

Aug. 4, 1931.

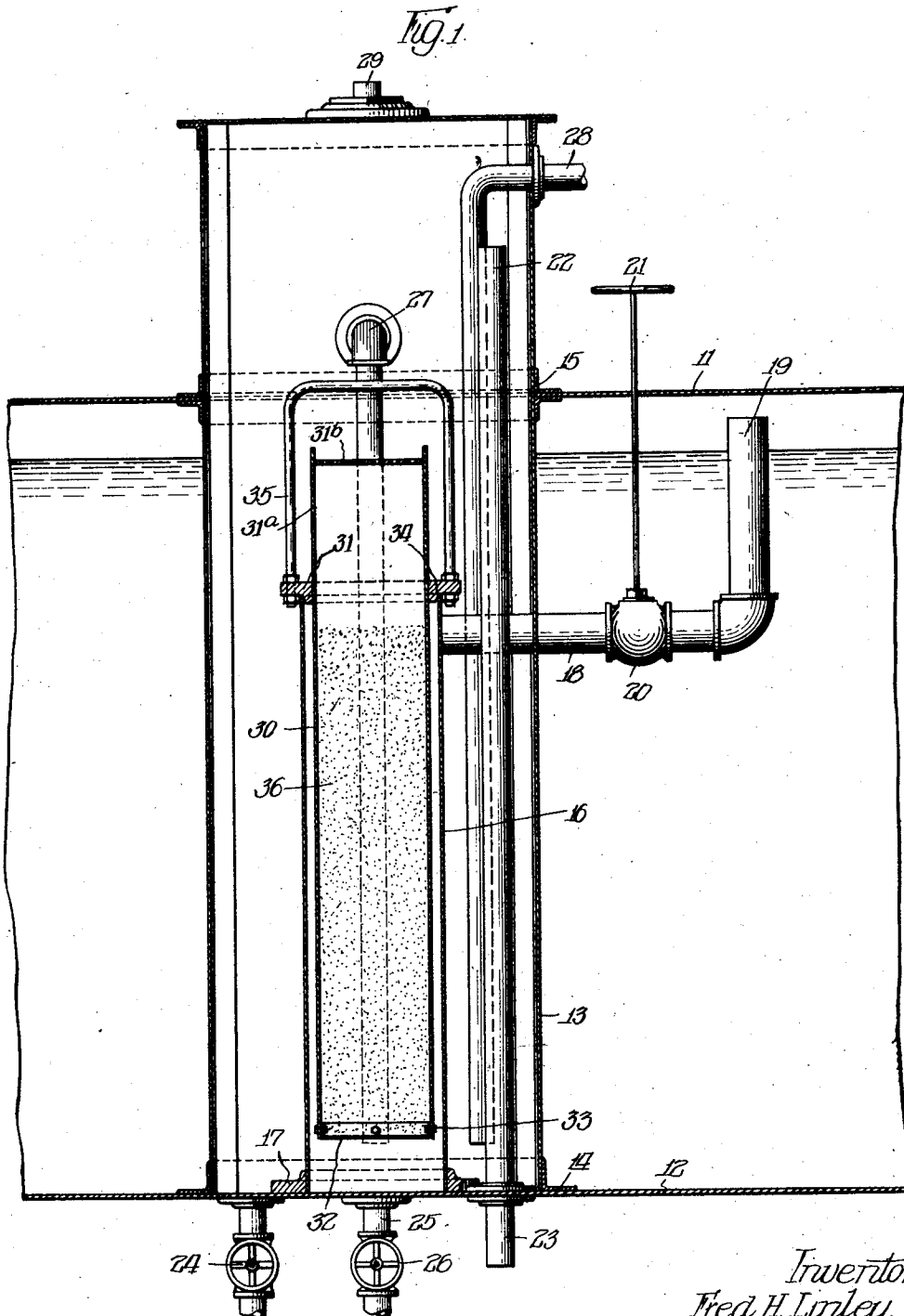
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1,817,572

OIL FILTER AND SKIMMER

Filed Sept. 22, 1928

2 Sheets-Sheet 1



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Fig. 2.

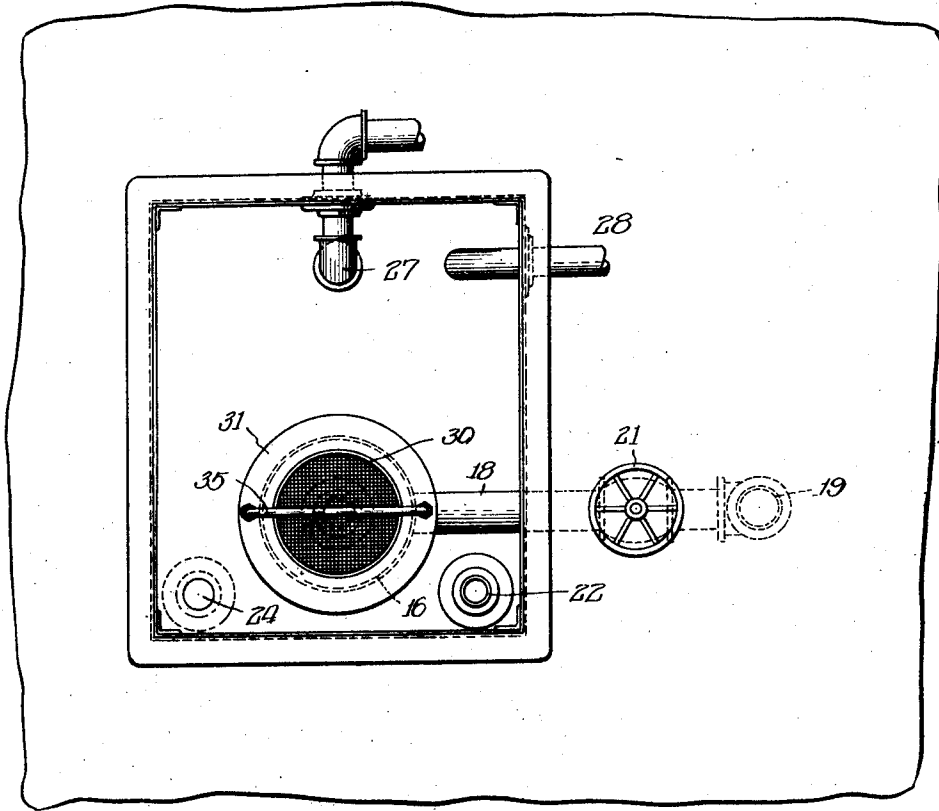


Fig. 3.

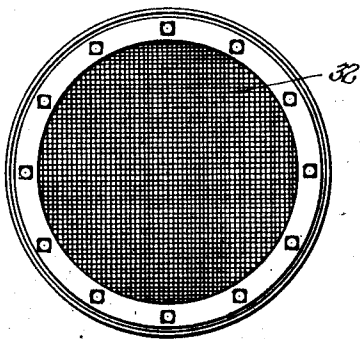
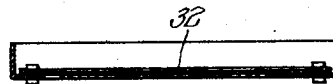


Fig. 4.



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UNITED STATES PATENT OFFICE

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OIL FILTER AND SKIMMER

Application filed September 22, 1923. Serial No. 307,716.

This invention relates to a new and improved oil filter and skimmer and more particularly to an apparatus of this character especially adapted for use in connection with water tanks, such as, for example, those of a locomotive tender or the like.

In locomotive construction and operation it has been the practice to use the exhaust steam from auxiliary engines, such as the air pumps, boiler feed pumps and stoker engines for pre-heating the boiler feed water in a water heater. In some forms of construction a certain amount of the exhaust steam from the main engines is also used for this purpose. This exhaust steam is condensed in transferring a portion of its heat to the feed water and the condensate leaves the feed water heater at a comparatively high temperature which may be from 100° to 150° Fahrenheit.

In some installations this condensate has been returned to the water tank for reuse in the boiler. This return is desirable as the residual heat of the condensate is transferred to the water in the tank. It has been found, however, that there is a considerable amount of oil entrained with the exhaust steam and carried by the condensate. This oily matter has a detrimental effect upon the boiler as it is deposited upon the boiler surfaces and reduces their heat conductivity. This not only cuts down the heat transfer in the boiler but renders the boiler surfaces liable to injury from overheating.

It is an object of the present invention to provide a new and improved oil filter and skimmer adapted to remove oil from engine condensates and to return the water to the water tank.

It is an additional object to provide a construction of this character which may readily be installed in existing constructions without material alteration therein.

It is also an object to provide a construction of this character in which the filtering element may be readily removed for cleaning and replacement and which is simple in design and construction.

Other and further objects will appear as the description proceeds.

We have shown a preferred embodiment of

our invention in the accompanying drawings, in which—

Figure 1 is a fragmentary vertical section showing our invention applied to a tender water tank;

Figure 2 is a plan view of the filter and skimmer with the cover removed;

Figure 3 is a plan view of the bottom closure of the filter; and

Figure 4 is a section through Figure 3.

In the drawings the top of the tender water tank has been shown at 11 and the bottom at 12. The outer casing 13 of our oil filter and skimmer is secured by means of the angle iron connection 14 to the bottom 12 of the tank. This casing 13 extends upwardly through the top 11 of the tank and is secured to the top by means of the angle irons 15.

The casing 13, as shown in Figure 2, is rectangular in horizontal section. The tubular inner casing 16 is secured within the outer casing 13 to the bottom 12 of the tank by means of the ring 17. The outlet pipe 18 leads from the upper portion of the inner casing 16 through the outer casing 13 and through the water in the water tank. The discharge end 19 of the pipe 18 is located above the normal water level in the tank. The pipe 18 is controlled by the valve 20, which has a valve handle 21 extending above the top 11 of the tank.

An overflow pipe 22 is located within the outer casing 13 and has its lower end 23 extending through the bottom of the tank.

It has been found that the oil entering through the inlet pipe 27 contains a large amount of sludge which stays within the bottom portion of the container 13 and does not rise to the top of the liquid level as might be expected. It is important to draw off frequently the collected sludge, and to this end there is provided a drain valve 24 which leads from the bottom of the casing 13 to a suitable point of discharge. It has also been found desirable to drain from time to time the inner casing 16 and for this reason there is provided, as shown in Figure 1, a drain pipe 25 which is controlled by means of a valve 26.

While the condensate is admitted through

the pipe 27, there is provided another inlet pipe 28 which extends from a point near the top of the casing 13 downwardly terminating at a point adjacent to the bottom of the casing and in the use of the additional inlet steam may be admitted to the bottom of the casing 13 from whence it will bubble upwardly through the liquid contained in the casing and will, during this upward travel, be condensed. Still an additional inlet pipe 29 may be provided for the purpose of admitting steam above the surface of the liquid within the casing 13 whereby surface contact brings about a condensation of the steam.

As illustrated, the filter member comprises an imperforate tubular portion 30 which is supported in an annular member or a ring 31 at the upper extremity of the tube and is provided at its lower extremity with a perforate body portion 32 which is held in assembled position by means of bolts 33. The ring 31 which engages closely the top edge of the casing 16 and is provided with a handle 35 which may be utilized in removing or replacing the filter element. The filter element contains some suitable filtering material, as, for example, excelsior or steel wool presenting a large surface area for catching the oil as the water emulsion passes downwardly through the material.

It has been found that the oily emulsion contains solid particles which, if allowed to enter directly into the filtering tube, collect upon the upper surface of the filtering material and interfere with the proper operation of the device and in order to overcome this disadvantage the filtering tube 30 is extended, as shown at 31a, to provide a perforate portion, the upper end of which is closed by means of a perforate wall 31b. By means of this arrangement, a preliminary straining is imparted to the oily emulsion and the area through which the oily emulsion may be fed to the filtering material is increased.

In the operation of our apparatus the condensate from the feed water heater enters the outer casing through the inlet 27. This serves to introduce the liquid adjacent the bottom of the outer casing. Exhaust steam from other sources not used in the feed water heater may be introduced into the outer casing as steam through the inlets 28 and 29. It will become condensed through surface contact in the casing. The liquid in the outer casing will rise until it reaches a level slightly above that of the discharge end 19 of the outlet pipe. Much of the oil will rise to the surface of the liquid which will be above the top of the filter member.

The water containing some remaining oil will pass down through the filter material in the casing 30, and out through the screen 32. The filter material will remove substantially all of the remaining oil. The filtered water passes upwardly between the casing 30 and

the inner casing 16 and passes out through the outlet pipe 18. This flow will be continuous as long as the condensate is being introduced into the apparatus. When there has been an accumulation of oil upon the surface of the water in the apparatus the valve 21 may be closed. Since no water is then discharged from the apparatus the water level will rise until it is above the overflow pipe 22 and the oil on top of the water will flow out through this pipe. After the oil has been sufficiently flushed off the valve 21 may be opened and the process proceed as before. The inner and outer casings may be drained by the means provided for that purpose whenever it is desirable.

While we have shown one preferred form of our invention by way of example, it is to be understood that it is capable of modification to meet varying conditions and we contemplate such changes and modifications as come within the spirit and scope of the appended claims.

We claim:

1. An oil filter and skimmer comprising an outer casing, an inner casing closed at the bottom and open at the top into the outer casing, a removable filter member fitted into the inner casing and closing said top opening, an inlet adapted to lead material to be treated into the outer casing and adjacent the bottom thereof and an outlet leading from the inner casing.
2. An oil filter and skimmer comprising an outer casing, an inner casing closed at the bottom and open at the top into the outer casing, a removable filter member fitted into the inner casing, said filter member having an imperforate lower side and a perforate upper end opening into the outer casing, and a perforate bottom opening into the inner casing, a space between the filter member sides and the sides of the inner casing, and an outlet pipe leading from the upper portion of said space.
3. In combination with a water tank, an oil filter and skimmer for filtering oil from condensate and returning the condensate to the tank, said oil filter and skimmer comprising an outer casing, an inner casing located within and spaced from the walls of the outer casing, a pipe leading into the upper portion of the outer casing and discharging below the level of the inner casing, a filter fitted into the inner casing and closing the top thereof, an opening in the upper portion of the filter to the outer casing, an opening from the lower portion of the filter to the inner casing, and an outlet leading from the upper portion of the inner casing to the tank and extending above the normal water level in said tank.
4. In combination with a water tank of an engine tender, an oil filter and skimmer comprising an outer casing set into the water tank

- and extending vertically through the tank, an inlet for condensate extending into said outer casing and discharging adjacent the bottom thereof, an inner casing in the outer casing, said inner casing having a closed bottom and open upper end, a filter member removably fitted into the inner casing, said filter member having a portion serving as a closure for the upper end of the inner casing, said portion having an opening therein leading into the filter member, the bottom of the filter member having an opening therein, and an outlet leading from the inner casing to the water tank and terminating above the normal level of water in said tank.
5. In combination with a water tank of an engine tender, an oil filter and skimmer comprising an outer casing set into the water tank and extending vertically through the tank, an inlet for condensate extending into said outer casing and discharging adjacent the bottom thereof, an inner casing in the outer casing, said inner casing having a closed bottom and open upper end, a filter member removably fitted into the inner casing, said filter member having a portion serving as a closure for the upper end of the inner casing, said portion having an opening therein leading into the filter member, the bottom of the filter member having an opening therein, an outlet pipe leading from the inner casing to the water tank and terminating above the normal level of water in said tank, a valve for controlling said outlet, and an overflow pipe in the outer casing having its inlet end located above the level of the end of the outlet pipe, and its discharge end located externally of the outer casing and the water tank.
6. An oil filter and skimmer comprising an outer casing, an inner casing, a filtering element located within the inner casing, an inlet for an oily emulsion opening into the bottom of the outer casing, and a supplementary inlet for exhaust steam opening within the bottom of the outer casing and adapted to supply steam to the filter during the operation thereof, whereby the steam is condensed and filtered with the oily emulsion.
7. A combined filtering and skimming device, comprising in combination, an outer casing into which the liquid to be operated upon is discharged, an inner casing, a filtering element mounted within the inner casing and adapted to filter the liquid discharged into the outer casing, an outlet leading from the filtering element to carry off the cleansed liquid, and a plurality of drains located in the bottom of the outer chamber, one of said drains permitting periodical removal from the outer chamber of sediment settled upon the bottom thereof the other of said drains permitting removal of accumulated oil from the surface of the liquid in the outer chamber.
8. In combination with a water tank, an oil filter and skimmer for removing impurities from condensate and returning the condensate to the tank, said oil filter and skimmer comprising an outer casing supported in the water tank, an inner casing located within and spaced from the walls of the outer casing, said inner casing being closed at the bottom and open at the top, an inlet condensate pipe leading into the lower portion of the outer casing, an overflow pipe opening into the outer casing above the normal liquid level, a filter element supported in the inner casing, an outlet pipe leading from the inner casing to direct the cleansed condensate into the water tank, said outlet pipe having a controlling valve whereby a closure of the valve will cause the level to rise in the outer casing until the floating impurities are separated by passing through the overflow pipe.
- Signed at Duluth, Minnesota, this 18th day of September, 1928.
- FRED H. LINLEY.
FORD E. BOYD.