

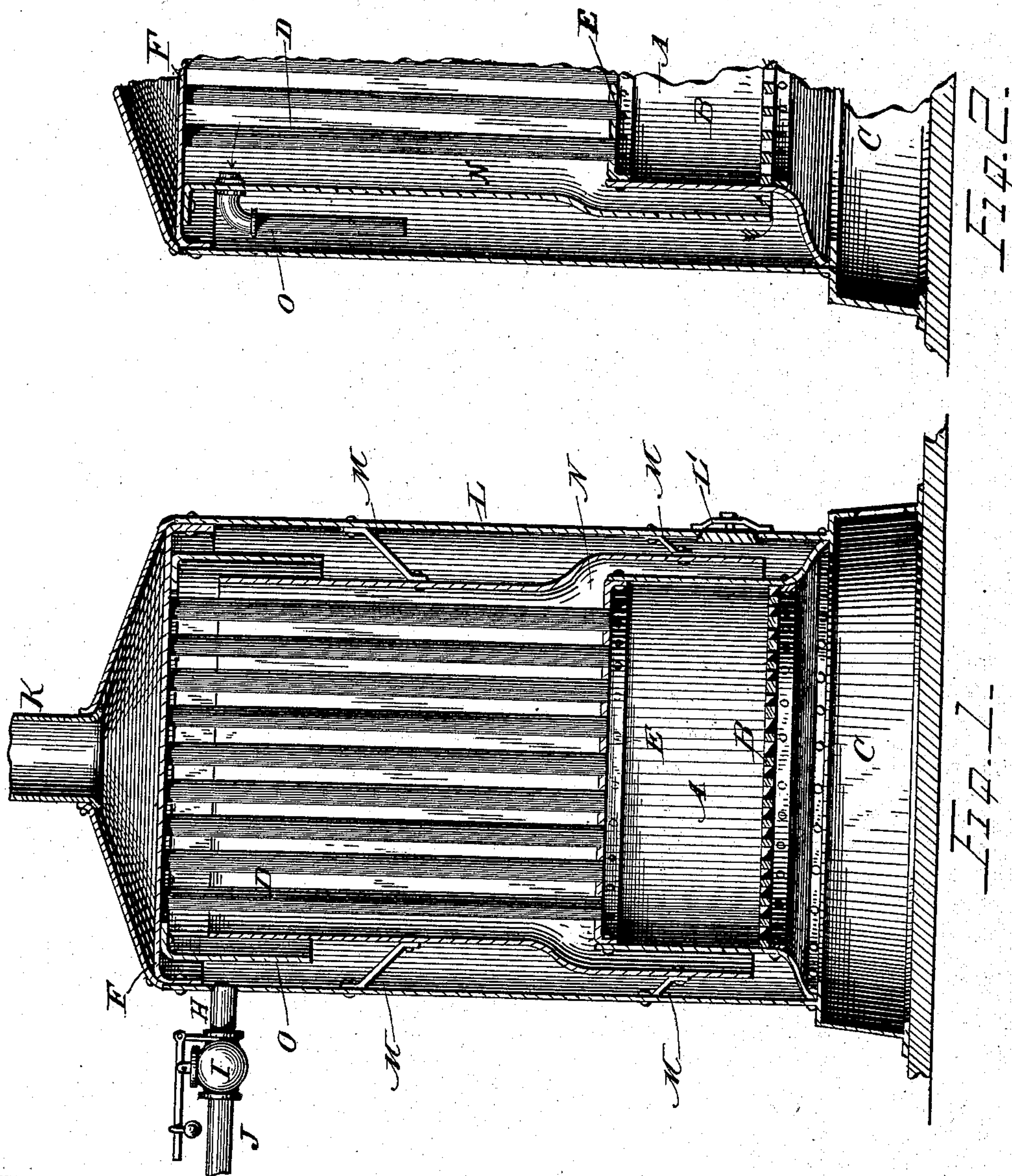
(No Model.)

B. N. PAYNE.

STEAM BOILER.

No. 322,475.

Patented July 21, 1885.



WITNESSES:

Wm S. Quay
L. H. Hills

INVENTOR

B. N. Payne.
BY *E. B. Stocking*
ATTORNEY

UNITED STATES PATENT OFFICE.

BENJAMIN N. PAYNE, OF ELMIRA, NEW YORK.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 322,475, dated July 21, 1885.

Application filed April 18, 1885. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN N. PAYNE, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification, reference being had to the accompanying drawings.

This invention has relation to steam-boilers, and is illustrated in connection with that class known as "vertical," and is connected in principle with that class which is provided with means for producing currents in the water within the boiler, the object being to produce and control such currents in such manner as to positively deposit sediment and foreign substances in the water at convenient points for removing the same, and to prevent the adhesion of the same to the flues, crown-plate, shell, or other portions of the boiler where it would prevent the rapid production of steam and otherwise impair the operation of the boiler.

The invention consists in certain features of construction hereinafter described, and particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a vertical section of a boiler constructed in accordance with my invention. Fig. 2 is a vertical section showing a modification of my invention.

Like letters indicate like parts in both figures.

A represents the fire-box; B, the grate; C, the ash-pit; D, a series of fire-tubes passing from the crown-sheet E to the head F of the boiler proper.

H represents the steam exit-pipe, which is provided with the safety-valve I, and connects with any ordinary supply-pipe J.

The stack or up-take K may be arranged in any suitable manner to receive the products of combustion.

L represents the shell or outer casing of the boiler proper, and is provided with the hand-hole or cover L', preferably arranged near the base of the boiler.

By means of any suitable supporting-stays, M, I support between the tubes D and the shell a vertical cylindrical diaphragm, N, which extends from near the bottom to near

the top in one form of my invention, and completely to the top or head of the boiler in the modification of the invention. In both forms the diaphragm N is of such relative diameter as to form an annular space between itself and the shell, and a similar space around the tubes and between itself and the walls of the fire-box. These two annular spaces communicate directly with each other at the bottom of the boiler, and indirectly with each other at the upper end of the same. This indirect connection at the upper end of the boiler, which I provide, may be either a secondary diaphragm, O, secured to and depending from the upper head of the boiler, or it may be a series of bent pipes leading through the diaphragm and depending downwardly within the outer annular space between the shell and the diaphragm.

This being the construction, the operation is as follows: As the heated water rises it flows in the one instance over the upper end of the cylindrical diaphragm N, and, striking against the depending diaphragm O, is directed downward in the outer annular space until it reaches the bottom of the diaphragm N, when it again rises within the inner annular space to repeat the circuit, and any sediment or substance of greater specific gravity than the water is naturally finally deposited in the base of the boiler below the lower end of the diaphragm N and within easy access of the hand-hole L'. In the other instance the same course is taken by the water except that it passes through the curved depending pipes O. It is readily understood that by reason of the contact of the water with the walls of the fire-box, and with the series of fire-tubes, it becomes quickly heated and rises within the diaphragm, and thence passes over the same or through the bent pipes secured to the same, and is by said pipes or the secondary diaphragm O positively deflected in a downward current, as above described. In both constructions steam is taken from the upper portion of the shell and from the outer annular space, and the upper ends of the flues are, by the constant circulation of the water, prevented from undue expansion, overheating, and burning.

I do not limit my invention to the exact con-

struction shown, but reserve my right to change the same to horizontal boilers and for other purposes, and to any extent and in any manner within the skill of persons conversant with boiler construction.

Having described my invention and its operation, what I claim is—

1. In a boiler of the class described, the combination, with its outer shell, fire-box, and tubes, of a continuous cylindrical diaphragm extending from near the bottom of the fire-box upwardly to near the top of the same, and a depending secondary diaphragm or its described equivalent arranged between the main diaphragm and the shell, substantially as specified.

2. In a steam-boiler of the class described,

the combination, with the fire-box A, the fire-tubes D, the head F, and shell L, of a continuous cylindrical diaphragm, N, extending from near the bottom of the fire-box and around the fire-tubes to near the head F, the supports M, and devices, substantially as described, for directing water from the inside of said diaphragm over its upper edge and downwardly between it and the shell to the base of the boiler, substantially as shown and described.

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

BENJAMIN N. PAYNE.

Witnesses:

E. B. SMITH,
HENRY L. TAYLOR.