Aug. 14, 1945. W. DEUTSCH 2,382,697

PROCESS FOR ELECTRICAL DEHYDRATION OF PETROLEUM EMULSIONS

Filed April 13, 1938

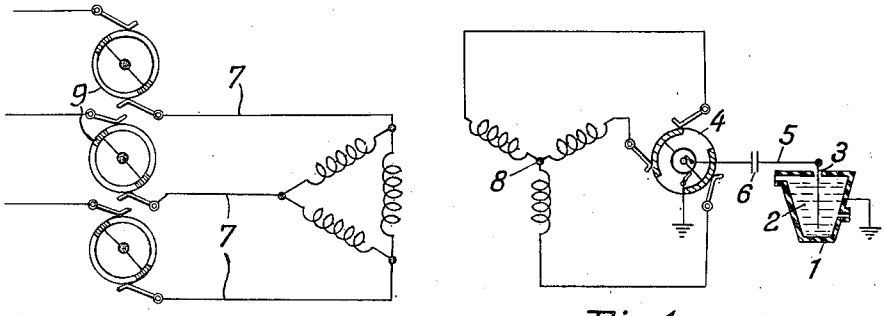


Fig. 1

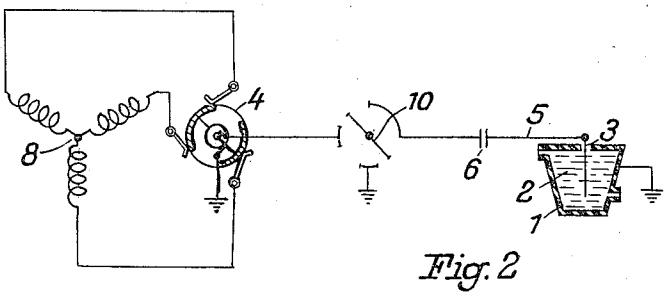


Fig. 2

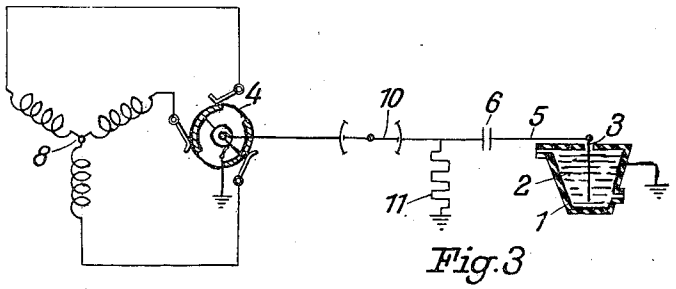
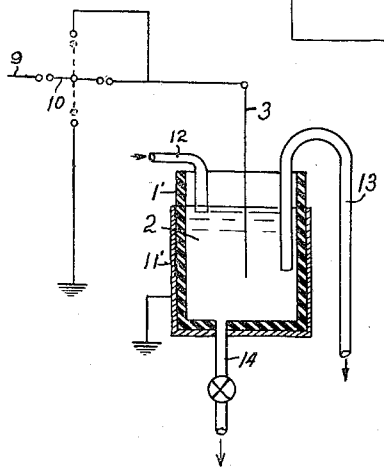


Fig. 3

Fig. 5



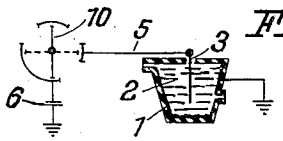


Fig. 4

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PROCESS FOR ELECTRICAL DEHYDRATION OF PETROLEUM EMULSIONS

Walther Deutsch, Frankfort-on-the-Main, Germany; vested in the Alien Property Custodian

Application April 13, 1938, Serial No. 201,844
In Germany September 1, 1937

1 Claim. (Cl. 204—191)

This invention relates to a process of and apparatus for the electrical separation of emulsions, and especially for removing water from oils (such as crude petroleum).

According to the invention, a condenser is interposed in the electric circuit traversing the emulsion under treatment, and the system constituted by the emulsion and series condenser is periodically charged by a source of high tension and afterwards discharged again. The periodical application of the high tension to the system can be effected, for example, by mechanically switching the source of current on and off. The condenser interposed in accordance with the invention and forming adequate protection against flash-overs in the treatment vessel, enables the discharge output, which acts upon the emulsion, to be effectively apportioned, thereby rendering it possible to adapt the working conditions to suit the composition of the emulsion under treatment for the time being.

The invention will hereinafter be more fully described with reference to the accompanying drawing which illustrates diagrammatically and solely by way of example, five circuit arrangements suitable for use in carrying the invention into practical effect and in which—

Fig. 1 shows one embodiment of circuit arrangement;

Fig. 2 shows a second embodiment;

Fig. 3 shows a third embodiment;

Fig. 4 shows a fourth embodiment; and

Fig. 5 shows a fifth embodiment.

In the embodiment shown in Fig. 1, the reference numeral 1 denotes the earthed vessel containing the emulsion 2, into which latter an electrode 3 dips. A condenser 6 is interposed in the lead in conductor 5 of the electrode 3, said conductor leading to a high-tension rectifier 4, such as a mechanically operated polyphase rectifier. The primary side 7 of the transformer 8 acting on the rectifier 4, is equipped with a motor-driven switch drum 9, which periodically switches on and interrupts the current from the main circuit. When this current is switched on, the system, constituted by the resistance of the emulsion 2 and condenser 6, is charged, the full, rectified secondary voltage being, at first, applied solely to the emulsion 2, and then compensated in the condenser 6.

This compensating effect in the condenser 6, prevents the useless afterflow of charges through the water bridges formed in the emulsion, which flow would not produce any further separation, but only lead to a waste of energy.

After the switch 9 has shut off the line circuit, the system 6, 2 discharges to earth through the rectifier contacts and the transformer winding.

In the circuit arrangement shown in Fig. 2, the periodical switching on and off, on the secondary side of the transformer 8, is effected by means of a rotary commutator 10, which alternately charges and earths the system comprising the condenser 6 and the emulsion 2.

In the arrangement shown in Fig. 3, the system 6, 2 is discharged to earth through a high-ohmic resistance 11.

The application of the high tension current to the emulsion under treatment can also be effected in the manner shown in Fig. 4, by periodically switching, on and off, a previously charged condenser 6. When the commutator 10 is in the position indicated by continuous lines in the figure, the condenser 6 is charged, and when the commutator is in the position indicated by broken lines, the condenser is in series with the emulsion and is discharged.

In certain cases, the interposition of a separate condenser can be dispensed with entirely, and the condenser can be replaced by arranging for the wall of the vessel containing the emulsion, to serve as the dielectric of a condenser, the outer coating of which is earthed, whilst the inner coating is formed by the emulsion itself.

This arrangement is illustrated in Fig. 5 in which 1' is the vessel containing the emulsion, 2 is the emulsion serving as the inner condenser coating, 11' is the earthed outer coating of the vessel serving as an outer coating of the condenser. 3 is a high tension electrode connected to a source of high tension current 9 through the high tension switch 4. Emulsion is supplied to the vessel through pipe 12, oil is withdrawn through pipe 13 and water and slime are withdrawn through pipe 14.

It is obvious that the invention is not restricted to the circuit arrangements shown. For example, the apportioning condenser 6, which is essential for the invention, can succeed a voltage-impulse apparatus, of known type, with spark gap and condenser. The periodical switching on and interruption of the high tension current can also be effected in other ways than those illustrated.

I claim:

A process for dehydrating a petroleum emulsion, which comprises forming a condenser by placing the emulsion in a dielectric container having a grounded external conductive coating and an electrode in contact with the emulsion, charging this condenser by connecting the said electrode and coating with a source of rectified alternating current, then discharging this condenser by grounding the electrode and repeating the charging and discharging periodically.

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