March 24, 1959 E. STIRNEMANN ET AL 2,879,218

ELECTROPYROLYSIS APPARATUS

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Fig. 1

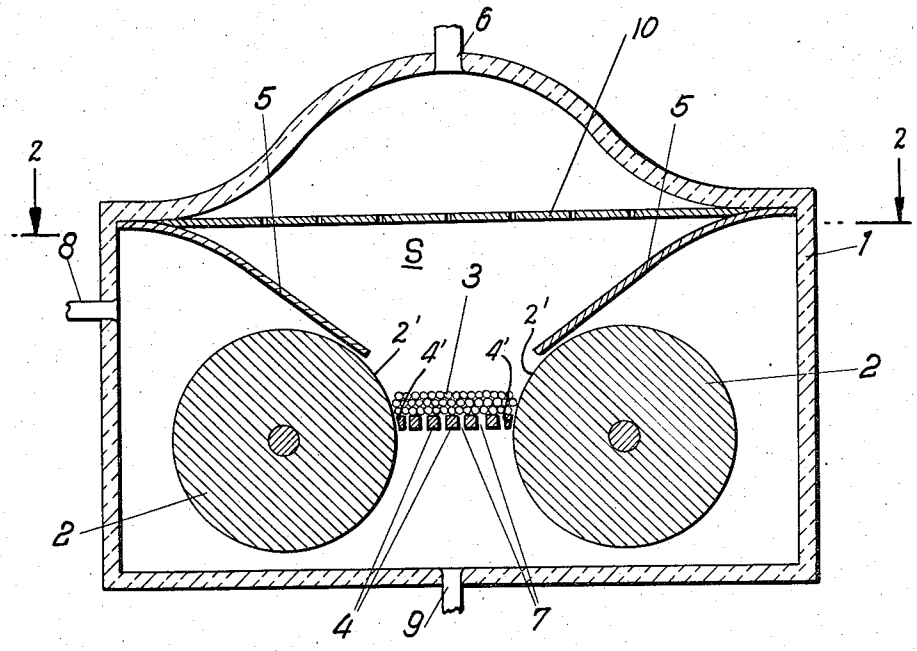
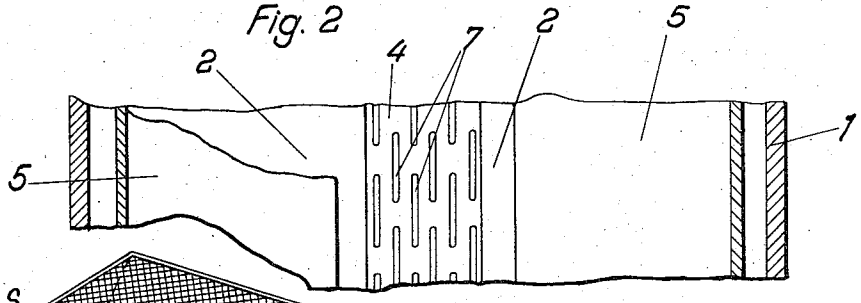


Fig. 2



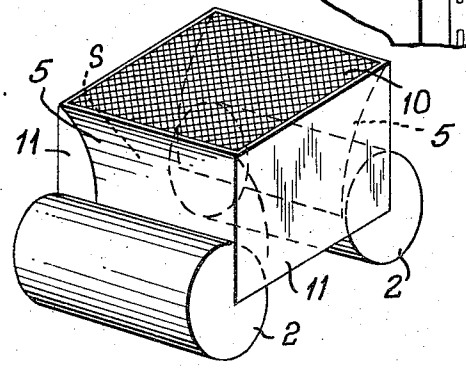


Fig. 3

Inventors:
Ernst Stirnemann
and Theodor Zuilhang
by Michael S. Striker
Atty.

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FIG. 4

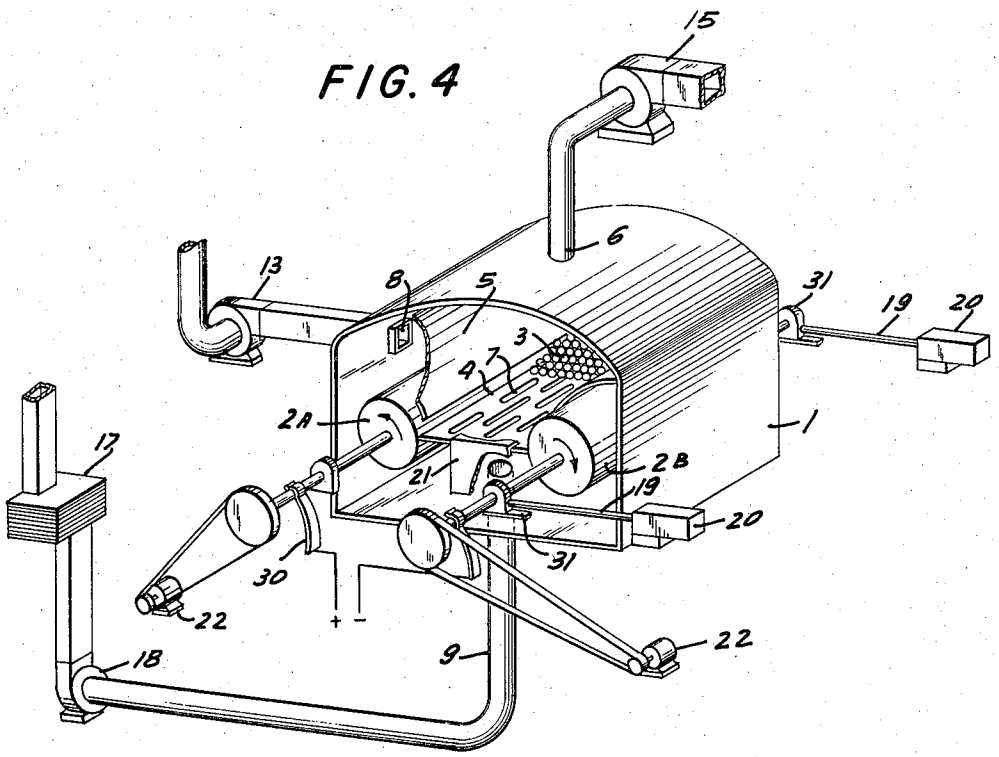
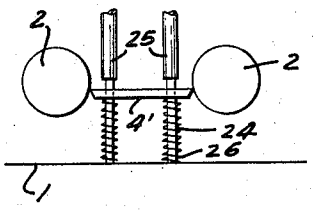


FIG. 5



INVENTORS
ERNST STIRNEMANN
THEODOR LANG
BY MICHAEL S. STRIKER
ATTORNEY

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ELECTROPYROLYSIS APPARATUS

Ernst Stirnemann, Basel, and Theodor Emil Lanz, Neuewelt, Munchenstein, Switzerland, assignors to Lonza Electric and Chemical Works Limited, Basel, Switzerland

Application August 9, 1955, Serial No. 527,324

Claims priority, application Switzerland August 10, 1954

15 Claims. (Cl. 204—325)

The present invention relates to electropyrolysis apparatus.

More particularly, the present invention relates to an apparatus for producing acetylene-containing gases from a liquid hydrocarbon which is decomposed by intermittent electric arc discharges produced between main and auxiliary electrodes arranged in the liquid hydrocarbon.

There exist electropyrolysis apparatus wherein liquid hydrocarbons are electropyrolized between two electrodes, the arrangement being usually such that the electrodes are stationary relative to each other so that distance between the electrodes increases as the electrodes become worn. Alternatively, the electrodes may be movable relative to each other so that the distance between the electrodes may from time to time be adjusted. However, great difficulty has been encountered in providing electropyrolysis apparatus wherein the wearing off of the electrodes is automatically properly compensated for, so that the operation of known devices is not very efficient.

It is therefore an object of the present invention to overcome the above disadvantages by providing an electropyrolysis apparatus in which wearing off of the electrodes is automatically compensated for.

It is another object of the present invention to provide an electropyrolysis apparatus which is relatively simple, which may be constructed and operated at low cost, and which will give long periods of trouble-free service.

With the above objects in view, the present invention mainly consists in an electropyrolysis apparatus which comprises a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge, at least two spaced main electrodes arranged in the vessel, non-conductive support means arranged in the space between the main electrodes, and auxiliary electrode means constituted by a mass of electrically conductive granules arranged on the support means and being freely movable relative to the same and to each other. The main electrodes are preferably roller electrodes which are mounted for rotation about two parallel horizontal axes of rotation which are spaced from each other a distance greater than the sum of the radii of the roller so that the above-mentioned space is formed between the outer peripheries of the roller electrodes.

The support means is perforated, and the granules are normally of such size and configuration as to be incapable of falling through the perforation of the support means but are capable of falling through the perforations after having attained a predetermined smaller size as the result of wearing off.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific

embodiments, when read in connection with the accompanying drawings, in which:

Fig. 1 is a diagrammatic sectional elevational view of a preferred embodiment of the present invention;

Fig. 2 is a fragmentary diagrammatic view, partly in section, taken substantially along line II—II of Fig. 2;

Fig. 3 is a diagrammatic perspective view of part of the embodiment illustrated in Figs. 1 and 2;

Fig. 4 is a schematic view illustrating the general arrangement of one embodiment; and

Fig. 5 is a fragmentary end view schematically illustrating a modification.

Referring now to the drawing, there is shown a preferred embodiment of an electropyrolysis apparatus according to the present invention. The device includes a fluid-tight vessel or container 1 which is adapted to receive a liquid hydrocarbon, such as oil, which is capable of being electropyrolized by an electric arc discharge.

At least two main roller electrodes 2 are mounted in the vessel 1 for rotation about two parallel horizontal axes of rotation which are spaced from each other a distance greater than the sum of the radii of the roller electrodes so that a space is formed between the outer peripheries or peripheral surfaces 2' of the roller electrodes. The rotatable electrodes may be made of any suitable material, such as carbon. Alternatively, the electrodes may be made of any other electrically conductive material which is capable of withstanding the electric arc temperatures, as, for example, graphite or silicon carbide.

Suitable drive means including electric motors 22 are operatively connected to the shafts of the roller electrodes 2 for rotating the roller electrodes about their axes.

A non-conductive support means 4 which is made of polymerized tetrafluoro ethylene or any other suitable heat and oil resistant material is arranged in the space between the outer peripheries of the roller electrodes 2. The support means 4 is perforated, the perforation 7 preferably being elongated slots, as may best be seen in Fig. 2.

At least one, but preferably a plurality of superposed layers of electrically conductive particles 3 are supported by the support means 4 and constitute an auxiliary electrode. The granules, which may be made of carbon petroleum coke, oil coke, graphite or the like, normally are of such size and such configuration that they will not drop through the perforations 7 of the support means 4. Also, the edges 4' of the latter are sufficiently near the outer peripheries 2' of the roller electrodes 2 so that the granules will normally not drop through the space between these edges 4' and these peripheries 2'.

Suitable shielding means 5 may be provided for covering the upper portions of the roller electrodes 2, as is clearly shown in Fig. 1 of the drawing. The shielding means 5 may be made of resilient sheet metal.

Suitable liquid supply means 13 and removal means 18 having an inlet conduit 8 and an outlet conduit 9, respectively, in communication with the interior of the vessel 1 are provided for supplying a liquid hydrocarbon into the interior of the vessel and for removing spent liquid, and a suitable gaseous medium removal means 15 having a conduit 6 in communication with the upper portion of the vessel 1 is provided for removing gaseous matter from the interior thereof.

The operation of the device is as follows:

A difference of electric potential is applied through slide contacts 30 to the roller electrodes 2 while the same are rotated about their axes of rotation and while the granules 3 are supported on the support means 4. All of the electrodes, i. e., the two roller electrodes 2 and the auxiliary electrode which is constituted by the granules 3, are immersed in a liquid hydrocarbon so that a film of liquid

hydrocarbon is formed between the roller electrodes 2 and the granules 3. The film provides a spark gap so that an electric arc discharge may occur within the vessel 1. As a result of this arc discharge, a certain quantity of the liquid hydrocarbon will be vaporized so as to form acetylene-containing vapors and gases. The vaporization takes place with explosive rapidity so that the expanding vapors and gases scatter the granules 3. The size of the spark gap is thus increased until the gap is too great to permit the continued existence of the arc. The arc will therefore be extinguished and there will no longer be any force tending to scatter the granules 3.

The granules will, as may readily be seen from the drawing, be free to move upwardly only, especially if suitable shielding means 11 are provided for shielding the space between the outer peripheries of the roller electrodes 2 in the regions of the opposite free end faces of the rollers, as shown in Fig. 3. The granules will therefore scatter within the upper portion of the vessel 1 and therefore will be free to drop when the arc has been extinguished. It will be readily understood that the granules will drop either directly onto the support means 4 or will impinge upon and be deflected by the shielding means 5 in such a manner that they will be guided onto the support means 4. The shielding means 5, then, acts as a funnel for guiding falling particles onto the support means 4.

A suitable gas-permeable shield 10, such as a screen or net, is arranged in the upper portion of the vessel 1 and is part of shielding means 11. The shield 10 will limit the upper movement of the granules 3 and the shielding means 5 and 11, form a hollow space within which the scattered granules 3 may move while permitting acetylene-containing gases formed as a result of the arc discharge to pass to the conduit 6 through which the gaseous medium is exhausted, for example by an exhauster 15.

As soon as sufficient granules 3 are once again supported by the support means 4, a sufficiently small spark gap is formed so that the potential difference between the roller electrodes 2 is capable of forming another arc discharge. A film of hydrocarbon formed between the roller electrode 2 and the individual granules 3 will thus be electropyrolized and the granules 3 will again be scattered and the arc extinguished, in the manner set forth above.

By virtue of the above arrangement, the size of the spark gap to be traversed by the electric arc will be maintained constant despite wearing off of outer surfaces of the roller electrodes 2 after prolonged use and despite wearing off of individual granules 3.

Also, by virtue of the roller electrode arrangement, no one surface portion of either of the main electrodes 2 is worn off excessively, and any one surface portion through which an arc discharge is formed will readily be cooled before being subjected to a subsequent discharge. In this way the useful life of the electrodes 2 is greatly increased.

As set forth above, the support means 4 is formed with perforations 7. The purpose of these perforations is to permit the removal of those granules 3 which, as a result of prolonged use, have become so warn as to have attained a relatively small size. It has been found that for the sake of efficient operation, only granules of at least a certain size should be used. Consequently, the perforations 7 are provided to permit worn granules to fall through the support means 4. The thus spent granules may be removed from the interior of the vessel 1 by way of the outlet conduit 9.

The support means 4 is an elongated one and has a width which exceeds the distance between the outer peripheral surfaces 2' of the roller electrodes 2. As set forth above, the support means 4 is arranged relative to the roller electrodes 2 in such a manner that the edges 4' of the support means 4 are in such close proximity with the outer peripheral surfaces 2' of the roller electrodes that normally sized granules 3 are prevented from falling through the spaces between the edges 4' of the support means 4 and the outer peripheral surfaces 2' of the roller electrodes 2.

If desired, the support means 4 may be mounted for movement relative to the roller electrodes 2 in a vertical direction normal to the horizontal plane passing through the electrode axes. In this way, the support means 4 may be moved downwardly, from the position illustrated in Figure 1, so that the edges 4' may at all times be maintained near the peripheral surfaces 2' despite wearing off of these surfaces after prolonged use. Fig. 5 illustrates this construction and shows two vertical guide members 24 on which support plate 4' is guided. Springs 26 abut on the vessel 1 and on plate 4' to urge plate 4 upwards. Stops 25 on guide members 24 retain plate 4 on guide member 24.

Alternatively, either or both of the roller electrodes 2 may be mounted for movement toward and away from the other roller electrodes and the support means 4 so that the distance between the roller axes and consequently the distance between the support means edges 4' and the peripheral surfaces 2' of the roller electrodes 2 may be varied. In this way, the spaces between the edges 4' and the peripheral surfaces 2' may be maintained sufficiently small to prevent useful normally sized granules 3 from falling into the outer conduit 9. As shown in Fig. 4, roller 2A is stationary, and roller 2B is mounted on bearings 31 which are slidable towards roller 2A. Moving means 20, for example electric motors, operate members 19 to shift bearings 31. The perforated support plate 4 is mounted on brackets 21 in vessel 1.

In order to prevent the auxiliary granule electrodes from leaving the reaction space except when worn as explained before, a preferred embodiment of our invention includes non-conductive shielding plates at both ends of both roller electrodes 2 and of the supporting means 4. The plates form part of the shielding means 11 (Fig. 3) and tightly fits the ends of the roller electrodes and the supporting means. The upper surface of the rollers is covered by the shielding means 5, and the room above the reaction space is closed by the gas permeable screen 10.

If desired, suitable filter means 17 may be operatively associated with the liquid removal means 18 for separating spent granules, as well as electrode sedimentation, soot and the like from spent liquid which is removed from the vessel 1 through the outlet conduit 9.

Also, if desired, a plurality of pairs of roller electrodes 2 may be provided. The same may be electrically connected either by way of a series-circuit or by a parallel connection.

Insofar as particular numerical values of dimensions, voltages, etc., are concerned, the ranges of these values may be extremely wide. It has been found, however, the distance between the outer peripheral surfaces 2' of the roller electrodes 2 should be chosen in accordance with the voltage to be used. If, for example, the difference of electric potential between the roller electrodes 2 is between 500 and 1,000 volts, the distance between the surfaces 2' should be between 30 and 70 mm.

The diameters and lengths of the roller electrodes is immaterial insofar as the present invention is concerned. It has been found, however, that the size of the roller electrodes materially influences the capacity and useful life thereof. It has also been found that for practical purposes, the length of the roller electrodes should not exceed 2000 mm. and the diameter should not substantially exceed 500 mm.

In a preferred embodiment of the present invention the space between the peripheral surfaces 2' is between 20 and 200 mm., and preferably between 30 and 60 mm., and the roller electrodes 2 are between 100 and 200 mm. in length and have a diameter of between 100 and 500 mm.

Also, the granules 3 may have a roller-shaped, spherical or other suitable configuration. The outer diameter of each granule is preferably between 5 and 10 mm., but it

has been found that granules of between 6 and 8 mm., and preferably of 7 mm., in diameter are particularly suitable.

Moreover, the perforations 7 of the support means 4 of a preferred embodiment of the present invention are constituted by elongated slots which are preferably 2 to 4 mm. in width.

The following example is given further to illustrate the present invention, the scope of the invention, however, not being limited to the specific details of the example.

In a preferred embodiment of an electropyrolysis apparatus according to the present invention, the roller electrodes are 150 mm. long and have a diameter of 115 mm. The space between the outer peripheral surfaces of the roller electrodes is 35 mm. The auxiliary electrode is constituted by a mass of petroleum coke granules weighing a total of 80 grams, the outside diameter of each granule being 7 mm. The vessel 1 is filled with liquid hydrocarbon which distills between 120 and 180° C., and the liquid is exposed to electric arc discharges while the roller electrodes are rotated at approximately 30 r.p.m., the temperature being maintained at about 50° C. 1250 standard or normal liters of a gaseous mixture of the following composition was produced while the potential difference between the electrodes was 550 volts and during an energy consumption of 4.06 kw.-hr. per normal or standard cubic meter of gaseous mixture produced:

Constituent:	Percent volume
C_2H_2 and homologues thereof	36.7
C_2H_4	8.8
H_2	51.3
C_2H_6	1.2
CH_4	2.0

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of electropyrolysis apparatus differing from the types described above.

While the invention has been illustrated and described as embodied in an electropyrolysis apparatus for producing acetylene containing gases from a liquid hydrocarbon, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. An electropyrolysis apparatus comprising, in combination, a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two horizontal axes of rotation in such a manner that the outer peripheries of said main roller electrodes are spaced horizontally from each other; means for rotating said main roller electrodes; non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheries; and auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other.

2. An electropyrolysis apparatus comprising, in combination, a fluid-tight vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two horizontal axes of rotation in such a manner that the outer peripheries of said main roller electrodes are spaced horizontally from each other; means for rotating said main roller electrodes; non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheries; auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other; liquid supply means in communication with said vessel for supplying a liquid hydrocarbon thereinto; and gaseous medium removal means in communication with said vessel for removing therefrom acetylene-containing gases produced in said vessel as the result of electropyrolysis of liquid hydrocarbon supplied thereinto by said liquid supply means.

3. An electropyrolysis apparatus comprising, in combination, a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel generally horizontal axes of rotation in such a manner that the outer peripheries of said main roller electrodes are spaced horizontally from each other; means for rotating said main roller electrodes; non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheries; auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other; and shielding means above said main roller electrodes, said shielding means having upper surfaces downwardly inclined toward said space so that granules moved upwardly from said support means during electropyrolysis will, when falling down, be guided by said shielding means into said space and onto said support surface of said support means.

4. An electropyrolysis apparatus, comprising, in combination, a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel generally horizontal axes of rotation spaced from each other a distance greater than the sum of the radii of said main roller electrodes so that the outer peripheries thereof are spaced horizontally from each other; means for rotating said main roller electrodes; non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheries; auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other; and two shielding means arranged above said main roller electrodes, respectively, each of said shielding means being constituted by at least one elongated plate member extending in the direction of said main roller electrodes and being mounted in such a manner that it extends downwardly toward said space and has a free edge above the corresponding main roller electrodes in the region of said space so that granules moved upwardly from said support means during electropyrolysis will, when falling down, be guided by said shielding means into said space and onto said support surface of said support means.

5. An electropyrolysis apparatus comprising, in combination, a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel generally horizontal axes of rotation spaced from each other a distance greater than the sum of the radii of said main roller electrodes so that the outer peripheries thereof are spaced horizontally from each other, at least one of said main roller electrodes being also mounted for movement toward and away from the other of said main roller electrodes so that the distance between said axes may be varied; means for rotating said main roller electrodes; non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheries; and auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other.

6. An electropyrolysis apparatus comprising, in combination, a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel generally horizontal axes of rotation in such a manner that the outer peripheries of said main roller electrodes are spaced horizontally from each other; means for rotating said main roller electrodes; non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheries; and auxiliary electrode means constituted by a mass of electrically conductive granules forming a plurality of superposed layers arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other.

7. An electropyrolysis apparatus comprising, in combination, a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel generally horizontal axes of rotation in such a manner that the outer peripheries of said main roller electrodes are spaced horizontally from each other; means for rotating said main roller electrodes; perforated non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheries, the perforations operating at said surface and being constituted by a plurality of elongated slots; and auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other, said granules being normally of such size and configuration as to be incapable of falling through said perforations of said support means but being capable of falling through said perforations of said support means after having attained a predetermined smaller size as the result of wearing off.

8. An electropyrolysis apparatus comprising, in combination, a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel generally horizontal axes of rotation spaced from each other a distance greater than the sum of the radii of said main roller electrodes so that the outer peripheries thereof are spaced horizontally from each other, at least one of said main roller electrodes being also mounted for movement toward and away from the other of said main roller electrodes so that the distance between said axes may be varied; moving means connected to said one main roller electrode for moving the same relative to said other main roller electrode in such a manner that the space between their peripheries is maintained substantially constant despite wearing off of said outer peripheries of said main roller electrodes during electropyrolysis; means for rotating said main roller electrodes; non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheies; and auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support surface of support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other.

9. An electropyrolysis apparatus comprising, in combination, a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel generally horizontal axes of rotation spaced from each other a distance greater than the sum of the radii of said main roller electrodes so that the outer peripheries thereof are spaced horizontally from each other; means for rotating said main roller electrodes; non-conductive support means having a generally horizontal surface; mounting means for mounting said support means in the space between said main roller electrodes for movement relative thereto in such a manner that said support surface of said support means may be maintained in close proximity with said outer peripheries of both main roller electrodes despite wearing off thereof during electropyrolysis; and auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other.

10. An electropyrolysis apparatus comprising, in combination, a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel generally horizontal axes of rotation spaced from each other a distance greater than the sum of the radii of said main roller electrodes so that the outer peripheries thereof are spaced horizontallly from each other; means for rotating said main roller electrodes; elongated non-conductive support means having a width exceeding the distance between said outer peripheries of said main roller electrode and defining a generally horizontal support surface extending between said outer peripheries; mounting means for mounting said support means in the space between said main roller electrodes for movement relative thereto in a direction normal to a plane passing through said axes so that said support surface of said support means may be maintained in close proximity with said outer peripheries of both main roller electrodes despite wearing off thereof during electropyrolysis; and auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other.

11. An electropyrolysis apparatus comprising, in combination, a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel generally horizontal axes of rotation in such a manner that the outer peripheries of said main roller electrodes are spaced

horizontally from each other; means for rotating said main roller electrodes; non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheries; auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other; first shielding means above said main roller electrodes, said shielding means having upper surfaces downwardly inclined toward said space so that granules moved upwardly from said support means during electropyrolysis will, when falling down, be guided by said shielding means into said space and onto said support surface of said support means; and second shielding means in said space in the regions of the opposite free end faces of said main roller electrodes for restricting movement of said granules in the direction of said main roller electrodes to movement between two planes, containing, respectively, said opposite free end faces of said main roller electrodes.

12. An electropyrolysis apparatus comprising, in combination, a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel generally horizontal axes of rotation in such a manner that the outer peripheries of said main roller electrodes are spaced horizontally from each other; means for rotating said main roller electrodes; non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheries; auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other; first shielding means above said main roller electrodes, said shielding means having upper surfaces downwardly inclined toward said space so that granules moved upwardly from said support means during electropyrolysis will, when falling down, be guided by said shielding means into said space and onto said support surface of said support means; second shielding means in said space in the region of the opposite free end faces of said main roller electrodes for restricting movement of said granules in the direction of said main roller electrodes to movement between two planes containing, respectively, said opposite free end faces of said main roller electrodes; and gas-permeable means arranged above said space and connected to said first and second shielding means for limiting the upward movement of said granules while permitting the passage of a gaseous medium produced by electropyrolysis of a liquid contained in said vessel.

13. An electropyrolysis apparatus comprising, in combination, a fluid-tight vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel generally horizontal axes of rotatiton in such a manner that the outer peripheries of said main roller electrodes are spaced horizontally from each other; means for rotating said main roller electrodes; non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheries; auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other; liquid supply means in communication with said vessel for supplying a liquid hydrocarbon thereinto; liquid removal means in communication with said vessel for removing spent liquid therefrom; filter means operatively associated with said liquid removal means for filtering spent granules, electrode sedimentation, soot and other pyrolysis residue from spent liquid being removed from said vessel; and gaseous medium removal means in communication with said vessel for removing therefrom acetylene-containing gases produced in said vessel as the result of electropyrolysis of liquid hydrocarbon supplied thereinto by said liquid supply means.

14. An electropyrolysis apparatus comprising, in combination, a fluid-tight vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel substantially horizontal axes of rotation in such a manner that the outer peripheries of said main roller electrodes are spaced horizontally from each other; means for rotating said main roller electrodes; non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheries; auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other; liquid supply means in communication with said vessel as the result of electropyrolysis of liquid hydrocarbon supplied thereinto by said liquid supply means; and cooling means for cooling the liquid hydrocarbon supplied into said vessel by said liquid supply means.

15. An electropyrolysis apparatus comprising, in combination, a vessel adapted to contain a liquid capable of being electropyrolized by an electric arc discharge; at least two main roller electrodes arranged in said vessel and mounted for rotation about two parallel generally horizontal axes of rotation spaced from each other a distance greater than the sum of the radii of said main roller electrodes so that the outer peripheries thereof are spaced horizontally from each other; means for rotating said main roller electrodes; non-conductive support means arranged in the space between said main roller electrodes and defining a generally horizontal support surface extending between said outer peripheries; and auxiliary electrode means constituted by a mass of electrically conductive granules arranged on said support surface of said support means extending between said main roller electrodes and being freely movable relative to said support means, said main roller electrodes, and to each other.

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