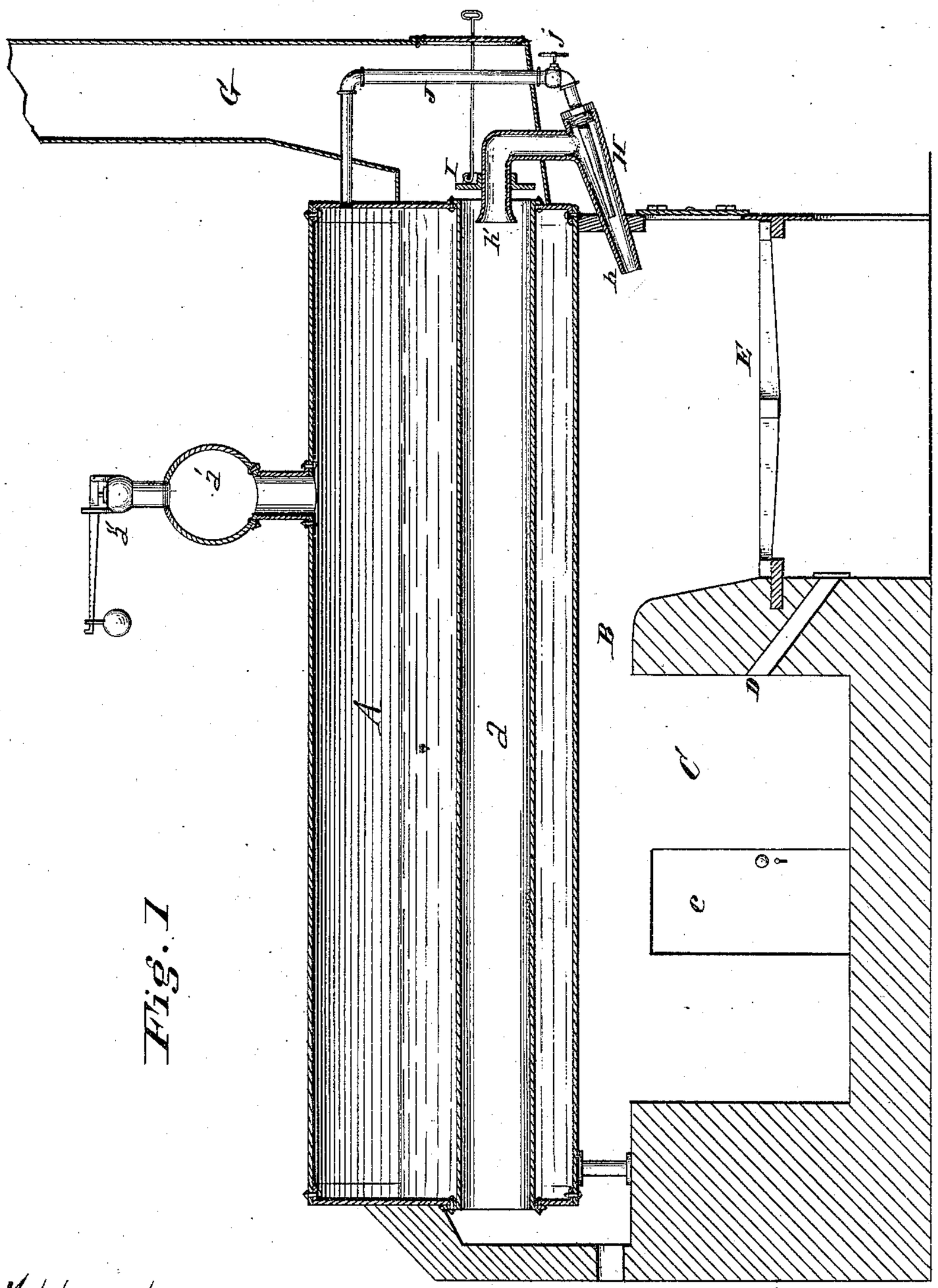
D. P. BEARD.

Steam-Boiler Furnace.

No. 163,137. Patented May 11, 1875.



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UNITED STATES PATENT OFFICE.

DAVID P. BEARD, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF HIS RIGHT TO PATRICK G. ROONEY.

IMPROVEMENT IN STEAM-BOILER FURNACES.

Specification forming part of Letters Patent No. **163,137**, dated May 11, 1875; application filed December 12, 1874.

To all whom it may concern:

Be it known that I, DAVID P. BEARD, of St. Louis, St. Louis county, Missouri, have invented an Improvement in Steam-Boiler Furnaces, of which the following is a specification:

My invention is designed as an improvement upon the steam-boiler furnace for which Letters Patent of the United States No. 53,367 were issued to Joseph H. Webster March 20, 1866; and my invention consists, first, in a certain peculiar relative arrangement of the boiler-flue, smoke-stack, and tube, which returns the gases, &c., to the fire-box, by which the current from the boiler-flue is naturally directed to the return-tube before it is turned in the direction of the chimney, and the use of steam, heretofore largely employed to direct said current, thereby dispensed with in a great measure for this use, and used only to regulate the velocity of the return current, and unite with the current in the return-tube to facilitate the combustion of gases in the flue-chamber. My invention further consists of an adjustable device in connection with the return-tube, by which the discharge of gases to the chimney and the return-flue to the fire-box, relatively, may be varied to achieve the maximum of efficiency in smoke prevention.

The accompanying drawing shows a sectional elevation of the boiler with my improvement attached.

A is the boiler, having the ordinary flue or flues *a*, steam-dome *a'*, and safety-valve *a''*. The boiler rests, as usual, in masonry, so formed that the heat-conducting space B leading from the grate-bars to the farthest end of the boiler expands into a combustion-chamber, C, having doors *c* to provide for cleaning. It also has, preferably, an induction-vent, D, for cold air from the space under the fire-grate E. F is the breeching of the smoke-stack G.

The boiler, formed and set as described, or in any other preferred way, is furnished with my improvement, as follows: H is the return smoke-tube, the part *h* of which projects preferably anglewise into the fire-box, while the bell-shaped mouth *h'* rests inside or adjacent to the end of flue *a*. By this arrangement of tubes the current of gases, naturally directed by the draft of the stack G from the grate-bars E through combustion-chamber C, passage B, and flue or flues *a* to the mouth or bell-shaped opening *h'*, is separated into two currents, the one passing out into the chimney, and the other, collected by the flaring mouth *h'* of said pipe, passes through the part *h* into the fire-chamber E. It is therefore obvious that a great part of the heated gases and floating particles of combustion directed to the chimney is, while moving in that direction, openly and directly received by the bell-mouth of pipe H, which directs it to the fire-chamber to support combustion and materially aid in the prevention of smoke and saving in fuel. By reason of the location of the tube H with its mouth directly in line for the reception of gases, the great quantity of steam used in the Webster device to so deflect the currents as to enable a part to enter the return smoke-flue is saved. The steam introduced in my device is used in very limited quantities, and only for the purpose of increasing the force of the return current and aiding in the prevention of smoke. The currents, divided as above described at the mouth of pipe H, can be of unequal bulk, depending proportionately upon the relative positions of the end of flue *a*, and a sliding or adjustable annular damper, I, fitting around tube H. By the adjustment of this damper the right distribution of said unequal currents to achieve the maximum of efficiency in smoke consumption may be attained. Pipe J introduces the jet of steam from the boiler A, which is regulated by cock *j*. The pipe J, at its discharging end, is inclosed within the tube H, so that its escaping force will, by the injector principle, serve in the highest degree to keep up the current through pipe H with but little use of steam.

I claim—

1. In a boiler of the character stated, the return-flue H, arranged with its mouth *h'* facing the flue or flues *a* of the boiler, substantially as and for the purpose specified.

2. In combination with the return-flue H *h* and boiler-flue or flues *a*, the adjustable plate I, operating substantially as and for the purpose specified.

In testimony of which invention I hereunto set my hand.

DAVID P. BEARD.

Witnesses:

EDGAR J. GROSS,

J. L. WARTMANN.