

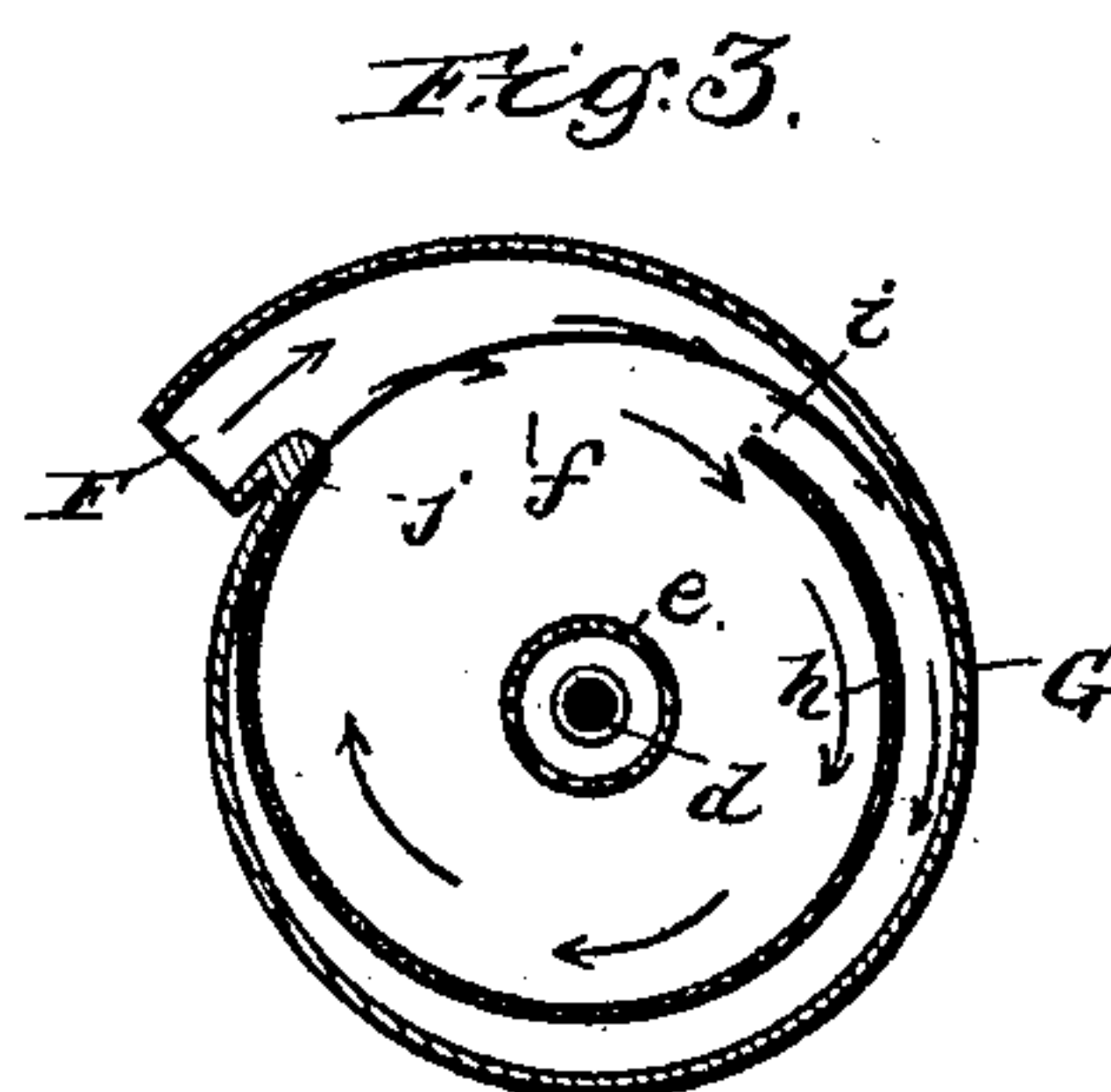
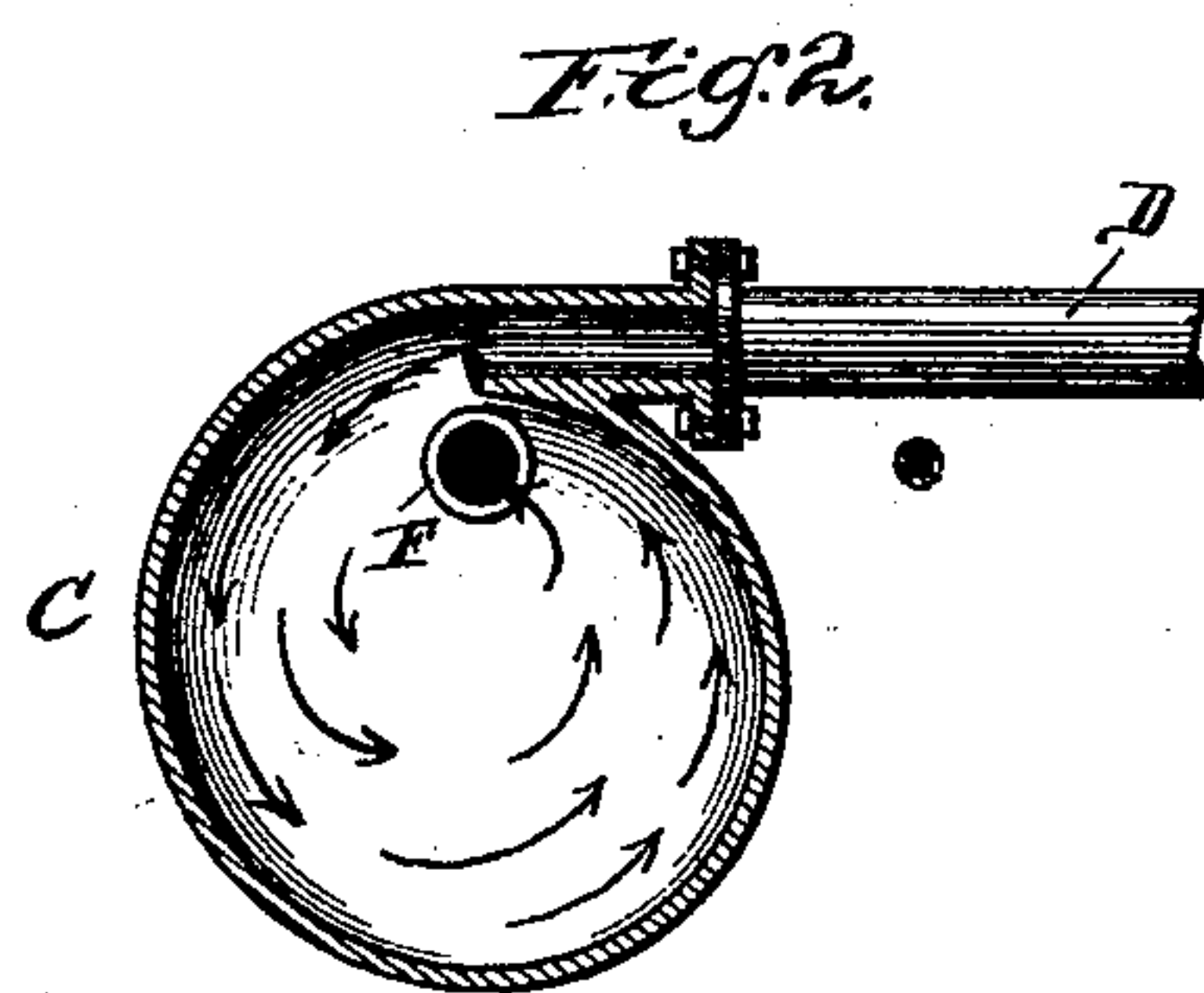
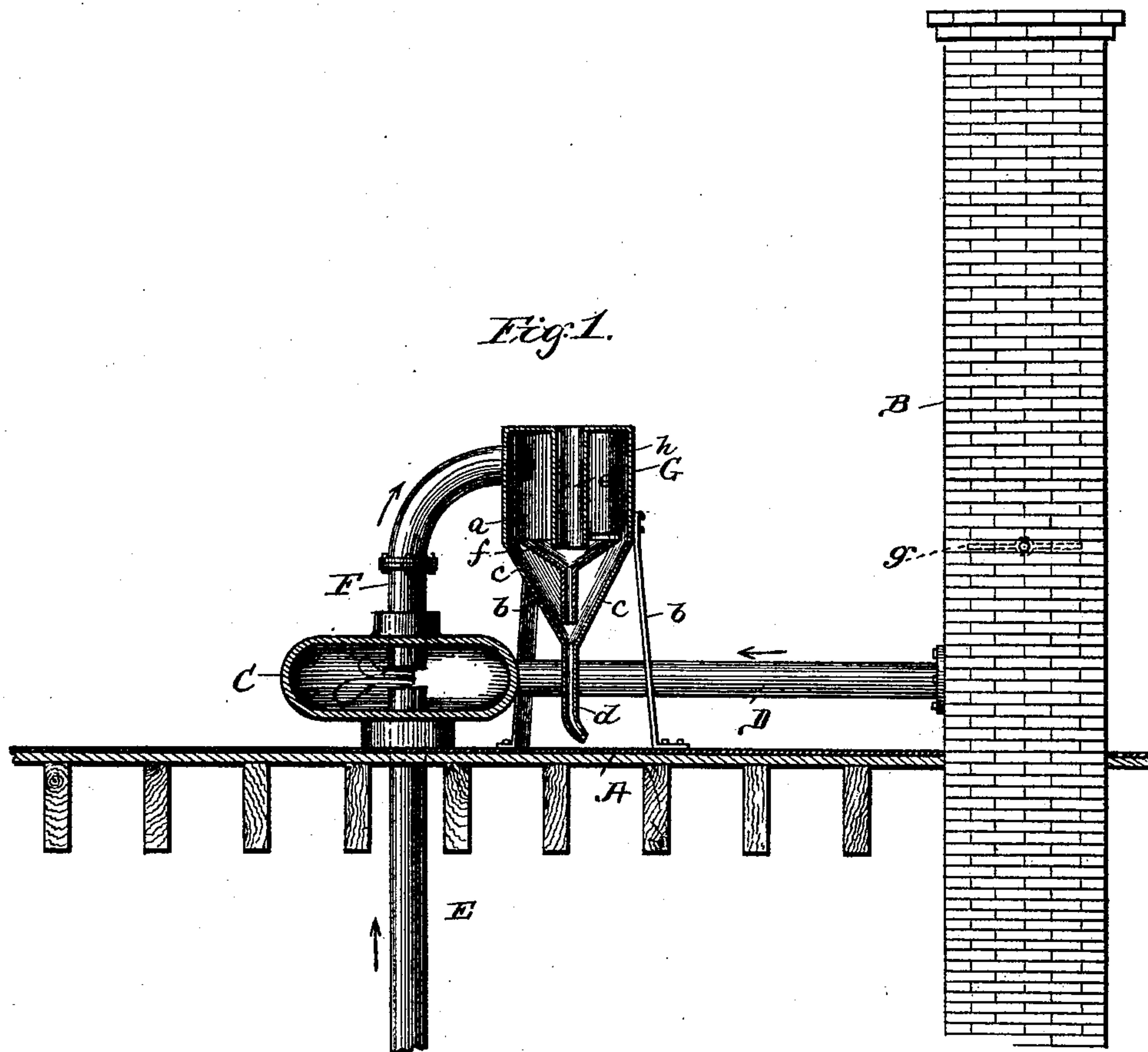
(No Model.)

M. F. EATON.

## COMBINED EXHAUST HEAD AND SMOKE CLEANER.

No. 453,143.

Patented May 26, 1891.



Witnesses.

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# UNITED STATES PATENT OFFICE.

MARSHALL F. EATON, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO  
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## COMBINED EXHAUST-HEAD AND SMOKE-CLEANER.

SPECIFICATION forming part of Letters Patent No. 453,143, dated May 26, 1891.

Application filed September 1, 1890. Serial No. 363,667. (No model.)

*To all whom it may concern:*

Be it known that I, MARSHALL F. EATON, a citizen of the United States, residing in the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Combined Exhaust-Head and Smoke-Cleaner, of which the following is a specification.

This invention relates to improvements in that class of devices known as "exhaust-heads," usually applied to the discharge end of exhaust-steam pipes, above the roofs of buildings to condense the exhaust-steam and carry off the condensation, which would otherwise fall in a fine spray to the streets.

The prime object of this invention is to utilize such an exhaust-head for cleansing soot from the smoke of the furnaces in the building prior to its discharge into the air, whereby the smoke is rendered light, clean, and almost colorless, and the "smoke nuisance," so common in most large cities or manufacturing districts, especially where soft coal is used to any extent, is avoided.

Another object is to utilize the exhaust-steam for drawing the smoke from the smoke-stacks into the exhaust, whereby the choking or smothering of the smoke-stack or chimney is avoided, and at the same time the draft thereof is materially promoted. These objects are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 represents a sectional elevation through a device embodying my invention, showing the same as applied to a smoke-stack or chimney; Fig. 2, a horizontal section through the smoke-chamber, and Fig. 3 a similar view through the exhaust-head.

Similar letters of reference indicate the same parts in the several figures of the drawings.

Referring by letter to the accompanying drawings, A indicates the roof of a building, and B the chimney or smoke-stack for the furnaces contained in the building. Upon the roof is located a smoke-chamber C, circular in horizontal section and having a generally elliptical form in cross or vertical section, into one side of which opens a pipe D, connecting with the chimney or smoke-stack, the chamber, for convenience, being located adjacent

to the chimney. Through the lower side of the smoke-chamber enters the exhaust-steam pipe E, which projects somewhat into the chamber, but at one side of the center thereof, as more clearly illustrated in Fig. 2, and registers with the inwardly-projecting ends of a pipe F, connecting the top of the smoke-chamber with one side of the exhaust-head G, the opposing ends of the pipes E and F being slightly separated from but in a line with each other. Hence the exhaust-steam discharges from the pipe E directly into the pipe F, jumping the space by which the pipes are separated, and in its comparatively rapid passage through the chamber creates a strong suction toward the pipe F, which draws therein the smoke from the smoke-chamber, being aided in this action by the peculiar form of the chamber, producing a centripetal action on the smoke, which enters the chamber at one side and follows round the walls thereof, as illustrated in Fig. 2, and is directed to the escape-pipe F, into which it is drawn, as before described. The combined smoke and steam is discharged from the pipe F into the exhaust-head G, where it is thoroughly saturated by the steam before its escape from the exhaust-head, and all the soot contained in the smoke is caught by the condensation from the steam and drawn off, instead of being emitted from the chimney with the smoke, as would otherwise occur. To accomplish this result, the intermingled smoke and steam must be detained in the exhaust-head a sufficient length of time to insure the thorough condensation of the steam, to which end an exhaust-head of any desirable or well-known construction may be employed; but I prefer to employ such a one as is illustrated in the drawings, consisting of the main chamber *a*, supported upon the roof by legs *b* or in any other similar manner, the walls *c* of the lower portion of which converge and terminate in a discharge-spout *d*, which may be connected by suitable pipes with the drain-pipe or sewer. The upper end of the main chamber is closed, excepting a central opening, through which the cleansed smoke is discharged and from which extends downwardly a short internal pipe *e* of about the capacity of the pipe F, terminating within a funnel *f*, suspended in the chamber *a* and



serving to so protect the inner end of the discharge-pipe *e* that the steam and cleansed smoke will be detained in the main chamber sufficiently long to thoroughly saturate the smoke with the steam and drench out all of the soot from the smoke, which latter, in escaping from the exhaust-head with the comparatively small amount of steam, is compelled to traverse a tortuous passage. Within the main chamber *a* of the exhaust-head is also located a curved deflector *h*, extending substantially the full length of the chamber, parallel with the side walls thereof in a vertical plane, but in a horizontal plane is struck on a different arc of a circle, so that it begins, say, at about the point *I*, one-eighth of an inch from the side wall of the chamber, near the point of connection of the pipe *F*, while at the opposite side of the chamber—say at a point *J*—it meets with and is attached to the walls of the chamber, thus forming a converging passage between the deflector and the walls of the chamber, behind which the heavier portions of the soot and dirt will pass with a portion of the inrushing steam and follow along the tapering wall *c* to the bottom of the chamber, from whence they will be discharged instead of falling into the funnel *f*, as would be the case with the greater portion thereof were this deflector not employed. This deflector subserves the further purpose of breaking up the steam-jet as it enters from the pipes *F* and renders the passage of the steam through the exhaust-head still more tortuous, thereby promoting the condensation of the steam and the effectual cleansing of the soot from the smoke to the maximum degree.

The chimney should be provided just above the connection therewith of the pipe *D* with a damper *g*, capable of being operated in any suitable manner from the interior of the building whenever the apparatus before described is in operation to direct the smoke to the pipe *D* and prevent its escape from the chimney-top in the usual manner.

In practice it is not absolutely essential to the successful operation of my device that the smoke enter the smoke-chamber at one side thereof, or that the exhaust-steam pipes connected with the chamber at one side of the center for drawing off the smoke, or that the chamber have the exact form illustrated in the drawings, for various other forms and arrangements may be adopted without departing from the spirit of my invention; but I have found the form and arrangement shown in the drawings most desirable and efficacious in accomplishing the objects of my invention.

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

1. The combination, with the smoke-cham-

ber connected with a smoke-stack and the exhaust-steam pipe opening into said chamber, of an exhaust-head and a pipe connecting said exhaust-head with the smoke-chamber, said pipe registering with and constituting a continuation of the exhaust-pipe, substantially as described.

2. The combination, with the smoke-chamber connected at one side thereof with a smoke-stack and the exhaust-steam pipe opening into said chamber to one side of the center thereof, of an exhaust-head and a pipe connecting said exhaust-head and the smoke-chamber, said pipe registering with and constituting a continuation of the exhaust-steam pipe, substantially as described.

3. The combination, with the smoke-chamber connected with a smoke-stack and the exhaust-steam pipe opening into said chamber, of an exhaust-head comprising a main chamber provided with an external discharge-pipe at the lower end thereof, an internal discharge-pipe at the upper end thereof, and a funnel located between the inner end of said internal pipe and the discharge-pipe, and a pipe connecting said exhaust-head with the smoke-chamber, registering with and constituting a continuation of the exhaust-steam pipe, substantially as described.

4. The combination, with the smoke-chamber connected with a smoke-stack and an exhaust-steam pipe opening into said chamber, of an exhaust-head comprising a main chamber provided with an external discharge-pipe at the lower end, an internal discharge-pipe at the upper end, a funnel located between the inner end of said internal pipe and the external pipe, and a curved deflector partially surrounding said internal discharge-pipe and located above the funnel, and a pipe connecting said exhaust-head at one side thereof with the smoke-chamber, registering with and constituting a continuation of the exhaust-steam pipe, substantially as described.

5. The combination, with the smoke-chamber connected at one side thereof with a smoke-stack and the exhaust-steam pipe opening into said chamber to one side of the center, of an exhaust-head comprising the main chamber provided with an external discharge-pipe at the lower end, an internal discharge-pipe at the upper end, a funnel located between the inner end of said internal pipe and the external pipe, and a curved deflector partially surrounding said internal discharge-pipe and located above the funnel, and a pipe connecting said exhaust-head at one side thereof with the smoke-chamber, registering with and constituting a continuation of the exhaust-steam pipe, substantially as described.

MARSHALL F. EATON.

Witnesses:

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R. C. OMOHUNDRO.