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HOT WATER AND STEAM BOILER.
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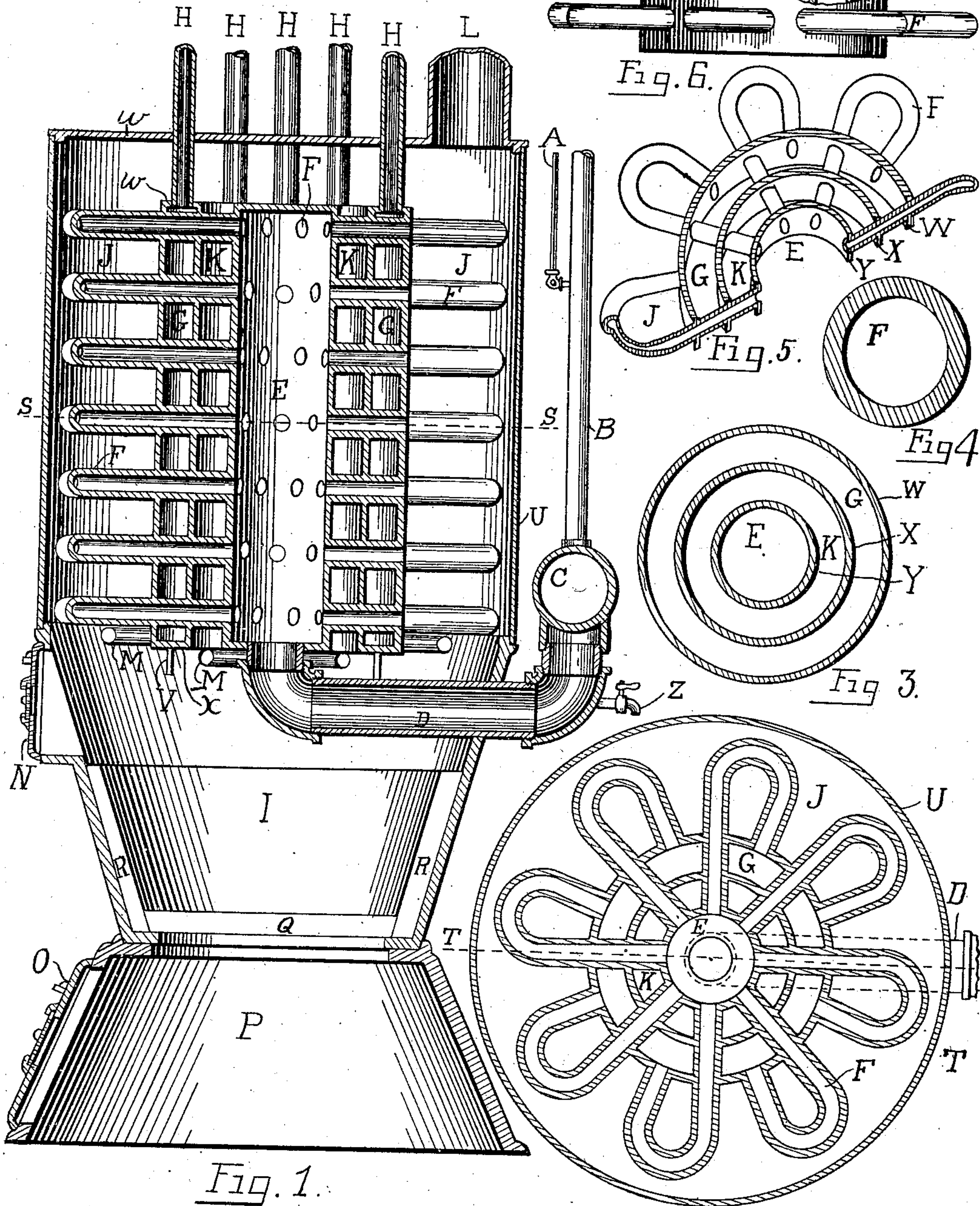


Fig. 1.

Fig. 2.

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HARRY L. WORDEN AND HENRY O. WURMSER, OF LORAIN, OHIO.

HOT-WATER AND STEAM BOILER.

944,759.

Specification of Letters Patent.

Patented Dec. 28, 1909.

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To all whom it may concern:

Be it known that we, HARRY L. WORDEN and HENRY O. WURMSER, citizens of the United States, residing at Lorain, in the county of Lorain and State of Ohio, have invented certain new and useful Improvements in Hot-Water and Steam Boilers, of which the following is a specification.

This invention has relation to hot water and steam boilers and has for its object the provision of a boiler of novel construction adapted for the heating of water or the generation of steam for heating purposes.

In the accompanying drawing illustrating our invention: Figure 1 is a vertical sectional view, on the line T, T, of Fig. 2, of the complete boiler with the supply and return pipes connected thereto. Fig. 2 is a horizontal sectional view on the line S—S of Fig. 1. Fig. 3 is a detail horizontal sectional view of the boiler shells devoid of the tubes. Fig. 4 a cross sectional view of one of the tubes which connect the inner and outer boilers. Fig. 5 is a detail perspective view of a portion of the inner and outer boilers and the connecting tubing thereof. Fig. 6 is a side elevation partly broken away of one section of a boiler made according to our invention.

Water is supplied to the boiler by means of a feed water pipe A leading from a source of supply to a return pipe B. The return pipe B leads to a manifold C and any required number of these feed pipes are provided, all leading to the manifold C which latter communicates by a conduit D with a cylindrical boiler Y that constitutes the inner boiler and has a water space E and is surrounded by the outer boiler which is composed of the inner shell X, the outer shell W and suitable heads *w*, *x*. The inner and outer boilers are sustained in position over a fire pot I, which has a fire clay lining R and a door N, suitable supports V being provided for the boilers to rest on. The outer boiler is, as shown, in the form of a hollow cylinder disposed concentrically to the inner boiler, so as to leave a fire space K therebetween and a jacket U having a head *u* rests upon the fire pot, leaving a fire space J around the external wall of the outer boiler and over the top of both boilers. A smoke pipe or flue L leads from the head *u* of the jacket U and a series of supply pipes H extend from the outer boiler through the

head *u*, of the jacket and lead to separate radiators (not shown). An ash pit P supports the fire pot I and is provided with a door O and the fire pot is provided with a grate Q.

Circular gas burners M, M, are arranged in the fire pot below the boilers and these burners can be used for heating the system by gas when desired. The inner and outer boilers are maintained in communication with one another by means of water tubes F. These tubes are disposed in a series of circular rows vertically spaced equidistant from one another, the rows extending from substantially the bottom of the boiler to the top of the same. Each circular row of tubes has all the tubes composing the row in horizontal alinement and each tube extends from the shell of the inner boiler, through the fire space between the boilers through the outer boiler, into the fire space J between the outer boiler and the jacket U, where it bends around in substantially U shape and terminates at the outer shell of the outer boiler. Each tube has preferably both ends disposed radially to the boilers and each tube is in communication at its inner end with the inner boiler and at its outer end with the outer boiler as clearly shown in Fig. 5.

The water travels through the apparatus as follows: Beginning at return pipe B, the water flows through manifold C, thence by way of conduit D, to the inner boiler, then through tubes F, into the water space G, of the outer boiler, from which it flows into the supply pipes H, and through the radiators back to the return pipes B. The relative capacities of the water spaces in the inner and outer boilers and connecting tubes and that of the supply and return pipes and conduits is preferably so proportioned that the water, while flowing through the boilers and the tubes F, moves with much less velocity than while flowing through the supply and return pipes and connections, thus giving ample time for the water to heat while passing through the boilers and connecting tubes F. The products of combustion from the fire pot pass up through the fire spaces J and K and out through smoke flue L and hence both boilers and substantially the whole surface of the tubes F are exposed to the fire and heat at all times.

We claim:

1. In apparatus of the character described,

the combination of an inner boiler and an outer boiler surrounding the inner boiler and spaced therefrom, with tubes extending from the inner boiler through the outer boiler and
5 outside the latter and thence back to the outer boiler.

2. In apparatus of the character described, the combination of an inner cylindrical boiler an outer boiler concentric to and spaced
10 apart from the inner boiler, with a jacket surrounding and spaced apart from the outer boiler and tubes extending from the inner boiler, through the outer boiler, into the space between the outer boiler and the jacket
15 and back into the outer boiler.

3. In apparatus of the character described, the combination with an inner boiler and an outer boiler concentric to the inner boiler, of tubes extending from the inner boiler
20 through the outer boiler and curved around outside the outer boiler and then entering

the outer shell of the outer boiler, the ends of said tubes being radial to the boilers. 25

4. In apparatus of the character described, the combination of an outer jacket, an outer boiler arranged within the jacket and spaced therefrom, said outer boiler having an internal fire space, an inner boiler arranged in the
30 fire space of the outer boiler, water tubes extending from the inner boiler through the outer boiler and beyond its outer wall and thence back into the said outer wall, supply
35 pipes leading from the outer boiler and return pipes leading to the inner boiler.

In testimony whereof we have affixed our signatures, in presence of two witnesses.

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Witnesses:

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