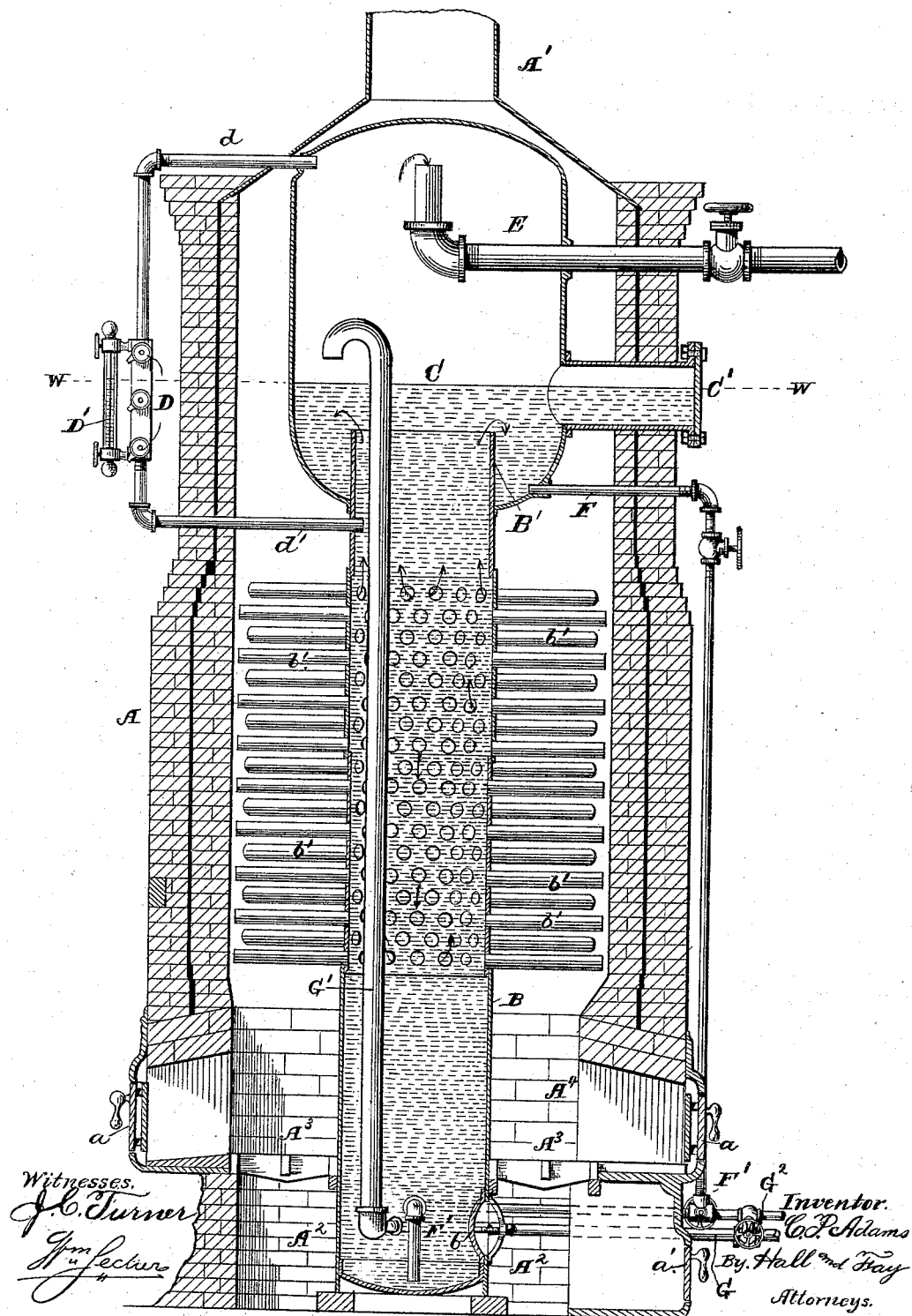


(No Model.)

C. P. ADAMS.
STEAM BOILER.

No. 492,253.

Patented Feb. 21, 1893.



UNITED STATES PATENT OFFICE.

CHARLES P. ADAMS, OF CLEVELAND, OHIO.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 492,253, dated February 21, 1893.

Application filed March 25, 1892. Serial No. 426,396. (No model.)

To all whom it may concern:

Be it known that I, CHARLES P. ADAMS, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The annexed drawing and following description set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be employed. Said annexed drawing represents a vertical section of my improved steam boiler.

In said drawing the letter A indicates the jacket of brick or other material which surrounds the boiler in the manner usual in radial tube boilers and which has a suitable smoke-stack, A', at its upper end.

A vertical stand-pipe, B, is supported upon the foundation of the boiler by any suitable means and has a man-hole opening into the annular ash-pit A², which is beneath the annular grate A³ in the bottom of the annular furnace A⁴. Said furnace has suitable doors, a, affording access to the same, and the ash-pit has suitable doors a', for draft and removal of ashes. The stand-pipe has radial water tubes, b', projecting from its sides from a point above the furnace to a distance from its upper end, said tubes projecting preferably in circular rows and with the tubes in one row projecting so as to alternate with the tubes in the rows above and below it.

The radial water tubes may be of any suitable or desired shape or form, such as straight with the outer ends closed or doubled with both ends fastened into the central stand pipe.

An enlarged steam-dome, C, or steam-drum, is secured to and around the upper, open portion of the stand-pipe, said upper portion or extension, B', projecting up into the lower portion of the steam-dome, a distance above the bottom of the same. A man-hole, C', is

formed inside of the steam-dome to afford access to the interior of the upper portion of the boiler.

Gage-cocks, D, and water-column, D', communicate with the upper end of the steam-dome through a pipe, d, and with the portion of the stand-pipe below the bottom of the steam-dome, through a pipe, d'.

The steam-pipe E enters the steam-dome and has its feed-opening in the upper end of the same.

A blow-off pipe, F, extends from the bottom of the steam-dome, out through the jacket of the boiler, and down to another blow-off pipe, F', which extends from the bottom of the stand-pipe, being connected to said other blow-off pipe.

A feed water pipe, G, enters the lower end of the stand pipe and is continued upward by a vertical pipe, G', of a considerably larger diameter, extending into the dome and having its discharge opening either above or below the water level. The upper end of said vertical pipe is preferably curved downward so as to discharge the feed water in a downward jet.

When the boiler is filled with water to the water-level W—W and fire is started, the heat and products of combustion will ascend from the furnace, passing through the spaces between the radiating water-tubes, and will escape through the smoke-stack, the water in the stand-pipe and water-tubes being heated in the same manner as in all boilers of this kind, of the radiating water-tube or "porcupine" style. The steam generated in the water-tubes will rise, as indicated by arrows, and will collect in the steam-dome, from which it will be taken by the steam-pipe E, and, as the steam-dome is surrounded by hot air and products of combustion and is of greater diameter than the stand-pipe, the steam will be dry, having a large and thoroughly heated separating area, and the boiler will have comparatively slight tendency to priming. The feed water will enter the boiler through the feed water pipe G and will ascend through the larger vertical pipe G' in the stand pipe, where the water will be heated completely or nearly to the temperature of the

surrounding water, owing to the slowness with which it ascends in the larger pipe compared to the pressure and speed with which it enters the lower end of said larger vertical pipe through the smaller feed pipe. As the water ascends slower in the vertical pipe than it enters through the feed pipe, and is exposed to the heat of the water in the stand pipe, the sulphates and carbonates of lime in the water and other impurities, tending to incrust upon the sides and bottom of the boiler and in the water tubes, may partly or entirely be separated and precipitated in the vertical pipe, from which they may be blown out; separate connections, G², of suitable construction being made with the blow-off pipe outside the boiler so that the vertical portion of the feed water pipe may be used as a surface blow-off as well as in the capacity of feed pipe. The water which passes out at the upper end of the vertical pipe will meet with the steam and hot water in the steam dome and the greater part of whatever impurities still remain in said water will be separated and precipitated to the bottom of the steam dome around the extension of the stand pipe. As the water will thus leave the greater part of its impurities in the vertical portion of the feed pipe, and in the bottom of the steam dome, and the remaining impurities may settle in the bottom of the stand-pipe, the lower water-tubes will not be liable to be filled with sediment and to incrust to any serious degree, so that the life of the boiler and the intervals between cleaning may be prolonged. The sediment collected in the bottom of the steam-dome and in the bottom of the stand-pipe may be blown off through the upper and lower blow-off pipes F and F', whenever required or be removed through the man-holes.

It may be desirable, when great steam-generating capacity is desired, to provide several stand-pipes having radial water-tubes, all extending and opening into one common steam-dome.

Other modes of applying the principle of my invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism herein set forth provided the principles of construction

respectively recited in the following claims are employed.

I therefore particularly point out and distinctly claim as my invention—

1. In a steam boiler, the combination of a steam dome, a stand pipe of less diameter than said dome and having an extension projecting through the bottom of said dome a distance above said bottom, and a feed water pipe having its discharge opening in said dome and outside of said extension, substantially as set forth.

2. In a steam boiler, the combination of a steam dome, a stand pipe of less diameter than said dome and having an extension through the bottom of said dome and projecting a distance above said bottom, and a feed water pipe having its discharge opening above the water level in the steam dome and outside of the circumference of the stand pipe extension, substantially as set forth.

3. In a steam boiler, the combination of a steam dome, and a stand pipe of less diameter than said dome and having an extension projecting through the bottom of said dome and a distance above said dome, said extension forming a space in the dome for catching sediment, substantially as set forth.

4. In a steam boiler, the combination of a steam dome, a stand pipe of less diameter than said dome and having an extension projecting through the bottom of said dome and a distance above said bottom, a blow-off pipe in the bottom of the stand pipe, a feed water pipe entering through the bottom of the stand pipe and having a cock connection with said blow-off pipe, and a vertical pipe of larger diameter than the feed water pipe, forming a continuation of the latter, and formed with a downwardly curved discharge end above the water level in the steam dome and outside of the circumference of the stand pipe extension, substantially as set forth.

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 15th day of March, A. D. 1892.

CHARLES P. ADAMS.

Witnesses:

WM. SECHER,
L. D. WOOD.