

(No Model.)

2 Sheets—Sheet 1.

J. CRUZE.
FURNACE.

No. 587,796.

Patented Aug. 10, 1897.

Fig. 1.

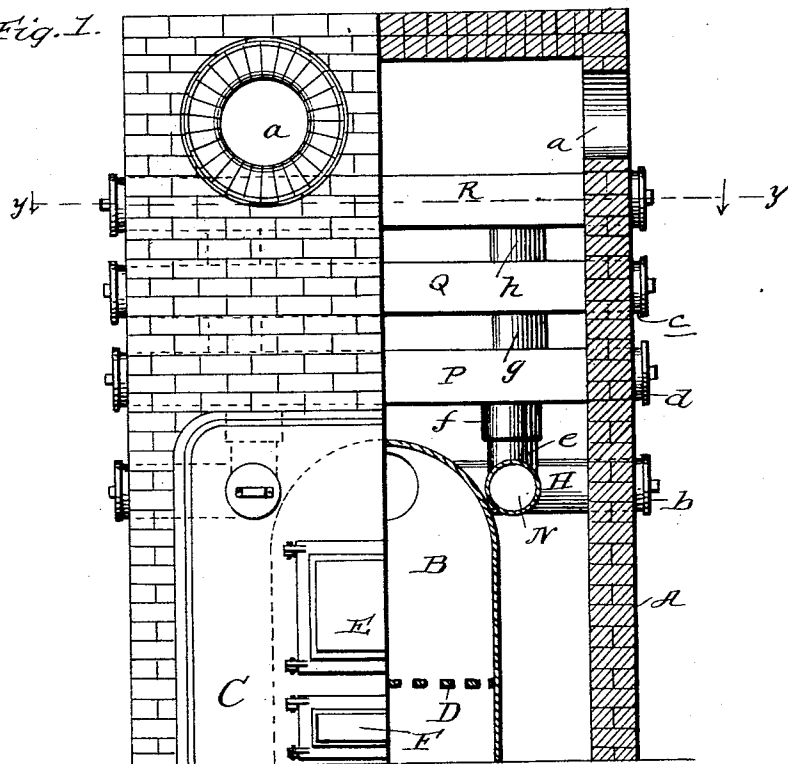
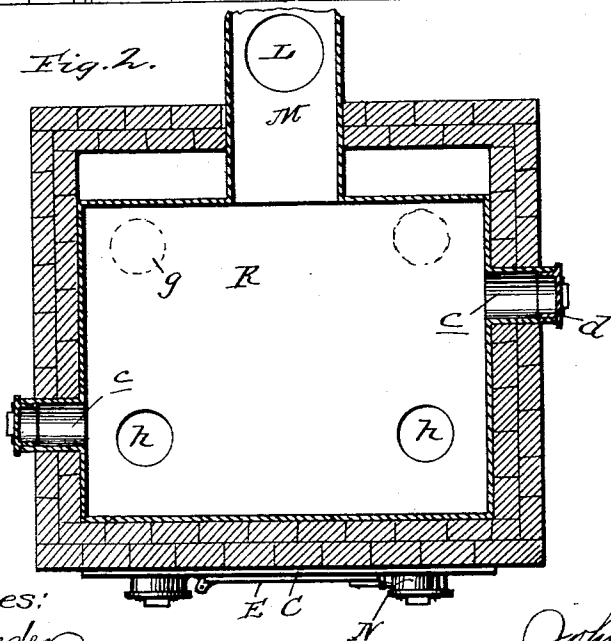


Fig. 2.



witnesses:

Chas. Raeder

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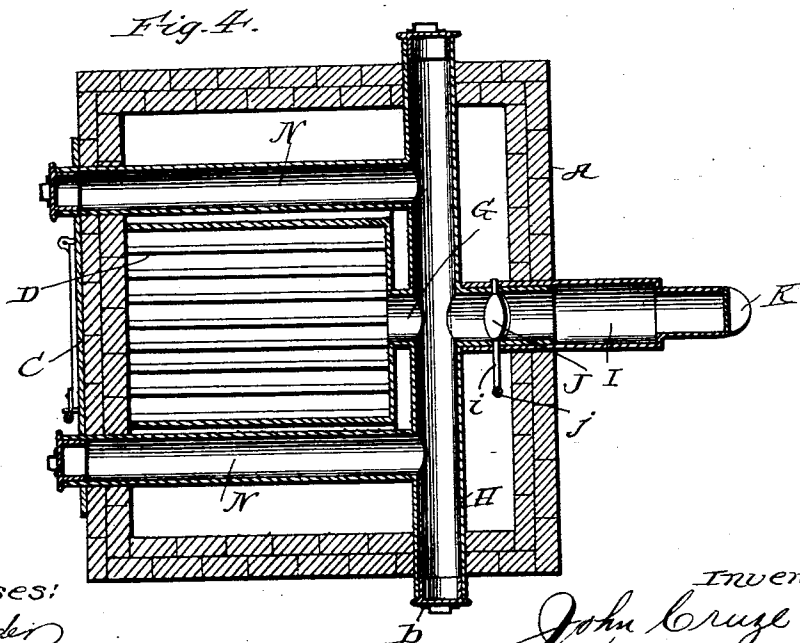
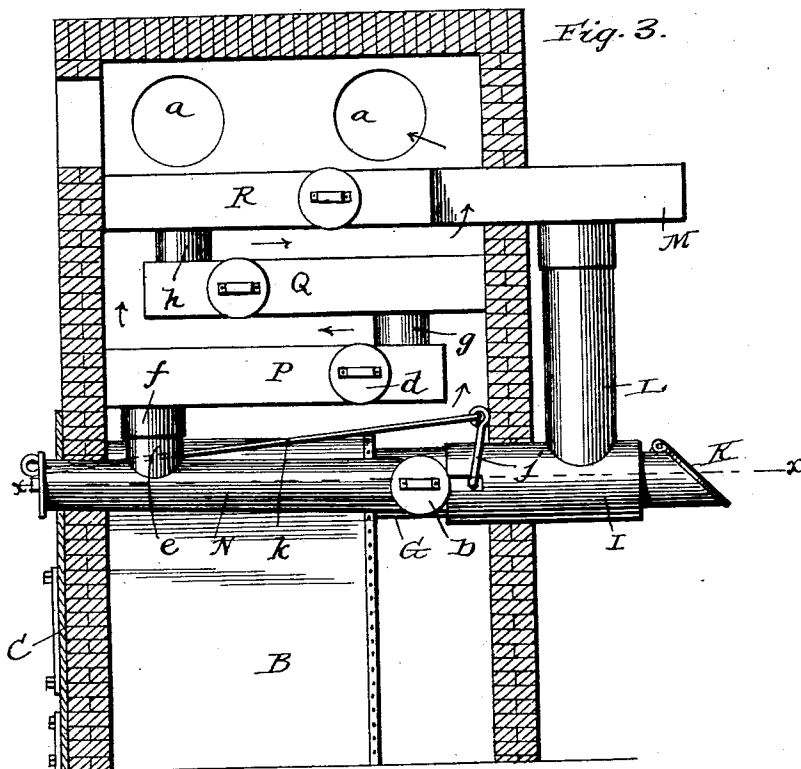
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witnesses:

C. H. Rader
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UNITED STATES PATENT OFFICE.

JOHN CRUZE, OF KNOXVILLE, TENNESSEE.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 587,796, dated August 10, 1897.

Application filed February 5, 1896. Serial No. 578,117. (No model.)

To all whom it may concern:

Be it known that I, JOHN CRUZE, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented certain new and useful Improvements in Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in hot-air furnaces; and it has for its general object to provide a cheap and simple hot-air furnace, and one which, while very compact, has a large radiating-surface and is so constructed that it is adapted for burning hard or soft coal, coke, or wood.

The invention will be fully understood from the following description and claim when taken in conjunction with the accompanying drawings, in which—

Figure 1 is a front elevation, partly in section, of my improved furnace. Fig. 2 is a horizontal section taken in the plane indicated by the line *yy* of Fig. 1. Fig. 3 is a side elevation of the furnace with the casing in section, and Fig. 4 is a horizontal section taken in the plane indicated by the line *xx* of Fig. 3.

In the said drawings similar letters designate corresponding parts in all of the views, referring to which—

A indicates the casing of my improved furnace, which is constructed of brick or other suitable material. This casing A is provided adjacent to its top with a suitable number of openings *a* for the connection of hot-air flues, (not illustrated,) and in it is arranged the combustion-chamber B, which is preferably of the proportional size illustrated. The said combustion-chamber B has its rear, side, and top walls formed of boiler-plate, while its forward wall is formed by the front wall of the casing A and a reinforcing-plate C, of metal, and it is provided with a suitable grate D to support the fuel, and is also provided with the fire and ash doors E F, as shown.

Leading rearwardly from the rear wall of the combustion-chamber adjacent to the upper end thereof is a smoke-pipe G, which merges at its rear end in a transversely-arranged cylindrical drum H, as better shown

in Fig. 4 of the drawings. This drum H extends through the opposite side walls of the casing, as shown, and its ends are closed by the stoppers *b*, which are removable, so as to permit of the drum being readily cleaned when desired.

I indicates a smoke-pipe which communicates with the drum H at a point opposite the pipe G and is provided with a damper J, for a purpose presently described, and also has its rear end beveled and closed by a gravitating valve or cover K, so as to permit of it being readily cleaned when desired.

L indicates a smoke-pipe which communicates with and leads upwardly from the pipe I, and M indicates a smoke-pipe, preferably of rectangular form in cross-section, which communicates at an intermediate point of its length with the upper end of the pipe L and is designed to be connected with an uptake. (Not illustrated.)

N indicates drums of cylindrical form in cross-section, which are connected at their rear ends to the transverse drum H and extend forwardly at opposite sides of the combustion-chamber through the front wall of the casing A, and are provided at their forward ends with removable stoppers similar to those of the drum H; and P, Q, and R indicate a plurality of square drums of rectangular form in cross-section, which are arranged one above the other above the combustion-chamber B, as better illustrated in Figs. 1 and 3, and are provided on opposite sides with the short tubes *c*, which extend through the side walls of the casing, as shown, and are provided with removable stoppers *d*, so as to permit of the drums being readily cleaned when desired.

The drums N are provided adjacent to the forward wall of the casing A with short upwardly-extending branches *e*, and the drum P is provided adjacent to its forward end with short depending pipe-sections *f*, which receive the branches *e* in a telescopic manner, as better illustrated in Fig. 1. Similar telescopic pipe-sections (indicated by *g* and *h*, respectively) connect the drums P and Q adjacent to the rear ends thereof and the drums Q and R adjacent to the forward ends thereof, and the said drum R is connected at its rear end to the smoke-conduit M, as shown. The

manner described of connecting the several drums N, P, Q, and R is highly desirable, since it permits of the connection being quickly and easily made.

5 The damper J, before described, is mounted on a rock-shaft *i*, which has an angular arm *j* at one end, and said damper is designed to be opened and closed through the medium of the rod *k*, which is connected to the arm *j* 10 and extends through the front wall of the casing A, as illustrated.

Hard or soft coal, coke, or wood may be used as fuel in my improved furnace, and when the fire is first built the damper J may 15 be opened, so as to afford a strong direct draft through the pipes G, I, L, and M to the uptake. When, however, the fire is well started, the damper J is closed.

With the damper J closed it will be seen 20 that in virtue of the construction described the heat, smoke, and particles of combustion will pass through the pipe-section G to the drum H, thence into the drums N at the rear ends thereof, thence into the drum P at the 25 forward end thereof, thence into the drum Q at the rear end thereof, thence into the drum R at the forward end of said drum, and thence by the pipe M at the rear end of the drum R into the uptake. It will be seen that in virtue 30 of the arrangement of the several drums the smoke and particles of combustion are caused to take a circuitous course in their passage to the uptake, and it will also be seen that the construction and arrangement of the 35 drums afford a very large radiating-surface, which will cause the smoke and particles of combustion to give up all or almost all of the heat before they reach the uptake.

The air to be heated is by preference permitted to enter the casing A adjacent to the 40 bottom thereof and on opposite sides of the combustion-chamber B, and it passes up past the drums N and then passes forwardly between the drums P and Q, thence upwardly, 45 thence rearwardly between the drums Q and R, and thence upwardly to the space above the drum R, from whence it is carried by the flues (not illustrated) to the apartment or apartments to be heated. The drums P, Q, and R 50 extend the full width of the space within the casing and are relatively arranged as shown in Fig. 2, and it will therefore be seen that the air is compelled to take the course just described, in consequence of which and the

large radiating-surface afforded it will be 55 highly heated before it reaches the exit-openings *a* at the top of the casing.

It will be appreciated from the foregoing that while my improved furnace consumes 60 but a minimum amount of fuel and is an efficient air-heater, yet it is very simple in construction and may therefore be readily repaired when necessary. It will also be seen that with the exception of the casing A my improved furnace may be constructed of 65 boiler-iron and may therefore be constructed in any sheet-iron-working shop by sheet-iron workers of ordinary skill.

Having described my invention, what I claim, and desire to secure by Letters Patent, 70 is—

The hot-air furnace described comprising the casing, the combustion-chamber arranged within the casing at the lower portion thereof, the transverse drum H, arranged in rear 75 of the combustion-chamber and supported by the side walls of the casing a pipe connecting the combustion-chamber adjacent to the upper end and the drum H, the longitudinal drums N, connected at their rear ends to the 80 drum H, and extending forwardly therefrom and arranged at opposite sides of the combustion-chamber and supported at their forward ends in the front wall of the casing, the pipe 85 M, extending through the rear wall of the casing and adapted to be connected with an uptake, the pipe I, connected to the transverse drum H, at a point opposite the pipe leading from the combustion-chamber and extending 90 through the rear wall of the casing, the damper arranged in said pipe I, and having the crank-arm and the hand-rod connected thereto and extending through the front wall of the casing, the pipe L, connecting the pipes I and 95 M, and connected to said pipe I, between the damper therein and the outer end of said pipe, and a plurality of drums connected together and also connected with the drums N, adjacent to the forward ends thereof and with the pipe M, all substantially as and for the purpose set forth. 100

In testimony whereof I affix my signature in presence of two witnesses.

JOHN CRUZE.

Witnesses:

C. M. RAEDER,
THOMAS E. TURPIN.