

No. 657,924.

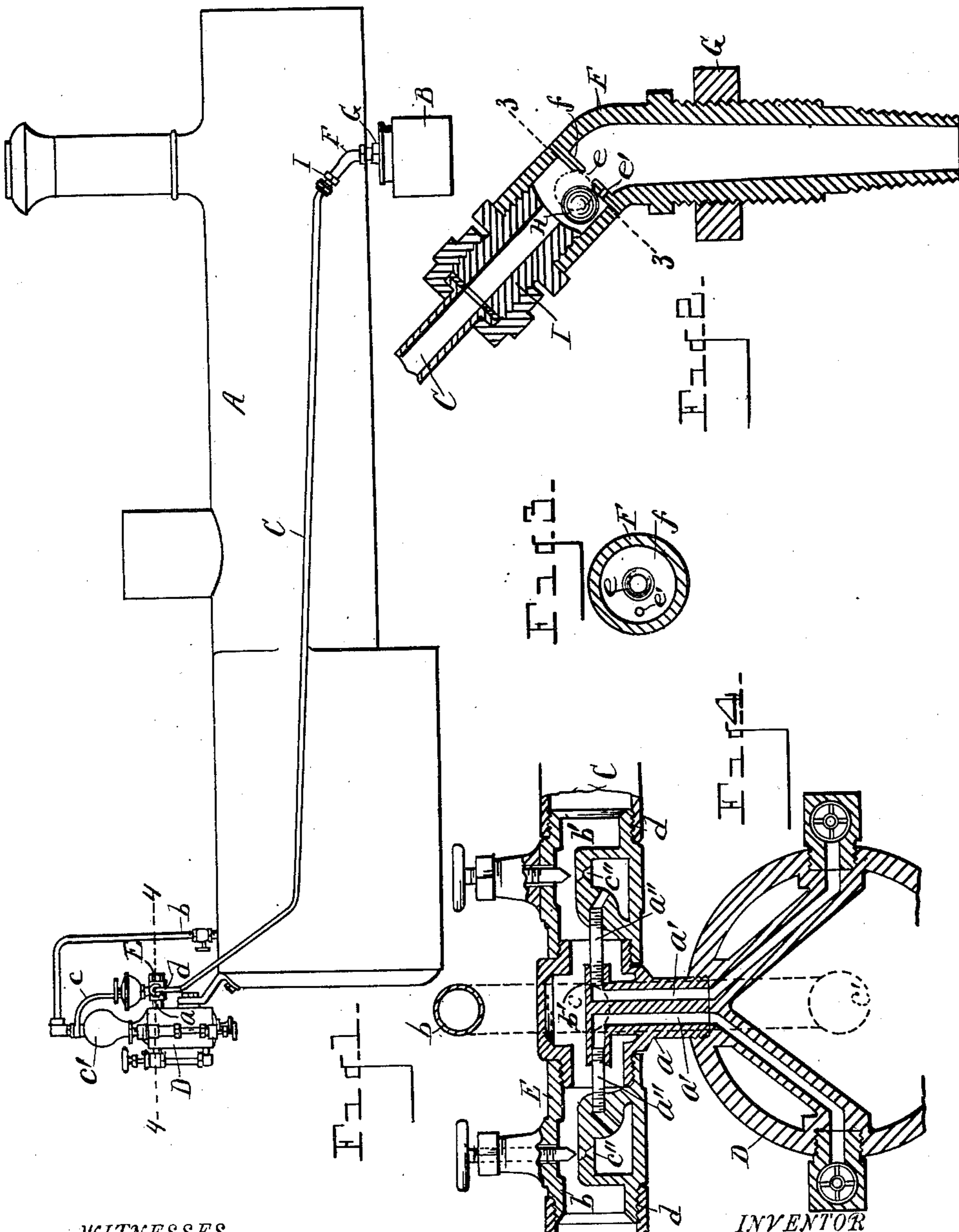
Patented Sept. 18, 1900.

G. B. ESSEX.
LUBRICATOR.

(Application filed Dec. 31, 1897.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES

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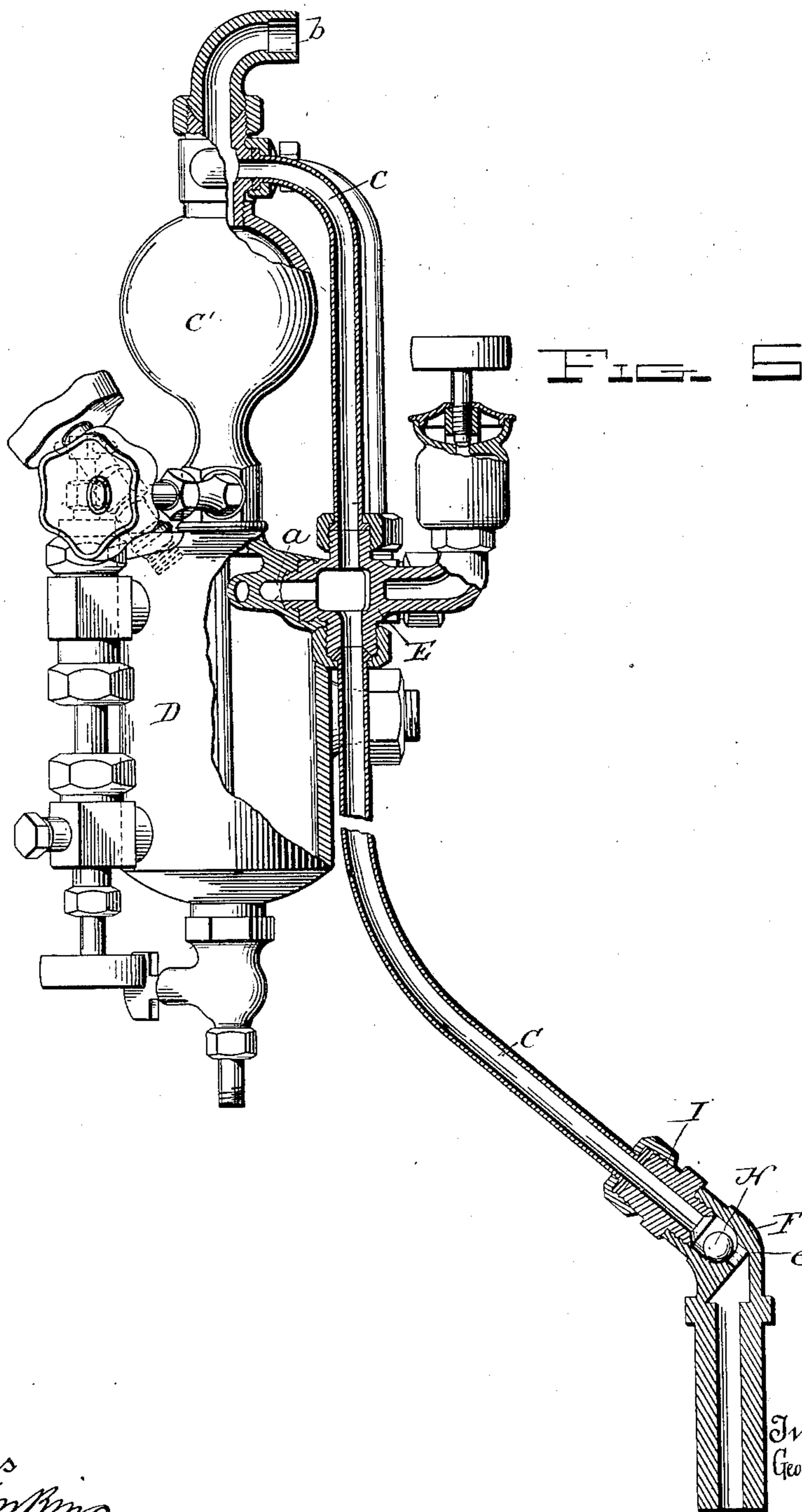
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UNITED STATES PATENT OFFICE.

GEORGE B. ESSEX, OF DETROIT, MICHIGAN, ASSIGNOR TO THE MICHIGAN LUBRICATOR COMPANY, OF SAME PLACE.

LUBRICATOR.

SPECIFICATION forming part of Letters Patent No. 657,924, dated September 18, 1900.

Application filed December 31, 1897. Serial No. 665,113. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. ESSEX, a citizen of the United States, residing at Detroit, in the county of Wayne, State of Michigan, have invented certain new and useful Improvements in Lubricators; and I do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to lubricators, and especially to that class employed in lubricating the cylinder and valves of locomotives; and it consists in the construction and arrangement of parts hereinafter fully set forth, and pointed out particularly in the claims.

The object of the invention is to provide lubricating mechanism for locomotive-cylinders in which the arrangement is such as to insure a continuous and uniform flow of oil through the tallow-pipe to the steam-chest under all conditions of load and pressure, obviating the accumulation of water of condensation in said tallow-pipe and balancing the pressure within the tallow-pipe, so as to prevent the possible retaining of any water of condensation therein through any back pressure from the steam-chest or any increase in the force or rapidity of pulsations therein, providing also a choke to prevent the emptying of the contents of the reservoir of the lubricator into the tallow-pipe and an undue passage of steam through said pipe when the throttle is closed or when there is an excessive forward pressure in said pipe by way of the lubricator, providing for a perfect feeding of the oil at all times.

The objections found in many locomotive-lubricators in common use is that they are not efficient where a high pressure must be carried or when the engine is laboring under a heavy load, owing to the fact that an even pressure in the tallow-pipe cannot be maintained, for the reason that the communication with said pipe at the boiler end thereof is usually reduced in order to choke the passage of oil from the lubricator therethrough when the throttle is closed, permitting of the

passage of but a small body of steam into the upper end of the tallow-pipe, which must resist the pressure at the steam-chest end of said tallow-pipe where the communicating opening is of the full area of said pipe, resulting in a back pressure within the tallow-pipe at the end communicating with the steam-chest, preventing a free flow of steam there-through, causing the small volume of steam which enters the upper end of said pipe to condense, filling the pipe with water of condensation, which is maintained therein by reason of said back pressure and the force of the pulsations in the steam-chest, culminating in the filling of the tallow-pipe with water and oil and preventing the passage of oil to the cylinder while the engine is working. These objections are overcome by the mechanism described in the accompanying drawings, in which—

Figure 1 is a side elevation of a locomotive boiler and steam-chest, showing the application of my improved lubricator thereto. Fig. 2 is an enlarged longitudinal section through the connection employed to connect the lower end of the tallow-pipe with the steam-chest, showing the ball-valve and choke-aperture therein. Fig. 3 is a transverse section as on line 3 3 of Fig. 2. Fig. 4 is an enlarged horizontal section as on line 4 4 of Fig. 1, showing the oil and steam passage in the lubricator and the connection of the tallow-pipe and the steam-supply pipes therewith; Fig. 5, an elevation, partly in section, of the apparatus, showing the steam-passage by which the tallow-pipe communicates with the boiler through the lubricator.

Referring to the letters of reference, A designates a locomotive-boiler, B the steam-chest, and C the tallow-pipe. It will be understood that there are two of these tallow-pipes, one on each side of the boiler, which communicate with the steam-chests of the respective cylinders.

The lubricator D is of the balanced hydrostatic sight-feed class, and as its construction does not enter into this case a more detailed description will not be necessary here.

The discharge-arm *a* of the lubricator is provided with a coupling E, to which is connected the steam-induction pipe *b*, leading

from the boiler through the steam-supply tube *c*, connected with the condenser *c'*, to which said steam-induction pipe leads. Also connected with said coupling *E* on each side are the upper ends of the tallow-pipes, as at *d*. The steam from the boiler via pipes *b* and *c* passes into the coupling *E* and through the open channel *b'* into the communicating tallow-pipes *C* on either side, as clearly shown in Fig. 4, while the oil from the lubricator passes into said coupling through the discharge-arm of said lubricator by way of the respective channels *a'*, through the ducts *a''*, and into said steam-passage *b'*, through the reduced ports *c'*, thence into the tallow-pipes and, with the steam flowing therethrough, into the steam-chests.

F designates a coupling which is used to connect the lower end of the tallow-pipe with the steam-chest. This coupling comprises a hollow oblong body, the upper end of which projects forward at an angle to the body portion and the lower end of which is threaded externally to enable it to be screwed into the steam-chest, being adapted to be locked by the jam-nut *G*. Crossing the inner diameter of said coupling, above the point of angle thereof, is an inclined diaphragm *f*, having an aperture *e* through its geometric center adapted to form a seat for the ball-valve *H*, which is located within said coupling above said inclined diaphragm and which normally falls away from said aperture, as shown by solid lines in Fig. 2. Formed through said diaphragm *f*, between its lower margin and the central aperture *e*, is a reduced aperture *e'*, which serves as a choke to prevent a too-rapid discharge of the steam and oil through said coupling into the steam-chest when the throttle is closed or when there is an excessive forward pressure in the tallow-pipe and the ball-valve *H* occupies its seat over the aperture *e*, as shown by dotted lines in Fig. 2. At the upper end of the coupling *F* is a union *I*, through the means of which said coupling is united to the lower end of the tallow-pipe *C*.

It will be seen on referring to Fig. 4 that the steam which enters the upper end of the tallow-pipe through the steam-induction pipe *b* and the supply-pipe *c* has a free and unobstructed passage into the tallow-pipe through the passage-way *b'* in the coupling *E*. The area of said passage being equal to that of the tallow-pipe the pressure within said pipe is perfectly balanced when the throttle is open and the engine is working, as said pipe is then supplied with boiler-pressure at each end through apertures of equal area. By reason, too, of making the communication through the lubricator between the steam-induction pipe and the tallow-pipe free and unobstructed and in area equal to that of the tallow-pipe a volume of live dry steam is constantly supplied to the upper end of the tallow-pipe of the full area thereof, obviating the condensation of said steam and prevent-

ing the accumulation of the water in the tallow-pipe, as is the result where the steam and oil are fed into the tallow-pipe through a reduced aperture, which serves as a choke when the throttle is closed. The tallow-pipe being relieved from water of condensation and the pressure in the upper end of said pipe being equal to that in the end communicating with the steam-chest when the throttle is open, no accumulation of wet steam and water in the tallow-pipe is possible through back pressure or the pulsations in the steam-chest when the engine is laboring or working under high pressure, thereby maintaining the tallow-pipe always free and clear and insuring a perfect and continuous passage of oil therethrough to the cylinder at all times.

In the operation of this device the ball *H* remains in the position shown in Fig. 2 when the pressure in the steam-chest is balanced by the pressure in the tallow-pipe, affording a free and unobstructed passage from the lubricator through the tallow-pipe to the steam-chest, insuring a perfect and uniform supply of oil to the cylinder. When the throttle is closed, however, the pressure in the steam-chest is instantly removed, while the full boiler-pressure remains upon the lubricator and the upper end of the tallow-pipe, which condition would cause a rush of steam and oil through said tallow-pipe into the steam-chest were some provision not made for choking the aperture in said tallow-pipe at its lower end. This I accomplish through the medium of the ball-valve *H*, which immediately the throttle is closed is carried onto its seat over the aperture *e* in the diaphragm *F* by the attempt of the steam to pass through said aperture and is held there by the steam-pressure within the tallow-pipe, whereby the passage of steam and oil in the tallow-pipe through the aperture *e* is arrested, leaving open only the minute aperture *e'*, which is so reduced that a small quantity only of steam and oil is permitted to pass therethrough, thereby leaving undisturbed the condition of the lubricator, which continues to feed with the same regularity whether or not the throttle is open or closed and the engine is laboring under a light or heavy load. When the throttle is again opened, the pressure in the steam-chest meets and balances the pressure in the tallow-pipe, thereby releasing the ball *H*, which rolls from its seat, affording a free passage from the tallow-pipe into the steam-chest of the full area of said tallow-pipe.

Under conditions where the engine is running light with the throttle partially closed there is an excess of pressure forward in the tallow-pipe tending to cause an undue flow of steam and oil to the cylinder. This undue flow through the tallow-pipe is prevented by the ball-valve, which immediately seats itself upon any increase of pressure in the tallow-pipe over that of the steam-chest, so that there is maintained within said pipe prac-

typically a uniform condition as to pressure and flow of lubricant at all times during the operation of the engine.

In apparatus of this character it is necessary in order to balance the pressures in the tallow-pipe when the throttle is open that there be an unrestricted flow of steam into the lubricator end of the tallow-pipe in such volume as to create boiler-pressure within the tallow-pipe. To attain this result, I preferably make the steam-passage through the lubricator of cross-section or area equal to that of the tallow-pipe, as indicated in Fig. 5. A slight variation either way will not preclude proper action, and I do not mean to restrict myself absolutely and in all cases to this equal area. I do, however, deem it preferable under most circumstances to preserve such equality, though not carrying said feature into the claims nor restricting my invention thereto.

Having thus fully set forth my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a lubricator for locomotives, the combination of the lubricator, the tallow-pipe communicating with the boiler through said lubricator, the lower end of the tallow-pipe communicating with the steam-chest, a diaphragm in said communicating passage having a central aperture, the ball-valve adapted to close said aperture, there being a reduced passage establishing communication between the tallow-pipe and steam-chest independent of said valve-controlled aperture.

2. In a lubricator for locomotives, the combination of the lubricator, the tallow-pipe communicating with the boiler through said lubricator, the coupling uniting the lower end of the tallow-pipe with the steam-chest, the inclined diaphragm in said coupling, there being an aperture through said diaphragm, the ball-valve adapted to close said aperture but normally lying away therefrom, there being another and reduced aperture through

said diaphragm independent of said valve-controlled aperture.

3. In a lubricating apparatus provided with suitable cylinder and equalizing-pipe connections, and in combination with the lubricator and the steam chest or cylinder, a duct connecting the same, containing a minimum-supply choked passage, a relatively-larger by-passage, separate and distinct from the minimum-supply choked passage, and a valve for controlling said by-passage automatically seated by the pressure within the duct on the lubricator side and automatically unseated by gravity when pressure is on the cylinder side.

4. In a lubricating apparatus provided with suitable cylinder and equalizing-pipe connections, and in combination with the lubricator and the steam chest or cylinder, a duct connecting the same, containing a minimum-supply choked passage, a relatively-larger by-passage, separate and distinct from the minimum-supply choked passage, and a valve for controlling said by-passage, said valve presenting surfaces of equal area to the steam in the duct on the cylinder and on the lubricator sides.

5. In a lubricator for locomotives, the combination of a lubricator, a tallow-pipe communicating with the boiler through said lubricator, the lower end of the tallow-pipe communicating with the steam-chest; a diaphragm in said communicating passage having an aperture; a ball-valve adapted to close said aperture, there being a reduced passage establishing communication between the tallow-pipe and the steam-chest independent of said valve-controlled aperture.

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

GEORGE B. ESSEX.

Witnesses:

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E. S. WHEELER.