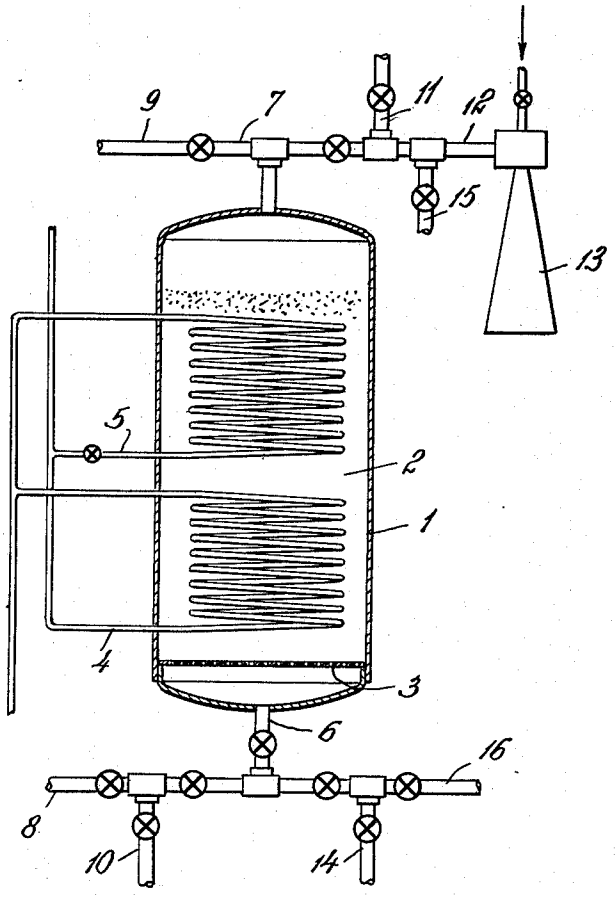
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METHOD OF HANDLING DEHYDRATION

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METHOD OF HANDLING DEHYDRATION

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4 Claims. (Cl. 196—4)

In United States Patent 2,195,989 to Edward L. Hoffman, there is disclosed a method of handling and transporting gasoline and similar light petroleum products, in which deleterious effects of corrosion of the pipe line and loss of quality of product is avoided by passing the gasoline through a dehydrating adsorbent to reduce its dissolved water content prior to passing it into the pipeline for transportation.

This invention has specifically to do with the method of handling and regenerating the drying mass used in such a process.

Most finished gasolines today are inhibited. Many are dyed. The purpose of the inhibitor is to prevent deterioration of the gasoline, before sale, by oxidation reactions.

The most efficient and convenient way of dehydrating the drying adsorbent after it becomes water saturated is by passing air through it, while heating, to drive off the moisture. This drying regeneration is usually preceded by a purging, either with superheated steam or by evacuating. Its completion leaves the adsorbent saturated with air. Upon reintroduction of gasoline to be dehydrated, that oxygen, in the catalytic surroundings afforded by the adsorbent, reacts with the gasoline. If the gasoline is not inhibited, it produces gum and color reactions. If the gasoline is inhibited, it reacts to remove or destroy the inhibitor, leaving the gasoline unprotected against subsequent oxidation. If the gasoline is dyed, the dye in many cases will be removed or altered in color.

This invention has for its object the provision of a method of regenerating such dehydrating adsorbents as will avoid the substantial presence of oxygen in the regenerated dehydrating adsorbent.

This invention will be readily understood by reference to the diagrammatic drawing attached to this specification in the single figure of which 1 denotes a drying tower, packed with an adsorbent 2 supported by a grid 3. Within the adsorbent there are embedded heating coils 4 and 5 connected to heating medium inlet and outlet manifolds. An inlet 6 is provided, and an outlet 7. In dehydrating operation, a light petroleum product, such as gasoline, enters from pipe 8, and departs through pipe 9. When the adsorbent 2 becomes so water-soaked that it will no longer remove dissolved water from the gasoline to the extent desired, pipes 8 and 9 are closed, and regeneration begins. First the adsorbent is purged of gasoline. This may be accomplished by admitting steam, preferably superheated, through pipe 10, and discharging that steam plus the gasoline removed either through pipe 11 to a condenser, not shown, or through pipe 12 to a barometric condenser or other source of vacuum, 13. If desired, the purging may be merely a vacuum purging, using the vacuum developed by barometric condenser 13. Purging may also be accomplished by admitting an inert gas, such as flue-gas or a normally non-condensible gaseous petroleum hydrocarbon through pipe 16. During purging the operation may be assisted, if desired, by applying heat through coils 4 and 5. After purging, the adsorbent is dried by continuing the heating with coils 4 and 5, while introducing air through pipe 14. The outgoing air, together with moisture may be discharged to atmosphere through pipe 15. Drying may also be accomplished by continuing the passage of steam with or without use of coils 4 and 5, the steam being sufficiently superheated to act as a moisture removing medium.

After drying, by whatever means it is accomplished, steps are taken to not only remove any oxygen which may be associated with the adsorbent, but also to prevent access of oxygen to the adsorbent until such time as it is to be put into service. These steps consist of cutting off the drying medium flow and whatever heat may be supplied, and admitting a normally non-condensible, gaseous, petroleum hydrocarbon fraction, such as refinery residue gas, through pipe 16, continuing the flow of such gas until the adsorbent body is well flushed, the gas passing through being disposed of through pipe 15, then reducing the flow of gas, but continuing it, while barometric condenser 13 is operated to induce a relatively high vacuum, say of about 26" mercury, then closing all valves in the outlet piping and flowing gas into the adsorbent until pressure is built up to atmospheric or even somewhat above, then closing all inlet valves and allowing the adsorbent to stand with gas introduced until dehydration of oil is resumed.

In this manner an adsorbent so free of oxygen is obtained that no noticeable effect, even upon rather sensitive inhibited gasolines, is observed therefrom.

Some good portion of the desirable effect may be obtained from merely flushing and blanketing, without the vacuum, but considerably enhanced freedom from oxygen is obtained by the step of applying vacuum while continuing a small flow of gas, since some oxygen, apparently tightly adsorbed, stubbornly resists removal.

We claim:

1. That method of conducting a cyclic process including dehydrating inhibited gasolines to remove dissolved water therefrom which comprises passing the gasoline through a confined body of adsorbent material capable of removing water dissolved in said gasoline, ceasing passage of gasoline when adsorbent becomes incapable of further water removal, drying said adsorbent by the joint action of heat and a stripping gas flowing therethrough, flushing said adsorbent with a normally gaseous petroleum hydrocarbon fraction, charging said adsorbent with a protective charge of said normally gaseous hydrocarbon while awaiting reuse as a dehydrator, and again using the adsorbent in the dehydrating portion of the cycle.

2. That method of conducting a cyclic process including dehydrating inhibited gasolines to remove dissolved water therefrom which comprises passing the gasoline through a confined body of adsorbent material capable of removing water dissolved in said gasoline, ceasing passage of gasoline when adsorbent becomes incapable of further water removal, drying said adsorbent by the joint action of heat and a stripping gas flowing therethrough, flushing said adsorbent with a normally gaseous petroleum hydrocarbon fraction, continuing flow of said gas in small quantity through said adsorbent while applying a vacuum thereto, raising the pressure on said adsorbent to at least atmospheric pressure by flowing said gas thereinto, maintaining said gas in contact with said adsorbent while adsorbent awaits use in dehydration, and again using said adsorbent in the dehydrating portion of the cycle.

3. That method of handling regeneration of a dehydrating adsorbent used in removing dissolved water from light petroleum products to prevent the presence of oxygen in the regenerated adsorbent which comprises drying the adsorbent by the combined action of heat and a stripping gas, flushing the adsorbents, after drying, with a normally gaseous petroleum hydrocarbon fraction, charging said adsorbent with a protective charge of said gas, and maintaining said charge in said adsorbent until reuse for dehydration is begun.

4. That method of handling regeneration of a dehydrating adsorbent used in removing dissolved water from light petroleum products to prevent the presence of oxygen in the regenerated adsorbent which comprises drying the adsorbent by the combined action of heat and a stripping gas, flushing the adsorbent, after drying, with a normally gaseous petroleum hydrocarbon fraction, continuing flow of said gas in small quantity through said adsorbent while applying a substantial vacuum thereto, raising the pressure on said adsorbent to at least atmospheric pressure by flowing said gas thereinto, and isolating said adsorbent in the presence of said gas so added until the dehydrating operation is resumed.

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