

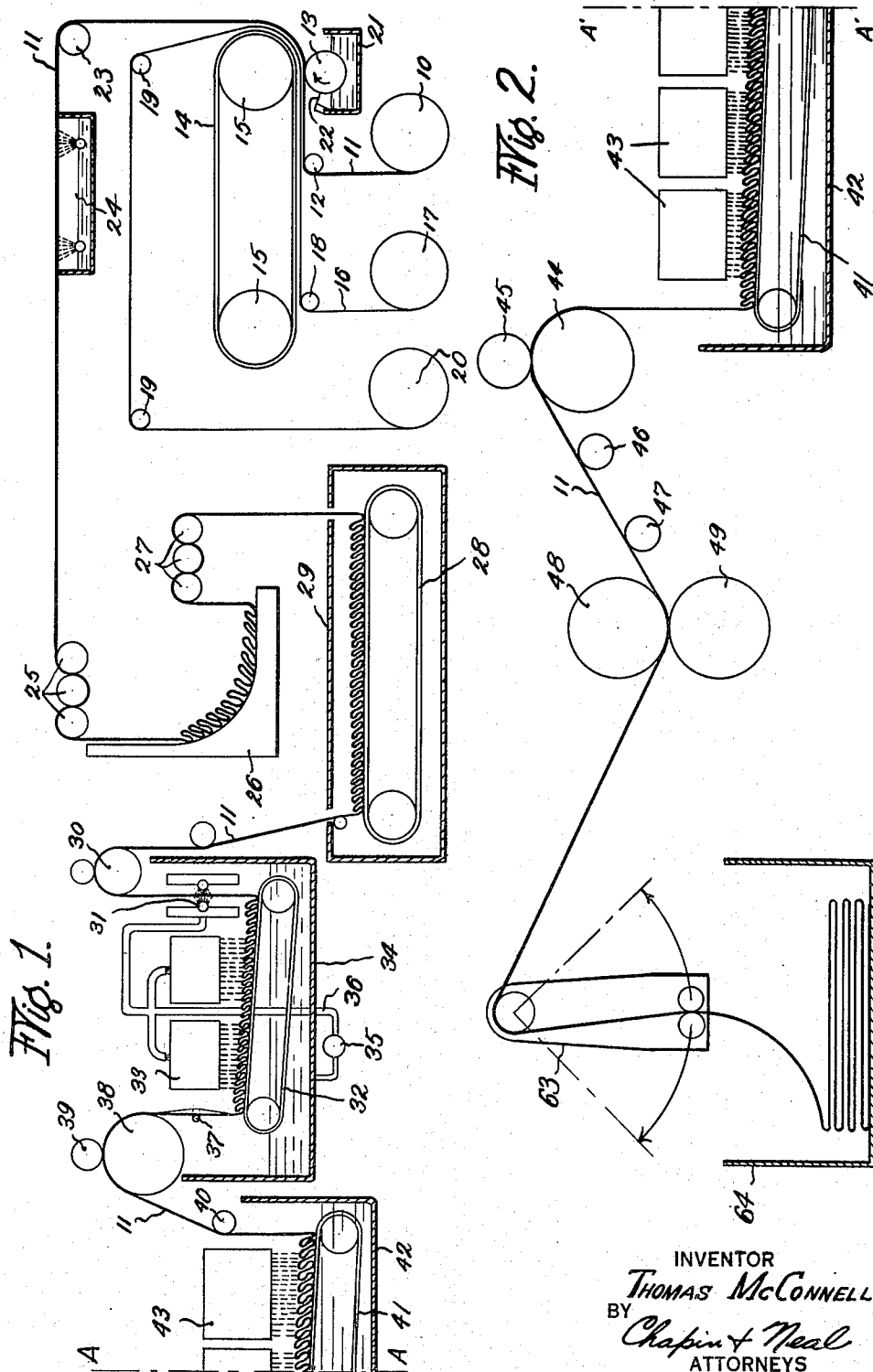
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METHOD OF TREATING FABRIC

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METHOD OF TREATING FABRIC

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This invention relates to the manufacture of fabrics such as plissé crepe in which localized shrinkage of the cloth is employed to produce the characteristic puckered or crinkled appearance.

Fabrics of this general character have in the past been produced by a series of substantially independent manufacturing operations each completed separately. As far as I am aware, no method has heretofore been proposed by which the production of these fabrics could be carried out as a continuous and unitary operation, or without subjecting the fabric to uneven tension or pressure conditions which created irregularities in the final product. Among the difficulties which have been encountered in attempting a continuous operation of this character are the mechanical difficulties of synchronizing the various machines conventionally used in carrying out the various treatments to which the cloth must be subjected. A further difficulty has arisen in previously proposed processes in that the fabric has been subjected to uneven strain or pressure as by drawing it through guide eyes while condensed laterally into rope form, or by piling it in folded condition in boxes in which it remained during the intervals between operations.

It is one object of the present invention to provide a process which will permit the production of fabrics of the above character as a continuous operation in a way to avoid the difficulties heretofore encountered. Other and further objects relating to improvements in the quality of the product resulting from details of the method will be made apparent in the following specification and claims.

The accompanying drawing shows diagrammatically one suitable arrangement of mechanism for carrying out the method of this invention.

Figs. 1 and 2 show successive portions of a unitary machine for carrying out the method.

Referring to the drawing the supply of cloth to be processed is indicated at 10 in the form of a roll. The cloth is drawn from roll 10 in flat web form 11 over a guide roll 12 and between a printing roll 13 and an endless belt 14, preferably of rubber. Belt 14 passes around drums or cylinders 15, one of which is driven. A web of "liner" or backing fabric 16 is fed from a supply roll 17 over a guide roll 18 and between the belt 14 and the web 11; the liner, after the webs have passed through the printing mechanism, being separated from web 11 and directed by suitable guide rolls 19 to a windup indicated at 20.

The printing roll 13 may take the form of an engraved copper roll rotating in a box 21 containing a shrinking agent such as caustic soda with a gum carrier. As the roll 13 brings up this caustic paste, the excess is scraped off by a doctor 22, leaving the engraved part filled. The roll 13 is positioned to act against the web and belt at a point where the latter is backed by one of the cylinders 15. The pressure applied by the printing roll is sufficient to transfer the paste from the engravings of the roll to, and part way through, the cloth. As will be understood the action of the caustic paste is to shrink or mercerize the cloth locally at the areas covered by the paste, the puckering of the cloth occurring between the printed areas.

The web 11 after leaving the printing device passes over guide roll 23 to a finely divided water spray generally indicated at 24 which moistens the back or unprinted side of the web. Due to the hygroscopic action of the caustic soda the latter is drawn through the cloth at the printed portions. The spray is not heavy enough to wet the cloth thoroughly, being sufficient only to cause penetration of the cloth by the caustic, providing a sharp definition of the borders of the printed areas without diluting the caustic soda or causing it to run over the unprinted portions. This treatment of the reverse side of the web as part of the printing operation is believed novel and results in a product of improved appearance and more uniform quality.

After moistening, the web passes to feeding rolls indicated at 25 which ripples the web into a J-box as shown at 26. The J-box is of a size sufficient to allow time for local mercerization and shrinking of the cloth during its passage through the box. A slow moving conveyor may be used at this point if preferred.

From the J-box the web is directed through driven rolls 27 which deliver the web to a net conveyor 28 which is enclosed by a housing 29. The conveyor 28 is driven at less speed than the normal advance of the web so that the web ripples onto the conveyor. Hot air is supplied to the housing from any suitable source, not shown. The hot air passing through the cloth during the passage of the rippled web through housing 29 is insufficient to completely dry the cloth, but heats the cloth and partially dries it to complete the shrinking reaction.

After leaving the conveyor 28 the web passes through driven rolls 30 and downwardly between perforated pipes 31 that constantly spray H_2SO_4 , preferably having a sp. gr. of 1.03, to saturate the

cloth as it ripples onto a belt conveyor 32 which is traveling at a speed sufficiently low to allow time for the NaOH to be neutralized. Over conveyor 32, which may be formed of a plurality of narrow belts or a single wide belt of perforated material, are positioned perforated rubber trays 33 which are kept filled with the same acid solution as is used in pipes 31. The solution from the trays falling downwardly on the rippled web on the conveyor furthers the neutralization and assists mechanically in the removal of the gum by the downward wash. Conveyor 32 is set with the delivery end higher than the receiving end to promote drainage and reduce the carry-over of acid to the succeeding washing compartment. The acid from pipes 31 and trays 33 is collected at the bottom of housing 34 in which the spraying mechanisms are located and is recirculated by a pump 35 through suitable piping 36. A small feed line, not shown, enters the system at any suitable point to introduce strong acid in sufficient quantity to maintain the neutralizing solution at a uniform strength.

From the neutralizing conveyor the web passes over a bow bar 37 to eliminate the possibility of scrims and then over a rubber covered drum 38 which is driven to advance the web, still without tension. Rolling freely on top of drum 38 is a small wooden roller 39 that by its weight eliminates slippage of the web on the drum.

The neutralized web passes over a guide roll 40 and into a rippled formation on a belt conveyor 41, similar in construction to conveyor 32 and positioned in suitable tank structure 42. Above the conveyor 41 are located a plurality of perforated trays 43, which shower the advancing rippled web with water to wash the acid from the cloth. The length of conveyor 41 and its speed of travel are made such that all traces of acid are removed.

After washing, the web is fed from conveyor 41 by feed rolls 44 and 45, similar to rolls 38 and 39, and over supporting rolls 46 and 47 to a two-bowl mangle shown at 48-49 which removes excess moisture from the cloth. On leaving the mangle, the web is folded by suitable mechanism as at 63 into a box 64.

Several important features of novelty should be particularly noted. The cloth at no time is condensed transversely, in other words it is kept in full width web form throughout its treatment. The advance of the web is continuous without either warp-wise or weft-wise tension, and actually at a substantially uniform rate. The necessary variations in time for the various operations are secured by rippling the fabric through J-boxes or on slow moving conveyors. The material is moved through the J-boxes or on the conveyors at a slow rate but in a large bulk per unit of length. When the material is moving in flat form it travels at a higher speed but in a less bulk per unit of length. Moreover, by alternating these two conditions of the web and adapting the various operations alternately to these conditions, no elaborate synchronizing devices are required, simple variable speed drives being adequate, in cooperation with the tolerance allowed by the rippled accumulations of the web positioned between the several sets of web driving rolls, to compensate for minor speed variations and for progressive shrinkage of the web and its relaxing during washing and other moistening steps.

Plissé crepe is obtained by the foregoing means in a better and more uniform quality than has

hitherto been possible. The localized shrinkage produced by the caustic paste or other shrinking agent creates intermediate puckered areas in which the web has a greater apparent thickness or loft. This loft being due to the local waviness of the web and not to any increased thickness of the fabric, it is particularly susceptible to injury if the web is subjected to uneven or local pressure or tension. In prior processes where the web has been gathered transversely into rope form for transfer from one operation to another, the drawing of the rope through the guide eyes gave an uneven tension in different portions of the web which was clearly traceable in the finished product. In ordinary cloth finishing this would not be important, since the cloth is straightened under a relatively heavy tension in the tenter. Such a tension is not possible in the manufacture of plissé crepe, as it would destroy the fullness or loft of the puckered areas. For this reason the process described herein produces a crepe of improved quality, since the web is never subjected to irregular tension.

In other prior processes the web has been folded into a box for transfer from one operation to another. The folded cloth at the bottom of such a box would be subjected to the pressure of the cloth above it for a comparatively long time, the destruction of the loft of the fabric being especially pronounced at the fold lines. In accordance with the present invention, the fold lines are never subjected to pressure, and the location of the fold lines is changed from one rippling operation to another. Furthermore, the web is never subjected to tension either warp-wise or weft-wise, even those short runs where the fabric bears the weight of a short length of the web being of so short a duration that no injury to the loft of the fabric can result.

What I claim is:

1. The method of producing plissé crepe and like fabrics as a continuous operation which comprises continuously advancing a web of cloth in flat form, applying a hygroscopic shrinking agent in a predetermined pattern to one side of the advancing flat web of cloth, drawing the shrinking agent through to the opposite side of the web from that upon which it was printed by supplying moisture thereto from the web to satisfy its hygroscopic action, rippling the web into a more slowly moving but continuously advancing accumulated form, and continuing the advance of the web in rippled condition and without subjecting the web to warp-wise or weft-wise tension for a sufficient length of time to permit substantial completion of the action of the shrinking agent.

2. The method of producing plissé crepe and like fabrics as a continuous operation which comprises continuously advancing a web of cloth to be treated, transferring a caustic mercerizing paste from the intaglio portions of an engraved roll to one face of the web under sufficient pressure to force the paste partway through the cloth, moistening the opposite side of the web to thereby cause the paste to complete the penetration of the web by hygroscopic action, feeding the web forward in flat form and rippling it into a more slowly moving but continuously advancing accumulated form, carrying out the mercerizing action and successive neutralizing and washing operations while the web is in rippled condition and feeding the web in flat form from its rippled condition whereby a substantially uniform rate of advance of the web as a whole

is obtained without exact synchronization between the several advancing and feeding movements.

3. The method of applying a caustic mercerizing paste to cloth in the production of plissé crepe and like fabrics which comprises transferring the paste to one face of the cloth from the intaglio portions of an engraved roll under sufficient pressure to force the paste partway through the cloth and thereafter moistening the opposite side of the cloth sufficiently to thereby cause the paste to complete the penetration of the cloth by hygroscopic action.

4. The method of applying a caustic mercerizing paste to cloth in the production of plissé crepe and like fabrics which comprises transferring the paste to one face of the cloth from a printing roll under sufficient pressure to force the paste partway through the cloth and thereafter moistening the opposite side of the cloth sufficiently to cause the paste to complete the penetration of the cloth by hygroscopic action.

5. A method of making plissé or like fabrics which includes the steps of placing a shrinking agent in the form of a hygroscopic mercerizing paste in the intaglio portions of an engraved roll, transferring the paste to the cloth by rolling the latter between the roll and a rubber backing member under sufficient pressure to force the paste part way through the cloth, and drawing the shrinking agent through to the opposite side of the web from that upon which it was printed by supplying moisture thereto from the web to satisfy its hygroscopic action.

6. A method of making plissé crepe or like fabrics which includes the steps of placing a

shrinking agent in the form of a hygroscopic mercerizing paste in the intaglio portions of an engraved roll, transferring the paste to the cloth by rolling the latter between the roll and a rubber backing member under sufficient pressure to force the paste part way through the cloth, drawing the shrinking agent through to the opposite side of the web from that upon which it was printed by supplying moisture thereto from the web to satisfy its hygroscopic action, rippling the web into a slowly moving but continuously advancing accumulated form, and continuing the advance of the web in rippled condition and without subjecting the web to warp-wise or weft-wise tension for a sufficient length of time to permit the desired action of the shrinking agent.

7. A method of producing plissé crepe and like fabrics as a continuous operation which comprises continuously advancing a web of cloth in flat form, applying a hygroscopic shrinking agent in a predetermined pattern to one side of the advancing flat web of cloth, drawing the shrinking agent through to the opposite side of the web from that upon which it was printed by supplying moisture thereto from the web to satisfy its hygroscopic action, rippling the web into a more slowly moving but continuously advancing accumulated form, continuing the advance of the web in rippled condition and without subjecting the web to warp-wise or weft-wise tension for a sufficient length of time to permit completion of the action of the shrinking agent, and neutralizing the shrinking agent, washing, and drying the web all without subjecting the web to warp-wise or weft-wise tension.

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