

No. 743,523.

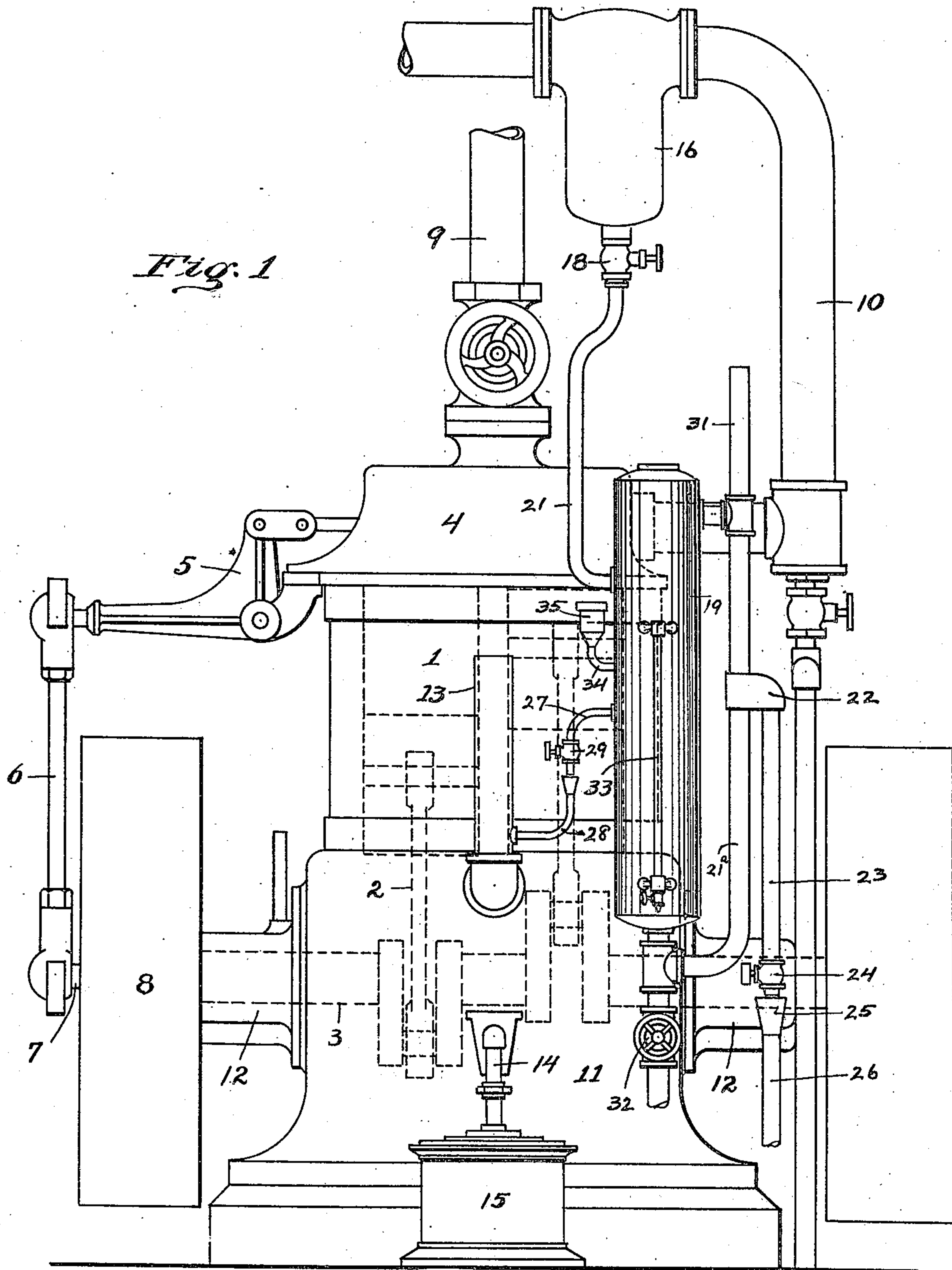
PATENTED NOV. 10, 1903.

J. P. KLEBER.
LUBRICATING DEVICE FOR ENGINES.

APPLICATION FILED JAN. 13, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses.

Fred H. Sweet.

J. H. Winter.

Inventor.

John P. Kleber

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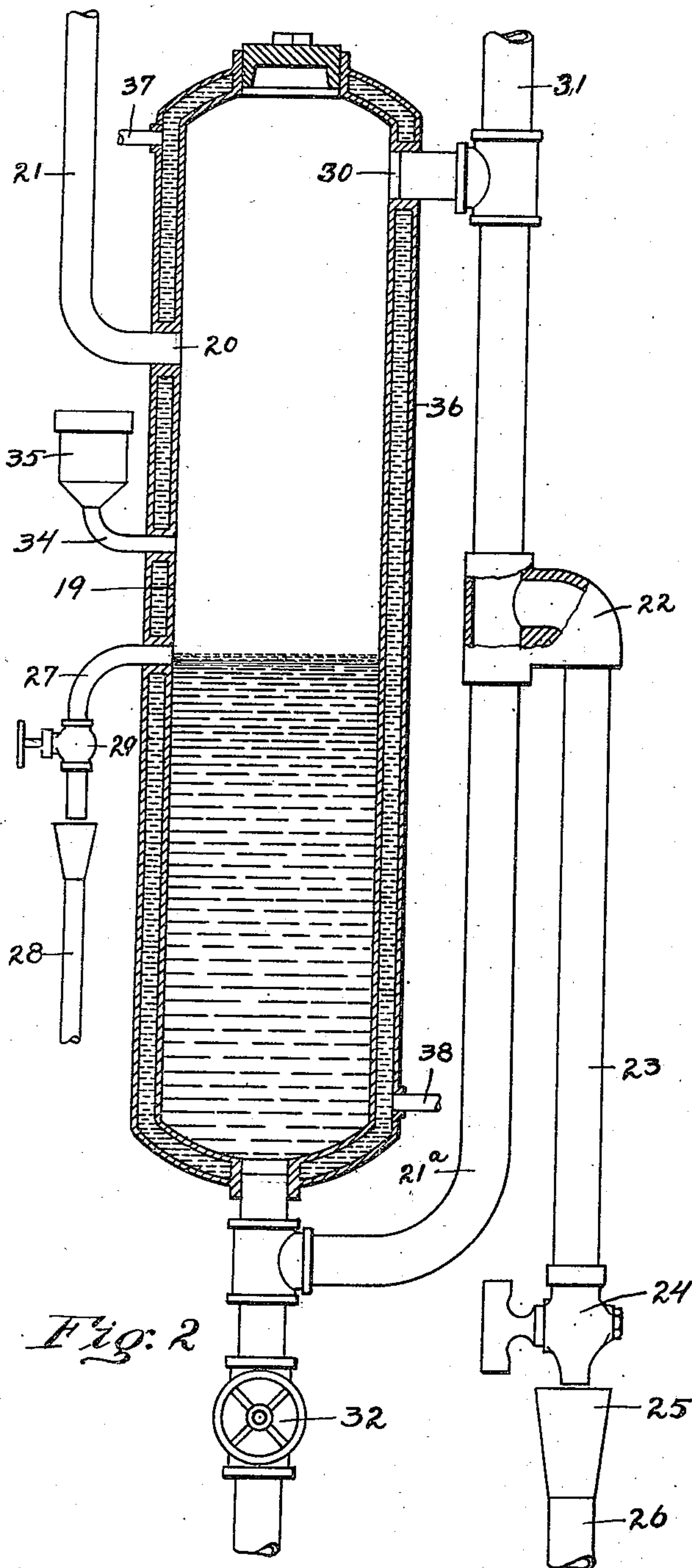


Fig. 2

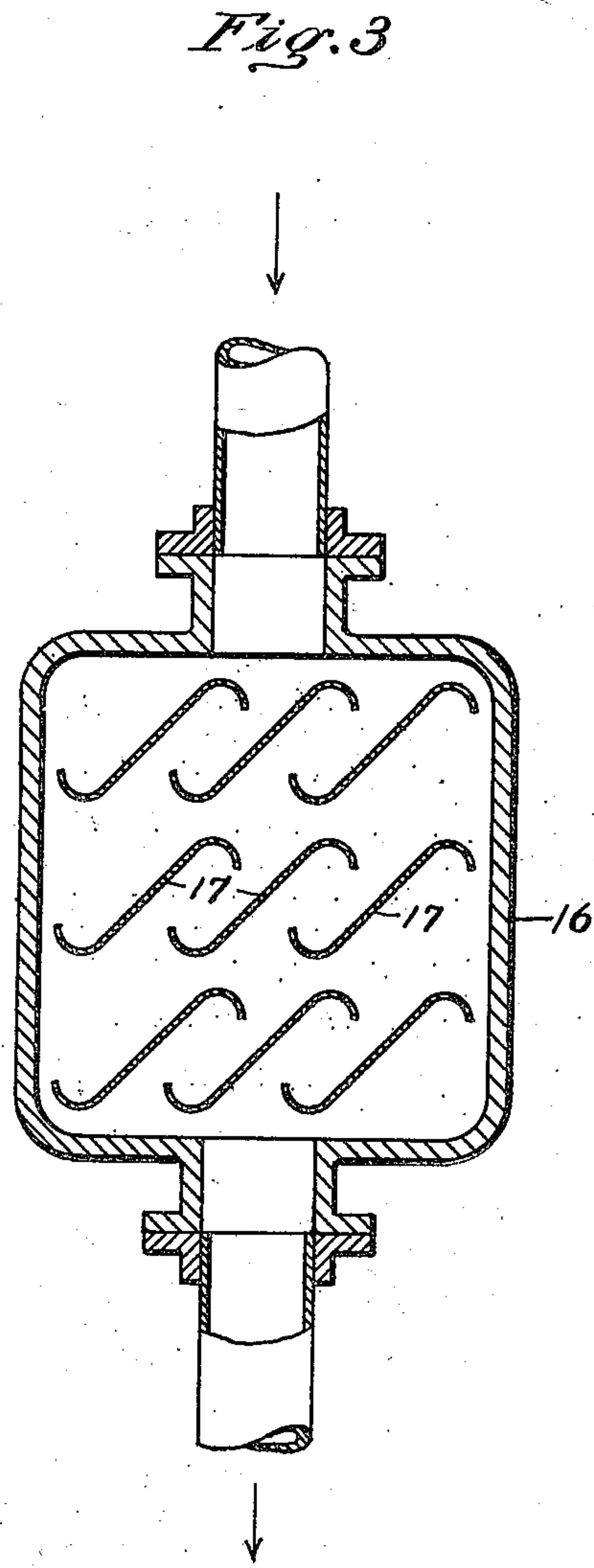


Fig. 3

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UNITED STATES PATENT OFFICE.

JOHN P. KLEBER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF
TO A. C. CANFIELD, OF PITTSBURG, PENNSYLVANIA.

LUBRICATING DEVICE FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 743,523, dated November 10, 1903.

Application filed January 13, 1903. Serial No. 138,837. (No model.)

To all whom it may concern:

Be it known that I, JOHN P. KLEBER, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Lubricating Devices for Engines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to lubricating devices for steam-engines; and its object is to provide means which will collect the waste oil escaping from the exhaust, separate it from the water of condensation and relieve it from the pressure of the steam, and then return it to the engine to be used over again, thus resulting in a large saving of oil, as well as keeping the engine thoroughly lubricated, so that the wear and consequent repairs are greatly reduced.

With steam-engines which are provided with inclosed cranks, such as Westinghouse upright engines and the like, it is the custom to put a considerable quantity of water into the crank-case and then pour oil into the same. The oil floats on top of the water and serves to keep the cranks, governors, bearings, connecting-rods, and other parts lubricated. I have discovered that the reciprocation of the piston-rods carries the oil into the cylinders, whence it escapes through the valves into the exhaust, thus being wasted. Manufacturers of these engines and engineers have generally supposed that the addition of a gallon of oil to the crank-case will suffice to keep the engine lubricated for several weeks. I have discovered, however, that the waste of oil through the exhaust goes on very rapidly, as much as a gallon passing out through the exhaust from a small engine in the course of an hour. As a consequence these engines as heretofore handled have been run with practically no or at least a very insufficient supply of oil, thus causing them to wear rapidly and making frequent repairs necessary.

The object of my invention is to provide means which will collect the oil escaping through the exhaust of these engines, separate the same from the steam and water of condensation, and return it to the crank-case, thus keeping the engine well lubricated and

greatly reducing the wear and consequent repairs, as well as the amount of oil used.

To this end my invention consists, generally stated, in connecting to the exhaust of the engine suitable devices for separating the waste oil from the steam and water of condensation and relieving the same from the pressure of the exhaust-steam and then returning the same to the crank-case of the engine.

The invention also consists in certain details of construction, which are hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a front view of an upright engine, showing my invention applied thereto. Fig. 2 is a vertical section through the oil and water separator, and Fig. 3 is a horizontal section through an oil and steam separator suitable for my purpose.

In the drawings I have shown my invention applied to an upright engine of the Westinghouse type, in which the cylinders 1 are placed in a vertical position and have their piston-rods 2 projecting downwardly and connected to the horizontal crank-shaft 3. The valve-chest 4 is located at the upper ends of the cylinders 1, and the valves are actuated by a bell-crank lever 5, connected by the rod 6 to a crank 7 on the fly-wheel 3. The steam-inlet pipe is shown at 9 and the exhaust-pipe at 10. In engines of this type the cranks and crank-shaft are inclosed in a casing 11, the crank-shaft extending through suitable tight boxes 12 at the ends of the casing. It is the custom to fill the crank-case with water to a certain level and then pour in several gallons of oil, which floats on top of the water, and during the rotation of the cranks the water and oil are churned up and the cranks, connecting-rods, piston-rods, governors, bearings, and the like thoroughly lubricated. Oil is added from time to time, and for this purpose a pipe 13 leads into the upper portion of the crank-case, this pipe also serving as a vent to prevent the accumulation of pressure in the crank-case. It is also customary to provide an overflow-pipe 14, leading from the crank-case at a point slightly above the level of the water and oil therein, so as to prevent an excess of water and oil in the case. This

overflow-pipe leads to a collector 15, from which the oil is removed from time to time and returned to the crank-case.

All of the parts of the engine so far described are or may be of the usual or any preferred construction, and the particular engine shown in the drawings has been selected for the purpose of illustration merely. My invention is not limited to this precise form of engine, but is adapted for any engine having an inclosing crank-case in which oil or oil and water is placed. I have discovered that in engines of this type the oil and water in the crank-case is carried by the piston-rods up into the cylinders, from whence it passes into the valve-chest and through the valves to the exhaust, this waste going on very rapidly, especially as to the oil, which wastes in larger quantities than the water. As a consequence it does not take long to entirely exhaust or at least greatly reduce the amount of oil in the crank-case, so that the engine will be running with insufficient lubrication. My invention provides means for collecting the oil which passes out with the exhaust-steam and returning the same to the crank-case.

The oil must be first separated from the exhaust-steam, and for this purpose I may employ any device capable of separating liquids from steam, of which a number are on the market. In the drawings I have shown one well-known type of such separator, known as the "Webster oil-separator." This comprises a casing 16, connected in the exhaust-pipe, so that the steam must pass through the same. In this casing are a number of baffle-plates, consisting of vertically-arranged metallic strips 17, having their edges curved or bent, as shown in Fig. 3, to form pockets in which the liquids, such as the oil and water of condensation, are trapped. The exhaust-steam as it passes through this casing impinges against these curved metallic strips and is deflected thereby from one to the other. The water of condensation and oil are caught or trapped in the pockets formed by the bent edges of the baffle-plates and trickles down the same and accumulates in the bottom of the casing. The casing is provided at its bottom with an outlet having a suitable valve 18. The separator shown in the drawings has long been used to separate the cylinder-oil from the exhaust water of condensation preparatory to reusing the latter as feed-water for the boiler; but the oil has generally been conducted to the sewer and wasted. Any other well-known device for separating oil from steam may be used for my purpose equally as well as the particular separator shown.

A certain amount of steam and a considerable quantity of water of condensation necessarily pass along with the oil from the separator 16, and if it were taken directly to the crank-case it would introduce into the same an excess of water as well as create such a

pressure in the case as to force the water and oil out at the bearings. I therefore pass the oil and water through a device which will relieve the same from all pressure and separate out from the same the excess of water of condensation and then return the oil with the proper proportion of water to the crank-case. This device comprises a casing 19 of suitable size and height, preferably being a cylinder, as shown, and having an inlet 20 at or near its upper end, which is connected, by means of a pipe 21, to the valved outlet 18 of the oil and steam separator 16. At the lower end of the casing 19 is an outlet for the water, to which is connected a pipe 21^a, which extends upwardly to a considerable distance, makes a bend, as at 22, and then extends downwardly, as at pipe 23. In order that the engineer may see whether the device is operating properly, the pipe 23 is provided at its lower end with an ordinary cock 24 and has its end just above a funnel 25 connected to a pipe 26, which leads to the sewer or other convenient place. The lower end of the pipe 23 is located slightly above the top of the funnel 25, so that the engineer can see whether the water is flowing properly.

About midway of the height of the casing 19 and preferably a slight distance below the level of the bend 22 of the water-outlet pipe is the oil-outlet 27, from which a pipe 28 leads back to the crank-case of the engine, and this can conveniently be accomplished by connecting the lower end of said pipe to the vent-pipe 13. A suitable valve 29 is placed in the pipe 28. As some steam is liable to find its way into the casing 19, I provide the upper end of the latter with a pressure-relieving vent 30, which is connected to a pipe 31, leading to the atmosphere or other convenient place. This pipe 31 will also be connected to the outlet-pipe at the bend 22, so as to relieve this outlet-pipe of any pressure that might accidentally find its way into the same. The lower end of the casing 19 is provided with a suitable drain-cock 32, through which the entire contents of the chamber may be drained and the same cleaned. I also preferably connect to the casing a suitable water-gage 33 of any well-known type to indicate the height of the liquids in the casing. As it is necessary to add fresh oil to the engine from time to time, I provide a suitable oil-inlet pipe leading into the casing 19 a short distance below the oil and water inlet 20. This pipe is provided at its upper end with a cup 35, into which the oil is poured, and a suitable cap or plug is used for closing the same. The oil and water escaping into the overflow-collector 15 can also be poured into the casing 19 through the inlet 34.

The oil and water of condensation entering the casing 19 is necessarily quite warm, and the oil when returned to the engine should be cool. Preferably the casing 19 will be provided with a water-jacket 36, having a water-inlet 37 and outlet 38, so that a circulation of

water may be maintained therein, thus thoroughly cooling the casing 19 and its contents. In this way cold oil will be returned to the crank-case and the crank and other parts will be kept cool.

In the use of my invention the exhaust-steam from the engine passes through the steam and oil separator 16, whereby the oil and water of condensation are separated from the steam and thence flow down through the pipe 21 into the casing 19. In this way all of the oil and a considerable amount of water of condensation, as well as a small quantity of steam, find their way into the casing 19. The water being heavier than the oil naturally goes to the bottom, while the oil floats on top. The water will accumulate in the casing until it is of sufficient height to flow out through the pipe 21. The bend 22 is slightly higher than the oil-outlet 27; but the water in the casing 19 will not reach quite the level of the water in the outlet-pipe 21, for the reason that the oil floating on the water by its weight holds the water-level in the casing slightly lower than in the outlet-pipe 21. The oil floating on top of the water flows out of the opening 27 and through the pipe 28 back to the crank-case. The valve of the latter pipe will preferably be open, and the oil passes in practically a constant stream back to the crank-case. A certain amount of water also passes along with the oil; but this is not detrimental, as the crank-casing must contain a certain proportion of water. Should any excess of water find its way into the casing 19, it immediately goes to the bottom of the casing and flows out through the outlet 21. The device therefore separates from the oil all excess of water and returns to the crank-casing all of the oil and the proper proportion of water. The vent-pipe 31 relieves the casing and outlet-pipe of pressure, so that the proper working of the device is not disturbed.

Whenever it is necessary to add fresh oil to the engine, it is poured in at the opening 34, and as the oil floats on top it will find its way through the outlet 27 and pipe 28 to the crank-case. The oil and water taken from the overflow-collector 15 also will be poured into casing 19 through the opening 34, and no matter how much water may be contained with the oil it will cause practically no increase in the amount of water going back to the crank-casing, as the excess of water immediately drops to the bottom of casing 19 and passes out through the outlet 21, the oil, however, being retained in the casing and finding its way back to the crank-case.

By means of my device it is possible, if desired, to entirely separate the oil from the water, so that no water will pass back to the engine. This can be accomplished either by slightly lowering the bend 22 of the outlet-pipe, so that the water in the casing can never quite reach the height of the outlet 27, or by keeping the valve 29 in the pipe 28 closed in order that the accumulation of oil in the cas-

ing will force the water-level down, the water constantly escaping through the outlet-pipe. The valve 29 will be opened at intervals and the oil on top of the water will flow back to the crank-case; but no water will go with the same. I prefer, however, to keep the valve 29 open constantly, so that no attention on the part of the engineer is necessary.

With my device the oil is used over and over again, thus making a very large saving in the amount of oil used and also preventing the possibility of running the engine without sufficient oil. Furthermore, no cylinder-oil is necessary, for the reason that the oil passing up through the cylinders necessarily passes through all joints in the valve mechanism and keeps the same sufficiently lubricated. My device, furthermore, relieves the engineer of all responsibility for seeing that the engine is properly lubricated, and even with a careless engineer no damage can result to the engine, as all of the oil passing out with the exhaust-steam is automatically returned to the crank-case.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a steam-engine, the combination with the cylinder and crank, of an inclosing case for the crank adapted to contain oil, a water and oil separator connected to the exhaust-outlet of the cylinder and having an outlet leading back to the crank-case and means for cooling said oil before it is returned to the crank-case.

2. In a steam-engine, the combination with the cylinder and crank, of an inclosing case for the crank adapted to contain oil, a steam and liquid separator connected to the exhaust of the cylinder, and a water and oil separator connected to said steam and liquid separator and having an oil-outlet leading back to the crank-case.

3. In a steam-engine, the combination with the cylinder and crank, of an inclosing case for the latter adapted to contain oil, means connected to the exhaust from the cylinder for separating the oil from the steam and from the excess of water of condensation and relieving the same from pressure, and a connection from said means to the crank-case.

4. In a steam-engine, the combination with a cylinder and crank, of an inclosing case for the latter adapted to contain oil, a casing connected to the exhaust of said engine, a water-outlet leading from the bottom of said casing, an oil-outlet in said casing above said water-outlet, and a pipe leading from said oil-outlet to the crank-case.

5. In a steam-engine, the combination with a cylinder and crank, of an inclosing case for the latter adapted to contain oil, a casing connected to the exhaust of said engine, a water-outlet leading from the bottom thereof, a pipe connected to said outlet and extending upwardly for a considerable distance and then extending downwardly, an oil-outlet in said casing at a point slightly below the bend in

the water-outlet pipe, and a pipe leading from said oil-outlet to the crank-case.

6. In a steam-engine, the combination with the cylinder and crank, of an inclosing case for the latter adapted to contain oil, a water and oil separating device comprising a casing, an inlet into the upper end thereof connected with the exhaust from the cylinder, a pressure-vent for said casing, a water-outlet from the bottom of said casing, a pipe connected to said outlet, said pipe extending upwardly a considerable distance and then extending downwardly, an oil-outlet from said casing between the inlet to, and the water-outlet from, said casing, and a pipe leading from said oil-outlet to the crank-case.

7. In a steam-engine, the combination with the cylinder and crank, of an inclosing case for the latter adapted to contain oil, a steam and oil separator connected to the exhaust of said cylinder, an oil and water separator connected to said steam and oil separator, a water-outlet from said oil and water separator, and an outlet therefrom leading to the crank-case, and a pressure-relieving vent in the upper end of said oil and water separator.

8. In a steam-engine, the combination with the cylinder and crank, of an inclosing case for the crank adapted to contain oil, means

connected to the exhaust of said cylinder for separating the oil and water of condensation from the steam, an oil and water separator connected to said means, a pressure-relieving vent from the upper end of said oil and water separator, a water-outlet from the lower end therefrom, an oil-outlet also leading therefrom to the crank-case, and a water-jacket surrounding the same.

9. In a steam-engine, the combination with the cylinder and crank, of an inclosing case for the crank adapted to contain oil, an oil and water separator connected to the exhaust of the cylinder, said oil and water separator comprising a casing, a water-outlet from the bottom thereof, an oil-outlet therefrom between the inlet thereto and the water-outlet therefrom, a pipe leading from said oil-outlet to the crank-case, a pressure-relieving vent for said casing, and an opening into said casing above the oil-outlet through which oil may be poured into said casing.

In testimony whereof I, the said JOHN P. KLEBER, have hereunto set my hand.

JOHN P. KLEBER.

Witnesses:

F. W. WINTER,
ROBERT C. TOTTEN.