

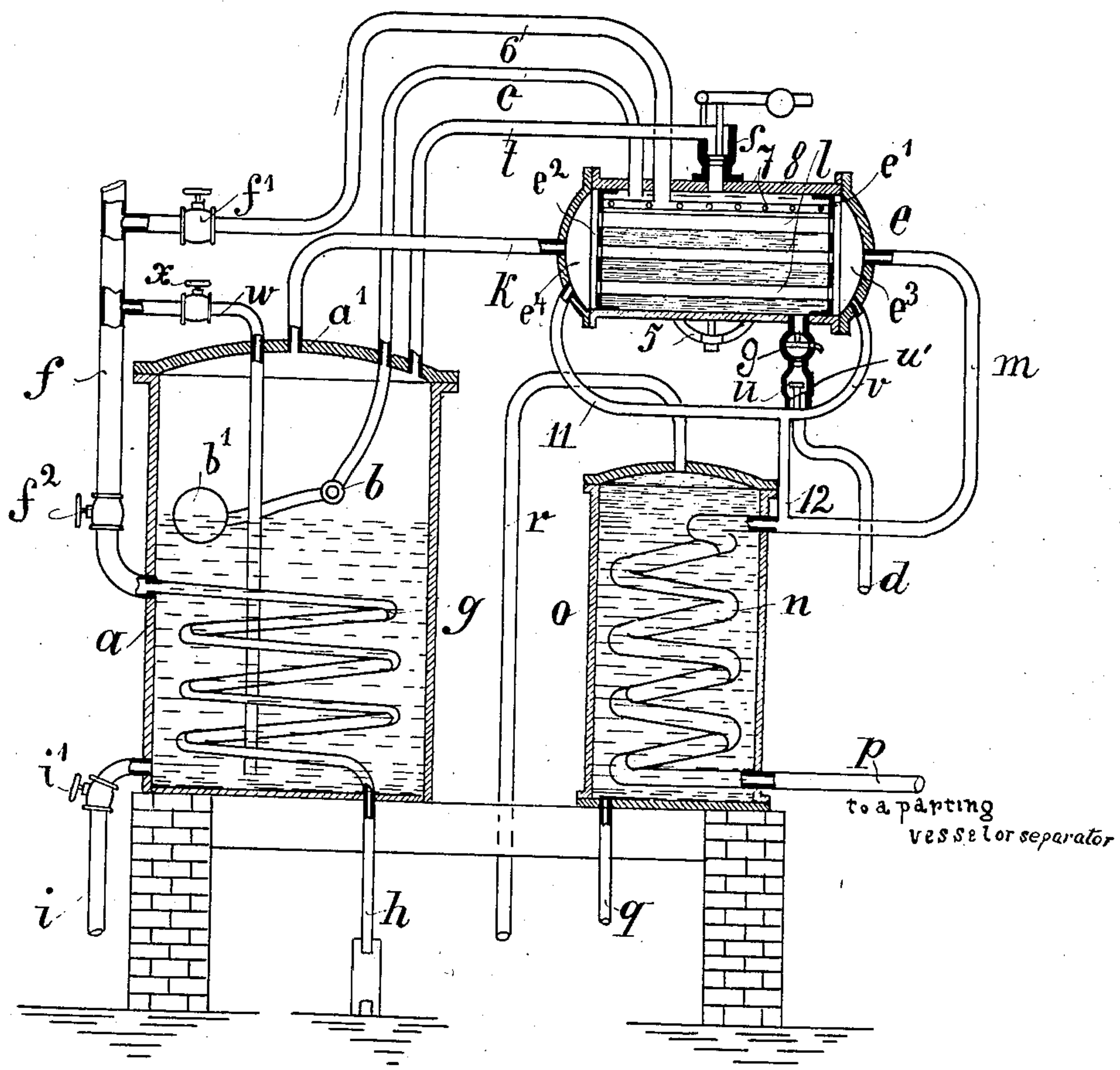
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APPARATUS FOR CONTINUOUSLY DISTILLING BENZIN AND THE LIKE.

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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR CONTINUOUSLY DISTILLING BENZIN AND THE LIKE.

No. 810,637.

Specification of Letters Patent.

Patented Jan. 23, 1906.

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*To all whom it may concern:*

Be it known that I, AUGUST HEINRICH LUDWIG GERHARDT, a citizen of the Empire of Germany, residing at Bettenhausen, near Cassel, in the Empire of Germany, have invented a new and useful Apparatus for Continuously Distilling Benzin and the Like, of which the following is a specification.

My invention relates to an apparatus for distilling benzin and the like in which a heater is inserted between the still and the source of liquid; and the invention resides in the combination and arrangement of component parts and the details of construction to be hereinafter described, and particularly pointed out in the appended claims.

In the accompanying drawing, which illustrates my invention, is shown a vertical central section through the complete apparatus, the tubes and coils being shown mostly in elevation and partly in section.

The distilling apparatus shown is chiefly destined for the distillation of benzin, and hereinafter the liquid to be distilled is assumed to be benzin. However, the same apparatus may also be used for distilling other liquids—for example, also water in case the still is heated in a known manner with direct fire.

The distilling apparatus comprises a still *a*, a heater *e*, and a condenser *o*. In employing the heater in the distilling apparatus according to my invention all the known defects are avoided which are due to the development of vapor from raw or dirty benzin in the heater. The heater *e* contains a plurality of heating-tubes *l*, secured with their ends in two tube-plates *e'* *e''*, so that two chambers *e<sup>3</sup>* and *e<sup>4</sup>* are formed within the covers. The collecting-chamber *e<sup>3</sup>* is connected with the coil *n* of the condenser *o* by means of a tube *m*, and the distributing-chamber *e<sup>4</sup>* is connected with the top part of the still *a* by a tube *k*. Moreover, the two chambers *e<sup>3</sup>* and *e<sup>4</sup>* are connected with each other by a draining-tube *v* and with the tube *m* by a tube *12*. The heater *e* is provided on the top with a safety-valve *s* of any known construction. A short pipe connection depends from the bottom of the heater, in which is a three-way cock *9* and a check-valve *u*, having a seat *u'*.—A cleaning-opening is located in the bottom of the heater, which is normally closed by a cover *5*. A tube *d* leads from a suitable ben-

zin source of supply, from which the benzin may be forced into the heater with the aid of compressed air or under a head or otherwise. The safety-valve *s*, which may be assumed to be provided with a well-known stuffing-box, (not shown,) does not lead into the atmosphere, as hitherto, but is connected with the cover *a'* of the still *a* by means of a tube *t*. For cleaning the heater *e* steam can be conducted from the steam-supply tube *f* by operating a valve *f'* in a branch tube *6*, which terminates in a perforated tube *8*, the size and number of the perforations *7* of which depend upon the size of the heater and the circumstances. The top part of the heater *e* is connected with the still *a* by means of a tube *c*, which projects through the cover *a'* down to a certain point above the level and is on the end provided with a cock *b*. The plug of the latter is connected by an arm with a float *b'* and is thereby controlled.

The still *a* is provided with a coil *g*, into which steam can be admitted from the supply-tube *f* on opening a stop-valve *f<sup>2</sup>*. The lower end of the coil *g* is connected with a draining-tube *h*, through which the condensed steam is allowed to escape to some convenient place. The steam may also be introduced direct into the still from the supply-tube *f* by opening a valve *x*, located in a tube *w*, reaching down to a certain point above the bottom. This is done when the still is to be cleaned or in case heavy benzin-vapor is to be developed. The still *a* is, moreover, provided on the bottom part with a discharging-tube *i* and a stop-cock *i'*. The coil *n* of the condenser *o* is connected with a parting or separating vessel (not shown) by means of a tube *p*. For cooling the coil *n* fresh water is admitted to the condenser *o* through a tube *q*, while the warmed water escapes through a tube *r*. It is immaterial in what known manner this cooling-water is replaced or refrigerated.

The operation of the distilling apparatus is as follows: The benzin supplied from the source through the tube *d* lifts the check-valve *u* and enters, through the open three-way cock *9*, the intermediate part of the heater *e*—i. e., the space surrounding the tubes *l*—where it is preliminarily heated in a manner to be hereinafter described. The warm benzin flows through the tube *c* and the opened cock *b* into the still. It will be evi-



dent that the float *b'* so regulates the admittance of the warm benzin as to render the level more or less constant. The benzin in the still *a* is heated by steam, either indirect  
 5 by means of the coil *g* or direct, and is evaporated. The benzin-vapor escapes through the tube *k*, passes through the tubes *l* of the heater, and gives off a great part of its heat to the benzin surrounding the tubes *l*, where-  
 10 upon it goes through the tube *m* and the coil *n*, in which latter it is condensed. The condensed pure benzin is conducted through the tube *p* to the respective parting or separating vessel and thence to the storage vessel.  
 15 Should any part of the benzin-vapor already become condensed in the heater *e*, it is collected in the chambers *e*<sup>3</sup> and *e*<sup>4</sup> and conducted through the tubes *v* 11 12 to the tube *m* and the coil *n*. In case any vapor should be  
 20 developed from the raw benzin in the heater *e* it will open the safety-valve *s* and escape through the tube *t* into the still *a*. In this manner every excess of pressure will be avoided with certainty. At the same time the  
 25 pressure produced by the vapor developed from the raw benzin in the heater *e* will close the check-valve *u* if the same should be in an open position, so that the benzin-vapor will be prevented from entering the supply-tube  
 30 *d*. In this manner the distilling apparatus is rendered entirely automatic and capable of working without any danger, while at the same time it retains the advantages of the heater.

35 The float-controlled supply-valve *b* affords the advantage that all stop valves or cocks to be adjusted by hand are dispensed with.

The check-valve *u* may be replaced by any other known stop device and also placed under the control of the safety-valve *s* by any  
 40 of the well-known means, so that the valve is closed the moment the safety-valve is opened. Where so preferred, instead of the check-valve *u* the plug of the three-way cock 9 may be  
 45 placed under the control of the safety-valve *s*.

In the heater of the described apparatus dirt can easily accumulate. To remove this dirt, the three-way cock 9 is so turned as to connect the intermediate space of the heater  
 50 with the atmosphere, and then the stop-valve *f'* is opened, so that steam from the supply-tube *f* will enter the heater in jets and drive out the dirt through the three-way cock 9. The heater *e* may be of any other known construction. For example, it may be constructed in a similar manner as the well-known  
 55 ribbed heating apparatus.

In general the distilling apparatus described so far may be varied in many respects  
 60 without deviating from the spirit of my invention.

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

1. In an apparatus of the character described, the combination with a still, of

means for heating said still, a heater comprising two sections or compartments, a tube leading from a supply to one of the compartments, a safety-valve on the heater, a tube connecting the outlet of said safety-valve  
 70 with said still, means for introducing steam in jets into said heater for cleaning same, a blow-off cock on the bottom part of said heater, a supply-tube for conducting the preliminarily-heated liquid from said heater into  
 75 said still, a float-controlled supply-valve on the end of said supply-tube within said still, a tube connecting the top part of said still with the second compartment of said heater, a condenser, a tube connecting the second  
 80 chamber of said heater with said condenser, and means for leading off the condensed pure liquid from said condenser.

2. In an apparatus of the character described, the combination with a still, of a  
 85 steam-coil within said still, means for conducting steam to said steam-coil, a draining-tube outside said still and connected with said steam-coil, means for admitting steam direct to said still, an internal supply-tube  
 90 within said still, a float-controlled supply-valve on the free end of said internal supply-tube, a heater, a check-valve attached to the bottom part of said heater, a tube connecting said check-valve with the source of liquid to  
 95 be distilled, a safety-valve on the top part of said heater and adapted for allowing any vapor developed from the preliminarily-heated liquid to escape, a tube for conducting the vapor escaping from said safety-valve to the  
 100 top part of said still, means for introducing steam in jets into said heater for cleaning same, a blow-off cock on the bottom part of said heater for discharging the dirt mingled with steam, an external supply-tube for con-  
 105 ducting the preliminarily-heated liquid from said heater into said internal supply-tube within said still, a tube connecting the top part of said still with the chamber of said heater adapted to receive the heated medi-  
 110 um, a condenser, a tube connecting said chamber of said heater with said condenser, and means for leading off the condensed pure liquid from said condenser.

3. In an apparatus of the character described, the combination with a still, of a  
 115 steam-coil within said still, a steam-supply tube connected with the one end of said steam-coil, a stop-valve inserted in said steam-supply tube, a draining-tube outside said still  
 120 and connected with the other end of said steam-coil, an internal steam-tube within said still and reaching down to a point above the bottom, a branch tube connecting said internal steam-tube with said steam-supply  
 125 tube, a stop-valve inserted in said branch tube, a discharging device on the bottom of said still, an internal liquid-supply tube within said still, a float-controlled supply-valve on the free end of said internal liquid-  
 130



supply tube, a heater comprising collecting-chambers and connecting-tubes for the reception of the heated medium, and a separate space for the medium to be heated, a tube  
 5 leading from the source of supply to the latter space, a check-valve located in such tube, a safety-valve on the top part of said heater and adapted for allowing any vapor developed from the preliminarily-heated liquid to escape,  
 10 a tube connecting the outlet of said safety-valve with the top part of said still, a perforated steam-injecting tube within the space of said heater surrounding its heating-tubes, a branch tube connecting said perforated steam-injecting tube with said steam-supply tube and provided with a stop-valve,  
 15 a blow-off cock on the bottom part of said heater, an external liquid-supply tube leading from the heater to the said internal tube in the still, a tube connecting the top part of said still with the heater, a condenser comprising a coil, a tube connecting the collecting-chamber of said heater with the one end of the coil of said condenser, a series of draining-tubes connecting the distributing-chamber and the collecting-chamber of said heater with said tube leading to the coil of said condenser, means for conducting a cooling fluid to said condenser and for leading off the  
 20 warmed fluid, and a tube connecting the other end of the coil of said condenser with the place for further treating the condensed pure liquid.

4. In a distilling apparatus, the combination with a still, condenser, and main steam-conducting pipe and of a heater having two chambers therein, a conduit leading from the

source of supply to the still in open communication with one of the chambers of the heater, a second conduit leading from the still to the  
 40 condenser in communication with the other chamber of the heater, a discharge-cock located in the first conduit between the heater and source of supply, and a valve-controlled branch steam-pipe leading from the main  
 45 steam-pipe to the first-named chamber of said heater, substantially as described.

5. The combination in a distilling apparatus with a still, condenser, and source of supply, of a heater including two compartments,  
 50 one of said compartments, comprising a collecting-chamber, a distributing-chamber, and tubes providing open communication in between the two, and the second compartment being formed between said collecting and distributing chambers and about said tubes, a  
 55 conduit leading from the still to the condenser in open communication with the first compartment, a conduit leading from the source of supply to the still in communication with said second compartment, and an auxiliary externally-arranged conduit connecting the collecting-chambers of the first-mentioned compartment of the heater and in communication with the conduit leading  
 60 from the still to the condenser, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AUGUST HEINRICH LUDWIG GERHARDT.

Witnesses:

HANS HEDERICH,  
 OTTO CODOINEL.