

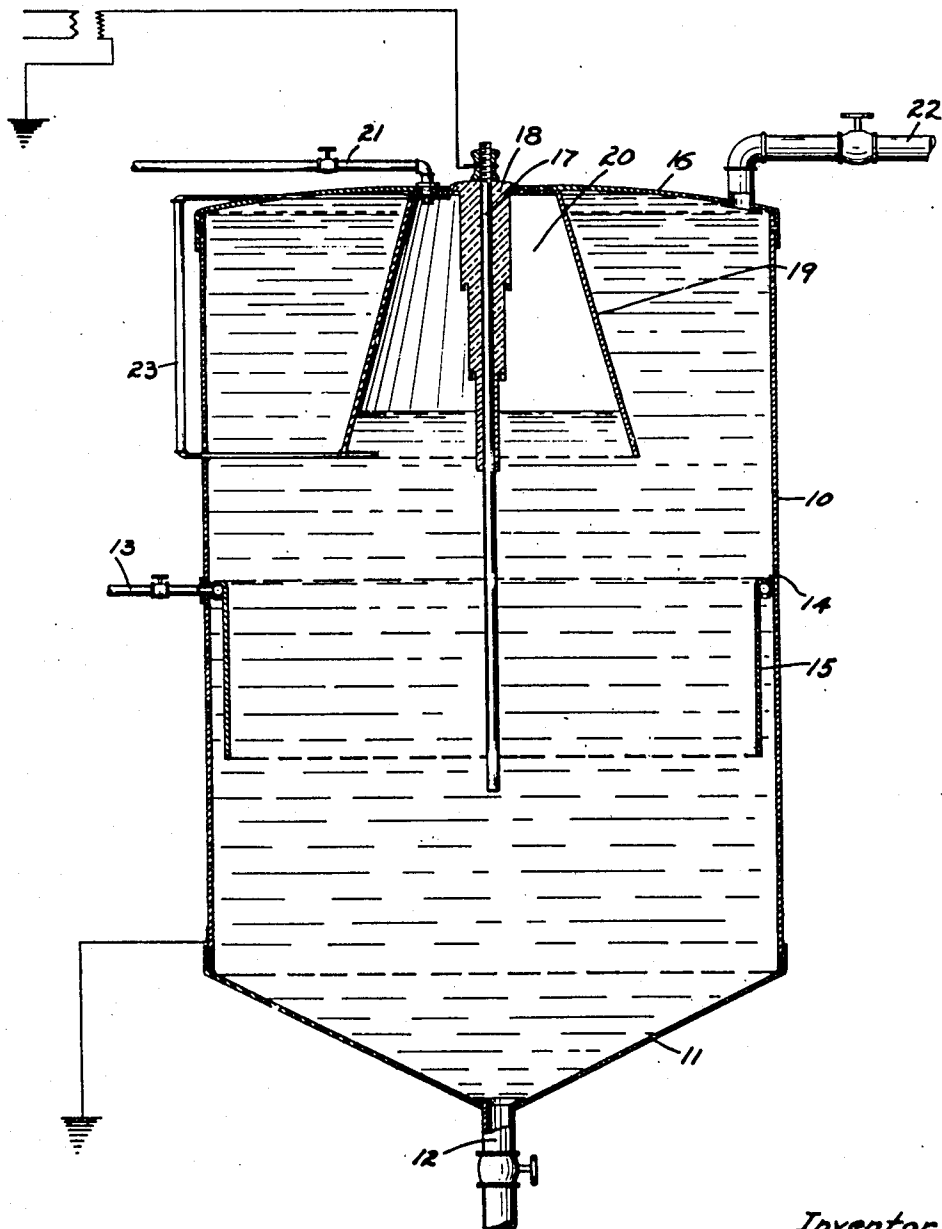
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R. T. KOWES

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METHOD OF INSULATING HIGH VOLTAGES IN ELECTRICAL PRECIPITATORS

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UNITED STATES PATENT OFFICE

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METHOD OF INSULATING HIGH VOLTAGES IN ELECTRICAL PRECIPITATORS

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This invention relates to a means and method of insulating electrodes in oil dehydrators and the like.

A method of dehydrating oil has been developed which is comprised essentially of producing an electrical discharge between an electrode immersed in oil and the surrounding shell. The voltage employed for this purpose is usually in a range between 18,000 and 100,000 volts. When such a discharge takes place the minute water particles in the oil coalesce and drop out of suspension in the oil. Also other particles of foreign matter are frequently brought down with the water. Because of the high voltages employed some difficulty has been present in keeping the electrode insulated from the grounded shell. In the conventional construction the electrode is extended into the shell through the roof thereof and attempts have been made to provide an insulating bushing which keeps the electrode insulated from the shell. However, it has been found that in a relatively short time a carbon deposit will take place on the surface of the bushing or there will be other deposits such as water thereon which will form a short circuit between the electrode and the shell.

It is an object of this invention to provide an improved means and method of maintaining the electrode insulated from the grounded shell and preventing any deposits forming on the insulating bushing which enable such short circuiting.

With the foregoing and other objects in view, which will be made manifest in the following detailed description, and specifically pointed out in the appended claims, reference is had to the accompanying drawing for an illustrative embodiment of the invention, wherein:

The figure is a vertical section through an oil dehydrator illustrating the improved construction wherein the electrode is kept insulated from the shell.

Referring to the accompanying drawing, wherein similar reference characters designate similar parts throughout, the improved dehydrator comprises a shell 10 having a conical bottom 11 in which there is an outlet 12

for water and other foreign matter. An inlet for oil, from any suitable source of supply, is indicated at 13 which supplies oil to an annular pipe 14 arranged on the interior of the shell. This pipe has a perforated bottom so that the oil flows downwardly therefrom between the shell 10 and a skirt 15 suspended from the pipe in spaced relation to the shell. The roof or top of the shell is indicated at 16, through which the electrode 17 extends. This electrode extends downwardly to a point below the bottom of skirt 15 and it is intended that the electrical discharge take place between the electrode 17 and the walls of the shell 10, causing the water particles to coalesce and drop out of suspension.

The electrode is surrounded by a bushing 18 of insulating material, such as porcelain or the like. A shield 19 is secured to the roof 16 and extends downwardly about the bushing 18 in spaced relation thereto, forming a chamber 20. A valve controlled pipe 21 preferably communicates with the interior of this chamber. As clearly shown upon the drawing, the shield 19 is frusto-conical in form, having a closed top and an open bottom. Also in the preferred form of construction the bushing 18 preferably increases in cross sectional area from bottom to top. The outlet for oil from the dehydrator is indicated at 22 and a suitable oil level indicator is indicated at 23.

The operation and advantages of the improved construction are as follows. Oil enters the dehydrator through pipe 13 and is subjected to the electrical discharge which causes the water particles to coalesce and drop out of the oil. The oil then rises in the dehydrator and passes out through outlet 23. The chamber 20 confines an insulating fluid. The particular insulating fluid is immaterial as natural gas, carbon dioxide, nitrogen, or any other gas, may be used for this purpose. This gas may be supplied to the interior of chamber 20 through pipe 21 and kept at sufficient pressure to maintain the level of oil within chamber 20 near the bottom of shield 19. The oil which enters the dehydrator is preferably preheated to maintain the temperature within chamber 20 above the

dew point of the gas employed so that the gas will not condense on the surface of the bushing 18 and possibly produce a short circuit between the electrode 17 and the roof of the shell. As the shield 19 is disposed wholly within the shell it is surrounded by an annulus of oil having the highest temperature of the oil within the shell. This high temperature oil surrounding the shield maintains the temperature of the gas within the shield, or within chamber 20, at the same temperature. Consequently there is no tendency for condensation to take place within chamber 20 on either the shield or on the bushing. By thus maintaining an annulus of insulating gas around the bushing 18 it will be readily appreciated that no deposits will be formed on the exterior of the bushing 18 and it will be impossible for a short circuit to be formed between the electrode and the roof of the shell. The shell 19, while it might be cylindrical, is preferably frusto-conical as shown, and likewise the bushing 18 preferably increases in cross sectional area from bottom to top. This arrangement causes chamber 20 to decrease volumetrically from bottom to top so that the level of oil in chamber 20 will be kept relatively low although the pressure within the shell may increase fairly materially. In other words increases in pressure of oil within the shell will not be so readily perceptible by rises of liquid within the shield 19. It will be readily appreciated, however, that this advantage is not essential and that a cylindrical shield could be employed and likewise a bushing 18 which is of uniform size from top to bottom could be used.

It is not essential that a gas be used for an insulating fluid in chamber 20. Instead a dry oil or other liquid, having insulating properties, could be used. This could be introduced into chamber 20 through pipe 21 or the entire shell could be completely filled with dry oil originally, the air being allowed to escape from chamber 20 through pipe 21. Having thus been filled with dry oil, the flow of wet oil undergoing treatment within the dehydrator will not disturb it or carry it from within shield 19.

From the above described apparatus it will be appreciated that a novel means and method is provided which will effectively maintain the electrode 17 insulated from the shell so that no short circuits will be established between the electrode and the roof of the shell.

Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. An electrical dehydrator for oil and the like comprising a shell, an electrode extending into the shell, a bushing of insulating

material surrounding the electrode adjacent the shell, and a shield disposed wholly within the shell having a closed top and an open bottom surrounding the bushing, said shield serving to confine an insulating gas about the bushing to prevent short circuiting between the electrode and the shield.

2. An electrical dehydrator for oil and the like comprising a shell, an electrode extending into the shell, a bushing of insulating material surrounding the electrode adjacent the shell, and a shield disposed wholly within the shell having a closed top and an open bottom surrounding the bushing, said shield serving to confine an insulating gas about the bushing to prevent short circuiting between the electrode and the shield, said bushing being characterized by increasing in cross sectional area from bottom to top.

3. An electrical dehydrator for oil and the like comprising a shell, an electrode extending into the shell, a bushing insulating the electrode from the shell, and means providing an annular wall about the bushing in spaced relation to the bushing, said wall being disposed wholly within the shell, and serving to confine a gas about the bushing to prevent short circuiting.

4. An electrical dehydrator for oil and the like comprising a shell, an electrode extending into the shell, a bushing insulating the electrode from the shell, means providing an annular wall about the bushing in spaced relation to the bushing, said wall being disposed wholly within the shell, and serving to confine a gas about the bushing to prevent short circuiting, and a supply pipe for supplying the space between the wall and the bushing with gas.

In testimony whereof I have signed my name to this specification.

R. T. HOWES.

DISCLAIMER

1,891,645.—*Raymond T. Howes*, Los Angeles, Calif. METHOD OF INSULATING HIGH VOLTAGES IN ELECTRICAL PRECIPITATORS. Patent dated December 20, 1932. Disclaimer filed May 28, 1934, by the assignee, *Petroleum Rectifying Company of California*.

Hereby enters this disclaimer in the said Raymond T. Howes patent to said claims 1, 2, 3; and 4 therein, reading as follows:

"1. An electrical dehydrator for oil and the like comprising a shell, an electrode extending into the shell, a bushing of insulating material surrounding the electrode adjacent the shell, and a shield disposed wholly within the shell having a closed top and an open bottom surrounding the bushing, said shield serving to confine an insulating gas about the bushing to prevent short circuiting between the electrode and the shield.

"2. An electrical dehydrator for oil and the like comprising a shell, an electrode extending into the shell, a bushing of insulating material surrounding the electrode adjacent the shell, and a shield disposed wholly within the shell having a closed top and an open bottom surrounding the bushing, said shield serving to confine an insulating gas about the bushing to prevent short circuiting between the electrode and the shield, said bushing being characterized by increasing in cross sectional area from bottom to top.

"3. An electrical dehydrator for oil and the like comprising a shell, an electrode extending into the shell, a bushing insulating the electrode from the shell, and means providing an annular wall about the bushing in spaced relation to the bushing, said wall being disposed wholly within the shell, and serving to confine a gas about the bushing to prevent short circuiting.

"4. An electrical dehydrator for oil and the like comprising a shell, an electrode extending into the shell, a bushing insulating the electrode from the shell, means providing an annular wall about the bushing in spaced relation to the bushing, said wall being disposed wholly within the shell, and serving to confine a gas about the bushing to prevent short circuiting, and a supply pipe for supplying the space between the wall and the bushing with gas."

[Official Gazette June 19, 1934.]