Patented Dec. 25, 1945 2,391,504

UNITED STATES PATENT OFFICE

2,391,504

ANTISEIZING PASTE FOR SEALING THREADED JOINTS AND LIKE PARTS

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No Drawing. Application October 30, 1943, Serial No. 508,396

3 Claims. (Cl. 252—37)

This invention relates to a pasty composition which is particularly adapted for employment in sealing threaded joints in metal parts, especially those formed in aluminum alloy, for preventing penetration of gasoline or oil and being capable of easy separation when so desired.

This application is a continuation-in-part of my application Serial No. 385,336, filed March 26, 1941.

A preferred composition is composed of the following ingredients:

	Parts
Highly oxidized and polymerized blown castor oil	4
Blown castor oil of lesser viscosity	1
Powdered zinc stearate	1
Light mineral oil	0.6

The blown castor oils provide a mixture having the desired viscosity in the final product. These castor oils have been blown so that they become polymerized and oxidized to a high degree whereby the properties are substantially fixed and do not alter during the course of time. By comparison, unpolymerized castor oil is approximately 30–35 percent soluble in gasoline, but this solubility steadily decreases in proportion as the oil is blown. The primary ingredient in the above preferred composition is a highly blown castor oil which is insoluble in gasoline, has good adherence to aluminum or aluminum alloys in the presence of gasoline, and is a thick viscous material: the material known as "Hydronamic 351" has been found satisfactory in practice. The less viscous blown castor oil has also been oxidized and polymerized to a condition to which it is substantially insoluble in gasoline but is of lesser viscosity and lesser freedom from oxidation than the primary highly blown castor oil; and it serves, by appropriate quantity of admixture, to produce a thinner product of semi-solid rather than solid nature. In this way, it facilitates the spreading of the material during application, and also is effective to permit a quick release due to its anti-seize characteristics. Commercially available "Hydronamic 4A" has been found effective.

The powdered zinc stearate is introduced to provide anti-seize properties in the finished composition; and converts the product to the form of a semi-solid grease rather than that of viscous liquid. Other metallic soaps may be employed, but it has been found that zinc stearate is more satisfactory than other stearates. Calcium stearate may be used when care is taken to break up and distribute any hard particles that are formed, and thereby reduce the composition to a smooth uniform paste. Zinc and calcium soaps of arachidic and higher aliphatic acids may be used. In general, it is preferred to employ zinc or calcium soaps of saturated straight-chain aliphatic acids having at least 17 carbon atoms not including the carboxylic group.

The light mineral oil is employed as a stabilizer for the product to prevent any separation or formation of further products by way of oxidation or polymerization. It thus is effective to prevent continued polymerization of the oxidized and polymerized castor oils, so that the compound does not tend to become thicker upon aging in bulk or in place. In practice, it has been found that the mineral oil known as "Mobil SS servo unit oil" is satisfactory for this employment. This oil has a viscosity (Saybolt Universal) of 95 seconds at 100 degrees F.; pour point of minus 50 degrees F.; flash point of 300 degrees F. in a Cleveland open cup; specific gravity reading of 31.7 degrees A. P. I.; corrosive action negative at a temperature of 212 degrees F. In particular, the oil selected should have such neutrality that it does not require more than 0.05 m. g. of potassium hydroxide, or its equivalent in neutralizing sulfuric acid, for neutralizing one gram of the oil. Thus, light, medium and heavy petroleum oils are satisfactory including the commercial DTE oil and Spindle oil, such as the commercial "Gem A" oil.

An alkyl ricinoleate may be employed as a substitute for the mineral oil in corresponding proportion, care being taken that it is similarly neutral in behavior. Suitable ricinoleates are the methyl, ethyl, propyl, butyl, amyl, hexyl, methyl-acetyl, ethyl-acetyl, and the ethylene and diethylene glycol esters. Suitable alkyl ricinoleates therefore include the ricinoleic esters of aliphatic alcohols having up to six carbon atoms. Such employment of alkyl ricinoleates has been described and claimed in my divisional application, Serial No. 593,095, filed May 10, 1945.

As a matter of practice, it is preferred to maintain the proportions of the various ingredients within the following ranges: the quantity of the blown castor oil employed, figured on the basis of 4 parts of highly polymerized blown castor oil, includes the addition of from ½ to 2 parts of the less viscous blown castor oil in order to obtain the desired viscosity in the final product: or a quantity of 4½ to 6 parts of blown castor oil.

With this proportion, from 1 to 2 parts of zinc stearate may be employed, together with 0.3 to 1.5 parts of the light mineral oil or alkyl ricinoleate.

The mixture is prepared by weighing off the desired amount of castor oil into a mixing kettle and adding the zinc stearate cold, and then mixing until the blend is a heavy dough or paste of uniform consistency. The mineral oil or alkyl ricinoleate operating as a stabilizer or anti-oxidant may be added prior to or during mixing.

After thorough mixture, the compound is heated slightly and stirred until the zinc stearate melts and combines with the oily component to form a smooth uniform mixture. The heating temperature should not exceed 115 degrees C., in order to obtain a yellowish-brown color of product. If this temperature is exceeded to any substantial extent, the color darkens rapidly and decomposition of the stearate may occur: the thorough preliminary mixture also assists in preventing decomposition. The heated and blended product may be permitted to cool naturally, but preferably its cooling is accelerated to avoid maintaining the material at an elevated temperature for an excessive length of time.

The product never hardens or sets in bulk or in place, and permits easy separation even at low temperatures.

In comparative tests of various materials made in accordance with the invention, it has been found that the mixtures prepared with light mineral oil have an even lower gasoline solubility than mixtures prepared with ricinoleate soaps.

On exposure to an accelerated dry-out or aging test at a temperature of 70 to 75 degrees C. for 15 hours, compositions of the described type exhibited properties indicating that they maintain the integrity of the seal. Anti-seize tests were performed by applying the compositions to the first two threads of a ½-inch anodized aluminum alloy pipe plug, then screwing the plug into a ½-inch aluminum alloy pipe coupling by use of a wrench with a 12-inch lever arm and a torque of approximately 600 to 900 inch pounds. Each plug was then backed off about one turn, and the degree of seizure determined by alternately tightening and loosening the plug through a quarter turn as rapidly as possible for about 4 or 5 seconds. If seizure has occurred, the plug cannot then be removed from the coupling without tearing the threads. On these tests the several compositions were found to give acceptacle results.

It is obvious that the invention is not limited to the specific examples of practice set out, but that it may be modified in many ways within the scope of the appended claims.

I claim:

1. An anti-seize paste composition for sealing metal joints exposed to the action of gasoline, comprising 4½ to 6 parts of highly polymerized blown castor oil, 1 to 2 parts of zinc stearate, and 0.3 to 1.5 parts of a neutral light mineral oil.

2. An anti-seize paste composition for sealing metal joints exposed to the action of gasoline, consisting of a mixture of highly polymerized blown castor oils, one of said castor oils being high blown and polymerized into a thick viscous mass and substantially 4 parts by weight thereof employed, and another of said castor oils being less highly blown and polymerized and substantially ½ to 2 parts thereof employed and forming in mixture with the said one castor oil a less viscous vehicle, 1 to 2 parts of zinc stearate, and 0.3 to 1.5 parts of a neutral light mineral oil as a stabilizer for preventing oxidation and further polymerization of said other blown castor oil.

3. An anti-seize paste composition for sealing metal joints exposed to the action of gasoline, comprising 4½ to 6 parts of highly polymerized blown castor oil, 1 to 2 parts of a soap selected from the group consisting of zinc and calcium soaps of saturated aliphatic acids having at least 17 carbon atoms exclusive of the carboxyl group, and 0.3 to 1.5 parts of a neutral light mineral oil.

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