

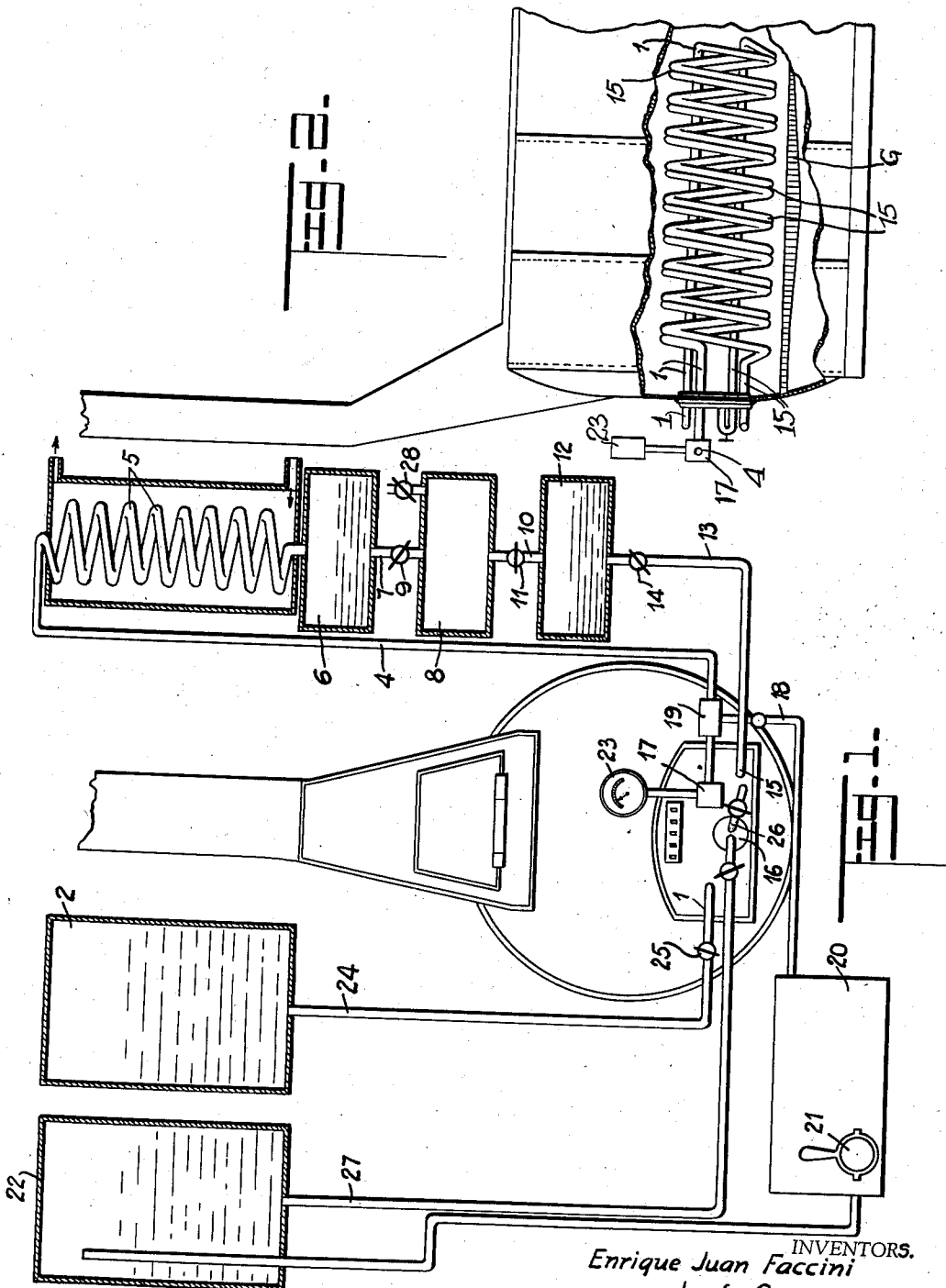
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APPARATUS FOR BURNING HEAVY FUEL OILS

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APPARATUS FOR BURNING HEAVY FUEL OILS

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Our invention relates to the combustion of heavy hydrocarbons, such as crude oils and the like, and its main object is to provide a simple and economic apparatus which will considerably reduce installation and operating expenses, while at the same time allowing a substantially complete utilization of the fuel.

Heretofore, the combustion of heavy hydrocarbons has been effected by the spraying or atomizing of the fuel by means of a current of air or steam under pressure. Such procedure requires the installation of compressors or boilers with special equipment, which is very expensive and, besides, necessitates a considerable operating and maintenance expense. Moreover, the atomizing or spraying of the fuel is not effected in a perfect manner, thus causing an incomplete combustion and, consequently, a loss because of the wasted residues.

According to this invention, mechanical atomizing or spraying is eliminated, and the combustion is perfect and complete.

In our apparatus the heavy hydrocarbons are first cracked, the light distillates are separated therefrom, and are subsequently condensed and gasified, the expanding gases being then introduced into the burner, resulting in a complete atomizing and combustion of the distillation residues, which are carried together with said gases to the burner.

In order that the invention may be clearly understood and easily put into practice, we refer to the accompanying drawing, showing, by way of example, a suitable installation, and on which

Figure 1 is a schematic view of the apparatus while

Figure 2 is a view, partly broken away, of the interior of the apparatus.

The apparatus as shown comprises few very simple elements. At 1 is shown a distillation coil which is fed directly from the crude oil tank 2, which in turn is connected, by means of the usual piping, to the main storage tank (not shown). This coil 1, the heating surface of which will vary in accordance with the requirements and the character of the oil, covers the inner wall of the grate G, being preferably adapted thereto and following its contour.

Coil 1, outwardly projects through a suitable opening in the furnace door and, by means of the pipe 4, extends to an adequate height where it is connected to a condensing coil 5, provided with cooling means, the condensing surface of which coil 5 varies in accordance with the de-

sired capacity. The lower end of coil 5 is connected to a tank 6 of suitable dimensions, for the purpose of storing the liquefied products. Tank 6, in turn, is connected by a pipe 7 with another tank 8 through a valve 9, tank 8 in turn communicating with a tank 12 by means of a pipe 10 equipped with a valve 11.

The liquid distillate carried by the pipe 13 flows through a non-return valve 14, to the vaporizing coil 15 which, in regular spirals, extends above the grate, along the path of coil 1. The end of coil 15 leads to the burner indicated at 16 in Fig. 1 but not otherwise shown. A pipe 18, which starts from the trap 19 in pipe 4, leads to a tank 20 collecting the oil which has already yielded its percentage of light oils. The pump 21 carries this oil to the auxiliary feeding tank 22.

The crude oil contained in tank 2 flows through the pipe 24 and through valve 25 enters coil 1, travelling through its entire length. Coil 1 being exposed to the heat of burner 16, heats the oil to a temperature of 130° C., for which the thermostatic valve 17 has been set. In this way, a constant ebullition process of the oil is started, which causes the separation therefrom of the first by-products in a gaseous state, such as crude naphtha (80 to 100° C.) kerosenes (130° C.) and other light oil gases. These gases flow through the pipe 4 into condensing coil 5 then are gradually liquefied collecting in the tank 6, thus resulting in a first distillation by-product having all the advantages and features of the crude naphtha.

From the tank 6, the distilled product flows through the pipe 7 into tank 8, and thence to tank 12 which feeds the vaporizing coil 15, also exposed to the heat of burner 16. By virtue of this heating action, the product is again gasified, and thus it not only acquires a greater aptitude for quick combustion, but also, logically, increases in volume until it reaches pressures of 4 to 5 atmospheres, under normal working conditions. The pressure and admission of gases to the burner 16 are controlled by the thermostatic valve 17, the operation of which will be described later.

Careful investigations and tests have proved that large percentages of crude naphtha, sometimes reaching 36% can thus be obtained depending on the nature of the crude oil used.

So far, we have a volume of highly combustible gases contained at a certain pressure in the vaporizing coil 15. Upon leaving same, the gases enter the burner 16 through the pipe 26,

after passing the thermostatic control valve 17. Once in the burner, the gases burn in the form of a jet which violently strikes the bottom of the grate, the size of the jet depending on the caliber of the burner mouth and the pressure.

The heavy oils which do not distill at the temperature regulated by the thermostatic valve 17 are dragged along by the lighter distillation vapours and are deposited in the trap 19 from which they pass to the collecting tank 20 to be elevated by means of pump 21 to tank 22. From the latter, the oil passes through pipe 27 to the burner 16 and falls in the shape of a thin thread on the flame produced by the combustion of the gases resulting from the light distillates. Thus, combustion of the heavy residual fractions is instantaneously and thoroughly effected. In this manner, not only an efficient and safe service, but also a maximum economic utilization of the fuel is obtained.

The thermostatic valve 17 is of great importance for the accuracy, safety and efficiency of the apparatus. Located intermediate the vaporizing coil 15 and burner 16 and adjusted to a temperature required to obtain the first by-products, this valve controls and maintains the stability of such thermic system. It may be adjusted so as to easily adapt it for operation in accordance with the quality of the oil used, in order to establish the temperatures which are most suitable for obtaining the best gaseous product from the fuel. Also, the special arrangement of said valve in the installation of the system, makes it independent of the different temperatures which may exist in the furnace. The arrangement of this valve allows two adjustments: for quantity and quality.

An excessive production of fuel in the coil 1 would find an outlet in the overflow valve 23 and may be collected, if desired.

Having now particularly described and ascertained the nature of the present invention and the manner in which same may be carried out, we claim:—

1. Oil burning apparatus comprising a burner, a distillation coil disposed to be subjected to the heat of the burner, an oil supply line connected to one end of said coil, a condensing coil connected at one end to the other end of said distillation coil, said condensing coil being located above said distillation coil, means in the

connection between said distillation coil and said condensing coil for the collection of unvaporized oil, a storage vessel connected to the other end of said condensing coil and located below the latter coil and above the burner, a vaporizing coil connected at one end with said storage vessel and disposed to be subjected to the heat of the burner, and a connection between the other end of said vaporizing coil and the burner.

2. Oil burning apparatus comprising a burner, a distillation coil disposed to be subjected to the heat of the burner, an oil supply line connected to one end of said coil, a condensing coil connected at one end to the other end of said distillation coil, said condensing coil being located above said distillation coil, means in the connection between said distillation coil and said condensing coil for the collection of unvaporized oil, a storage vessel connected to the other end of said condensing coil and located below the latter coil and above the burner, a vaporizing coil connected at one end with said storage vessel and disposed to be subjected to the heat of the burner, a connection between the other end of said vaporizing coil and the burner, an oil trap in the connection between the distillation coil and the condenser coil, and means for the supply of oil from said trap to the burner.

3. Oil burning apparatus comprising a burner, a distillation coil disposed to be subjected to the heat of the burner, an oil supply line connected to one end of said coil, a condensing coil connected at one end to the other end of said distillation coil, said condensing coil being located above said distillation coil, means in the connection between said distillation coil and said condensing coil for the collection of unvaporized oil, a storage vessel connected to the other end of said condensing coil and located below the latter coil and above the burner, and a connection between said vessel and said burner.

4. Oil burning apparatus as set forth in claim 1 including a thermostatically operated valve controlling admission of gases from the vaporizing coil to the burner.

5. Oil burning apparatus as set forth in claim 2 including a thermostatically operated valve controlling admission of gases from the vaporizing coil to the burner.

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