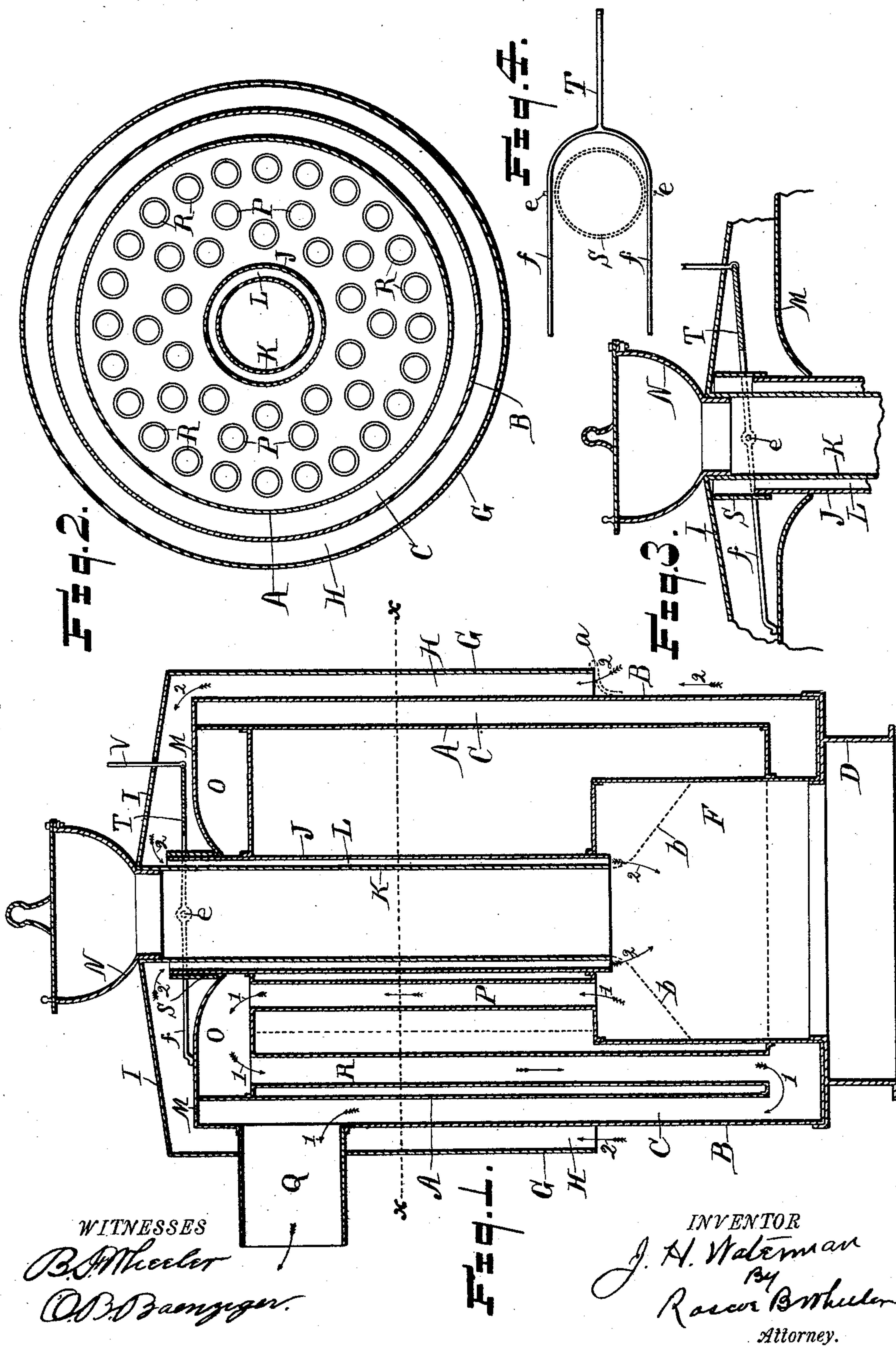


(No Model.)

J. H. WATERMAN.
BOILER.

No. 484,350.

Patented Oct. 11, 1892.



UNITED STATES PATENT OFFICE.

JOHN H. WATERMAN, OF DETROIT, MICHIGAN.

BOILER.

SPECIFICATION forming part of Letters Patent No. 484,350, dated October 11, 1892.

Application filed June 24, 1891. Renewed September 15, 1892. Serial No. 445,960. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. WATERMAN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Boilers; and I do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in boilers especially designed for use in steam and hot-water circulating systems for heating the interior of buildings; and it consists in a certain construction and arrangement of parts, as hereinafter fully set forth, the essential features of which being pointed out particularly in the claims.

The objects of the invention are to produce a magazine-feed base-burning boiler that will successfully burn bituminous coal and consume the smoke and gases thereof and in which the construction is such that a hot-air blast is produced to supply combustion within the fire-pot, the radiation of heat from the boiler is obviated, and economy effected in the consumption of fuel. These objects are attained by the arrangement of parts illustrated in the accompanying drawings, in which—

Figure 1 is a central vertical section through my improved boiler. Fig. 2 is a horizontal section through the boiler on dotted line *xx* of Fig. 1. Fig. 3 is a vertical section through the upper end of the magazine, showing the adjustable collar or damper raised to cut off the supply of air to the fire. Fig. 4 is a plan of the bifurcated lever employed to actuate said damper.

Referring to the letters of reference, A designates the shell of the boiler, which is environed by the smoke-sheet B, so as to leave an air space or flue C between said sheet and the boiler-shell. The boiler and smoke-sheet are supported on a suitable base D, which forms the ash-pit below the fire-pot F, that is located within the boiler, at the base thereof.

G designates an exterior casing around the smoke-sheet B and at such distance therefrom

as to form an air-space H between said casing and sheet, open at the bottom. Said casing also extends over the cap of the boiler, forming the cover I, and is supported on suitable brackets *a*, on which its lower edge rests.

This improved boiler is provided with a double magazine composed of the outer shell J and an inner shell K of less diameter than the outer shell, forming an air-space L between said shells which is open at the top and bottom. The lower end of the outer shell J extends into the fire-pot F, and its upper end passes through the cap M and is secured therein. The mouth of the inner shell K extends even with the lower end of the outer shell, and the upper end of said inner shell is attached to the cover I and communicates with the coal-hopper N, through which coal is supplied to the magazine. This formation of an air-space between the shells of the magazine prevents the coking of the coal therein and serves as a vehicle through which air is drawn to supply combustion within the fire-pot, as hereinafter described.

P designates a series of direct alternating flues located around the magazine, as shown in Fig. 2, and that communicate at their lower ends with the fire-pot, the upper ends of said flues communicating with the chamber O, formed between the head of the boiler and the cap M, as shown in Fig. 1.

R designates a series of direct flues located around the flues P and adjacent to the shell A of the boiler. Said flues R communicate at their upper ends with the chamber O, and at their lower ends with the base of the exterior flue-space C, leading to the smoke-pipe Q. It is understood that the water fills all the space around the flues P and R between the outer shell of the magazine and the shell of the boiler, said flues in Fig. 1 being shown in one side of the boiler only. As will now be apparent, the coal discharged from the magazine fills the fire-pot F, as shown by dotted lines *b*. The caloric current caused by the combustion of said coal passes upward from the fire-pot through the flues P, thence downward through the flues R and up through the outer circular flue C between the boiler-shell and smoke-sheet to the smoke-pipe Q, as shown by the direction of the arrows 1. The

air necessary to support said combustion is drawn upward through the air-space H and between the cover I and cap M, thence downward through the space L between the shells of the magazine, and is discharged in a circular sheet directly onto the fuel in the fire-pot, as shown by the direction of the arrows 2. It will be seen that the area of discharge for the caloric current from the fire-pot is greater than that of the induct of the air-supply, whereby the air is drawn rapidly downward through the space L and impinges with great force upon the surface of the burning coal. By this manner of supplying the air from above combustion is caused to take place directly on the surface of the coal, causing intense heat and spreading an incandescent glow over its entire burning surface. The force of the downward blast of air catches the gases and carbon caused by combustion before they can rise, thoroughly mixing the air therewith at a point of incandescent heat, whereby the volatile products of combustion are entirely consumed and the caloric current emanating therefrom is rendered smokeless. By means of this construction and manner of burning fuel bituminous coal may be readily used without danger of coking or burning in the magazine, and the combustion is so complete that there is little, if any, ashes left, thus obtaining the maximum degree of heat for the quantity of coal consumed. The strong draft of air rushing up the air-space H to supply combustion within the fire-pot carries with it the heat that radiates from the outer surface of the smoke-sheet B, thereby obviating the overheating of the basement and utilizing said heat to supply the fire with a hot blast of air and saving that portion of the product of combustion which has ordinarily been wasted.

To provide for regulating the supply of air to support combustion, the sleeve or collar S is employed, which encircles the upper end of the outer shell K of the magazine and is adapted to slide vertically thereon.

T designates a bifurcated lever, the forks of which pass on each side of the collar S and are pivoted thereto, as shown at e in Fig. 4, the ends of said forks resting on the cap M. To the opposite end of said lever is attached a vertical rod V, whereby by drawing upward on said rod the lever T will be actuated to raise the collar S and close the opening into the air-space L, as shown in Fig. 3, which acts as a damper to cut off the supply of air to the fire, and by means of said rod V the

damper or collar S may be raised or lowered to regulate the supply of air, as desired.

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

1. In a boiler, the combination of the combustion-chamber and the magazine communicating with said chamber, said magazine composed of an outer and an inner shell that passes entirely through the boiler, with a single annular air-flue between said shells, said flue being direct and open at each end, its lower end communicating with the combustion-chamber and its upper end with the exterior air, the entire surface of the outer shell of the magazine being surrounded by the water-space in the boiler, whereby the shells of the magazine are prevented from being excessively heated, as specified.

2. In a boiler, the combination of the smoke-sheet, the exterior casing around the smoke-sheet at such distance therefrom as to form an air passage or flue between said casing and sheet, open at its lower end and communicating with the exterior air around said sheet, and the magazine composed of an outer and an inner shell, forming an air-passage between said shells which communicates with the air-passage between the smoke-sheet and the outer casing, substantially as set forth.

3. In a boiler, the combination of the fire-pot, the magazine communicating therewith, said magazine composed of an outer and an inner shell, so as to form a direct air-flue between said shells, the outer shell of the magazine terminating at a point below the upper end of the inner shell, and the sliding annular sleeve encircling the upper end of the outer shell of the magazine and adapted to be actuated to close said air-flue, substantially as set forth.

4. In a boiler, the combination of the outer casing and smoke-sheet forming the outer air-space, the magazine composed of the outer and inner shells, with an air-space between said shells that communicates with said outer air-space, the sliding collar surrounding the upper end of the outer magazine-shell, the lever pivoted to said collar, and means for actuating said lever, substantially as and for the purposes specified.

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

JOHN H. WATERMAN.

Witnesses:

E. S. WHEELER,
O. B. BAENZIGER.