This invention relates to a process of manufacturing lubricating grease from mineral oil.

Lubricating grease is generally produced by saponifying fats with alkaline material and water and then mixing mineral oil with the soap mass thus produced. The best quality of lubricating grease is only obtained when the soap mass to be mixed with the mineral oil, is free from unsaponified fat or alkaline material, and when only such water, as is essential for the saponification reaction, is present in the soap mass. Complete saponification results in both a greater yield and the production of a more uniform product.

It is the general practice in manufacturing lubricating grease to saponify the fats in an open steam jacketed vessel at a temperature near the boiling point of the mass. In such a process a part of the water present in the mixture is continuously vaporized during the saponification period. Thus it is necessary to first estimate the amount of evaporation which will take place and then add an excess of water to the mixture so that after the heating period has been completed, the mass will still retain just sufficient water for the saponification. Unless this estimation is accurately made, the loss by evaporation may be great enough to substantially use up all the water before the hydrolysis of the glycerides present in the fat has been completed, in which event free fat and free lime or caustic or both will remain and a poor quality of soap result.

This invention comprehends that by conducting the saponification of the fats in a closed vessel, in which the evaporation of water is substantially prevented, variation in the water content of the soap mass may be readily eliminated and the saponification completed without danger of insufficient water being present for the saponification and without necessarily judging at what exact period the reaction has been completed. Moreover, by conducting the process in a closed vessel, pressure may be maintained in the vessel and thereby the saponification carried out at a higher temperature resulting in a more rapid and complete saponification of the fats. Upon then releasing the pressure and lowering the temperature, the required mineral oil may be mixed with the soap stock and a more uniform and satisfactory product produced.

By this process the amount of water necessary for the saponification reaction may be employed which will not only insure a uniform saponification reaction, but also has an important bearing upon the color and appearance of the product. Thus the lubricating grease produced following the use of this minimum amount of water, the color of different batches of lubricating greases will be much more uniform than the color produced by the customary process.

It has been further found that if the pressure on the soap mass is reduced to atmospheric, before the mineral oil is mixed with the mass, the color of the resultant product can be controlled in a simple and economical manner. If water is mixed at the start or early during the period in which the mineral oil is mixed with the mass, a dark reddish colored product may be produced, and if the water is mixed in with the mass at the end or near the end of the mixing in period, a light colored lubricating grease can be produced. Thus, the time at which the water is added to the mass may control the color of the finished lubricating grease.

The objects and advantages of this invention will be apparent from a description of a preferred process embodying the invention, and will present themselves from the practice of the same. In the following description the process is set forth in detail and examples given of the desired proportions, temperatures, times of the reactions and other factors. It is understood, however, that such details are given merely to illustrate the preferred embodiment of the invention and may be widely varied without departing from the spirit of the invention.

The process described illustrates the procedure for producing 8000 pounds of lubricating grease by this invention and the proportions of material given are those pre-
ferred for producing this quantity of lubricating grease.

For the fatty constituents of the process various oils or fats may be employed such, for example, as lard oil and tallow. I prefer to employ a mixture of lard oil and tallow, both fat stocks being of good commercial grade. About 340 pounds of tallow to 1300 pounds of lard oil are desirable proportions.

Such material is placed in a closed vessel preferably provided with a mechanical stirring device and some suitable heating means such as a steam jacket.

To the fatty constituent is then added the quantity of water necessary in the saponification reaction, together with a suitable alkaline material such as lime or caustic alkali or both.

I prefer to employ both lime and caustic alkali in proportions of approximately 180 pounds of lime to 60 pounds of caustic alkali. The water added to such a mass is generally about 180 pounds. A small quantity of mineral oil, about 300 pounds, should be added at this time to prevent the mass from bunching.

The container is then closed and the mass heated to produce the saponification, during which time the mass is continually agitated.

When employing a steam jacket for heating the container, about 50 to 150 pounds of steam may be turned into the jacket which will raise the pressure in the container to a point somewhat below the pressure in the jacket. The mass should be heated to over 220°F. and preferably between 265 and 275°F. and the necessary pressure of around 50 pounds per square inch maintained upon the container.

Under these conditions saponification progresses very rapidly, it being generally complete in about thirty minutes. After the saponification is complete the heat is turned off and the pressure and temperature upon the soap mass reduced. The soap mass may be retained in the same vessel but preferably is transferred by blowing to a separate vessel for the later treatment, since in this manner the later treatment may begin at once and the pressure container left free to receive further charges. In either case, a quantity of mineral oil (sufficient to bring the weight of the finished mass to the weight of eight thousand pounds) is then mixed in with the mass while the mass is still warm. When the mass is transferred from the pressure container to the open vessel some evaporation of the water present takes place, which reduces the water content to 76 pounds. This evaporation, however, is uniform between the batches.

The soap mass is then agitated and the bulk of the mineral oil added to the mass as fast as the soap mass will absorb the oil.

The mixing in of the mineral oil requires from one to one-and-a-half hours when the size of batch described is treated. This mixing-in period is utilized to standardize the color of the resultant soap grease. When it is desired to produce a light colored grease, water is added near the end of the last-mentioned mixing-in period; generally about 50 pounds of water are sufficient for this purpose. A dark colored product is produced by adding the water early in the mixing-in period and intermediate colors can be obtained by adding the water at suitable intermediate periods.

By this process the saponification reaction may be more completely controlled, the amount of water present in the mass being known at any time. The lubricating grease may be produced more rapidly than by the customary processes and a light color and more uniform color of lubricating grease produced.

While the process herein described is well suited for the purposes of this invention, various modifications may be made without departing from the spirit of the invention.

The invention is of the scope set forth in the accompanying claims.

I claim:

1. In the manufacture of lubricating grease containing mineral oils, the combined operations of producing a soap stock by saponifying fats under a pressure substantially above atmospheric and at a temperature corresponding thereto, rapidly reducing the pressure to atmospheric, whereby, through such rapid reduction of pressure, causing a partial vaporization of the water of the mass, and adding the requisite mineral oils to form the grease to the soap stock while agitating the mass, said oils being added at such a rate that the mass absorbs the oils.

2. The process of manufacturing lubricating grease containing mineral oils, which comprises saponifying a mixture of fat and fatty oils with lime, alkali and water at a temperature over 220°F. and at a pressure corresponding thereto while maintaining the quantity of water present substantially constant throughout the saponification reaction, then rapidly releasing the pressure to atmospheric, thus causing a partial vaporization of the water present, and then mixing with the mass the requisite mineral oils to form a lubricating grease, the oils being added at a rate which will permit the mass to absorb the oils.

3. A process of manufacturing lubricating grease containing mineral oils, which comprises saponifying a mixture of waxes and fats with alkaline material at a pressure substantially above atmospheric and at a temperature corresponding thereto, releasing the pressure at such a rate that a partial vaporization of water from the soap mixture will take place, thereby forming a soap m-x.
ture with a predetermined residual water content, and then mixing with the soap mass the requisite mineral oils to form a lubricating grease, the oils being added at a rate which will permit the mass to absorb the oils.

4. A process of manufacturing lubricating greases of a predetermined color and containing mineral oils, which comprises saponifying a mixture of fats and water with alkali material at a temperature over 220 degrees F. and at a pressure corresponding thereto, then releasing the pressure at such a rate as to cause a partial vaporization of the water present in the soap mass, thereby producing a soap mass containing a predetermined water content, transferring the soap mixture to another container, and adding water and the requisite mineral oil to form a lubricating grease in predetermined quantities while agitating the mass.

Signed at Richmond, Calif., this 26th day of June, 1923.

WALTER VICTOR ATKINSON.