

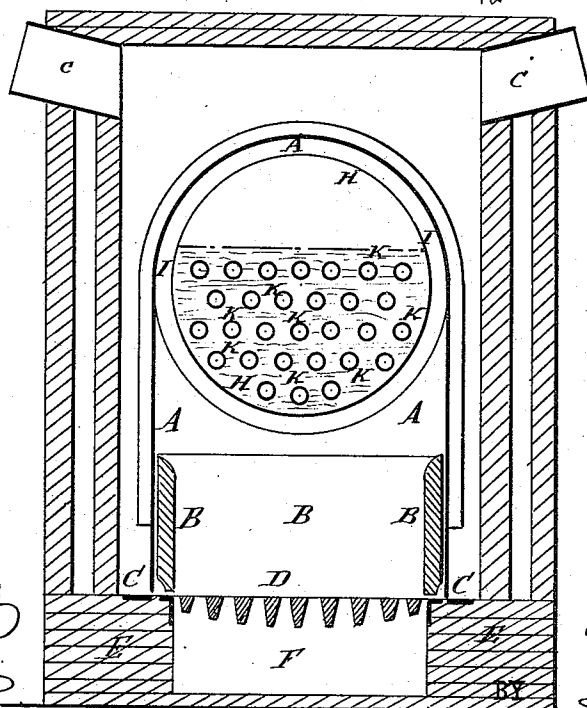
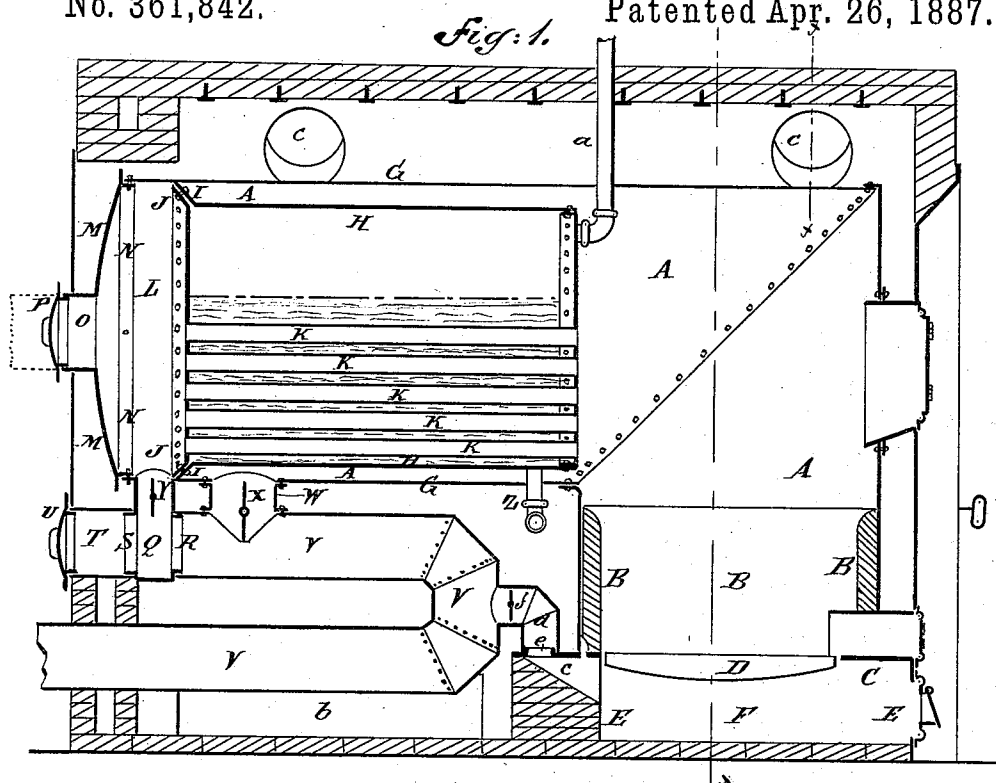
(No Model.)

F. SHRIVER.

COMBINED STEAM AND HOT AIR FURNACE.

No. 361,842.

Patented Apr. 26, 1887.



WITNESSES:

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FREDERICK SHRIVER, OF GRAND RAPIDS, MICHIGAN.

COMBINED STEAM AND HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 361,842, dated April 26, 1887.

Application filed May 18, 1886. Serial No. 302,539. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK SHRIVER, of Grand Rapids, in the county of Kent and State of Michigan, have invented a new and useful Improvement in Combined Steam and Hot-Air Furnaces, of which the following is a full, clear, and exact description.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in both the figures.

Figure 1 is a longitudinal vertical central section of my invention, and Fig. 2 is a transverse vertical section of the same.

The object of this invention is to provide combined steam and hot-air furnaces constructed in such a manner that a large amount of water-heating surface and air-heating surface will be exposed to the direct action of the products of combustion, and that all the parts of the furnaces can be readily cleaned and repaired.

The invention consists in the construction and combination of various parts of the steam and hot-air furnace, as will be hereinafter fully described.

A represents the combustion-chamber, the lower part of which is lined with fire-brick B to form a fire-chamber, or is provided with an ordinary cast-iron fire-chamber. The lower edge of the combustion-chamber A rests upon a bed-plate, C, from which the fire-grate D is suspended, and which rests upon a brick foundation, E, forming the walls of the ash-pit F.

The horizontal part of the combustion-chamber A is extended or has a jacket, G, formed upon or connected with it, within which is placed the horizontal steam generator or boiler H. The steam-generator H is made of a less diameter than the jacket G, so as to form an annular space for the products of combustion all around the said steam-generator.

The rear edge of the shell of the steam-generator H has an annular flange, I, formed upon or attached to it, which projects outward at an angle of about forty-five degrees, so that its outer edge will come in contact with the jacket G, and thus close the rear end of the annular space surrounding the said steam-

generator. The rear head of the steam-generator H has an annular flange, J, formed on its edge, and projecting outward and rearward to correspond with and fit against the flange I, to which it is secured by bolts or rivets.

In the heads of the steam-generator H are secured the ends of the tubes K, through which the products of combustion pass from the combustion-chamber A to the smoke-chamber L, and which are surrounded by water, so as to present a large amount of heating-surface to the water.

The rear end of the smoke-chamber L is closed by a head, M, made concave upon the inner side and convex upon the outer side, and provided with an annular flange, N, upon the outer part of its concave side, to fit into the rear end of the shell of the smoke-chamber L and receive the bolts or rivets by which the said head is secured to the said shell.

In the center of the head M is formed an opening surrounded by a collar, O, upon which is placed a cover, P, so that by removing the said cover the smoke-chamber L can be readily cleaned. When a direct draft is required, the cover P can be removed and a smoke-pipe placed upon the collar O, as indicated in dotted lines in Fig. 1.

With an opening in the bottom of the shell of the smoke-chamber L is connected the flanged upper end of the smoke-connection Q, in the inner and outer sides of the lower part of which are formed openings surrounded by collars R S. With the rear collar, S, is connected the end of a short pipe, T, the outer end of which is closed by a cover, U, so that by removing the said cover the smoke-connection and the upper arm of the smoke-pipe can be readily cleaned. With the inner collar R is connected the end of the upper arm of the U-shaped smoke-pipe V, the end of the lower arm of which is designed to be connected with a chimney or smoke-stack.

In the lower rear part of the jacket G and in the upper rear part of the upper arm of the smoke-pipe V are formed openings which are connected by a short pipe or smoke-connection, W, so that the products of combustion can pass directly from the annular space around the steam-generator H into the smoke-pipe V. The connecting-pipe W is provided

with a damper, X, so that the passage of the products of combustion through the pipe W can be allowed or prevented, as may be desired.

- 5 In the upper part of the smoke-connection Q is placed a damper, Y, so that the passage of the products of combustion through the said smoke-connection can be allowed or prevented, as may be desired. With this construction,
 10 by closing the damper X and opening the damper Y all the products of combustion will be made to pass through the tubes K on their way to the smoke-pipe V, and the greatest possible amount of steam will be generated.
 15 By closing the damper Y and opening the damper X the products of combustion will pass from the space around the steam-generator to the smoke-pipe V and will be prevented from passing through the tubes K, so
 20 that the greater part of the heat will be expended in heating the air.

- Z represents the feed-pipe through which water is introduced into the steam-generator, and which is connected with the lower part of
 25 the said steam-generator. With the upper part or steam-space of the generator H is connected the pipe *a*, through which the steam is led to the room or rooms to be warmed.

- The cold air to be heated enters through
 30 openings *b* in the lower parts of the side walls of the brick-work inclosing the furnace, passes around the smoke-pipe V, the jacket G, and the combustion-chamber A, and is led through the pipes *c* to the room or rooms to be warmed.

- 35 With the bend of the smoke-pipe V is connected the end of a small pipe, *d*, the other end of which is connected with a collar, *e*, surrounding an opening in the rear part of the base-plate C. The pipe *d* is provided with a
 40 damper, *f*, so that by opening the damper *f*, when the grate D is to be shaken, the fine ashes will be drawn through the said pipe *d* into the smoke-pipe V, and will thus be prevented from escaping into the room in which
 45 the furnace is set.

It will be understood that no claim in this case is made, broadly, to features shown and claimed in application bearing Serial Number 202,446—viz., to a U-shaped smoke pipe or

exit having pipe-connection with the ash-pit, 50 within which pipe-connection is arranged a damper.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is— 55

1. In a combined steam and hot-air furnace, the combination, with the combustion-chamber and jacket G, inclosing the steam-generator, forming a continuation of the combustion-chamber and having an opening in 60 its rear lower part, the U-shaped smoke-pipe V, having an opening in the rear upper side of its upper arm, and the smoke-connection Q and the smoke-pipe, of the short pipe W, the damper X, placed in the said pipe W, and 65 the damper Y, placed in the smoke-connection Q, substantially as herein shown and described, whereby the products of combustion can be sent to the smoke-pipe through the tubes of the steam-generator, or through the 70 annular space around the said steam-generator, accordingly as steam or hot air may be especially required, as set forth.

2. In a combined steam and hot-air furnace, the combination, with the jacket G, of tubular 75 steam-generator H, its shell and rear head formed with annular flanges I J upon their adjacent edges and in contact with the said jacket, the smoke-chamber Z, pipe-connections W Q, dampers X Y, and flue V, substan- 80 tially as herein shown and described, whereby the rear end of the annular space between the said jacket and steam-generator is closed, as set forth.

3. In a combined steam and hot-air furnace, 85 the combination, with the inclosing hot-air chamber, of the combustion-chamber A, having extension G, the steam-generator H, of less diameter than the extension G, provided with flues K, and having the annular flange I, 90 the U-shaped smoke-pipe V, the connections W, Q, and *d*, and the dampers X, Y, and *f*, substantially as shown and described, and for the purposes set forth.

FREDERICK SHRIVER.

Witnesses:

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 E. D. BROCK.