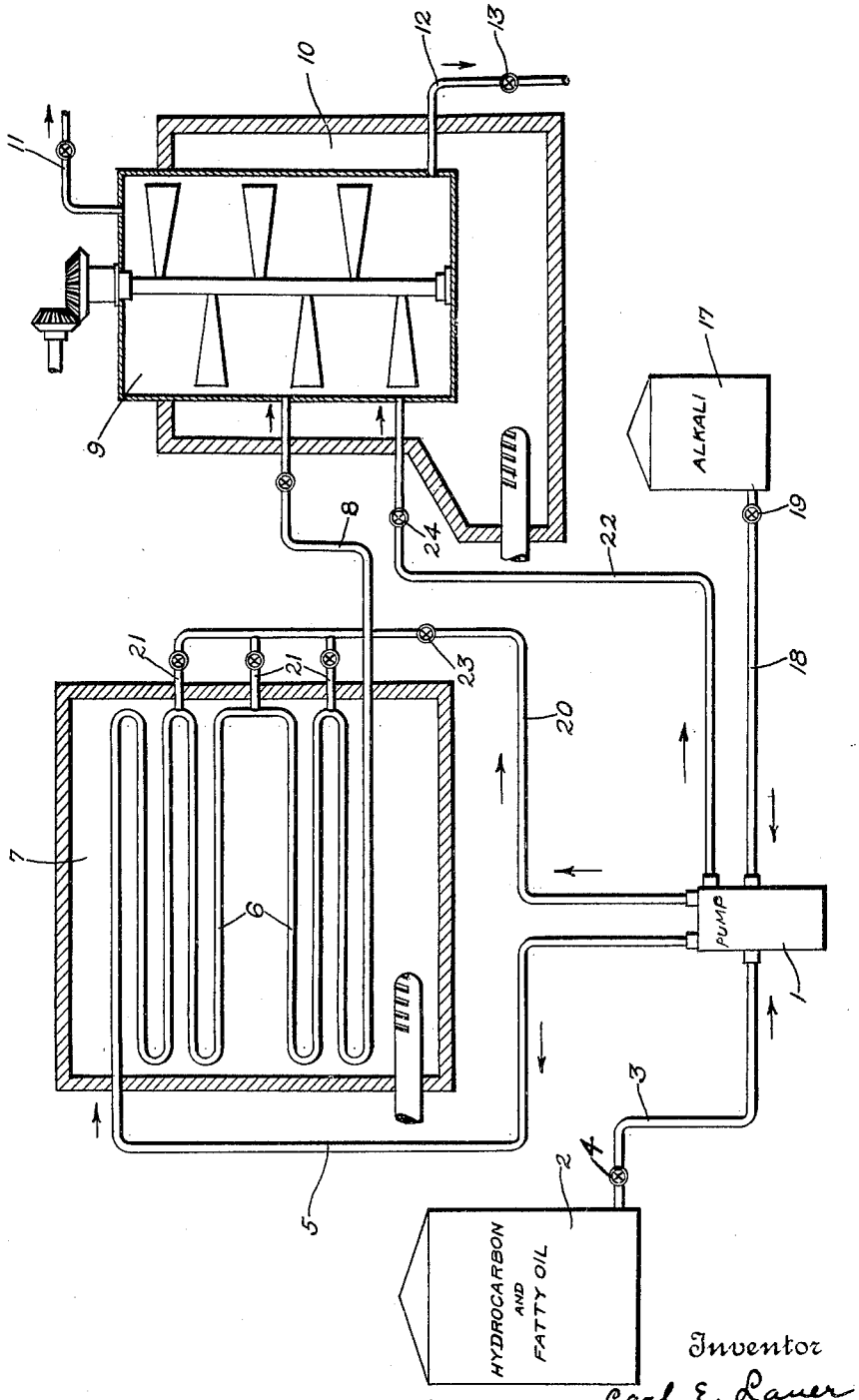
May 30, 1933. C. E. LAUER 1,912,001

MANUFACTURE OF GREASE

Filed July 1, 1930



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Patented May 30, 1933 1,912,001

UNITED STATES PATENT OFFICE

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MANUFACTURE OF GREASE

Application filed July 1, 1930. Serial No. 465,142.

This invention relates to an improved method of and apparatus for manufacturing grease by a continuous process wherein the mineral and fatty oil ingredients are heated in admixture and reacted with alkaline material to produce a desired grease.

The invention broadly contemplates mixing mineral oil and fatty oil or fatty acids in desired proportion, passing the mixture through a preheating section of a coil heater wherein it is heated to a predetermined temperature preferably in excess of the melting point of the final product, introducing alkaline or saponifying material to the preheated mixture, maintaining the admixture of oil and alkaline material in a heated state during its continued passage through the remaining portion of the heating coil to bring about saponification of its saponifiable constituents following which it may be conducted to a chamber wherein water and other undesirable materials may be removed to any desired extent in vapor form to produce a desired final product.

While the invention is particularly well adapted to the preparation of high soap content grease such as used for the lubrication of locomotive driving journals, it may also be adapted to the production of different types of grease compositions containing variable amounts of soap or different metallic soaps such as caustic, lime, aluminum and the like and comprising mineral and fatty oil constituents of various physical properties wherein the mineral oil ingredient may consist of a light lubricating oil, or heavy cylinder oil, and may embrace either a distillate or residual oil derived from paraffin or naphthene or mixed base crude, while the fatty oil or fatty acid ingredients may be derived from animal or vegetable origin such as hard tallow, tallow oil, fleshing grease, stearin, elaine oil, castor oil, cottonseed oil, and the like, and may also include hydrogenated fats.

Furthermore the invention may embrace the preparation of grease compositions containing such additional constituents as graphite, rosin, wax and the like, incorporated therein to impart certain specially desired physical properties to the product.

Another aspect of the invention contemplates an improved apparatus adapted to continuous methods of manufacturing grease which comprises a continuous heating coil communicating with an open or a closed kettle or chamber and having means for introducing saponifying material to the interior of the coil through one or more intermediate points to commingle with the oil mixture and react with its saponifiable constituents during continued flow through the coil from which the admixture is conducted to the chamber wherein undesirable vaporous materials may be removed in order to produce the desired final product.

By prior art methods of manufacture, mineral and fatty oil ingredients may separately be charged to a kettle wherein they may be mixed and heated to a suitable temperature. The saponifying material is then slowly added to the hot mixture with agitation and continued heating sufficient to maintain the reacting admixture at substantially constant temperature thereby facilitating the reaction as well as vaporizing water.

In batch operations of this nature difficulty may be experienced in consistently maintaining absolute uniformity in the product produced in succeeding batches of the grease due largely to slight variations in operating conditions, particularly variation in temperature conditions prevailing throughout the whole mass of reacting ingredients within the kettle. Thus variations may frequently occur in the rate of heating of different batches or on the other hand in particular batches the temperature rise may vary throughout the mass of the material being heated with the occurrence of localized overheating of certain portions of the mixture. Although these variations may be of very small magnitude, nevertheless they may cause undesirable variations in the appearance or quality of the final product.

Accordingly my invention contemplates a method of continuous manufacture of grease products adapted to bring about better and more complete control of operating conditions during heating and subsequent

saponification than is possible in conventional batch methods of manufacture.

By the practice of my invention mixed mineral oil and fatty oil or fatty acid are passed through a continuous tubular heating coil wherein the mixture is progressively heated in a primary or preheating section of a heating coil to a predetermined temperature. At a suitable point or points in the coil at which the oil mixture has attained this desired temperature saponifying material, such as aqueous caustic soda, lime, or the like, is introduced. Saponification takes place during the passage of the mixture through the secondary or remaining portion of the heating coil.

During passage through this portion of the heating coil the mixture may be maintained at substantially constant temperature or heated to a predetermined temperature considerably higher than that to which the oil mixture was heated prior to the introduction of the saponifying material.

The reacted mixture is then preferably passed to a closed kettle or chamber wherein water and other undesirable constituents are vaporized and removed to any desired extent to produce the desired final product.

While, in the preferred method of practicing the invention, the saponifiable constituents are saponified within the coil, the reaction may be finally brought to completion within the chamber or kettle and if necessary additional alkaline material may be introduced directly to the admixture within the chamber in order to bring about the desired degree of saponification.

Furthermore, saponification may be carried out entirely within the chamber, particularly when employing pure fatty acids rather than fatty oil as an ingredient, since the reaction rate between pure fatty acids and alkaline material may be effected with sufficient rapidity to enable substantially continuous production of the product when introducing the alkaline material directly to the chamber. When operating in this particular manner it may be desirable to reduce the charge rate in order to increase the time during which the reacting admixture remains in the chamber or a relatively larger chamber may be employed, if desired, in order to increase the time during which the reactions may be carried out.

The invention may be clearly understood from the following detailed description which has reference to the accompanying drawing illustrating diagrammatically a preferred embodiment of the apparatus adapted to practice the invention.

A pump 1 withdraws mineral oil and fatty oil ingredients which have been previously mixed in desirable proportion from a storage tank 2 through a pipe 3, having a valve 4, and delivers the mixture through a pipe 5 to a heating coil 6, preferably a continuous tubular type of pipe still heater, mounted in a furnace 7 heated by a suitable burner.

The pipe 8 leads from the heating coil 6 to a chamber or kettle 9 which may be provided with suitable stirring means. The kettle 9 is shown mounted in a furnace 10 but in many instances a steam jacketed kettle or even a well insulated kettle will be entirely satisfactory. The kettle is also provided with an exhaust pipe and suitable valve 11 through which vapors may be withdrawn from the kettle. Draw-off pipe 12 equipped with a valve 13 leads from a point near the bottom of the kettle 9 to any desired containers, not shown, into which the contents of the kettle may be drawn.

Alkali storage tank 17 is connected by pipe 18 containing valve 19 to suitable proportional pumping means operated in conjunction with pump 1, and such pumping means may deliver the alkali through pipe 20 to several branch pipes 21 provided with suitable valves and leading to different points in the heating coil 6. The proportional pumping means is also connected by pipe 22 with the kettle 9. Pipes 20 and 22 are provided respectively with valves 23 and 24 by means of which the alkali may be directed to the coil 6 and to the kettle 9 as desired.

In carrying out the process the mixed hydrocarbon and fatty oils are withdrawn by pump 1 from tank 2 and passed through the heating coil 6 where the oil may be heated to any desired temperature preferably above the melting point of the final product. For example, a desired range may be between 400° and 500° F., or the temperatures may be considerably higher. In one method of operation the proportioning pump associated with pump 1 delivers an alkali solution from tank 17 through pipe 20 into the coil 6 through any or all of the pipes 21. The point of injection of the alkali most suitable for the preparation of the grease being made may be determined by experiment, it being noted that the introduction of the alkali through the upper pipe 21 provides the longest time for reaction and saponification before the mixture reaches the kettle 9. The rate of heating and of passage of the mixed oils through the heater 6 may be such as to permit complete saponification of the mass before it reaches the kettle 9, but, on the other hand, the factors governing the rate of saponification may be so adjusted that saponification is only partially completed by the time the mixture reaches the kettle 9.

Any desired level of contents may be maintained in the kettle 9 and it is preferable that a substantial body be maintained

therein in order to assure substantially uniform composition of the finished product, which may be drawn off continuously or intermittently through pipe 12 into suitable containers.

Any desired proportion of the water vapors evolved may be withdrawn through the pipe 11, as well as any other vapors generated in the system. The process is especially adapted to the preparation of substantially dehydrated greases and in such instances practically all of the water will be evaporated from the mass in the kettle 9. While it is usually preferable to maintain the contents of the kettle at temperatures above the melting point of the finished product and draw off such product in a substantially liquid condition through pipe 12, the method in the preparation of greases in which the ingredients are heated at temperatures below the melting point of the final product with stirring and partial or complete dehydration and withdrawal of the finished product in a semi-liquid or semi-solid mass is not precluded.

In another method of operation valve 23 and pipe 20 may be closed, and valve 24 and pipe 22 open, so as to permit the proportional pump to deliver the alkali solution directly to the kettle 9. In such an instance reaction and saponification of the fatty constituents will be completed entirely within the kettle 9.

While heating and saponification may be carried out at substantially atmospheric pressure it is preferable to employ pressure within the heating coil as well as in the chamber in order to prevent undesirable vaporization of the low boiling constituents of the mixture. By adjusting the valve in the outlet pipe 8 of the heating coil 6 any desired pressure may be maintained within the coil whereby I am able to employ temperatures of upwards of 700° F. without substantial vaporization of any light oil constituents of the mixture.

Although substantially the same pressure may autogenously be maintained within the kettle 9 as that which prevails within the coil outlet by regulating the flow of vaporous material through the valved pipe 11, it may be preferable to employ pressure somewhat reduced from that existing within the coil in order to bring about the desired degree of vaporization of water and other material of a more or less gaseous nature.

Thus, for example, I may employ a pressure of around 400 pounds gauge and a temperature not in excess of 650° F. at the heating coil outlet as compared with about 100 pounds gauge within the kettle. Under these conditions the reaction may ordinarily be completed within the coil while the desired amount of water or other material is vaporized and removed from the chamber.

Obviously many modifications and variations of the invention, as hereinbefore set forth, may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. A continuous process for manufacturing grease comprising mixing mineral oil and fatty oil in the desired proportion, flowing the mixture in a confined stream while heating it therein to a predetermined and controlled temperature, introducing saponifying material into the preheated mixture, further flowing the mixture of oil and saponifying material in a confined stream while subjecting it to further heating to bring about saponification of its saponifiable constituents, passing the mixture into an enlarged zone, and withdrawing from said zone undesired vapors evolved therein to produce the desired final product.

2. A continuous process for manufacturing grease comprising mixing mineral oil and fatty oil in the desired proportion, flowing the mixture in a confined stream while heating it therein to a desired temperature above the melting point of the final product, introducing saponifying material to the preheated mixture, further flowing the mixture of oil and saponifying material in a confined stream while subjecting it to further heating to bring about saponification of its saponifiable constituents while maintaining the mixture substantially at said temperature, passing the mixture into an enlarged zone, and withdrawing from said zone undesired vapors evolved therein to produce the desired final product.

3. A continuous process for manufacturing grease comprising mixing mineral oil and fatty oil in the desired proportion, flowing the mixture in a confined stream while heating it therein to a desired temperature above the melting point of the final product, introducing saponifying material to the preheated mixture, further flowing the mixture of oil and saponifying material in a confined stream while subjecting it to further heating to a predetermined temperature, passing the mixture into an enlarged zone, and withdrawing from said zone undesired vapors evolved therein to produce the desired final product.

4. A continuous process for manufacturing grease comprising mixing mineral oil and fatty oil in the desired proportion, flowing the mixture in a confined stream while heating it therein to a desired temperature above the melting point of the final product, introducing saponifying material into the preheated mixture, further flowing the mixture of oil and saponifying material in a confined stream while subjecting it to fur-

ther heating to bring about saponification of its saponifiable constituents, passing the mixture into an enlarged zone, introducing additional saponifying material into the mixture in said zone, and withdrawing therefrom undesired vapors evolved therein to produce the desired final product.

5. A continuous process for manufacturing grease comprising mixing mineral oil and fatty oil in the desired proportion, flowing the mixture in a confined stream while heating it therein to a predetermined and controlled temperature, and introducing saponifying material into the hot oil stream, passing the mixture into an enlarged zone, withdrawing from said zone undesired vapors evolved therein to produce the desired final product.

6. A process as defined in claim 5 in which the mixture of mineral oil and fatty oil is maintained under superatmospheric pressure.

In witness whereof I have hereunto set my hand this 16th day of June, 1930.

CARL E. LAUER.