2 Sheets--Sheet 1.

T. KRUSE.

Hot-Air Furnace.

No. 129,145. Patented July 16, 1872.

Fig. 1.

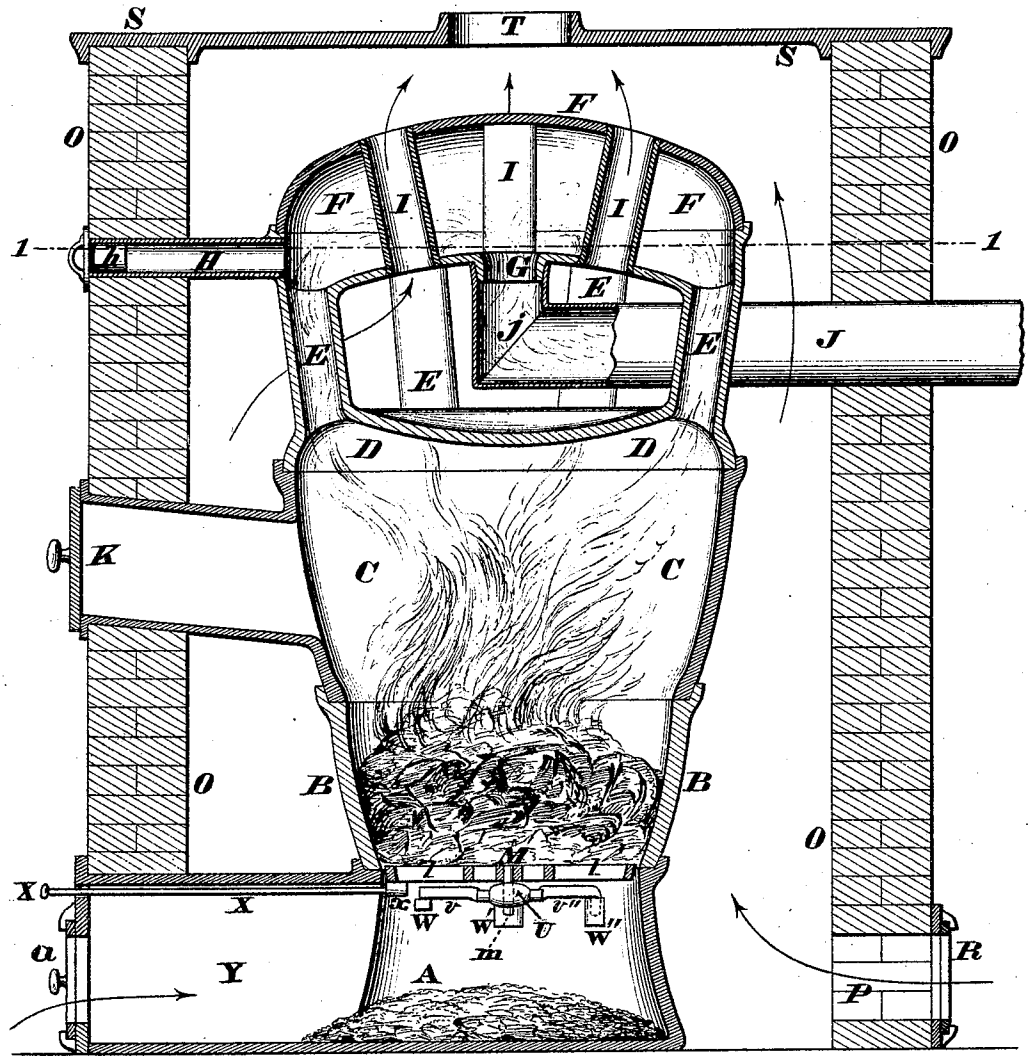
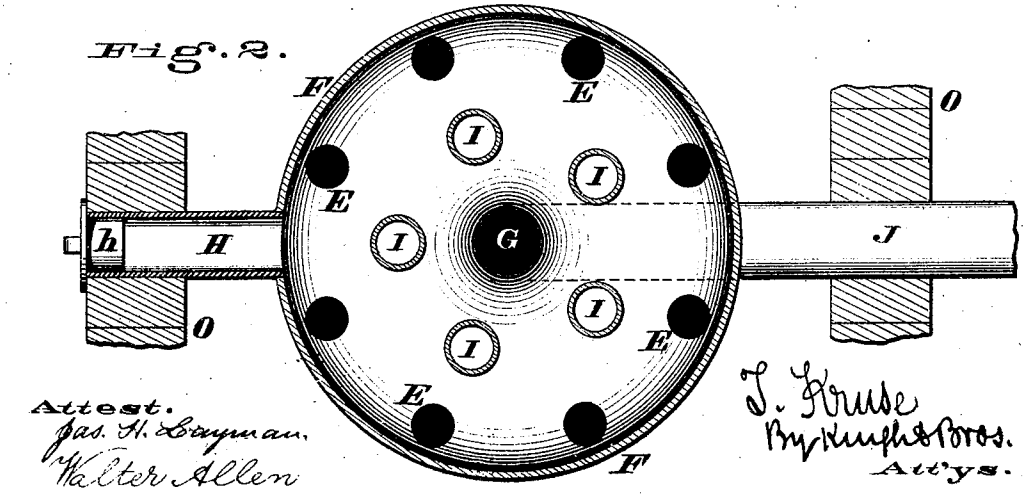


Fig. 2.



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Jas. H. Layman.
Walter Allen

T. Kruse
By Knight Bros.
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2 Sheets--Sheet 2.

T. KRUSE.

Hot-Air Furnace.

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Fig. 3.

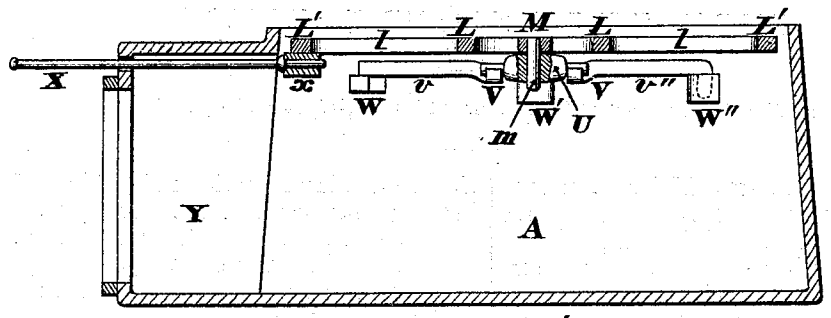


Fig. 4.

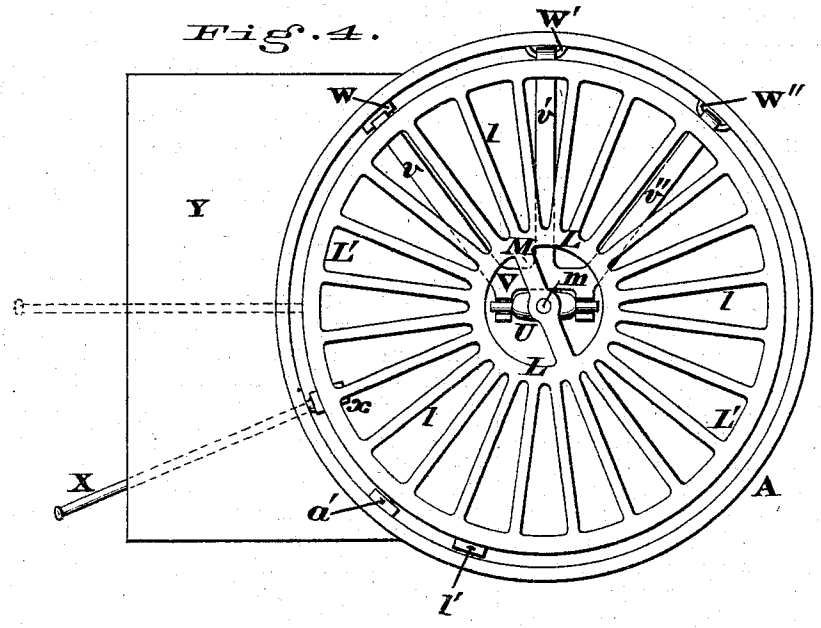
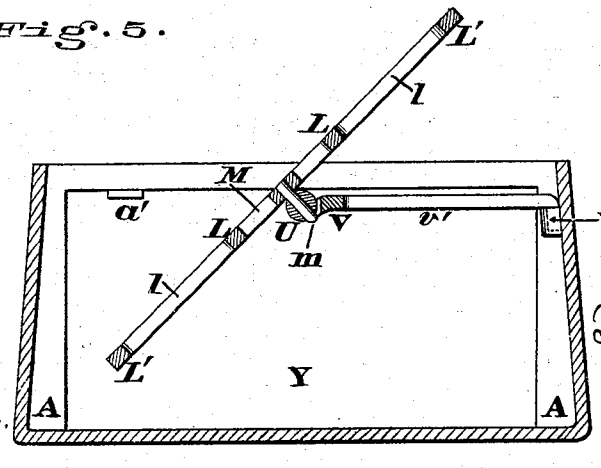


Fig. 5.



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Jas. H. Layman.
Walter Allen

T. Kruse.
By Knight Bros
Att'ys.

UNITED STATES PATENT OFFICE.

THEODORE KRUSE, OF LA FAYETTE, INDIANA.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. 129,145, dated July 16, 1872.

Specification of an Improved Warm-Air Furnace, invented by THEODORE KRUSE, of La Fayette, Tippecanoe county, Indiana.

This invention relates to that class of furnaces which are employed for heating air for the purpose of warming churches, schools, dwellings, &c.; and the first part of my improvement relates to a peculiarly-arranged chamber, into which the products of combustion are discharged before they escape through the exit-pipe, said chamber being provided with a number of tubes, through which air circulates in such a way as to be warmed in the most thorough manner and with the least combustion of fuel, the details of construction of the furnace being hereinafter fully described. The second part of my invention relates to a shaking and dumping grate, which is supported within the furnace in such a manner as to be readily withdrawn through the ash-pit whenever occasion requires, and without being compelled to detach any portion of the apparatus.

Figure 1 is a vertical section of a furnace provided with my improved air-warming chamber, and Fig. 2 is a horizontal section of said chamber at the line 1 1. Fig. 3 is a vertical section through the ash-pit, showing the grate in its normal or fixed condition. Fig. 4 is a plan, showing the manner of shaking the grate; and Fig. 5 is a section at right angles to Fig. 3, showing the grate in its dumping position.

Of the above illustrations the last three are drawn on a somewhat enlarged scale.

My furnace consists, essentially, of three superimposed sections—to wit, the ash-pit A, fire-pot B, and combustion-chamber C, which may be of the represented or any other approved form. Surmounting the chamber C, so as to completely close the upper end thereof, is a dome, D, from which project a number of flues, E, that connect with an air-warming chamber, F. This chamber is closed at top, and is provided with a central discharge-opening, G, on its under side, and a horizontal passage, H, closed by a plug, *h*, and, with these exceptions and that of the flues E, said chamber is completely closed on all sides. A number of air-tubes, I, are either cast with or fitted into the chamber F, and said tubes are arranged in a circle concentric with the exit-opening G, and so as to occupy an intermediate position between said opening and the outer series of flues E. Depending from the under side of the air-heating chamber F is the elbow *j* of the discharge-pipe J that conducts the products of combustion into the chimney. The passage H is for the purpose of cleaning out any soot that may accumulate in the chamber F, and the outer end of this channel is, as before stated, closed by a plug, *h*, except when required to be opened for cleaning the said chamber. K is the feeding-door of the fire-chamber B C. The ash-pit A is provided with a register, *a*, for the purpose of admitting air to support combustion within the furnace.

My improved grate consists essentially of two concentric rings, L L′, which are united by radial bars *l*, and the inner one L of said rings has cast with it an arm, M, from whose midlength projects downwardly a pin, *m*, which serves as a pivot to permit horizontal rotation of said grate. This pivot turns within a rock-shaft, U, which is journaled in a frame, V, the latter being provided with radial arms *v v′ v″*, as shown in Fig. 4. Of these arms the one *v* rests upon a lug, W, while the other ones *v′ v″* are adapted to enter sockets W′ W″, said lug and sockets being cast upon the inside of the ash-pit A. Projecting from the ring L′ is a lug, *l′*, which, when the grate is in its fixed position, is adapted to rest upon a lug, *a′*, of the ash-pit. A socket, *x*, upon the ring L′, is adapted to receive a lever or handle, X, wherewith the grate may be shaken or dumped, as occasion may require.

The passage Y leading to the ash-pit should be sufficiently large to permit the withdrawal of the grate whenever the latter is placed diagonally within said passage. Whenever the grate is in its normal or fixed position, as seen in Fig. 3 and indicated by dotted lines in Fig. 4, the lug *l′* rests upon the lug *a′*, and thus maintains said grate horizontally and prevents its sagging down on either side. To shake the grate so as to rattle out the ashes, cinders, &c., it is only necessary to vibrate the handle X in a horizontal plane, as shown in Fig.

To dump the contents of the fire-chamber into the ash-pit, the grate is rotated in either direction until the lug *l′* passes beyond the lug *a*, when the grate can be inclined, as shown in Fig. 5. This inclination is effected by simply turning the handle X so as to cause the rotation of rock-shaft U within its bearings on

frame V. This grate, together with its supporting-frame, can at any time be withdrawn through passage Y without taking the furnace apart.

The entire furnace is intended to be surrounded with a jacket, O, of masonry or other suitable material, and the lower part of this jacket is provided with openings, P, having registers, R, so as to control the supply of cold air that flows in around the furnace. The jacket is inclosed at top with a plate, S, having one or more necks, T, to which latter pipes are to be attached for the purpose of conducting warm air through the house in which the furnace is located.

The operation of my furnace is as follows: The fire and smoke ascend from the fire-pot through the flues E and enter the chamber or drum F, from which they can escape only by descending the central opening G at the bottom of said chamber; but before reaching this point the products of combustion are compelled to circulate completely around the tubes I, as clearly shown in Fig. 1. From this central opening G the products of combustion escape through the exit-pipe J. The cold air that flows in through the openings P in the jacket is brought first in contact with the exterior of fire-chamber B C, when the air becomes somewhat warmed and ascends around the sides of the furnace. After ascending as far as the dome D, the air then circulates around the flues E and enters the tubes I, and after traversing the latter the now fully heated air is discharged from the apparatus in the manner indicated by the arrows.

Owing to the tortuous course the air is compelled to take before escaping from the furnace it takes up as much heat as possible, and consequently my furnace is enabled to discharge a large amount of heated air with a moderate consumption of fuel. The chamber F being closed at top, becomes in effect a reservoir for the arrest of the most highly-heated products of combustion, which are there compelled to part with their heat by conduction through the metal composing the top of the chamber F before being allowed to escape, which, as before explained, they can do only by descending from said chamber, and their point of exit being precisely central, there is secured an equal draught on all sides of the stove.

My stove is found in practice to almost completely consume the combustible materials of the fuel, the gases leaving it in an almost invisible condition.

Claims.

I claim as my invention—

1. The provision, in a warm-air furnace, of the dome D, upwardly-projecting flues E, air-heating chamber F, central and downwardly-discharging orifice G and air-tubes I, the latter being concentric with the orifice G, and arranged so as to occupy an intermediate position between said orifice and the series of outer flues E, for the purpose specified.

2. I also claim the dumping and shaking grate L L′ *l*, bar M, pivot *m*, lugs *l′ a′*, rock-shaft U, detachable frame V *v v′ v″*, lug W, and sockets W′ W″, as and for the purpose herein explained.

In testimony of which invention I hereunto set my hand.

THEO. KRUSE.

Attest:

GEO. H. KNIGHT,

JAMES H. LAYMAN.