

(No Model.)

H. E. MILLER.
APPARATUS FOR DRYING SUBSTANCES.

No. 508,112.

Patented Nov. 7, 1893.

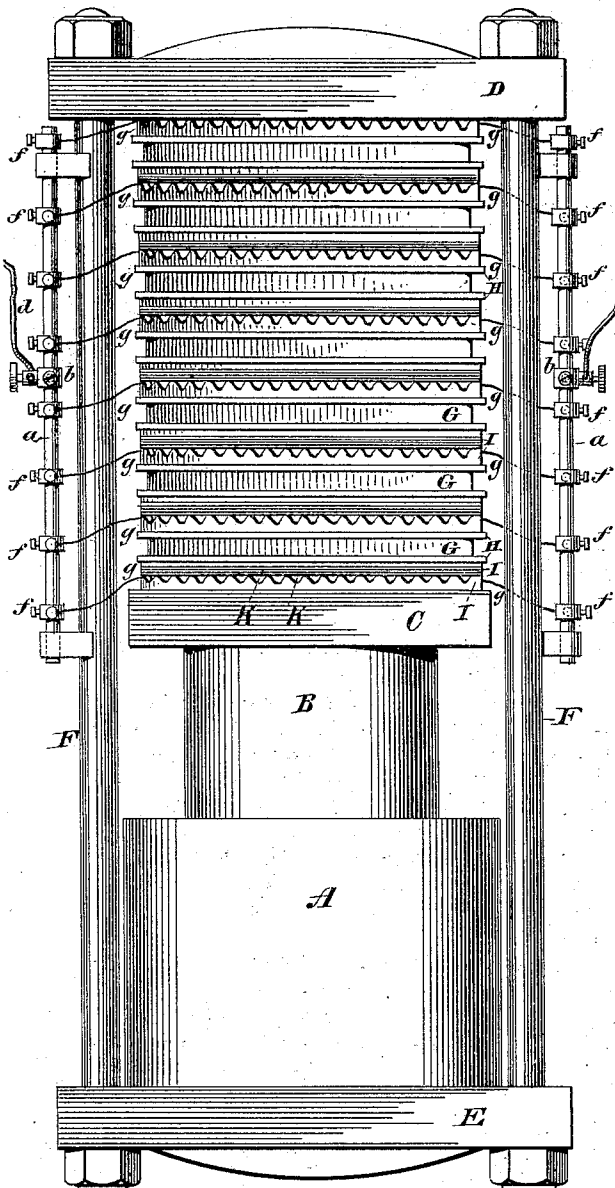


Fig. 1.

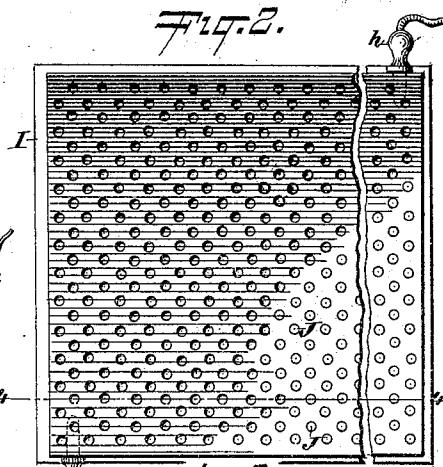


Fig. 2.

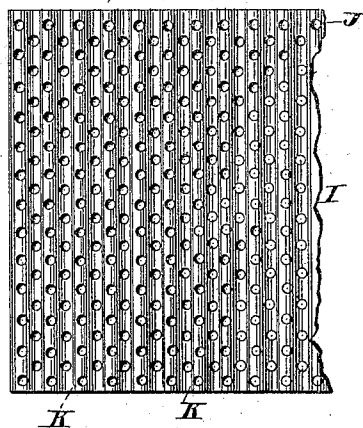


Fig. 3.

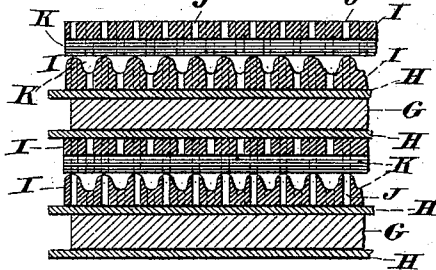


Fig. 4.

WITNESSES:
Gustave Dietrich
R. A. Porteous

INVENTOR
Horace E. Miller,

BY
Chas. B. Gill
ATTORNEY.

UNITED STATES PATENT OFFICE.

HORACE E. MILLER, OF NEWARK, NEW JERSEY. .

APPARATUS FOR DRYING SUBSTANCES.

SPECIFICATION forming part of Letters Patent No. 508,112, dated November 7, 1893.

Application filed October 26, 1891. Serial No. 409,758. (No model.)

To all whom it may concern:

Be it known that I, HORACE E. MILLER, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Drying Substances, of which the following is a specification.

The invention relates to improvements in apparatus for drying substances as hereinafter described and claimed.

In the accompanying drawings I illustrate the apparatus when adapted for use in the manufacture of celluloid and other compounds of pyroxyline, but it is to be understood however that the invention is not confined exclusively to the drying of any particular substance.

A description of the apparatus in its relation to the manufacture of celluloid, will fully disclose the nature and objects of the invention, and hence in this application I particularly refer to this material.

In the manufacture of celluloid and other pyroxoline compounds, the soluble fiber is produced by treating the paper with acids and it is then prepared for subsequent manipulations by being washed in a water bath and subjected to the action of a "whizzer" by which the major portion of the water is removed. The soluble fiber, camphor, pigments and color are then thoroughly mixed and ground together in a mill, after which the mass is by hydraulic pressure pressed into thin cakes, which are thereafter put into an evaporating press to dry the moisture (water) therefrom, leaving the cakes hard and brittle. The cakes are then disintegrated by crushing rolls and the material thus formed is then thoroughly mixed with solvents and left in an air-tight box until the solvents have thoroughly permeated the mass, when it will be ready for the next step of the process which is its subjection to heated calender rolls to complete the thorough mixing of the ingredients and the formation of a uniform homogeneous compound. The material is then pressed into slabs and sheeted or given other form and properly seasoned in driers.

The point of the above described process of manufacturing pyroxoline compounds at which the present invention comes into special use is that at which the cakes of material are put

into the evaporating press to dry the aqueous particles therefrom so as to leave the cakes hard and brittle. The method of thus drying the cakes of material at present in use is by placing them between sheets of dry blotting paper, one above the other, until the evaporating press is full, whereupon the pressure being applied, the blotters will absorb from the cakes the aqueous particles thereof; the cakes arranged between the blotters are left under pressure for about twelve hours and thereafter the blotters having become wet are removed and dry ones substituted and the cakes of material between them left under pressure for another twelve hours when this step of the process will be complete and the cakes will be found to be in condition for the further treatment necessary in the manufacture of celluloid.

In accordance with the present invention I very much simplify and expedite the process of removing the aqueous particles from the material after it has been pressed into thin cakes by hydraulic pressure, and present an apparatus by which the blotters are themselves dried while inclosing the cakes of material and in which the complete drying step of the process may be completed in a very short space of time.

The particular method of drying the cakes of material will be fully pointed out hereinafter in connection with the description of the apparatus constituting the present invention.

Referring to the accompanying drawings Figure 1 is a side elevation of an evaporating press constructed in accordance with and employing the invention, the plates, blotters and cakes of material being shown under pressure and the plates included in the electric circuit. Fig. 2 is a detached plan view of the outer or smooth face of one of the plates. Fig. 3 is a like view of a portion of the opposite face of said plate, and which is corrugated, and Fig. 4 is a detached vertical section through a bank of the plates, blotters and cakes of material, said section being on the dotted line 4—4 of Fig. 2.

In the drawings A designates the hydraulic cylinder; B the plunger; C the platen on said plunger; D, E, the top and bottom heads and F the supporting rods, the whole constituting the well known hydraulic press.

The cakes of material G to be dried are

each placed between the blotters or other absorbent H, and these are arranged between the pairs of plates I, the layers of material, blotters and pairs of plates being banked one upon the other on the platen C, as shown in Fig. 1, until the space between said platen and the head D is about full, whereupon the electric circuit will be completed and the pressure applied.

The plates I are perforated and corrugated, as shown, and are arranged in pairs with the corrugated surfaces in face to face contact, the corrugations however in one plate extending at right angles to those of the next adjoining plate so as to cross each other and form outlets for the escape of the moisture which may pass into the perforations. The perforations referred to are designated by the letter J, and the corrugations by the letter K.

In the arrangement of the plates, blotters and cakes on the press I first place one pair of the plates upon the platen C, and upon this the blotter or other absorbent H, whereupon the cake of material G is placed upon the said blotter H and then another blotter or other absorbent H is laid upon said cake G, and upon this latter blotter I place another pair of plates I. The one cake G is then in condition to be subjected to the heat and pressure, but since it is more expeditious to dry a number of the cakes at one time, I proceed to bank a number of the cakes between the blotters and plates on the platen, and dry them all at one operation. To the rods F are attached by means of suitable brackets the rods *a* having the sleeves *b*, to which, by means of suitable binding screws are connected the main conductors *d*, *e*, of the electric circuit. Upon the rods *a* are also applied the sleeves *f* supporting the flexible conductors *g*, which carry at their free ends the plugs *h* adapted for insertion into the corrugations between the plates I for the purpose of connecting said plates in the electric circuit. The conductors *g* are independent of each other, and hence any number of them may be employed in accordance with the number of plates I on the platen. It is apparent that the electric circuit may be completed through any pair of the plates I upon the application of the plugs *h* thereto, and that all of the plates I are capable of being quickly brought into the electric circuit or removed therefrom at will, the plugs *h* being independently attachable to the plates and detachable therefrom. I do not confine the invention to the particular means illustrated for connecting the conductors *g* to the plates.

In the use of the apparatus the plates, blotters and material being on the platen C, the electric circuit will be completed through the plates by means of the conductors *g*, and the hydraulic pressure will be applied, the effect being that the plates will be heated to the predetermined degree and the moisture will be expelled from the cakes and taken up

by the blotters, which in turn will have their moisture evaporated by the heat of the plates, said moisture finding an escape through the perforations and corrugations of the plates. It will thus be seen that the process of drying the cakes of material is rendered continuous and rapid, avoiding the long delays and repeated handling and drying of the blotters incident to the methods heretofore employed in the manufacture of pyroxyline compounds. The current heating the plates will be properly controlled by a rheostat and hence said plates may be given just the degree of heat appropriate for the material under treatment according to its nature and condition at the time of applying pressure.

In drying some materials it will not be necessary to employ either the hydraulic pressure to expel the moisture or the blotters to absorb it, and hence I do not confine the invention in its broader sense to the use of blotters or press nor to the drying of any particular substance, whether in the condition of pulp or powder or in rigid form.

The apparatus above described when applied in the manufacture of pyroxyline compounds is, however, of special importance and results in the saving of much time and labor and the effectual accomplishment of the object desired.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In drying apparatus, the perforated plates corrugated on one face and plain on the opposite face, and arranged in pairs with their corrugated faces against each other and their plain faces outward, combined with connections including said plates in an electric circuit; substantially as and for the purposes set forth.

2. In drying apparatus the perforated plates corrugated on one face and plain on the opposite face and arranged in pairs with their corrugated faces against each other and their plain faces outward, said pairs of plates having layers of absorbent material between them, combined with means for heating said plates; substantially as and for the purposes set forth.

3. In drying apparatus, the press, the rods *a*, *a*, the conductors *d*, *e*, connected respectively therewith and the series of independent conductors *g* secured to said rods, combined with the series of perforated plates having outlets for moisture and adapted to receive one end of said conductors *g*, and the layers of absorbent material; substantially as and for the purposes set forth.

Signed at New York, in the county of New York and State of New York, this 24th day of October, A. D. 1891.

HORACE E. MILLER.

Witnesses:

CHAS. C. GILL,
ED. D. MILLER.