

No. 623,993.

Patented May 2, 1899.

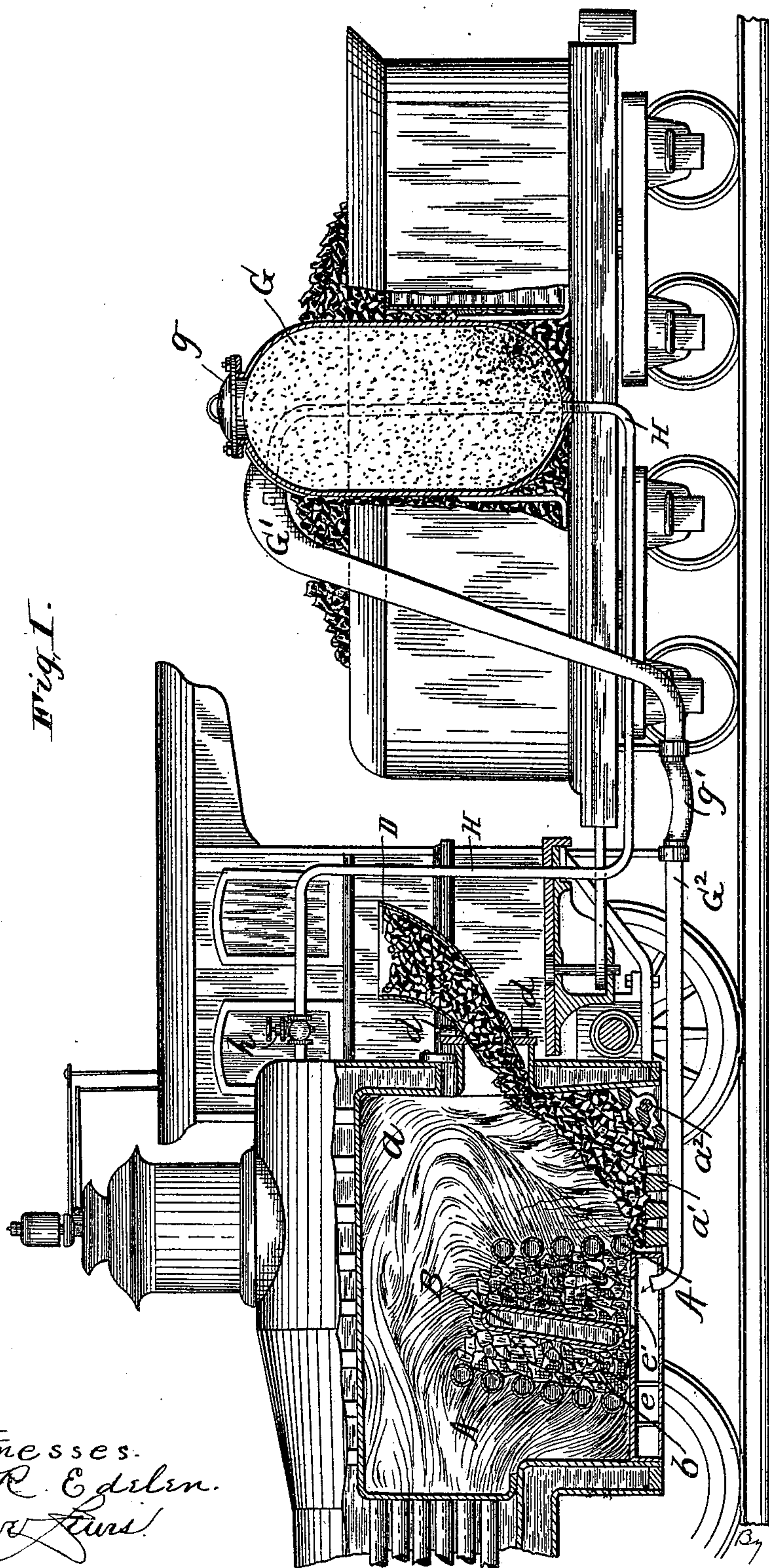
D. B. DEVORE.

FEEDER FOR STEAM BOILER FURNACES.

(Application filed Oct. 16, 1897. Renewed Sept. 7, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.
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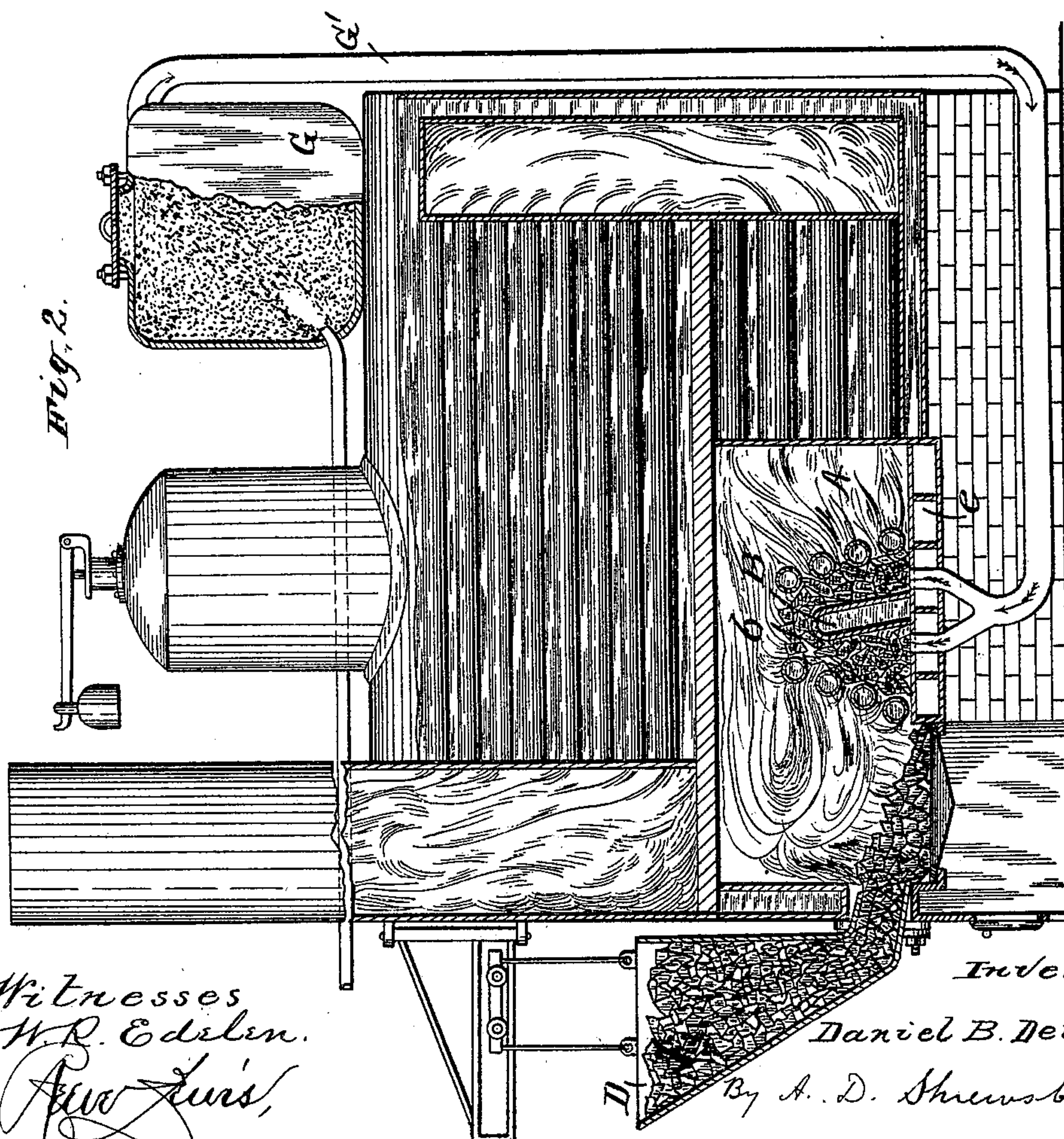
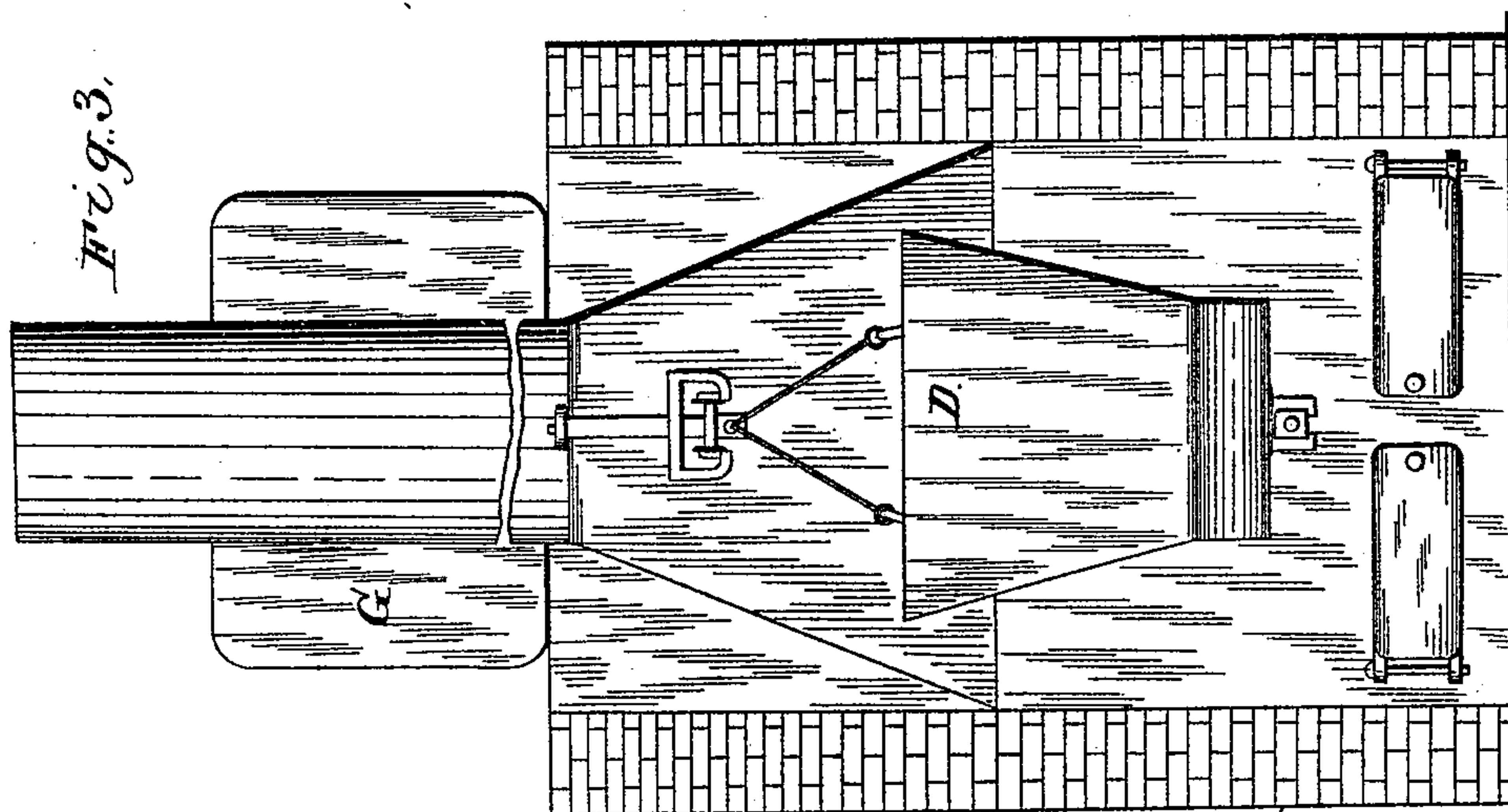
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UNITED STATES PATENT OFFICE.

DANIEL B. DEVORE, OF WASHINGTON, DISTRICT OF COLUMBIA.

FEEDER FOR STEAM-BOILER FURNACES.

SPECIFICATION forming part of Letters Patent No. 623,993, dated May 2, 1899.

Application filed October 16, 1897. Renewed September 7, 1898. Serial No. 690,444. (No model.)

To all whom it may concern:

Be it known that I, DANIEL B. DEVORE, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Stokers or Feeders for Steam-Boilers and Furnaces; and I do hereby declare the following to be a full, clear and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has reference to improvements in stokers or feeders for steam-boilers and furnaces; and it consists of certain novel features of construction, which will be hereinafter fully described in the specification, elucidated in the drawings, and pointed out in the claims.

The object of the present invention is to provide simple, economical, convenient, and efficient means for utilizing pulverized coal or impalpable dust in furnaces and steam-boilers. Many devices have come before the public for utilizing these products, but none thus far has given results sufficiently satisfactory to warrant their adoption from a practical standpoint. The failures are owing to means employed in feeding and also in producing proper or complete combustion of said products.

The present invention is designed to overcome all these difficulties and at the same time to consume only a minimum amount of fuel in volatilizing a maximum bulk of pulverized coal, thus producing an intense heat by the means I employ for producing these results.

My invention consists in introducing tubing transversely within a fire-box, the free ends being secured to the water-legs, so that the water can circulate through said tubes.

My invention further consists in providing a water-back which is preferably placed between the rows of tubes and also secured to the water-legs which constitute said fire-box, the water circulating in a similar manner as explained with reference to said tubes.

My invention further and mainly consists in surrounding said water-back with broken terra-cotta or similar material and held in position by the transverse tubes previously referred to.

My invention further consists in providing by means of said water-back an additional or supplemental box or compartment for giving increased heat to the gases as they are evolved from the heated terra-cotta pile.

My invention further consists in providing a closed chamber under the supplemental box for receiving compressed air or superheated steam, in combination with the pulverized coal, and one or more openings from said chamber for allowing the products to pass through the interstices of the terra-cotta pile which become red-hot by means of the ordinary furnace-fire, thus allowing the pulverized coal or its equivalent to become transformed into intensely-heated gases.

My invention further consists in arranging a removable funnel or stoker for depositing fuel in the fire-box and means for removing or swinging said stoker to one side, free from the furnace-door, when occasion may require.

My invention further consists in a reservoir for pulverized coal and an air-pipe entering said reservoir for forcing said coal-dust into a furnace through the medium of a dust-delivery pipe.

To more fully understand my invention I will proceed to describe the drawings, in which—

Figure 1 represents a side elevation and section, partly broken away, of a locomotive and its accompanying tender, exhibiting my improved device. Figs. 2 and 3 are respectively a central longitudinal section and a front elevation of an ordinary steam-boiler and furnace having my device applied thereto.

My invention consists in securing water pipes or tubes A transversely in a fire-box *a* and securing said tubes to the water-legs of the fire-box. Situated centrally between said tubes and also secured to the water-legs is a water-back B. Surrounding said water-back is broken terra-cotta *b* or similar substance, which is held in position by said transverse tubes A, thus forming a transverse pile across the fire-box, which will be hereinafter more fully set forth.

The fire-box has two compartments, which are formed by the terra-cotta pile *b*, previously referred to. The rear compartment is provided with a grate *a'*, of ordinary construction, and a supplemental tilting grate *a''*. These

grates support the coal for heating the terra-cotta pile. The coal is fed to the fire-box by an automatic stoker D, located immediately in front of the furnace-door in the cab of the engine.

When necessary to examine the interior of the fire-box, the stoker D is pushed to one side through the medium of the hinges $d\ d$, which adapt it to swing flat against the boiler and away from the throttle-valve, gage-cocks, and reversing-lever. By this arrangement no inconvenience is experienced by the engineer. The forward compartment of the fire-box gives additional heat to gases as they pass through the boiler-tubes. Immediately under the terra-cotta pile and forming a solid bottom to this partition of the fire-box is a transverse chamber e , which is provided with an opening e' for allowing the fine pulverized coal to be forced through the interstices of the terra-cotta pile by means of compressed air or superheated steam.

Located in the tender of the engine is a hermetically-sealed reservoir G for holding pulverized coal and which is provided with a cover g . Entering at the bottom of said reservoir is a pipe H for supplying compressed air or steam for forcing the pulverized product into the fire-box of the engine. The pipe, as shown in the drawings, Fig. 1, can terminate at the bottom of said reservoir, or it can be extended, as shown in dotted lines, and extend to the top and partly enter the fuel-supply pipe of said reservoir. Extending from the top of the reservoir previously referred to is a large pipe G' , forming a gooseneck, which is connected to a pipe G^2 by means of a flexible coupling g' and extending into the chamber e for supplying the pulverized coal, as previously stated.

The supply-reservoir is located on the boiler. The compressed-air pipe and fuel-supply pipe are similar to those previously described for feeding the fuel into the furnace with this exception—the delivery end of pipe G^2 is bifurcated and delivers the powdered fuel on both sides of the water-back into the terra-cotta pile and not into the closed chamber, as shown in Fig. 1.

Referring to Figs. 2 and 3, the device for removing the stoker is supported by a crane, which is provided with a track and trolley, said trolley being connected to the stoker by rods or wire ropes. By this means the stoker can be pulled out from the fire-door and then swung around by its supporting-crane, which is pivoted to ears secured to the boiler.

When operating my improved device, the reservoir G is filled with pulverized coal or impalpable powder, the manhole-cover g being securely fastened. The operator starts the fire in the furnace, and after it is under way the stoker D is filled, when this part of the apparatus becomes automatic. All that is necessary is to shake the pivoted grate a^2 occasionally when a larger quantity of coal is required on the fire than the stoker can de-

liver through gravity when not full of coal. As said fire in transit to the boiler-tubes must consequently pass over and through the terra-cotta pile b , thus making it red-hot, when this stage is reached the operator opens the valve h on the locomotive, which carries a current of compressed air or superheated steam into the fuel-reservoir G, (the air-compressor or superheater is not shown in the drawings, as they are too well known to require illustration,) which forces or draws the fine particles of pulverized coal through the pipes G' , g , and G^2 , respectively, into the chamber e , from which it passes through the opening e' , through the interstices of the terra-cotta, from which it instantly issues in volumes of intensely-heated gases. By this method or process of utilizing fine particles of coal or dust there is no clogging of the furnace, which has heretofore been the difficulty with pulverized-feed burners. As the fine fuel is regulated by the valve h , previously referred to, it is evident the fire can be regulated by this means of feeding this fine fuel to any degree of temperature. An arrangement could be devised to make the entire device automatic—that is, make the heat of the furnace operate the valve by means of a lever and expansion-rod; but that part of the invention would perhaps be the subject of another application with other devices connected therewith.

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

1. In a furnace for steam-boilers and other like purposes, the combination of water-tubes situated transversely in said furnace, and connecting with the water-legs of a fire-box, and broken terra-cotta piled between said tubes forming a transverse wall across said fire-box for the passage of pulverized coal and the means for feeding said coal, substantially as described.

2. In a furnace for steam-boilers and other like purposes, the combination of water-tubes situated transversely in said furnace, and connecting with the water-legs of a fire-box, a water-back located centrally between said tubes, and terra-cotta surrounding said water-back for the passage of atomized coal through the medium of an air-blast, substantially as described.

3. In a furnace for steam-boilers and other like purposes, the combination of water-tubes situated transversely in said furnace, and connecting with the water-legs of a fire-box, broken terra-cotta piled between said tubes forming a transverse wall across said fire-box, and the means for heating said terra-cotta pile, pulverized coal passing over and through said terra-cotta pile through the medium of an air-blast or superheated steam, substantially as described.

4. In a furnace for steam-boilers and other like purposes, the combination of water-tubes situated transversely in said furnace, and connecting with the water-legs of a fire-box,

a water-back located between said tubes, a terra-cotta pile surrounding said water-back for the passage of atomized coal located in a reservoir or magazine and conveyed by a pipe
5 into a box located immediately under said terra-cotta pile and water-back, a perforation or opening in said box for the aforesaid passage of coal-dust into a terra-cotta pile by means of an air-blast or superheated steam
10 substantially as described.

5. In a furnace for steam-boilers, a stoker removably secured before a fire-door and adapted to feed fuel to a fire-located in a furnace for heating a terra-cotta pile, of a water-
15 back within said terra-cotta pile and arranged between water-tubes, a steam or air blast for feeding pulverized coal into and through said terra-cotta pile substantially as described.

6. In a furnace for steam-boilers, the combination of water-tubes situated transversely in said furnace, and connecting with the water-legs of a fire-box, a water-back B, located between said tubes A, and terra-cotta pile b, surrounding said water-back, for the passage
20 of atomized coal G, by means of pipes G', g' and G² into chamber e, thence through open-

ing e', through the medium of an air-blast, substantially as described.

7. In a furnace for steam-boilers and other like purposes a stoker pivotally secured before a fire-door and adapted to feed fuel to a furnace in combination with a terra-cotta pile arranged between water-tubes, and an air-blast for feeding pulverized coal into and through said terra-cotta pile, substantially as
30 described. 35

8. In a furnace for steam-boilers and other like purposes, the combination of a fire-box provided with an ordinary fire, a terra-cotta wall or pile extending across said fire-box, forming two compartments, a hollow box or chamber under said fire-box, a fuel-supply pipe communicating with said chamber, and an air-pipe in an atomized-coal reservoir for forcing said coal into the terra-cotta pile, substantially as shown and described.
40 45

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

DANIEL B. DEVORE.

Witnesses:

W. RU. EDELEN,
HORACE BURDETTE.