

No. 668,777.

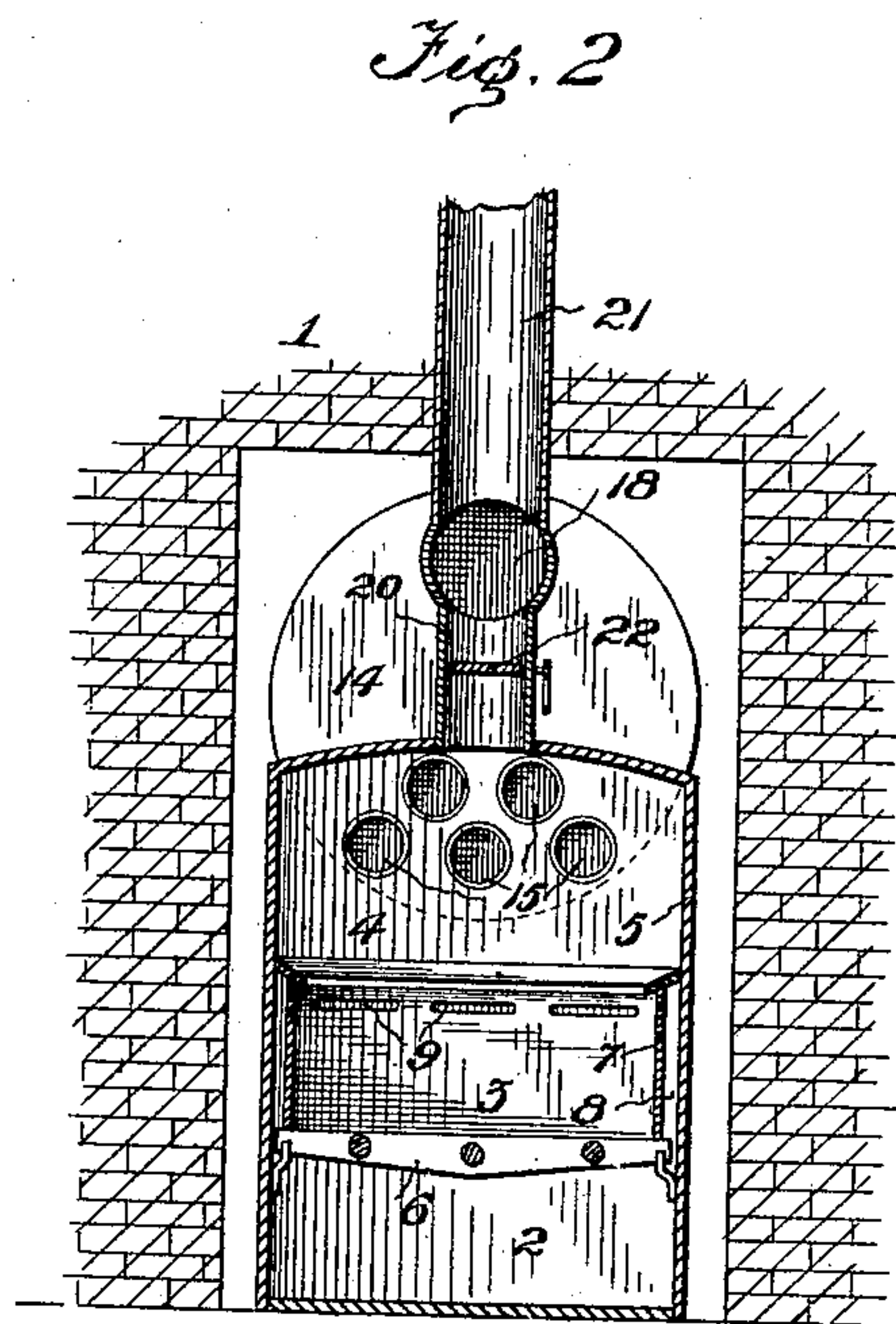
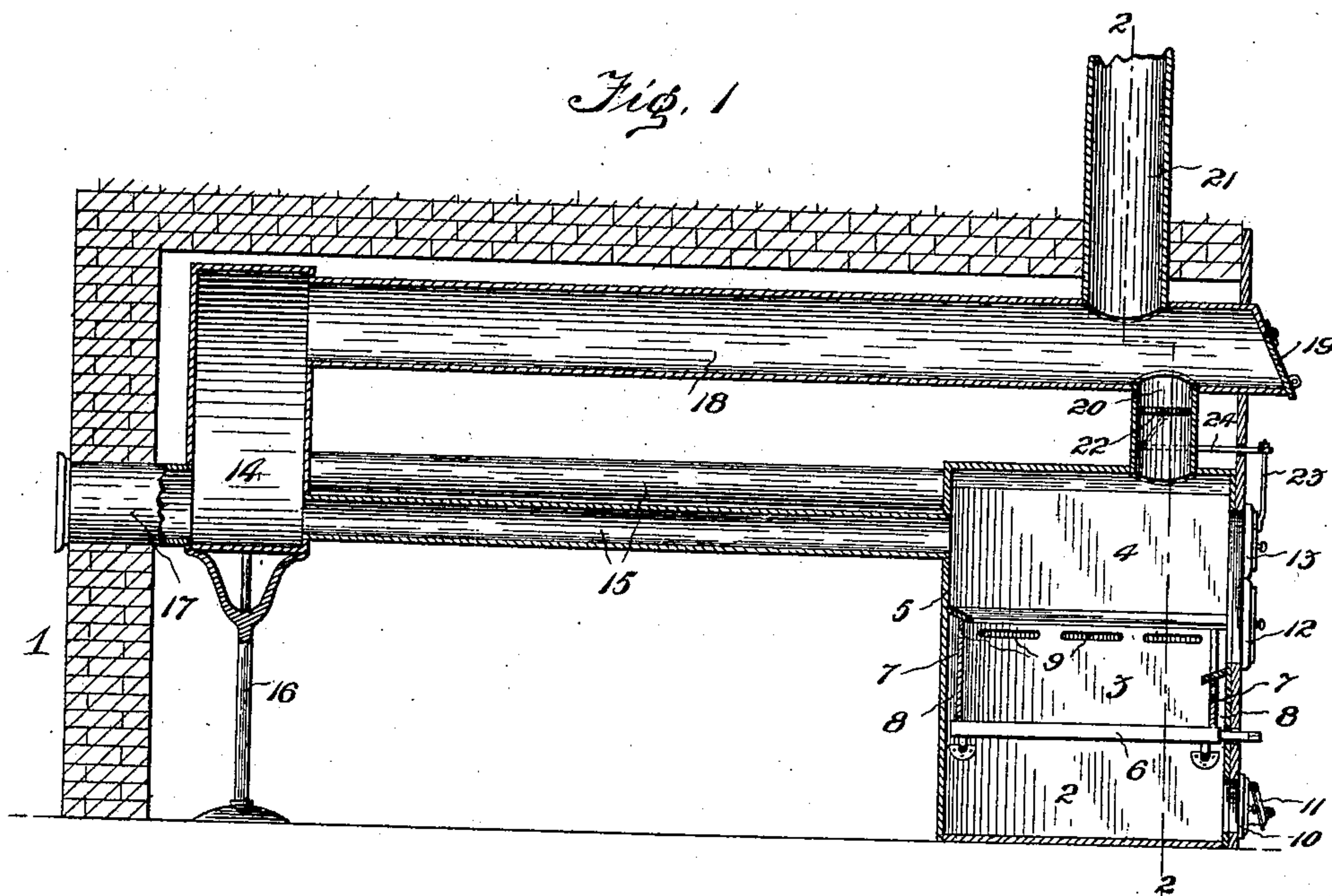
J. D. SIGLER.
FURNACE.

Patented Feb. 26, 1901.

(No Model.)

(Application filed June 14, 1900.)

2 Sheets—Sheet 1.



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Fig. 3

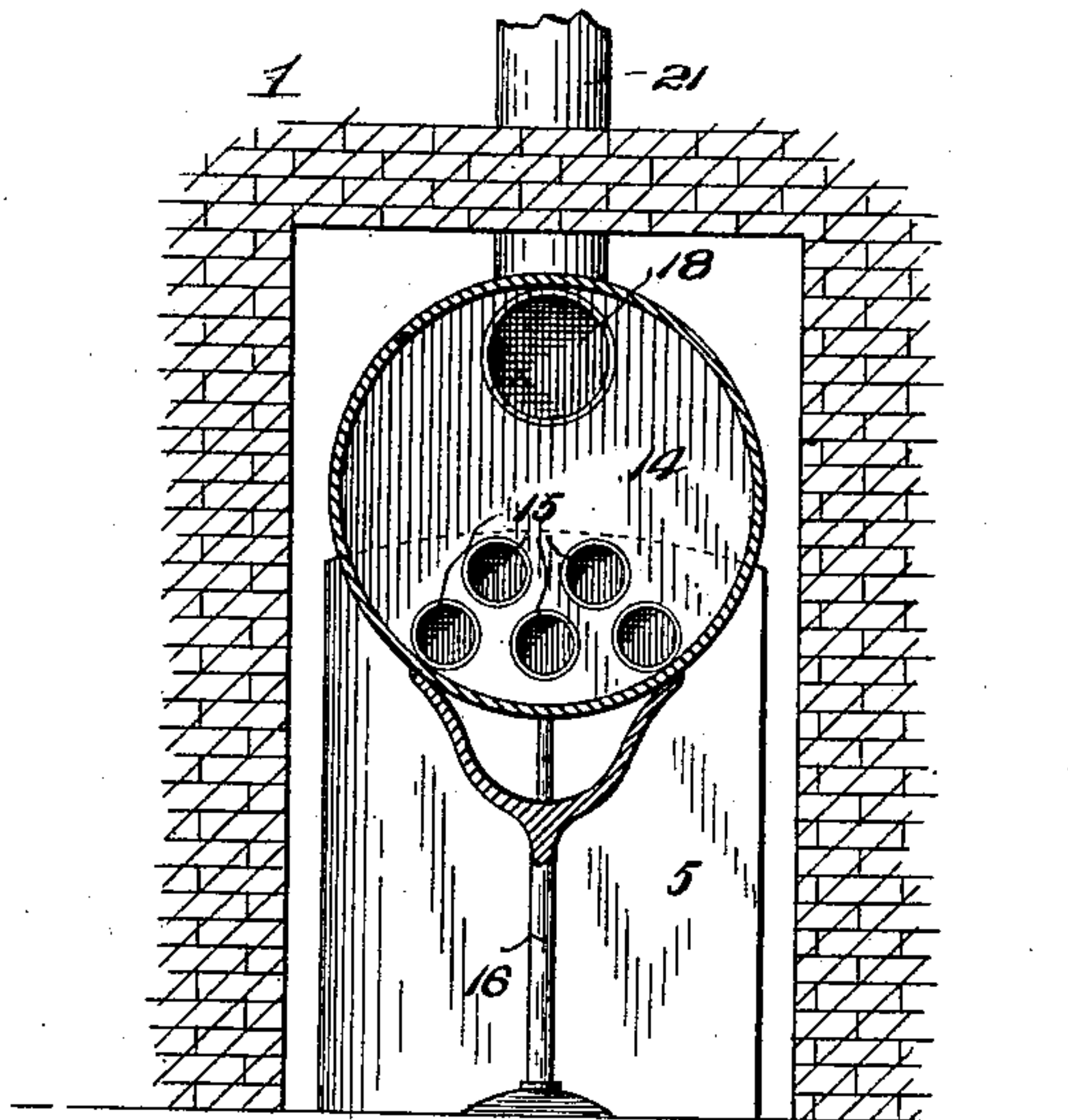


Fig. 4

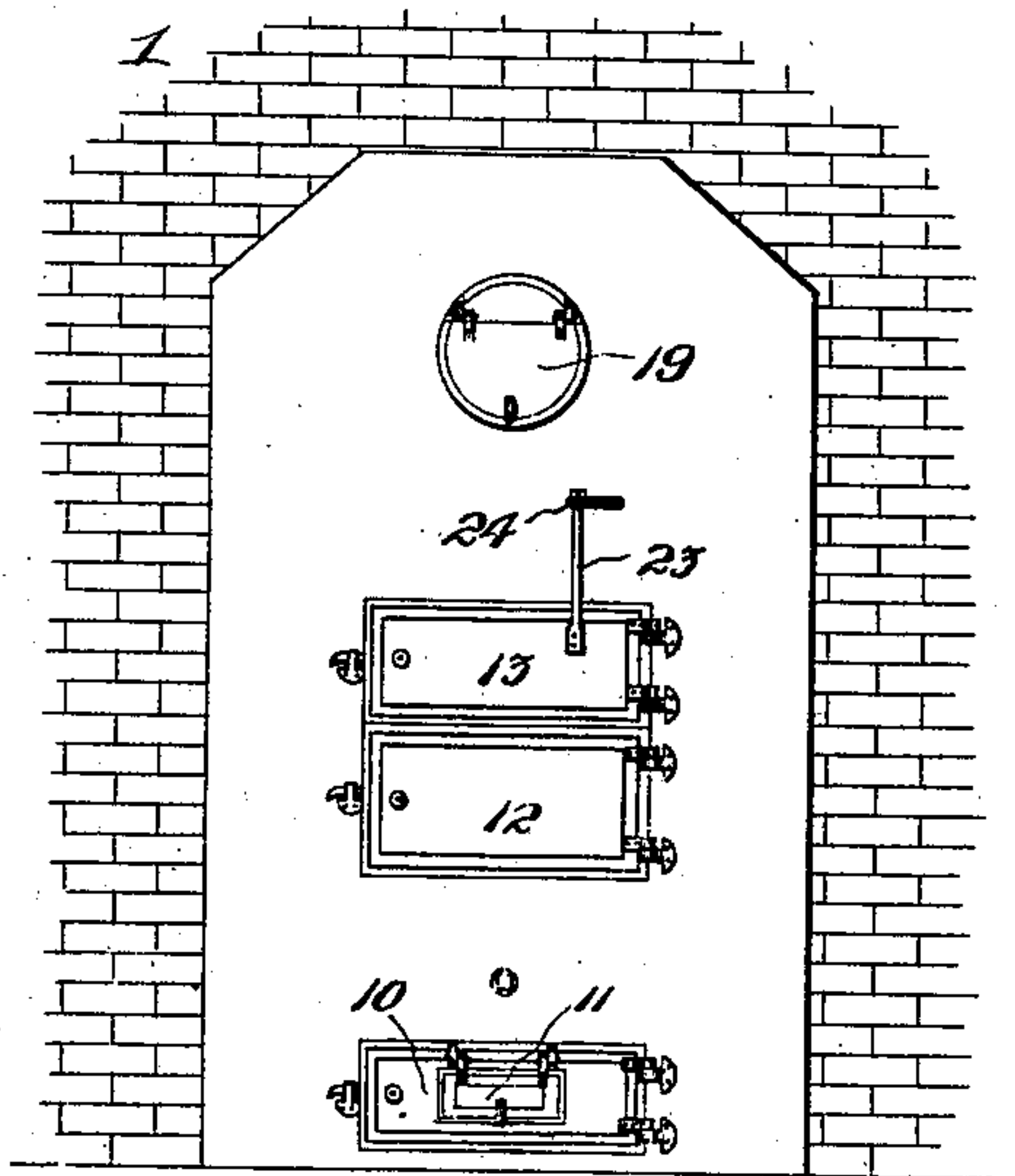
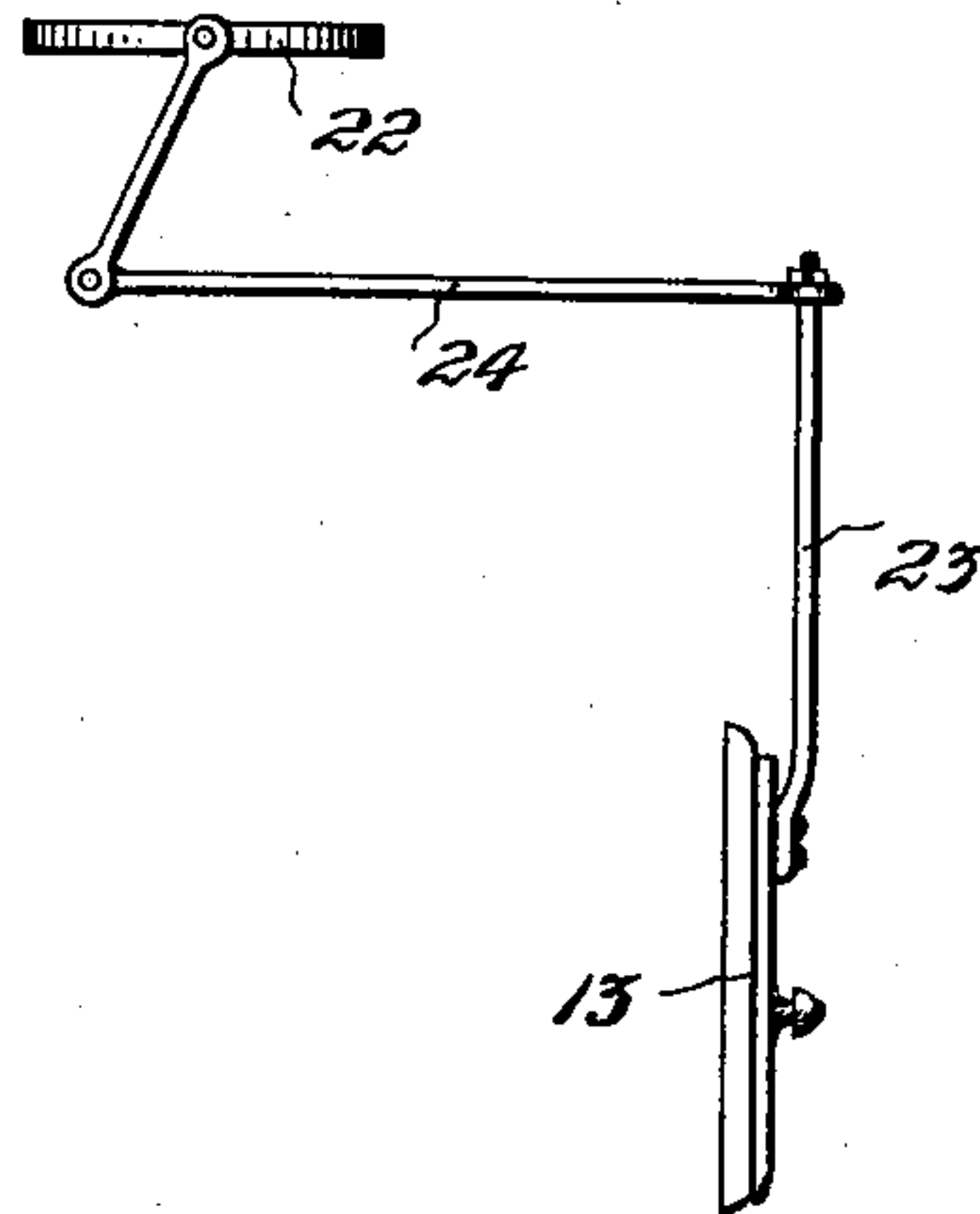


Fig. 5



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UNITED STATES PATENT OFFICE.

JAMES DANIEL SIGLER, OF SHELBY, OHIO.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 668,777, dated February 26, 1901.

Application filed June 14, 1900. Serial No. 20,345. (No model.)

To all whom it may concern:

Be it known that I, JAMES DANIEL SIGLER, a citizen of the United States, residing at Shelby, in the county of Richland and State of Ohio, 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 ap-
10 pertains to make and use the same.

In hot-air furnaces as ordinarily constructed difficulty has been found in obtaining the necessary extent of heating-surface to thoroughly warm the air without impairing the
15 quality thereof by excessive heat, and in the heating of the different portions of a building with the same furnace it is found in many instances that some of the rooms will be overheated, while a sufficient amount of heat is
20 not supplied to rooms in another part of the building.

My invention has for one object to provide a furnace in which a greater extent of heating-surface is afforded by the employment of
25 a series of tubes extending horizontally from the fire-box to a soot-chamber or drum located at the rear end of the furnace-casing, through which the smoke and products of combustion are conveyed from the fire-box and caused to
30 circulate throughout the entire length of the furnace-casing and causing a return flow of the smoke and products of combustion back again to the front portion of the furnace-casing through a return-flue, whereby all the
35 available heat of the fuel is utilized before the fuel passes outside of the casing without in any way hindering the draft, as is frequently the case in similar types of furnaces.

A further object of the invention is to improve and simplify the construction of the inclosing casing in which the ash-pit, fire-box, and combustion-chamber are located and obviate the liability of explosion by constructing the said casing of a single or continuous
45 part instead of constructing it in two parts in the ordinary manner, thus avoiding the use of seams, which are liable to open as the metal becomes expanded by the heat and permit gas from the fire-box to escape into the
50 air-chamber.

A further object of the invention is to provide a construction of fire-box in which flues or passages communicating with the ash-pit and upper portion of the fire-box are provided to supply fresh air to said fire-box, and
55 thus oxygenate the unconsumed gases and products of combustion rising from the bed of fuel and place them in condition to be much more readily and effectively consumed.

A still further object of the invention is to provide damper mechanism for automatically opening the damper between the combustion-chamber and outlet-flue or smoke-pipe, so as to allow the hot air, gases, and products of combustion to escape directly to the exterior
65 when the furnace-door is opened.

A still further object is to mount the several interior parts of the furnace in the inclosing casing in an effective manner to provide a furnace of superior strength and capacity for wear and to generally simplify and improve the construction and increase the practical efficiency of furnaces of this type.

With these and other minor objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts, as will be hereinafter more fully described, and particularly pointed out in the appended claim.

In the accompanying drawings, Figure 1 is a vertical longitudinal section through the casing and interior parts of a hot-air furnace constructed in accordance with my invention. Fig. 2 is a vertical transverse section through the fire-box, grate, ash-pit, combustion-chamber, return-flue, and smoke-pipe on the line 22 of Fig. 1. Fig. 3 is a cross-section through the drum or soot-chamber. Fig. 4 is a front view of the furnace. Fig. 5 is a detail view showing the automatic direct outlet-damper
80 and connections.

Referring now more particularly to the drawings, in which like reference-numerals designate corresponding parts throughout the several views, the numeral 1 represents the outer casing of the furnace, constructed of brick or other suitable material and provided with one or more openings for the ingress of air to be heated and outlet-pipes for the heated air, all in the usual manner. The internal
95 100

parts of the furnace comprise the ash-pit 2, fire-box 3, and combustion-chamber 4, formed within a chamber or casing 5, located at the front of the furnace, the said chamber or casing 5 constituting a one-piece inclosure for said parts. The purpose of thus constructing the fire-box, ash-pit, and combustion-chamber in one piece or a continuous chamber or casing is to avoid the formation of seams which are liable to open as the metal becomes expanded by the heat and permit gas from the combustion-chamber to escape to the air-chamber, and thus all liability of explosion is obviated. The grate 6 may be of any approved construction, but is preferably formed of a series of shaking and dumping bars in the usual manner. The interior of the fire-box is provided at the rear and on opposite sides with a cast-iron or fire-clay lining 7, extending vertically and spaced from the walls of the casing 5, so as to form air flues or passages 8, which are in communication, at their lower ends with the ash-pit and at their upper ends with the upper portion of the fire-box, through inlet-openings 9, formed in said lining. The purpose of this construction is to allow fresh air to pass from the ash-pit into the top portion of the fire-box to oxygenate the gases and products of combustion and effect a more perfect consumption of the same.

Access to the ash-pit is obtained through a door 10 in the front wall of the chamber 5, which door is provided with the usual damper 11, and access is obtained to the upper portion of the fire-box and the combustion-chamber through doors 12 13, also located in the front wall of the chamber 5.

The hot air, gases, and products of combustion pass from the combustion-chamber to a smoke box or drum 14, located at the rear end of the casing 1, through the medium of a series of horizontal flues 15, connected at their forward ends to the rear wall of the casing 5 at the upper end of the combustion-chamber and at their rear ends to the front wall of the drum 14, adjacent to the lower end of the same. This drum is mounted upon a suitable standard or support 16 and is provided at its rear with a "clean-out" 17, extending through the wall of the casing 1 to the exterior, whereby the accumulated soot may be removed therefrom whenever desired. Arranged above the smoke-flue 15 is a return-flue 18, extending forwardly from and communicating with the smoke box or drum and having its forward end opening to the exterior through the front wall of the furnace and closed by a check-damper 19, to which may be attached an operating device, whereby said damper may be opened and closed from the upper floors of the building to regulate the draft. At a point in rear of this damper or regulator and within the casing 1 the return-flue 18 is in communication with a pipe 20, leading from the upper portion of the com-

bustion-chamber, and with an outlet flue or pipe 21, which conveys the smoke to the exterior. By this construction it will be seen that the hot air, smoke, and unconsumed gases are caused to travel rearwardly through the smoke-pipes 15 the entire length of the casing 1 to the smoke box or drum 14, and from thence to again pass forwardly through the return-flue 18 to discharge through the outlet flue or pipe 21, and thus all of the available heat of the fuel is utilized to heat the air within the casing 1 without in any way impairing the draft. To allow the smoke and gases to pass directly out through the smoke-pipe 21 when the doors 12 13 are opened to cool off the furnace, a valve 22 is located in the pipe 20, and suitable connections are provided between the damper and the door for automatically opening and closing the damper when the door is opened or closed. These connections consist in the present instance of a lever or rod 23, connected with the door 13 and with an arm 24, slidably mounted and connected with the valve 22, so as to open the same when the door is opened and close it upon the closing of the door.

From the foregoing description, taken in connection with the accompanying drawings, the mode of operation of the furnace will be readily understood, and it will be seen that by causing the smoke to circulate back and forth throughout the furnace-casing a much larger area of radiating-surface is afforded than would be otherwise the case, so that economy in the use of fuel is secured. It will also be seen that the air is heated without being burned or devitalized or relieved of its moisture, so that an abundant supply of pure air is furnished. The peculiar construction of the fire-box, whereby air is furnished to oxygenate the gases in the fire-box, is also advantageous in effecting a saving in fuel, as a much larger portion of the gases is consumed than in furnaces having fire-boxes of ordinary construction.

Changes in the form, proportion, and minor details of construction may be made within the scope of the invention without departing from the spirit or sacrificing any of the advantages thereof.

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

In a hot-air furnace, the combination, with an inclosing casing, of an interior casing located at the front end thereof and containing the ash-pit, fire-box and combustion-chamber, a smoke box or drum arranged at the rear of the inclosing casing and provided with a clean-out extending to the exterior, smoke-flues extending between the combustion-chamber and drum, a return-flue extending forwardly from the drum through the front of the inclosing casing, a check-damper in the outer end of the return-flue, an outlet pipe or flue connected with the smoke-flue

adjacent to the front end thereof, a pipe connecting the combustion-chamber with the return-flue, a direct damper in said pipe, and means for automatically opening and closing
5 said damper upon the opening and closing of the combustion or fire-box door, substantially as set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES DANIEL SIGLER.

Witnesses:

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J. A. SELTZER.