

No. 679,640.

Patented July 30, 1901.

C. SCHLEYDER.  
STEAM BOILER FURNACE.

(Application filed Feb. 10, 1900.)

(No Model.)

3 Sheets—Sheet 1.

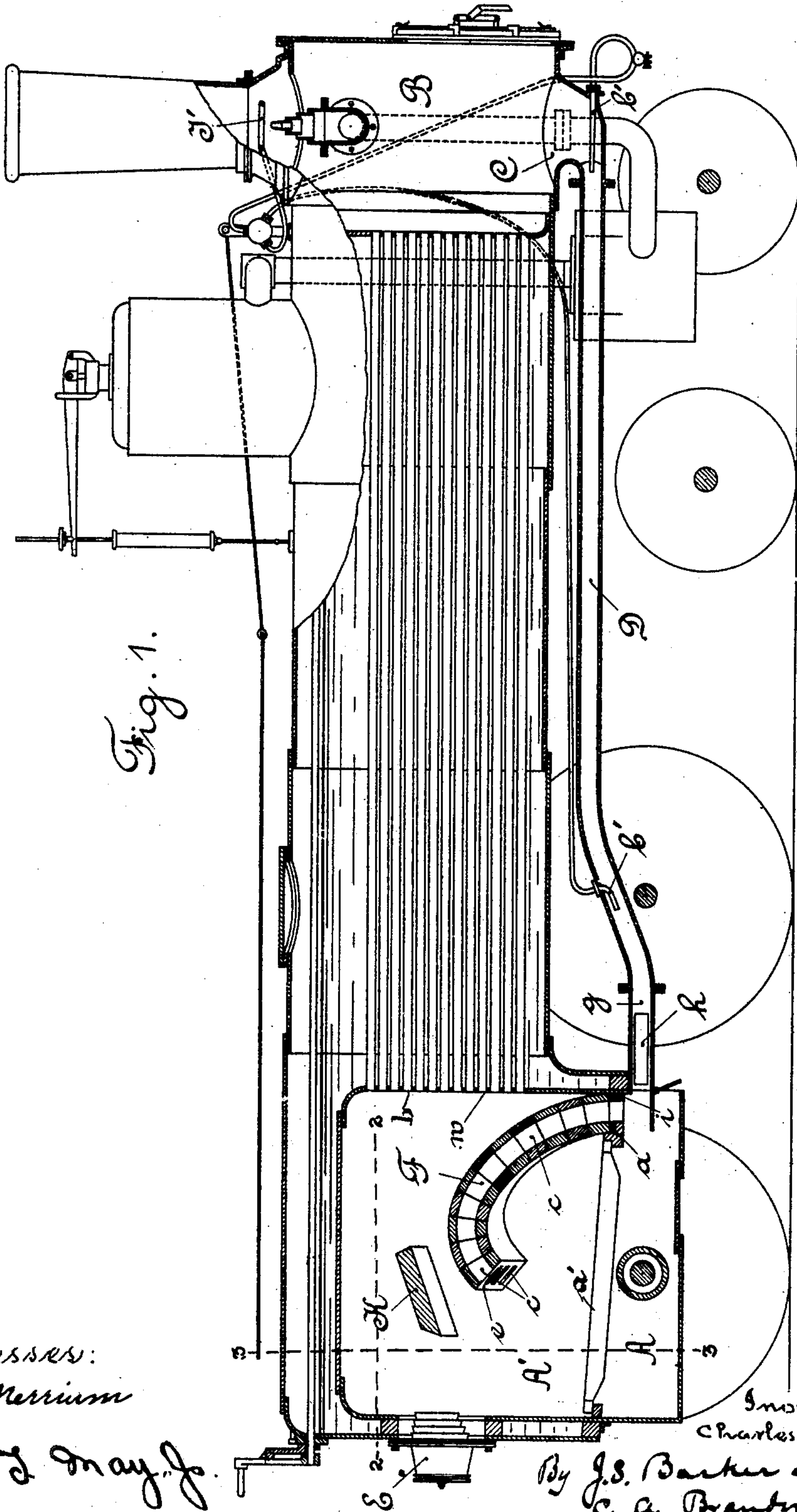


Fig. 1.

Witnesses:  
C. C. Merriam

Geo. J. May Jr.

Inventor:  
Charles Schleyder  
By J. S. Barker and  
C. A. Brandenburg  
Attorneys

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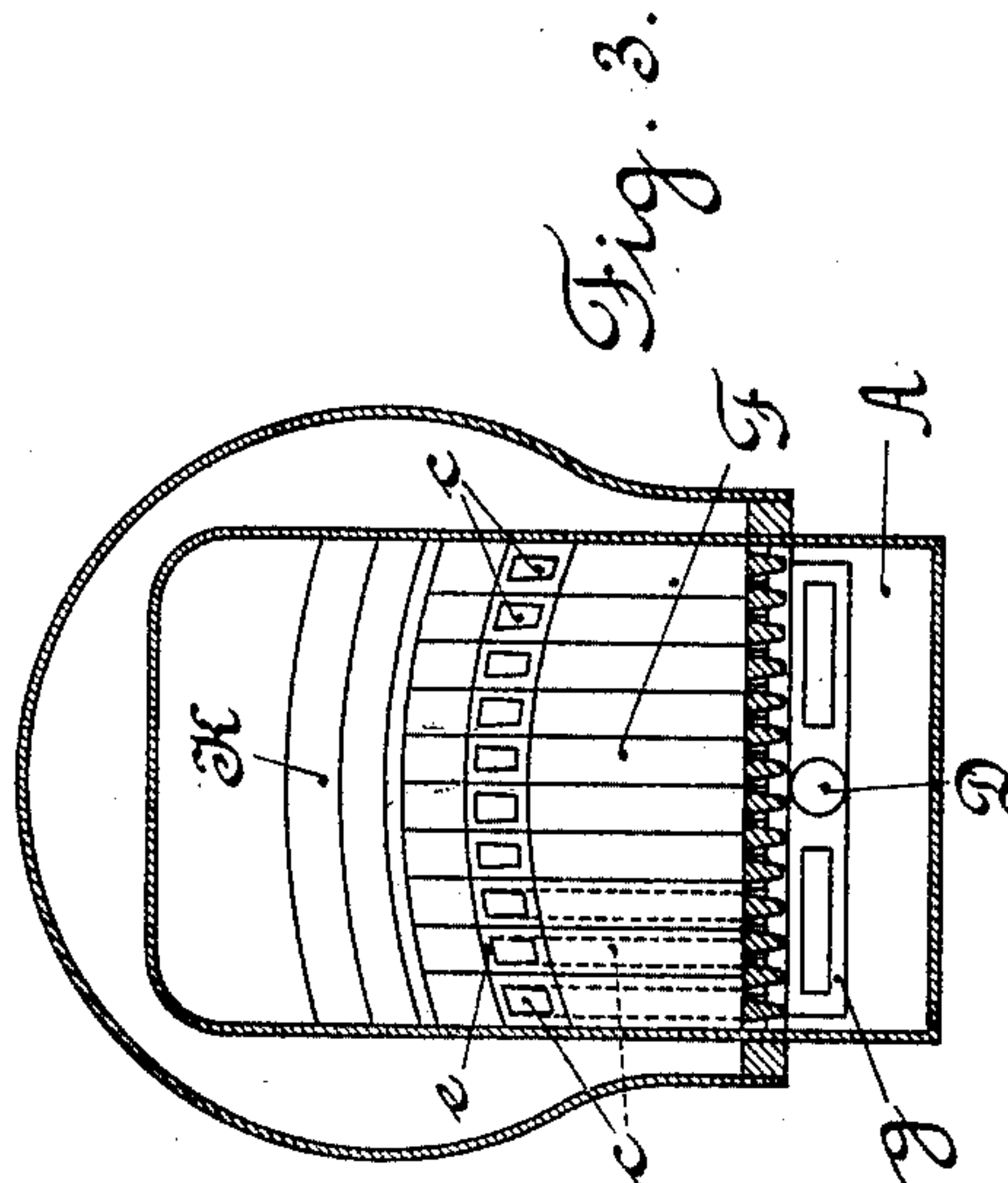
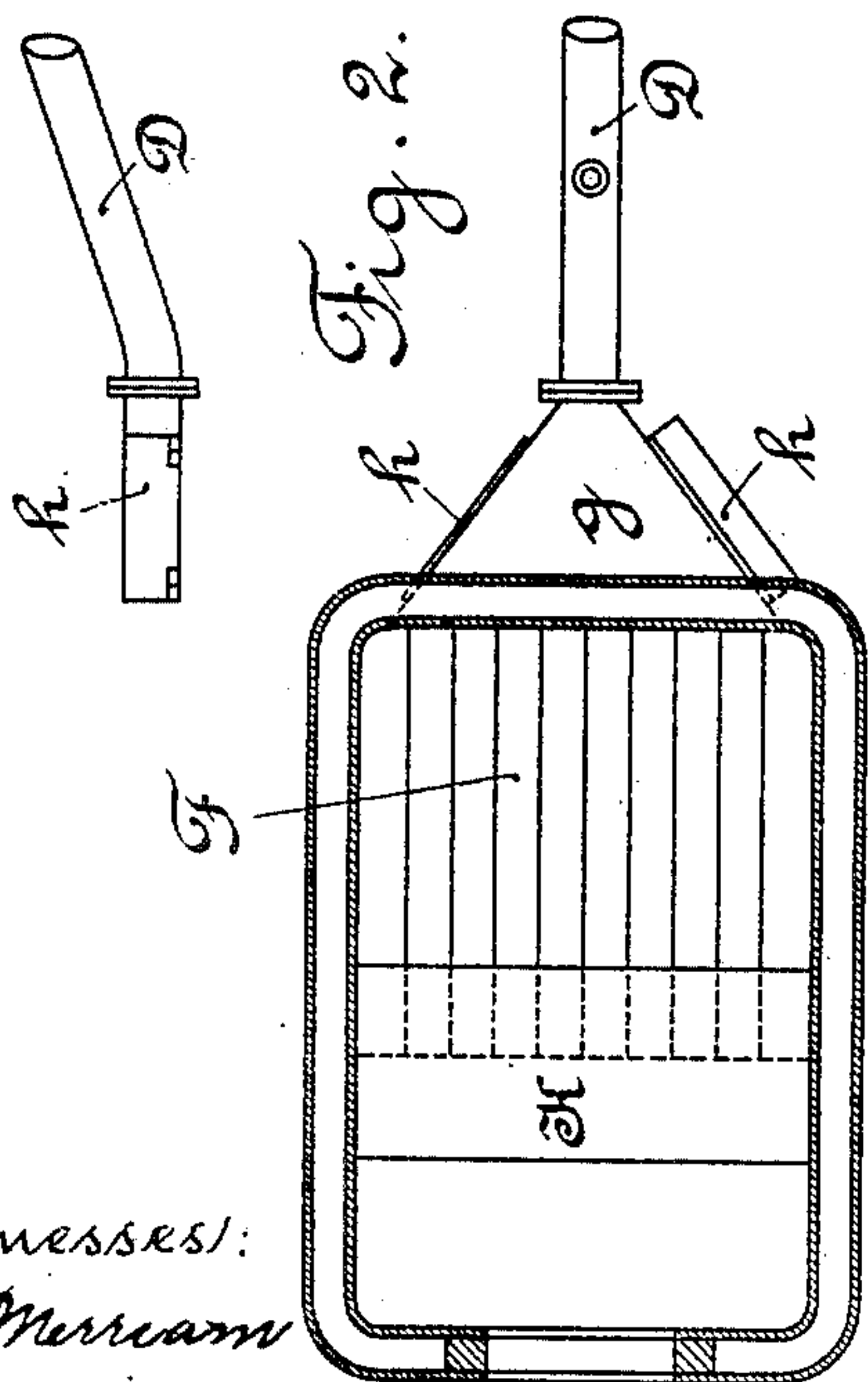
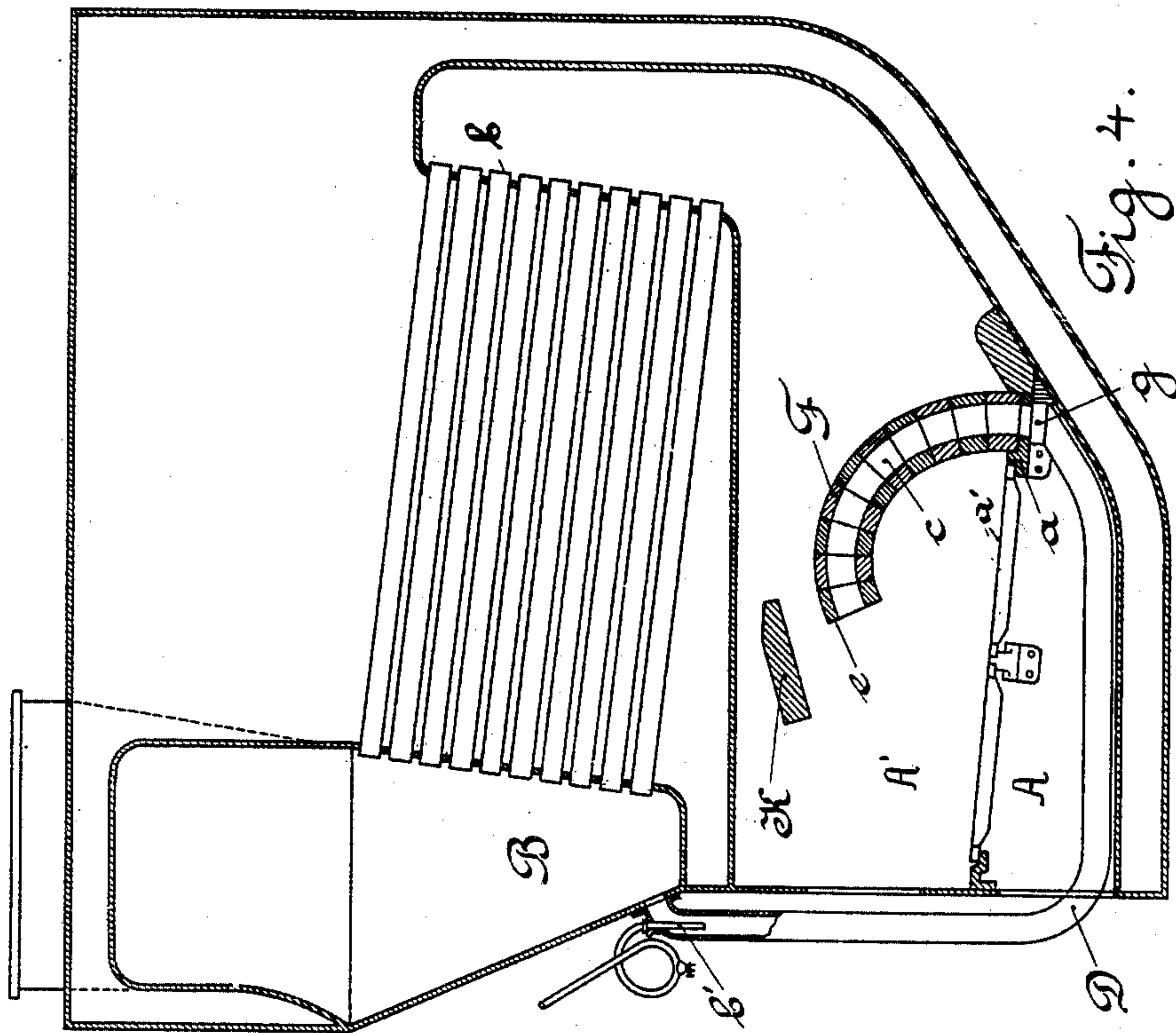
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Witnesses:  
B. C. Merriam  
Geo. J. May, Jr.

Inventor:  
Charles Schleyder  
By J. S. Barker and  
C. A. Brandenburg attn.

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3 Sheets—Sheet 3.

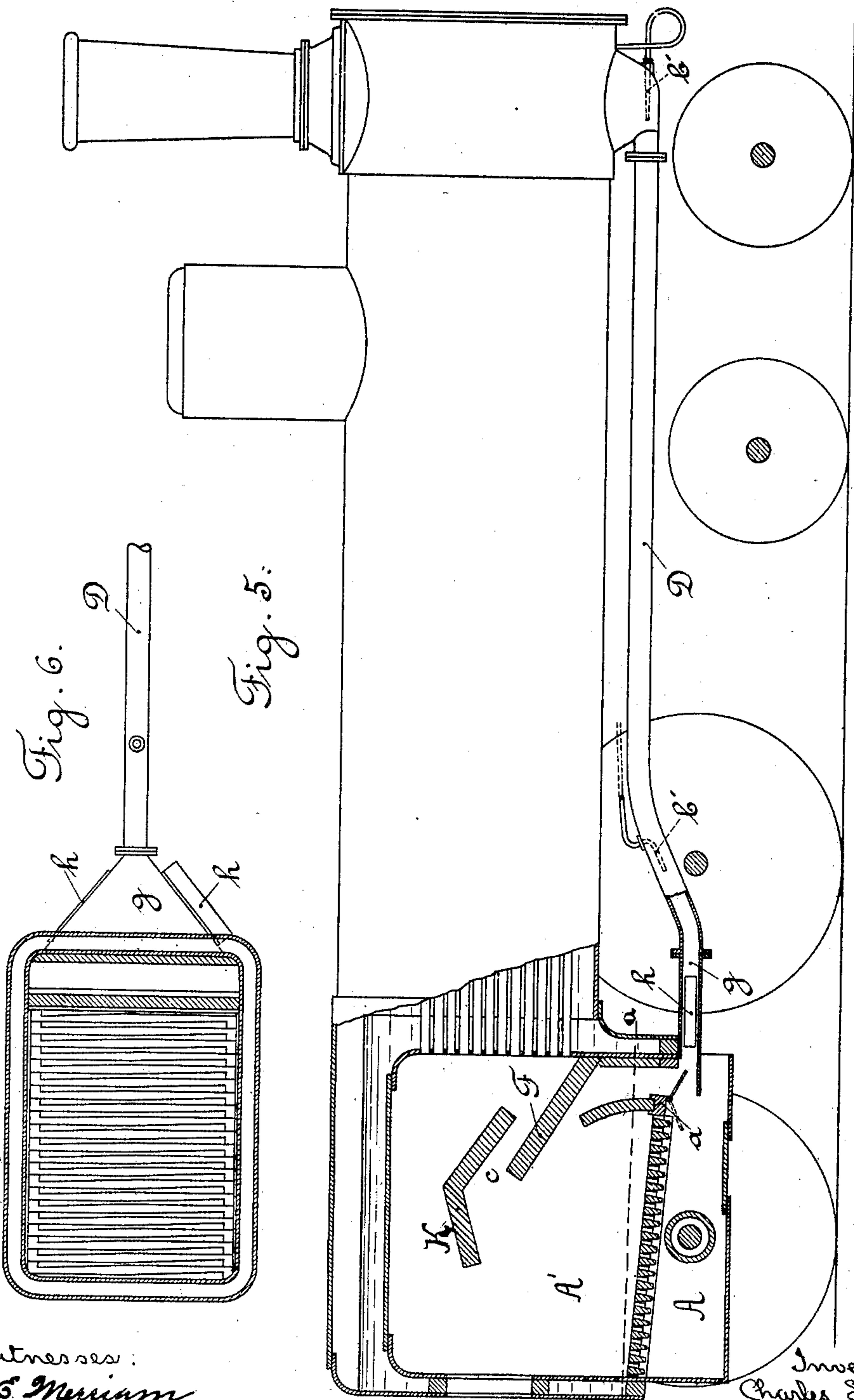


Fig. 6.

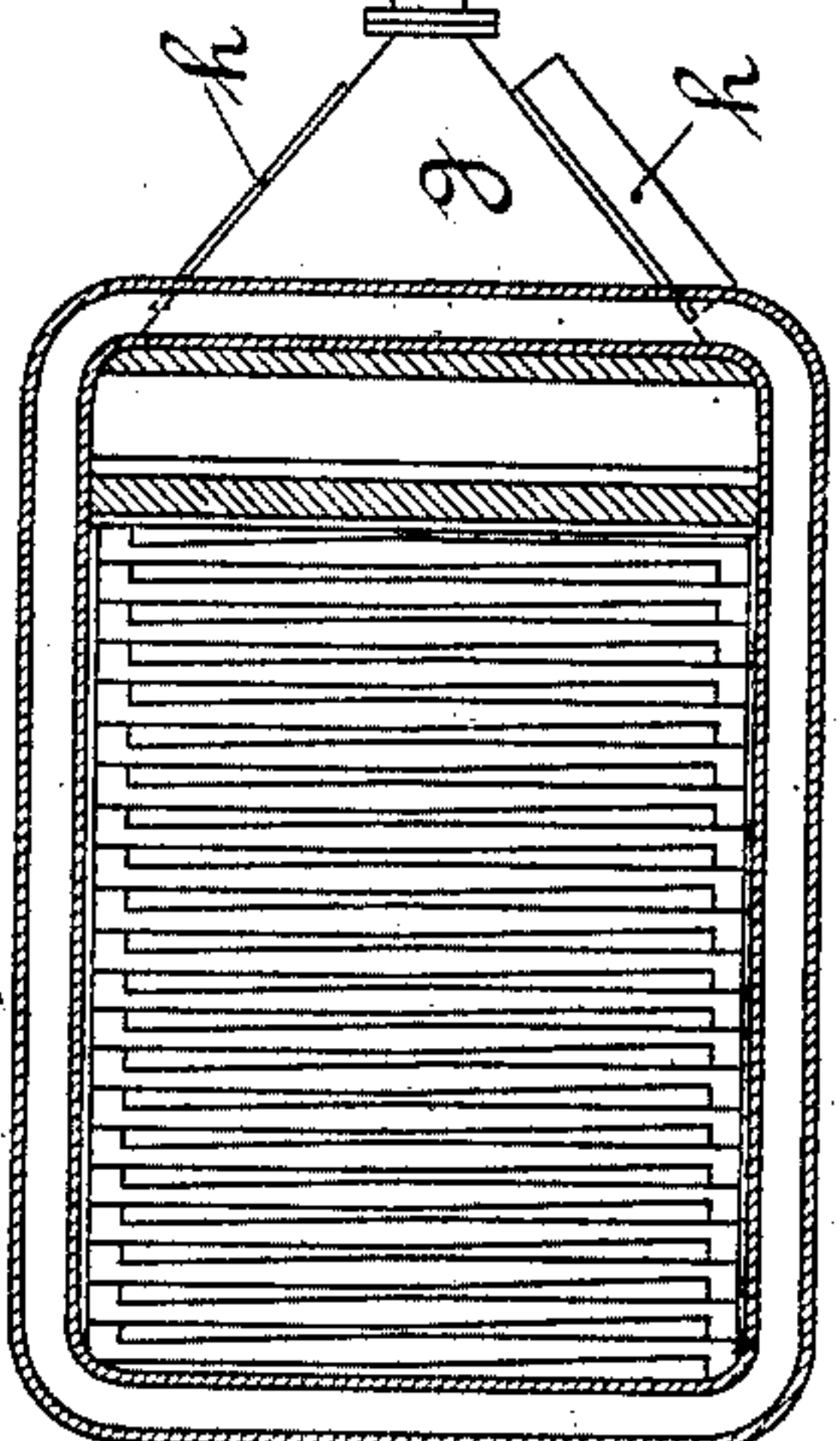


Fig. 5.

Witnesses:  
C. E. Merriam  
Geo. J. May, Jr.

Inventor,  
Charles Schleyder  
By J. S. Barker and  
C. A. Brandenburg  
Attys.



# UNITED STATES PATENT OFFICE.

CHARLES SCHLEYDER, OF ZDIC, AUSTRIA-HUNGARY.

## STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 679,640, dated July 30, 1901.

Application filed February 10, 1900. Serial No. 4,802. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES SCHLEYDER, a subject of the Emperor of Austria-Hungary, residing at Zdic, Bohemia, in the Empire of Austria-Hungary, have invented new and useful Improvements in or Relating to Steam-Boiler Furnaces, of which the following is a specification.

My invention relates to steam-generators, and has for its object to produce a steam-boiler furnace wherein a maximum amount of heat is obtained with a minimum expenditure of fuel and wherein means are provided to secure the consumption of smoke and prevent the escape of sparks.

In the accompanying drawings, Figure 1 is a longitudinal vertical section illustrating my invention as applied to a steam-locomotive. Fig. 2 is a horizontal section taken through the fire-box on the line 2 2 of Fig. 1. Fig. 3 is a vertical transverse section taken on the line 3 3 of Fig. 1. Fig. 4 is a longitudinal vertical section of my invention as applied to a boiler-furnace for use in marine engines. Fig. 5 is a longitudinal vertical section of the modified form of my invention applied to a locomotive; and Fig. 6 is a detail view showing a cross-section of the fire-box, taken on the line *a a* of Fig. 5.

In the drawings, A represents the ash-pit, A' the fire-box, *a'* the grate, B the smoke-box, and *b* the fire-tubes, of the boiler-furnace of any preferred type of construction.

In the fire-box A' is arranged a transverse bridge-wall F, resting upon and supported by the forward grate-support *a* and the support *i*, fixed to the forward wall of the fire-box. The bridge-wall F is composed of fire-brick and is preferably shaped in cross-section as shown in Fig. 1 of the drawings, its general outline being parabolic, and extending from the forward portion of the grate *a'* upward and rearward to a point approximately midway between the grate and the top of the fire-chamber and midway between the forward and rear walls thereof and thence rearward and downward a short distance, so that its rear face is inclined toward the grate. This wall is constructed of hollow brick *e*, laid in such a manner as to form longitudinal parallel passages or conduits *c*, for a purpose to be hereinafter described. At a point above

and in rear of the rear face of the bridge-wall is preferably arranged a transverse baffle-plate K, also of fire-brick, but without perforations or passages.

The bottom of the smoke-box B is provided with a funnel-shaped aperture C, communicating, by means of a pipe or conduit D, with the lower portion of the ash-pit A at a point directly below the base of the bridge-wall F. The exit end of the conduit D is preferably widened to form a funnel *g*, Figs. 2 and 6, the large end of the funnel extending across the entire width of the ash-pit. The side walls of the funnel *g* are provided with openings or apertures adapted to be closed by slides or valves *h* to regulate the admission of air into said funnel.

Within the tube or conduit D may be arranged a suitable number of steam blast-pipes *b'*, adapted to project jets of steam into said conduit to assist in maintaining a circulation therethrough.

The air necessary to support combustion within the fire-box is admitted thereto through doors E in the rear of the fire-box, said doors being preferably located at a point above the vertical center of the fire-box and being so constructed and arranged as to heat the air during its passage therethrough and to direct the same downward toward the grate, so that the air will be mixed with the rising gases and products of combustion at about the middle of the fire-chamber.

The operation of the smoke-consumer heretofore described is as follows: The gases and products of combustion passing from the fire-chamber through the flues *b* arrive in the smoke-box B and are directed downward by means of steam-jets issuing from the circular steam-pipe T', arranged below the smoke-funnel, through the funnel-shaped aperture C in the bottom of the smoke-box. Thence the products of combustion pass through the tube D into the funnel *g*, the circulation being maintained in said conduit D by means of steam-jets *b'*. Arriving in said funnel *g* the products of combustion are mixed with air introduced through the valves *h* and are allowed to enter the ash-pit A near the forward lower end thereof. The exit-opening of the funnel *g* being arranged directly below the bridge-wall F, a portion of



the products discharged by said funnel will find their way through the conduits *c* of said bridge-wall, the remaining portion of the mixture of air, gases, &c., passing upward through the grate *a'*. The bridge-wall *F* being constantly subjected to the heat of the furnace becomes incandescent, and the products passing therethrough and coming in contact therewith are partially or wholly consumed therein, any surplus products not so destroyed being heated and caused to expand, so that they will issue from said conduits *c* with a great velocity and will be forced downward against the rising fire-gases, so as to be completely consumed thereby. This complete combustion is greatly assisted by the introduction of heated air into the fire-chamber through the doors *E*, the air admitted therethrough being directed downward into the center of the fire-chamber, as before described. In this manner the air is perfectly mixed with the fire-gases and the complete combustion of the same effected. One of the advantages of this arrangement is that the passages and conduits are kept clear from any accumulation of ashes or other deposits, the circulation through such parts being so rapid and perfect that the flying ashes cannot find lodgment. In this manner also the smoke-box *B* is kept clear and the escape of sparks from the smoke-stack prevented.

It is evident that the apparatus above described might be modified in many ways without departing from the scope or spirit of my invention, and in the drawings I have illustrated a few of such possible modifications. For example, some or all of the steam-injector jets might be done away with, as found expedient, the relative arrangements of the parts might be changed, (see Fig. 4, for example,) the particular shape of the bridge-wall might be modified as found desirable, and the single passage therethrough provided—as shown, for example, in Fig. 5—and the shape of the fire-baffle *K* altered to suit the requirements of the particular form of boiler employed. Other similar modifications and changes in detail will readily suggest themselves to those skilled in the art to which this invention relates.

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

1. In a steam-boiler furnace, the combination with the fire-chamber, ash-pit, and smoke-box, of a bridge-wall located in said fire-box having a longitudinal conduit therethrough and a return-flue connecting the smoke-box with the ash-pit, and discharging into said

ash-pit at a point directly below the base of the bridge-wall, substantially as set forth.

2. In a furnace, the combination with the fire-chamber, and smoke-box, of a return-flue arranged to conduct the products of combustion from said smoke-box, a hollow bridge-wall, located in the fire-chamber, communicating with said return-flue and receiving the products of combustion therefrom, and air-feeding devices opposed to said bridge-wall, said hollow wall and the air-feeding devices discharging toward each other to mix the returned products of combustion with the air above the grate, substantially as set forth.

3. In a steam-boiler furnace, the combination with the fire-chamber, ash-pit and smoke-box, of a return-flue extending from said smoke-box, a hollow, arched bridge-wall, located in the fire-box, communicating with said return-flue, and discharging the products of combustion supplied thereto in a downward direction at a point above the grate, and air-feeding devices located in rear of said bridge-wall, and arranged to discharge air downward into the path of the products of combustion discharged by said bridge-wall conduit, whereby said products of combustion are mixed with air at a point directly above the grate, substantially as set forth.

4. In a smoke-consumer for boiler-furnaces, the combination with the ash-pit, fire-chamber and smoke-box, of a return-flue connecting the smoke-box with the ash-pit, a hollow bridge-wall located in the fire-chamber taking from a point directly above the exit-opening of the return-flue, and discharging into the fire-chamber, a baffle-plate located above and in rear of said point of discharge, and air-feeding devices in rear of said baffle-plate arranged to discharge air downward into the fire-chamber below said baffle-plate, substantially as set forth.

5. In a smoke-consumer for steam-boiler furnaces, the combination with the fire-chamber, the ash-pit and the smoke-box, of flues connecting the fire-box and smoke-box, a return-flue connecting the smoke-box and ash-pit, a steam-injector arranged near the top of the smoke-box and discharging downward, and injectors arranged in the return-flue, whereby a rapid and continuous circulation is maintained through said parts, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES SCHLEYDER.

Witnesses:

ADOLPH FISCHER,  
VOSLOSLAV H. EUBY.