No. 646,727. Patented Apr. 3, 1900.

W. L. CROUCH.

STEAM GENERATOR.

(Application filed June 20, 1899.)

(No Model.)

Fig. 1.

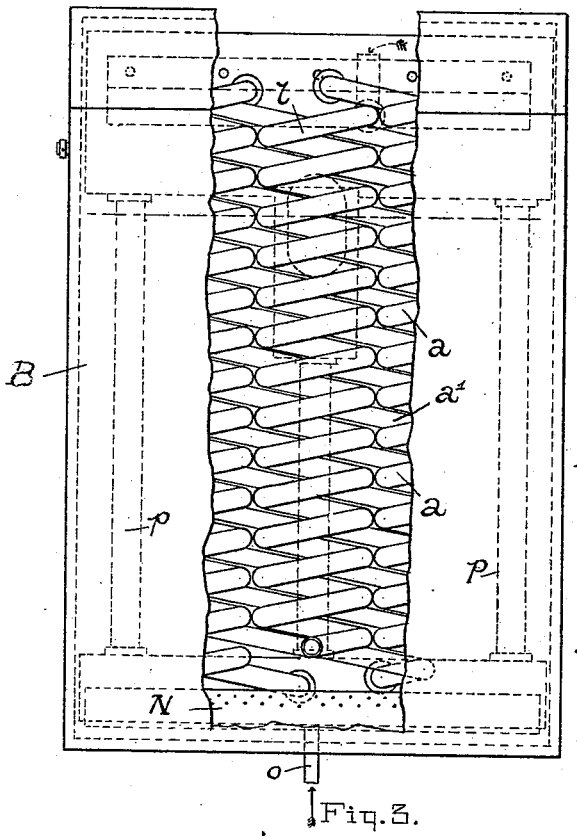


Fig. 2.

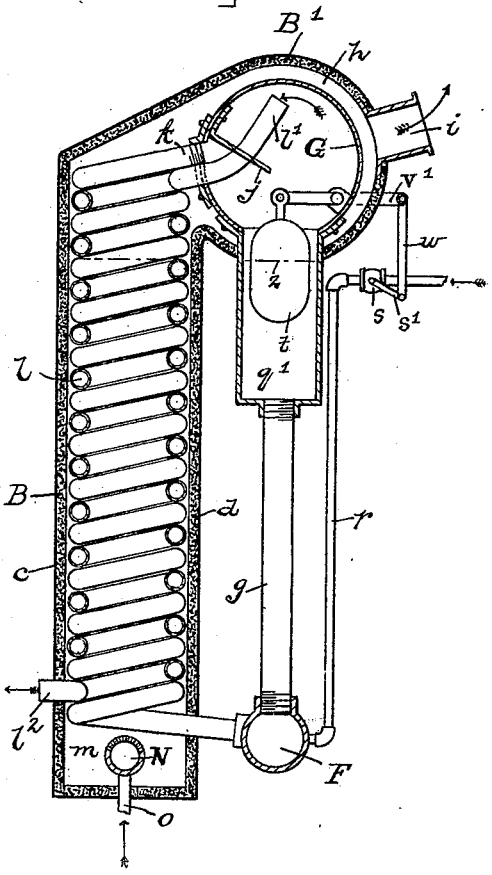


Fig. 3.

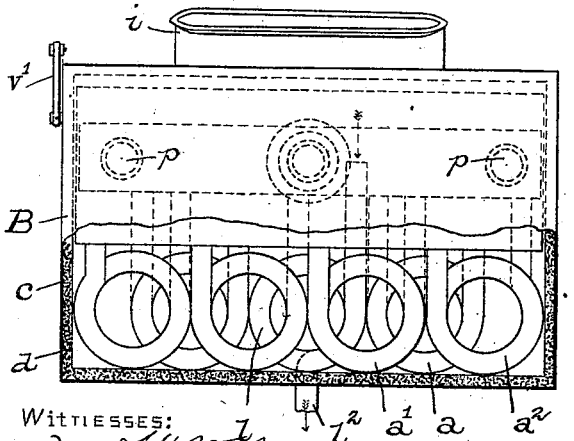
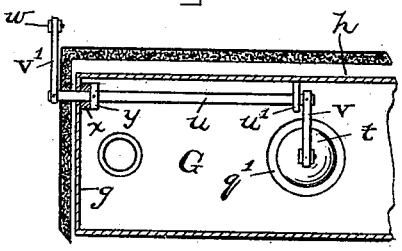


Fig. 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

WALKER LEE CROUCH, OF NEW BRIGHTON, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE COLUMBIA MOTOR AND MANUFACTURING COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 646,727, dated April 3, 1900.

Application filed June 20, 1899. Serial No. 721,184. (No model.)

To all whom it may concern:

Be it known that I, WALKER LEE CROUCH, a citizen of the United States, residing at New Brighton, in the county of Beaver and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

This invention relates to a steam-generator, and has for its object to provide a generator capable of quickly heating water and converting it into steam of high pressure for use as a power to drive small engines.

The invention comprises a series of vertical coils of water-tubes, the coils of one tube being interlapped on two sides by the coils of other tubes, and all the coils at their lower ends connected with and receiving water from a base-drum and the upper ends of all the coils connected with a steam-drum. It also comprises a superheated steam-pipe, an automatic water-inlet valve, and a case of double walls, with insulated space between the walls, said case inclosing the coiled tubes and pipe.

Referring to the drawings, Figure 1 is an elevation of the generator in which part of the walls of the inclosing case are broken away to show the coils. Fig. 2 is a vertical section through the center of the generator, showing all the parts. Fig. 3 is a top view or plan in which the upper part of the wall of the case is broken away to show the plan arrangement of the coils. Fig. 4 is a plan view of the mechanical connection between the inlet valve-lever and the float whereby the water-inlet valve is automatically operated.

A number of vertical coiled water-heating tubes a a' a^2 have their coils interlapped, one within the other, as shown—that is to say, the coils of the several tubes are wound alternately right and left and the coils of each tube are open-spaced sufficient to permit the coils of the adjoining tubes on each side to intermesh or interlap. For instance, the coils of the two tubes a' a^2, which are at opposite sides of the tube a, both intermesh between the coils of said latter tube. I have here mentioned only three tubes at one end of the generator; but this arrangement of intermeshing coils is carried on with all the vertical coils that may be employed. In the present instance six such vertical coiled water-heating tubes are shown, though any greater number may be used. All of these coils of water-tubes are inclosed in a tight upright case B, having a wall c, with its inner surface coated with a suitable coating d, of asbestos or some other poor conductor of heat. Each of the coiled water-heating tubes has its lower end e extended straight and projecting through the wall of the case and connected with a horizontal base-drum or manifold F, from which water is supplied to all the coils.

The upper part of the inclosing case B has a lateral offsetting bulge or chamber B', in which is a steam-drum G. This drum is in the form of a cylinder lying in horizontal position, and an open space h is all around the steam-drum within the bulging chamber B', and an outlet or smoke-flue i leads from said bulging chamber. Within this steam-drum is a baffle-plate j, attached at one side and extending lengthwise and pitched or inclining, as seen in Fig. 2, and the upper end k of each coiled water-heating tube opens into the steam-drum just below the said baffle-plate. A vertical coiled steam-pipe l is also within the case B, and its several coils intermesh or interlap with the coils of the water-heating tubes a' a^2 on either side. The upper end l' of this steam-pipe enters the steam-drum G, and its end opens in the top of the drum above the baffle-plate, where the steam will be dry. The lower end l^2 of the steam-pipe is bent laterally and projects through the wall of the case, as seen in Figs. 2 and 3, from which point it may be conducted to an engine. This pipe supplies superheated steam.

The steam-drum G is vertically above the water base-drum F, and the two are directly connected at both ends by a vertical pipe or leg p (shown by broken lines in Figs. 1 and 3) and by a central pipe q, having at its upper end an enlarged water-column part q'. The water-supply pipe r enters in the present instance the manifold or base-drum F, and in this pipe is a valve s, which controls the supply of water. This valve is regulated automatically, so as to maintain an approximate constant height of water in the generator.

This water level or height is denoted by the broken horizontal line z in Fig. 2. The valve is opened and closed by a valve-lever s', working in a vertical plane. Mechanical connection is provided between this valve-lever s', outside of the steam-drum, and a float t in the water-column q'. This connection is shown in Figs. 2 and 4. A rock-shaft u within the steam-drum has a bearing at u' and another bearing in the head g of the steam-drum. The inner end of the rock-shaft has an arm v projecting forward, from which the said float t is suspended. The outer end of the rock-shaft also has an arm v', which projects back in a direction opposite from the first-named arm. A link or rod w connects this last arm v' with the valve-lever s'. It will now be seen that the varying height of the water in the water-column q' will raise and lower the float and cause the shaft u to rock, and thereby raise or lower the outer arm v', which will act on the valve-lever s' and cause it to open the valve wider to admit water faster or to partly close the valve, and thus reduce the water-supply, all to meet the requirements of firing and the consumption of steam.

I have made provision for insuring a steam-tight joint and prevent leakage where the rock-shaft u passes through the head g of the steam-drum, and I do this without employing a stuffing-box or gland. On the inside of the steam-drum G the head g of the drum has a bushing-boss x, through which the rock-shaft passes. The rock-shaft itself carries a collar y, which fits tightly and is pinned or otherwise rigidly fixed to the shaft. This collar y bears directly against and in contact with said bushing-boss x on the drum-head. The faces of the boss and the collar y, which are in contact, are ground smooth and fit closely. The steam-pressure in the drum G keeps the collar y tightly seated against the boss x, and thus leakage of steam is prevented.

There is a space or fire-box m in the bottom of the upright case, and here is a burner N for gas, oil, or other fuel. This may be one continuous burner-pipe N, extending horizontally in the space or fire-box and having small jet-apertures, or the burner may be otherwise constructed. It may have connected with it a pipe o for supplying gas and air. The arrangement of the vertical coiled steam-pipe l in the upright case, where the greatest heat of the burner is and the intermeshing of the coils with those of the water-tubes, insures that the steam will be superheated and dry.

Of course this generator may be used for any purpose for which it is well suited; but I have designed it particularly for use on automobile-carriages and steam-launches for the water.

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

1. A steam-generator having in combination an upright case, B, having at its top an integral lateral offset bulge or chamber, B'; a horizontal water-manifold or base-drum, F, exterior of said upright case and below said offset chamber; a horizontal steam-drum in said lateral offset chamber; coiled water-heating tubes within the upright case and connecting between the manifold and steam-drum; a water-column opening into the bottom of the steam-drum and connecting with said manifold; and an automatically-operated valve governing the water-supply.

2. A steam-generator having in combination an upright case, B, having at its top an integral lateral offset bulge or chamber, B'; a plural number of vertical, water-heating tubes connecting a water-manifold exterior of said upright case and a steam-drum in said lateral offset bulge or chamber; a water-column, q', opening into the bottom of the steam-drum; a float, t, in said water-column; a water-supply pipe connected to the manifold and having a valve, s, with a valve-lever, s'; a mechanical connection from said lever, s', to a rock-shaft, u, pivoted in the steam-drum and having an arm connected with said float; a bushing-boss, x, fast on the inside of the steam-drum and around the said rock-shaft; a collar, y, tightly fitted to the rock-shaft and seated in contact with said bushing-boss, whereby a steam-tight joint is made where the rock-shaft passes through the head of the drum.

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

WALKER LEE CROUCH.

Witnesses:
GEORGE KOETHER,
WM. H. VAIL.