved construction and arrangement of parts, whereby the ends in view are more perfectly and economically attained.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and mode of operation.

A cylindrical casing, A, or a series of such, one above another, constitutes the sides of the fire-chamber, into which the fuel B is fed through the coal-chute B', which latter is closed by a door in the usual way.

The casings A I prefer to make corrugated inside and outside, in order to increase its heat-radiating power.

Surrounding this is a chamber, C, for heating air, formed by an outer casing, C', made and attached in any of the ways known to the art, and is provided with apertures  $c$  in any desired number, at or near its lower end, for the reception of cold air, and hot-air flues  $c'$  at or near its upper end, for conducting the air which is heated by passing up the chamber C, thence into the apartments to be warmed.

Such furnaces have heretofore been put up on a foundation of brick, stone, or other like support, so as to make an ash-pit in such foundation, which had no connection with the furnace other than that of juxtaposition.

For the purpose of securing increased cleanliness, and a construction more convenient in putting up and changing location, I have combined with such a furnace a portable ash-pit, D, made of cast iron or other

suitable material. This ash-pit D is closed in front by doors D', and from at or near its rear side an ash and dust-flue,  $d'$ , leads to the chimney.

When the fire is to be raked out or cleaned, a damper of the ordinary construction, arranged in the flue  $d'$ , is opened, and the draught then through the doors D' will cause the dust and lighter ashes to be carried into the chimney instead of escaping at the open front of the ash-pit, as heretofore, into the room or cellar in which the furnace is put up.

Around the upper part of the inside of the ash-pit D, is a series of ledges,  $d$ , in any desired number, on which I arrange a bearing-ring, F, of the form substantially as shown in fig. 4. This ring is made with projecting corners  $f'$ , or other similar device, which, fitting into or engaging some fixed part of the furnace, shall prevent it from rotating. In its upper face I arrange, in any suitable way, a series of friction-rollers,  $f$ , preferably of chilled iron, on which I rest the outer rim  $e$  of the basket-grating E, which latter, (of the form shown in fig. 5,) constitutes a part of the bottom of the fire-chamber. This grating is made with a radial series of grate-bars,  $e'$ , converging downward from the outer rim  $e$  to an inner ring,  $e'$ .

A skeleton frame-work  $e''$  is attached to the inner ring  $e'$ , and the outer extremity of the main arm is turned up to form a hook,  $e''$ , at or near the center of the ring  $e'$ , and such skeleton  $e''$  is arranged at such a level that the inner grating E', when hung on the hook  $e''$  by its central socket or hole, as shown, and is brought to a horizontal position, its upper face shall be even, or nearly so, with the upper face of the ring  $e'$ . The object of this arrangement is to provide a convenient means of emptying the fire-chamber.

The grating E' is kept closed by a pivoted arm,  $f^2$ , operating in the end of a rigid arm,  $f^3$ , of the ring F.

The grating, when closed, rests on the arm  $f^3$ , and, by swinging this arm back by means of a rod,  $f^4$ , the grating E' is at liberty to be turned to the position shown in fig. 5. For convenience in turning it, it has a handle,  $e^5$ . A similar handle,  $e^6$ , forms the means of giving to the whole bottom of the fire-chamber an intermittent rotary motion, the rim  $e$  rolling on the rollers  $f$ .

In fig. 2, I have shown the cover A' of the fire-chamber of a conical form, and corrugated. From its upper part a horizontal smoke-flue,  $a$ , leads off to the chimney. The air passing up through the chamber C is heated as it rises, and passes out at the flues  $c'$ , to the rooms to be warmed. By the conical cover I secure a greater amount of heat-radiating surface.

In fig. 1, the cover A<sup>2</sup> is also conical, but it is also so arranged as to afford a still greater amount of heat-radiating surface.

The chamber C extends to the furnace-top C', as in

fig. 2. The inner casing A is continued up around the cone, and inside of it is arranged another casing, A<sup>2</sup>, with tight joints, so as to make an annular smoke-chamber, b<sup>1</sup>, between the two, and a hot-air chamber, b, inside over the cone, such chamber being open at the top, as shown.

A series of horizontal pipes, a<sup>2</sup>, leads from the hot-air chamber C to the cone chamber b, and between these pipes the smoke and products of combustion pass up into the chamber b<sup>1</sup>, and thence out at the smoke-flue b<sup>2</sup>. But to prevent too strong a draught on the side of the chamber b<sup>1</sup>, next to the smoke-flue b<sup>2</sup>, I arrange in the chamber b<sup>1</sup>, on that side, a diaphragm, s, having perforations s'. The form of this diaphragm is shown in fig. 6, and its arrangement in the chamber b<sup>1</sup>, a short distance above the pipes a<sup>2</sup>, is shown in fig. 1. Its effect is to check the draught up that side of the furnace, and compel a portion of the smoke, heated gases, &c., to traverse the smoke-flues and chambers on the opposite side of the furnace, so as the more effectually to impart heat to the currents of air in the air-passages.

The intensity of the fire side the chamber A is controlled by a sliding damper device, n, of any desired form. The spring n', operating against a pin, i, or other fixed part of the damper-slide, closes the damper and shuts off the draught.

A wire, m, extends from the pin i to one arm of a pivoted bent lever, l, such as is used in bell-hanging, and another wire, rod, or chain, m' extends up to any of the rooms above. There it is connected with an indicator, such as is shown in figs. 3, 7, and 8. This indicator consists of a frame or base-plate, p, by which it is attached to the wall. It has slots o made like the slots of a sliding damper, and over these slots o is arranged a sliding plate p', having like slots o'. To this plate p' the rod or chain m' is attached.

A hand-wheel, q, on the end of a threaded bolt, q', which latter plays through a threaded hole in the end of the plate p', furnishes the means of raising and lowering the plate p'. The length of the rod or chain m' is such that the draught-holes of the damper n, and the holes o o' of the plates p p', shall, when the chain is merely taut, be opened or closed the same in each. Then, by raising the plate p' so as to open wholly or in part the slots o o', the draught-holes in the damper n will be opened to the same extent, and by lowering the plate p' both will be closed together. An examination of the indicator will then always show whether or not, and how much, the furnace-damper n is open, and afford the means of regulating the heat without going to the cellar or basement, where the furnace is usually put up. But for greater convenience in adjusting the length of the chain m', and in keeping it always to the proper adjustment, I attach to the plate p' a ratchet-wheel, l, and pulley, l', passing the chain m' around the pulley, as in fig. 8. By the use of a key on the square pin k the slack of the chain is wound up, and a pawl of the usual construction keeps

it there. Should the chain need to be slackened, the operation is reversed.

The smoke-flue a, (fig. 2,) it will be observed, not only extends out horizontally from the cone A<sup>1</sup>, but its inner end enters the cone and extends to or nearly to its center. By this arrangement, the smoke and gases of combustion are caused to act more uniformly on all parts of the cone, and also escape less rapidly from the cone, so that a more perfect combustion is secured, with a consequent increased evolution of heat.

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

1. A bearing-plate or ring F, arranged on ledges d, inside the casing of a hot-air furnace, with devices substantially as described for preventing its rotation, as a support for a vibrating grating.

2. In combination with the bearing-plate of last claim, a series of friction-rollers, f, arranged therein, substantially as described.

3. The dumping-grate E', hung on a toggle or hook, e', in combination with the surrounding vibrating basket-grating E, arranged substantially as described.

4. The lever f<sup>2</sup>, pivoted to an arm, f<sup>1</sup>, of the bearing-plate F, in combination with the dumping-grate E', arranged and operative substantially as set forth.

5. A cone-shaped top, A<sup>1</sup>, for a furnace, arranged with a smoke-flue leading horizontally from at or near its center, substantially as described with reference to fig. 2.

6. A series of horizontal air-tubes, a<sup>2</sup> a<sup>2</sup>, arranged around the base of the cone A<sup>2</sup>, and leading into the warm-air chamber b, when combined with an annular smoke-flue, b<sup>1</sup>, all placed directly over the fire-chamber A, and surrounded by the outer warm-air chamber C, substantially as described.

7. A perforated plate or diaphragm, s, arranged under the throat of the smoke-pipe b<sup>2</sup> and in the annular ascending smoke-flue, and extending around about one-half the circumference of the annular flue, substantially as described.

8. A spring, n, operating the damper-slide, when used in connection with an indicator, the adjustment of which shall show the adjustment of the damper, substantially as described.

9. A ratchet-wheel, pulley, and pawl, connected to and in combination with the sliding damper of a furnace, arranged substantially as described.

10. In connection with a warm-air furnace, an indicating device consisting of two plates p p', having apertures o o', the one furnished with a screw-shaft, or its equivalent, and so arranged that the damper-openings shall be shown by the indicator-openings, substantially as described.

In testimony whereof, I, the said BENJAMINE S. KOLL, have hereunto set my hand.

BENJAMINE S. KOLL.

Witnesses:

A. S. NICHOLSON,  
THOS. B. KERR.