

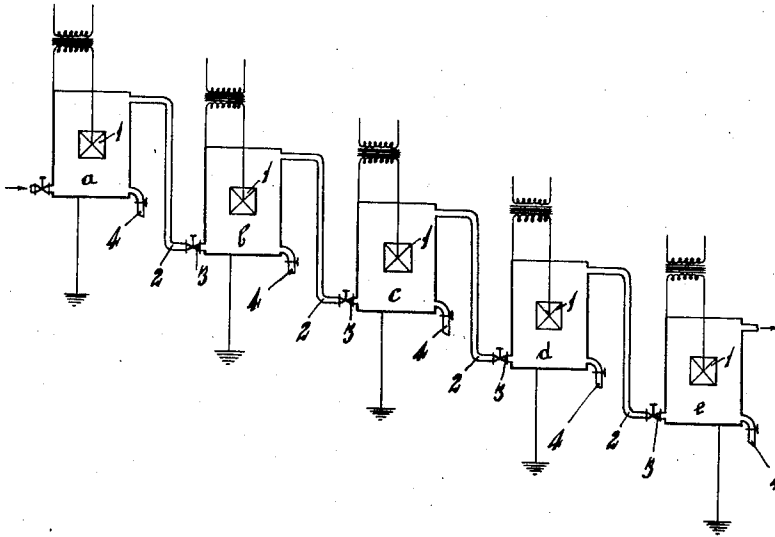
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J. H. C. DE BREY

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MULTISTAGE PROCESS FOR ELECTRICAL DEHYDRATION OF EMULSIONS

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Inventor
J. H. C. de Brey
By *J. J. Juvie*

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JAN HEINRICH CHRISTOPH DE BREY, OF THE HAGUE, NETHERLANDS.

MULTISTAGE PROCESS FOR ELECTRICAL DEHYDRATION OF EMULSIONS.

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My invention relates to an improvement for separating the phases of an emulsion especially of mineral oil by means of electric current. It is well known that emulsions generally consist of a multitude of water globules of various sizes dispersed in a medium of oil. The size of these water globules varies widely from 0.1 micron up to one millimeter in diameter, and usually one and the same emulsion contains globules of the most widely varying diameter.

Hitherto it has been the object of the existing processes for electric dehydration to separate all the water globules, the smallest as well as the largest, simultaneously from the oil, i. e. under the same electro-physical conditions. In those cases where the process of dehydration has been carried out in consecutive steps it has nevertheless been customary to apply the same electric pressure for the consecutive steps. It is, however, obvious that this is not the right principle, as it is self-evident that it requires other physical, that is, electrical, conditions for segregating globules of, say 1 millimeter diameter than for segregating the microscopic particles of one micron diameter and less. In fact I have found that the smaller the water particles are, the higher the electric pressure required to segregate them from the oil. Consequently, in order to obtain a complete dehydration of an emulsion, i. e. not only the segregation of the comparatively larger globules but also of the smallest water particles, an electric pressure of 10,000 to 50,000 volts is required.

The application of these high electric pressures to emulsions of high water content meets with difficulties on account of the low electric resistance of these emulsions, which practically cause an electrical short-circuit for the high voltages. I have found a method whereby these difficulties are obviated and which consists therein that the emulsion is being treated in steps at consecutive higher pressures, whereby during each step—prior to applying the next higher pressure—the water freed by the preceding lower pressure step, is separated from the emulsion.

I can carry out my process in a periodical manner but I prefer to proceed continuously.

The process can best be elucidated by the following example, in which a number of containers are referred to, although accord-

ing to my invention the process may be carried out in only one container.

The emulsion containers (*a*, *b*, *c*, *d* and *e*), each of which is equipped with an electrode of suitable design, are put in cascade, as shown on the accompanying sketch.

As illustrated in said sketch one end of the secondary of a transformer is connected to the electrode and the other end to the wall of the container.

The emulsion, which contains 40% water, enters the first container *a*, preferably at the bottom through the pipe 2 with cock 3. In this first container *a* the emulsion is exposed to an electric pressure of 500 to 1000 volts. The larger water particles segregate easily under the influence of these low pressures, but the smaller particles remain untouched. The water, which is drained off continually from the bottom of container *a* through the pipe 4 will amount to about 75% of the total water content of the emulsion. Thus the water content of the emulsion at the top of this first container *a* will be about 14%. This 14% emulsion, which on account of its lower water content has a considerably higher electric resistance than the original raw material, can therefore be exposed to a considerably higher electric pressure. In this particular case it will be between 5000 and 10,000 volts. The partially water-freed emulsion from the container *a* flows preferably by gravity (but naturally it can also be pumped, if necessary) to a second container *b*, where again it enters preferably at the bottom and where under the influence of the electric pressure of 5000 to 10,000 volts it will again lose about 75% of its water. This water is again drained off at the bottom, and the top of the emulsion container *b* will show a water percentage of about 4%.

Looking through the microscope it can now be observed that all the larger water particles have disappeared and that the emulsion contains merely water globules of a diameter of 20 microns and less. This emulsion can now be exposed to a higher electric pressure and this is effected in a third container *c*, where the process is repeated but now under an electric pressure of 15,000 to 20,000 volts, under the influence of which again 75% of water settles out and is drained off at the bottom, resulting in a top of about 1%.

A fourth and fifth container *d* and *e*,

running respectively at 30.000 and 50.000 volts, reduce the water content practically to zero.

With an emulsion of other water content than that given in the example, the number of steps in which my process is carried out will be altered in accordance with the water content of the raw material, and with the degree of purity required for the final product. But the principle remains the same and consists in a multi-stage-dehydrating process, where the emulsion is exposed to consecutive higher electric pressures, in accordance with its decreasing water content. The process can be carried out with ordinary sinusoidal alternate current, as also with the so-called pulsating alternate current, which is the object of my invention as described in my application for Letters Patent Serial No. 705958 filed April 11, 1924.

I claim:

1. A process for separating the phases of emulsions by means of the electric current, consisting in subjecting the emulsion to a multi-stage dehydrating process under successively higher electric pressures.

2. The process of separating the phases of emulsions by means of the electric current, consisting in subjecting the emulsion to a multi-stage dehydrating process with successively higher electric pressures in

each successive dehydrating stage, the electric pressures increasing in accordance with the decreasing water content of the emulsion.

3. The process of separating the phases of emulsions by means of the electric current, consisting in subjecting the emulsion to a multi-stage dehydrating process with successively higher electric pressures in each successive dehydrating stage, the electric pressures increasing in accordance with the decreasing water content of the emulsion, the separating water content being drained off at each stage.

4. The process of dehydrating mineral oil emulsions, consisting in subjecting the emulsions in successive stages to relatively increase electric pressures and physically eliminating the water separated from the emulsion at each stage.

5. An electric dehydrating process for mineral oil emulsions, consisting in the utilization of the electric current at successively higher electric pressures for treating the emulsion in successive stages, the water separated by the treatment being divided from the emulsion following each stage treatment.

In testimony whereof I affix my signature.

JAN HEINRICH CHRISTOPH de BREY.