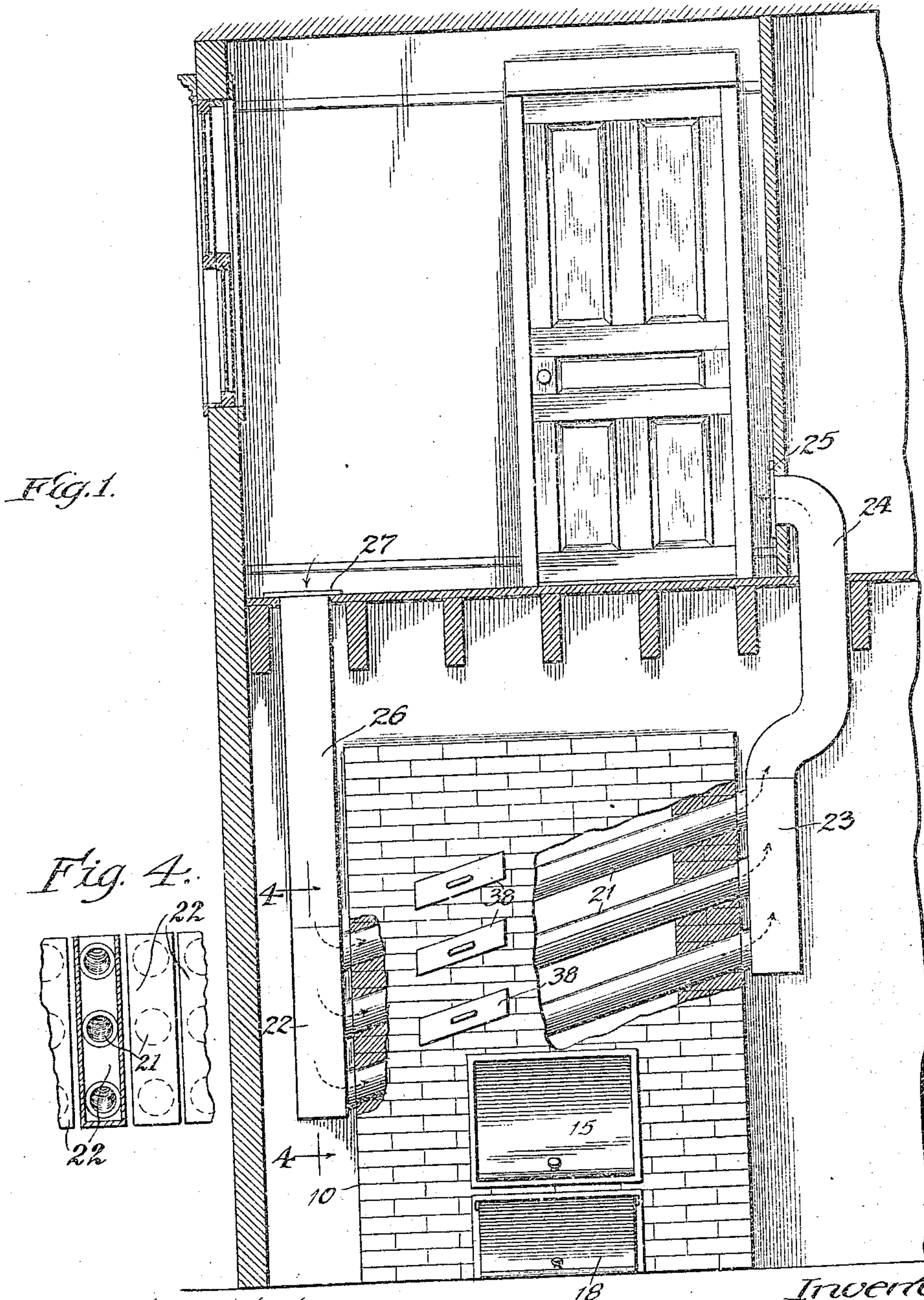


C. W. WIEGAND.  
HEATING SYSTEM AND FURNACE.  
APPLICATION FILED NOV. 2, 1907.

Patented Mar. 22, 1910.  
3 SHEETS—SHEET 1.

952,776.



Witnesses  
Ray White  
Harry R. Lohrke

Inventor  
Cris W. Wiegand  
By *Robert Bain* Attorney



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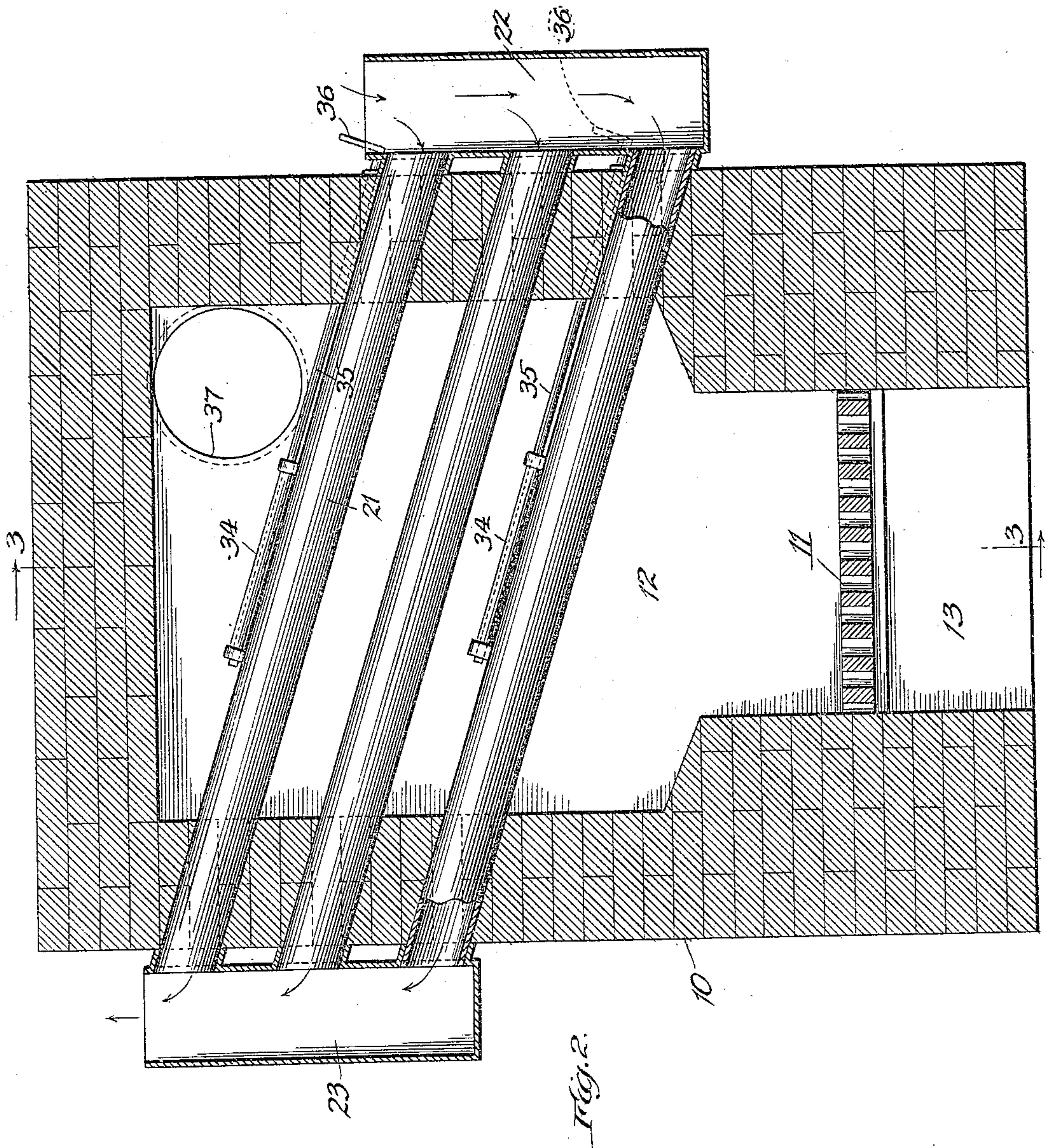


Fig. 2.

Witnesses  
Ray White  
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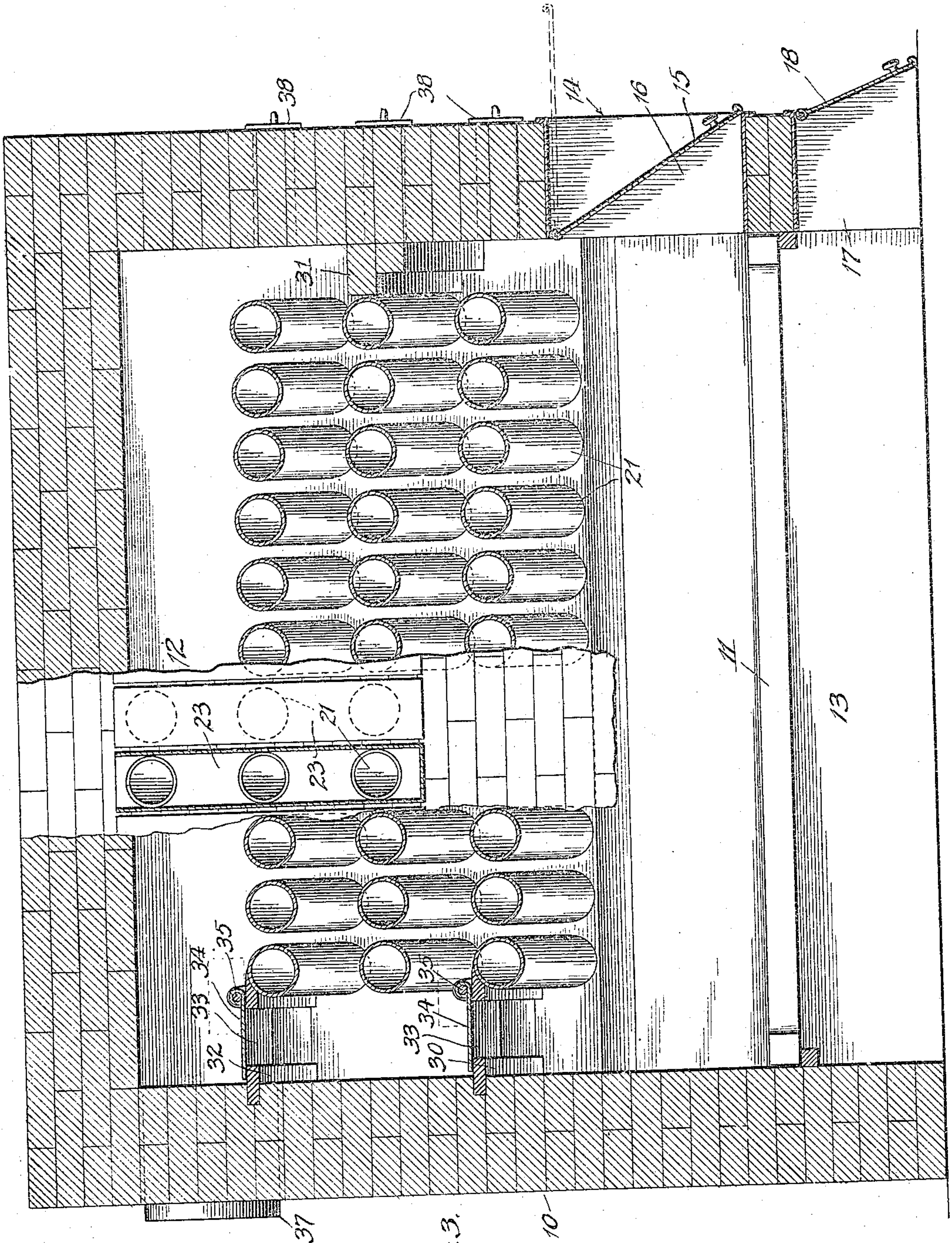
Inventor  
Cris W. Wiegand  
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Attys



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Witnesses  
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Fig. 3.

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# UNITED STATES PATENT OFFICE.

CRIS W. WIEGAND, OF CHICAGO, ILLINOIS.

HEATING SYSTEM AND FURNACE.

952,776.

Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed November 2, 1907. Serial No. 400,320.

*To all whom it may concern:*

Be it known that I, CRIS W. WIEGAND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Heating Systems and Furnaces, of which the following is a specification.

My invention relates to improvements in heating systems and furnaces, and has for one of its objects to provide a hot air heating system of novel arrangement for uniform and economical distribution, and to provide a furnace well adapted for the systematic arrangement disclosed.

A further object of my invention is to provide a furnace which may be constructed largely of masonry and as a unit of any desired size with the minimum amount of variation in the size and character of some of its essential parts.

Another object of my invention is to provide a furnace wherein the air tubes are advantageously constructed and arranged to afford a very large heating surface and good circulation. And yet another object of my invention is to provide simple and efficient means for varying the course of the hot gases with respect thereto, to vary the heating and draft.

A still further object of my invention is to provide an improved fire door arrangement; and other and further objects will become apparent to those skilled in the art from the following description taken in conjunction with the accompanying drawings; wherein;

Figure 1 is a diagrammatic view illustrative of an installed system embodying my invention; Fig. 2 is a transverse vertical section through the furnace looking toward the rear thereof, and; Fig. 3 is a longitudinal vertical section through the furnace on line 3—3 of Fig. 2. Fig. 4 is a section on line 4—4 of Fig. 1.

Throughout the several views like numerals of reference refer always to like parts.

In general in the preferred embodiment of my invention I provide a furnace having its combustion chamber above the fire line traversed by a plurality of sets of parallel, inclined tubes, each set comprising a plurality of tubes arranged one above the other in spaced relation, and the several sets of the series being arranged side by side and

close together, so that like tubes of the several sets form tiers separated by passages running horizontally lengthwise of the combustion chamber and at an angle transversely of said chamber. Each set of flues communicates at each end with a header, and the separate headers for opposite ends of each set of the series are, preferably, respectively piped to the hot air inlet and cold air outlet of a separate area to be heated, so that each area to be heated, such as each room of a residence, has its own supply and return piping connection with the furnace for most effective circulation of heated air.

In the specific construction shown in the drawings, 10 indicates in general the furnace, preferably comprising a shell of masonry of suitable thickness inclosing an area divided at a suitable elevation by grate 11 into an upper combustion chamber 12 and a lower ash pit 13. An opening 14 is made through the front wall of the furnace at a suitable height above the level of the grate 11, the perimeter of said opening being covered with a suitable iron door frame 16, of considerable depth, owing to the thickness of the wall, said frame being preferably of rectangular shape and having pivoted thereto along its upper edge adjacent the inner boundary of the furnace wall a door or closure 15, which when closed, as indicated in Fig. 3, extends diagonally down to and rests against the lower front edge of the frame 16, the opening, frame and door being so proportioned that when the door is raised to open position, as indicated in dotted lines, it projects forward beyond the opening 14 and acts to prevent the efflux of gas and flame which some times accompanies the opening of an ordinary fire door. The door 15 may obviously be counterweighted in customary manner, not herein shown. The ash pit is likewise provided with an orifice 17 provided with a door 18.

At a suitable height above the grate 11, I provide the inclined air tubes, 21, arranged vertically in sets, and laterally in tiers, the tubes of each set being disposed one above the other in separated relation, and like tubes of the several sets of the series being arranged in horizontal alinement in close proximity to each other, so that each tier of tubes has somewhat the effect of a baffle wall, and the several tiers include between them fire passages for the circulation of gases



of combustion. The tubes preferably extend transversely across the furnace and project through the side walls thereof, the tiers of tubes and the fire passages being horizontal from end to end of the combustion chamber, and inclined from side to side thereof. In the specific construction shown, each set of tubes comprise three units, and a comparatively large number of sets is provided, said tubes of each set extending entirely through the side walls of the furnace casing, and at each end communicating with a header, there being provided at each end of the tubes one header common to the several tubes of the set. As indicated in the drawings, the inlet headers 22 communicate with the lower extremities of the inclined tubes and the outlet headers 23 communicating with the upper extremities of said tubes, are the same in effective construction, varying only in the presentation of the tube-receiving flanges.

I prefer in the installation of my furnace that each outlet header 23 constituting a separate outlet be connected through a suitable duct 24 to a hot-air register 25 of an area to be heated, and that from such area a return pipe connection 26 be made from a suitable air outlet 27 to the inlet header or separate inlet 22 of the same set of tubes 21, so that each area to be heated may be segregated from every other area of the building.

For directing and controlling the distribution of heat to the several tiers of pipes, I preferably space the end pipes of the tier a suitable distance from the proximate furnace wall, and at the rear end of the furnace I provide bridges 30 and 32, spanning from the furnace wall to the proximate tubes of the lower and upper tiers respectively throughout their entire length exposed inside of the furnace, and through such bridges make orifices 33 of suitable size adapted to be opened or closed by hinged dampers 34 controlled by damper rods 35 extending to the exterior of the furnace at one side thereof and provided with operating handles 36. At the front end of the furnace I provide a bridge 31 spanning from the front wall of the furnace to the proximate pipe of the central tier, such bridge preferably having no opening therein. The smoke flue opening 37 I preferably make, as indicated in Fig. 2, above the level of the uppermost tier of tubes 21, in communication with the area of the combustion chamber adjacent the lower or intake ends of the tubes 21, where the greatest space is available. Now it will be apparent that the heat circulation with respect to the tiers of tubes 21, may be considerably varied at pleasure by the opening or closing of the dampers of bridges 30 and 32, the opening of both orifices in the two bridges giving the products of combustion a direct passage beneath the

lower tier of tubes through said orifices to the smoke outlet 37, advantageous in starting a fire or reducing the heating effect; the opening of the orifice of bridge 30 and closing of the orifice in bridge 32 giving a more tortuous passage through said orifice in bridge 30, between the central and upper tiers of tubes and to the smoke outlet 37 over the uppermost tier of tubes and the closing of the apertures in both bridge walls giving a passage from the rear of the grate under the lower tier between the lower and middle tiers, over the middle tier to the front end, and over the upper tiers to the smoke outlet. To permit cleaning between the air tubes, I preferably provide in the front wall of the furnace, in alinement with the lower ends of the tubes, clean-out openings closed by covers 38, as best indicated in Figs. 1 and 3.

It will be seen that the construction heretofore described is such that tubes and headers of identical construction may be used in units of various sizes, the length or depth of the furnace being varied according to the number of sets of tubes which it is desired to employ, without varying the tube or header construction, and as the casing of the furnace is preferably of masonry such appropriate construction can readily be provided in each particular instance. It will further be apparent that my improved furnace provides a large heating surface in a comparatively small space arranged in a manner to permit easy regulation of application of heat thereto, and that the location and arrangement of the flues and headers are such as to afford excellent circulation through the furnace in any installation thereof, particularly where the independent return piping for each set of tubes is employed. Also it will be obvious that the arrangement described is effective in providing a passage for the products of combustion of greater linear extent in small space, thereby insuring the efficient utilization of the heat units developed and consequent economy in coal consumption, and that the fire door arrangement is effective and advantageous.

While I have herein described in some detail a specific embodiment of my invention, it will be apparent to those skilled in the art that numerous changes might be made in the embodiment without departure from its spirit and scope, and I do not desire, therefore, to be understood as limiting my invention to the particular construction shown and described.

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

1. In a hot air furnace, a shell inclosing a combustion chamber, said shell having fire doors in front, air tubes extending through



said shell, said tubes being arranged vertically in sets and horizontally in tiers, and separate headers each connecting the outlet ends of the tubes of a set.

5 2. In a hot air furnace, a shell inclosing a combustion chamber, said shell having fire doors in front, air tubes extending through said shell from side to side transversely of the combustion chamber, said tubes being  
10 arranged vertically in sets and horizontally in tiers, separate headers each connecting the outlet ends of the tubes of each set, and means for directing the course of the products of combustion with respect to the tiers  
15 of tubes.

3. In a furnace, a masonry shell inclosing a combustion chamber, tubes extending through said shell from side to side at an

angle to the horizontal, said tubes being arranged vertically in sets and horizontally in 20 tiers, said tiers being arranged in separated relation and the tubes of each tier in close proximity, and the end tubes of the several tiers being spaced apart from the end walls of the shell, bridges from the end walls of 25 the shell to suitable end tubes of the tiers, certain of said bridges having orifices therein, and means for closing said orifices operable from the exterior of the furnace.

In testimony whereof I hereunto set my 30 hand in the presence of two witnesses.

CRIS W. WIEGAND.

In the presence of—

C. W. BOYDEN,

LARS W. JENSEN.