May 7, 1935. L. R. HERNDON 2,000,079

MACHINE

Original Filed May 27, 1931

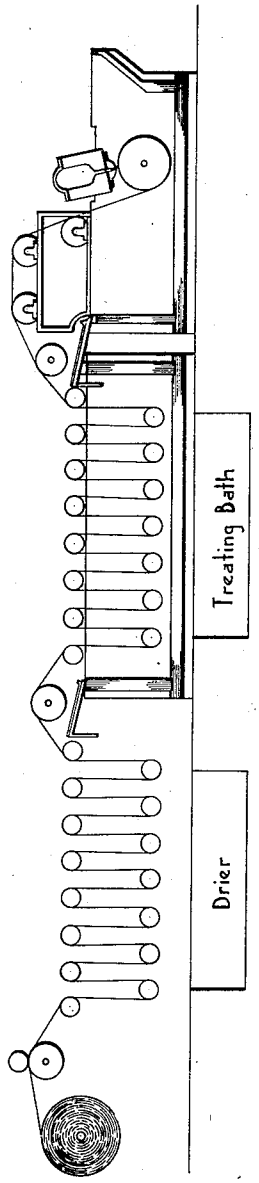


FIG. 1



FIG. 2

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UNITED STATES PATENT OFFICE

2,000,079

MACHINE

Lee Roy Herndon, Kenmore, N. Y., assignor to Du Pont Cellophane Company, Inc., New York, N. Y., a corporation of Delaware

Continuation of application Serial No. 540,412, May 27, 1931. This application October 21, 1932, Serial No. 639,000

13 Claims. (Cl. 18—57)

This application is a continuation of my application Serial Number 540,412, filed May 27, 1931 for "Production of regenerated cellulose films".

This invention relates to the production of thin, smooth, and flexible pellicles, for example of cellulosic materal, which tend to slip as they pass through a machine. The invention is particularly useful in the manufacture of regenerated cellulose pellicles, wherein it gives particular advantages as a means for resisting the tendency of the pellicle to contract. The invention will be described in detail in its application to a regenerated cellulose casting machine but this description is adopted for facility only and does not serve as a limitation of the invention.

In the manufacture of regenerated cellulose pellicles by the viscose process great lateral contraction occurs, a pellicle at the wind-up being often scarcely half the width of the solution extruded from the machine orifice. The reason for this lateral contraction is that viscose contracts some in regeneration, that regenerated cellulose contracts greatly in drying, and that the machine prevents the pellicle from contracting in the longitudinal direction by keeping the sheet under longitudinal tension whereas, except for the slight resistance offered by the machine rollers, nothing prevents the pellicle from shrinking laterally.

Not only is the contraction of the pellicle unequal in the longitudinal as compared with the lateral direction, but it is also unequal laterally as regards different portions of the same sheet. Because of its uneven shrinkage the finished sheet has places of uneven thickness, and because of the unequal tension on the sheet in formation the longitudinal strength of the finished sheet is often double its lateral strength. These inequalities are usually undesirable.

It is an object of this invention to improve the manufacture of regenerated cellulose pellicles. It is another object of this invention to lessen the contraction of regenerated cellulose pellicles in the manufacturing machine drier. It is another object of the invention to improve manufacturing machines. It is another object of the invention to improve slitting machines. It is another object of the invention to improve coating machines. It is another object of the invention to provide a surface for a roller or other object, which will grip and control a pellicle without sticking to it. Other objects of the invention will be in part apparent and in part set forth as the description proceeds.

The objects of this invention are accomplished by using a roller or rollers in the pellicle handling, treating, slitting or casting machine (particularly in the drier) which are of a material, or which have surfaces of a material, or, particularly, whose surfaces are coated with a material sufficiently adhesive (when dried) to regenerated cellulose to minimize or prevent the lateral contraction of the pellicle in manufacture or the slipping of the sheet in the handling, treating, or slitting machine.

In the drawing Figure 1 is a diagrammatic representation of portions of a Brandenberger manufacturing machine showing the location of the drier rollers, and Figure 2 represents a roller prepared according to one hereinafter described form of my invention.

The materials which accomplish the objects of my invention are preferably made up and applied to a roller or other surface in the form of a coating composition, but they may be molded into a roller or a roller sleeve whenever they exhibit sufficient strength and durability in that form.

In applying the principles of my invention in the form of a coating composition to a roller the entire roller may be surfaced with the adhesive material or, as shown in Figure 2, portions of the roller, for instance at each end, may be surfaced. This is equally true regardless of the kind of machine in which the improved roller is to be used. It is to be understood that where the ends of the roller alone are covered with my adhesive material the advantages of the invention will be obtained only if the pellicle makes contact with the bands.

Among the materials which accomplish the objects of my invention when used as the basic constituent of a coating composition to be applied to rollers, or when used as the basic or sole ingredient of a moulding composition from which rollers or roller sleeves are to be cast, are cellulose materials of the coating and plastic composition types including the cellulose esters and cellulose ethers; natural and synthetic resins including fossil and other gums, fossil and other resins, terpenes, synthetic resins including the polyhydric alcohol-polybasic acid type, the vinyl type, and the chlorinated aromatic hydrocarbon type; soft rubber compositions; oil varnishes; silicates, such as sodium silicate; and casein. When made in the form of molded rollers plastic materials such as Bakelite plastics perform the function.

I term the substances by which the objects of my invention are attained "adhesive substances"

because their adhesion to the sheet resists the tendency of the sheet to contract or to slip. It is to be understood, however, that these adhesives are not used in a moist or tacky condition, that they do not leave appreciable traces on the sheet, and that they do not appear to require increased power for the operation of the machine.

In applying my invention to machines having cast iron or other metal rollers, I find it advantageous to make up a coating composition containing, for instance, a cellulose ester or cellulose ether, a resin, for instance damar resin, a plasticizer, for instance tricresyl phosphate, and common solvents, and apply the composition to the roller. The coating is allowed to dry and the roller is then put in use. In using certain materials whose adhesion to a metallic roller is known to be poor, I first coat with an undercoat and thereafter with the desired material. The technique of this will be understood by those skilled in the art of coating compositions.

The principles of my invention may be applied, if desired, to the wet end of the machine, for instance to the rollers of the desulfuring bath wherein lateral shrinkage of the pellicle is known to occur.

My invention is also useful in slitting machines. The automatic wrapping machinery used in the wrapping of candy, cigars, and other articles require regenerated cellulose cut in very accurate widths. In order to attain this accuracy of cutting, extreme accuracy of slitting machine design is necessary. In spite of this, and in spite of improvements in slitting machine construction, variations in width of slit pellicles occur because the pellicles, which are often of extreme thinness and flexibility and have smooth and slippery surfaces, slide on the surfaces of the rollers of the slitting machine. I have discovered that this sliding can be stopped by applying the principles of my invention to the rollers of the slitting machine in the same way that the principles of the invention are applied to the rollers of a casting machine and that slitting machines so improved produce a much more accurately cut pellicle than is possible with older types of machines.

My invention is also useful in machines for treating pellicles as, for instance, in machines for applying a moisture-proof coating to a pellicle. I have discovered that the efficiency of operation of these machines is materially increased by the use of rollers embodying the principles of my invention as above described and herein claimed.

While I have discussed the invention in terms of sheets or films of regenerated cellulose as a matter of convenience, it is to be understood that this problem arises in the manufacture of very thin, flexible, non-fibrous, smooth and preferably transparent pellicles which in the course of drying tend to shrink or tend to slip in the course of the mechanical treatment. Thus for example, in the manufacture of a sheet or film of cellulose acetate, ethyl cellulose, or glycol cellulose by a wet casting process, the same problems would be involved and the principles of this invention would provide a solution for such problems. It is to be understood, therefore, that my invention is applicable in the manufacture, handling, or treatment of pellicles which tend to slip or contract during manufacture. Among such pellicles may be mentioned regenerated cellulose, cellulose esters including nitrocellulose and cellulose acetate, cellulose ethers including butyl cellulose and benzyl cellulose, and gelatine regardless of by what process the pellicles be made, and even pellicles of cellulosic material only a portion of which has been gelatinized or regenerated.

The advantages of my invention lie in the production of films or sheets of regenerated cellulose having lateral strength more nearly equal to the longitudinal strength than was previously considered feasible; in the production of films or sheets of regenerated cellulose having greater width than was previously possible with a given width of orifice; in an increased production of regenerated cellulose sheeting; in an improved manufacturing machine; in improved slitting by my improved slitting machines; and in improved operation of coating towers and other treating machines.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that I do not limit myself to the specific embodiments thereof except as defined in the appended claims.

I claim:

1. In the manufacture of regenerated cellulose films the step which comprises passing the film over a heated roller having an adhesive surface.

2. In the manufacture of regenerated cellulose films the step which comprises passing the film over a heated roller having an adhesive surface comprising a film-forming material.

3. In the manufacture of regenerated cellulose films the step which comprises passing the film over a heated roller having an adhesive surface comprising a cellulosic film-forming material.

4. In the manufacture of regenerated cellulose films the step which comprises passing the film over a heated roller having an adhesive resinous surface.

5. In the manufacture of regenerated cellulose films the step which comprises passing the film over a heated roller having a surface comprising a drying oil.

6. In the manufacture of regenerated cellulose films the step which comprises passing the film over a roller having an adhesive surface.

7. In the manufacture of thin, flexible, and smooth pellicles the step which comprises passing the pellicle over a roller having an adhesive surface.

8. In the manufacture of a regenerated cellulose pellicle the step which comprises passing the pellicle over a roller having an adhesive surface comprising a film-forming material.

9. In the manufacture of regenerated cellulose films the step which comprises passing the film over a roller having an adhesive surface comprising a cellulosic film-forming material.

10. In the manufacture of regenerated cellulose films the step which comprises passing the film over a roller having an adhesive resinous surface.

11. In the manufacture of regenerated cellulose films the step which comprises passing the film over a roller having a surface comprising a drying oil.

12. The method of maintaining the alinement of a regenerated cellulose pellicle in a slitting machine which comprises passing the pellicle over a roller having an adhesive surface comprising a film-forming material.

13. In the slitting of thin, flexible, and smooth pellicles the step which comprises passing the pellicle over a roller having an adhesive surface.

LEE ROY HERNDON.