J. HOWARTH.

Oil Still.

No. 20,562. Patented June 15, 1858.

Fig. 2

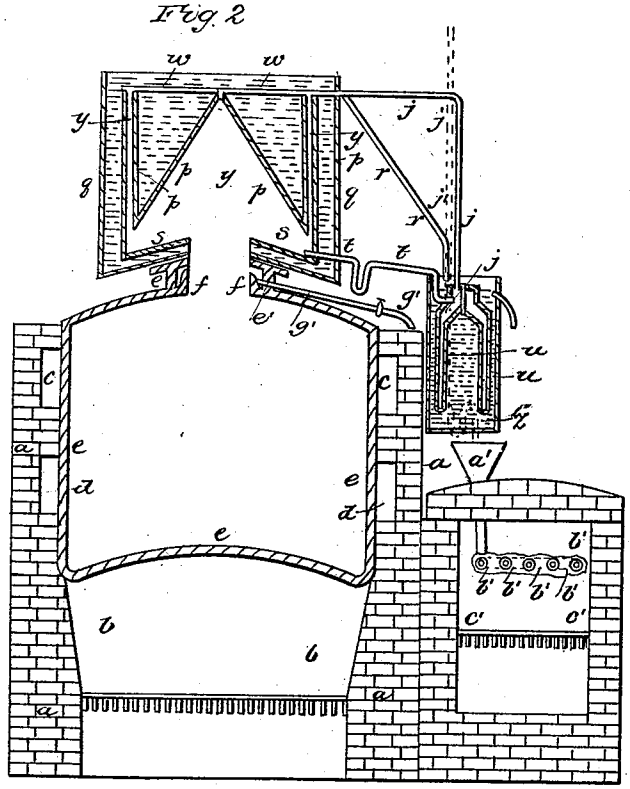
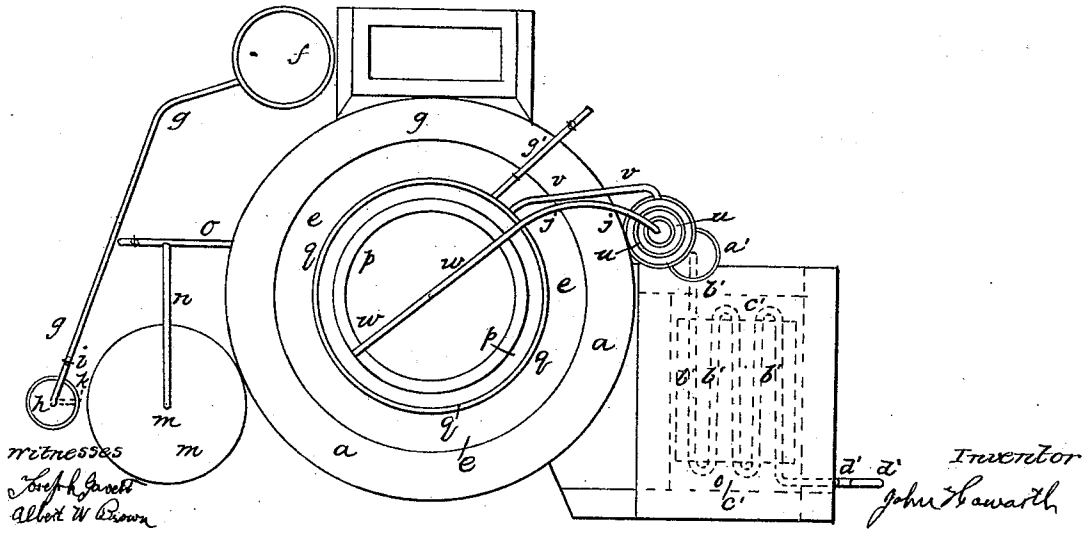


Fig. 1



Witnesses
Joseph Gavett
Albert W Brown

Inventor
John Howarth

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JOHN HOWARTH, OF SALEM, MASSACHUSETTS.

IMPROVEMENT IN APPARATUS FOR DISTILLING OILS.

Specification forming part of Letters Patent No. **20,562**, dated June 15, 1858.

To all whom it may concern:

Be it known that I, JOHN HOWARTH, of Salem, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Apparatus Used for Distilling Rosin-Oil and other Oils; and I do hereby declare that the following description, taken in connection with the accompanying drawings, hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvements, by which my invention may be distinguished from others of a similar class, together with such parts as I claim and desire to have secured to me by Letters Patent.

The figures of the accompanying plates of drawings represent my improvements. Figure 1, Plate 1, is a plan or top view of my improved apparatus. Fig. 2 is a central vertical section of the same. Fig. 3, Plate 2, is a front elevation.

Before proceeding to describe in detail the features of my invention, I will first state the process commonly employed in the distillation of rosin-oil, in order that the distinctive features of my improvements may be clearly manifested and more readily understood.

By the usual mode of producing rosin-oil the products of distillation consist of water, naphtha, and afterward oil of different degrees of thickness and quality, the oil which comes over at a certain stage of the distillation being of the best quality, while that which follows becomes thicker and thicker as the process goes on until the contents of the still are exhausted with the exception of the residue, which consists of pitch. The still is then allowed to cool by extinguishing the fire, the pitch removed, the still recharged with rosin, and the heating process recommenced. This, it may be remarked, is a daily operation, the still being replenished with rosin once in twenty-four hours.

The disadvantages of the above process may be briefly enumerated as follows: a great waste of fuel, as from four to five hours of heating are required before the evaporation commences, while the frequent changes of temperature of the still in consequence of its repeated heatings and coolings renders it liable to crack and break; second, the oil left on the hot sides of the still as it is boiled down, especially on that portion of the surface that comes in contact with the flues, that extend two or three times around the still, becomes carbonized, and thereby discolors the oil and injures its quality. The want of uniformity in the results of the distillation, on account of the impossibility of keeping up a uniform temperature in the still, as the vapors are made faster when the oil gets lower in the still, and are liable to be carbonized unless the fire is regulated with great nicety.

The most essential feature of my improvements consists in introducing heated oil under pressure into the still in such a manner as to keep up a constant feed and retain the oil always at one and the same level. From the statement hereinbefore made that at one stage of the distillation, when the oil is brought down to a certain point in the still, oil of the best quality is produced, the importance of thus keeping up a constant supply of heated oil, so as to retain the distillation always at that stage when the best quality of oil is made, will be apparent, as the result is invariably and necessarily oil of the first class, and that only, and not, as in the old process, oils of all the different grades in one distillation from the thinnest and best to the thickest and poorest, until the last production is nothing but pitch. By this improvement the distillation can be kept up for any length of time without stopping to cool, and then recharge the still every twenty-four hours, as no pitch can be formed until the feeding-in of the oil is stopped, while a large percentage of fuel is saved, as it is only necessary to keep the still always at one temperature, instead of reheating a cold still every twenty-four hours, and it is requisite only to regulate the fire so as to keep the oil at a certain degree of heat, instead of varying the temperature of the oil according to its height in the still, as heretofore—an operation requiring great skill and care on the part of the attendant. The carbonization of the thin strata of oil remaining on the sides of the still in contact with the flues, which necessarily occurs by the old process, is also prevented by my improvements, as the inner surface of the still is kept protected by the constant feed of oil, which is thereby maintained at a sufficient height to

cover and extend above the surface exposed to the heat of the flues.

I have also made several other improvements, which will be hereinafter referred to and fully explained.

a a a in the drawings represent the supporting masonry of the distilling apparatus. *b b* is the fire-chamber communicating with flues *c* and *d*, formed in the brick-work, and extending around the still *e e* in the usual manner. *f* is a reservoir or receptacle to contain the oil or melted rosin with which the still is to be charged. This reservoir *f* is placed above the top of the still, in order to induce the necessary pressure upon the oil. A pipe, *g g*, conducts from it and delivers the oil into a funnel, *h*. This funnel *h* is placed at the same height at which the oil is to be kept in the still, and has its supply regulated by a stop-cock, *i*, in the pipe *g g*. The oil received by the funnel *h* passes down through a pipe, *k*, which communicates with a worm, *l*, inclosed by a cylinder, *m*, into which steam is admitted, so as to surrouud the worm and heat the oil therein. The oil thus heated is forced from the worm through the pipes *n* and *o* into the still, near its bottom.

From the above description it will be seen that the still is constantly fed with heated oil under pressure, and, furthermore, that the oil will be always kept at the same level in the still as the height of the funnel *h*, the supply to which is regulated by the stop-cock *i* in the pipe *g*, so as to keep it full, or nearly so, and thereby feed in the oil to the still as fast as it is wanted and no faster, so as to preserve a uniform level, the objects and advantages of which have hereinbefore been fully stated.

The importance of feeding in heated instead of cold oil will be apparent, as it is vitally essential to the success of the process that the temperature of the oil should always be kept the same, and as the temperature is usually about 450° to 550° Fahrenheit, the feeding in of cold oil would, it is evident, lower the temperature at once.

By the usual arrangement of rosin-oil apparatus, the oil or rosin, as the case may be, is put into the still through a "man-hole" formed in its top, and when the still is charged the distillation is commenced. By my improvement it will be seen that a constant feed is kept up, the whole process forming a continuous operation.

p p is the condenser, placed upon the top of the still and within a tank, *q q*, in such a manner as to expose the whole of its surface to cold water which is supplied to the water-tank by means of a force-pump. As the hot vapors rise from the oil in the still they will strike against the cold surfaces of the condenser and become condensed thereon, and run down the same to the bottom *s s* of the condenser, thence through the elbow-pipe *t t* into a second condenser, *u u*, where whatever vapors that may remain are condensed, the condensing-water being supplied by a pipe, *v*, upon the tank *q q*.

I will next proceed to describe my improvement for increasing the effective operation of the condensing portion of the apparatus. With the vapors that rise into the condenser from the still are large quantities of carbureted-hydrogen gas and other incondensable gases, which rise to the top of the condenser and prevent rapid condensation of the vapors, both by occupying condensing-space and by pressure, which it is essential to avoid, as, if the vapors be not rapidly condensed, they will become carbonized in the still. I have provided means for relieving the incondensable gases from the top of the condenser by means of a pipe, *w w*, having openings or communications *x x*, &c., with the condensing-spaces *y y*, into which the vapors rise. The pipe *w w* conducts off the gases by a pipe, *j*, into the second condenser, *u u*, in company with the oil received from the pipe *t t* at the bottom of the condenser. After thus passing through the second condenser, *u u*, the uncondensed gases will escape through the long gas pipe or flue *j*, and the oil will be delivered through a short pipe, *z*.

Were it not for the arrangement above described, the carbureted-hydrogen gas could not be prevented from occupying nearly the whole space in the first condenser, as there would be no outlet except at the bottom, oil vapors and gases having to pass out at that point. By my improvement the gases find a free exit through the top of the condenser, while the oil condensed can find its way out at the bottom pipe, *t t*.

The next improvement which I shall describe relates to the bleaching of the oil or removing watery particles from it. The bleaching has heretofore been an independent operation, the oil, after being delivered from the still, being heated sufficiently to expel the watery vapors in large open vessels. This mode of bleaching allowed the heated oil to come in contact with the atmospheric air and to absorb the oxygen of the same, which absorption of oxygen invariably discolored the oil, rendering it much darker than before the operation.

My improvement consists in conducting the oil, after it has passed through the second condenser, through a heated worm or coil of pipes protected by a covering of clay, whereby the oil is bleached as fast as it is run through the still and without coming in contact with the air. The oil is delivered from the second condenser, *u u*, through a short pipe, *z*, into a funnel, *a'*, which is placed upon the top of and communicates with a worm or series of bent pipes, *b' b'*. These pipes *b' b'* are covered with clay or other suitable material, and set in a furnace, *c' c'*, that forms a part of or may be connected to the brick-work *a a* of the still.

By protecting the pipes *b' b'* with a coating of clay, the oil passing through the said pipes is prevented from being overheated, the covering of clay serving to protect the pipes from the action of the fire, and also, which is very important, during the bleaching operation

preventing sudden changes of temperature in the oil. After thus being passed through the heated pipes *b' b'* and bleached without being exposed to the air, the oil is delivered through an elbow-pipe, *d'*.

The last improvement I have made consists in preventing the pitch that may adhere to the side of the heated still from passing into and through the condenser and becoming incorporated with the oil, which materially injures its color and quality. I effect this desideratum by forming in the neck *e' e'* of the still and communicating therewith a deep circular gutter, *f' f'*, Fig. 2, which receives all the pitch, &c., that may climb up the sides of the still. The pitch thus collected, so as to prevent its passing up into the condenser, may be removed at proper intervals by means of a pipe, *g'*, entering into said gutter.

It may be remarked, in conclusion, that all of the improvements hereinabove described are equally applicable to the distillation of all the oils susceptible of distillation.

Having thus described my improvements, I shall state my claims as follows:

1. In combination with the still, the reservoir, placed above the level at which the oil is to be kept in the still, and the worm, heated as described or in any other manner, whereby heated oil under pressure is fed into the still in such a manner as to keep the oil therein always at one and the same level, as set forth.

2. The use of a pipe communicating with the several vapor-spaces within the still, as described, whereby the condenser is relieved from the incondensable gases that are generated in the still, and which prevent the effective condensation of the vapors.

3. A gutter formed in the neck of the still, for the purpose specified.

JOHN HOWARTH.

Witnesses:
JOSEPH GAVETT,
ALBERT W. BROWN.