J. Green,

Apparatus for Deodorizing Petroleum, Benzole &c.

No. 46794, Patented Mar. 14, 1865.

Fig. 2.

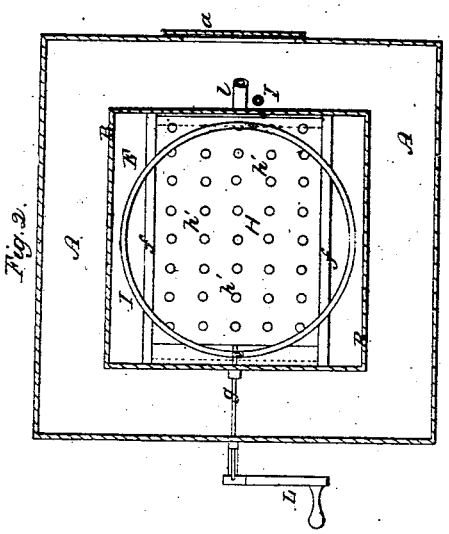


Fig. 3.

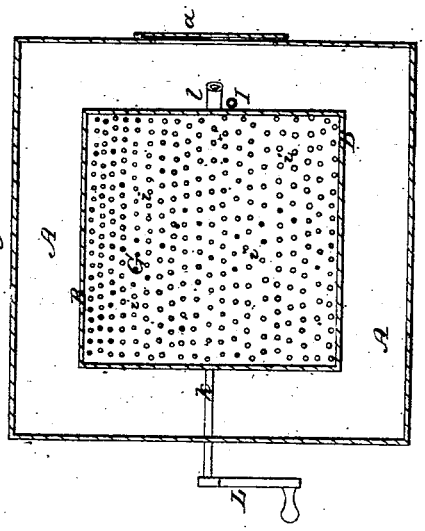


Fig. 4.

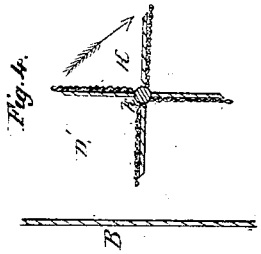
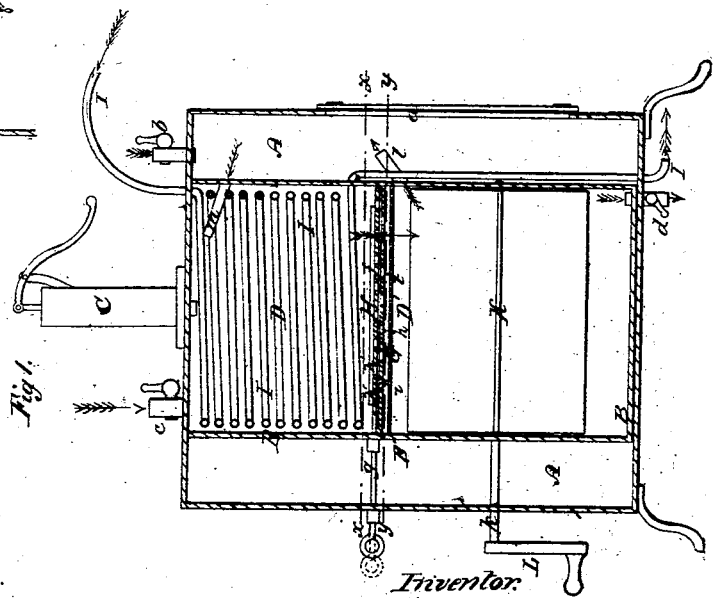


Fig. 1.



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UNITED STATES PATENT OFFICE.

JOEL GREEN, OF ROCHESTER, NEW YORK.

IMPROVED APPARATUS FOR DEODORIZING PETROLEUM, BENZOLE, &c.

Specification forming part of Letters Patent No. **46,794**, dated March 14, 1865.

To all whom it may concern:

Be it known that I, JOEL GREEN, of Rochester, in the county of Monroe and State of New York, have invented a new and useful Improvement in Deodorizing Crude or Distilled Petroleum, Benzole, Naphtha, &c., *in vacuo;* and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Figure 1 is a central vertical section of my improved apparatus; Fig. 2, a transverse horizontal section of the same in the plane of line *x x*, Fig. 1; Fig. 3, a similar section in the plane of line *y y;* Fig. 4, a diagram showing the form and position of the agitator.

Like letters of reference indicate corresponding parts in all the figures.

In its crude state petroleum is highly charged with hydrocarbon gas. It is owing to the presence of this gas that it has its peculiar and disagreeable odor and explosive qualities. The object of the process of deodorization is to remove to as great a degree as possible this gas, thereby modifying the odor and at the same time reducing the inflammability. Various processes have been employed, the most common of which is the use of acids. This has the effect to somewhat change the odor, but does not reduce the volatility, because it does not carry off the gas. Among other modes steam has been admitted into and through the oil, thereby not only raising the temperature of the same, so as to readily evolve the gas, but also at the same time carrying the gas off by positive force; but while this is effective in accomplishing one result designed—viz., changing the odor—it is also liable to reduce the volume or quantity of oil by carrying off a larger portion than is desired in the form of gas, especially if the temperature is accidentally raised to high.

My invention consists in the employment of an apparatus for deodorizing or removing the gas contained in the oil *in vacuo*, in such a manner that the oil is properly agitated to free it of the gas, and is properly drawn off by a pump, and at the same time wasteful expenditure from conversion of the oil into gas by too high a temperature is prevented by retaining said gas in the apparatus till the excess is again condensed.

As represented in the drawings, a suitable air-tight receiver, A, of large size is produced, in which is situated an oil-tank, B. The receiver is provided with a man-hole, *a*, on one side, by which the interior is adjusted, being made tight in any desirable manner. It is provided at suitable position with an air-inlet, *b*, by which air is admitted to relieve the vacuum, an oil-inlet, *c*, by which the unrefined oil is admitted into the tank, and an outlet, *d*, by which the deodorized oil is discharged. On top the receiver or otherwise suitably connected with it is situated an ordinary exhaust-pump, C.

I prefer to make the oil-tank B in two compartments or chambers, D and D′, which are separated by a partition, E, and a little below it a partition, G. The partition E is provided at regular and uniform distances apart with holes *h h*, Fig. 1, of sufficient size to allow the oil to run through readily and quickly. On top this partition (or beneath it, if desired,) rests a slide, H, Figs. 1 and 2, covering a large space, and resting in suitable guides, *f f*, which allow it motion endwise, produced by a rod, *g*, extending out through the receiver. The slide is provided with holes *h′ h′* similar to those in the partition E, and so situated relatively with them that when the slide is thrown back, as in black lines, the communication is cut off, but when it is drawn forward, as in red lines, the respective holes coincide, allowing the oil to pass through. The partition G, Figs. 1 and 3, is simply a metallic plate filled with perforations *i i*, or else a sheet of wire-cloth or some equivalent material.

In the upper chamber, D, of the tank is situated a coiled pipe, I, entering at the top and passing out at the bottom through the side of the tank, and thence down or out through the receiver. Through this pipe passes steam for heating the oil. Any equivalent arrangement may be employed—such, for instance, as a steam-jacket surrounding the chamber; or, if desired, the steam can enter and pass through the oil directly.

In the lower chamber, D′, of the oil-tank, at a suitable position, is situated an agitator, K, preferably in the form of a fan, and composed of wire-cloth, as shown most clearly in Figs. 1 and 4. It may, however, be of other form and composed of other material, if desired. This agitator is hung upon axis *k*, extending out through the tank and receiver and

operated from the outside by a winch, L, or by any equivalent means.

In the top of the lower chamber, D′, is an outlet or tube, *l*, opening from the tank into the receiver, and near the top of the upper chamber, D, is a similar inlet, *m*, opening from the receiver into the tank. This arrangement is for producing an exhaust in both tank and receiver when the pump is operated, and thus effectually exhausting the air and drawing the gas off from both.

In operation the upper chamber, D, of the tank is first filled with oil, and then, by means of the exhaust-pump the air is drawn off from both the tank and receiver. Steam is then let on through the pipe I, gradually heating the oil to the right temperature to evolve the hydrocarbon gas. The slide H is then opened, so that the oil will pass through the holes *h h′* and perforations *i*.

In this arrangement of the partitions E G two advantages are gained, viz: First, I can retain a large reserve or supply of oil in the upper chamber, D, allowing it to pass down as required. This saves the necessity of frequently opening the receiver. Second, in passing through the holes *h h′* and perforations *i* the oil is distributed over a large surface, and is thoroughly cut up, or its particles separated. This is of the greatest importance, for the gas is thus allowed to escape more easily from the broken and separated mass than if the latter passed through in a solid body, in which case the gas would be so confined as to be difficult of escape. On reaching the lower chamber, D′, the oil is subjected to a thorough action by the agitator K. This stirs it up in such a manner as to bring all portions of it to the surface, so that the gas will become thoroughly separated and pass upward to the pump. Were the agitator dispensed with and the oil to remain still, the only action would be, so to speak, an evaporation from the surface, while the globules or particles of gas deep in the oil would still remain unseparated; but by being brought to the surface constantly they readily escape. In am not aware that such an agitator has ever before been employed in combination with a vacuum-tank and receiver, and such I claim. By this arrangement in addition to the beneficial effect of the agitator the removal of the great pressure of the atmosphere by exhaustion allows the gas to escape very readily and rapidly, and these two effects combined produce the most perfect result. By the use of the exhaust-pump I not only draw off the air so as to relieve the oil of pressure, but also draw off the gas as it is evolved; and still further, and of the utmost importance, the exhaust-pump constitutes in this particular process of deodorization a governor or regulator to prevent wasteful expenditure of the oil. To explain: Should the temperature of the oil become too high at any time from accident or otherwise so much of the volatile products of the oil would be converted into gas as to greatly diminish the mass and produce a wasteful expenditure. This gas would pass off and escape unless some means were employed to retain it. The pump accomplishes this result, imprisoning and holding the gas till the temperature is reduced and a portion of the gas again condensed. The oil deodorized by this process gives a brilliant white light, while that deodorized by the ordinary process gives a red light.

I do not claim, broadly, removing or separating the existing gas from petroleum, &c., *in vacuo;* but

What I claim as my invention, and desire to secure by Letters Patent, is the process of—

1. Removing the existing gas of petroleum, benzole, naphtha, and other hydrocarbon liquids *in vacuo* by means of the receiver A, tank B, and pump C, arranged and operating substantially as and for the purpose herein set forth.

2. Forming the tank in two compartments, D D′, separated by the partitions E G, and slide H, provided, respectively, with the holes and partitions *h h′ i*, the whole arranged, combined, and operating substantially as and for the purpose herein specified.

3. The agitator K, in combination with the vacuum-tank B, receiver A, and exhaust-pump C, arranged and operating substantially as herein specified.

In witness whereof I have hereunto signed my mane in the presence of two subscribing witnesses.

JOEL GREEN.

Witnesses:
JAY HYATT,
A. SERROSS.