(No Model.) 2 Sheets—Sheet 1.

E. BLASS.

STEAM BOILER.

No. 456,689. Patented July 28, 1891.

Fig. 2.

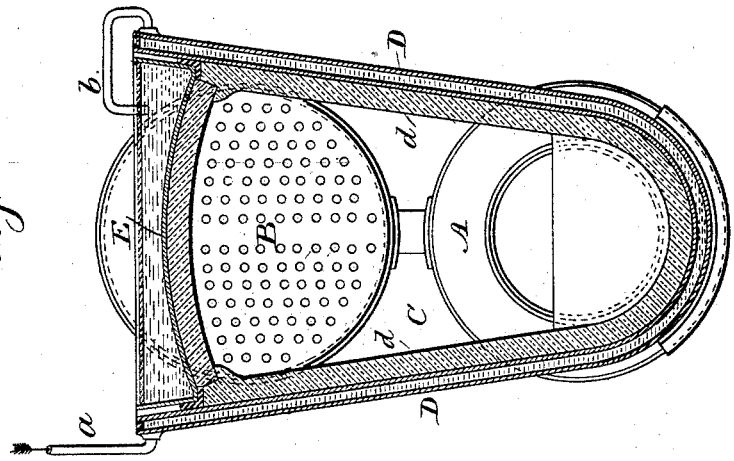


Fig. 1.

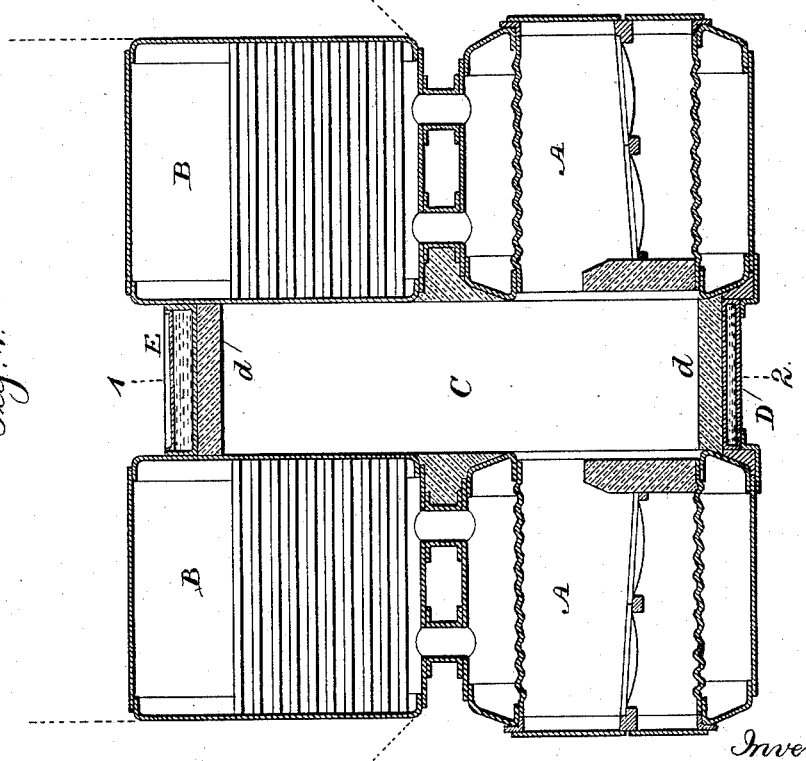
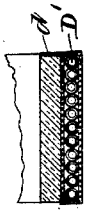


Fig. 3.



Witnesses
Chas. H. Smith
J. Stahl

Inventor
Edward Blass
per Lemuel W. Serrell
Atty

(No Model.) 2 Sheets—Sheet 2.

E. BLASS.

STEAM BOILER.

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Fig. 4.

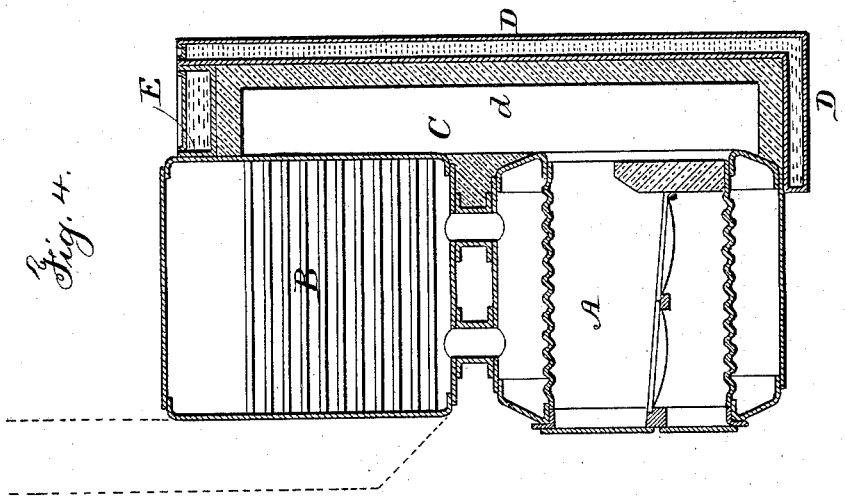


Fig. 5.

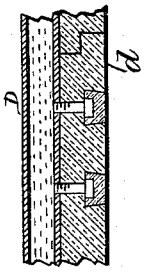


Fig. 6.

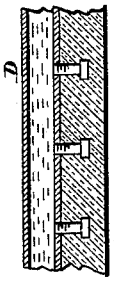
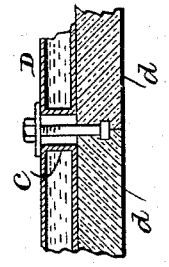


Fig. 7.



Witnesses

Chas. H. Smith

J. Stair

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UNITED STATES PATENT OFFICE.

EDWARD BLASS, OF ESSEN-ON-THE-RUHR, GERMANY.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 456,689, dated July 28, 1891.

Application filed October 8, 1890. Serial No. 367,430. (No model.) Patented in Germany July 15, 1888, No. 45,935, and in England November 29, 1888, No. 17,412.

To all whom it may concern:

Be it known that I, EDWARD BLASS, a subject of the Emperor of Germany, residing at Essen-on-the-Ruhr, Prussia, have invented an Improvement in Steam-Boilers, (for which Letters Patent have been granted in Germany, dated July 15, 1888, No. 45,935, and in Great Britain, dated November 29, 1888, No. 17,412,) of which the following is a specification.

This invention relates to steam-boilers which comprise a part containing a fire-box and one or more parts provided with tubes; and it consists in a separate water-jacket lined with fire-brick and forming the back flue of the boiler, there being a pipe for the supply of water to run through such jacket into a trough over the flue.

In the drawings, Figure 1 is a longitudinal vertical section, and Fig. 2 a transverse section on line 1 2, Fig. 1, of two boilers, each composed of the fire-box part A and the tubular part B. C is the flue connecting together the parts A and B. The said flue consists in an inner wall of fire-brick or other fire-proof material and a shell D E of sheet metal, the part D of the latter forming a water-jacket, which incloses the said wall at the sides and the bottom, while the part E forms a trough covering the wall at the top. Into the jacket D water is introduced at *a*, and it flows out of the same into the trough E at *b*.

Fig. 3 shows in section a water-jacket D′, consisting in a row of juxtaposed tubes through which water is caused to circulate in like manner as through the shell D. The said tubes are preferably inclosed by an outer shell of sheet metal.

Fig. 4 represents a water-jacket D, applied to a flue C, which connects together the parts A and B of a single boiler, the jacket extending in this case over the whole back of the flue. The protecting-shell may also consist in a single sheet-metal wall, above which are arranged perforated water-pipes, by means whereof water is caused to flow over and along the shell in view of cooling it.

The fire-proof material may be secured to the shell by screws or bolts, whose heads are protected by the former. Thus Fig. 5 shows an arrangement for fastening bricks *d* to the shell by means of screws having their heads sunk into recesses of the bricks, the said recesses being subsequently filled up with fire-proof clay. If the inner part of the flue is to consist in a layer of clay applied to the shell, the construction shown by Fig. 6 is available, in which the clay is represented as a layer inclosing bolts screwed into the metal. According to Fig. 7, the connection between the bricks *d* and a water-jacket shell is established by bolts passing through tubes *c*, which traverse the jacket and are fixed in the walls thereof.

I claim as my invention—

1. The combination, with a boiler having a fire-box and return-flues, of a back flue having a lining of fire-brick, and a double shell of sheet metal surrounding the same and forming a water-jacket separate from the boiler, and a pipe for supplying water to run through such jacket, substantially as specified.

2. The combination, with a boiler having a fire-box and return-flues, of a back flue having a lining of fire-brick, and a double shell of metal surrounding the same and forming a water-jacket separate from the boiler, and a pipe for supplying water to run through such jacket, and a trough over the flue, substantially as specified.

Signed by me this 2d day of October, 1890.

EDWARD BLASS.

Witnesses:

WM. DOUGLAS MOORE,

JAMES G. MCMURRAY.