(No Model.) 2 Sheets—Sheet 1.

H. H. NIEMAN.

FLUE PROTECTOR FOR STEAM BOILERS.

No. 485,112. Patented Oct. 25, 1892.

Fig. 1.

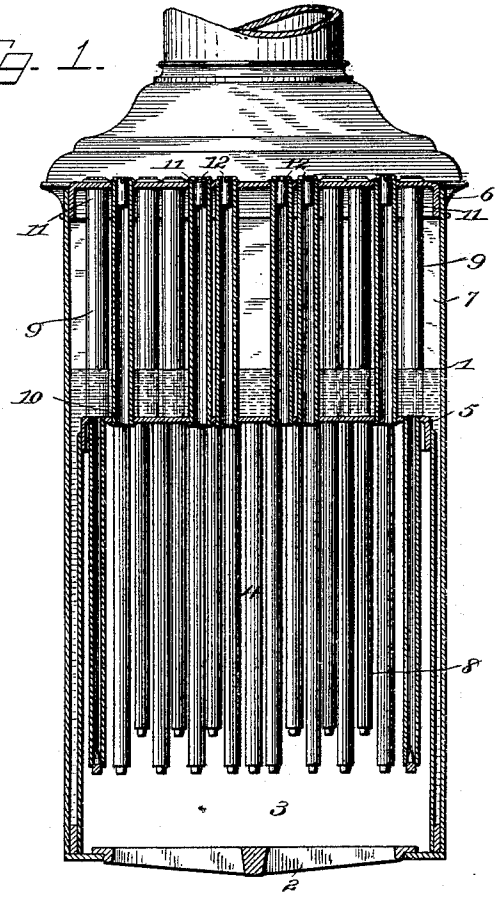
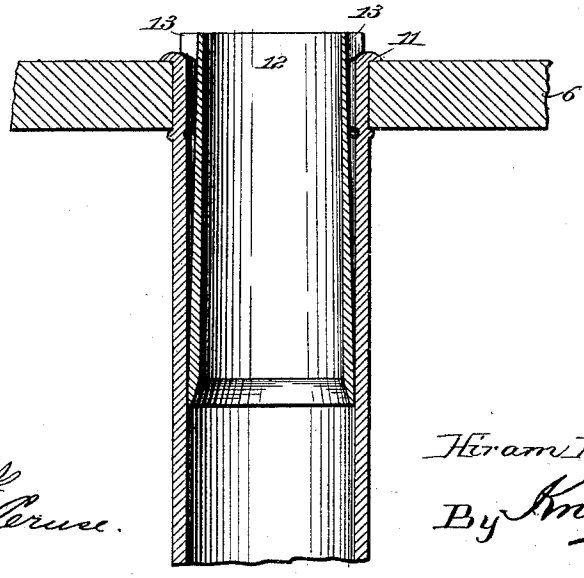


Fig. 2.



Attest:
Walter Famariss
George E. Crouse.

Inventor:
Hiram H. Nieman,
By Knight Bros.
Attys.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

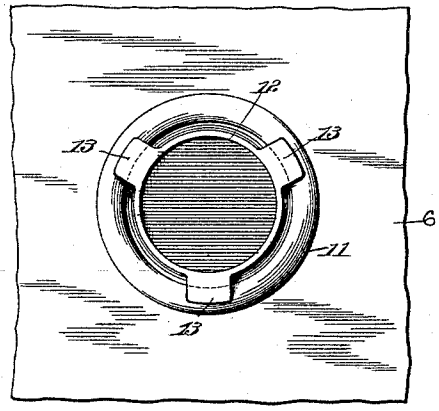


Fig. 4.

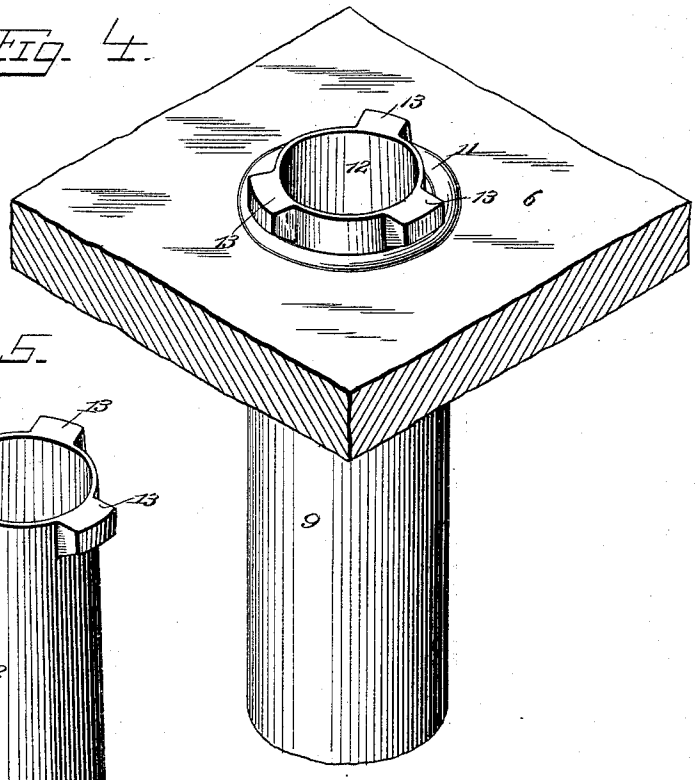
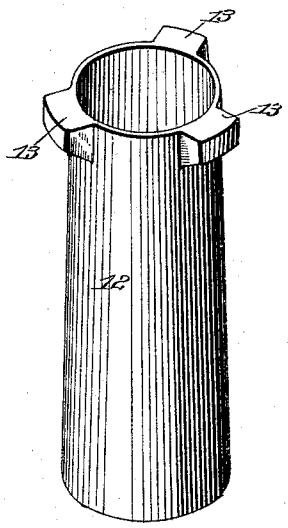


Fig. 5.



Attest:
Walter Famariss
George E. Cruse

Inventor:
Hiram H. Nieman.
By Knight Bros.
Attys.

UNITED STATES PATENT OFFICE.

HIRAM H. NIEMAN, OF CINCINNATI, OHIO, ASSIGNOR TO THE AMERICAN FIRE ENGINE COMPANY, OF SENECA FALLS, NEW YORK.

FLUE-PROTECTOR FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 485,112, dated October 25, 1892.

Application filed May 17, 1892. Serial No. 433,345. (No model.)

To all whom it may concern:

Be it known that I, HIRAM H. NIEMAN, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Flue-Protectors for Steam-Boilers, of which the following is a specification.

In vertical-flue boilers, especially of the class used in steam fire-engines, where smoke-flues extend from the crown-sheet of the fire-box or combustion-chamber to the top head, considerable difficulty has been experienced in keeping the flue-tubes tight in the top head, owing to excessive heating at this point, where the flue-tubes are not protected by water. Hence after an engine has been in continuous service for a considerable time, causing the flues to be overheated, it is sometimes found that the flues will leak in the top head. In order to obviate this difficulty, I have devised a shield or protector consisting of a thimble inserted within the end of the tube which is expanded into the upper flue-sheet or top head. The said thimble flares downward, so that its lower end fits the interior of the tube closely enough to direct the smoke or gases of combustion through the thimble out of contact with the upper end of the flue-tube. The reduced diameter of the thimble at its upper end leaves a surrounding space between it and the expanded end of the flue-tube, the better to protect the latter from the heat, and the upper end of the thimble is provided with radial lugs seated on the expanded and upset end of the flue-tube above the flue-sheet. The said thimbles require no permanent attachment but are inserted with the greatest facility and can be renewed as often as necessary at trifling cost and without requiring the services of a machinist.

In order that my invention may be clearly understood, I will describe it with reference to the accompanying drawings, in which—

Figure I is a vertical section of a steam fire-engine boiler with my invention applied. Fig. II is a vertical section, on a larger scale, of a part of the flue-plate with the upper end of the flue-tube expanded therein and the thimble or shield inserted in the tube. Fig. III is a plan thereof. Fig. IV is a perspective view of the same. Fig. V is a perspective view of the thimble detached.

The external shell 1 of the boiler, grate 2, fire-box 3, combustion-chamber 4, crown-sheet 5, upper flue-sheet 6, main water and steam chamber 7, water-circulation tubes 8 within the combustion-chamber 4, and the flue-tubes 9, extending from the crown-sheet 5 through the main boiler-chamber 7 to and through the upper flue-sheet 6, may have any preferred and suitable construction and arrangement. The lower ends 10 of the flue-tubes are screwed into the apertures in the crown-sheet 5 and their upper ends 11 are upset and expanded within and around the apertures in the upper flue-sheet 6 in customary manner. The lower ends 10 of said flue-tubes being below the water-line are protected from overheating in the proper service of the boiler; but the upper ends 11, having no such protection, are subject to excessive heating, especially during protracted service, and hence after the engine has been run for many hours without intermission leaks are sometimes developed on the top head in the joints where the upper ends 11, of the flue-tubes are expanded in the upper flue-sheet. To obviate this difficulty by protecting the joints or upper ends of the flue-pipes from overheating where they are without water protection, I employ thimbles 12, inserted in the upper ends 11 of the flue-tubes from above the upper flue-sheet 6, the said thimbles flaring slightly downward, so that at their lower ends they fit the interior of the flue-tubes 9 or approximately so. In order to direct the gases of combustion through the said thimbles out of contact with the upper portion of the tube and above the lower end, a space is provided around the thimble within the tube, as clearly shown in Figs. II and III, said space being largest at the extreme upper end of the thimble, at which point the flue-tubes are farthest above the surface of the water, and are consequently subjected to the greatest heat. Lugs 13, which may be three in number, (more or less,) project radially from the thimble near its upper end and are seated on the upset and expanded end 11 of the flue-tube, as

shown in Figs. II, III, and IV. The spaces between the lugs 13 afford communication between the spaces surrounding the thimbles and the space above the flue-sheet for the purpose of equalizing the heated air in the space surrounding the thimbles and retaining it at as low a temperature as possible.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. The combination, with the flue-sheet 6 and the flue-tubes 9, secured therein at their upper ends, of the protecting shields or thimbles 12, supported in the flue-tubes 9 and fitting therein snugly at their lower or inner ends and forming air-spaces between the flue-tubes and their outer ends, which air-spaces communicate with the space above the flue-sheet, substantially as and for the purpose set forth.

2. In combination with the flue-tubes 9, the protecting shields or thimbles 12, supported therein and flaring or increasing in diameter from their outer ends inward, so as to fit the flue-tubes snugly at their inner ends and afford air-space between the flue-tubes and thimbles above their inner ends, said air-spaces being largest at the outer ends which are farthest above the surface of the water in the boiler, substantially as and for the purposes set forth.

3. In combination with the flue-tubes 9, the protecting shields or thimbles 12, supported therein and provided with radial lugs 13, seated in the expanded ends of said flue-tubes, and formed with flaring or increasing diameters from their outer ends inward, so as to fit the flue-tubes snugly at their inner ends and afford air-spaces at their outer ends, said air-spaces being in communication with the space above the expanded ends of the flue-tubes, substantially as and for the purpose set forth.

HIRAM H. NIEMAN.

Witnesses:
C. T. SILSBY,
WILLIAM S. SILSBY.