L. KIRSCHBRAUN.

PROCESS OF PRODUCING ASPHALTIC PRODUCTS.

APPLICATION FILED FEB. 16, 1918. RENEWED APR. 29, 1922.

1,436,450. Patented Nov. 21, 1922.

2 SHEETS—SHEET 1.

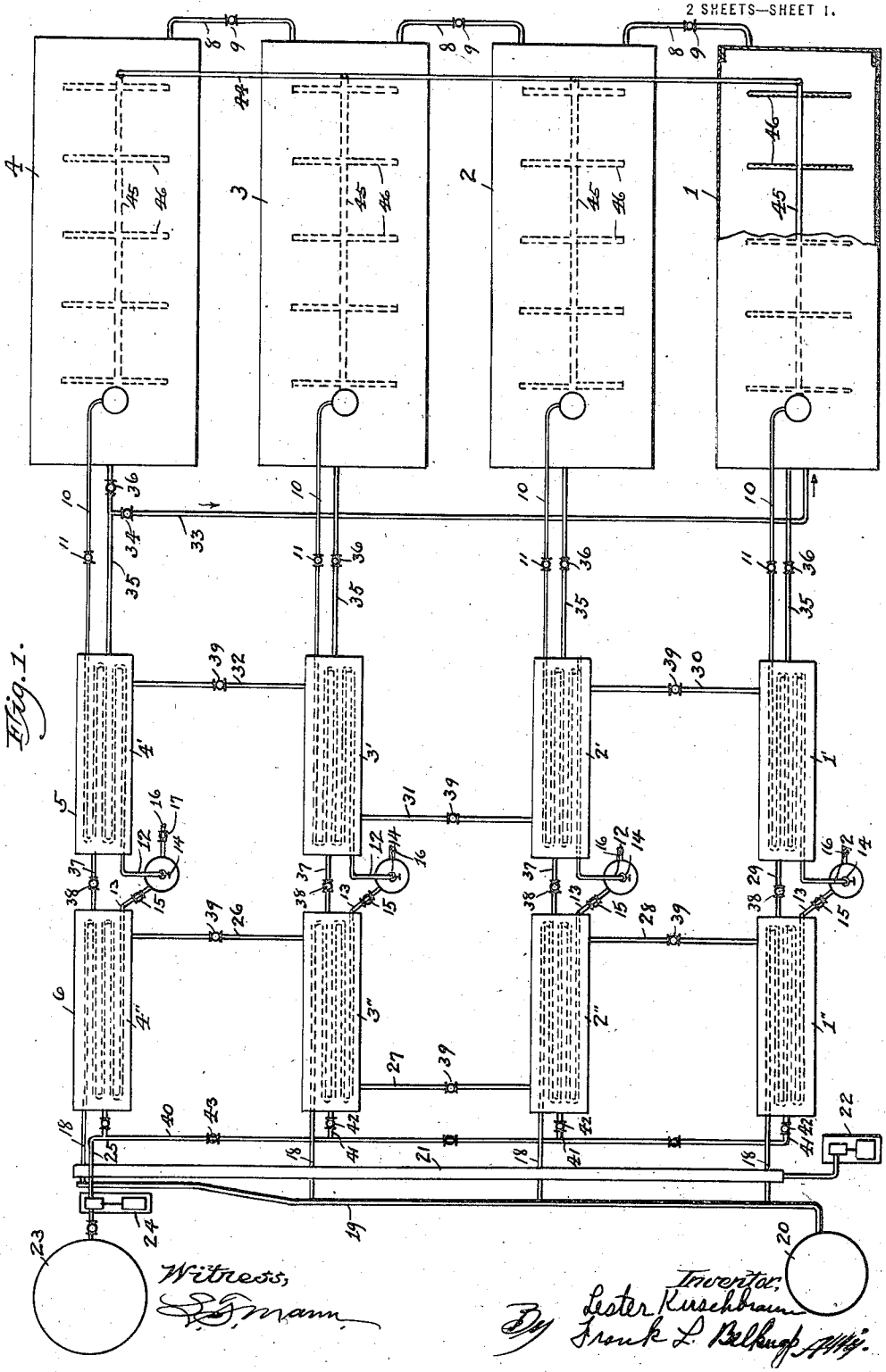


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

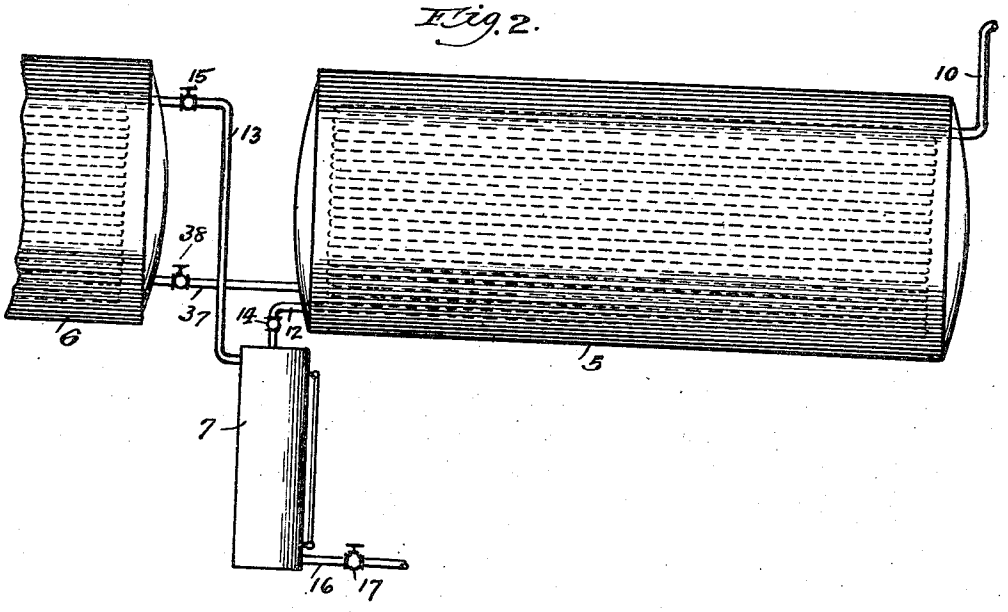
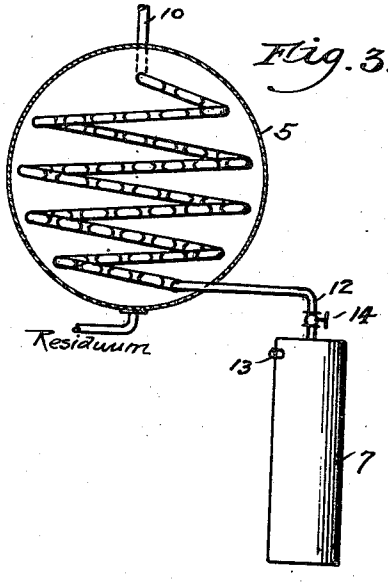


Fig. 3.



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UNITED STATES PATENT OFFICE.

LESTER KIRSCHBRAUN, OF CHICAGO, ILLINOIS.

PROCESS OF PRODUCING ASPHALTIC PRODUCTS.

Application filed February 16, 1918, Serial No. 217,628. Renewed April 29, 1922. Serial No. 557,454.

To all whom it may concern:

Be it known that I, LESTER KIRSCHBRAUN, a citizen of the United States, residing in the city of Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Processes of Producing Asphaltic Products.

This invention relates to improvements in process for making asphaltic products, and refers more particularly to an invention of that character in which petroleum residuum is converted into solid or semisolid products by means of the use of super-heated steam injected directly into contact with the oil.

I have heretofore invented and patented a certain invention relating to the production of asphaltic products from the treatment of super-heated steam. In the practical carrying out of said process more or less difficulty was experienced in preventing the emulsification of the condensed superheated steam and the oily vapors after they had passed through the condenser. The heavy distillates became so emulsified with the watery condensate that it was too expensive to attempt to separate them. This, of course, tended to impair the efficiency of the process as far as the recovery of the distillates was concerned. The salient object of the present invention is to provide a simple method of preventing this emulsification without at the same time in any way impairing the efficiency of the process or in any way affecting the production of the asphaltic products. At the same time the process is very materially improved commercially, in that the cost of operation is very materially reduced. By means of the present invention the oily vapors, which to a large extent have a boiling point above the boiling point of water, are first condensed and separated from the steam and then the latter, after being freed from the oily vapors, is itself condensed or may be used for other purposes. As, for example, it might be returned to the super-heater. Also by means of the present invention the incoming fresh oil to be treated may be utilized as a cooling or condensing medium and at the same time be itself pre-heated prior to its entering the stills. If desired water may be used as a condensing medium instead of oil, with the object of the water absorbing the heat from the outgoing vapors and being converted into steam for use in the super-heater. Other objects of the invention will appear from the more detailed description of the process and apparatus. The process may be operated as either a continuous or intermittent one, and is well adapted for the distillation of various kinds and gravities of oils in which the difficulties arising from emulsification are present or in which it is desired to conserve heat.

The invention will be understood from the drawings forming a part of the specification and the description thereof.

In the drawings Fig. 1 is a more or less diagrammatic plan view of the apparatus used in carrying out the invention.

Fig. 2 is a side elevation of the one set of primary and secondary condensers on an enlarged scale.

Fig. 3 is a cross sectional view of the same.

The drawings 1, 2, 3 and 4 designate a battery of stills which may be of the usual horizontal boiler type and mounted in the usual furnace construction, and connected for either continuous or batch distillation.

1′, 2′, 3′, and 4′ designate the primary condensers for the corresponding stills, and 1″, 2″, 3″ and 4″ designate secondary condensers for the said stills.

Both the primary and secondary condensers take the form of closed coils shown more clearly in Figs. 2 and 3.

The coils of the condensers are inclined as shown in Fig. 3 so as to readily drain the oil and steam or water passing therethrough.

The primary condenser coils are enclosed in tanks or condenser boxes 5, and the secondary condenser coils in similar tanks 6.

Between each primary and secondary condenser is interposed a receiving tank 7.

Describing now the piping connections between these stills and condensers, the rear end of the stills is connected with pipes 8, in each of which is interposed a valve 9. When the valves 9 are opened, the stills may be run as a battery, and, of course, by closing the valves 9 any one or more of the stills may be cut out of the battery or each still operated as a batch or unit still.

Each still is connected to the primary condenser by an ordinary vapor line 10, in each of which is interposed a throttle valve 11. These valves are normally opened, but may be so regulated as to maintain a back pressure on the stills if desired.

The condensate passes from the primary condenser into the receiving tank by pipe

12 and thence the still uncondensed vapors pass to the corresponding secondary condenser by means of pipe 13.

A valve 14 may be interposed in the pipe 12 and a valve 15 in the pipe 13, operating, if desired, in substantially the same way as the valve 11.

The lower end in each receiving tank 7 is provided with a draw off pipe 16 controlled by throttle valve 17. The outlet end of each secondary condenser is connected to a pipe 18, which pipes 18 in turn connect to a manifold 19, leading to a receiving or collecting tank 20.

If desired a vacuum may be maintained by connecting the pipes 18 to a header 21, the header 21 in turn being connected to a vacuum pump 22. This header is located above the draw off pipes from the secondary condensers so that it will not draw liquid.

Describing now the manner of furnishing the condensing medium to the tanks 5 and 6, cold residuum is drawn from a supply tank 23, and forced by means of pump 24 through the delivery line 25 into the tank 6 of the condenser 4''.

The oil passes from this tank by means of pipe 26 to the tanks 6 of the condenser 3'', thence by pipe 27 into the condenser 6 of the tank 2'', and finally by pipe 28 into the tank 6 of condenser 1''. From there the oil passes by means of cross pipe 29 into and through the series of tanks 5 by means of the connecting pipes 30, 31 and 32, the oil passing in the direction shown by the arrows.

From the tank 5 of the condenser 4', the oil passes into the main delivery header 33. This header 33 is connected to the still No. 1, the oil passing from still No. 1 to stills 2, 3 and 4 by means of cross pipes 8 heretofore described.

The foregoing is the connection used when the process is operated as a continuous process instead of a batch.

Describing now the additional connections and valves needed in the event that it is desired to operate as a batch process, the header 33 is provided with a valve 34, which is closed, and the header 33 out of operation.

The tanks 5 are now connected to the respective stills, 1, 2, 3 and 4, by delivery pipes 35, in each of which is interposed a valve 36. The valves 36 are all open when the process is operated as a batch process, and closed when operated as a continuous process.

The primary and secondary condensers 1' and 1'' are provided with a transfer pipe 29 controlled by valve 38. The other condensers are connected by transfer pipes 37 in each of which is interposed a valve 38. The valves 38 are closed when the process is operated as a continuous process but can open when the process is operated as a batch process.

The pipes 26, 27, 28, 30, 31 and 32, inclusive, are also provided with valves 39, which valves 39 are open when the process is operated as a continuous one, and closed for batch operation.

For batch operation a pipe 40 is connected to the pipe 25, and is connected to the tanks of the secondary condensers, 1'', 2'' and 3'', by cross pipes 41, in each of which is interposed a valve 42. The valves 42 are closed for continuous operation and open for batch operation. A valve 43 is interposed in the header 40 so as to cut the latter out of operation when the apparatus is being used as a continuous process.

Superheated steam is injected into each still through means of main headers 44 connected to pipes 45 lying adjacent the bottom of the stills, each of the pipes 45 being provided with perforated cross branches 46, as is well understood in the art.

Describing now the operation of the process, the steam is injected into the oil in the still in the manner described in my said previous Patent, No. 1,194,750.

The production of the ductile asphalt described in said patent results from the operation of said process.

This invention is more particularly concerned with the treatment of the heavy distillates which leave the stills in the carrying out of said process.

The heavy distillates, which have a boiling point substantially above that of water, pass into the primary condenser coils, and the oil is there condensed and collected in the receiving tanks. The steam, however, is not condensed, for the reason that the temperature of the residuum oil passing through the condenser box of the primary condenser coils is above the boiling point of water. The condensed heavy oil distillates are drawn off from the receiving tank and collected and saved. These distillates are particularly adapted for the manufacture of high grade lubricating oil and wax.

The steam vapors pass from the receiving tank into the secondary condenser coils, and are there condensed and drawn off. The temperature of the oil passing through the condenser boxes of the secondary coils is maintained at a temperature below the boiling point of water so that the steam will readily condense.

If desired, a vacuum may be maintained, in the manner heretofore described to facilitate distillation and the travel of the vapors through the system. By regulating the feed of the oil which serves as a condensing medium through first the central and then the primary condensers, the temperature of the condensers can be controlled. For example the oil should be fed through the secondary condenser so as to be below the boiling point of water and through the primary condenser

so as to be heated above the boiling point of water.

From the foregoing it will be seen that I effectively prevent the emulsification of the watery and oily vapors in the condensers. This is possible for the reason that the emulsification does not take place until condensation of the steam ensues. It is, of course, apparent that the utilization of the residuum as the condensing medium is a pronounced economy in operation, inasmuch as the residuum is pre-heated by the condensation of the vapors.

If desired, the steam, instead of passing through the secondary condensers, could be taken directly from the receiving tanks back to the superheaters. This can be readily accomplished by merely closing the valves 38, and pumping the steam from the receiving tanks back to the superheaters.

I claim as my invention:

1. A process of treating petroleum oil to prevent emulsification thereof, consisting in distilling the oil in a plurality of stills, simultaneously injecting super-heated steam into the body of the oil, passing the oil vapors through a plurality of primary and secondary condensers, regulating the temperature on the secondary condensers to a temperature below the boiling point of water by passing a cooling medium there-through and regulating the temperature of the primary condensers to a point above the boiling point of water by passing said cooling medium from the secondary through the primary condensers, condensing the oil in the primary condensers which has a boiling point above that of water but below that of the temperature of the primary condensers and condensing the steam in the secondary condensers.

2. A process of treating petroleum oil to prevent emulsification thereof, consisting in distilling the oil in a still, simultaneously injecting super-heated steam into the body of the oil, passing the oil vapors through a primary and a secondary condenser, regulating the temperature on the secondary condenser to a temperature below the boiling point of water by passing a cooling medium there-through and regulating the temperature of the primary condenser to a point above the boiling point of water by passing said cooling medium from the secondary through the primary condenser, condensing the oil in the primary condenser which has a boiling point above that of water but below that of the temperature of the primary condenser and condensing the steam in the secondary condenser.

LESTER KIRSCHBRAUN.