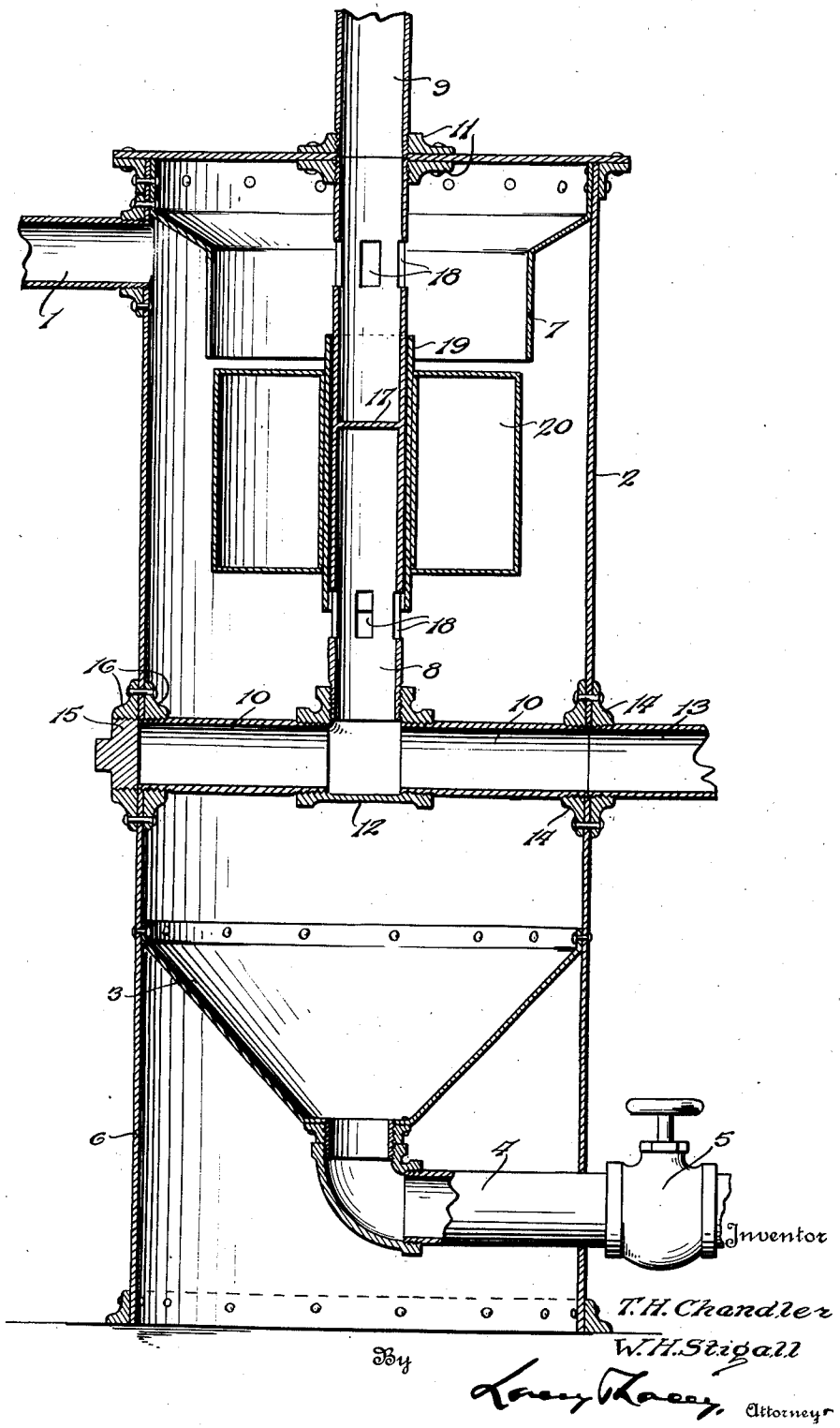
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GAS, OIL, AND SAND SEPARATOR

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GAS, OIL, AND SAND SEPARATOR.

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This invention is an apparatus for separating gas, sand and water from oil as it comes from a producing oil well.

The objects of the invention are to provide in such an apparatus a simple and effective float valve without levers, fulcrums or other complicated working parts for automatically controlling the separate discharge of gas and oil; to provide means whereby the water and sand will be automatically separated from the gas and oil and discharged through a separate outlet so that the action of the valve is not affected by any abrasive action of the sand; to provide an oil seal whereby a vacuum may be applied to the gas or oil discharge lines without affecting the separating process, and to carry out the entire separating process in a closed vessel to prevent waste by evaporation. These objects and other objects which will incidentally hereinafter appear are attained in such an apparatus as is illustrated in the accompanying drawing, and the invention resides in certain novel features which will be particularly pointed out in the appended claim.

The drawing is a vertical section of an apparatus showing one embodiment of our invention.

In the drawing, the reference numeral 1 designates the pipe line leading from the well and discharging into a closed vessel 2 which is preferably cylindrical and is provided with a tapered bottom 3 from the lower end or inverted apex of which an outlet pipe 4 for the sand and water extends. This outlet pipe 4 is preferably equipped with a controlling valve 5 which may be of any approved construction and it is coupled to the tapered bottom 3 so as to provide a leak-proof joint. The cylindrical wall of the vessel is extended downwardly beyond the tapered bottom, as shown at 6, whereby to provide a support for the vessel, but it will be understood, of course, that this particular manner of supporting the vessel in an upright position is merely a matter of choice and any approved support may be employed. The sand and water coming into the vessel with the gas and oil will pass by gravity to and accumulate in the bottom 3 and may be drawn off at suitable intervals by opening the valve 5 in an obvious manner. The gas and oil will rise within the vessel above the water and sand, and a baffle sleeve 7 is secured in the upper portion of the vessel so as to extend over the inlet pipe 1 and in spaced relation to the same to prevent splash or spray from the oil rising into the upper portion of the vessel.

Within the upper portion of the vessel is a vertical pipe or tube 8 which communicates at its upper end with a gas discharge pipe 9 and at its lower end with an oil discharge pipe 10, the upper end of the tube 8 and the lower end of the gas discharge pipe 9 being secured in the head of the vessel by flanges 11 in an obvious manner, while the lower end of the tube 8 is coupled to the oil discharge pipe 10 by a T-coupling 12. This arrangement provides for a plurality of oil outlets and thereby facilitates the leading of the oil in any direction to a storage tank. As shown in the drawing, one pipe 10 is connected to an outlet pipe 13 through flanges 14 while another pipe 10 has its outer end closed by a plug 15 coupled thereto through flanges 16. The tube or pipe 12 is provided with a partition 17 approximately at its center which divides its interior into separate upper and lower portions and in both its upper and its lower end portions the pipe or tube is provided with elongated ports 18 for the respective discharge of the gas and oil from the vessel. The uppermost ports 8 are confined by the baffle sleeve 7. A sleeve valve 19 surrounds the tube or pipe 8 with a close sliding fit, and a float 20 is secured upon said sleeve valve and floats upon the oil in the vessel, following the level of said oil and, consequently, moving the sleeve valve up or down. If an excess of oil comes into the vessel, the float rises and the upper end of the sleeve valve restricts or closes the upper or gas discharge ports 18 until the increasing volume and pressure of gas within the vessel forces the excess oil out through the lower or oil discharge ports 18, thereby lowering the oil level in the vessel and permitting the float to descend. On the other hand, if an excess of gas in proportion to oil comes into the vessel, the oil level drops, causing the float to descend until its lower end restricts or closes the oil discharge ports 18, thereby permitting the oil level to again build up.

It will thus be seen that no matter what may be the proportions of oil and gas fed into the separator, provided, of course, that the total volume is within the capacity of the various ports and pipes, the separation is complete and positive, and there is no pos-

sibility of gas finding its way into the oil discharge line or vice versa. The operation of the apparatus is independent of the pressure of the incoming fluids, and, because there is always a quantity of oil trapped in the lower portion of the vessel to act as a seal, a vacuum may be applied in the discharge lines without any adverse effect. The sand and water obviously drop to the bottom of the vessel and will accumulate therein until such time as it may be deemed desirable to draw off the same, and the sleeve valve is disposed out of the path of the sand which is deflected by the baffle sleeve 7 so that it descends close to the wall of the vessel and, therefore, will have no substantial abrading action upon the valve and little, if any, abrading action on the float.

Our apparatus is exceedingly compact and simple and will be found to operate efficiently and automatically at all times.

Having thus described the invention, we claim:

A gas and oil separator comprising a closed vessel having an inlet near its top for receiving the mixture of gas, oil, sand and water as it comes from a well, a tapered bottom in the vessel for settling out the sand and water, an outlet pipe leading from said bottom, a vertically extending pipe within the vessel having ports in its upper and lower portion, and a partition dividing its interior between said ports, a gas discharge connected with the upper end of said pipe, a horizontally disposed oil discharge pipe connected with the lower end of said pipe and located above the tapered bottom of the vessel and having its ends supported by the wall of said vessel, a cylindrical float slidably mounted on said first mentioned pipe and having an axial sleeve constituting a valve for reciprocally controlling the ports of said pipe, and a baffle sleeve secured in the upper end portion of the vessel over the inlet and confining the upper ports.

In testimony whereof we affix our signatures.

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