(No Model.)

J. T. FANNING.

STEAM BOILER.

No. 552,318. Patented Dec. 31, 1895.

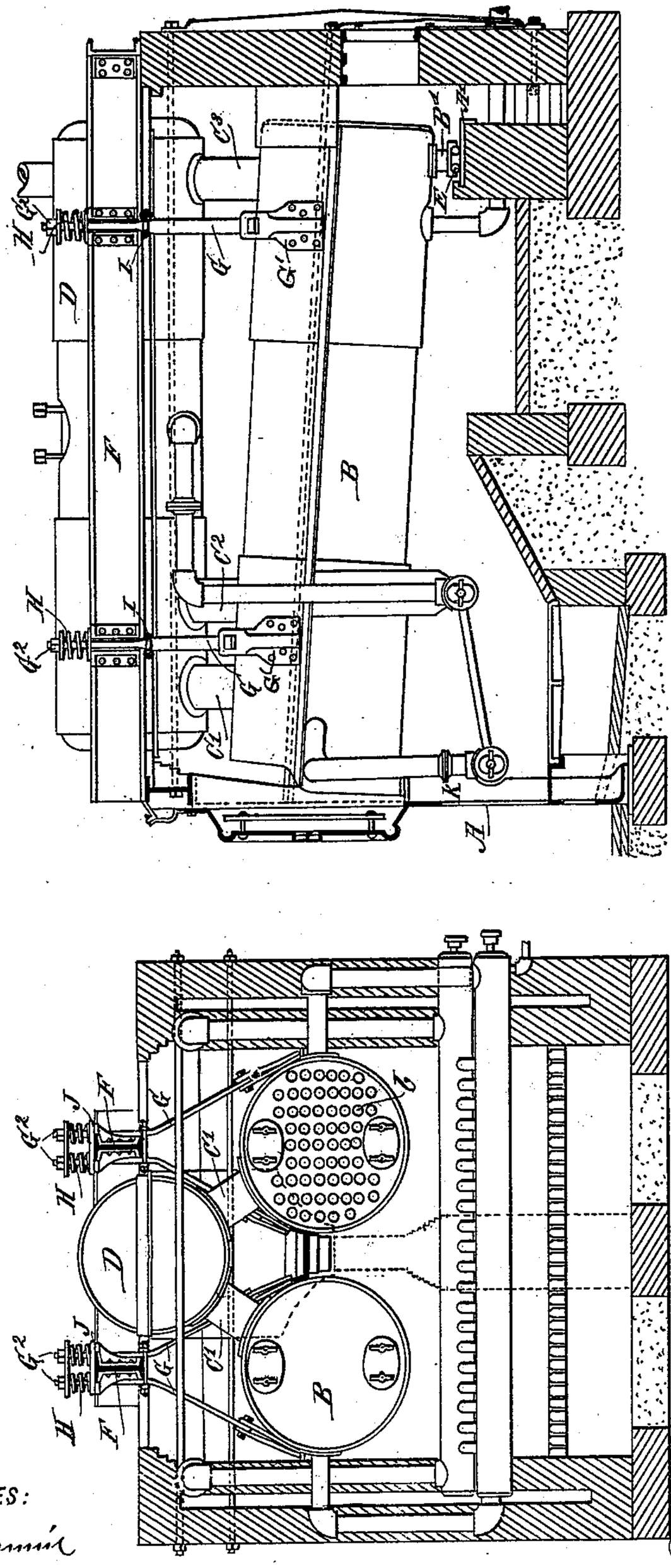

Fig. 1.

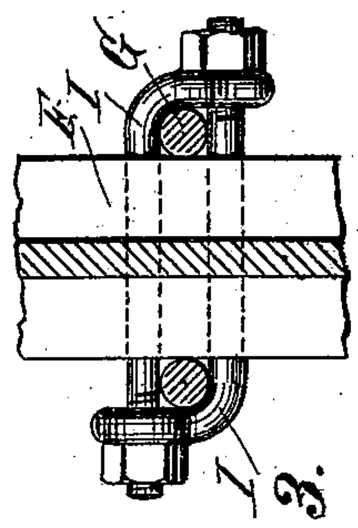

Fig. 2.

Fig. 3.

WITNESSES:

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JOHN T. FANNING, OF MINNEAPOLIS, MINNESOTA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 552,318, dated December 31, 1895.

Application filed June 29, 1895. Serial No. 554,449. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. FANNING, engineer, residing at Minneapolis, Hennepin county, in the State of Minnesota, have invented a certain new and useful Improvement in Steam-Boilers, of which the following is a specification.

The boiler is of that class which presents a shell, or preferably two shells, mounted side by side and traversed by tubes, with the grate of any suitable form and style, at a proper distance below, and with liberal connections from these shells upward into a combined generating and separating drum in which steam generated is disengaged from the water, and the water is returned downward to the shells by similar liberal connections so arranged as to induce and maintain a longitudinal circulation in a circuit through the drum and shells. The weight of this form of boiler and its contents is very great. My invention is intended to avoid the difficulties ordinarily met in supporting it and allowing for expansion and contraction with heat and cold. I hold the front ends of the tubular shells in a fixed position and allow the rear ends to move backward and forward, as has long been practiced. The weight is sustained at the back partly by rollers underneath and partly by slings which suspend the weight from points overhead. The slings are equipped with springs which, while maintaining a nearly uniform strain on the slings and girders, allow by their elasticity for imperfections in the workmanship and adjustment and for settling or changes which may occur, and for vertical expansion and contraction of the parts by changes of temperature. I endeavor to so adjust the slings that they will support about three-fourths of the weight, leaving the other quarter to run on the rollers.

The invention gives assurance of the exact position of the boiler under all conditions, while relieving the rollers from excessive loads.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention.

Figure 1 is a vertical cross-section on the line 1 1 in Fig. 2. Fig. 2 is a side elevation with a side wall removed, and Fig. 3 is a horizontal section of a portion on a larger scale. The illustrations show a water-grate used therewith.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

A is the boiler front, constructed with supporting-lugs K in any ordinary or suitable manner.

B B are inclined shells traversed by tubes *b*. Connections C′ C² C³ unite each of these shells with a horizontal separating-drum D above. The shells B, with their connections C′, &c., and the separating-drum D, constitute the main body of the boiler. The weight of a part of the back end is carried on a shoe, bolted on the under face of each shell B at the rear end, as shown by B′. Rollers E are interposed and inclosed between each shoe B′ and a stationary way A′, supported on a foundation beneath. The free turning of the rollers allows the rear end of the boiler to move forward and backward to accommodate the expansion and contraction.

F F are stout girders placed by the sides of the separating-drum D and below the top thereof, and adapted to support any required portion of the weight of the structure, while not extending to any greater height than the top of the separating-drum.

G G are slings secured by straps G′ to the shells B B, two or more pairs of slings for each shell. The slings converge and extend upward through clamps I. The lower portion of each sling G is flat and thin and stands inclined, but the upper end of each is formed into a screw-threaded bolt extending upward through the interior of the clamp I and through a cross-plate J and a helical spring H and receives a nut G². Each sling supports a portion of the weight of the boiler, and its strain is transmitted through the springs H H to the corresponding girder F. The nuts allow of adjustment of tension of the respective slings, so that any required portion of the strain due to the weight of the boiler may be transmitted through the several springs H to the girders F, while the remainder of the weight is carried on the lugs K, shoes B′ and rollers E below. When the temperature is high the boiler increases in length and the rollers E allow the boiler to

elongate rearward, and when the temperature lowers the parts return to their original positions. In this movement the slings G swing forward and backward to the extent required, exerting a nearly-constant lifting force acting through the springs H. The nuts G^2 should be adjusted to sustain a liberal portion of the weight, and relieve the rollers E from excessive load while allowing them to serve in maintaining the proper level of the rear end of the boiler.

It will be seen that besides providing for the expansion and contraction of the boiler longitudinally, the expansion and contraction of the boiler vertically are allowed for by the action of the springs H, these elongating and lifting the nuts G^2 when the temperature is high and the metal expands, and being compressed and lowering such nuts when the boiler cools.

The plate J is important in receiving the load and transmitting it to the girder. The clamps I are important because they hold the slings properly inward at the base of the girders so that the upper portions of the slings are parallel and the nuts can bear fairly on the plate J while the lower portions of the slings diverge.

The nuts G^2 are adjusted from time to time to allow for permanent changes, while the springs H allow by their elasticity for temporary changes which occur in firing up and cooling off the boiler.

I claim as my invention—

1. In a steam boiler support, the longitudinal girders F, arranged along the sides of and not higher than the separating drum D and out of contact therewith, slings G connecting from such girders to inclined shells B below, the clamps I holding the upper portion of the slings inward, and the cross plates J above the girders for receiving the load, in combination with means G^2 for adjusting the slings, all arranged to serve substantially as herein specified.

2. In a steam boiler support, the longitudinal girders F, arranged along the sides of and not higher than the separating drum D, out of contact therewith, slings G connecting from such girders to a shell B at a lower level, the clamps I holding the slings inward, the cross plates J above the girders, and springs H encircling the slings and adapted to exert a yielding tension, combined as herein specified.

3. In a steam boiler, the inclined shell or shells B, connections $C' C^3$ and generating and separating drum D, having lugs K, ways A', shoes B' and rollers E, arranged to support in part the weight of the drum, shells and contents, in combination with the slings G, springs H and nuts G^2, adapted to transfer with practically uniform strain the remaining portion of the weight to fixed supports above and to allow by the swinging of the slings and by the elastic action of the springs for both horizontal and vertical changes in the dimensions of the boiler with changes of its temperature, all arranged for joint operation substantially as herein specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

JOHN T. FANNING.

Witnesses:

CLARENCE V. KENDALL,

M. F. BOYLE.