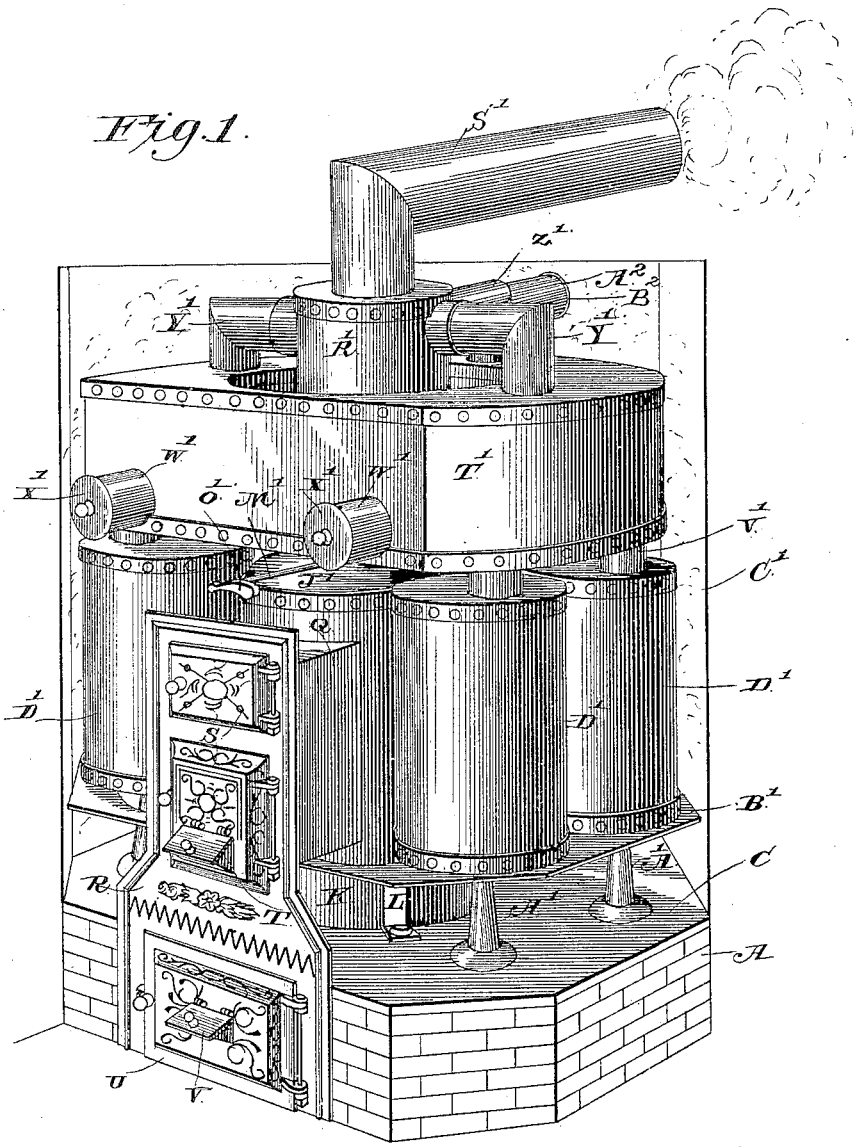
(No Model.) 3 Sheets—Sheet 1.

J. LAWYER.

HEATING FURNACE.

No. 419,049. Patented Jan. 7, 1890.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

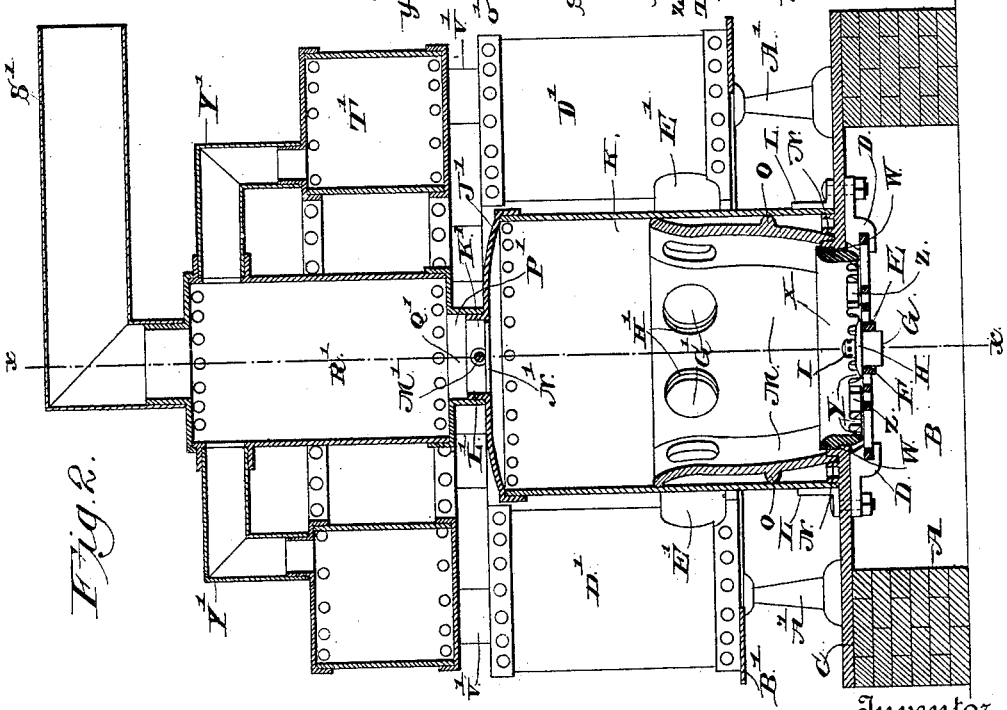
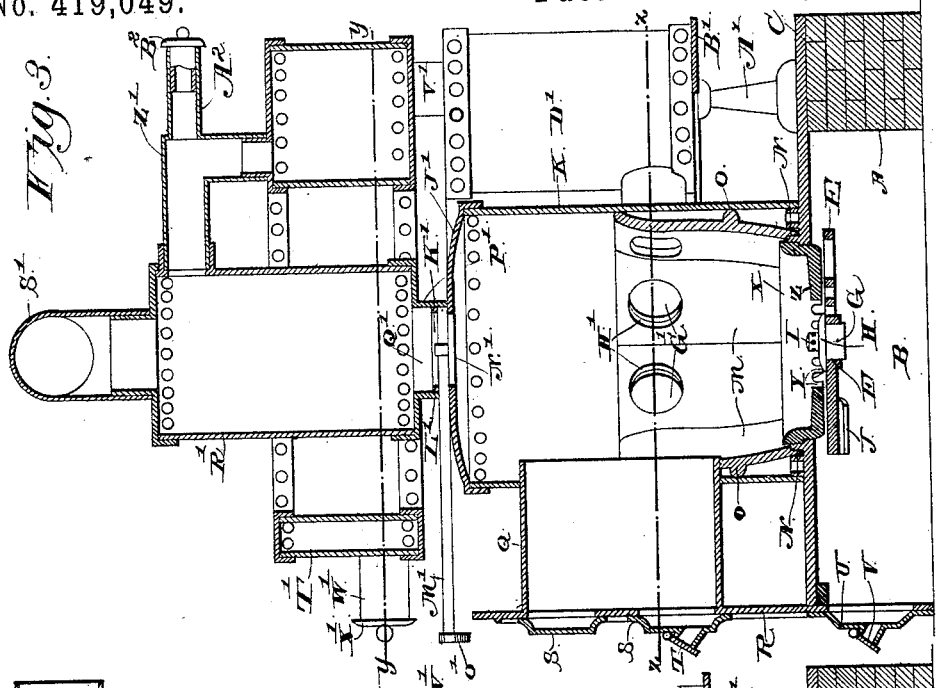


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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HEATING FURNACE.

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Fig. 4.

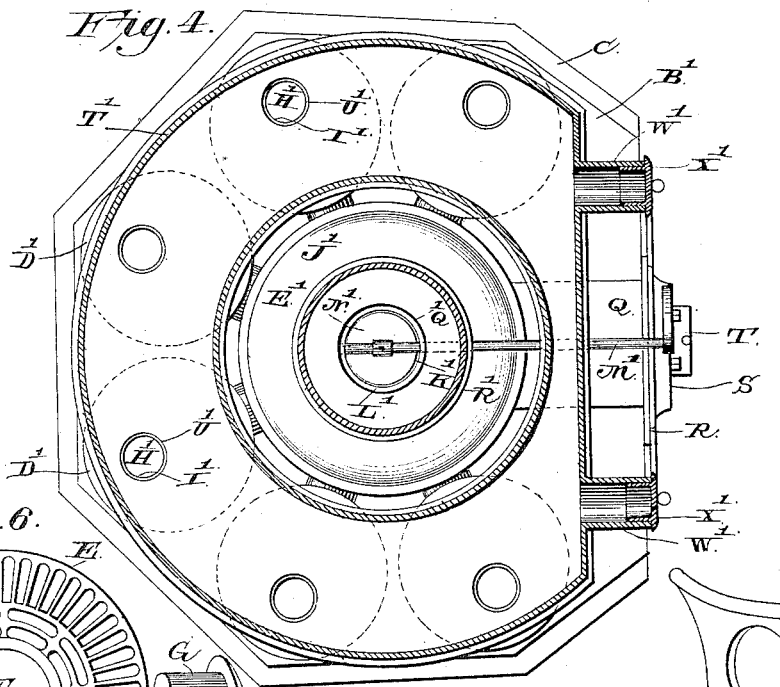


Fig. 6.

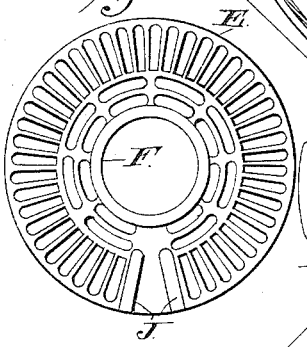


Fig. 5.

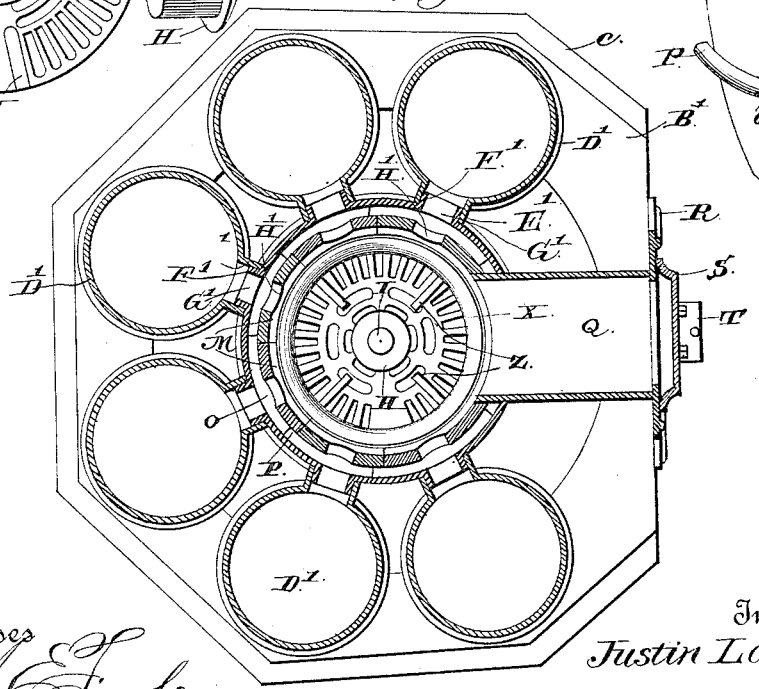
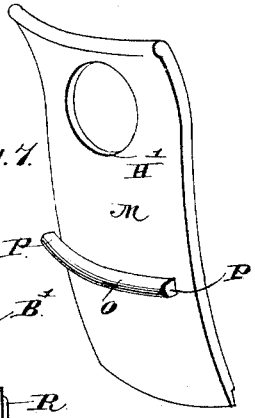


Fig. 7.



Witnesses
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UNITED STATES PATENT OFFICE.

JUSTIN LAWYER, OF COLDWATER, MICHIGAN.

HEATING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 419,049, dated January 7, 1890.

Application filed February 23, 1889. Serial No. 300,900. (No model.)

To all whom it may concern:

Be it known that I, JUSTIN LAWYER, a citizen of the United States, residing at Coldwater, in the county of Branch and State of Michigan, have invented new and useful Improvements in Heating-Furnaces, of which the following is a specification.

This invention relates to heating-furnaces; and it has for its object to construct a furnace which shall be simple and durable, easily managed, and which shall be provided with radiating-surfaces of considerable extent, so that the greatest possible amount of benefit shall be derived in proportion to the quantity of fuel used.

The invention consists in the improved construction and arrangement of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the drawings, Figure 1 is a perspective view of my improved furnace. Fig. 2 is a vertical transverse sectional view. Fig. 3 is a vertical sectional view taken on the line *x x* of Fig. 2. Fig. 4 is a horizontal sectional view taken on the line *y y* of Fig. 3. Fig. 5 is a horizontal sectional view taken on the line *z z* of Fig. 3. Fig. 6 is a detail view of the grate removed from the furnace. Fig. 7 is a detailed view of one of the segments or sections composing the lining or fire-pot of the furnace.

The same letters refer to the same parts in all the figures.

A designates the base of my improved furnace, which may be constructed of brick or concrete work, and in which is located the ash-pit B.

C is the hearth, which is constructed of cast-iron, and which is provided on its under side with hangers D, of suitable construction, one or more of which hangers may be made detachable from the hearth-plate, in order that the grate E, which is supported upon said hangers, may be readily detached whenever it shall be desired to place a new one in position.

The grate E consists of a circular casting provided with suitably-located slots or openings, through which ashes may be sifted when the said grate is oscillated upon its hangers. The said casting is also provided with a central opening F, in which is fitted a plug G. The latter is provided with an annular flange H, by which it is supported upon the upper side of the casting E, and it has a head I, provided with openings, in which a poker or hooked rod may be inserted for the purpose of removing the said plug when it shall be desired to dump the contents of the fire-pot through the central opening in the grate into the ash-pit. The grate E has converging flanges J on its under side, between which the end of a suitable rod or handle may be inserted when it shall be desired to shake or oscillate the device.

K designates the shell of the furnace, which is preferably of cold-rolled iron or steel plate, and which is suitably secured to the hearth by means of angle-brackets L. The lower end of the shell is provided with a lining forming the fire-pot, said lining being composed of a series of segments or sections M M, the lower ends of which rest in an annular groove N in the hearth-plate, surrounding the grate-opening in the latter. The segments M converge slightly at their lower ends, so as to form the fire-pot of the desired shape and capacity, and they are provided on their rear sides with transverse ribs O, extending slightly at one edge, so as to form lugs P, and terminating at a short distance from the opposite edge, as will be seen in Fig. 7, so that each of the said segments will tend to hold the next adjoining segment in position within the shell or casing. A single one of the sections M is made devoid of the lug P, so that it may be readily removed when it shall be found necessary to remove any of the segments for the purpose of substituting new ones. By making the lining of the fire-pot in sections, as herein described, it is obvious that any one of the sections or segments may be replaced with much less trouble and at less expense than in cases where the entire fire-pot is constructed in a single piece, necessitating its complete renewal in case of injury to any part thereof.

Q designates the feed-opening, which extends forwardly from the front side of the shell or casing, and the front end of which has the door-frame R, in which are hung the fuel-doors S, the lower one of which has the

draft door or damper T and the ash-pit door U, which is likewise provided with a draft door or damper V. The grate-opening in the hearth-plate is provided with an annular flange or shoulder W, serving to support a removable cast-iron ring X, the lower edge of which is provided with a series of teeth Y, and with inwardly-extending arms Z, which latter rest, or nearly so, on top of the grate. This ring serves a twofold purpose, namely: first, to guide or convey the fuel toward the central portion of the grate, where it is subjected to the most effective draft, and, secondly, by its teeth Y and arms Z, to assist in breaking up the fuel when the grate is oscillated, so as to separate the ashes more effectually from the cinders and live coals remaining in the fire-box.

Ranged upon the base of the furnace in a circumferential series around the shell or casing K are a series of pedestals A′, serving to support a plate or diaphragm B′, which extends entirely around the shell or casing, terminating at the sides of the fire-front. This plate or diaphragm does not extend entirely to the said shell or casing, but terminates at some distance therefrom. Its outer edge, however, extends entirely to the casing of brick or masonry by which the entire furnace is surrounded, and which in the drawings is indicated by letter C′. Supported upon each of the pedestals A′ and resting upon the intermediate plate or diaphragm is a cylindrical radiator D′, which is provided on its inner side near its lower end with a tubular collar E′, adapted to fit over a flange F′, extending from the shell of the furnace and corresponding with an opening in the latter (indicated by G′) and registering with an opening H′ in the corresponding section M of the lining. Each of the cylindrical radiators is provided at its upper end with an opening H′, surrounded by a flange or collar I′, the object of which will be presently described.

J′ designates the top of the furnace, which is provided with a central opening K′, surrounded by a flange or collar L′, which is provided with bearings for a rod or shaft M′, carrying a damper N′, and extending forwardly and provided with a handle O′, by means of which it may be conveniently manipulated. Mounted upon the flange L′ by a downwardly-extending collar P′, surrounding an opening Q′ in its lower end, is a cylindrical radiator R′, to the upper end of which is connected the stove-pipe S′, through which the products of combustion are conveyed to the chimney.

T′ is an annular casing or radiator, the bottom of which is provided with a series of openings U′, registering with the openings H′ in the upper ends of the radiators D′ and surrounded by flanges or collars V′, adapted to encircle the flanges I′ upon the said radiators D′, with which the said annular radiator T′ is in this manner connected. The annular casing or radiator T′ is provided on its front side with forwardly-extending flues W′, having caps or stoppers X′, which may be conveniently removed when it shall be desired to clean the said radiators. The upper side of the annular radiator T′ is connected by means of elbows Y′, located at both sides, with the central cylindrical radiator R′. A third elbow Z′, located at the rear side, likewise connects the annular radiator with the central cylindrical radiator R′, and the said elbow Z′ is provided with a rearward extension A^2, having a cap or flue-stopper B^2, which may be readily removed for cleaning purposes.

The operation of this invention will be readily understood from the foregoing description, taken in connection with the drawings hereto annexed.

The entire furnace is to be inclosed within a casing of masonry, upon which the heated air is to be conveyed in the usual manner to any desired parts of the building. The current of air will enter through openings at the bottom of the outside wall or casing all around the furnace and pass between the foundation and diaphragm, and thence between the shell of the furnace and the radiators D′. The arrangement and location of the several radiators, it will be seen, is such as to expose the current of air to a very considerable heating and radiating surface, and I thus derive the greatest possible advantage in proportion to the quantity of fuel used in the furnace. By properly manipulating the damper N′ the draft from the furnace may be caused to be directed upward through the radiator R′, and from thence to the chimney, or by closing the damper N′ the whole of the products of combustion may be forced to pass through the cylindrical radiators D′, from thence into the annular radiator T′, and finally through the central cylindrical radiator R′ and to the chimney.

The general construction of my improved furnace is simple and comparatively inexpensive, and it may be readily managed and kept clean without necessitating the employment of skilled labor.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination of the furnace-casing, the cylindrical radiators arranged in a circumferential series around the same and having openings near their lower ends connected by tubular flanges or collars with corresponding openings in the furnace-casing, and the segmental lining-sections arranged within the casing, having their lower ends fitted in an annular groove in the hearth-plate, and provided with openings near their upper ends registering with the openings in the furnace-casing that communicate with the radiators, as herein set forth.

2. The combination of the base, the hearth-plate, the furnace-casing mounted upon the latter, the pedestals mounted upon the base, and the cylindrical radiators supported on said pedestals, substantially as herein set forth.

3. The combination of the base having a series of pedestals mounted thereon, the hearth-plate, the furnace-casing supported upon the latter, an annular plate or diaphragm mounted upon the said pedestals and surrounding the furnace-casing at some distance from the latter, and the cylindrical radiators arranged upon the plate or diaphragm above the pedestals and having openings near their lower ends connected to the furnace-casing, substantially as set forth.

4. The combination of the furnace-casing, the cylindrical radiators arranged around the same and having openings near their lower ends connected with the casing, an annular radiator mounted upon and connected with the upper ends of the cylindrical radiators, and a central cylindrical radiator arranged above and connected with the furnace-casing, and pipes connecting the said central radiator, respectively, with the surrounding annular radiator and with the chimney, substantially as set forth.

5. The combination of the furnace-casing, the cylindrical radiators arranged around and connected therewith, the annular radiator mounted upon and connected with the upper ends of the cylindrical radiators, a central radiator mounted upon and connected with the furnace-casing, a damper arranged between the furnace-casing and said central radiator, and pipes connecting the central radiator with the annular radiator and with the chimney, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

JUSTIN LAWYER.

Witnesses:
GEO. STARR,
H. R. SAUNDERS.