

G. A. CUTTER.
 DRYING MACHINE.
 APPLICATION FILED APR. 19, 1909.

959,722.

Patented May 31, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

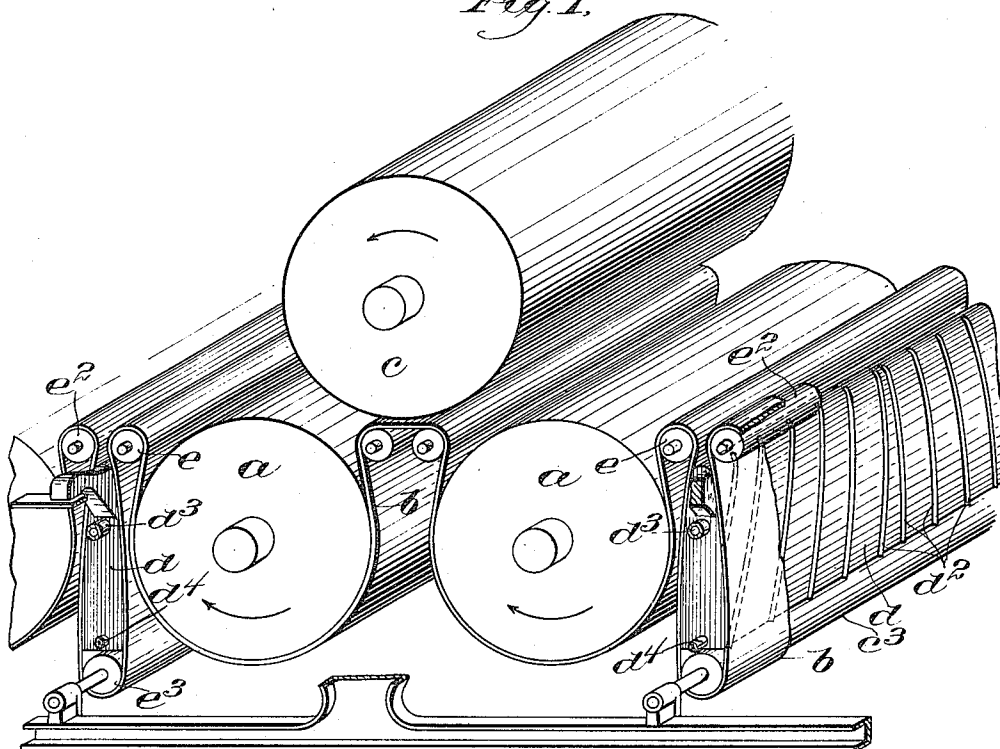


Fig. 2.

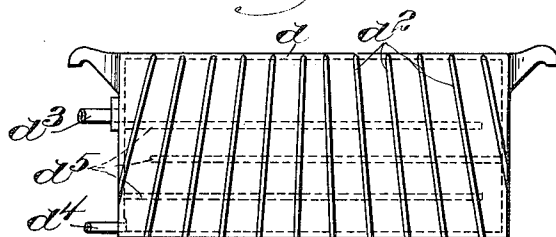
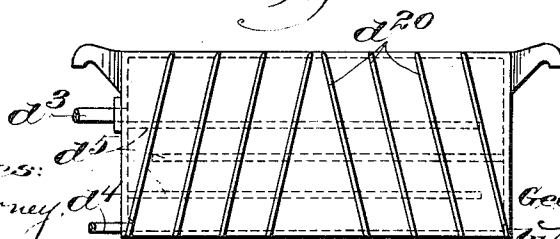


Fig. 3.



witnesses:
 Jas. J. Maloney,
 not a lawyer.

Inventor:
 George H. Cutter
 by J. J. Livermore
 atty.

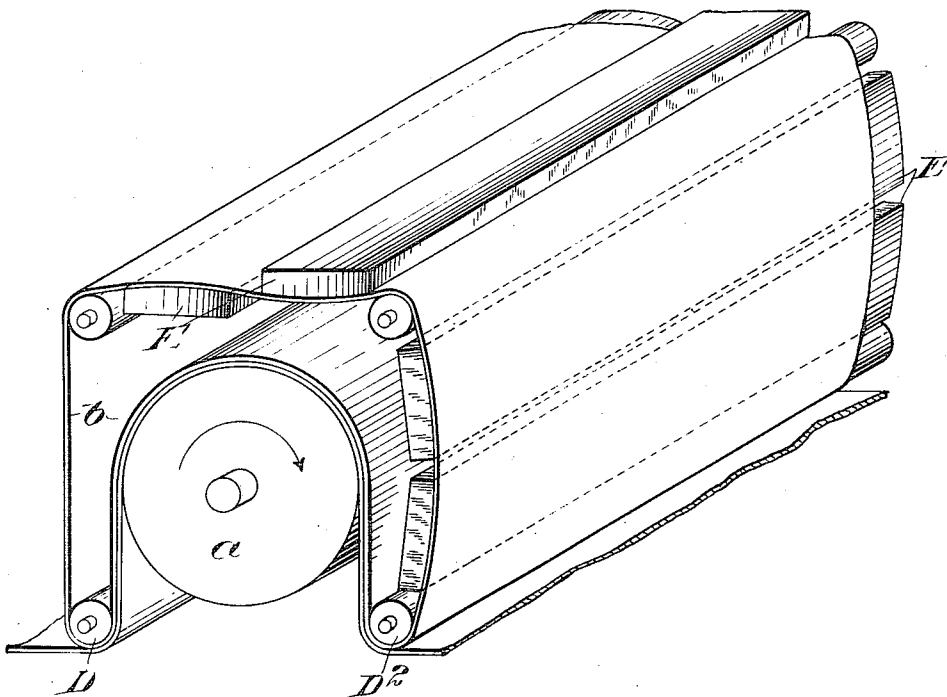
G. A. CUTTER.
DRYING MACHINE.
APPLICATION FILED APR. 19, 1909.

959,722.

Patented May 31, 1910.

2 SHEETS—SHEET 2.

Fig. 4.



Witnesses:
Jas. J. Maloney.
W. J. Maloney.

Inventor:
George A. Cutter.
by *H. J. W. Moore*
Atty.

UNITED STATES PATENT OFFICE.

GEORGE A. CUTTER, OF TAUNTON, MASSACHUSETTS, ASSIGNOR TO CELL DRIER MACHINE COMPANY, A CORPORATION OF MAINE.

DRYING-MACHINE.

959,722.

Specification of Letters Patent.

Patented May 31, 1910.

Application filed April 19, 1909. Serial No. 490,908.

To all whom it may concern:

Be it known that I, GEORGE A. CUTTER, a citizen of the United States, residing in Taunton, in the county of Bristol and State of Massachusetts, have invented an Improvement in Drying-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a drying machine, and is embodied in a machine of that class in which the material or article to be dried is conveyed through the apparatus, and held in contact with or adjacent to a heated drying surface, or surfaces, by a suitable conveyer, such, for example, as an endless band of felt, or other suitable material. Such machines are used for drying pulp, paper, raw stock, such as wool, granular material, or separate articles such as cuffs, hosiery and the like—or in fact any material or article the nature of which is such that it cannot be drawn through the machine without a carrier of some sort. Such machines are also used in some cases with material in web form, where it is desired to obtain extra pressure against the drying surfaces, or when the strength of the material is insufficient to admit of pulling it through the machine. In a machine of this class, the moisture driven off from the material or article being dried, must also pass through the conveyer; and naturally is to a certain extent retained thereby. It is desirable, therefore, to provide the apparatus with means for drying the conveyer itself, during the operation, so that the moisture retained therein will not check the drying of the material going through. For this purpose, the machine is provided with supplemental drying elements arranged in the path of the conveyer, so that the conveyer in its travel passes in near proximity to or in actual contact with the surfaces of the supplemental drying element, so as to be heated to evaporate the moisture absorbed from the material being dried.

The supplemental drying elements, herein shown as stationary cells, may be disposed between adjacent drying cylinders, or may be grouped in the return loop of the conveyer, or may be disposed in any suitable way to act upon the conveyer when the said

conveyer is out of contact with the regular drying cylinders.

A further feature of the invention consists in means combined with the stationary cells for laterally stretching the conveyer, which may consist of an endless band of felt, so as to maintain an even width thereof and to prevent the felt from puckering on the regular drying cylinders. This is accomplished by providing the surfaces of the supplemental stationary cells with divergent ribs, the said ribs diverging from the middle toward the edges in the direction of travel of the conveyer over the cells.

Figure 1 is a perspective view, partly in section, of a portion of a drying machine embodying the invention; Fig. 2 is a side elevation of a felt drying cell, constructed as shown in Fig. 1; Fig. 3 is a similar view of a felt drying cell showing a modification; and Fig. 4 is a perspective view of a machine showing a modification in the arrangement of the drying cells.

The machine embodying the invention comprises the heated rotating cylinders *a* around which travels the conveyer, herein shown as an endless band of felt, or other suitable material, indicated by the reference letter *b*, the material to be dried being carried through the machine around the drying cylinders *a*, and the intermediate cylinder *c*, the felt conveyer serving to hold the material in close contact with the surfaces of the cylinders *a*, and, at the same time, to support the material and aid in conveying the same through the machine.

In the construction shown in Fig. 1, the band *b* extends only over the lower cylinders, the material not being protected by the felt as it passes over the upper intermediate cylinder *c*. In order to keep the conveyer dry, that is to say, to carry off the moisture absorbed from the material in the drying operation, the machine is provided with supplemental drying members for the band alone, the said members in the construction shown in Fig. 1 consisting of stationary cells *d* arranged at intervals along the machine between adjacent felt-carrying drying cylinders *a*. From the cylinders *a*, the felt is carried over idler rolls *e*, *e*², *e*³, there being two of the rolls adjacent to the upper portion of the cell *d*, and one roll adjacent to the lower portion thereof, so that the felt will travel

freely, and at the same time lie in contact with the opposite surfaces of the cells d . In order to obtain a stretching effect, and thereby maintain the normal width of the felt while it is traveling through the machine, and prevent the same from puckering or wrinkling, the cells d are provided with projections or ribs d^2 which diverge from the middle of the cell in the direction of travel of the felt, so that the said ribs tend to push the surface of the felt outward toward the ends of the drying cells.

In the construction shown in Fig. 2, the divergence of the ribs d^2 increases from the middle toward the ends of the cells, so that the action on the felt is gradual, the stretching effect increasing toward the edges of the band. This specific arrangement, however, is not essential to the invention, it being practicable to arrange parallel, diverging ribs d^{20} as indicated in Fig. 3. The cells d are arranged to be heated by steam, and are provided with inlet pipes d^3 and outlet pipes d^4 , and the distribution of the hot steam over the surface is insured by the use of staggered baffle plates d^5 , shown in dotted lines, Figs. 2 and 3.

In the construction thus far described, the felt is shown as diverted from the cylinders at intervals and passed over the drying cells located between adjacent cylinders. It is practical, however, to locate the felt drying cells in the return loop of the band of felt, so that it first passes over the drying surface for the material, and is subsequently passed over the drying cells before again coming into operation to convey the material. Such a construction is indicated in Fig. 4, which is shown, for convenience, as comprising a machine having only one drying cylinder, it being obvious, however, that the felt might be carried over a plurality of drying cylinders in succession, as in the machine shown in Fig. 1, and then returned in a single loop around and out of contact with the cylinders.

In the construction shown in Fig. 4, the conveyer, after passing over the drying cylinder or cylinders into contact with which it is guided by means of idler rolls D and D², is returned out of contact with the drying cylinders, and during its return travel is subjected to the action of the drying cells E which may be suitably arranged so as to afford an adequate drying surface with the least amount of objectionable friction. In order that the conveyer may be subjected to the drying action at both sides, the cells may be staggered, as indicated at the upper part of Fig. 4, so that the felt passes over one and under another, and it is obvious that this arrangement might be repeated, if desired, although it is practicable to arrange the additional cells, as shown in Fig. 4, with the conveyer passing over only one surface thereof.

It is obvious, however, that the arrangement of the cells may be varied, the specific construction and arrangement shown not being essential to the invention.

Claims.

1. In a drying machine, the combination with rotatable drying cylinders; of an endless conveyer of felt or other suitable material held in contact with said cylinders; and a stationary heated drying cell projecting into the path of said conveyer and lying in contact therewith at points where said conveyer is not in contact with the cylinders.

2. In a drying machine, a plurality of heated cylinders; an endless conveyer adapted to travel in peripheral contact with said cylinders; a stationary heated drying cell projecting into the path of said conveyer; and means for guiding said conveyer whereby it comes in contact with said drying surfaces.

3. In a drying machine, a plurality of heated cylinders; an endless conveyer adapted to travel in peripheral contact with said cylinders; a stationary heated drying cell the surface of which is provided with projecting engaging parts diverging from the middle thereof toward the ends thereof; and means for guiding said conveyer whereby it comes in contact with said surface.

4. The herein described drying element for a continuously traveling web, which is provided with a surface portion adapted to be heated and to be located in contact with said traveling web, and diverging ribs or projections on said surface.

5. The herein described drying element for a traveling web, which consists of a stationary heated element having a convex surface provided with projecting engaging parts diverging from the middle of said element toward the ends thereof.

6. A stationary drying element for a traveling web, consisting of a steam heated cell having a convex surface provided with ribs extending along said surface substantially in the direction of travel of said web, said ribs diverging from the middle toward the ends of the cell, and the angle of divergence being progressively increased.

7. A drying machine having a plurality of rotatable drying cylinders; an endless conveyer; idler rolls whereby said conveyer is held in contact with the periphery of the cylinders throughout a portion of its travel; stationary heated drying cells; and means for guiding said conveyer into contact with said stationary cells during another portion of its travel.

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

GEORGE A. CUTTER.

Witnesses:

JAS. J. MALONEY,
M. E. COVENEY.