F. H. DUNHAM.

METHOD OF AND APPARATUS FOR TREATING ASPHALTIC OILS FOR THE PRODUCTION OF ASPHALT AND THE RECOVERY OF LIGHTER PRODUCTS.

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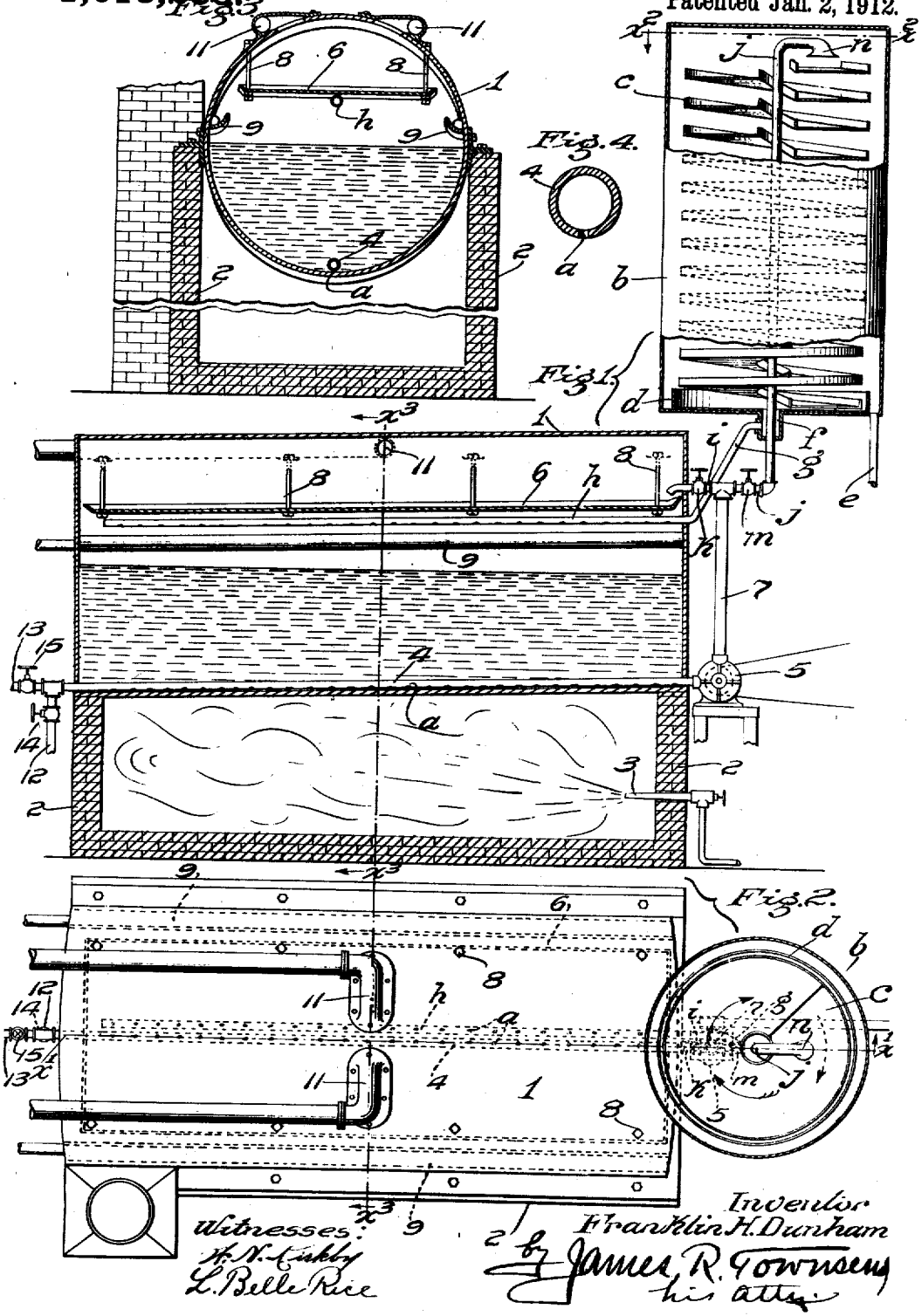
1,013,283.

Patented Jan. 2, 1912.



Witnesses:
H. N. Tibbey
L. Belle Rice

Inventor:
Franklin H. Dunham
by James R. Townsend
his atty.

UNITED STATES PATENT OFFICE.

FRANKLIN H. DUNHAM, OF SANTA PAULA, CALIFORNIA.

METHOD OF AND APPARATUS FOR TREATING ASPHALTIC OILS FOR THE PRODUCTION OF ASPHALT AND THE RECOVERY OF LIGHTER PRODUCTS.

1,013,283. Specification of Letters Patent. Patented Jan. 2, 1912.

Application filed April 26, 1910. Serial No. 557,817.

To all whom it may concern:

Be it known that I, FRANKLIN H. DUNHAM, a citizen of the United States, residing at Santa Paula, in the county of Ventura and State of California, have invented new and useful Improvements in Methods of and Apparatus for Treating Asphaltic Oils for the Production of Asphalt and the Recovery of Lighter Products, of which the following is a specification.

This invention relates to improvements in the method and apparatus described in my application Serial No. 416,611, filed in the United States Patent Office Feb. 18, 1908, in which I claim the method of obtaining asphalt from asphaltic oils which consists in heating the oils to a temperature of from 400 to 600 degrees Fahrenheit, within a shell, removing oil from the lower portion of the shell, to the upper portion of the shell and there subjecting the same to the temperature of the shell above the surface of the lower charge of oil, and removing the vapors from the shell below the level of the upper charge thereof. I also claim therein apparatus for obtaining asphalt cement from asphalt solutions comprising the combination with a shell, means to heat a charge of asphaltic solution in the shell, means for carrying off light vapors from the upper portion of the shell, and means near the median portion of the shell to carry off heavy vapors of condensation from the walls of the shell, of an evaporating pan in the shell above the last-named means, and means for transferring liquid from the lower part of the charge in the shell to said evaporating pan.

The object of the present improvement is to greatly increase the output of the products for a given time without increase of expense.

I regard this invention as pioneer within the scope of the appended claims.

The accompanying drawings illustrate the invention.

Figure 1 is a vertical mid-sectional elevation on line x^1, Fig. 2, of apparatus embodying this improvement. Fig. 2 is a plan view of the apparatus shown in Fig. 1. The condenser is sectioned on line x^2, Fig. 1. Fig. 3 is a section on line x^3, Figs. 1 and 2, looking toward the left and showing a part of the apparatus shown and claimed in said former application and not claimed herein. Fig. 4 is an enlarged cross-section which may be a section of either of the perforated pipes shown in Figs. 1 and 3.

A cylindrical extractor shell 1 which may be of any suitable dimensions, as for instance, twelve feet in diameter to twenty-two feet in length, is set in a furnace wall 2 of ordinary construction, and is provided with means as the fluid fuel burner 3 for supplying heat to a charge of asphaltic oil in the lower half of the shell. Said shell, as in the former application, may have a slant or slope from the front to the rear end sufficient for drainage; for instance, six inches to twenty-two feet. The perforated suction pipe 4 having orifices *a* at its under side receives the fluid material at the bottom of the extractor and the pump 5 is connected with the higher end of the pipe 4 to draw liquid through such pipe from the bottom of the charge in the extractor and to discharge it into an evaporating pan 6 located in the extractor, preferably about mid-way between the axial plane of the extractor and the top of the extractor. Said pump 5 serves to supply to the evaporating pan 6 liquid drawn from the pump of the extractor, but instead of returning all of the liquid thus withdrawn directly to the pan, said liquid or a determined portion thereof is first passed through an external condenser which may be a cylindrical sheet metal shell *b* having inside thereof a continuous channeled spiral pan *c* extending from near the top of the shell *b* down into a bottom pan *d* at the bottom of the shell but of less diameter than the shell. The shell *b* is preferably circular in horizontal cross section and is exteriorly cooled by any suitable means as by atmospheric air to condense vapors which may arise from the hot material in the pan and come into contact with the walls of the condenser shell. An outlet *e* is provided for the liquids thus condensed, and which in practice would be heavy lubricating oils. The liquid that does not escape from the channeled pan *c* is delivered into the bottom pan *d* which is provided with a central outlet *f* which communicates through a pipe *g* with a perforated distributer pipe *h* which extends along beneath the evaporating pan 6 in the extractor.

The pipe 7, which leads from the pump 5, is provided with two branches *i* and *j*, pro-

vided with valves *k*, *m*. The branch *i* discharges into the evaporating pan 6 and the branch *j* leads to the upper end of the condenser shell *b* and is there provided with an opening *n* to discharge the material pumped therethrough into the top of the spiral channel pan *c*. By adjusting the valves *k*, *m*, partly open a portion of the liquid pumped through the pipe 7 will flow into the pan 6 and another portion will flow into the pan *c*. The liquid which flows into the pan *c* flows downward in said pan and within the condenser throwing off its vapors until it reaches the pan *d* and thence the liquid flows through the pipe *g* on to the top of the charge of heated oil in the extractor shell. As with the former application the evaporting pan 6 is supported by rods or bolts 8, and troughs 9 are arranged along the walls at the mid-portion of the extractor shell to collect the heavier vapors and to conduct them out of the extractor through pipes 10 together with the lighter oils that may collect on and fall down the side of the shell. Outlets 11 for the lighter vapors are also provided, and lead to a receptacle, not shown, adapted for the recovery and retention of any vapors flowing through said outlet and liquids condensed therefrom. A draw-off 12 for the hot asphaltic cement is provided at the lower end of the extractor shell 1, which is set aslant downward away from the end at which the oil and the fire are applied. By this combination with the extractor of a supplementary condenser for removing the heavy oils which may rise as vapor from the heated material drawn from the bottom of the extractor, and allowing the resultant product to flow back on to the top of the charge of oil in the extractor, great economy of time is secured for the reason that the oils which will escape in the form of vapor from the heated material thus drawn from close to the source of heat at the bottom of the charge will be immediately eliminated by means of the condenser, and the asphaltic material returned from the condenser direct to the top of the charge in the extractor will be heavier than the material at the top of the charge and will tend to carry the same down and produce agitation in said charge.

The operation is not continuous, a single charge of asphalt solution being treated until the required asphaltic cement of the desired penetration is secured; all of the lighter materials having been extracted. When the charge has been fully treated the asphaltic cement will be drawn off through the valved pipe 12 that communicates with the perforated pipe 4; and a new charge may be pumped into the extractor through the valved pipe 13 which also communicates with pipe 4. The valves 14, 15 of the pipes 12, 13, may then be closed and the process described will then be repeated with the new charge of asphaltic oil.

The speed of the pump 5 and the regulation of the valves *k* and *n* will be determined by the judgment of the operator, consideration being had to the temperature of the charge in the shell and the relative vaporizing and condensing areas. The pump 5 will be run at a speed sufficient to discharge a constant flow of liquid into the top of the condenser through the pipe *j*; and the valves *k* and *n* will be regulated to allow liquid to flow into the pan 6 in sufficient quantity to maintain a constant flow of liquid through the pan to the lower end thereof which is farthest from the pipe *i*. The discharge of lubricating oil through the pipe *e* may be four times, more or less, that of the discharged material through all of the pipes 10 and 11. During the operation the attendant will regulate the burner, the pump and the valves so as to maintain a predetermined heat of the charge and a predetermined output at the various outlets. Various heats and various proportions of output may be obtained to greater or less advantage with different kinds of oil and no set rule is deemed practicable for all kinds of oil.

I claim:—

1. The method of obtaining asphalt cement from asphaltic oils, which consists in heating a charge of the oil to a temperature between 400 and 600 degrees Fahrenheit within a shell by heat applied to the bottom of the shell; removing asphaltic solution from the bottom of the charge in the shell and condensing outside said shell vapors arising from said solution; returning the unvaporized portion of said solution to the top of the asphaltic charge in the shell and removing vapors from the shell.

2. The method of obtaining asphalt cement from asphaltic oils, which consists in heating the oil to a temperature between 400 and 600 degrees Fahrenheit within a shell by heat applied to the bottom of the shell; removing asphaltic solution from the bottom of the shell; condensing outside said shell vapors arising from said solution and returning the unvaporized solution to the top of the asphaltic charge in the shell; collecting and condensing vapors arising inside the shell, discharging said vapors and condensation from the shell, and finally withdrawing the asphaltic cement from the shell.

3. The method of obtaining asphalt cement from asphaltic oils, which consists in heating a charge of oil to a temperature between 400 and 600 degrees Fahrenheit within a shell by heat applied to the bottom of the shell; removing asphaltic solution from the bottom of the charge in the shell, condensing outside said shell vapors arising from said solution; returning the unvaporized portion of said solution from the condenser to the

top of the asphaltic charge in the shell; removing asphaltic solution from the bottom of the charge in the shell, conducting the same directly to the upper portion of the shell and removing from the shell vapors arising in the shell, and finally removing the unvaporized asphaltic product from the shell.

4. The combination with an extractor shell, of means to heat the bottom of the shell, a condenser shell outside the extractor shell, a spiral pan inside the condenser shell, means to draw liquid from the bottom of the extractor shell and deliver it to the top of the pan, means to discharge the products of condensation from the condenser shell, means to conduct the uncondensed products from the condenser shell and return it to the extractor shell, and means to discharge vaporized products from the condenser shell.

5. Apparatus for obtaining asphaltic cement and lighter products from asphaltic solution, comprising a shell, a condenser outside the shell, means to heat the bottom of the shell, means to discharge from the shell the vapors arising in the shell, means to draw off asphaltic solution from the bottom of the shell and deliver it to the condenser, means to discharge condensed vapors from the condenser, and means to return the unvaporized asphaltic product to the shell.

6. The combination with an extractor shell, of means to heat the lower portion of the shell, a perforated pipe extending along the bottom of the shell, a condenser having a shell outside the extractor shell, means to pump liquid from the pipe to the condenser and to the extractor shell, and means to recover the vapors from both shells.

7. The method set forth, which consists in heating a charge of asphaltic oil to a temperature between 400 and 600 degrees Fahrenheit within a shell by heat applied below the surface of the charge; removing asphaltic solution from below the surface of the charge, allowing vapors to arise from such removed solution, condensing outside said shell vapors arising from said removed solution; returning the unvaporized portion of said solution to the upper part of the charge in the shell and removing vapors from the shell and continuing the operation until the residue in the shell constitutes an asphaltic cement.

8. In apparatus for obtaining asphaltic cement from asphaltic oils, the combination with an extractor shell, of means to heat a charge in the shell, means to draw off the lower portion of such charge and deliver it to a condenser, such condenser, means to discharge condensed vapors from the condenser and means to return unvaporized asphaltic product from the condenser to the shell.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 13th day of April, 1910.

FRANKLIN H. DUNHAM.

In presence of—
JAMES R. TOWNSEND,
L. BELLE RICE.