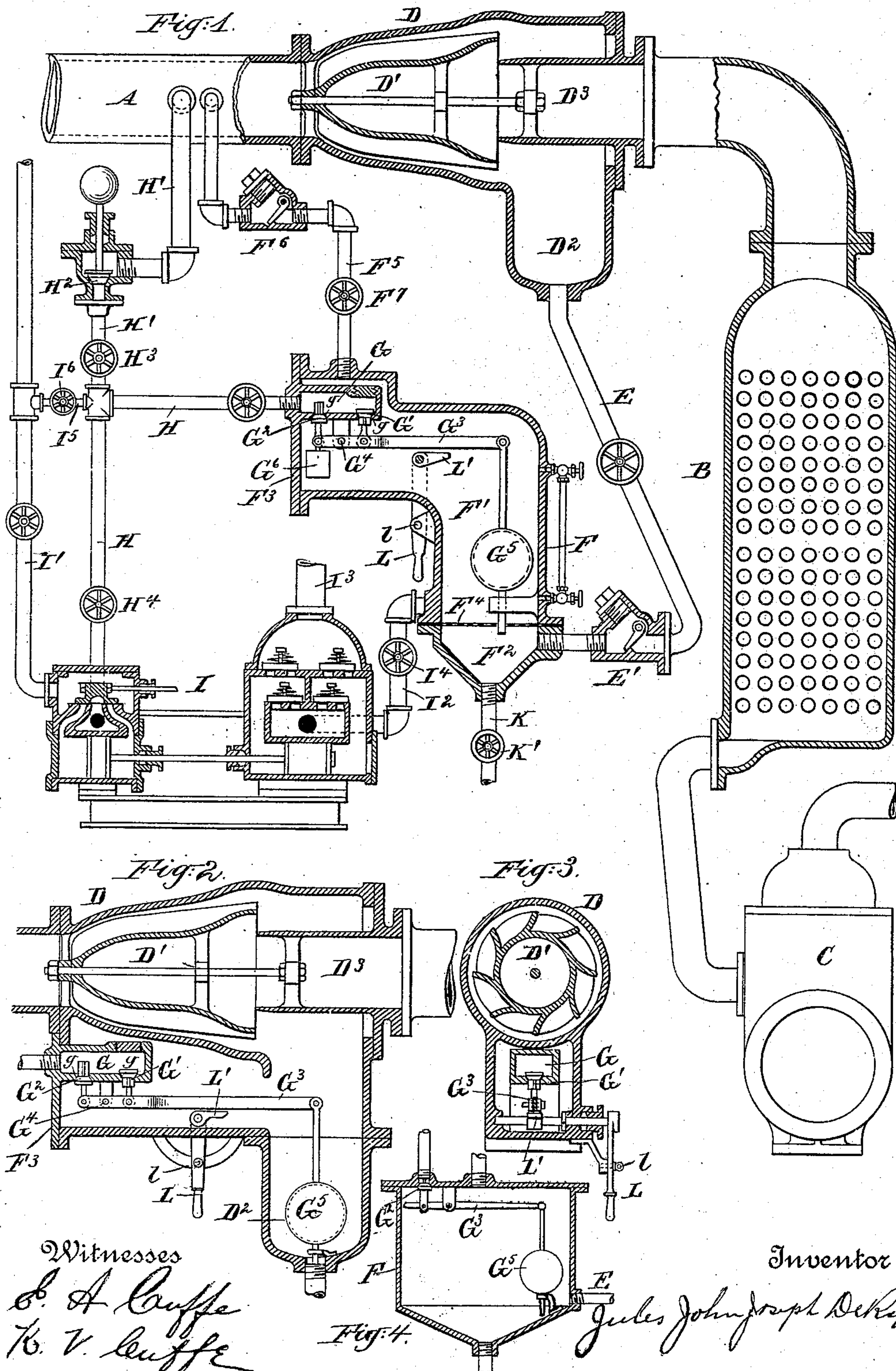


(No Model.)

J. J. J. DE RYCKE.
APPARATUS FOR DRAINING STEAM PIPES.

No. 551,921.

Patented Dec. 24, 1895.



Witnesses
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APPARATUS FOR DRAINING STEAM-PIPES.

SPECIFICATION forming part of Letters Patent No. 551,921, dated December 24, 1895.

Application filed August 31, 1894. Serial No. 521,807. (No model.)

To all whom it may concern:

Be it known that I, JULES JOHN JOSEPH DE RYCKE, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Apparatus for Draining Steam-Pipes, of which the following is a specification.

The object of my invention is to provide an improved apparatus for removing the grease and water which is trapped in steam-separators, steam-heating systems, &c.

I place a tank at a level below the lowest point in the grease-extractor or other system to be drained and connect it by a suitable pipe, so that the condensed steam and other liquid will descend by gravity. Below the tank I place a pump that has a power-cylinder which can either be driven by atmospheric pressure or by steam, preferably the latter. The pump-cylinder is connected by a pipe to the lower end of the tank, and the exhaust from the power-cylinder is controlled by valves which are properly fitted to openings that communicate with the interior of the tank and throttle the exhaust from the pump, so that the exhaust can be discharged into the same only when the valves leave their seats. The valves are connected through suitable rods and a lever to a float that is located at a low point in the tank. The float, due to the fluctuation of the level of the water and grease as it flows into and is pumped out of the tank, sinks and rises and correspondingly closes and opens the valves whereby the exhaust from the power-cylinder of the pumping-engine is kept under perfect control. The top of the tank is connected to the main exhaust-pipe, so as to afford a ready discharge for the exhaust of the power-cylinder of the pumping-engine into the main exhaust before it reaches the extractor.

The mechanism is entirely inclosed in the tank, thus avoiding the use of stuffing-boxes.

The action is automatic. The pump starts as soon as the float has risen sufficiently to open the valves and release the exhaust and continues until the float again sinks. The accompanying drawings represent what I consider the best means of carrying out the invention.

Figure 1 is a vertical section partly in ele-

vation. Fig. 2 is a similar view of a portion showing a modification, and Fig. 3 is a transverse vertical section of the same. Fig. 4 is a vertical section of a portion, showing another modification.

Similar letters of reference indicate similar parts in all the figures where they appear.

A is the pipe bringing the exhaust-steam from an engine (not shown) to the condenser B and its connected vacuum-pump C.

D is the separator. I have shown and prefer to use the one described in an application for patent filed by me January 20, 1894, Serial No. 497,467, consisting of a casing introduced in the exhaust-pipe containing essentially a cone D' having helical wings or webs arranged on its outer surface, so as to give a centrifugal motion to the steam, throwing it against the casing, the water and grease adhering to the surfaces and finally trickling down and collecting in the pocket D² at a lower level.

D³ is a tubular extension of the exhaust-pipe into the hollow interior of the cone, causing the steam to turn a sharp angle in continuing its course, throwing the mechanically-suspended particles of water and grease against the rear wall of the casing, whence they run down and are collected in the pocket.

E is a pipe leading from the bottom of the pocket D² to the lower chamber F² of the tank.

E' is a check-valve located in this pipe to prevent a backflow of the grease under any circumstances.

The tank F consists of two chambers F' F² one above the other and separated by a perforated diaphragm or screen F⁴ of sufficient fineness to prevent the rise of clots or lumps of grease or gritty matter which might lodge in the valve-seats of the pump. In the chamber F' is introduced a rectangular compartment G formed on the head F³ of the tank, and having in its lower part two valve-seats *g g* for two vertically-moving balanced valves G' G², one opening upward and the other downward, as shown, mounted on a horizontal lever G³ turning on the center G⁴ and controlled by the float G⁵ suspended from the free end of the lever.

H is a pipe leading exhaust steam from a pump I to the compartment G. This pump I is preferably a duplex pump and is oper-

ated by steam received through the pipe I' from a boiler (not shown) and exhausted through the pipe H to the compartment G and thence past the valves G' G² into the upper portion of the tank F, through the pipe F⁵ past the check-valve F⁶ into the main exhaust-pipe A, passing to the separator mingled with the main exhaust-steam.

The pump I draws through the pipe I² which enters the tank F above the diaphragm F⁴ and continues to work so long as the level in the tank is sufficiently high to raise the float and hold the valves G' G², which control the exhaust, open. As the level sinks the float correspondingly sinks, closing the valves G, G² and throttling the exhaust until a point is reached at which the pump will either work slowly but continuously or will stop completely until the level again rises, these conditions depending on the amount of water and grease collected by the separator. The valves G' G² are balanced by being mounted on the lever G³ on the opposite sides of the fulcrum G⁴, the valve G² opening downward and the valve G' opening upward. This insures that the closing and opening movements shall be effected by slight changes in the height of the water-level and that the action shall be uniform and without shock.

I⁴ is a valve controlling the suction-pipe I². The water is discharged through the pipe I³ into any suitable reservoir or drain.

H' is a relief-pipe leading from a point in the pipe H to the main exhaust-pipe A. This passage is controlled by a weighted valve H² which, when from any cause the pressure becomes too great, will rise and allow the steam to escape into the main exhaust.

I⁵ is a pipe controlled by the valve I⁶ connecting from the steam-pipe I' to the exhaust-pipe H. This valve is closed in ordinary working; but when it is desired to cleanse the tank F the valves H³ and H⁴ are closed, as are also the valves F⁷ and I⁴. The float G⁵ is then raised by withdrawing the pin l and turning the lever L by hand, lifting by the engagement of the short arm L' of the lever under the float-lever G³ and thus opening the valves G' and G². The valve I⁶ is then opened and steam under pressure fills the tank F, blowing out its contents through the pipe K and valve K'.

G⁶ is a balance-weight attached to the lever G³ at the end opposite to the float G⁵ to partly balance the latter and render the working more sensitive.

It will be noted that the working parts governing the starting and stopping of the pump are all inclosed within the tank F, and that the exhaust-steam after passing the valve escapes directly into the tank in free communication with the condenser, thus avoiding the stuffing-boxes and other friction-producing devices which would be necessary in transferring the motion from the float in the drainage-tank at the low pressure of the condenser to a valve located in a passage under

a sufficiently-high pressure of steam to drive the pump.

Modifications may be made without departing from the principles of the invention.

Figs. 2 and 3 show a form in which compartment G with its valves G' G² and the lever G³ and float G⁵ are all inclosed in a chamber forming the lower part of the separator. Some of the advantages will be sacrificed by this construction, but it will serve efficiently in some situations.

In the construction shown in Fig. 4 the compartment G is omitted and a single unbalanced valve is employed controlled by the float. Other forms of valves may be used.

Instead of driving the pump by steam from a boiler I can drive it by atmospheric pressure, as will be apparent. The exhaust being in communication with the condenser there is atmospheric pressure on the power-cylinder of the pump when the pipe I' is disconnected. The pump is regulated as before by raising the back-pressure of the exhaust by throttling. This manner of working by atmospheric pressure may be preferable in some cases, especially where very high steam is used, and pressure-reducers would be required to give the low pressure necessary to the successful working of this apparatus. Steam may be taken from the second or third receiver of a compound or triple expansion engine if the pressure in such receiver shall be low enough to be used.

I prefer the whole as shown. It will be understood that suitable gages, valves, and other fittings are to be used as deemed necessary or convenient.

I have shown the invention applied to a separator and grease-extractor introduced in the main exhaust-pipe of an engine; but it will be understood that it will also drain the water of condensation from steam-heating systems and serve in many other situations.

I claim as my invention—

1. A tank receiving the drainage from a steam-pipe, a float within the tank subject to fluctuations in the level of the drainage, a pump for removing the drainage, the exhaust passage from the power cylinder of the pump and a valve located in such passage and controlled by the rising and sinking of the said float, all combined and arranged to serve substantially as herein specified.

2. The combination of a tank, a float located therein and subject to the fluctuation in the level of the drainage received in such tank, a valve regulated by the action of the float, and controlling the exhaust passage from the power cylinder of a pump, the perforated screen, the inlet pipe for the drainage located below said screen, the suction pipe to the pump entering above the screen, and the separator located above such tank all substantially as herein specified.

3. The combination of a tank, a float located therein and subject to the fluctuation in the level of the drainage received in such

tank, a valve regulated by the action of the float and controlling the exhaust passage from the power cylinder of a pump, the inlet for the drainage, the suction pipe to the pump, and a pipe conveying the exhaust to a point in the main exhaust pipe leading to the separator all substantially as herein specified.

4. The tank F compartment G therein balanced valves G' G² lever G³ and float G⁵, in combination with each other and with the pump I and suction pipe I² leading thereto from the tank and exhaust pipe H leading from the power cylinder of the pump to the said compartment and controlled by the said valves, substantially as herein specified.

5. The tank F compartment G valves G' G² and float G⁵ controlling said valves in combination with each other and with the screen F⁴ and the connection E from the system to be drained entering below screen and the connection I² to the suction side of a pump from a point above the screen and a connection H leading from the exhaust of the pump to the said compartment all substantially as herein specified.

6. The tank F compartment G valves G'

G² and float G⁵ controlling said valves in combination with each other and with the connection E from the system to be drained, a connection I² to the suction side of a pump and a connection H leading from the exhaust of said pump to the said compartment all substantially as herein specified.

7. The tank F compartment G valve G² and float G⁵ controlling said valve in combination with each other and with the connection E from the system to be drained, a connection I² to the suction side of a pump and a connection H leading from the exhaust of said pump to the said compartment, the drainage pipe K and valve K', the pipe I' leading to the steam side of the pump the connection I⁵ from said pipe to the said exhaust connection H and suitable valves H³ H⁴ F⁷ and I⁴ controlling said connections and the lever L L' for lifting the float and opening the valves by hand so that the contents of the tank may be blown off substantially as herein specified.

JULES JOHN JOSEPH DE RYCKE.

Witnesses:

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