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R. E. NAGEL

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DEPHLEGMATOR

Filed Jan. 9, 1928

Fig. 1.

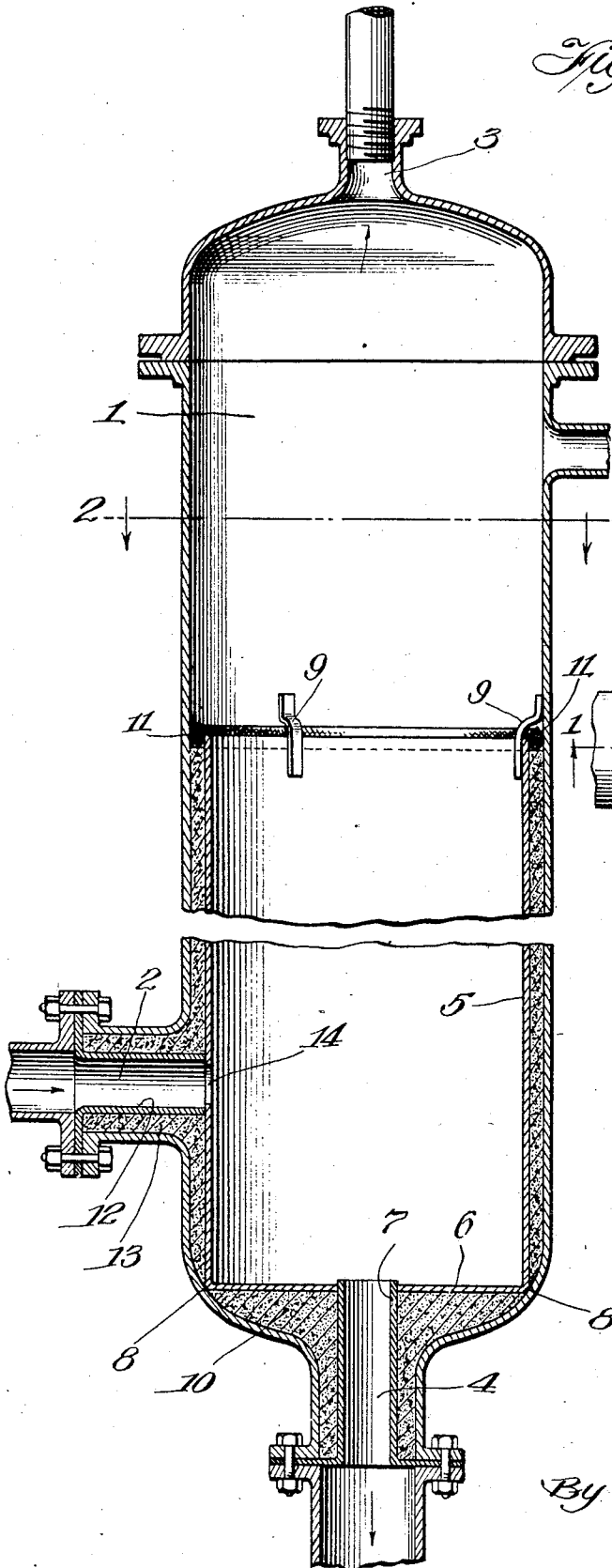
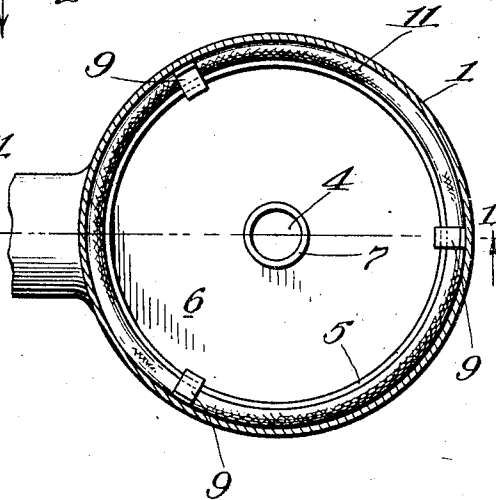


Fig. 2.



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UNITED STATES PATENT OFFICE

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DEPHLEGMATOR

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This invention refers to improvements in dephlegmators and refers, more particularly, to a dephlegmator suitable for use in the cracking of sulphur containing hydrocarbon oils. In the commercial operation of cracking plants, great difficulty is experienced in the corrosion of the dephlegmator or reflux condensers and particularly in the lower portion of the dephlegmators, i. e. that portion which is in contact with the hottest vapors. This corrosion not only materially lessens the life of the dephlegmator, but where the dephlegmator is under substantial pressure, so weakens it as to make it dangerous to operate. Moreover, inasmuch as the corrosion is on the inner side of the dephlegmator, the dephlegmator may be weakened to the danger point without there being any exterior evidence of such weakening. The result has been not only disastrous fires, but loss of life. The present invention is designed to reduce to a minimum the corrosive effect of sulphur containing oils in the cracking of the same. To this end, I provide the inner side of the dephlegmator and generally it may be sufficient to provide only the lower portion of the inner wall of the dephlegmator with what may be termed a floating liner. This liner is formed of some metal more able to withstand the effect of corrosion than the steel shell forming the main body of the dephlegmator; for example, the liner may be made of a chromium metal or chromium nickel steel or the like. Thus, inasmuch as the liner will have a different co-efficient of expansion than the main body of the shell of the dephlegmator, provision must be made for permitting its expansion independent of the expansion and contraction of the steel shell itself. This liner need not be of as great a thickness as the main body of the shell itself, but it is desirable that provision be made to prevent the vapors from passing between the outer wall of the liner and the inner wall of the main shell of the dephlegmator. Accordingly, between the two, I insert a vapor proof packing in such a way as to prevent any vapors seeping in between the walls, but without interfering with the independent

contraction and expansion of the shell and liner relative to each other.

In the accompanying drawing, Fig. 1 is a vertical sectional view of a dephlegmator shell equipped with my invention and Fig. 2 is a horizontal cross sectional view on line 2-2 of Fig. 1. Fig. 1 is a section on line 1-1 of Fig. 2.

Referring to the drawing 1 designates the main shell of the cylindrical dephlegmator provided with vapor inlet pipe 2, vapor outlet conduit 3 and condensate draw-off pipe 4.

Within the dephlegmator is mounted a liner 5, which may be formed of a metal able to withstand corrosion, as heretofore stated. The lower end of the liner is preferably provided with a closure cap 6, which may be formed as integral with the liner, if desired, and this cap 6, in turn, has a non-corrosive pipe extension 7 through which the reflux condensate passes. The liner 5 is preferably welded to the inner wall of the shell at its lower end, as shown at 8, but at its upper end free to expand and contract. In order to insure the upper end of the liner being in fixed position at all times relative to the cylinder wall, I provide a plurality of circumferentially disposed holding brackets 9, as shown. The external diameter of the liner is such that it is spaced slightly away from the dephlegmator wall and in this annular space, I insert a suitable filler, as, for example, a plastic filler, for example, a paste of graphite and lead. Also in the space between the bottom plate 6 and the lower end of the shell, I insert under pressure a filler of similar paste, as shown at 10. Preferably between the upper end of the annular liner and the brackets, I insert asbestos packing, as shown at 11. Care should be taken to so force the packing in the annular space between the liner and dephlegmator wall as to insure against leakage of any vapors in this space. The vapor nozzle 2 may also be provided with a similar internal liner 12 spaced from the walls of the nozzle and I insert between the inner wall of the nozzle and the outer wall of the liner 12 similar packing 13. In order that the vapors may enter through the vapor nozzle, the liner is provided with an aper-

ture 14, opposite the nozzle. The end of the liner 12 must lie flush against the wall of the liner 5, so as to form a tight joint against which the packing 13 may be forced without leakage.

I have shown the invention as applied to a dephlegmator for a cracking plant but, of course, this same idea may be embodied, for example, in the expansion chamber, or any other chambers subject to the corrosive action of oil vapors.

I claim as my invention:

An apparatus of the character described comprising a chamber, a liner of non-corrosive material within said chamber and spaced from the interior wall thereof, the lower portion of said liner being fixed to the interior wall of said chamber and its upper end being free to expand and contract independently of said chamber, and means for preventing vapors from entering the space between said liner and the interior wall of said chamber.

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