

N. L. Blanchard's Steam Boiler.

117251

Fig. 1

PATENTED JUL 25 1871

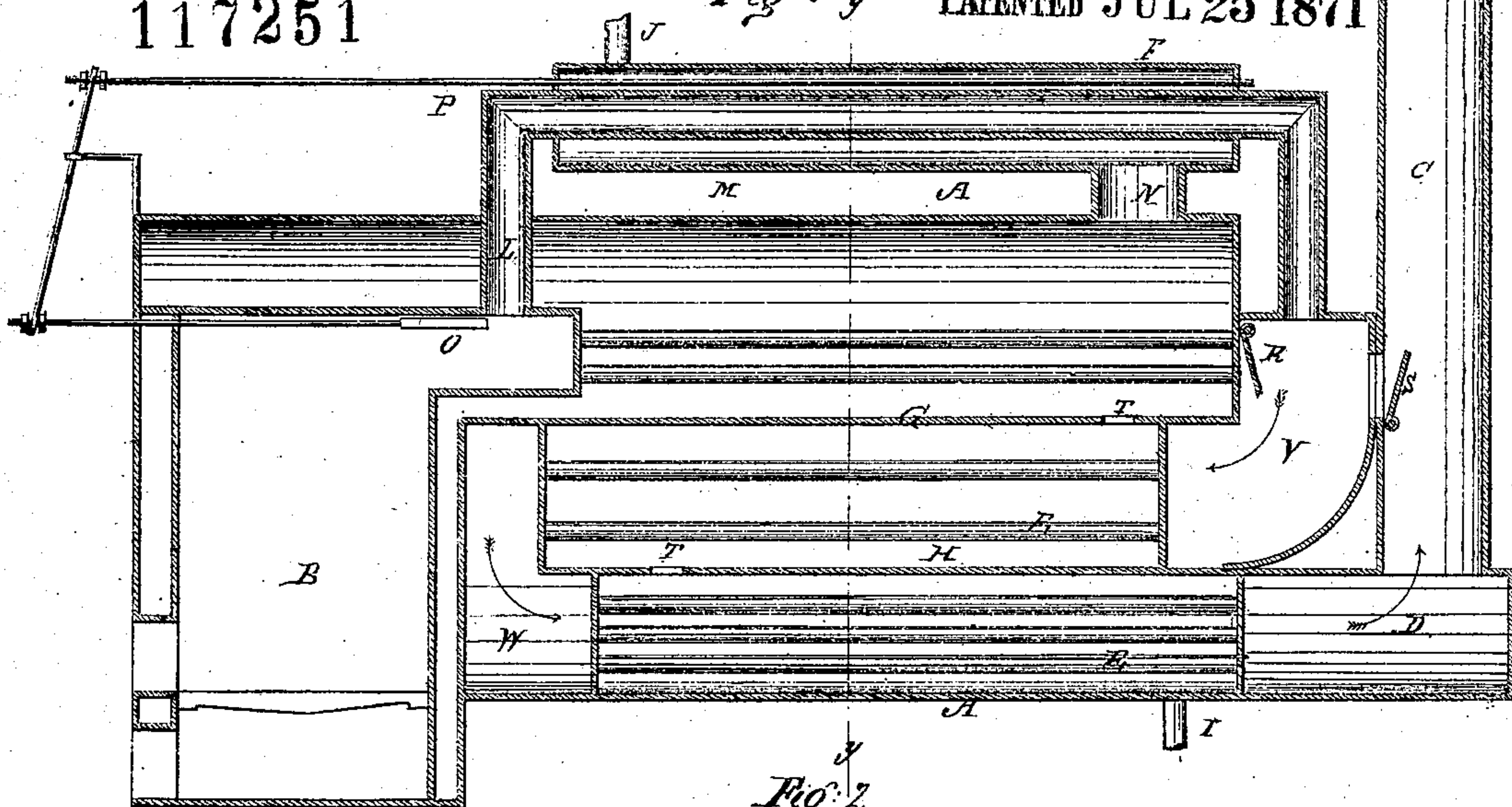


Fig. 2

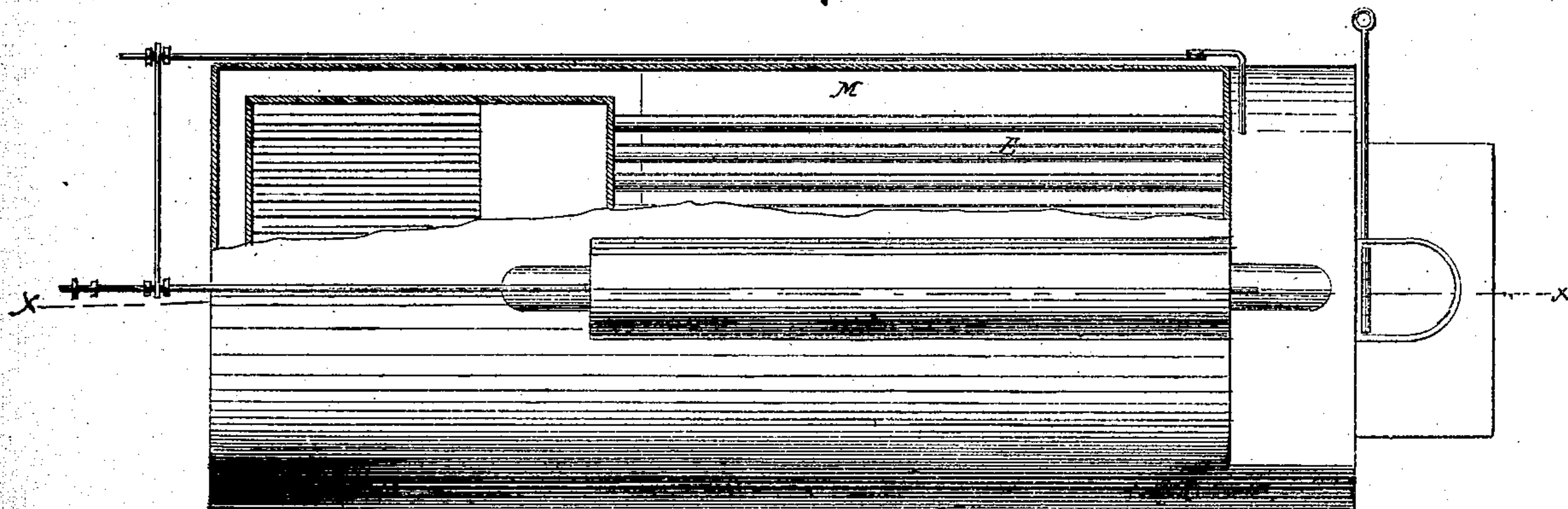
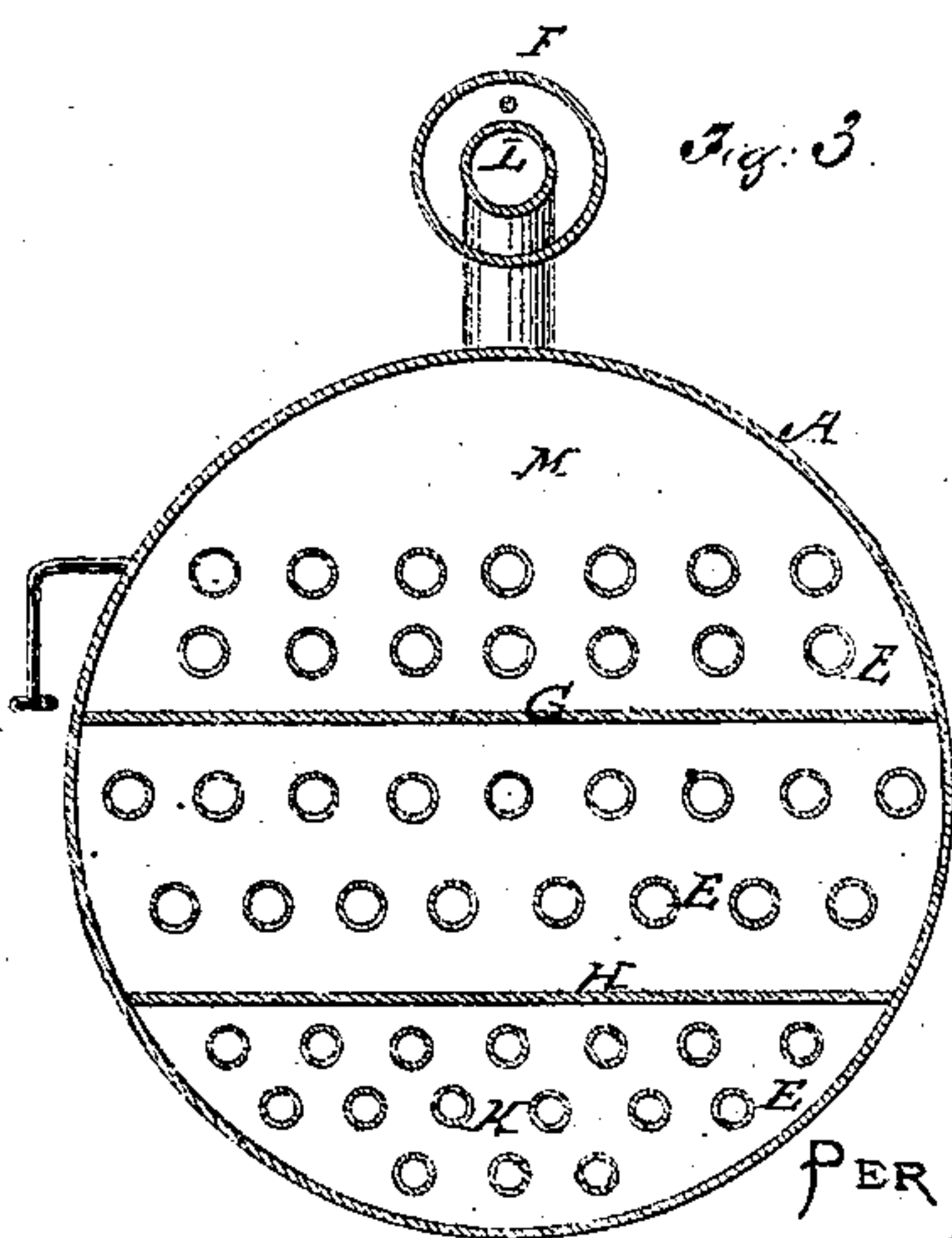


Fig. 3



Witnesses:

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NATHANIEL L. BLANCHARD, OF SPUYTEN DUYVIL, NEW YORK.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 117,251, dated July 25, 1871.

To all whom it may concern:

Be it known that I, NATHANIEL L. BLANCHARD, of Spuyten Duyvil, in the county of Westchester and State of New York, have invented a new and useful Improvement in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification.

This invention relates to a new and useful improvement in boilers for the generation of steam, and is based upon the idea that uninterrupted circulation of the whole body of water in a boiler is a barrier to obtaining the best results in producing steam in such boiler; and the invention consists in the introduction of diaphragms or partitions or their equivalents, which shall form separate water-compartments in steam-boilers, such compartments being so arranged that the heated gases and products of combustion, in their course from the fire-box through tubes or in contact with surfaces to the "up-take," shall come in contact with surfaces of a gradually-decreasing temperature, the variations in temperature of such surfaces being caused by the division of the body of water within the boiler by means of the diaphragms or partitions or their equivalents, as will be hereinafter more fully described.

In the accompanying drawing, Figure 1 represents a vertical longitudinal section of the boiler taken on the line *x x* of Fig. 2. Fig. 2 is a top view partly in section. Fig. 3 is a vertical cross-section of Fig. 1 on the line *y y*.

Similar letters of reference indicate corresponding parts.

A is the shell of the boiler. B is the fire-box. C is the chimney-stack or up-take. D is the smoke-box. E represents the tubes through which the smoke and gaseous products of combustion pass. F is a superheating steam-drum.

In this example of my invention I show my improvement applied to what is known as the locomotive-boiler, but I do not by any means confine myself to that class of boilers, as my partitions or diaphragms may be arranged in the ordinary flue or plane-cylinder boiler, or separate vessels may be arranged so as to prevent a general circulation of the water. I am aware that in my efforts to prevent a general circulation of

water in a steam-boiler, or in a series of connected boilers, I am running in direct opposition to the generally-received theory, as the effort has heretofore been to produce just what I am endeavoring to prevent—that is, a general circulation of the whole body of water from which the steam is generated.

In this case I employ three series of tubes, through which the heated gases pass in their course to the up-take, as indicated by the arrows. G and H represent the diaphragms or partitions by which these series of tubes are separated. The feed-water is pumped into the boiler through the pipe I. The steam is discharged for use through the pipe J. The diaphragms G and H obstruct, if they do not entirely prevent, the circulation of the water, and the products of combustion will, in their course to the smoke-box, pass over surfaces or through tubes of gradually-diminishing temperature. The sediment will naturally settle in the lower compartment K, from whence it may be readily removed by having a large man-hole or two hand-holes in the bottom of the shell. The water which fills the water-legs of the boiler will consequently be nearly or quite pure. L is a flue connected with the fire-box, which is made to divert a portion of the heat before it enters the flues of the water-space and conduct it through the steam-drum E. M is the steam-space of the boiler. The steam passes into the drum through the pipe N. By this means the steam is thoroughly dried and superheated before it is taken out of the drum for use. O is a valve, by means of which the quantity of heat which enters the flue L is regulated. This valve is operated by the expansion and contraction of the rod P, (or upon the Thermostadt principle,) in the steam-drum E. R is a valve, which is connected with the rod P, by which the draught through the upper series of flues is regulated. The heated gases and products of combustion which are allowed to pass through the steam-drum are returned and made to pass through the second series of fire-tubes, as indicated by arrow 1. S is a valve-damper, by the opening of which a direct draught from the fire-box to the stack is obtained. In starting fire in the fire-box this arrangement is of much importance. T T are orifices through the diaphragms G H, to allow the feed-water to pass upward from the lower

to the upper series of tubes. V and W are the return-chambers intermediate between the series of tubes.

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

1. The chimney-stack C, smoke-box D, smoke-tubes E, smoke-flue L, channels V W, and super-heater F, combined, as described, with a series of water-chambers, separated by perforated diaphragms G H, for the purpose specified.

2. The diaphragms G H, arranged as partitions

between several sets of tubes, to operate upon the circulation of water in the manner described, and for the purpose specified.

3. The valves O R, combined, as described, with the rod P in steam-drum F, for the purpose specified.

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Witnesses:

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