(No Model.)

G. SEWELL.

STEAM BOILER.

No. 541,637. Patented June 25, 1895.

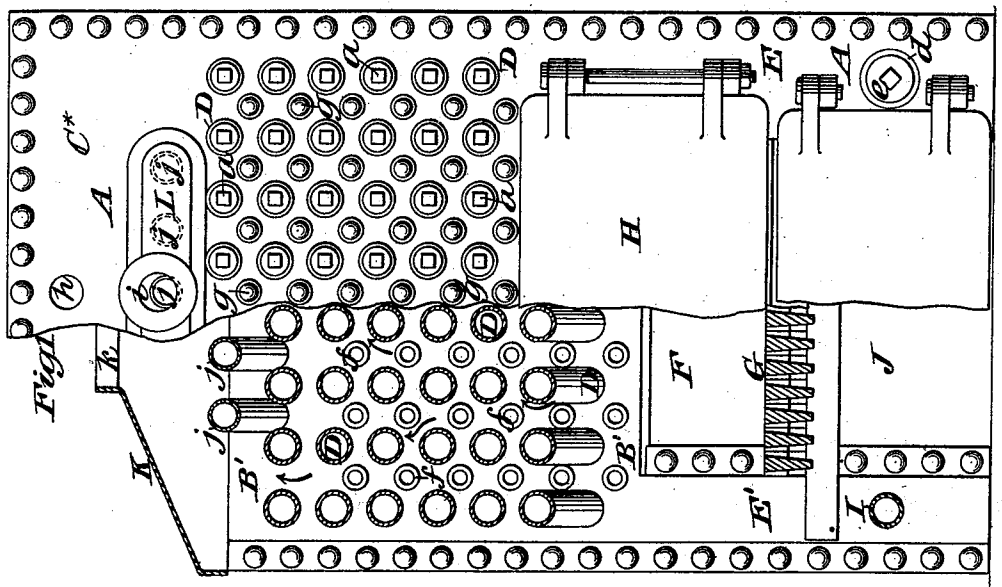

Fig. 1.

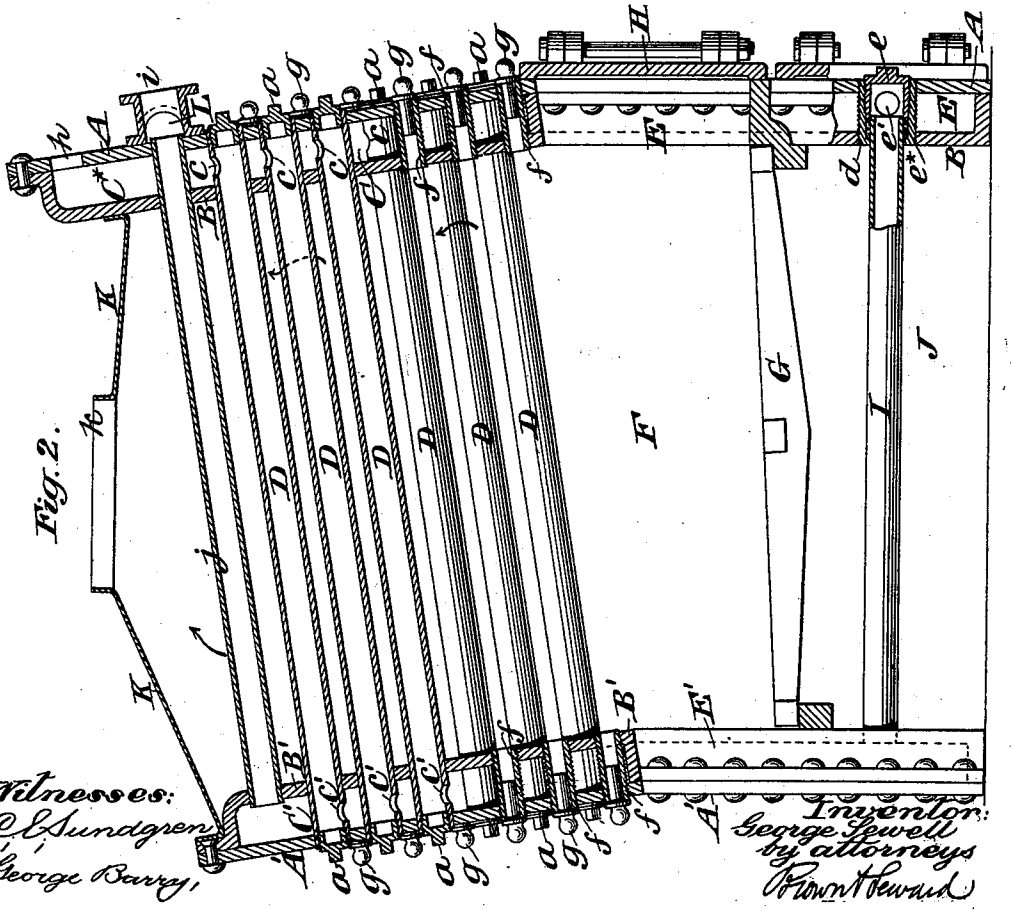

Fig. 2.

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UNITED STATES PATENT OFFICE.

GEORGE SEWELL, OF BROOKLYN, NEW YORK.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 541,687, dated June 25, 1895.

Application filed July 3, 1894. Serial No. 516,424. (No model.)

To all whom it may concern:

Be it known that I, GEORGE SEWELL, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Steam-Boilers, of which the following is a specification.

This invention relates particularly to boilers of the water-tube class.

I will first describe my improvement with reference to the accompanying drawings and then point out its novelty in claims.

Figure 1 represents a front view partly in section of a boiler embodying my invention. Fig. 2 represents a vertical section taken at right angles to the view Fig. 1.

Similar letters of reference designate corresponding parts in both the figures.

A B and A′ B′ represent two parallel hollow heads or walls each composed of an outer tube-sheet A or A′ and an inner tube-sheet B or B′ arranged parallel with each other and united at their margins in any suitable manner to form between them water spaces C and C′.

D D are numerous water tubes of any convenient size arranged at suitable distances apart and connecting the said hollow heads or walls, each of said tubes being fitted and secured water-tight and steam-tight in any suitable manner, as by expanding them into holes provided for them in the several tube-sheets. The said tubes are closed at their ends, the closure being represented as made by plugs *a* secured tightly into the said tubes. The said tubes are provided with holes *c c′* in those portions which are included within the water spaces C C′. The said hollow heads or walls are represented as approximately vertical having only a slight inclination and the tubes D D are represented as approximately horizontal having only a slight inclination corresponding with that of the inclination of the heads. The holes *c* next the higher ends of the tubes are represented in the upper sides thereof and the holes *c′* next the lower ends thereof are represented in their lower sides.

The two hollow heads or walls A B and A′ B′ containing the water spaces C C′, are represented as having at their sides downward extensions E E′ which form water legs which are closed at the bottom and which rest upon the ground or upon a floor or other suitable foundation and by which the whole superstructure is supported. Below the water-tubes and between the water legs E E′ is the fire chamber F represented as furnished with a grate G below which there is an ashpit J. The fire chamber F is represented as provided under the higher ends of the water tubes with a fire door H. The rear end of the furnace may be inclosed with brick-work or in any other suitable manner.

Between those parts of the water legs E E′ below the fire grate G, are arranged water-tubes I, the said tubes I communicating with the water spaces within the water legs E E′, which spaces communicate with the water spaces C C′ surrounding the tubes D between their respective tube-sheets A B and A′ B′. The connections between the tubes I and the water spaces in the water legs may be made in any suitable manner whereby they are rendered water-tight. One of the said connections is represented in Fig. 2, as made by a stuffing-box *d* and a screw-plug *e*, the said stuffing-box being screw-threaded externally and screwed water-tight in both of the tube-sheets A B or A′ B′. The tube enters the inner end of the said stuffing-box and the part which projects into said box is surrounded therein by a packing *e**, preferably metallic. The screw-plug *e* is hollow and of an internal caliber to fit over the end of the tube I, but its outer end is inclosed and constructed to receive a wrench by which to screw it up against the packing *e** for the purpose of tightening the said packing around the said tube. The said stuffing-box and the screw-plug have corresponding lateral openings *e′* through which the tube communicates with the water-space C or C′. This mode of connecting a tube with two tube-sheets between which there is a water-space might be employed in any part of the boiler.

The tube-sheets A B are connected together between the tubes D D by means of hollow stay-bolts *f*, preferably and represented as consisting of externally screw-threaded tubes which are screwed tightly into the two tube-sheets. The two tube-sheets A′ B′ are connected together by hollow stay-bolts *f*. These hollow stay-bolts serve the purpose of staying or bracing the tube-sheets and by reason of their being hollow provide for the cleaning

off of the outsides of the tubes by means of a steam blast introduced through said stay-bolts. The said stay-bolts are fitted with removable plugs *g* which remain in place while the boiler is in operation but are removed for the purpose of inserting the steam jet nozzle by which the steam blast is introduced.

The upper parts of the hollow heads or walls A B and A′ B′ are without any tubes D. The front head A B is continued considerably higher than the tubes so that the upper part C* of its contained space may constitute steam room from which the steam outlet is at *h* close to the top thereof. The said outlet *h* may have the steam pipe directly connected with it or may have connected with it a steam drum with which the steam pipe is connected.

The water-tubes D D are all inclosed at the top by a cover or roof K which may be of sheet iron covered with asbestos or other non-conductor of heat. The said cover is represented as furnished with an outlet *k* communicating with a smoke-stack or chimney. The sides of the boiler between the heads A B and A′ B′ may be inclosed with masonry or other material or may consist of hollow walls constituting water spaces.

I have represented the boiler as fed with water through a box L attached to the upper part of the front head A B. The feed-pipe is intended to be connected to this box at *i*. From this box several tubes *j* lead directly through the tube-sheets A B of the front head and the water-space C between the said tube-sheets and through the inner tube-sheet B′ of the rear head A′ B′, the said tubes running through the space above the water-tubes D D for the purpose of heating the feed water by the gaseous products of combustion which proceed from the fire-chamber and circulate among and between the water-tubes D D on their way to the smoke-stack or chimney. The tubes *j* have water-tight joints in the tube-sheets A B of the front head and in the front tube-sheet B′ of the rear head so that they deliver no water directly into the front water-space C but only deliver it into the rear water-space C′ into which they open. From this water-space the water enters the tubes D D through their lower openings *c′* and circulates along the said tubes to their upper ends and into the water-space C. The steam generated in the tubes D circulates along the said tubes to their higher ends and into the space C, whence it rises continually to the upper part C* of the said space above the said tubes. The return water circulation from the front water space C to the rear water space C′ is downward from the said water-space through the legs E, thence through tubes I under the fire grate into the rear water legs E′, and thence upward to the water-space C′.

What I claim as my invention is—

1. In a steam-boiler, the combination with two tube-sheets having a water space between them and a water-tube in communication with said water-space, of a stuffing-box screwed into both of said tube-sheets and receiving at its inner end the communicating end of said water-tube, packing surrounding said tube within said stuffing-box, a hollow plug having a closed outer end screwed into the outer end of said stuffing-box, the said stuffing-box and plug having an opening to the water-space between the tube-sheets, substantially as herein set forth.

2. In a water tube boiler, the combination of two heads or walls each consisting of two tube-sheets having a water-space between them, steam generating water-tubes inserted tightly into both tube-sheets of each of said heads or walls and forming communication between the water-spaces therein, a fire-chamber between said heads or walls below said water-tubes, a feed-water heating tube passing through both tube-sheets of one of said heads or walls and its contained water-space, and passing through the inner tube-sheet of the other of said heads or walls and entering its water-space, and a cover over said fire-chamber and said steam-generating and water heating tubes, substantially as herein set forth.

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Witnesses:
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