

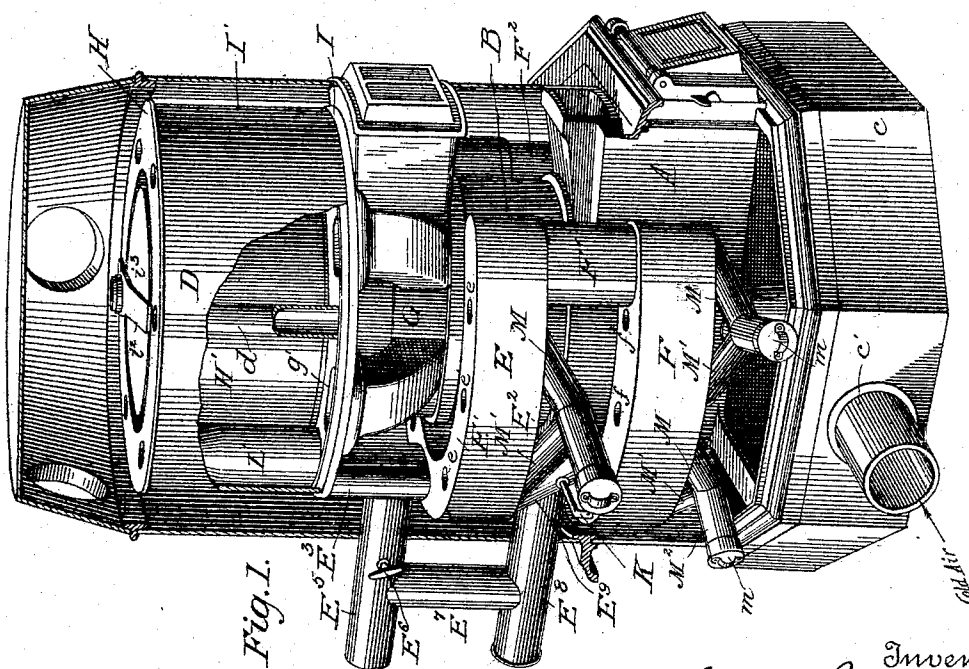
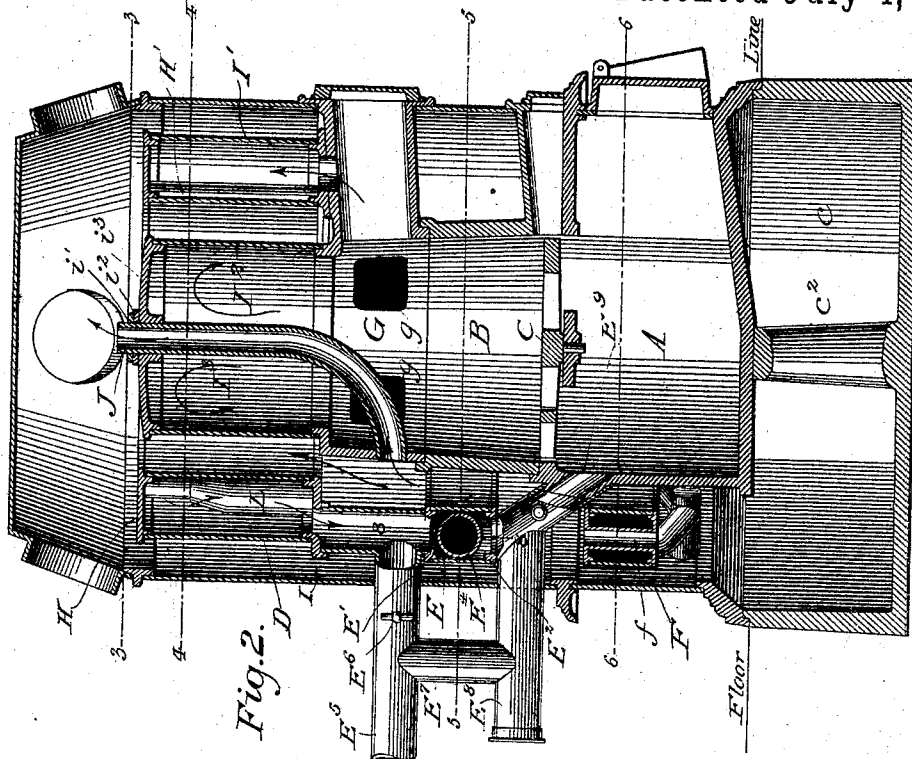
(No Model.)

3 Sheets—Sheet 1.

C. C. SOFLEISS.
HOT AIR FURNACE.

No. 500,821.

Patented July 4, 1893.



Witnesses
Raymond Barnes
J. Elmer

Inventor
C. C. Soffeis
By *his* Attorneys
P. F. Dodge

(No Model.)

3 Sheets—Sheet 2.

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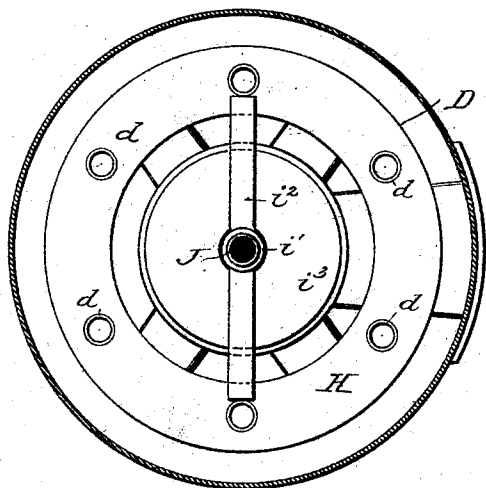


Fig. 3.
on line 3-3.

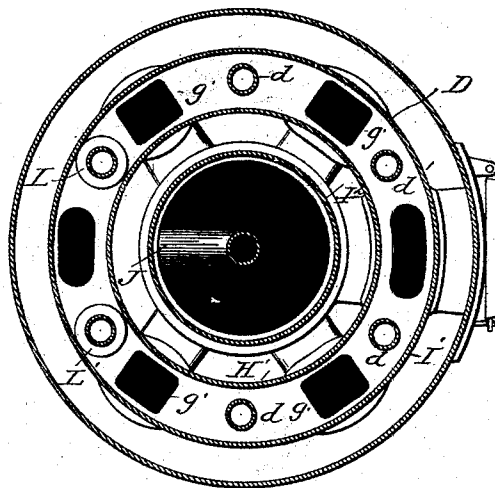


Fig. 4.
on line 4-4.

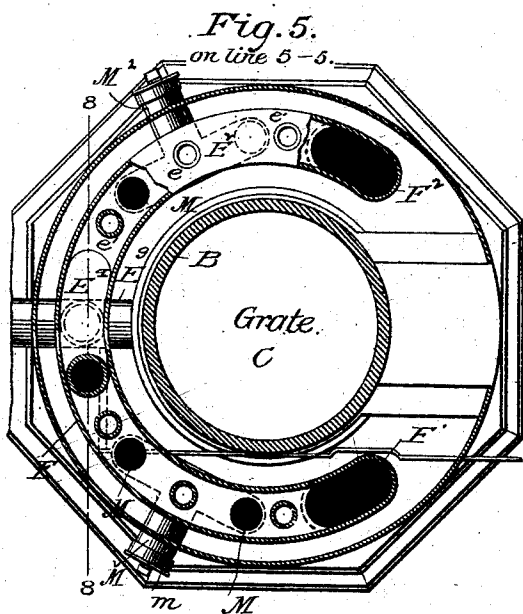


Fig. 5.
on line 5-5.

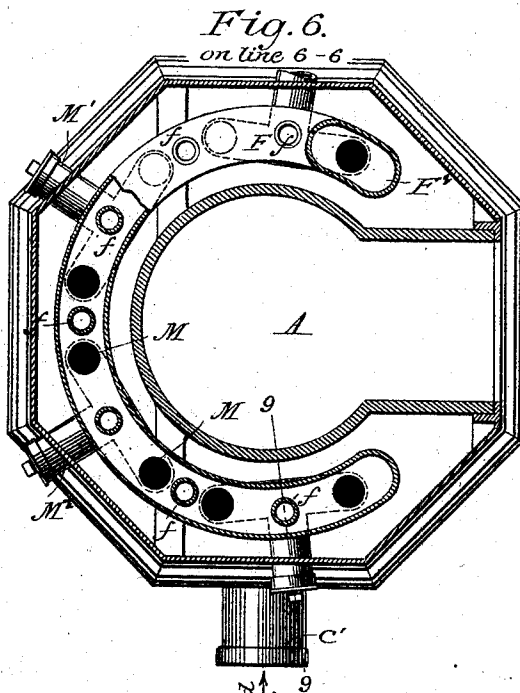


Fig. 6.
on line 6-6.

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Fig. 7.

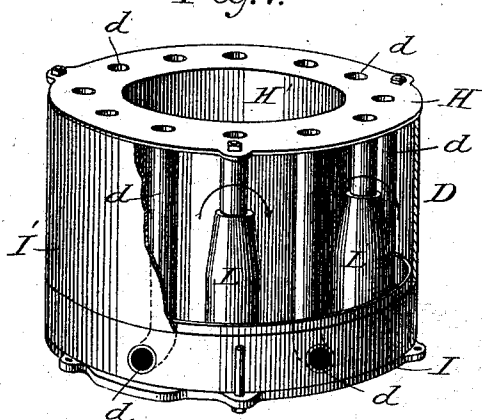


Fig. 9.

on line 9-9.

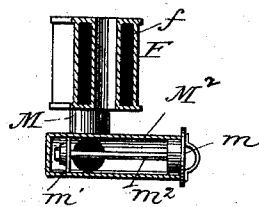


Fig. 8.

on line 8-8.

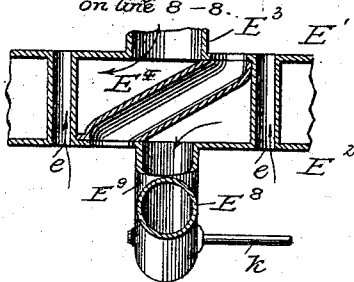


Fig. 10.

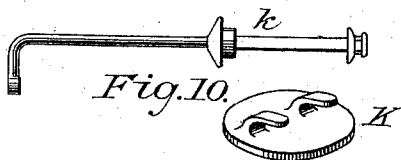
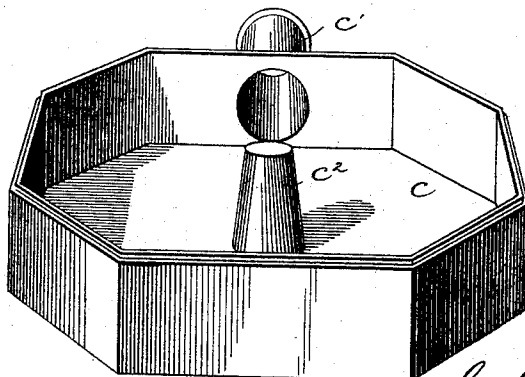


Fig. 11.



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UNITED STATES PATENT OFFICE.

CONRAD C. SOFLEISS, OF WOODBURY, NEW JERSEY.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 500,821, dated July 4, 1893.

Application filed July 6, 1892. Serial No. 439,178. (No model.)

To all whom it may concern:

Be it known that I, CONRAD C. SOFLEISS, of Woodbury, county of Gloucester, and State of New Jersey, have invented a new and useful Improvement in Hot-Air Furnaces, &c., of which the following is a specification.

My invention relates to hot air furnaces for heating buildings, and it has for its main objects increased efficiency and heating capacity relatively to the amount of fuel consumed, and ease and convenience in regulating, manipulating, and clearing out.

To these ends the invention consists in the construction hereinafter described and claimed.

In the accompanying drawings,—Figure 1 is a perspective view of a hot-air furnace embodying my invention, portions of the casings being removed to expose the internal construction. Fig. 2 is a vertical longitudinal section through the same on the line 2—2. Figs. 3, 4, 5 and 6 are horizontal sections on the lines 3—3, 4—4, 5—5 and 6—6 respectively, of Fig. 2. Fig. 7 is a perspective view of a modified form of drum. Fig. 8 is a vertical section on the line 8—8 of Figs. 2 and 5. Fig. 9 is a vertical section on the line 9—9 of Fig. 6. Fig. 10 is a detail view of a damper. Fig. 11 is a perspective view of a cold air chamber.

Referring to the drawings,—A represents the ash-pit; B, the fire-pot or chamber, and C, the grate, all of which may be of the ordinary and usual construction. Beneath the ash-pit is located a cold air chamber or tank *c*, which is preferably formed of terra cotta and provided at its side with an opening having a neck *c'* adapted to be connected to a pipe leading to the external air. This chamber is provided at its center with a post *c²* on the upper edge of which the base of the ash-pit rests so that the weight of the ash-pit and the superimposed parts of the heater are afforded support at the center. I locate this cold-air chamber beneath the surface of the ground with its upper edge projecting slightly above the same, in position to sustain the outer casing of the heater. Under this arrangement the access of moisture or water to the cold-air chamber will be prevented.

Within the outer casing and above the fire-pot I locate a smoke drum D, containing a se-

ries of hot-air pipes *d d'*, &c. I also locate within the casing surrounding the fire-pot and ash-pit respectively, two smoke drums E and F, each containing a series of vertical air pipes *ee'*, &c., and *ff'*, &c. The upper smoke drum D rests upon a cylindrical crab G, which in turn rests upon the fire-pot. This crab contains in its side a series of openings *g*, which communicate with the smoke drum D, as more fully described hereinafter.

The smoke drum D consists of an upper cylindrical ring H and a lower ring I, the latter seated upon the crab G, and provided with openings *g'*, communicating with the opening *g*, in the crab. Between these rings are arranged the series of vertical hot-air pipes *d d'*, &c., which open at their two ends through the openings in the respective rings, as shown. These pipes are inclosed between two casings H' and I', fixed between the rings at their outer and inner edges respectively. Under this arrangement it will be observed that the gases and products of combustion pass from the fire-pot into the space between the casings H' and I', and around the hot-air pipe located therein.

I provide the drum D at its center with a casing I², forming a combustion chamber I³, in direct communication with the fire-pot. The annular passage between the casings H' and I², is in communication with the cold-air space surrounding the fire pot. The top of the combustion chamber I³, is closed by means of a circular plate *i³*, which is seated upon the casing I². At its center this plate is provided with an opening through which a hot-air pipe J, extends downward through the crab G, to the air space surrounding the fire-pot. At its upper end this pipe is provided with a collar *i'*, beneath which and around the pipe is located a bar *i²*, having its ends resting on the upper ring H of the drum D. This bar and the collar thereon hold the plate *i³* firmly in position on the upper side of the casing I².

The drum E, before alluded to, consists of the upper and lower crescent shaped plates E' and E², which are provided with openings between which the vertical cold-air pipes *e e'* are arranged. These pipes are inclosed by means of a continuous internal and external casing located between the plates E'

E'' at their outer and inner edges the whole forming a crescent-shaped chamber whose ends terminate in front of the fire-pot a short distance on either side of a central line there-through.

The drum E, communicates at its rear through a vertical pipe E³, with the upper drum D.

The drum F, is of a construction similar to that of the drum E, and communicates at its ends through pipes F' F² with the drum E.

Within the drum E, at its rear, I extend a diagonal pipe or smoke check E⁴, dividing the drum E into right and left compartments, the vertical pipe E³, communicating with one of said compartments and the pipe E⁹ with the other. The pipe E⁴ communicates at its two ends with the cold-air space.

Between the casing H' and I' of the upper drum D, at the rear, I provide two pipes or smoke checks L and L', which are formed at their lower ends to completely close the space between the said casings, and which are reduced at their upper ends to admit of the passage of the products of combustion there-around. These pipes are in communication at their ends with the cold air space of the heater. The pipe E³, through which communication is afforded between the drums D and E, is provided in its side with an opening communicating with the horizontal direct smoke pipe E⁵, leading to the chimney and provided with a damper E⁶. From this pipe E⁵, a vertical pipe E⁷, extends downward to a horizontal pipe E⁸, which communicates with indirect smoke flue and dust flue E⁹. This dust flue opens at its upper end into the indirect smoke flue E⁸ and drum E, and is provided with a damper K, more fully described hereinafter.

From the foregoing description it will be seen that the products of combustion will ascend from the fire pot into the combustion chamber I³ thereover, and will be directed downward by the plate i³, and will enter through the openings g, inside of the crab and ascend into the space between the casings H' and I' of the drum D, and circulate around the hot-air pipes d, d', &c., located therein.

Owing to the smoke checks L L', the products of combustion will be compelled to pass upward around the reduced portions of the same and then downward through the pipe E³, and form a direct draft outward through pipe E⁵ to the chimney.

For indirect draft when the damper E⁶ is closed the products of combustion will continue through the pipe E³, downward and enter drum E, at its back and pass to the front of the same through one side, circulating around the hot-air pipes therein, and outward and downward through the vertical pipe F² to the drum F, through which they will pass around the hot-air pipes to the opposite end of the drum, then upward therefrom through the pipe F', to the drum E entering the latter at the end opposite that at which

they passed out. They will then pass around the pipes therein to the rear of the drum, whence they will pass, through the indirect smoke flue above the chamber to the horizontal pipe E⁸, then upward through pipe E⁷, to pipe E⁵, and then out through the chimney. The cold air entering the cold-air tank C, will pass upward within the outer casing through the pipes in the drums F and E, and will continue upward through the pipe J, in the combustion chamber and also through the pipes d d', &c., located in the drum D. It will further pass into the space between the casings H' and I³, all of these passages opening into the upper portion of the heater, from which the hot air may be conveyed by suitable pipes, as usual, to the compartments to be heated.

Under my construction it will be observed that the passages for the products of combustion are exposed on all sides to the cold air entering at the base of the heater, and owing to the circuitous and extended course pursued by the products of combustion the cold air is afforded an extended radiating surface.

In Fig. 7 I have illustrated the upper drum D, in a slightly modified form. In this construction the hot air pipes, instead of being vertical and opening at their lower ends through the lower ring, are provided at their lower ends with elbows, and are located directly over the openings g, from the combustion chamber, so that the products of combustion will impinge directly against the same.

In order that provision may be made for removing soot or dust which may accumulate in the drums E and F, I provide the same in their under sides with openings from which inclined pipes M M', &c., extend which are connected at their ends with horizontal pipes M². These horizontal pipes extend outward through the outer casing of the heater and are closed by caps m. They are each provided with a rake or scraper m', which is provided with a suitable handle m². By removing the cap the rake may be withdrawn and effectually remove the accumulated soot or dust from the drums, which on account of the inclination of the pipes leading therefrom will enter the horizontal pipe before mentioned.

The damper K, already referred to, is mounted on an operating rod k, which is in turn mounted in the dust flue to rock. The damper proper consists of an elliptical plate from the surface of which two arms extend upward and then laterally, leaving a space between their ends and the surface of the plate. This space is adapted to receive the operating-rod which is formed to fit snugly therein and rock the damper. Under this construction it will be seen that the damper proper may be removed from the operating rod without it being necessary to remove the latter from the pipe.

The damper K is located in the dust flue opposite the horizontal pipe E⁸, and the latter is closed at its outer end by a removable cap. By taking off this cap the damper may be

reached and removed or replaced from the outside without separating the pipe or disturbing any part of the furnace.

It is to be understood, of course, that my furnace may be employed as a steam or water heater provided the construction herein described is retained and its operation is essentially the same, in which case the steam or water will pursue the course followed by the air.

Having thus described my invention, what I claim is—

1. The combination with the fire pot of the crescent shaped smoke drums each provided with vertical cold-air passages, said drums being located one above the other and communicating with each other at the ends, one of said drums divided into two parts by a partition at the rear, and having draft inlet and outlet at opposite sides of said partition.

2. The combination of the ash-pit, the fire-box, and the combustion chamber, with the smoke drums surrounding said parts, the drum of the fire-pot communicating with the ash-pit and with the drum surrounding the latter, and the drum of the combustion chamber having direct connection with the outlet flue, and also a circuitous connection through the other drums, and a damper for changing or reversing said connections at will.

3. The combination with the combustion chamber, and the ash-pit, of the smoke drum D, surmounting the combustion chamber and communicating therewith, the series of air pipes extending through the smoke drum and communicating with the cold air space between the casing and the combustion chamber, the smoke drum E, communicating with the smoke drum D and surrounding the fire pot, the series of air pipes extending there-through, the smoke drum F, surrounding the ash-pit and communicating with smoke drum E, and the series of air pipes extending through the same.

4. The smoke drum for hot air furnaces comprising a vertical annular chamber closed at the top and having through its bottom inlet and outlet smoke passages alternating with each other, vertical air pipes passing

through said chamber, and smoke checks located between the smoke passages and closing the lower part of the chamber but leaving passages at the top whereby the products of combustion entering and leaving at the bottom are caused to ascend to the top of the drum in their passage therethrough.

5. In a hot-air furnace, the combination of the combustion chamber, the drum D surrounding the same, communicating therewith and provided with cold air pipes, the smoke checks in said drum, the drum E, communicating at one side with the drum D, the series of air pipes therein, the drum F, communicating at its ends with the ends of the drum E, the air pipes in said drum F, and the pipe leading from the said drum to the chimney.

6. The combination with the smoke drum provided at intervals with the cold air pipes extending therethrough of inclined pipes extending from the under side of said drum between the cold air pipes and the horizontal pipe into which the inclined pipes lead.

7. In a hot-air furnace, the combination of the combustion chamber, the external casing, the intermediate smoke drum, the series of pipes extending therethrough and the pipe E⁴, also extending through said drum and dividing the same into two compartments, said pipe communicating at its ends with the air space between the external casing and the combustion chamber.

8. The combination with the dust-flue and with the pipe E⁸ open at its outer end and provided with a removable cap, of the rotatable damper-rod passing transversely through the dust flue, and the damper plate supported on said rod and removable therefrom in a direction at right angles to its axis, whereby the damper plate is adapted to be removed and replaced through the pipe E⁸.

In testimony whereof I hereunto set my hand, this 1st day of July, 1892, in the presence of two attesting witnesses.

CONRAD C. SOFLEISS.

Witnesses:

W. R. KENNEDY,
F. S. ELMORE.