May 4, 1954 R. A. SHARP 2,677,353

PORTABLE STEAM BOILER

Filed May 1, 1951 2 Sheets-Sheet 1

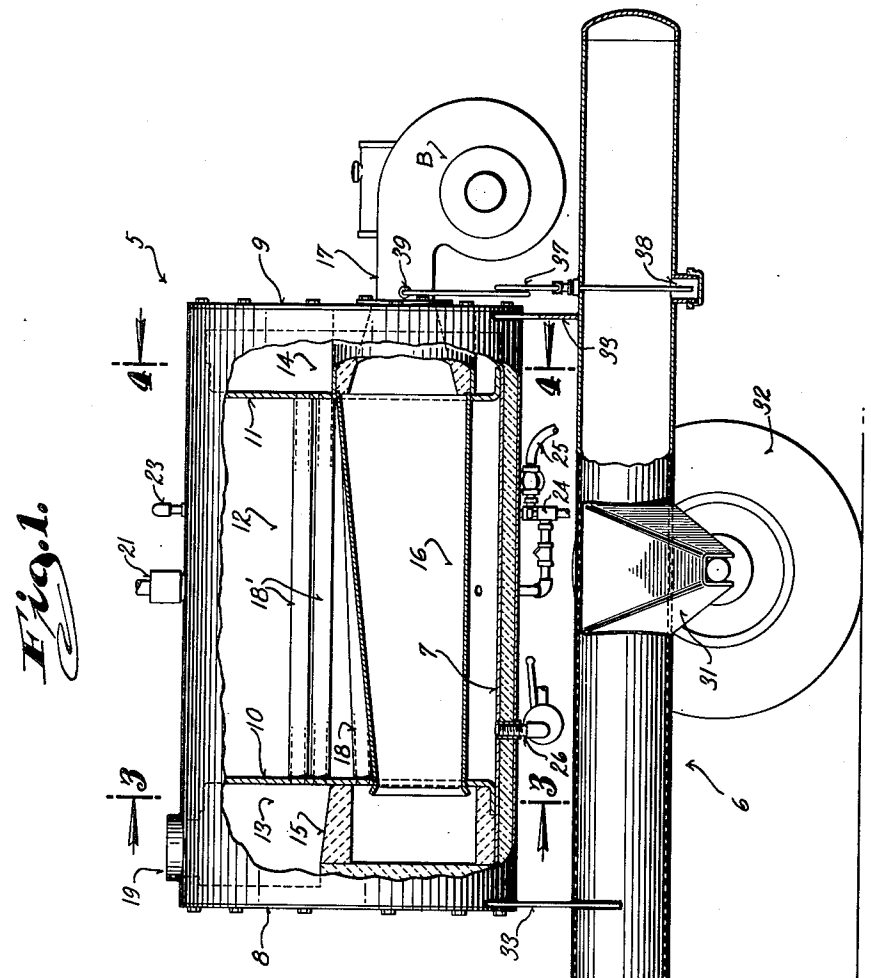

Fig. 1.

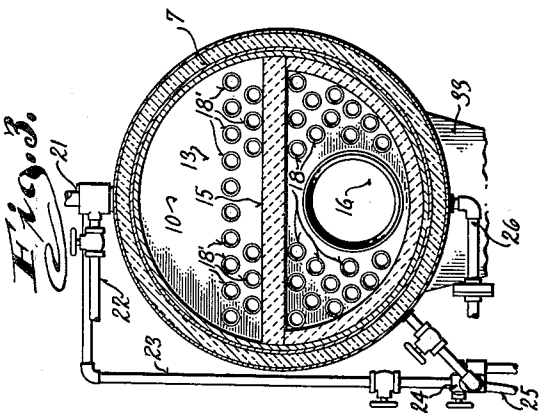

Fig. 3.

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May 4, 1954 R. A. SHARP 2,677,353

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Filed May 1, 1951 2 Sheets-Sheet 2

Fig. 2.

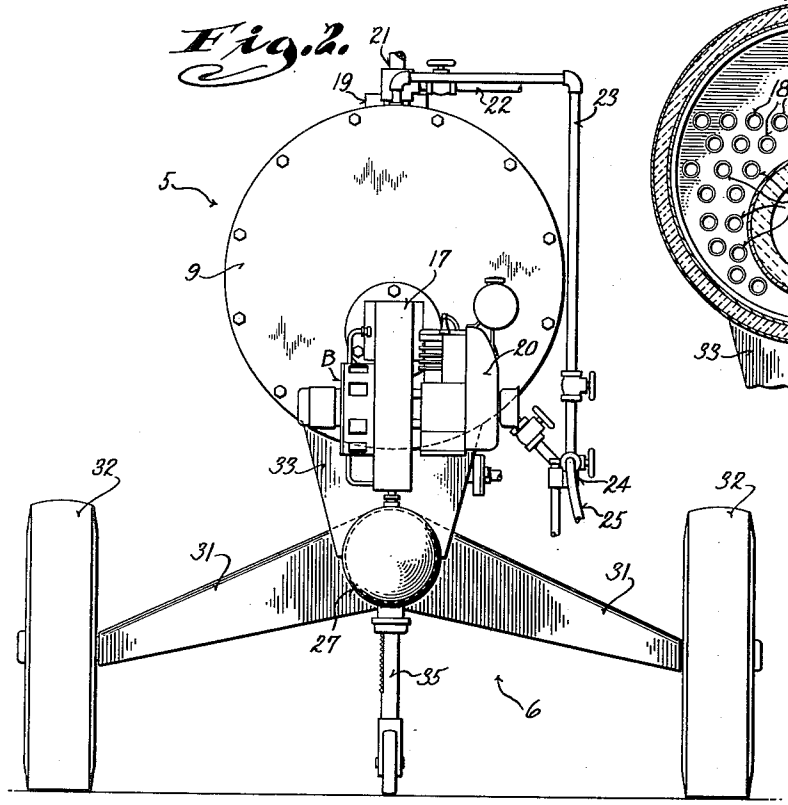


Fig. 4.

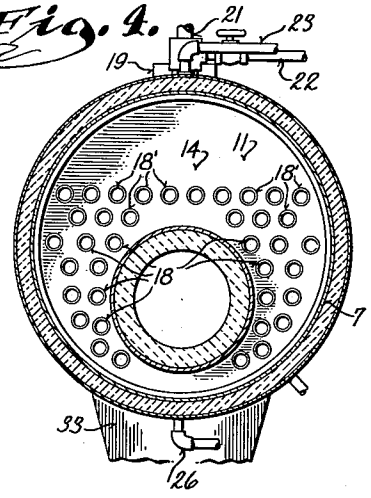
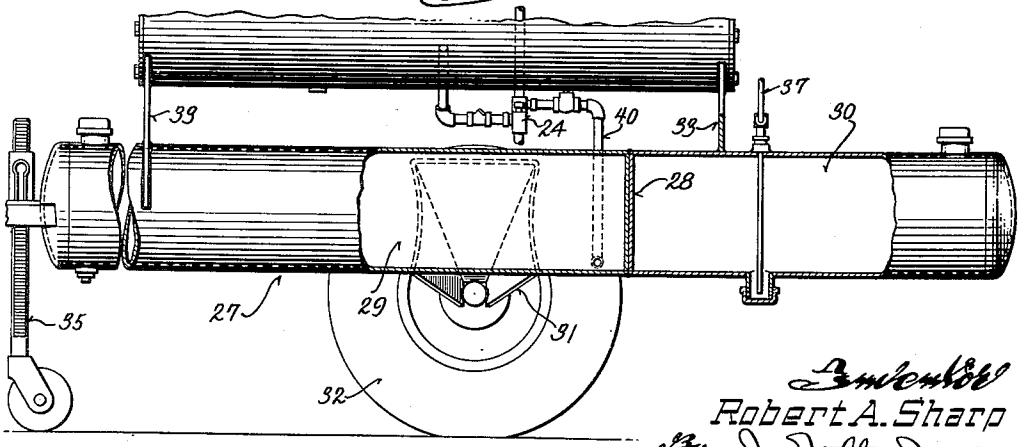


Fig. 5.



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PORTABLE STEAM BOILER

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3 Claims. (Cl. 122—12)

1

This invention relates to portable steam boilers of the type designed to be towed to location by a truck or other vehicle.

Ordinarily these boilers are oil-fired so that it is essential that some means be provided to carry a supply of fuel oil. With a view toward achieving utmost compactness and simplicity in design and construction, this invention has as its purpose to provide a portable steam boiler in which the steam generator per se, i. e. the boiler unit and its oil burner, is mounted upon a wheeled chassis, the main longitudinal member or backbone of which is an elongated fuel tank of sufficient capacity to carry an adequate supply of fuel oil for the oil burner.

Another object of this invention is to provide a portable steam boiler of the character described in which the main longitudinal member of the chassis is divided medially of its ends to define two tanks, one of which holds fuel oil for the oil burner of the boiler while the other provides the condensate reservoir or water tank to carry a supply of feed water for the boiler.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate two complete examples of the physical embodiments of the invention constructed according to the best modes so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a view in side elevation with parts broken away and in section of a portable steam boiler constructed in accordance with this invention;

Figure 2 is a rear end view of the boiler;

Figure 3 is a cross sectional view through Figure 1 on the plane of the line 3—3;

Figure 4 is a cross sectional view through the boiler unit on the plane of the line 4—4 in Figure 1; and

Figure 5 is a fragmentary side elevational view with parts broken away and in section, illustrating a slightly modified form of the invention.

Referring now particularly to the accompanying drawings, the numeral 5 designates the boiler or steam generating unit per se, mounted upon a two wheeled chassis 6 so that it may be towed from place to place. The boiler unit 5

2

comprises a cylindrical jacketed shell 7 closed at its ends by front and rear end walls or bulkheads 8 and 9, respectively, and divided by front and rear partitions 10 and 11 to define a central water space 12 and front and rear headers 13 and 14, respectively.

The front header 13 is divided by a horizontal wall 15 of refractory material into lower and upper chambers, and a taperingly reduced combustion chamber 16 extends from the rear bulkhead to the lower chamber of the front header. Hence, a heating flame projected into the combustion chamber 16 by an oil burner 17 and the hot combustion gases resulting therefrom enter the lower chamber of the front header from which the hot gases pass rearwardly through a series of fire tubes 18 back into the rear header 14 and from it forwardly through an upper set of fire tubes 18' to debouch into the upper chamber of the header 13 from which the flue gases are discharged through a stack 19.

The oil burner 17 is suitably supported with its nozzle positioned to project its flame into the combustion chamber and its blower B is driven by a small gasoline engine 20.

The water space 12 of the boiler unit has a steam outlet 21 at its top from which the steam may be conducted to any desired point of use and, if desired, a valved branch line 22 leads from the main outlet to provide an auxiliary steam outlet. Such an auxiliary steam outlet is especially useful where a steam hose is carried with the boiler unit to be instantly available for the discharge of steam where desired, it being understood that the hose would be attached to the auxiliary steam outlet.

The boiler unit also has a valve controlled steam line 23 leading to an injector 24, the feed line 25 of which is adapted to be connected to any suitable source of water; and a blow-down 26.

The main longitudinal member or backbone of the chassis 6 is an elongated cylindrical tank 27 adapted to hold an adequate supply of fuel oil for the burner, or, as in the modified embodiment of the invention shown in Figure 5, divided by a partition 28 to provide a condensate reservoir or water tank 29 as well as a fuel tank 30. Two oppositely extending arms 31 are fixed to the elongated tank 27 medially of its ends to provide the axle of the chassis, and the wheels 32 are mounted on the ends of these arms. The boiler unit is mounted on and above the tank 27 by legs 33.

At its front end the tank 27 has a conventional trailer hitch 34 fixed thereto and project-

ing forwardly therefrom, and preferably this hitch includes an adjustable supporting leg 35. The hitch 34, of course, provides means for attaching the entire unit to a truck or other towing vehicle, and the supporting leg 35 provides means for supporting the boiler independently of its towing vehicle, it being understood that the center of gravity is forwardly of the wheel axis.

Also located at the front end of the tank 27 is the capped filler spout 36 through which the tank may be filled, and a fuel line 37 leads from a sump 38 in the rear bottom portion of the tank to the fuel inlet 39 of the oil burner.

Where the tank 27 is partitioned as in Figure 5, each tank, of course, has its own capped filler spout, and the condensate reservoir or water tank 29 is connected with the injector 24 through a valved pipe line 40 so that water contained in the tank 29 can be drawn into the boiler.

Attention is directed to the tapered formation of the combustion chamber 16. By virtue of this construction the cross sectional area of the combustion chamber is progressively smaller to thereby assure effective contact between the hot combustion gases and the walls of the combustion chamber, notwithstanding the reduction in volume of these gases as heat is abstracted therefrom.

The tapered formation of the combustion chamber also has the additional advantage of enabling reduction in overall size of the boiler. It is, of course, desirable to have as large a combustion chamber as possible, and, since the refractory partition wall 15 inevitably covers part of the header wall 10, usually referred to as a tube sheet, it follows that that portion of the tube sheet area thus occupied is unavailable for the attachment of fire tubes. However, since the combustion chamber is smaller at its forward discharge end it occupies less of the area of the tube sheet 10 and thus accommodates the refractory partition 15 without entailing an increase in the size of the sheet. Obviously if the combustion chamber were of uniform diameter throughout its length the tube sheet 10 would have to be larger to accommodate the area thereof covered by the partition wall 15 and still encompass all of the upper group of fire tubes 18' and this would entail increasing the overall dimensions of the boiler.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent that this invention provides a portable boiler in which the utmost in simplicity and practicality has been achieved through unique design and construction.

What I claim as my invention is:

1. In a portable steam generator: a substantially cylindrical boiler unit; a supporting chassis for the boiler unit comprising an elongated tank longer than the boiler unit but considerably smaller in girth, a pair of arms fixed to the tank substantially medially of its ends and extending outwardly from opposite sides thereof to provide an axle, and a pair of wheels mounted on the ends

of said arms for rotation on a common axis crosswise of the axis of the tank, said wheels supporting the tank for transit in a substantially horizontal position, and the tank providing a receptacle for holding a supply of liquid fuel to be burned in the boiler unit; legs joined between the boiler unit and the tank at locations on the tank spaced longitudinally in opposite directions from said axle so that the boiler unit is supported by the wheels solely through said legs and the tank, and said legs mounting the boiler unit on the tank above the medial portion thereof and substantially directly over the supporting wheels with the axis of the boiler unit substantially parallel to that of the tank; and duct means mounted on the chassis for feeding liquid fuel from the tank to the boiler unit.

2. In a portable steam generator; a substantially cylindrical boiler unit; a two-wheel trailer chassis for the boiler unit comprising an elongated substantially cylindrical tank having a girth considerably smaller than that of the boiler unit, an axle rigidly joined to the tank substantially medially of its ends and extending laterally from opposite sides of the tank, and a pair of wheels mounted on the ends of the axle for rotation on a common axis crosswise of the tank axis to support the tank for transit in a substantially horizontal position, said tank providing a receptacle for holding a supply of liquid fuel to be burned in the boiler unit; a pair of legs mounting the boiler unit on the tank, above the medial portion of the tank and over said wheels, and with the axis of the boiler unit substantially parallel to that of the tank, said legs being rigidly secured to the boiler unit and being joined to the tank at locations intermediate the wheel axle and the ends of the tank so that the boiler unit is supported by said wheels through portions of the tank extending longitudinally in opposite directions from the wheel axle and lying between the axle and the mounting legs; and duct means mounted on the chassis for feeding liquid fuel from the tank to the boiler unit.

3. The portable steam generator set forth in claim 2 further characterized by the provision of a partition wall in said tank intermediate the ends thereof to divide the tank into longitudinally adjacent liquid fuel and condensate receptacles; and other duct means on the chassis to communicate the condensate receptacle with the boiler unit.

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