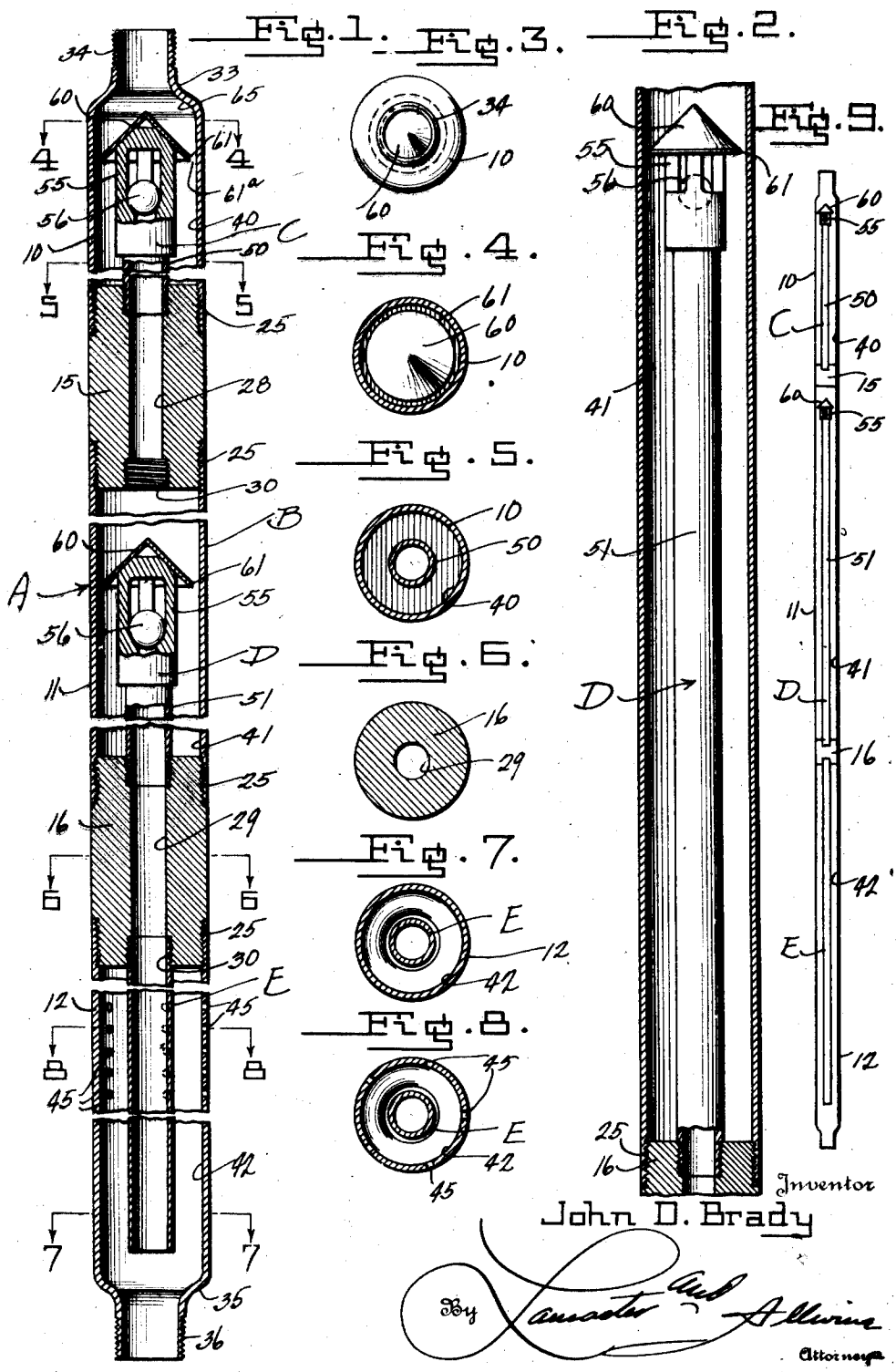
April 23, 1929. J. D. BRADY 1,710,606

GAS AND SAND TRAP FOR OIL WELL EQUIPMENT

Filed Aug. 29, 1925



Patented Apr. 23, 1929. 1,710,606

UNITED STATES PATENT OFFICE.

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GAS AND SAND TRAP FOR OIL-WELL EQUIPMENT.

Application filed August 29, 1925. Serial No. 53,371.

This invention relates to an improved gas and sand trap for oil well pumping equipment.

The primary object of this invention is the provision of a relatively simple type of trap adapted to be used in connection with well pumping equipment and to be attached to the working barrel at the lower end thereof, or other suitable location, for the purpose of trapping undesirable materials or fluids, such as sand and gas.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawing, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a fragmentary longitudinal cross sectional view taken through the improved trap, showing the cooperating details thereof.

Figure 2 is a fragmentary longitudinal cross sectional view taken through a sand trap feature of the device, showing the relative arrangement of parts of the same.

Figure 3 is a plan view of the improved device.

Figures 4 to 8 inclusive are cross sectional views taken substantially on their respective lines in Figure 1 of the drawing.

Figure 9 is a diagrammatic representation of the relative arrangement of parts, showing more particularly the relative longitudinal dimensions of the device, and the gas and sand trap compartments.

In the drawing, wherein for the purpose of illustration is shown only a preferred embodiment of this invention, the letter A may generally designate the improved sand and gas trap, which may include a sectional housing B within which are provided upper and lower sand trapping compartments having means C and D therein respectively to cooperate in the precipitation or settlement of sand in the compartments. The housing B also provides a lower gas trap compartment within which is located a conduit E which cooperates in the trapping of gas.

The housing B preferably consists of upper, intermediate and lower tubular casing portions 10, 11 and 12 respectively; the upper and intermediate tubular portions 10 and 11 being connected by a coupling or nipple 15, and the intermediate and lower portions 11 and 12 being connected by a coupling or nipple 16. The couplings or nipples 15 and 16 are preferably of cylindrical formation, or they may have wrench engaging exterior surfaces, but each of the same preferably are provided with upper and lower reduced externally screw threaded ends 25 for detachable reception in the internally screw threaded ends of the casing portions 10, 11 and 12, as is illustrated in the drawing, so that the couplings 15 and 16 do not protrude beyond the external circumference of the housing portions 10, 11 and 12, as is clearly illustrated in the drawings. The nipples 15 an 16 are furthermore respectively provided with passageways 28 and 29 therethrough, which are internally screw threaded at 30, at the ends thereof, for detachably receiving details such as the sand trap means C and D, and the gas trap pipe E, as is illustrated in the drawing. The upper end of the upper housing tube 10 is preferably swaged at 33, and externally screw threaded at 34, for detachable connection to the bottom collar of the standard working barrel. As an example of the relative dimensions, it may be stated that it should be swaged to fit a 2¼″ bottom collar of the working barrel, and to this end the external dimension of the pipe of the housing B is preferably 4″. The lower end of the lower housing section 12 is swaged at 35, and externally screw threaded at 36 for a 2½″ tubing. Other couplings or connections not illustrated may, however, be provided for connection of the device to the working barrel or anchor tubing. Directly above the nipple 15 a sand trap compartment 40 is provided, in which the sand trap means C is disposed; an intermediate sand compartment 41 is provided between the nipples 15 and 16, in the housing portion 11, and within which the sand trap means D is provided; and a lower compartment 42 is also provided within which the gas trap tube E is positioned.

As a feature of the gas trap of this invention, the lower tubular casing or portion of the housing B is preferably provided with a series of perforations 45, arranged approximately ¾″ apart vertically; five of the perforations being provided for each series; said perforations being approximately ¼″ and all of the series being disposed at the upper end of the tubing 12, just below the nipple 16, for the venting of gas.

The sand trap means C and D are both of

the same construction, except that the lower sand trap means D is longer. They respectively include tubes 50 and 51, which are detachably threaded at their lower ends in the screw threaded sockets 30 provided in the nipples 15 and 16 respectively; said tubes 50 and 51 being preferably 1½″ inner diameter, and thus externally spaced from the internal periphery of the compartments 40 and 41 in which they are received. They provide passageways aligning with the passageways 28 and 29 of the coupling or nipples 15 and 16, and thru which the oil is pumped. Otherwise, the sand trap means C and D are the same, and at the upper end of each of the tubes 50 and 51, valve cages 55 are supported, having ball check valves 56 operating therein in the well known manner, to prevent back pressure into the well, but permitting the fluid contents to be pumped upwardly thru the housing B and thru the compartments thereof. A novel feature of each of the devices C and D is the provision of a substantially conical shaped baffle member or plate 60, which is mounted on the tops of the valve cages 55, and divergently extended peripherally outwardly of the said valve cages 55, facing downwardly towards the internal periphery of the tubular portions 10 and 11 of the housing B, and at their lower peripheries 61, the same are slightly spaced from the internal periphery of the tubular portions 10 and 11, preferably for ¼″, and thru which restricted space the oil must flow, so that the sand and other foreign materials are baffled against the overhanging portions of the baffles 60 and deflected downwardly, tending to precipitate and cause the same to descend into the sand trap compartments 40 and 41, between the tubes 50 and 51, and the housing B, as can readily be understood. It is to be particularly noted that the intermediate sand trap compartment is relatively longer than the upper sand trap compartment, and the same is adapted to receive the main portion of the sand, although the uppermost baffle 60 aids in trapping the residue of sand in the compartment 40, as can readily be understood. The shoulder 65 caused by swaging the upper end of the pipe may also assist in the sand precipitation.

The gas trap tube E is preferably of the same size as the tubing 50 and 51, and is threaded in the lower socket 30 of the nipple 16, and depends into the gas compartment 42, for substantially the entire length thereof, in spaced relation from the walls of the tubing portion 12, and between which tube E and 12 the gas may be trapped and vented.

The operation of the improved gas and sand trap will be apparent from the foregoing. The gas trap E at the lower end will effectively prevent the gas from flowing upwardly thru the standing valve and the pumping equipment, and the sand trap structures will effectively cause the sand to settle in the compartments 40 and 41 to receive the same. These compartments it should be noted are respectively about 4′ and 8′ in length, and bear substantially the same relation of parts as is diagrammatically illustrated in Figure 9, although it is contemplated to merely use one sand trap, or to use the sand trap independently of the gas trap, or vice versa. The most extensive use, however, will be the arrangement of details illustrated in the drawings, with the sand and gas traps used together.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a sand and gas trap the combination of a tubular housing including upper, lower and intermediate sections, nipples detachably connecting said sections, said nipples having passageways therethrough, said upper, lower and intermediate sections in connection with said nipples providing upper, lower and intermediate compartments respectively into which said passageways of the nipples communicate, said lower section of the tubular casing just below its connecting nipple having a series of transverse vent openings therein, a gas trap tube supported by one of said nipples in depending spaced relation within said lower section of the tubular casing, relatively long tubes supported by said nipples in upwardly extending relation in said upper and intermediate compartments having passageways therethrough communicating with the passageways of said nipples, valves supported at the upper ends of said last mentioned tubes, and baffles supported by said valves and peripherally extending in slightly spaced relation with the interior surfaces of said compartments in which they are disposed.

2. In a gas trap for oil wells the combination of a barrel tube open at the upper and lower ends thereof and having a passageway therethrough, a nipple supported in the lower portion of the barrel having a reduced passageway therethrough, a second nipple supported in spaced relation above the first mentioned nipple having a reduced passageway therethrough, a relatively long tube supported by the first mentioned nipple in upwardly extending relation in the passageway of the tube between said nipples, said tube being of a diameter smaller than the internal diameter of the barrel tube, and spaced therefrom to provide a sand trap compartment, the said relatively long tube having a passageway therethrough opening thru the reduced passageway of the lower nipple and at its upper end being open in the barrel tube passageway immediately below the upper nipple,

and a tube supported by the upper nipple, the same being relatively shorter than the tube supported by the lower nipple, the tube supported by the upper nipple being spaced from the inner periphery of the barrel tube to provide an upper sand trap compartment, said tube supported by the upper nipple having a passageway therethrough communicating with the reduced passageway of the upper nipple and being open at the upper end.

3. In a gas trap for oil wells the combination of a barrel tube open at the upper and lower ends thereof and having a passageway therethrough, a nipple supported in the lower portion of the barrel having a reduced passageway therethrough, a second nipple supported in spaced relation above the first mentioned nipple having a reduced passageway therethrough, a relatively long tube supported by the first mentioned nipple in upwardly extending relation in the passageway of the tube between said nipples, said tube being of a diameter smaller than the internal diameter of the barrel tube, and spaced therefrom to provide a sand trap compartment, the said relatively long tube having a passageway therethrough opening to the reduced passageway of the lower nipple and at its upper end being open in the barrel tube passageway immediately below the upper nipple, a tube supported by the upper nipple, the same being relatively shorter than the tube supported by the lower nipple, the tube supported by the upper nipple being spaced from the inner periphery of the barrel tube to provide an upper sand trap compartment, said tube supported by the upper nipple having a passageway therethrough communicating with the reduced passageway of the upper nipple and being open at the upper end, said barrel tube immediately below the lower nipple having transverse gas vent perforations therein, and an elongated tube supported by the lower nipple in depending relation within the passageway of the barrel tube in spaced relation with the inner periphery thereof, said depending tube supported by the lower nipple having a passageway therethrough communicating with the passageway of the lower nipple and the passageway of the relatively long tube upwardly supported by the lower nipple, the depending tube supported by the lower nipple having the lower end thereof open adjacent the lower open end of said barrel tube.

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