SIGHT FEED LUBRICATOR SYSTEM

Filed Feb. 12, 1946

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This Invention relates to industrial lubrication and is particularly concerned with improvements in force feed lubricating systems for delivering oil in small but metered quantities to the bearings and other parts of engines, compressors and all other heavy duty machinery.

The principal object of the invention is to provide a lubrication system having a sight feed chamber through which oil may be floated, drop by drop under pressure, without emulsifying the fluid in the compartment to interfere with the observation and gauging of its delivery, nor reacting with that fluid to form gums and other heavy matter to clog delivery lines, cause valve sticking and other operating difficulties.

It is a further and more specific object of the invention to provide a sight feed fluid for pressure lubricating systems which is to all intents and purposes completely immiscible with the oil circulating in the system, has substantially no tendency to emulsify with that oil, and to be carried out of the sight feed chamber with the delivery stream, and which remains unaffected by any of the well known addition agents for petroleum lubricants, neither forming gums with them nor suffering other chemical change.

The full nature of the invention, the manner of obtaining the foregoing objects, and of its advantages and features, will be fully developed in the following description in the light of the accompanying drawing, in which:

The single figure is a cross-sectional view of a portion of a force feed lubricating system.

The sight feed chamber shown in the drawing is typical of the general type of device which is included in force feed lubricating systems for steam, gas and Diesel engines, air and gas compressors, and other heavy duty machinery, where small, carefully metered quantities of oil are delivered through individual lines to a number of bearings and other points. In the operation of such a system each stroke of the pump (not shown) delivers a minute volume of oil through line 10, and valves 11 and 12, to a nozzle 13 mounted in the base of the chamber. The volume so delivered may, of course, be adjusted to meet the needs of individual cases. In some instances, for example, 40 or 50 strokes of the pump may be required to build up a single drop of oil on the nozzle, while in other cases the pump may deliver a drop or two during each stroke. Regardless of the rate of delivery, when a drop of sufficient size has been built up, it breaks free from the end of nozzle 13 and floats upwardly through the somewhat heavier sight feed liquid with which the chamber is filled, to join a pool of oil 15 which accumulates in the top of the chamber. It is evident, of course, that each increment of oil which is delivered to nozzle 13 must result in the displacement of an equal quantity of oil from pool 15 of the completely filled chamber, such oil being delivered under pressure through valve 16 to the delivery line 17, leading to a bearing or other point.

In order for the system to function properly the fluid 16 must be generally immiscible with oil 15 and should have a slightly different color so that the stream of droplets floating through it may be observed through the tubular sight glass 18 joining base 19 with the top 20, or through any other conventional form of window for the chamber, thereby giving an indication of the rate of delivery as well as a rough gauge of the quantity of oil flowing through delivery line 17 to a particular bearing point. It has been the practice in the art to fill the chamber with glycerol or ethylene glycol, or aqueous solutions of one or both of these substances, and in some cases, water alone has been employed as a sight feed liquid through which the oil supply is floated. While these liquids are generally immiscible with petroleum lubricating oils, they have a tendency to emulsify with them, and particularly so under the high pressure conditions prevailing in the sight feed chamber. If the tendency is very marked, as it occasionally is, the clouding up of the sight feed liquid interferes with ready observation of the oil delivery; and in any case the emulsion tends to flow into delivery line 17 with the oil, thus resulting in a gradual loss of sight feed fluid. Since this process goes on continually, even though slowly, it gives rise to the necessity for frequent addition of fluid to the sight feed chamber to maintain it filled to the proper working level. All of these problems become very much more acute when the lubricating oil in the system contains one or more additives, that is to say, oxidation and rust inhibitors, extreme pressure agents, and other property improvers, which serve to promote emulsification of the sight feed fluid.

It has been further noted that certain of these highly desirable addition agents react with glycerol and ethylene glycol to form gummy matter of a highly viscous nature which fouls the sight feed glass so as to all but destroy its essential utility in the system, and which gradually works its way into the system to clog the check valves and other delicate mechanisms. This not only makes for increased maintenance and servicing costs but gives rise to a very real danger that the
lubricating system will become so clogged as to be unable to perform its normal function with consequent damage to the machinery which it is supposed to serve.

I have discovered that all of the foregoing difficulties with sight feed lubricator systems may be overcome by the use of an aqueous solution of sugars or other carbohydrates in the sight feed chamber. In general, any sugar seems to suffice, either in its pure state or in admixture with other sugars. Excellent results have been obtained for example with water solutions of cane sugar, beet sugar, and commercial syrup made from converted starch. It has further been found that the aqueous content of the syrups may be varied within wide limits to meet the needs of individual cases, it being necessary only that the final product shall have a suitable consistency and color, and a specific gravity in excess of that of the oil in the lubricating system.

One solution which has proven highly satisfactory as a sight feed fluid consists essentially of 25 per cent by volume of water and 75 per cent by volume of a commercial mixture of corn syrup containing dextrin, maltose, dextrose and glucose, to which a small percentage of cane sugar has been added. For convenience such a syrup will be referred to as a “commercial corn syrup.” This product was subjected to extensive tests in one of the sight feed chambers of a duty gas engine lubricator. In the course of a month’s operation, this substantially colorless liquid remained entirely clear, no evidence of emulsification was noted, and it was necessary to add fluid to the system during the period, and at the end of that time the sight glass, valves and delivery lines, were found to be entirely free of gum or other heavy viscous matter. By way of contrast it may be noted that other sight feed chambers which were filled with glycine frequently required make-up fluid to maintain satisfactory working levels and rapidly became fouled with unidentified gummy deposits of the kind mentioned herein before. The test was continued beyond the one month period, both on the mentioned gas engine and on other equipment, in competition with systems containing both glycine, ethylene glycol, or a mixture of the two, and with lubricants containing various addition agents as well as with straight petroleum oils. After some three months’ testing it was quite evident that the sugar solution was far superior to the other sight feed fluids, both as to immiscibility, non-emulsification, and freedom from gumming with the oil addition agents.

I have prepared a number of other aqueous solutions of the foregoing commercial syrup in which the sugar concentration varied between 20 and 90 per cent by weight of the total, and I have also prepared both cane and beet sugar syrups having the same general range of concentration. All of these syrups have proven entirely satisfactory as sight feed fluids in lubricator systems employed for a wide variety of special purposes, and very much superior to the glycercol and ethylene glycol mixtures which are normally used.

It will be evident from the foregoing that my new sight feed liquids consist essentially of aqueous solutions of one or other carbohydrates, having concentrations within the limits indicated above. In general, however, I prefer to add a small but sufficient percentage of a mold inhibitor to preserve them against deterioration in transit or storage. I have found, for example, that the presence of about 0.2 per cent by weight of methyl ester of para-hydroxybenzoic acid suffices to inhibit molding or spoiling of my sugar solutions without adversely affecting any of their desirable sight feed liquid properties; and the same thing may be accomplished by the use of very small percentages of other well known and commercially available inhibitors of mold growth.

Having described my invention and illustrated it by way of specific example, what I claim as new and as forming part of the same is:

1. In a sight feed lubricator system, including a sight feed compartment, and a sight feed liquid substantially filling that compartment, characterized in that said liquid is an aqueous solution containing from 20 to 90 per cent by weight of sugar and having a specific gravity in excess of that of oil employed in such system.

2. In a force feed lubricator system including a sight feed compartment, and a sight feed liquid substantially filling that compartment, characterized in that said liquid is an aqueous solution of fructose or a mixture of carbohydrates chosen from the group consisting of sucrose, maltose, lactose, glucose, and dextrin, and in that such solution has a specific gravity in excess of that of the lubricating oil circulated through such system.

3. In a force feed lubricator system including a sight feed compartment, and a sight feed liquid substantially filling that compartment, characterized in that said liquid is an aqueous solution of from 20 to 90 per cent by weight of a mixture of carbohydrates chosen from the group consisting of sucrose, maltose, lactose, glucose, and dextrin, and in that such solution has a specific gravity in excess of that of the lubricating oil circulated through such system.

4. A force feed lubricator system including a sight feed compartment, and a sight feed liquid substantially filling that compartment, characterized in that said liquid consists essentially of an aqueous solution of from 20 to 50 per cent by weight of commercial corn syrup having a specific gravity in excess of that of oil forced through said sight feed compartment.

5. In a force feed lubricator system including a sight feed compartment, and a sight feed liquid substantially filling that compartment, characterized in that said liquid consists essentially of an aqueous solution of from 20 to 50 per cent by weight of commercial corn syrup and less than 1 per cent by weight of a mold inhibitor, said solution having a specific gravity in excess of that of oil forced through said sight feed compartment.

6. In a force feed lubricator system including a sight feed compartment, and a sight feed liquid substantially filling that compartment, characterized in that said liquid consists essentially of an aqueous solution of from 20 to 50 per cent by weight of commercial corn syrup and about 0.2 per cent by weight of methyl ester of para-hydroxy-benzoic acid for inhibiting mold formation, said solution having a specific gravity in excess of that of oil forced through said sight feed compartment.

7. In a force feed lubricator system including a sight feed compartment and a sight feed liquid substantially filling that compartment, characterized in that said liquid consists essentially of a solution of about 75 per cent by weight of commercial corn syrup and about 25 per cent by weight of water.

8. In a force feed lubricator system including a sight feed compartment, and a sight feed liquid...
substantially filling that compartment, characterized in that said liquid consists essentially of a solution of about 75 per cent by weight of commercial corn syrup, about 25 per cent by weight of water, and less than 1 per cent by weight of an inhibitor of mold formation.

9. In a force feed lubricator system including a sight feed compartment, and a sight feed liquid substantially filling that compartment, characterized in that said liquid consists essentially of a solution of about 75 per cent by weight of commercial corn syrup, about 25 per cent by weight of water and about 0.2 per cent by weight of methyl ester of para-hydroxy-benzoic acid for inhibiting mold growth.

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