

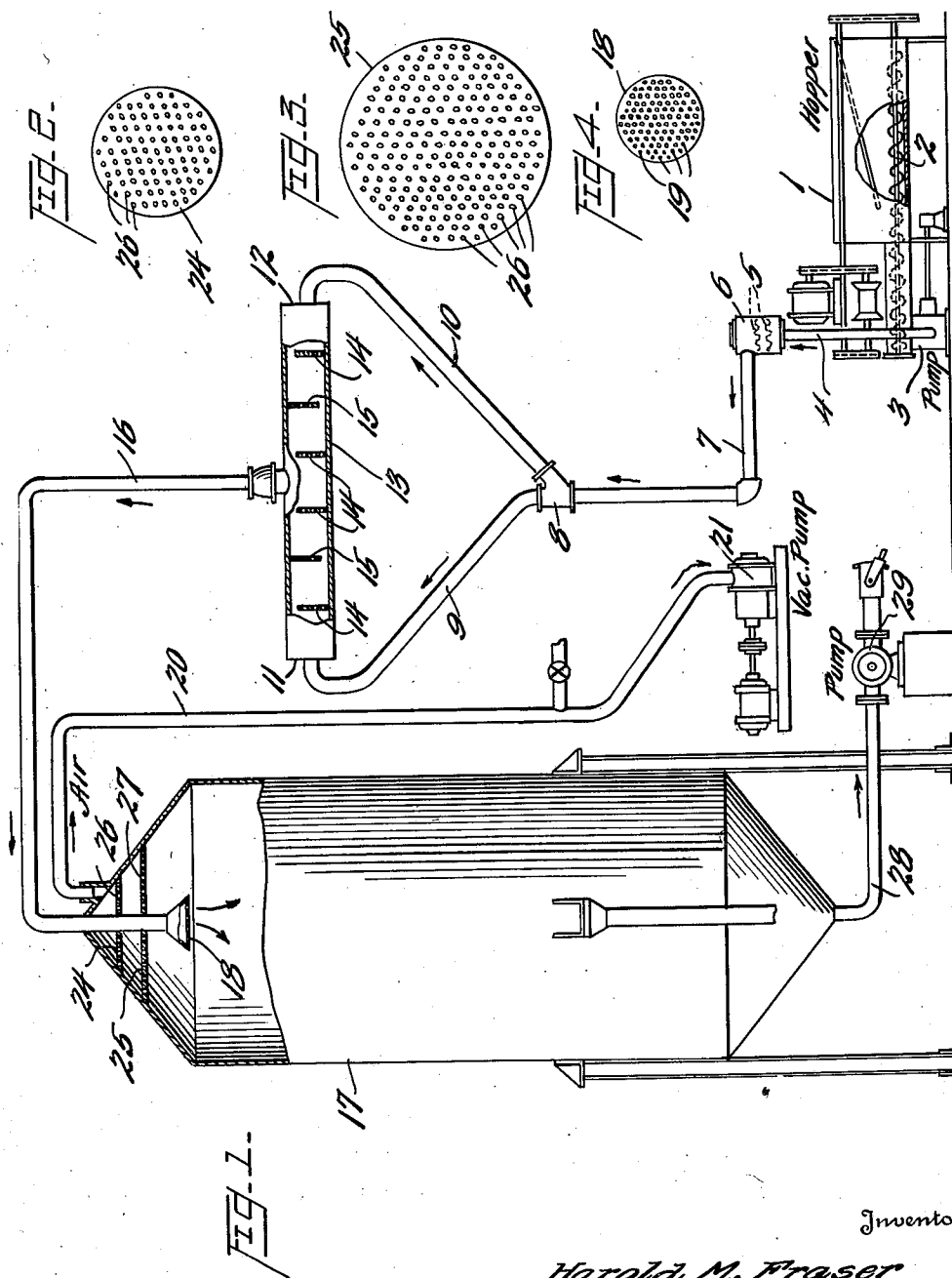
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METHOD OF AND APPARATUS FOR TREATING GREASE

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METHOD OF AND APPARATUS FOR
TREATING GREASE

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The present invention relates to the treatment of grease, and more particularly to a method and apparatus for mixing greases and removing entrapped air therefrom.

Usually one of the final steps in the manufacture of greases is the pouring of the same into pans so that the grease may chill. This results in rather stiff blocks, the contents of which need further treatment or milling to produce a final grease of proper texture and consistency, that is, one which forms a smooth, homogeneous mass.

The working or milling of the grease mixes and entraps air into the grease, which it is highly desirable to remove.

The removal of air from greases has the following advantages:

(1) The storage stability of the grease is greatly increased, that is the oxidation of the grease is greatly inhibited, if not entirely eliminated, due to the absence of air bubbles intermeshed in the grease;

(2) Due to the absence of air bubbles in the grease, the pumpability of the grease in a grease gun is greatly increased. Further, the absence of air prevents the formation of air locks in the system being lubricated;

(3) If air bubbles are present in grease, when the latter is used to lubricate bearings, the entrapped air displaces a definite quantity of grease which may be necessary for the lubrication of the bearing.

The present invention will be described in connection with the accompanying drawing, in which

Figure 1 is an elevational view, partly diagrammatic, of apparatus suitable for carrying out the present invention;

Fig. 2 is a plan view of the upper air-exit plate;

Fig. 3 is a plan view of the lower air-exit plate; and

Fig. 4 is a plan view of the grease divider, whereby the grease is broken up in small streams, facilitating the removal of the air from the grease on the entrance of the latter into the vacuum grease container.

Referring to the drawing, grease which has been preferably cooled to room temperature in pans is delivered to a hopper 1, adapted to hold between 500–600 pounds of grease. The grease is conveyed by means of a conveyor, preferably a screw conveyor 2, located at the bottom of hopper 1, to a pump 3 which forces the grease through conduit 4 and screen 5 in container 6. The grease then travels by conduit 7 to T 8, where it is divided in two streams 9 and 10, re-

spectively, which are forced into opposite ends 11 and 12 of the mixer 13.

The conveyor 2, rotating at about 120 R. P. M., removes the grease from the hopper at the rate of about 200–300 pounds per minute. These specifications are illustrative, and not by way of limitation. The screen 5 is an exceedingly fine one being preferably a 60 mesh screen.

The mixer 13 is provided with a series of perforated plates 14 and 15, preferably arranged so that the grease may travel around the end of each plate in a wave motion to ensure a more thorough mixing of the grease. Plates 14 are open at their tops and plates 15 are open at their bottom portions, these plates alternating one with the other to impart a wave motion to the grease. The arrangement is especially desirable when two or more different types of grease are mixed together, as for example, a soda base grease with an aluminum, calcium or lead soap grease.

The grease is pumped from the mixer 13 through conduit 16 to vacuum tank 17, which usually has a vacuum varying between 26 to 30 inches of mercury. The grease enters the vacuum pipe through grease divider plate 18, which is provided with apertures 19, which may range in size from $\frac{1}{8}$ of an inch to $\frac{3}{4}$ of an inch or thereabouts. Using a plate 16 inches in diameter, about 260 $\frac{3}{4}$ inch apertures may be provided. The plate 18 functions to break the incoming grease into small streams, which enables the entrapped air to be quickly removed. Each bubble of air as it comes into the divider plate is surrounded by a thin film of grease which breaks upon the grease entering the vacuum tank, and the air is removed from the grease. The air is withdrawn from the vacuum tank 17 through conduit 20 by means of vacuum pump 21. The finished grease at the conclusion of a run is removed from the tank 17 by the pump 22, the grease passing through exit conduit 23.

It is to be noted that the vacuum tank 17 is provided with an upper air exit plate 24 and a lower plate 25, these plates being provided with apertures 26 and 27, respectively. The tank 17 being under vacuum, there is a tendency for the grease therein to foam or be lifted. If there is a sufficient amount of space above the active grease line, there is relatively little tendency for the grease to pass through the conduit 20 to the vacuum pump 21. If the grease does foam up to the level of plates 24 and 25, the latter act as barriers preventing the grease from passing into

suction conduit 20, while permitting the air to pass therethrough.

The vacuum tank 17 is adapted to hold between 35,000 to 40,000 pounds of grease which is approximately one day's production. Therefore, in carrying out the present invention, the mixing and milling of the grease is continuous for the period of one day, or for a shorter period if so desired. After the vacuum tank has been operating until it contains a charge of the character set forth, the grease is allowed to remain in the vacuum tank for a period of two to ten hours, depending upon the consistency of the grease. During this period, the vacuum pump 21 is operating to remove volatiles from the grease and also any remaining traces of air. After the grease has been allowed to stabilize for a period of two to ten hours, vacuum pump 21 is stopped and the vacuum is broken. Then the pump 29 is started, and the grease is removed from the tank by passage through the conduit 28. The grease may then be passed into proper containers.

The grease which is the subject matter of the present invention is, of course, made by mixing a metal soap with mineral and/or vegetable oils, there being optionally present other ingredients.

While the present invention may be used for the treatment of various kinds of greases, it is particularly applicable to the production of grease made in accordance with the disclosure of application Serial No. 347,533.

While it is not desired to be limited to the conditioning of grease of any particular viscosity, it may be stated that the viscosity of the grease which is usually delivered to the vacuum tank 17 at atmospheric temperature does have a slight bearing upon the removal and elimination of the air from the grease. If the A. S. T. M. worked penetration of the grease is harder than 250, it is necessary to pump the grease into the vacuum tank 17 at a much slower rate, and to leave the grease in the tank somewhat longer than specified, as for example where the grease would ordinarily be left in the tank from two to ten hours, if a hard grease is pumped into the vacuum tank the grease would be left therein for a period of two to twelve hours. Further, upon conditioning a grease made with a high viscosity oil, as for example above 100 Saybolt at 210° F. and having a penetration between 325 and 375, it is necessary to slow down to some extent the pumping of the grease.

The method and apparatus herein disclosed has produced exceedingly good results when it has been used to treat and condition a grease having approximately an oil viscosity of 85 Saybolt at 210° F., the grease containing 4% soap; the grease being a mixture of 75% of a soda base grease and 25% of an aluminum base grease.

In carrying out the present invention, the sodium soap grease and the aluminum soap grease, which has been cast in pans, are introduced into the hopper 1 in approximately the ratio of three parts of soda base grease and one part of aluminum base grease. The grease is then pumped through the screen 5 to break the grease up into a smooth homogeneous mass. The screen serves to increase the homogeneity of the grease. After the grease passes through the mixer 13, and by the time it is ready to be introduced into the vacuum tank 17, the grease is a homogeneous smooth transparent product, and as it leave the vacuum tank it contains no visible traces of entrapped air.

The method and apparatus herein disclosed

continuously produces from different soap base greases a well mixed smooth grease, and analyses of the grease taken at relative intervals as it comes from the vacuum tank, shows that on a ten gram sample the proportions of the different soap base greases are then within about one-half of one percent of the proportions in which they are charged into the hopper. For example, when there is initially charged three parts of a soda base grease and one part of an aluminum base grease, the finally conditioned grease as it is removed from the vacuum tank has the different soap base greases present in that proportion.

The method and apparatus herein set forth functions admirably to condition greases which have been poured into pans for cooling and which are usually too stiff to be used for ordinary lubrication. It is quite desirable to mill the greases to impart to them the proper texture and consistency. When this is done, the working or milling of the lubricating grease in the working and mixing apparatus herein set forth functions to introduce air into the grease which frequently is highly objectionable. While the mixing and milling apparatus herein set forth which is thought to be highly novel, does produce a grease from which it is desirable to remove the air, it is desired to point out that greases may be milled in other types of apparatus which causes air to be entrapped in the grease, and therefore greases, irrespective of the method of milling, or whether they have at all been milled, may be treated in the vacuum tank by splitting them up into fine streams. Then each bubble of air is surrounded by a thin film of grease, and as soon as each stream comes in contact with a vacuum, the film of grease breaks and the air is removed from the grease.

It is desired to point out that if the air is left in the grease the grease in many occasions tends to become milky white, and this is particularly so when the grease with its air content is passed through a grease gun.

The present invention is applicable to the production of greases of various types, including cup greases and pressure gun greases.

In accordance with the present invention, there is thereby produced, as a new product, lubricating grease substantially devoid of air and resistant to oxidation.

From the standpoint of the apparatus, the invention resides broadly in means for feeding the grease to a hopper or other mixing means, means for separating the grease into separate portions, a mixer provided with a series of baffles positioned to pass the grease through the mixer in an impeded path, as for example a tortuous path or a sinuous path; a vacuum container for receiving the grease from the mixture, means for feeding the grease to the vacuum container, and means for withdrawing the grease from the latter.

While the present method and apparatus is particularly useful in producing a mixed soap base lubricating grease, it may be stated that the apparatus may be used for the milling and conditioning of any grease which is ordinarily too stiff to be used for lubricating purposes. In other words, instead of feeding into the hopper a mixture of a soda base grease and an aluminum base grease, a soda base grease or a calcium base grease, or any other grease may be fed into the hopper and passed through the system for the purpose, providing a smooth, homogeneous grease of desired texture and consistency.

Under some circumstances it will not be neces-

sary to pass the grease through the screens 5 but the grease may be passed directly to the mixer 13. Further, while it is preferable to split the grease into two components this is not absolutely essential and therefore, under some circumstances the grease may be pumped directly from the hopper 1 to the mixer 13 without any splitting step, the grease being introduced at one end of the mixer or at any other convenient place. It is not essential to split the grease into two components when the grease which is being conditioned has not been compounded by mixing a grease having one soap base with a grease having a different soap base. In other words, a soda base grease by itself or a calcium base grease by itself or a similar grease may be delivered directly from the hopper to the mixer 13.

I claim:

1. The method of removing entrapped air from lubricating grease comprising dividing the grease into a plurality of small streams containing entrapped air, and subjecting the so-treated grease to a vacuum whereupon the air is quickly removed from said grease streams.

2. The method of removing entrapped air from lubricating grease comprising dividing the grease into a plurality of small streams containing entrapped air, introducing said streams of grease into a vacuum container whereupon the air is quickly withdrawn from the streams of grease, and withdrawing the removed air from the vacuum container.

3. The method of removing entrapped air from lubricating grease comprising dividing the grease into a plurality of small streams containing entrapped air, introducing said streams of grease into a vacuum container whereupon the air is quickly withdrawn from the streams of grease, withdrawing the removed air from the vacuum tank while preventing the withdrawal of grease along with the air, and separately withdrawing the so-conditioned grease.

4. The method of removing trapped air from lubricating grease comprising introducing the grease into a vacuum container, dividing the grease into small particles containing air bubbles covered by films of grease, subjecting the so-conditioned grease to the action of a vacuum to break the grease films, and removing the freed air from the vacuum container.

5. The method of removing trapped air from lubricating grease comprising introducing the grease into a vacuum container, dividing the grease into small particles containing air bubbles covered by films of grease, subjecting the so-conditioned grease to the action of a vacuum to break the grease films, removing the freed air from the vacuum container, allowing the grease charge to build up in said vacuum container, further removing from said grease charge any remaining traces of air, and then removing the stabilized grease.

6. The method of removing trapped air from lubricating grease comprising introducing the grease into a vacuum container, dividing the grease into small particles containing air bubbles covered by films of grease, subjecting the so-conditioned grease to the action of a vacuum to break the grease films, and removing the freed air from the vacuum container while preventing the withdrawal of grease along with the air.

7. In apparatus for the production of a smooth, homogeneous grease, the combination of a mixer provided with means to pass grease therethrough in an impeded path, a vacuum container, means

for delivering the grease from the mixer to the vacuum container, means in the latter for dividing the grease into particles containing air bubbles covered by films of smooth substantially homogeneous grease, vacuum means adapted to break said films of grease and to remove the freed air from the vacuum container, and means for withdrawing the grease therefrom.

8. In apparatus for the production of a smooth homogeneous mixed grease from a plurality of different soap base greases, the combination of grease feeding means, means for separating the grease into separate portions, a mixer provided with a series of baffles positioned to pass the grease through the mixer in an impeded path, a vacuum container for receiving the grease from the mixer, means for feeding the grease to the vacuum container, means therein for dividing the grease into particles containing air bubbles covered by films of grease adapted to break upon being subjected to the action of a vacuum, means for removing the freed air from the vacuum container, and means for withdrawing the grease from the container.

9. In apparatus for the production of a smooth homogeneous mixed grease from a plurality of different soap base greases, the combination of grease feeding means, a mixer, means for splitting the grease into two components and delivering one component to one end of the grease mixer and the other component to the other end of the grease mixer, said mixer being provided with a series of baffles positioned to pass each component of the grease through the mixer in an impeded path, a vacuum container, means for uniting and delivering the so-treated grease to the vacuum container, means therein for dividing the grease into particles containing air bubbles covered by films of grease adapted to break upon being subjected to the action of a vacuum, means for removing the freed air from the vacuum container, and means for withdrawing the grease from the container.

10. In apparatus for the production of a smooth homogeneous mixed grease from a plurality of different soap base greases, the combination of grease feeding means, a mixer, means for splitting the grease into two components and delivering one component to one end of the grease mixer and the other component to the other end of the grease mixer, said mixer being provided with a series of baffles positioned to pass each component of the grease through the mixer in an impeded path, a vacuum container, means for uniting and delivering the so-treated grease to the vacuum container, means therein for breaking up the grease in a plurality of fine streams facilitating the withdrawal of entrapped air, means for withdrawing the removed air from the vacuum container, and means for withdrawing the so-conditioned grease.

11. In apparatus for the production of a smooth homogeneous mixed grease from a plurality of different soap base greases, the combination of grease feeding means, means for initially subdividing the grease to increase its homogeneity, means for separating the grease into separate portions, a mixer provided with a series of apertured baffles positioned to pass the grease through said mixer in an impeded path, a vacuum container for receiving the grease from the mixer, means for feeding the grease to the vacuum container, means therein for dividing the grease into particles containing air bubbles covered by films of grease adapted to break upon being sub-

jected to the action of a vacuum, means for removing the freed air from the vacuum container, and means for withdrawing the grease from the container.

12. In an apparatus for the production of a smooth homogeneous mixed grease from a plurality of different soap base greases, the combination of grease feeding means, means for initially subdividing the grease to increase its homogeneity, means for separating the grease into separate portions, a mixer provided with a series of apertured baffles positioned to pass the grease through said mixer in an impeded path, a vacuum container, means for feeding the grease from the mixer to the vacuum container, means therein for breaking up the grease in a plurality of fine streams facilitating the removal of entrapped air, means for withdrawing the removed

air from the vacuum container, and means for withdrawing the so-conditioned grease.

13. In apparatus for the production of a smooth, homogeneous grease, the combination of a mixer provided with means to pass grease therethrough in an impeded path, a vacuum container, means for delivering the grease from the mixer to the vacuum container, means in the latter for dividing the grease into particles containing air bubbles covered by films of smooth substantially homogeneous grease, vacuum means adapted to break said films of grease and to remove the freed air from the vacuum container, means therein for preventing the withdrawal of grease along with the freed air, and means for separately withdrawing the so-conditioned grease.

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