

[54] DRYING ARRANGEMENT ON MACHINES FOR COATING SUPPORTING WEBS, MORE ESPECIALLY WITH PHOTOGRAPHIC EMULSIONS

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[57] ABSTRACT

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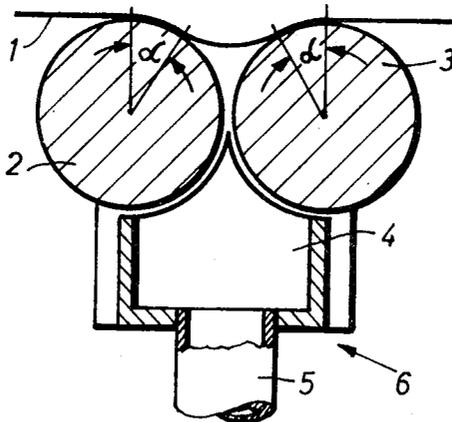
A web coated with a photographic emulsion is supported for drying in a blast of hot air on spaced sets of two-roll hollow suction devices. A suction box having an arcuately pointed section disposed closely adjacent and between the peripheries of the rollers on the side opposite the web lowers the pressure between the web and the rollers to increase the force and area of rotation-inducing contact between the web and the rollers and to firmly guide and retain the web on the rollers regardless of its orientation. This minimizes the number of rollers needed to support the web to increase the area of contact with the hot air and facilitating drying.

[56] References Cited

UNITED STATES PATENTS

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4 Claims, 3 Drawing Figures





**DRYING ARRANGEMENT ON MACHINES FOR  
COATING SUPPORTING WEBS, MORE  
ESPECIALLY WITH PHOTOGRAPHIC  
EMULSIONS**

This is a continuation of application Ser. No. 861,412, filed Sept. 26, 1969, now abandoned.

This invention relates to a drying arrangement for machines for coating supporting webs, more especially with photographic emulsions. The arrangement comprises a duct in which the supporting web is guided over rotatable cylinders. These cylinders are set in rotation by the supporting web, which is advanced by separate feeding devices.

It is a known condition in connection with the construction of such cylinder or roller paths that a minimum wrapping angle has to be maintained for each cylinder. Relative speeds between the web and cylinder surface are avoided by this means. This is especially important with material sensitive to scratching, particularly photographic films.

The wrapping angle is just as significant with absorbent supports such as photographic papers which are coated on one side in the coating machine. Moistening on one side of the support leads to the known upward curling of the edges of the web, and the consequences of this curling, namely the bending over of the edges and cracking of the web. This can be avoided if well-wrapped guide rollers are arranged at not too large intervals, the web always being straightened again on said rollers.

The known arcuate drying paths, e.g., the spiral web guiding arrangement, correspond to this condition. Modern developments, however, have resulted in so-called flat driers, in which the cylinder axes lie in one plane. These driers, which are of very simple construction, can be made of any desired length.

With a strong nozzle blowing section on one side, it is possible in a flat drier to obtain a sufficient wrapping for driving the cylinders by suitable matching of the impact pressure to the web surface and web tension. This is provided the bearing friction of the cylinders is kept low. The reliability of such a construction for the production of photographic films sensitive to scratching does, however, leave much to be desired. With paper coated on one side, however, this wrapping angle caused by the impact pressure is insufficient in order to counteract the aforementioned difficulties at the edges of the web.

One known web-guiding element is the hollow suction device, with which the web is guided over a succession of rollers disposed closely adjacent one another, a vacuum being applied between the rollers, so that the web runs in undulated form over the roller path. A good wrapping angle is in this case provided for each roller. It is, however, too costly to equip an entire flat drier throughout its length with a hollow suction device. Furthermore, a considerable portion of the back of the web would be covered by the rollers and consequently the drying of the back, which is not to be neglected with an absorbent support, is undesirably impaired.

It has now been found that the disadvantages of known drying arrangements can be avoided by the web being guided at prescribed intervals over two-roller hollow suction devices. The result thereby achieved is that the web can be guided through a flat drier of any desired length without involving heavy expense in con-

struction or installation costs. Several flat driers equipped with two-roll hollow suction devices can in addition be connected in series in a manner known per se into a space-saving duct drier with loop-shaped guiding of the web. The deflection of the web into the next flat drier section is in this case always effected over air cushions with deflection of the layer side, so as to avoid damage, while the deflection of the web on the side opposite to the layer or coating takes place over rollers.

One embodiment of the drying arrangement according to the invention is now to be explained more fully by reference to a drawing, wherein:

FIG. 1 shows the two-roll hollow suction device in longitudinal section;

FIG. 2 shows it in cross-section; and

FIG. 3 shows a diagrammatic construction of the drying arrangement with a loop-like guiding of the web.

In FIGS. 1 and 2, a supporting web 1 coated with photographic emulsion runs over a pair of cylinders or rollers 2 and 3, which in conjunction with a suction box 4 and a suction pipe 5 form the two-roll hollow suction device 6. Suction box 4 has an arcuately pointed section disposed between and closely adjacent the peripheries of rollers 2 and 3. The rollers 2 and 3 are mounted with their journals 7 and 8 in the side members 9 and 10 of the suction box 4. Under the influence of the suction effect, the supporting web 1 wraps around the two rollers at an angle  $\alpha$ .

In FIG. 3, the web 1 is guided over a number of two-roll hollow suction devices 6, air cushion guiding arrangements 11 being provided at the deflection points on the coating side. At the other deflection points, where the coating is outermost, the web 1 is guided over guide rollers 12. The walls of the channel or duct are omitted from the Figure for the sake of clarity.

We claim:

1. In a drying arrangement for coated webs being transported in a substantially linear path more especially coated with photographic emulsions, the arrangement comprising means for guiding and retaining the web upon rotatable rollers, wherein at predetermined spaced intervals two-roll hollow suction devices are disposed in contact with said web for guiding and retaining it, said two-roll hollow suction devices each comprising a pair of freely rotatable cylindrical rollers having parallel axes and peripheries disposed closely adjacent each other, a suction box disposed closely adjacent and between the peripheries of said rollers on the side opposite said web and having an arcuately pointed section disposed centrally between and closely adjacent said peripheries of said rollers whereby the static air pressure between said peripheries is reduced below atmospheric pressure and the area of forceful contact of said web with said rollers is increased by the suction effect resulting from the differential between atmospheric pressure on the portion of said web remote from said rollers and the reduced pressure on the portion of said web between the peripheries of said rollers to pull said webs in firm rotation—inducing contact with said rollers irrespective of the weight of the web in a shallow curved indentation from said substantially linear path into the space between said rollers whereby said web is firmly guided and retained in said substantially linear path irregardless of its orientation.

2. A roller support as set forth in claim 1 wherein side members are attached to the sides of said suction box adjacent the ends of said rollers, and bearing and jour-

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nal means rotatably connect the ends of said rollers with said side members.

3. A roller guide and retainer for an arrangement for drying webs comprising a pair of cylindrical rollers freely rotatably mounted in parallel axes with their peripheries disposed closely adjacent each other, a suction box disposed closely adjacent and between one side of said peripheries and having an arcuately pointed section disposed centrally between and closely adjacent said peripheries of said rollers, a web disposed in contact with said rollers on the side opposite from said suction box, a conduit connected to said suction box for exhausting air from it whereby the static air pressure between said peripheries and said web is reduced to increase the forceful contact between said supporting web and said peripheries of said rollers as a result of the

differential between atmospheric pressure on the portion of said web remote from said rollers and the reduced pressure on the portion of said web between the peripheries of said rollers to pull said webs in firm rotation—inducing contact with said rollers irrespective of the weight of said web in a shallow curved indentation from said substantially linear path into the space between said rollers whereby said web is firmly guided and retained in said substantially linear path irregardless of its orientation.

4. A roller support as set forth in claim 3 wherein side members are attached to the sides of said suction box adjacent the ends of said rollers, and bearing and journal means rotatably connect the ends of said rollers with said side members.

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