May 29, 1928. 1,671,586

A. HORWITZ

APPARATUS FOR SULPHONATING OILS

Filed June 22, 1921

FIG. 1.

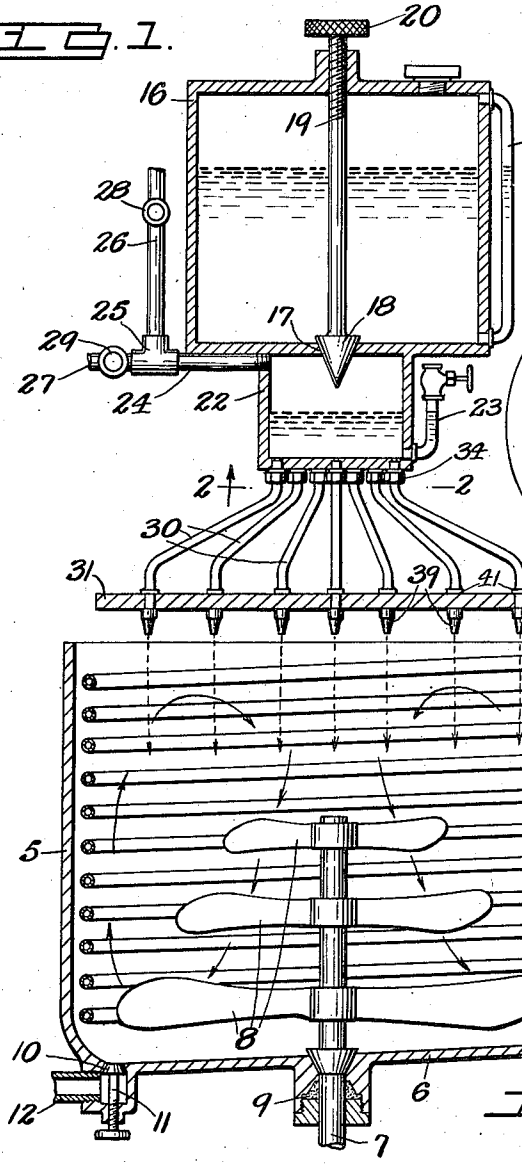


FIG. 2.

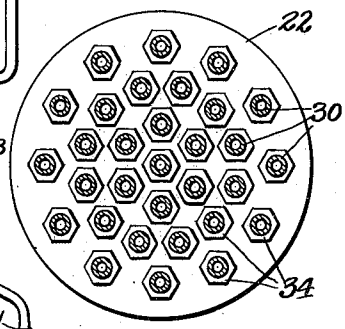


FIG. 3.

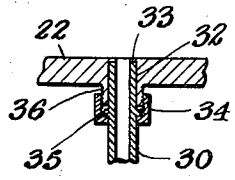
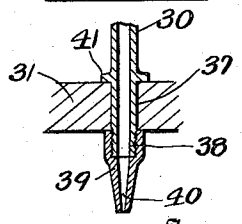


FIG. 4.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR SULPHONATING OILS.

Application filed June 22, 1921. Serial No. 479,568.

This invention relates to apparatus for sulphonating oils of various kinds, and the object of the invention is to provide an apparatus of the class specified in which large quantities of oil may be sulphonated in order to produce a product of the same quality throughout, or a product which is uniform by reason of the fact that a given body or quantity of oil is treated under the same temperature and under the same conditions; a further object of the invention is to provide an apparatus in which large quantities of oil may be treated in a comparatively short time by reason of the method of introducing and mingling the acid with the oil to be sulphonated; and with these and other objects in view the invention consists in an apparatus of the class and for the purpose specified, constructed as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which:—

Fig. 1 is a diagrammatic sectional view of my improved apparatus and indicating the method of its use;

Fig. 2 a partial section on the line 2—2 of Fig. 1 on an enlarged scale; and,

Figs. 3 and 4 are enlarged detail sectional views of parts of the construction shown in Fig. 1.

Heretofore it has been customary to treat comparatively small quantities of oil with a suitable acid for the purpose of producing a sulphonated oil, and in this operation the acid is either dripped or slowly poured into a vessel containing the oil to be sulphonated and suitable means was employed in the vat for agitating the mass. By reason of this method of procedure it has heretofore been almost impossible to produce a large quantity of sulphonated oil which would be uniform throughout by reason of the fact that the treatment of the comparatively small quantities of oil under slightly different conditions would produce a product having different characteristics. With the present process of sulphonating small quantities of oil considerable time is taken in order to produce said product by reason of the method of introducing the acid into and mingling the same with the oil to be sulphonated.

With my improvement the acid used in the treatment or sulphonation of an oil is forced into the body of oil through a multiplicity of discharge nozzles located above the body of oil to be treated, and in this way or by means of this method of procedure the acid is distributed throughout the mass or body of oil and a more thoroughly and uniformly sulphonated oil is produced in considerably less time than by the old process, as above set out. I have also found that a considerably larger body or quantity of an oil can be sulphonated with my improved apparatus in a shorter time than by the treatment of a comparatively small body or quantity of oil under the old process.

In carrying my invention into effect, I provide an apparatus such as is diagrammatically illustrated in Fig. 1, and which illustrates my improved method of sulphonating oils, and in said figure, I have shown at 5 a tank or vat adapted to receive the oil to be sulphonated, and said tank is open at the top and provided with an inclined bottom 6 centrally of which is mounted a vertical shaft 7, which extends into the tank 5, and secured to the shaft within said tank are three agitator blades 8 of different sizes, the smallest blade being secured to the uppermost end of the shaft 7 and the largest to the lower end portion of said shaft. A suitable stuffing box 9 is provided for the protruding portion of the shaft 7 to prevent the leaking of oil therearound. The lowest point of the bottom of the tank 5 is provided with a discharge aperture 10 controlled by a valve 11, which permits of the discharge of the oil from the tank 5 when treated, which oil passes through a pipe 12 to any suitable point. A pipe coil 13 is mounted within the tank 5 in juxtaposition to the walls thereof and the ends of said coil pass outwardly through the tank 5 through pipes 14 and 15 and, in practice, water is circulated through the coil 13 for the purpose of cooling the mass within the tank 5 in the operation of the apparatus.

I also provide a main acid tank 16 which is supported above the tank 5 in any desired manner and the bottom of said tank is provided centrally with a discharge aperture 17 controlled by a valve 18 having a rod 19 which extends through the top of the tank and is provided with a milled head 20 by means of which the valve 18 may be manipulated. The tank 16 is also provided at one

side thereof with a gage device 21 by means of which the amount of acid discharged from or passed into the tank 16 may be determined.

Mounted below the main acid tank 16 is a supplemental acid tank 22 placed in communication with the main tank through the discharge aperture 17, and said supplemental tank is provided with a gage device 23 and a pipe 24 communicates with the top portion of said tank, said pipe being provided with a coupling 25 with which a supply pipe 26 and discharge pipe 27 are connected, said pipes being provided respectively with valves 28 and 29. In practice, air under pressure is adapted to be passed into the top of the suppemental tank 22 through the pipes 26 and 24 to discharge the acid from said tank as hereinafter described.

A plurality of tubes 30 are mounted in connection with the bottom of the supplemental tank 22 and the free end portions thereof are also mounted in connection with a transverse plate 31. The connection of the tubes 30 with the tank 22 is made by passing the ends of said tubes upwardly into apertures 32 in the bottom of said tank, said apertures being reduced as shown at 33, and sleeve nuts 34 operate upon annular shoulders 35 on the tubes 30 and are threaded upon downwardly directed studs 36 on the bottom of the tank 22.

It will be understood that the tubes 30 may be arranged in any desired manner and in Figs. 1 and 2 I have shown one arrangement of said tubes, and it will be noted that said tubes are extended radially to permit of the distribution of the acid over the greater portion of the body of oil in the tank 5, and the free end portions of said tubes are coupled with the plate 31 in the manner shown in Fig. 4 of the drawing, the end portions of said tubes being passed through apertures 37 in said plate and adapted to extend therethrough. The extended portions of said tubes are threaded as shown at 38 to receive discharge nozzles 39 having tapered discharge apertures 40, and said nozzles as well as annular shoulders 41 on the tubes 30 are adapted to hold said tubes in connection with the plate 31.

In the use of my improved apparatus, as shown in the accompanying drawing, a predetermined amount of oil, preferably castor oil is placed in the tank 5, and the shaft 7 and the agitator blades 8 are rotated by any suitable means to stir or agitate the oil in said tank, and the blades 8 will be so constructed or designed as to operate to draw the oil downwardly through the central portion of the tank and force the same upwardly around the side walls of said tank, as indicated by the arrows in Fig. 1 of the drawing. A predetermined amount of the acid in the tank 16 is then admitted into the tank 22 through the discharge aperture 17, after which the valve 28 is opened to admit air under pressure into the top portion of the tank 22, which operation will force the acid in said tank outwardly through the discharge nozzles 39 and into the oil to be sulphonated in the tank 5.

It will be understood that the acid under pressure is forced downwardly into and penetrates the mass of oil in the tank 5 regardless of the action imparted to said oil by the blades 8.

By providing main and supplemental acid tanks as shown and described, small amounts of acid may be forced into and mingled with the oil in the tank 5, and this operation is repeated as often as may be desired or necessary to thoroughly and properly sulphonate the oil in said tank. It will be understood that in the operation of the apparatus, or when the acid in the tank 22 has been discharged the valve 28 will be closed and the valve 29 opened to allow the compressed air in the tank 22 to escape, and the gage device 23 will facilitate this operation, or will denote at what time the valves 28 and 29 should be manipulated, and the gage device 21 will or may be graduated to indicate the amount of acid in the tank and the amount discharged therefrom in order that the proper proportion of acid to a given amount of oil may be introduced into the tank 5 for sulphonating oil therein.

My improved apparatus may also be used for the purpose of washing and neutralizing the oil treated with sulphuric or other acid, this being done by either passing the oil from the tank 5 into a similar tank, or this may be performed in the first named tank, if desired, and in washing the oil, treated with acid, to dispose of the neutral, uncombined or free acid, water or a similar liquid is forced downwardly through the discharge nozzles 39 into the mass within the tank 5, while being agitated by the blades 8, in other words, my invention is not necessarily limited to the specific use of the apparatus herein shown and described, and various changes therein and modifications thereof may be made, within the scope of the appended claims, without departing from the spirit of my invention or sacrificing its advantages.

Having fully described my invention what I claim as new and desire to secure by Letters Patent is:—

1. An apparatus of the class described comprising an oil tank, means mounted in said tank and extending through the bottom thereof for agitating oil placed in said tank, means for cooling the oil in said tank, a main acid tank mounted above said oil tank, a supplemental acid tank in communication with said main acid tank, means for controlling the communication between said

main and supplemental acid tanks, and a plurality of discharge nozzles coupled with and in communication with the supplemental acid tank and spaced over said oil tank.

2. An apparatus of the class described comprising an oil tank, means mounted in said tank and extending through the bottom thereof for agitating oil placed in said tank, means for cooling the oil in said tank, a main acid tank mounted above said oil tank, a supplemental acid tank in communication with said main acid tank, means for controlling the communication between said main and supplemental acid tanks, a plurality of discharge nozzles coupled with and in communication with the supplemental acid tank and spaced over said oil tank, and means whereby air under pressure may be passed into the supplemental acid tank to force the acid therein outwardly through said nozzles and into said oil tank.

3. An apparatus of the class described comprising an oil tank, means for agitating oil placed therein, a normally closed acid tank mounted in juxtaposition to and above said oil tank, a multiplicity of independent discharge tubes coupled with said acid tank and distributed above the top of the oil tank, nozzles on the free ends of said tubes and directed toward the oil tank, and means for introducing a gas under pressure into the acid tank for discharging acid from said tank through said tubes and nozzles and into the oil tank.

4. An apparatus of the class described comprising an oil tank, means for agitating the oil placed in said tank, the top of said tank being open, a normally closed acid chamber located above the open end of said tank, a plurality of independent discharge tubes communicating with said chamber and arranged in spaced relation above said oil tank, means for introducing a gas under pressure into said acid chamber and for discharging acid under pressure into the tank through said discharge tubes.

5. An apparatus of the class described comprising an oil tank, means for agitating the oil placed in said tank, the top of said tank being open, a normally closed acid chamber located above the open end of said tank, a plurality of independent discharge tubes communicating with said chamber and arranged in spaced relation above said oil tank, means for introducing a gas under pressure into said acid chamber and for discharging acid under pressure into the tank through said discharge tubes, nozzles at the discharge ends of said tubes, and means for cooling the oil in said tank.

In testimony that I claim the foregoing as my invention I have signed my name this 20th day of June, 1921.

ALEXANDER HORWITZ.