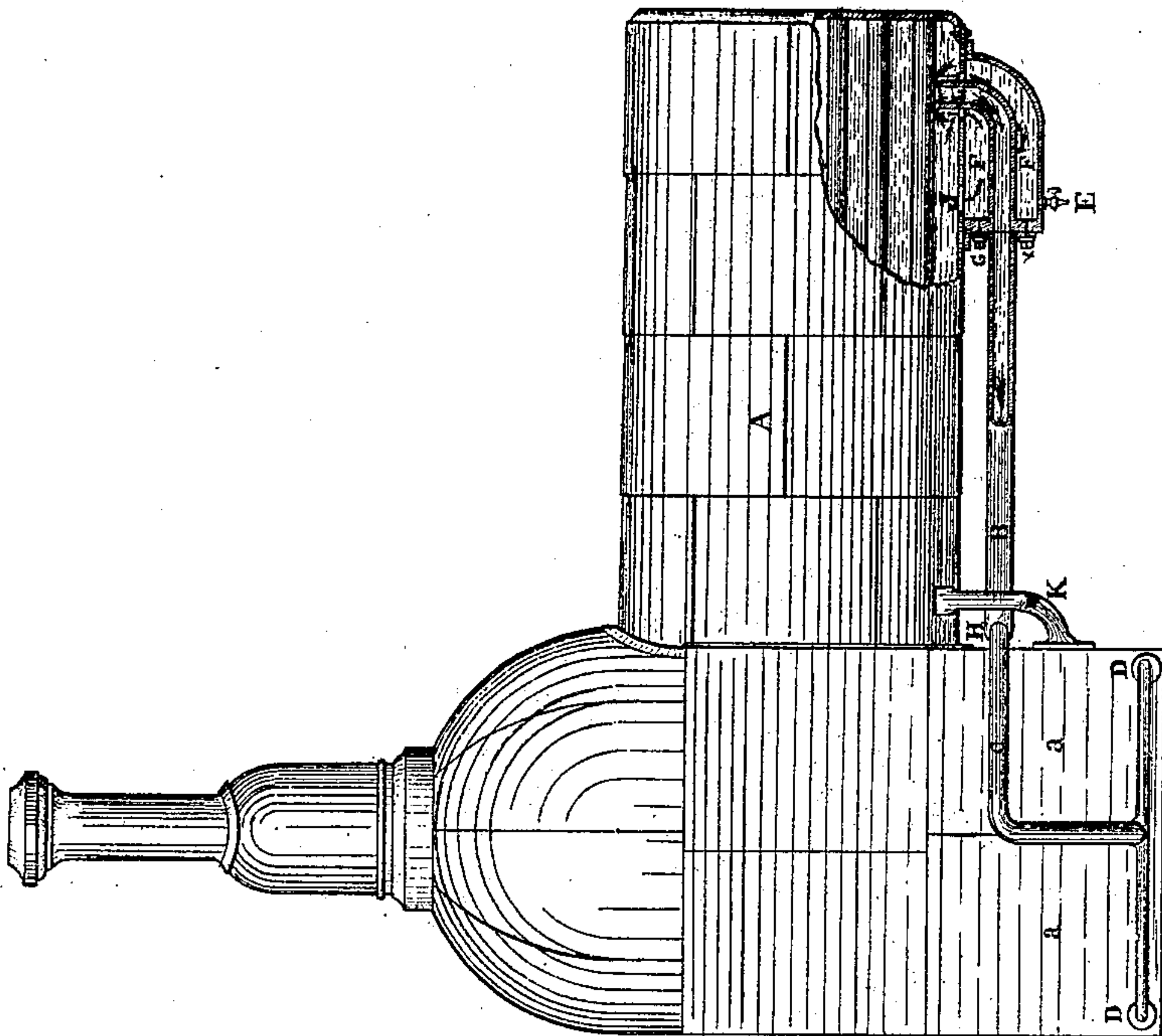


W. B. MACK.
STEAM BOILER.

No. 109,829.

Patented Dec. 6, 1870.



A. LOCOMOTIVE BOILER.

a.a. FIRE BOX.

B. EDUCATION PIPE.

C. INDUCTION PIPE.

.. Branching to each side of Fire Box

D.D. EXTENSION OF PIPE C.

F. RESERVOIR FOR MUD.

II. OPENINGS FROM THE BOILER
INTO THE RESERVOIR.

E. BLOW-OFF COCK.

G. COUPLING OF FLANGE

to connect Education Pipe with Mud Reservoir

K. BRACKET

to support Education Pipe in Position.

H. THE POINT IN THE EDUCATION PIPE B.
WHERE THE BRANCHES C.C. SEPARATE
TO EACH SIDE OF THE FIRE BOX.

T. THE POINT WHERE THE EDUCATION
PIPE ENTERS THE CYLINDER
PART OF THE BOILER.

I. EXTRA OPENING INTO MUD CHAMBER.

WITNESSES

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WILLIAM B. MACK, OF DETROIT, MICHIGAN, ASSIGNOR TO DIVIE BETHUNE DUFFIELD, OF SAME PLACE.

Letters Patent No. 109,829, dated December 6, 1870.

IMPROVEMENT IN STEAM-BOILERS.

The Schedule referred to in these Letters Patent and making part of the same.

I, WILLIAM B. MACK, of Detroit, in the county of Wayne and State of Michigan, have invented a certain Improvement in Locomotive and Marine Boilers, of which the following is a specification.

The Nature and Object of the Invention.

The nature of my invention consists in the construction and arrangement of devices whereby a constant and equable circulation or current of the water in locomotive or marine boilers is obtained, carrying said water from the region of the cylinder-part of the boiler, furthest removed from the fire, to the lowest part of the fire-box, or that part usually termed the leg of the boiler; and

Its object is actively to distribute the heated water equally and uniformly to all points or parts of the boiler, thereby causing a more even expansion of the boiler-plates, and greatly lessening their liability to rupture, as well as the liability and danger of explosion.

A Description of the Accompanying Drawing.

Figure A is a side view of a locomotive-boiler.

a a is a side view of fire-box in the same.

Figure B is an eduction-pipe, entering the shell of the boiler, and carried through the mud-reservoir *F* to the point *H*, where it branches off to each side of the fire-box.

Figure C is the induction-pipe, connecting with or leading out of B at the point *H*, and ending at points *D D*, where it enters the fire-box.

Figure *F* is the mud-chamber or reservoir, with blow-off cock *E* attached below.

Figure *G* is the coupling or flange which connects that portion of the pipe B which runs through the mud-chamber *F* with that part of it which passes on to the point *H*.

Figure *H* is the point where the pipe B is divided into the pipes *C C*.

Letters *i i* are the openings out of the boiler into the mud-reservoir, to admit the passage of the mud into the mud-chamber without passing through the pipe B.

Letter *K* is a bracket or brace to support the eduction-pipe firmly in position.

Letter *L* is the entrance-pipe leading to the eduction-pipe B.

Two arrows indicate the course of the water after its entrance into the eduction-pipe in its onward and circulating course, so far as the same can thus be shown.

Letter *J*, extra opening into mud-chamber.

General Description.

The eduction-pipe B is let into the lower side of the

cylinder portion of the shell of the boiler at a point furthest removed from the fire, the opening in the boiler being of larger diameter than that of the pipe, which is held firmly in place by braces, so as to admit a free passage of water or sediment around the same into the mud-chamber.

It is then carried from its point of connection with this part of the boiler to the point *H*, either inside the cylinder-part of the boiler and brought out at the point *H*, or outside of and underneath the cylinder-part of the boiler, as shown in the drawing.

At this point *H* the pipe B can be reduced in diameter, and is carried to each side of the fire-box *a a*, where it is turned into and enters either at the side or bottom, and at one of its lowest points, and where the fire acts with its greatest intensity.

This entrance may be made at one point directly, or at more, if required. In the accompanying drawing it is represented as entering at two points *D D* on each side of the fire-box.

In boilers whose shape will admit of it the entire conducting-pipe B and *C C* may be carried to the fire-box *a a*, inside of the boiler-casings, and without coming through the outside plates at any point.

The water, it will be seen, is carried by its own gravity from the cylinder-part of the boiler furthest removed from the fire, through the pipe B, to the point *H*, where it branches off, following the divisions *C C*, and entering the fire-box or shell *a a* at the points *D D*.

The coldest portion of the water in the boiler is found at the mouth of pipe *L*, and the induction-pipe B is employed in a constant conveyance of this comparatively cold water to the fire-box *a a*, where the water is the hottest, the effect being, as already intimated, to subject the entire body of water in the boiler, at some time, to that part of the fire-box where the heat is most intense.

A mud-chamber, *F*, with its point *L* cast in one piece, is provided with openings *i i*, so that the mud or sediment which is carried or may be carried along with this current of water to the points, as described, may pass through them, *i i*, and be deposited in said mud-chamber *F* without entering eduction-pipe B.

The blow-off cock *E* is placed at the bottom of this mud-chamber *F*, in order that any or all mud or sediment which is thus received into the mud-chamber may be blown off and ejected whenever necessary.

The extra opening *J*, from boiler into mud-pipe, is made so as to allow escape of water, displaced by mud or sand deposits, through *i i*, or *vice versa*, as appears by arrows drawn for illustrating the course of the current of water through and out of mud-chamber.

Claim.

I claim as my invention—

The construction and arrangement of the mud-chamber F with its pipe L and the blow-off cock E, the openings i i and flange G, and its combination with the conducting or circulating pipes B and C,

substantially as and for the purposes hereinbefore set forth.

WILLIAM B. MACK.

Witnesses:

HENRY H. SWAN,
HENRY M. DUFFIELD.