

(No Model.)

C. C. CARTER.

SMOKE CONSUMING FURNACE.

No. 361,133.

Patented Apr. 12, 1887.

Fig. 1.

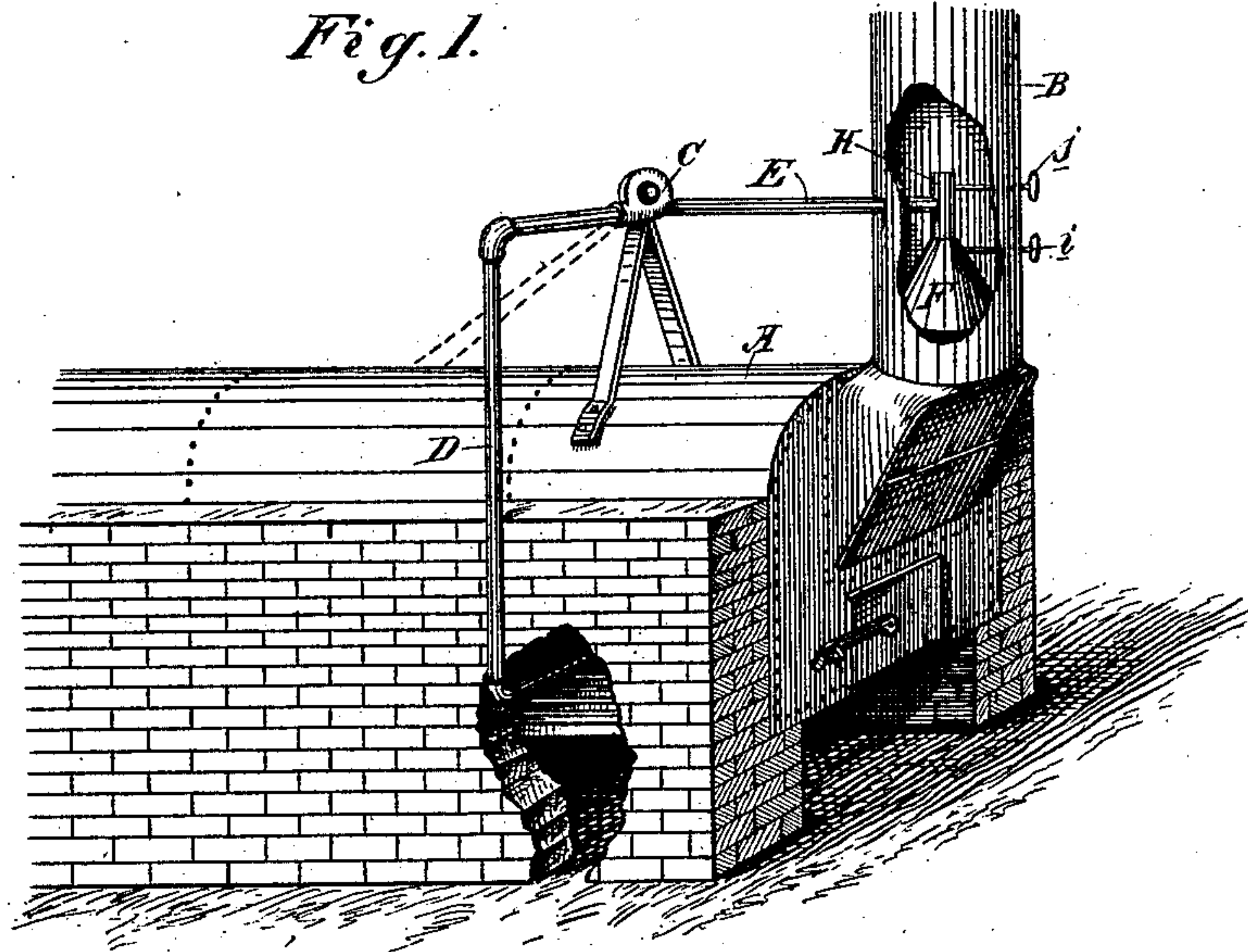
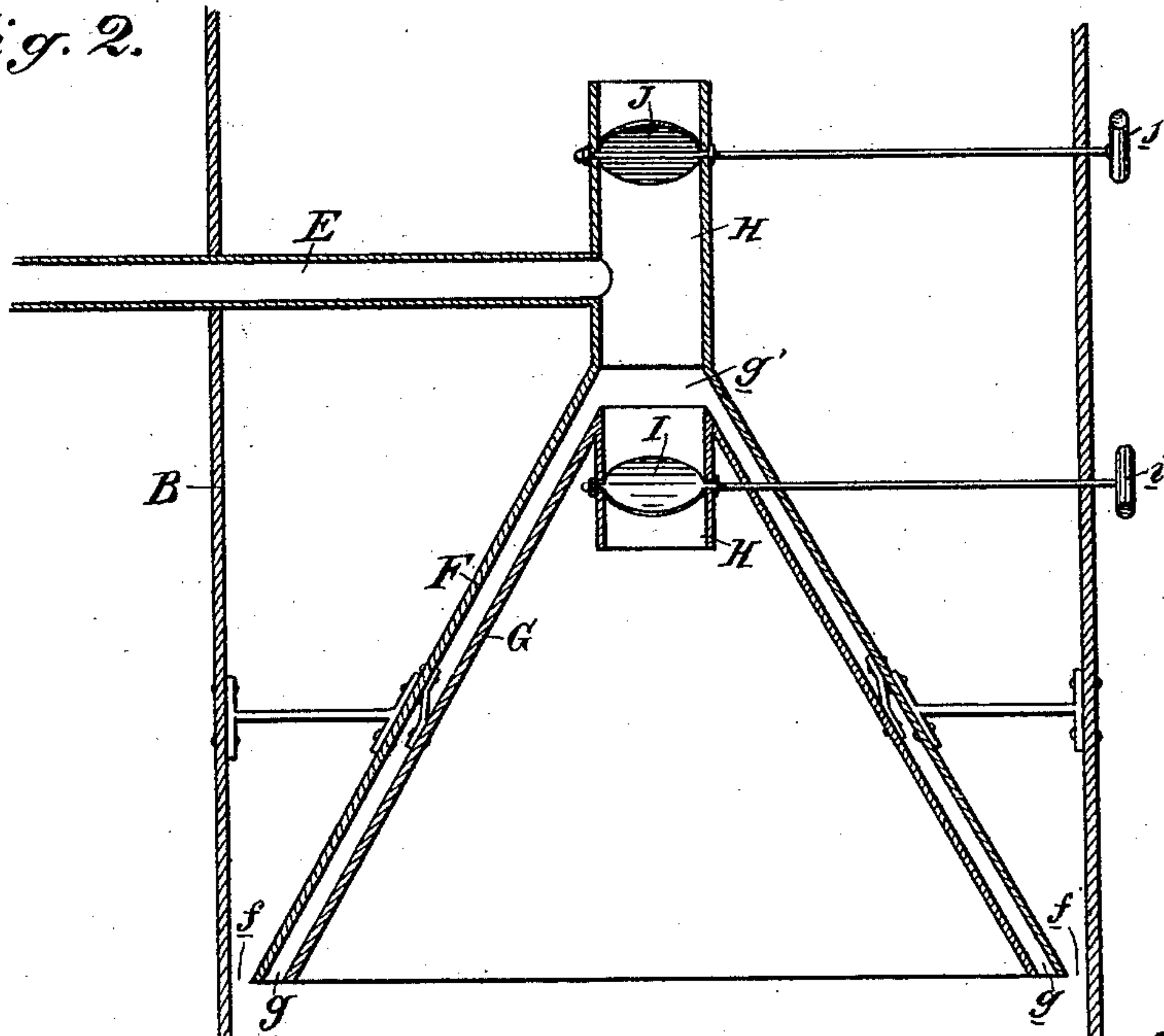


Fig. 2.



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UNITED STATES PATENT OFFICE.

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SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 361,133, dated April 12, 1887.

Application filed February 23, 1887. Serial No. 223,596. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. CARTER, of the city and county of San Francisco, State of California, have invented an Improvement in Smoke-Consuming Furnaces; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of smoke-consuming furnaces in which a suction blower or fan is connected with the smoke stack and with the fire-chamber, whereby the smoke and other products of combustion are drawn from the stack and forced through the furnace again.

My invention consists in a conical or inverted-funnel-shaped hood located within the smoke-stack and having a diameter a little less than that of said stack, a second hood located within and concentric to the first hood and of a diameter enough smaller than the outer hood to leave an annular space between the two, a pipe or passage through the apices of both hoods and communicating with the annular space between them and with the pipe from the suction-blower, a damper controlling said pipe or passage below its communication with the annular space between the hoods, and a damper controlling it above its communication with the suction-blower pipe, all of which I shall hereinafter fully describe.

In smoke-consuming furnaces of this class it has generally been the custom to stop the suction-pipe from the fan-blower at the inner surface of the stack. The disadvantage of this has led to an improvement, by placing within the stack a conical or inverted-funnel-shaped mouth-piece or hood, which communicates at its apex with the pipe from the fan-blower, and it is also provided with apertures or ports in its sides, which are controlled by gates operated from without, whereby, when said gates are open and the fan-communication closed, the natural draft may take place uninterfered with, and after this draft has become sufficiently strong and has served its purpose in firing up, then by closing the gates the smoke and products of combustion are confined to the mouth-piece and are drawn up by the fan and discharged into the furnace again. Experience has shown me the disadvantage of this form of consumer. The funnel-shaped mouth-piece has a diameter a little smaller than the stack, and therefore there is left an annular space

around its rim and between it and the inner surface of the stack, through which a portion of the products of combustion passes by the natural draft. It has not been deemed best to close this point of natural draft, as a certain amount is found necessary; and when the damper closing the main natural draft is closed the smoke and products of combustion have either to find an escape through this annular space between the base of the mouth-piece and the stack or to pass into the body of the mouth-piece, and thence into the pipe connecting with the suction-fan. The suction, while very strong in the upper end of the mouth-piece, is very weak at its base, because at that plane the area of the mouth-piece is so great that the force of the suction by distribution is diminished. Therefore, while it is true that a great portion of the smoke and products of combustion passes up into the mouth-piece, a large portion also escapes by the annular passage between the rim of the mouth-piece and the interior surface of the stack.

The object of my invention is to overcome this difficulty by applying the suction where its power may be employed to a greater advantage and less of the smoke and products of combustion allowed to escape, almost all being drawn in by the suction. I accomplish this by transferring the point of suction from the apex of the funnel-shaped mouth-piece to the base of the hoods, which I shall now describe.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a perspective view of my smoke-consuming furnace. Fig. 2 is a vertical section through the stack and its interior parts.

A is a furnace of any suitable pattern, and B is its stack.

C is the fan or suction blower, adapted to be driven by suitable power.

D is the pipe extending from the suction-blower to and opening directly through the side wall of the furnace into the fire-chamber.

E is the pipe extending from the suction-blower and entering the stack B.

F is the outer conical or inverted-funnel-shaped hood. It is located within the stack and has a diameter a little smaller than that of the stack, whereby a space, *f*, is left between its rim and the inner surface of the stack.

G is the inner hood, which is located and

secured within the outer hood, F, and has a diameter enough smaller than said outer hood to form an annular space, *g*, between the two hoods, which said space is open below.

5 H is a passage through the apices of the hoods. With this passage the annular space *g* communicates at its top, as shown by *g'*, and above this point of communication the pipe E from the fan-blower also communicates with
10 passage H. In point of construction this passage may be formed of two parts, one of which consists of a pipe formed at the apex of the outer hood and the other consisting of a short pipe formed in the apex of the inner hood, the
15 adjacent ends of the two pipes being separated to form the communication *g'* of the annular space *g* with the passage. In other words, one pipe extends upwardly from the outer hood, while the other extends downwardly a short
20 distance within the inner hood.

I is a damper, which is located within the passage H, at its lower end, said damper being operated by a stem or handle, *i*, passing outwardly through the hoods and the smoke-stack.
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J is a damper located within the passage H, at a point above that at which the suction-pipe E communicates with said passage, and this damper is operated by a stem or handle,
30 *j*, passing outwardly through the smoke-stack.

The operation of this device is as follows: When the furnace is first fired up and it is necessary that the stack should be as little obstructed as possible in order to provide the
35 natural draft, both dampers I and J are fully opened, so that the passage H is unobstructed and the smoke and products of combustion may pass directly up through the inner hood and into and through the passage H into the
40 stack above. A portion of the smoke and products of combustion also passes up through the annular space *f*, left between the base of the outer hood and the interior surface of the smoke-stack B. The passage H is made suf-
45 ficiently large to provide a free exit, so that the natural draft may take place as thoroughly as possible. After the furnace is well started both dampers I and J are closed, whereby both ends of the passage H are closed. By the
50 closing of the lower damper, I, the inner hood practically becomes a solid core, through which nothing can pass. By the closing of the upper damper, J, the main stack above is shut off from the suction-pipe. When these damp-
55 ers are closed, the fan is started up, and by the suction produced the smoke and products of combustion pass into the annular space *g* between the two hoods, and from said space into the passage H, and thence into the suc-
60 tion-pipe through the fan, through the pipe D, and into the fire-chamber. It will now be seen that the suction is directed and takes effect at the base of the hoods and in close proximity to the only space left for the escape of
65 the smoke through the stack—namely, the annular space *f* between the rim of the outer hood and the stack. The suction being there-

fore so close to this space, will prevent the escape of the smoke and the products of combustion, and will draw them at once in the direction desired. The force of the suction is also
70 greatly increased, or, rather, a less degree of suction will answer the same purpose when thus directed than a larger degree directed, as heretofore, at the apex of the hood.
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With this apparatus I need not employ as much power for operating the fan as has been found necessary in other cases, and instead of keeping up a furious suction to induce the smoke and products of combustion to pass up-
80 wardly through the hood, I am enabled to do the work with a more gentle suction properly directed.

Having thus described my invention, what I claim as new, and desire to secure by Letters
85 Patent, is—

1. In a smoke-consuming furnace in which a suction blower or fan is employed to draw the products of combustion from the stack, inverted-funnel-shaped or conical hoods lo-
90 cated within the stack and one within the other, the inner hood having a diameter enough smaller than the outer hood to leave a space between them, open at its base and connected above with the pipe from the suction
95 blower or fan, substantially as herein described.

2. In a smoke-consuming furnace in which a suction blower or fan is employed to draw the products of combustion from the stack, inverted-funnel-shaped or conical hoods lo-
100 cated within the stack and the one within the other, and having diameters whereby an annular space is left between the two hoods, which is open below and communicates above with the pipe from the suction blower or fan,
105 and an annular space is left between the rim of the outer hood and the interior surface of the stack, substantially as herein described.

3. In a smoke-consuming furnace, the inverted-funnel-shaped or conical hoods located
110 within the stack and the one within the other, said hoods having diameters which leave an annular space between the two hoods opening below into the stack, and a central passage through the apices of the hoods communicat-
115 ing with the annular space between them and with the pipe from the suction blower or fan, and dampers within said passage for controlling it, substantially as herein described.

4. In a smoke-consuming furnace, the outer
120 inverted-funnel-shaped or conical hood located within the stack and leaving a space between its base and the interior surface of said stack, the inner inverted-funnel-shaped or conical hood having a diameter enough smaller
125 than the outer hood, whereby an annular space is left between the two hoods, open below the open-ended passage H, through the apices of the two hoods and communicating with the annular space between them and with
130 the pipe from the suction fan or blower, the damper I at the lower end of the passage, and the damper J at its upper end, substantially as herein described.

5. In a smoke-consuming furnace, the suction-blower C and pipes D and E, in combination with the inverted-funnel-shaped or conical hood F, located within the stack, the inner
5 hood, G, within the outer one, and leaving a space, *g*, between the two, the central open-ended passage, H, through the apices of the two hoods and communicating with the annular space *g* and with the pipe E from the suction-blower, the damper I at the lower end of
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the passage H, and the damper J in said passage above the point of communication with the suction-blower pipe, substantially as herein described.

In witness whereof I have hereunto set my hand.

CHARLES C. CARTER.

Witnesses:

S. H. NOURSE,
H. C. LEE.