

No. 685,902.

Patented Nov. 5, 1901.

A. F. L. BELL.

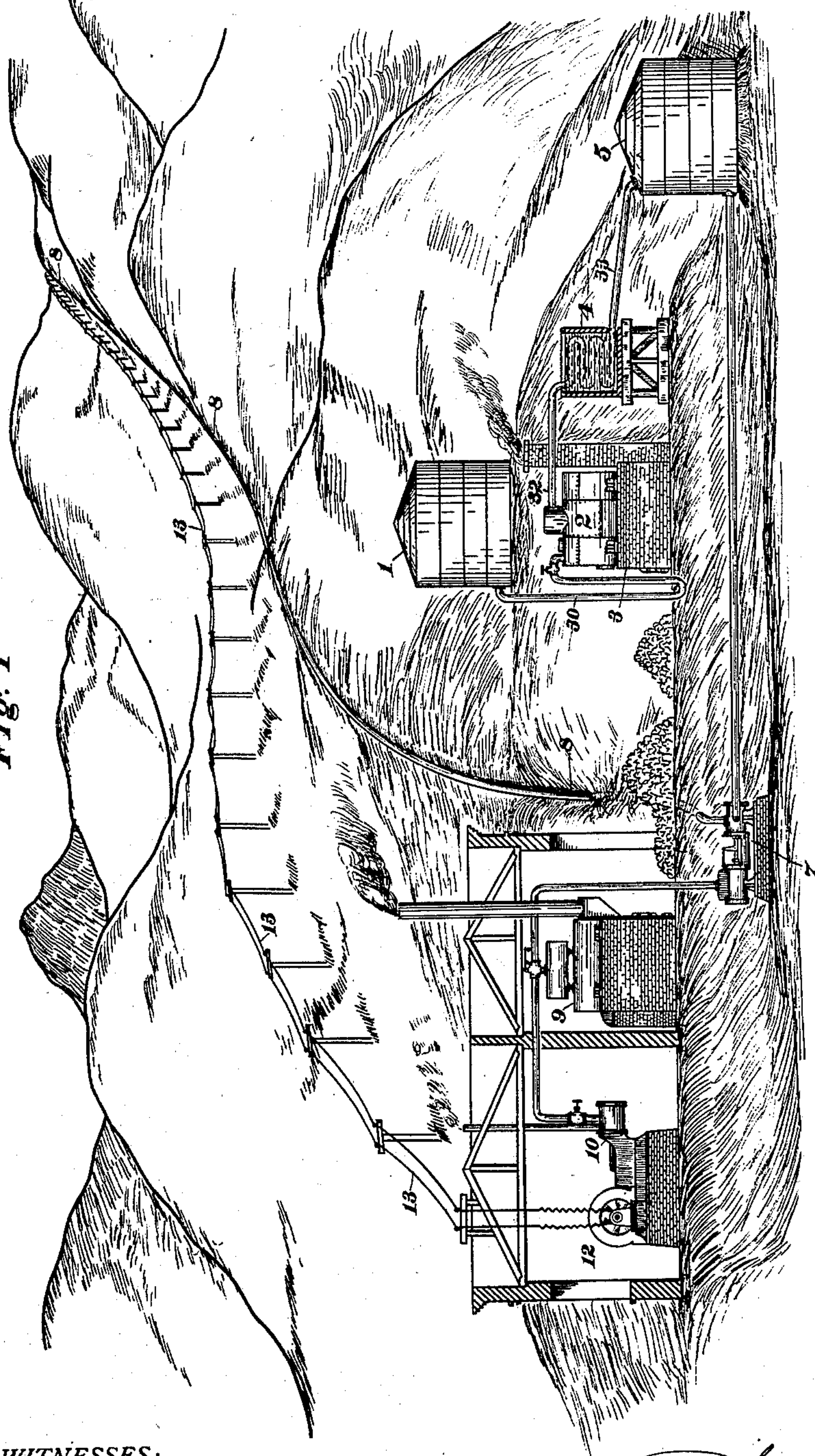
TREATMENT AND CONVEYANCE OF MINERAL OILS.

(Application filed May 29, 1901.)

2 Sheets—Sheet 1.

(No Model.)

Fig. 1



WITNESSES:
P. W. J. Lander,
Elmer Wickes

INVENTOR.
Arthur F. L. Bell,
BY J. Richards & Co.
ATTORNEYS.

No. 685,902.

Patented Nov. 5, 1901.

A. F. L. BELL.

TREATMENT AND CONVEYANCE OF MINERAL OILS.

(Application filed May 29, 1901.)

(No Model.)

2 Sheets—Sheet 2.

Fig. III

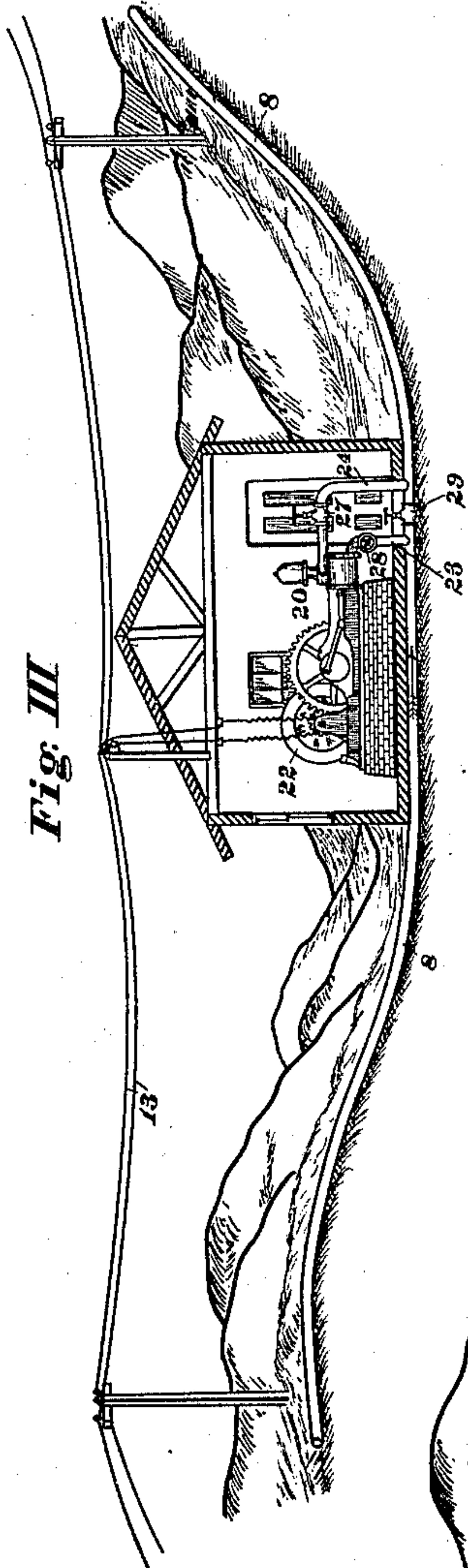
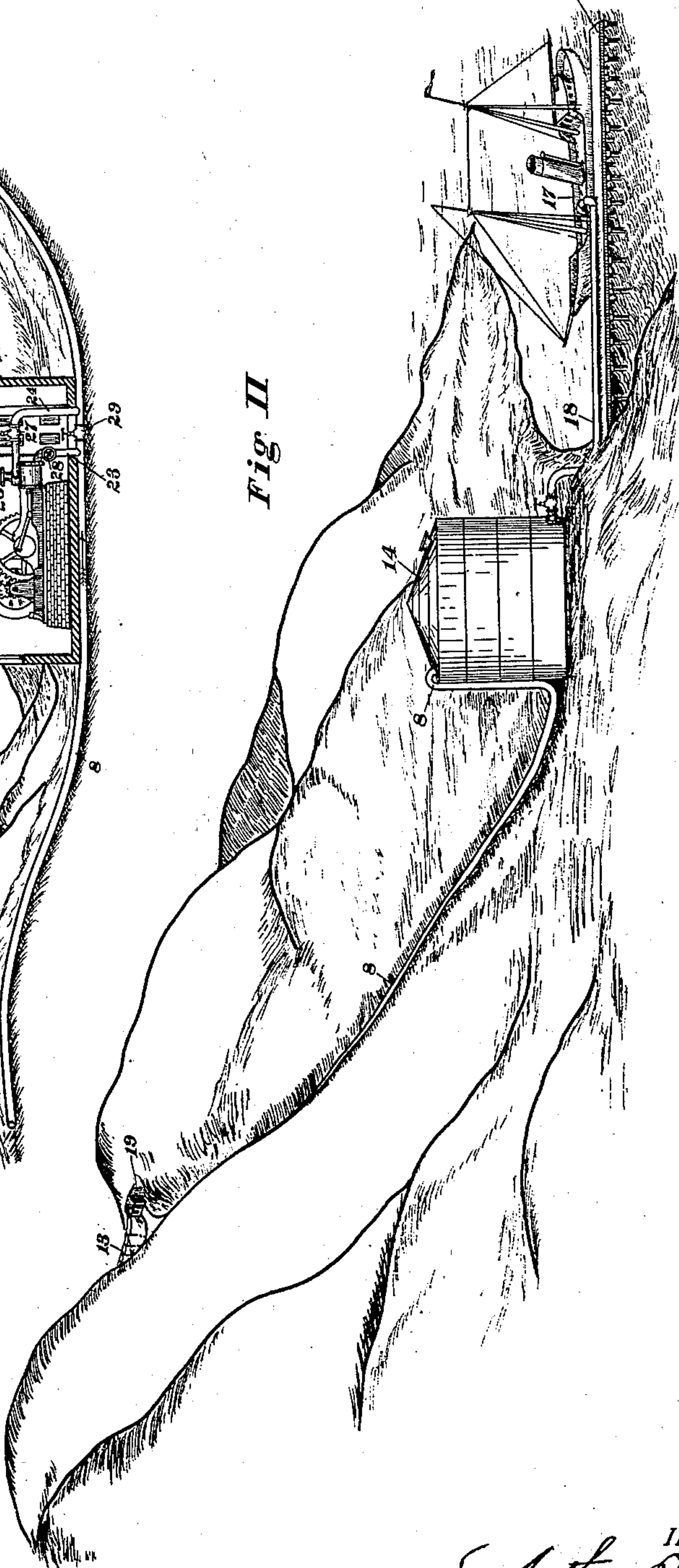


Fig. II



WITNESSES:
P. M. J. Lander,
Elmer Wickes.

INVENTOR:
Arthur F. L. Bell
BY J. Richards & Co.
ATTORNEYS.

UNITED STATES PATENT OFFICE.

ARTHUR FRANCIS LESLIE BELL, OF LOS ANGELES, CALIFORNIA.

TREATMENT AND CONVEYANCE OF MINERAL OILS.

SPECIFICATION forming part of Letters Patent No. 685,902, dated November 5, 1901.

Application filed May 29, 1901. Serial No. 62,381. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR FRANCIS LESLIE BELL, a citizen of the United States of America, residing at Los Angeles, county of Los Angeles, and State of California, have invented certain new and useful Improvements in Treatment and Conveyance of Mineral Oils; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to the extraction for utilization as fuel of the carbonaceous solids contained in heavy petroleum-oils, such fuel being employed in the process of separating the distillates from such oils, and also dynamical means for their conveyance in liquid form in pipes or by other means requiring motive power. It involves the apparatus or means for accomplishing these ends in a practical way, especially in the treatment, distillation, and conveyance of what are called the "heavy petroleum-oils" found on the Pacific coast in Kern county, California, and elsewhere.

To carry out and apply my invention, there are required at the wells or source of petroleum a furnace and apparatus for distilling the same and to collect the carbonaceous residuum therefrom, a conducting pipe-line for conveying the distilled oil to a place of shipment or use, and a steam-engine or other motive power to generate electric current to be conveyed along the pipe-line for operating auxiliary pumping machinery when such is required, the whole representing what I term the "initial" plant, situated at or near the point where the heavy petroleum-oils are procured.

The principal object of my invention is to provide for the economical conveyance of petroleum-oils and their products when the natural oil is too viscous or heavy to be forced through long pipes without a great loss of power.

Another object is to remove the asphaltin as a by-product, which has but little value at wells or place of securing the natural oil, and to use this by-product as a fuel to perform distillation and conveyance of the mo-

bile distillates to a convenient point of shipment by land or sea.

In the application of my invention there are employed apparatus and agencies in substance as shown in the drawings.

Figure I is a view in side elevation of a plant such as is required at the wells; Fig. II, a view of loading the petroleum or distillates into a vessel at seaboard, and Fig. III a side elevation of intermediate pumping machinery as applied in stations along a pipe-line when resistance in the latter is too great to be overcome by the initial impelling force.

In the conveyance of light or limpid petroleum-oils in pipes the viscous friction is not enough to prevent successful and economical transmission even to long distances; but with the heavier class of such oils the viscous friction in pipes is such that this system is impracticable except for short distances; but if these heavy oils are distilled the liquid product can be rendered as mobile and easy of conveyance as the distance and other circumstances demand and at the same time by proper apparatus such oils will furnish fuel and heat for distillation and motive power for their conveyance, as hereinbefore stated and by means now to be described in connection with the drawings, in which the principal notations are as follows:

1 is a collecting-tank or receiver for crude oil; 2, a distilling vessel or retort; 3, a furnace to heat the distilling vessel; 4, a condenser to liquefy the volatile distillates, and 5 a tank or receiver for the limpid oil after treatment.

7 is a forcing-pump that draws the limpid oil from the tank 5 and impels it through a pipe-line 8 to an intermediate station or stations or to terminal place of delivery, as illustrated in Fig. II.

9 is a boiler and furnace to supply steam to an engine 10, that drives an electric generator 12, from which current is conveyed on the wires 13 to supply motive power for relay or station pumps along the pipe-line 8 when such are required.

In Fig. II, 14 is a terminal storage-tank situated at a dock or wharf 15, and 17 a vessel being loaded with oil through a gravity pipe-line 18, or, if desired, an additional pump-

ing-station could be connected to the pipe 18 to facilitate the loading of the vessel. 19 is an auxiliary pumping-station on the pipe-line 8 leading to the tank 14.

5 In Fig. III, 20 is a common force-pump driven by an electric motor 22 and the usual gearing. 23 is a suction-pipe, and 24 a discharge-pipe, for the pump 20. Between the pipe-line 8 and the pump 20 are valves 27,
10 28, and 29, that serve to place the pump in or out of the circuit of flow through the pipe-line 8, as may be required and as hereinafter explained.

The process and operation are as follows,
15 employing the crude oils found in Kern county, California, as an example: These oils have a gravity of 13° to 18° Baumé, according to the different localities, so it is impossible to pump them for any distance through a
20 pipe-line. The result is that this oil has to be transmitted by railway and the freight charges are naturally much higher than if the oil could be pumped through pipe-lines to tide-water. Most of the California oils, in-
25 cluding those of Kern county, consist of two component parts—petrolin and asphaltin. The former represents the oleaginous matter and the latter the hardening substances in the crude oil. When this asphaltin is re-
30 moved by chemical means, it resembles a brown impalpable powder. When refined according to the herein-described process, the petrolin is wholly removed in the form of distillates and the asphaltins are left in the
35 bottom of the converter in the form of a black hard residuum, which if the process is carried far enough will when removed from the still be a porous substance resembling coke. This residuum has only a small percentage of the
40 petrolin left in it and will not adhere to anything, but can be handled similarly to coal. Furthermore, when ignited it burns freely and has very little tendency to melt down and spread over the grates. This coke or residuum
45 makes an efficient fuel and is adapted for fuel in refining the crude oil in stills; also for generating power and electric current for pumping the distillates through the pipe-line 8 initially and at stations along the pipe-line
50 as its length and grade may render necessary, making up a cycle of operations that are interdependent and a novel system of operating.

The operation is as follows: Crude oil from
55 the oil-fields is discharged into the receiving-tank 1, from where it is delivered through a pipe 30 into the still 2. In this still the oil is heated by means of the coke or residuum before described taken from previous charges.
60 When the still 2 becomes heated, the light oils flow off from the still through the pipe 32 in the form of vapor, which on passing through the condenser 4 is liquefied and converted to a fluid oil called a "distillate." As
65 the process goes on it requires increasing heat and at the same time steam is admitted into the still to help drive off the vapor until

the residue is a coke requiring heat from 600° to 800° Fahrenheit to liquefy it. When the still 2 has been operated to the point where
70 the attendant thinks the residue is of the proper consistency, no more fuel is placed under the still, and it is allowed to cool until the residuum can be drawn off into suitable recep-
75 tacles, or if allowed to remain in the still until cool it can be broken up and removed in pieces and stored for use as a fuel for any purpose. When the vapor has been condensed into oil or distillate, this is conveyed by the pipe 33 to the tank 5, from where it is drawn by a
80 pump 7 and forced into the pipe-line 8 to be delivered usually at the seaboard. The pump forces the distillates into the line at the greatest admissible pressure, which may be as
85 much as nine hundred pounds per square inch. This pressure is enough to force the distillates for a considerable distance at the required velocity. This distance might be
90 from a few miles to thirty miles, owing to the grade. Then it will be necessary to employ a second or intermediate pump, which would
95 take the oil from the pipe-line and return it at a pressure equal to that of the first pump, so that the oil would be continually impelled at the required velocity from one stage to another, and so on to the end of the line. The
100 power for these intermediate stations is derived from electricity generated at the first or main station from steam made from the consumption of the by-products of the crude
105 oil, as before described. In this way all of the light oils or distillates are available for delivery in the pipe-line, and the coke or solid material would be used for fuel, or if not re-
110 quired for that purpose can be sold as a commercial product. The electric current being generated at the first or initial station and the conducting-wires near the pipe-line all the pumping-stations are parts of one com-
115 bined system requiring no boilers, engines, or separate motive power and but little attendance.

I do not confine my invention to the number of elements or parts and arrangement shown in the drawings, as some of these might
115 require to be double or multiple, as the amount of oil treated and the degree of its reduction might require.

I am aware that the distillation of mineral oils is a common process, and that crude oil
120 and distillates from the same are conveyed through long lines of pipe, and that auxiliary or intermediate pumping-stations taking their fuel for generating the necessary power from the pipe-lines are employed to impel
125 the fluid in such pipe-lines. I do not claim either the process of distillation or the mode of conveying mineral oils by the means named; but

What I do claim, and want to secure by
130 Letters Patent, is—

In a system of apparatus for the separation, utilization and conveyance of the bituminous and kindred products found in certain min-

eral oils, the following elements in combination, viz: first, a receiver for collecting and storing the crude oil; second, a distilling plant for separating the volatile distillates from the
5 carbonaceous residuum; third, a reservoir for collecting and storing the distillates; fourth, a pipe-line leading from said reservoir to a distant terminal; fifth, a forcing apparatus located in said pipe-line near the reservoir;
10 sixth, a power plant for energizing said forcing apparatus by the combustion of the residuum; seventh, electric generators driven by said power plant; eighth, electric conductors extending from said generators along
15 the pipe-line; ninth, electric motors located

at points along the pipe-line, energized through said conductors; tenth, auxiliary forcing-pumps located in said pipe-line, driven by said electric motors; and eleventh, means for collecting, storing and distributing 20 the distillates at the terminal of the line, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR FRANCIS LESLIE BELL.

Witnesses:

H. H. CLARK,
R. D. HALOBIRD.