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E. S. CLARK.

STEAM BOILER AND COUPLING.

No. 546,809. Patented Sept. 24, 1895.

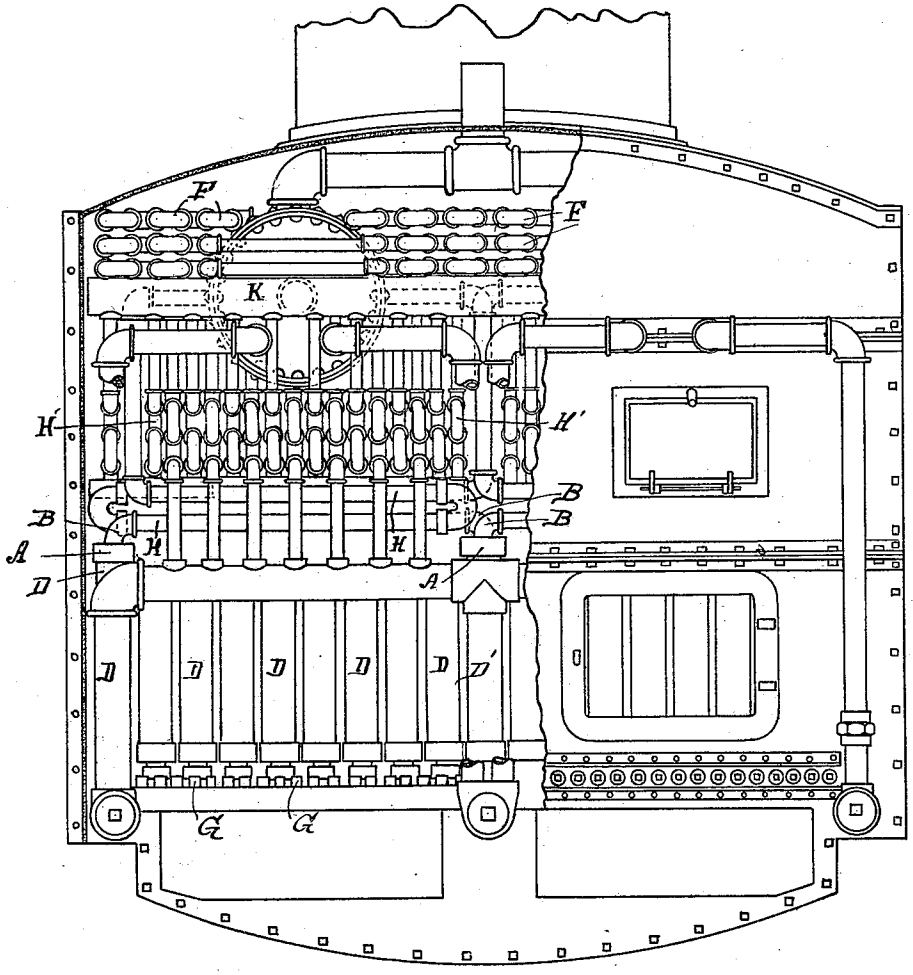

Fig. 1.

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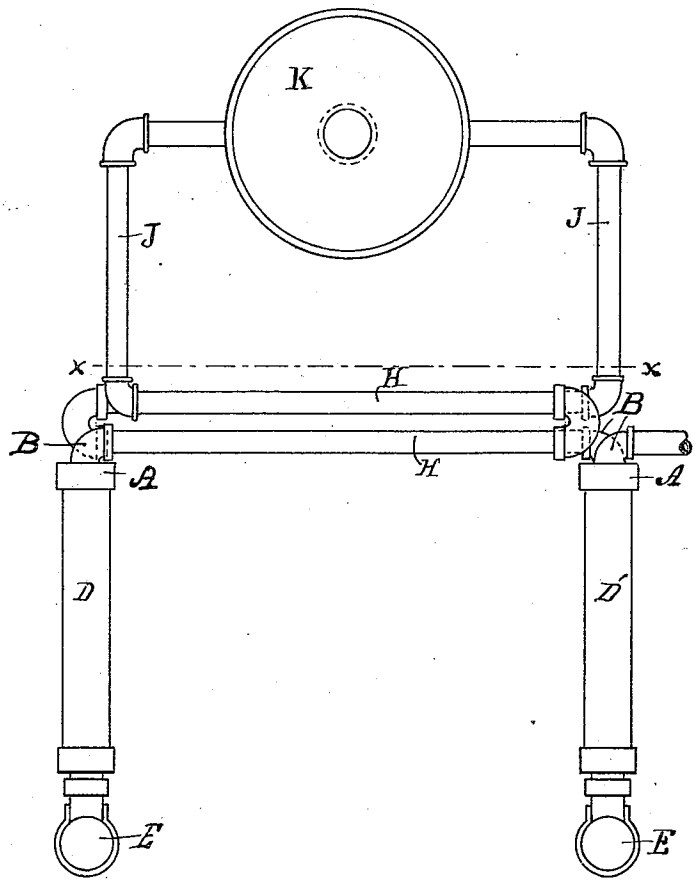

Fig. 2.

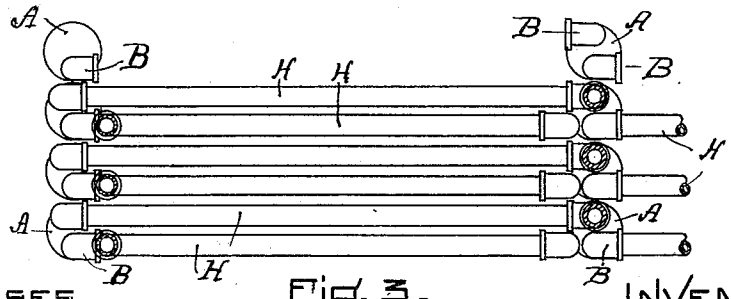

Fig. 3.

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STEAM BOILER AND COUPLING.

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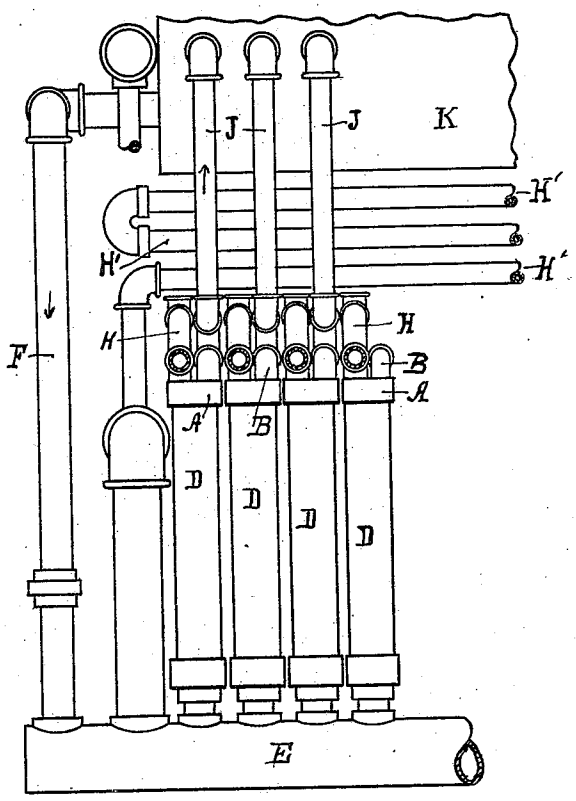

FIG-4.

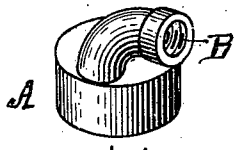

FIG-5.

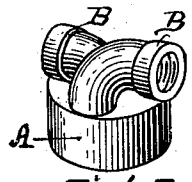

FIG-6.

WITNESSES

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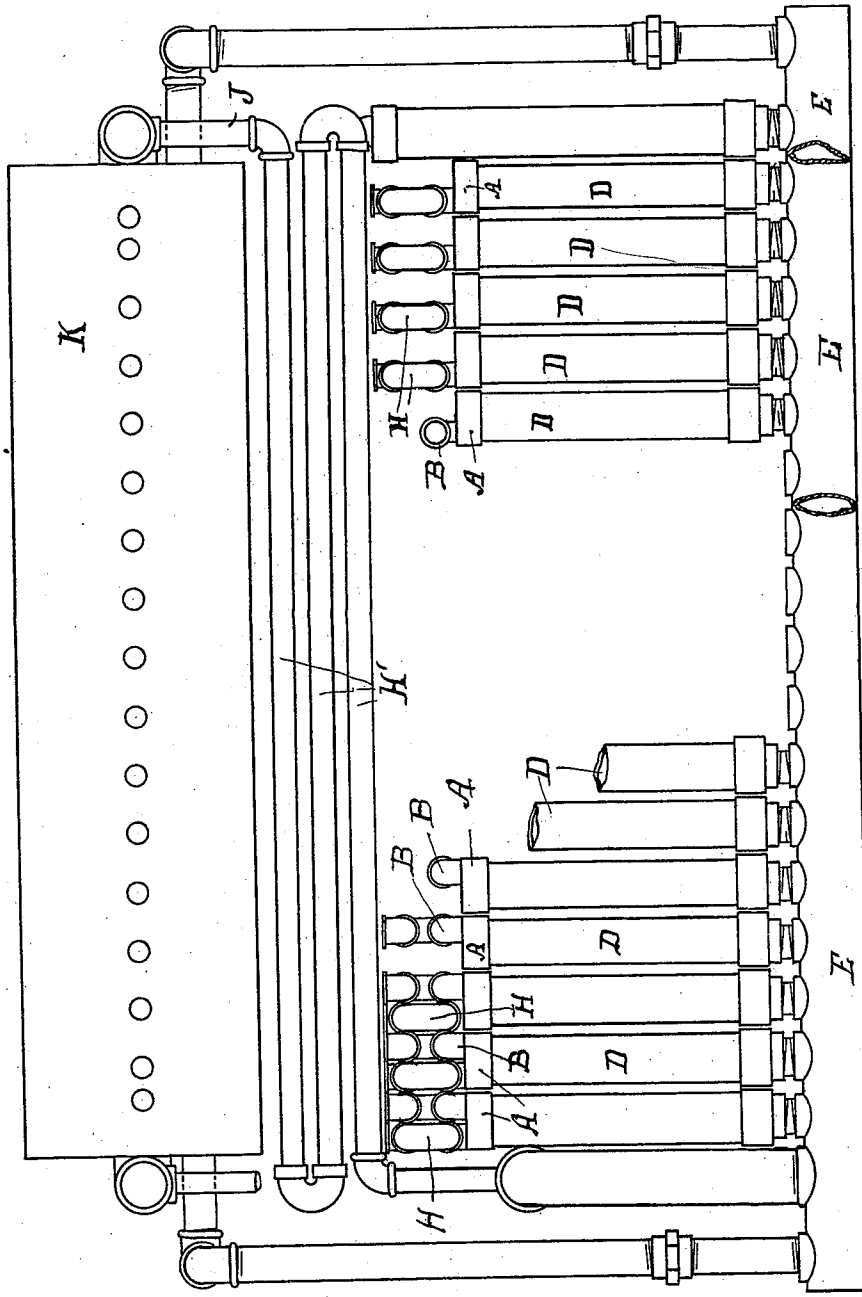

Fig. 7.

WITNESSES

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UNITED STATES PATENT OFFICE.

EDWARD S. CLARK, OF BOSTON, MASSACHUSETTS.

STEAM-BOILER AND COUPLING.

SPECIFICATION forming part of Letters Patent No. 546,809, dated September 24, 1895.

Application filed November 13, 1894. Serial No. 528,644. (No model.)

To all whom it may concern:

Be it known that I, EDWARD S. CLARK, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Steam-Boilers and Couplings, of which the following, taken in connection with the accompanying drawings, is a specification.

The object of this invention is to provide a more compact and economical steam-boiler than any heretofore known and to secure the highest results in volume and quality of steam produced within a given space and with the consumption of a given amount of fuel under conditions of absolute safety.

By an improved offset coupling of novel construction I am able to arrange the various water and steam pipes in parallel planes (and planes at right angles to each other) in very close proximity and without waste spaces within the boiler-shell, as must be the case at each side of the boiler when the pipes run obliquely and are joined by the ordinary axial couplings. I utilize the waste heat in the top of the shell by running the feed-water pipes zizzag through such top space besides the steam-drums, and then bring the water to the lower part of the boiler by pipes external to the shell. Enlarged vertical water-pipes form the back and side walls of the fire-box and such part of the front wall as is not occupied by the doors. The return-bend of one transverse pipe lies over the closed half of the end cap and closely adjacent to the coupling connection of the other pipe to the vertical tube. The vertical pipes forming the walls of the fire-box enter the manifold base-pipe, which has a succession of adjacent openings enabling the verticals to be closely set, thus giving a large amount of water in the tubular walls. Over the doors I arch a manifold supply-pipe for the shorter vertical pipes with which the circulation-tubes connect which run from front to rear.

My improved coupling consists in an enlarged screw-threaded cap to engage with the threaded end of a water or steam pipe and a quarter-turn screw-threaded coupling-socket on its closed end and at one side of its axial center, such coupling-socket being adapted to receive the threaded end of a tube running at right angles to the axis of the cap, while the opposite half of the closed end of the cap is vacant to admit of a steam-pipe from the opposite side of the fire-box or its return-bend lying in close proximity to said tube or coupling-socket.

My coupling also consists in said threaded cap, having an integral threaded coupling-socket located at one side of the axial center of the cap and adapted to receive the threaded end of a tube extending at right angles to the axis of the cap.

My improved boiler embodies a fire-box having an end wall and side walls formed of closely-set vertical water-tubes rising from horizontal manifold pipes connected to the feed-water pipe, in combination with transverse heating-tubes of smaller diameter crossing and recrossing said box in the upper part of the fuel-chamber and with couplings joining such vertical and transverse tubes, the threaded socket for the smaller tube being offset and placed at one side of the center of the end portion of the cap for the larger tube, the other side being closed. By this construction two vertical tubes set opposite to each other have within their own vertical plane and side by side two independent and parallel transverse circulation-pipes, each overlapping one-half of the cap of the other and rising to communicate with the steam-drum.

In the drawings, Figure 1 is a front elevation of one form of my improved boiler, part of the front wall being broken away to show the interior. Fig. 2 is a detail in front elevation; Fig. 3, a horizontal section on line xx of Fig. 2, showing the circulation-pipes and the couplings. Fig. 4 is a partial side elevation. Figs. 5 and 6 are perspective illustrations of my single and double couplings which are seen in the other figures. Fig. 7 is a skeleton side elevation of one of my boilers with single fire-box—that is, one without the partition or central row of vertical tubes. In this figure part of the manifold base-pipe is broken out to show beyond it the corresponding base-pipe and verticals of the farther side of the fire-box.

A represents an enlarged internally-threaded metallic cap forming the body of my improved coupling. B is a tubular coupling-socket opening through the end of said cap and located entirely at one side of its axial center,

being thus offset, so that the pipe screwed into its threaded outer end will lie in a plane at one side of the axial plane of the cap, leaving space on the other side thereof for another pipe, both being within the vertical plane of the upright tubes from which they extend. I provide both single and double offset couplings—that is, with one of the offset coupling-sockets or with two. (See Figs. 3, 5, and 6.) These sockets are shown integral with the cap and make a quarter-turn, so as to connect tubes of different sizes at right angles to each other.

The fire-box of my boiler has its side walls and inner end wall formed of vertical water-tubes D, set closely side by side and connected by screw-threads at foot to manifold base-pipes E, through which the feed-water passes after descending from the feed-water-heating tubes F, Fig. 1, or otherwise. The grate-bars G are shown in Fig. 1.

The end caps A of the couplings A B screw upon the threaded upper ends of the vertical tubes D. The circulation is through transverse heating-tubes H, which screw into the offset coupling-sockets B and extend across the top of the fire-box and return by an ordinary return-bend and rise through pipe J into the steam-drum K. It is obvious that two of the vertical tubes D standing directly opposite to each other, with their coupling-sockets respectively offset to right and left, will have two distinct and parallel transverse circulation-pipes H in the vertical plane between such two tubes D. One of these two pipes starts from one of the coupling-sockets and the other starts at the opposite side of the fire-box from the socket of the other coupling, and each makes its return-bend substantially over the vacant half of the opposite end cap. (See especially Figs. 3, 4, and 7.)

The doubly-offset coupling, Fig. 6, is used when, as in Fig. 1, the furnace has a central series of vertical tubes D′, closely set and forming a partition or center wall from front to rear of the fire-box. This construction is indicated also in Figs. 2 and 3. In these double offset couplings two integral quarter-turn sockets are formed on the end of the cap A, facing in opposite directions, the tubes connected thereto being in different planes, each at one side of the axis of the cap, and both being within the vertical planes of the walls of the tube upon which the cap is screwed. In these cases all of the end of the cap is closed except the portion devoted to the two offset sockets. Figs. 1, 4, and 7 show an upper range of transverse heating-tubes H′, which provide for the circulation from the end vertical tubes.

I am aware that it is common to connect pipes of different sizes by reducing couplings having threaded sockets adapted thereto. I am also familiar with T-couplings, by which a current from one pipe is diverted into two others at right angles thereto, all such pipes having one common axial plane; but I am not aware that prior to my invention offset couplings such as are herein set forth were ever known or used.

I claim as my invention—

1. In a steam boiler, an offset coupling for uniting tubes of different sizes, such coupling consisting of a threaded end-cap for the larger tube, and formed with a threaded coupling socket opening through the outer end and at one side of the axial center of said cap, and adapted to receive the threaded end of the smaller tube lying at one side of the axial plane of the larger tube, the remaining portion of the end of said cap being closed, to give space for the reception of the return bend of a like tube extending thereto from a similar coupling at the opposite side of the boiler, whereby the two smaller tubes lie parallel to each other and within the plane of the larger tubes from which they extend, substantially as and for the purpose set forth.

2. In a steam boiler, an offset coupling for uniting tubes of different sizes in perpendicular planes, such coupling consisting of a threaded end-cap for the larger tube, and a quarter-turn screw-threaded coupling socket formed integral with the end portion of said cap and at one side of its axial center, and adapted to receive the threaded end of a tube running at right angles to the axis of the cap, the end of said cap being otherwise closed, substantially as and for the purpose set forth.

3. In a steam boiler, a fire-box having an end wall and side walls formed of closely set vertical water tubes supplied from horizontal manifold base pipes and suitably arranged feed-water pipes, in combination with transverse heating tubes of less diameter than the vertical tubes, crossing and recrossing the fire-box above the fuel chamber, and with couplings joining such vertical and transverse tubes, the threaded socket for the smaller tube being offset and placed at one side of the center of the end portion of the cap for the larger tube, the remainder of such end portion being closed, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 6th day of November, A. D. 1894.

EDWARD S. CLARK.

Witnesses:
CHARLES G. KEYES,
A. H. SPENCER.