

No. 621,037.

Patented Mar. 14, 1899.

E. C. CURTIS.
FEED WATER HEATER.
(Application filed May 27, 1898.)

(No Model.)

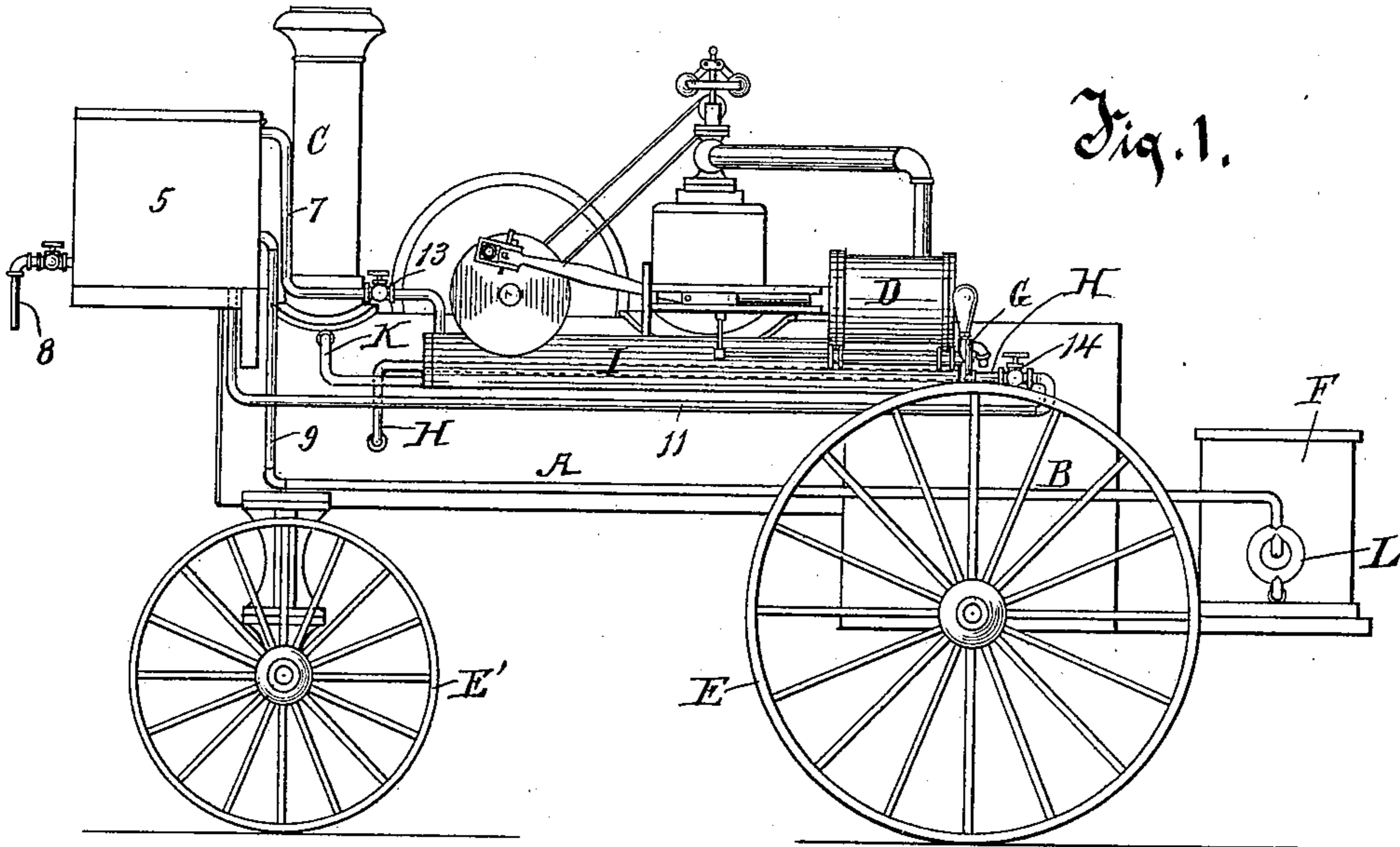
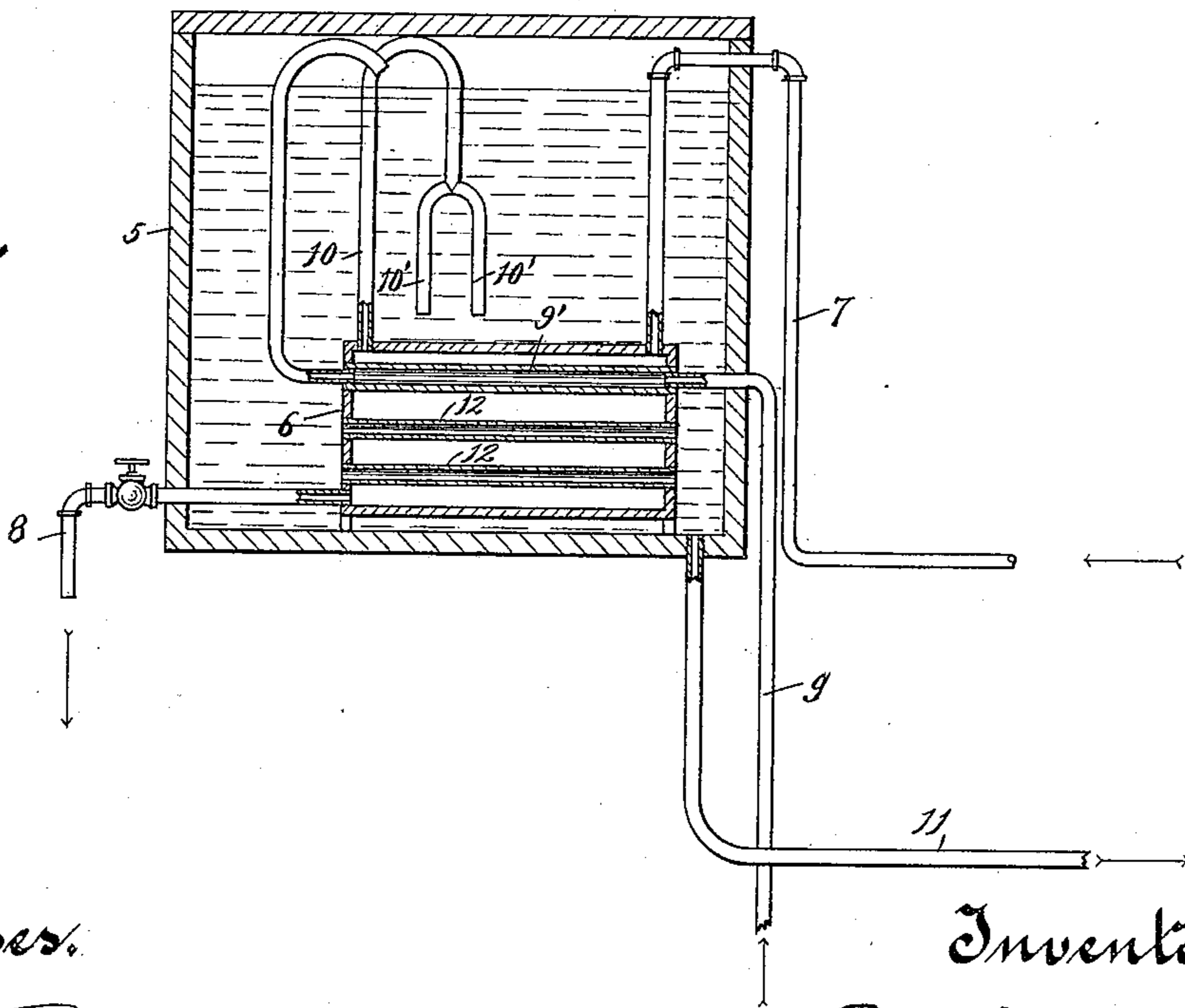


Fig. 2.



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FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 621,037, dated March 14, 1899.

Application filed May 27, 1898. Serial No. 681,921. (No model.)

To all whom it may concern:

Be it known that I, ELON C. CURTIS, of Rosendale, in the county of Fond du Lac and State of Wisconsin, have invented a new and useful Improvement in Feed-Water Heaters, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention relates to improvements in a feed-water heater for engines that is so constructed as to be adapted to use the exhaust-steam of the engine for raising the temperature of the water to be fed to the boiler; and the invention includes not only the improved means for accomplishing this very desirable object, but also and as incidental to such chief purpose the means for separating refuse oil or other waste lubricant from the exhaust-steam and discharging it from the engine or feed-water-heating apparatus related thereto, thus preserving only the pure steam and the water of condensation therefrom to be returned to the boiler.

The invention consists of the devices and combinations of devices as herein described and claimed or their equivalents.

My improved devices, while capable of being used with any engine, are especially adapted for use with portable engines of that class that are commonly employed for operating threshing-machines and other farm machinery, and I have shown my improvements in connection with such a portable engine delineated in a general way, mostly in outline.

In the drawings, Figure 1 is a side elevation of a portable engine and my improvements attached thereto. Fig. 2 is a longitudinal section of the receptacle or chamber of my feed-water heater with the devices that are located therein and in close relation thereto.

In engines of this class as now in use the boiler A, with a fire-pot B, smoke-stack C, and cylinder D are mounted on wheels E E' and are in common use for operating threshing-machines and other farm machinery. Some of these engines are also provided with a so-called "water-heater" I, which consists of a horizontally-disposed steam-tight chamber so arranged that the exhaust-steam from the cylinder D is discharged directly into this chamber I and therefrom is discharged by an exhaust-pipe K into the smoke-stack C. This steam-chamber I in those engines that are

provided with such chamber is utilized for heating the feed-water to a very limited extent by extending the water-supply pipe through the steam-chamber from the pump G to its rear end and thence into the boiler A, as shown at H. This water-pipe is extended in front of the pump G to some tank, as F, or other water-supply, from which it is pumped through the chamber I, as described. I have not shown the supply-pipe leading to the pump G as used in such engines, since I provide other means for supplying the pipe with water, as hereinafter described.

I have illustrated my improvements in feed-water heaters in connection with an engine having the horizontally-disposed chamber I, as my improvements are readily attached thereto and are especially valuable in connection therewith, though my improvements may be employed in connection with an engine that does not have the chamber I or any analogous water-heater.

In applying my improvements to an engine I employ a water-receptacle 5, which has a loosely-fitting cover and which may be located at any convenient place on the engine. Within the receptacle 5 there is a water-tight steam-drum 6, located near the bottom of the receptacle, and an exhaust-steam pipe 7 leads to this steam-drum from the exhaust of the engine, which in the engine shown in the drawings is the heating-chamber I. This exhaust-steam pipe taps the steam-chamber I at its top, so as to take therefrom chiefly, and so far as is possible only, the steam of the exhaust of the engine, from which the refuse oil or lubricant has been separated by falling to the bottom of the chamber I and from which it is blown out or discharged through the pipe K. In using my improvements in connection with an engine having this chamber I advantage is taken of the initial or first separation of waste oil or lubricant from the steam in this chamber in the manner stated before the purer steam is led into the steam-drum 6. Where such a chamber as I is not on the engine, the exhaust-pipe 7 leads directly from the exhaust of the engine to the drum 6, and the separation of steam from the refuse oil and foreign matter must take place entirely within the drum 6, which in such case is preferably made larger in proportion than is shown in the drawings, and the separation is

thereby satisfactorily accomplished. A waste-pipe 8 leads from near the bottom of the drum 6 through the wall of the receptacle 5 and is adapted to discharge the waste oil and residuum that has been separated from the steam in the drum. A water-supply pipe 9 leads from the supply-tank F into the receptacle 5 and through the drum 6, preferably near its upper portion, so as to get the maximum result from the steam entering and passing through the drum and is thence carried upwardly near to the top of the receptacle 5 and there terminates, so as to discharge freely into the receptacle. That portion of the water-supply pipe 9 that passes through the drum 6 is preferably considerably enlarged, as seen at 9', thereby providing an increased capacity or small reservoir with extended surface for cooling the steam by the contact of the steam in the drum 6 against this larger surface of the pipe, thus also cooling the oil and causing it to separate from the steam. In the drawings the tank F is shown for supplying water to the pipe 9, and a jet-pump L is shown for forcing the water through the pipe; but it will be understood that water for the receptacle 5 can be obtained from any other tank or reservoir or even from a stream of water or well, as opportunity permits, the water being pumped or carried to the receptacle through a pipe, as 9, by any means in common use. A steam-discharge pipe 10 leads upwardly from the top of the drum 6 and is turned over and terminates in a plurality of downwardly-discharging pipes 10' 10'. These discharge-pipes 10' 10' have their mouths at such locality in the receptacle 5 as to be below the surface of the water therein, thus discharging their steam into the water, giving off its principal supply of heat and obviating any whistling or blowing of the exhaust. A hot-water-feed pipe 11 leads from the bottom of the receptacle 5 to the pump G, and there leads into the pipe H, extending through the chamber I and into the boiler, so that the hot water can be pumped directly from the receptacle 5 into the boiler of the engine. A stop-cock 13 in the pipe 7 provides for shutting off the steam from the drum 6 when, if ever, the water in receptacle 5 becomes undesirably hot. When this cock 13 is closed, the exhaust-steam in chamber I must be discharged through pipe K into the smoke-stack. A drip-cock 14 is provided in the feed-pipe 11. I also preferably provide one or more steam-tight pipes 12 12, extending from end to end through the drum 6, which serve as flues for the free passage of water in the receptacle 5 through them, being adapted still further to reduce the temperature of the steam in the drum 6, aiding to insure the separation of the oil therefrom.

The result of my improved construction is to heat the water before it goes into the boiler, to take off most of the back pressure on the engine, and to keep the boiler free from scale.

The pipe 10, to obviate any backing up of

water into or through it, should have its bend above the surface of the water, and Fig. 2 of the drawings so far as it indicates otherwise (if at all) should not control what is most desirable in the construction.

What I claim as my invention is—

1. A feed-water heater, comprising a water-receptacle, water-pipes leading to and from the receptacle, a steam-drum in the receptacle near its bottom adapted to be entirely surrounded by water in the receptacle, an exhaust-steam pipe leading into the steam-drum, a steam-pipe leading upwardly from the drum and open in the receptacle above the drum but below the water-line, and a water-discharge pipe leading from the drum.

2. An attachment to a portable engine comprising a water-receptacle on and portable with the engine, a closed steam-drum in and substantially at the bottom of the receptacle, a pipe leading into the receptacle and into the drum near its top adapted to convey exhaust-steam from the engine to the drum, a steam-discharge pipe leading from the drum at its top upwardly the pipe being recurved and open at its discharge end downwardly in the receptacle below the normal water-line therein, a waste-pipe leading from the drum at its bottom and discharging outside of the receptacle, a water-supply pipe leading into the receptacle and horizontally through the steam-drum and thence extending upwardly and discharging into the receptacle near its top, a water-discharge pipe leading from the receptacle at the bottom, and open flues or water-passages through the drum horizontally for the free passage of water therethrough in the receptacle.

3. In a feed-water heater, the combination of a water-receptacle, pipes to supply and discharge the water, a steam-drum of less size than the water-receptacle and located in the receptacle near its bottom, a steam-pipe leading to the drum, and a steam-discharge pipe leading from the drum upwardly and then downwardly and provided with a plurality of terminal pipes discharging downwardly into the receptacle below the water-line.

4. In a feed-water heater, the combination of a water-receptacle, pipes leading to and from the water-receptacle, a steam-drum smaller than and wholly within the receptacle, horizontally-disposed pipes in the steam-drum leading from end to end thereof forming flues through which the water in the receptacle can circulate freely, a steam-supply pipe leading into the drum, a steam-discharge pipe leading from the drum and discharging into the receptacle below the water-line, and a residuum-discharge pipe leading from at or near the bottom of the drum.

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

ELON C. CURTIS.

Witnesses:

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