

J. SPENLE.

APPARATUS FOR DRYING PROOFED AND LIKE FABRICS OR MATERIALS.

APPLICATION FILED FEB. 29, 1908. RENEWED JUNE 30, 1910.

967,076.

Patented Aug. 9, 1910.

4 SHEETS—SHEET 1.

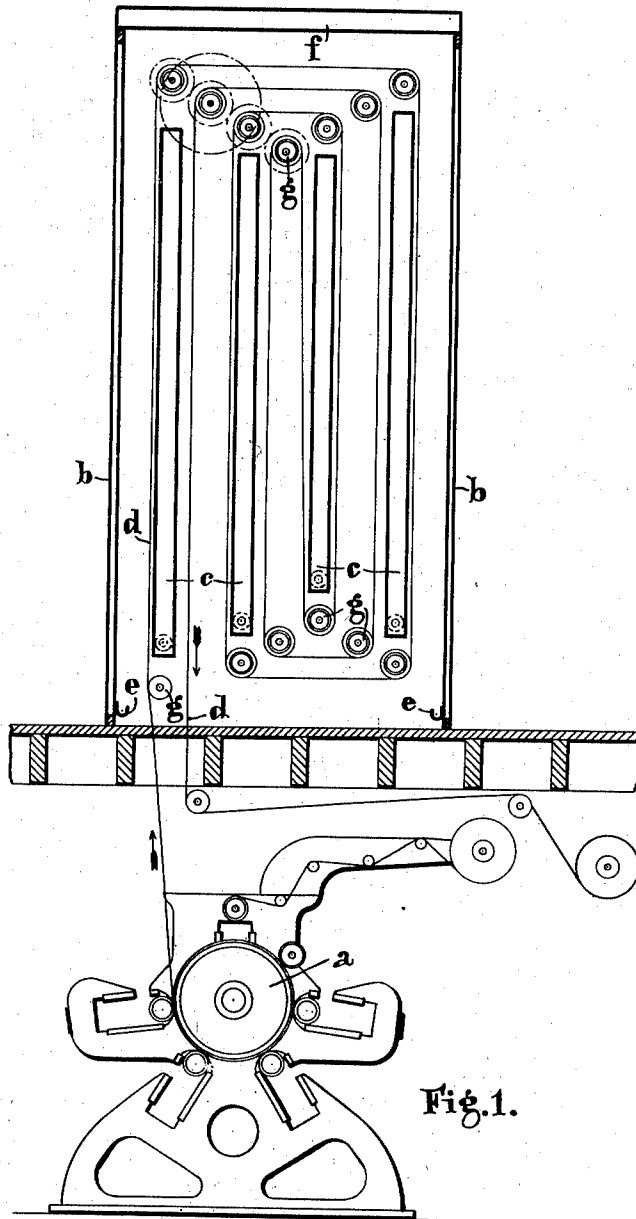


Fig. 1.

ATTEST

Bentley Stahl

Edw L. Tolson.

INVENTOR

John Spenle.

By Spear, Middleton, Denalston & Speller

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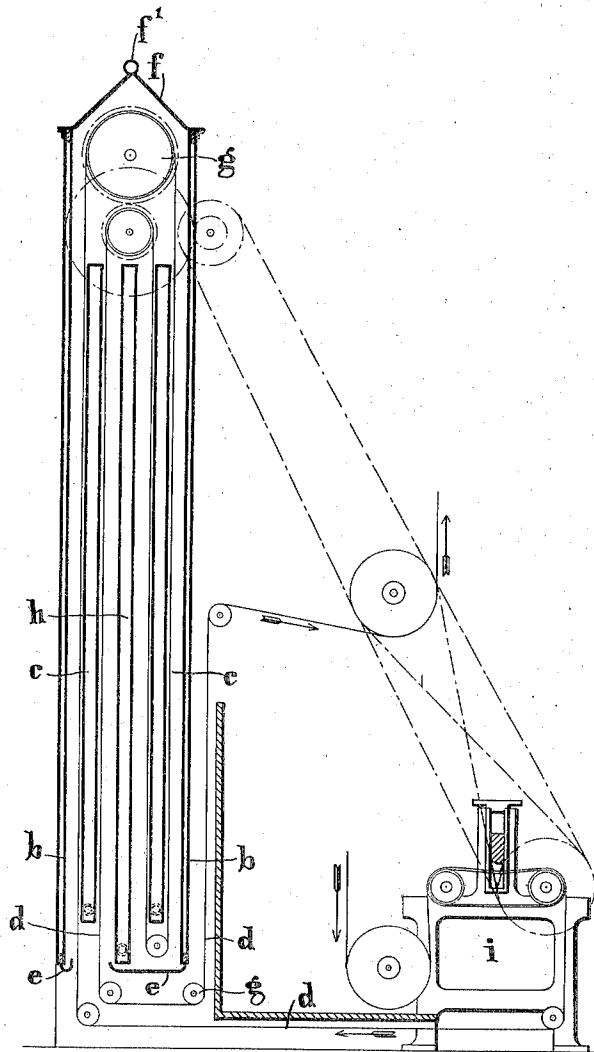


Fig. 2.

ATTEST

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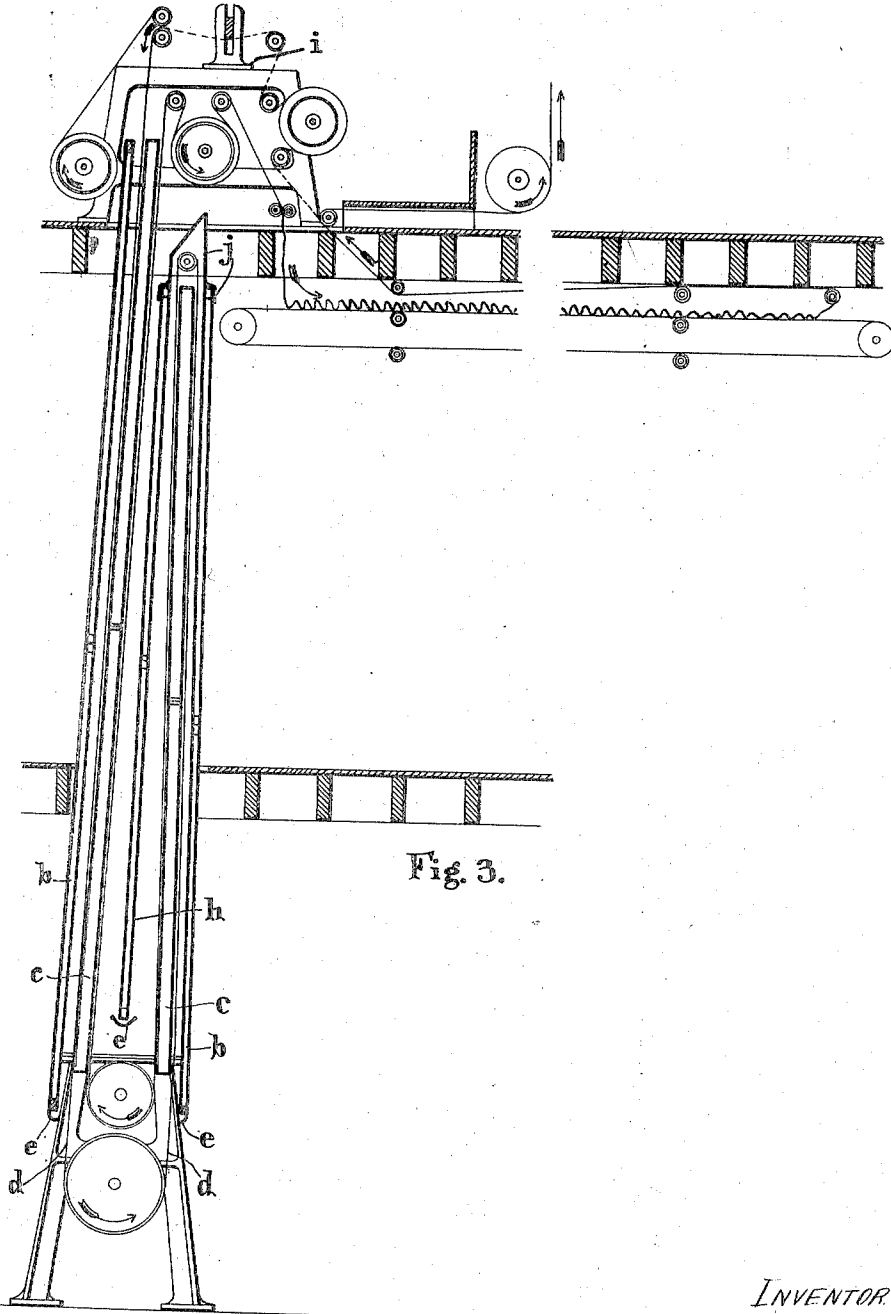


Fig. 3.

ATTEST.

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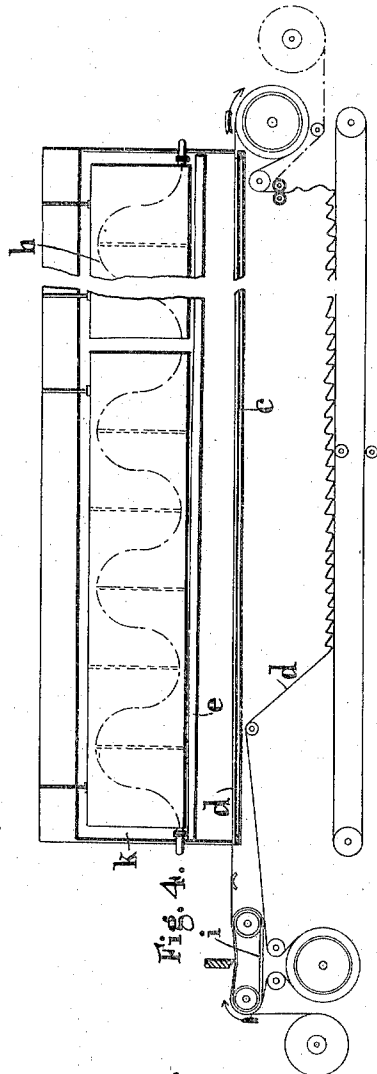
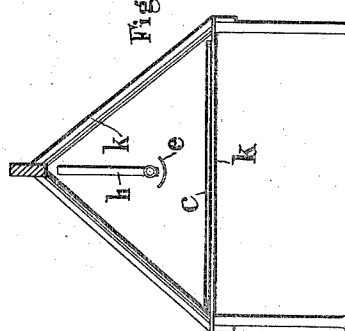


Fig. 4.

Fig. 5.



ATTEST.

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UNITED STATES PATENT OFFICE.

JOHN SPENLÉ, OF SALFORD, ENGLAND.

APPARATUS FOR DRYING PROOFED AND LIKE FABRICS OR MATERIALS.

967,076.

Specification of Letters Patent.

Patented Aug. 9, 1910.

Application filed February 29, 1908, Serial No. 418,619. Renewed June 30, 1910. Serial No. 569,692.

To all whom it may concern:

Be it known that I, JOHN SPENLÉ, a subject of the King of Great Britain and Ireland, residing at Adelphi Iron Works, Salford, in the county of Lancaster, England, have invented certain new and useful Improvements in Apparatus for Drying Proofed and Like Fabrics or Materials, of which the following is a specification.

10 This invention relates to apparatus employed for drying proofed or like fabrics or materials which may have been treated with india-rubber, gutta-percha, oxidized oils, pyroxylin, shellac or other substances held
15 in solution or containing volatile solvents or fluids as ethers, benzenes, and spirits. In the drying operation the volatile solvents vaporize and produce noxious and inflammable vapors. The latter have heretofore been
20 drawn off from the drying chamber and condensed, but with such method it is necessary to use pumps or exhausters and surface condensers, and on account of air being drawn into the apparatus by the exhausting action
25 of the pumps, a very large volume of fluid has to be dealt with, necessitating the use of unnecessarily large pumps and condensers for the quantity of solvent recovered. Moreover, on account of the condensation of
30 the moisture contained in the air drawn into the drying chamber as aforesaid, the volatile solvents recovered may be considerably below full concentration.

35 The object of my invention is to produce an apparatus capable of not only drying the fabric or material passing therethrough and of evaporating the volatile solvents, but of condensing such solvents, the operation of condensation being performed without the
40 use of pumps or other exhausting appliances and without the volatile solvents, when recovered, being diluted or rendered impure in the manner before described.

45 My invention comprises the combination with a drying chamber or its equivalent through which the material to be dried is passed, of cooling pipes, chests or the like so arranged that the vapors generated in the drying chamber will be directly condensed by contact with the cooling surfaces
50 in the manner hereinafter described.

Referring to the two accompanying sheets of explanatory drawings:—Figure 1 illustrates one convenient application of my invention and Figs. 2, 3, 4 and 5 three modified applications of same.

The same reference letters in the different views indicate the same or similar parts.

In Fig. 1, my invention is shown as applied to a drying chamber used in conjunction with a printing machine *a*, in which
60 volatile solvents are employed to hold the printing materials in solution. I place within the drying chamber *b* suitable steam chests *c*, arranged vertically, for drying the fabric *d*
65 by contact or by radiation in its passage through the chamber. I prefer to give the fabric in such passage a volute or like path as shown so as to obtain a long drying surface, in the well known manner, before the
70 face of the fabric comes into contact with the guiding rollers *g*. The walls of the drying chamber *b* are suitably cooled as by means of a jacket. By this means as the
75 volatile solvents are vaporized within the chamber *b*, they will be quickly condensed by contact with the cool surfaces or walls of said chamber, and will trickle down the latter to troughs or receptacles *e* placed at their
80 lower ends to prevent any drops from falling upon the fabric. I may arrange that the top or upper end *f* of the drying chamber *b* shall be hollow as shown and be steam heated to prevent condensation thereon, as the condensed solvent may fall therefrom on to the
85 fabric. The material to be dried preferably enters and passes out of the drying chamber at its lower end as shown to prevent the escape of the hot vapors which tend to rise to the top of the apparatus.

90 The apparatus illustrated at Fig. 1 may be used in conjunction with a padding, coating, spreading or like machine instead of with a printing machine as illustrated.

In addition to cooling the walls of the drying chamber as in the example illustrated at Fig. 1, I may, as shown at Fig. 2, place cooling chests or pipes *h* between the folds of the fabric and extend one of the troughs or receptacles *e* to enable it to receive the condensed solvent which trickles down the surface of *h*. The top or upper end *f* of the chamber *b* in this case is made with sloping sides and steam is passed through the conduit formed at the top thereof as shown so as
100 to keep the top of the apparatus sufficiently warm to prevent condensation thereon. The drying chamber in this case is used in conjunction with a spreading machine *i*.

110 In the apparatus illustrated at Fig. 2, the fabric passes in close proximity to the heating chests or pipes *e* and the vapors rising

from the fabric are immediately condensed by contact with the adjacent cool surface.

When the printing, padding, coating, spreading or like machine is arranged at the upper end of the drying chamber, I prefer to construct the latter as shown in Fig. 3. The walls or sides of the chamber *b* converge toward the top in order to restrict, as far as possible, the exit for the escape of vapors which tend to rise to the top of the chamber. I may close a portion of the upper end of the drying chamber *b* by a detachable cover *j*. If the material is to be passed through the drying chamber several times, it is formed into a continuous web and passes through the drying chamber, and then back thereto as indicated in dotted lines.

When a horizontal drying apparatus is employed in conjunction with spreading or like devices, as used for example in india-rubber and other proofing works, and as illustrated at Figs. 4 and 5 (the latter view being taken at right angles to the former) I place the heating chests or pipes *c* within a suitable casing *k* having therein one or more cooling chests or pipes as *h* and troughs *e* or their equivalent, as in the forms of apparatus before described, the top portion of the casing *k* being arranged as shown to insure that no drops of condensed solvent shall fall on to the material *d*, being dried. I prefer however to employ a vertical form of drying chamber as illustrated at Figs. 1, 2, 3 and 4, for with the horizontal form only the upper heating surface of the drying chests can be sufficiently taken advantage of, whereas in the vertical form the whole surface of the heating elements can be usefully employed.

When pipes are employed as cooling surfaces in the drying chamber, I preferably arrange the same in a serpentine or circuitous formation but with sufficient vertical length between each bend as to insure that the drops of condensed solvent, which collect thereon at the upper end of the drying chamber, can trickle down the pipes to the troughs or receptacles, as *e*, at the bottom of such chamber.

By means of my improved apparatus, I am enabled to recover in practically full concentration the solvents employed in the printing or other operation, and thus to render possible the use of such solvents which have heretofore been considered too costly and dangerous for ordinary work.

I prefer to arrange that the rate of cooling can be adjusted at will, as for example by regulating the temperature of the cooling fluid, so as not to set up too rapid cooling,

which, by reducing the pressure in the drying chamber, may induce air to enter the latter to take the place of the gases condensed therein and cause the disadvantages hereinbefore referred to.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In apparatus for recovering volatile solvents or fluids contained in proofed and like fabrics or materials, in combination, an open chamber through which the wet treated fabric or material is passed, means for heating and for cooling the interior of said chamber, and means passing said fabric or material in close proximity to the surface of said heated means and at a distance from said cooling means, substantially as set forth.

2. In apparatus for recovering volatile solvents or fluids contained in proofed and like fabrics or materials, in combination, a chamber into which the wet treated fabric or material is passed, heating and cooling elements within said chamber, and means giving the fabric or material a volute like path through said chamber, substantially as set forth.

3. In apparatus for recovering volatile solvents or fluids contained in proofed and like fabrics or materials, in combination, a chamber, a plurality of heating and cooling elements arranged alternately with one another within the said chamber, means giving the fabric or material a volute like path through said chamber and directing it between the heating and cooling elements, and receptacles for the condensed solvent, in close proximity to the surface of said heating elements, substantially as set forth.

4. In apparatus for recovering volatile solvents or fluids contained in proofed and like fabrics or materials, in combination, a chamber having its upper end open, a plurality of heating and cooling elements alternately disposed in the said chamber and converging toward the upper end thereof, means for passing the fabric or material between adjacent heating and cooling surfaces in a volute like path, and in close proximity to the surface of said heating elements and receptacles for the condensed solvent, substantially as and for the purpose described.

In testimony whereof, I affix my signature in presence of two witnesses.

JOHN SPENLÉ.

Witnesses:

VIVIAN ARTHUR HUGHES,
CHARLES CONRAD.