

(No Model.)

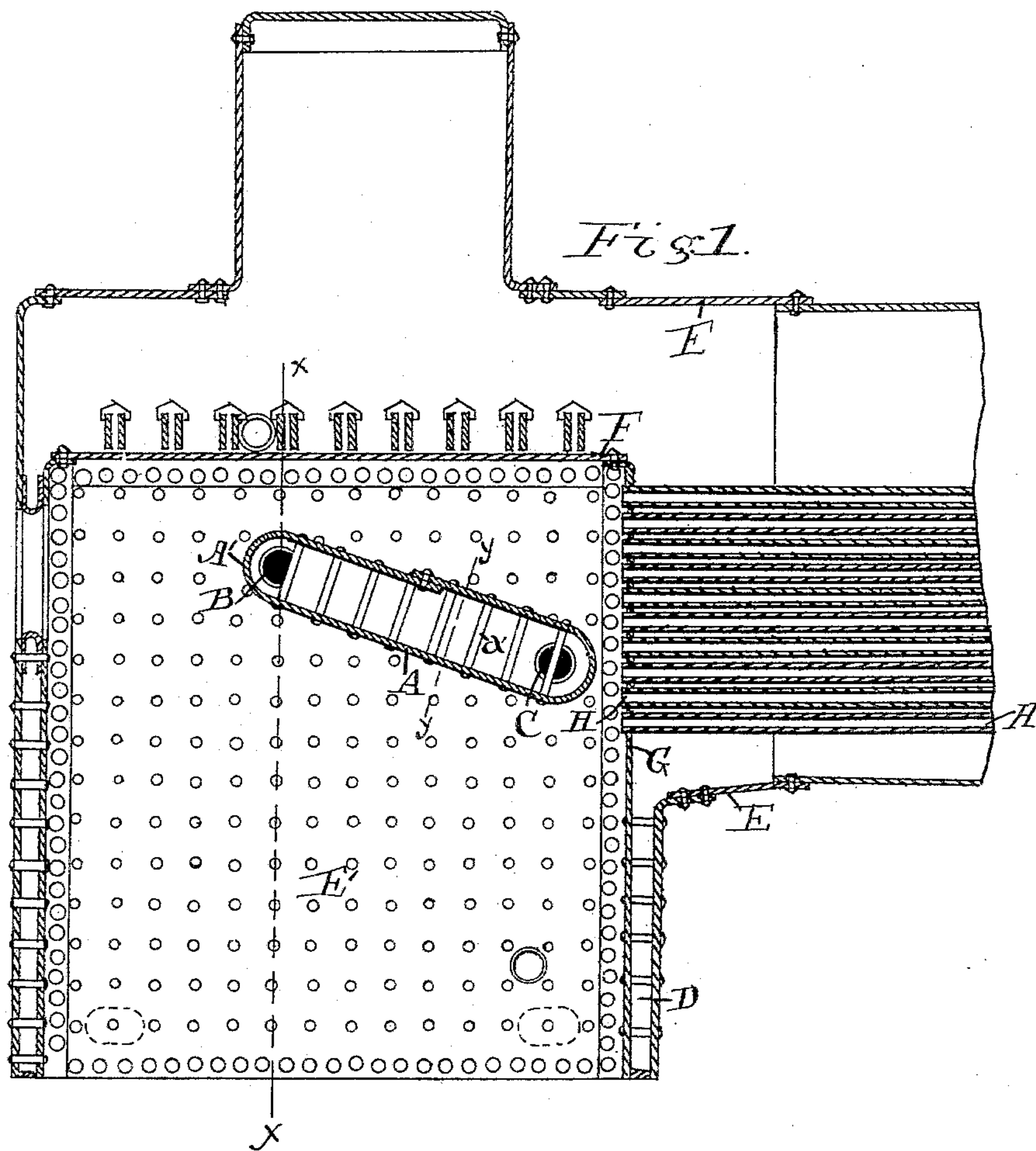
2 Sheets—Sheet 1.

W. TITCOMB.

WATER DIAPHRAGM FOR STEAM BOILERS.

No. 339,599.

Patented Apr. 6, 1886.



Witnesses:

B. D. Currie
E. J. Clark

Inventor:

Wm. Titcomb
by J. H. Bates,
his atty.

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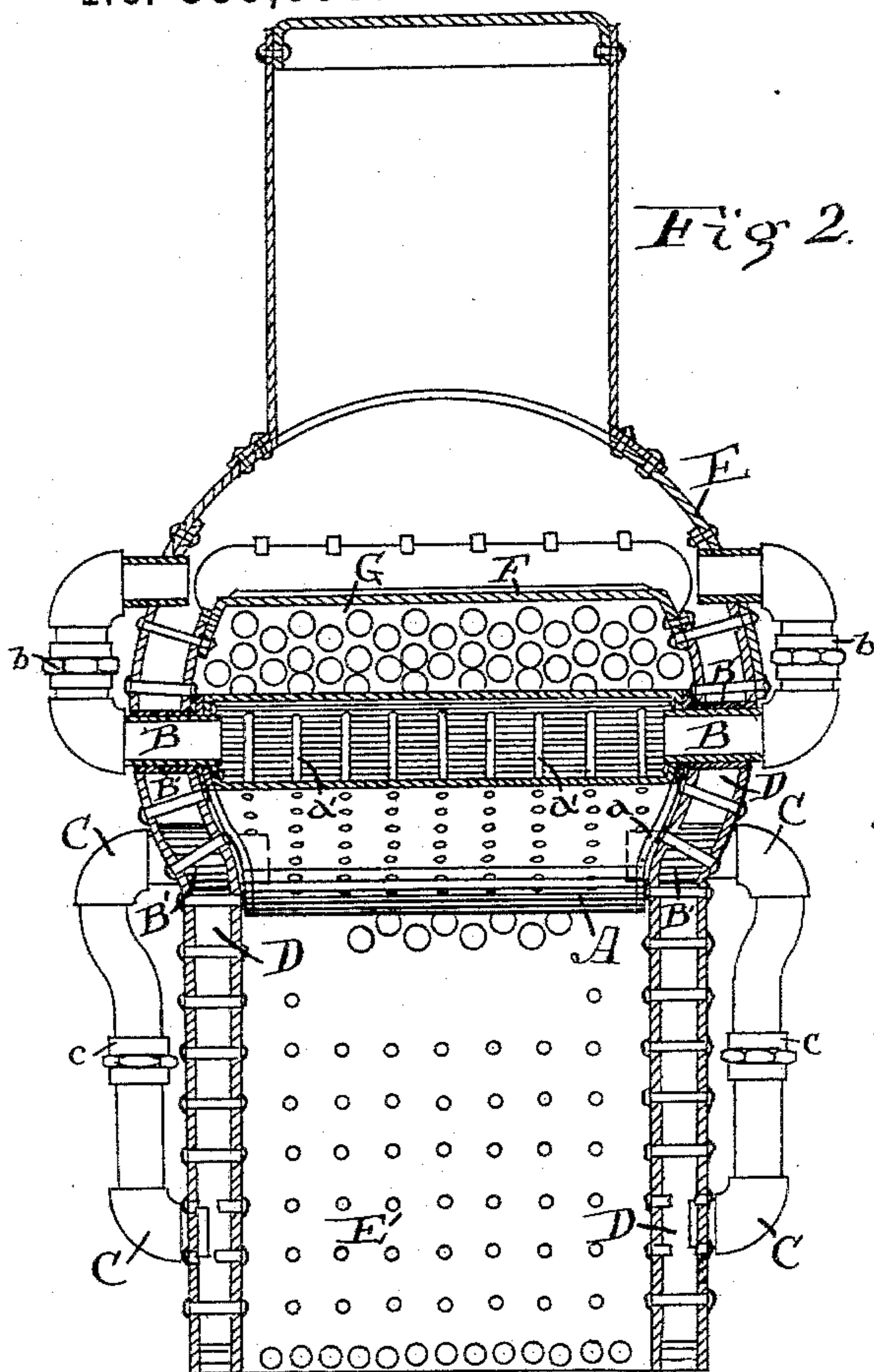


Fig 2.

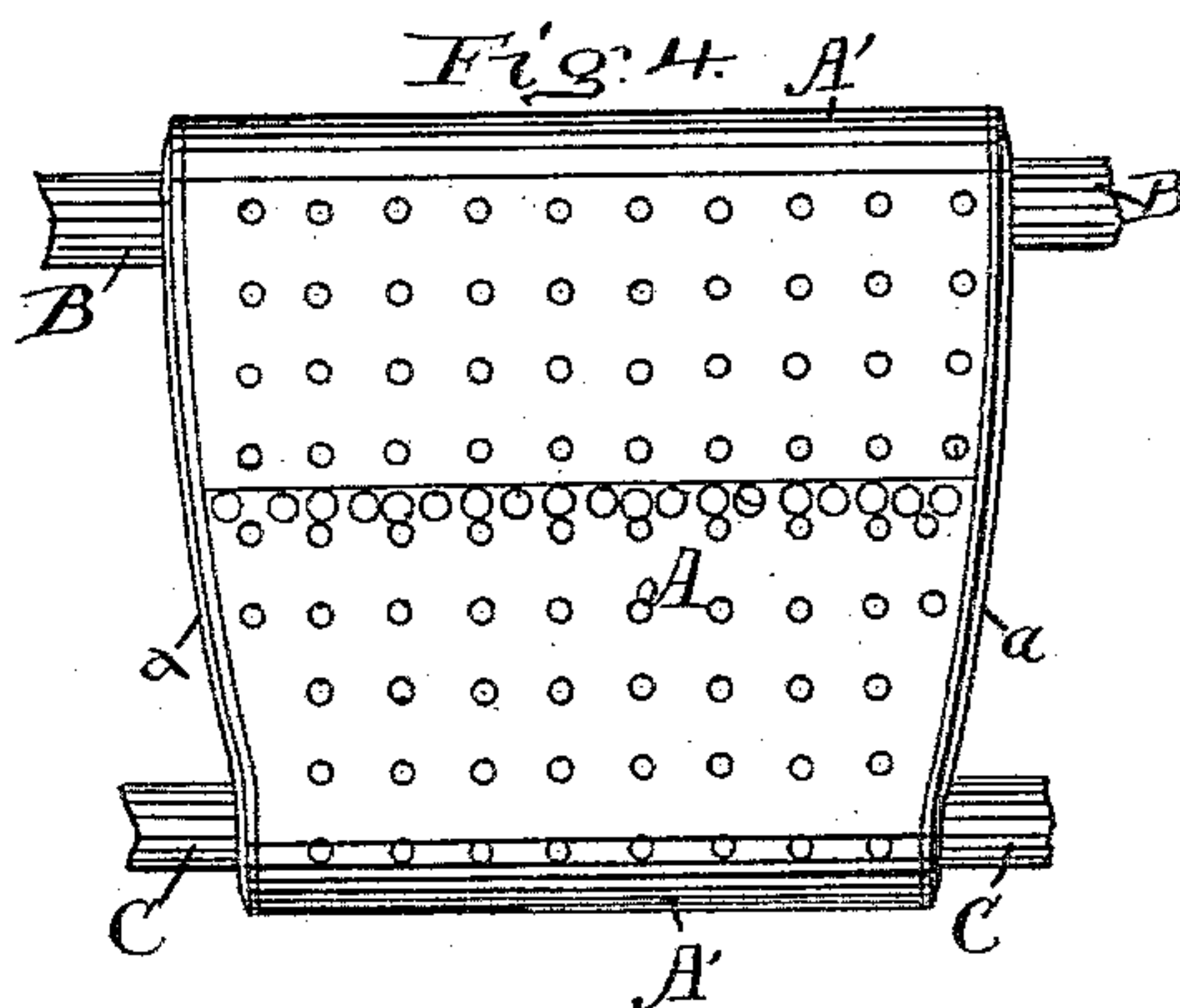


Fig. 4. A'



Fig. 5.

Witnesses:

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UNITED STATES PATENT OFFICE.

WINSLOW TITCOMB, OF WATERVILLE, MAINE.

WATER-DIAPHRAGM FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 339,599, dated April 6, 1886.

Application filed December 18, 1885. Serial No. 186,069. (No model.)

To all whom it may concern:

Be it known that I, WINSLOW TITCOMB, a citizen of the United States, residing at Waterville, in the county of Kennebec and State of Maine, have invented certain new and useful Improvements in Water-Diaphragms for Steam-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 and figures of reference marked thereon, which form a part of this specification.

My invention relates to water-diaphragms for steam-boilers, particularly those of locomotives; and the object of my invention is to provide a water-diaphragm to be placed in the fire-box of a locomotive to divert the fire against the crown-sheet, which diaphragm shall be so constructed as to insure a perfect water-circulation with the boiler, and which shall be readily removed in case repairs to the flue-sheet or any part of the fire-box are necessary.

One of the difficulties with the locomotive as now ordinarily constructed is, that the strong blast coming up through the coal-fire frequently carries with it masses of coal, and, forcing them against the flue-sheet, plugs up the flues. To remedy this difficulty and to deflect the fire upward and backward against the crown-sheet, for the purpose of increasing the heating-surface, arches or diaphragms of fire-brick are sometimes used. These fire-brick arches rest on brackets attached to the sides of the fire-box, and it sometimes happens that when the fire has been drawn the walls of the fire-box are made to crack and leak, because the fire-brick arch holds its heat and keeps the adjacent walls of the fire-box expanded while the rest of the boiler is cooling off. They also fill up the space within the fire-box to such an extent that when any repairs are to be made on the flue-sheet, &c., the arches have to be taken down and rebuilt—an operation attended with considerable labor and expense. Water-arches have sometimes been used to overcome this difficulty and to increase the heating-surface of the boiler; but such arches have not come into general use, because, being attached to the boiler in a more or less permanent manner, they have been in the way when

it was desired to make repairs within the fire-box.

In constructing my water-diaphragm I connect it with the water-space of the boiler by pipes opening from the top and bottom of the diaphragm, and thence passing through the water-legs at the sides of the fire-box and returning into the water-space, the pipes being coupled in such a way that they can be unscrewed from the outside of the boiler and removed from the diaphragm, which is then perfectly free to be removed by slipping down inside the fire-box.

In the accompanying drawings, in two sheets, Figure 1 is a central longitudinal section through a locomotive-boiler containing my device. Fig. 2 is a section through *xx* of Fig. 1. Fig. 3 is a section through the diaphragm at *yy* of Fig. 1. Fig. 4 is a plan or top view of diaphragm.

E is the locomotive-boiler, and *D* the water-legs or water-space around the fire-box.

E' is the fire-box, *F* the crown-sheet, and *G* the flue-sheet and *H* the flues.

A is the water-diaphragm, its ends *A'* *A'* being rounded and its sides *a a* being somewhat rounded, to enable it to be put into place with an easy fit, as will be hereinafter explained.

a' a' are stay-bolts. When placed in the fire-box, the diaphragm extends the entire width from side to side of the fire-box, and from a point a short distance—say three inches—from the ends of the lower flues backward and upward to a point sufficiently far from the door and below the crown-sheet to allow of a free passage for the products of combustion. I prefer to place the lower side of the diaphragm on a line from the ends of the lower flues to the top of the door, and the ends being about three inches and twenty inches from the ends of the flues and the door, respectively. The position and size of the diaphragm is a matter that is to be governed by circumstance. Two pipes, *B B*, are screwed into the sides of the upper end of the diaphragm *A*—one on each side—and these pipes pass through bushings *B'* out through the water-space *D* to the outside of the boiler. From thence the pipe *B* goes upward, and is tapped into the boiler at some point below the low-water line. The union-joint *b* connects the ends of the pipe. The bushing *B'* makes a steam-tight fit with the boiler; but the pipe

B may pass through the bushing with an easy fit. The two pipes C C lead from the lower end of the diaphragm A in the same manner as the pipes B, and are tapped into the boiler at a point well down on the water-leg, opening into the water-space D. The pipes C are also supplied with unions *c*. As here shown, the weight of the diaphragm is sustained by the pipes B B and C C; but brackets may be riveted to the inside of the fire-box immediately below each pipe to relieve the pipes from the strain and sustain the diaphragm when the pipes are being removed. When the boiler is fired up, the diaphragm deflects the fire upward against the crown-sheet, and also prevents the plugging of the flues, as before described. As fast as the water in the diaphragm is heated, it passes out of the pipes B and thence into the upper part of the water-space of the boiler, where the water is hottest, while the cooler water from the bottom of the water-legs is drawn in to take its place. By connecting thus with the upper and lower portion of the water-space of the boiler I secure the best possible circulation of water through the diaphragm. By drawing a supply from the cooler water in the bottom of the water-leg I materially improve the circulation in the water-legs themselves, and also of the rest of the boiler.

When it is desired to remove the diaphragm for making repairs within the fire-box, the union-joints *b b* and *c c* are uncoupled, and the pipes B B and C C are unscrewed from the diaphragm, operating from the outside. The diaphragm, being now disconnected from the boiler, may be turned sidewise and slipped down inside the fire-box. The sides of the diaphragm being somewhat curved, as shown in Fig. 3, the diaphragm can be readily turned inside the fire-box and made to fit quite close

at the sides. It is desirable to have the diaphragm fit as closely as may be against the sides of the fire-box, to protect the pipes B and C as much as possible from the fire, which would otherwise tend to destroy the screw-thread which enters the side of the diaphragm, and prevent its being readily unscrewed. If brackets are used underneath the pipes, as has been mentioned, the pipes receive an additional protection from the fire.

When it is desired to clean out the diaphragm, the pipes C C are unjointed just outside the boiler, and water or steam blown through from one side to the other. The space between the end of the diaphragm and the flue-sheet allows the cinders which collect on top of the diaphragm to drop down through to the fire.

I claim—

1. In a locomotive-boiler, a water-diaphragm connected with said boiler by pipes passing through the water-legs of said boiler, and thence returning into said water-legs, said pipes having union-joints or other suitable connections which adapt them to be readily removed from said diaphragm, disconnecting it from the boiler, substantially as described.

2. In a locomotive-boiler, a water-diaphragm connected with the lower portion of the water-legs of said boiler and with the upper portion of the water-space of said boiler by pipes passing outward through said water-legs, and thence returning into said boiler, said pipes being provided with union-joints, all substantially as and for the purposes set forth.

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

WINSLOW TITCOMB.

Witnesses:

H. D. BATES,
S. W. BATES.