April 1, 1924. 1,489,109

E. BATAILLE

VAPOR REMOVING PLANT

Filed Aug. 23, 1921 2 Sheets-Sheet 1

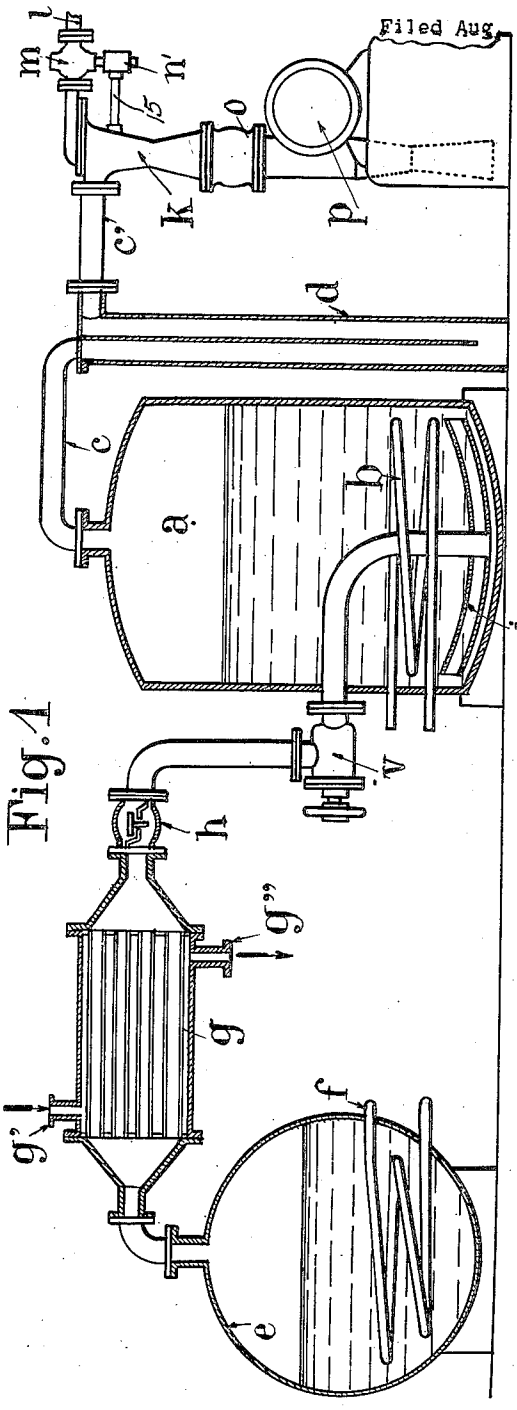


Fig. 1

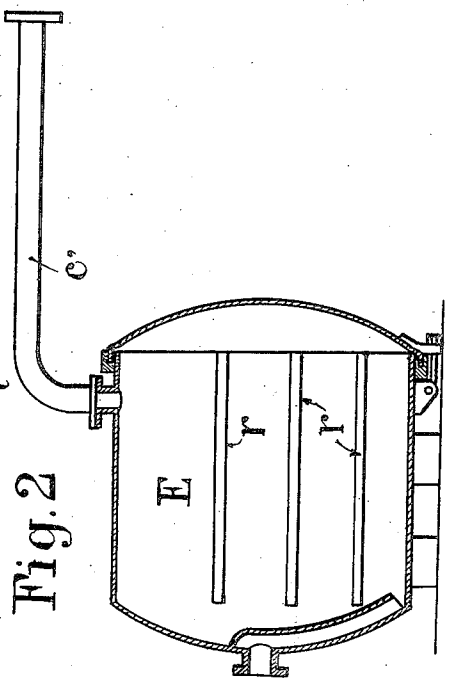


Fig. 2

Inventor:
Edward Bataille
by Cushman Bryant & Darby
Attorneys

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Fig. 3

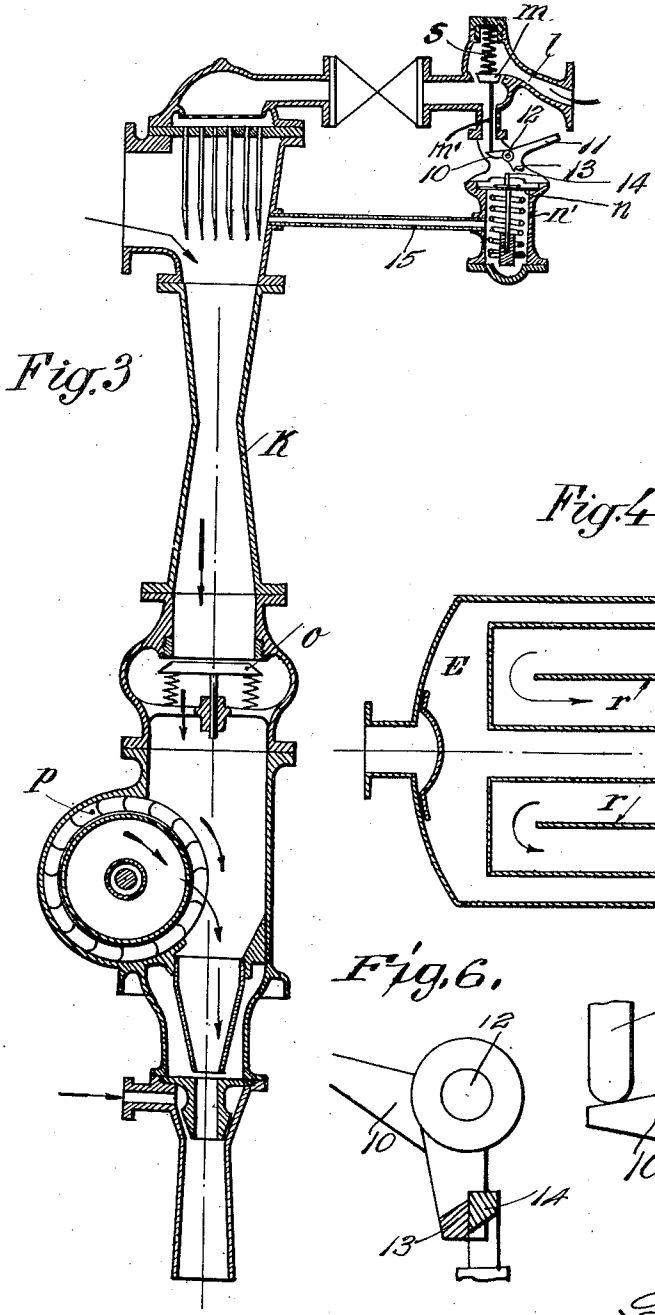


Fig. 7.

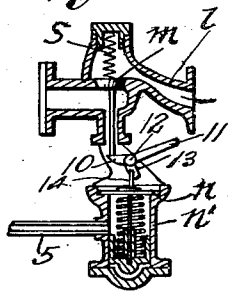
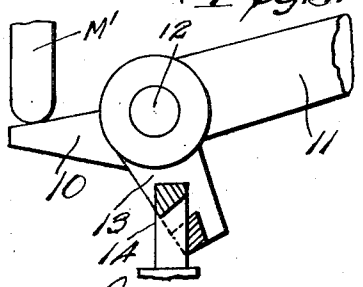


Fig. 4

Fig. 6.

Fig. 5.



Inventor:
Edouard Bataille
by Cushman Bryant & Darby
Attys

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UNITED STATES PATENT OFFICE.

EDOUARD BATAILLE, OF PARIS, FRANCE.

VAPOR-REMOVING PLANT.

Application filed August 23, 1921. Serial No. 494,531.

To all whom it may concern:

Be it known that I, EDOUARD BATAILLE, citizen of the Republic of France, residing at Paris, France, 11 Avenue de Malakoff, have invented certain new and useful Improvements in Vapor-Removing Plants (for which applications have been filed and granted in the following countries: France, No. 474,474, July 2, 1914; Belgium, No. 284,085, Dec. 29, 1918; Spain, 72,057, July 9, 1920; and Tunis 1,885, Mar. 26, 1921), of which the following is a specification, reference being had therein to the accompanying drawing.

In a considerable number of industries wherein a vacuum is employed in the operations, such as the drying of meat, the purifying of oils, and the like, it is recognized that it is of the greatest importance to make use of the highest possible degree of vacuum. But on the other hand, the vacuum obtainable is limited firstly by the presence of air in the vacuum chamber and secondly by the vapor tension of the volatile substances to be removed.

My invention relates to the application, in combination with a supply of water vapor at low tension to the treating chamber and in combination with other suitable means, of an ejector which is mounted in series with a vacuum condenser for instance of the well-known Westinghouse-Leblanc type, to installations employed either for the drying of meat, fish or the like, or for the removal of volatile substances—alone or together with the water vapor—such as aldehydic products or ammoniacal substances in order to obtain the complete purifying of oils.

The following description, together with the accompanying drawing which is given by way of example, sets forth an embodiment of this invention.

Figure 1 is a diagrammatic view of a plant for the purifying of oils or the treatment of other liquids. Fig. 2 represents a drying chamber for meat or the like which may be substituted for the oil purifying tank Fig. 1. Figure 3 is a vertical sectional view of the vacuum creating apparatus. Figure 4 is a sectional view of the drying chamber.

Fig. 5 is a side elevational view partly in section, showing the diaphragm operating lever.

Fig. 6 is a detailed view showing the lever in engagement with a diaphragm stud.

Fig. 7 is a sectional detail view showing the valve in the closed position.

As shown in Fig. 1, *a* represents the oil purifying tank which is heated for instance by a coil *b* supplied with live or exhaust steam, or by hot water. The said tank is connected through the piping *c*, the oil separator *d* and the piping *c'*, with a vacuum apparatus which will be described hereinafter. A low pressure boiler *e* heated for instance by a worm *f* supplies low pressure steam or water vapor which is delivered into a superheater *g*—with live steam inlet *g'* and outlet of condensed water *g''*—wherein the steam is superheated at a low temperature and is dried at the same time. It is understood that in the said superheating operation the steam or water vapor is brought to a temperature above that which corresponds to its point of saturation at the degree of vacuum in which it operates when in contact with the substance under treatment, but the said water vapor may have a very low temperature, for instance 15 or 20° C. The said water vapor which is in the dry state and at a low temperature is caused to pass through a check valve *h* and thence through a regulating valve *v*, and is supplied by a suitable distributing device *i* to the oil in the tank *a* in such manner that it stirs up the same to the greatest possible degree.

The apparatus used to produce the vacuum is clearly shown in Fig. 3 and consists essentially of an ejector which may be disposed in series with other ejectors or with a condenser provided with a vacuum pump. In the preferred form, it is constituted by an ejector *k* which is preferably of the Westinghouse-Leblanc type with multiple nozzle tubes in series with a rotary vacuum condenser of the Westinghouse-Leblanc type. The ejector *k* is supplied with live steam arriving through the piping *l* which is provided with the automatic check valve *m*. The steam passes through a check valve *o* into a vacuum condenser *p* of the Westinghouse-Leblanc type. The check valve *o* is so disposed as to close automatically by the effect of the outside pressure in case the vacuum is diminished at the suction end of the vacuum condenser while the tank *a* is still under vacuo. As to the automatic valve *m*, this is controlled in the known manner

by the vacuum existing in the suction end of the condenser p by means of a diaphragm n which is placed in suitable relation with the vacuum condenser and controls the closing valve, and in this manner should the vacuum become reduced in the condenser p, the check valve o will close in order to prevent the admission of the condenser pressure, while at the same time the valve m is automatically closed in order to prevent the feed steam of the ejector k from continuing to flow and to proceed into the tank a.

The automatic valve m is normally maintained in the open position by means of the stem m' which rests against a lug 10, projecting from the lever 11, that is arranged to be swung about its pivot 12 as shown in Fig. 5. The rotation of the lever 11 is impeded by contact of a depending arm 13 against a stud or stop 14 which projects upwardly from the diaphragm n. The arm 13 is so recessed as to be automatically engaged by the stop 14 when the lever is swung in a predetermined position when the vacuum falls in the ejector k, that is to say, when the absolute pressure is increased in the diaphragm casing n' the steam is conducted through the communicating passage 15 to the interior of the casing n', which causes the stop 14 to be released from the arm 13 of the lever, thus permitting the valve m to be closed under the action of the spring s, as shown in Fig. 7.

The low pressure water vapor which is supplied in the dry state and at low temperature throughout the oil contained in the tank a, is caused to draw off the volatile substances of an aldehydic nature, ammoniacal products and the like, and thus serves to convey the said substances into the vacuum pump. The particles of oil which are mechanically brought over are arrested in the oil separator d which may be disposed equally well before the ejector or between the ejector and the condenser.

Known installations for oil purifying purposes are in use wherein water vapor is caused to traverse the oil and is drawn off by a vacuum pump. But the use of the ejector in series with a vacuum condenser for instance of the Westinghouse-Leblanc type will afford special advantages in this case. In fact, with the known devices, the process is limited to the use of the theorectical vacuum corresponding to the vapor tension of condensing water in the condenser. By combining the Westinghouse-Leblanc rotary vacuum condenser and a steam ejector k mounted in series before the latter, a vacuum may be produced which is still much less than the theoretical vacuum used in the preceding case, and this can be maintained in spite of the flow of vapor or steam in the apparatus. However the reduction of the vacuum and the temperature possesses the greatest advantage in the case of the purifying of oils or other organic liquids.

On the other hand, at the end of the purifying operation, it is no longer necessary, as in the known devices, to transfer the oil from the tank a to another receptacle for the cooling of the same before placing it in contact with the air. In fact, as the operating temperature is very low by reason of the very high vacuum obtained, it is now possible to completely cool the oil and to dry the same, by closing the valve v and stopping the admission of low tension vapor at i, continuing only to operate the rotary condenser p which will suffice to remove the moisture remaining in the oil and therefore to cool the same by this means alone to a suitable degree while obtaining the perfect drying of the oil at the same time.

In Figs. 2 and 4 there is disclosed a chamber or drying device which is intended to be mounted in the installation Fig. 1 to take the place of the tank a and the separator d, between the valve v and the pipe c', for the drying of meat, fish or other organic or inorganic substances which require to be dried at a low temperature. The chamber E comprises for instance the flat supports r whereon is disposed the material under treatment, the said supports being of hollow form and supplied with a circulation of exhaust steam obtained for instance at the outlet of the ejector k, or of hot water provided by the vacuum condenser p. The vapor obtained from the low pressure boiler e which is superheated and dried at low temperature by the superheater g is brought into actual contact with the meat or the like under treatment. This dry vapor gets saturated by the effect of the contact with the meat as it takes out the moisture therein contained, until the meat becomes completely dried. This will afford a gradual drying at a very low temperature which will not be prejudicial to the qualities of the treated organic matter, this being carried out by a plan and a process of the simplest character having an exclusively mechanical action, and not requiring the use of any chemical products or absorbent substances.

This application to the drying of organic or other substances, of water vapor previously dried and superheated to a very low temperature by the use of a vacuum apparatus affording a very high vacuum, is a characteristic feature of this invention. This drying vapor also plays an important part inasmuch as it acts precisely to place the combined ejector and vacuum condenser under the best working conditions in order to obtain a high vacuum corresponding to a very low temperature, all these conditions being most favorable for maintaining the

meat in good condition during the operation.

Claims—

1. An installation for the treatment of matters to be purified or dried under a vacuum comprising a chamber for containing the matter to be treated, a low pressure steam opening in said chamber, an ejector for causing the vacuum in the said chamber, and means for drawing the vapors from the outlet of the ejector.

2. An installation for the treatment of matters to be purified or dried under a vacuum comprising a chamber for containing the matter to be treated, a low pressure steam opening in said chamber, an ejector for causing the vacuum in said chamber, and a condenser for drawing out the vapors from the outlet of the ejector.

3. An installation for the treatment of matters to be purified or dried under a vacuum comprising a chamber for containing the matter to be treated, means for producing steam in the vacuum at low temperature, a pipe for conducting this steam at low pressure and at low temperature to said chamber, and a vapor ejector for causing the vacuum in this chamber, and means for drawing out the vapors from the outlet of the ejector.

4. An installation for the treatment of substances in vacuo comprising a chamber adapted to contain the substance under treatment, a supply of low pressure steam to the said chamber, piping proceeding from the said chamber to a steam ejector connected in series with a vacuum condenser, an automatic check valve being disposed between the ejector and the condenser and adapted to close when the vacuum is diminished in the condenser, together with an automatic check valve disposed upon the steam supply pipe of the ejector and also adapted to close when the vacuum is diminished in the said condenser.

5. An installation for the treatment of substances in vacuo comprising a chamber adapted to contain the substance under treatment, a boiler for the production of steam at low pressure, a heater for superheating at low temperature the steam produced by the said boiler in order to effect the drying of the same, piping provided with a valve for conducting the said steam in the dry state and at a low temperature into contact with the substance to be treated in the treating chamber, a pipe leading from the said treating chamber to a steam ejector mounted in series with a vacuum condenser, an automatic check valve being disposed between the ejector and the condenser and adapted to close when the vacuum is diminished in the condenser, an automatic check valve disposed upon the steam supply pipe of the ejector and also adapted to close when the vacuum is diminished in the said condenser.

6. An installation for the treatment of organic substances such as meat, fish and the like for the drying and the constant preservation of the same, comprising a chamber provided with suitable supports for containing the said substances disposed thereupon, means for producing dry steam at low temperature and for conducting the same into the said chamber whereby the said steam is caused to circulate in contact with the said substances, and a pipe leading from the said treating chamber to a steam ejector mounted in series with a vacuum condenser.

7. An installation for the treatment of substances such as meat, fish and the like for the drying and the constant preservation of the same, comprising a chamber provided with suitable supports for containing the said substances disposed thereupon, having a circulation of a heating fluid within the said supports in order to raise the temperature of the said substances, means for producing dry steam at low temperature and for conducting the same into the said chamber whereby the said steam is caused to circulate in contact with the said substances, together with a valve disposed upon the pipe conducting the said dry vapor into the said chamber, a pipe proceeding from the said chamber to a steam ejector mounted in series with a vacuum condenser, an automatic check valve disposed between the ejector and the condenser and adapted to close when the vacuum is diminished in the condenser, and an automatic check valve disposed upon the steam supply pipe of the ejector and also adapted to close when the vacuum is diminished in the said condenser.

In testimony whereof I hereunto affix my signature.

EDOUARD BATAILLE.