

No. 708,433.

Patented Sept. 2, 1902.

H. WEBSTER.  
SUPERHEATER FOR STEAM GENERATORS.

(Application filed Apr. 27, 1901.)

(No Model.)

3 Sheets—Sheet 1.

Fig-1.

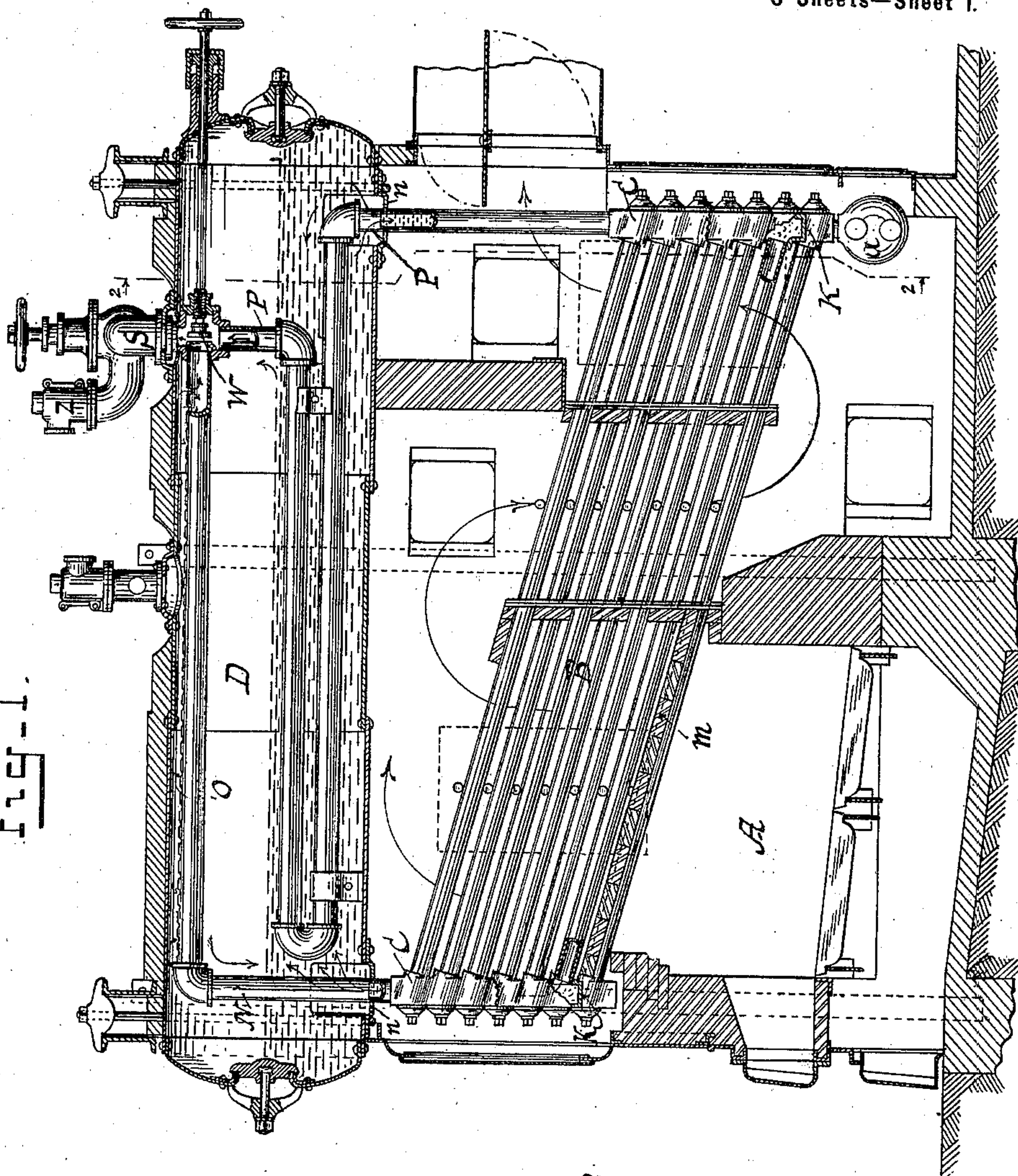
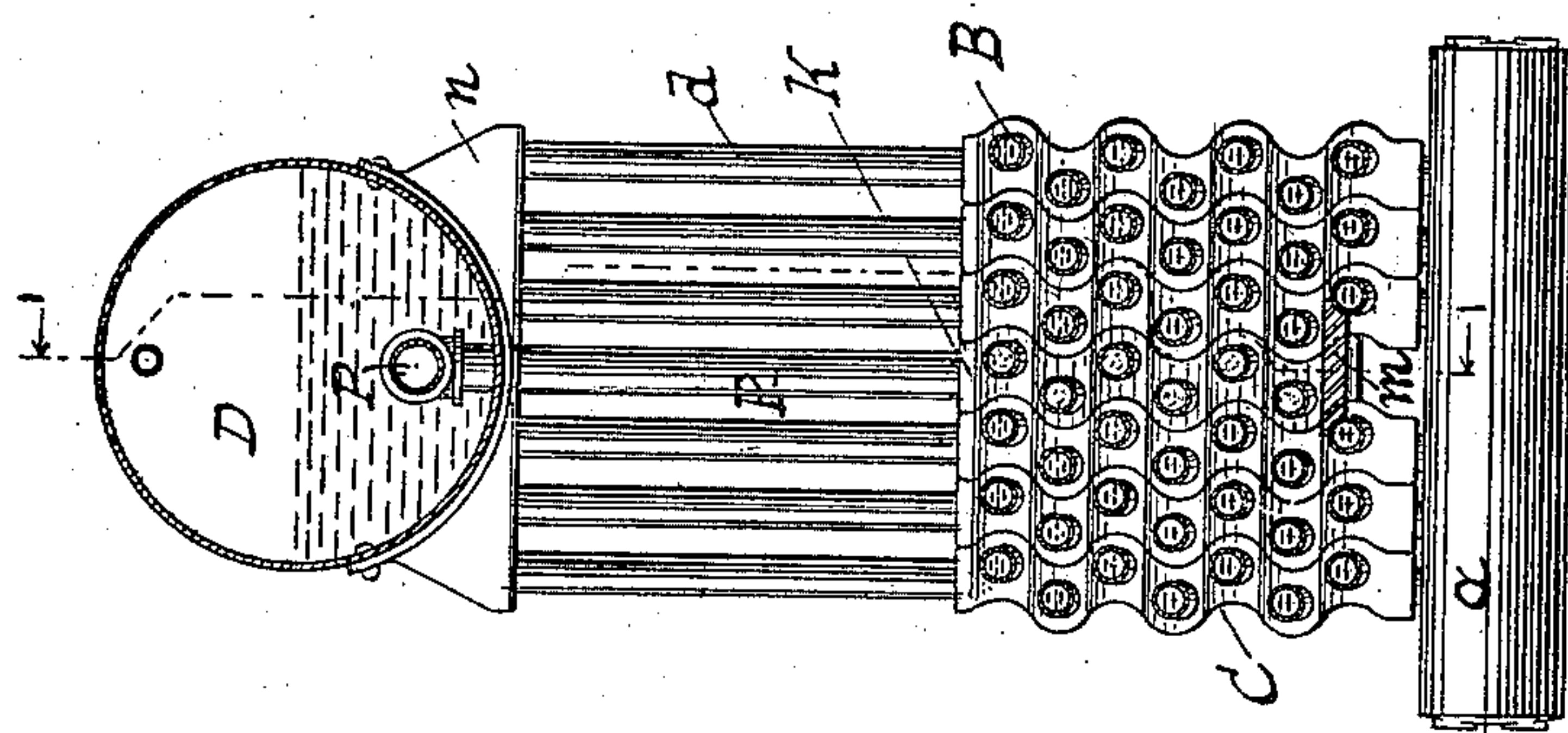


Fig-2.



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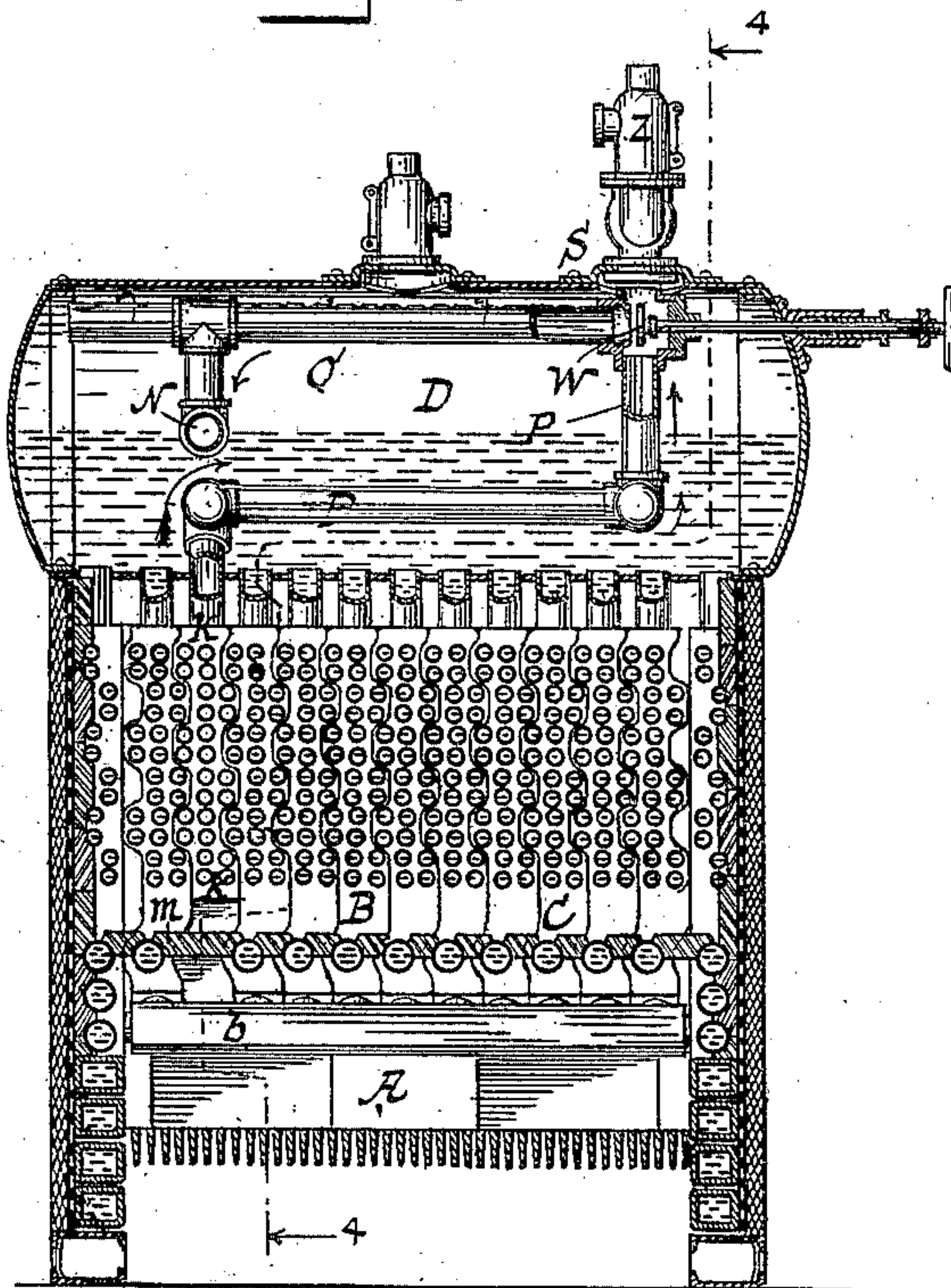
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3 Sheets—Sheet 2.

Fig. 3.



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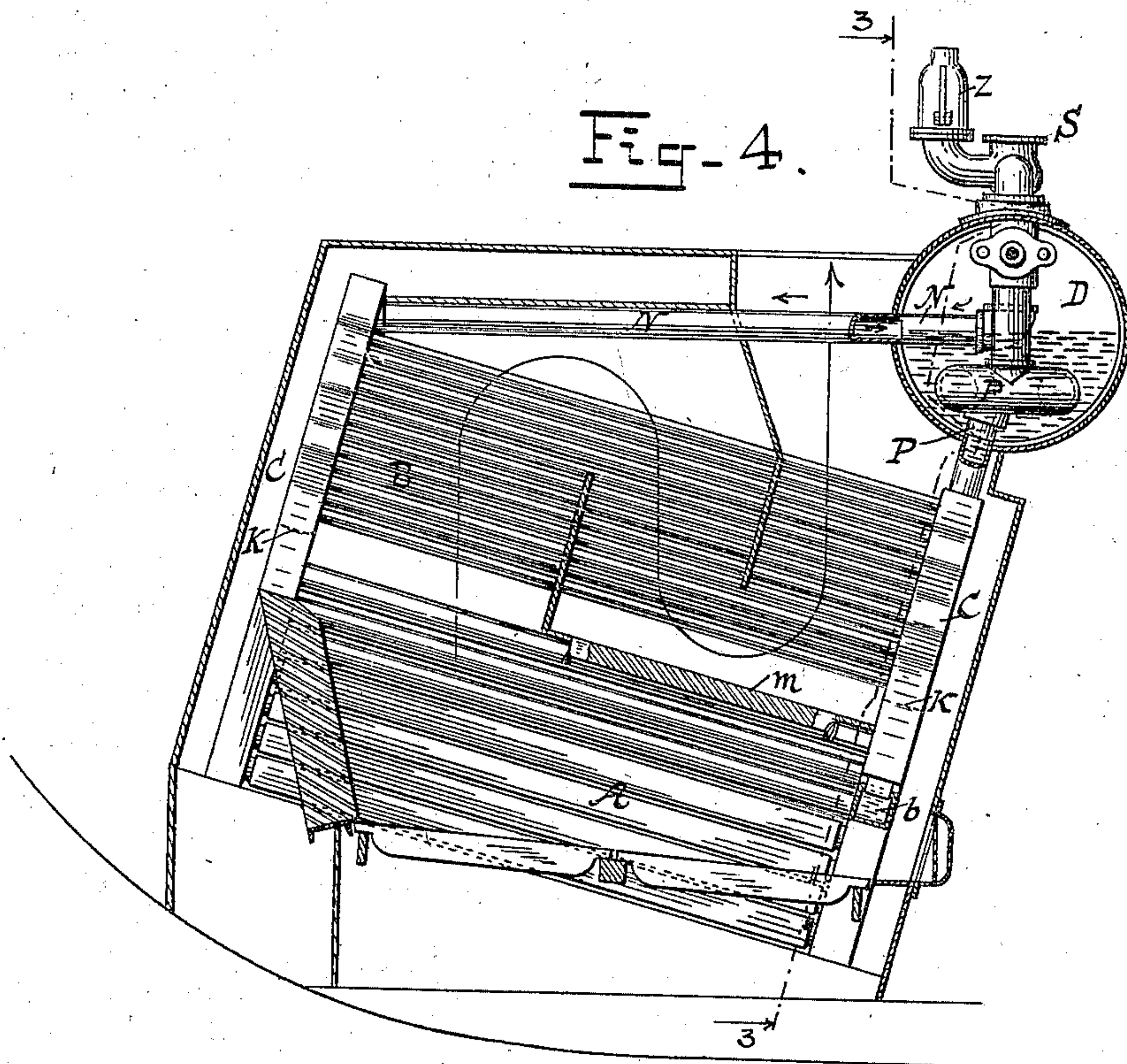
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3 Sheets—Sheet 3.



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# UNITED STATES PATENT OFFICE.

HOSEA WEBSTER, OF MONTCLAIR, NEW JERSEY.

## SUPERHEATER FOR STEAM-GENERATORS.

SPECIFICATION forming part of Letters Patent No. 708,433, dated September 2, 1902.

Application filed April 27, 1901. Serial No. 57,649. (No model.)

*To all whom it may concern:*

Be it known that I, HOSEA WEBSTER, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Superheaters for Steam-Generators, of which the following is a specification, reference being had therein to the accompanying drawings.

10 The invention consists in a steam-generator having a combustion-space, a water-space, a steam-space, and a steam-superheating space partitioned from said water-space and connected to communicate with the steam-space and steam-outlet.

15 The invention is shown embodied in a sectional steam-generator of the Babcock and Wilcox type, one of the sections of water-tubes and headers therein being utilized exclusively as the steam-superheating space, which, however, may include more of the sections of water-tubes, and in the adaptation of the invention to a two or three drum generator a section of the water-tubes may be utilized for each drum.

20 In the accompanying drawings, forming a part of this specification, Figure 1 represents a side view, partly in section, on the line 1 1 of Fig. 2; Fig. 2, a transverse view, partly in section, on the line 2 2 of Fig. 1, of one design of a Babcock and Wilcox generator; Fig. 3, a transverse sectional view on the line 3 3; Fig. 4, a side view, partly in section, on the line 4 4, Fig. 3, of another design of the same type of generator, wherein the steam and water drum is arranged transversely instead of longitudinally with the group of headers and connected water-tubes, each embodying my invention.

35 40 The corresponding parts of the generators shown in the respective figures of the drawings will be herein referred to by similar letters of reference.

45 In the several figures, A is the furnace; B, the inclined water-tubes; C, the headers, and D the water and steam drum. The headers C are separately arranged at the opposite extremities of each vertical tier or section of the inclined water-tubes B, the several sections of the tiers of tubes, with their connected and communicating headers, being arranged side by side and forming a group, as shown in

Figs. 2 and 3. The headers communicate at the upper ends with the drum D through the nipples *c*, tubes *d*, and cross-boxes *n*, and at the lower ends with the manifolds A and B. These enumerated parts as arranged form the main essential water-circulating and steam-generating parts of this type of generator.

For the purpose of this invention one of the sections K of the group of water-tubes B and its connected headers is set off and utilized for superheating the steam generated in the other sections, the lower end of the headers in the section K being closed and cut out of communication with the transverse manifolds A and B, and consequently with the water circulation. The headers of the steam-superheating section K are shown shortened at the lower ends in this instance, and one or more of the water-tubes of this section are consequently omitted. To protect the lower tubes of the steam-superheating section K from the intense heat of the furnace-fire, a partition *m*, of fire-clay or other non-conducting material, is placed beneath the lower tubes and bridges the space between the two bottom tubes of the adjoining sections, as shown in Figs. 2 and 3. The circulating-tube N of the steam-superheating section K extends above the water-line in the drum D and connects with the perforated dry pipe O and the exit or discharge pipe P with the main steam-outlet pipe S of the generator. The dry pipe O is also connected at its end with the steam-outlet pipe S, a valve W being provided to open and close the communication. This valve is designed to close or throttle the direct communication between the dry pipe and the steam-outlet pipe and is provided with an operating-stem projecting through the shell of the drum D. When this valve is closed, all the steam drawn from the steam-space through the dry pipe and superheating-space will pass out of the generator in a superheated state. When no steam is taken from the generator, the valve may be opened to permit a mixing and circulation of the saturated steam through the superheating-space. By means of this valve device the temperature of the superheated steam may be readily regulated by controlling the amount of saturated steam entering the main outlet from the dry pipe. The exit or discharge pipe P from the su-



perheating-space may be directed to extend within the drum D in the form of a coil or return-bend, as shown in Fig. 1, or as shown in Fig. 3, wherein the relative position of the drum is changed, and the connection made with the superheating-section located near one side of the group of headers in order to increase its superficial area, so that when placed below the water-line of the drum D, as shown, it will act as an attemperator and prevent the tubes of the superheating-section from overheating when no steam is being drawn from the generator.

To insure safety in the use of the superheating-space, as described, an auxiliary safety-valve *z* may be placed in direct communication with the main steam-outlet and set to open at a pressure anticipating the opening of the main safety-valve. This auxiliary safety-valve *z*, set to blow previous to the main safety-valve, will, in the event sudden stopping of the engine and consequent sudden rise in the pressure, open in advance of the main safety-valve, and thereby create a circulation through the superheater and prevent

its burning out in the interim of shutting off the steam from the engine and the opening of the main safety-valve.

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

1. A steam-generator constructed with a group of water-tube sections, and having one of said sections forming said group, partitioned therefrom and connected to communicate with the steam-space and steam-outlet, to form a steam-superheating section, as set forth.

2. A steam-generator having a steam-superheating space partitioned therefrom, as described, provided with an auxiliary safety-valve adjusted to open in advance of the main safety-valve of the generator, as set forth.

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

HOSEA WEBSTER.

Witnesses:

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HARRIS R. GREENE.