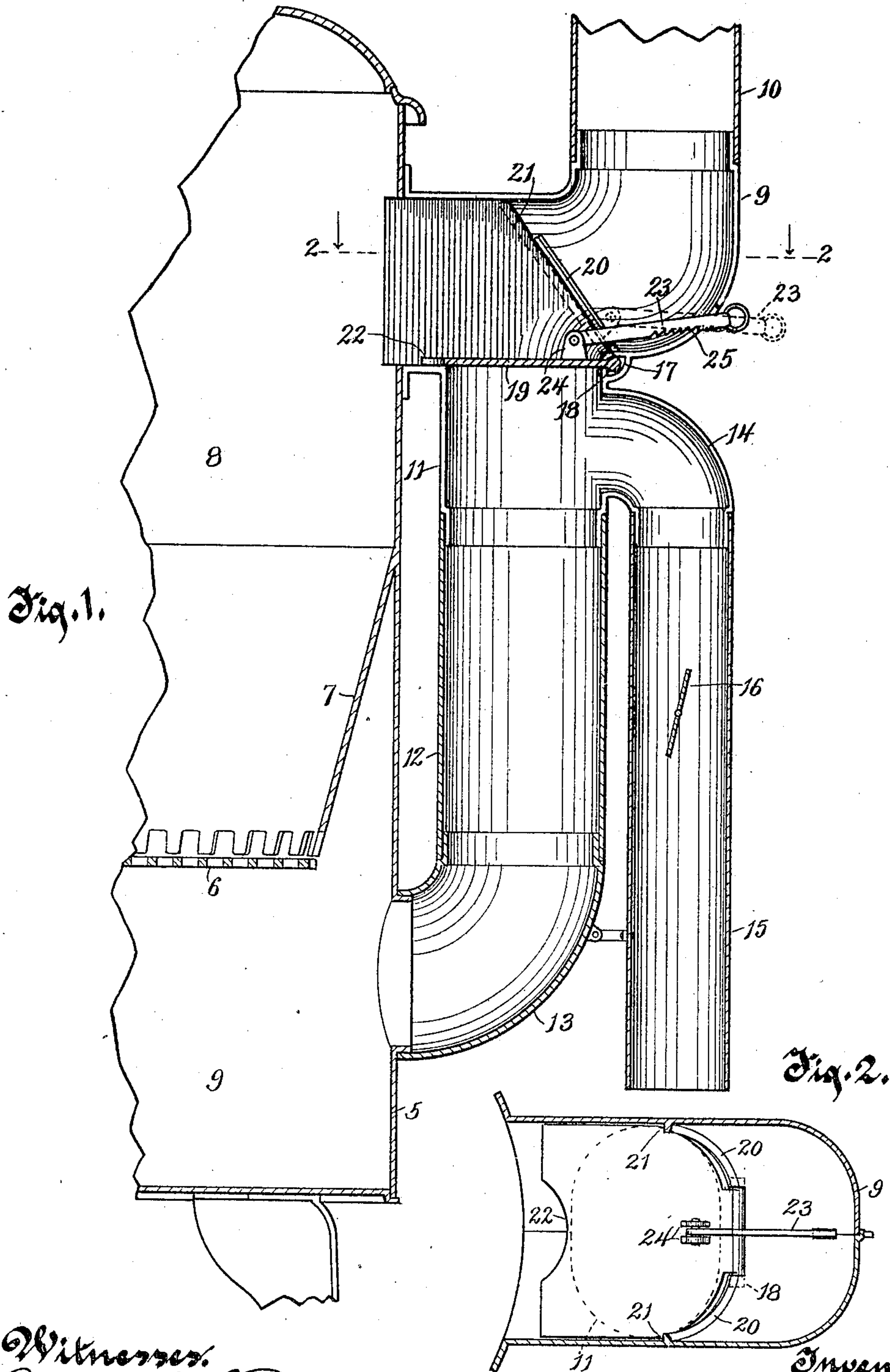


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PATENTED DEC. 4, 1906.

F. W. MENKEY.  
RETURN FLUE FOR STOVES AND THE LIKE.  
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# UNITED STATES PATENT OFFICE.

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## RETURN-FLUE FOR STOVES AND THE LIKE.

No. 837,320.

Specification of Letters Patent.

Patented Dec. 4, 1906.

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*To all whom it may concern:*

Be it known that I, FREDERICK W. MENKEY, residing in Portage, in the county of Columbia and State of Wisconsin, have invented new and useful Improvements in Return-Flues for Stoves and the Like, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to new and useful improvements in return-flues for stoves and the like, and has for its object to provide a novel conductor for the smoke and hot gases of a stove or furnace or other heating apparatus which will return these elements to the heating apparatus, beneath the grate thereof, in such a manner that they may be utilized for combustion in the combustion-chamber.

Another object of this invention is to provide for supplying fresh air to the heating apparatus by means of the said conductor, causing it to commingle with the hot gases and become heated before entering the grate, and thus assuring a proper admixture of air and gases for combustion and avoiding the detrimental effect produced by a cold draft on the fire-bed.

Another object of this invention is to improve upon a construction having somewhat similar objects to the foregoing, which has been secured to Louis Dietz, as inventor, and myself, as assignee, by United States Letters Patent No. 767,636, dated August 16, 1904, and Canadian Letters Patent No. 88,093, dated July 5, 1904. This object of the invention includes, among other things, the provision of a single valve or gate which in one position will disconnect the return-conductor and fresh-air supply from the smoke-pipe, leaving the fresh-air supply in connection with the return-conductor to produce an ordinary direct draft, but which in another position will interrupt the smoke-pipe more or less and deflect a portion of the smoke and hot gases into the return-conductor, leaving the only passage through the smoke-pipe at its uppermost portion, so as to separate the steam and non-combustible gases from the deflected combustible gases and other products of combustion.

With the above and other objects in view the invention consists in the return-flue, as herein described and claimed, its associated parts and combinations thereof, and all equivalents.

Referring to the accompanying drawings, in which like characters of reference indicate the same parts in both the views, Figure 1 is a sectional elevation of a fragment of a heating-stove provided with a return-flue construction in accordance with this invention, and Fig. 2 is a sectional plan view of a portion thereof on the plane of line 2 2 of Fig. 1.

In the drawings, 5 represents a fragment of an ordinary heating-stove having a grate 6 and a fire-pot 7, with a combustion-chamber 8 thereabove and an ash-pit 8' therebelow, all of usual construction. While the invention is shown in connection with this particular form of heating-stove, it is to be understood that it is not limited in its application to such stove, but may be attached to or constitute a part of any suitable heating apparatus, such as a furnace or a range or the like.

A sectional casting 9 of special construction takes the place of the ordinary elbow connection for the smoke-pipe 10, but has in addition to the smoke-pipe passage a depending sleeve 11 at its bottom portion, between its attaching-collar flange and its elbow portion. The sleeve 11 forms a connection for a return-pipe 12, the lower end of which connects with an elbow 13, opening into the ash-pit of the stove beneath the grate, so that there is a complete return-conductor or return-flue from the combustion-chamber 8 through the casting 9 and its sleeve 11, the return-pipe 12, and the elbow 13 to the space beneath the fire-bed on the grate.

The sleeve 11 of casting 9 has formed thereon an elbow 14, to which is connected a cold-air pipe 15, extending down to near the floor and provided with a valve or damper 16. At the junction of the sleeve 11 with the elbow portion of casting 9 there are formed opposite sockets 17, into which pivotally fit trunnion projections 18 at the rear end of a valve or gate 19, so that the valve is capable of swinging from a closed position, (shown by full lines in Fig. 1,) where it completely closes the upper end of the sleeve 11, to a full-open position, as shown by dotted lines in Fig. 1, where it will lie against inclined flanges 20, provided therefor in the interior of the casting, and against the shoulders 21, forming extensions of said flanges. The shoulders 21 are produced by the change in cross-section of the smoke-pipe passage through the casting 9, which is rectangular between the flanges 20 and the attaching-



collar and is ovaloid throughout the elbow portion. When in its full - open position against the flanges 20 and the shoulders 21, the valve 19 practically closes the passage-way for the smoke-pipe, except for a portion thereof which is assured of always remaining open by reason of a cut-out portion 22 in the free end of the valve, which leaves a space between the valve and the top of the casting to always allow the lightest of the products of combustion to pass to the chimney. For adjusting the position of the valve and for locking it in its adjusted positions a rod 23 is pivotally connected to an ear 24 on the back thereof and passes through an opening in the elbow portion of the casting 9, being provided with engaging teeth 25 to engage the edge of said opening and lock the valve against accidental movement.

The valve is rounded at its rear or pivotal end to conform to the contour of the passage through the casting throughout its swinging movement, and its side edges are parallel to always fit against the parallel side walls of the portion of the casting 9 in which they travel during the movements of the valve. Thus the valve is made to fit its casing in any position and leave no space between it and the casing to permit of the passage around it of any considerable amount of air. In its closed position the valve lies flat upon the flat bottom of the casting 9, so as to tightly close the communication between the smoke-pipe passage and the return-flue, as well as closing any communication between the smoke-pipe passage and the cold-air flue.

In operation the valve 19 is in its closed position, as shown in full lines in Fig. 1, while the fire is being started, and in this position the drafts are the same as the direct draft in the ordinary flue constructions, except that fresh air is taken beneath the grate through the cold-air pipe 15 and the return-pipe 12 instead of through the ash-pit door, as usual. With this direct draft there is no return of the gas to the grate, for the valve 19 tightly closes the return-flue and the gases pass unimpeded through the stovepipe - passage of the casting 9 to the chimney. When the fire has become fairly started, the rod 23 is drawn outwardly, so as to lift the valve 19 to any desired position, which will depend upon the nature of the fuel being burned, the usual position of the valve with hard coal being its full-open position against the flanges 20 and the shoulders 21. Now the smoke and gases coming from the combustion - chamber will for the greater part be deflected by the inclined valve and directed down the return-pipe 12, where they will commingle with and heat the fresh air drawn in by induction through the cold-air pipe 15 and become thoroughly intermixed therewith during the passage down the return-flue, so that as the mixture enters the chamber beneath the

grate it is in a perfectly - combustible state and on passing through the grate and coming into contact with the live coals will burn freely and contribute to the heating effect. Inasmuch as the stove-pipe passage through the casting 9 cannot be completely closed by means of the valve 19 even when in the full-open position, the steam and lighter non-combustible gases which travel along the top of said passage are permitted to separate from the deflected gases by passing through the opening 22 or through the space above the valve 19, if the valve is in an intermediate position, and escape by way of the chimney. The valve 19, therefore, in addition to its valve functions in opening and closing the various passages, serves as a separator to select the combustible gases from the non-combustible gases and deflect them to the return-flue, while allowing the non-combustible gases to escape to the chimney. In burning wood or soft coal, which contain an abundance of moisture, the valve 19 is preferably locked in an intermediate position, so as to increase the space above it through which the steam and lighter gases may pass out.

It will be noted that with the present invention the valve opens only at its upper portion, and consequently when in an intermediate position does not leave a passage beneath it through which the heavier carbonaceous gases may pass to the chimney, as with the construction shown and described in the patents above mentioned. Furthermore, the valve 19 serves the double purpose of controlling the degree of opening through the smoke-pipe passage of the casting and also controlling the communication between the smoke-pipe passage and the return-flue, so that a single operation of the valve is all that is necessary to change the drafts from a direct draft to a return draft. With the previous construction above referred to in order that a direct draft may be produced it was necessary to change the position of the valve or deflecting-gate to close the valve in the fresh-air pipe, so that the draft would not be checked by an inflow of cold air to the chimney through the cold-air pipe, to close the valve in the return-pipe, so that the fire might not be deprived of its draft by the short path from the ash-pit to the chimney by way of the return-pipe, and to open the ash-pit door to admit fresh air to the grate. Thus the present invention combines in one operation of the valve what required four different operations with the former structure and in addition possesses the advantages of complete separation of combustible from non-combustible gases, as before stated.

The valve 16 in the cold-air pipe is only used in event of the fire becoming too hot, when it may be closed more or less to control the supply of fresh air, and thereby the degree of combustibility of the gases introduced



beneath the grate by the return-flue. Obviously the cold-air pipe 15 extends down to near the floor, so as to take the coldest air in the room, and thereby facilitate the heating of the room.

There is no tendency for the deflected gases to pass down the cold-air pipe 15 and out into the atmosphere, because of their being lighter than the cold air in said pipe, and therefore unable to displace it, and for the further reason that the draft of the fire is drawing upon these gases to carry them down through the return-pipe instead.

Under no circumstances can cold air from the cold-air pipe 15 be drawn by the draft in the chimney past the valve 19, because of the tight fit of the valve in its casing in all of its positions and because of the further fact that the opening of this cold-air pipe into the return-flue is beneath the valve, and the passage of the hot gases through the space opened by the valve effectively prevents any passage of air in the opposite direction.

What I claim as my invention is—

1. In a return-flue for stoves and the like, a connection having a smoke-pipe passage, a return-pipe leading from the smoke-pipe passage to beneath the grate, a valve for controlling communication between the smoke-pipe passage and the return-pipe, and a cold-air pipe connecting with the return-pipe between the valve and the discharge end of the return-pipe.

2. In a return-flue for stoves and the like, a connection having a smoke-pipe passage, a return-pipe leading from the smoke-pipe passage of the connection to beneath the grate, a valve for adjustably controlling communication between the stovepipe-passage and the return-pipe, and a cold-air pipe connecting with the return-pipe just beneath the valve, said return-pipe serving as a conductor through which the air and gases pass to heat the air and mix it with the gases.

3. In a return-flue for stoves and the like, a connection having a stovepipe-passage, a return-pipe leading from the smoke-pipe passage to beneath the grate, a movable valve pivoted at its lower end to the connection and fitting the walls of the passage during its movements so as to close the lower portion of

the passage, and a cold-air pipe connecting with the return-pipe beneath the valve.

4. In a return-flue for stoves and the like, a connection provided with a stovepipe-passage therethrough with a portion having a flat bottom and parallel side walls, a return-pipe leading from said portion of the smoke-pipe passage to beneath the grate, a valve pivoted at its rear end in the connection and having parallel edges to fit the parallel walls of the stovepipe-passage, flanges against which the valve bears in its open position, means for moving the valve and holding it in its adjusted positions, said valve having its free end extending in the direction from which the gases come and provided with an opening to permit the gases in the upper portion of the passage to pass therethrough even when in its closed position against the flanges, and a cold-air pipe connecting with the return-pipe beneath the valve.

5. In a return-flue for stoves and the like, a sectional casting having a stovepipe-passage therethrough and forming an elbow connection, a sleeve of the casting leading from the stovepipe-passage, a return-pipe connecting with the sleeve and discharging beneath the grate, sockets formed in the casting at the junction of the sleeve with the elbow, a valve pivotally mounted in the sockets and adapted to move within the smoke-pipe passage from a position where it closes the connection between the smoke-pipe passage and the sleeve to a position where it deflects the gases into the sleeve and nearly closes the smoke-pipe passage, flanges formed in the smoke-pipe passage against which the valve may bear in the latter position, a rod pivotally connected to the valve and passing through an opening in the elbow portion of the casting, teeth formed on the rod and adapted to engage the casting to hold the valve in its adjusted positions, an elbow connecting with the sleeve of the casting, and a valved cold-air pipe connected to said elbow.

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

FREDERICK W. MENKEY

Witnesses:

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