Aug. 29, 1933. W. P. McCORKINDALE 1,924,612

PAPER DRYING APPARATUS OF THE FESTOON TYPE

Filed Feb. 9, 1931 3 Sheets-Sheet 1

Fig. 1.

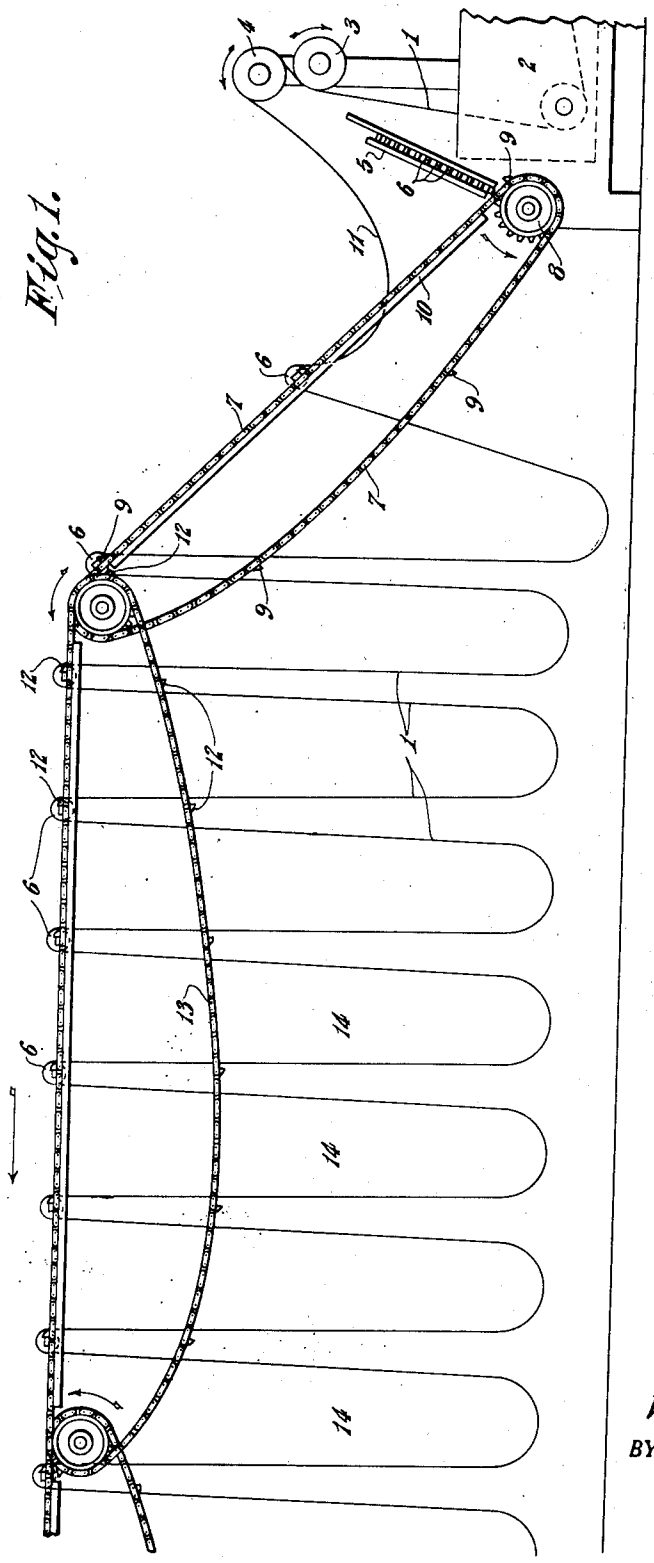


Fig. 4.

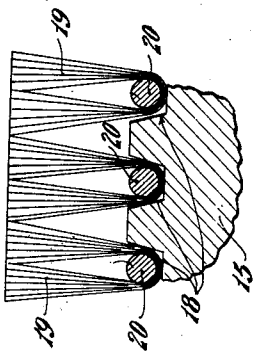


Fig. 3.

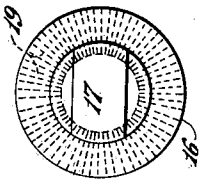
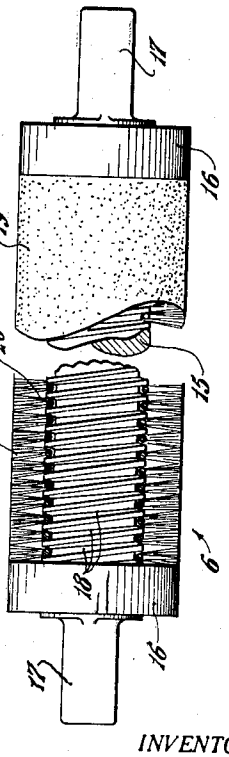


Fig. 2.



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Filed Feb. 9, 1931 3 Sheets-Sheet 2

Fig. 5.

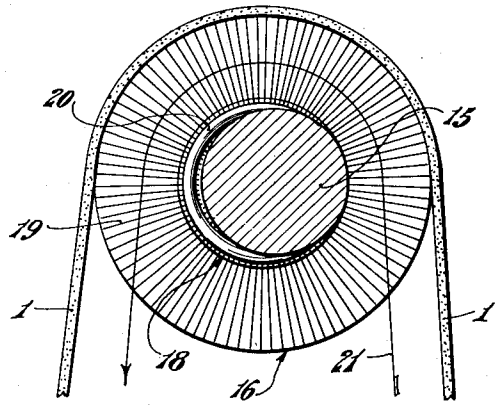


Fig. 6.

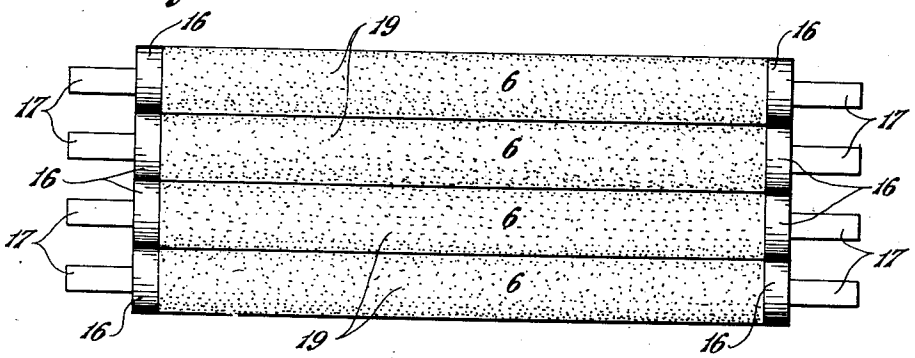
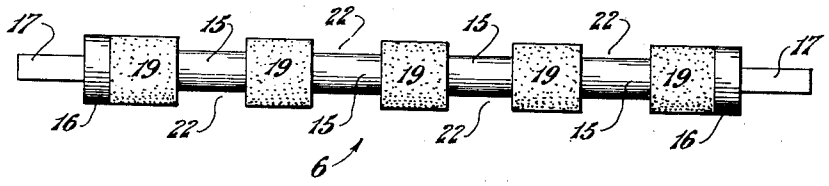


Fig. 7.



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Filed Feb. 9, 1931 3 Sheets-Sheet 3

Fig. 8.

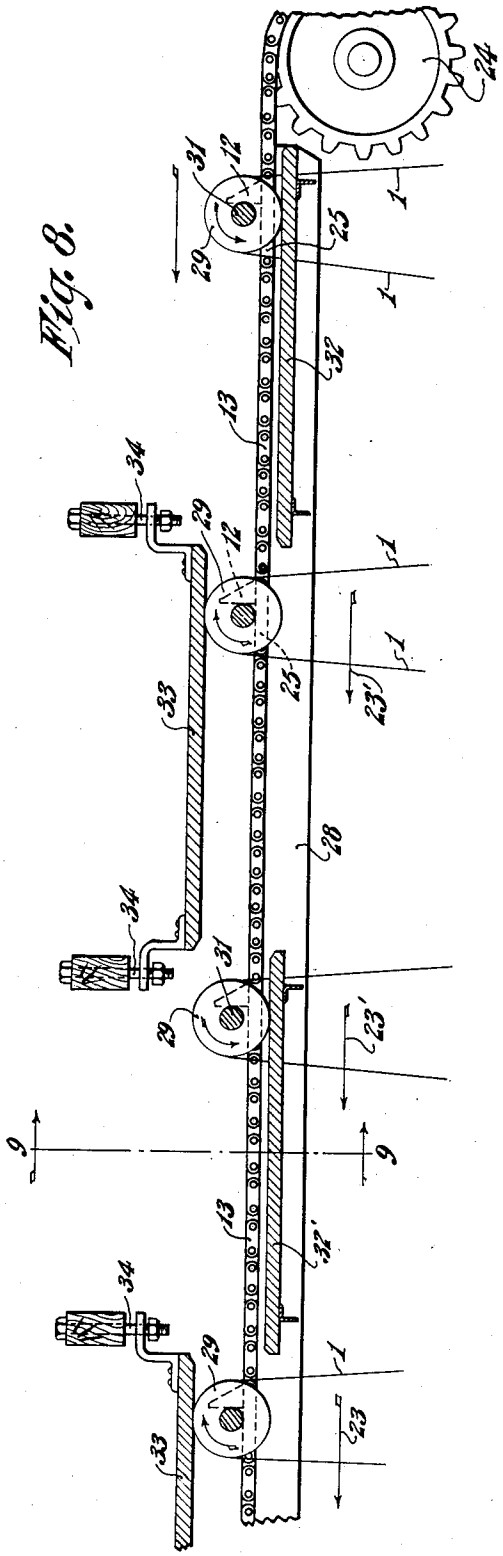


Fig. 10

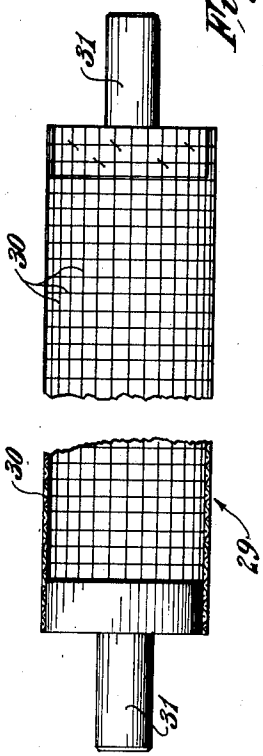


Fig. 11.

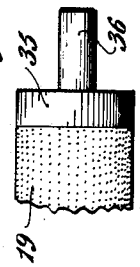
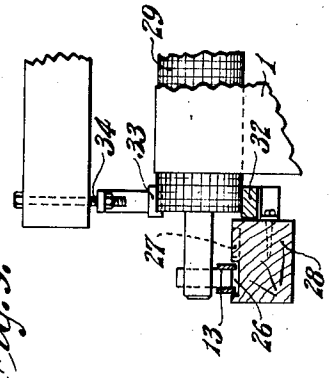


Fig. 9.



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UNITED STATES PATENT OFFICE

1,924,612

PAPER DRYING APPARATUS OF THE FESTOON TYPE

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Application February 9, 1931. Serial No. 514,461

6 Claims. (Cl. 34—20)

My invention relates to improvements in paper drying apparatus of the festoon type and more particularly for treated papers, that is, paper which has been sized, glazed, or otherwise treated by passing it through a vat containing the necessary paper treating ingredients in liquid form, and then looping it into festoons on a movable carrier which passes thru a heated room, thereby drying the paper.

An object of my invention is to eliminate the waste of material and labor involved in the systems now in use. At the present time, the web of moist paper to be dried is carried or supported on wooden poles or rods, usually circular in cross section. The wet paper clings to these rods and, as it dries, it "bakes on", causing wrinkles and streaks to appear in the finished paper at the points of contact with the wooden rods. These areas of streaked and wrinkled paper must be cut out and discarded. It is the principal object of my invention to eliminate these streaked and wrinkled areas, and thereby do away with the waste of the paper and the labor involved in cutting out the spoiled sections.

Broadly, my invention comprises a festoon carrying member formed as a cylindrical brush having solid flanges near each end, equal in diameter to the outside diameter of the ends of the bristles, and also having extended, flattened end portions projecting beyond each flange, which are designed to rest on the carrier chains for supporting the brush. By supporting, or suspending the moist paper, on the ends of the bristles of the brush, air is allowed to freely circulate thru the brush, and thereby reaches the entire or whole surface of the portion of paper resting on the brush at all times, with a result that the drying of the web of paper will take place uniformly and without any wrinkling or streaking effect in the finished product.

I accomplish this object with the device illustrated in the accompanying drawings, in which:

Fig. 1 is a diagrammatic side elevational view of the treating end of a festoon drying apparatus, showing an end of the treating vat, the magazine rack for the paper carriers, and one of the carrier chains.

Fig. 2 is a detail view, partly in elevation and partly in section, of a carrier and paper supporting brush.

Fig. 3 is an end view of the carrier shown in Fig. 2, showing the flattened ends of the carrier rod.

Fig. 4 is a detail view showing the construction of the cylindrical brush.

Fig. 5 is an enlarged sectional view through a carrier, showing the moist paper supported thereon and the provisions for free circulation of air.

Fig. 6 is a view of several carriers, as they are stacked in the magazine rack, showing how the solid flanges prevent the bristles from meshing or interlocking.

Fig. 7 is an elevational view of a modified form of carrier, showing spaced sections of bristles, thereby providing for a greater circulation of air, and

Figs. 8, 9, 10 and 11 are modifications, Fig. 9 being a section on the line 9—9 of Fig. 8.

Referring to the drawings in detail, in which like numerals refer to like parts throughout:

The web of moist paper 1, after passing thru the sizing or other vat 2, is withdrawn from this vat over the two driven rollers 3 and 4. A magazine or storage rack 5, open at its upper and lower end, is filled with the carriers and supporting members 6. The carrier chain 7, which is driven by the sprocket 8, is equipped with equally and regularly spaced lug links 9. As these lug links 9 pass under the magazine rack 5, they successively engage the flattened end portions 17 of a carrier member at the bottom of the rack 5 and carry it upward along on the chain supporting rails 10.

The carrier 6 engages and picks up a loop 11 of the wet paper 1, the chains 7, on each side of the carrier, convey the paper carriers 6 and the loop of paper 1 upward until the carriers 6 are picked up by the lug links 12 on the chains 13. This action causes the paper 1 to hang in loops or festoons 14, and in this form the paper is slowly conveyed thru the drying room, until thoroughly dried. No claim is made to the general layout of any of the above described apparatus, except the paper supporting carrier 6, which is my invention.

Each of the carrier and paper supporting members 6 is formed with the shaft 15 having the end or bearing flanges or discs 16 and the oppositely extending and flattened end lugs 17, which are engaged by the lug links 9 and 12 of the carrier chains 7 and 13. The shaft 15, flanges 16 and end lugs 17 are preferably made an integral piece, of duralumin or similar suitable metal. The shaft portion 15 is spirally grooved, or threaded between the flanges as indicated at 18, with bristles 19 secured in the grooves 18 by means of the wire 20 of suitable material, as copper or bronze. The bristles 19 are of such a length as to bring their ends even, or slightly below the outer peripheral surface of the flanges 16, as shown. This is for

the purpose that, when the carriers 6 are assembled or stacked in the magazine rack 5, the flanges 16 will prevent the bristles 19 from meshing or interlocking with each other, as indicated in Fig. 6. The web of moist paper 1 is supported on the ends of the bristles 19, (see Fig. 5), thereby allowing air to freely circulate thru the bristles and between the paper 1 and shaft 15, as indicated by the arrow 21. This construction effectually prevents the paper from "baking" onto the carrier 6, and causes it to dry evenly and smoothly throughout its supporting contact surface.

In the modified form of carrier and support, indicated in Fig. 7, sections of the bristles 19 are omitted, leaving the spaced annular openings 22 between the paper and the shaft 15, thereby permitting a greater degree of air circulation against the under side or surface of the web of moist paper 1.

Referring to the construction shown in Figs. 8, 9, 10 and 11, reference numeral 13, as before, indicates a portion of the horizontally disposed sprocket chain moving in the direction of the arrows 23'. One of the driving sprocket wheels is shown at 24. 25 indicates links in the chain having the upwardly extending lugs 12, which lugs are those shown in Fig. 1.

The sprocket chain 13, and an adjacent chain of the next section are supported in grooves 26 and 27 in the oppositely located bar members 28 (only one of which is shown). 29 indicates a roll member having the wire cloth 30 of any suitable mesh and on which the depending webs —1— of paper are supported. This roll is provided with the oppositely projecting shaft portions 31 which are engaged by the lugs 12 of the sprocket chain for carrying the festoon webs of paper along through the drying room. 32 and 32' indicate strips of any suitable material which are located adjacent the grooved bar members 28. These strips are for the purpose of slightly elevating the roll members 29, when they engage the same, as shown at the right hand end of Fig. 8. Another purpose of these bars is to cause the paper supporting rolls 29 to rotate, whereby the contacting surface of the paper which is hung on these rolls is brought into a different surface or portion of the paper. This operation continues until the roll 29 leaves the strips 32 and 32'. As it leaves the strip 32, it comes into contact with the weighted bar or strip 33 located above these rolls. It is now rotated in the opposite direction as it is carried forward by the chain 13. The paper 1 is now drawn upward in the opposite direction onto and over the roll 29 so that the original depending length of the depending paper is restored. As the roll engages the strip 33, the shaft ends 31 will be rotated against the lugs 12. When the roll 29 leaves the strip 33, it drops down onto the next strip 32', as shown, thus causing it to again be rotated in the same direction as it did when in contact with the strip 32. This operation is alternately repeated during the entire travel of the paper through the drying room with the final result that the paper is dried without any of the objectionable marks, creases or ridges, which are caused by the paper "drying onto" the supporting bars as now practiced.

The weighted bars 33 are freely suspended on the rods 34. When the wire rolls 29 engage the strip 32, the shaft ends 31 are elevated clear of the chain but still in contact with the lugs 12. When the roll is in engagement with the weighted or heavy bars 33, these shaft ends are resting on the sprocket chain as shown and frictionally revolve thereon and against the lugs.

It is obvious that the reticulated paper supporting roll 29 permits a free and unobstructed flow of the drying air through the meshes of the wire in a manner similar to the brush shown in Figs. 2, 3, 4, and 5.

It should be stated that it is to be understood that the roll shown in Fig. 11, having the bristles 19, may be substituted for the wire roll 29 shown in Fig. 10. It is obvious that the ends 36 will operate in the same manner as the shaft ends 31 of the roll 29. The bristles 19 will support the paper being dried in the same manner as the wire 30.

From this description, it will be seen that I have provided a very efficient and inexpensive construction for receiving a web of moist paper by means of movable supporting and conveying carrier members which are mounted at the entrance of and in the drying chamber or room, and, one which will thoroughly prevent the formation of wrinkles, streaks or other marks in the finished product. Also, a construction, which, not only prevents the formation of wrinkles and streaks at the points where the paper is suspended, but a structure that materially hastens the drying process by reason of a free and unobstructed circulation of the warm air adjacent to and directly on the supporting and carrier members. The employment of brushes, the bristles of which provide the supporting contact for the moist web of paper, I have found effectually overcomes and prevents the formation of wrinkles, scratches, or objectionable marks of any kind, in the dried and finished sheet of paper of any weight, either light or heavy and of any desired color.

What I claim is:

1. In a festoon drier construction, for the purpose described, a carrier and supporting member formed as a brush, comprising a metal shaft and bristles wired to said shaft.

2. In a festoon drier construction, for the purpose described, a carrier and supporting member comprising a brush, said brush being formed of a metal shaft and a plurality of bristles, the bristles being wired to said metal shaft, said shaft having flanged ends substantially equal in dimensions to the outside dimensions of said bristles.

3. In a paper drying machine, a paper supporting roller comprising a shaft, flanges near each end of said shaft, spiral grooves formed in said shaft between the said flanges, bristles secured in said spiral grooves, with their outer ends flush with the circumferential surfaces of said flanges the end portions on said shaft outside of the flanges being formed with a flat surface for the purpose of preventing said roller from revolving, when moved on a supporting surface or track.

4. In combination, in a paper drying apparatus having a conveyor chain with lugs—which apparatus is located adjacent the delivery end of a paper making machine, a plurality of paper-supporting members in a magazine which is located adjacent the conveyor and the delivery end of the machine, and are successively removed as the lugs on the conveyor engage the members for moving the supporting members into contact with the web of paper, said members comprising brushes, radially arranged bristles on the brushes which engage the paper, and flange means on the paper-supporting members for preventing the radial bristles of the brushes from nesting with each other.

5. Means for drying paper when suspended in

a festoon manner comprising a cylindrical brush formed with a plurality of radially extending bristles, the bristles of which engage and support the moist paper, whereby a free circulation of air is provided beneath the supporting surface of the web of paper, said brush having the bristles arranged in groups in spaced relation along its length.

6. A conveyor and supporting member for festoon paper dryers comprising a shaft, bristles secured to the same, flanges on the shaft for permitting a plurality of the members to be assembled in the same plane, without the bristles being in contact, and extension or lug portions on the shaft having a flat surface to permit the member to be moved along on a track surface, when the web of paper is supported on and in contact with the bristles as described.

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