June 3, 1924. 1,496,189

R. R. WATERMAN

BOILER

Filed Feb. 13, 1919 2 Sheets-Sheet 1

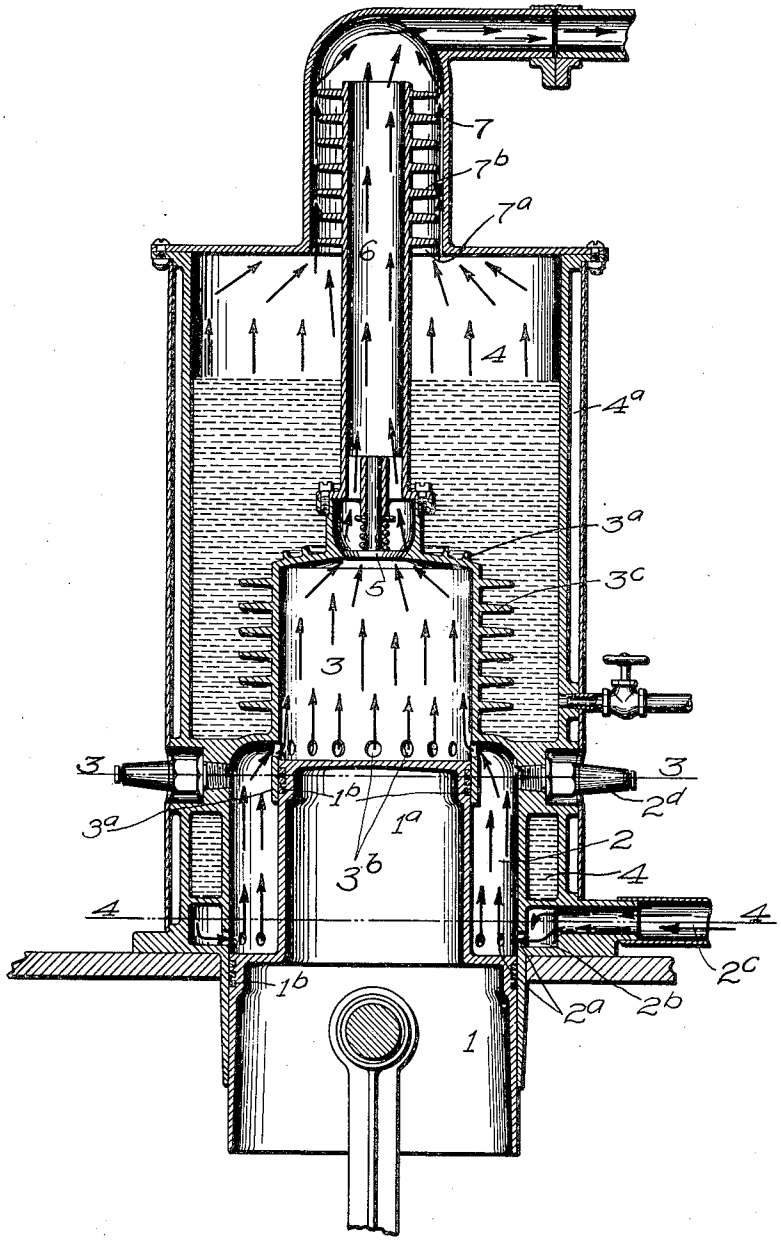


Fig. 1.

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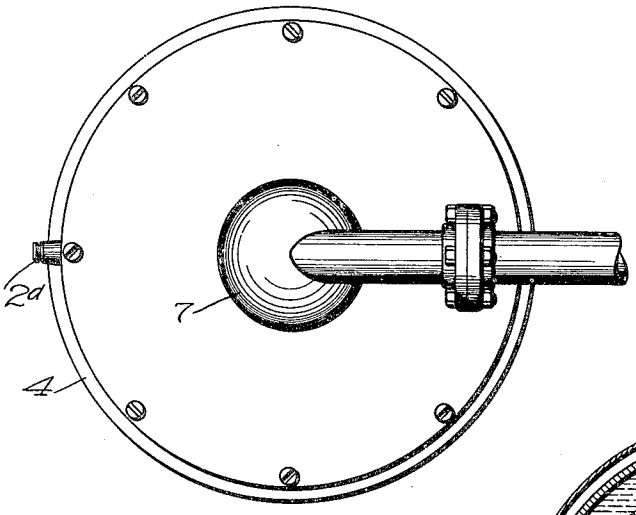


Fig. 2.

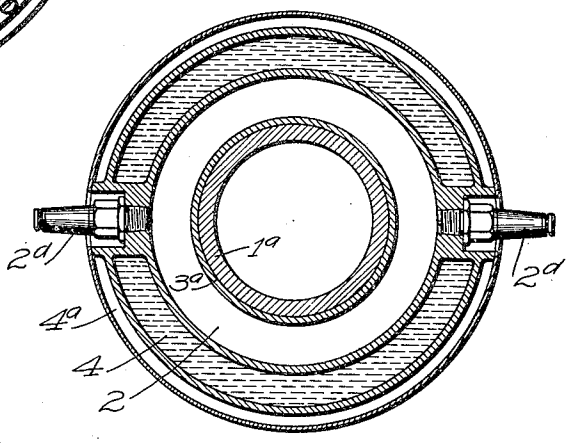


Fig. 3.

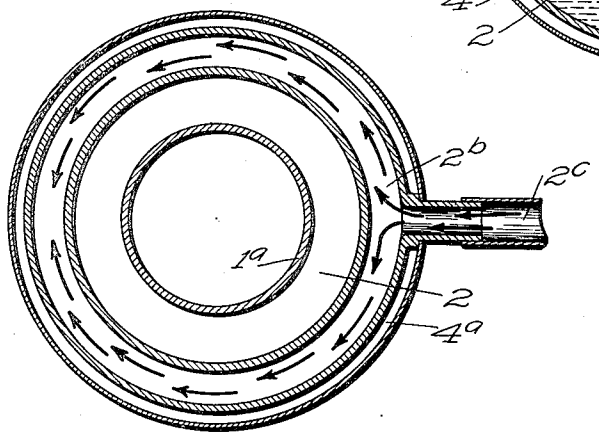


Fig. 4.

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Patented June 3, 1924. 1,496,189

UNITED STATES PATENT OFFICE.

RUSSELL R. WATERMAN, OF UPLANDS, CALIFORNIA.

BOILER.

Application filed February 13, 1919. Serial No. 276,800.

To all whom it may concern:

Be it known that I, RUSSELL R. WATERMAN, a citizen of the United States, residing at Uplands, in the county of San Bernardino and State of California, have invented certain new and useful Improvements in Boilers, of which the following is a specification.

My invention relates to a boiler for producing a motive fluid for steam engines and the objects of my invention are first, to provide a boiler in which the water is reduced to steam by means of heat produced by the exhaust gases of an internal combustion engine, second, to provide a device of this class in which the motive fluid produced is a combination of steam and exhaust gases from an internal combustion engine, third, to provide a device of this class in which the water is heated by induction through the walls of the cylinder of an internal combustion engine; fourth, to provide means for utilizing the heat from exhaust gases for producing steam for use as a motive fluid in a steam engine; fifth, to provide a new and novelly constructed boiler for converting water into steam; sixth, to provide a new and novel method of converting water into steam or vapor for motive fluid purposes and seventh, to provide an apparatus of this class which is simple and economical of construction, durable, very efficient in its action, easy to operate, easy to install, and which will not readily deteriorate or get out of order.

With these and other objects in view as will appear hereinafter my invention consists of certain novel features of construction, combination and arrangement of parts and portions as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings and to the characters of reference thereon which form a part of this application in which:

Figure 1 is a sectional view of my boiler complete showing a cylinder and piston only of the gas engine and showing some of the parts in elevation to facilitate the illustration, Fig. 2 is a top view thereof, Fig. 3 is a sectional view through 3—3 of Fig. 1 showing some of the parts in elevation, and Fig. 4 is a sectional view through 4—4 of Fig. 1.

Similar characters of reference refer to similar parts and portions throughout the several views of the drawings.

The piston 1, explosion chamber 2, compression chamber 3, boiler 4, valve 5, superheater 6, and boiler head 7, constitute the principal parts of my boiler.

The piston 1 is a two sized piston the part 1^a of which is adapted to fit in the compression chamber 3 and the part 1 is adapted to fit in the explosion chamber 2 and each portion of the piston is provided with expansion rings 1^b adapted to provide a tight fit between said piston and the walls of the chambers 2 and 3. Communicating with the lower portion of the explosion chamber 2 are a plurality of inlet ports 2^a which communicate with an annular channel 2^b extending around said chamber and in communication with this channel 2^b are the fuel intake conductors 2^c. Mounted in the upper portion of the explosion chamber 2 are the spark plugs 2^d which provide for the ignition of the gases in the explosion chamber 2. The compression chamber 3 is provided with a downwardly projecting portion 3^a and in this downwardly projecting portion is provided a plurality of ports 3^b through which the exploded gases pass into the compression chamber 3 and said gases are compressed therein by the inward movement of the piston portion 1^a in said compression chamber 3. This compression chamber 3 communicates with the super-heater 6 through a valve 5 which valve is actuated by the pressure in the compression chamber 3. The outer walls of the compression chamber 3 are provided with a plurality of thin projections adapted to facilitate the induction of heat from said compression chamber outwardly. Surrounding the explosion chamber 2 and compression chamber 3 is a water receptacle or boiler 4 which is provided with an air space 4^a around its outer side for holding the heat this being the preferred construction, however, it is obvious that other insulation may be used if desired. This water receptacle or boiler 4 is provided on its upper end with a head 7 which is provided with an outlet orifice 7^a therein into which extends the upper end of the super heater 6 which is provided with a plurality of fins 7^b for the purpose of facilitating the induction of heat into the steam rising from the

water in the receptacle 4. The steam and compressed exhaust gases unite at the end of the super-heater 6 and may be conducted to an engine for use. It will be noted that a plurality of chambers 2 and 3 like the ones shown and described may be used in one boiler; that the structure herein only discloses one of the several different structures that may be utilized for producing a combined steam and exhaust gas under pressure for fuel for expansion engines.

It is obvious that with this construction there is provided a means whereby the exhaust gases from an internal combustion engine may be utilized for heating water and producing steam and that the steam may be used for power for steam engines, or that steam may be mixed with the exhaust gases under pressure and the combined steam and exhaust gases used as a fuel for steam or other expansion engines.

The operation of my boiler as disclosed is as follows: The fuel enters the cyliner 2 by means of the inlet 2^c when the piston is in its receded position, as shown in Fig. 1 of the drawings. At the same time the burnt gases pass into the chamber 3, and with the inward stroke of the piston the exhaust gas is compressed in the chamber 3 and is forced out through the valve 5 into the conductor 6, then passes into the conductor 7. The fresh gas drawn in through the intake 2^c is compressed and ignited when the piston reaches the top of its stroke, the piston 1^a receding until it reaches the lower end of the stroke when the exhaust gases pass into the chamber 3 and fresh gas passes into the cylinder 2. The passage of the burnt gases from the cylinder 2 into the chamber 3 is cut off by the upward movement of the piston 1^a. Thus it will be noted that the operation of the piston 1 in the cylinder 2 is similar to that of the ordinary two cycle gas engine. The heat caused by the explosion of the gases in the cylinder 2 and the heat from the exhaust gases in the chamber 3 is conducted through the walls of said cylinder and chamber and heats the water contiguous thereto, transforming it into steam, which passes out through the conductor 7 and intermingles with the exhaust gases. It will be noted that the water is heated by the cylinder 2 and chamber 3 through the walls and fins in connection with the chamber 3 and that the steam is super-heated in its passage from the receptacle 4 by means of the exhaust gases in the conductor 6 facilitated by the fins 7^b.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. An apparatus of the class described, including a gas engine cylinder, a piston reciprocably mounted therein, a separate compression chamber separated from the engine cylinder by the piston during a portion of the stroke, and communicating with said cylinder, a water receptacle surrounding both said cylinder and separate compression chamber containing water and means for conducting the exhaust gases and the vapor produced from the water for use.

2. An apparatus of the class described, including a gas engine, a separate compression chamber separated from the cylinders of the gas engine by the piston during a portion of the stroke, communicating with the cylinder of said gas engine, a water receptacle surrounding both the exterior of the cylinder of said gas engine and said separate compression chamber and conductor means communicating with the interior of said water receptacle, separate compression chamber and said gas engine cylinder for conducting steam and vapor from said water receptacle and the exhaust gases from said engine cylinder and separate compression chamber for use.

3. An apparatus of the class described including a gas engine, a separate compression chamber separated from the cylinders of the gas engine by the piston during a portion of the stroke communicating with the cylinder of said gas engine, a water receptacle in which the gas engine cylinder and separate compression chamber is mounted, said receptacle containing water, which water communicates with the exterior of said cylinder and said separate compression chamber and receives the heat therefrom by conduction and means for conducting vapor produced from the water by said heat and said exhaust gases for use.

4. An apparatus of the class described, including a two diameter gas engine cylinder, a two diameter piston reciprocably mounted therein, means controlled by the piston for regulating the flow of gas from the large diameter cylinder to the small diameter cylinder, a conductor connected with the small diameter cylinder, a valve in said conductor adapted to control the flow of exhaust gases from said small diameter cylinder, a water receptacle surrounding said two diameter cylinder and said conductor.

5. An apparatus of the class described, including a two diameter gas engine cylinder, a two diameter piston reciprocably mounted therein, means controlled by the piston for regulating the flow of gas from the large diameter cylinder to the small diameter cylinder, an exhaust gas conductor connected with the small diameter cylinder, a valve in said conductor adapted to control the flow of exhaust gases from said small diameter cylinder, a water receptacle surrounding said two diameter cylinder and said conductor, a motive fluid conductor communicating with the upper end of said water receptacle with an enlarged portion adjacent

thereto into which the upper end of the exhaust gas conductor extends.

6. An apparatus of the class described, including a two diameter gas engine cylinder, a two diameter piston reciprocably mounted therein means controlled by the piston for regulating the flow of gas from the large diameter cylinder to the small diameter cylinder, an exhaust gas conductor connected with the small diameter cylinder, a valve in said conductor adapted to control the flow of exhaust gases from said small diameter cylinder, a water receptacle surrounding said two diameter cylinder and said conductor, a motive fluid conductor communicating with the upper end of said water receptacle with an enlarged portion adjacent thereto into which the upper end of the exhaust gas conductor extends, and fins surrounding the upper end of said exhaust gas conductor and the upper end of the small diameter of said cylinder to facilitate the conductor of heat from said small diameter cylinder and the upper end of the exhaust gas conductor for heating the water and vapor in its passage from said water receptacle.

In testimony whereof, I have hereunto set my hand at Tulare, California, this 4 day of February 1919.

RUSSELL R. WATERMAN.