W. JOHNSON.

BOILER.

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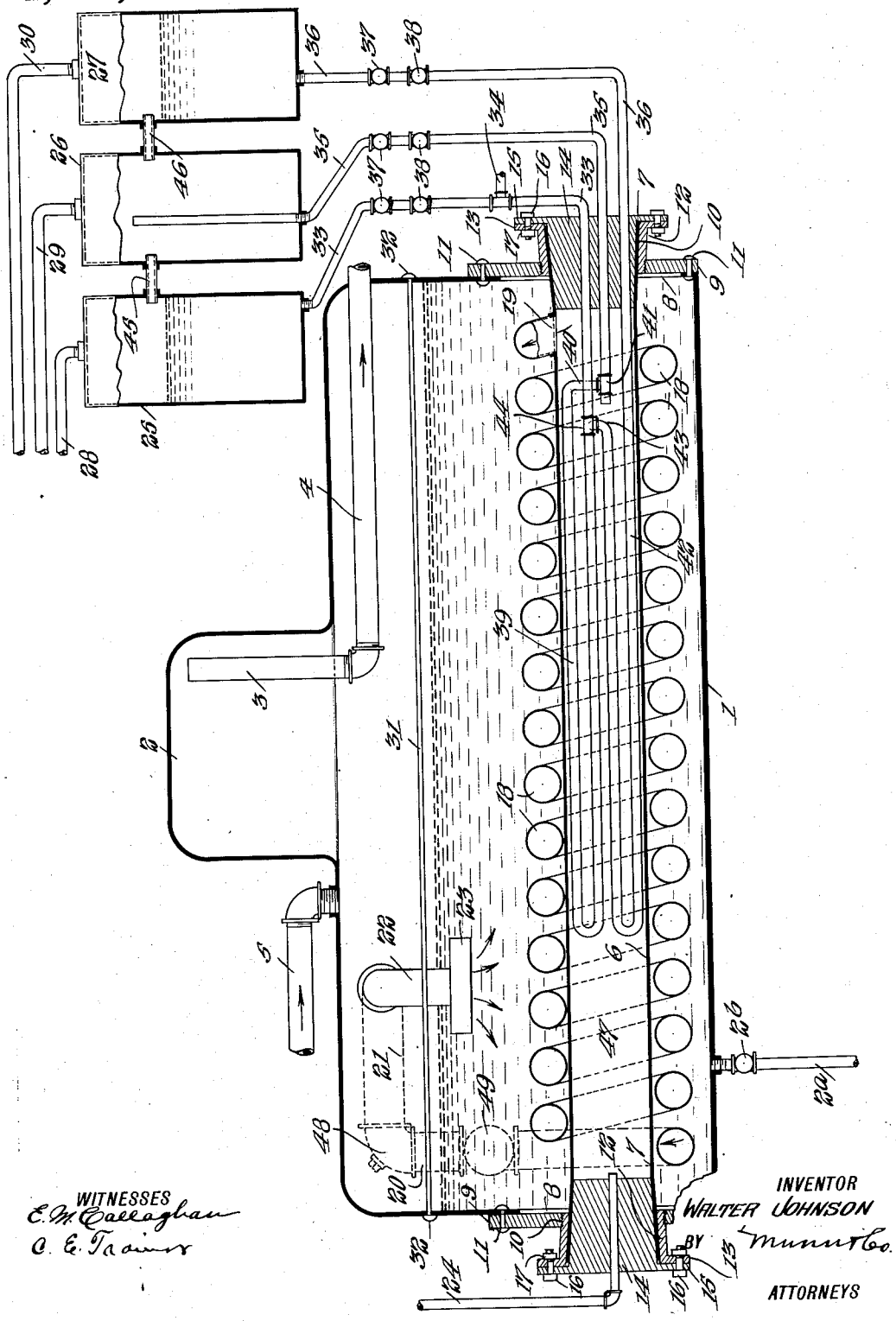

WITNESSES

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BOILER.

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To all whom it may concern:

Be it known that I, WALTER JOHNSON, a citizen of the United States, residing at Lincoln, in the county of Lancaster and State of Nebraska, have invented a new and useful Improvement in Boilers, of which the following is a specification.

My invention is an improvement in boilers, and has for its object, the provision of a boiler suitable for providing steam for motors, or for heating systems, having a special form of heating means, arranged to give the largest possible amount of steam per heat unit.

In the drawings is shown a diagrammatic vertical section of the improvement.

The present embodiment of the invention comprises a shell or casing 1, of approximately cylindrical shape, and provided at its upper side with a steam dome 2. A service pipe 3 leads from the top of the steam dome downwardly, and thence horizontally at 4, and out at one end of the boiler, for carrying the steam to the place of use. A discharge pipe 2^a is provided at the bottom of the boiler, and is controlled by a valve 2^b. A supply pipe 5 opens into the top of the boiler, near the dome for supplying water to the boiler. A tube, or casing 6 is arranged within the shell, near the bottom, and longitudinally of the boiler, the said tube or casing extending through each end of the shell.

The tube or casing 6 is approximately cylindrical, the ends 7 however being frusto conical, or flaring, gradually increasing in cross section outwardly. The ends of the boiler have openings 8 for the tube, and a plate 9 having a threaded opening 10 is secured over each opening 8, by means of rivets 11. A frusto conical or flaring sleeve 12 is threaded into each opening 10, each sleeve fitting closely outside of the adjacent end of the tube.

Each sleeve 12 has a marginal lateral flange 13 at its outer end, and a frusto conical plug 14 fits within each end of the tube, and each plug has a lateral annular flange 15, fitting against the flange 13 of the adjacent sleeve 12. Bolts 16 are passed through the flanges 13 and 15 at each end of the boiler, and nuts 17 engage the bolts on the inner sides of the flanges.

A pipe 18 is arranged spirally of the tube, in the boiler, and the said pipe 18 opens into the tube at one end, as shown at 19. At the other end of the tube, the pipe 18 extends upwardly, as shown at 20, to a point near the top of the boiler, and above the normal water level. The pipe then extends horizontally toward the opposite end of the boiler, as shown at 21, and then inwardly toward the center of the boiler, and then downwardly, as shown at 22.

The lower end of the portion 22 of the pipe is below the normal water level, and is provided with a spreader or enlargement 23. A pipe 24 extends through the plug 14 at the end of the boiler adjacent to the portion 20 of pipe 18, and three tanks or reservoirs 25—26 and 27 are arranged at the opposite end of the boiler, at a higher level than the boiler.

The tank 25 is adapted to contain fuel in liquid or gaseous form, and tank 27 is adapted to contain water. Tank 26 is adapted to contain air, and the said tanks 25—26 and 27 are provided with supply pipes 28—29 and 30, respectively, for supplying the fuel, air, or water, as the case may be. The heads of the boiler are preferably strengthened or reinforced, by means of a rod 31, extending longitudinally of the boiler, through both heads, and being headed at 32 on the outer side of each head.

A pipe 33 leads from the bottom of tank 25, into the tube 6, extending through the plug 14 at the end of the boiler adjacent to the tank, and a branch pipe 34, leads from the said pipe near the boiler. A pipe 35 leads from near the top of tank 26, through the bottom thereof, to tube 6, and a pipe 36 leads from the bottom of tank 27 to the tube, both pipes 35 and 36 passing through the plug near the tanks.

The three pipes 33—35 and 36 are controlled by valves 37 and 38 two valves being interposed in each pipe. Pipe 33 extends longitudinally of tube 7 to a point near the spreader 23, and is then bent directly back upon itself at 39, and extends to near the plug 14 through which pipe 33 passes. Near the plug the pipe is bent downwardly as shown at 40, and connects with pipe 35 at 41.

Pipe 36 extends longitudinally of tube 6 to near the spreader 23, and is then bent back upon itself, as shown at 42, and extends to near the connection 41 before mentioned. Near this point the pipe is bent upwardly at 43, and is connected to pipe 33 at 44. The tanks 25 and 26 are connected near their tops by a cross pipe 45, and tanks 26 and 27 are connected at the same point by a pipe 46.

The tank 25 is provided with fuel by pipe 28 from any suitable source of supply, and tank 27 with water, while tank 26 is supplied with air under pressure, and by means of pipes 45 and 46, the pressure is transmitted to tanks 25 and 27. The chamber 47 formed in the tube between the ends of pipes 33—39, 36 and 42 is the combustion chamber, and a check valve 48 is provided in pipe 20 to prevent the reflux of water into tube 6, or into the combustion chamber. A valve 49 is also provided in the said pipe.

The valves 38 in pipes 33—35 and 36 are automatically controlled by the steam pressure apparatus of any usual or desired form, and valves 37 of the said pipes are controlled by the operator to admit the proper amount from each tank to the combustion chamber. The tank 26 maintains pressure also in the boiler, and the pressure in the tank is enough higher than that of the boiler to cause the fuel, air and steam to feed properly. Pipe 24 before mentioned is connected also to the source of air pressure supply, and air is supplied to the combustion chamber from this pipe 24 as well as from pipe 35.

In operation, fuel, air and steam is fed into the combustion chamber by pipes 33, 35 and 36, the said pipes being perforated as are also pipes 39 and 42. Plug 14 at the end of the tube adjacent to chamber 47 may be removed to ignite the gases after which it is closed. The heated products of combustion pass from the chamber 47 through the spiral pipe 18—19, and through pipes 20—21, 22 and spreader 23 into the water thoroughly heating the same.

Water is supplied to the boiler by pipe 5, and the steam generated is drawn off through pipes 3 and 4. All of the component parts of the mixture to be burned are fed under pressure to the combustion chamber. The tube 6 may be entirely removed by removing the plugs 14 and sleeve 12, for cleaning or repairing.

It will be noticed that at the point 44, the pipe 33 supplying fuel and the pipe 36 supplying water form a junction and the said water and fuel are superheated at this point forming water gas. From this point, the said matters travel forming a thorough combination, and no air is added to the mixture until the mixture reaches the point 41. Air is added at 41, and the complete mixture is ejected into the tube 6, the air being combined at a high temperature with the water gas, and the mixture at this point is instantly ignited, causing an explosion of the charge or mixture. The products of combustion are of course, under the boiler pressure, and cannot expand as when released into the atmosphere.

It is known that any gas requires a certain amount of specific heat, otherwise known as "latent heat." Air passing through the ordinary furnace undergoes an enormous isothermal expansion and thereby consumes an enormous amount of heat, the said heat being latent and therefore not registerable by thermometers. In the improved boiler, the gases are held under pressure in the combustion chamber, so that this latent heat is not lost as in the ordinary construction. It will be seen that the improved boiler presents three features of importance, namely 1st, the formation of the water gas under intense heat, second, the maintaining of the gases under pressure to preserve the heat energy and third, immersing the gases in the water of the boiler by means of which the gases and water are brought to an uniform temperature. It will be understood that the combustion chamber of the boiler may be changed to provide for burning other forms of fuel than that specified without departing from the principle of the invention. The pipe 24 is for supplying the necessary air for combustion.

I claim,

1. A boiler comprising a casing of approximately cylindrical form having a steam dome and having an opening at each end, a tube extending longitudinally of the casing and extending through the opening at each end of the boiler, the ends of the tube being flaring, a plug in each end of the tube, each plug having a marginal flange at its outer end, a plate secured to the boiler over each opening, each plate having an opening for the tube, a sleeve encircling each end of the tube, each sleeve being threaded into the opening of the adjacent plate and having an annular marginal flange abutting the flange of the adjacent plug, means for clamping the flanges together, a plurality of tanks adjacent to the boiler and at a higher level than the tube, one of the tanks being adapted to contain fuel, another to contain water, and another to contain air under pressure, a communication between the air tank and each of the other tanks, a pipe leading from each tank to the tube, a plurality of valves in each pipe, a pipe arranged spirally of the tube in the boiler and communicating with the tube at one end and delivering to the interior of the boiler below the water level at the other end, and a pipe opening into the tube at the end remote from the tanks for supplying air under pressure to the tube.

2. A boiler comprising a casing of approximately cylindrical form having a steam dome and having an opening at each end, a tube extending longitudinally of the casing and extending through the opening at each end of the boiler, the ends of the tube being flaring, a plug in each end of the tube, each plug having a marginal flange at its outer end, a plate secured to the boiler

over each opening, each plate having an opening for the tube, a sleeve encircling each end of the tube, each sleeve being threaded into the opening of the adjacent plate and having an annular marginal flange abutting the flange of the adjacent plug, means for clamping the flanges together, a plurality of tanks adjacent to the boiler and at a higher level than the tube, one of the tanks being adapted to contain fuel, another to contain water, and another to contain air under pressure, a communication between the air tank and each of the other tanks, a pipe leading from each tank to the tube, a plurality of valves in each pipe, a pipe arranged spirally of the tube in the boiler and communicating with the tube at one end and delivering to the interior of the boiler below the water level at the other end.

3. A boiler comprising a casing of approximately cylindrical form having a steam dome and having an opening at each end, a tube extending longitudinally of the casing and extending through the opening at each end of the boiler, a plurality of tanks adjacent to the boiler and at a higher level than the tube, one of the tanks being adapted to contain fuel, another to contain water, and another to contain air under pressure, a communication between the air tank and each of the other tanks, a pipe leading from each tank to the tube, a plurality of valves in each pipe, a pipe arranged spirally of the tube in the boiler and communicating with the tube at one end and delivering to the interior of the boiler below the water level at the other end, and a closure for each end of the tube.

4. A boiler comprising a casing of approximately cylindrical form having a steam dome and having an opening at each end, a tube extending longitudinally of the casing and extending through the opening at each end of the boiler, the ends of the tube being flaring, a plug in each end of the tube, each plug having a marginal flange at its outer end, a plate secured to the boiler over each opening, each plate having an opening for the boiler, a sleeve encircling each end of the tube, each sleeve being threaded into the opening of the adjacent plate and having an annular marginal flange abutting the flange of the adjacent plug, means for clamping the flanges together, a pipe arranged spirally of the tube in the boiler and communicating with the tube at one end and delivering to the interior of the boiler below the water level at the other end, and a plurality of tanks for fuel, air and water delivering to the tube.

5. A boiler comprising a casing of approximately cylindrical form having a steam dome and having an opening at each end, a tube extending longitudinally of the casing and extending through the opening at each end of the boiler, a pipe arranged spirally of the tube in the boiler and communicating with the tube at one end and delivering to the interior of the boiler below the water level at the other end, a closure for each end of the tube, a plurality of tanks for fuel, water and air under pressure delivering to the tube.

6. A boiler comprising a casing having a steam dome, a combustion tube arranged longitudinally of the casing and extending beyond the same at each end, a pipe arranged spirally of the tube in the boiler, said pipe communicating with the tube at one end and with the boiler at the other, a closure for each end of the tube, each closure comprising a plug fitting in the end of the tube, a sleeve encircling the end of the tube, said sleeve and plug having each a marginal lateral flange, means for clamping the flanges together, and a plate having an opening secured to each end of the casing over the opening, the inner end of each sleeve being threaded into the opening of the adjacent plate.

7. A boiler comprising a casing having a steam dome, a combustion tube arranged longitudinally of the casing and extending beyond the same at each end, a pipe arranged spirally of the tube in the boiler, said pipe communicating with the tube at one end and with the boiler at the other, a closure for each end of the tube, each closure comprising a plug fitting in the end of the tube, a sleeve encircling the end of the tube, said sleeve and plug having each a marginal lateral flange, means for clamping the flanges together, and a detachable connection between each sleeve and the adjacent end of the boiler.

8. A boiler comprising a casing having a steam dome, a combustion tube arranged longitudinally of the casing and extending beyond the same at each end, a pipe arranged spirally of the tube in the boiler, said pipe communicating with the tube at one end and with the boiler at the other, a closure for each end of the tube, each closure comprising a plug fitting in the end of the tube, a sleeve encircling the end of the tube, means for securing the plug and the sleeve together, and a means for securing the plug and sleeve to the casing.

9. A boiler comprising a casing having a steam dome, a combustion tube arranged longitudinally of the casing and extending beyond the same at each end, a pipe arranged spirally of the tube in the boiler, said pipe communicating with the tube at one end and with the boiler at the other, and a closure for each end of the tube.

10. A boiler comprising a casing, a combustion chamber within the casing, reservoirs for fuel, air under pressure, and water arranged adjacent to the boiler, said res-

ervoirs communicating with each other, a supply pipe leading from each reservoir to the combustion chamber, the supply pipes for the fuel and water reservoirs opening into a common pipe in the combustion chamber, said common pipe communicating with the supply pipe from the reservoir for air under pressure adjacent to the outlet thereof, and a pipe leading from the combustion chamber above the water level and delivering to the water in the boiler below the said water level.

11. A boiler for containing water, a combustion chamber in the boiler below the normal water level, a pipe leading from the combustion chamber and extending above the water level and delivering below the water level to the water, supply pipes for fuel, air under pressure, and water leading to the combustion chamber, the supply pipes for the fuel and the water opening into a common pipe within the combustion chamber, said common pipe and the supply pipe for air delivering together to the combustion chamber.

12. In a boiler, a combustion chamber arranged below the normal water level, means for supplying air under pressure to the combustion chamber, a communication leading from the said chamber above the normal water level and delivering to the water below said water level, means for combining liquid fuel and water to form water gas in the chamber, and means for combining the said gas with the air under pressure before it is delivered to the combustion chamber.

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Witnesses:
GEO. M. GATES,
CECIL C. GATES.