

A. GELLEN.
 APPARATUS FOR THE RECOVERY OF ACID USED IN REFINING OILS.

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Fig. 1

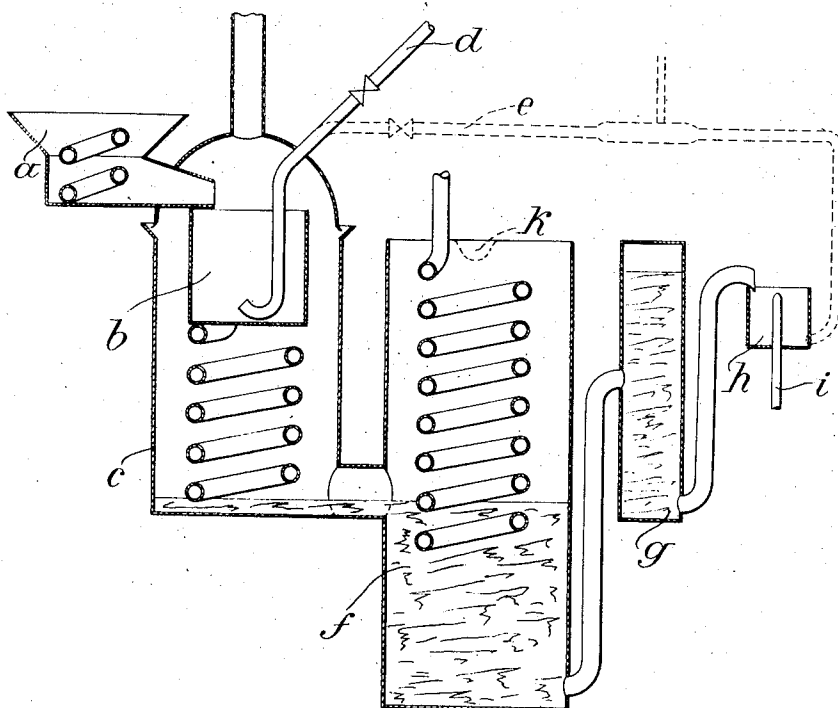


Fig. 2

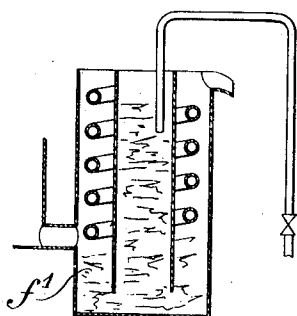
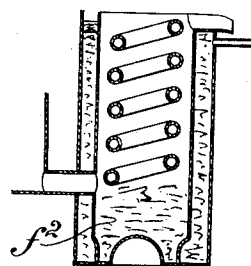


Fig. 3



Witnesses:
 B. Dommers
 E. Leckert.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE RECOVERY OF ACID USED IN REFINING OILS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ADALBERT GELLEN, a subject of the Emperor of Austria-Hungary, residing at Glinik Maryampolski, Galicia, Austria-Hungary, have invented certain new and useful Improvements in Apparatus for the Recovery of Acid Used in Refining Oils, of which the following is a specification.

Heretofore the elimination and separation of the acid contained in the acid waste products, acid tars and the like, resulting from the refining of mineral oil products or the like, with acids was effected by means of apparatus consisting usually of cast-iron receptacles having two exhaust tubes arranged in their bottoms: one narrow tube for the eliminated acid and one wider tube for the tar product freed from acid. These apparatus do not permit continuous working, but only operate with separate charges, because only a certain quantity of the waste products to be treated can be treated with steam in order to decompose the sulfonic acids and similar compounds, whereafter the whole arrangement must be left alone for some time, in order to enable the eliminated acid to settle out; this acid is then drained off from below, and then the steamed tar product is drawn from the receptacle. Now on the one hand it is inevitable that during this process acid may extend into the tar or other product freed from acid, and that great quantities of acid are retained in the lower layers of the said tar situated immediately above the acid, so that always considerable quantities of the latter will remain admixed with the products freed from acid; on the other hand the tar-like mass may solidify while the acid is drained off, thereby considerably hindering the easy discharge of the receptacle.

The apparatus forming the object of the present invention permits a continuous working, avoids the disadvantages referred to, yields a product absolutely or nearly free from acid, requires but little supervision and can even work entirely automatically if liquid products of the kind referred to are treated. Moreover it permits the economical treatment of masses that are poor in acids and that are to be stored for any length of time, while in the known apparatus such products could not be freed from acid at all.

In the drawings Figure 1 shows by way

of an example the whole arrangement of a form of the apparatus forming the object of the present invention, Fig. 2 is a modified form of the depositing receptacle for the separated acid and Fig. 3 is a further modification of the same.

Through the receptacle *a* which if required may contain a heater, the waste product to be treated passes and enters the receptacle *b* in its original condition or mixed with water, and is here treated with a strong jet of steam or water conveyed through a tube *d* for the purpose of freeing the acid or of decomposing the sulfonic acids and similar compounds. If desired acid may also be conveyed by means of an injector, from the receptacle *h* serving for the reception of the acid already separated from the tar-like substances or the like, through a tube *e* into the receptacle *b*. This acid performs the same function as steam or water, namely, sets free the combined acid. The mixture thus formed now flows from this latter into a receptacle *c* suitably heated for instance by means of a steam coil and during this passage acid is separated from the organic substances; the mixture then passes into the receptacle *f* representing the separating chamber proper where the acid being of higher specific weight collects at the bottom and can be drained off, whereas the tar or asphalt-like substances rise and as they progress on their way gradually lose their content of acid, so that tar, asphalt or the like nearly or quite free from acid will flow off through the spout *k*. In order to clarify the acid, an intermediate receptacle *g* may be used, through which the acid is passed on to a collecting vessel *h* to be then conveyed by means of the exhaust tube *i*, to its destination.

The acid within the receptacle *f* is maintained at constant level by means of a float (not shown in the drawing) connected to an electric bell. When liquid waste products are to be treated, they can be directly filled into the receptacle *b* the receptacle *a* being then dispensed with. It will further be of advantage to cover the separating receptacles, as shown in Fig. 1, with a cap through the exhaust tube of which, the sulfurous acid that disengages in the apparatus can be discharged into the open air or fed into other apparatus, as Glover-towers and the like in order to be further utilized. By means of the apparatus described an

acid of considerably higher degree of concentration can be obtained and the waste material to be treated can be satisfactorily freed from acid, which cannot be attained
5 with the known intermittently operating apparatus.

Figs. 2 and 3 show two modified forms indicated by letters f^1 and f^2 of the receptacle f , wherein the heat is better utilized.
10 In the construction shown in Fig. 2, a hollow cylinder is inserted into the receptacle proper, the lower end of said cylinder extending so far downward as to immerse below the layer of tar into the acid, so that
15 owing to the pressure of the tar column in the heated outer cylinder, said acid is raised as far as the upper edge of the inserted cylinder and thence can be drained off, while the tar or the like flows off from the outer
20 cylinder. In contradistinction to this arrangement, in the modified form according to Fig. 3 the tar or the asphalt-like mass separated from the acid, rises in the interior cylinder f^2 and the acid in the outer cylinder,
25 and the constituents thus separated flow off through spouts or nozzles provided for this purpose on the upper end of this cylinder.

The continuously working apparatus as
30 above described works as follows: The waste acids, acid tars or other solid or liquid acid waste products that are to be freed from acid are introduced into the decomposing receptacle b either in a cold or in a preliminarily
35 heated or in a molten condition according to their nature and in the acid receptacle they are submitted in small quantities to the action of steam, water or acid, either in the form of a spray or not, and are thereby
40 transformed into a mixture that contains the acids and the organic compounds such as tars, asphalts and the like, no longer chemically united but, on the contrary, the particles of acid are suspended in the tar-like substances or the like. This mixture of acid
45 and oils, tars or solid organic compounds is now caused to flow through several receptacles of any desired form that are heated in any known way by means of steam, hot air,
50 hot waste gases or the like and in which the acid is separated from the tars or other organic substances, whereupon the acid collecting at the bottom of the last receptacle can be drained off in a continuous flow or is
55 raised by the weight of a product freed from acid that is above it, nearly to the level of the inflow of the raw material, and flows off automatically, while the tar, asphalt or the like freed from acids separated from the

eliminated acid rises and also flows off at 60 the top automatically and uninterruptedly.

Claim—

1. Apparatus for the continuous elimination of acid from acid-containing waste products resulting from the refining of mineral oils, comprising a decomposing receptacle, means to supply a decomposing medium to the receptacle, a receptacle containing the decomposing receptacle, means for heating the latter receptacle, a separating receptacle in communication with the second receptacle, having continuous discharges for acid and for organic products. 65

2. Apparatus for recovery of acid used in refining oils, comprising means for continuously supplying the substance to be treated, a decomposing vessel continuously receiving the substance from said means, means to supply a decomposing medium to the decomposing vessel, a receptacle containing said vessel, means for heating the receptacle, a settling chamber having outlets at different levels for acid and for hydrocarbon products, and means for heating said chamber. 70 80 85

3. Apparatus for recovery of acid used in refining oils, comprising means for continuously supplying the substance to be treated, a decomposing vessel, means to continuously supply a decomposing medium to said vessel, a receptacle containing the decomposing vessel and into which the latter discharges, means to heat the receptacle, a settling chamber into which the receptacle discharges having concentric chambers communicating at their bottoms and outlets at different levels for acid and for tarry products. 90 95

4. Apparatus for recovery of acid used in refining oils, comprising means to continuously supply the substance to be treated, a decomposing vessel, a receptacle containing said vessel and into which the latter discharges, means for heating the vessel, a settling chamber communicating with the bottom of the receptacle and having an acid discharge near its bottom and a hydrocarbon discharge near its top, an acid clarifier connected to said acid discharge means to receive clarified acid, and means to supply clarified acid to the decomposing vessel for setting free further quantities of acid. 100 105 110

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ADALBERT GELLEN.

Witnesses:

JOSEF RUBASCH,
AUGUST FUGGER.