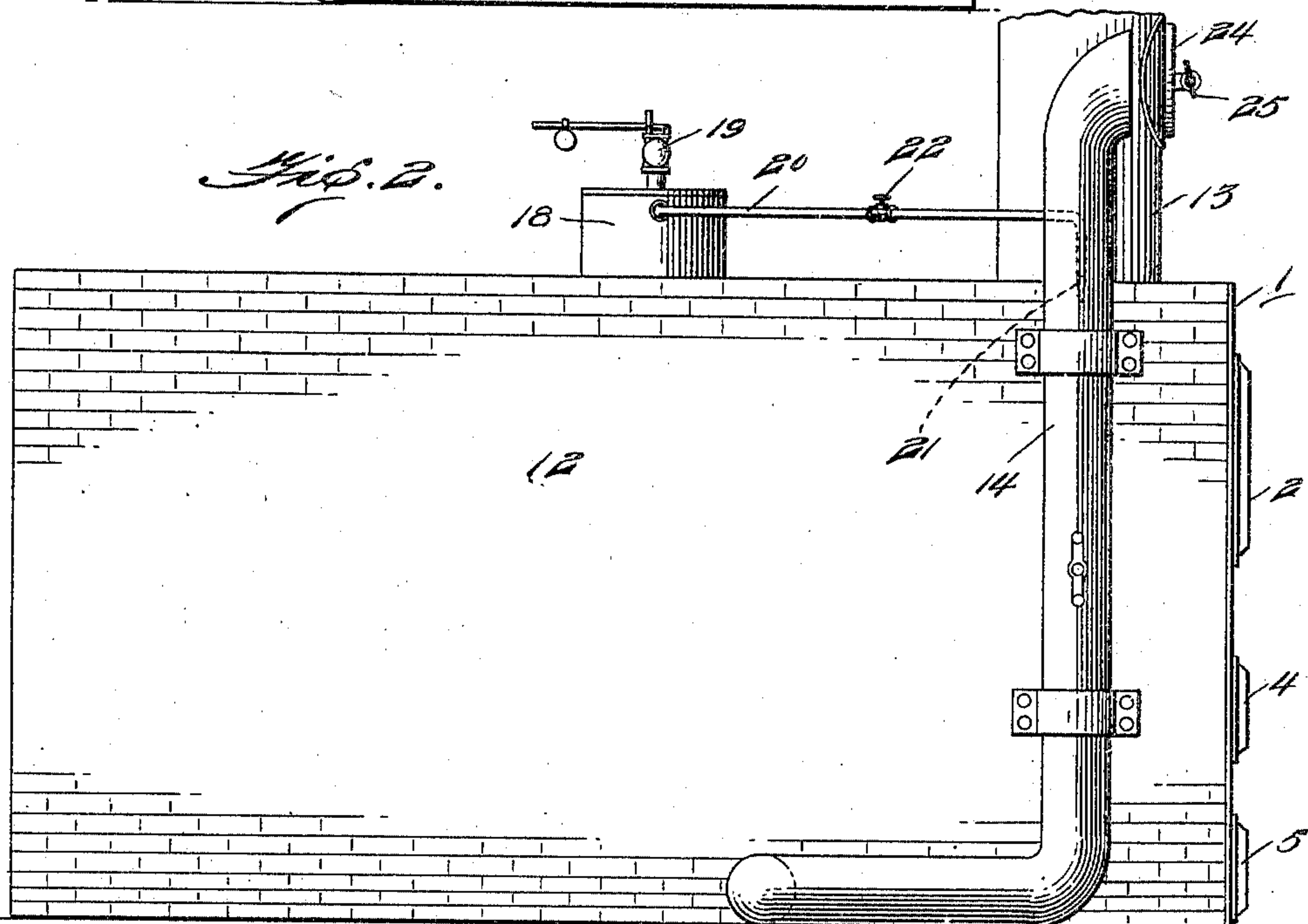
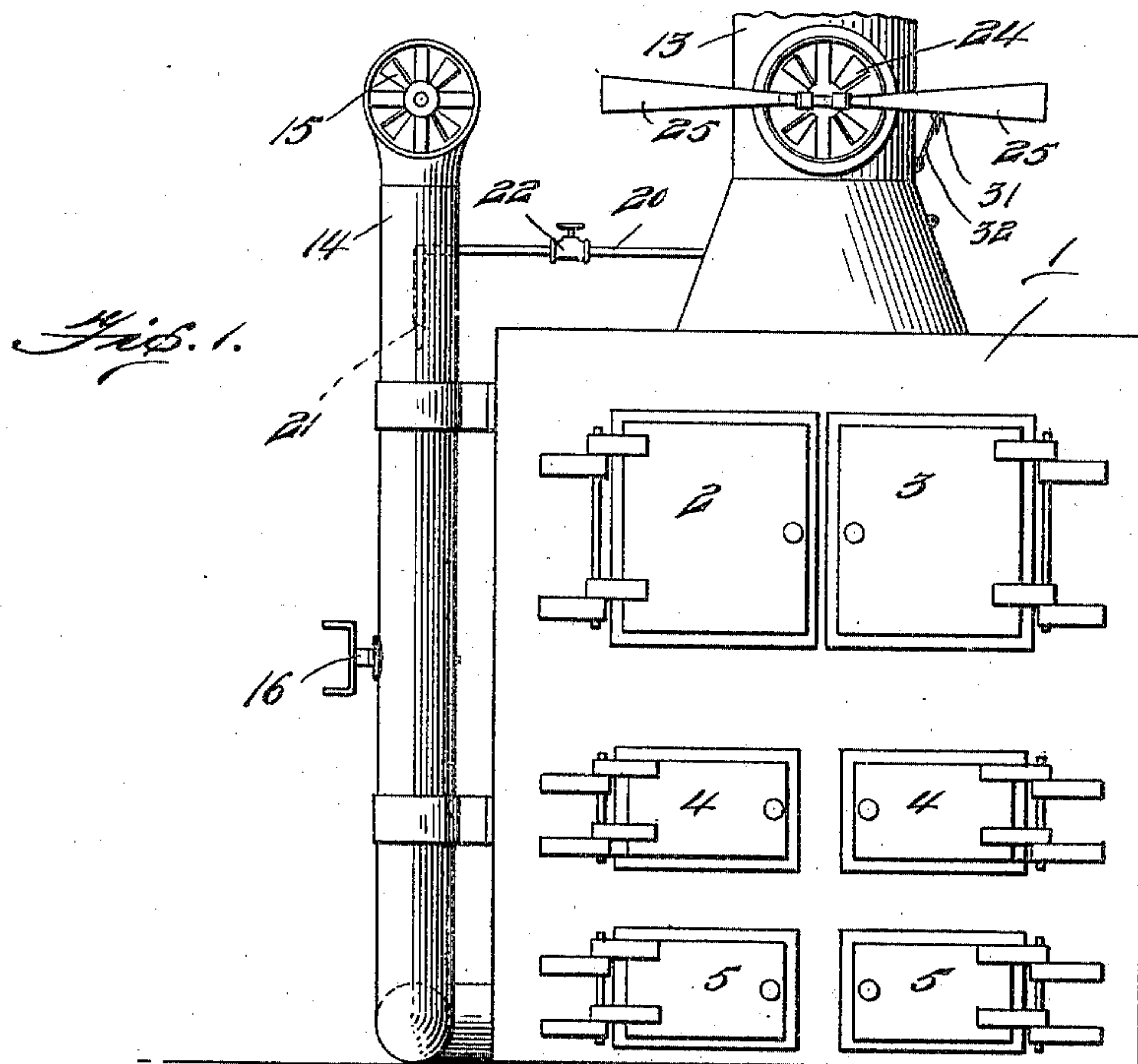


950,918.

H. B. HEMPHILL.  
DRAFT REGULATOR.  
APPLICATION FILED FEB. 10, 1908.

Patented Mar. 1, 1910.

3 SHEETS—SHEET 1.



Witnesses  
*B. M. Offutt*  
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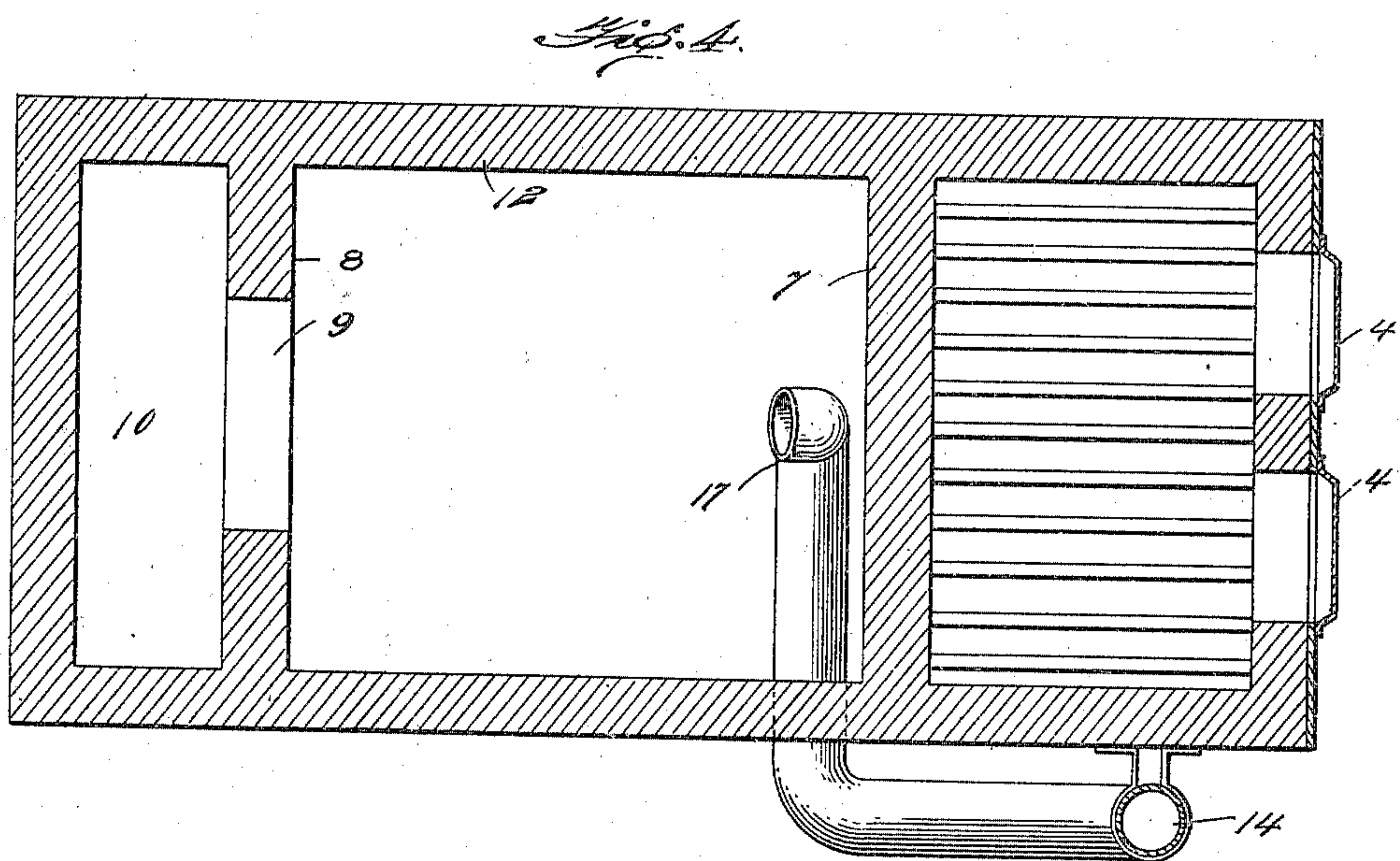
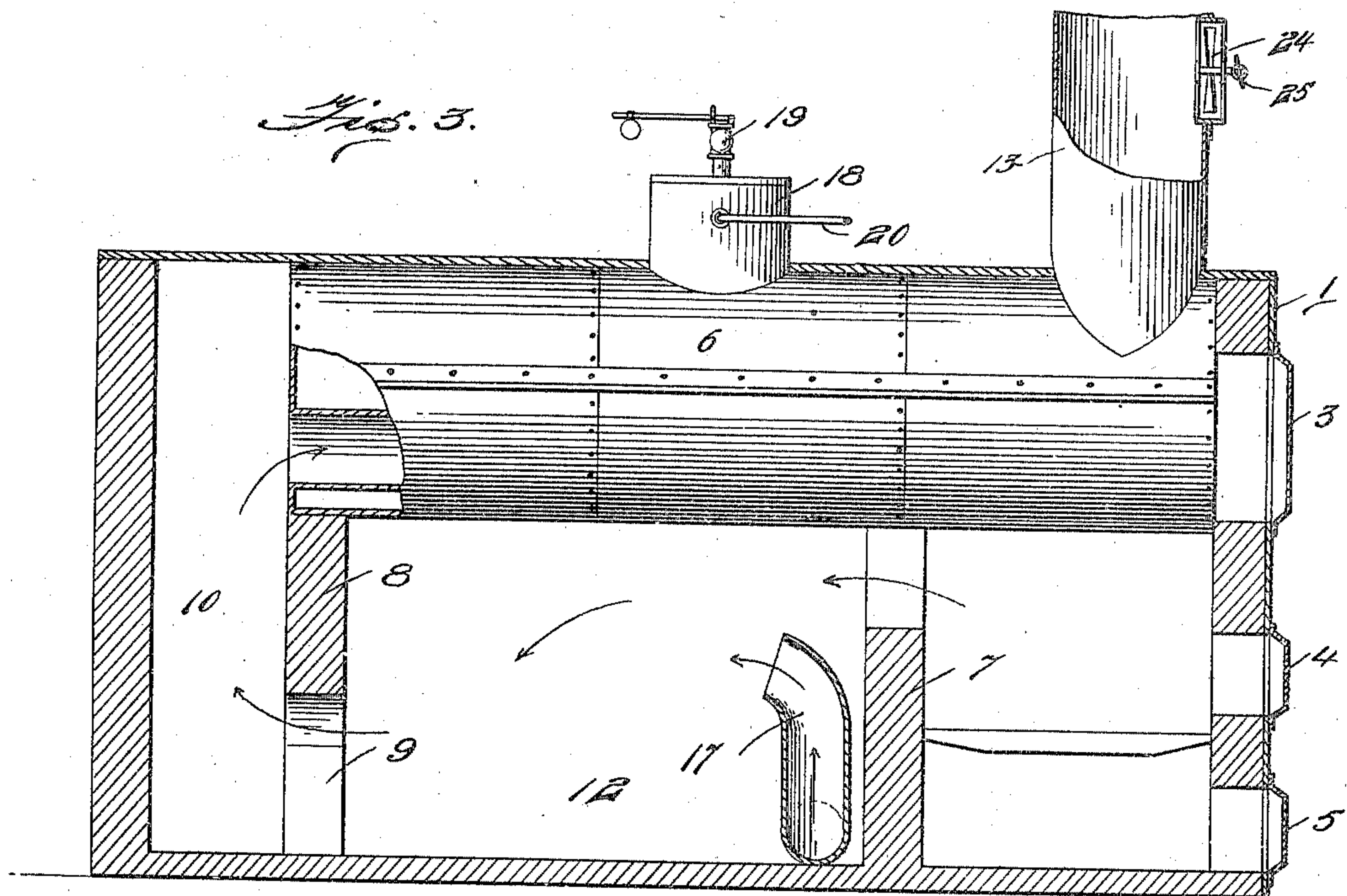
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3 SHEETS—SHEET 2.



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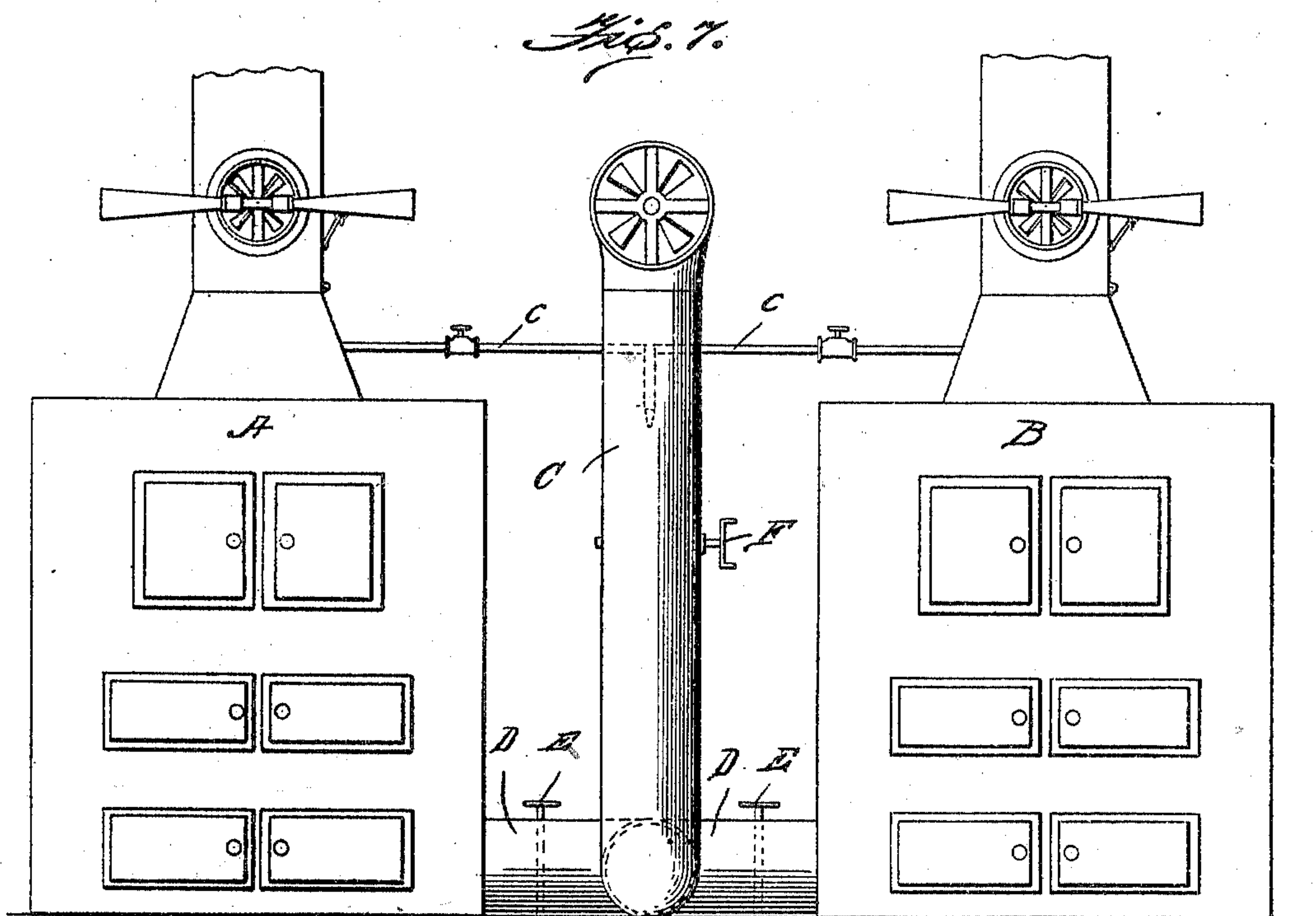
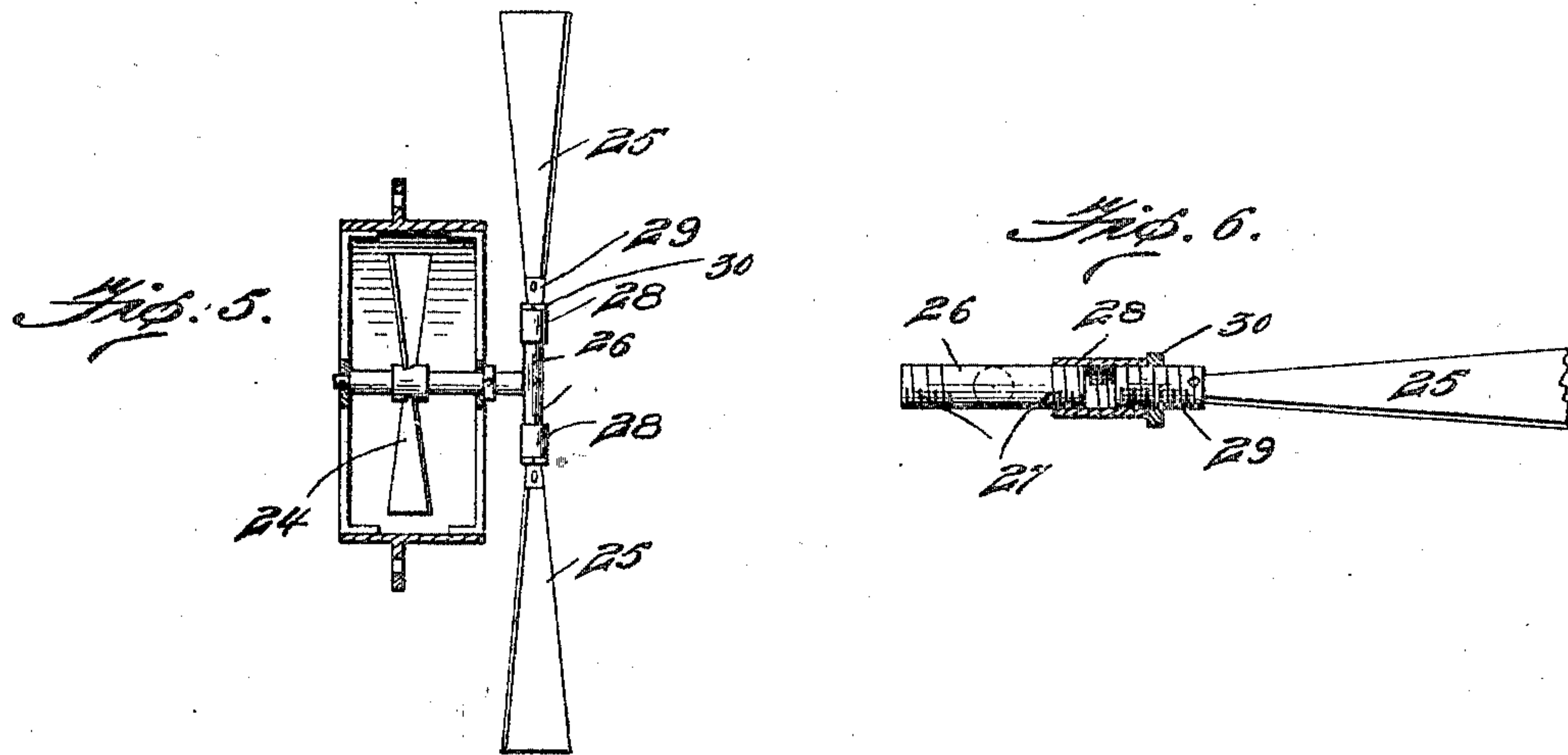
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3 SHEETS—SHEET 3.



Witnesses  
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# UNITED STATES PATENT OFFICE.

HENRY B. HEMPHILL, OF ELDORADO, ILLINOIS, ASSIGNOR OF ONE-FOURTH TO GLEN A. SAPP AND CARL E. SAPP, OF WABASH COUNTY, ILLINOIS.

## DRAFT-REGULATOR.

950,918.

Specification of Letters Patent.

Patented Mar. 1, 1910.

Application filed February 10, 1908. Serial No. 415,223.

*To all whom it may concern:*

Be it known that I, HENRY B. HEMPHILL, a citizen of the United States, residing at Eldorado, in the county of Saline and State of Illinois, have invented certain new and useful Improvements in Draft-Regulators; 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 appertains to make and use the same.

My invention relates to draft regulators for boiler furnaces, and the object of the invention is the provision of means which enables the engineer or operator to absolutely control the draft at all times so as to obtain maximum combustion for a given amount of fuel.

A further object of the invention is the provision of a device of this character which enables me to secure a second combustion or, in other words, to continue the combustion or flame entirely through the boiler tubes to the stack.

Further objects of the invention will appear as the specific description which follows is read in connection with the accompanying drawings which form a part of this specification, and in which,

Figure 1 is a front elevation of the furnace with the draft regulating device, Fig. 2 is a side elevation thereof, Fig. 3 is a longitudinal sectional view with parts broken away. Fig. 4 is a horizontal sectional view, Fig. 5 is a detail side elevation of the draft controlling fan, Fig. 6 is a sectional view of one of the retarding blades, and, Fig. 7 is a front elevation of a modification.

Referring more especially to the drawings, 1 represents the front of the furnace which is provided as usual with flue caps 2 and 3, and with the usual fire doors 4, and ash pit doors 5. The intermediate part of the boiler 6, is supported as is usual, and at its rear end upon a wall 8, which has formed in the lower part thereof an arch-way 9, and which permits the products of combustion to pass from the bridge wall to the rear end of the boiler to the space 10, thereof which is formed between the walls 8 and 10. Side walls 12, inclose the boiler as is usual.

Leading from a point adjacent the stack 13, downwardly along the side of the boiler is an air inlet flue 14, having at its upper end a fan 15, and intermediate its length a

damper 16, adapted to control the action of the fan and the steam jet, which will be hereinafter described. The lower end of the air inlet flue, 14, runs parallel with the floor for a short distance along the side wall and then enters and is provided with an up-standing discharge nozzle 17, back of the bridge wall 7. This nozzle is so positioned as to direct its output toward the rear of the furnace and in a direction with the normal draft so as to thereby increase the combustion within the furnace.

The boiler is provided with the usual steam dome 18, and safety valve 19. Leading from the steam dome is a pipe 20, having a discharge nozzle 21, located within the air inlet flue 14, immediately below the fan 15, so as to direct the steam in a line with the draft of air so that it will be properly commingled therewith. A suitable valve 22, is located between the steam dome and the nozzle so that the amount of steam fed to the draft tube may be properly regulated. In action the steam and air is projected violently from the nozzle 17, into the space between the wall 8 and bridge wall 7, and is thereby mixed with the unburned gases so that they are ignited thereby causing a substantial second combustion, which in reality forms nothing more than a continuous flame from the fire box 23, to the rear end of the boiler 6. This flame is so long and well established that it passes entirely through the boiler before it dies out and thereby increasing the efficiency of the furnace and producing more steam for the amount of coal used.

The damper 16, is used to regulate the force of the draft through the air inlet flue 14, but in order to more certainly accomplish this result, I arrange a draft regulating device in the shape of a fan 24, which is rotated by suction in the stack 13. I also provide means which I shall hereinafter describe for rendering the action of this fan operative or inoperative, as is desired. In order to regulate the action of the draft regulating device 24, I attach two elongated retarding blades 25, to the shaft of the draft regulating device by coupling arms 26, which are keyed to the shaft and are threaded upon their outer ends as at 27 to receive the tubular coupling member 28. This coupling member is engaged at its opposite ends by an arm 29, upon which is threaded a lock nut 30. It will be seen that by releasing the



lock nut and turning the blades, I am enabled to place them in such position that they will either strike the air at an angle or will present a perfectly flat face thereto. 5 When in this latter position, the action of the regulating device 24, will, of course, be retarded and when in the former position, the action will be increased. By increasing or decreasing the action, the draft in the 10 stack is either lessened or increased, thus regulating the draft as desired.

In order to obtain the maximum draft through the furnace the regulating device is held stationary and the full head of steam 15 allowed to pass into the air inlet flue 14, with the damper 16 wide open. Owing to the small amount of cool air passing into the stack at its base the hot gases rise in the stack by reason of the excessive combustion 20 generated, and the draft is not retarded to any appreciable extent. The regulating device is held stationary by means of a hook 32, pivotally carried by an eye 31, upon the stack and adapted to engage a similar eye on 25 one of the retarding blades 25. When it is desired to secure the minimum amount of draft the damper 16 is turned completely off, the steam is shut off from the draft flue 14, and the retarding blades turned edge- 30 wise so as to permit the suction in the stack to draw in cool air and rotate the regulating device as fast as possible, the cool air entering retards the action of the rising gases and thereby decreases the draft. By regulating 35 the angle of the retarding blades the fresh air admitted to the stack at its base may be regulated.

In order to obtain a maximum draft through the stack by the manipulation of 40 the regulating device 24 alone, it is only necessary to hold said device stationary by means of the hook and eye 31—32. This results in the minimum amount of fresh air entering the stack at its base thus permitting 45 the hot gases in the stack to rise in a substantially unobstructed manner. If it is desired to further increase the draft through the furnace the damper 16 may be opened and a jet of steam from the nozzle 21 forced 50 into the pipe 22 thus sucking in a considerable amount of fresh air and forcing it out of the nozzle 17 behind the bridge wall. The minimum amount of draft through the furnace is obtained by adjusting the retard- 55 ing blades 25 so that their edges strike the air in their rotary movement and offer little resistance to the rotation of the regulating device 24. When the regulating device is rotating at its highest speed a relatively

great amount of fresh air is permitted to en- 60 ter the stack at its base on account of the fact that the regulating device offers less resistance than when rotating at slower speeds. This cold air entering the stack nullifies the effect of the rising gases and retards their 65 action in proportion to the amount of air admitted which is regulated, of course, by the speed of the regulating device 24 governed by the position of the rotating blades 25. 70

In the modification shown in Fig. 7 I have illustrated two furnaces A and B, arranged side by side with a draft flue C, arranged intermediate the two steam domes of each by 75 valve pipes c, and with the space behind the bridge walls of the respective furnaces by pipes D, which are provided with dampers E. The flue is also provided with a damper F, so as to regulate the draft to the respec- 80 tive furnaces.

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

1. In a furnace having a bridge wall, a draft flue, a discharge nozzle connected with 85 said flue and opening into the space behind the bridge wall of the furnace, a steam jet projecting into said draft flue, means to control the volume of draft through said flue, a stack having an air inlet aperture, a rotary 90 regulating device carried by the stack for controlling the admission of fresh air through said aperture to the stack and thereby the draft through the furnace, means carried by and rotating with said device for ad- 95 justing the action thereof, and means to hold said adjusting means stationary.

2. In a furnace having a bridge wall, a draft flue, a discharge nozzle connected with said flue and opening into the space behind 100 the bridge wall of the furnace, a steam jet projecting into said draft flue, means to control the volume of draft through the flue, a stack having an air inlet aperture, a rotary regulating device carried by the stack for 105 controlling the admission of fresh air through the aperture to the stack and thereby the draft through the furnace, a pair of adjustable fan blades carried by the regulating device for controlling the action, and means to 110 hold the fan blades in adjusted position.

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

HENRY B. HEMPHILL.

Witnesses:

PHILIP WEISKOPF,  
GLEN SAPP.