No. 644,215. Patented Feb. 27, 1900.

P. J. SCHLICHT.

APPARATUS FOR PRODUCING COMBUSTION.

(Application filed Mar. 9, 1896.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1,

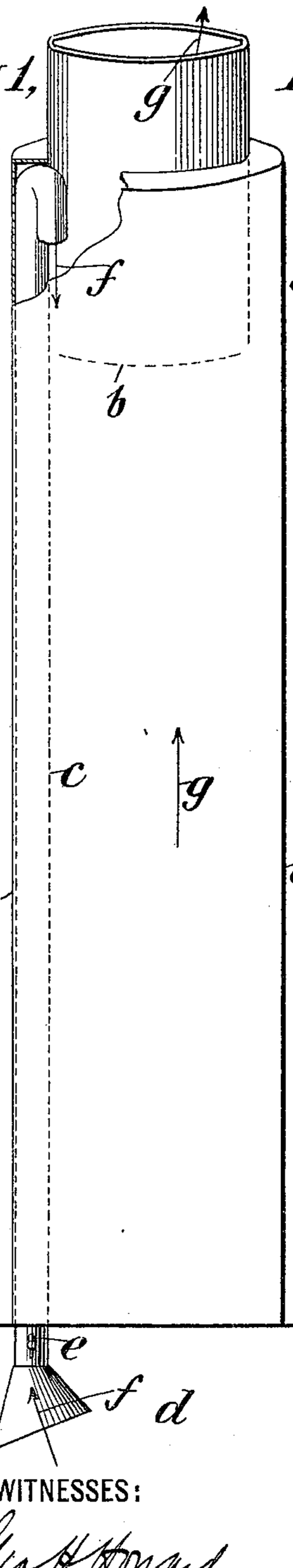


Fig. 2,

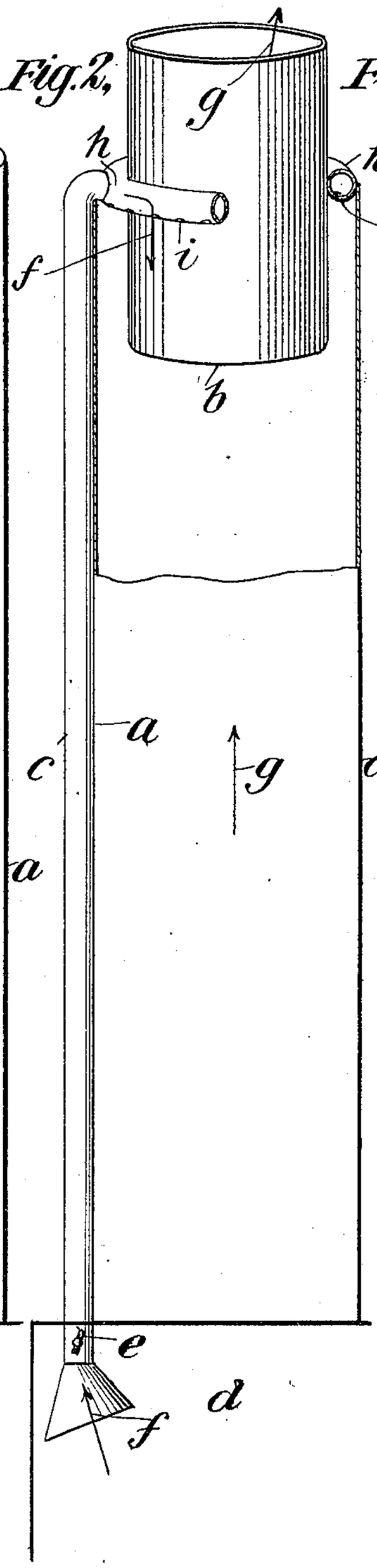
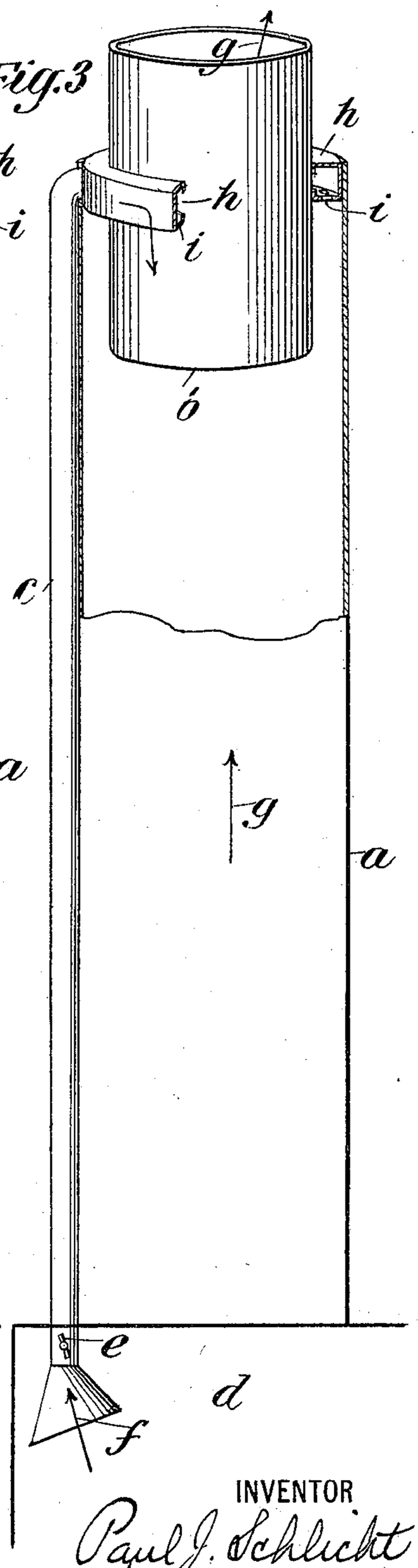


Fig. 3



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(No Model.) 4 Sheets—Sheet 2.

Fig. 5.

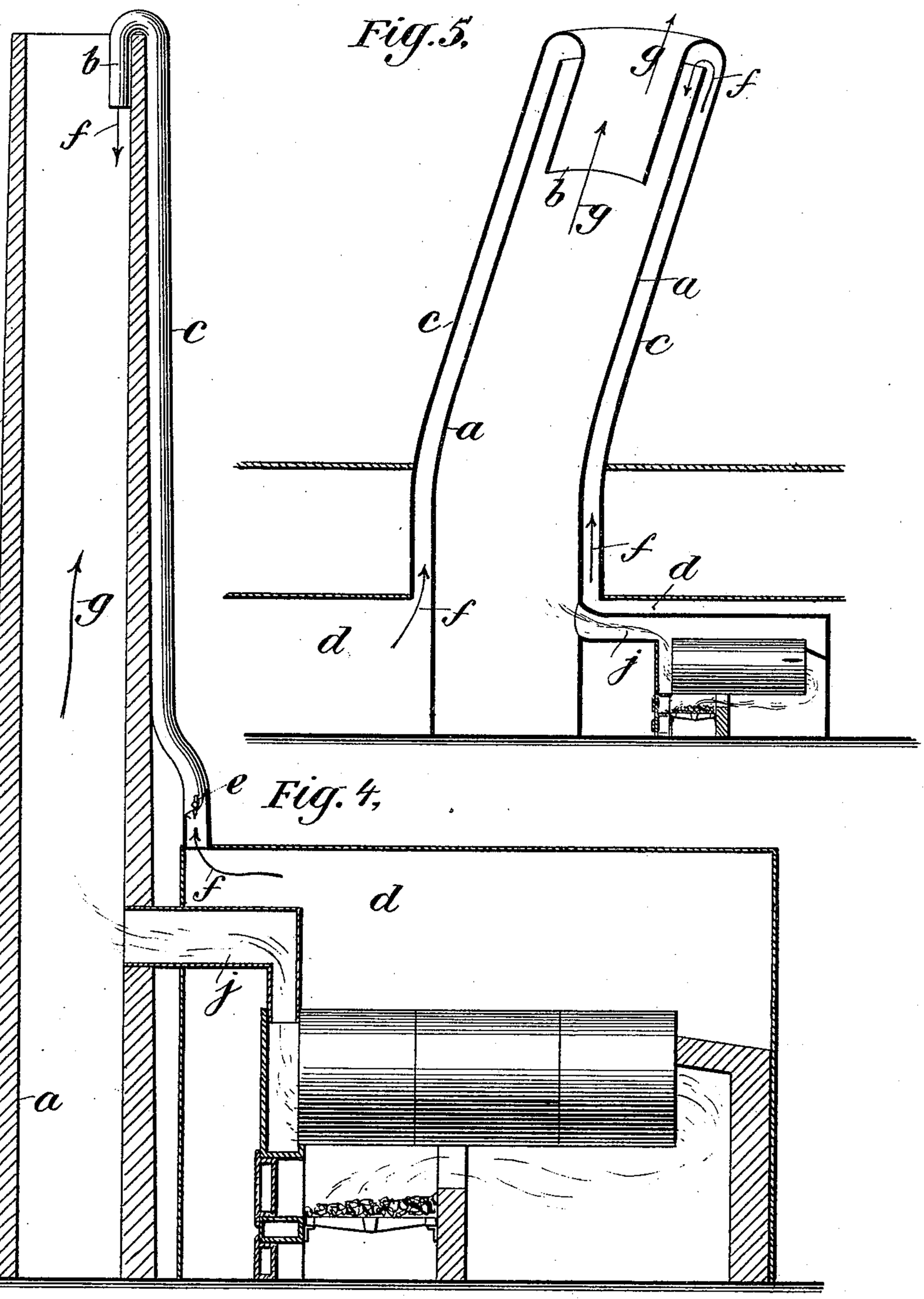

Fig. 4.

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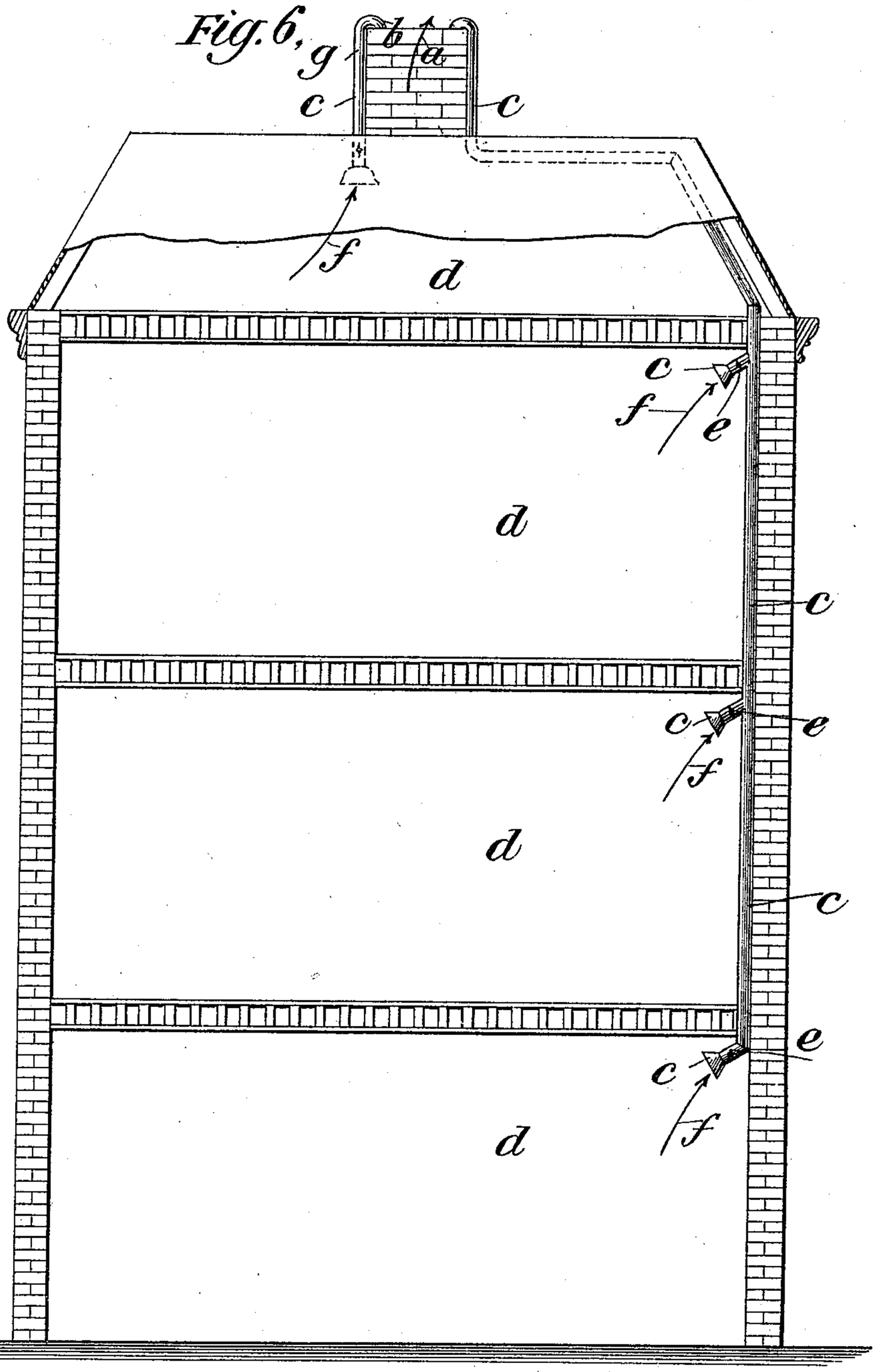
(No Model.) 4 Sheets—Sheet 3.

Fig. 6.



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(No Model.) 4 Sheets—Sheet 4.

Fig. 7.

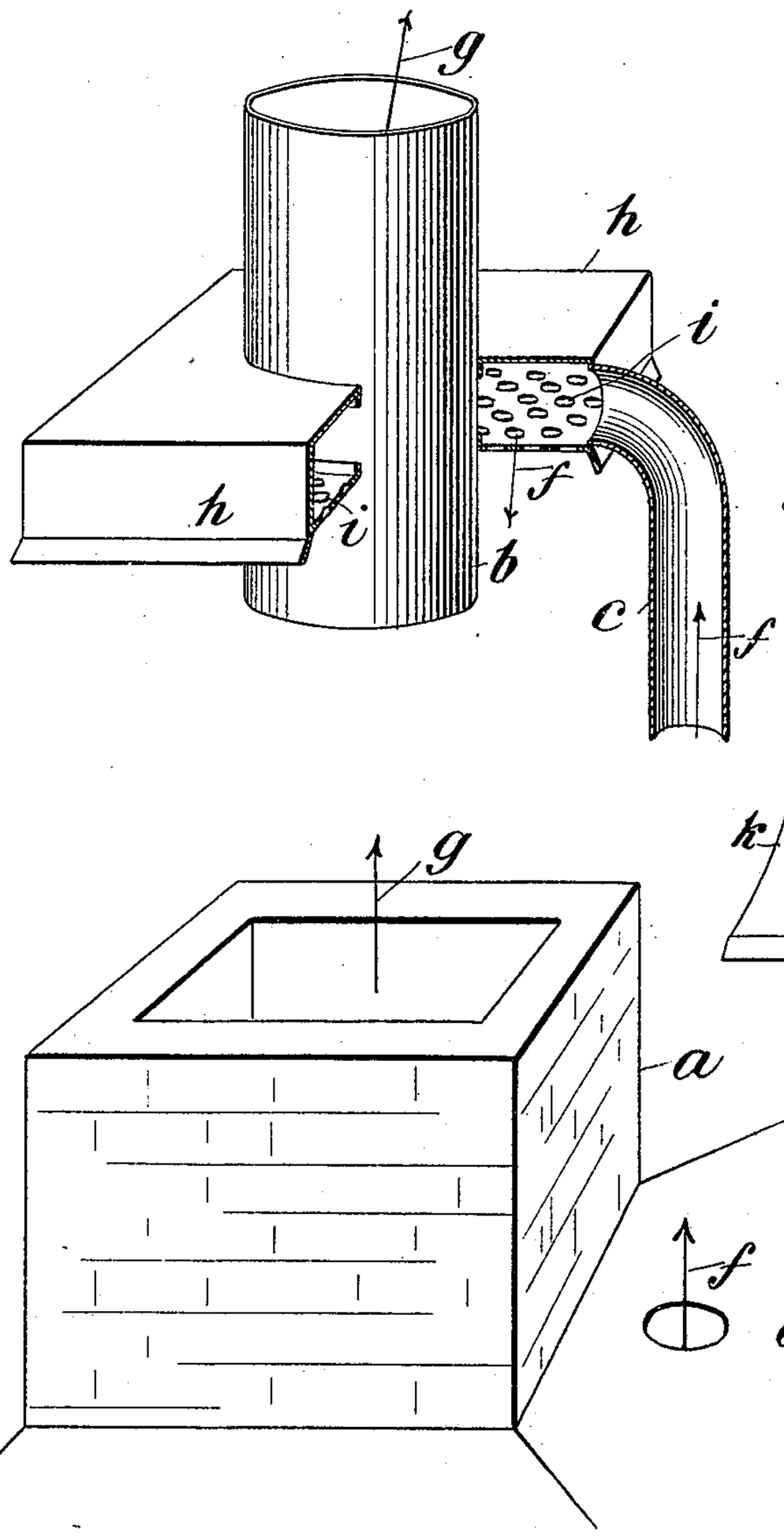
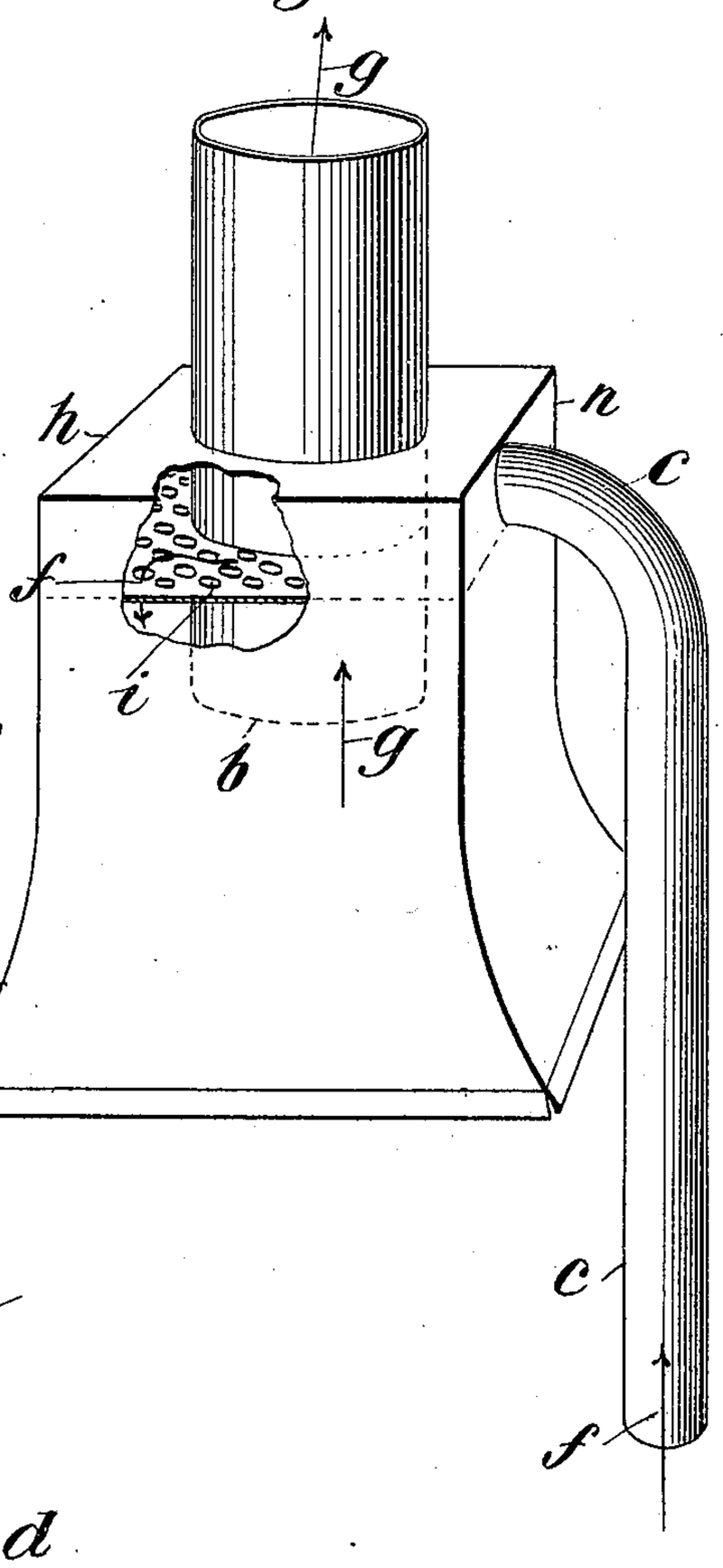


Fig. 8.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PRODUCING COMBUSTION.

SPECIFICATION forming part of Letters Patent No. 644,215, dated February 27, 1900.

Application filed March 9, 1896. Serial No. 582,408. (No model.)

To all whom it may concern:

Be it known that I, PAUL J. SCHLICHT, a citizen of the United States, and a resident of Summit, in the county of Union and State of New Jersey, have invented a new and useful Improvement in Apparatus for Producing Combustion and at the Same Time Effecting Ventilation, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, which form a part hereof.

My improved apparatus relates to means for carrying out the improved method herein described of producing combustion and effecting ventilation in the most effective manner; and its object is to provide a simple means for this purpose which may be applied to or embodied in existing combustion apparatus without material alteration of their structures and which when applied thereto or embodied therein will adapt the said apparatus to be operated in accordance with my improved method.

My invention consists, first, in the combination, with a chimney or stack or other flue through which the products of combustion escape, of one or more compartments for holding heated air in the interior of a building or vessel or other structure, means for causing a current of air to move downward within said chimney or stack in contact with the products of combustion, and an air duct or passage leading from said compartment or compartments to said means and adapted to conduct the air from said compartment or compartments to the said means, whereby the air from the interior of the building or vessel, which is already heated to some extent, is caused to flow down through the chimney or stack in contact with the products of combustion, and is thereby utilized in promoting combustion, and whereby the part of the building or vessel from which the air is taken is at the same time ventilated. The means for causing the current of air to move downward within the chimney must be outside of said compartment—as contrasted, for example, with a deflector on a lamp globe or chimney—so that the products of combustion do not escape into said compartment, which would prevent my improved method of ventilation from being realized or carried out.

This part of my invention also contemplates the employment of one or more air-ducts leading from different parts of the interior of the building or vessel, whereby combustion may be improved and at the same time an equable temperature may be maintained throughout the building or vessel. This part of my invention also contemplates the protection of the air duct or passage from the low temperature of the external atmosphere by making the said duct or pipe of non-conducting material or covering it with such material or by some other suitable method.

My invention also consists in so arranging the air duct or passage leading from the compartment or compartments in the interior of the building or vessel that the air in passing through it to the deflector will be still further heated by heat received from the combustion products within the chimney or stack.

My invention also consists in the combination, with a chimney or stack or other flue through which the products of combustion escape, of a deflector and an air duct or passage placed inside of the chimney or stack and adapted thereby to deliver heated air to the deflector.

My invention also consists in the employment of a distributing box or chamber connected with the stack for distributing the air received from the air duct or passage around the sides of the chimney or stack.

My invention also consists in an article of manufacture consisting of an attachment for a chimney or stack comprising a deflector and a distributing box or chamber for distributing air around the sides of the chimney or stack adapted to be secured to the chimney.

My invention also consists in certain other features of construction and combination of parts hereinafter described and claimed.

My invention is fully shown in the accompanying drawings, in which—

Figure 1 is a perspective view, partly broken away, of a stack and deflector and an air duct or pipe inside of the stack leading from some part of the interior of the building. Fig. 2 is a similar view showing the air-duct on the exterior of the stack and showing one form of distributing box or chamber. Fig. 3 is a similar view showing a different form of distributing-chamber. Fig. 4 is a sectional view

of a chimney or stack and boiler-room, showing the air-duct leading from the top of the boiler-room. Fig. 5 is a similar view of a steamship-stack, showing an air-duct inclosing the stack and connecting with the upper part of the boiler or furnace room. Fig. 6 represents a building having three stories and an attic having an air-duct leading from the several floors and attic to the deflector in the chimney. Figs. 7 and 8 are perspective views, partly broken away, showing my improvement embodied in a chimney attachment.

In Fig. 1, *a* represents an ordinary annular stack. *b* is a deflector. It is annular in shape, thus conforming to the shape of the stack, but is smaller in size than the latter, as a result of which there is a space or passage between the deflector and the stack for the admission of air. It is made of suitable length. *c* is an air duct or passage leading from some compartment or room in the exterior of the building, such as is represented at *d*. For convenience of illustration the room or part of the building *d* is shown in Fig. 1 immediately below the stack; but it will be understood that the pipe *c* may extend to any part of the building near by or at a distance or to an adjoining building. The pipe *c* is placed upon the inside of the stack and is fastened in such position in any suitable way. The upper end of the pipe *c* is turned over, so as to deliver the current of air in a downward direction. The upper end of the pipe *c* thus acts as an additional deflector. The upper end of the stack-pipe between the deflector *b* and the wall of the stack is closed or covered, as shown, so that no air is admitted to the stack except through the pipe *c*. *e* is a damper of any ordinary construction placed in the pipe *c*, by means of which that pipe may be opened to any extent or closed. *f f* are arrows representing the current of air passing through the pipe *c* and into the stack. *g g* are arrows representing the products of combustion escaping through the stack. The operation of this apparatus is as follows: The air passes from the room or compartment of the building with which the air-duct is connected through the said air-duct and is delivered to the deflector *b* and by that deflector is caused to flow downward within said chimney or stack in contact with the products of combustion and in this way to flow to the combustion-chamber and promote combustion. The air is heated first by the heat which is imparted to it in the room or compartment of the building from which it is taken. This heat is ordinarily wasted, as such hot air is generally allowed to escape from a building to the external atmosphere, and fresh cold air is introduced for the purpose of ventilation. In my apparatus this heat is saved and is utilized for imparting heat to the air fed to the combustion-chamber. The air is still further raised in temperature as it passes through the pipe *c* on the inside of the stack by the heat imparted to it through the walls of the pipe *c* from the escaping products of combustion. The air is then brought into contact with the escaping products of combustion and as it passes down in the stack or chimney to the combustion-chamber is raised to a still higher degree of temperature and is supplied in this hot state to the combustion-chamber.

It is often true, especially in cold weather, that the air in the interior of a building is much warmer than the external atmosphere. By causing this warm air to flow to the combustion-chamber the air fed to that chamber is heated to a higher degree, but without any additional expense, the added heat being secured by drawing the air from a source of heat that would otherwise be wasted. An additional advantage resulting from the use of my invention is the improved ventilation of the building. The heated and contaminated air is removed from the interior of the building and utilized for the purpose of combustion, thus enabling a fresh supply of pure cool air to be introduced into the building. By placing the air-pipe *c* inside of the stack that pipe is in the first place protected from exposure to the external atmosphere, which might result in the loss of some part of the heat originally contained in the air, and in the second place is exposed to the heat of the escaping products of combustion.

In Fig. 2, *a* is the stack; *b*, the deflector; *c*, the air duct or passage, and *d* the room or compartment of the building from which the air is to be taken. In the form shown in this drawing the pipe *c* is on the exterior of the stack. In such a case the pipe should be protected from the low temperature of the external atmosphere by making the pipe of non-conducting material, such as wood fiber, or by incasing it in non-conducting material—for example, asbestos. *e* is the damper for controlling the air duct or passage. The room or compartment of the building from which the air is taken is represented as immediately below the stack; but it will be understood that the air-duct may lead from any part or room in the building or in an adjoining building. *h* is a distributing-chamber, into which the air-pipe *c* opens. The purpose of this chamber is to distribute the air around the sides of the stack, so as to cause the air to flow down the stack or chimney in an annular current, inclosing or surrounding the current of combustion products moving in the opposite direction. This distributing-chamber is formed by a circular or annular pipe surrounding the deflector *b* and closing or covering the upper end of the passage between the deflector and the wall of the stack. The lower side of this chamber is provided with perforations *i i*, through which the air passes down from the chamber into the stack. The air is then directed downward by the deflector and caused to flow to the place of combustion in contact with the products of combustion escaping therefrom. *f f* are arrows

indicating the direction of the entering air-current. *g g* are arrows indicating the direction of the outflowing current of combustion products. The air-duct *c* can, if desired, be covered with non-conducting material wherever it is exposed to the external atmosphere, but is preferably left without any covering at the place where it comes into contact with the stack. As a result of this the pipe is protected from exposure to the outside atmosphere, while at the same time it is heated somewhat by contact with the stack, and the air rising through this pipe receives additional heat through the wall of the stack. The operation of this form of device is substantially the same as that of the form shown in Fig. 1, except that the air is caused to enter the stack on all sides.

In Fig. 3 a form of apparatus is shown similar to that of Fig. 2, except that the distributing box or chamber is somewhat different in shape.

In Fig. 4, *a* is an ordinary brick stack. *d* is the boiler or furnace room. *c* is an air duct or passage leading from the upper part of this boiler or furnace room to the top of the stack. This pipe is bent over the top of the stack and made to extend a short distance into the same at the top for the purpose of directing the current of air downward within the stack. The bent-over end of this pipe at the place marked *b* operates as a deflector. *e* is a damper to regulate the air duct or passage. *f f* are arrows indicating the direction of the air-current, and *g g* are arrows indicating the direction of the current of combustion products. *j* is a breeching or flue connecting the furnace with the stack. In this form of apparatus the air flows from the upper part of the boiler or furnace room through the pipe *c* into the chimney or stack and is directed down the same and caused to flow to the place of combustion in contact with the hot products of combustion escaping therefrom.

It is well known that the temperature of the air in a boiler or furnace room often reaches an excessively-high point, such as to cause great discomfort and sometimes injury to the operators. It is often difficult to ventilate such rooms in such a way as to keep the temperature down to a suitable point. Ordinarily the heat imparted to the air in the boiler-room is entirely wasted and not only serves no useful purpose, but is deleterious to comfort and health. By my improved apparatus I utilize this heat by causing the heated air to flow to the place of combustion, and thereby making this heat operate to promote combustion. As stated above, I prefer to make the air-duct of non-conducting material or to cover it with non-conducting material either entirely or wherever it would otherwise be exposed to the external atmosphere. The hot air which escapes from the boiler-room is raised in temperature by being brought into direct contact with the products of combustion.

In Fig. 5 I have shown a similar apparatus applied to the boiler-room and stack of a steamship. In this case the air-duct is formed by a jacket inclosing the stack, and this jacket is connected in any suitable way with the boiler-room on each side of the stack.

It is especially true on shipboard that the heat of a boiler-room is oftentimes so great as to make it impossible for the operators to remain in the room very long. I utilize this heat and at the same time ventilate the boiler-room and greatly reduce its temperature, thereby increasing the efficiency of the operators and adding greatly to their comfort and to the safety of their work. The air-duct *c*, formed by the inclosing jacket, should be made of or covered with material which is non-conductive of heat.

Fig. 6 represents a building having three stories and an attic. *a* is the chimney. *c c* are two air ducts or passages, one leading from the attic to the top of the chimney and the other having branches connected with each room in the building and leading also to the top of the chimney. The end of each of these pipes is bent over and made to project down the chimney for a short distance. The bent-over end of the pipe in each case, as at *b*, operates as a deflector to produce a downwardly-moving current of air in the chimney or stack. *e e* are dampers in these air ducts or pipes. *f f* are arrows indicating the direction of the current of air, and *g g* are arrows indicating the direction of the current of combustion products. If desired, the branch leading to the attic can also be connected with the same common air duct or passage as the branches leading to the other rooms in the building. In this form of apparatus the warm air from every part of the building is utilized in promoting combustion, and at the same time the building is ventilated and maintained at an equable temperature in its different parts. For example, if the air in one room is warmer than the air in another room the warmer air will pass up through the pipe first, and in this way the air will be first drawn from the warmer room, and this will continue until the air in both rooms is about the same temperature, when the air will flow equally from both. In this way by having one or more air ducts or passages leading to different parts of the building the temperature of these different parts of the building will be made uniform.

In Fig. 7 my apparatus is shown in the form of an attachment adapted to be applied to a chimney or stack. *a* represents any ordinary stack or chimney. The attachment consists of a deflector *b*, the distributing box or chamber *h*, having perforations *i i* in its bottom, and the air duct or pipe *c*, which is adapted to be connected with any suitable pipe or passage leading to the interior *d* of the building. In making the attachment the pipe *c* is connected with the distributing box or chamber and extends but a short distance below that, far enough to enable any suitable con-

nection to be made between the end of the pipe and any place from which it is desired to remove the air. This attachment is provided with any suitable means for connecting it to a chimney or stack. It is simple in its construction and can be easily and economically made and affords a ready means of applying my improved apparatus to any ordinary chimney or stack.

In Fig. 8 another form of my improved attachment is shown, which is similar to that shown in Fig. 7, except that it has an additional feature—the stack-restricter *k*. This restricter is below the distributing chamber or box *h* and is adapted to be attached or fastened to the top of the chimney or stack. In some plants it is found that the chimney is too large in proportion to the area of the grate. In such cases it is beneficial to restrict the area of the chimney at the top near the deflector. By employing a restricter, such as *k*, which is of such a size at the bottom as to be readily applied to the top of the chimney or stack and which diminishes in size toward the top, the proper restriction of the size of the chimney can be secured.

Important and valuable results are secured by my invention in the direction of economy and increased efficiency. Instead of taking the air from the external atmosphere at a low temperature—as, for example, in winter—the air is taken from a place where it has been heated to some extent, and as the air contains this amount of heat to start with it can be heated to a higher degree during its passage through the air-duct and down the chimney in contact with the products of combustion than would be possible if cold air were taken from the outside atmosphere. At the same time the room from which the warm air is drawn is ventilated and a convenient way is provided for getting rid of the warm and contaminated atmosphere inside of the building. The heating of the air is also aided by protecting the air duct or passage from the external cold and by distributing the air uniformly around the sides of the stack, so as to increase as far as possible the surface contact between it and the products of combustion.

It will be apparent that some parts of my improved apparatus can be used without the others or in combination with other devices or systems.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a chimney or stack of a compartment adapted to hold heated air in the interior of a building, vessel or other structure, means arranged on the chimney outside of the said compartment for causing a current of air to move downward within said chimney or stack in contact with the products of combustion, and an air duct or passage leading from said compartment to said means and adapted to conduct the air from said compartment to said means, substantially as set forth.

2. The combination with a chimney or stack of a compartment adapted to hold heated air, a deflector arranged on the chimney outside the compartment for causing a current of air to move downward within said chimney or stack in contact with the products of combustion, and an air duct or passage leading from said compartment to said deflector, said air-duct being protected from the low temperature of the external atmosphere and being adapted to conduct the warm air from said compartment to said deflector, substantially as set forth.

3. The combination with a chimney or stack of a compartment adapted to hold heated air, a deflector arranged on the chimney outside the compartment for causing a current of air to move downward within said chimney or stack in contact with the products of combustion escaping therethrough, and an air duct or passage leading from said compartment to said deflector and adapted to receive heat from the combustion products within the chimney or stack and to deliver heated air to said deflector, substantially as set forth.

4. The combination with a chimney or stack of two or more compartments adapted to hold heated air, a deflector arranged on the chimney outside the compartments for causing a current of air to move downward within said chimney or stack in contact with the products of combustion escaping therethrough, and one or more air ducts or passages leading from said compartments to said deflector and adapted to conduct air from said compartments to said deflector, substantially as set forth.

5. The combination with a chimney or stack, of a boiler or furnace room, a deflector arranged on the chimney outside of the boiler or furnace room for causing a current of air to move downward within said chimney or stack in contact with the products of combustion escaping therethrough, and an air duct or passage leading from the boiler or furnace room to said deflector and adapted to conduct the heated air from the furnace or boiler room to the said deflector, substantially as set forth.

6. The combination with a chimney or stack, of a deflector for causing a current of air to move downward within said chimney or stack in contact with the products of combustion escaping therethrough, and an air duct or passage inside of the chimney or stack adapted to deliver heated air to the deflector, substantially as set forth.

7. The combination with a chimney or stack of a compartment adapted to hold heated air, a deflector arranged on the chimney outside the compartment for causing a current of air to move downward within said chimney or stack in contact with the products of combustion escaping therethrough, and an air duct or passage on the side of the chimney or stack leading from said compartment to said deflector and adapted to receive heat from the combustion products within the chimney or

stack and to deliver heated air to said deflector, substantially as set forth.

8. The combination with a chimney or stack, of a deflector for causing a current of air to move downward within said chimney or stack in contact with the products of combustion escaping therethrough, and an air duct or passage leading to said deflector and adapted to deliver air thereto, and a distributing-chamber for distributing the air around the sides of the chimney or stack, substantially as set forth.

9. The combination with a chimney or stack, of a deflector for causing a current of air to move downward within said chimney or stack in contact with the products of combustion escaping therethrough, and an air duct or passage leading to said deflector and adapted to deliver air thereto, and a distributing-chamber provided with a perforated bottom for distributing the air around the sides of the chimney or stack, substantially as set forth.

10. As an article of manufacture, an attachment for a chimney or stack consisting of a deflector adapted to cause a current of air to move downward within said chimney or stack in contact with the products of combustion escaping therethrough, and a distributing box or chamber for distributing the air around the sides of the chimney or stack adapted to be secured to the chimney or stack, substantially as set forth.

11. As an article of manufacture, an attachment for a chimney or stack consisting of a deflector adapted to cause a current of air to move downward within said chimney or stack in contact with the products of combustion escaping therethrough, and a distributing box or chamber provided with a perforated bottom for distributing the air around the sides of the chimney or stack adapted to be secured to the chimney or stack, substantially as set forth.

12. As an article of manufacture, an attachment for a chimney or stack consisting of a deflector adapted to cause a current of air to move downward within said chimney or stack in contact with the products of combustion escaping therethrough, and a distributing box or chamber provided with a perforated bottom for distributing the air around the sides of the chimney or stack adapted to be secured to the chimney or stack, and an air-pipe connected with said chamber, substantially as set forth.

13. As an article of manufacture, an attachment for a chimney or stack consisting of a deflector adapted to cause a current of air to move downward within said chimney or stack in contact with the products of combustion escaping therethrough, and a distributing box or chamber provided with a perforated bottom for distributing the air around the sides of the chimney or stack, and a stack-restricter below said box or chamber adapted to be secured to the top of the chimney or stack, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PAUL J. SCHLICHT.

Witnesses:
GEO. W. MILLS, Jr.,
EDWIN SEGER.