(No Model.) 2 Sheets—Sheet 1.

N. R. WEAVER.

LUBRICATOR FOR STEAM ENGINE VALVES.

No. 550,547. Patented Nov. 26, 1895.

Fig. 1.

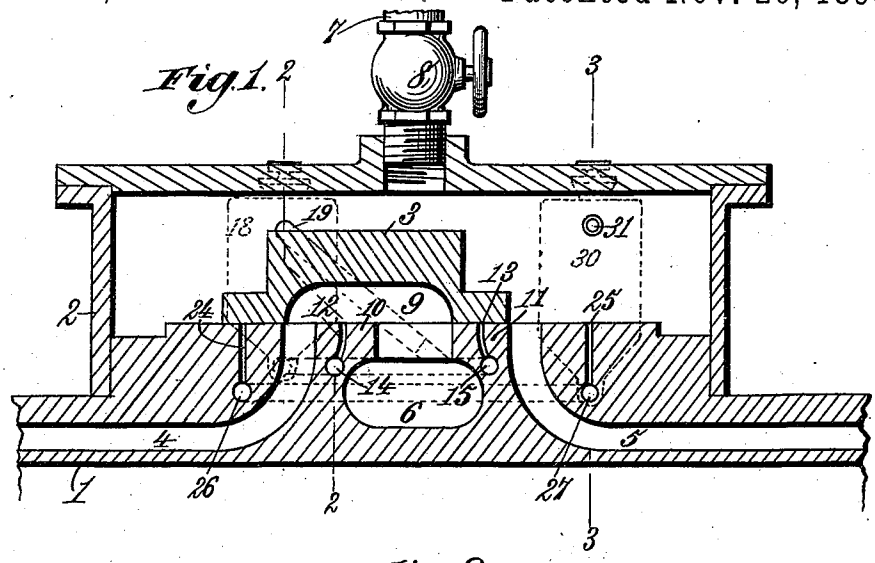


Fig. 2.

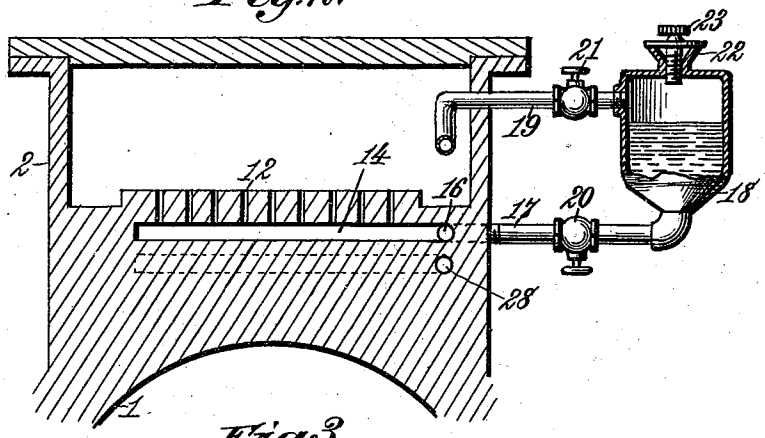
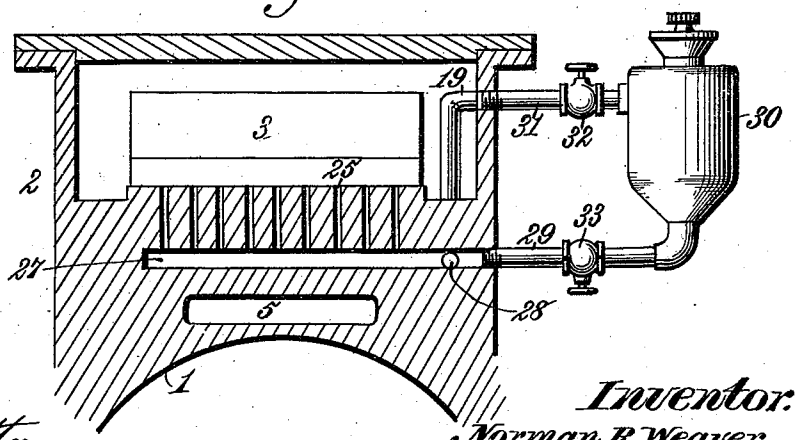


Fig. 3.



Witnesses.
Robt. Everett.
Thos. A. Green

Inventor.
Norman R. Weaver.
By James L. Norris.
Atty.

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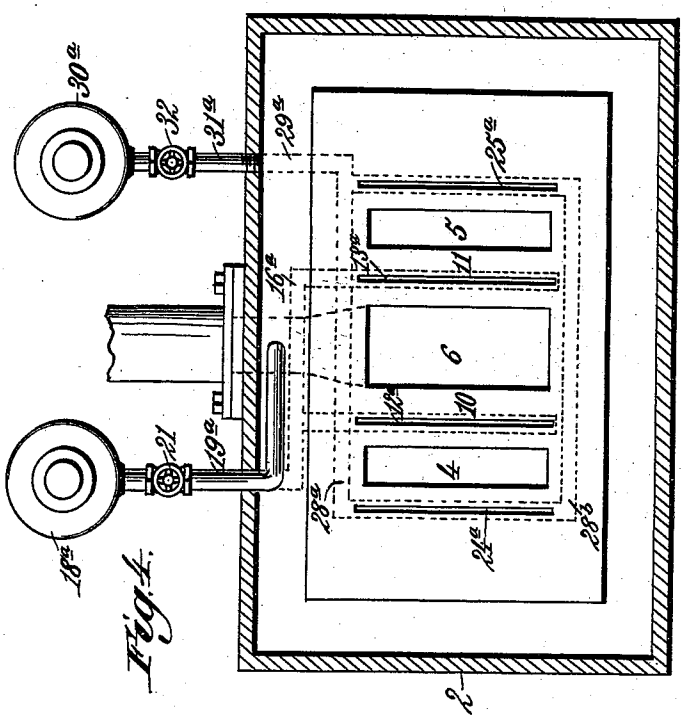

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UNITED STATES PATENT OFFICE.

NORMAN R. WEAVER, OF SELMA, ALABAMA.

LUBRICATOR FOR STEAM-ENGINE VALVES.

SPECIFICATION forming part of Letters Patent No. 550,547, dated November 26, 1895.

Application filed March 7, 1895. Serial No. 540,874. (No model.)

To all whom it may concern:

Be it known that I, NORMAN R. WEAVER, a citizen of the United States, residing at Selma, in the county of Dallas and State of Alabama, have invented new and useful Improvements in Lubricators for Steam-Engine Valves, of which the following is a specification.

My invention relates to an improved lubricator for steam-engine valves, and has for its object to provide improved means for employing both the live and exhaust steam for forcing the lubricant under pressure against the working portions of the piston-valves and their seats, and in such manner that the lubricant will be applied to the working parts only at and during such times as they are developing friction and only in such quantities as are desirable, and to provide against waste or loss of lubricant by balancing the pressure of the steam upon the opposite sides of the lubricant-feed devices during such time as the working parts are not in the proper position for the reception of the lubricant.

To these ends my invention consists in the features and the novel construction and arrangement of parts hereinafter fully described, and definitely pointed out in the claims following the description, due reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a vertical longitudinal central section of the steam-chest and a portion of the cylinder of a steam-engine, illustrating my improved lubricator applied thereto. Fig. 2 is a transverse section taken on the line 2 2 of Fig. 1. Fig. 3 is a similar view on the line 3 3 of Fig. 1. Fig. 4 is a top plan view, partly in section, illustrating a modification.

Referring to the drawings, the numeral 1 indicates the steam-cylinder of a steam-engine provided with a steam-chest 2, in which is adapted to be reciprocated a slide-valve 3 of ordinary or usual construction. The cylinder is provided with the steam-inlet ports 4 and 5 and exhaust-port 6, as usual, and the steam-chest 2 with a steam-supply pipe 7 communicating with a throttle-valve 8, that controls the admission of steam to the steam-chest from the boiler in the well-known manner. For the sake of illustration I have shown the valve 3 as consisting of an ordinary slide-valve of well-known form, having upon its under side a recess 9, adapted to alternately afford communication between the exhaust-port and the steam-ports 4 and 5. The bridges 10 and 11, which form the partitions between the exhaust-port 6 and the steam-ports 4 and 5, are respectively provided with a series of vertical ducts 12 and 13, which at their upper ends open directly beneath the under side of the valve 3 and at their lower ends communicate with passages 14 and 15. The passages 14 and 15 are connected by a passage 16, and the latter passage at one end is connected with a pipe 17, that leads to the bottom of a reservoir 18. The reservoir 18 is arranged at one side of the steam-chest, as more clearly shown in Fig. 2, and at its upper end is connected by means of a pipe 19 with the exhaust-port 6 of the cylinder 1. Both the pipes 17 and 19 are provided with valves 20 and 21, which serve to control the admission of exhaust-steam to the reservoir and the discharge of lubricant therefrom, and the reservoir 18 is also provided at its upper end with a filling-orifice 22, closed by a valve or plug 23, by means of which the lubricant may be supplied to the reservoir. In a similar manner live steam is employed to force lubricant against the under side of the slide-valve 3 at the opposite ends of the throw of the latter, as follows: In the valve-seat of the cylinder upon the opposite sides of the steam-inlets 4 and 5 are formed two series of vertical ducts 24 and 25, said ducts at their upper ends opening directly into the interior of the valve-chest 2 and at their lower ends communicating with passages 26 and 27, that are united by a common passage 28, with which latter is connected one end of a pipe 29, which at its other end is connected to the lower end of a reservoir 30, similar in all respects to the reservoir 18, before described. A steam-pipe 31 communicates at one end with the interior of the steam-chest and at its other end with the upper end of the reservoir 30. Valves 32 and 33 are arranged in the pipes 31 and 29 and serve to control the admission of steam to the reservoir 30 and the discharge of lubricant therefrom.

Having described the construction of my improved lubricator, the operation is as follows: Steam is supplied to the steam-chest 2 by means of the pipe 7 and throttle-valve 8

and the slide-valve 3 reciprocated by any suitable mechanism in the usual manner to alternately admit steam to the opposite ends of the cylinder through the steam-ports 4 and 5 and permit it to exhaust therefrom through the said ports and the exhaust-port 6. Assuming the parts to be in the position illustrated in Fig. 1, the operation of the lubricating means is as follows: Steam will enter from the valve-chest 2 into the reservoir 30, above the lubricant contained in the latter, through the pipe 31 and will force the lubricant, with a pressure equal to the pressure in the valve-chest, through the pipe 29, passages 28, 27, and 26, and up into the feed-ducts 24 and 25. The ducts 24 being covered by the face of the valve 3, the lubricant will be forcibly pressed against said face and held in close contact therewith as the valve traverses the open ends of said ducts. On the other side the ducts 25 are unobstructed at their upper ends and the lubricant would be discharged therefrom into the valve-chest were it not that the steam bears against the columns of lubricant contained in said ducts with a balanced pressure—that is to say, the steam in the valve-chest exerts precisely the same pressure against said columns of lubricant in the ducts that it does against the lubricant in the reservoir—and hence the lubricant is prevented from being forced up out of said ducts excepting when the valve covers the latter and thus removes the pressure from the upper ends of the ducts, when it will be forced against the valve, as before described. The lubricant is fed to the ducts 12 and 13 in the bridges in precisely the same manner. The back-pressure of the exhaust-steam in the exhaust-port 6 is admitted by the pipe 19 to the upper part of the reservoir 18, and the lubricant is thereby forced through the pipe 17 and passages 16, 15, and 14 into the ducts 12 and 13. The lubricant is forced by said pressure of exhaust-steam against the under side of the valve 3, while the columns of lubricant in the ducts 12 are prevented from being discharged from said ducts by the balanced pressure of the exhaust-steam in the manner before described.

It will be readily apparent that when the valve 3 is shifted to reverse its position relative to the inlet and exhaust ports the action of the live and exhaust steam on the lubricant in the feed-ducts will also be reversed.

Instead of forming each series of feed-ducts of several distinct ducts, I may substitute for each of said series of ducts a single duct of a width nearly coextensive with the width of the valve, as shown in Fig. 4. As shown in said Fig. 4, the bridges 10 and 11, arranged between the exhaust-port 6 and steam-ports 4 and 5, are respectively provided with single ducts 12^a and 13^a, opening at their upper ends directly under the slide-valve, and connected by a passage 16^a that communicates with the bottom of the reservoir 18^a. The upper end of said reservoir is connected by a pipe 19^a with the exhaust-port 6. Similar ducts 24^a and 25^a are arranged upon the opposite sides of the steam-ports 4 and 5 and are united at their ends by corresponding ducts 28^a and 28^b, the duct 28^a communicating by a pipe 29^a with the lower end of the reservoir 30^a, and a pipe 31^a connecting the upper end of said reservoir with the steam-space of the steam-chest. The operation is precisely the same as that before described, excepting that the lubricant in the ducts 28^a and 28^b is fed to the under side of the slide-valve constantly as the valve moves thereover, the lubricant in the exposed or uncovered portions of the ducts being held against discharge therefrom by the balanced pressure of the steam in the manner before described.

Constructed in the manner above described my improved lubricator is entirely free from moving parts of any kind whatsoever, thus avoiding all wear, friction, and liability of derangement or clogging of the parts; and it may also be used with equal facility in connection with an ordinary slide-valve, such as illustrated, or with valves of the Corliss or other well-known types, no especial form of valve being necessary, and it may therefore be applied to engines already in use for, as the construction of the valve is not material, the necessary ducts and passages have only to be bored in the cylinder and the reservoirs connected in position, making it equally applicable to either old or new engines.

The invention as above described is designed for use with a lubricant that is heavier than water. However, in many cases it may be desirable to employ a lubricant that is lighter than water—such as oil, for example—and in such case the connections to the reservoirs 18 and 30 should be reversed—that is to say, the steam being supplied to the reservoirs at the bottom of the reservoirs and the lubricant fed from the upper portion thereof. The operation remains the same.

I have shown the reservoirs 18 and 30 as being arranged in close proximity to the valve-chest; but it will be manifest that their location is immaterial and may be altered to suit circumstances.

Having described my invention, what I claim is—

1. In a steam engine valve lubricator, the combination with the cylinder, steam chest and shifting valve, of feed ducts adapted to alternately communicate with the working face of the valve and with the exhaust port of the cylinder of a reservoir for the lubricant, and passages connecting said reservoir with said feed ducts and with the exhaust port respectively, substantially as described.

2. In a steam engine valve lubricator, the combination with the cylinder, steam chest and shifting valve, of feed ducts adapted to alternately communicate with the working face of the valve and with the steam space of the steam chest, a reservoir for lubricant, passages connecting said reservoir with said

feed ducts and with the steam space of the steam chest, feed ducts adapted to alternately communicate with the working face of the valve and with the exhaust port, a reservoir communicating with said feed ducts, and passages connecting said reservoir with said feed ducts and with the exhaust port respectively, substantially as described.

3. In a steam engine valve lubricator, the combination with the cylinder having the steam ports 4 and 5 and the intermediate exhaust port 6, the channeled bridges 10 and 11 arranged intermediate the said steam ports and the exhaust port, said channels at their upper ends communicating with the working face of the valve controlling said ports, the valve 3 for alternately connecting the steam ports with the exhaust port, a passage 16 connecting said channels, a reservoir 18 for lubricant, a pipe 17 connecting the passage 16 with the lower end of said reservoir, and a pipe 19 connecting the upper end thereof with the exhaust port 6, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

NORMAN R. WEAVER.

Witnesses:
J. SYD. ROBBINS,
GEO. WM. LEWIS.