F. H. STANARD.

MEANS FOR GENERATING MOTIVE FLUID FOR MOTOR CARS.

APPLICATION FILED JAN. 30, 1912.

1,067,771.

Patented July 15, 1913.

2 SHEETS—SHEET 1.

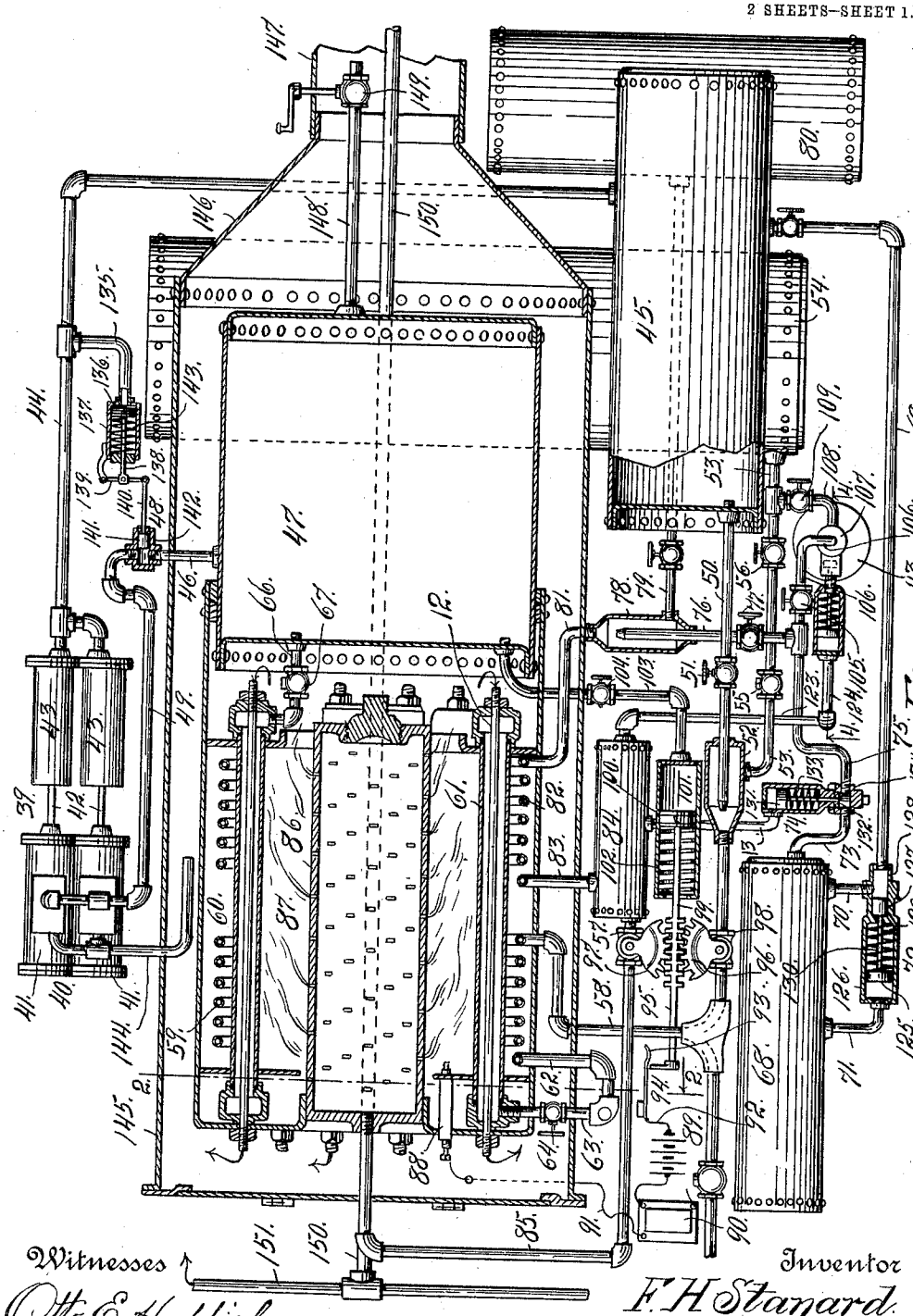


Fig. 1

Witnesses

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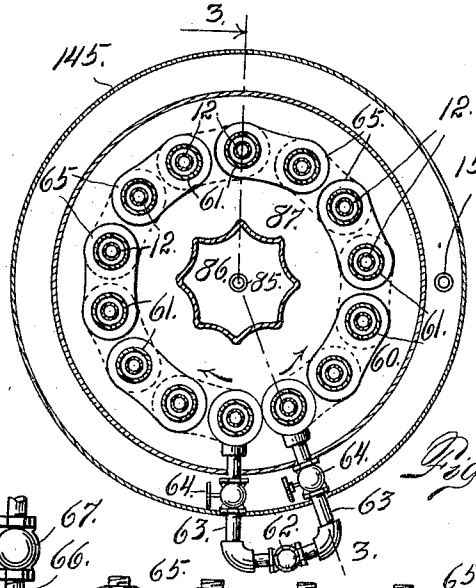


Fig. 2.

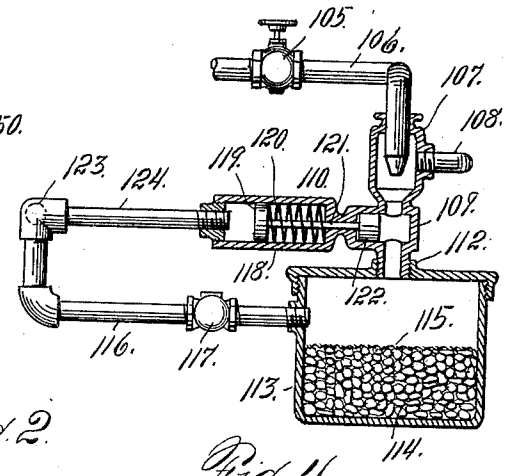


Fig. 4.

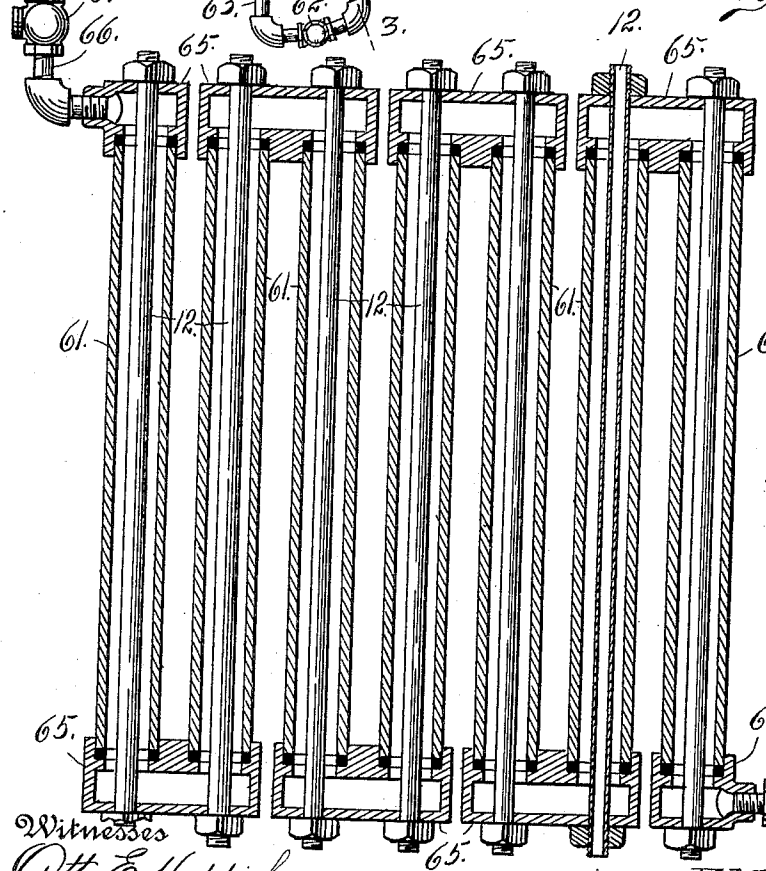


Fig. 3.

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UNITED STATES PATENT OFFICE.

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MEANS FOR GENERATING MOTIVE FLUID FOR MOTOR-CARS.

1,067,771. Specification of Letters Patent. Patented July 15, 1913.

Application filed January 30, 1912. Serial No. 674,330.

To all whom it may concern:

Be it known that I, FRANK H. STANARD, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Means for Generating Motive Fluid for Motor-Cars; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to means for generating motive fluid for motor cars.

In my improved construction for generating motive fluid, I employ a steam generator connected in operative relation with an air receiver, the latter being in turn supplied with compressed air by a pump or air compressor mounted on the machine. The steam generator, or boiler, is so connected with the receiver, and with a water tank also mounted on the machine, that the water is introduced to the coils and tubes of the generator by means of an injector. Furthermore, the generator is supplied with heat by means of a burner extending centrally through the generator and supplied with fuel from a tank containing a combustible mixture, formed by connecting coils surrounding the steam generator with a gasolene tank, and the receiver, in such a manner that the gasolene and air are introduced to the said coils by an injector, the coils leading to a gas tank, or tank for containing the fuel for supplying the burner or heater for the generator. Provision is also made whereby when the motive fluid generated reaches a predetermined pressure in the dome of the generator, said pressure being somewhat less than that in the air receiver, the air will be automatically cut off from the generator, and the combustible mixture cut off from the burner. Furthermore, when the pressure in the tank containing the combustible mixture reaches a predetermined degree, the supply of air and gasolene for generating the said mixture is also automatically cut off. It may be stated that after the apparatus is once started, its operation is automatic.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing, in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a top plan view with most parts sectionized, illustrating my improved construction. Fig. 2 is a section taken on the line 2—2, Fig. 1, viewed in the direction of the arrow. Fig. 3 is a section taken on the line 3—3, Fig. 2, following the curve of the zone in which the tubes 61 are arranged. In Fig. 3 the tubes which are actually arranged in a circular zone are for convenience of illustration, shown as if they were lying in a single plane. Fig. 4 is a section taken through the construction for generating acetylene gas for use in the gas tank in lieu of the gasolene explosive mixture. This section is taken on the line 4—4, Fig. 1.

Let the numeral 39 designate an air compressor, whose engine structure 40 is composed of two cylinders, 41, whose piston stems 42, lead to air pump cylinders, 43, which are connected by means of a pipe 44 with a receiver 45. As illustrated in the drawing, the engine of the compressor is supplied with motive fluid through a pipe 46, connected with the motive fluid dome 47, the pipe 46 leading to a regulator 48 from which a pipe 49 leads to the cylinders 41 of the compressor engine.

Connected with the receiver 45, and in communication therewith, is a pipe 50, containing a valve 51 and leading to the casing 52 of an injector construction, the said casing being also in communication with a pipe 53 leading from a water tank 54. This pipe 53 is equipped with a check valve 55 and a manually operated valve 56. Assuming that the receiver 45 is charged with air, and that the valves 51 and 56 are both open, the air entering the casing 52 will draw in water from the tank 54, and this water and air will be carried through a pipe 58 to a pipe coil 59, forming a part of the motive fluid generator, the said coil being located in a chamber 60, surrounding the longitudinally disposed pipes 61 through which the fire tubes 12 of the generator pass, the tubes 61 being relatively large for the purpose. After passing through the coil 59, the water having been formed into steam, passes with the air through a pipe 62 to two branch pipes 63, each being controlled by a valve

64. These branch pipes 63, lead to boxes 65, each box connecting a longitudinal pipe 61 with an adjacent similar pipe, whereby the motive fluid after escaping from the extremity of one pipe 61, enters the box 65 and passes to the adjacent pipe 61 in the opposite direction. After passing through the last named pipe it enters a similar box 65, at the opposite end of the generator, the same communicating with an adjacent pipe 61, and so on, in this manner the motive fluid passes through all of the pipes 61 of the generator, the fluid traveling in opposite direction from the branch pipe 63, and after reaching the two pipes 61, remote from the branch pipe 63, it passes through pipes 66, controlled by check valves 67, into the dome 47.

The manner of supplying a combustible mixture for generating the motive fluid will now be described.

An auxiliary receiver 68 is connected with the main receiver 45 by a pipe 69, the air entering the auxiliary receiver through a branch pipe 70, the auxiliary receiver being also connected through a branch pipe 71 with an automatic regulator 72. It is assumed that the air pressure in the auxiliary receiver will be approximately 100 pounds, while that in the main receiver is 600 pounds. From the auxiliary receiver the air passes through a pipe 73 to a regulator 74, and thence through a pipe 75 to a pipe 76, controlled by a manually operated valve 77; the pipe 76 leads to the casing 78 of an injector, the injector casing being also connected by means of a pipe 79 with a gasolene tank 80; as air is introduced to the injector casing 78, gasolene is drawn into the same casing, and the air and gasolene pass through a pipe 81 to a coil 82 located within the annular chamber 60 surrounding the tubes 61 of the generator. Within the coil 82 the air and gosolene are converted into a combustible mixture, which passes through a pipe 83 to a tank 84, from which the mixture passes through a pipe 85 to a burner 86 centrally arranged within the generator, an annular combustion chamber 87 being interposed between the burner and the zone of the longitudinally arranged pipes 61 of the generator. This burner is perforated, whereby the combustible mixture is allowed to enter the combustion chamber 87, in which the said mixture is ignited through a spark plug 88, located in an electrical circuit composed of a battery 89, an induction coil 90, and conductors 91 and 92; the wire 91 leads from the induction coil to the spark plug 88, while the wire 92 leads to a spring contact 93 adapted to be engaged by the contact extremity 94 of a rack bar 95 connected with segmental gears 96 and 97 for controlling a valve 57 and a valve 98 located in the pipe 58. The rack bar 95 is integral with the stem 99 of a piston 100, located in a cylinder 101, acted on by a spring 102. This cylinder on the opposite side of the piston from the spring, is in communication with the dome 47 by means of a pipe 103, provided with a manually operated valve 104. When the pressure within the dome 47 exceeds a predetermined degree, say 500 pounds, assuming that the pressure in the main receiver is 600 pounds, the piston 100 will be actuated to close the two valves 87 and 98, whereby the air and water are cut off from the coil 59 of the generator, and the combustible mixture cut off from the burner 86. In this way, the pressure within the dome is automatically maintained at a predetermined degree less than the pressure within the main receiver 45. This is necessary in order that the motive fluid may enter the dome at all times.

If for any reason the gasolene within the tank 80 should not be available, the burner may be supplied with acteylene gas in the following manner: The valve 105 which is normally closed, is opened while the valve 77 in the pipe 76 is closed, the valve 105 being located in the pipe 106 leading to an injector casing 107, which is also connected by means of a pipe 108 with the pipe 53 leading from the water tank 54. There is a valve A in the pipe 108 which is opened to allow the water to pass to the casing 107, the valve 56 in this event, being closed. As the air enters the casing 107, it draws water into the same casing, and this passes downwardly through the casing member 109 of an automatic regulator 110, and thence through a nipple 112 into a receptacle 113 containing carbid 114, the carbid receptacle being equipped with a screen 115, interposed between the water and the carbid; the gas generated in the tank 113, passes through a pipe 116, containing a check valve 117, and thence into a pipe 123 connected with the tank 84, whereby the latter is supplied with gas which may be carried to the burner 86 through the pipe 85, in the same manner as the combustible mixture composed of air and gasolene, as heretofore explained. As soon as the pressure within the tank 84 becomes greater than a predetermined degree, say 80 pounds, this pressure will act through a pipe 124 (see Fig. 4) on a piston 119 within a cylinder 118, forming part of the automatic regulator 110, to actuate a relatively small piston 122 within the casing 109, whereby the latter is moved to a position to cut off the supply of water to the carbid receptacle. The small piston 122 is connected with the larger piston 119 by means of a stem 121, the said stem being surrounded by a coil spring 120 interposed between the piston 119 and one extremity of the cylinder 118. The tension of this spring is so regu-

lated as to resist the pressure of the gas within the tank 84, until such pressure exceeds a predetermined degree, say 80 pounds, or the pressure required. When the pressure within the tank 68 exceeds 100 pounds, this pressure will act upon a piston 125 within a cylinder 126 of the automatic regulator 72, and actuate a smaller piston 127 to cut off communication with a casing 128 between the tank 45 and the tank 68. The piston 125 is acted on by a spring 129 surrounding the stem 130 of the larger piston 125. It must be understood that the tension of the spring 129 is so regulated that it will maintain the piston 125 and 127, in position to allow the air to pass from the tank 45 to the tank 68 until the pressure within the last named tank has reached the predetermined desired degree. When the gas within the tank 84 has reached a predetermined degree, the supply of air to the injector casing 78 from the tank 68 will be cut off by the automatic regulator 74 composed of a relatively large piston 131, connected with a relatively small piston 132, the piston 131 being acted on by a spring 133, whose tension is regulated to accomplish the desired purpose. As the pressure within the tank acts on the piston 131, through a pipe 13 the piston 132 is actuated to close the passage in a casing 134, connecting the pipes 73 and 75, whereby the air is cut off from the injector casing 78, and the generation of combustible mixture within the coil 82 must cease until the pressure within the gas tank is sufficiently reduced to allow the spring 133 to reverse the movement of the pistons 131 and 132, whereby the air from the tank 68 is again allowed to pass to the casing 78 for injector purposes. When the pressure within the receiver 45 reaches a predetermined degree, say 600 pounds, the air acts through a branch pipe 135 on a piston 136, located in a casing 137, the said piston being connected by means of a stem 138 with a lever arm 139, the latter being in turn connected with a stem 140 leading to a relatively small piston 141, located within a casing 142 of the regulator 48, whereby the piston 141 is actuated to cut off communication between the dome 48 and the engine 40 of the compressor 39, stopping the compressor until the pressure within the receiver 45 is reduced sufficiently to open communication between the dome and the engine 40 through the instrumentality of a coil spring 143, which acts upon the piston 136 to resist a pressure equal to that desired within the receiver 45.

The exhaust from the cylinders 41 of the air compressor engine 40, passes through a pipe 144 into a hood 145 surrounding the generator, and completely incasing the latter and the dome 48, the hood tapering at its outlet extremity as shown at 146, and merging into a conduit 147 leading to the atmosphere directly, or through any suitable channel.

The motive fluid in the steam dome may be utilized for running a motor car or for other purposes.

As illustrated in the drawing, a pipe 148 leads from the steam dome, being controlled by a throttle valve 149. The motive fluid may be carried through this pipe to any desired point where it is to be used. The exhaust from the engine 40, into the hood 145, increases the draft and facilitates the removal of the products of combustion, which after leaving the combustion chamber 87, pass through the fire tubes 12 and thence forwardly through these tubes, escaping therefrom into the hood 145, thence they exhaust to the atmosphere by passing rearwardly and entering the exhaust conduit 147. After the live motive fluid has been used in the engine (not shown) of an automobile or other structure, the exhaust may return through a pipe 150, and pass in both directions through a transversely arranged pipe 151, if it is desired to employ the motive fluid on the compound principle.

From the foregoing description, the use of my improved apparatus for generating motive fluid will be readily understood.

While my improved structure is more specially designed for use on automobiles or motor cars, it may be employed for generating motive fluid for any desired use.

Assuming that it is to be used upon an automobile, I prefer to employ it in connection with a construction where each wheel of the machine has an individual engine, as set forth in a simultaneously pending application. Whether used in this manner or not, the machine may be started by the use of air from the receiver 45, which may be passed through the generator into the dome, and carried thence to the engines, or engine, for starting the machine before any fire is lighted. When, however, the construction is operated in the regular way, the valve 51 is opened, and the air entering the injector casing 52, draws water from the tank 54, and the water and air pass through the coils 59 of the generator, and thence into the tubes 61 surrounding the combustion chamber 87, and from the said tubes to the dome 47. The burner 86 is supplied with a combustible mixture, through air taken from the auxiliary receiver 68 through the pipe 73, the part 134 of the automatic regulator 74, and thence through the pipe 75 and the pipe 76 to the injector 78, which is also in communication with the gasolene tank 80, by way of the pipe 79. In this manner, air and gasolene are carried through the pipe 81 to the coil 82, surrounding the zone of the pipes 61; the air and gasolene are converted

into a gaseous combustible mixture in the coil 82, and carried through the pipe 83 to the tank 80, whence this mixture is passed through the pipe 85 to the burner, provision being made for automatically igniting the mixture in the combustion chamber 87 through the instrumentality of an electric circuit having the contact 93 coöperating with the contact 94, mounted on a rack bar 95, which is moved in one direction by a spring 102, acting on the piston 100, and in the opposite direction by the motive fluid in the dome 47. When the contact 94 is moved to its limit in either direction, it engages the contact 93, and closes a spark plug circuit heretofore described, and through the instrumentality of this circuit, the spark plug 88 ignites the combustible mixture in the combustion chamber 87 of the generator. When desired, acetylene gas may be generated by connecting the carbid receptacle 113, with the gas tank 84, and supplying the said receptacle and the carbid therein with water, by the use of an injector supplied with air from the tank 68, and with water from the tank 54, by virtue of the connections heretofore described. When the apparatus is operating in the regular way, the receiver 45 is supplied with air from the compressor 39, whose engine 40 is operated from motive fluid taken from the dome 47, as heretofore explained.

Having thus described my invention, what I claim, is:

1. In apparatus of the class described, the combination of a steam generator, a dome in communication with the generator for receiving the motive fluid, a compressed air receiver, a water tank, an injector connected in operative relation with the receiver, the water tank and the generator, and means operated by the motive fluid from the dome for automatically cutting off the supply of air and water from the injector to the generator, substantially as described.

2. In combination, a steam generator, a receiver for compressed air, a source of water supply, an injector connected in operative relation with the said receiver, the water source and the generator, a valve located in the discharge conduit of the injector, and means connected with the said valve and operated by the motive fluid from the dome for automatically closing the said valve to cut off the supply of air and water to the generator, substantially as described.

3. A motive fluid generator, comprising an air compressor, a receiver, a steam generator, a dome for the motive fluid in communication with the steam generator, an operative connection between the motive fluid in the dome and the air compressor, means for automatically cutting off the supply of motive fluid to the compressor when the pressure in the receiver reaches a predetermined degree, a source of water supply, an injector, an operative connection between the injector, the source of water supply, the receiver and the steam generator, for delivering air and water to the generator, a valve located in the path of the air and water on its way to the steam generator, and means connected in operative relation with the valve and in communication with the motive fluid of the dome for automatically cutting off the supply of air and water to the generator when the pressure in the dome has reached a predetermined degree.

4. In a generator, the combination of a series of pipes connected in operative relation to permit the travel of fluid successively therethrough, the said pipes being annularly arranged, a burner centrally located in the space surrounded by the said pipes, the burner being so arranged that a combustion chamber is interposed between the burner and the said pipes, fire tubes passing through the said pipes which are relatively large for the purpose, the said fire tubes being open ended, means for introducing water to the said pipes, means for introducing a combustible mixture to the burner, and a hood surrounding the generator and adapted to confine the products of combustion as they leave the fire tubes of the generator, the said hood having an exhaust outlet, substantially as described.

5. The combination of a burner, which is hollow for the reception of combustible mixture, the wall of the burner being perforated, a series of tubes annularly arranged around the burner, the axes of the tubes being parallel with the axis of the burner, the arrangement being such that a combustion chamber is formed between the burner and the said tubes, each tube being in communication at opposite ends with the adjacent tubes on opposite sides, to allow fluid to pass successively through the series of tubes, and a motive fluid dome having a check valved controlled connection with the last tube of the series, substantially as described

6. The combination of a hollow burner, having closed ends and perforated walls for the escape of a combustible mixture, the front end of the burner being in communication with a source of combustible mixture, a series of tubes annularly arranged around the burner parallel with the axis of the latter, an annular space being left between the series of tubes and the burner forming a combustion chamber, a number of sets of tubes, means for introducing water to one end of one of the tubes of each set of tubes of the series, the extremities of the tubes of each set being connected to permit the fluid to pass successively and in opposite directions through all the tubes of each set, the last tube of each set having an outlet for the motive fluid, and a dome having a

check valved connection with each outlet of each set of tubes, substantially as described.

7. The combination of a burner, a hood annularly arranged around the burner and connected with the forward extremity thereof, a dome connected with the rear extremity of the hood and located in the rear of the burner, a series of tubes annularly arranged around the burner, and parallel therewith, said tubes being located within the hood, leaving a space between the tubes and the burner, and also between the tubes and the hood, the tubes being connected at their extremities to allow fluid to successively traverse the several tubes, the last tube of the series having check valved communication with the dome, and a pipe coil surrounding the series of tubes within the space between the tubes and the hood, means for introducing fluid to one extremity of the coil, the opposite extremity of the coil being in communication with the first tube of the series, substantially as described.

8. The combination of a hollow burner, having perforated walls, tubes annularly arranged around the burner and parallel therewith, the said tubes being arranged to leave a combustion chamber between the tubes and the burner, the tubes being in communication with each other to allow fluid to successively traverse the various tubes, a dome with which the last tube of the series has check valved controlled communication, means for introducing air and water to the said tubes, and means for delivering a combustion supporting medium to the burner, substantially as described.

9. The combination of a generator, equipped with a burner centrally arranged within the generator, the latter including tubes annularly arranged around the burner, and parallel therewith, an injector for introducing air and water to the tubes of the generator, and an injector for introducing a combustion supporting medium to the burner, substantially as described.

10. A generator comprising a burner, a series of tubes annularly arranged around the burner, and in communication with each other at their extremities to allow fluid to successively traverse the various tubes of the series, the tubes and burner being arranged to leave an annular combustion chamber therebetween, a hood connected with the burner at its forward extremity, and surrounding the said tubes, leaving a space between the hood and the tubes, a coil of pipe surrounding the tubes within the space between the hood and the tubes, one extremity of the coil being open for the introduction of fluid, while the other extremity is in communication with all of the pipes of the series, a second coil also surrounding the said tubes within the space between the tubes and the hood, one extremity of said coil being open for the introduction of fluid to form a combustion supporting medium, while the other extremity is in communication with the burner of the generator, substantially as described.

11. In a generator, the combination of a burner centrally arranged, tubes annularly arranged around the burner and extending parallel with the latter, means for introducing air and water to the tubes of the generator, and means for introducing a combustion supporting medium to the burner, substantially as described.

12. In apparatus for generating motive fluid, the combination of a steam generator, comprising a burner, tubes annularly arranged around the burner and extending parallel with the latter, the tubes being connected at their extremities to cause fluid to circulate successively therethrough, the said tubes being spaced from the burner to form a combustion chamber, a pipe coil surrounding the tubes, means for introducing air and water to the coil, a pipe leading from the discharge extremity of the coil and communicating with one of the said tubes, a second coil also surrounding the tubes, means for introducing fluid to the said coil to form a combustion supporting medium, a tank for receiving such medium, a pipe leading from the said tank to the burner, a motive fluid dome in communication with the said tubes, and means operated from the motive fluid in the dome for automatically cutting off the supply of combustion supporting medium to the burner and the air and water from the coil of the generator, substantially as described.

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

FRANK H. STANARD.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."