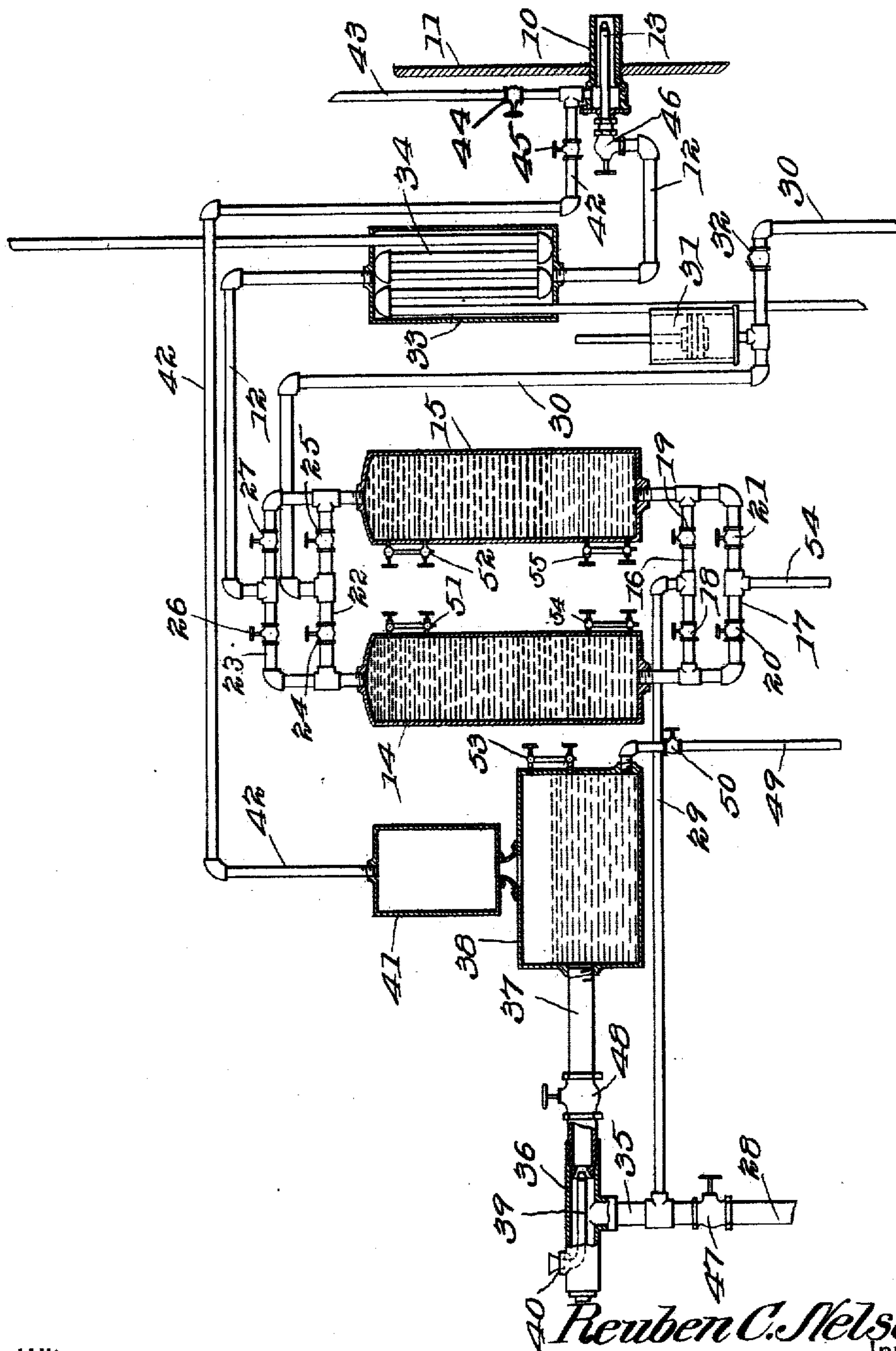


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R. C. NELSON.  
HYDROCARBON FUEL FEEDING APPARATUS.

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Witnesses

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# UNITED STATES PATENT OFFICE.

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## HYDROCARBON-FUEL-FEEDING APPARATUS.

No. 814,311.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed June 20, 1905. Serial No. 286,186.

*To all whom it may concern:*

Be it known that I, REUBEN C. NELSON, a citizen of the United States, residing at Healdsburg, in the county of Sonoma and State of California, have invented a new and useful Hydrocarbon-Fuel-Feeding Apparatus, of which the following is a specification.

This invention relates to apparatus for supplying hydrocarbon fuel to furnaces or stoves of various kinds, and has for its object to improve the construction and increase the efficiency and utility of devices of this class.

With these and other objects in view, which will appear as the nature of the invention is better understood, the same consists in certain novel features of construction, as hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which corresponding parts are denoted by like designating characters, is illustrated the preferred form of embodiment of the invention capable of carrying the same into practical operation, it being understood that the invention is not necessarily limited thereto, as various changes in the shape, proportions, and general assemblage of the parts may be resorted to without departing from the principle of the invention or sacrificing any of its advantages.

In the drawing the figure is a sectional side elevation, somewhat in diagrammatic form, of the improved apparatus.

The improved apparatus comprises in general a hydrocarbon-burner, a liquid-fuel supply leading to said burner, a pair of tanks independently connected to the fuel-supply means, means for supplying water under pressure to said tanks, a heater connected into said fuel-supply between the tanks and burner, and means for supplying air under pressure to said burner.

The burner member may be of any of the various forms in common use wherein hydrocarbon combined with air or steam is employed as a fuel, and for the purpose of illustration a conventional form of a burner of this class is represented at 10, supported in a wall 11, representing a furnace-wall, and having a fuel-supply pipe 12 connected to an oil-nozzle 13.

Disposed adjacent to the burner are two tanks 14 15, connected at the lower ends by branch pipes 16 17, supplied, respectively, with shut-off valves 18 19 and 20 21, and likewise connected at the upper ends by branch pipes 22 23 and supplied, respectively, with

shut-off valves 24 25 and 26 27, a waste-pipe 54 leading from the branch pipe 17 between valves 20 21. A water-supply pipe 28 is connected into the apparatus, and this supply may be from the ordinary street-mains, or a small pump may be required to produce the requisite pressure. The water-supply leads by a branch 29 into the pipe 16 and from thence into the bottom of the tanks 14 15, the flow being controlled by the valves 18 19. The supply-pipe 30 for the liquid fuel leads into the branch pipe 22 and thence into the tops of the tanks 14 15, the flow being controlled by the valves 24 25. The liquid fuel may be supplied from any source, such as a reservoir or tank placed at any distance, and, if required, a pump (indicated at 31) may be employed to provide the requisite pressure, the pipe 30 having a check-valve (represented at 32) to secure the action of the pump. The burner supply-pipe 12 leads from the branch pipe 23, and a heater chamber or shell 33 is connected into the pipe 12, with a coil 34 of pipe leading through the shell, the coil receiving the exhaust-steam from a pump, engine, or other source of supply, the pump or engine not being shown, as they form no part of the present invention. By this simple means the liquid fuel is heated to a considerable extent before passing to the burner. Connected to the water-supply 28 is a branch 35, leading thence to a chamber 36, from which a branch 37 leads to a tank 38. Within the chamber 36 an air-nozzle 39 is supported and has an inlet at 40, the nozzle pointing forwardly and disposed in advance of the inlet branch 35. Disposed above the tank 38 and communicating therewith is an air-chamber 41, and leading from the air-chamber is a pipe 42, terminating at the burner 10. A steam-pipe 43 also leads to the burner 10 and is supplied with a controlling-valve 44, while similar controlling-valves 45 46 are connected, respectively, into the air-pipe 42 and fuel-supply pipe 12. Controlling-valves 47 48 are likewise connected, respectively, into the water-supply pipe 28 and branch 37, as shown. The tank 38 is supplied with a waste-pipe 49, which is provided with a governor-valve 50, while the tanks 14 15 and 38 are supplied, respectively, with glass tube-gages 51 54, 52 55, and 53 to designate the stages of their contents. By this arrangement, as the water under pressure passes through the chamber 36 and thence to the branch 37 and tank 38, a vacuum is created



in advance of the contracted nozzle 39 and causes air to flow in at 40 and commingle with the water and carried thereby into the tank 38 and rises into the chamber 41 and  
 5 creates an air-pressure therein to supply the burner through the pipe 42, as will be obvious, and so long as the flow of water continues and the level of water in the tank 38 is maintained the pressure of air will be correspondingly maintained.  
 10

By properly adjusting the valves 48 and 50, the level in the tank 38 may be maintained at a substantially uniform level, and thus produce a correspondingly - uniform  
 15 pressure in the air-chamber and air-pipe.

In operation, it being assumed that the tanks 14 and 15 are filled with water and valves 18 and 19 open and the remaining valves closed, the valves 18 and 19 are then  
 20 closed and the valves 24, 25, 20, and 21 are opened, allowing the water to flow out through the pipe 54, while the oil under pressure passes through the pipe 30 and pipe 22 into both of the oil-tanks 14 and 15, the oil  
 25 taking the place of the water. After the water-level has been lowered to a sufficient extent, as will be determined by the gages 54 and 55, the valves 20 and 21 are closed and prevent the escape of any oil. The valves  
 30 24 25 are then closed and the valves 47 48 and one of the valves 18 and 26 or 19 and 27, as the case may be, opened, according as to which of tanks 14 or 15 is to be first used.

A water-pressure will thus be imparted to  
 35 the fuel in one of the tanks and cause the same to flow through the pipe 12 to the burner 10, to which it is admitted by the controlling-valve 46, as hereinafter explained. The oil-fuel will of course remain above the  
 40 water-line, which will rise as the oil is forced to the burner. In the meantime the water has been flowing into the tank 38 and carrying air with it through the air-nozzle 39 and creating an air-pressure in the chamber 41  
 45 and pipe 42, which is admitted to the burner through the valve 45. Thus the requisite mixture of air and liquid fuel is obtained and the burner placed in condition for ignition when cold as the requisite air-pressure  
 50 is obtained without the necessity for preliminary heating, as when steam is depended on for supplying the air. As soon as one tank 14 or 15 is exhausted of oil—as, for instance, the tank 15—which will be indicated  
 55 by the gage member 52, the valves 19 and 27 are closed and the valves 18 and 26 opened, and the valve 21 also opened to permit the water in the tank 15 to flow out through the waste-pipe 54. The valve 25  
 60 is then opened to permit the tank 15 to fill again, and then when the tank 14 is ex-

hausted the tank 15 is again connected to the burner and the tank 14 disconnected and emptied of water and again filled with oil, and so on indefinitely, there being no inter-  
 65 ruption to the supply of fuel while changing the tanks.

The device is thus particularly useful and convenient when employed in connection with apparatus other than steam-generators,  
 70 but is also a very valuable device for use in connection with steam-generating apparatus, as by its use much labor and time are saved when first starting the burner, as before stated.  
 75

The heater member 33 34 is also an important feature of the apparatus, as the fuel is heated to a relatively high degree before it reaches the burner and is therefore much  
 80 more quickly vaporized than if it reached the burner in cold condition. The use of the heater thus produces a material economizing of both fuel and labor, as will be obvious.

A very complete and simply - constructed apparatus is thus produced which is not de-  
 85 pendent upon pumps or other similar means for creating pressure, but dependence is had entirely upon gravity to secure the desired results.

Having thus described the invention, what  
 90 is claimed is—

In apparatus of the class described, the combination with a pair of oil-tanks, of an oil-supply pipe having valved connections with both tanks, a water-discharge pipe  
 95 having valved connections with the lower ends of both tanks, a water-pressure supply pipe having valved connections with the lower ends of the tanks, a service-pipe having valved connections with the upper ends  
 100 of both tanks, and through which the oil in said tanks is forced, a burner with which said pipe communicates, a heating device connected in the service-pipe, a water-actuated air-injector, a separating-tank into  
 105 which said injector discharges, a compressed-air tank or reservoir above the separating-tank, and serving to receive the air therefrom, an air-supply pipe leading from the tank or reservoir to the burner and having a  
 110 governing-valve, a discharge-pipe leading from the air and water separating tank, and a steam-pipe, also, having a valved connection with the burner.

In testimony that I claim the foregoing as  
 115 my own I have hereto affixed my signature in the presence of two witnesses.

REUBEN C. NELSON

Witnesses:

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 C. E. HEARING.