(No Model.) 3 Sheets—Sheet 1.

H. J. NOYES.

HOT AIR FURNACE.

No. 523,990. Patented Aug. 7, 1894.

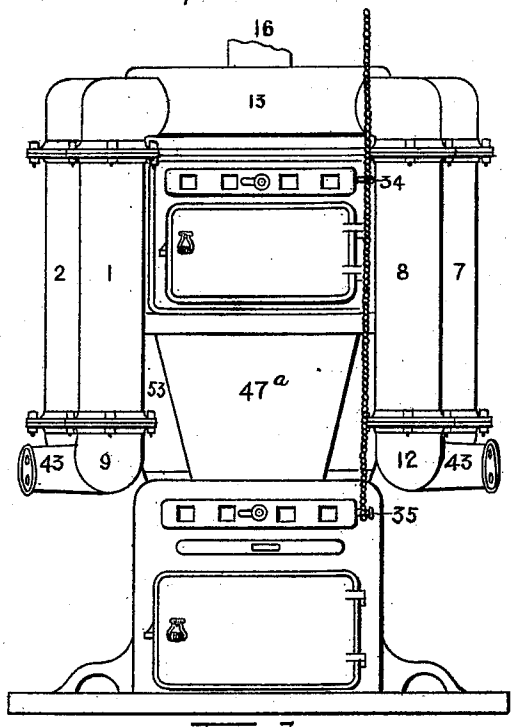

Fig. 1

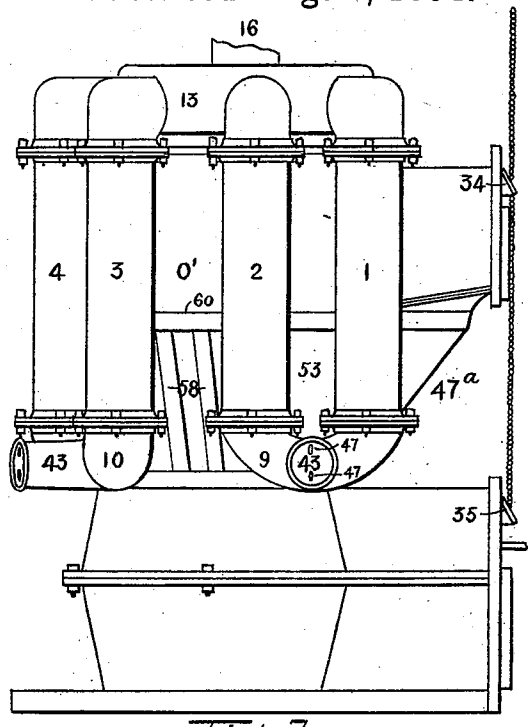

Fig. 2

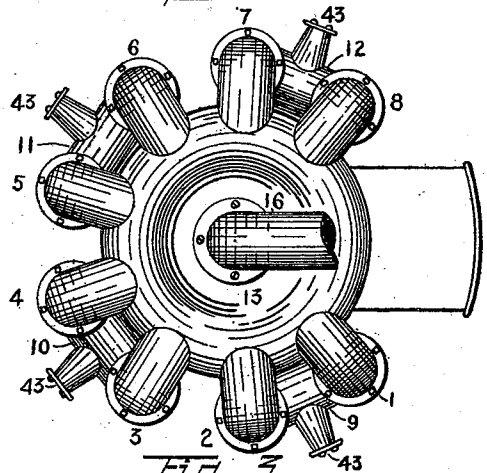

Fig. 3

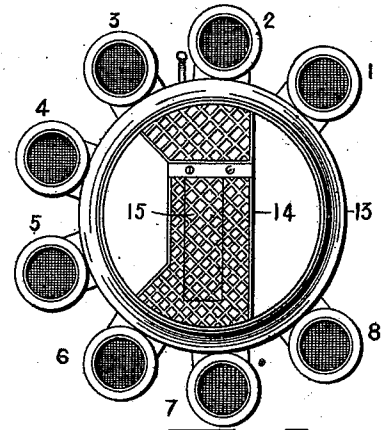

Fig. 4

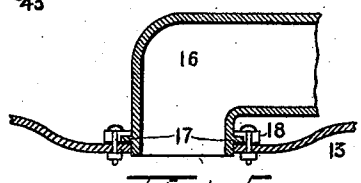

Fig. 5

Witnesses
A. Clark Ford
Wm. Fish.

Inventor.
H. J. Noyes
By, W. H. Burridge
Atty.

(No Model.) 3 Sheets—Sheet 2.

H. J. NOYES.

HOT AIR FURNACE.

No. 523,990. Patented Aug. 7, 1894.

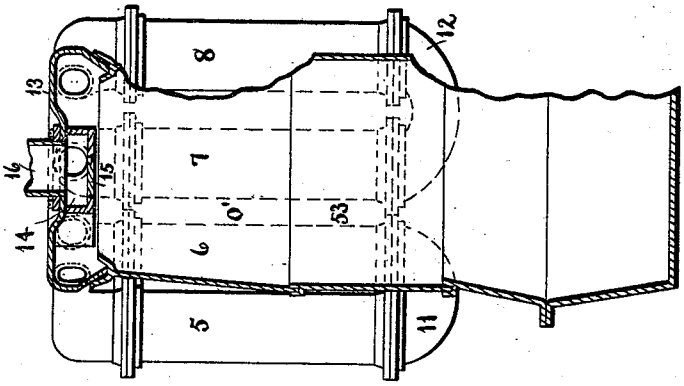

Fig. 7.

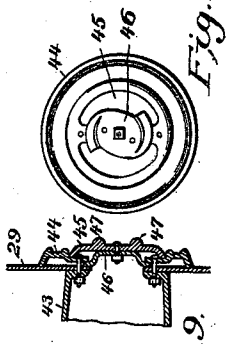

Fig. 10.

Fig. 9.

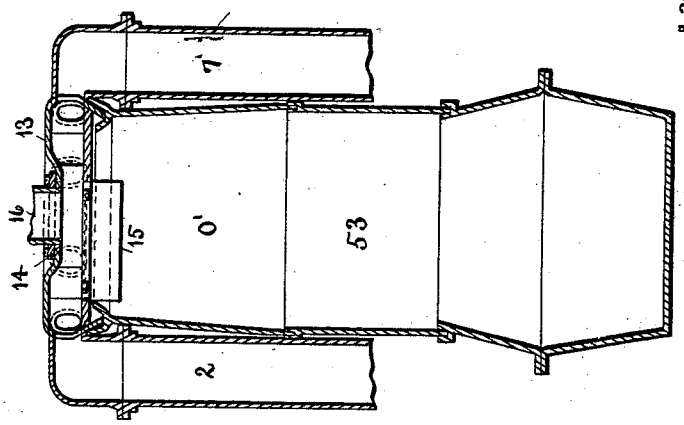

Fig. 6.

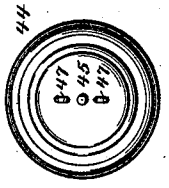

Fig. 8.

Witnesses:
F. E. Cutter.
L. A. Stratton

Inventor:
H. J. Noyes,
By W. H. Burridge,
Atty.

(No Model.) 3 Sheets—Sheet 3.

H. J. NOYES.

HOT AIR FURNACE.

No. 523,990. Patented Aug. 7, 1894.

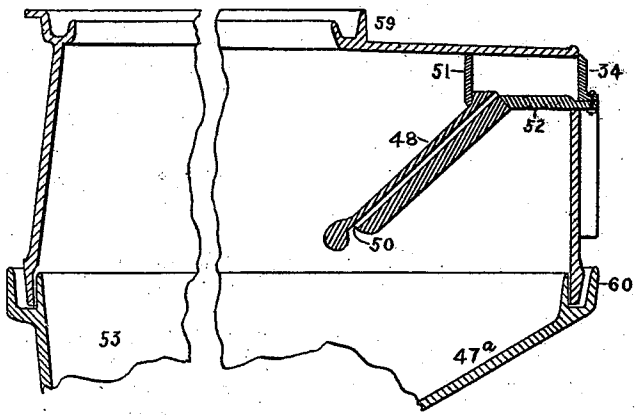

Fig. 11

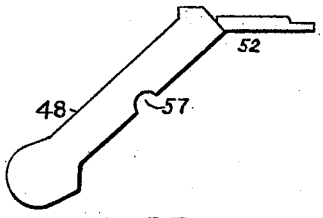

Fig. 12

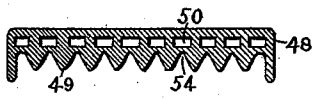

Fig. 13

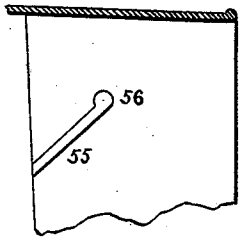

Fig. 14

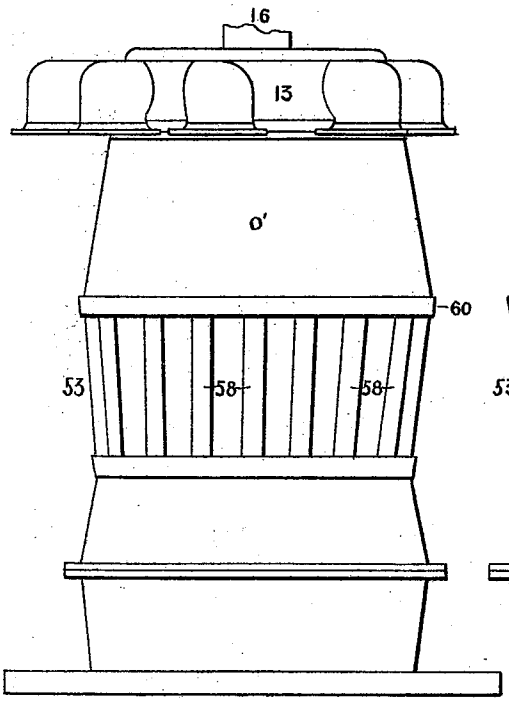

Fig. 15

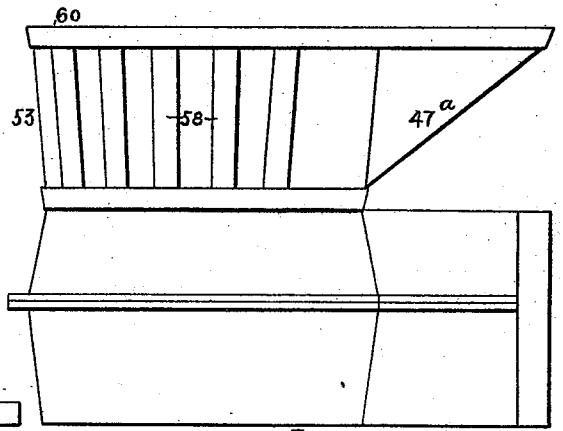

Fig. 16

Witnesses.
H. Clark Ford
Wm. Fish.

Inventor.
H. J. Noyes
By. W. H. Burridge Atty.

UNITED STATES PATENT OFFICE.

HORATIO J. NOYES, OF ASHTABULA, OHIO.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 523,990, dated August 7, 1894.

Application filed October 5, 1892. Serial No. 447,963. (No model.)

To all whom it may concern:

Be it known that I, HORATIO J. NOYES, a citizen of the United States, residing at Ashtabula, in the county of Ashtabula and State of Ohio, have invented a certain new and Improved Hot-Air Furnace, of which the following is a full, clear, and exact description.

The nature of my invention relates to improvements in that class of furnaces used for heating dwellings, factories, &c., and consists in the method of radiation, the arrangement and construction of the various flues, and a coking device hereinafter fully explained.

The object of my improvement is to provide a strong, serviceable and economical furnace.

That my invention may be seen and fully understood by others, reference will be had to the following specification and annexed drawings forming a part thereof, in which—

Figure 1 is a front elevation of my furnace; Fig. 2, a side elevation; Fig. 3, a top view; Fig. 4, a view of the under side of the top portion, detached; Fig. 5, a view illustrating the means of attaching the chimney pipe to the furnace; Fig. 6, a transverse, vertical section of the furnace casing showing the direct course of the products of combustion; Fig. 7, a longitudinal, vertical section of said casing showing the indirect course of said products; Figs. 8, 9 and 10, detached views of the flue cleaning device; Fig. 11, a vertical, longitudinal section of a portion of the furnace showing a section through the middle of the coking device; Fig. 12, an end view of the coking device, detached; Fig. 13, a cross-section of said device; Fig. 14, an interior view showing one of the inclined shelves or lugs on which the coking device rests; Fig. 15, a rear view of the furnace with the flues detached; and Fig. 16, a side view of the fire-pot and ash-pit, detached.

Similar letters and figures of reference designate like parts in the drawings and specification.

It will be understood that the ordinary casing is used in connection with my furnace, said casing not being shown in the drawings.

Referring to Figs. 1, 2 and 3, the radiating pipes are represented by the numerals 1, 2, 3, 4, 5, 6, 7 and 8. These pipes are in open communication with each other and form a continuous radiating circuit, through the medium of the connections 9, 10, 11 and 12 and the cap or upper combustion chamber O', Figs. 2 and 15, for the products of combustion emanating from the burning fuel in the fire pot. There are four equal passages in the cap 13 through which the products of combustion pass and from thence down the radiating pipes 1, 4, 5 and 8, around through the connections 9, 10, 11 and 12 and up again through the radiating pipes 2, 3, 6 and 7 into the expanding chamber 14, Figs. 4, 6 and 7, and thence out through one common passage pipe 16 to the chimney flue. A casing of galvanized iron (or it may be of brick) surrounding the furnace, in proper proportions, is supplied with air inlets, at the base of the furnace, to admit air to be heated.

The heat radiating from the furnace causes the air received at the base of the casing to expand and rise to the top of said casing, or warm air chamber, which is connected with pipes leading therefrom to rooms or apartments to be supplied with heat. The passage being continuous up around the furnace and radiating pipes 1, 2, 3, 4, 5, 6, 7 and 8, causes the products of combustion which pass through said pipes to become reduced in temperature, lower in fact than that required for sustaining combustion in the fire pot. Therefore the expanding chamber 14, receiving the waste heat from the top of the combustion chamber, re-expands the products of combustion received therein from the radiating pipes, and causes the passage of draft through pipe 16 and chimney flue to be accelerated, thereby rendering an exposure of a much greater surface to the air than would otherwise be without said chamber 14. In the construction of the furnace, more or less radiating pipes may be used without departing from the nature of my invention. The above is the result if the damper 15 is closed, as shown in Figs. 4, 6 and 7, should this damper be left open however, the draft would be direct.

The damper 15 may be operated by any suitable means, as by a rod connected therewith and extending to the front of the furnace. The radiating pipes may be sheet-steel or cast-iron with flanged connections with the cap 13 and lower couplings and of any desired length,

the material and length of said pipes not being arbitrary. The connections are made tight by any suitable fire-proof packing.

The chimney connection is formed in the following manner: A ring 17, Fig. 5, is cast on the pipe 16, which forms a shoulder, bearing on the edge of the opening in the cap 13. The collar 18 circumscribes the pipe 16 loosely, having an annular lap, over the ring 17. The pipe 16 is adjusted in proper position relative to the chimney and set in cement and the collar 18 is then bolted to the cap 13, thus securing the pipe in position, after which cement is placed around the joint making the same perfectly tight.

In case the radiating pipes and their connections become clogged or overloaded with soot, they are readily cleared of the same through the extensions 43, Figs. 1, 2 and 3, which are in open communication with the connections 9, 10, 11 and 12 and extend to openings in the casing. The outer terminals of the extensions 43 are in contact with the casing 29, as shown in Fig. 10, and are provided with lugs and eyes. The collar 44 circumscribes the opening in the casing and has eyes corresponding or registering with the eyes in the extension 43, the outer collar being bolted to said extension through these eyes with the casing intermediate, thus forming a tight joint. The interior of the cap 45 is provided with the flanged disk 46 and the exterior face with the lugs 47, 47. By a partial turn of the cap 45 the flanged disk 46 engages the extended portion of the lugs containing the eyes in the collar 44. By simply removing the cap 45 and placing a piece of lighted oiled waste, or its equivalent, in the opening, the pipes and their connections will be cleared of all soot lodged therein.

The coking device used in connection with this furnace is constructed as follows: The front of the fire-pot is provided with the chute 47, Figs. 1, 2, 11 and 16, which extends up to the mouth or upper door of the furnace. Extending entirely across the mouth of the furnace and on an angle of about forty-five degrees, more or less, is the plate 48 the under side of which is ridged longitudinally, as shown at 49 in Fig. 13, said figure being a cross-section of the plate. Above the ridges and intermediate thereof are the flues 50. The solid plate 51, Fig. 11, is secured to the plate 48 and extends across the opening and a similar plate 52 attached to the plate 48 below the line of the flues 50, extends across as shown, the two plates 51 and 52 forming a box with the damper 34 in the front thereof. The interior of said box is in open connection with the flues 50. When the fire-pot 53 is filled with coal up into the chute 47, as far as the mouth of the furnace, the fire will burn with an intense heat in said fire-pot while the gas liberated by the coking coal in said chute will pass down through the channels 54 formed by the ridges 49 and commingle with the air passing through the flues 50 from the damper 34 and burn with a blue flame extending across the magazine. On each side of the mouth of the furnace is the shell or elongated lug 55, Fig. 14, which supports the plate 48, the knob or elongated portion 56 being received in the notch 57, Fig. 12. This device produces a solid bed of coke in the chute 47, which is forced down into the fire-pot and the chute again filled with coal.

The heated air passing down through the pipe 1 and up through the pipe 2 becomes cooled and, upon entering the combustion chamber, is reheated and expanded, thereby producing a partial vacuum and accelerating the draft.

The joints 59 and 60 are cemented and sand packed to insure perfectly tight joints, that is: the channels shown at 59 and 60, Fig. 11, are provided with cement into which the joining parts are set and the remainder of the space is filled with sand.

In the manufacture of this invention minor changes may be found necessary or desirable. I would not therefore have it understood that I confine myself to the precise construction and arrangement of the parts herein described, but reserve to myself the right to all changes and modifications that may be resorted to without departing from the nature of my invention.

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

1. In a hot air furnace, a series of radiating pipes in open communication with each other through connecting pipes and the upper combustion chamber and the chambers in the cap 13, in combination with the expanding chamber 14 and the pipe 16, in the manner substantially as and for the purpose set forth.

2. In a hot air furnace, a coking device consisting of a plate provided with a series of flues and exterior ridges, said plate set on an incline in the mouth of the furnace, in combination with the damper 34 in open connection with the flues, substantially as and for the purpose set forth.

3. In a hot air furnace, the extensions 43 extending from the radiating connections, provided with collars on the exterior of the casing, in combination with caps 45 provided on the interior with flanged plates for engagement with and disengagement from extending lugs on said extensions, whereby the radiating pipes may be readily cleaned, substantially as specified.

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

HORATIO J. NOYES.

Witnesses:
HARRY PARKER,
GEO. D. PARKER.