

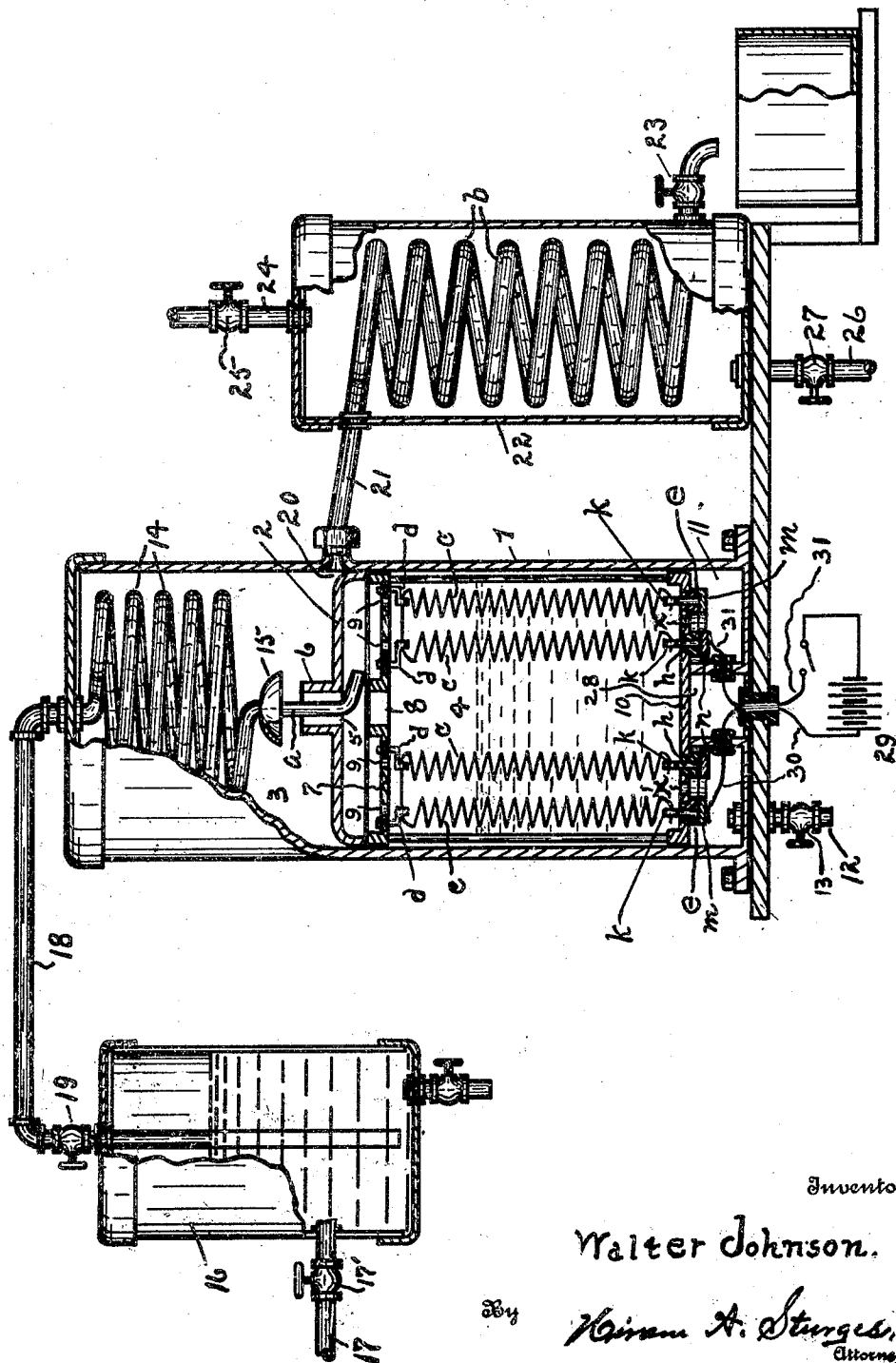
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W. JOHNSON

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PURIFYING APPARATUS FOR LIQUID HYDROCARBON

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Inventor

Walter Johnson.

By

Wm. A. Sturges,
Attorney

UNITED STATES PATENT OFFICE.

WALTER JOHNSON, OF NORTH LOUP, NEBRASKA.

PURIFYING APPARATUS FOR LIQUID HYDROCARBON.

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To all whom it may concern:

Be it known that I, WALTER JOHNSON, a citizen of the United States, residing at North Loup, in the county of Valley and State of Nebraska, have invented certain new and useful Improvements in a Purifying Apparatus for Liquid Hydrocarbon, of which the following is a specification.

This invention relates to an apparatus for purifying liquid hydrocarbon, and has for its object to provide an apparatus by means of which all grades of mineral oil may be conveniently and effectively treated for this purpose.

The invention consists of the novel construction, combination and arrangement of parts as described herein and claimed, and as illustrated in the accompanying drawing, wherein the single figure is a view in side elevation partly in section, of an apparatus showing one embodiment of the invention.

I provide a container 1, provided midway between its ends with a partition 2, to provide an upper compartment 3 and a lower compartment 4, said partition having an aperture 5 formed therein, and being provided on its upper side with a sleeve 6 circumscribing said aperture.

The partition 2, preferably, is imperforate with the exception of its aperture 5. Below and near said partition is a distributing-receptacle 7 having an exit port 8 and a plurality of apertures 9, formed in its bottom.

Numeral 10 indicates a foraminous partition disposed near the bottom of the container, and thereby forming a compartment 11; and communicating with this compartment is a drain pipe 12, provided with a valve 13.

In the upper compartment is a pipe-coil 14 having a lower, rectilinear part *a* traversing the sleeve 6 to communicate with the distributing-receptacle 7, said part *a* being provided with a hood 15 overhanging the sleeve.

Numeral 16 indicates a tank for containing liquid hydrocarbon under pressure and delivered thereto by the supply pipe 17, said pipe being provided with a valve 17', and the pressure being sufficient in degree to cause said liquid to be conducted by the pipe 18 to the pipe coil 14, the pipe 18 being provided with a valve 19.

Numeral 20 indicates a discharge port for the container 1, said port being disposed

above and near the partition 2 and in communication with a conducting pipe 21, said last named pipe having a spiral part *b* disposed within a condensing reservoir 22, its discharge terminal being provided with a valve 23. Numeral 24 indicates an intake pipe for the reservoir, this pipe being provided with a valve 25, said reservoir also being provided with a discharge pipe 26 having a valve 27.

As thus described, it will be understood that if the valves 17', 19 and 23 are open, liquid hydrocarbon will enter the distributing-receptacle 7 and will pass through the apertures 9 of said receptacle; and during operation, on account of the control provided by the valves, the supply of liquid hydrocarbon for the container 1, is limited to that part below and adjacent to the distributing-receptacle.

In order that the liquid hydrocarbon may be effectively and conveniently purified, it is accomplished by vaporization by use of heating devices within and wholly separated from the container, and consisting of a plurality of electrical resistant coils *c*, these preferably being disposed substantially parallel with reference to each other within the lower compartment in line with the apertures 9 of the distributing-receptacle, said resistant coils preferably being employed in pairs, the upper part of each pair being mounted upon a pair of insulated arms *d*, with which the distributing-receptacle is provided.

The partition 10 is provided, to project below its bottom, with a plurality of insulating blocks *e* and *h*, these being arranged in pairs for a mounting of the metallic plugs *k* which provide a mounting for the lower ends of the resistant coils.

At *m* is indicated an annular electrical conductor which is disposed adjacent to the cylindrical wall of the container, said conductor being suitably secured to the lower ends of the insulating blocks *e*, said conductor *m* being in contact with the metallic plugs *k* of said blocks *e*, and at *n* is indicated a second annular electrical conductor which is disposed inwardly and adjacent to the conductor *m*, said conductor *n* being secured to the lower ends of the insulating blocks *h*, said conductor *n* being in contact with the metallic plugs *k* of said insulating blocks *h*.

Numeral 28 indicates a sleeve upon which

the partition 10 is disposed. Any suitable number of resistance coils may be employed and they may be energized by any adequate source of electrical supply, an electric battery 29 being shown for this purpose, its conductor 30, of one polarity, being in electrical contact with the endless conductor *m*, and the conductor 31, of opposite polarity, being in electrical contact with the endless conductor *n*.

While I have described the foregoing elements in detail, I do not wish to be understood as limiting myself in this respect, nor to form, size, proportion of parts, nor material to be employed, since the scope of the invention is determined by the appended claims.

As stated above, any desired number of electrically energized resistant coils may be employed, and on account of their arrangement and the proportion of parts, an intense heat may be generated. During operation, for obtaining the best results, the valve 13 should remain open, and by adjustments of the other valves mentioned, the supply of liquid hydrocarbon within the compartment 4 should be maintained from one-half to two-thirds filled. The liquid hydrocarbon will be delivered to the lower compartment by passing through the apertures 9 of the distributing-receptacle, and moving downward by gravity upon the resistant coils.

The intense degree of heat will cause the liquid contents of the lower receptacle to be vaporized, the heated vapor moving upwardly through the ports 8 and 5 to the upper compartment 3, a part of the heat being absorbed by the pipe-coil 14, which causes the contents of said pipe-coil to become heated ready for delivery to the distributing receptacle, the condensed parts on said coil 14 being prevented from moving downwardly within the sleeve 6 by the hood 15.

The vaporized hydrocarbon, in this partly condensed condition, will then pass to the spiral part 6 within the condensing reservoir 22 by passing the port 20 and conducting pipe 21. It will thus be seen that the parts employed are few and may be economically manufactured, and it will be appreciated that the pipe coil 14 could be dispensed with, but since it utilizes the heat, it is of advantage.

By passing water at a low temperature through the reservoir, the vaporized hydrocarbon may be condensed, the product being discharged through the valve 23, the large per cent of water generally contained, in suspended form, in mineral oil, when undergoing treatment in the container, as described, being subjected to a full white heat and being decomposed into an oxygen and hydrogen gas.

Among some of the advantages to be derived by use of the apparatus, it may be stated that the oil, while under treatment, is exposed to actual contact with the electrically charged resistant coils; also, since the heating element employed is immersed in the oil and is isolated from the walls of the container, the heat is applied economically and without waste; also, it is considered that the parts operate automatically, or substantially so, requiring only a limited attention of an operator.

It will be understood that the residue of the product passes the valve 13, which, as stated, remains open during operation, the residue moving to the compartment 11 through apertures *z*.

Having fully described my invention, what I claim and desire to secure by Letters Patent is,—

1. In a hydrocarbon purifying apparatus, a container having a lower compartment provided with a drain device and having an upper compartment communicating with the lower compartment and provided with a discharge port, means including a pipe-coil for conducting liquid hydrocarbon through the upper compartment to be discharged within the lower compartment, a plurality of electrically energized resistant coils within the lower compartment for vaporizing and causing vaporized hydrocarbon to move therefrom to the upper compartment, means for preventing a movement of the partly condensed hydrocarbon from the upper to the lower compartment, and a conduit communicating with the discharge port of said upper compartment for conducting the partly condensed hydrocarbon outwardly from said container.

2. In a hydrocarbon purifying apparatus, a container having a foraminous partition and provided with a discharge port, a receptacle disposed horizontally within and below the discharge port of the container and having its bottom provided with apertures and a discharge port in communication with the discharge port of said container, a pair of adjacently disposed, insulated, annular, electrically-energized conductors mounted on the foraminous partition, means for conducting liquid hydrocarbon to said receptacle, a plurality of resistant coils within the container and in electrical communication with said annular, electrically energized conductors for vaporizing the liquid hydrocarbon, said resistant coils being disposed substantially parallel with reference to each other, below and in line with the apertures of the receptacle.

3. In a hydrocarbon purifying apparatus, a container having a discharge port, means for conducting liquid hydrocarbon to that part of the container below its discharge port, heating devices within and insulated

from the container and in contact with the liquid hydrocarbon for causing vaporization thereof, a foraminous partition within the container below said heating devices, and a drain-pipe in communication with that part of the container below said partition.

4. In a hydrocarbon purifying apparatus, the combination with a container having a communicating upper and lower compartment with a discharge port near the bottom of said upper compartment, a conduit entering the top of the upper compartment and arranged to conduct liquid hydrocarbon to the lower compartment, a grating near the upper end of the lower compartment, a grating near the lower end of said lower compartment, a plurality of electrically energized resistant coils disposed vertically and supported by said gratings to cause vaporization of the liquid hydrocarbon for a discharge thereof to the upper compartment, a conducting pipe in communication with said discharge port and means for condensing the vaporized hydrocarbon while it is conducted by said pipe.

5. In a hydrocarbon purifying apparatus, the combination with a container having a communicating upper and lower compartment, the lower compartment having oil standing therein at a predetermined level, a discharge port near the bottom of the upper compartment, a conduit entering the top of the upper compartment and arranged to conduct liquid hydrocarbon to the lower compartment, a plurality of electrically energized resistance coils disposed in the lower compartment and partly submerged by said oil, to vaporize the oil and superheat the vapor; a conducting pipe in communication with said discharge port, and means for condensing the vaporized hydrocarbon while it is conducted by said pipe.

6. In a hydrocarbon purifying apparatus, a container provided near its bottom with a foraminous partition, a distributing receptacle having apertures in its bottom and dis-

posed within the container above said partition, a plurality of electrically energized substantially vertical, resistant coils supported at their respective ends by the distributing receptacle and partition and disposed directly below the apertures of said distributing receptacle, a conduit for conducting liquid hydrocarbon to the distributing receptacle to be delivered to the resistant coils through said apertures for vaporizing said liquid hydrocarbon, said distributing receptacle being provided with an exit port to permit a movement therethrough of the vaporized hydrocarbon, means for conducting vaporized hydrocarbon from that part of the container above the distributing-receptacle, and means for condensing the vaporized hydrocarbon after it has been conducted from said container.

7. In a hydrocarbon purifying apparatus, a container provided near its bottom with a foraminous partition, and provided with a drain pipe below said partition, a distributing-receptacle having apertures in its bottom and disposed within the container above said partition, a plurality of electrically energized, substantially vertical resistant coils supported at their respective ends by the distributing-receptacle and partition and disposed in line with the apertures of said distributing-receptacle, means for delivering liquid hydrocarbon to the distributing receptacle for a movement through said apertures to be deposited upon said resistant coils to cause vaporization of said liquid hydrocarbon, the distributing-receptacle being provided with an exit port to permit a movement therethrough of the vaporized hydrocarbon, and means for conducting vaporized hydrocarbon from said container.

In testimony whereof, I have affixed my signature in presence of two witnesses.

WALTER JOHNSON.

Witnesses:

HIRAM A. STURGES,
M. M. GIBSON.