

No. 672,480.

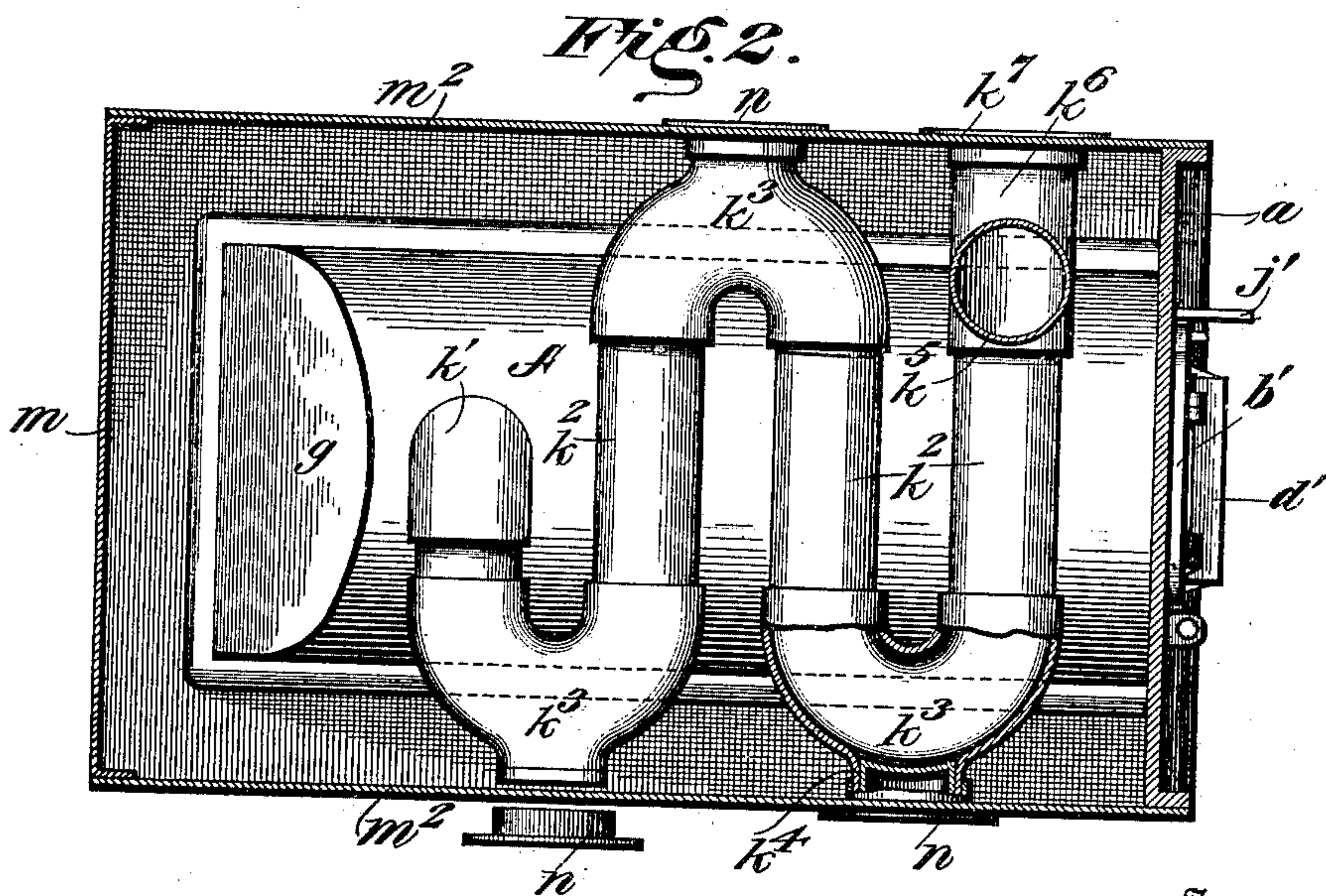
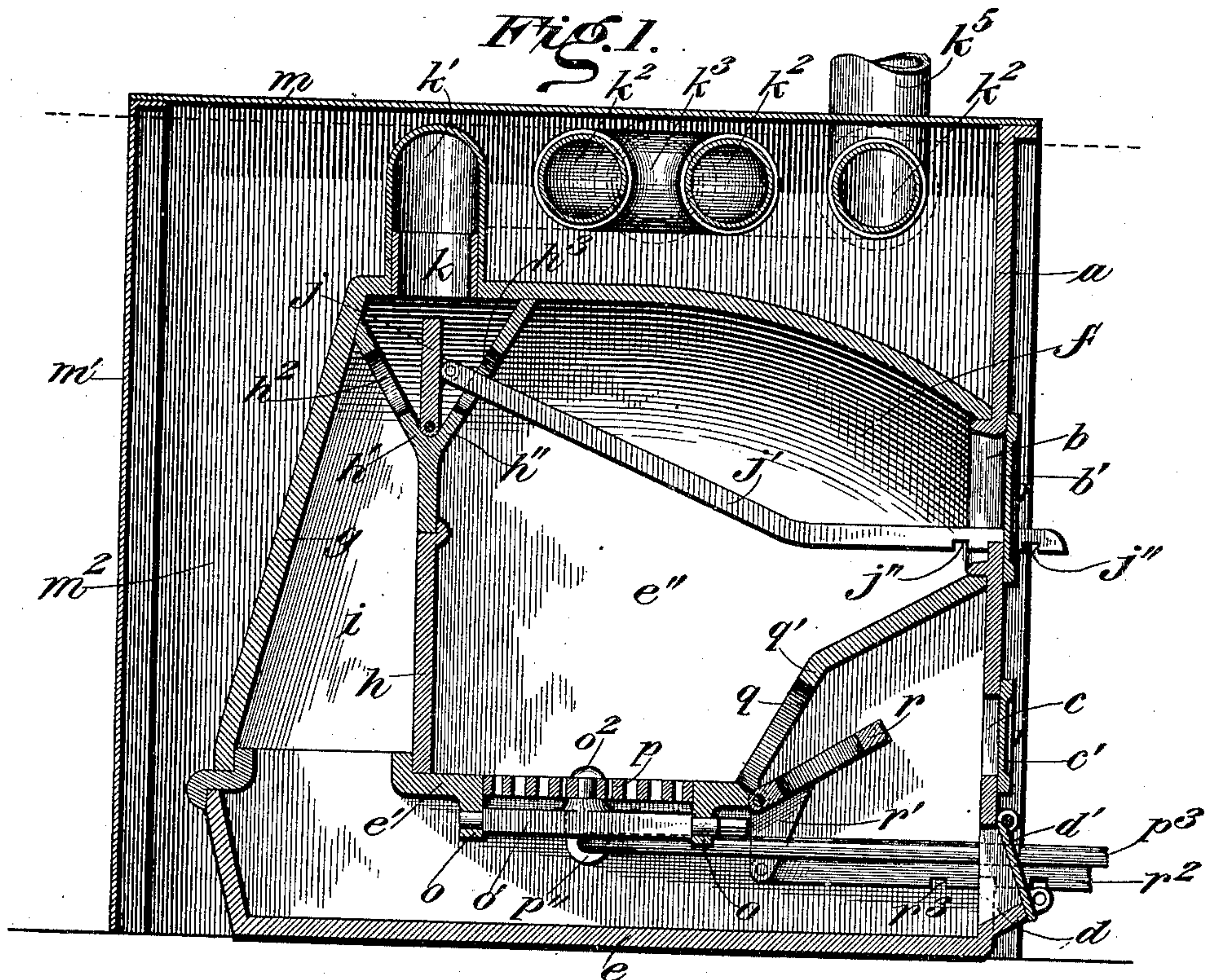
Patented Apr. 23, 1901.

J. F. HALL.
HOT AIR FURNACE.

(No Model.)

(Application filed Sept. 16, 1899.)

2 Sheets—Sheet 1.



Witnesses
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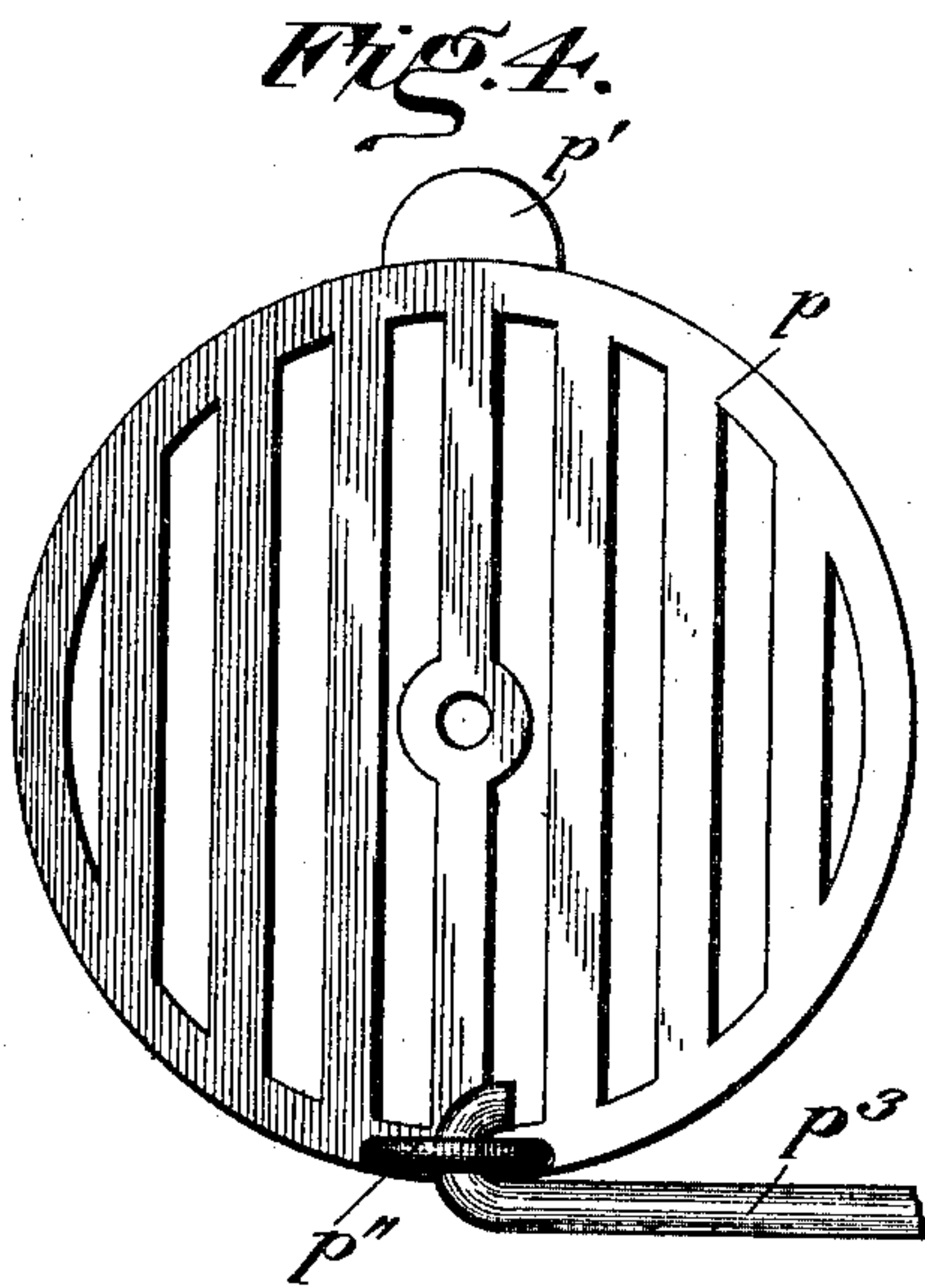
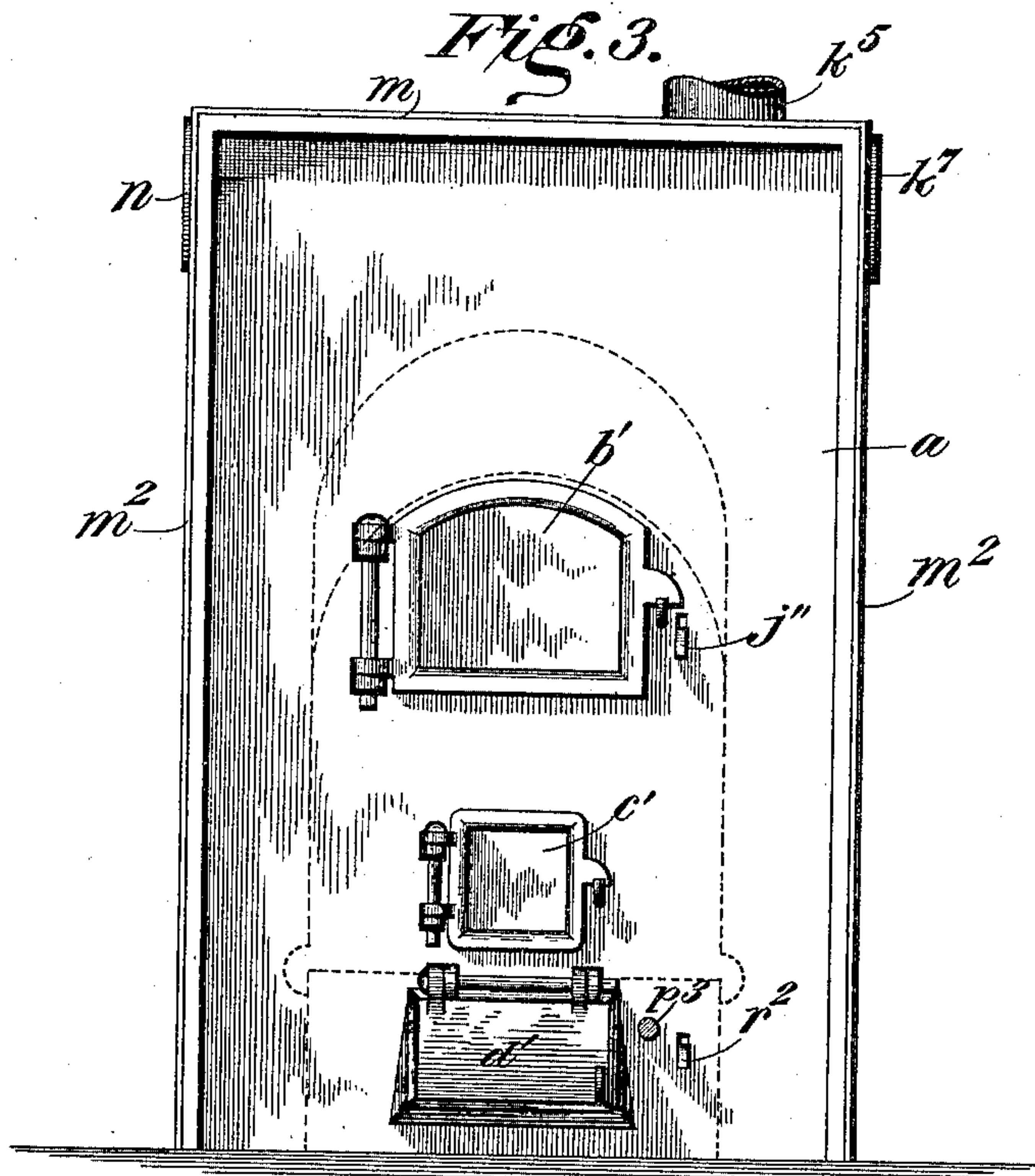


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN F. HALL, OF MOLINE, ILLINOIS.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 672,480, dated April 23, 1901.

Application filed September 16, 1899. Serial No. 730,769. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. HALL, a citizen of the United States, residing at Moline, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Hot-Air Furnaces; and I do hereby 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.

This invention relates to hot-air furnaces, and aims to provide improved facilities for managing a furnace of this kind and to utilize a greater percentage of heat derived from combustion than in prior forms of furnaces.

A further object is to provide means for cleaning out the flues through which the products of combustion pass.

With the above-stated objects in view the invention consists in certain novel features of construction and combinations of parts, all as will be hereinafter more particularly described, and then pointed out in the claims at the end of the description.

In the accompanying drawings, forming a part of this specification, Figure 1 represents a longitudinal vertical sectional view of a furnace embodying my invention. Fig. 2 is a top plan view of the same, the cover-plate or housing-top being removed and some of the parts below broken away. Fig. 3 represents the furnace in front elevation. Fig. 4 represents the grate in top plan view, and Fig. 5 is a plan view of the oscillatory grate-supporting bar.

The walls of the furnace may be composed of cast-iron and comprise a front a , with openings b , c , and d therein, a bottom e to the ash-pit, a bottom e' to the fire-pot, sides e'' , top f , back g , and partition h .

The partition h separates from the fire-pot a vertical passage-way i , leading from the ash-pit, said partition joining the fire-pot bottom e' and being provided at its upper part with divergent walls h' and h'' , which may join the back g and top f , respectively, said divergent walls being apertured, as shown at h^2 and h^3 , and a damper j , pivoted in the notch or space formed by these walls, is designed to control both apertures. Adjustment of this damper may be regulated by means of a bar j' , pivotally connected with

the same and extending forward through the opening h^3 and through the front of the furnace alongside the opening b therein, said bar having a series of notches j'' in its lower edge to engage the edge of the slot through which it passes. It will be readily understood that by manipulating this bar the position of the damper j may be varied to regulate the draft, according to the relation of said damper to the openings h^2 and h^3 . In the top f of the furnace, over the space bounded by said top and the divergent walls h' and h'' , an opening k is provided for the exit of products of combustion, and with said opening a tortuous flue communicates, comprising an elbow k' , a number of straight pipe lengths k^2 , extending crosswise of the furnace, (or lengthwise, if desired,) above the top of the same, and elbows k^3 connecting adjacent pipe lengths and having clean-out openings intermediate the same, as shown at k^4 . A housing incloses the furnace and said tortuous flue. Said housing may comprise a top m , back m' , and sides m^2 , of metal, brick, or any suitable material, preferably brick, with the top and sides joining the furnace-front a . Said furnace-front a will thus be seen to constitute the front wall of the said housing. Openings are provided in the sides of this housing corresponding with the openings k^4 in the elbows k^3 , and closures n are applied to the latter through the openings in the housing sides or ends. It will be seen that by simply removing these closures access can be gained to all parts of the tortuous flue for cleaning out the same. Said flue may connect with the chimney by an elbow k^5 , one branch of which passes through the top of the housing, or the products of combustion may escape through another branch k^6 of said elbow in line with the straight pipe length k^2 and here shown with a closure k^7 .

Hot air may be taken from the space between the housing and the furnace-walls and conducted through pipes to any points desired, and it will be seen that the tortuous flue provides for extensive utilization of the heat from the products of combustion.

The bottom plate e' of the fire-pot has lugs o on the under side thereof in which is journaled a rock-bar o' , one end of the same being squared for purposes of manipulation.

A circular grate p occupies a correspondingly-shaped opening in the bottom of the fire-pot and is mounted on the said rock-bar, being swiveled thereto by means of a stud o^2 , formed upon the same and upset over the grate. The grate has a lug p' at one side to limit its movement by coming against the bottom of the fire-pot and at the opposite side has a depending ear p'' , to which is coupled a rod p^3 , which extends through the front of the furnace and affords means for oscillating or shaking the grate in an obvious manner.

To dump the grate, a suitable implement is applied to the squared end of the rock-bar o' .

When wood is used as fuel, the grate p may be substituted by a solid plate and the draft admitted wholly through an opening q , provided in a wall q' of the fire-pot, which extends from the bottom of the latter to the front a , just below the opening b . The said opening q is controlled by a grate r , pivoted to the bottom or other suitable part of the fire-pot and formed with an ear r' , to which is coupled a bar r^2 , which extends through the front of the furnace and may be notched, as shown at r^3 , to provide for opening and shutting the grate in an obvious manner and for different adjustments of the same. This grate is for draft purposes or to pull the clinkers through from the fire-pot.

The fire-pot may be reached with a poker inserted through the opening c , which is normally closed by a door c' . Doors b' and d' likewise normally close the openings b and d .

(See Fig. 3.)

It will be observed that the top f of the fire-pot slants or inclines downward to the front a at the top of the opening b . This is done in order that when the door b' is opened the air coming in at this opening will keep the smoke from coming out, there being no space just above the door where the smoke might accumulate and by an eddy current push the smoke out near the top of the door. The fire-pot may be lined up part way of fire-brick, if desired, so that the body of the fire may not touch the fire-pot, which construction will lengthen the life of the furnace. When the air-damper j in the back of the furnace is closed, the gases will pass down through the grate and around back up through the chamber i . This makes it possible to hold the fire for a long time and is an advantageous feature of the furnace.

It will be seen that with a construction such as above described the objects primarily set forth are accomplished. However, such construction is of course susceptible of modification within the scope of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a hot-air furnace, the combination with the fire-pot having an outlet at its upper part for products of combustion, an ash-pit, a back flue leading from the latter to a point opposite the outlet from the fire-pot

and having an outlet at such point, a gate or damper pivoted between said outlets for controlling the same, and an adjusting device consisting of a bar having one end pivoted to said damper and the other end thereof protruding through a slot or opening in the furnace wall or front and having a series of notches therein to engage the edge of the slot through which it passes, whereby said damper may be adjusted so as to close either of said outlets at will or be held in an intermediate position between the same to allow the products of combustion to escape through either or both outlets, substantially as described.

2. In a hot-air furnace, the combination of a housing, a fire-pot therein the front wall of which constitutes the front wall of said housing, said fire-pot having an outlet at its upper part for the products of combustion, an ash-pit, a back flue leading from the latter to a point near the outlet from the fire-pot, a gate or damper between said outlet and the upper end of said back flue, and means for closing said damper and for operating the same to control the outlets of the said flue and fire-pot, substantially as described.

3. In a hot-air furnace, the combination with a suitable housing, of a fire-pot having an outlet at its upper part, a tortuous conduit for products of combustion located between the housing and the fire-pot, an ash-pit, a back flue leading from the latter to a point opposite the outlet from the fire-pot, and having an outlet at such point, a gate or damper operating between said outlets, and an adjusting device therefor comprising a bar having one end pivoted to the damper and the other end protruding through an opening in the furnace-wall, and having means for engaging the edge of said opening, whereby the said damper is adjustable to close either of said outlets at will or to be held in an intermediate position to allow the products of combustion to pass through one or both outlets, substantially as described.

4. In a hot-air furnace, the combination with a suitable housing, of a fire-pot having an outlet at its upper part, a tortuous conduit for products of combustion located between the housing and the fire-pot, said conduit having clean-out openings at the bends thereof provided with closures, an ash-pit, a back flue leading from the latter to a point opposite the outlet from the fire-pot, and having an outlet at such point, a gate or damper operating between said outlets, and an adjusting device therefor comprising a bar having one end pivoted to the damper and the other end protruding through an opening in the furnace-wall and having means for engaging the edge of said opening, whereby the said damper is adjustable to close either of said outlets at will, or to be held in an intermediate position to allow the products of combustion to pass through one or both outlets, substantially as described.

5. In a hot-air furnace, the combination with a suitable housing, of a fire-pot having an outlet at its upper part, a tortuous conduit for products of combustion located between the housing and the fire-pot, said conduit having clean-out openings accessible from the exterior of the housing and provided with suitable closures, an ash-pit, a back flue leading from the latter to a point opposite the outlet from the fire-pot, and having an outlet at such point, a gate or damper operating between said outlets, and an adjusting device therefor comprising a bar having one end pivoted to the damper and the other end protruding through an opening in the furnace-wall and having means for engaging the edge of said opening, whereby the said damper is adjustable to close either of said outlets at will or to be held in an intermediate position to allow the products of combustion to pass through one or both outlets, substantially as described.

6. In a hot-air furnace, the combination with a suitable housing, of a fire-pot having an outlet at its upper part, a tortuous conduit for products of combustion located between the housing and the fire-pot, said conduit having clean-out openings accessible from the exterior of the housing and provided with suitable closures, an ash-pit, a back flue leading from the latter to a point opposite the outlet from the fire-pot, and having an outlet at such point, a gate or damper operating between said outlets, and an adjusting device therefor comprising a bar having one end pivoted to the damper and the other end thereof protruding through an opening in the furnace-wall and having notches therein to engage the edge of said opening, whereby the damper is adjustable to close either of said outlets at will or to be held in an intermediate position to allow the products of combustion to pass through one or both outlets, substantially as described.

7. In a hot-air furnace, the combination with a suitable housing, of a closed fire-pot, the front wall of which constitutes the front wall of said housing, said fire-pot having an outlet at its upper part, a tortuous conduit for products of combustion located in a space between the housing and the fire-pot, said conduit having clean-out openings accessible from the exterior of the housing and provided with suitable closures, an ash-pit, a back flue leading from the latter to a point opposite the outlet from the fire-pot, and having an outlet at such point, a gate or damper operating between said outlets, and an adjusting device therefor comprising a bar having one end pivoted to the damper and the other end protruding through an opening in the furnace-wall and having notches therein to engage the edge of said opening, whereby the damper is adjustable to close either of said outlets at will or to be held in an intermediate position to allow the products of combustion to pass through one or both outlets, substantially as described.

8. In a hot-air furnace, the combination of a suitable housing, a fire-pot therein having an outlet at its upper part, and provided at the front thereof with an adjustable grate having means for operating the same from the front of the furnace, a tortuous conduit for products of combustion located between the housing and fire-pot, an ash-pit, a back flue leading from the latter to a point opposite the outlet from the fire-pot, and also having an outlet at such point, a gate or damper operating between said outlets, and an adjusting device therefor comprising a bar having one end pivoted to the damper and the other end protruding through an opening in the furnace-wall, and having means for engaging the edge of said opening, whereby the said damper is adjustable to close either of said outlets at will or to be held in an intermediate position to allow the products of combustion to pass through one or both outlets, substantially as described.

9. In a hot-air furnace, the combination of a suitable housing, a fire-pot therein having an outlet at its upper part, and provided at the front thereof with an adjustable grate having means for operating the same from the front of the furnace, a tortuous conduit for products of combustion located between the housing and fire-pot, said conduit having clean-out openings at the bends thereof provided with closures, an ash-pit, a back flue leading from the latter to a point opposite the outlet from the fire-pot, and also having an outlet at such point, a gate or damper operating between said outlets, and an adjusting device therefor comprising a bar having one end pivoted to the damper and the other end protruding through an opening in the furnace-wall and having means for engaging the edge of said opening, whereby the said damper is adjustable to close either of said outlets at will or to be held in an intermediate position to allow the products of combustion to pass through one or both outlets, substantially as described.

10. In a hot-air furnace, the combination of a suitable housing, a fire-pot therein having an outlet at its upper part, and provided at the front thereof with an adjustable grate having means for operating the same from the front of the furnace, a tortuous conduit for products of combustion located between the housing and fire-pot, said conduit having clean-out openings accessible from the exterior of the housing and provided with suitable closures, an ash-pit, a back flue leading from the latter to a point opposite the outlet from the fire-pot, and also having an outlet at such point, a gate or damper operating between said outlets, and an adjustable device therefor comprising a bar having one end pivoted to the damper and the other end protruding through an opening in the furnace-wall and having means to engage the edge of said opening, whereby the damper is adjustable to close either of said outlets at will or

be held in an intermediate position to allow the products of combustion to pass through one or both outlets, substantially as described.

11. In a hot-air furnace, the combination of
 5 a suitable housing, a fire-pot therein having an outlet at its upper part, and provided at the front thereof with an adjustable grate having means for operating the same from
 10 the front of the furnace, a tortuous conduit for products of combustion located between the housing and fire-pot, said conduit having clean-out openings accessible from the exterior of the housing and provided with suitable closures, an ash-pit, a back flue leading
 15 from the latter to a point opposite the outlet from said fire-pot, and also having an outlet at such point, a gate or damper operating between said outlets, and an adjusting device therefor comprising a bar having one end
 20 pivoted to the damper and the other end protruding through an opening in the furnace-wall and having notches to engage the edge of said opening, whereby the damper is adjustable to close either of said outlets at will
 25 or be held in an intermediate position to allow the products of combustion to pass through one or both outlets, substantially as described.

12. In a hot-air furnace, the combination with a suitable housing, a fire-pot therein

having an outlet at its upper part, and provided with a bottom grate, said fire-pot also having an adjustable grate at the front thereof provided with means for operating the same from the front of the furnace, a tortuous conduit for products of combustion located
 35 between the housing and fire-pot, said conduit having clean-out openings at the bends thereof provided with closures, an ash-pit, a back flue leading from the latter to a point opposite the outlet from the fire-pot, and also
 40 having an outlet at such point, a gate or damper operating between said outlets, and an adjusting device therefor comprising a bar having one end pivoted to the damper and the other end protruding through an
 45 opening in the furnace-wall and having means for engaging the edge of said opening, whereby the said damper is adjustable to close either of said outlets at will or to be held in an intermediate position to allow the products
 50 of combustion to pass through one or both outlets, substantially as described.

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

JOHN F. HALL.

Witnesses:

HERBERT G. COPP,
 LIPTER J. CHAMBERS.