

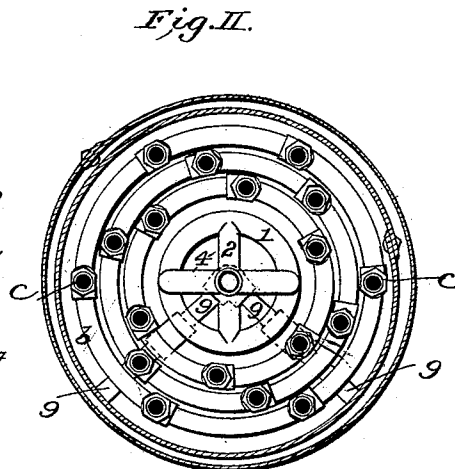
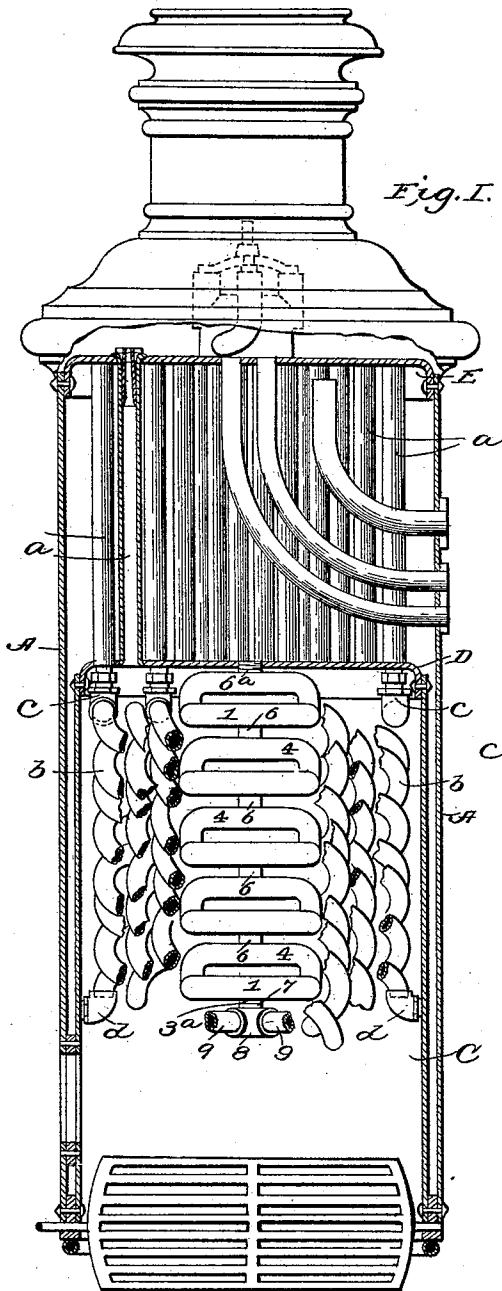
(No Model.)

2 Sheets—Sheet 1.

C. AHRENS.
STEAM BOILER.

No. 495,868.

Patented Apr. 18, 1893.



witnesses:
Henry T. Brown.
Walter E. Allen

Inventor:
Christopher Ahrens.
By Knigh Bros.
Attorneys.

(No Model.)

2 Sheets—Sheet 2.

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Fig. III.

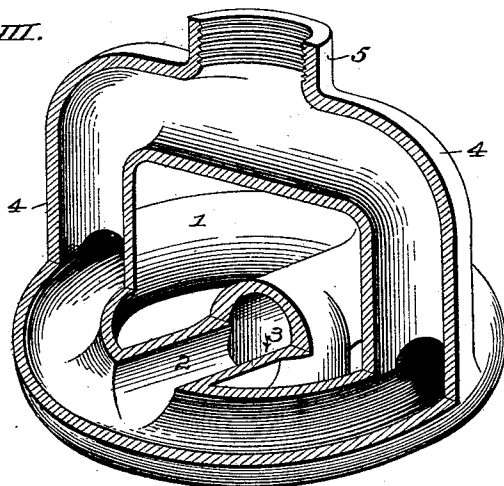


Fig. IV.

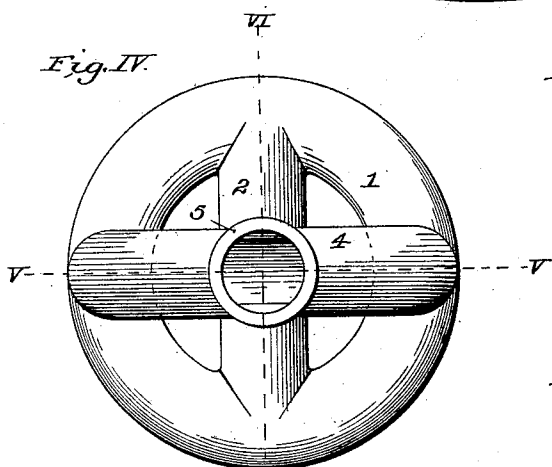


Fig. V.

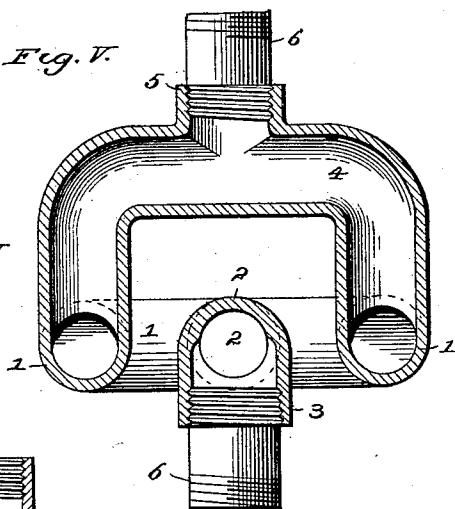
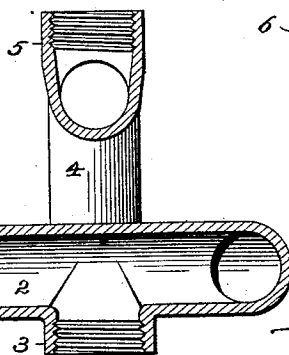


Fig. VI.



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UNITED STATES PATENT OFFICE.

CHRISTOPHER AHRENS, OF CINCINNATI, OHIO, ASSIGNOR TO THE AMERICAN FIRE ENGINE COMPANY, OF SENECA FALLS, NEW YORK.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 495,868, dated April 18, 1893.

Application filed February 6, 1893. Serial No. 461,222. (No model.)

To all whom it may concern:

Be it known that I, CHRISTOPHER AHRENS, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a certain new and useful Improvement in Steam-Boilers, of which the following is a specification.

My invention primarily relates to the class of vertical flue and coiled tube boilers such as described in Letters Patent No. 358,430, granted to the Clapp & Jones Manufacturing Co., assignee of M. R. Clapp, March 1, 1887, in which several concentric spiral coils of water circulation tubes are arranged within the fire-box, said tubes being connected at their lower ends with the annular water space between the fire-box and the outer shell and at their upper ends, through the crown sheet, with the water and steam space between the crown sheet and the top head through which space the vertical flue-tubes pass. The said coiled water-tubes of the Clapp patent referred to, through which a constant and active circulation of water is maintained, afford a large extent of very effective heating surface, but although the said spiral coils are rolled as small as is practicable, there is left a space of considerable diameter in the center of the fire-box unoccupied with water-tubes, which acts as an unobstructed flue, causing an excessive amount of heat to pass up through the central flue-tubes, resulting in their expansion out of proportion with the outer tubes and loosening the joints of the latter, in the crown sheet and top head. To overcome this difficulty, effect a more uniform passage of heat through the flue-tubes, direct the gases of combustion in more effective contact with the coiled water-tubes and at the same time provide additional water circulation passages and heating surface in the hottest part of the fire-box I have devised an improved water-circulating fire-deflector, adapted to occupy the space in the center of the fire-box, within the coiled water-tubes. This consists of a vertical series of hollow rings and connections, which may be constructed of malleable cast-iron each casting consisting of a hollow ring with a tube extending diametrically across it provided at the center with a downwardly projecting

coupling collar, and with vertical legs extending upward at two opposite points of the ring connected at top, forming a yoke, in a plane at right angles to the cross tube first referred to, the said yoke being provided at its center with a coupling collar projecting upward for connection by means of a coupling-tube or nipple with the cross tube of the ring above. Any desirable number of these yoked rings are coupled together in a vertical series so as to reach from the bottom of the coiled tubes to the crown sheet or top of the fire-box. The top of the stack or series of yoked deflecting rings is connected by means of a coupling tube or nipple, through the center of the crown sheet, with the main water space of the boiler and the bottom of the stack or series is connected preferably by two horizontal tubes with the water-back formed by the annular space between the fire-box wall and the outer shell of the boiler. A fire deflector is thus provided, constituted of water-tubes and effecting the following important results. First. By utilizing the space in the center of the fire-box the capacity of a steam fire engine boiler is increased to the extent of two horse power, without increasing the outside dimensions. Second. By deflection the heat heretofore concentrated in the center of the boiler and partially lost, and distributing it more thoroughly among the spiral copper tubes the steaming capacity of the boiler is greatly increased. Third. By deflecting and utilizing the excessive heat, which otherwise passes up through the central flue-tubes, the durability of the boiler is increased and its cost of maintenance is reduced by avoiding leaky flues. Fourth. By this provision for the more thorough and uniform distribution of the heat a more reliable and efficient boiler is produced.

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

Figure I is a vertical section of a steam fire engine boiler, embodying my invention, the central water circulation fire deflectors being shown in elevation. Fig. II is a horizontal section of the same. Fig. III is a sectional perspective view of one of the deflecting yoked rings, on a large scale. Fig. IV is a top view of

one of the said yoked rings. Fig. V is a vertical section of the same on the line V—V. Fig. VI is a vertical section thereof on the line VI—VI.

- 5 The outer shell A—fire-box C, crown sheet D, top head E, flue-tubes *a* and the coiled water-tubes *b* with their connections *c*, *d*, may be constructed and arranged substantially as shown and described in the Clapp patent, No. 358,430, already referred to.

- 10 Each malleable iron hollow casting of which my improved water-tube fire-deflector is constructed, consists of a ring 1, a diametric connecting tube 2, a coupling collar 3, projecting downward from the center of said tube, a vertical yoke 4 connected with the hollow ring 1 at points intermediate of the openings into the tube 2, and a coupling collar 5 projecting upward from the center of the yoke, for the reception of a coupling tube or nipple 6 by which it is connected with the bottom collar 3 of the casting next above, as shown in Fig. I. The top nipple 6^a, of the series passes through the center of the crown sheet D, forming a connection with the main water and steam space. The bottom collar 3^a at the lower end of the series is connected by a tube or nipple 7 with a coupling 8 of L or other suitable form from which diverging tubes 9 extend to the wall of the fire-box C forming connections with the water-back or annular space between the said fire-box wall and the outer shell A.

- 35 By the construction and connections above-described a fire deflector is provided, occupy-

ing the central space within the coiled tubes *b* and through which active water circulation is kept up thus providing very effective additional heating surface without any increase in outside dimensions, and greatly increasing the effect of the coiled tubes *b* themselves by deflecting the heat more thoroughly among them.

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

1. The hollow fire deflector consisting of a ring 1 diametric connecting tube 2, vertical yoke 4 and coupling collars 3 and 5 substantially as shown and described.

2. A fire deflector for steam boilers consisting of a connected series of yoked rings each having a diametric connecting tube transverse to the vertical yoke substantially as set forth.

3. The combination of the vertical series of fire deflectors, 1, 2, 4, connecting tubes or nipples 6, and the tubes and nipples 6^a connecting the united series of fire deflectors with the water-back and main water space respectively, substantially as described.

4. In combination with the coiled water-tubes *b* the fire deflectors 1, 2, 4, occupying the central space within said coiled tubes and serving to distribute the heat among said coiled tubes substantially as described.

CHRISTOPHER AHRENS.

Witnesses:

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E. M. ENGLISH.