April 14, 1936. F. PASCHKE ET AL 2,037,483

METHOD OF AND APPARATUS FOR DRYING ARTIFICIAL SILK CAKES

Filed May 7, 1931 2 Sheets-Sheet 1

Fig. 1.

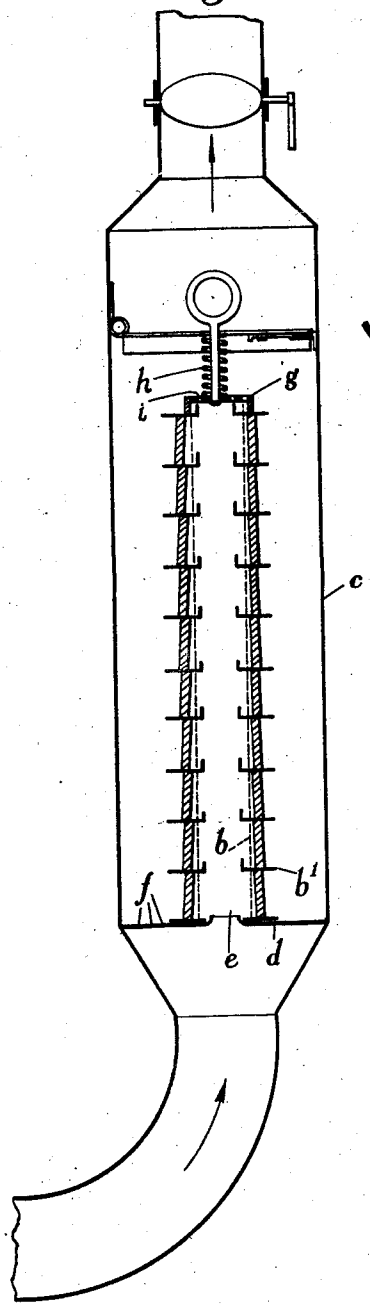



Fig. 7.

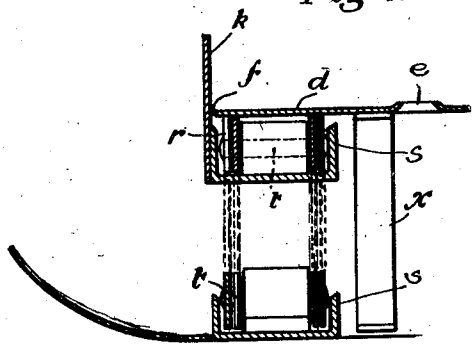
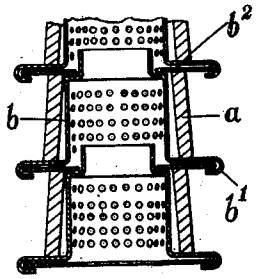



Fig. 2.

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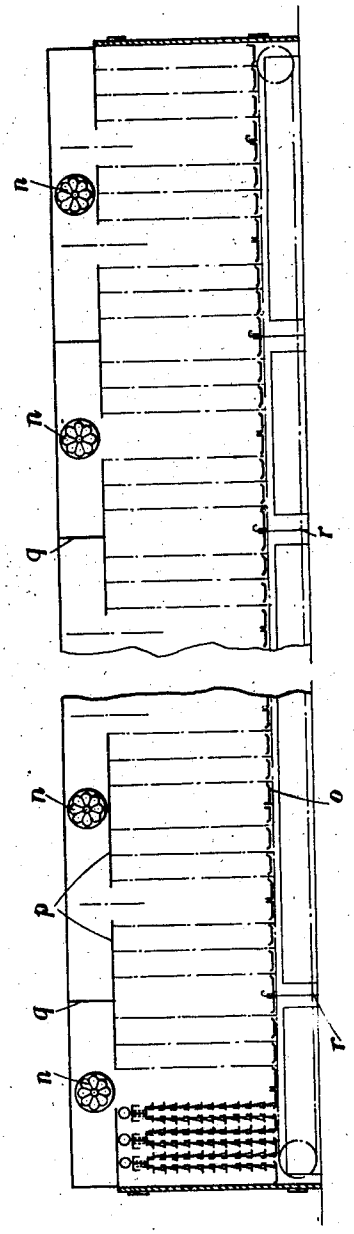


Fig. 3.

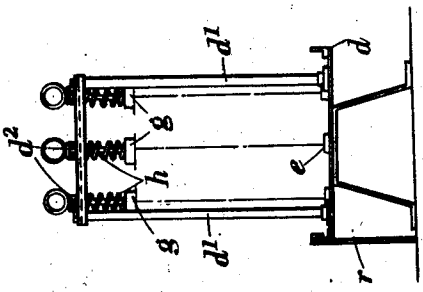


Fig. 6.

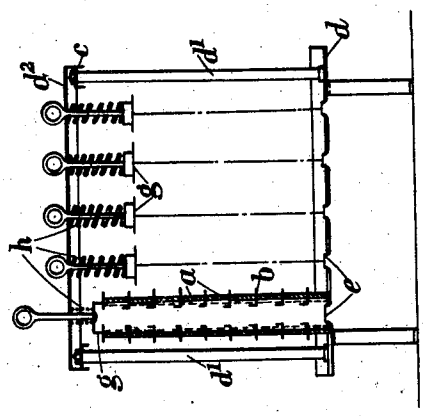


Fig. 5.

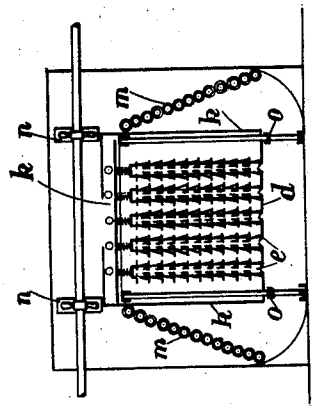


Fig. 4.

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2,037,483

## METHOD OF AND APPARATUS FOR DRYING ARTIFICIAL SILK CAKES

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Application May 7, 1931, Serial No. 535,748
In Germany May 19, 1930

7 Claims. (Cl. 34—26)

This invention relates to methods of and apparatus for drying artificial silk cakes. When these cakes are inserted in the usual drying chambers or ovens, it is a very long time before the innermost thread layers are dried owing to the substantial thickness of the cakes.

According to the present invention, the time occupied in drying is considerably shortened by exposing the cakes, which are preliminarily dried on their surfaces, to an air current which is forced through the thread layers. The wet cakes coming from the washing apparatus will not allow the passage of air through the thread layers at all, but it has been found that if before exposing the cakes to an air current as set out above they are dried on their surfaces in any suitable way, the air current will thereafter pass through the cakes and rapidly dry them completely. The preliminary drying may be effected by passing an air current along the inner and outer surfaces of the cakes.

The cakes may be arranged one above the other in the form of a hollow column and the preliminary drying effected by the passage of air through the inside and over the outside of the column. Washer-like supporting plates may be inserted between adjacent cakes, or the cakes may be separately mounted on carriers having flanges on which the bottom edges of the cakes rest and so constructed that they are capable of interengaging with one another to form a column. The apparatus for carrying out the method in accordance with the invention may be such that the cakes are supported so that their two sides are separated to enable air to be supplied to one side thereof, and having means whereby air is caused to flow through the inside and over the outside surfaces of the cakes to effect a preliminary drying thereof. When these surfaces are dried the main air current supplied to one side of the cakes will pass through the cakes and rapidly complete the drying.

In order that the invention may be clearly understood and readily carried into effect, constructional forms of cake drying apparatus according to the invention will now be described by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a sectional elevation of one form of apparatus;

Figure 2 is a sectional elevation to an enlarged scale of part of the column of cakes with their carriers;

Figure 3 is a side sectional elevation of another form of apparatus; and

Figure 4 is a cross-sectional elevation thereof;

Figure 5 is a section on an enlarged scale of one of the plates with the column of cakes arranged thereon and its covers;

Figure 6 is a side elevation thereof; and

Figure 7 is a transverse section on an enlarged scale illustrating details in the construction of the parts of the apparatus shown in Figures 3 to 6.

In the construction of apparatus illustrated in Figures 1 and 2, each of the cakes *a* is mounted around and in spaced relation to a perforated tubular carrier *b* having a bottom flange *b'* on which the cake rests and a shoulder $b^2$ near the top (Figure 2). The carriers *b* and cakes *a* are then built into a column, the bottom flange of the one carrier resting initially upon the shoulder and cake of the carrier below. This column is placed within a cylindrical drying chamber *c*, the bottom carrier of the column resting upon a plate *d* arranged transversely of the drying chamber, the plate having a central aperture *e* through which air may be supplied to the inside of the column and with small holes *f* located outside the column of cakes. The top of the column is closed by a cover *g* carried on the lower end of a rod *g'* which is slidable vertically in a support in the chamber and has a handle at its upper end. The cover *g* is urged downwards by a spring *h*. The cover *g* has a series of small holes *i* in communication with the inside of the column. The plate *d* and cover *g* form partitions separating the sides of the cakes except for the holes or by-pass paths *f* and the holes or paths *i*. The carriers *b* may be those described in copending United States application Serial No. 514,563.

In operation, air is supplied to the bottom of the cylindrical drying chamber *c* and passes into the inside of the column i. e. to one side of the cakes. It cannot, however, pass through the wet cakes *a* and, therefore, only a small current flows along the inside of the cakes and out through the restricted openings formed by the holes *i* in the top plate *g*. Similarly, a small air current flows through the holes *f* in the bottom plate *d* along the outsides of the cakes. These small air currents dry the cakes on their inner and outer surfaces with the result that the cakes then are able to let air pass through them. From this point the drying proceeds rapidly through the whole of the cakes.

A number of columns of cakes may be arranged within a single drying chamber, and in such a case the drying chamber *c*, instead of being circular, may be in the form of a long tunnel, as in

the example illustrated in Figures 3 to 6. It is provided with two vertical baffles *k*, one on either side, spaced away from the side walls of the tunnel. Heating elements *m* are supported in the spaces between the baffles *k* and the side walls and fans *n* are mounted in apertures in the baffles *k* near the top thereof. The baffles terminate some distance above the bottom of the tunnel and the fans are so driven that air is caused to circulate downwards between the baffles and the side walls, around the lower edges of the baffles and upwards in the central space between the baffles.

The cakes are supported on flat horizontal plates or partitions *d* provided with a number of apertures *e* arranged in rows. At the sides of the plates are fixed uprights *d'* serving to support cross-bars $d^2$ at their upper ends, one cross-bar for each transverse row of holes, and each cross-bar carries a number of the aforesaid vertically slidable rods *g'*, one for each hole in the transverse row, each such rod being arranged as before and carrying at its lower end the cover *g*. The cakes to be dried are piled one on the other over each aperture *e* in the plate *d* with washer-like supporting plates between successive cakes, and secured in position by the covers *g* as described above.

The plates or partitions *d* are of such width as to fit fairly closely between the baffles *k* and they are supported on an endless conveyor *o* within the tunnel at a level just above the lower edges of those baffles, by means of which conveyor the partions *d* are moved through the tunnel from end to end. Referring to Fig. 7, the plates *d* rest at each side edge on an endless chain *r* the rollers of which are shown at *t*. The two runs of the chain are supported in top and bottom channel members *s*. The plates are provided with feet *x* on which they stand when outside the chamber; but when the plates are supported on the chains *r*, these feet *x* are slightly raised so as to clear the bottom of the chamber. When a number of such plates *d*, each supporting a number of piles of cakes, occupies the whole length of the tunnel, it will be appreciated that the air circulated by the fans *n* and heated by the heating elements *m* will for the most part pass upwardly into the interior of the cakes although some air will also pass through the restricted openings *f* between the edges of the plates *d* and the baffles *k*. The restricted passage of air past the edges of the plates *d* serves to effect the preliminary drying of the outsides of the cakes, and if desired small holes may be provided in the plates between the piles in order to hasten the external drying. The covers *g* are also provided with small holes in order to allow a restricted passage of air through the interior of the piles of cakes until the drying has progressed far enough to enable the air supplied to the inside of the cakes to pass freely between the threads.

Horizontal baffles *p* are provided which extend between the vertical baffles and the side walls just below the apertures for the fans, and are provided with holes or slots so placed as to cause the circulating air to follow a tortuous path. Transverse baffles *q* may also be provided above these horizontal baffles. The arrangement of the baffles, fans and heaters may be such as to divide the tunnel into a number of successive zones as shown and then baffles *r* may be arranged to depend from one end of each carrier plate to prevent the passage of air lengthwise of the tunnel.

The particular arrangements of baffles and fans described above for causing the air to circulate around the spaces within the tunnel are not essential to the invention, and in fact are not new in themselves; they may be replaced by any convenient arrangement which will cause air to pass upwardly into the interior of the piles of cakes and outwardly between the threads thereof.

The preliminary drying of the cakes can be effected in any suitable way, and the invention is not limited to the use of the drying apparatus described above. Of course, the main drying may be effected by passing air from the outside to the inside of the cakes instead of from the inside to the outside as described above. It has, however, been found that by the use of the novel process and apparatus the time of drying is reduced to about one quarter of the time necessary if the cakes are placed in a drying oven in the usual way.

It is found to be particularly advantageous if the carriers on which the cakes are placed for drying are previously employed in the washing of the cakes and in their treatment between the washing and drying operations. In this case, the cakes need not be touched by hand during the whole treatment from the washing to the end of the drying.

We claim:—

1. A method of drying artificial silk cakes consisting in preliminarily drying the cake on its surfaces and then forcing an air current through the thread layers of the cake.

2. A method of drying artificial silk cakes consisting in preliminarily drying the cake on its surfaces by the passage of an air current over them and then forcing an air current through the thread layers of the cakes.

3. A method of drying artificial silk cakes consisting in effecting a preliminary drying by passing air currents through the inside and over the outside of the cake and subsequently forcing an air current through the thread layers of the cake from the inside to the outside.

4. Apparatus for drying artificial silk cakes comprising means for supplying air to one side of said cakes, means for effecting a preliminary drying thereof and means whereby said air is caused to pass through the thread layers of said cakes to complete the drying when said preliminary drying has been effected.

5. Apparatus for drying artificial silk cakes comprising means for supporting said cakes so that their inside and outside surfaces are exposed and for separating said sides except for restricted openings, and means for supplying air to one side of said cakes, said restricted openings being such as to cause a passage of air through the inside and over the outside of said cakes to effect a preliminary drying of said surfaces and restricting said flow to such an extent that after said preliminary drying has been effected air is caused to pass through the thread layers of said cakes to complete the drying.

6. Apparatus for drying artificial silk cakes comprising a chamber, a partition across said chamber for supporting said cakes thereon, said partition having an aperture over which said cakes rest on end and perforations beyond the outer edge of the cakes so supported, a perforated cover for engaging the other end of said cakes, and means for supplying air on one side of said partition, the air flowing through said perforations and aperture passing through the inside and over the outside of said cakes to effect a preliminary drying of the surfaces thereof and said

perforations being such that after said preliminary drying has been effected air is caused to pass through the thread layers of said cakes to complete the drying.

7. A method of drying artificial silk cakes consisting in effecting a preliminary drying by passing an air current through the inside and over the outside of the cake and subsequently forcing an air current through the thread layers of the cake.

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