

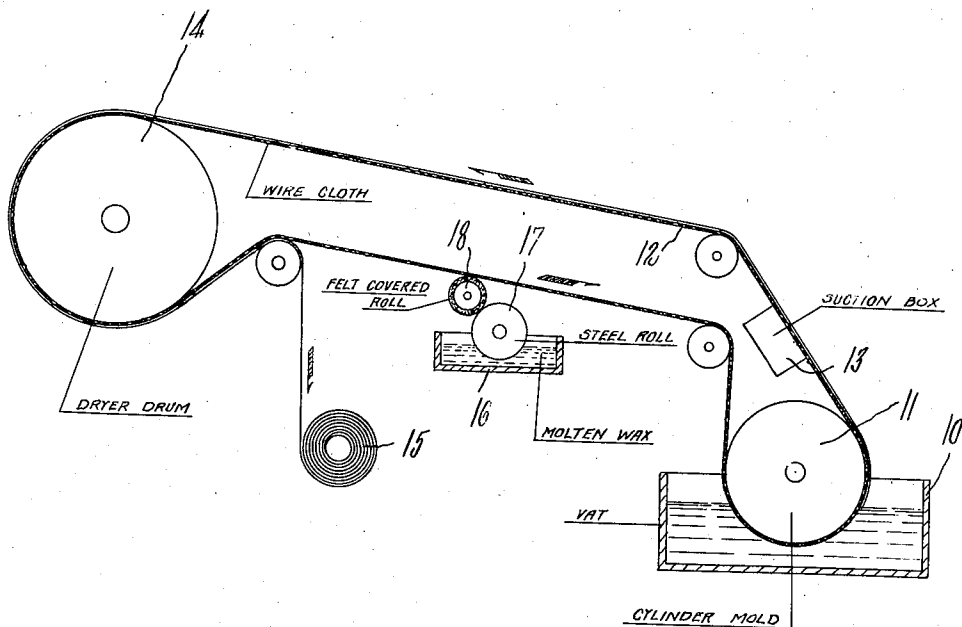
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MANUFACTURE OF BINDER-CONTAINING WATERLAID FELTS

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MANUFACTURE OF BINDER-CONTAINING
WATERLAID FELTSMilton O. Schur, Berlin, N. H., assignor to Brown
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5 Claims. (Cl. 92-39)

This invention relates to the manufacture of binder-containing waterlaid felts or webs such as are produced on machinery of the papermaking type. It deals more especially with a felt or web whose binder content is activated to a more or less adhesive state while the felt is being dried under heat from its wet or freshly formed condition.

In fabricating the foregoing class of felts or webs, it has been found that the felt tends to stick to the hot surface with which it is in contact in the course of drying. This tendency, which arises from adhesive-activation of the binder content of the felt, is especially serious when the web contains a substantial amount of binder and is still supported during drying by the endless wire cloth on which it is formed, or on a wire cloth to which it has been transferred, as the wire cloth is heated by contact with a hot drier drum or equivalent drying surface, for, in such case, the felt tends to stick so badly to the wire cloth that it is badly marred or disrupted in being stripped or removed from the cloth. A felt containing a substantial amount of starchy binder is illustrative of the kind of felt that gives rise to such sticking trouble, for the starch content of the felt induces the felt to adhere tenaciously to the wire cloth or "wire" on which the felt is being dried under heat. In other words, the starchy binder evidently becomes so gelatinous or sticky under moist heat as to bond the felt to the wire cloth.

In accordance with the present invention, the hot surface with which the binder-containing web is in contact in the course of drying is protected by hydrophobic or water-repellent substance against the sticking of the web thereto. Thus, when the web is still supported by the wire cloth on which it is formed as it is being dried at elevated temperature, the cloth may advantageously be filmed or protected very thinly with the paraffin wax or like normally solid but readily fusible water-repellent substance that prevents the adhesively-activated binder in the web from bonding with or gripping the wire cloth, since the moisture-activated or wet binder has very little, if any, adhesive affinity for a surface treated with water-repellent substance. As the web is being dried, the wax or equivalent fusible substance melts and is absorbed by the felt, wherefore, the wire remains quite clean or free from accumulation of wax or kindred substance that might interfere with good felting or web formation thereon. The wax or equivalent hydrophobic substance, which becomes liquid on and

thinly protects the hot wire or other hot support with which the wet binder-containing felt is in contact in the course of its drying at elevated temperature, may be applied to the wire at a stage of its endless travel beyond that of removing the dried web therefrom and before it returns to the stage at which fiber is being progressively deposited or felted thereon from aqueous suspension to form a felt or web. It is thus seen that the present invention enables in a simple, inexpensive, and very effective way to do away with sticking or gumming of a binder-containing web to a hot surface with which it is in contact in the course of its drying.

With the foregoing and other features and objects in view, the present invention will now be described in further detail with particular reference to the accompanying drawing, which shows diagrammatically and conventionally a papermaking machine equipped with instrumentalities for treating the endless wire cloth with wax at a stage of its travel before the fiber is deposited from aqueous suspension thereon as a felt layer or web.

The papermaking machine depicted for purpose of illustrating the present invention is generally of the type described in Richter et al. Patent No. 1,888,771 and comprises a vat 10 into which an aqueous fiber suspension, e. g., a wood pulp suspension, of appropriate consistency may be progressively fed from a supply source (not shown). Rotating partially submerged in the aqueous fiber suspension in the vat 10 is a cylinder mold 11, about which passes the endless wire cloth 12 on which the web or felt is formed and dried. It appears hardly necessary to go into the details of forming the felt or web, since these features are described in the aforementioned patent and will be obvious to those skilled in the art. Suffice it to say that the water of the fiber suspension passes through the wire cloth and the foraminous periphery of the cylinder mold into the interior of the cylinder mold, from which it is progressively removed, and that in so doing a layer of fibers is progressively deposited or felted on the wire cloth. After the cloth emerges from the vat of the cylinder mold, it is preferably passed over one or more suction boxes 13, which serves to remove excess or free water from the freshly deposited or wet web carried thereby.

The wet web, while still supported by the wire cloth on which it is formed, may be dried, as shown, by passage about a comparatively large-sized rotary drier drum 14, which may, as ordinarily, be hollow so as to receive steam as the

heating or drying medium. Immediately after the wire cloth and the substantially completely dried web carried thereby have left the drum 14, the web may be stripped or removed from the wire cloth and progressively accumulated as a roll 15.

Before the wire cloth returns to the cylinder mold 11, or completes its circuit, it may be very thinly filmed on its outer or web-carrying side with paraffin wax or equivalent readily fusible hydrophobic substance, preferably a substance having a fusing or melting point below that, say, about 212° F., of the periphery of the drum 14 with which the wire cloth contacts during the web-drying period. The wax to be applied to the wire may be maintained in molten condition in a vat 16 as a bath in which a steel roll 17 rotates partially submerged so as to pick up progressively a thin film of the molten wax and transfer it to a felt-covered roll 18 rotating in contact with the wire cloth 12 and preferably having a surface or peripheral speed much greater than the lineal speed of the wire cloth. It might be noted that the steel roll 17 is rotated comparatively very slowly in the bath of molten wax and that the roll 18, whose felt cover or periphery is pressed against the periphery of the roll 17, transfers only a very small quantity of wax to the web-carrying side of the wire cloth. Only an exceedingly thin film of wax is thus rubbed substantially uniformly over the web-carrying side of the wire cloth by the felt cover or periphery of the roll 18.

The very thin film of wax applied to the wire cloth does not interfere noticeably with the desired deposition or felting of fibers from aqueous suspension on the wire cloth in the vat 10 or with the desired uniform texture of the web progressively formed on the wire cloth; nor does it cause separation or parting of the web from the wire cloth even during the drying period. Because the web is retained on the wax-protected or filmed wire cloth throughout the drying period, it remains flat or free from cockles or curls and hence does not require a subsequent pressing or flattening treatment. As the web is progressively dried at elevated temperature on the wire cloth passing about the steam-heated drier drum 14, it absorbs much of the wax, in consequence of which the cloth remains practically unfouled or free from wax accumulation. After the dried web has been removed from the wire cloth, the wire cloth may be progressively rewaxed, as already described, before returning to the web-forming stage in the vat 10. The web-contacting side of the wire cloth is thus always in condition for the progressive formation of the web or felt thereon.

The method hereof is subject to variation as regards the particular mode of applying the wax or other hydrophobic substance to the wire cloth. For instance, the wax may be applied to the wire cloth as a solution in a suitable organic solvent, as an aqueous dispersion or emulsion, or as a vapor. In lieu of wax, mineral oil or the like may serve to prevent sticking or gumming of the web to the wire cloth during drying of the web at elevated temperature. However, the particular method of waxing the wire cloth hereinbefore described has been found to be quite satisfactory and economical.

In some instances, the wet web may be transferred from the forming wire or wire cloth in wet condition to a drier such as constitutes the usual dry end of a papermaking machine, for instance, one or more steam-heated drier drums with which the web makes direct facial contact as it is being

dried. When the dry end consists of a plurality of steam-heated drier drums on each of which only a small increment of the complete drying of the web is effected, the tendency of the web to stick on the drums is greatly reduced. In such latter case, it is hence possible to use "doctors" or blades to remove or scrape most of the fiber and binder sticking to the drying surfaces of the drums and to keep injury to the web at a minimum. However, even in such latter case, it may be desirable, pursuant to the present invention, to wax or oil the hot drier drum peripheries so as to inhibit altogether sticking or gumming of the web thereto. When the web is dried on a wire cloth, as in the case of a web-forming machine of the type herein described and illustrated, or when the web is transferred to a second wire cloth on which it is dried, it is most important that the wire surface be protected by wax, oil, or equivalent hydrophobic substance against the firm adhesion to the wire of the web that is otherwise apt to take place and that militates against removal or stripping of the web from the wire in the desired intact or substantially perfect condition.

The instant invention may be applied to especial advantage in producing the starch-containing felts or webs of Schur et al. application Serial No. 207,308, filed May 11, 1938. As indicated in that application, the starch in precooked or gelatinized condition may be added advantageously to the aqueous fiber suspension or stock just before it is delivered to the papermaking machine, for instance, to the head box from which the stock passes into the cylinder-mold vat 11. In some instances, however, the starch may, as stated in that application, be added to the still fluent suspension on the wire or wet end of the papermaking machine. Accordingly, it is to be understood that the appended claims shall, when they state that the starch or other binder is deposited along with fiber from aqueous suspension on the wire cloth as a starch-containing or binder-containing felt, be construed to mean that the starch or other binder is added to the aqueous fiber suspension either before or after delivery of the suspension to the wire cloth. Such binders as glue, casein, viscose, water-soluble or water-dispersible gums or resins, rubber latex, and similar ones may behave more or less like starch when incorporated in particular amount and/or under particular conditions into the aqueous fiber suspension from which the felt is made and are hence to be regarded as falling within the category of a binder that is activated to a more or less adhesive state in the presence of moisture and heat. In other words, the present invention extends broadly to the manufacture of binder-containing webs or felts which, by virtue of the binder present therein, may tend to stick to a hot surface with which they are in contact during drying at elevated temperature and which, accordant with the present invention, are kept from so doing by the filming of the surface with wax, oil, or other suitable hydrophobic substance, thereby permitting a removal of such webs or felts in undamaged or practically perfect condition from such surface.

I claim:

1. A method of progressively producing binder-containing waterlaid felt, which comprises progressively depositing fiber and binder from an aqueous suspension as binder-containing felt on a moving endless wire cloth at one stage of travel

of said cloth, said binder being activated to an adhesive state in the presence of moisture and heat, progressively drying said felt on said cloth under heat at another stage of travel of said cloth, progressively removing the dried felt from said cloth, and progressively applying to said cloth at a stage of its travel after the removal of said dried felt therefrom but before the redeposition of fiber and binder thereon a thin film of hydrophobic substance and thereby preventing adhesion of said felt as it is being dried to said cloth, said substance being selected from a class consisting of wax and oil.

2. A method of progressively producing starch-containing waterlaid felt, which comprises progressively depositing fiber and starch from an aqueous suspension as starch-containing felt on a moving endless wire cloth at one stage of travel of said cloth, progressively drying said felt on said cloth under heat at another stage of travel of said cloth, progressively applying to said cloth at a stage of its travel after the removal of said dried felt therefrom but before the redeposition of fiber and starch thereon a thin film of waxy hydrophobic substance fusible under the heat applied during the drying of said felt and capable of preventing said felt from sticking to said cloth.

3. A method of progressively producing starch-containing waterlaid felt, which comprises progressively depositing fiber and starch from an aqueous suspension as starch-containing felt on

a moving endless wire cloth at one stage of travel of said cloth, progressively drying said starch-containing felt on said cloth under heat at another stage of travel of said cloth, progressively removing the dried felt from said cloth, and progressively applying to said cloth at a stage of its travel after the removal of said dried felt therefrom but before the redeposition of fiber and starch thereon a thin film of paraffin wax melt-able under the heat applied during the drying of said felt.

4. In a method of producing a waterlaid felt containing a binder activatable to an adhesive state in the presence of moisture and heat, those steps which comprise thinly coating a wire cloth with wax prior to the deposition on said cloth of said waterlaid felt from an aqueous suspension of fiber and said binder; and then drying said felt on said wire cloth under heat.

5. In a method of producing a waterlaid felt containing a binder activatable to an adhesive state in the presence of moisture and heat, those steps which comprise thinly coating a wire cloth with hydrophobic substance prior to the deposition on said cloth of said waterlaid felt from an aqueous suspension of fiber and said binder, said substance being selected from a class consisting of wax and oil; and then drying said felt on said wire cloth under heat.

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