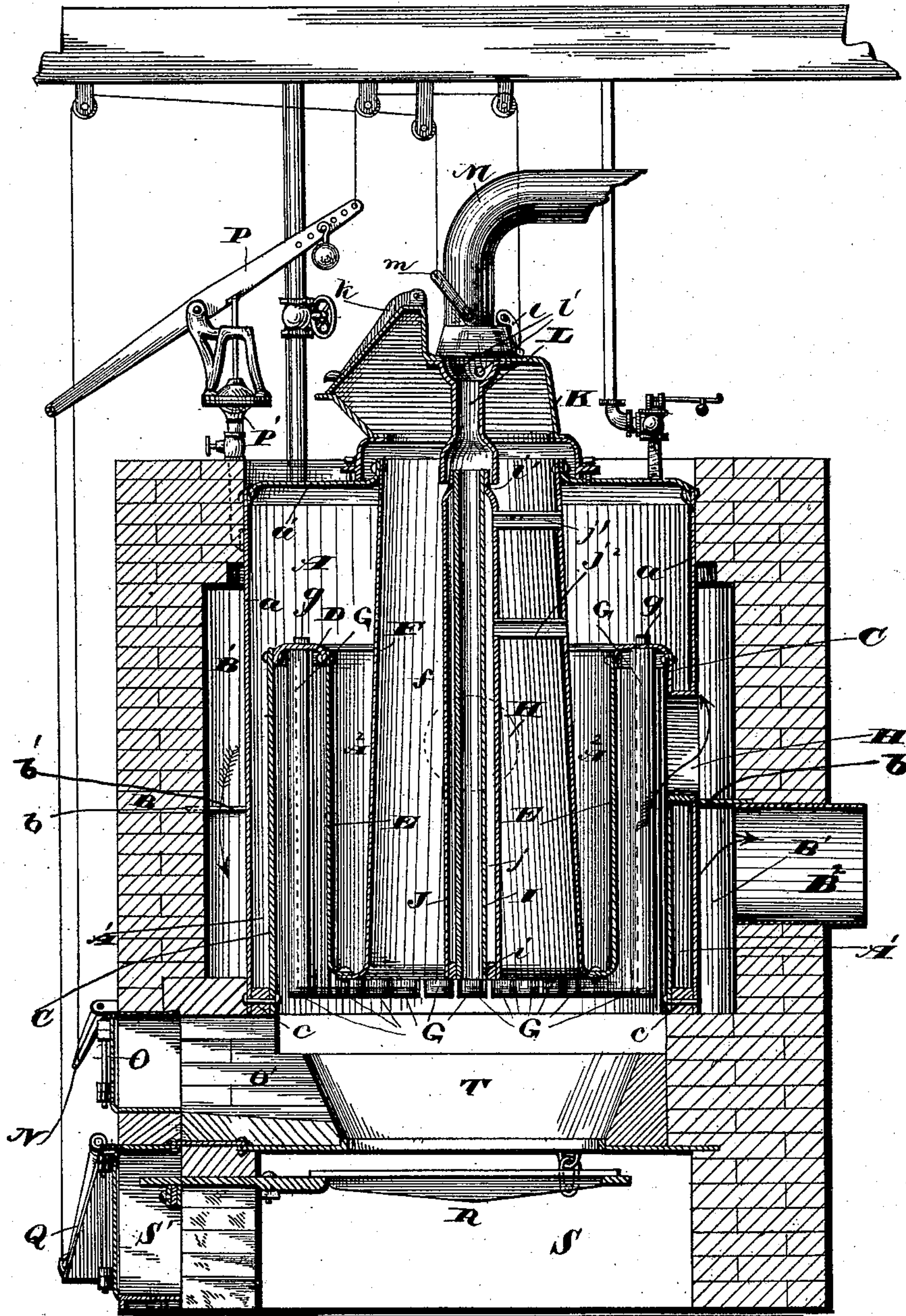


(No Model.)

J. C. McNEIL.
STEAM BOILER.

No. 322,623.

Patented July 21, 1885.



WITNESSES

Wm M Monroe
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UNITED STATES PATENT OFFICE.

JAMES C. McNEIL, OF AKRON, OHIO.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 322,623, dated July 21, 1885.

Application filed April 23, 1885. (No model.)

To all whom it may concern:

Be it known that I, JAMES C. McNEIL, of Akron, in the county of Summit and State of Ohio, have invented certain new and useful
5 Improvements in Steam-Boilers; 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 pertains to make and use the same.

10 My invention relates to improvements in steam-boilers of the class that have internal coal-feeding magazines; and it consists in certain features of construction and in combination of parts hereinafter described, and pointed
15 out in the claims.

My invention is designed as an improvement on a device for which Letters Patent of the United States were granted to me bearing
20 date June 14, 1881, No. 242,834, and to which reference is made in this specification.

In my former device, patented as aforesaid, I employ drop-tubes, a magazine, and an air-duct leading through the magazine and discharging into the furnace.

25 My present invention consists, principally, first, in adding a water-leg outside of the drop-tube and a hot-air chamber outside of the water-leg in open relation with the furnace and with the chimney; second, in inclosing
30 the air-tube through the magazine in a larger tube forming a water-leg between the two tubes and in open relation with the steam and water spaces of the boiler; and, third, in the arrangement of dampers and attachments connected with said air-tube.
35

The accompanying drawing is an elevation in section of my improved boiler attachments and setting.

40 The boiler A is of the upright cylindrical variety, and rests upon the setting B, that is offset in the central portion, forming a hot-air chamber, B', extending around the boiler and connecting with the flue B² leading to the chimney. The shell a of the boiler above is
45 riveted to the head a', and below is secured to the sheet C that forms the outer wall of the furnace, the joint being made usually by riveting through an intervening ring, c, or, if preferred, by flanges or offsetting one of the sheets
50 so that the two sheets come in direct contact, and then riveting. The plate C is riveted to the crown-sheet D, that in turn is riveted to

the top of the sheet E that forms the inner wall of the furnace, the latter sheet being riveted below to the sheet F that forms the casing of the magazine f. The plate F is riveted
55 above to the head a'. By this arrangement of parts water-legs A' and A² are formed, the one surrounding the furnace and the other surrounding the magazine, and both in open
60 relation above the main water-space of the boiler. A series of drop-tubes, G, are secured to the crown-sheet and extend down in the furnace space, as shown, and have circulating tubes g inside. Horizontal tubes H, of
65 considerable size and usually two or more in number, extend through the water-leg A' and are secured to the sheets a and C. These tubes lead from the furnace to the chamber B' and discharge above the plate b. This latter is set
70 in the mason-work and abuts against the boiler and divides the chamber B into two parts, except at an opening, b', through the plate, the latter being located on the side of the boiler opposite the flue B². The products of com-
75 bustion must pass from the furnace first through the tubes H into the upper portion of the hot-air chamber B', and from thence through the opening b' to the lower portion of
80 said chamber, from whence they pass through the flue B² to the chimney. The water-leg A' furnishes a large amount of effective heating surface, and thereby greatly increases the capacity of the boiler.

It is found that the hot-air chamber B economizes a large per cent. of the fuel. The heat from the products of combustion in passing
85 through this chamber is absorbed by the boiler until the gases, escaping through the flue B², are reduced to the same temperature as that of the boiler, and this, with the present state
90 of the art, is all that can be accomplished in this direction in the way of fuel-saving.

I is an air-pipe leading down through the magazine to discharge air into the furnace. This pipe is inclosed in the tube J, leaving a
95 water-space, j, between the tubes. A ring, i, may be inserted between the tubes, and as there is not room for conveniently riveting, the parts are usually welded; or the outer
100 tube may be reduced in size and welded directly to the inner tube, as shown at i'. Tubes j' and j² lead from the water-space j respectively to the steam and water spaces of the

boiler. This water-leg around the air-tube prevents the latter from being overheated, and consequently renders it durable. K is a hood covering the top of the magazine and provided with the door *k* for feeding coal to the magazine. An extension, L, of the air-tube has a damper, *l*, opening outward for admitting air from the room, and holes *l'* opening into the hood. The extension-pipe is connected with the pipe M, leading to the chimney, and this latter pipe is provided with a damper, *m*, for closing and opening the passage-way in this pipe. The lever of the damper *m* is connected by a cord with the lever N, that in its normal position inclines downward over the upper edge of the door O in such position that it will collide with and be raised by the door when the latter is opened, and thereby open the damper *m*. The door gives access to the passage-way O' for raking the grate. In stirring the fire an extra amount of gas is generated, and any of the gas that finds its way up through the tube I, or through the magazine, instead of being discharged into the room through the damper *l* or door *k* is carried away by the strong draft in the pipe M, and is discharged into the chimney. The gravity of the damper-lever *m* is sufficient to open the damper when relieved of the weight of the lever N, and the gravity of the latter is sufficient to close the damper when the door O is closed. The damper *l* is connected by a cord leading over pulleys, as shown, with the lever P of the automatic damper-regulator P', and the same lever is connected with the damper Q, that admits air under the grate. These dampers operate in unison, and when the grate becomes clogged with ashes, clinkers, &c., as is likely to occur when the apparatus is left for some time without attendance—for instance, during the night—so that but little air can pass the grate, the draft of the chimney will cause a strong current of air to pass down through the pipe I, by means of which the fire is kept burning. When the grates are free, the greater part of the draft will of course pass through the grates.

R is the grate; S, the ash-pit; S', the ash-pit door, and T the fire-pot. As these latter parts have already been described in my former patent, and as I make no claim in this specification to these devices, it is not considered necessary further to describe them.

The boiler is provided with steam and feed pipes, safety-valves, &c., in the usual manner.

What I claim is—

1. In a magazine boiler, the combination

with a water-leg surrounding the lower portion of the magazine, and drop-tubes depending from the crown-sheet, of a water-leg outside of the drop-tubes and in open relation above the water-space of the boiler, substantially as set forth.

2. In a magazine-boiler, the combination with a water-leg surrounding the lower portion of the magazine, drop-tubes, a water-leg outside of the drop-tubes, of an annular hot-air chamber formed in the setting inclosing the boiler from or near the water-line downward, said chamber connected by tubes with the furnace-space, and connected with a flue leading to the chimney, substantially as set forth.

3. The combination, with the hot-air chamber B' and tubes leading from the furnace-space through the outer water-leg to the said chamber, a flue connecting said chamber with the chimney, of a plate or equivalent dividing the chamber circumferentially, said plate located below the tubes leading from the furnace-space and above the chimney-flue, an opening in the plate connecting the upper and lower portions of the hot-air chamber, and located at the opposite side of the boiler from the chimney-flue, substantially as set forth.

4. In a magazine-boiler, an air-pipe leading down through the magazine for discharging air into the furnace, an outer tube connected at the top and bottom with the air-tube, forming a water-space around said air-tube, tubes leading from the said water-space respectively to the steam and water spaces of the boiler, substantially as set forth.

5. In a magazine-boiler, the combination with an air-tube leading through the magazine, a damper for admitting air to the tube and operated automatically and in unison with the damper admitting air below the grate, of a waste-pipe leading from the air-tube to the chimney, a damper operating in said waste-pipe, and mechanism, preferably as described, for automatically operating said damper from the furnace-door, and so arranged that the said damper will be open when the furnace-door is open and be closed when the furnace-door is closed, substantially as set forth.

In testimony whereof I sign this specification in the presence of two witnesses this 16th day of April, 1885.

JAMES C. McNEIL.

Witnesses:

CHAS. H. DORER,
ALBERT E. LYNCH.