

(No Model.)

C. R. MOORE.
BOILER.

No. 582,216.

Patented May 11, 1897.

Fig. 1.

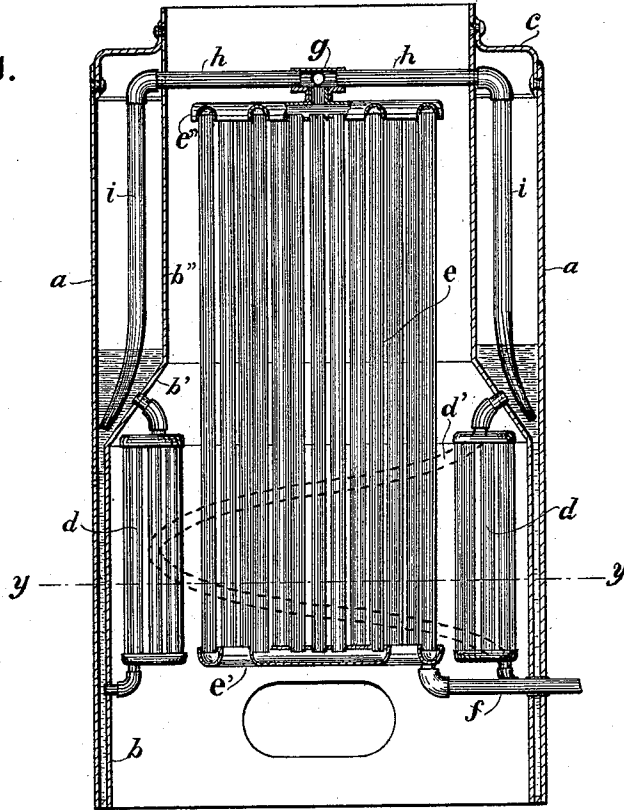
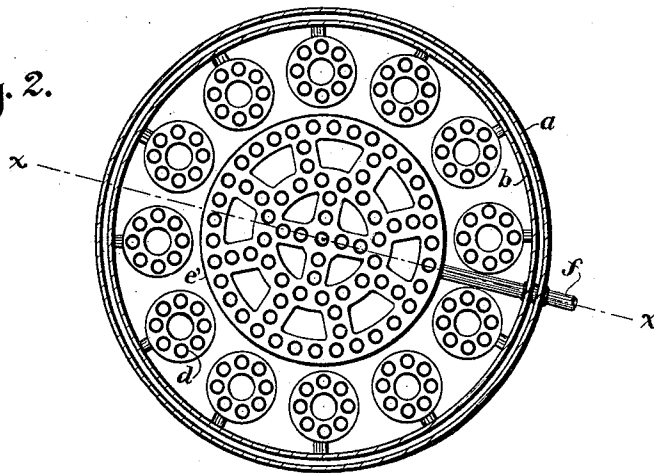


Fig. 2.



Witnesses
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UNITED STATES PATENT OFFICE.

CHARLES R. MOORE, OF ELMIRA, NEW YORK.

BOILER.

SPECIFICATION forming part of Letters Patent No. 582,216, dated May 11, 1897.

Application filed September 8, 1896. Serial No. 605,069. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. MOORE, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Boilers, of which the following is a specification.

My invention relates to improvements in upright boilers of the water-tube type, and more especially to such as are adapted for steam-fire-engine purposes, where it is desirable to make steam very rapidly.

The present invention is of the same nature as that described in Letters Patent No. 500,814, granted to me on July 4, 1893; and it consists in providing the boiler with separate, independent, and disconnected systems or sections of water-tubes, certain of which are connected to the water-space of the boiler in such a manner as to create a circulation and produce a rapid generation of steam, and one of which is located centrally, being so arranged and connected as to receive water from the feed-pump and deliver it in a heated condition to the water-space below the normal level thereof, the object being to generate steam rapidly from the comparatively small amount of water contained in the water-space and circulating-tubes and to heat the water to the boiling-point in the central tube system or section before delivering it to the water-space of the boiler.

A further object which I have in view is to so arrange the different systems or sections of tubes that any one section may be readily removed for the purpose of repairing without disturbing the remaining sections.

I attain these objects by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section on the line *xx* in Fig. 2 of a boiler embodying my invention, the dome, stack, and gratings being omitted; and Fig. 2, a transverse section of the same on the line *yy* in Fig. 1.

Similar letters refer to similar parts in the two views.

The body of the boiler is composed of two shells, one within the other. The outer shell *a* is straight. The inner shell is of nearly the same diameter as the outer shell at its

lower portion *b*, is bent inwardly at *b'* about midway the height of the boiler, and runs thence straight up at *b''* to the top of the boiler, where it is joined to the outer shell by the annular head *c*, thus forming an annular water-leg, water-space, and steam-space, as indicated. A number of tube-sections or nests *d* are shown ranged around the lower portion of the boiler just above the fire-box. These consist of upper and lower heads joined together by a number of tubes, the lower head being connected with the leg of the boiler and the upper head with the water-space below the level at which the water is ordinarily carried. Instead of the nests coils of tubes, as indicated by the broken lines *d'*, may be used for the circulating medium, and these coils may be double or triple, accordingly as the space permits. The style or shape of these circulating-tubes is immaterial. This leaves a straight cylindrical passage through the boiler, which is filled by the large section or nest of tubes *e*. This section consists of large headers *e'* and *e''*, joined together by tubes, properly-arranged flues or passages for the gases of combustion being provided through these headers and around the tubes. This section is nearer the diameter of the portion *b''* of the shell than the drawings show it, in order that there shall not be too free a passage for the gases up around the section next to the shell, all the gas-passages being so arranged and proportioned that the gases shall be drawn toward the center of the boiler as they ascend.

The central section may extend down near to the fire-box, as I have shown it, or not so far, accordingly as circumstances may dictate. The lower header *e'* is connected with the feed-pipe *f*, which passes out through a hollow stay in the leg of the boiler and is connected with the feed-pump or other source of supply. The upper header *e''* is coupled at its center to a casting *g*, which is provided with a number of offsets from which run pipes *h h* through the top of the inner shell into the steam-space, where they are coupled by elbows to vertical pipes *i i*, which in turn extend downward through the steam-space to below the normal water-level in the water-space.

Suitable hangers are provided for supporting the weight of the section *e*, and braces are also provided to hold it against displacement by shocks and vibrations such as are attendant upon a boiler when attached to a portable fire-engine.

It will readily be seen that any one of the systems or sections of tubes may be removed without disturbing the rest. Only two joints need be broken in taking out any section, even to the large central section. Instead of connecting the top header of the central section to the boiler in the manner described, however, I may connect it in the same way as I do the top section in the boiler described in my patent above mentioned.

In operation the central section is filled with water and the water-leg and circulating sections filled to any desired level. When making very quick steam, this level may be below the tops of the circulating-sections. The fire being started, the water in the circulating-sections is heated first, and when sufficient steam has been generated the feed-pump is started, and water from the central section, which has by this time become well heated, is fed in through pipes *h* and *i*, the cold water from the feed-pump entering the bottom of the section first and becoming heated before it reaches the top. There is therefore no drop in steam-pressure due to forcing cold water directly into the steam-making water. Within a very few minutes after starting the fire the boiler is steaming rapidly and the central section works in unison with the circulating-sections, delivering heated water to the water-space ready for immediate conversion into steam. The tubes and headers are always filled with water, and there is no danger of leaky joints or tubes caused by expansion from overheating.

I do not confine myself to the exact form of the sections and water-tubes as shown, nor to the particular manner of making the couplings to the body of the boiler.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an upright boiler, the combination of inner and outer shells forming an annular water and steam space, an annular series of circulating-tubes or nests of tubes connected with the water-space, and an independent central system or nest of tubes extending from the top of the boiler down within the series of circulating-tubes, said central system being connected at the bottom with the feed-water supply for the boiler, and at the top with an outlet leading down to the water-space below the normal water-level.

2. In an upright boiler, the combination of inner and outer shells forming an annular water and steam space, a casting provided with offsets located centrally at the top of the boiler, pipes leading radially out from said offsets and connected with vertical pipes leading down to the water-space, and an independent central system or nest of tubes connected at the top with said casting and at the bottom with the feed-water inlet.

3. In an upright boiler, the combination of inner and outer shells forming an annular water and steam space, a casting provided with offsets located centrally at the top of the boiler, pipes leading radially out from said offsets and passing through the inner shell where they are connected by elbows to vertical pipes leading down through the steam-space to a point below the normal water-level, a central system or nest of tubes connected at the top with said casting and at the bottom with a feed-water inlet, and a series of circulating-tubes or nests of tubes connected with the water-space in the manner described.

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

CHARLES R. MOORE.

Witnesses:

A. S. DIVEN,
HOLLIS H. MILLS.