

No. 731,673.

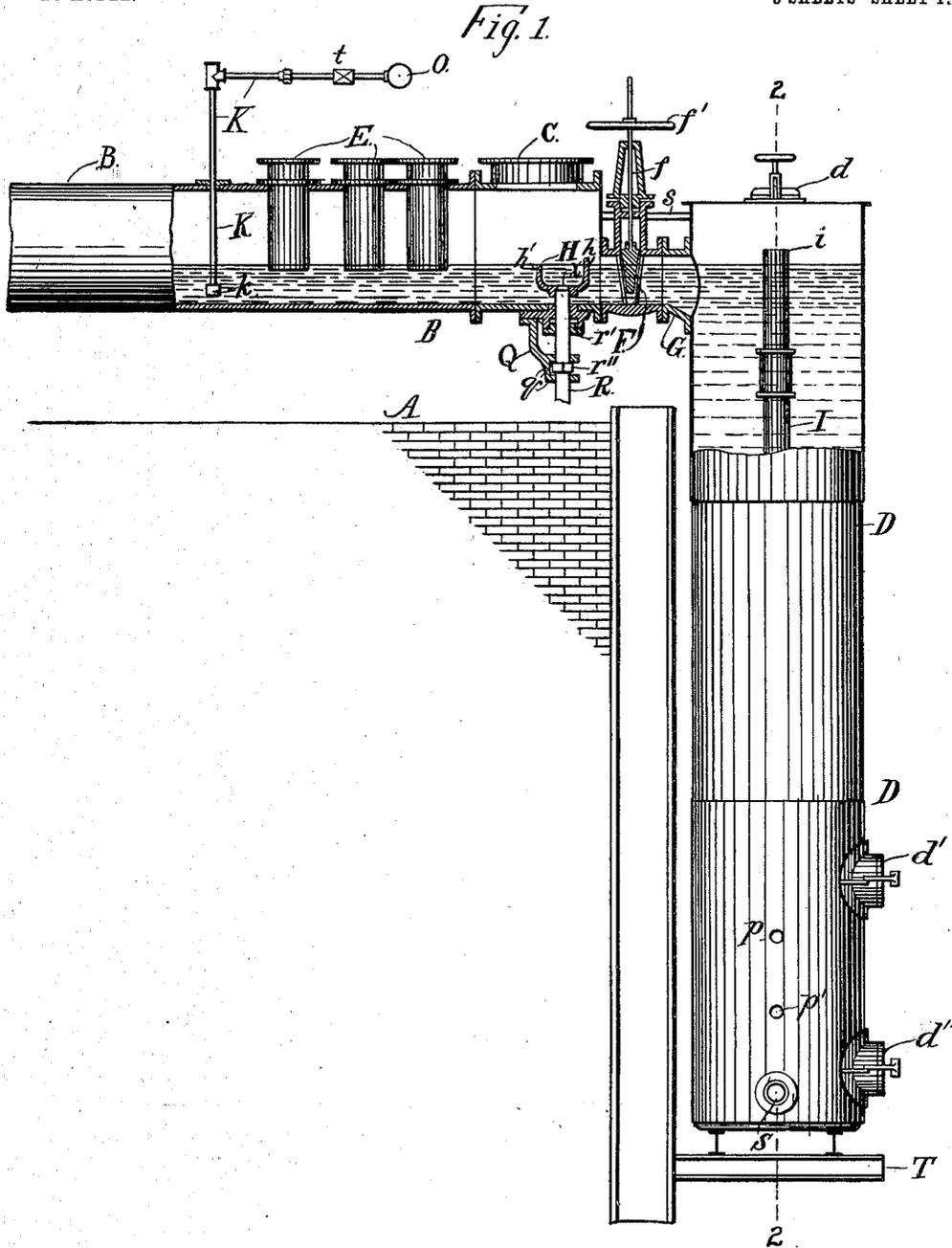
PATENTED JUNE 23, 1903.

C. R. FABEN, JR.
DIP PIPE FOR GAS APPARATUS.

APPLICATION FILED AUG. 22, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



WITNESSES:

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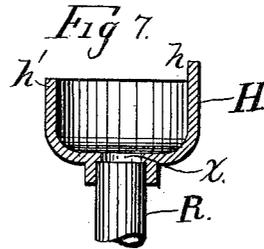
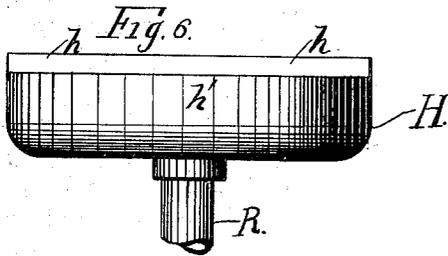
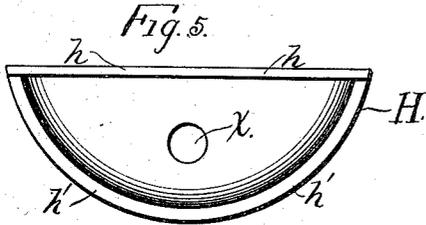
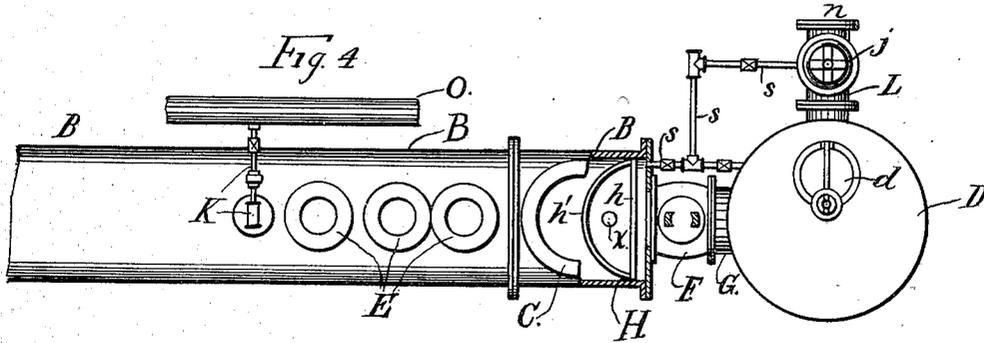
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UNITED STATES PATENT OFFICE.

CHARLES REED FABEN, JR., OF TOLEDO, OHIO.

DIP-PIPE FOR GAS APPARATUS.

SPECIFICATION forming part of Letters Patent No. 731,673, dated June 23, 1903.

Application filed August 22, 1902. Serial No. 120,723. (No model.)

To all whom it may concern:

Be it known that I, CHARLES REED FABEN, Jr., a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Apparatus for Separating Lampblack and Displacing Tar and Ammoniacal Liquor from Hydraulic Mains; and I do hereby 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.

This invention relates to apparatus for controlling the separation and discharge of liquids of different gravities and for maintaining the desired depth of seal on the dip-pipes in hydraulic mains of gas-works, or in other situations where liquids of different specific gravities are to be removed from a container and a fixed level of liquor maintained. When such device is applied to the hydraulic main of a gas-works, the object is to provide for the separate displacement or removal of tar from the lower level of the hydraulic main through a separate overflow; also, to provide a suitable overflow for excess of ammoniacal liquor or water that may be delivered into or condensed in said hydraulic main, said overflow being so constructed as to form a skimmer that in working practice will remove from the surface of said liquor or water any soot, lampblack, or other substance that may float thereon, such prompt removal or separation resulting in preventing the same from mixing with and contaminating the tar that may be contained in or passing through the hydraulic main at the moment.

The matter constituting my invention will be defined in the claims.

I will now describe the details of construction and arrangement of my improved apparatus by reference to the accompanying drawings, in which—

Figure 1 represents a sectional front elevation of an end portion of the hydraulic main, a tar-receiving tank, separating devices, and connections. Fig. 2 represents an elevation, partly in section on the line 2 2, Fig. 1, of the tar-receiving tank. Fig. 3 represents a sectional modification of the tar-tank, showing a diaphragm construction that may be employed in lieu of the pipe connection shown

in Fig. 1 and a modified construction of overflow device that may be employed for the removal of tar from said tank. Fig. 4 represents a top plan view of the apparatus, partly in horizontal section. Fig. 5 represents a top plan view, on enlarged scale, of the soot-skimmer and water-overflow device. Fig. 6 represents a front view of said soot-skimmer and water-overflow device. Fig. 7 represents a transverse section of the soot-skimmer and overflow device.

Above the retort bench or furnace A is set the hydraulic main B in the usual manner and has projecting down into it the dip-pipes E, which in practice connect with the retorts. (Not here shown.) The hydraulic main is provided with the gas-outlet C.

A supply-pipe K, leading from the main O, projects down and through the top of the hydraulic main B nearly to the bottom thereof and is provided at its lower end with a discharge-nozzle *k* for admitting warm ammoniacal liquor or water, preferably at a temperature of about 170° Fahrenheit, for the purpose of washing the main free from tar. The main O is supplied with ammoniacal liquor or water under pressure from a tank or pump from some convenient source, but preferably from a settling-tank or separator. The warm ammoniacal liquor or water is circulated through the main for washing out therefrom either freshly deposited or accumulated tar and then is conducted to the settling-tank, where it is freed from soot, dust, floating tar, or other suspended matter and is again pumped or otherwise forced through the main O and pipe K into the hydraulic main B.

In carrying out my invention I provide two distinct overflow devices—one for water or liquor of lighter specific gravity overflowing at a higher level and the other for the removal of tar or other liquid of heavier specific gravity fixed at a lower level—the height of one overflow device above the other being sufficient to cause the complete or nearly complete separation of the two liquids to be removed, according to the requirements of the peculiar specific gravity of each liquid. I will now particularly describe the construction and arrangement of these overflow devices.

In connection with the hydraulic main I provide a tar receiving and separating tank D, resting upon a bracket or other suitable support T and connecting to the hydraulic main by a short pipe connection G in such a manner as to permit the free flow of tar from the bottom of the main into the interior of said tank, as shown in Fig. 1. A gate-valve F, having a stem *f* and hand-wheel *f'*, is fitted in the pipe connection G for shutting off the flow of liquor from the hydraulic main to the tank D when it is desired to clean or repair either the main or any portion of the tank D and its pipe connections.

The skimmer and overflow device H for liquids of lighter gravity is preferably placed in the hydraulic main B and near the discharge end thereof, as shown in Figs. 1 and 4. This skimming device extends transversely across the main B and has a bottom opening *x*, with which connects the overflow discharge-pipe R, extending down to a separating-tank. (Not here shown.) The skimmer H is in the nature of a cup having a straight side with an upwardly-projecting lip *h*, placed adjacent to the end of the main, and a curved or semicylindrical side *h'*, placed toward the dip-pipes E. As will be noted by reference to Figs. 6 and 7, the curved side *h'* is at a lower level than the lip *h*, so as to permit the overflow of water or light liquid carrying floating soot or lampblack or lighter particles of tar. The skimming device H is supported a short distance above the bottom of the main B for permitting the passage of tar below the same and thence through the pipe connection G into the tank D.

The overflow-pipe R, which connects with the bottom of skimmer H, passes through a stuffing-box *r'* and is supported by the bracket Q. The pipe R at the level of the fork *q* is screw-threaded and has applied thereto an adjusting-nut *r''*, arranged in the fork *q* of the bracket Q, for vertically adjusting the skimmer H to the proper height in the main B to provide a sufficient depth of liquid in the main to properly seal the lower ends of the dip-pipes E. By this vertical adjustment of the skimmer H the depth of seal on the lower ends of the dip-pipes can be varied to suit different conditions and requirements. By means of the transverse arrangement of the skimmer H across the entire width of the main B and the upwardly-projecting lip *h* of said skimmer the excess of water and contained particles of soot and other suspended matter are arrested and conducted by pipe R to a separating-tank. (Not here shown.)

The tar-receiving tank D is supported on a bracket T and is provided at the top with an opening having a tight-fitting lid *d* and on its side, near the bottom, with other openings having lids *d'* *d''*. A tar-outlet pipe I is so placed in tank D that its upper open end *i* shall be above the liquid-level in the hydraulic main and that its lower end *i'* shall extend down into the tar near the bottom of the tank,

as shown in Fig. 2, and it is provided with a lateral outlet branch *i''*, passing through the side of the tank where it connects with the tar-overflow chamber L. This overflow-chamber L is closed at top and bottom and has a lateral clean-out opening closed by a lid *n*. The tar-escape pipe L' passes up through the bottom of chamber L and has a screw-threaded upper end *l* for receiving the screw-threaded section *l'* for controlling the height of the overflow. This section *l'* is provided at the top with a ball or curved bar *g*, to which is connected the rod J, passing through a stuffing-box in the top of the chamber and having a pointer *j* and at the top a hand-wheel *j'*. A graduated gage *l''* is secured to the top of the chamber adjacent to the rod J and its pointer *j* for indicating the height of the adjustable overflow-section *l'*. It will be understood that by turning the screw-threaded section *l'* it may be adjusted up or down on the screw-threaded portion *l* of pipe L', and thus regulate the height of the tar in the overflow-chamber L. It will be noted that the level of the tar-overflow is below the level of the ammoniacal liquor in the hydraulic main B and the tank D. The tar-escape pipe L' will in practice connect with the usual tar-pot. (Not here shown.) The hydraulic main B, tar-tank D, and overflow-chamber L are connected by equalizing-pipes *s*, having valves, as shown in Fig. 4, for the purpose of maintaining and equalizing the gas-pressure throughout the apparatus, so that the liquid-levels may be properly balanced and maintained. The tar-discharge pipe L' is provided with a branch steam-inlet pipe N, having a valve *n'*, and with valves *o* and *o'*, placed respectively above and below said steam-pipe, as shown in Fig. 2. By means of this pipe N steam may be admitted to pipe L' for softening and cleaning out tar or other accumulations therein. By closing the lower valve *o'* steam may be passed upward for cleaning the upper portion of pipe L', and by closing valve *o* and opening valve *o'* steam will be admitted to the lower portion of the pipe L'. The pipe L' having been properly cleaned the steam-valve *n'* is closed and both valves *o* and *o'* are opened for continuing the operation of the apparatus. The liquid-discharge pipe R may be provided with similar valves and a steam-supply pipe for cleaning it. A steam-coil P, having inlet and outlet pipes provided with valves *p p'*, is placed in the tar-tank D near its lower end for keeping the tar warm and fluid, so that it will readily flow off through pipe I and the overflow-chamber L. The tank D is also provided at the bottom with a drain-pipe S for drawing off at suitable intervals a portion or all of the accumulated tar, as occasion may demand.

In the modified construction of the tar-tank shown in Fig. 3 a vertical diaphragm M is substituted for the outlet-pipe I shown in Fig. 2, and the overflow-chamber L is secured to one side of the tank, connecting with the tar-

outlet compartment thereof; but I prefer the construction shown in Fig. 2.

To the lower end of the water-supply pipe K in the hydraulic main is applied a jet-nozzle *k*, composed of a cap which is slotted to form a suitable jet-orifice for the discharge of water or ammonia liquor near the bottom of the hydraulic main and preferably in the direction of the overflow and the outlet pipes leading from the main. A number of these pipes K with jet-nozzles are placed at different points along the length of the hydraulic main, so as to keep the main well washed and practically free from tar. The discharge of jets of warm or heated ammoniacal liquor or water from the nozzles *k* not only wash out the tar, causing it to flow into the tar-tank D, but also serves to prevent soot, lampblack, and other suspended matter from settling and mixing with the tar. The soot and lampblack will thus be caused to float near the surface and overflow into the skimmer H, from which it passes off with the excess of ammoniacal liquor and water through the discharge-pipe R into a separating-tank. (Not here shown.) In the settling-tank or separator the suspended matter is given time and space to settle or deposit, and the water, practically freed from suspended matter, is returned to the hydraulic main by means of a pump, either directly or through an elevated reservoir placed at a suitable height to discharge the water through the nozzle *k* under sufficient pressure to give a good washing and scouring effect in the main. By pumping the ammoniacal liquor over into the hydraulic main any volatile hydrocarbon oils contained in such liquor will be vaporized and thus add to the illuminating power of the gas.

In starting the use of the apparatus constructed as above described the valve *o* in the discharge-pipe L' is closed and the tank D is filled with water or other suitable liquor up to the level of the overflow of the skimmer H in the hydraulic main. The valve *o* is kept closed until the tank D has become filled to the necessary height above the lower end of the outlet-pipe I with tar, so that the light liquid shall be sealed off from said outlet-pipe I. The water admitted into the apparatus, as above described, will gradually be displaced and discharged through the skimming device H and its outlet-pipe R. When sufficient tar has accumulated in the tank D, the valve *o* in pipe L' will be opened, thus permitting the liquids contained in the tank to adjust themselves to their natural levels according to their peculiar specific gravities.

This apparatus has proven simple and effective and has given satisfactory and valuable results in practical operation.

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

1. The combination with a hydraulic main, of a soot-skimmer and overflow-cup for water and ammoniacal liquor, having an arresting-

lip extending transversely across the main and means for conducting off the liquor and soot from the bottom of said cup, substantially as described. 70

2. The combination with a hydraulic main, of a vertically-adjustable, transversely-arranged, overflow and soot-skimming cup, having an overflow at one side and a discharge-pipe from the bottom and separate means for conducting off the tar from the main below said cup, substantially as described. 75

3. The combination with a hydraulic main, of a tar-receiving tank, a connection from the bottom of the main to the tank, a vertically-adjustable liquor-overflow and soot-skimming device above the bottom of the main and having a discharge-pipe for maintaining the desired level of the sealing liquor, and means for discharging a stream of water or liquor below the water-level and near the bottom of the main to wash out the tar below the skimming device and prevent deposit of soot or lampblack, substantially as described. 80 85 90

4. The combination with a hydraulic main, of a tar-receiving tank, a connection from the bottom of the main to said tank, a transverse skimming device having an upwardly-projecting lip for maintaining the desired level of the sealing liquor, and an outlet-pipe connecting with said skimming device for conducting off the liquor and soot, substantially as described. 95

5. The combination with a hydraulic main, of a vertically-adjustable soot-skimmer for water and ammoniacal liquor, and having an upwardly-projecting lip extending transversely across the main, and a discharge-pipe connecting with the bottom of the skimmer for conducting off overflow water, or liquor, and soot, substantially as described. 100 105

6. The combination with a hydraulic main, of a transverse vertically-adjustable soot-skimmer, having an upwardly-projecting lip, a discharge-pipe connecting with the bottom of the skimmer, a tar-receiving tank, a connection from the bottom of the main to said tank, and a gate-valve in said connection for permitting tar to flow below the skimmer into the tank, substantially as described. 110 115

7. The combination with a hydraulic main, of a tar-receiving tank connecting with the bottom of the main, a transverse skimming device for the overflow of liquor and soot, an outlet-pipe therefor, a tar-outlet pipe having an open lower end in the tar-tank, and a tar-overflow chamber connecting with said tar-pipe and having a discharge-pipe provided with an adjustable overflow-section, substantially as described. 120 125

8. The combination with a hydraulic main, of a tar-receiving tank connecting with the bottom of the main for the removal of tar, an adjustable overflow device for liquor and soot arranged for maintaining the desired level of the sealing liquor in the main and having an outlet-pipe, a tar-outlet pipe having an open lower end near the bottom of the tar-tank, a 130

tar-overflow chamber connecting near the top of said tar-pipe, and a tar-discharge pipe provided with an adjustable overflow-section in said chamber, substantially as described.

- 5 9. The combination with a hydraulic main, of a tar-receiving tank connecting with the bottom of the main, a vertical tar-outlet pipe having an open lower end in said tank, a tar-overflow chamber connecting with said outlet-
10 pipe and having a discharge-pipe provided with upper and lower valves, and a steam-supply pipe connecting with said discharge-pipe between said valves, substantially as described.
- 15 10. The combination with a hydraulic main having an outlet for tar and liquor, of a supply-pipe for water or liquor terminating in a nozzle below the water-level and near the bot-

tom of the main for discharging jets of water or liquor for washing the main and keeping 20 it free from tar or other deposits, substantially as described.

11. The combination with a hydraulic main having a lower tar-outlet and an overflow for water and ammoniacal liquor, of a liquid-supply pipe having a discharge-nozzle below the 25 water-level and near the bottom of the main for discharging jets of water to wash out tar and prevent deposit of soot or lampblack, substantially as described. 30

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

CHARLES REED FABEN, JR.

Witnesses:

PATRICK J. WRIGHT,
WILLIAM G. CRAMER.