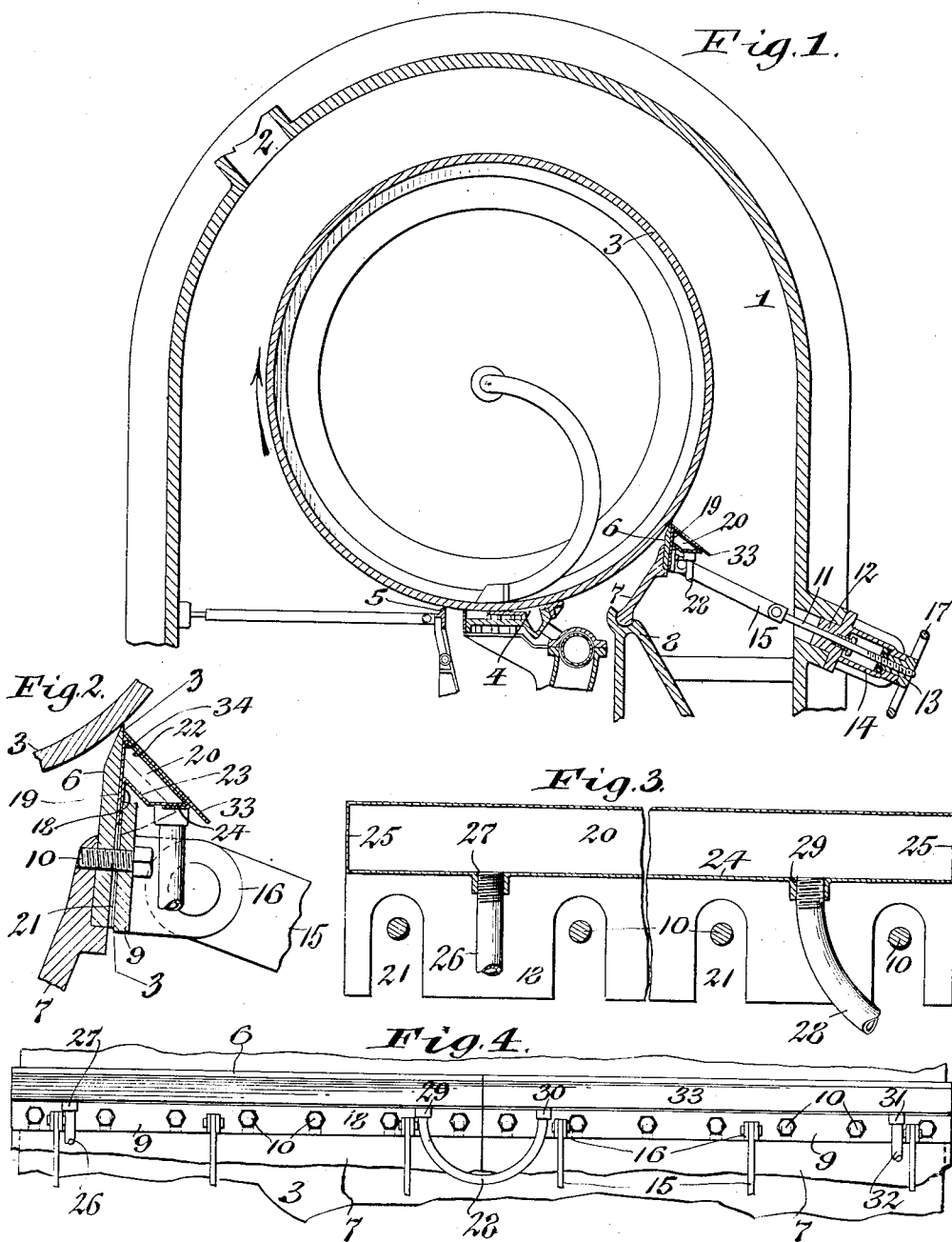


F. C. M. YAHN,
DRIER.
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1,353,980.

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DRIER.

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To all whom it may concern:

Be it known that I, FREDERICK C. M. YAHN, a citizen of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Driers, of which the following is a specification.

In machines for drying liquid materials a scraper or knife is usually employed for removing the dried material from the drying drum. When the dried material is hot or warm it has a tendency to stick to the scraper and unduly obstruct or clog the free movement of the desiccated material from the machine. This is particularly true when drying material such as malted milk.

The object of this invention is to prevent the sticking of the desiccated material on the scraper or knife and avoid clogging of the machine and to that end this invention consists of means for cooling the scraper and the material as the latter is removed from the drum by the scraper which cooling hardens the dried material and puts the same in a condition in which it will not stick to the scraper, thus avoiding clogging of the machine and facilitating the removal of the material from the machine.

In the accompanying drawings:

Figure 1 is a fragmentary vertical transverse section of one form of drier equipped with the preferred embodiment of my invention. Fig. 2 is a fragmentary vertical transverse section, on an enlarged scale, showing the preferred form of the cooling means containing my invention applied to a scraper or knife of the drier. Fig. 3 is a fragmentary vertical longitudinal section of the scraper and the adjacent parts of the drier and the cooling means applied to the scraper, and Fig. 4 is a front elevation of the scrapers and attaching means therefor.

Similar characters of reference refer to like parts throughout the several views.

The form of drier shown in the drawings is merely typical of one type which is suitable for use in connection with my invention and as there shown the same comprises a drying chamber 1 which contains the principal devices operating upon the liquid or wet material to be dried and in which a vacuum is formed by exhausting the air therefrom through an outlet 2 by any suitable

means and thus facilitate the drying of the material under treatment.

The drying or desiccating of the liquid material is effected upon the peripheral surface of a heating drum or cylinder 3 which in this instance is mounted within the drying chamber so as to rotate about a horizontal axis and which is heated internally in any suitable manner for the purpose of drying the liquid material which is deposited on the external surface thereof. The material may be supplied to the periphery of the drying drum in many ways, for instance, as shown in Fig. 1, this may be accomplished by means of a liquid delivery pan or nozzle 4, which is supplied with the liquid material to be dried from any suitable source and from which the material is discharged against the underside of the drying drum so that a continuous film is deposited continually on the surface of the same. The drum is rotated continuously forward in the direction indicated by the arrow in Fig. 1 so that successive parts thereof are presented to the liquid supply pan and the material to be dried is deposited continuously thereon. After the liquid material is deposited upon the drum by the pan the same is distributed uniformly over the drum so that it is of even thickness and any bubbles therein are also broken down by means of a distributing blade 5 which is mounted on any suitable part of the machine and arranged with its working edge close to the periphery of the drying drum adjacent to the front side of the delivery pan.

After the material to be dried has been delivered upon the drum it is dried thereon as each part of the drum rotates from the front side of the pan and has nearly reached the rear side thereof. Just before each part of the periphery of the drum reaches the rear side of the pan the dried material is removed therefrom in the form of a dried film by a scraper or knife 6 which has its operative edge arranged adjacent to the periphery of the drying drum and lengthwise thereof. This scraper or knife may be mounted in any suitable manner, for instance, as shown in the drawings by securing the same on the upper end of a rocking arm or plate 7 which is pivotally supported at its lower end on an adjacent partition 8 of the machine so as to

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be capable of swinging in a vertical plane and thereby enabling the scraper to be adjusted as required relative to the drying surface of the drum.

5 The scraper or knife is preferably secured to the supporting arm by arranging the same between the rear side of the supporting rock arm 7 and a clamping plate 9 engaging with the rear side of the scraper and employing a plurality of clamping screws 10 each of which pass through corresponding openings formed in the scraper supporting arm and clamping plate. The adjustment of the scraper is preferably effected, by means of a plurality of adjusting screws 11 mounted in guides 12 on the adjacent side wall of the drying chamber and capable of lengthwise movement but held against turning, a plurality of adjusting screw nuts 13 each of which engages with the outer threaded end of one of the adjusting screws and mounted on a bracket 14 so as to be capable of turning but held against lengthwise movement, and a plurality of links 15 each of which is connected at its outer end with one of the adjusting screws while its inner end is connected with a laterally projecting lug 16 on the clamping plate 9.

Upon turning the several screw nuts 13 by means of hand wheels 17 applied thereto the scraper may be adjusted with reference to the drying surface of the drum to suit the requirements of the material under treatment. In practice it is preferable to divide the scraper or blade into a plurality of sections, for instance, two sections, as shown in Fig. 4 which permits each of these sections to be adjusted independently of the other, but if desired the number of sections may be increased or the scraper may be made in one continuous piece.

In case the material which is being dried or desiccated is of a sticky character when removed from the drum, as for instance, malted milk, the same when still in the warm or hot condition tends to adhere or cling to the front surface of the scraper or knife and thereby not only interferes with the free escape of the dry material from this scraper but also tending to pile up on the adjacent parts of the scraper adjusting mechanism and unduly clog or obstruct the delivery of the material from the machine.

To avoid this means are provided for cooling or reducing the temperature of the scraper and material immediately adjacent to the place where the latter is removed by the scraper from the drying drum. This cooling of the material has the effect of hardening the same so that it is not liable to stick to the surface over which the same passes but instead moves freely and without tendency to pile up on the adjacent parts of the machine with which the same comes in contact and without causing any obstruction

or clogging in the machine. The cooling means which are employed for this purpose are preferably so organized that the same operate continuously and for this purpose the same are preferably organized to utilize a continuously flowing stream of cooling fluid such as water. These cooling means, as shown in the drawings, are preferably constructed as follows:

18, 19 represent two upright sheet metal plates which are secured together side by side, the front plate 18 terminating below the upper end of the rear plate 19 so that the upper part of the rear plate forms the rear wall of a liquid cooling chamber 20. The rear plate 19 engages with the front side of the scraper or knife and the lower parts of the two upright plates are clamped between the lower parts of the scraper 6 and the clamping plate 9 by the clamping screws 10, for which purpose the lower parts of these upright plates are provided with vertical slots 21 which receive the clamping screws. Extending laterally and downwardly relatively to the scraper are two inclined plates 22, 23, which are connected at their upper edges respectively with the upper edges of the long and short upright plates 19, 18. The lower front edges of the inclined plates are connected by a horizontal bottom plate 24. At their opposite ends the upper part of the long upright plate 19, two inclined plates 22, 23 and the bottom plate 24 are connected by vertical walls or heads 25 thereby forming the liquid cooling chamber.

This cooling chamber is divided into sections to conform to the scraper or knife upon which the same is mounted, for instance, as shown in Fig. 4 the same is made in two sections each of which is mounted upon one of the scraper sections so as to be movable therewith when adjusted relatively to the periphery of the drying drum.

In practice the cooling liquid such as cold water, is supplied by a tube or pipe 26 to an inlet 27 at one end of one of the cooling chamber sections, then transferred by a pipe or tube 28 from an outlet 29 at the opposite end of this cooling section to an inlet 30 of the other cooling section and then discharged from the outlet 31 at the opposite end of the last-mentioned cooling section, by means of a tube or pipe 32. By this means a circulation of cooling medium is secured in the several sections of the cooling chamber so as to maintain the same at the requisite low temperature which will cool the scraper and cool and harden the material which is removed from the drum and thereby prevents this material from sticking to the scraper, shelf, or other surface. The several tubes 27, 28 and 32 are preferably constructed of flexible material so as to permit the cooling chamber sections to be ad-

justed freely relatively to each other and also relatively to the drying drum without interfering with the passage of the water. The rear plate 19 and upper plate 22 are preferably formed from one sheet of metal and the front plate 18, lower plate 23 and bottom plate 24 are formed from another sheet of metal for convenience in manufacture, and the walls or heads 25 are each made of a sheet of metal.

On top of the upper inclined wall 22 of each cooling chamber section is arranged an inclined deflector or shelf 33 which engages with its upper edge tightly against the front side of the scraper immediately adjacent to the upper working edge of the latter while the lower edge of this shelf or deflector extends downwardly beyond the bottom of the cooling chamber. By constructing the cooling chamber of sheet metal it permits of using sheet copper which enables the maximum cooling efficiency of the water to be obtained, but in using sheet metal a rounded corner 34 is produced between the upper edge of the rear plate 19 and the upper plate 22 which however is covered by the shelf or deflector 31. In the absence of the shelf or deflector the rounded corner 34 which is formed between the upper end of the long upright plate 19, the upper edge of the upper inclined plate 22 would form a lodging place for the material and prevent the free removal of the same from the scraper. The employment of a separate shelf which fits closely against the front side of the scraper and forms an obtuse angle therewith insures the prompt removal of the dried material from the scraper and directs it over the cooling chamber where the temperature of the material is quickly reduced to such a point as will eliminate its tendency

to stick to any surface over which the same moves but instead slides freely over the same and thereby facilitates its discharge from the machine without liability of obstructing or clogging.

By the use of this device the adhesion of material having a sticky character when being removed from the drying drum is positively prevented from adhering to the surfaces over which the same passes, thereby enabling the machine to be run without interruption and increasing the output accordingly.

I claim as my invention:

1. A drier comprising a movable member upon the surface of which the material is dried, a scraper for removing the material from said member, and cooling means arranged adjacent to said scraper comprising two attaching plates secured side by side and terminating one above the other, two inclined walls extending laterally from the upper ends of said attaching plates, and a bottom plate connecting the lower ends of said inclined plates, said plates forming walls of a jacket for receiving a cooling fluid.

2. A drier comprising a movable member upon the surface of which the material is dried, a scraper for removing the material from said member, and cooling means arranged adjacent to said scraper comprising two attaching plates secured side by side and terminating one above the other, two inclined walls extending laterally from the upper ends of said attaching plates, and a bottom plate connecting the lower ends of said inclined plates, said plates forming walls of a jacket for receiving a cooling fluid and an inclined deflector arranged on the outer side of the upper inclined plate.

FREDERICK C. M. YAHN.