No. 92,465. PATENTED JULY 13, 1869.

W. NEEDHAM & J. KITE.

APPARATUS FOR DEPURATING LIQUIDS.

5 SHEETS—SHEET 1.

Fig. 1.

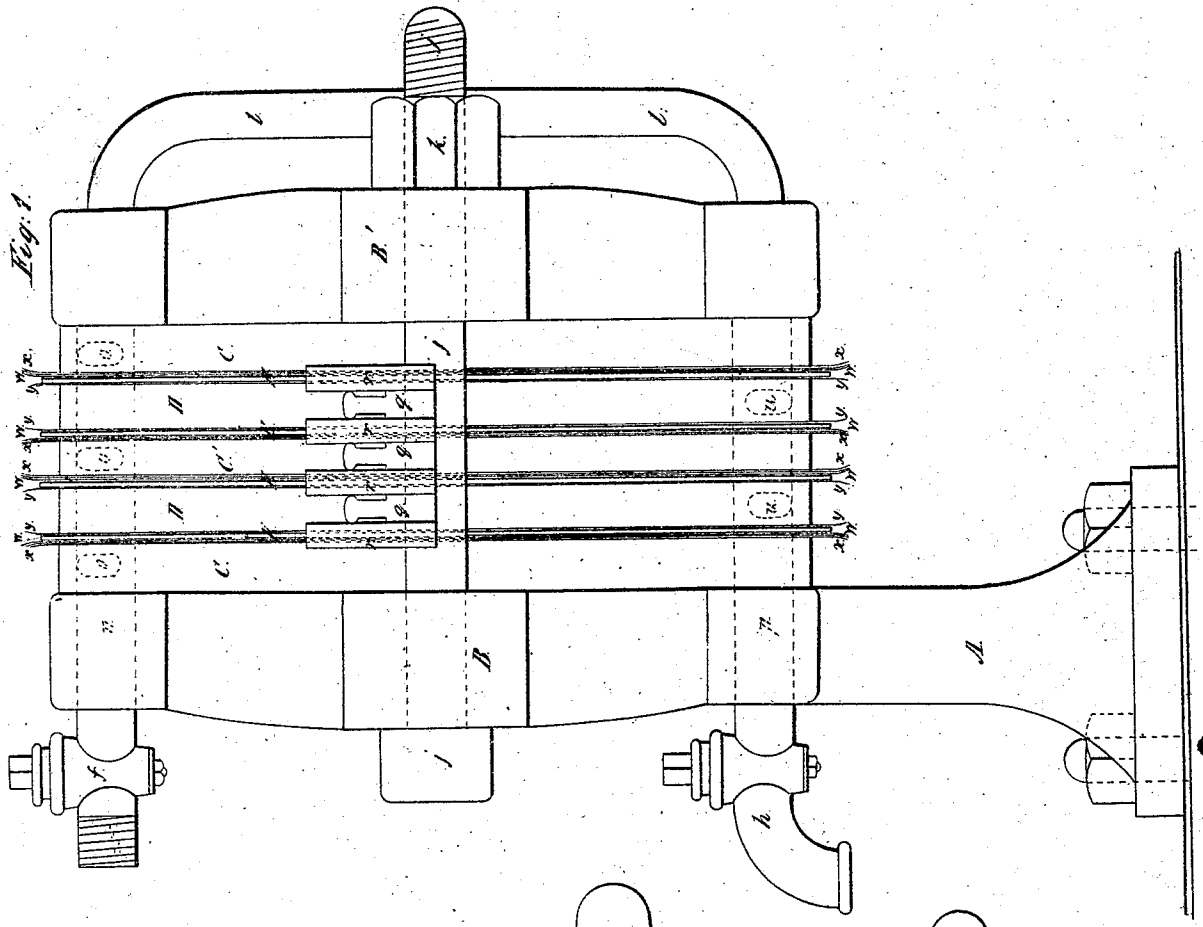
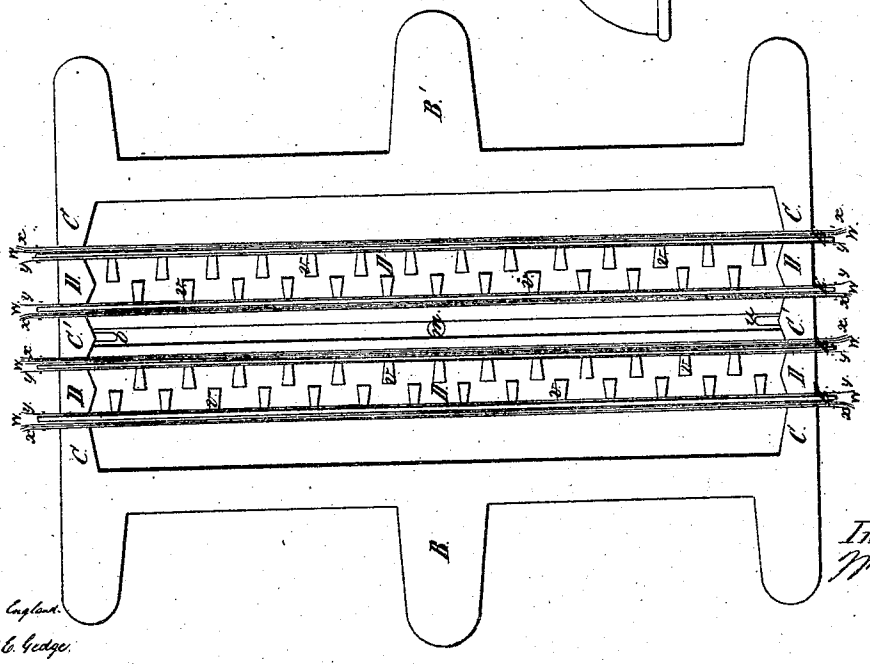


Fig. 3.



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5 SHEETS—SHEET 2.

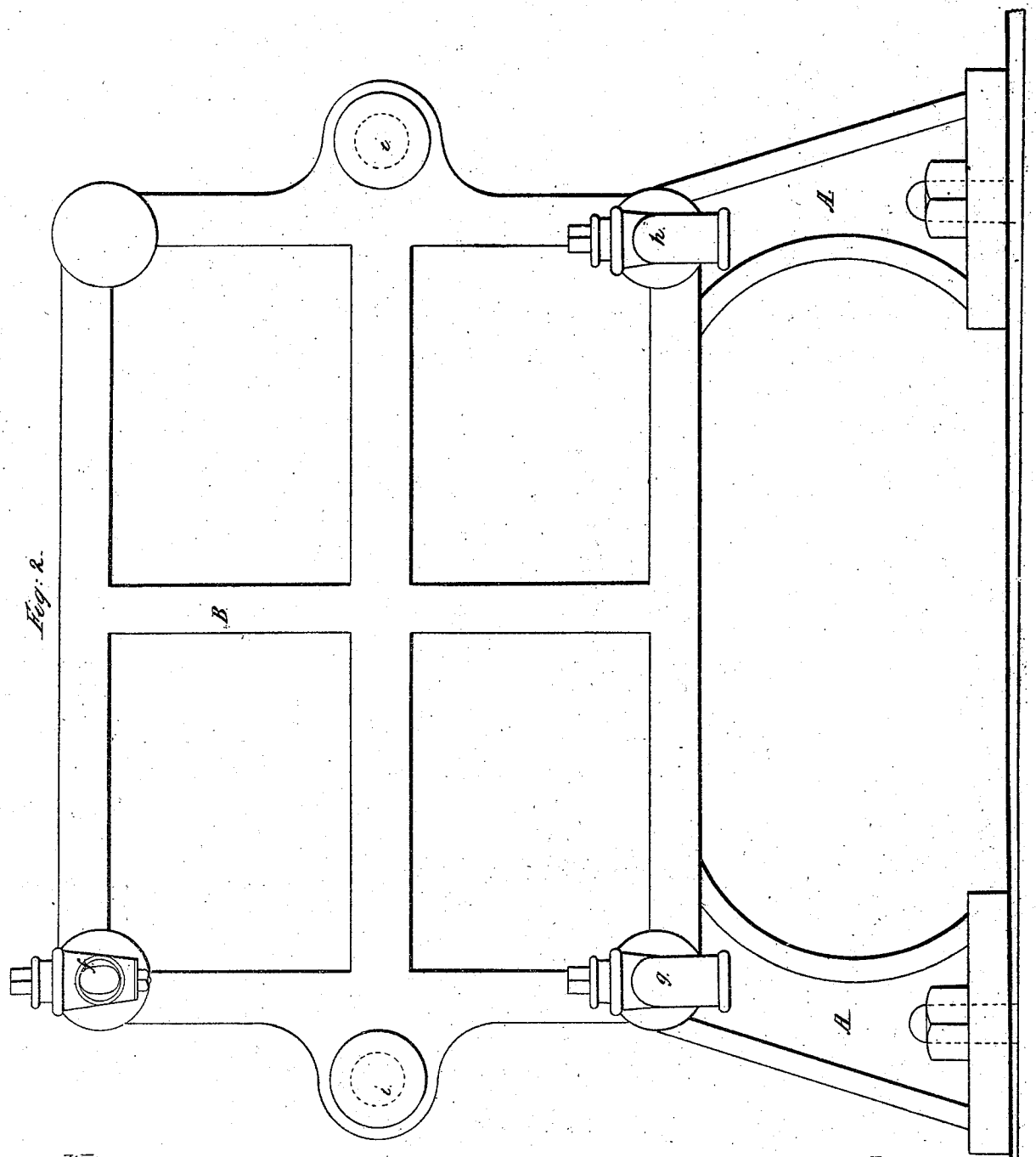


Fig: 2.

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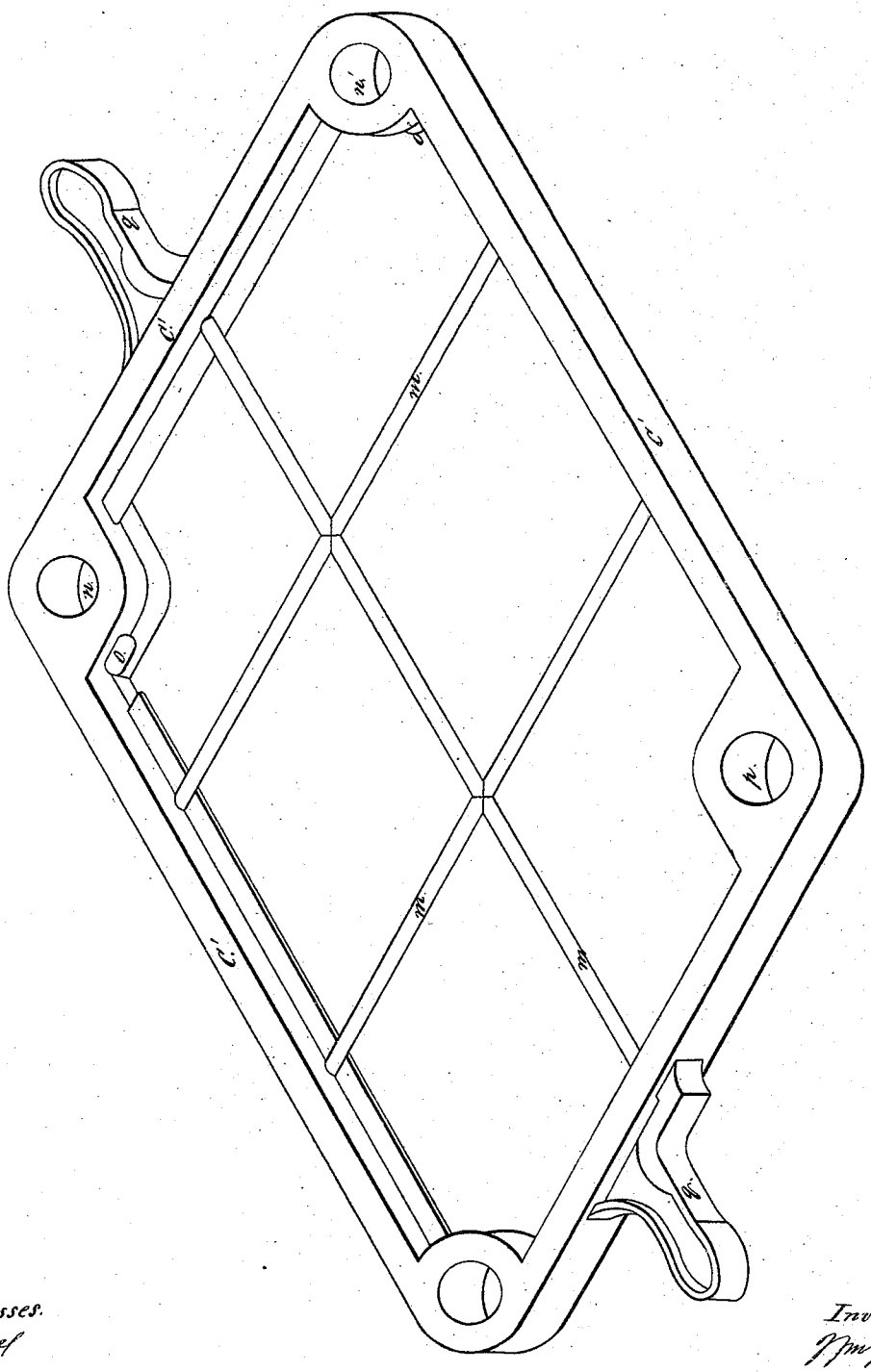
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APPARATUS FOR DEPURATING LIQUIDS.

5 SHEETS—SHEET 3.

Fig: 4.



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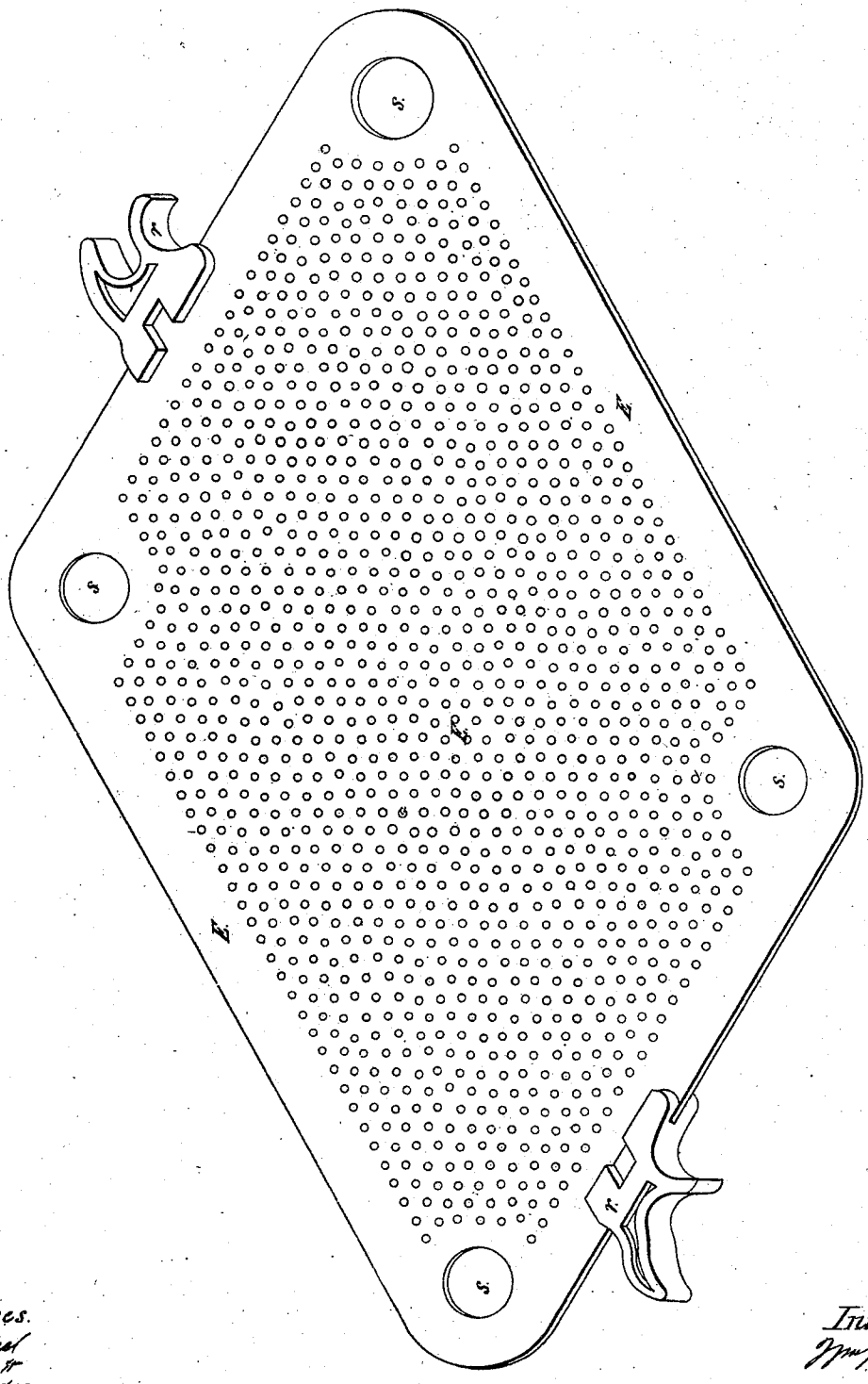
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APPARATUS FOR DEPURATING LIQUIDS.

5 SHEETS—SHEET 4.

Fig: 5.



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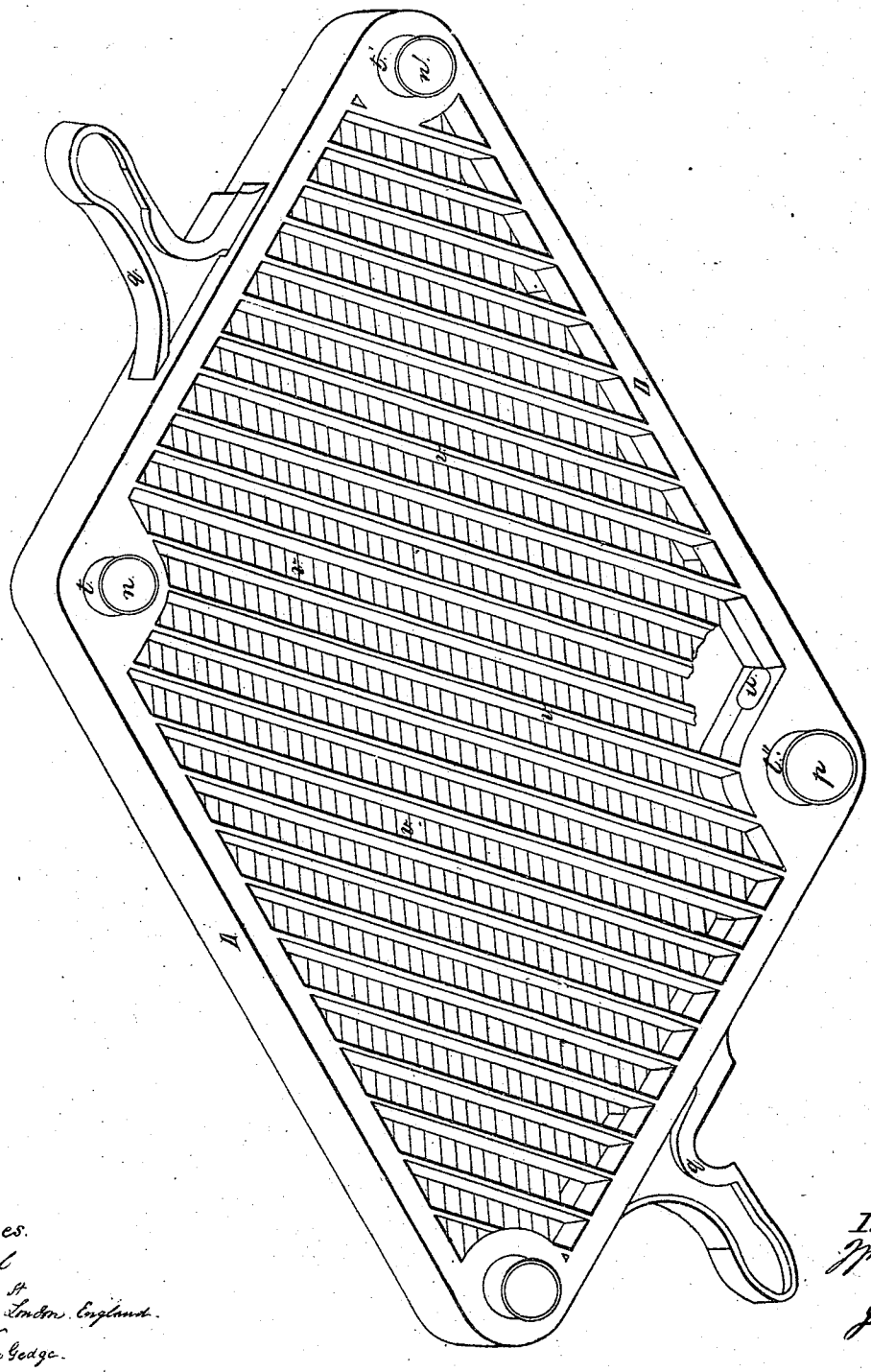
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W. NEEDHAM & J. KITE.

APPARATUS FOR DEPURATING LIQUIDS.

5 SHEETS—SHEET 5.

Fig. 6.



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United States Patent Office.

WILLIAM NEEDHAM AND JAMES KITE, OF VAUXHALL, ENGLAND.

Letters Patent No. 92,465, *dated July* 13, 1869.

IMPROVED APPARATUS FOR DEPURATING LIQUIDS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that we, WILLIAM NEEDHAM and JAMES KITE, both of Vauxhall, in the county of Surrey, in the Kingdom of England, engineers, have invented "Improvements in Machinery or Apparatus for Depurating Fluids;" and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object of our invention is the employment of paper as a filtering-medium, under high pressure, and it will be seen that all the improvements in machinery, or apparatus for depurating fluids, hereinafter set forth and described, concur to this end.

To compass our object, the first requirement was a perfectly even surface on both sides of the supply-chambers of the filtering-press, or depurating-apparatus, and this we have obtained by the use of perforated plates or diaphragms, of equal or of greater length and breadth or diameter than the frames forming the supply and discharge-chambers, so that when the press is put together ready for operating, these diaphragms are simply nipped between, and are not recessed in, or in any way fixed to these frames.

By this arrangement of the diaphragms we have got rid of all the recesses and irregularities of surface which, in the various apparatus hitherto constructed, render the application of paper, as a filtering-medium, impracticable, but this arrangement would not, of itself, entirely secure the paper against breakage, as it would be liable to break under pressure against the edges of those perforations in the diaphragms by which the depurated fluid enters the discharge-chamber after filtering through the paper, and thus give passage to unfiltered fluid.

We overcome this difficulty by interposing a textile fabric, an ordinary filtering-cloth, for example, between the paper and the perforated diaphragm, and we sometimes enclose the paper between two cloths, to give it additional support, and to keep the densest matter from contact with the paper.

The paper being thus secured against breakage under the pressure of the fluid, the next requirement was to provide for its easy and rapid introduction into the press, as well as for its removal when fresh paper became necessary.

For this purpose we make holes in the frames, forming supply-chambers in the perforated diaphragms and in the filtering-cloths, these holes corresponding with short tubes set in holes in the frames, forming the discharge-chambers, so that when the whole are placed in juxtaposition, they form supply and discharge-conduits, traversing the press, or depurating-apparatus, from end to end.

By this arrangement we obviate the necessity of holding the paper by hand until two frames are brought together, as the above-mentioned tubes, passing through the paper, support it so that it cannot slip from the face of the diaphragm, the cloths being carried in a similar manner, and thus it is only necessary to push the frames together, and brace the whole, to have the press ready for working, while, by loosening the bearing-bolts or braces, and pulling the frames apart, the papers can be removed and others substituted with the greatest facility.

Another advantage resulting from this arrangement of the conduits is that we dispense with a multiplicity of cocks and fastenings.

Description of the Drawings.

Figure 1, Sheet I, is a side elevation of a filtering-press, or depurating-apparatus, with our improvements applied;

Figure 2, Sheet II, an end view of same, showing supply and discharge-cocks;

Figure 3, Sheet I, longitudinal and vertical section through the centre of press;

Figure 4, Sheet III, isometrical view of frame of supply-chamber, detached;

Figure 5, Sheet IV, similar view of plane, perforated diaphragm detached; and

Figure 6, Sheet V, isometrical view of frame of discharge-chamber, detached.

A A′, figs. 1 and 2, cast-iron standards, supporting the press, which may also be supported at the other end when many chambers are used;

B B′, cast-iron frames, forming the two ends of the press;

C C C′, frames forming supply-chambers;

D D, frames forming discharge-chambers;

E E E E, perforated diaphragms;

f, cock through which the fluid to be depurated is supplied to the apparatus;

g, cock by which the thick unfiltered fluid is drawn off;

h, fig. 2, cock by which the depurated fluid runs off;

i i′, holes for the bearing-bolts *j* and nuts *k*, fig. 1, by which the chambers are braced together;

l, handle by which the end frame B′ is drawn along the bearing-bolts, when it is desired to pull the frames apart to renew the paper or cleanse the apparatus;

m, fig. 4, cross-bars strengthening frame C′. Every additional supply-chamber should be similarly braced, but this is not needed for the end frames C C, as they may be cast with the ends B B′;

n, opening forming supply-conduit;

o, orifice by which the fluid passes from *n* into supply-chamber;

o′, orifice by which the thick, unfiltered fluid passes to the opening *n′*, which forms its discharge-conduit;

p, opening to form conduit for the depurated fluid from the discharge-chambers;

q q, figs. 1, 4, and 6, brackets, by which the frames C′ and D are supported on the bearing-bolts *j*, and forming handles for their ready removal;

r, figs. 1 and 5, brackets or handles for supporting and removing diaphragms;

s s s s, fig. 5, openings for reception of tubes forming part of frames D;

t, fig. 6, tube which forms continuation of conduit *n* of frame C′;

t′, tube for continuation of conduit *n′*;

t″, tube continuing conduit *p*;

u, orifice by which the depurated fluid flows from the discharge-chamber into conduit *p*; and

v, diagonal bars for strengthening discharge-chamber and supporting perforated diaphragms E.

The red lines, figs. 1 and 3, represent the filtering-papers, and the blue lines the cloths *w*, interposing between the papers and the diaphragms E, and those, *x*, between the filtering-papers and the fluid to be depurated.

The dotted lines, figs. 1 and 3, indicate the course of the continuous supply and discharge-conduits.

y, cloth for making joint.

The working of this apparatus is as follows:

The fluid to be depurated is introduced by a force-pump, or otherwise, through the cock *f* into the conduit *n*, an air-vessel being used to maintain pressure during the strokes of the pump. From the conduit *n*, the fluid passes, by the orifice *o*, into the supply-chambers C C′ C, and from thence, through the cloths, filtering-papers, and diaphragms E E E E, into the discharge-chambers D D, where it thus arrives perfectly depurated, running from thence, by the orifice *u*, into the conduit *p*, and thence, by the outlet-cock *h*, and so on continuously.

It will be seen that the first and last supply-chambers C C filter from one side only, but that the chamber *c′* filters both right and left, as will every additional chamber which may be added.

Every part of this apparatus being separate, may be removed, for the convenience of cleaning and removing any matter that may have obtained a lodgement.

It need scarcely be observed that the filtering-press or depurating-apparatus, which we have above described, and shown on the drawing, is simply an illustration of, and given for the better comprehension of our invention, and that we do not limit ourselves to the number, or to the precise combination of chambers therein shown, as these chambers may, if preferred, be placed horizontally, and be of rectangular, circular, or any desired form, and the perforated centre of plane diaphragms be obtained by the insertion of wire gauze, or analogous material in substitution thereof, and the material used in the construction of the various parts of the apparatus may be metal, wood, or other material, this being dependent upon its particular application.

Having now described the nature of our said invention, and in what manner the same may be carried into practical effect, we would have it distinctly understood, that although we deem the use of all the improvements herein described and shown as most conducive to a perfect operation, yet we do not absolutely bind ourselves to the entire combination, as our arrangement of plane perforated diaphragms, and the interposition of textile fabrics, cloth, or cloths between the paper and the diaphragm, might be used without the adoption of our method of forming continuous conduits, by simple contact of the frames and diaphragms; and, therefore,

What we claim as our invention, and desire to secure by Letters Patent, is—

1. Securing filtering-paper from breakage under high pressure, by the use of plane diaphragms and textile fabrics, applied substantially as herein set forth.

2. Forming continuous supply and discharge-conduits, by simple contact of the frames, substantially as described and shown.

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