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CYLINDER OIL

Frederick H. MacLaren, Calumet City, Ill., and Thomas H. Rogers, Hammond, Ind., assignors to Standard Oil Company, Chicago, Ill., a Corporation of Indiana

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This invention relates to lubricants for valves or other mechanical parts that are exposed to steam, such lubricants being generally called steam cylinder oils.

The object of our invention is to provide a lubricant of this type which will readily form a stable water-in-oil emulsion, which will maintain a continuous resistant lubricating film on and between the metal surfaces to be lubricated without "gumming", and which will provide superior lubrication with less oil consumption than heretofore has been possible.

A further object is to make a cylinder oil from Mid-Continent crude which will be superior to cylinder oils heretofore made with Pennsylvania crude.

A further object is to provide a lubricant of this type which is stable and unlikely to decompose and separate out, and which will wear longer than any lubricant heretofore used for this purpose. Other objects will be apparent as the detailed description of our invention proceeds.

Lubrication of steam engines having Corliss valves, piston valves or D-slide valves is an easy matter when low pressure steam is used. When pressures above 100 pounds per square inch are encountered, the old cylinder oils (steam refined stock compounded with fats or fatty acids) are not satisfactory and they are very rapidly consumed. After extended research we have provided a new cylinder oil to meet the new requirements and we have shown, for instance, that an Allis Chalmers engine which heretofore changed rings every week will run for a year on one set of rings when lubricated by our new and improved cylinder oil.

Our formula contains a heavy lubricating oil, an asphaltic material, a water-in-oil emulsifying agent, and a compounding substance, the various ingredients being selected and used, as will be more particularly pointed out in the following description of a preferred embodiment. A formula which has proven satisfactory is as follows:

	Per cent
Heavy steam refined oil	89.2
Aluminum stearate	0.3
Steam reduced cracked petroleum residuum	2.0
No. 1 lard oil	8.5

The steam refined oil may be of the Mid-Continent type and may be characterized by a viscosity of about 210 at 210° F., an A. P. I. gravity of about 21.1 and a flash of about 530° F. Any equivalent lubricating oil may be used for this purpose. For instance, we have used a steam refined paraffin base Pennsylvania lubricating oil having a viscosity of about 217 at 210° F., an A. P. I. gravity of 25.1, and a flash of 580° F. A paraffin base oil is preferred for high temperatures, and in any case the lubricating oil should be free of gum forming constituents.

Instead of aluminum stearate we may use another equivalent soap, such as calcium stearate, iron stearate, etc. Oleates may be used but they are objectionable from the standpoint of gum formation. It is also highly important that this soap be an emulsifying agent of the water-in-oil type..

For the asphaltic material we prefer to use a steam reduced asphalt produced from a cracked petroleum residuum because asphalts of this type are characterized by their fluidity at high temperatures. This asphalt may have a softening point by the ball and ring method at about 135–145° F. and may have a penetration of a wide range, preferably about 5 to 20 at 77° F. Other asphaltic materials may be used, however, and it is essential that a component of this type be employed along with the heavy metal soap to give the oil the proper emulsifying characteristics.

The lard oil is a compounding agent which increases the oiliness of the finished product and it should be a substance which will not cause gum formation. Instead of lard oil we may use oxidized hydrocarbon wax or oil or other equivalent "oily" material.

The proportions may be varied between certain limits which may be approximately stated as follows:

	Per cent
Steam refined heavy lubricating oil	84–98.5
Aluminum stearate	0.2–1.5
Asphaltic material	0.5–4.0
Lard oil	1.0–10.0

In compounding our cylinder oil we have found that the temperature of mixing is extremely important and that it should be about 380–500° F., depending upon the particular soap and asphaltic material used. At temperatures below this the aluminum stearate and asphalt cannot be incorporated in a stable and uniform state.

One method of preparation is to mix all the ingredients together at about 400° F. Another method of manufacture is to mix the lard oil, aluminum stearate and asphaltic material with about 10% of the steam refined lubricating oil in a grease mixer, continuously stir the mixture and heat it to a temperature of 400° F., then cool the product to about 260° F. and add, with

continued stirring, the rest of the steam refined lubricating oil. It should be noted that there is no water in this formula and we have found that anhydrous mixtures are better than mixtures which include water.

The cylinder oil produced by the method hereinabove described has been subjected to severe tests and has proven itself superior to cylinder oils heretofore used. This is exemplified by a test on a twin Allis Chalmers engine which was lubricated by lubricators at each side. In one lubricator a compounded Pennsylvania Steam Refined Oil was used, and in the other our new oil was used. The former fed 24 pints of oil in 24 hours and the latter 8 pints of oil in 24 hours. After about ten days operation because of a "boil-over" it was found necessary to pump oil into the cylinder on the side being lubricated with the compounded Pennsylvania oil to prevent freezing of the pistons, while on the side being lubricated with our oil, the feed was continued at 8 pints per 24 hours. Allis Chalmers engines run for a year on one set of rings lubricated by our improved cylinder oil when they could only run for a week or two on rings lubricated by an equivalent amount of prior cylinder oil.

While we have described in detail a preferred embodiment of our invention it is understood that we do not limit ourselves to the specific materials, proportions or temperatures above stated except as defined by the following claims.

We claim:

1. A cylinder oil comprising a heavy steam refined lubricating oil compounded with an asphaltic material and aluminum stearate.

2. A cylinder oil comprising a heavy steam refined lubricating oil compounded with an asphaltic material and iron stearate.

3. A substantially anhydrous cylinder oil comprising a heavy steam refined lubricating oil compounded with a small amount of an asphaltic material and calcium stearate.

4. The method of making a cylinder oil which comprises heating a mixture of heavy oil, asphaltic material and water-in-oil emulsifying soap to a temperature of about 400° F.

5. The method of making a cylinder oil which comprises heating a mixture of heavy oil, asphaltic material and water-in-oil emulsifying soap to a temperature of about 400° F., then cooling this mixture and adding additional heavy lubricating oil thereto.

6. The method of making a cylinder oil which comprises heating about nine parts of heavy steam refined lubricating oil with about .3 parts of aluminum stearate, 2 parts of asphaltic material and 8½ parts lard oil to a temperature of about 400° F., cooling the mixture and adding thereto about 80 parts of heavy steam refined lubricating oil.

7. A cylinder oil having the following composition:

	Per cent
Heavy steam refined lubricating oil	84–98.5
Water-in-oil emulsifying soap	0.2–1.5
Cracked residuum asphalt	0.2–2.0
Compounding material	1.0–10.0

8. A cylinder oil having about the following formula:

	Per cent
Heavy paraffin base steam refined oil	89.2
Aluminum stearate	0.3
Steam reduced cracked petroleum residuum	2.0
No. 1 lard oil	8.5

9. A cylinder oil having about the following composition:

	Per cent
Heavy lubricating oil	84–98.5
Water-in-oil emulsifying soap	0.2–1.5
Asphaltic material	0.5–4.0
Compounding material	1.0–10.0

10. A cylinder oil comprising a heavy lubricating oil and a small amount of asphaltic material compounded with about 0.2–1.5% of an aluminum soap whereby it will, on introduction into a steam cylinder, form a stable water-in-oil emulsion.

11. A cylinder oil comprising a heavy lubricating oil and a small amount of asphaltic material compounded with about 0.2–1.5% of a calcium soap whereby it will, on introduction into a steam cylinder, form a stable water-in-oil emulsion.

12. The method of making a cylinder oil which comprises heating a mixture of heavy oil, asphaltic material and water-in-oil emulsifying soap to a temperature of about 380–500° F.

FREDERICK H. MacLAREN.
THOMAS H. ROGERS.