No. 649,446. Patented May 15, 1900.

J. A. GREEN.

STEAM INJECTOR FOR FIRE BOXES OF STEAM BOILERS.

(Application filed Sept. 2, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

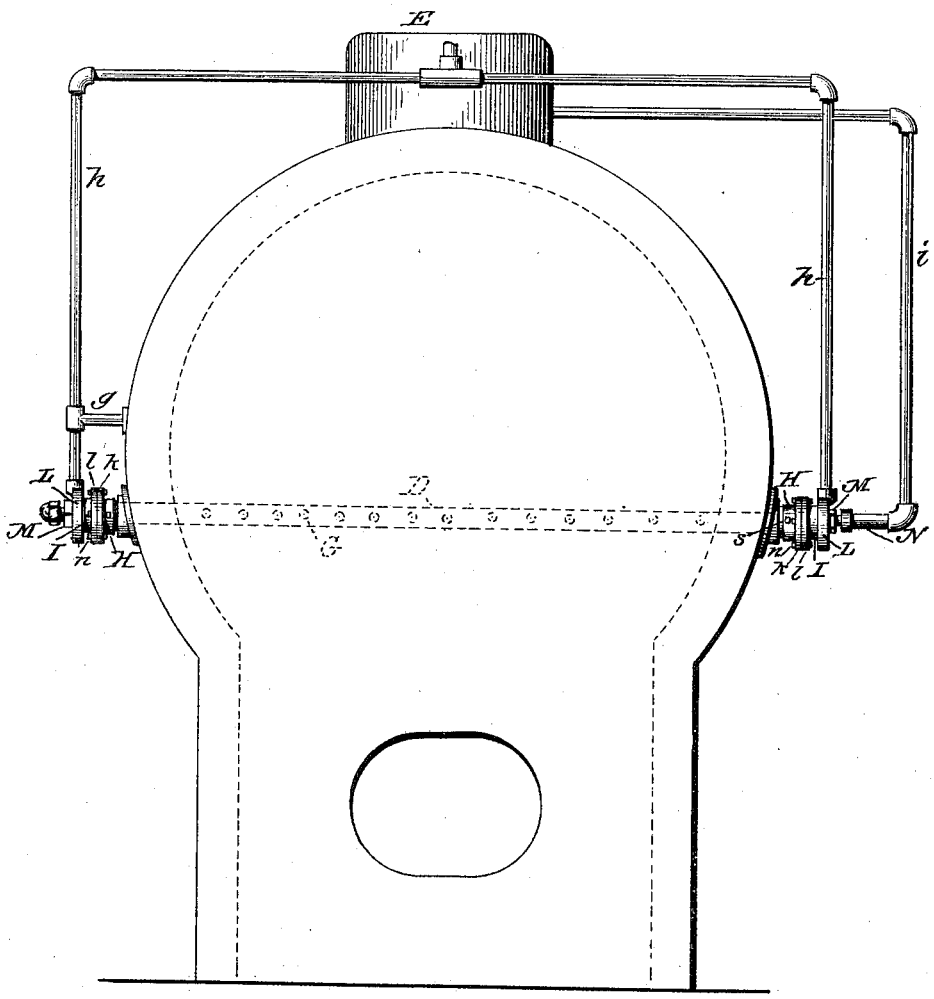

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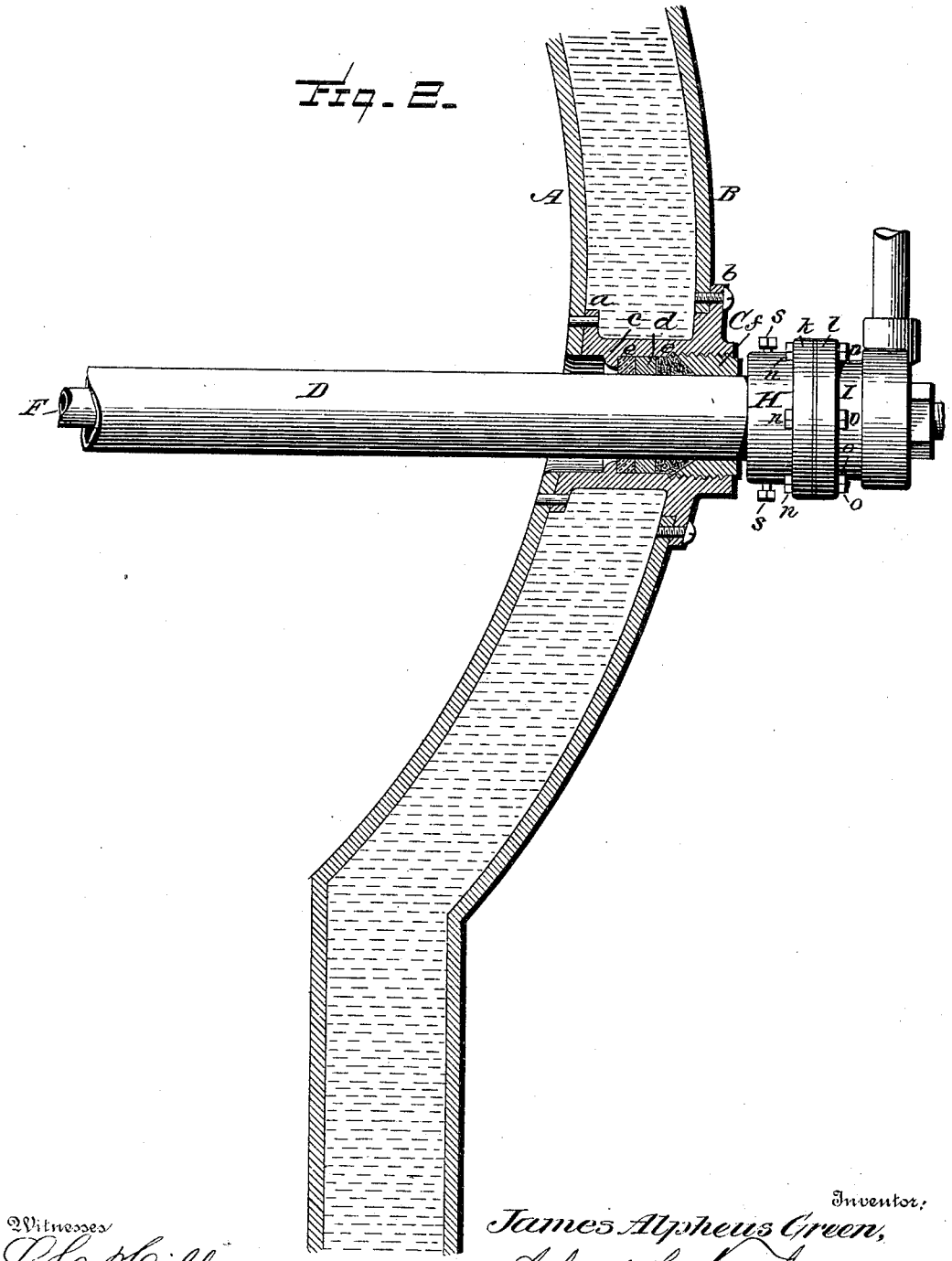
Fig. 2.



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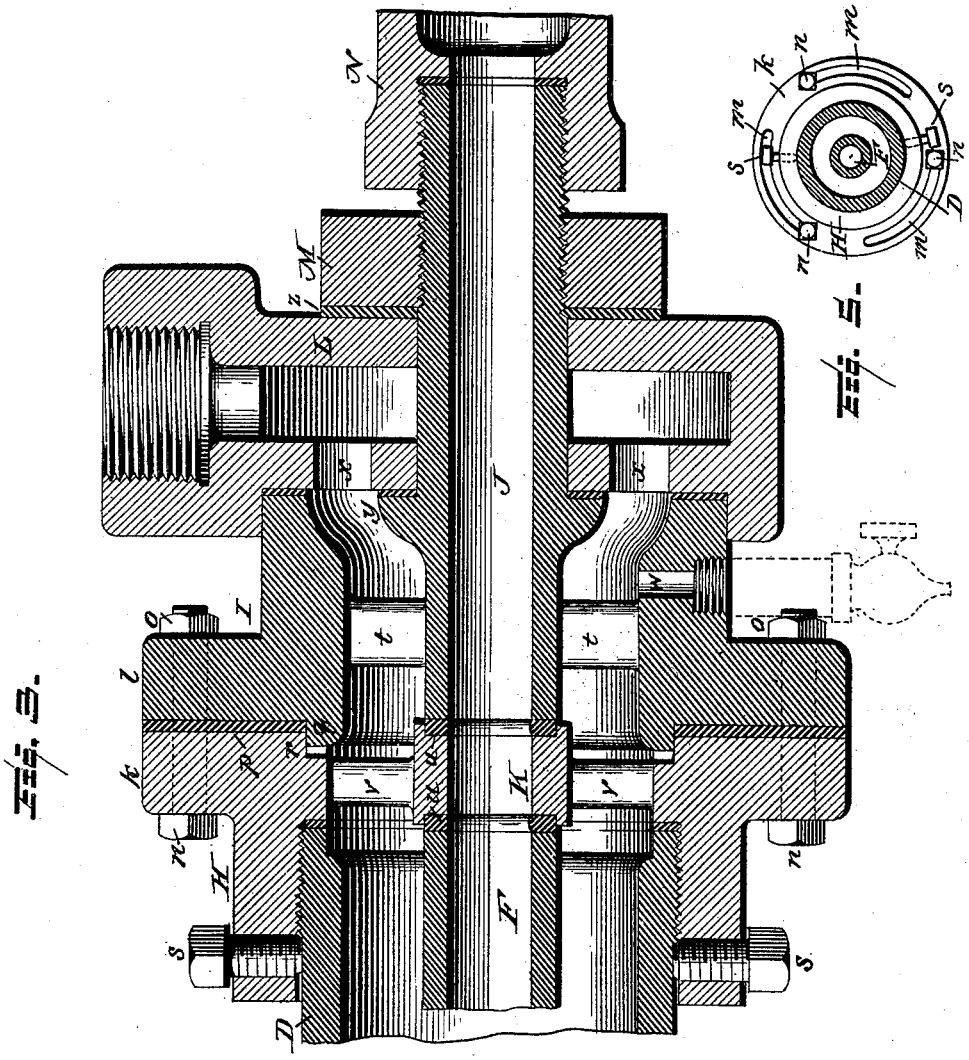

Fig. 3.

Fig. 5.

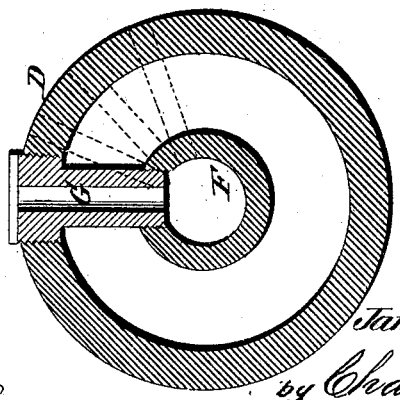

Fig. 4.

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UNITED STATES PATENT OFFICE.

JAMES ALPHEUS GREEN, OF MILLDALE, VIRGINIA.

STEAM-INJECTOR FOR FIRE-BOXES OF STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 649,446, dated May 15, 1900.

Application filed September 2, 1899. Serial No. 729,354. (No model.)

To all whom it may concern:

Be it known that I, JAMES ALPHEUS GREEN, a citizen of the United States, residing at Milldale, in the county of Warren and State of Virginia, have invented certain new and useful Improvements in Steam-Injectors for Fire-Boxes of Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters of reference marked thereon.

The present invention has reference to that class of devices adapted for use in connection with engine or other steam boilers for ejecting steam into the fire-box over the fire for consuming and preventing smoke.

The purpose of the invention is to materially improve such means or devices whereby their effectiveness will be greatly enhanced and their practical value increased both in operation and simplicity of construction, which purpose is attained by the construction substantially as shown in the drawings and hereinafter described and claimed.

Figure 1 of the drawings is an end view of an engine-boiler, showing the application of my invention thereto; Fig. 2, a sectional elevation of a portion of an engine-boiler, showing the two plates which form the water-space around the same, the pipes and their end connections being shown in elevation; Fig. 3, a sectional elevation on an enlarged scale, showing the steam and water pipes and their connections; Fig. 4, a cross-section showing the relative position of the steam and water pipes and the jet-tubes; Fig. 5, an end view of Fig. 3 on a reduced scale.

In the accompanying drawings, A B represent the two plates of the boiler to form a water-space between, which plates may be of any preferred construction. A suitable opening is formed in the sides of the boiler, which openings are diametrically opposite each other and have fitted therein flanged bushings C. The outer flanges *a b* of the bushings are secured to the boiler-plates A B by means of screws, rivets, or other convenient fastenings, as shown in Fig. 2 of the drawings. These bushings C have circumferential and inwardly-projecting seats *c* and independent metal packing-ring *d*, and upon each side of this ring is located the packings *e*, preferably of asbestos, said ring and packing being forced down tight against each other by a screw-threaded follower *f*. This construction provides a very superior and tight packing for the water-pipe D at its ends, said water-pipe extending horizontally through the sides of the boiler at the end thereof, as shown in Fig. 1 of the drawings, in the closest possible contact with the end wall thereof.

The water-pipe D connects with the boiler at a point below the water-line by the tubular connection *g* and at the dome E above the water-line, whereby both water and steam pressure are obtained, thus forming a more perfect and certain circulation of the water in the pipe D, and as the pipe is subjected to intense heat in the fire-box thereby performing the function of an auxiliary steam producer. The water-pipe D at its ends communicates with the dome E through the medium of the pipes *h*, through which the steam passes and occupies the pipe-space as far down as the water-line, thus forming a pressure above the water in said pipes.

The means shown and described of supplying the pipe D with water may be variously modified or changed as circumstances require, or any suitable means may be employed, such as a pump or other device, for supplying the water to the pipe. This water-pipe D surrounds a steam-pipe F, which pipe connects with the water-pipe D by suitable jet-tubes G, of any suitable number, as shown in Fig. 4 of the drawings and also in dotted lines of Fig. 1. The steam-pipe F connects with the dome E or at any part of the boiler above the water-line found desirable through the medium of a suitable pipe *i* or by any other means found best adapted to the purpose, the steam being supplied to the pipe F through the pipe *i*. The jet-tubes G are screw-threaded at their ends to engage screw-threaded holes in both the pipes D F, as shown in Fig. 4 of the drawings. The pipes D F may be constructed separately, as shown in Fig. 3 of the drawings, or cast or otherwise formed together with the jet-tubes G, said pipes and tubes thus being integral. In Fig. 3 I have shown the pipe D connected to

a screw-coupling H, and secured to said coupling is a coupling I by means of the bolts *n*, which extend through the flanges *k l* and are held thereto by screw-nuts *o*. An interposed packing *p* is located between the meeting faces of the couplings to form a tight joint. The coupling I, having a circumferential flanged seat *q* to form a bearing for the shoulder *r* upon the inner side of the coupling H, is turned upon its axis. Suitable set-screws *s* are provided to hold the water-pipe D in its fixed relation to the coupling H. The bolts *n* extend through segmental slots *m* in the flange *k* of the coupling H, whereby the water-pipe D may be turned upon its axis to adjust the same, as shown in Fig. 5 of the drawings. The adjustment of the water-pipe carries with it the steam-pipe F and the jet-tubes G, said adjustment bringing the position of the tubes at the most desirable angle for delivering the steam in a proper relation to the fire and fire-arch. The jet-tubes G may be arranged at different angles with relation to the pipe D, as shown in dotted lines of Fig. 4, so as to feed steam to the entire fire-surface, if so desired.

The steam and water pipes and the jet-tubes may be variously modified or changed in their construction, as deemed advisable, without in any manner affecting the essential features of the invention.

The steam-pipe F has sections at its ends which form the continuation of the pipe and are connected to the couplings in casting by means of the webs *t*, said pipe-section at one end of the pipe being designated at J. These sections J are coupled to the outer ends of the pipe F by means of a coupling-ring K and interposed packing *u*, said ring being connected to the coupling H by webs *v* in casting, thereby forming a continuous water-pipe.

The coupling I has a suitable drain *w*, to which may be connected a suitable cock, as shown in dotted lines of Fig. 3, to draw off the water from pipe D when it is found necessary to make an adjustment of said pipe.

Connected to the steam-pipe section J or held thereon in any suitable manner is a tubular coupling L, which communicates with the water-pipe D through the openings *x*, said tubular coupling being held tightly against the end of the coupling I and against the circumferential flange *y* by means of the tightening-nut M. This nut engages the screw-threaded end of the pipe-section J, and between it and the tubular coupling is a suitable packing *z*, and similar packings are interposed between the tubular coupling and the coupling I and circumferential flange *y* of the pipe-section J to form tight joints at these points, as shown in Fig. 3 of the drawings. The tubular coupling L has a screw-threaded socket for connecting therewith the end of pipe *h*, (shown in Fig. 1 of the drawings,) said pipe feeding water to the pipe D from the boiler or other source of supply. A pipe N is connected to the screw-threaded end of the pipe-section J, which pipe N is connected, by coupling or other suitable means, to pipe *i*, which supplies steam to the pipe F.

The couplings and pipes are subject to many changes or modifications to adapt them to circumstances in the general construction of the device, and I do not wish to be understood as confining or restricting the invention to the specific arrangement of pipes and couplings shown in the drawings.

Where the bushing C is connected to the boiler on straight surfaces of either double or single plate boilers, I wish it understood that the construction may be simplified by using screw-threads for attaching the bushing instead of the flanges, as shown.

In adjusting the water-pipe and the steam-pipe and the jet-tubes connected therewith to bring the jet in the proper relation to the fire and fire-arch, as found desirable, the cut-off cocks in the usual connecting-pipes are first closed and the drain opened, as shown in dotted lines in Fig. 3. The screws or bolts *n* in the segmental slots *m* are now loosened and the coupling H, with the pipes D F, is turned by suitable means to the desired position, after which the bolts or screws in the segmental slots are tightened to hold the pipes in their adjusted position, and then the drain is closed and the cut-off cocks opened.

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

1. A suitable steam-pipe and a water jacket or pipe surrounding the same, steam-jets connecting the pipes together and communicating with the interior of the steam-pipe, said water-jacket being connected to an axially-adjustable coupling whereby the same with its steam pipe and jet-tubes may be bodily turned upon its axis to change the position of said tubes, substantially as and for the purpose set forth.

2. A water pipe or jacket adjustable upon its axis, a steam-pipe contained therein, jet-tubes connecting the pipes together and communicating with the interior of the steam-pipe, supplemental pipes communicating with the water pipe or jacket at each end thereof and with the dome of the boiler to form a pressure above the water in said pipes, and a suitable supply-pipe connecting with the boiler above the water-line and with the steam-pipe, substantially as and for the purpose described.

3. A steam-pipe and a water pipe or jacket surrounding the same, jet-tubes connecting the pipes together and communicating with the interior of the steam-pipe, said water pipe or jacket adapted for adjustment upon its axis, a tubular coupling, and intermediate flanged couplings for making a connection between the ends of the pipe and the tubular couplings, and pipes leading to the boiler, substantially as and for the purpose specified.

4. A suitable steam-pipe and a water-pipe encircling the same, jet-tubes connecting the

pipes together and communicating with the steam-pipe, couplings connected together by suitable screw-bolts, one of said couplings having a circumferential flange with segmental slots through which the bolts extend whereby the pipes will admit of adjustment and be held in their adjusted position, substantially as and for the purpose set forth.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

JAMES ALPHEUS GREEN.

Witnesses:
W. B. ACKER,
GEO. M. COPENHAVER.