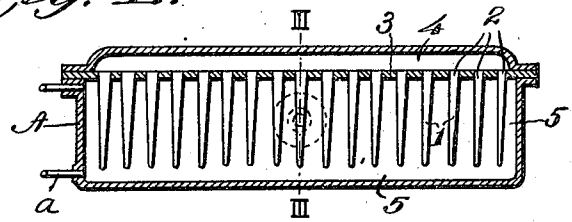
J. W. Æ. ELLING.

PROCESS AND APPARATUS FOR DRYING SOLID BODIES CONTAINING LIQUID.

APPLICATION FILED MAR. 20, 1917.

1,263,392. Patented Apr. 23, 1918.

Fig. 1.



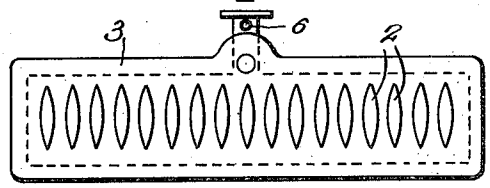


Fig. 2.

Fig. 3.

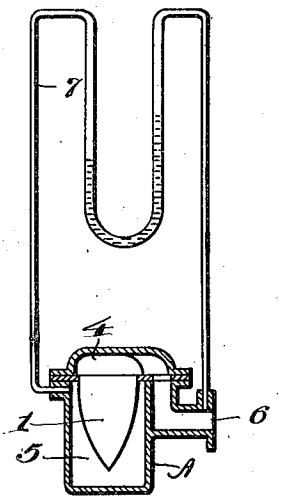
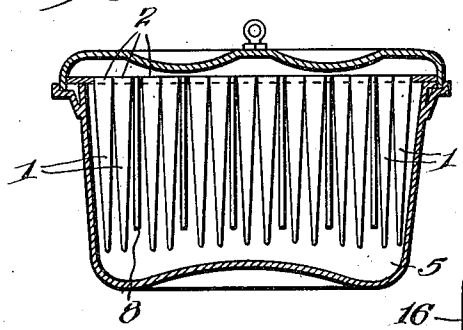


Fig. 4.



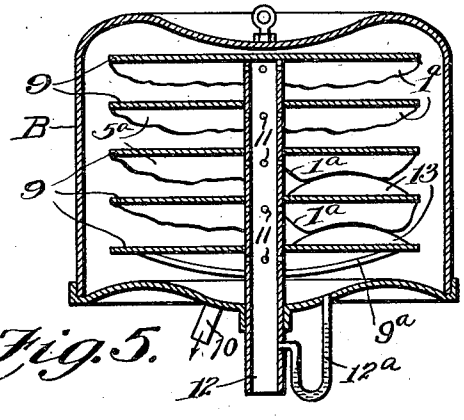
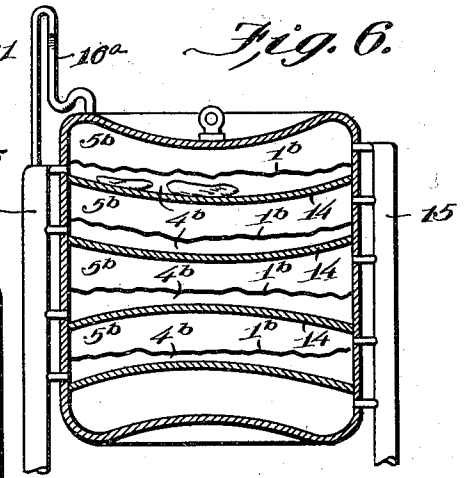


Fig. 5.

Fig. 6.



Inventor;

Jens W. A. Elling.

By Munn & Co

Atty.

UNITED STATES PATENT OFFICE.

JENS WILLIAM ÆGIDIUS ELLING, OF CHRISTIANIA, NORWAY, ASSIGNOR TO A/S. MYRENS VERKSTED, OF CHRISTIANIA, NORWAY.

PROCESS AND APPARATUS FOR DRYING SOLID BODIES CONTAINING LIQUID.

1,263,392. Specification of Letters Patent. Patented Apr. 23, 1918.

Application filed March 20, 1917. Serial No. 156,234.

To all whom it may concern:

Be it known that I, JENS WILLIAM ÆGIDIUS ELLING, a subject of the King of Norway, residing at Christiania, Norway, have invented certain new and useful Improvements in Process and Apparatus for Drying Solid Bodies Containing Liquid; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

In processes for extracting liquid from solid bodies, which may not be exposed to a high temperature or dry air, and must therefore be deprived of their moisture by vaporization, it is in many cases necessary to use a very high degree of evacuation in order to maintain the vaporization point for the fluid contained in the said body at a lower temperature than the highest to which the body may be exposed without injury.

When this is the case however the surrounding atmosphere will obviously be very thin, and as the insulating capacity of the atmosphere increases with increasing degree of evacuation, the said atmosphere will be a bad conductor for the heat from the heating medium to the goods to be dried. Accordingly very large heating or cooling surfaces as well as high velocities of the vapor from the goods are required in order to perform the evaporation in a reasonable time.

The above disadvantage are obviated by means of the present process according to which the heating medium is maintained under a higher pressure than the goods to be dried and is separated from the latter by means of a yielding or resilient wall or diaphragm in such a manner that the high pressure heating medium presses the said wall tightly against the goods to be dried. In this manner is obtained a good heat conducting effect as the heat does not pass any space of air but is conducted from the heating medium through the resilient wall directly to the goods to be dried.

The process according to the invention may be carried out in different ways, for instance by placing the goods to be dried in bags of resilient material and connecting the interior of said bags to a suction device adapted to maintain a suitable degree of evacuation in the same, while at the outside they are exposed to a heating medium under higher pressure pressing the bags against the goods. The drying goods may also be placed on shelves or hung against walls in the evaporation chamber being covered on one or more sides with resilient bags or diaphragms, the opposite sides of which are in contact with the heating medium.

In the accompanying drawings:

Figure 1 is a longitudinal section through a drying apparatus.

Fig. 2 shows the same in plan with the top cover removed.

Fig. 3 is a cross section on the line III—III on Fig. 1.

Fig. 4 is a section through another form of the invention and

Figs. 5 and 6 show sections through further modifications.

According to the form of the invention shown in Figs. 1 to 4, the goods to be dried are placed in bags 1, which are fastened along the edge of openings 2 in a horizontal plate 3 mounted in a container A. The space 4 above said plate is connected through a conduit 6 to a suction device not shown, which maintains a sufficient degree of evacuation, and the space 5 is filled with a suitable heating medium such as steam, hot air, hot water or the like through a pipe *a*.

In order to maintain a suitable pressure difference between the spaces 4 and 5 any pressure control mechanism of known construction may be used, such as for instance illustrated in Fig. 3, where the manometer tube 7 is connected at one end with the space 5 and at its other end, with the outlet 6 from the chamber 4.

According to the form shown in Fig. 4 a vertical plate 8 is located between each pair of bags in order to prevent a too large deformation of the bags in filling the same with goods to be dried.

According to the form illustrated in Fig. 5 the goods to be dried are placed on horizontal shelves 9 in a container B which is connected to a suction device by a conduit 10, said shelves 9 at the same time forming the upper walls of disk shaped heating chambers 5^a, the lower walls of which are formed by resilient bags or plates 1^a. The spaces between the resilient walls 1 and the shelves

9 are connected by means of openings 11 with a hollow shaft 12 carrying the shelves 9 supplied with a heating medium. The goods to be dried are placed on the shelves 9 as indicated at 13, and the heating medium is introduced into the chambers 5^a from the shaft 12 through the opening 11. The resilient walls expand and press against the goods to be dried so that heat is transmitted to the same through the resilient wall. Otherwise the process is accomplished in the same manner as above described.

The heating medium acts at the same time on the underside of the goods placed on the next shelf above. The lowest shelf has no bag but a dished plate 9^a on the underside forms a chamber supplied with a heating medium from the shaft 12. A suitable pressure difference between the interior of the container B and the chambers 5^a is maintained by a manometer tube 12^a.

By the form shown in Fig. 6 the goods to be dried are placed on shelves 14 under resilient walls or diaphragms 1^b. The spaces 4^b between said diaphragm 1^b and the shelves 14 are connected to the suction conduit 16, while the spaces 5^b above the diaphragms are supplied with a heating medium through the conduit 15. A pressure difference between spaces 4^b and 5^b is maintained by a manometer tube 16^a.

I claim:

1. The method of drying solid material, which comprises subjecting the material to suction while supplying heat to the surface of the material by a heating medium separated from and out of contact with the material, said heating medium exerting a pressure on the material being dried and while under suction.

2. A drying apparatus comprising two chambers separated by a flexible partition, means to exhaust one of the chambers, and means to supply a heating medium to the other chamber, said flexible partition contacting with and conforming to the changing shape of the material being dried.

3. In a drying apparatus, an exhausted chamber in which the material to be dried is placed, and a chamber supplied with a heating medium, said chambers having a wall common to both of them and capable of yielding under pressure to contact with the material to be dried.

4. A drying apparatus comprising a container, a flexible wall in the container forming chambers therein, means to suply a heating medium to one side of the wall and means to exhaust the container on the other side of the wall.

5. A drying apparatus comprising a container, rigid means therein for supporting the material to be dried, flexible walls cooperating with the supports forming noncommunicating chambers, means to supply a heating medium to one of said chambers and means to exhaust the other chamber.

6. A drying apparatus comprising a container, a plurality of rigid supports for the material to be dried, flexible members interposed between the supports forming superposed chambers, means for supplying a heating medium under pressure onto the flexible members to press the latter toward the supports and onto the material, and means to exhaust the space below the flexible members.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

JENS WILLIAM ÆGIDIUS ELLING.

Witnesses:
KARL L. LEE,
C. VARMAN.