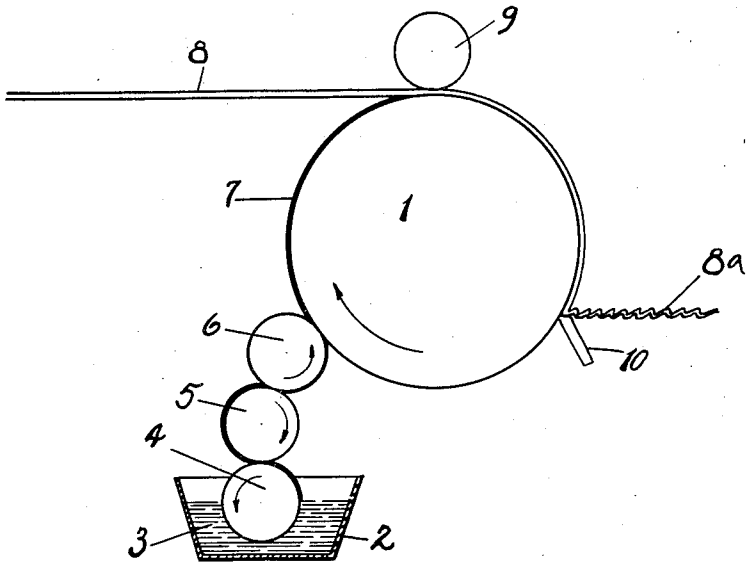
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CREPING PROCESS FOR PAPER WEBS AND THE LIKE

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CREPING PROCESS FOR PAPER WEBS AND THE LIKE

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My invention is related to methods of creping paper by means of thermoplastic adhesive substances, the general process being set forth and claimed in my Reissue Patent No. 17,633, dated April 1, 1930.

My present invention relates to improvements in the said process primarily, these improvements having to do with controlling the nature and character of the creping action, principally by means of controlling the characteristics of the film of adhesive substance by means of which the creping is carried on.

The several objects of my invention will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications, wherein I have described a preferred embodiment of my process. Reference is made to the drawing which forms a part of these specifications, and which shows semidiagrammatically and in elevation a typical apparatus suitable for the practice of my present process.

The creping of paper or other webs is a delicate art and the nature of the crepe produced can be modified through control of variables. Among these are of course the character, weight and stiffness of the web being creped, the nature of the means used to effect adhesion of the web to a creping roll, the nature and characteristics of any coating substance being creped with the web, and the angle and adjustment of the creping knife or doctor. My present process is addressed primarily to effecting control of the second and third of the above noted variables, the other variables being controllable, as before, to desired ends.

In my Reissue Patent No. 17,633 I show a creping apparatus in which a creping roll is turning in a bath of thermoplastic adhesive substance such as asphalt. The paper is held to this roll and is pressed tightly in contact with it by a back up or pressure roller. A film of thermoplastic substance is interposed between the web and the creping roll and serves positively to bind the web to the roll, from which it is removed by means of a creping knife or doctor. In a Patent No. 1,782,767, I have set forth a process and an apparatus involving additional means for controlling the creping process. In this process the web is first coated with the thermoplastic adhesive and then the coating is tempered, usually by being cooled, before the coated web is brought in contact with the creping cylinder. The creping cylinder is controlled as to temperature so that the temperature of the coating at the creping point may be definitely determined thereby. This method has proved entirely successful for most uses.

In my present process it is my object to form a film of the coating substance, first upon means other than the web to which it will subsequently be applied, and then to temper this coating before application to the web. My present process is particularly applicable to comparatively thick coatings of thermoplastic substance where it is desirable to produce a creped web characterized by a thick external coating, although it is equally adaptable to the other end of the scale where very thin coatings are desired. It is of particular importance in connection with the creping of webs by adhesively binding them to creping means where it is desired that very little penetration of the web by the adhesive substance employed shall result.

To form films of thermoplastic adhesive substance, such as bitumen, it is necessary in the initial stages to have the thermoplastic substance in a very soft state, or quite liquid. When it is in this condition if the substance is applied to the web there is likely to be more or less penetration of the web by the adhesive substance. Where a web is thus coated with a thick coating of adhesive substance, and the coating is thereafter tempered and finally creped with a control of the film temperature at the creping point, the result is to soften that surface of the coating which is next the creping cylinder, the remainder of the coating, if it be thick, remaining at a somewhat lower temperature. This is because heat is not readily transmitted through comparatively thick coatings of thermoplastic substance of adhesive characteristics, and also because at the crep-

ing point there is usually not time enough for the entire coating to be brought to a uniform temperature.

In the drawing I have shown a creping roll 1, upon the surface of which I form a film or coating of thermoplastic adhesive substance. I have shown a pan 2 into which I place a quantity of heat softened and preferably liquid thermoplastic substance 3. I have shown a roll 4 turning in this pan and picking up a quantity of the thermoplastic substance which it transfers to a second roll 5. A third roll 6 transfers the coating to the creping roll 1.

It will be understood that I am not restricted to the particular method of forming a coating upon the creping cylinder, and that the film of adhesive substance may be formed thereon or transferred thereto by other means which will be found adequate. Since, however, I crepe papers which are usually and preferably narrower than the creping roll, I employ coating means, or means in connection therewith, for limiting the width of the coating of asphalt or other adhesive formed upon the creping cylinder. Where transfer rolls are employed this may be done by using transfer rolls of approximately the width of the paper and less in length than the creping cylinder. In instances where, instead of the pan and transfer rolls, I employ a reservoir of adhesive substance and means adapted to hold it against a roll, or in instances where I employ a series of rolls comprising a pair of horizontal rolls in the pinch of which I pour the adhesive substance, I may control the width of the film formed by the rolls and transferred to the creping cylinder by suitable arrangement of adjustable dams.

All of the rolls in my mechanism may be controlled as to temperature, and while for some uses a heating upon one or more of the rolls may be found desirable, the general practice will be to form a film in my mechanism at a point remote from the point of application of the said film to a web of paper or the like, and then progressively to cool the film from the point of formation to the point of application. If the creping roll 1 is large enough so that there will be substantially a long path of travel for the film about its surface, I may form the film upon its surface in any way desired, and temper it substantially entirely by means of the creping cylinder. This may necessitate the provision of a creping roll which is larger than convenient. My creping roll is, however, controlled as to temperature, and inasmuch as it is furthest from the point of the initial formation of the film, and inasmuch as it it usually larger than the other rolls as shown, it exercises the greatest tempering effect upon my coating. My several rolls will be heated or cooled as desired, in any of the well known ways such, for example, as by admitting into their interior heated or cooled fluids.

The several rolls act as doctors upon each other to determine the thickness of the final film formed upon the roll 1. This film, particularly where the thermoplastic substance is cooled by the several rolls, may have a corrugated, tree branched, or "alligatored" surface, which appears to be advantageous in creping. The coating can, however, be scraped smooth.

Having formed upon the surface of the creping roll 1 a film of thermoplastic substance indicated at 7, which has been brought to the desired temperature, I next cause my web of paper or the like 8 to contact the roll and the film thereon and to move with the roll around to the creping point. The extent to which the web contacts the roll, is controllable. I usually allow a substantial arc of contact. I may then, and I usually do, provide a back up or pressure roll 9 bearing against the web and forcing it into more perfect contact with the adhesive film. Beyond the pressure roll I provide a doctor or creping knife 10 which crinkles the web as it is removed from the creping cylinder. The creped web is indicated at 8*a*.

In my process, particularly as applies to heavy coatings, the part of the coating away from the creping cylinder would usually be at a somewhat higher temperature than the part next the cylinder. This facilitates the adhesive union of the coating and the web. However, the coating may thus be applied to the web at such a temperature that although the coating is caused to adhere tightly to the web, there is very little if any saturating tendency.

Again, when I desire to crepe webs with very thin coatings of thermoplastic substance, if I attempted to form these coatings directly upon the web, I would have to form them at such a high temperature that there would be in many cases a quite undesirable tendency for the adhesive material to saturate the web. With thin webs or with very liquid conditions in the adhesive substance, even with thick webs, the substance may strike through the web in spots, rendering its outer surface more or less unsightly. With my present process I can form a film upon the surface of my creping cylinder and temper it to the point where its adhesive characteristics are very great and its saturating capacity very low. Thus by a relatively very much smaller amount of adhesive substance I can bind my web to the creping roll, thereby leaving the web substantially free of any penetration of the adhesive substance and economizing in the amount of adhesive substance used. Additionally, by controlling the temperature of the film before application to the web I achieve addi-

tional features of control which enable me advantageously to vary the nature of the crepe.

Various modifications in my invention may be made by those skilled in the art without departing from the spirit thereof.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a creping process the steps of forming a film of thermoplastic adhesive transferring said film to supporting means and controlling the temperature of the said film thereon before applying said film to the web to be creped.

2. In a creping process the steps of forming a film of an initially substantially liquid thermoplastic substance, transferring said film to a supporting surface and tempering said film thereon so as to render said substance non-saturating but still adhesive, and applying said film to a web to be creped.

3. A process of creping paper comprising forming a film of heat plastic adhesive substance, transferring said film to a continuous creping surface, progressively cooling said film during said transference, bringing a web into contact with said film on said creping surface, and removing said web and film from said surface, whereby said film and web are creped.

4. A process of creping webs comprising forming a film of thermoplastic adhesive substance, transferring said film to a creping surface, applying said film on said surface to a web to be creped and creping said web therewith, said film being progressively treated from the point of formation to the point of creping, to develop a strongly adhesive character therein.

5. A process of creping webs comprising providing a substantially liquid bath of thermoplastic adhesive substance, picking up said substance from said bath and transferring said substance in the form of a film to a creping surface out of contact with said bath, bringing a web in contact with said film on said surface so as to bind said web adhesively to said surface, and creping said web by removing it from said surface.

6. In a machine for creping paper, a source of supply of liquid thermoplastic adhesive substance, means for forming a film of said substance, means for transferring said film, creping means adapted to receive said film from said transferring means, and means for bringing a web in contact with said creping means and creping it thereon.

7. In a machine for creping webs, a bath of substantially liquid heat plastic substance, a cylinder turning therein, a plurality of transfer rolls, a creping cylinder, the first of said transfer rolls contacting with said first mentioned cylinder, the last of said transfer rolls contacting with said creping cylinder, means for tempering said film during the movement thereof, and means for bringing a web into contact with said creping roll and creping it thereon by means of said film.

8. In a machine for creping webs, means for holding a supply of substantially liquid thermoplastic substance, a pick-up roll turning therein, a creping cylinder and a plurality of transfer rolls, the first contacting said pick-up roll so as to receive a film of said thermoplastic substance therefrom, the last of said rolls contacting said cylinder so as to transfer said film thereto, means for bringing a web to be creped into contact with said cylinder, and means for creping said web thereon, said cylinder and said rolls having means for progressively controlling the temperature of the film thereon.

9. In a machine for creping webs, a source of substantially liquid heat plastic adhesive substance, a pick-up roll turning in contact with said substance and creping cylinder, means for transferring a film of said substance from said roll to said cylinder, means for limiting the width of the film so transferred, means for bringing a web to be creped into contact with said cylinder, and means for creping said web thereon.

10. In a machine for creping webs, means for holding a supply of substantially liquid thermoplastic adhesive substance, a creping cylinder, means for forming a film of said substance on said cylinder, means for limiting the width of said film, means for bringing a web to be creped into contact with said cylinder, and means for creping said web thereon, and means for controlling the temperature of said film from the point of formation to the creping point.

11. A process of coating saturable fabrics without saturating them, which comprises forming a film of initially saturating coating substance, transferring said film to a surface tempering said substance on said surface to adhesive but non-saturating consistency, bringing a fabric into adhesive contact with said film and removing said fabric and said film from said surface.

12. A process of treating materials with bituminous substance which comprises forming a film of a bituminous substance and transferring said film to a surface, tempering said film on said surface to non-saturating consistency, bringing a fabric into contact with said film and removing said film upon said fabric, said film being removed from said surface by means of a doctor.

13. A process of forming an appreciable coating of bituminous material upon a saturable fabric without saturating the same, which comprises providing a bituminous material in initially saturating condition, forming a film of said bitumen and trans-

ferring said film to a surface, tempering said film to adhesive but non-saturating character, applying said fabric thereto, and removing said fabric and said film together from said surface.

14. In a process of treating materials with heat plastic substance, the steps of forming a film of said heat plastic substance while said substance is in a saturating condition, applying said film to a suitable support tempering said film upon said support to a co-hesive and non-saturating condition, and removing said film bodily from said support.

15. A process of treating materials with coating substances without saturating them, which comprises forming a film of coating substance applying said film to a suitable support while said substance is in a relatively not strongly adhesive condition, tempering said substance on said support to a relatively strongly adhesive and at the same time cohesive condition, bringing a backing substance into contact with said film and removing said film and said backing from said support while said film is in said condition.

16. A process of treating fabrics with films of thermoplastic coating substance, which comprises providing a continuously moving support, forming at one stage a film of initially relatively liquid thermoplastic coating substance applying said film to said support, carrying said film on said support to a second stage, and intermediate said stages treating said film to bring it to a relatively non-liquid co-hesive and adhesive conditions, bringing a fabric into contact with said film on said support at said second stage, and removing said film on said fabric from said support.

17. A process of treating fabrics with films of thermoplastic coating substance, which comprises providing a continuously moving support, forming a film of initially relatively liquid thermoplastic coating substance externally of said support, applying said film to said support at one stage, carrying said film on said support to a second stage, and intermediate said stages treating said film to bring it to a relatively non-liquid co-hesive and adhesive condition, bringing a fabric into contact with said film on said support at said second stage, and removing said film on said fabric from said support, said removal being assisted by a doctor bearing against said support.

18. A process of creping fabrics by means of the positive adhesive action of a film of coating substance, which comprises providing a source of supply of coating substance, withdrawing a portion of said substance and forming a film thereof, applying said formed film to a creping surface at one stage, said film having initially improper characteristics for creping use, moving said film on said creping surface to a creping stage, and intermediate said stages treating said film to give it the proper characteristics for said creping use, applying a fabric to said film intermediate said stages and removing said fabric and film from said creping surface, whereby to crepe the same.

19. A process of creping fabrics by means of the positive adhesive action of a film of coating substance, which comprises providing a source of supply of coating substance, withdrawing a portion of said substance and forming a film thereof upon a creping surface at one stage, said film having initially improper characteristics for creping use, moving said film on said creping surface to a creping stage, and intermediate said stages treating said film to give it the proper characteristics for creping use, applying a fabric to said film intermediate said stages and removing said fabric and film from said creping surface, whereby to crepe the same.

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