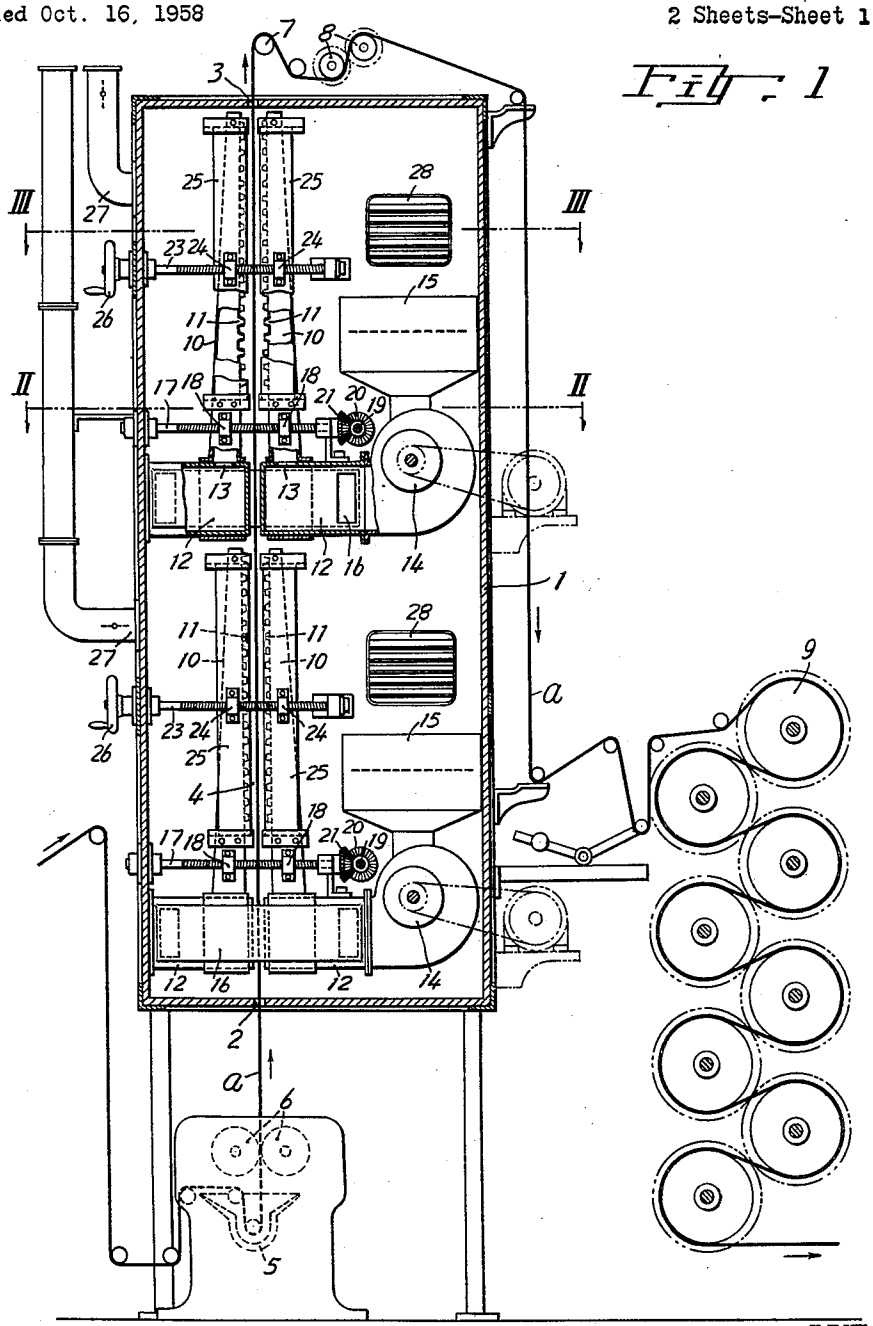
Nov. 14, 1961 BUNJI KAWAGUCHI 3,008,243

APPARATUS FOR DRYING RUNNING WEB MATERIAL

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Fig. 1



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Fig. 2

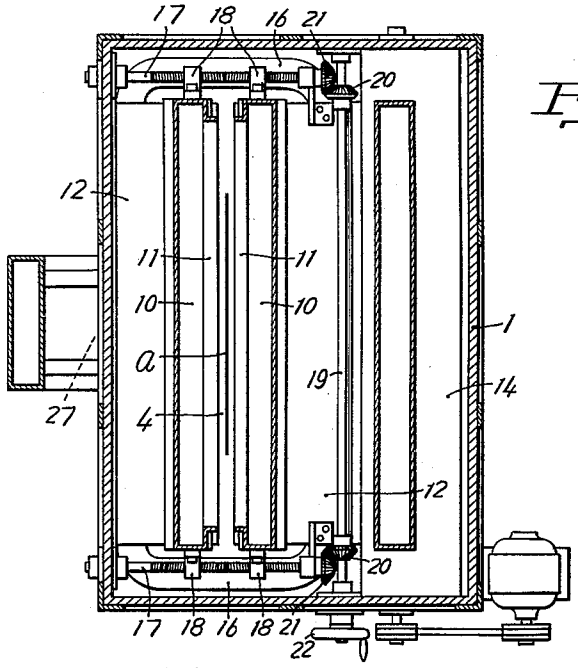
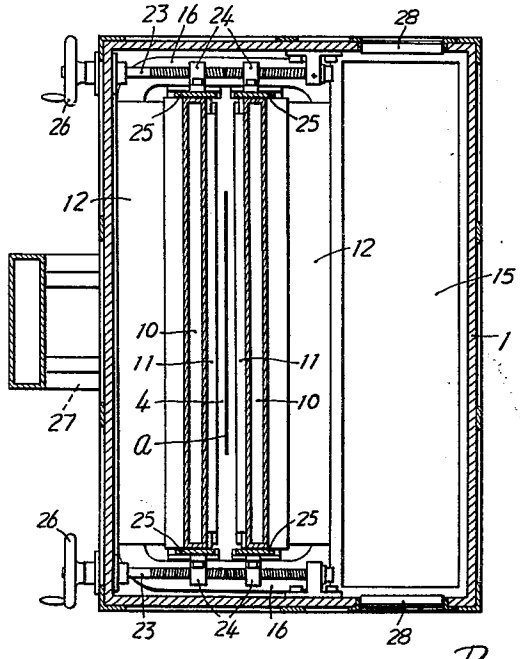


Fig. 3



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APPARATUS FOR DRYING RUNNING WEB MATERIAL

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1 Claim. (Cl. 34—160)

This invention relates to an apparatus for drying lengths of material, for example lengths of cloth.

According to the present invention, there is provided an apparatus, for drying lengths of material, for example lengths of cloth, including a drying chamber having an entrance and an exit for lengths of material, there being disposed within said chamber a drier including a plurality of nozzles through which hot air can be blown against any lengths of material passing through the chamber in order to dry said lengths of material, the arrangement being such that lengths of material in said chamber can pass along a path which is unobstructed and substantially straight, there being guide means disposed outside said chamber, for guiding lengths of material along said path in such a manner that the lengths of material do not come into contact with any members inside said chamber.

In order that the invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

FIG. 1 is a vertical section through an apparatus for drying lengths of material, for example lengths of cloth, after the latter have been treated in a vat (also shown), some parts of the apparatus being broken away,

FIG. 2 is a section taken along the line II—II in FIG. 1, and

FIG. 3 is a section taken along the line III—III in FIG. 1.

Referring to the drawings, the apparatus includes a vertical drying chamber **1**, which is preferably three meters or more in height, and which has an entrance opening **2** and an exit opening **3**, formed in the bottom and the top thereof, respectively, for lengths of cloth, one such length being denoted by *a*. An unobstructed vertical path **4** is left, between the members in the chamber **1**, for the length *a* to pass from the entrance **2** to the exit **3**. Before entering the chamber **1**, the cloth *a* is passed through a vat **5** filled with treating liquid, for example with dye, resin solution or the like, and then passed between squeezing rolls **6**, located just below the entrance **2**, for squeezing excess liquid out of the cloth *a* immediately before the latter enters the chamber **1**. A guide roll **7** is located just above the exit **3**, and rolls **8** disposed adjacent the roll **7** draw the cloth *a* out of the chamber **1** and over the guide roll **7**. The rolls **6** and **7** so guide the cloth *a* along the path **4** that the cloth does not come into contact with any of the members inside the chamber **1**. The squeezing rolls **6** and the rolls **8** are driven at almost the same speed by one or more sources of power (not shown).

If desired, the guide members near the entrance **2** can be modified by disposing a guide roll between the entrance and the squeezing rolls **6** and, in that case, it is not necessary to position the rolls **6** just below the entrance **2**.

Furthermore, the guide members near the exit **3** can be modified by disposing the rolls **8** with regard to the exit **3** in the same manner as the rolls **6** are disposed with regard to the entrance **2** in FIGURE 1, and, in that case, the roll **7** could be dispensed with. After leaving the drying chamber **1**, the cloth *a* is preferably passed over drying cylinders **9** for further drying.

In addition, a baking machine or the like can be provided through which the cloth *a* next passes, although such a machine is not illustrated in the drawings.

Inside the drying chamber **1** are disposed upper and lower driers of identical construction. Each drier includes a heater **15** for air drawn from the interior of the chamber **1** and a motor-driven blower **14** which draws air from the heater and blows the heated air into one duct of a pair of ducts **12** in the relevant drier. In FIGURE 1, the heated air is blown into the right-hand ducts of the respective pairs of ducts. Part of the heated air in each right-hand duct then travels through a hole **13** in the associated right-hand duct and into the open lower end of one of a relevant pair of hot air chambers **10**, whilst the remainder of the heated air passes along a pair of conduits **16**, disposed one on either side of the relevant pair of ducts **12**, and into the left-hand duct of the pair, from where the heated air passes, through the hole **13** in the relevant left-hand duct, into the other of the associated pair of hot-air chambers **10**. Nozzles **11** project outwardly, towards the cloth *a*, from one of the wider side walls of each hot-air chamber **10** at approximately right angles to the vertical path **4**. Since the two upper chambers **10** are disposed adjacent opposite faces of the cloth *a*, as also are the two lower chambers, heated air is blown from the nozzles **11** against both faces of the cloth.

The chambers **10** are mounted on respective ducts **12** in such a manner as to be horizontally slidable along those ducts, thus permitting the distance between the two chambers of a pair to be adjusted. Horizontal shafts **17** are disposed above respective conduits **16** and are rotatably mounted, at one end, in that side wall of the chamber **1** furthest from the heater **15** and are supported, at the other end, by respective ducts **12**. The shafts are axially immovable and each has a length of right-hand screw-threading and a length of left-hand screw-threading formed thereon. Projecting outwardly from the narrower side walls of the chambers **10** are ears **18**, there being one ear associated with each narrower side wall. Each ear encircles an associated one of the lengths of screw-threading on the shafts **17** and is internally screw-threaded to co-operate with that length, so that rotation of any one shaft **17** causes the two ears encircling that shaft to move away from, or towards, one another.

Shafts **19** extend perpendicular to the upper two shafts **17** and the lower two shafts **17**, respectively, and are connected to those shafts, for simultaneous rotation thereof, by bevel gear wheels **20** and **21**. One end of each shaft **19** projects through the walls of the chamber **1** and a hand-wheel **22** is attached to that end. Rotation of one of the hand-wheels **22** causes rotation of the relevant shafts **19** and **17**, and thus moves the relevant chambers **10** in opposite directions, that is to say, the distance between the respective relevant chambers **10** and the cloth *a* is increased or decreased.

Extending above the respective shafts **17**, so as to be substantially parallel thereto, are further axially immovable shafts **23** which have ears **24** mounted thereon in such a manner as to be axially movable with respect to the shafts **23**. Each shaft **23** is of identical construction to each shaft **17** except that it is not arranged to be driven by way of a gear-wheel **21** but by way of a hand-wheel **26** mounted on one end thereof. Furthermore, the shafts **23** are supported by side walls of the chamber **1** instead of by the ducts **12**. The ears **24** differ from the ears **18** only in that they project from respective vertical baffle plates **25** instead of projecting from the narrower side walls of the chambers **10**. The baffle plates **25** are mounted in horizontal guideways on respective narrower side walls of the chambers **10**, there thus being two baffle plates associated with each cham-

ber, the plates being slidable towards and away from one another and having their respective planes at right angles to the plane of the cloth *a*.

Simultaneous rotation of the upper or the lower pair of hand-wheels **26** causes the relevant pair of shafts **23** to rotate and thus moves the associated baffle plates **25** in opposite directions. By movement of the baffle plates **25** into the route taken by the exhaust air which escape laterally from that part of the path **4** between the relevant pair of hot-air chambers **10**, the amount of that escaping exhaust air can be adjusted.

For each of the upper and lower driers, an exhaust opening **27** and a pair of inlet openings **28** are provided in the side walls of the chamber **1**. Each of these openings **27** and **28** is provided with adjustable shutter means so that the amount of air passing therethrough can be voluntarily adjusted.

When the apparatus described above is in use, the cloth *a*, which has been treated with the liquid in the vat **5**, is carried into the drying chamber **1** immediately after passing between the squeezing rolls **6**, and is then dried, within the chamber, by the hot air blown from the nozzles **11**.

A great advantage is that the cloth passed through the chamber **1** does not contact any articles such as rolls, clips or the like within the chamber **1**, so that the treating liquid on the cloth does not run, as it would do if the cloth touched any articles while still relatively wet. Consequently, the finished cloth should be free from unevenness of color or similar defects. Since cloth *a* is actually partly supported, against gravity, by the hot air blown against both faces thereof during vertical travel through the chamber **1**, the tension in the cloth is appreciably decreased.

What I claim is:

Apparatus for drying web material comprising an elongated housing having a bottom inlet opening and a top outlet opening for the web material, means supporting said housing with its longitudinal direction extending upright, an air heater mounted in said housing, an air blower connected to said heater for drawing heated air therefrom, a pair of ducts fixedly mounted within said housing and extending laterally thereof, means connecting said ducts to said blower for passing hot air to said ducts, a pair of elongated hot air chambers each slideably mounted on a different one of said ducts and having an opening in communication with its respective duct for receiving heated air therefrom, said chambers being positioned opposite one another and extending longitudinally of said housing, each of said chambers having a series of nozzles along the length thereof directed towards the opposite chamber, means for moving said chambers to and from one another and along said ducts, a plurality of baffle plates, means adjustably supporting said baffle plates with each plate alongside a different side of a different one of said chambers with each plate positioned having an edge facing but spaced from an edge of another of said plates controlling the hot air outlet from between said chambers, means for guiding said web material into said inlet opening, between said chambers and their adjacent baffles and from said outlet opening with said web travelling in a vertical direction in said housing.

References Cited in the file of this patent

UNITED STATES PATENTS

2,389,586	Andrews	Nov. 27, 1945
2,409,431	Hess	Oct. 15, 1946
2,471,802	Walter et al.	May 31, 1949
2,590,850	Dungler	Apr. 1, 1952

FOREIGN PATENTS

477,234	Italy	June 15, 1953
496,430	Italy	July 20, 1954