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DRYING APPARATUS

Filed Nov. 24, 1928

Fig. 1.

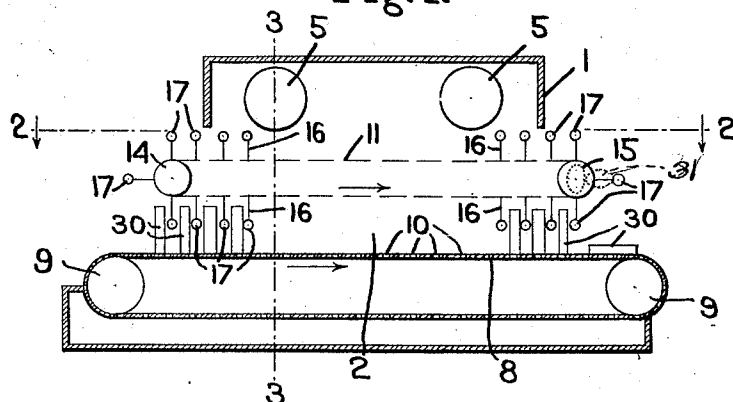


Fig. 2.

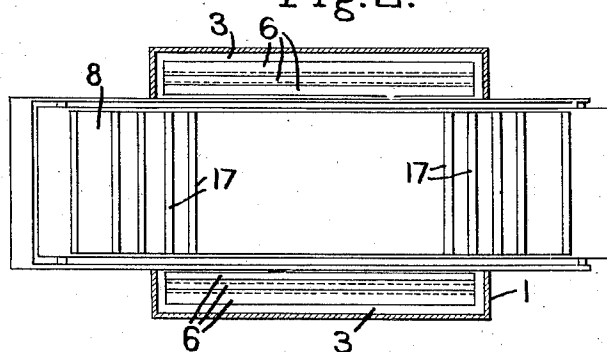
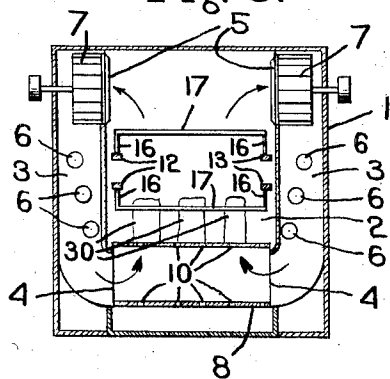


Fig. 3.



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DRYING APPARATUS

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This invention relates to a drier which has been specially designed for drying cellulose plates such as are used as raw material for the manufacture of solutions from which artificial silk may be made. In drying these plates it has been the common practice to pile up the packages of plates in large drying rooms and to subject them to the drying operation for several consecutive days.

Such careful treatment was employed because it is necessary to dry the plates at a relatively low temperature (about 35° centigrade) and the dehydration is kept within rather narrow limits. These cellulose plates when wet contain about twelve to fifteen percent of water, and they are dried to a point where they contain about five to six percent of water.

The object of my present invention is to provide an improved drier by which the necessary drying of the cellulose plates can be accomplished and without the use of the large rooms heretofore employed.

In order to give an understanding of the invention I have illustrated in the drawings a selected embodiment thereof which will now be described, after which the novel features will be pointed out in the appended claims.

In the drawings,

Figure 1 is a longitudinal sectional view through the drier embodying my invention; Fig. 2 is a section on the line 2—2, Fig. 1; Fig. 3 is a section on line 3—3, Fig. 1.

The drier comprises a casing 1 which forms within it a drying chamber 2 in which the cellulose plates are to be dried. These plates are put up in packages 30 as usual.

The casing 1 is formed at each side with circulating passages 3 which connect at their lower end with the heating chamber 2 through ports 4 and which also connect with said chamber 2 at their upper ends to other ports 5. Located in the circulating passages are heating pipes 6. 7 indicates fans or blowers which are located in the openings 5 and which serve to drive the air from the heating chamber at the upper end and force it downwardly through the passageways 3 and over the heating pipes 6, by which the

air is heated, the heated air then passing into the lower end of the drying chamber through the ports 4. Any desired number of these fans 7 may be employed depending upon the size of the drier, and by this means a circulation of the heating medium will be established upwardly through the drying chamber and then downwardly through the circulating passages 3. A counter-current in the longitudinal direction of the drier provides for the renewal of the air.

Extending longitudinally through the chamber 1 is a conveying belt 8 which extends at each end over direction rolls 9, one of said rolls being positively driven. Inlet ports 4 for the circulating air are located between the upper and lower runs of the belt, and said belt or conveyer is provided with perforations 10 to permit of free circulation of the air.

The packages 30 of plates are placed on the conveyor 8 at one end thereof by an attendant and are carried through the drying chamber by the movement of the conveyor.

Situated above the conveyor 8 is an endless belt device 11 provided with separators for keeping the packages 30 separate from each other as they are carried along by the conveyor 8. This separator also functions to loosen the individual plates in each package during the drying operation, as will presently be described. The endless chain device 11 comprises two endless chains 12 and 13 which pass over rollers 14, 15. Each chain is provided with outwardly directed arms 16 and the arms of the two chains are connected by separator rods 17.

The endless chain device 11 is arranged parallel to the conveyor belt 8 and the lower run of said endless chain device travels in the same direction as the upper run of the belt. The endless chain device, however, is operated at a varying speed so that the rods 17 have a sort of periodic forward movement. This periodic forward movement may be given to the endless chain device 11 in various ways without departing from the invention. As illustrating one way of accomplishing this I have shown the endless chain as operated by the elliptic gears 31.

In the operation of the machine the attendant will place the packages 30 on the conveyor belt at one end thereof, the left-hand end in Fig. 1, for instance, and the movement of the endless chain device 11 will bring one of the separator rods 17 downwardly into position directly behind the packages. The attendant will then place another package on the belt, and during further movement of the endless chain device 11 another separator rod 17 will be brought down in the rear of said package.

If the conveyor belt is a wide one it is possible to place the packages 30 in rows transversely across the belt. In Fig. 3 there are three such packages shown in a row.

As the packages are thus placed on the belt they are separate and held in separated relation by the separator rods 17, as clearly seen in Fig. 1. As the packages reach a position opposite the right-hand end of the endless chain device 11 they will be tipped over onto the conveyer 8 by the movement of the rods 17 passing around the guide roller 15, and thus they will come to lie on each other on the conveyer. These packages will be removed from the conveyor at the discharge end thereof by an attendant.

In addition to supporting the packages 30 and holding them separated from each other the rods 17 have for their purpose to loosen the individual plates in each package relative to each other. This is accomplished by reason of the fact that while the conveyor belt 8 moves forward at a uniform speed the rods 17 carried by the chain 11 will have a varying speed or a periodic or intermittent movement. The average speed of such periodic or intermittent movement, however, is the same as the speed of the conveyor 8. Because of this intermittent or periodic movement of the endless chain device 11 the packages 30 which are being carried through the drying chamber on the conveyor 8 will be rocked back and forth. During the pauses or intervals of closer movement of the endless chain device 11 the conveyor will be moving faster than the rods 17 with the result that the packages will be tipped backwardly.

During the quick jump movements of the rods 17 they will be moving faster than the conveyor 8 and will thus bring the packages back into vertical position again. This rocking motion of the packages will loosen the individual plates in each package relative to each other and will produce channels or spaces between the plates through which the drying medium may pass. In this manner it is possible within an interval of two hours to dry the cellulose plates uniformly and to a point where they contain only about five or six per cent of water by using a drying medium having a temperature of about 35° centigrade.

I claim:

1. In a dryer for drying cellulose plates, the combination with an endless conveyor operating at a uniform speed to convey packages of plates through a drying chamber, of means for giving the packages on the upper run of the conveyor simultaneously a rocking motion while being conveyed by the conveyor.

2. In a device for drying cellulose plates in packages, the combination with an endless conveyor for conveying packages through a drying chamber, of separators for separating the packages while on the conveyor, and means for giving all the separators simultaneously a periodic movement thereby to give the packages a rocking movement while they are being dried.

3. In a dryer for drying cellulose plates, the combination with an endless conveyor for conveying packages through a drying chamber on the upper run thereof, of a plurality of separators connected in endless chain formation and operating above the conveyor, the separators in the lower run of said endless chain formation being positioned to support the packages on the upper run of the conveyor, and means for operating the separators at a speed corresponding to that of the packages but with a periodical varying movement, whereby the packages will be rocked on the conveyor as they are being carried forward thereby.

4. In a dryer for drying cellulose plates in packages, the combination with an endless conveyor operating at a uniform speed to convey said packages through a drying chamber on the upper run, of means for giving the packages a continuous rocking movement while they are travelling along the upper run of the conveyor.

In testimony whereof, I have signed my name to this specification.

HERMANN HAAS.