

Advanced Textile Design (1913)



William Watson

ADVANCED TEXTILE DESIGN

BY

WILLIAM WATSON

SUPERINTENDENT AND LECTURER IN TEXTILE MANUFACTURE, THE ROYAL
TECHNICAL COLLEGE, GLASGOW; FORMERLY HEADMASTER OF THE
TEXTILE DEPARTMENTS OF THE ROYAL TECHNICAL INSTITUTE,
SALFORD, AND THE TECHNICAL SCHOOL, SHIPLEY

WITH DIAGRAMS

LONGMANS, GREEN AND CO.
39 PATERNOSTER ROW, LONDON
NEW YORK, BOMBAY, AND CALCUTTA

1913

All rights reserved

ADVANCED TEXTILE DESIGN

BY

WILLIAM WATSON

SUPERINTENDENT AND LECTURER IN TEXTILE MANUFACTURE, THE ROYAL
TECHNICAL COLLEGE, GLASGOW; FORMERLY HEADMASTER OF THE
TEXTILE DEPARTMENTS OF THE ROYAL TECHNICAL INSTITUTE,
SALFORD, AND THE TECHNICAL SCHOOL, SHIPLEY

WITH DIAGRAMS

LONGMANS, GREEN AND CO.
39 PATERNOSTER ROW, LONDON
NEW YORK, BOMBAY, AND CALCUTTA

1913

All rights reserved

Advanced Textile Design

WITH DIAGRAMS

William Watson

LONGMANS, GREEN AND CO.
PATERN, LONDON
NEW YORK CALCUTTA

In the interest of creating a more extensive selection of rare historical book reprints, we have chosen to reproduce this title even though it may possibly have occasional imperfections such as missing and blurred pages, missing text, poor pictures, markings, dark backgrounds and other reproduction issues beyond our control. Because this work is culturally important, we have made it available as a part of our commitment to protecting, preserving and promoting the world's literature. Thank you for your understanding.

PREFACE

THE designing and colouring of cloths, which are composed of one series of warp and one series of weft threads, are exhaustively treated in the accompanying book, entitled "Textile Design and Colour, Elementary Weaves and Figured Fabrics." This book forms a continuation of the subject, and deals in an equally complete manner with compound and special cloths in which two or more series of threads are employed in one or both directions, or which are produced in special methods. There is no separate section on colour, but the principles upon which colours are applied to the various classes of cloths are described and illustrated.

Many branches of Textile Design need specialisation, and with this object in view, and as an aid to the adequate treatment of each branch, a large proportion of the matter contained in this work has been specially prepared in the form of separate serial articles which have appeared in textile journals. The chapters on double cloths, special classes of double cloths, wadded and centre-stitched double cloths and treble cloths, on lappet and swivel weaving and designing, and on plain and figured warp pile fabrics, and book-harness muslins, have been published in the *Textile Manufacturer*; the sections on extra weft and extra warp figuring, and gauze and leno fabrics in the *Textile Recorder*; while portions of the chapters on weft pile fabrics and Turkish towelling structures have appeared in *Cotton* (U.S.A.). In re-issuing the matter in book form, most of the original illustrations have been used, but new examples have been introduced and the text has been carefully revised. Further, in order to make the book a complete work on the design and structure of compound and special cloths, chapters have been added on weft and warp-backed cloths, imitation backed fabrics, and backed cloths with wadding threads; on damasks, tapestry and upholstery cloths, ingrain carpets, fancy toilet and quilt fabrics, Brussels, Wilton, Tapestry, and Axminster pile carpets, etc.

Special jacquard and harness mountings, such as sectional jacquard arrangements, pressure and split harness mountings, self-twilling, double-

cloth, twin, and pile carpet jacquards, inverted hook machines, jacquards with working comber-boards, and gauze and Madras mountings, are fully described and illustrated, as are also the special mechanisms used in weaving lappet, swivel, and Turkish towelling fabrics. The book contains 461 figures, which embody over 2,000 designs, diagrams, and representations of woven fabrics.

The writer wishes to express his indebtedness to several textile engineering firms and many friends for the willingness with which they have placed information at his disposal, and to the publishers and printers for their attention to his wishes in the preparation of the book.

W. W.

GLASGOW, December, 1912.

CONTENTS

CHAPTER I

BACKED CLOTHS

PAGES

Introduction of Extra Threads—Principles of Tying or Stitching. <i>Weft-Backed Cloths</i> —Method of Designing—Reversible Weft-backed Weaves—Methods of Weft- Backing Standard Twill and Hopsack Weaves—Warp-Face Weaves Backed with Weft—Method of Selecting Weft Ties—Special Examples of Weft-Backing. <i>Warp-Backed Cloths</i> —Method of Designing—Reversible Warp-Backed Weaves —Beaming and Drafting Warp-Backed Designs—Methods of Warp-Backing Standard Weaves—Method of Selecting Warp Ties—Special Examples of Warp- Backing—Comparative Setting of Backed Cloths. <i>Imitation or Pseudo-Backed</i> <i>Cloths</i> —Imitation Weft Backing—Imitation Warp Backing. <i>Backed Cloths with</i> <i>Wadding Threads</i> —Weft-Backed and Warp-Wadded Designs—Warp-Backed and Weft-Wadded Designs,	1-24
---	------

CHAPTER II

DOUBLE CLOTHS

Double-Cloth Structure—Relative Proportions and Thicknesses of the Face and Backing Threads—Origination or Selection of the Face and Backing Weaves—Tying or Stitching—Construction of the Point-Paper Design—Construction of Double- Cloth Designs for Looms with Changing Boxes at one End only—Double-Cloth Beaming, Drafting, and Pegging—Effect of the System of Tying upon the Number of Healds—Special Features in Double-Cloth Designing—Position of the Backing Weave—Systematic Construction of Double-Cloth Designs—Reversible Double Weaves—Double-Cloths with Compound Face Weaves,	24-63
---	-------

CHAPTER III

SPECIAL CLASSES OF DOUBLE CLOTHS

<i>Double Cloths in which the Threads Interchange. Cut Double Cloths</i> —Cut Effects pro- duced by Interchanging the Threads—Designs in which the Cut is produced by interweaving the Threads in 3-and-3 order. <i>Double Plain Cloths</i> —Styles arranged 1-and-1 as to Colour—Correct Joining of Double Plain Weaves—Double Plain Horizontal Hairline—Intermingled Double Plain Effects—Specially arranged Double Plain Stripes—Double Plain Spotting—Broad Double Plain Stripes— Double Plain Cloths Specially Coloured in the Warp—Comparison with the First System—Cutting and Joining the Weaves—Methods of Colouring the Backing Ends—Method of Designing Stripe Patterns—Construction of Double Plain Check Patterns—Double Plain Effects in Three or Four Colours—Four- Shade Effects Coloured 1-and-1 in the Warp—Three-Colour Patterns arranged 1 Face, 1 Back in the Warp—Four-Colour Patterns arranged 1 Face, 1 Back in the Warp. <i>Double Twill and Sateen Stripe Designs</i> ,	63-88
---	-------

CHAPTER IV

WADDÉD AND CENTRE-STITCHED DOUBLE CLOTHS AND TREBLE CLOTHS

PAGES

<i>WaddéD Double Cloths</i> —Weft-WaddéD Double Cloths—Warp-WaddéD Double Cloths. <i>Centre-Stitched Double-Cloth Designs</i> —Centre Warp Stitching—Centre Weft Stitching. <i>Treble Cloths</i> —Systems of Stitching—Treble Cloth Designing in Stages—Construction of Drafts and Pegging Plans—Systematic Construction of Treble-Cloth Designs—Use of Centre Fabric as Wadding,	88-106
---	--------

CHAPTER V

EXTRA WEFT FIGURING

Principles of Figuring with Extra Materials—Methods of Introducing Extra Figuring Threads—Methods of Disposing of the Surplus Extra Threads. FIGURING WITH EXTRA WEFT—Continuous Figuring in one Extra Weft—One-and-One Wefting —Two-and-Two Wefting—One-and-Two Wefting—Two-and-Four Wefting— Selection of Suitable Positions for the Figuring Floats—Extra Material Cut Away—Extra Weft Stitched In—Modification of Ground Weave—Intermittent Extra Weft Figuring—Combination of Ground Weft Figure and Extra Weft Figure—Stitching by means of Special Ends— <i>Figuring with Two or More Colours of Extra Weft</i> —Pick-and-Pick Figuring—Methods of indicating Pick-and-Pick Ground Weaves—Pick-and-Pick Weave Shading—Pick-and-Pick Reversible Tapestry Style—Multiple Weft Persian Style of Figuring—Chintzing— <i>Reversible Weft-Face Figured Fabrics</i> —Simplified Methods of Designing—Treble-Wefted Reversible Fabrics,	106-131
--	---------

CHAPTER VI

EXTRA WARP FIGURING

Comparison with Extra Weft Figuring—Continuous Figuring in one Extra Warp— Heald and Harness Mounting—Alhambra Quilts—Binding in Extra Ends between Face Floats—Intermittent Figuring in One Extra Warp—Drafting and Denting Extra Warp Stripes—Figuring with Two Extra Warps—Stitching by means of Special Picks—Extra Warp Planting—End-and-End Figuring— Reversible Warp-Face Figured Fabrics,	131-147
--	---------

CHAPTER VII

FIGURING WITH EXTRA WEFT AND EXTRA WARP

Economical Use of Extra Materials—Extra Warp and Extra Weft Spotting. DOUBLE WEAVE COMBINATIONS—Designs Produced in Double-Plain Weaves—Double Twill Weaves—Combination of Fine and Coarse Fabrics— <i>Combinations of Double Weaves and Warp and Weft Float</i> —Crepon Structures—Double Weave and Weft Figure on Warp-Rib Ground,	148-156
---	---------

CHAPTER VIII

SPECIAL JACQUARD AND HARNESS MOUNTINGS AND SYSTEMS OF DESIGNING

Comparison with Ordinary Jacquard and Harness Mounts. <i>Sectional Jacquard and Harness Arrangements</i> —Sectional Harness Ties—Special Connection of Hooks
--

CONTENTS

ix

and Needles—Special Draft of the Warp Threads—Designing and Card-Cutting for Sectional Arrangements. <i>Methods of Increasing the Figuring Capacity of Jacquards</i> —Inverted Hook Jacquards—Combinations of Healds with Harnesses—Combinations of Lifting Rods or Bars with Jacquard Machines. <i>The Split Harness or Shaft Monture</i> —Operation of the Lifting Rods—System of Designing. <i>Working Comber-Boards,</i>	PAGES 156-168
--	------------------

CHAPTER IX

FIGURED MUSLIN AND DAMASK FABRICS

Figured Muslin Fabrics. FIGURED BOOK MUSLIN FABRICS—System of Loom Mounting and Structure of the Cloth—Features in Painting-out Designs—Ground Weave Variation—Introduction of Ground-Weft Cords—Weaving Particulars of Book-Muslins—Book-Muslin Loom. DAMASK FABRICS—Reversible and Non-Reversible Damasks— <i>The Pressure Harness</i> —Form of the Healds—Operation of the Harness and Healds—Method of Designing— <i>The Self-Twillling Jacquard</i> —Arrangement of Needles, Hooks, and Lifting Bars—Operation of Twilling Needles—Proportions of Hooks to Needles—Operation of Card Cylinder—Changing the Capacity and Sett—System of Designing—Production of Diversity of Effect,	169-186
--	---------

CHAPTER X

TAPESTRY AND UPHOLSTERY CLOTHS AND INGRAIN CARPETS

TAPESTRY AND UPHOLSTERY CLOTHS—Figured Double and Treble Plain Cloths—Combinations of Double Plain and Weft or Warp Figure— <i>Weft-Face Tapestry Cloths</i> —Figuring with the Harness Threads—Diversity produced by Mixing the Wefts— <i>Specially Stitched Weft Tapestry Cloth</i> —Special Weft Tapestry Mounting— <i>Warp-Face Tapestry Cloth</i> . SCOTCH, KIDDERMINSTER, OR INGRAIN CARPETS— <i>Double Plain Cloth Jacquard</i> —Operation of the Jacquard and Comber-Boards—Method of Designing—Limitation of the Mounting— <i>Weft-Face Ingrain Carpets</i> —Reversible Four-Ply Weft Structure—Methods of Producing Variety,	186-208
--	---------

CHAPTER XI

FANCY TOILET AND QUILT FABRICS

<i>Fancy Toilet Cloths</i> —Classification of the Fabrics—Loose-Back Toilets. <i>Fast-Back Toilets and Marseilles Quilts</i> —Method of Designing—System of Loom Mounting—Four-Pick Structure—Five-Pick Structure—Special Five-Pick Cloth. <i>Micheline or Patent-Satin Quilts</i> —Method of Loom Mounting—Method of Designing and Structure of the Cloth—Other Varieties of Quilts,	208-220
---	---------

CHAPTER XII

GAUZE AND LENO FABRICS

Structure of the Cloths. <i>Gauze Mounting</i> —The Doup—Bottom and Top Douping—Gauze and Leno Drafting—Relative Position of Healds—The Easer or Slackener
--

	PAGES
—Sheds formed in Doup Weaving—Construction of Lifting Plans—The Shaker Motion—Gauze and Leno Compared—Modifications of Pure Gauze and Leno. <i>Combinations of Gauze and other Weaves</i> —Stripe Patterns—Cellular Tennis Shirtings—Russian Cords—Simple Cross-over and Check Gauze Effects. <i>Simple "Net" Lenos</i> —Comparison of Top and Bottom Doup Pegging Plans—Denting Net Lenos—Designing Net Lenos and Features to Note—Production of Pattern by Varying the Lifts of the Standard Ends—Bead Mounting for Net Lenos. <i>Combinations of Gauze and Leno with Extra Warp and Extra Weft Effects. Two or More Doup Patterns. Patterns produced by one Doup and two or more Back Crossing Healds</i> —Comparison with Two-Doup Style—Construction of Heald-Knitting Plans for Gauze Stripes—Fancy One-Doup Net Leno—Distorted Weft Styles—Gauze and Figure Weave Combinations,	220-258

CHAPTER XIII

JACQUARD GAUZE AND LENO FABRICS

<i>Ordinary Jacquard and Doup-Heald Mountings</i> —Styles of Cloth—Combinations of Gauze, Plain Weave, and Warp (or Weft) Figure—One-crossing-one Styles—Special Ground Weaves—One-crossing-two Styles—Use of Two Doupes—Modification of Gauze Ground—Net-Leno Figured Styles—One-crossing-three Patterns—Combinations of Twill and Gauze. <i>The Special Gauze Jacquard and Harness</i> —Arrangement of Harness, Hooks, and Needles—System of Drafting—Method of Douping and Easing—Construction of Gauze Ground Weaves—Designing of Figures—System of Card-cutting—Top Douping in the Gauze Harness. MADRAS GAUZE FABRICS —Structure of the Cloth— <i>The Madras Loom</i> —System of Drafting—Method of Crossing the Ends—Method of Easing—Arrangement of Shuttle Boxes—Operation of the Gauze Reed—Operation of the Easing Bar—Operation of the Tug Reed—The Picking Motion—The Up-take Motion— <i>Madras Designing</i> —Modifications of the Structure—Single Cover Chintzed Design—Gauze Figure on Opaque Ground—Complex Three-colour Fabric—System of Card-cutting,	258-296
--	---------

CHAPTER XIV

LAPPET WEAVING AND DESIGNING

Features of Lappet Figuring —Scotch Lappet Wheel Loom. <i>Common Wheel Lappet System</i> —Rotation of the Pattern Wheel—Vertical Movement of the Pin and Needle Bars—Method of making the Needle Bars Inoperative—Lateral Movement of the Needle Bars—Relation of Movement of Shifter Frames to Rotation of Pattern Wheel—Construction of a "Common" Lappet Wheel—Methods of Indicating Lappet Designs—Method of Indicating a Pattern Groove. <i>Continuous Two-frame Lappet Design</i> —Relative Positions of the Needle Bars and Pecks. <i>Intermittent Three-frame Lappet Style</i> —Continuous All-over Three-frame Lappet Design. <i>Crossing the Needle Bars. To find the Diameter of a Wheel—The Length of Repeat. Methods of Diversifying Lappet Designs—Spacing the Needles in the Bars. Presser Wheel System</i> —Construction of a Presser Wheel—To find the Length of Whip Warp—Lappet Styles in Imitation of Net Leno—Waved Russian Cords. <i>Imitation Lace. Patterns produced by varying the Order of Lifting the Needle Bars,</i>	296-334
--	---------

CONTENTS

xi

CHAPTER XV

SWIVEL WEAVING AND DESIGNING

PAGES

Purpose of Swivel Mechanism—Swivel Ornamentation and Embroidery compared—General Description of Swivel Mechanism—Relation of Pitch of Shuttles to Repeat of Jacquard. Detached Swivel Figures—Imitation Embroidery—Special Swivel Style—Figuring with two or more Swivel Wefts—Combination of Swivel and Ordinary Figures—Production of Detached Figures in One Kind of Weft by Two Shuttles—All-over Swivel Figures. <i>Power Swivel Mechanisms—All-over Figuring Swivel Loom—Rack and Pinion Swivel Loom—Circular-Swivel Mechanism,</i>	334-362
---	---------

CHAPTER XVI

WEFT PILE FABRICS

Formation of Weft Pile. <i>Plain Velveteens—Tabby or Plain-back Velveteens—Length of the Pile—Density of the Pile—Changing the Density of the Pile—Fastness of the Pile—Twill-back Velveteens—Designs which simplify the Cutting Operation. Corded Velveteens—Corded Velveteen Cutting—Corded Velveteens from Plain Velveteen Weaves—Particulars of Weft Pile Fabrics. Weft Plushes. Figured Weft Pile Fabrics—Figured Velveteens—Figured Cords. Imitation Weft Pile Fabrics.</i>	362-382
---	---------

CHAPTER XVII

TURKISH TOWELLING FABRICS

Formation of the Pile—Turkish Towelling Weaves—Methods of Drafting and Denting—Terry Motions. <i>Terry Ornamentation—Stripe and Check Dobby Patterns—Figured Terry Pile Fabrics—Mixed Colour Effects,</i>	382-395
---	---------

CHAPTER XVIII

WARP PILE FABRICS

Formation of Warp Pile—Form of the Pile Wires—Structure of Warp Pile. <i>Plain Warp Pile Fabrics—All the Pile over each Wire—Two Picks to each Wire—Three Picks to each Wire—Fast Warp Pile Designing—Method of Heald Drafting—Four Picks to each Wire—One-half the Pile over each Wire—Backed and Double Foundation Cloths—Warp Pile Astrakhan Textures—Reversible Warp Pile Structures—Double Plush Weaving—Ornamentation of Plain Warp Pile Fabrics. Stripe and Check Designs,</i>	395-407
---	---------

CHAPTER XIX

FIGURED WARP PILE FABRICS

<i>Figuring with Cut and Looped Pile. Warp Pile Figuring on Ordinary Weave Grounds—Pile Figuring with Extra Threads—Figuring with Pile Threads which interweave in the Ground—Combinations of Pile and Figured Warp Rib. Combinations of Pile and Double Plain Cloth. Combination of Pile and Weft Figure. Looped Pile and Warp Rib Figure on Cut Pile Ground,</i>	408-425
--	---------

CHAPTER XX

FIGURED PILE FABRICS IN WHICH THE DESIGN IS DUE TO COLOUR

	PAGES
<i>Wilton and Brussels Structures—Comparison of the Cloths—Distinguishing Feature of the Cloths—Planting—Method of Designing—System of Loom Mounting—Card-cutting—Six-frame Mounting—Structure of Wilton Pile—Structure of Brussels Pile—Two-pick Wilton Pile Structure—Moresque Effects—Development of the Colours in both Cut and Looped Pile. Tapestry Pile Carpets—Comparison with Brussels and Wilton Structures—Tapestry Pile Designing—Preparation of the Pile Yarn for Printing—The Printing Drum—The Printing Pulley—The Scale Board—Operation of Printing—Beaming the Pile Warp—Structure of Tapestry Pile—Tapestry Pile Weaving. Chenille or Patent Axminster Pile—Comparison with Tapestry Pile—Chenille Pile Designing—Formation of the Chenille—Setting—Structure of the Fabric. Moquette or Royal Axminster Pile,</i>	426-449
INDEX,	451-461

ADVANCED TEXTILE DESIGN

CHAPTER I

BACKED CLOTHS

Introduction of Extra Threads—Principles of Tying or Stitching. *Weft-Backed Cloths*—Method of Designing—Reversible Weft-backed Weaves—Methods of Weft-Backing Standard Twill and Hopsack Weaves—Warp-Face Weaves Backed with Weft—Method of Selecting Weft Ties—Special Examples of Weft-Backing. *Warp-Backed Cloths*—Method of Designing—Reversible Warp-Backed Weaves—Beaming and Drafting Warp-Backed Designs—Methods of Warp-Backing Standard Weaves—Method of Selecting Warp Ties—Special Examples of Warp-Backing—Comparative Setting of Backed Cloths. *Imitation or Pseudo-Backed Cloths*—Imitation Weft Backing—Imitation Warp Backing. *Backed Cloths with Wadding Threads*—Weft-Backed and Warp-Wadded Designs—Warp-Backed and Weft-Wadded Designs.

Introduction of Extra Threads.—The backed, double, treble, etc., principles of construction are employed for the purpose of increasing the warmth-retaining qualities of a cloth, and in order to secure greater weight and substance than can be acquired in a single structure which is equally fine on the surface. A heavy single cloth can only be made by using thick yarns, in conjunction with which it is necessary to employ only a comparatively few threads per unit space. A heavy single texture is therefore obliged to be somewhat coarse in appearance. By interweaving extra weft, or extra warp, or both extra weft and extra warp threads on the underside of a cloth, it is possible to obtain any desired weight combined with the fine surface appearance of a light single fabric.

In addition to being employed for the sole purpose of giving greater weight and substance to a cloth, extra threads are very frequently introduced for ornamental purposes only, the additional weight of the threads being of no account, while in other cases they are introduced both for weight and ornamentation. In order that comparisons may be made, three classes of cloths are represented in Fig. 1, which are illustrative of the three reasons for introducing extra threads. A shows the face and B the underside of a warp-backed trousering fabric, in which the extra threads are introduced only to give additional weight and substance; C shows the face, and D the underside of an extra-warp figured dress texture, in which the extra threads are solely for the purpose of ornamentation; while E and F show the two sides of a figured double-cloth reversible rug structure, in which the extra threads serve both for weight and ornamentation.

When the extra threads are inserted solely to give additional weight, the idea is to employ them in forming a back to a face fabric; and one of the advantages of the backed, double, treble, etc., systems of construction is that the extra weight can be obtained in an economical manner, since material which is inferior to the face yarns may be used on the underside. Backed cloths are constructed on both the extra weft and the extra warp principle; a cloth consisting in the former case of

two series of weft threads and one series of warp threads, and in the latter of two series of warp threads, and one series of weft threads. Double cloths are composed of two series both of weft and warp threads, and treble cloths of three series; while there are other structures which consist of three series of threads in one direction and two series of threads in the other direction. Cloths are not limited to three series of threads in one or both directions, but it is only in special cases that a greater number of series is employed.

Principles of Tying or Stitching.—When extra yarns are employed for weight-giving purposes, it is very important that the threads on the underside are bound to the face-texture with the proper degree of firmness, and that they are

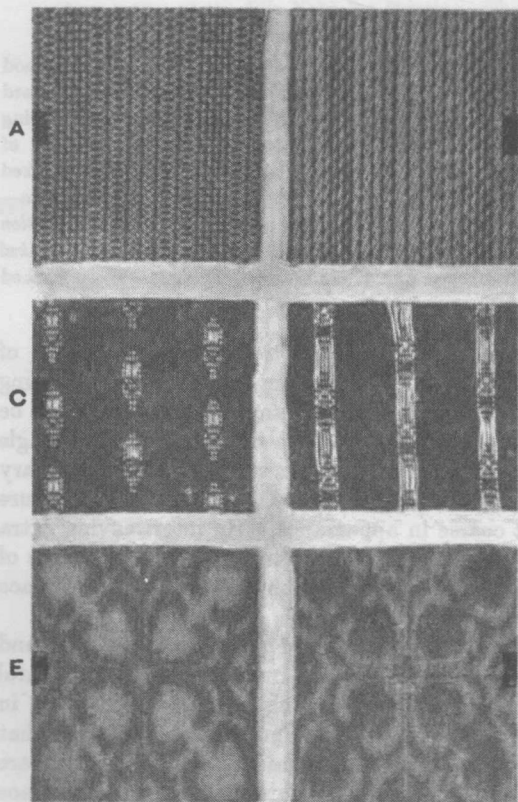


Fig. 1.

entirely invisible from the face side of the cloth. There are many features in tying or stitching which are common to the different classes of cloths, and these features are illustrated in a general way by the illustrations given in Figs. 2, 3, 4, and 5. Each flat view in the figures is shown connected by lines with a plan of the face weave of the cloth that is represented. The dotted lines in the flat views indicate the positions of warp and weft threads on the underside, while the solid black marks show the places where the back threads are raised over the face threads for tying. Corresponding positions of the ties are indicated by the black marks between the squares of the face plans. Assuming that the cloth is simply backed (with warp or weft as the case may be) the stitching marks indicate how the

back threads are interwoven; but if it be assumed that both warp and weft threads are employed in forming a cloth below the face fabric the marks only show how the two cloths are united.

In order to avoid the formation of marks or indentations in the face of a cloth, the threads on the underside should float over the threads of the face fabric between corresponding floats in the face weave. It is therefore necessary to carefully select suitable positions for the stitches or ties in the face weave, and for this reason the face weave that is employed largely determines the arrangement of the ties that is most applicable. The basis on which the face weave is constructed should be

ascertained, as from this the best order of distributing the ties can, in most cases, be judged. The following orders of distribution are in general use:—(a) Twill order, used for twill face weaves. (b) Sateen order, used for weaves based upon sateens, and also for the loose binding of twill weaves. (c) Plain or alternate order, used in binding certain weaves very firmly. (d) Irregular order, used for irregular weaves.

A in Fig. 2 represents a twill order of stitching a 2-and-2 twill face cloth with

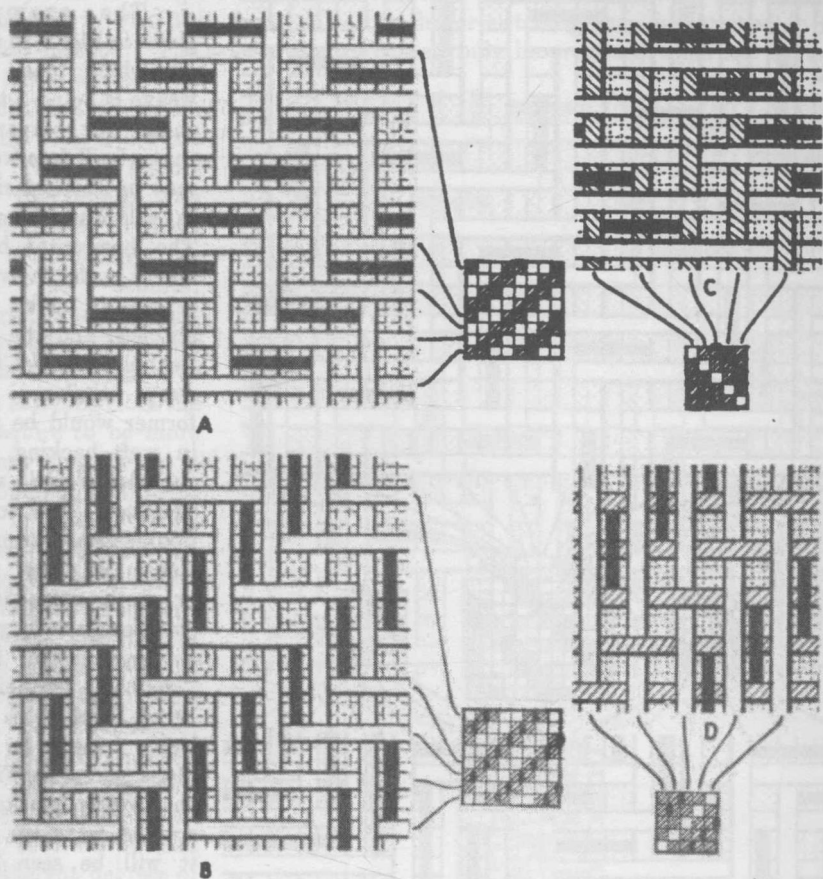


Fig. 2.

backing weft, and B with backing warp. In each case the backing threads are stitched with the face threads between corresponding floats in the face weave—e.g., in A, each backing weft stitch is indicated between face-weft floats, and in B, each backing warp stitch between face-warp floats. In the plan which corresponds with diagram A, the shaded marks represent the face-weft floats, while the black marks between the squares show where the backing picks float over the face ends, and coincide with the stitches shown in the flat view. The shaded squares, in the plan that corresponds with B, represent warp up, while the black marks between the squares, which coincide with the stitches shown in the flat view.

indicate where the backing ends float over the face picks. Similarly, C in Fig. 2 represents a 4 weft-and-1 warp twill face cloth, the ends of which are stitched in twill order by the backing picks; while D shows a 4 warp-and-1 weft twill in which the backing ends are raised in twill order over the face picks.

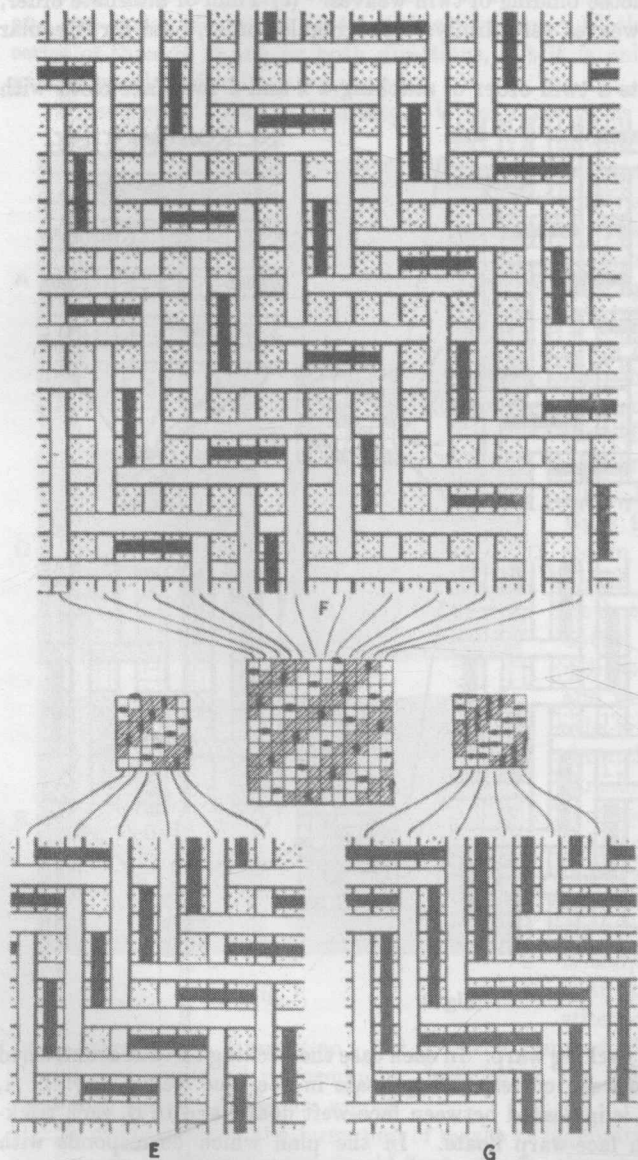


Fig. 3.

The examples given in Fig. 3, in each of which the face weave is 3-and-3 twill, show by comparison that a twill face weave may be stitched either in twill or sateen order. The horizontal black marks in the flat-views represent back weft stitches, and the vertical black marks, back warp stitches. The former would be used in weft backing, and the latter in warp backing; but in a double-cloth structure either of the two, or both methods in combination may be employed, the term "double - stitching" being applied in the latter case. In the plans given in Fig. 3 the weave marks represent warp up, and it will be seen that a warp tie is indicated between two marks, and a weft tie between two blanks. The twill order of stitching, shown at E, coincides with one repeat of the face twill weave, but

the sateen order requires the face twill to be extended to two repeats in each direction, as shown at F. Such an extension is necessary, in the 1 face, 1 back arrangement, when the face twill repeats on an even number of threads, whereas