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J. C. HUBBARD.

AUTOMATIC DRAINAGE ATTACHMENT FOR LUBRICATORS.

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Fig. 1

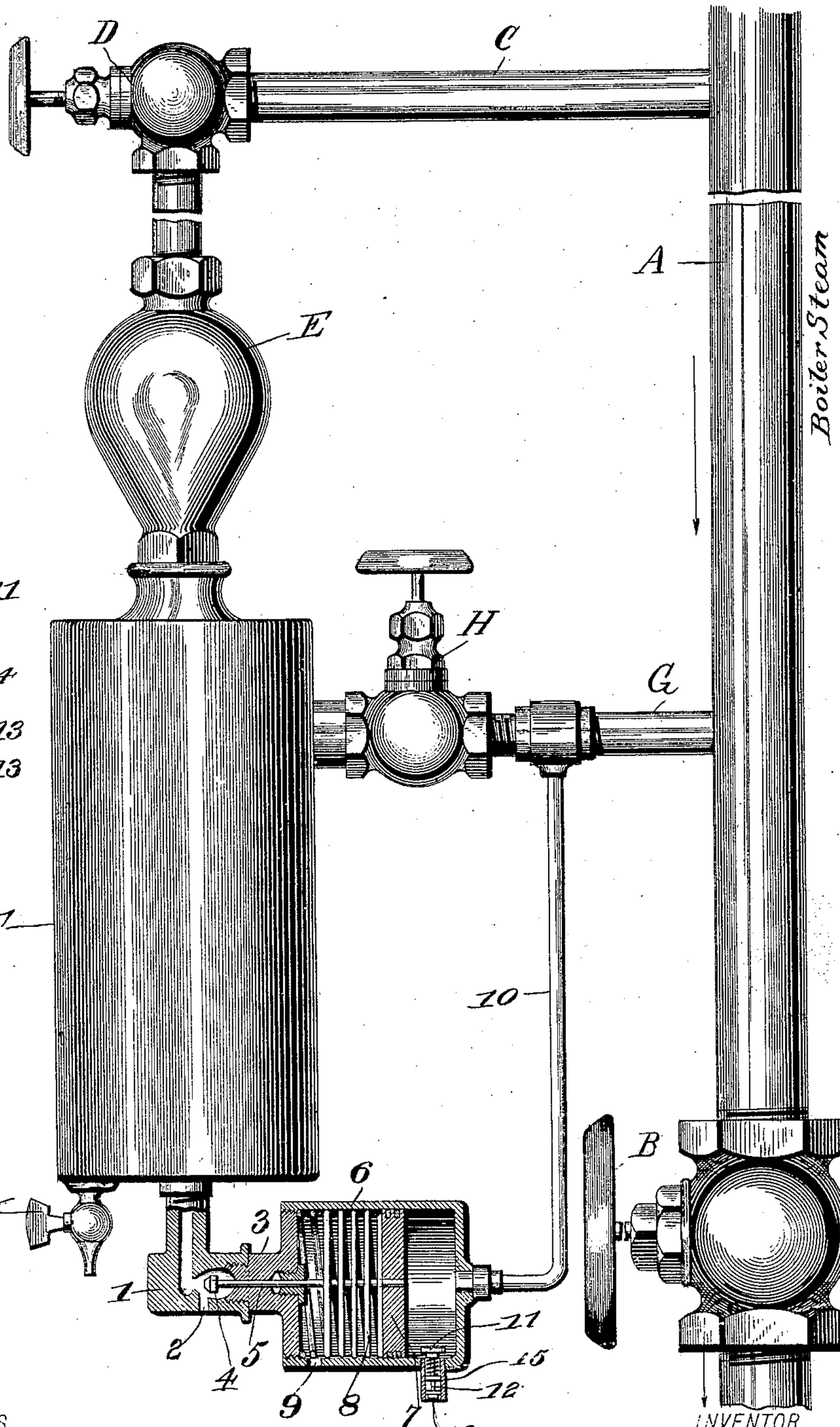
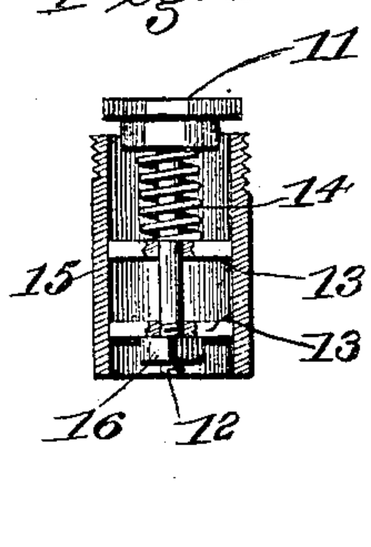


Fig. 2



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AUTOMATIC DRAINAGE ATTACHMENT FOR LUBRICATORS.

No. 856,151. Specification of Letters Patent. Patented June 4, 1907.

Application filed October 13, 1906. Serial No. 338,763.

To all whom it may concern:

Be it known that I, JOSEPH CHEVES HUBBARD, a citizen of the United States, and a resident of Georgetown, in the county of Georgetown and State of South Carolina, have invented certain new and useful Improvements in Automatic Drainage Attachments for Lubricators, of which the following is a specification.

My invention relates to an improvement in lubricators for steam engines in which the lubricator is coupled up with the steam pipe for a regulated feed. As lubricators of this type contain water it frequently happens that the engineer will forget to open the drain valve of the lubricator when leaving the plant at night in cold weather, with the result that the lubricators freeze and burst, thereby entailing the expense of new lubricators.

My invention is designed to prevent this possibility and consists in an attachment to the lubricator whereby it is automatically drained whenever the boiler pressure falls below a predetermined point, as hereinafter fully described with reference to the drawing.

Figure 1 represents, in side elevation, the main parts of any lubricator of the type referred to shown coupled up to the steam pipe, my attachment being shown in section as applied thereto, and Fig. 2 is a detail.

In the drawing the old parts of the lubricator are designated by letters, and the new parts, constituting my attachment, are designated by numerals.

A is a steam pipe through which live steam flows from the boiler in the direction of the arrow to the throttle valve B, and thence on to the engine.

F is the body or oil reservoir of the lubricator surmounted by the condenser E which in turn is connected through valve D and pipe C with the live steam pipe A. The oil reservoir F is also connected in the usual way by valve H and pipe G with the live steam pipe A.

Now it is possible for the engineer to cut off the lubricator from the steam pipe by valves D and H, and drain the lubricator F by cock I which has heretofore been provided for this purpose. It frequently happens, however, that the engineer forgets this when leaving the plant, or the weather may unexpectedly change, falling below the freezing point. In such case the water in the lubricators will freeze and the lubricators will burst and be destroyed, requiring new lubricators to be bought and installed. To prevent this objectionable result, I provide an automatic drainage valve which is normally maintained closed so long as steam of a predetermined pressure is on the boiler, but which automatically opens and drains the lubricator whenever the boiler pressure falls below the predetermined point. This valve is shown in section at the bottom of the lubricator and consists of the following parts: A valve chamber 1 is formed with a screw threaded extension on one side that is screwed into the bottom of the reservoir F. The valve chamber is formed interiorly with a valve seat adapted to receive a valve 4 mounted on the end of a sliding rod 5. A drainage outlet 2 leads from the valve chamber outwardly. The valve chamber has on one side a removable bonnet 3 which has a screw threaded connection with the side of the valve chamber so that the valve may be inserted or removed at will. The valve stem 5 slides centrally in the bonnet through a stuffing box which makes a steam tight joint. The bonnet 3 has at one end a disk-shaped plate which is screw threaded to receive the interior screw thread of a cylinder 6.

Within the cylinder there is closely fitted to slide a piston 7 connected to the valve rod 5. Between this piston and the head of the cylinder next to the valve 4 is arranged a coil spring 8 whose tension when unrestrained holds the valve 4 away from its seat. On the opposite side of the piston from the spring 8 the cylinder is tapped by a small steam pipe 10, which is connected to the steam pipe G and is always in open communication with the boiler and consequently maintaining on this side of the piston the steam pressure from the boiler. The tension of the spring 8 is adjusted to be less than the normal boiler pressure, so that as long as there is a normal boiler pressure the piston 7 will be forced to the left, thereby overcoming the tension of the spring and holding the valve 4 tightly closed on its seat and consequently shutting off communication between the reservoir F and the drainage outlet 2. If, however, the lubricator has not been drained by cock I and the plant is shut down, then the boiler pressure gradually falls until its influence on piston 7 is less than that of the spring 8, and then the spring 8 asserting its superior influence forces the piston to the

right and opening the valve 4 allows the contents of the lubricator to drain out automatically through the outlet 2.

If any steam should leak past the piston 7, it might happen that a steam pressure would gradually develop on the same side of the piston as the spring and thus counterbalancing the steam pressure on the other side allow the spring to open the valve and drain the lubricator, notwithstanding the fact that the engine may be working with the boiler at normal pressure. To prevent this, I form a vent hole 9 in the cylinder on the same side of the piston as the spring, which hole is constantly open and prevents the development of any steam pressure on this side of the piston. This vent hole also forms a tell-tale to apprise the engineer of any accidental leak past the piston.

In the operation of my attachment more or less steam will condense in the right hand end of the cylinder and the freezing of this condensed water must also be provided against. This is taken care of by an automatic check valve shown in detail in Fig. 2. This check valve consists of a tube 15, screw threaded at its upper end and tapped into the cylinder on its bottom side at the right hand side of the limit of the piston's movement from the spring. This tube is open both at top and bottom and its upper end is surmounted by a valve cap 11 fixed to a stem 12 which slides in cross bars 13, 13, fixed in the tube. A coil spring 14 is wound around the stem above the upper cross bar and bears upwardly against the valve cap to hold it up and away from the open upper end of the tube. Whenever there is a steam pressure on the steam end of the cylinder the valve cap 11 is forced down tightly on its seat and closes the top of the tube. When, however, the steam pressure in this end of the cylinder falls below the predetermined point, the spring 14 raises the valve cap 11 and opening the tube allows the condensed water to escape. To prevent the valve and stem from rising too high and getting loose the lower end of the stem 12 is screw threaded and a nut 16 is turned upon the same and made to bear against the lower cross bar 13. This nut by drawing down the stem also adjusts the tension of spring 14 and the size of the annular opening around the valve.

In carrying out my invention, I do not confine myself to any particular form of valve in connection with piston 7 as various forms of valves may be pneumatically operated by the steam pressure.

I claim—

1. A drainage attachment for a lubricator, comprising a valve controlling an outlet from the lubricator, means for holding the valve closed by the normal steam pressure and means for automatically opening the valve when the steam pressure falls.

2. A drainage attachment for a lubricator, comprising a valve controlling an outlet from the lubricator, a cylinder with piston connected to said valve, a live steam connection on one side of the piston, and a spring arranged upon the other side.

3. A drainage attachment for a lubricator, comprising a valve controlling an outlet from the lubricator, a cylinder with piston connected to said valve, a live steam connection on one side of the piston, and a spring arranged upon the other side, said cylinder having also a vent outlet in the same located on the same side of the piston with the spring to prevent steam pressure on this side.

4. A drainage attachment for a lubricator, comprising a valve controlling an outlet from the lubricator, a cylinder with piston connected to said valve, a live steam connection on one side of the piston, a spring arranged upon the other side, and an inwardly opening check valve located in the steam space of the cylinder beyond the travel of the piston and arranged to be held closed by the normal steam pressure and to be opened by the reduction of such pressure.

5. A drainage attachment for a lubricator, comprising a valve controlling an outlet from the lubricator, a cylinder with piston connected to said valve, a live steam connection on one side of the piston, a spring arranged upon the other side and a drainage valve for the steam side of the cylinder consisting of a tube, a stem sliding in said tube and having a valve cap on its end seating upon the tube and a spring wound around the stem and opening the valve when the steam pressure is reduced.

6. A drainage attachment for a lubricator, comprising a valve controlling an outlet from the lubricator, a cylinder with piston connected to said valve, a live steam connection on one side of the piston, a spring arranged upon the other side, an automatic drainage valve for the steam side of the cylinder, and means for adjusting this valve.

7. A drainage attachment for a lubricator, comprising a valve chamber having a channel and offset portion for connection with the lubricator, a valve seat and a drainage outlet, a valve mounted upon a stem and having a rigidly attached piston, a bonnet, and cylinder head inclosing the valve stem and having a screw connection both with the valve chamber and the cylinder, and a live steam connection for the other end of the cylinder.

8. An automatic steam actuated drainage valve combined with a steam actuated lubricator.

JOSEPH CHEVES HUBBARD.

Witnesses:
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