

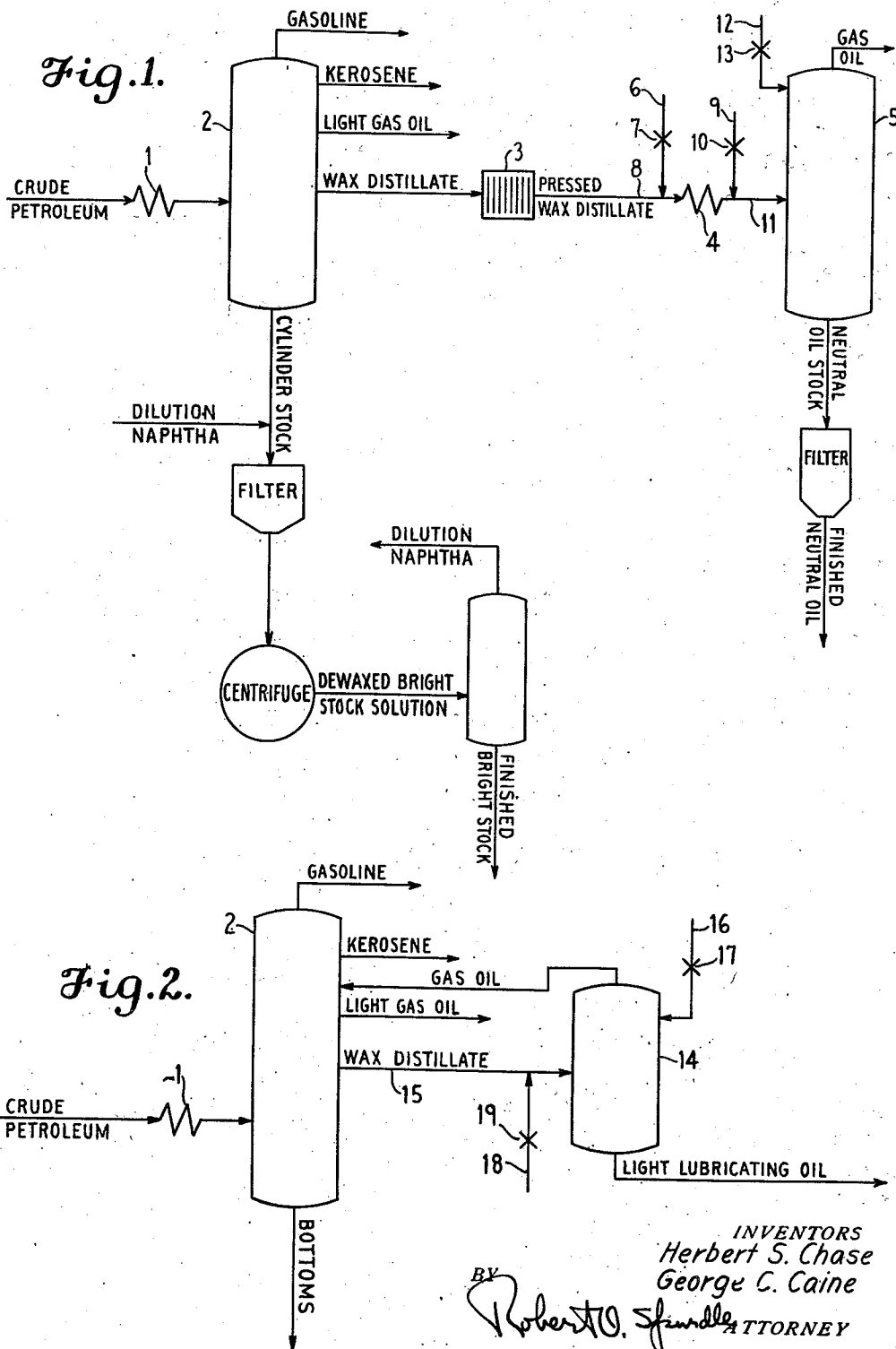
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ART OF PRODUCING LUBRICATING OILS

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ART OF PRODUCING LUBRICATING OILS

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This invention relates to improvements in the art of producing lubricating oils from crude petroleum by a processing and refining procedure of the general organization wherein the crude is subjected to distillation to segregate selected fractions comprising lubricating oil stocks; and these fractions subsequently processed in successive stages for the removal of undesired portions or constituents, to the end of an ultimate production of finished oils having the characteristics necessary or desired for particular lubricating services. More particularly, the invention is concerned with the manufacture of relatively light lubricating oils, of the type commonly designated as neutral oils when derived from certain paraffin base crudes as of Pennsylvania origin. It is an important objective of the invention to obtain such lubricating oils in greatly increased yield, while avoiding impairment of desired properties either in these or heavier lubricating oils concurrently produced from the same or other crude source. A further object is the attainment of the foregoing objective without creating difficulties in the operation of necessary conventional refining steps.

As one embodiment of established commercial value, the invention conveniently may be illustrated in its application to the production of lubricating oils from paraffin base crudes of Pennsylvania origin. As will appear more fully hereinafter, however, other embodiments are contemplated and have established utility, as in the production of light lubricating oils in increased yield from similar or different base crudes of other than Pennsylvania origin. It is to be clearly understood, therefore, that no limitation is intended to be expressed or implied in the particular selection of illustrative examples and embodiments to demonstrate the operative significance of the invention.

In order to make available a complete range of motor oils by blending light and heavy lubricating oils in various proportions, the primary distillation of Pennsylvania crude commonly is conducted to provide two broad lubricating stock fractions; one taken overhead as an intermediate side cut or distillate generally designated as lubricating or wax distillate, and the other a residual fraction comprising the heaviest portions of the crude and generally referred to as cylinder stock. In this manner, there is made available source material both for light lubricating oils (neutrals) and for heavy lubricating oils (bright stocks). The production of these two source materials to required specifications in the

ultimate oils as to characteristics such as gravity, flash, viscosity, and the like, together with refining problems encountered in the processing of each broad fraction, necessitates careful control of the primary crude distillation. A restrictive limitation is imposed upon the proportions of wax distillate and of cylinder stock which can be segregated from a given crude; and thus it has not been possible heretofore to materially increase the yield of neutral oil from a particular crude without creating refining difficulties and impairing the quality of the bright stock concurrently produced.

According to the present invention, it has now been discovered that the foregoing difficulties can be obviated by a novel and effective improvement in the processing of a wax distillate (or other light or distillate lubricating stock fraction when crudes of other than Pennsylvania origin form the crude source material) to neutral or similar light lubricating oils. More particularly, such wax distillate, after dewaxing and other desired refining treatment, herein is subjected to a secondary fractional distillation in the presence of a relatively minor proportion of hydrocarbon material having characteristics of a lubricating stock and further characterized by a viscosity substantially higher than that of the finished neutral oil to be produced. As a specific example of such material may be mentioned bright stock produced concurrently from the crude source supplying the wax distillate in process.

In the accompanying drawing, in which like reference characters denote like parts,

Figure I depicts an illustrative flow sheet of a crude processing and refining system for the production of lubricating oils, in which provision is made for incorporating the improvements constituting the present invention; and,

Figure II is a partial flow sheet illustrating the application of the invention to a somewhat different system for the production of lubricating oils.

Referring now more particularly to Figure I, the invention first will be illustrated in respect of its application to the production of neutral oils in increased yield from a paraffin base Pennsylvania crude. In such a system, primary distillation of the crude is effected in the unit comprising a usual pipe still 1 and fractionating column 2. Gasoline is taken overhead, while other light fractions comprising kerosene and light gas oil are removed at suitable points in the upper portion of the tower. A conventional lubricat-

ing or wax distillate is produced as a side cut from a lower intermediate point in the column 2, and the tower bottoms comprise the residual or cylinder stock fraction of the crude.

This primary distillation is carefully controlled according to usual practice to yield cylinder stock bottoms having characteristics of gravity, viscosity, and the like necessary for the ultimate production therefrom of bright stock meeting prescribed specifications. The processing of cylinder stock to bright stock may, as indicated in the accompanying flow sheet, involve the steps of dilution with naphtha to facilitate subsequent handling, filtration thru decolorizing clay, centrifuge dewaxing, and reduction by distillation to remove the naphtha diluent.

The wax distillate, which forms the source material for ultimate neutral oil production, comprises the less viscous lubricating oil fractions of the original crude supply together with a relatively large amount of gas oil. It has a viscosity at 100° F. ordinarily somewhat under 100 Saybolt seconds as compared with corresponding neutral oil viscosities of 150 Saybolt seconds and higher. This distillate lubricating stock first may be dewaxed by any desired method suitable for the economic removal of crystalline wax as, for example, with the aid of the plate and frame presses indicated at 3 in the flow sheet, and then must be reduced by a secondary distillation wherein gas oil is taken overhead under such conditions of tower control as to give a residual or bottoms fraction of suitable flash point and viscosity. The final processing of this fraction ordinarily involves decolorizing by filtration through fuller's earth or similar medium; and also may include such auxiliary refining operations as acid treatment, solvent extraction, and the like.

In a procedure such as the foregoing, the objects and advantages of the present invention are attained by a novel and improved method of effecting the secondary distillation or fractionation of the dewaxed light lubricating stock fraction. Heretofore, it has been customary to pass this pressed or otherwise dewaxed distillate through a heating coil 4 to a tower 5 wherein it is subjected to simple fractionation for the production of overhead gas oil and bottoms neutral stock. According to the invention, this conventional procedure is modified by arranging for the secondary fractional distillation to be conducted in the presence of certain hydrocarbon material brought into the system at a suitable point and in minor proportion relative to the amount of pressed distillate available. The so improved secondary fractionation is carried out under conditions of tower control effective to give a neutral oil bottoms fraction meeting prescribed specifications of viscosity and flash point, and it has been found that the method of the invention gives unexpectedly beneficial results in the way of greatly increased yields of neutral oil product.

The invention contemplates the use of rather a wide variety of hydrocarbon materials in connection with the improved method of conducting the aforesaid secondary distillation of light lubricating oil stock. Desirably, the material selected will have lubricating stock characteristics, and in the preferred application of this phase of the invention a suitably refined stock is regarded with favor. Thus, bright stock, obtained by filtering and dewaxing cylinder stock bottoms from a primary distillation of paraffin or mixed base

crude, serves very satisfactorily in the instant process. Bright stock for this purpose may, in the case of Pennsylvania and certain Mid-Continent crudes, be derived from the same original petroleum source material as produces the distillate lubricating stock fraction in process. Alternatively, the bright stock or other hydrocarbon material used equally well may be derived from extraneous sources. Likewise, it is feasible to use cylinder stock bottoms from various sources whether or not refined, heavy lubricating oil fractions from various operations, selected fractions of overhead cylinder stock or long residuums, and the like.

An important consideration in the selection of a particular petroleum fraction or other hydrocarbon material, to be introduced into the secondary distillation or fractionation of light lubricating stock as hereinbefore described, is its viscosity. Quite viscous material is preferred, and in any event the viscosity in question should be materially higher than that of the finished neutral or other light lubricating oil to be produced. By way of illustration, secondary distillation of pressed wax distillate for the production of neutral oil having a final viscosity of the order of 180 Saybolt seconds at 100° F. was effectively enhanced as to yield when conducted in the presence of bright stock in minor proportion having a viscosity of the order of 2000 Saybolt seconds at 100° F. This particular example is, of course, by no means limitative either in respect of the particular embodiment now being described or of other applications of the invention. Thus, bright stock of higher and of somewhat lower viscosity than that just referred to likewise proved wholly satisfactory in meeting the requirements of the invention.

The desired substantial yield increases obtained in the practice of the present invention may be occasioned by the use of bright stock or other suitable hydrocarbon material in relatively minor proportion based on the amount of pressed distillate or other lubricating oil stock undergoing the improved secondary distillation or fractionation. Excessive proportions must be avoided as tending to impair such properties of the finished product as flash point, but considerable freedom is permitted in selecting the proportion of such material relative to pressed distillate for any particular operation. In general very satisfactory results have been obtained with relative proportion of the order of 5% bright stock and 95% pressed wax distillate, these percentages being by volume. For a particular operation, either in this or other applications of the invention, the specific relative proportions selected will be governed by such factors as the type or character of the distillate stock undergoing secondary distillation or fractionation, the source and character of the additional hydrocarbon available or selected for use according to the invention, the specifications to be met in the finished neutral or other light lubricating oil product, and the production or yield increase desired. Thus, additional hydrocarbon material may be present during the secondary distillation of pressed wax distillate or lubricating oil stock in proportions both lower and higher than 5% with effective enhancement of yield over that characterizing a like distillation without the presence of such material. It is not desired, therefore, to limit the scope or contemplated application of the invention to particular ratios or proportions.

Specific evidence of the operative significance of

the present invention is provided by the results presented hereinbelow which were obtained in comparative runs using in one instance conventional procedure and in the other a method according to the invention.

Crude petroleum of Pennsylvania origin was subjected to a conventional primary distillation from which was obtained a distillate lubricating stock as an intermediate fraction containing substantial proportions of non-viscous diluent components. This stock was dewaxed by a usual pressing operation to provide a pressed wax distillate; and like portions of the latter then subjected to secondary distillation for the production of neutral oil as a bottoms or residual fraction having an objective predetermined viscosity @ 100° F. of 190 seconds Saybolt. Flash (open cup) specification on the said neutral oil product was 420° F. minimum. The charge to one such secondary distillation consisted of 100 parts of pressed wax distillate; and the charge to a comparative secondary distillation, utilizing the improvement of the present invention, consisted of 96 parts of pressed wax distillate and 4 parts of a Pennsylvania bright stock having a viscosity @ 100° F. of the order of 2000-2500 seconds Saybolt.

In the conventional run, the charge of 100 parts of pressed wax distillate yielded 47 parts of bottoms neutral oil having an A. P. I. gravity of 29.8, a flash point (open cup) of 425° F. and a viscosity @ 100° F. of 191 seconds Saybolt. The overhead fraction comprising the so-called gas oil or diluent components of the charge comprised 53 parts.

In the run according to the present invention, the charge of 96 parts of pressed wax distillate and 4 parts of bright stock yielded 59.8 parts of bottoms neutral oil having an A. P. I. gravity of 30.3, a flash point (open cup) of 420° F. and a viscosity @ 100° F. of 189 seconds Saybolt. The overhead fraction comprising the so-called gas oil or diluent components of the charge comprised 40.2 parts.

Referring still to the accompanying flow sheet in Figure I, and to the production of neutral oils from paraffin base Pennsylvania crudes in such a system according to the invention, the bright stock or other hydrocarbon material may be introduced into the pertinent part of the system with some degree of freedom as to the point or method of introduction. In the flow sheet there is indicated diagrammatically a line 6 provided with a control valve 7 and connecting with the charging line 8 through which pressed wax distillate enters the heating coil 4 of the secondary distillation unit. According to one method of practicing the invention, bright stock or similarly functioning material is fed through the line 6 into the line 8 where it meets and mixes with pressed distillate for continued flow therethrough in the coil 4. The flow of bright stock through the line 6 is so regulated as to give desired proportions of bright stock and pressed distillate, and after heating to suitable temperature the mixture is passed to the tower 5 from which neutral oil stock is withdrawn as a bottoms fraction of predetermined viscosity and flash point.

Alternatively the added bright stock or like material may be introduced through a line 9 provided with a valve 10 and connecting into the outlet or discharge line 11 from the heating coil 4. In this instance, bright stock in predetermined proportion mixes with the stock undergoing secondary distillation at a point intermediate the heating and fractionating portions of the

secondary distillation unit. Such procedure sometimes may be desirable in the interests of avoiding possible deleterious effects which might result from subjecting the added material directly to heating in the coil 4.

Still a further method of practicing the invention comprises the introduction of bright stock or the like through a line 12 provided with a valve 13 and leading into the upper portion of the tower or fractionating column 5. Here the introduced material functions as an auxiliary reflux supply, this modification having particular advantage in that the added viscous hydrocarbon material is effectively contacted with the rising lighter fractions of the lubricating stock undergoing secondary distillation or fractionation and thereby is enabled to function with marked efficiency in occasioning the balanced viscosity effect apparently contributing to the yield increases made available by the present invention without impairment of prescribed product characteristics.

The foregoing illustrative methods of practicing the invention are in no sense limitative thereof, and other alternatives which will be suggested thereby to those skilled in the art are considered within the scope thereof. Likewise, it is contemplated that the foregoing and other methods of operation may be used in various combinations to achieve the benefits and advantages arising from the improved fractional distillation of light lubricating oil stock in the presence of suitable hydrocarbon material according to the invention.

Referring now to Figure II of the accompanying drawing, in the system there illustratively depicted a usual pipe still 1 and fractionating column 2 provides a distillation unit for the primary fractionation of the crude to yield fractions as indicated. A wax distillate (or similar lubricating distillate when crudes of different origin are being processed) is removed as an intermediate side cut from the column 2 and passes through the line 15 directly, without intervening dewaxing or like refining treatment, to a fractionating unit comprising a flash tower 14. If desired steam may be supplied to the tower 14 by suitable means (not shown) in order to aid in the separation therein of light ends such as gas oil. Such diluent components of the wax or lubricating distillate pass overhead (together with steam) from the flash or re-fractionating tower 14 and are returned to the column 2 as shown. Light lubricating oil, comprising the less viscous lubricating oil fractions of the original crude supply, is drawn from the bottom of the tower, as a residual product having predetermined flash point and viscosity, and thereafter may be subjected to such subsequent refining as may be necessary or desirable. Such refining will depend, among other factors, upon the character of the original crude supply, as for example the necessity for dewaxing which may be effected by any suitable or effective method, this and other subsequent refining operations forming no part of the present invention.

In an operation such as the foregoing the yield of light lubricating oil, withdrawn as a bottoms fraction from the flash fractionator 14, may be markedly increased while still meeting prescribed specifications of viscosity and flash point by conducting such fractionation in the presence of bright stock or similar functioning hydrocarbon material according to the invention. Herein, provision is made for introducing such material to

the fractionating unit or operation by two illustrative alternative methods, it being understood other methods suggested thereby may be used as well as various combinations which may be desirable in particular commercial operations.

Thus, the invention in this embodiment may be practiced with effective results by the introduction of viscous hydrocarbon material through a line 16 provided with a control valve 17. In this practice, the introduced material enters the upper portion of the tower 14 and functions as an auxiliary reflux supply after the manner and with the advantages previously discussed in connection with the use of line 12 leading to column 5 in Figure I. Alternatively, bright stock or the like may be introduced through a line 18 provided with a control valve 19 and serving to conduct the introduced material directly into the line 15 through which the lubricating stock passes into the tower 14. In this practice the viscous hydrocarbon material is brought into the operation in intimate admixture with the stock undergoing re-fractionation.

While the invention thus far has been described with particular reference to the production of neutral oils from paraffin base crudes of Pennsylvania origin, other embodiments are equally within its contemplated scope and production. Broadly, the novel distillation method may be applied with advantage to the fractionation of any lubricating oil stock or fraction from which a relatively light lubricating oil product is to be obtained by the controlled removal of diluent components such as gas oil. More specifically may be mentioned light lubricating stock fractions derived from Mid-Continent, Texas, Coastal, or other crudes regardless of the general crude processing procedure by which such fractions are obtained. As regards the Pennsylvania neutral oils, hereinbefore discussed at greater length, the two most generally marketed products are those having viscosities at 100° F. of the order of 150 Saybolt seconds and of 180 Saybolt seconds respectively. Certain other light lubricating oils such as those obtained from some Mid-Continent crudes are produced with viscosities at 100° F. ranging from 100 seconds to 500 seconds. Similarly from other crudes, light lubricating oil products may have market specifications within this range as well as higher and lower Saybolt viscosities at 100° F. It will be understood, therefore, that no particular or special class of light lubricating oil products is contemplated as the limitative objective of process of the invention.

The increased light lubricating oil yields resulting from the practice of the present invention have particular economic significance in that these increased yields are obtained with the aid of but minor proportions of heavier stock such as bright stock, cylinder stock, and the like. Viewed in its commercial aspect, an outstanding benefit of the invention, therefore, resides in the materially increased yield of total motor or other lubricating oil which is now made possible from a given crude petroleum supply. As an example of this effect may be considered the production of motor oils from a paraffin base crude as of Pennsylvania origin. Prior to the invention, the processing of such a crude for the eventual production of motor oils would yield a certain relatively fixed proportion of bright stock and concurrently a certain relatively fixed proportion of neutral oil of given viscosity. With the application of the present invention to such an operation, the bright stock yield is but slightly reduced

while the neutral oil yield for a given viscosity is very materially increased; and thus the total yield of motor oil from the crude has been enhanced without impairment of quality in either the heavy or light lubricating oil products. Further advantage, in this connection, resides in the flexibility which the invention imparts to the general procedure since the yield increases may be varied somewhat by varying the relative proportion of bright stock or like functioning material introduced into the secondary distillation or fractionation of the stock from which the neutral oil product is derived. It will be understood, of course, that while in general larger proportions of introduced bright stock or the like occasion greater neutral or other light lubricating oil yield increases, the relative proportion of added material for any given operation must be selected with due regard to the necessity of meeting prescribed specifications in the finished product such as flash point.

In the various illustrative embodiments and examples herein, the neutral or other lubricating oil product obtained in increased yield according to the invention generally has been referred to and indicated as a residual or bottoms fraction drawn from the improved fractionating or distilling operation. In some circumstances of contemplated operation it may be desirable to obtain such product as a side-cut withdrawn from the fractionating column at a suitable point in the lower portion thereof, rather than as a strictly bottoms or residual fraction. The expressions bottoms fraction or residual product, as applied to lubricating oil product obtained by the invention, therefore is to be considered as embracing the practice just outlined as well as other equivalent practice in this respect.

We claim:

1. In a process for recovering lubricating oil from a normally liquid hydrocarbon mixture containing relatively light lubricating components and lighter diluent components by fractionally distilling said mixture to remove diluent components as distillate material and to recover lubricating components as residual product fraction comprising a relatively light lubricating oil stock characterized by a particular viscosity and flash point, the improvement which comprises increasing the yield of said relatively light lubricating oil stock recovered from said mixture by conducting such fractional distillation of said mixture in the presence of a small proportion of heavy lubricating oil stock having a viscosity substantially higher than the viscosity of said residual product fraction, and selecting the proportion of said heavy lubricating oil stock in amount sufficient to occasion more than an additive increase in yield of said residual product fraction but insufficient to effect appreciable deviation from the aforesaid particular viscosity and flash point, the viscosity and flash point of said increased yield of relatively light lubricating oil stock being substantially the same as that characterizing the relatively light lubricating oil stock recovered in the absence of said additional heavy oil.

2. In a process for recovering a specified lubricating oil from a normally liquid hydrocarbon mixture comprising a distillate fraction derived from a petroleum source material and containing relatively light lubricating components and lighter diluent components, which process includes the steps of fractionally distilling the said mixture, removing diluent components as

distillate material, and recovering lubricating components as residual product fraction comprising a relatively light lubricating oil stock characterized by a particular viscosity and flash point, the improvement which comprises increasing the yield of said relatively light lubricating oil stock as such residual product fraction having the aforesaid particular viscosity and flash point by fractionally distilling said mixture in the presence of a small proportion of heavy lubricating oil stock having a viscosity substantially higher than the viscosity of said residual product fraction, and selecting the proportion of said heavy lubricating oil stock in amount sufficient to occasion more than an additive increase in yield of said residual product fraction but insufficient to cause appreciable deviation from the aforesaid particular viscosity and flash point, the viscosity and flash point of said increased yield of relatively light lubricating oil stock being substantially the same as that characterizing the relatively light lubricating oil stock recovered in the absence of said additional heavy oil.

3. A process for producing lubricating oil which includes subjecting a petroleum source material containing lubricating oil components to fractional distillation, separating therefrom a lower fraction containing relatively heavy lubricating oil components undiluted with light non-lubricating oil components and a distillate intermediate fraction containing relatively light lubricating oil components and an appreciable amount of lighter diluent components, passing said intermediate fraction to a subsequent distillation stage, fractionally distilling the same and recovering therefrom as residual product fraction a relatively light lubricating oil stock characterized by a particular viscosity and flash point, and increasing the yield of lubricating oil stock having the aforesaid particular viscosity and flash point above the amount of lubricating oil stock of substantially the same viscosity and flash point that is obtainable from said intermediate fraction in the absence of additional heavy lubricating oil components by conducting said last referred to fractional distillation in the presence of a small proportion of heavy lubricating oil stock having a viscosity substantially higher than the viscosity of said residual product fraction, selecting the proportionate amount of said heavy lubricating oil stock to be small as compared with the amount of heavy lubricating oil components in said lower fraction but sufficient to occasion more than an additive increase in yield of said residual product fraction, the viscosity and flash point of said increased yield of relatively light lubricating oil stock being substantially the same as that characterizing the relatively light lubricating oil stock recovered in the absence of said additional heavy oil.

4. A process for producing lubricating oil which includes subjecting a petroleum source material containing lubricating oil components to fractional distillation, separating therefrom a lower fraction containing relatively heavy lubricating oil components undiluted with light non-lubricating oil components and a distillate intermediate fraction containing relatively light lubricating oil components and an appreciable amount of lighter diluent components, passing said intermediate fraction to a subsequent distillation stage, fractionally distilling the same and recovering therefrom as residual product fraction a relatively light lubricating oil stock

characterized by a particular viscosity and flash point, and increasing the yield of lubricating oil stock having the aforesaid particular viscosity and flash point above the amount of lubricating oil stock of substantially the same viscosity and flash point that is obtainable from said intermediate fraction in the absence of additional heavier hydrocarbon oil components by conducting said last referred to fractional distillation in the presence of a small proportion of heavy lubricating oil components from said lower fraction, said proportion being so selected as to occasion more than an additive increase in yield of said residual product fraction; the viscosity and flash point of said increased yield of relatively light lubricating oil stock being substantially the same as that characterizing the relatively light lubricating oil stock recovered in the absence of said additional heavy oil.

5. Process of producing from a wax-containing crude petroleum, lubricating oil in distinct portions comprising relatively lighter and heavier product fractions each meeting predetermined specifications including viscosity and flash point, which comprises subjecting such petroleum to a primary distillation and fractionation to segregate selected fractions thereof, withdrawing a residual fraction comprising relatively heavy lubricating oil stock of predetermined viscosity, refining and dewaxing said residual fraction to produce therefrom a lubricating oil comprising the said relatively heavier product portion of the process, separately withdrawing a distillate fraction comprising relatively light lubricating oil stock having a viscosity substantially less than that of the lubricating oil to be obtained therefrom as the relatively light product portion of the process, passing said distillate fraction to a dewaxing stage, withdrawing therefrom a dewaxed distillate fraction having a substantially lower viscosity and flash point than the said relatively lighter product portion of the process, passing said dewaxed distillate fraction to a secondary fractional distillation stage, concurrently passing a small proportion of said relatively heavier lubricating oil product to said secondary distillation stage, conducting said secondary fractional distillation, withdrawing therefrom a residual fraction comprising relatively light lubricating oil stock having predetermined viscosity and flash point, and refining said last mentioned residual fraction to produce therefrom a lubricating oil comprising the said relatively lighter product portion of the process; said process being particularly characterized by a greater total yield of lubricating oil, in distinct relatively lighter and heavier portions each meeting predetermined specifications of viscosity and flash point, than is obtained when the same said product portions are produced without the step of passing heavy lubricating oil to the said secondary distillation stage.

6. Process of producing from a wax-containing crude petroleum, lubricating oil in distinct portions comprising relatively lighter and relatively heavier product fractions each meeting predetermined specifications including viscosity and flash point, which comprises subjecting said petroleum to a primary distillation and fractionation to segregate selected fractions thereof, withdrawing a residual fraction comprising relatively heavy lubricating oil stock of predetermined viscosity, refining and dewaxing said residual fraction to produce therefrom a lubricating oil comprising the said relatively heavier

product portion of the process, separately withdrawing a distillate fraction comprising relatively light lubricating oil stock having a viscosity substantially less than that of the lubricating oil to be obtained therefrom as the relatively light product portion of the process, passing said distillate fraction to a dewaxing stage, withdrawing therefrom a dewaxed distillate fraction having a substantially lower viscosity and flash point than the said relatively lighter product portion of the process, passing said dewaxed distillate fraction to a secondary distillation stage, concurrently passing to said secondary distillation stage a small portion of viscous hydrocarbon material derived from the residual fraction of said primary fractionation, conducting said secondary fractional distillation, withdrawing therefrom a

residual fraction comprising relatively light lubricating oil stock having predetermined viscosity and flash point, and refining said last mentioned residual fraction to produce therefrom a lubricating oil comprising said relatively lighter product portion of the process; said process being particularly characterized by a greater total yield of lubricating oil, in distinct relatively lighter and heavier portions each meeting predetermined specifications of viscosity and flash point, than is obtained when the same product portions are produced without the step of passing viscous hydrocarbon material to said secondary distillation stage.

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