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 APPARATUS FOR SEPARATING LIQUIDS FROM MIXTURES OF GASES AND LIQUIDS.
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913,802.

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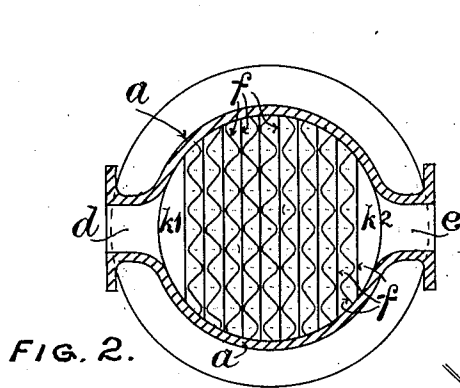


FIG. 2.

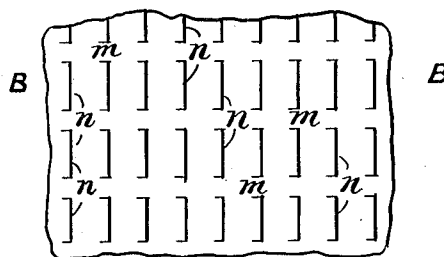


FIG. 4.

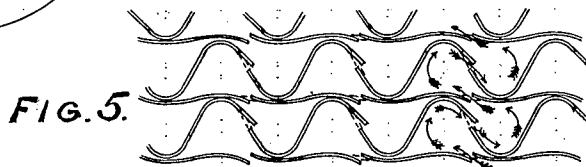


FIG. 5.

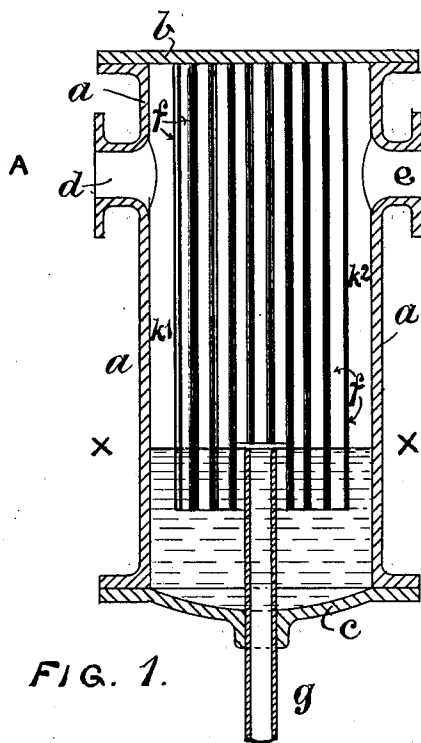


FIG. 1.

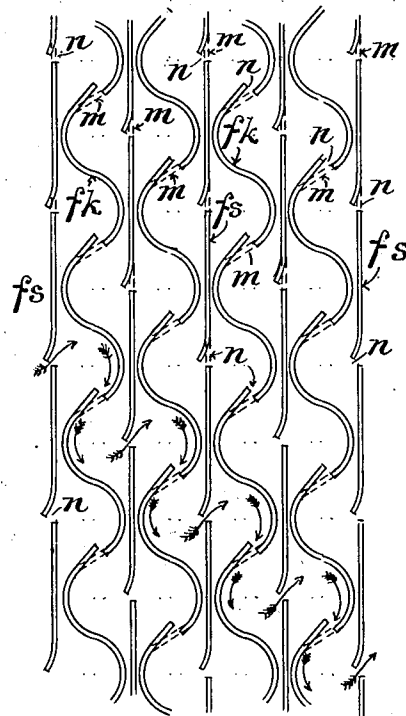


FIG. 3.

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UNITED STATES PATENT OFFICE.

ARTHUR HENRY BARKER, OF CHELMSFORD, ENGLAND.

APPARATUS FOR SEPARATING LIQUIDS FROM MIXTURES OF GASES AND LIQUIDS.

No. 913,802.

Specification of Letters Patent.

Patented March 2, 1909.

Application filed August 14, 1908. Serial No. 448,512.

To all whom it may concern:

Be it known that I, ARTHUR HENRY BARKER, a subject of the King of Great Britain and Ireland, residing at Chelmsford, in the county of Essex, England, have invented a certain new and useful Improved Apparatus for Separating Liquids from Mixtures of Gases and Liquids Specially Applicable for Separating Oil and Water from Steam, for which I have applied for Letters Patent in Great Britain and Ireland, No. 20,244, bearing date September 11, 1907, and of which the following is a specification.

My invention relates to means or apparatus for separating liquids from vapors or mixture of gases and liquids, and is particularly applicable for separating oil and water from steam, and consists of a vessel or chamber having an inlet and outlet, with a series of vertically placed perforated metal plates or sheets alternately straight or flat and corrugated, extending across the vessel or chamber, so that the mixture of liquid and gas must pass through the perforations of the sheets successively.

For the sake of illustration the invention is hereunder described with reference to the accompanying drawings, of which—

Figure 1, is a vertical section of the improved apparatus. Fig. 2, is a plan on line A A of Fig. 1. Fig. 3 is an enlarged horizontal section through part of a battery the plates or sheets alternately flat and corrugated, and across a line of corrugations such as B B Fig. 4. Fig. 4 is an elevation of a flat perforated sheet, and Fig. 5 shows in horizontal section a slightly modified arrangement of a battery of plates.

In all the figures the same reference letter refers to the same or corresponding part.

a is the casing or wall of the separator.

b and *c* are the top and bottom covers respectively.

d indicates the inlet for the moist steam or vapor, and *e* the outlet for the dried steam or gas.

f, Figs. 1 and 2, is the battery of perforated plates.

g is an outlet pipe or tube for carrying off the condensed steam or grease, the upper end of which must be a short distance above the lower edges of the battery plates.

In Fig. 3, *fs* indicate the straight plates, and *fk* the corrugated plates.

Although the sheets may be perforated

with round holes or in the other usual manner, I prefer to make them as slits or louvers as shown at *n* in Figs. 3 and 4, by placing the plate between a pair of slitting or cutting dies, so that part of the metal is cut or slit along three sides and bent outward as a flap, and leaving a narrow slit or gap along the middle side. This is shown most clearly in the upper part of Fig. 3, where the dotted lines *m*, see also *m* Fig. 4, indicate the undisturbed part of the plate left between adjoining superposed slits. It will be evident, that with this arrangement or device, no metal is removed from the plates. The plates extend completely across from side to side between the walls of the casing as shown in Fig. 2, so as to block the passage of the steam or vapor except through the slits *n*, while leaving a sufficiently large space *k*¹ on the entering side for the incoming steam or vapor to distribute itself and lose its velocity, and a similar space *k*² on the outgoing side for the dried steam to collect and acquire the velocity to carry it away through the outlet *e*.

As shown in Figs. 2, 3 and 5 the straight and corrugated plates or the more or less corrugated plates alternate with one another.

Although I do not restrict myself to any definite number of slits *n* in a given length of cross section of the plates, I prefer to make a side slit in alternate slopes only, as shown in Fig. 3, and a single slit in the straight plate for each complete corrugation in the adjoining corrugated plate, so that all the slits in one plate are parallel to one another. The pitch or distance apart of the corrugations is made equal to the pitch or distance apart of the slits in the flat plates, and the direction of the slits in the flat plates is opposite to that of those in the perforated plates. Thus when the plates are assembled together to form a battery as shown in Figs. 2 and 3, the steam in passing through the plates is broken up into a very large number of small streams, each stream being directed by the shape of the slits in a direction nearly parallel or tangential to the surface of the plate itself, and the stream will follow the circuitous path indicated by the arrows in Fig. 3.

The centrifugal force acting on the particles of moisture or oil, will tend to throw them against and into contact with the surface of the plates, those escaping the first plates being caught by the succeeding plates.

The moisture and oil thus coming into contact with the plates adheres to them and thus becomes separated from the steam or vapor. Further, the moisture or steam so separated will be driven by the same centrifugal action into the corners between the flat and corrugated plates, where being outside the main stream, it will flow downward into the liquid well of water or grease at the lower part of the apparatus, and collect in the same, rising above the level $x x$. The surplus above $x x$ is drawn off from time to time by opening a stop tap, not shown, at the lower end of the pipe g , or by means of a steam trap of any well known type. This arrangement in Fig. 3, causes the steam to follow a diagonal path across the battery of plates, which if continued across the full width of the battery would leave a wedge shaped bundle of spaces at each side inoperative or only weakly operative; I prefer to reverse alternate bundles of say 5 or 6 plates end for end, or top for bottom; and thus obtain a reversal of the diagonal direction. This device will leave only three or four steam spaces at each end inoperative. It will also be evident that if alternate corrugated plates be reversed end for end, that the intermediate straight plates may be dispensed with, but the arrangement with alternate straight and corrugated perforated plates has double the capacity or efficiency.

The arrangement shown in Fig. 5 gives a sinuous path as indicated by the arrows at right angles to the plates, and avoids the necessity of reversing alternate bundles of plates as is required by the arrangement shown in Fig. 3.

Having now described my invention, what

I claim as new and desire to secure by Letters Patent is:—

1. The combination of a vessel or chamber a having an inlet d and an outlet e , a battery of alternate corrugated and flat or approximately flat perforated sheets of metal lettered fk and fs respectively, placed across the vessel or chamber between said inlet and outlet, and a drain or draw-off pipe g substantially as illustrated and described for the purpose specified.

2. The combination of a vessel or chamber a having an inlet d and an outlet e and a battery of alternate corrugated and flat or approximately flat perforated sheets of metal fk and fs respectively placed across the vessel or chamber between said inlet and outlet for the purpose specified.

3. The combination of a series of corrugated perforated sheets fk of metal with a series of flat or slightly corrugated perforated sheets fs of metal, arranged so that a flat or approximately flat sheet alternates with a corrugated sheet substantially as illustrated in Figs. 3 and 5 for the purpose specified.

4. The combination of a series of corrugated slit or louvered metal plates with a series of flat or approximately flat slit or louvered metal plates, a corrugated plate alternating with a flat plate for the purpose specified.

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

ARTHUR HENRY BARKER.

Witnesses:

WILLIAM MIDDLETON,
ALEXANDER ALFRED FAIRCLOTH.