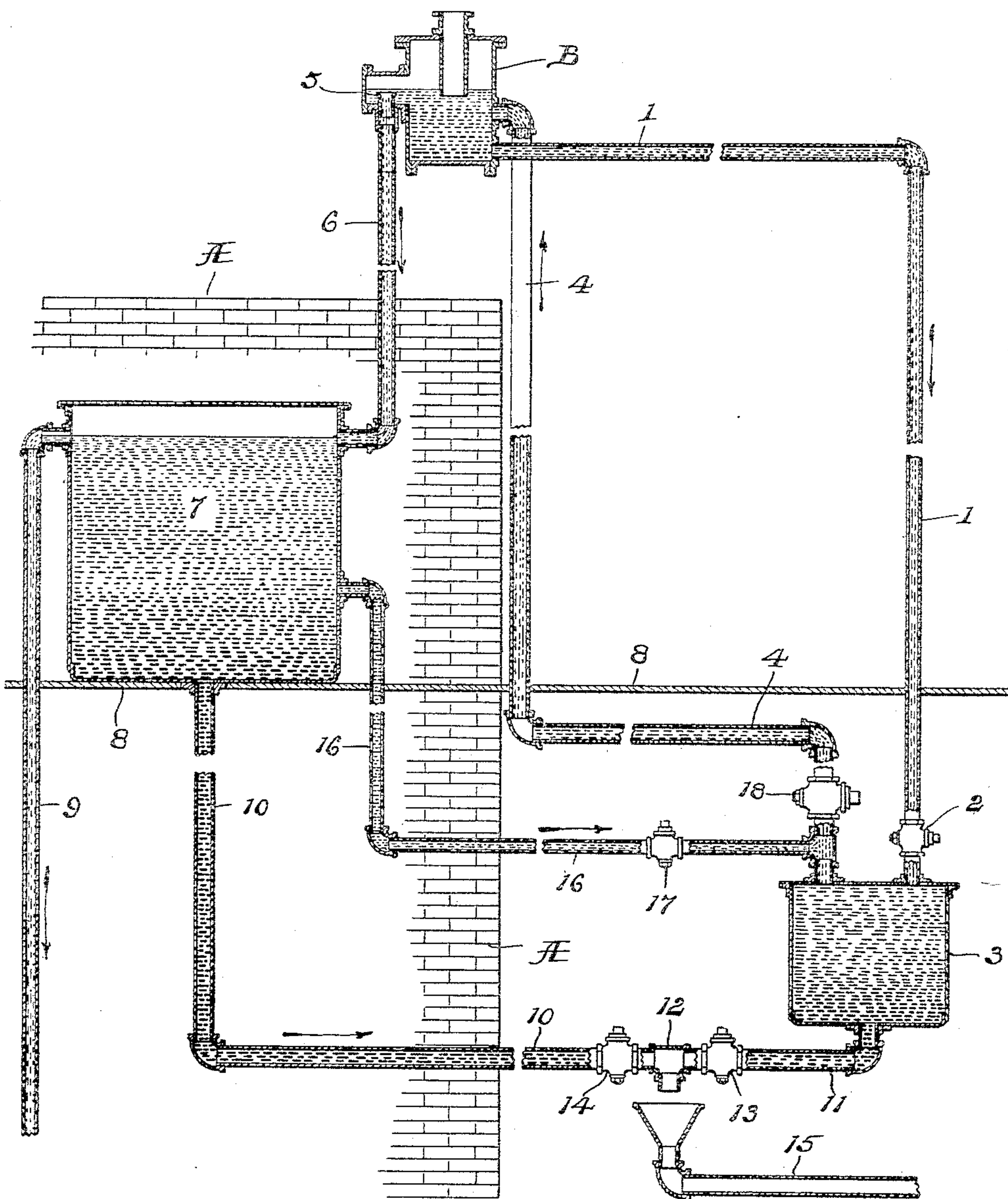


TAR DISPLACEMENT SYSTEM.

APPLICATION FILED OCT. 7, 1907. RENEWED DEC. 27, 1909.

956,586.

Patented May 3, 1910.



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TAR-DISPLACEMENT SYSTEM.

956,586.

Specification of Letters Patent.

Patented May 3, 1910.

Application filed October 7, 1907, Serial No. 396,179. Renewed December 27, 1909. Serial No. 535,154.

To all whom it may concern:

Be it known that I, ERNEST F. LLOYD, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Tar-Displacement Systems, of which the following is a specification, reference being had therein to the accompanying drawings.

10 In the manufacture of illuminating gas, the tar produced in the retorts in the form of an easily condensable vapor, together with quantities of water containing ammonia, or "weak liquor," and carbon in the form of a soot, is precipitated into the hydraulic main; and this invention relates to a system for displacing from these other products contained in the hydraulic main, the precipitated tar, and removing it therefrom.

20 The object of the invention is to provide a system in which a circulation is automatically maintained in the hydraulic main to carry the precipitated tar into the displacement tank, without employing a pump, or other external means requiring power, to force the flow.

It is also an object of the invention to provide means in the system whereby a supply of liquor is automatically accumulated, and to so connect said accumulated supply with the displacement tank that, when the tar is drawn from said tank, the supply may be let in in an amount equal to the tar removed, to maintain the liquor in the hydraulic main at the proper level and to assist in drawing off the tar.

40 A further object of the invention is to provide a system having the particular arrangement and combination of parts whereby certain other advantages are secured, all as hereinafter more fully described, reference being had to the accompanying drawing, in which the figure illustrates a system embodying the invention.

45 A represents the wall of the benches and B the hydraulic main constructed in the usual manner and into which the products from the retorts are introduced in the ordinary way. Connected at one end to the bottom of the main is the tar flow pipe 1 which extends outward therefrom and preferably away from the benches for some distance where it is cool and then downward into the displacement tank 3, said pipe being provided with a shut-off valve 2 just above the tank. Leading upward from the tank 3 is

a liquor return pipe 4 which is preferably carried over to the face of the benches and extending upward adjacent thereto where it is warm, is connected at its upper end to the hydraulic main near the end thereof opposite that to which the tar pipe 1 is attached and at a distance above the bottom of said main but below the level of the liquor as maintained by the liquor overflow 5.

60 An adjustable overflow 5 is provided for the main to maintain the liquor in the main at the desired height, and a pipe 6 conducts the liquor from said overflow downward and into any suitable supply tank as 7 supported upon the charging floor 8 or in any suitable position. An overflow pipe 9 is connected to said supply tank near its top to conduct the overflow to the cistern and a tar drain pipe 10 is connected to its bottom and extends downward therefrom, thence outward toward the displacement tank which is also provided with a tar drain pipe 11 connected to its bottom, the two drain pipes meeting in a discharge tee 12. Valves 13 and 14 are provided in the drain pipes one at each side of the discharge, and a pipe 15 leading to the tar cistern is provided with a funnel to receive the discharge from the drain pipes.

85 Connected at one end to one side of the supply tank at a distance from its bottom, is the supply pipe 16 and extending downward and outward is connected at its opposite end with the liquor return pipe 4 just above the displacement tank. A valve 17 is inserted in said supply pipe to control the same and a valve 18 is provided in the return pipe just above the point where the supply pipe is connected thereto. The tarry vapor in entering the hydraulic main is immersed in the liquor contained therein and a greater part of the tar precipitated to the bottom where it will run off through the pipe 1 as it is much heavier than the liquor, and cooling rapidly as it passes along said pipe, enters the displacement tank and falls to the bottom thereof. The liquor contained in the tank being displaced by the tar, rises in the return pipe and finds its way back into the main, entering the same at the end thereof opposite that to which the pipe 1 is attached and above the thick tarry mass in its bottom, and thus a circulation is maintained through the pipe 1, displacement tank, return pipe and main, by the action of gravity which may be aided in the operation by the difference in temperature of the tar contained in

the tar flow pipe which is rapidly cooled as it descends therein, and the temperature of the ascending liquor in the return pipe which is heated by the proximity of the pipe to the retort benches. This circulation clears out the bottom of the main and deposits the tar in the displacement tank, the liquor finally overflowing into the supply tank.

To draw off the tar which has collected in the displacement tank, the valves 2 and 18 are first closed to prevent the draining of pipes 1 and 4 and consequent lowering of the liquid level in the main, and then the valves 17 and 13 are opened to permit the tar to flow out of the displacement tank and an equal amount of liquor from the supply tank 7 to flow in so that when the tar has all passed off and the valve 13 again closed the pipes and displacement tank will all be full. The valve 17 is then closed and the valves 2 and 18 again opened to permit circulation which at once starts, the liquid level in the main being maintained, as the displacement tank and pipes are full when said valves are opened.

The supply tank which will be partially emptied by the drawing off of the liquor into the displacement tank, may be gradually filled by the overflow from the main and as considerable tar is carried into said supply tank by the inflowing liquor, the drain pipe 10 is provided to draw off the tar from the bottom of this tank and discharge it through the tee 12 into the cistern. This system by maintaining a circulation in the hydraulic main clears the same, and removes the tar promptly from contact with the gas obviates the necessity of cleaning the main often, and greatly assists the displacement of the tar, and by providing the displacement tank and the supply tank in series in the system, a gravity separation is effected, the tar is drawn off at two successive points and the liquor passes out the overflow 9 quite free from tar.

By interposing the supply tank in the system as described, the flow of liquor therefrom into the displacement tank aids in drawing the tar from said tank and at the same time obviates the necessity of providing pumps or similar means for forcing in a quantity of liquor or water to take the place of tar drawn off and to thus maintain the level of the liquor in the hydraulic main.

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

1. In a tar displacement system, the combination with a hydraulic main, an overflow for said main, and a displacement tank supported below the level of said main and connected thereto to receive tar gravitating therefrom, of means for drawing the tar from the displacement tank, and a liquor supply tank to receive the liquor from the

overflow connected to the displacement tank to discharge liquor into the same when the tar is drawn off to maintain the level of the liquor in the hydraulic main.

2. In a tar displacement system, the combination with a hydraulic main, of an overflow for said main, a displacement tank supported below the level of said main, a pipe connecting said main and tank to conduct the tar contained in the main into the tank, a valve in said pipe, a supply tank to receive the liquor from the overflow, a pipe connecting the supply tank and the displacement tank, a valve in said pipe, and means for drawing the tar from the displacement tank.

3. In a tar displacement system, the combination with a hydraulic main, of an overflow for said main, a displacement tank, a pipe connecting the said main and tank, a return pipe connecting said tank and main, a valve in said pipe, a valve controlled discharge pipe connected to the displacement tank, a supply tank, a pipe connecting the overflow of the main with said supply tank to conduct the liquor from the main thereto, an overflow for the supply tank and a valve controlled pipe connecting the supply tank with the displacement tank.

4. In a tar displacement system, the combination with a hydraulic main, of an overflow for said main, a displacement tank supported below the level of the main, a tar flow pipe connected to said main at one end and to the tank at its opposite end, a valve in said pipe, a return pipe connected at one end with the top of the displacement tank and at its opposite end with the main, a valve in said return pipe, a supply tank to receive the liquor from the overflow, a pipe connected at one end to the supply tank and at its opposite end to the top of the displacement tank, and a valve in said pipe.

5. In a tar displacement system, the combination with a hydraulic main and a liquor overflow for said main, of a displacement tank supported below the level of said main, a tar flow pipe connected at its upper end to the bottom of the main and at its lower end to the top of the displacement tank, a valve in said pipe, a valve for drawing off the tar in the displacement tank, a supply tank to receive the liquor from the overflow supported above the level of the displacement tank, a pipe connected at its upper end to the supply tank, and at its lower end to the displacement tank, and a valve in said pipe whereby when the discharge valve is opened to draw the tar from the displacement tank, the flow of tar is forced by the flow of liquor from the supply tank and the displacement tank filled.

6. In a tar displacement system, the combination with a hydraulic main, of an adjustable overflow for the main, a displace-

ment tank supported below the level of the main, a tar flow pipe connecting the bottom of the main with the tank, a valve in said pipe, a return pipe connecting the tank with the main, a valve in said return pipe, a valve controlled discharge pipe for said displacement tank, a supply tank supported above the level of the displacement tank and below the level of the overflow from the main, a pipe connecting said overflow and supply tank, an overflow pipe leading from the supply tank, a valve controlled discharge pipe leading from the bottom of said supply tank, a pipe connected at one end to the side of the supply tank at a distance from its bottom and connected at its opposite end to the top of the displacement tank, and a valve in said pipe.

7. In a tar displacement system, the combination with a hydraulic main, an overflow for said main, means to remove the accumulations of liquor from the main as they accumulate independent of the tar displacement means, of a tar displacement tank supported below the level of the bottom of said main, a tar flow pipe connected at one end to the bottom of the main near one end thereof and at its opposite end to the displacement tank, a return pipe connected at its lower end to the top of the displacement

tank and at its opposite end to the main near the end thereof opposite that to which the tar pipe is connected and at a distance from the bottom of the main, valves in said pipes, a valve controlled supply pipe for introducing liquor into said tank, and a valve controlled pipe for drawing the tar from said tank.

8. In a tar displacement system, the combination with a hydraulic main, an overflow for said main, means to remove the accumulations of liquor from the main as they accumulate independent of the tar displacement means, of a displacement tank supported below the level of said main, a flow pipe connecting said main and tank to conduct the tar contained in the main to the tank, a valve in said pipe, a return pipe connecting said tank to said main at a point away from said flow pipe, a valve in said return pipe, means for introducing liquor into said displacement tank and means for drawing the tar from said displacement tank.

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

ERNEST F. LLOYD.

Witnesses:

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OTTO F. BARTHEL.