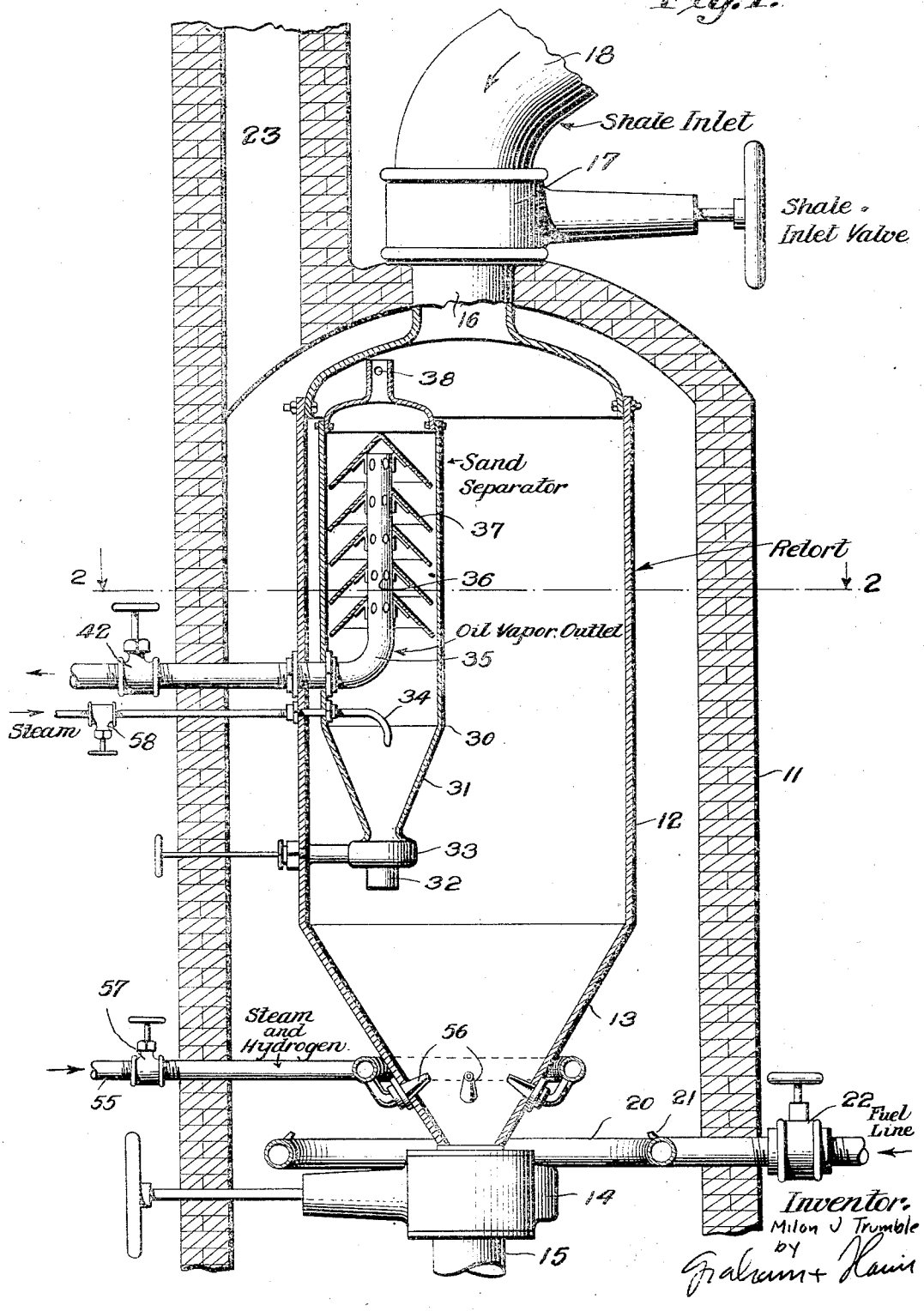
Sept. 7, 1926. 1,598,831

M. J. TRUMBLE

PROCESS FOR RECOVERING VALUES FROM OIL SHALES

Filed May 15, 1922 2 Sheets-Sheet 1

Fig. 1.



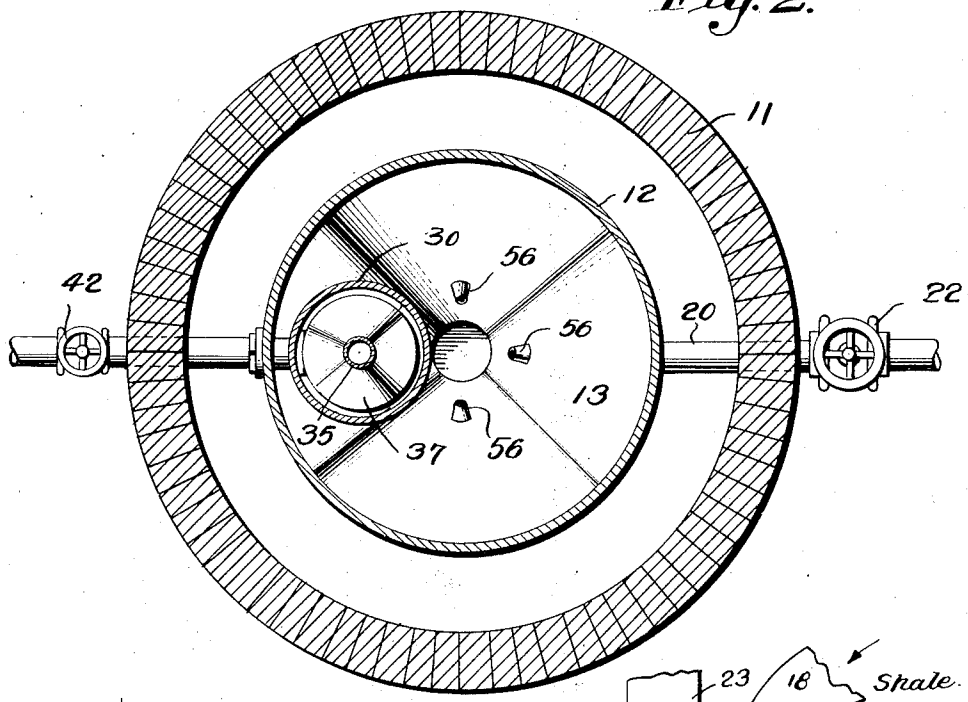
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Filed May 15, 1922 2 Sheets-Sheet 2

Fig. 2.



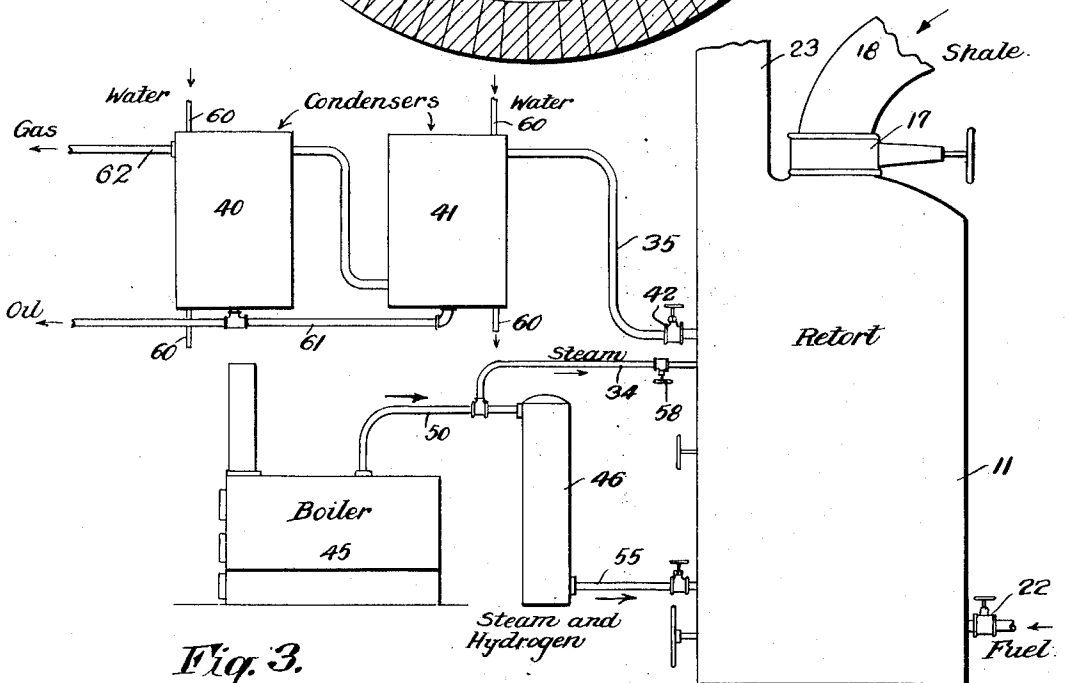


Fig. 3.

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Patented Sept. 7, 1926. 1,598,831

UNITED STATES PATENT OFFICE.

MILON J. TRUMBLE, OF LOS ANGELES, CALIFORNIA.

PROCESS FOR RECOVERING VALUES FROM OIL SHALES.

Application filed May 15, 1922. Serial No. 561,227.

My invention relates to the treatment of oil shales for the purpose of recovering oils therefrom.

The principal object of my invention is to provide a process by which these values may be economically recovered, and by which a very complete recovery is made possible.

Further objects and advantages will be made evident hereinafter.

Referring to the drawing which is for illustrative purposes only:

Fig. 1 is a cross section through a retort adapted to carry on my invention.

Fig. 2 is a cross section on a plane represented by the line 2—2 of Fig. 1, this plane being viewed in the direction of the arrows.

Fig. 3 is a diagrammatic view of a complete apparatus adapted to carry on my process.

In the form of apparatus shown, 11 is a furnace preferably formed of brick work in which a retort 12 having a coned bottom 13 is placed. This retort is provided with a valve 14 at its lower end through which its contents may be dumped into a pipe 15, the upper end of the retort having a neck 16 which may be closed by a valve 17. Shale may be delivered from any suitable source by means of a chute 18 through the valve 17 when same is open.

The interior of the furnace about the retort 12 is shown as heated by means of a gas or oil pipe 20 having burners 21, the amount of fuel delivered being governed by a valve 22. The furnace is provided with a stack 23. Situated inside the retort 12 is a sand separator 30 which is cylindrical in outline having a coned bottom 31 terminating in a pipe 32 which may be closed by a valve 33. A steam blowoff pipe 34 is provided and a vapor outlet pipe 35, this outlet pipe having openings 36 therein, these openings being placed under cones 37. The top of the sand separator is provided with openings 38 so that the interior of the separator is at all times in open communication with the interior of the retort 12. Condensers 40 and 41 are provided, being connected to the pipe 35 which is provided with a valve 42 and a steam boiler 45 and a hydrogen generator 46 are also provided.

The method and connection of the apparatus can best be understood from the following description.

The interior of the retort 12 being filled with shale up to approximately the level of the line 2—2 steam is generated in the boiler 45, passing through a pipe 50 into the hydrogen generator 46 in which a portion of the steam is disassociated, the oxygen being combined with some readily oxidizable substance thus releasing a small percentage of free and highly reactive hydrogen. This hydrogen is delivered through a pipe 55 and through nozzles 56 into the interior of the retort 12, the flow of the steam and hydrogen being controlled by a valve 57. During the time that the steam and hydrogen are being admitted, the valves 14 and 17 are tightly closed and a valve 58 in the pipe 34 is also closed. The steam and hydrogen pass upwardly through the mass of shale acting upon the oil contained therein and the combined vapors pass through the openings 38 into the interior of the sand separator 30, passing downwardly between the edges of the cones 37 and the wall of the separator 30. The vapors carry a small percentage of free sand or dust which settles in the bottom of the sand separator 31 below the end of the pipe 34 and which may be blown out after the retort 12 is emptied by opening the valve 33 and the steam valve 58. The steam and oil vapors rise inside the cones 37 passing through the openings 36 through the pipe 35 and through the valve 42 into the condensers 40 and 41. Water circulation is maintained through these condensers by means of pipe 60, the uncondensable gases passing off through a pipe 62. The oil in the pipe 61 is mixed with water which can be readily separated by settling.

As just explained the steam delivered through the pipe 50 is depended upon to heat the material in the retort, and it is possible to operate without any other source of heat. To reduce the amount of steam required it is sometimes economical, but not necessary, to externally heat the retort by means of the burner 20.

In a similar manner it is desirable to partially disassociate the steam and to highly superheat both the hydrogen so produced

and the un-dis-associated steam in the generator 46, the highly heated gases and vapors being then forced into the shale and acting as a heating and converting agent therein. The hydrogen acts to combine with oxygen or carbon in the charge of shale and thus to increase the temperatures therein. In some cases, however, actual conversion of a portion of the steam into hydrogen is unnecessary, the steam in a highly heated condition readily producing the desired results.

It is a well known fact that the hydrocarbons are present in oil shales in a form usually known as polybitumens, which are infusible and insoluble. By my process these insoluble bitumens are converted by the superheated steam and gas into soluble bitumens. The conversion results from a polymerization of the polybitumens and produces a definite chemical change so that my process should not be confused with those in which oil, coal or the like are distilled by the use of steam. All these processes are purely mechanical and not chemical.

My process is broadly new and basic in that it utilizes superheated gas or steam to cause polymerization of the insoluble polybitumens in soluble bitumens.

I claim as my invention:—

1. In the treatment of oil shale to obtain the values therefrom, the process which consists in: superheating steam; partially decomposing the same to produce hydrogen; heating the shale with such steam and hydrogen; withdrawing the vapors so produced; and condensing said vapors.

2. In the treatment of oil shale to obtain the values therefrom, the process which consists in: superheating steam; partially decomposing the same to produce hydrogen; placing a body of the shale into a suitable container; introducing such steam and hydrogen into said container to heat the shale therein; subjecting the container to the action of a heating medium applied exteriorly thereof; withdrawing the vapors produced from the shale; and condensing said vapors.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 10th day of May 1922.

MILON J. TRUMBLE.