

(No Model.)

A. B. COSBY.
STEAM BOILER FURNACE.

No. 502,616.

Patented Aug. 1, 1893.

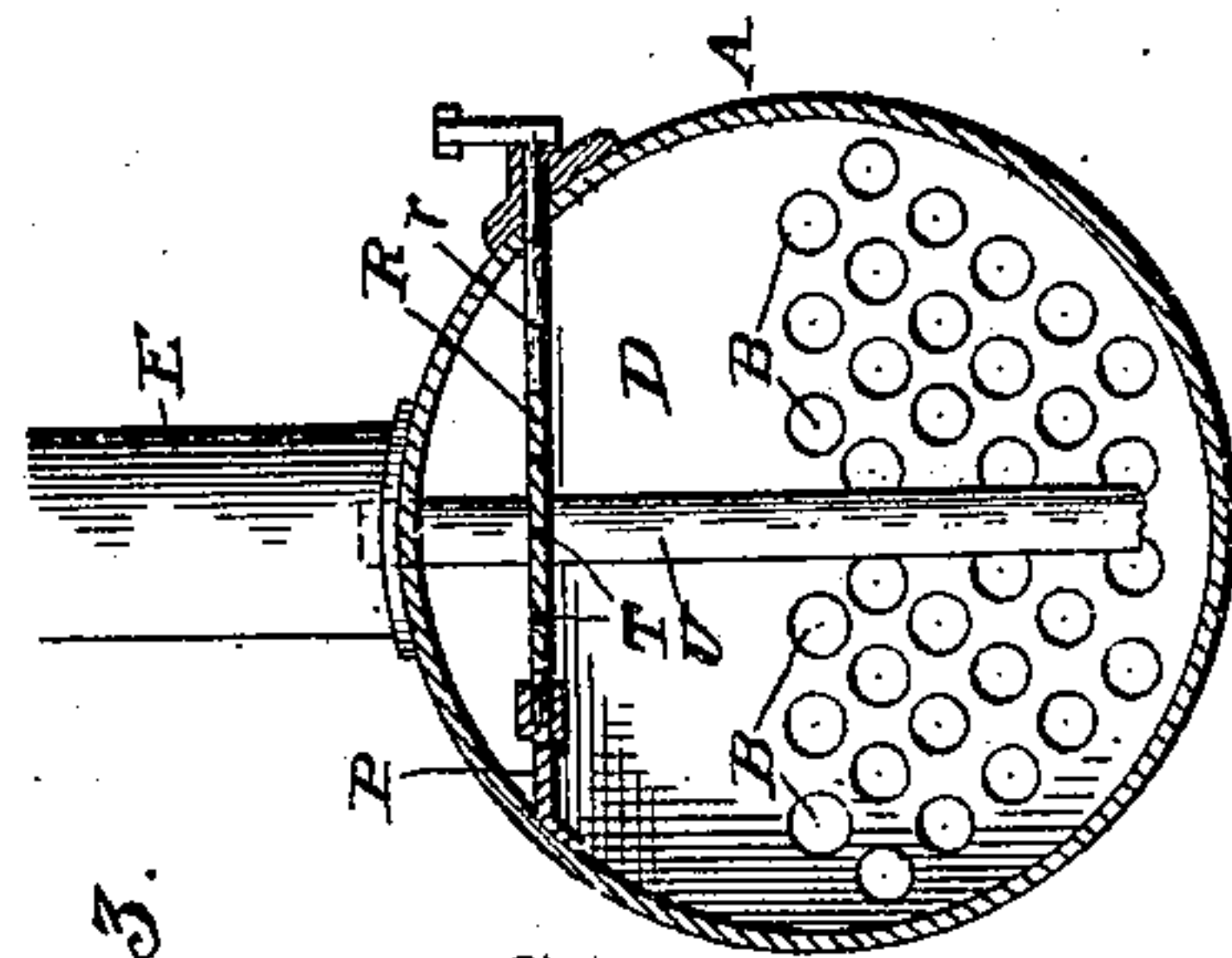
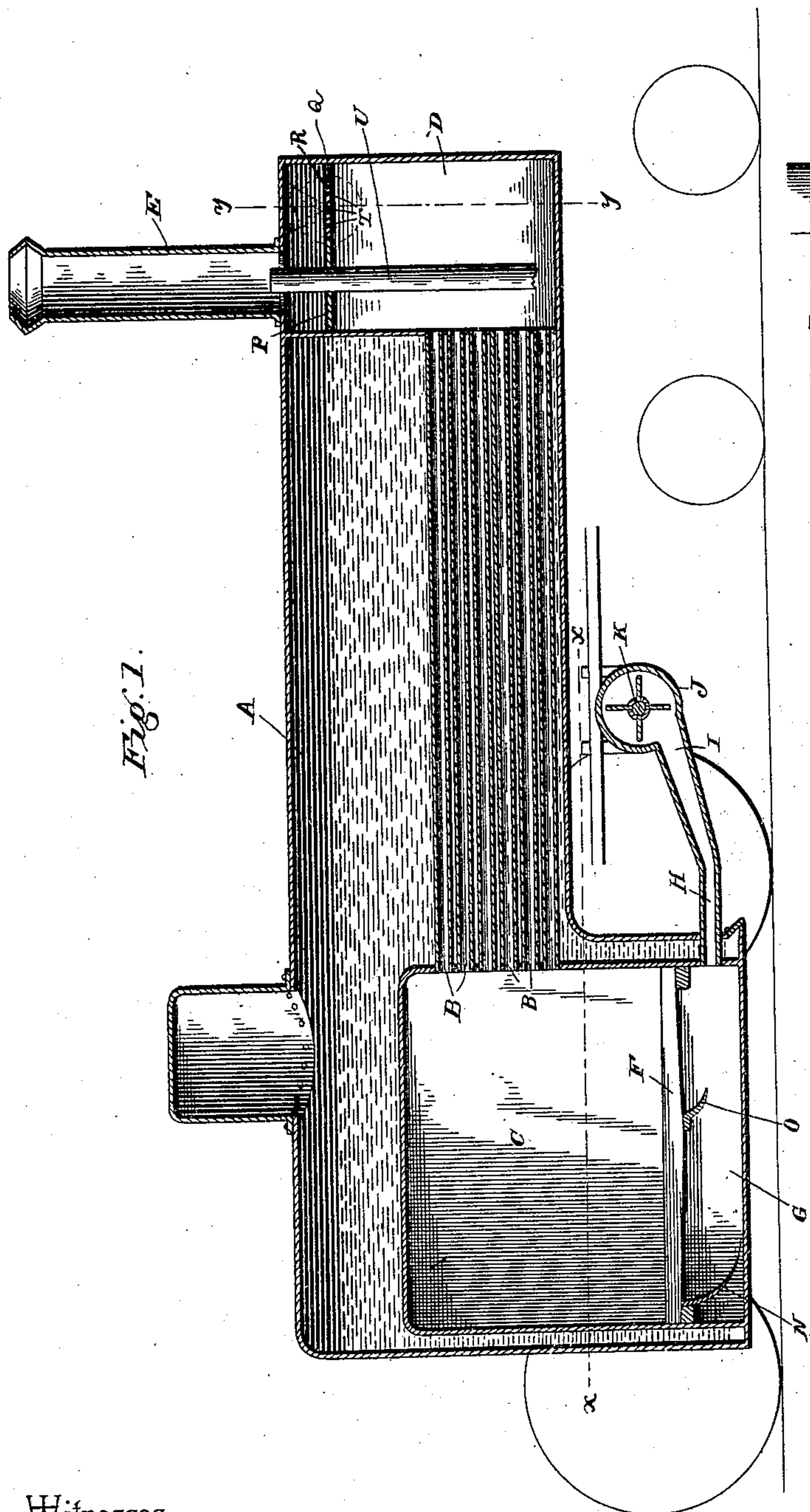


Fig. 3.

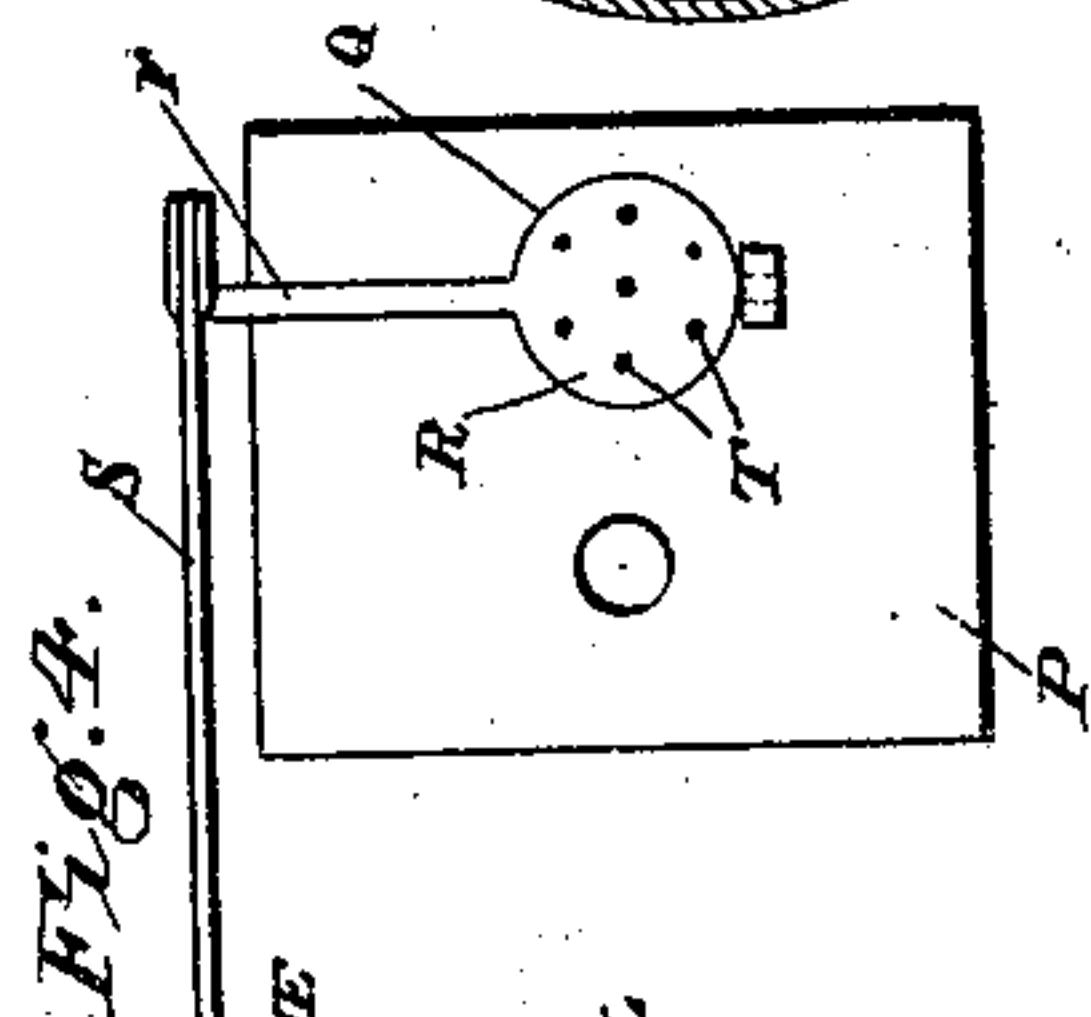
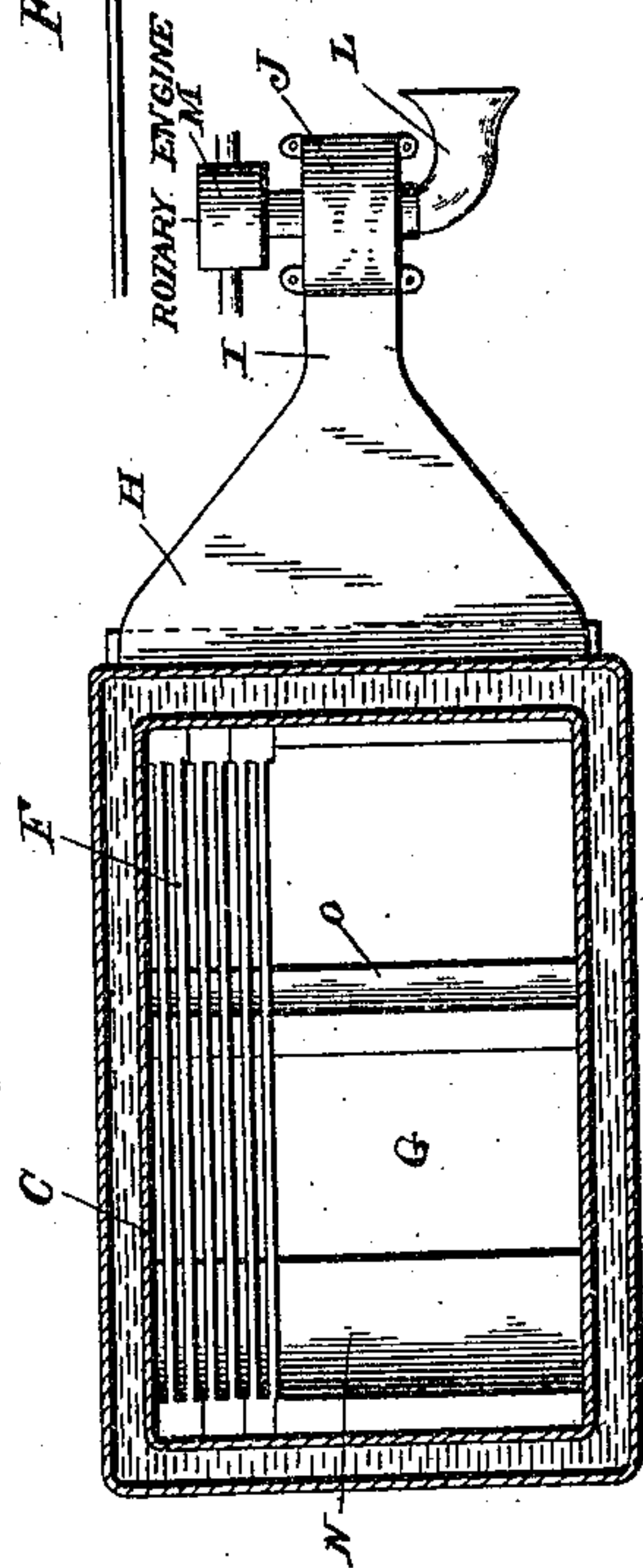


Fig. 4.

Fig. 2.



Witnesses

J. M. Johnson
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Inventor

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By his Attorneys,

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UNITED STATES PATENT OFFICE.

ANDERSON B. COSBY, OF RICHMOND, VIRGINIA, ASSIGNOR OF TWO-THIRDS
TO MARK M. STRAUSE AND SAMUEL PROSKAUER, OF SAME PLACE.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 502,616, dated August 1, 1893.

Application filed December 7, 1892. Serial No. 454,356. (No model.)

To all whom it may concern:

Be it known that I, ANDERSON B. COSBY, of the city of Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention relates, more particularly, to means for promoting and obtaining a practically perfect combustion of fuel in a steam boiler furnace, and increasing the steaming capacity of the boiler by preventing loss of heat consequent upon the too free escape of heated gases, thus producing economy in the use of fuel, as hereinafter more particularly described.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a locomotive boiler having my improvements applied thereto. Fig. 2 is a horizontal section on the line $x-x$ of Fig. 1. Fig. 3 is a vertical transverse section on the line $y-y$ of Fig. 1. Fig. 4 is a plan of a detail of the invention.

Similar letters of reference indicate similar parts in the respective figures.

Arepresentsa locomotive boiler of any usual or approved construction, having ordinary fire flues B leading from the fire-box C into the smoke-box D, from which extends the stack E. F is the grate, below which is the ash-pit G. The smoke-box and ash-pit, in the normal condition of things, or while the invention is in operation, are tight, except as hereinafter explained.

Leading into the ash-pit G is the flared air-trunk H, which is of a width equal to that of the ash-pit, so that air forced under pressure through said air-trunk shall be evenly distributed throughout the entire area of the ash-pit and under that of the grate, so as to give an equal distribution of the air under pressure to supply the fire with the required draft, or the volume of air necessary to support combustion.

The flared air-trunk H diverges from the enlarged discharge I of the casing J, in which is mounted the fan K. The enlarged discharge I of the casing J has an area equal to that of the mouth of the air-trunk H, so that

the volume of air from the fan shall neither be reduced nor concentrated but spread out in said trunk so as to be evenly distributed under the fire resting upon the grate.

The side inlet opening of the casing J has connected thereto the flared or bell-shaped supply-pipe L, into which air is received in the forward movement of the boiler. At the opposite side of the casing J, and mounted on the end of the shaft K is a rotary engine M, receiving its steam from the boiler A, the engine serving to drive the fan K. For the rotary engine M a belt, or other suitable driving device, may be substituted.

In order to evenly direct the volume of air up through the fire on the grate F at all portions of its area, I employ the transverse curved plates N and O, respectively. The plate N is deeper than the plate O, extending from the bottom of the grate at the end farthest from the air-trunk H to the bottom of the ash-pit G, and is curved toward said trunk so that the air which passes to such portion of the ash-pit shall be deflected up through the grate. The tendency of the air to pass wholly to the end of the ash-pit farthest from the point of entrance before ascending to the grate, is overcome by the shallow transverse plate O, arranged intermediately of the transverse plate N and the mouth of the air-trunk H, and which projects from the bottom of the grate F toward said air-trunk, so that a portion of the volume of air which would otherwise skirt the bottom of the grate is caught by the transverse plate O, and directed up through that portion of the fire lying centrally upon the grate, thus, with the deeper transverse plate N, providing for an equal distribution of the air to the fire.

The smoke and other products of combustion pass from the fire-box C to the smoke-box D, but are interrupted in their passage up through the latter by means of a transverse diaphragm P. The said diaphragm extends entirely across the smoke-box above the line of the upper row of flues. The diaphragm P is provided with a draft-opening Q, in which is placed the pivoted damper R suitably journaled on the diaphragm so as to work in said opening. The journal or pivot is extended at one end, and provided with an arm r , to

which is connected a rod S under the control of the engineer for opening or closing the damper R. The damper is furnished with perforations T, so that when it is turned to close the draft opening Q, a small area is still left for the escape of the nitrogen or other incombustible gases.

In firing up, it is necessary to entirely open the damper R, so that the usual draft may be temporarily provided; and when the fire is first started, the fan K is not called into requisition, the draft or supply of air necessary to support combustion being obtained in the ordinary manner through the medium of the stack. After the fire has attained the necessary headway, the fan K is put in action and the damper R closed; and by reason of the air projected into the ash-pit, and equally distributed under and through the fire, the requisite amount of oxygen to support combustion is provided.

The diaphragm P, which practically closes the smoke-box, except as to the perforations T, will temporarily arrest the nitrogen and other heated incombustible gases, so that their heat shall not be lost, but assist, as far as practicable, in the generation of steam; the combustible gases by reason of their temporary arrestation, being consumed in the fire-box or flues, thus materially aiding in the generation of steam.

An exhaust pipe U is adapted to be used when the apparatus is applied to a locomotive boiler, said pipe being adapted to convey the exhaust into the smoke stack.

Although I have described the invention as applied to a locomotive boiler, it may be used in connection with boilers of other types. Changes in the form, proportions, and minor details of construction, may be made without departing from the nature of the invention.

I herein disclaim the invention described and claimed in my application, Serial No. 472,777, filed May 2, 1893; but

Having described my invention, I claim—
1. The combination in a flue boiler having

a fire-box, a tight smoke-box and a tight ash-pit, of a fan, a flared air-trunk connected with said fan and leading to the ash-pit under the grate and of a width substantially equal thereto, a diaphragm arranged within the smoke-box between the smoke escape and the upper line of flues and having a draft opening, and a perforated damper arranged to work in said opening, substantially as described.

2. The combination in a flue boiler having a tight smoke-box and a tight ash-pit, of a fan, a flared air-trunk diverging from the fan and leading into the ash-pit below the grate, said air-trunk being substantially equal to the width of the fire-box, transverse air dividing and deflecting plates arranged under the grate and of a width equal thereto, and a perforated diaphragm placed in the smoke-box between the top line of flues and the smoke escape, substantially as described.

3. The combination in a flue boiler having a tight smoke-box and a tight ash-pit, of a fan having an enlarged discharge, a flared air-trunk diverging from the fan discharge and leading to the ash-pit below the grate, said air-trunk being substantially equal to the width of said ash-pit, a transverse curved plate constituting an air deflector arranged under the grate at one end and curved therefrom to the bottom of the ash-pit, a curved transverse plate, of less depth depending from the grate between the first named transverse plate and the air-trunk, a diaphragm arranged within the smoke-box between the top line of flues and the smoke escape and having an opening therein, and a perforated damper arranged to work within said opening, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ANDERSON B. COSBY.

Witnesses:

JOHN H. SIGGERS,
N. G. SCHAAFF.