

UNITED STATES PATENT OFFICE

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METHOD OF CLEANING LUBRICANT CASES OF ENGINES

No Drawing.

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The present invention relates more particularly to a method for cleaning lubricant cases of engines, particularly crank cases, transmission and differential cases of motor vehicles such as automobiles, trucks and the like.

The invention in its broader aspects, is adapted for use in cleaning lubricant cases of engines generally, for example, motors on trolley cars, Diesel engines, boats and the like, and in general relates to that type of process in which a flushing oil is circulated repeatedly to and from a pump. The essence of the present invention resides in maintaining a body of flushing oil in said case and varying the liquid level thereof, the variation in level being accurately controlled to accomplish the purposes of the invention, as will be hereinafter more particularly discussed.

In use and operation, it has been found that when a flushing oil is drained from a lubricant containing case, sediment will collect in the form of a skin along the side walls. This is naturally objectionable, and in the present invention has for one of its objects the prevention of this sediment formation by maintaining a liquid level and lowering it gradually.

The utility as well as other objects of the invention, will be more particularly brought out in the following description.

The process is carried out by first draining from the lubricant containing case the used and dirty lubricant. Structure such as that illustrated and described in my issued United States Patent No. 1,633,283, dated June 21, 1927, may be utilized to carry out the process of the present invention, but it is to be particularly understood that the practice of the process is not limited to the particular type of structure illustrated in said patent, as the broad concept of the invention resides in a process capable of being carried out in any type of apparatus. This dirty lubricant may be passed to suitable storage. A charge of cleaning or flushing oil, say from one to two gallons, more or less, may be then introduced into the lubricant containing case. Before the introduction of this cleaning or flushing liquid, an adjustable plug and valve such as illus-

trated in my co-pending application, Serial No. 168,586, filed Feb. 16, 1927, may be detachably connected to the outlet from the lubricant containing case for the purpose of controlling the discharge flow of said flushing liquid from the lubricant containing case. Assume that a charge of flushing liquid has been introduced to the lubricant containing case while the valve was closed, the quantity of which may be sufficient to fill the case. An apparatus comprising a cyclic circulatory system and more particularly consisting in a pump, a filter and connections between the case, pump and filter, may be connected to the lubricant containing case in such a manner as to cause a continuous cyclic circulation of said flushing liquid between the pump and the lubricant containing case, the flushing liquid being continuously filtered during each cyclic circulation. The amount of flushing liquid discharged from the lubricant containing case is controlled of course, by the extent to which the valve is opened.

As a feature of the present invention during this cyclic circulation, it is advisable to maintain varying levels of flushing liquid in the lubricant containing case. This varying of the level is definitely controlled, and may be defined in three stages. Initially, it is advisable that a greater quantity of flushing liquid be introduced to the lubricant containing case than withdrawn in order to build up a level to substantially fill the case. After the cyclic circulation has been in operation for a length of time sufficient to dislodge a substantial portion of the impurities and foreign matters from the lubricant containing case, it is then desirable to gradually lower the liquid level in order to drain the casing of the flushing liquid. During this second stage, this is very definitely controlled by introducing a lesser quantity than the quantity withdrawn, which of course, can be definitely controlled by the proper regulation of the valve and pump. During this second stage, and while the level is gradually being lowered, the agitation of the flushing liquid due in part to the pressure of the pump, and the parts moving within the lubricant containing case prevents a quiescent condition of the flushing

liquid thereby preventing the precipitation of the objectionable residue referred to above, along the side walls of the case.

When the lever has been lowered to a point immediately adjacent the discharge, or even when the flushing liquid has been substantially completely withdrawn from the case, it may be found that some precipitation has taken place in the lower portion of the case, and more particularly in the channel of flow. This may be washed out and removed very effectively by then, during the last stage of the process, introducing flushing liquid either from the cyclic circulatory system or a fresh charge from another source to accomplish this final flushing.

When the case has been thoroughly flushed as above described, the adjustable plug is removed, the permanent plug closing the outlet drain is put back in place, a fresh charge of lubricating oil then placed in the case, and the case is ready for operation.

The process is characterized by its efficiency in preventing this undesirable accumulation of residue, which efficiency is directly due to the careful control of the liquid level.

It is to be understood that I do not desire to be limited to any particular form of apparatus, the present invention being restricted solely to a method whereby through control of the liquid level of flushing liquid in a lubricant containing case, the objectionable formation of precipitants is prevented, and the interior of the case efficiently and thoroughly cleaned.

I claim as my invention:

1. A method of cleaning lubricant containers, which comprises first removing the used lubricant and preventing the return of any substantial portion thereof to said container, thereafter introducing flushing liquid thereto, no substantial portion of which had previously been introduced to said container, thereafter circulating repeatedly said flushing liquid to and from the container under pressure, initially building up a liquid level of said flushing liquid in said container by continuously introducing a greater quantity of flushing liquid while simultaneously withdrawing a lesser quantity of flushing liquid, continuing said circulation until the container is cleaned, thereafter gradually lowering the liquid level therein and finally withdrawing all of said flushing liquid from said container.

2. A method of cleaning lubricant containers, which comprises removing used lubricant therefrom and preventing the return of any substantial portion thereof to said container, then introducing thereto a quantity of flushing liquid, no substantial portion of which had previously been introduced to said container, building up a liquid level of said flushing liquid in said container by introducing said flushing liquid while simultaneously withdrawing a lesser quantity thereof, in re-

peatedly circulating said flushing liquid to and from the container under pressure, thereafter lowering the liquid level of said flushing liquid in said container by withdrawing a greater quantity of flushing liquid while simultaneously introducing flushing liquid in lesser quantity, and in finally draining all of said flushing liquid from said container and preventing the return of any substantial portion thereof to said container.

3. A method of cleaning lubricant containers, which comprises removing used lubricant therefrom and preventing the return of any substantial portion thereof to said container, then introducing thereto a quantity of flushing liquid, no substantial portion of which had previously been introduced to said container, building up a liquid level of said flushing liquid in said container by introducing said flushing liquid, while simultaneously withdrawing a lesser quantity of said flushing liquid, in repeatedly circulating said flushing liquid to and from the container under pressure, and during such circulation relieving said flushing liquid from any foreign matter, thereafter lowering the liquid level of said flushing liquid in said container by withdrawing a greater quantity of flushing liquid while simultaneously introducing flushing liquid in lesser quantity, and in finally draining all of said flushing liquid from said container and preventing the return of any substantial portion thereof to said container.

4. A process such as claimed in claim 2, further characterized in that said flushing liquid is agitated during a substantial portion of the time it is in the container.

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