Jan. 23, 1934. S. P. MILLER 1,944,523

TREATMENT OF COAL DISTILLATION GASES

Filed Dec. 4, 1928 3 Sheets-Sheet 1

Fig. 1.

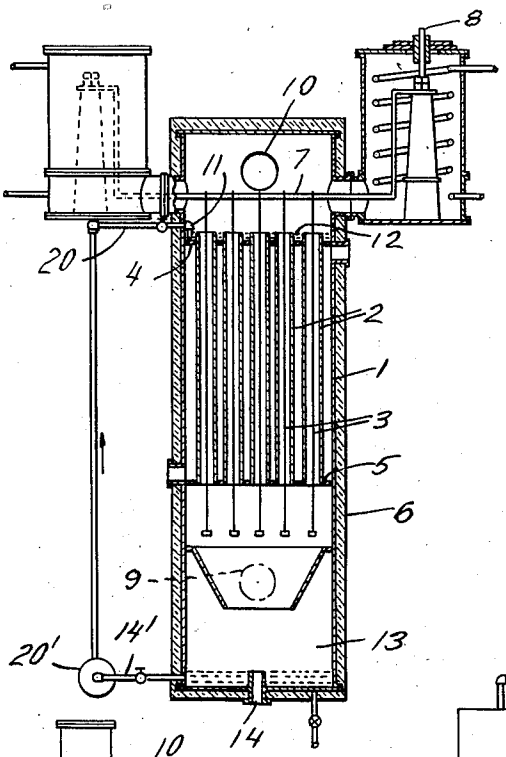
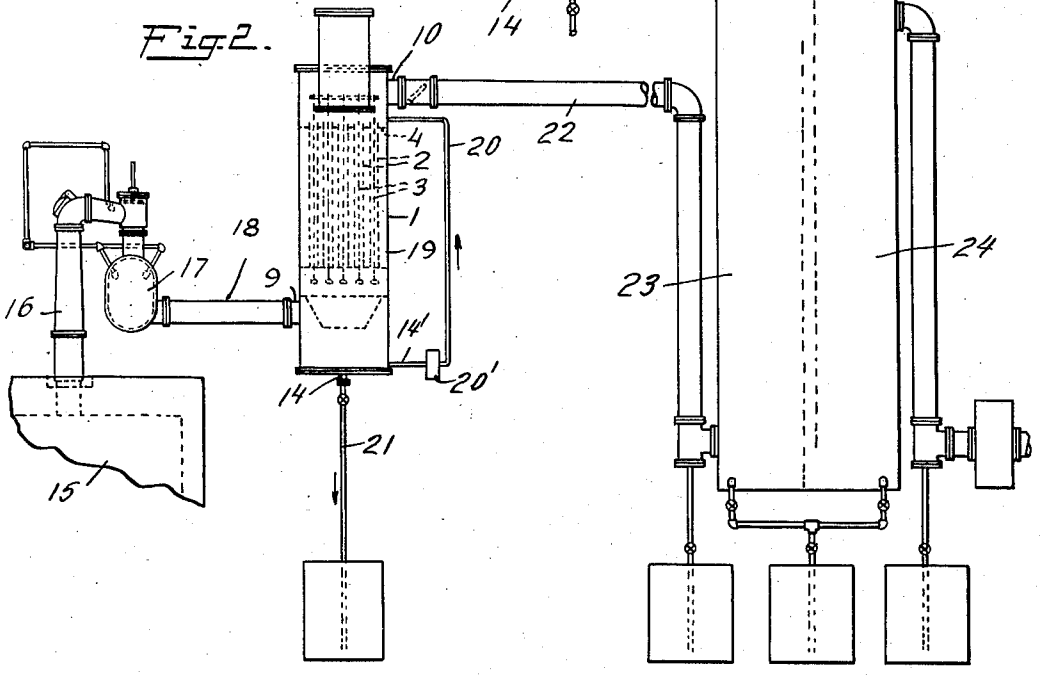


Fig. 2.



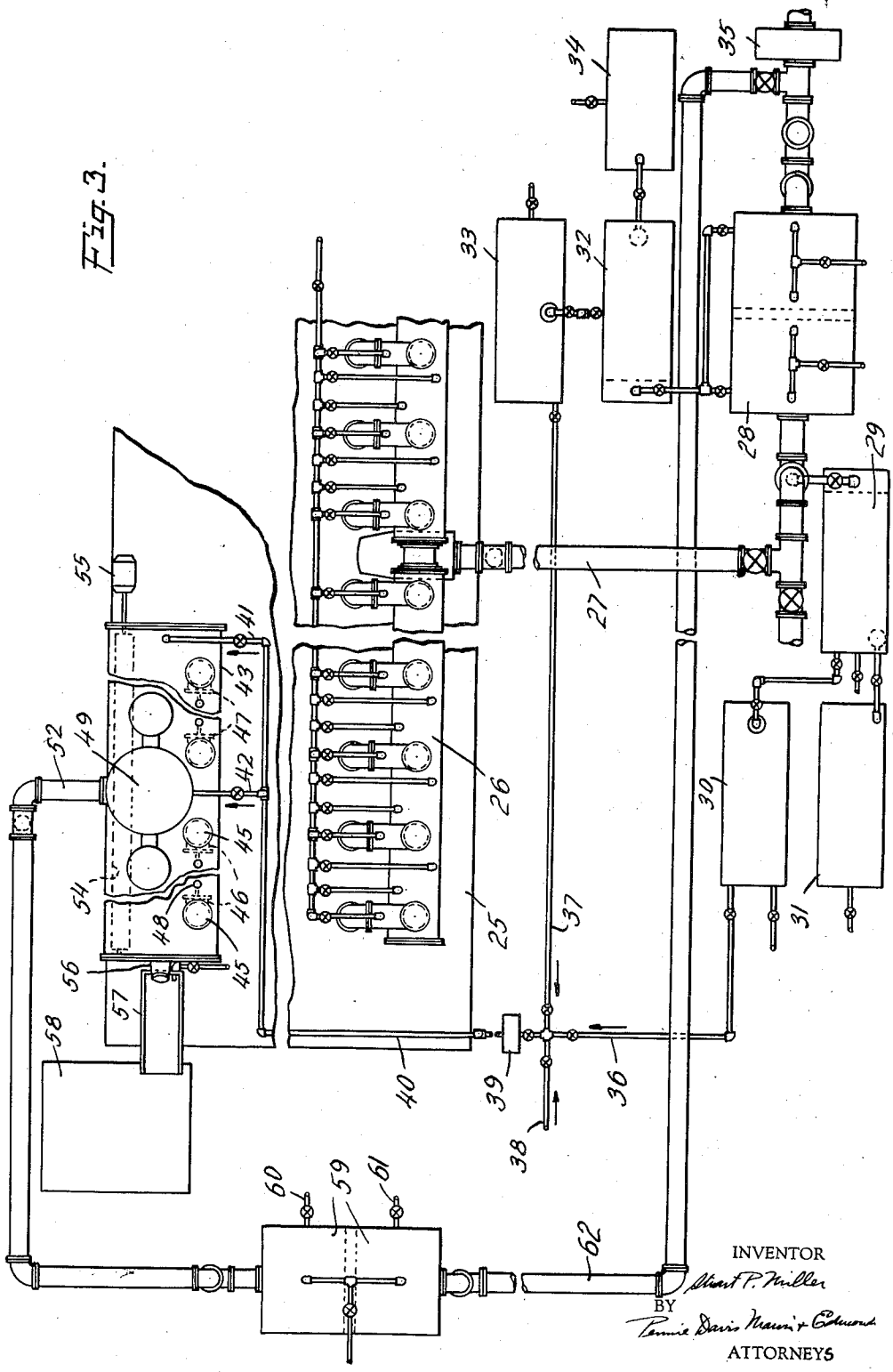
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Fig. 3.



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Fig. 4.

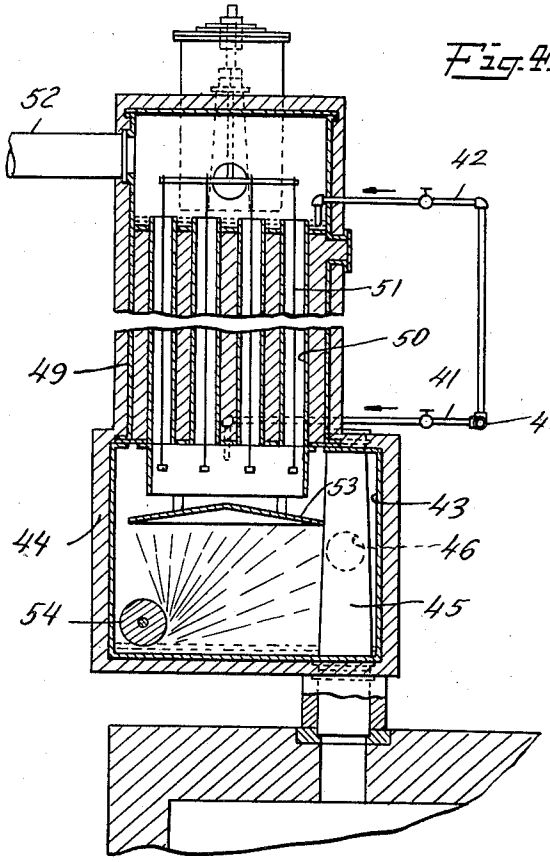
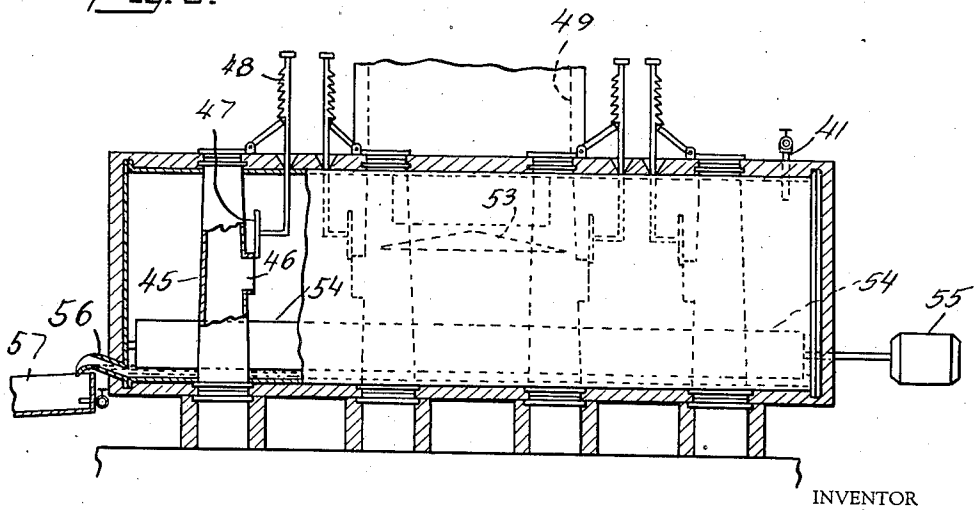


Fig. 5.



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Patented Jan. 23, 1934 1,944,523

UNITED STATES PATENT OFFICE

1,944,523

TREATMENT OF COAL DISTILLATION GASES

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Application December 4, 1928. Serial No. 323,656

4 Claims. (Cl. 183—114)

This invention relates to the treatment of coal distillation gases, coal or coke gasification gases, and similar gases at high temperatures for the production of pitch and clean oils therefrom, and it comprises an improved process in which hot coke oven or other coal distillation or carbonization gases, or similar gases, such for example as carburetted water gas, and producer gas, carrying heavy tarry or pitchy constituents in suspension, are subjected to electrical precipitation treatment, and in which the surfaces upon which the pitchy particles are deposited are kept flushed with a fluid medium which dissolves or blends with the deposited pitch, such as tar, pitch, heavy oil, etc., whereby the surfaces are kept free from accumulations of deposited pitch, and whereby the deposited pitch is absorbed by and recovered in admixture with the fluid medium, or the residue of such medium.

The coal distillation gases given off from coke ovens leave the individual ovens at a high temperature, around 600 to 700° C. or higher. The coal distillation gases from gas retorts may leave the individual retorts at a considerably higher temperature, particularly in the case of horizontal and inclined retorts, although in many horizontal retort plants the gases will leave the retorts at around 500° C. The gases leaving such coal distillation ovens or retorts, as well as other types of coal carbonization apparatus, are tar laden gases and are commonly cooled to a low temperature to separate the tar therefrom. The separated tar is in general thinly fluid. If, however, the gases are not cooled to a low temperature, but are maintained at a high temperature, a large part of the normal tar constituents are contained in the gases in the form of oil vapors which require cooling to a lower temperature before they separate out in liquid form. At such higher temperatures, the gases also carry in suspension particles of pitch and particles of "carbon" so-called. The nature of the pitch particles varies with the temperature of the gases.

If tar laden gases are cooled sufficiently to condense part of the oil vapors, and are then passed through an electrical precipitator, the particles of pitch separated from the gases in the precipitator will, if they contain a sufficient amount of oil, be thinly fluid and will flow readily from the surfaces of the precipitator. At higher temperatures, however, the pitch particles contain less oil constituents and, if the temperature is too high, there is a tendency for particles of pitch to separate on the surfaces of the precipitator in a non-fluid state. At high temperatures, there are present in the coal distillation gases particles of hard or high melting point pitch together with constituents of a greasy or resinous character which, in the absence of sufficient admixed oil, are of a semi-liquid or plastic character. If the pitch separated on the walls of the electrical precipitator is not sufficiently fluid, it does not freely flow from such surfaces, but tends to remain and accumulate, and may be further distilled by the hot gases. As a result, there is a tendency, at higher temperatures, for the deposit of non-fluid pitch or resin, and carbonization of such deposit, which require the discontinuance of the operation and the cleaning of the precipitator tubes.

This objectionable deposit of pitch or carbon can be obviated by cooling the gases to a sufficiently low temperature before subjecting them to electrical precipitation, but such cooling of the gases results in condensation of oil constituents which are deposited with the pitch particles, giving an increased yield of a lower melting point pitch, and decreasing the content of oil vapors carried by the gases. In practical operation, it is necessary to observe a safe margin below the temperature at which objectionable coking or carbonization of pitch deposit in the precipitator will take place.

The present invention provides an improved process in which coal distillation and similar gases can be subjected to electrical precipitation at a high temperature and without danger of objectionable deposit of non-fluid pitch or carbon on the tubes of the precipitator, and without danger of distillation and carbonization of pitch which may be so deposited. The present process enables the gases to be subjected to electrical precipitation at a much higher temperature, with the separation from the gases of pitch constituents of higher melting point, and with the retention of increased amounts of heavy and high boiling oils in the form of vapor in the gases, so that an increased yield of clean oils can be subsequently condensed from the gases.

According to the present invention, the surfaces of the electrical precipitator, on which the pitch particles are deposited, are kept flushed with a liquid medium which is a solvent for the pitch or which blends with the pitch and insures that all deposited pitch particles will be flushed from the surfaces. In this way, the surfaces are kept continually flushed and free from danger of carbonization or objectionable deposit of non-fluid pitch particles, even though the gases may be at

such a high temperature that otherwise such deposit and objectionable carbonization will take place.

The media which are employed in the present process may vary considerably, depending upon the particular gases treated, the temperature of treatment, and the character of products desired. In general, it will be more advantageous to employ a fluid medium for washing the precipitator surfaces which will combine with the deposited pitch particles to give a product of desired composition. The media employed includes tars, pitches, heavy oils resulting from the distillation of tars, etc. The tar may be tar separated from coal distillation gases of the same character employed in the process, for example, using coke oven tar for operations involving the treatment of coke oven gases, although the tar or pitch need not necessarily be derived from the same source as the gases treated.

In employing such media, they are supplied in regulated amounts to the surfaces of the electrical precipitator on which the pitch particles deposit. In the case of tubular precipitators having centrally arranged wire or rod electrodes, and with the tubes vertically arranged, the flushing medium can be supplied to the top of the tubes and permitted to flow down the sides of the tubes, keeping the sides flushed. Such precipitators may be operated either with an upward flow of the gases or with downward flow of the gases. In the case of downwardly flowing gases, the tar or pitch which is to be employed for flushing the surfaces of the precipitator may be atomized or sprayed into the gases before they enter the precipitator tubes. The action of the precipitator will be to throw the suspended particles of spray on the same surfaces on which the particles of high melting point pitch are thrown, thereby insuring that the surfaces will be flushed and kept clean from objectionable pitch or carbon deposits.

The flushing medium should in general be supplied at a temperature considerably below that of the gases, and it should be supplied in sufficient amounts to keep the surfaces of the precipitator clean. With high temperature gases, at a temperature approximating that at which they leave the coal distillation ovens or retorts, the gases have a pronounced distilling capacity for tar or pitch with which they come in contact, and, if the flushing medium is not supplied in sufficient amounts, distillation thereof may take place to such an extent that adequate flushing and cleaning of the surfaces will not take place. However, by supplying a sufficient amount of the flushing medium, such distillation thereof as may take place will not interfere with the keeping of the surfaces of the precipitator clean from objectionable pitch or carbon deposits. Such distillation as takes place in such cases is often desirable since it increases the content of oil vapors contained in the gases, and particularly the content of lighter or lower boiling oils.

The flushing medium may in many cases be used over and over again, by pumping it back from the bottom of the precipitator where it collects to the top of the tubes so that it may again flow down over the surfaces of the tubes. In such cases, however, where distillation takes place to any considerable extent, this should be allowed for by the supply of additional medium, such as tar, and the drawing off of the surplus pitch, so as to avoid increasing the melting point of the circulating pitch to a point where objectionable carbonization would take place. Instead of recirculating the medium, it is more advantageous in some cases, if not in most cases, to supply fresh medium continuously at the top of the precipitator tubes and to draw off the pitch continuously from the bottom, or, where two or more precipitators are arranged in series or in parallel, the medium separated in one precipitator may be employed as the flushing medium in another precipitator. With coke oven gases, for example, tar may be employed for flushing the precipitator tubes, admitting the tar at the top of the tubes so that it will flow down over the surfaces of the tubes, and drawing off the resulting tar or pitch at the bottom. Where the tar is admitted without preheating, it will be regulated in quantity in order not to cool the gases to an objectionable extent, but it will nevertheless keep the tubes flushed, and will undergo some distillation at the same time that the gases pass up through the precipitator tubes and are freed from suspended particles of pitch by the electrical precipitator treatment. In such cases, the gases will pass through the precipitator at a sufficiently high temperature to retain in vapor form the greater part of the oil content with which they leave the coke ovens, and, in addition, they will have an increased oil content due to the distillation of oil from the tar employed for flushing the precipitator tubes. As a result, a large yield of clean oils can be directly recovered from the cleaned gases by subsequent cooling and condensation.

Instead of employing tar without preheating, the tar may be preheated to make it thinly fluid, or partly distilled tar or pitch can be employed in a preheated and thinly fluid state. In such cases, where the coal distillation or other gases are at such a high temperature that carbonization would otherwise take place by the deposit of non-fluid pitch or carbon on the tubes, such deposit can be prevented, the tubes can be kept flushed from objectionable deposit, and more or less distillation of the flushing medium will simultaneously take place, with resulting enrichment of the gases in oil vapors.

The gases which are subjected to electrical precipitation treatment, according to the present invention, may be gases as they come from the individual ovens or retorts, or as they come from a collector main or gas collecting means in which the gases from a number of ovens or retorts are first collected. The gases may be subjected to electrical precipitation treatment without other preliminary treatment than such cooling as is incidental to their passage from the ovens or retorts to the electrical precipitator, and, in such cases, the gases may be at a high temperature such that they have a marked distilling action upon the flushing medium. Instead of employing the gases directly as they come from the ovens or retorts, they may first be employed for the distillation of tar or pitch, for example, by atomizing or spraying tar or pitch into the gases. Such gases, coming from the ovens or retorts at a high temperature, have a pronounced distilling capacity, and, by regulating the contact of tar or pitch with them, the tar or pitch can be distilled to a point where pitch of high melting point is produced as a residue, leaving oils of high boiling point in vapor form in the gases. When the gases are thus employed for distillation, there is less danger, in general, of objectionable carbon deposit in the tubes of a precipitator, because of the cooling of the gases by the distillation, and the dilution of the gases in oil vapors and

the partial removal of suspended pitch particles from the gases during the distillation. However, if an attempt is made to produce pitch of high melting point, around 400° F. or higher, with such gases, or if the contact of the tar or pitch being distilled is not sufficiently intimate, the gases may not be cooled sufficiently, and they may still carry in suspension particles of pitch or resins which, in the precipitator, would be deposited in a non-fluid or plastic condition with resulting tendency toward carbonization or objectionable pitch or coke deposit in the precipitator tubes. In such cases, the tubes should be flushed with tar or pitch in sufficient amount to dissolve and blend with the deposited pitch particles and keep the tubes clean and free from objectionable carbonization and pitch deposit.

From the standpoint of apparatus or equipment, the electrical precipitator employed in the present process can be located in close proximity to the ovens or retorts which supply the coal distillation or other gases which are to be subjected to electrical precipitation treatment for the removal of suspended carbon and pitch particles therefrom. The higher the temperature of the gases, and the less they are cooled before they are subjected to the electrical precipitation treatment, the greater the content of oil vapors which remain in vapor form as the gases leave the precipitator, and the larger the yield of clean oils which can be subsequently condensed from the gases, and particularly of heavy high boiling oils. By cleaning the gases at a sufficiently high temperature, it is possible to retain in vapor form in the gases leaving the precipitator constituents which, in an isolated state, are solid or semi-solid at ordinary temperatures, such as resins, semi-solid greases, etc. However, when the gases containing these constituents are subsequently cooled, and they are condensed in admixture with lower boiling point oils, they readily form a thinly fluid oil mixture.

When the gases from the ovens or retorts are employed for distillation of tar or pitch before they enter the electrical precipitator, the distillation will in general take place while the gases are at or near their maximum temperature, and the gases, after being employed for such distillation, may still be at a high temperature and may carry a large part of their normal oil constituents in vapor form, including heavy constituents which, in an isolated state, are solid or semi-solid at ordinary temperatures.

The gases leaving the electrical precipitator, in the present process, are subsequently cooled to condense oil constituents therefrom. Because of the high temperature at which the removal of suspended pitch particles is effected, according to the present invention, an unusually high yield of oils will be obtained from the gases, including most of the oil constituents which would normally be recovered as tar, and including substantially all of the tar constituents except the heavy pitch constituents which are deposited in the precipitator or which may be removed from the gases before they reach the precipitator. Inasmuch as the heavy pitch particles are removed in the precipitator, the gases will be clean gases, i. e. free from heavy tar or pitch constituents, and the oils condensed from the gases will accordingly be clean oils, directly merchantable as creosote oils, tar acid or carbolic oils, etc. These oils will be characterized by a high content of high boiling or heavy constituents, including constituents which, in an isolated state, are solid or semi-solid at ordinary temperatures, and constituents which are normally incapable of distillation without decomposition. In addition to the high oil content recovered from the gases themselves, there will be an additional recovery of oil from the oil vapors distilled from the tar or pitch employed as the flushing medium. The cleaned gases and vapors can be fractionally condensed to separate two or more oil fractions, or the entire oil content can be separated in a single fraction, for example, as a superior creosote oil. When fractionally condensed, heavier and lighter oil fractions can be recovered, for example, a heavy creosote oil, a light carbolic or tar acid oil, etc.

The pitch separated from the gases in the electrical precipitator will be blended with the flushing medium, or with the unvaporized residue of the flushing medium. When the flushing medium is recirculated, it may be progressively distilled until a high melting point pitch is produced. If it is drawn off before it has been distilled to a high melting point pitch, it will be in the form of a lower melting point pitch, or of a heavy tar containing the separated pitch constituents blended with it. When the electrical precipitation treatment is carried out in combination with the distillation of tar or pitch by the gases before they enter the precipitator, the flushing medium collecting in the bottom of the precipitator may pass thru the still and be subjected to distillation by bringing it into intimate contact with the hot gases. In this case, the feed of tar or pitch to the still may take place through the precipitator, and the tar or pitch may serve the function of keeping the precipitator tubes free from objectionable carbon deposit or coking at the same time that the flushing medium is preheated and partially distilled before it enters the still to be there further distilled to produce, for example, pitch of high melting point.

The present invention is of more or less general application to the treatment of pitch laden gases at high temperatures where the pitch or similar constituents carried in suspension in the gases are not sufficiently fluid to run freely from the precipitator. Such tar laden gases are produced at coke oven plants, retort gas plants, and from other processes where destructive distillation or decomposition takes place and pitch or pitch-like constituents are formed which at high temperatures are of a plastic or non-fluid character. By treating such gases at high temperatures, they can be effectively freed from such pitch or pitch-like constituents while still leaving all or practically all of the oil constituents, including constituents of a normally solid or semi-solid character, in vapor form in the high temperature gases, so that they can be subsequently recovered in a clean state, i. e. free from pitch contamination, on cooling of the cleaned gases. Such cleaning of the gases and separation of heavy pitch and similar constituents therefrom, can, moreover, be carried out at a much higher temperature than would otherwise be possible, thus enabling pitch constituents to be separated which could not otherwise be separated without further cooling and simultaneous separation of oil constituents with the pitch, and enabling heavy resinous and other constituents to be maintained in a vapor form to be subsequently recovered and condensed as valuable oil constituents. The oil recovered in the present process is moreover a clean oil, or clean oil fractions, which are directly utilizable

or marketable, and which require no distillation to separate them from heavy pitch residue.

The invention will be further illustrated and described in connection with the accompanying drawings, which are of a somewhat conventional and diagrammatic character, and which illustrate certain embodiments of the invention, although it will be understood that the invention is illustrated thereby but is not limited thereto.

In the accompanying drawings,

Fig. 1 shows, in vertical section, an electrical precipitator adapted for carrying out the process of the invention;

Fig. 2 shows in a conventional manner part of a by-product coke oven plant and by-product recovery system adapted for the carrying out of the present process;

Fig. 3 is a conventional plan view of part of the coke oven plant showing the ordinary by-product recovery system and showing a separate still and precipitator adapted for carrying out the process of the present invention;

Fig. 4 is a vertical section taken through the precipitator and still of Fig. 3 and

Fig. 5 is an elevation, with parts in section, of the still of Figs. 3 and 4.

Referring to Fig. 1, the electrical precipitator 1 has a plurality of vertically arranged tubes 2 each with a central wire electrode 3. The tubes are supported in upper and lower tube sheets 4 and 5 and the apparatus as a whole is heavily insulated as indicated at 6. The bus-bars supporting the wire electrodes are indicated at 7 and are connected by a lead 8 with a suitable source of negative current, the tubes being connected with the opposite source. The precipitator has a gas inlet 9 at the bottom for the hot coal distillation or other gases and a gas outlet 10 at the top leading to condensers (not shown). One or more tar inlets 11 are provided for supplying tar or pitch or other suitable flushing medium such as heavy oil to the top of the tube sheet 4 so that it will overflow into the individual tubes and flow downwardly over the inner surfaces of these tubes. The layer of tar or pitch or other medium 12 may be of varying depth but should be kept supplied at one or more places to avoid stagnation and to keep the flushing medium thinly fluid and continuously overflowing into the individual tubes. A collecting chamber 13 at the bottom of the precipitator provides for collecting the excess of flushing medium, together with absorbed pitch particles, and an outlet pipe 14 to provide for withdrawing the medium from the bottom of the precipitator. Line 14' and pump 20' are for use in recirculation of pitch through precipitator tubes if desired.

The precipitator of Fig. 1 is adapted for use with various kinds of gases produced by destructive distillation operations and containing in suspension semi-solid or non-fluid pitch particles, or particles which would tend to form a non-fluid or plastic deposit of carbon or pitch on the precipitator tubes. It can be applied to various types of gas producing plants producing such pitch laden gases.

In Fig. 2 a coke oven plant is indicated conventionally at 15, having the usual uptake pipes 16 leading from the individual coke ovens to the collector main 17, or to a separate collector main connected to a selected number of ovens. A pipe or main 18 leads from the main 17 to the precipitator 19, which is similar in construction and operation to that of Fig. 1 and which has a supply pipe 20 near the top for supplying tar or other flushing medium and with outlet pipe 21 from the bottom for removing the pitch or excess of flushing medium from the precipitator. A pipe 22 leads from the precipitator to the condensers 23 and 24 shown conventionally. Line 14' and pump 20' are for use in recirculation of pitch through the precipitator tubes if desired.

In the operation of such a plant, the hot coke oven gases from the individual ovens pass through the uptake pipes 16 and main 17 to the precipitator 19 at a high temperature. The tubes of the precipitator are flushed with tar or heavy oil or pitch supplied to the pipe 20 and the excess of flushing medium is drawn off through the pipe 21. The gases freed from heavy suspended particles of pitch, etc. then pass through the pipe 22 to the condensers where clean oils are directly condensed therefrom before the gases pass to the ammonia absorber, etc.

Figs. 3, 4 and 5 show a conventional by-product coke oven plant provided with a still for distilling the tar produced at the plant and with a precipitator arranged for receiving the gases escaping from the still. In these figures, a conventional coke oven plant is shown at 25 with a collector main 26 arranged for collecting the gases from a plurality of individual ovens, and with a cross-over main 27 leading from the collector main to the condensers 28. The collector main is provided with means for cooling the gases therein with ammonia liquor sprayed into the gases and the tar and ammonia liquor are drawn off through the cross-over main to the decanter 29 where separation of tar from ammonia liquor takes place, the tar being collected in the receptacle 30 and the ammonia liquor in the receptacle 31. A decanter 32 receives the tar and ammonia liquor from the condensers 28 and separates the tar from the ammonia liquor, the tar collecting in 33 and the ammonia liquor in 34. The usual exhauster for drawing the gases through the system is indicated at 35.

Pipes 36 and 37 are provided for drawing off the tar from the tanks 30 and 33 respectively. A pipe 38 provides for the introduction of outside pitch or tar or oils or other suitable material. A pump 39 pumps the tar or other medium through the pipe 40 having branches 41 and 42. The branch 41 leads directly to the still 43 and the branch 42 leads to the precipitator 49.

The still 43 is heavily insulated as indicated at 44 and has a plurality of internal uptake pipes 45 having side openings 46 with a valve 47 having operating handle 48, although external uptakes may as well be used. The arrangement is such that the gases from a number of ovens can be drawn off into the still, instead of into the collector main 26, by properly regulating the valves which connect the ovens with the still and with the main 26.

The electrical precipitator 49 is shown as located immediately above the still 43, and the bottom of the precipitator as opening into the still 43, although this exact arrangement is not essential. The precipitator has cylindrical tubes 50, vertically arranged, and centrally located wire electrodes 51, the precipitator being in general of the same type of construction and operation as that of Fig. 1. The gas outlet pipe 52 leads from the top of the precipitator to the condensers 59.

Below the bottom of the precipitator is located a baffle 53, although in many arrangements this will not be required, and in the bottom of the still is a roll 54 preferably directly connected to

an operating motor 55. The still has a pitch outlet 56 at the end remote from the tar inlet end, the pitch discharging into a trough 57 in which it may for example be granulated by a stream of water, and the pitch then collected in the receptacle 58.

In the operation of the apparatus of Figs. 3, 4 and 5, the ordinary by-product recovery system of the coke oven plant can be operated in the ordinary way, with cooling of the gases in the collector main to separate tar therefrom, and with subsequent cooling of the gases to a lower temperature in the condensers to separate additional tar therefrom. The tars so separated can be pumped at a regulated rate either directly to the still 43 through the pipe 41 or directly to the precipitator 49 through the pipe 42, or in regulated amount to both the still and the precipitator.

By disconnecting certain of the coke ovens from the collector main 26 and connecting them with the still 43, the hot coke oven gases will pass directly from the coke ovens through the insulated pipes to the still 43. The still has a layer of tar or pitch in the bottom portion thereof and this is atomized or sprayed by the rapidly rotating roll 54 up into the gases in the upper portion of the still. In this way the tar or pitch to be distilled is brought into intimate contact with the hot gases and the tar or pitch can be rapidly and effectively distilled to produce pitch of high melting point. The gases, enriched with oil vapors from the distillation and still at a high temperature, pass up into the precipitator, and tar or other flushing medium is introduced at the top of the tubes and flows down over the tubes of the precipitator. Some distillation of the tar thus supplied may take place while it is flowing down over the precipitator tubes, but this flushing of the tubes insures that such pitch particles as are thrown out of the gases will be combined with the flushing tar and removed from the precipitator with it.

The gases passing through the precipitator carry vapors of high boiling, plastic or semi-plastic constituents, not only those carried over from the coke ovens by the hot gases, but also similar constituents distilled from the pitch, that is, the distillation can be carried to such an extent that even high boiling constituents of a normally solid character can be distilled from the pitch, including constituents of a waxy or resinous character. If the temperature of the electrical precipitator is too high there is danger of forming a deposit of a semi-solid or plastic character on the tubes, with resulting further distillation by the hot gases and carbonization of the deposited layer, requiring the shutting down of the precipitator for cleaning purposes. This can be overcome, however, by supplying tar or pitch in sufficient amounts to the top of the tubes to dissolve and flush away the deposited pitch or resin particles, carrying them back to the still with the added tar. The supply of tar through the precipitator has the further advantage of preheating the tar and of removing some of the lower boiling oil constituents from it, thereby enriching the gases in such low boiling constituents, without cooling the gases to such an extent as to condense any appreciable amount of heavy constituents therefrom except those carried in suspension and which are separated from the gases by the electrical precipitation treatment. The rate at which the tar is supplied to the top of the precipitator tubes can be regulated, and part or all of the tar supplied to the still can be supplied in this way. Additional tar can be supplied to the still directly through the pipe 41. With the location of the electrical precipitator as shown in Fig. 3, part of the tar should always be supplied to the end of the still opposite the pitch draw-off, in order to maintain adequate circulation of tar or pitch throughout the whole still, or part of the product leaving the bottom of the precipitator should be diverted to the end of the still.

By operating in the manner described, the distillation of tar can be carried to approximately the maximum extent which will leave a fluid high melting point pitch capable of flowing freely from the still. The temperature of the gases leaving the still and passing through and leaving the precipitator can also be kept sufficiently high to insure that heavy constitutents of the gases are retained in vapor form to be subsequently recovered in the condensers.

The gases resulting from the distillation and from the subsequent electrical precipitation treatment are cooled in the condensers 59 by means of suitable cooling fluids, which, as shown, are provided in the form of liquid sprays at the top of the condensers. Two or more oil fractions are thus condensed and may be drawn off at 60 and 61 respectively. The gases leaving the condensers pass through the pipe 62 to the main gas system of the coke oven plant and enter into the exhauster 35.

The apparatus illustrated in Figs. 3, 4 and 5 provides either for supplying the heavy tar separated from the gases in the collector main 26 or the light tar separated from the gases in the condensers 28, or the regulated mixing and supplying of both of these tars in regulated proportions. So also, tar from an outside source may be supplied through the pipe 38. A sufficient excess of the tar or oil supplied can be employed to insure that danger of objectionable carbonization on the sides of the tubes is prevented, and to insure that semi-solid or plastic deposits of pitch, etc. on the sides of the tubes will be dissolved and flushed away with the flushing medium.

It will thus be seen that the present invention enables the treatment of hot pitch laden gases to be carried out at high temperatures, at which difficulties would otherwise be met with, and with the overcoming of these difficulties and the handling of the gases even at excessively high temperatures. It will further be seen that the operation of the electrical precipitator and the prevention of deposits of pitch or carbon, etc. thereon may be advantageously accompanied with the distillation of the tar or oil or pitch employed as a flushing medium, and that such distillation as takes place in the precipitator itself may be supplemented by further distillation with the gases before they enter the precipitator. That is, the gases subjected to the electrical precipitation treatment may be normal gases as they come from the coke oven or other source, or they may be gases which have been first employed for distilling tar or pitch and which are still at such a high temperature that they can advantageously be treated according to the present process.

While the invention has been more particularly described in connection with the operation of by-product coke oven plants, and the treatment of coke oven gases, it will be understood that the invention is of broader application to other

coal distillation gases or to gases from other destructive distillation or gasification processes which contain constituents of a tarry or asphalt-like character; and that the present process enables such gases to be employed at high temperatures at which they could not otherwise be subjected to electrical precipitation treatment without difficulty from objectionable carbonization or other objectionable deposits upon the precipitator surfaces.

I claim:

1. The improved method of treating hot coal distillation and other gases which comprises bringing them into intimate contact with tar or pitch to be distilled, then subjecting the gases to electrical precipitation to separate suspended pitch particles therefrom, and flushing the surfaces on which the pitch particles are deposited with tar or pitch.

2. The improved method of treating hot coal distillation gases from coke ovens and the like which comprises collecting the gases at a high temperature and bringing them into intimate contact with pitch to be distilled, passing the resulting gases while still at a high temperature through an electrical precipitator and thereby separating from the gases suspended pitch particles, and flushing the surfaces of the precipitator with tar or pitch to blend with the deposited pitch particles.

3. The improved method of treating hot coal distillation gases which comprises subjecting them at a high temperature to an electrical discharge in an electrical precipitator, simultaneously flushing the collecting electrode of the precipitator with tar or pitch, supplying heat to and distilling the tar or pitch by said gases in the precipitator while flushing the collecting electrode with it.

4. The improved method of treating hot coal distillation gases, which comprises bringing them into intimate contact with tar or pitch to be distilled so as to distill the tar or pitch, then passing the gases up through an electrical precipitator to separate suspended pitch particles therefrom, introducing tar or pitch onto the collecting surfaces of the precipitator near the top thereof so as to provide a flushing film of tar or pitch flowing down over the collecting surfaces of the electrical precipitator during the passage of the gases up therethrough.

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