

# VOLUME I.

## STRUCTURE OF FIBRES AND YARNS.

Cotton.	PAGE	PAGE	
Gossypium Barbadense.....	13	Grinding .....	42
Gossypium Arboreum.....	14	Stripping .....	44
Gossypium Hirsutum.....	14	Combing .....	44
Gossypium Herbaceum.....	14	Heilmann-Comb .....	44
Gossypium Peruvianum.....	14	Dobson and Barlow's Comb.....	45
Gossypium Reliosum.....	14	Imbs' Comb.....	46
Gossypium Tahitense.....	15	Ribbon-Lapper.....	47
Gossypium Sandwichense .....	15	Drawing .....	48
Examination of the Various Kinds Under the Microscope .....	15	Drawing-Frames .....	49
Ripe and Unripe Cotton .....	15	Stop-Motions .....	50
Chemical Composition .....	16	Back Stop-Motion .....	51
Sowing and Harvesting.....	16	Front Stop-Motion .....	51
Cleaning .....	16	Can Stop-Motion.....	51
Seed-Cotton Cleaner.....	16	Drawing Frame with Electric Stop-Motion.....	51
Ginning .. ..	18	Slubbing, Intermediate and Roving .....	52
Saw-gin .....	19	Slubbing .....	52
Improved Brush for Saw-gins.....	19	Intermediate-Frame .....	53
Automatic Oiling of Saws .....	19	Roving-Frame .....	53
Improved Saw-gin with Device for Grading.....	20	Speeders, Fly-Frames.....	55
Macarthy-gin .....	21	Differential-Motion .....	56
Improved Macarthy or Comb-gin .....	21	Holdsworth's Differential-Motion.....	57
Macarthy Double Roller-gin.....	21	New Differential-Motion.....	58
Feeders for Cotton-gins.....	22	Spinning .....	59
Cotton Spinning .....	23	Common Fly-Throstle .....	59
Mixing .....	23	Ring-Frame .....	60
Opening.....	24	Spindles .....	61
Opening and First Picking .....	24	Sawyer Spindle .....	61
Principle of Picking .....	26	Rabett Spindle .....	61
Finisher-Picker .....	27	Sherman Spindle.....	61
Piano Feed .....	28	Whitin Gravity Spindle.....	62
Carding .....	29	Separators .....	63
Principle of Carding .....	29	Doyle's Separator .....	63
Card Teeth .....	30	Cumming's Separator.....	64
Carding Engines.....	30	Stop-motion for Delivery of Roving in Spinning Frames .....	64
Roller Card .....	31	Tension-Regulating Device for Spindle-Driving Bands	65
Revolving Flat Carding Engine.....	31	Mule .....	66
Revolving Flat Clearer for Revolving Flat Cards.....	34	Table Showing the Square Root of the Various Counts from 1 to 200 with the Twist Per Inch for Different Kinds of Yarn .....	70
Top Flat Card .....	37	Doubling .....	70
Combination Card .....	38	Twisters Built upon the Throstle-Frame Principle.....	71
Double Carding Engines .....	38	Twisters Built upon the Mule-Jenny Principle .....	71
Breaker and Finisher Cards.....	39	Ring-Frame Twister, or Ring Twister.....	72
Lap-Winder .....	39	Gasing .....	72
Railway-Head .....	40	Polishing .....	72
Card Clothing Mounting Machine.....	41		

PAGE		PAGE	
<b>Wool.</b>			
Surface Structure.....	73	Soap .....	97
Felting Properties.....	74	Testing Soap .....	97
Comparing Hair and Wool.....	75	Hard and Soft Water.....	97
Natural Color of Wool.....	75	Heat and Strength for Scouring Liquor.....	97
Length, Crimp and Fineness.....	75	Influence of Scouring Liquor Upon the Fibre.....	98
Length of Staple.....	75	Stale Urine.....	98
Crimp and Fineness.....	75	Sodium-Carbonate .....	98
Elasticity.....	77	Potassium-Carbonate .....	98
Chemical Composition of Pure Wool.....	77	Ammonium-Carbonate .....	98
Trueness .....	77	Ammonia.....	98
Soundness .....	78	Sal-Ammoniac .....	98
Softness .....	78	Salt.....	98
Examination of Wool Fibres Under the Microscope.....	78	Wool-Scouring .....	99
Mouflons or Wild Sheep.....	81	Modern Wool-Scouring.....	99
Domestic Sheep.....	83	Construction of Scouring Machines.....	99
American Breeds of Sheep.....	83	Rake Scouring Machine.....	100
Foreign Breeds.....	84	Hydraulic Scouring Machine.....	101
Long-Wool Sheep.....	84	Rules for Scouring Wool.....	102
Lincoln Sheep.....	84	Wool-Drying.....	103
Romney Marsh Sheep .....	85	Screen or Table Wool-Dryer .....	103
Leicester Sheep .....	85	Automatic Continuous Wool-Dryer .....	104
Cotswold Sheep.....	85	Combining Washing and Drying Machines.....	106
Oxford-down Sheep .....	85	A New Style Wool-Dryer .....	106
Medium and Short-Wool Sheep.....	85	Burring .....	107
South-down Sheep.....	86	Carbonization of Wool.....	107
Dorset Sheep.....	86	Carbonization with Sulphuric Acid .....	108
Hampshire-down Sheep.....	86	Carbonization with Chloride of Aluminum .....	108
Cheviot Sheep.....	87	Carbonization with Chloride of Magnesium .....	108
Shropshire Sheep.....	87	Carbonization with a Strong Salt Solution.....	108
Black-faced Scotch Sheep.....	87	Carbonization with Acid Vapors.....	109
Sheep of the European Continent, Asia and Africa .....	88	Burr-Picker.....	109
Fat-rumped Sheep.....	88	Self-Feed for Burr-Pickers, Mixing-Pickers, and	
Fat-tailed Sheep.....	88	Scouring Machines.....	111
Wallachian Sheep.....	88	Wool-duster.....	112
Merino Sheep.....	89	Straight-Duster.....	113
Saxon Merino.....	89	Cone-Duster .....	113
Prussian Merino.....	90	Mixing .....	113
Silesian Merino.....	90	Method of Mixing.....	114
Hungarian Merino .....	90	Oiling by Hand.....	115
English Merino .....	90	Atomizing Wool Oiler for First Breaker-Cards.....	115
French Merino.....	90	Kinds of Oil to Use.....	116
Russian Merino .....	90	Testing Oils.....	116
African Merino.....	91	Quantity of Oil to be Used.....	116
Australian Merino.....	91	Construction of the Wool-Picker .....	117
American Merino.....	92	Carding .....	118
South American Merino.....	92	Set of Cards.....	118
Cashmere Goat.....	92	Self-Feed Machines for First Breaker-Cards.....	118
Angora Goat.....	92	Bramwell Self-Feed.....	119
Camel's Hair .....	93	Peckham Automatic Feeder.....	120
Camel.....	93	Lemaire Feeder.....	121
Llama.....	93	Construction of the Card Clothing and Relative Action	
Vicugna .....	93	of the Card Wires.....	121
Guanaco .....	94	Fillet Winding .....	122
Yamma or Llama.....	94	Covering with Sheets of Card Clothing.....	122
Alpaca or Paco.....	94	Illustration and Explanation of a Set of Cards .....	122
Grading of the Fleece .....	95	First Breaker-Card .....	123
Good and Bad Wool.....	96	Burring Machine as Attached to the First Breaker.....	125
Yolk .....	96	Single Burring Machine—Metallic Feed-Rolls.....	125
Scouring Agents and the Preparation of Scouring		Single Burring Machine with Feed-Rollers Attached.	126
Liquors .....	96	Double Burring Machine with Feed-Rollers Attached.	127
		Retainer-Roll for Feeding to the First Breaker-Card..	128

PAGE		PAGE	
<b>Metallic Breast.....</b>	129	1888 Comb .....	165
Combined Burrning Machine and Metallic-Breast.....	129	Little and Eastwood's Comb.....	166
Intermediate Feeding Machines.....	130	Balling or Top Making.....	167
Lap-Feeding System.....	130	Drawing .....	167
Ribbon System.....	130	Open Drawing.....	167
Side-Drawing System.....	130	Cone Drawing .....	169
Balls and Creel-Feed.....	130	French Drawing.....	170
Apperley-Feed .....	131	Set of French Drawing Machinery .....	171
Second Breaker .....	131	First Drawing-Frame .....	171
Finisher Carding Engine.....	131	Second Drawing-Frame.....	171
Condensers.....	131	Slubbing-Frame.....	172
Double-deck Condenser .....	132	Roving-Frame .....	172
Single-Doffer Condenser.....	132	Spinning .....	172
Three-Doffer Condenser.....	133	Flyer Spinning .....	172
Different Styles of Condensing Ribbons in Roving.....	134	Cap-Spinning .....	172
Condensing by Means of Rolls.....	134	Ring Spinning.....	173
Condensing by Means of Aprons.....	134	Mule .....	175
Condensing by Means of Apron and Rolls.....	134	Difference Between the English and French System of Drawing and Spinning.....	175
Bolette Condenser—Method of Operation .....	135	Twisting.....	175
Bolette Condenser made with Single Rubbers .....	135	Genapping .....	175
Bolette Condenser made with Double Rubbers.....	137	 <b>Silk.</b>	
Improved Bolette Condenser .....	137	Mulberry Silk Worm.....	176
Grinding.....	139	Egg .....	176
Turning and Covering Rollers.....	141	Larva.....	176
Preparing Waste for Re-working .....	141	Cocoon.....	177
Hard Waste.....	141	Color.....	177
Soft Waste.....	141	Moth.....	177
Rag or Shoddy Picker.....	141	Introduction of the Silk Worm into Europe.....	177
Garnette Machine.....	142	Cocoons in Their Natural State.....	177
Waste Duster.....	144	Polyvoltines .....	177
Spinning.....	144	Stifing .....	178
Modern Spinning Machinery.....	144	Sorting .....	178
Mule.....	144	Reeling .....	178
Spinning Machine.....	148	Silk Reel.....	179
Ring Spinning .....	149	Improved Silk Reel.....	180
Spinning Machine Attached to Finisher Card.....	149	Raw Silk .....	183
Single Yarn.....	149	Cleaning.....	183
Warp Yarn.....	150	Doubling.....	184
Filling Yarn .....	150	Twisting or Spinning.....	184
Twisting.....	150	Take-up Attachments for Doubling, Twisting or Spin- ning .....	184
Ring-Twister .....	151	Tram Silk .....	184
Two-Fold Yarn.....	151	Organzine Silk.....	185
 <b>Worsted.</b>		Silk Throwing.....	185
Different Methods of Manufacturing Worsted Yarns..	152	Single Silk .....	185
Principal Operations Composing the Manufacture .....	152	Scouring .....	185
Sorting, Scouring, Drying.....	153	Boiled-off Silk .....	185
Preparing Wool for Combing.....	153	Souple Silk.....	185
Preparing by Carding and Gilling.....	153	Ecru Silk.....	185
A. Carding.....	153	Shaking, Glossing and Lustreing .....	185
B. Backwashing and Gilling.....	154	Weighting of Silk.....	186
Preparing by Gilling .....	155	Silk-Conditioning .....	187
Improved Method of Working Fallers.....	155	Chemical Compositions.....	187
Gill-Box.....	156	Waste Silk .....	187
Preparing-Set .....	156	Wild Silk.....	188
Combing .....	156	Wild Silk Compared to Silk Produced by the Bombyx Mori .....	188
Combing by Machines.....	157	Carding, Combing and Spinning.....	189
Nip Comb.....	157	Tests for Distinguishing Silk From the Other Fibres..	189
Lister's Nip Comb.....	157		
Square-Motion Comb.....	161		
Noble Comb.....	162		
Dabbing Brush.....	165		

PAGE	PAGE
Thirty-eight Illustrations Showing the Gradual Development of Eggs (or Seeds) into Larva (or Worm) Chrysalis (or Cocoon), and Adult (or Moth)..... 189	Place of Growth..... 209
<b>Flax.</b>	Jute Spinning..... 209
Chemical Composition of Flax ..... 191	Softening ..... 210
Pulling of Flax ..... 191	Preparations Most Frequently Used for Softening..... 211
Rippling ..... 192	Jute Line ..... 211
Retting ..... 192	Hackling Machine ..... 211
Grassing ..... 192	Spreading, Drawing, Roving and Spinning..... 211
Dew-Retting ..... 193	Jute Tow ..... 211
Cold-Water Retting..... 193	Carding ..... 211
Scutching ..... 193	Breaker Card..... 212
Improved Power Scutcher..... 195	Finisher Card..... 212
Flax Spinning..... 198	Drawing, Roving, Spinning..... 212
Roughing ..... 198	<b>Ramie.</b>
Hackling..... 198	The Use of the Fibre..... 213
Sorting..... 199	Its Cultivation ..... 213
Spreading ..... 199	Status of the Ramie Industry..... 214
Carding ..... 201	England's Opinion on Ramie..... 214
Breaker-Card ..... 201	Machines and Processes for Decorticating Ramie, as Exhibited at the Late Paris Exposition..... 215
Finisher-Card..... 203	The Favier Machine..... 215
Combination-Card..... 203	The Landsheer Machine..... 216
Combing ..... 203	The Armand Barbier Machine..... 216
Drawing..... 203	The Michotte Machine..... 216
Roving-Frame ..... 205	The Fleury et A. Moriceau Process..... 216
Line System..... 205	An American Machine for Decortication ..... 216
Spinning ..... 206	Spreading, Drawing, Carding, Spinning..... 218
Wet Spinning..... 206	<b>China Grass.</b> ..... 219
Dry Spinning-Frame ..... 208	<b>Hemp.</b>
Drawing of Line and Tow During the Spinning ..... 208	Place of Growth..... 220
Reeling ..... 208	Best Method of Cultivation..... 220
<b>Jute.</b>	Retting..... 221
Fibres Magnified..... 209	Power Breaker in Use in this Country..... 221
Color..... 209	Hemp Compared to Flax..... 221

## List of Illustrations.

FIG.	Cotton.	PAGE	FIG.	PAGE	
1	Gossypium Barbadense .....	13	14	Side Elevation of Seed Cotton Cleaner .....	16
2	Sea Island Cotton Plant.....	13	15	Central Longitudinal Section of Cotton Cleaner	17
3	Gossypium Herbaceum (Indian Species) .....	14	16	End View of Seed Cotton Cleaner.....	17
4	Gossypium Herbaceum (European Species) .....	14	17	Vertical Longitudinal Section of Seed Cotton Cleaner .....	17
5	Illustration of Length of Staple of Sea Island, Up- lands, Peruvian, Egyptian and Indian Cottons. ....	15	18	Discharge Spout or Guide of Seed Cotton Cleaner .....	17
6	Sea Island Cotton Magnified.....	15	19	Vertical Sectional View of Seed Cotton Cleaner..	18
7	Upland Cotton Magnified.....	15	20	Sectional View of Saw-Gin.....	18
8	Surat Cotton Magnified.....	15	21	Perspective View of Brush for Saw-Gin.....	19
9	A. Unripe Cotton Fibre; B. Half-ripe Cotton Fibre; C. Ripe Cotton Fibre, Magnified .....	16	22	Inside Elevation of Portion of a Bristle-Holder for a Saw-Gin Brush .....	19
10	Transverse Sections of Ripe Cotton Fibres .....	16	23	Transverse Section of a Bristle-Holder for a Saw-Gin Brush .....	19
11	Transverse Sections of Unripe Cotton Fibres.....	16	24	End Elevation of Brush Cylinder .....	19
12	Structureless Cotton Fibre Magnified.....	16			
13	Transverse Sections of Cotton Fibres After Treat- ment with Caustic Alkalies.....	16			

# VOLUME II.

## CONTENTS.

### Calculations.

	PAGE
<b>Grading of the Various Yarns Used in the Manufacture of Textile Fabrics According to Size or Counts.....</b>	5
<b>Cotton Yarns.....</b>	5
Table of Lengths from No. 1 to 240's.....	5
Grading of Two-Ply, Three-Ply, etc., Yarns.....	5
To Find Weight in Ounces of a Given Number of Yards of a Known Count.....	6
To Find Weight in Pounds of a Given Number of Yards of a Known Count.....	6
To Find the Equivalent Size in Single Yarn for Two, Three or More Ply Yarn Composed of Minor Threads of Unequal Counts.....	7
<b>Woolen Yarns.....</b>	8
<i>A.</i> "Run" System.....	8
Table of Lengths from $\frac{1}{4}$ -run to 15-run .....	8
To Find the Weight in Ounces of a Given Number of Yards of a Known Count.....	8
To Find the Weight in Pounds of a Given Number of Yards of a Known Count.....	9
<i>B.</i> "Cut" System.....	9
Table of Lengths from 1-cut to 50-cut Yarn.....	9
To Find the Weight in Ounces of a Given Number of Yards of a Known Count.....	9
To Find the Weight in Pounds of a Given Number of Yards of a Known Count.....	9
Grading of Double and Twist or More Ply Yarns.....	10
<b>Worsted Yarns.....</b>	11
Table of Lengths from No. 1 to 200's.....	11
Grading of Two-ply, Three-ply, etc., Yarns.....	11
To Find the Weight in Ounces of a Given Number of Yards of a Known Count.....	11
To Find the Weight in Pounds of a Given Number of Yards of a Known Count.....	12
To Find the Equivalent Size in Single Yarn of Two, Three or More Ply Yarn Composed of Minor Threads of Unequal Counts.....	12
<b>Silk Yarns.....</b>	13
<i>A.</i> Spun Silks.....	13
<i>B.</i> Raw Silks.....	13
Length of raw Silk Yarns per Pound and per Ounce from 1 to 30 Drams.....	14
Linen Yarns, Jute Yarns, China Grass and Ramie.....	14
<b>To Find the Equivalent Counts of a Given Thread in Another System.....</b>	14
<i>A.</i> Cotton, Woolen and Worsted Yarns.....	14
<i>B.</i> Spun Silk Yarns Compared to Cotton, Woolen or Worsted Yarns.....	16
<i>C.</i> Linen Yarns, Jute and Ramie.....	16
<i>D.</i> Raw Silk Yarns Compared to Spun Silk, Cotton, Woolen or Worsted Yarns.....	16
<b>To Ascertain the Counts of Twisted Threads Composed of Different Materials.....</b>	17
If Compound Thread is Composed of Two Minor Threads of Different Materials.....	17
If Compound Thread is Composed of Three Minor Threads of Two or Three Different Materials.....	17
<b>To Ascertain the Counts for a Minor Thread to Produce, with Other Given Minor Threads, Two, Three or More Ply Yarn of a Given Count.....</b>	18
<i>A.</i> One System of Yarn.....	18
<i>B.</i> Two Systems of Yarns.....	19

	PAGE
<b>To Ascertain the Amount of Material Required for Each Minor Thread in Laying Out Lots for Two, Three or More Ply Yarn.....</b>	19
A. Double and Twist Yarn.....	19
Composed of Minor Threads of the Same Material.....	19
Composed of Minor Threads of Different Materials.....	20
B. Three or More Ply Yarns .....	20
Composed of Minor Threads of the Same Material.....	20
Composed of Minor Threads of Different Materials.....	21
<b>To Ascertain the Cost of Two, Three or More Ply Yarn.....</b>	22
Composed Either of Different Qualities of Yarn only, or of the Latter Item in Addition to Different Counts of Minor Threads.....	22
If One of the Minor Threads is of a Different Material than the Other.....	22
If a Three-ply Yarn is Composed of Minor Threads of Unequal Counts as well as of a Different Price.....	23
If a Three-ply Yarn is Composed of Minor Threads of different Materials as well as of Different Prices.....	24
<b>To Find the Mean or Average Value of Yarns of Mixed Stocks.....</b>	24
To Ascertain Medium Price of a Mixture when Price and Quantity of Each Ingredient are Given.....	24
To Find Quantity of Each Kind Wool to Use in a Mixture of a Given Value.....	25
To Find Quantity of Each Kind to Use when the Quantity of One Kind, the Different Prices of Each Kind and the Prices of the Mixture are Given.....	26
<b>Reed Calculations.....</b>	27
To Ascertain Ends in Warp Knowing Reed Number, Threads per Dent and Width of Warp in Reed.....	27
To Ascertain Reed Number if Number of Ends in Warp and Width in Reed are Known.....	27
To Ascertain Width of Warp in Reed if Reed Number, Threads per Dent and Threads in Warp are Known.....	28
<b>Warp Calculations.....</b>	29
To Find Weight of Warp if Number of Ends, Counts and Length are given.....	29
If Two or More Different Kinds of Yarn are Used.....	29
If Weight of Warp is Required to be Found for One Yard only .....	31
When Required to Ascertain the Weight of a Warp Dressed with Yarns of Various Counts and Answer Required is for the Total Weight of Warp.....	31
To Find the Counts for Warp Yarn if Number of Ends in Warp and Amount of Material, Length and Weight to be Used are Given.....	33
To Find Threads to Use if Counts of Yarns, Lengths and Weight of Warp are Given.....	34
To Find Length of Warp if Number of Ends, Counts and Weight of Yarn are Given.....	34
When Two or More Different Materials are Used in the Construction of Cloth.....	35
<b>Filling Calculations.....</b>	37
To Find the Length of Filling Yarn Required for Producing One or a Given Number of Yards of cloth, if Picks per Inch and Width of Cloth in Reed are Known.....	37
To Find Weight of Filling Yarn Required, Expressed in Ounces, producing One Yard of Cloth, if Picks per Inch, Width of Cloth in Reed and the Counts of Yarn are Known.....	37
To Find Weight of Filling Yarn Required, Expressed in Pounds or Fraction Thereof, for any Number of Yards if Picks per Inch, Width of Cloth in Reed and Counts of Yarn are Known.....	37
If Two or More Different Kinds of Filling Yarn are Used, and it is Required to Ascertain Weight of Material for Each Kind.....	38
If the Counts are Equal, and Lots Differ only in Color or Twist.....	38
If Filling Yarns of Different Counts of Materials are Used.....	39
To Find Counts for a Filling Yarn Required to Produce a Given Weight per Yard Cloth.....	40
If Such Example Refers to Weight Given in Ounces for One Yard.....	40
If Example Refers to a Given Number of Yards and Weight is Expressed in Pounds.....	40
To Find the Picks per Inch for a Piece of Cloth of which Counts of Yarn, Length of Cloth to be Woven, Width in Reed and the Amount of Material to be Used are Given.....	41
If Two or More Different Counts of Filling Yarn are Used.....	41
If Arrangement as to Counts of the Filling is of a Simple Form.....	41
If Arrangement of Filling has a Large Number of Picks in Repeat.....	42
To Ascertain Number of Yards of Cloth Woven for a Certain Amount of Yarn on Hand .....	42
<b>To Ascertain the Amount and Cost of the Materials Used in the Construction of Fabrics.....</b>	44
A. Find the Total Cost of Materials Used, and B. Find the Cost of the Same per Yard Finished Cloth.....	44
Fancy Cassimere.....	44
Worsted Suiting.....	44

	PAGE
Cotton Dress Goods.....	45
Woolen Tricot Suiting,.....	46
Worsted Suiting.....	46
Fancy Cassimere.....	48
Fancy Cotton Dress Goods.....	50
Worsted Suiting.....	52
Beaver Overcoating.....	53
Ingrain Carpet (Extra Fine ; Cotton Chain ; Worsted Filling).....	54
Ingrain Carpet (Extra Super ; Worsted Chain).....	55

## Structure of Textile Fabrics.

The Purpose of Wear that the Fabric will Be Subject to.....	57
The Nature of Raw Materials.....	57
Counts of Yarn Required to Produce a Perfect Structure of Cloth .....	58
To Find the Number of Ends which, in Cotton, Woolen, Worsted, Linen and Silk Yarns, can Lie Side by Side in One Inch.....	58
Table Showing the Number of Ends of Cotton Yarn from Single 5's to 2/160's that will Lie Side by Side in One Inch .....	60
Table Showing Number of Ends of Woolen Yarn "Run Basis," from 1-run to 10-run, that will Lie Side by Side in One Inch.....	60
Table Showing the Number of Ends of Woolen Yarn "Cut Basis" from 6-cut to 50-cut, that will Lie Side by Side in One Inch.....	61
Table Showing the Number of Ends of "Worsted Yarn," from 5's to 2/160's that will Lie Side by Side in One Inch .....	61
Table Showing the Number of Ends of Raw Silk Yarn, from 20 Drams to 1 dram, that will Lie Side by Side in One Inch.....	61
Table Showing the Number of Ends of Linen Yarns, from 10's to 100's, that will Lie Side by Side in One Inch....	62
To Find the Diameter of a Thread by Means of a Given Diameter of Another Count of Yarn .....	62
To Find the Counts of Yarn Required for a Given Warp Texture by Means of a Known Warp Texture with the Respective Counts of the Yarn Given.....	63
A. Dealing with One Material .....	63
B. Dealing with Two or More Materials.....	64
Influence of the Twist of Yarns upon the Texture of a Cloth.....	64
To Find the Amount of Twist Required for a Yarn if the Counts and Twist of a Yarn of the Same System, but of Different Counts, are Known.....	65
Influence of the Weave upon the Texture of a Fabric.....	66
To Find the Texture of a Cloth .....	67
To Change the Texture for Given Counts of Yarn from one Weaver to Another.....	70
To Change the Weight of a Fabric without Influencing its General Appearance .....	70
1. Given Cloth.....	71
2. Required Cloth.....	72
1. Given Cloth.....	72
2. Required Cloth.....	73
To Find number of Ends Per Inch in Required Cloth.....	73
Weaves which will Work with the Same Texture as the $\frac{2}{2}$ Twill.....	74
Weaves which will Work with the Same Texture as the $\frac{3}{3} \frac{4}{4}$ etc. Twill.....	74
Selections of the Proper Texture for Fabrics Interlaced with Satin Weaves.....	75
Selection of the Proper Texture for Fabrics Interlaced with Rib Weaves.....	75
Warp Effects.....	75
Filling Effects.....	76
Figured Rib Weaves .....	76
Selections of the Proper Texture for Fabrics Interlaced with Corkscrew Weaves.....	76
Selection of the Proper Texture for Fabrics Constructed with Two Systems Filling and One System Warp.....	77
Selection of the Proper Texture for Fabrics Constructed with Two Systems Warp and One System Filling.....	79
Selection of the Proper Texture for Fabrics Constructed with Two Systems Warp and Two Systems Filling.....	82
One End Face, to Alternate with One End Back in Warp and Filling.....	82
Two Ends Face, to Alternate with One End Back in Warp and Filling.....	83

## Arithmetic.

Specially Adapted for Textile Purposes.

PAGE		PAGE	
Addition .....	85	Square Root of Mixed Numbers.....	105
Subtraction .....	85	Table of Square Roots (From 1 to 240).....	105
Multiplication .....	86	Cube Root.....	106
Division .....	88	To Find the Cube Root of a Given Number .....	106
Parenthesis or Brackets.....	89	Table of Cube Roots (From 2 to 50).....	107
Principle of Cancellation .....	90	Average and Percentage.....	107
Common Fractions.....	91	Average.....	107
Addition of Common Fractions .....	92	Percentage .....	108
Subtraction of Common Fractions .....	94	To Find the Rate Per Cent .....	108
Multiplication of Common Fractions.....	94	To Find the Base .....	108
Division of Common Fractions.....	95	Ratio.....	108
Decimal Fractions .....	96	Proportion .....	109
Addition of Decimal Fractions.....	98	Single Proportion.....	109
Subtraction of Decimal Fractions.....	98	Compound Proportion.....	110
Multiplication of Decimal Fractions .....	99	Alligation .....	111
Division of Decimal Fractions.....	99	Alligation, Medial .....	111
Square Root.....	101	Alligation, Alternate .....	111
To Find the Square Root for any Number .....	101	U. S. Measure.....	112
Square Root of Decimal Fractions .....	102	Metric System .....	113
Square Root of Common Fractions.....	103		

**Index and Glossary, Page 114.**

## Calculations.

### List of Illustrations.

FIG.		FIG.		PAGE
1 Woolen Thread Magnified		22 Plain Weave.....		68
2 Worsted Yarn Magnified		23 $\frac{2}{2}$ Twill .....		69
3 Mohair Magnified	For the Purpose of Ascertaining Texture to Use for the Construction of Textile Fabrics.....	24 $\frac{3}{3}$ Twill .....		70
4 Cotton Yarn Magnified	58	25 $\frac{3}{2} \frac{1}{3}$ Twill .....		70
5 Silk Yarn Magnified		26 $\frac{2}{2}$ Twill.....		71
6 Diagram of Fabric Having Warp and Filling Twisted in the Same direction .....	65	27 $\frac{3}{3}$ Twill .....		72
7 Diagram of Fabric Having Warp and Filling Twisted in the Opposite Direction.....	65	28 Seven-Leaf Satin [Warp for Face].....		75
8 $\frac{4}{4}$ Twill.....	66	29 $\frac{3}{3}$ Rib Weave Warp Effect .....		76
9 Plain Weave.....	66	30 $\frac{4}{2}$ Rib Weave Warp Effect .....		76
10 Diagram		31 Figured Rib Weave .....		76
11 Complete Weave } of the $\frac{2 \ 1 \ 1 \ 1}{2 \ 2 \ 2 \ 2}$ Twill .....	67	32 Nine-Harness Corkscrew .....		77
12 Section }		33 Figured Corkscrew.....		77
13 Diagram		34, 35, 36, 37, 38, 39, 40 Weaves for Fabrics Constructed with Two Systems of Filling and One System of Warp.....		77, 78, 79
14 Section } of the $\frac{2 \ 1 \ 1 \ 1}{1 \ 1 \ 1 \ 2}$ Twill .....	67	41, 42, 43, 44 Weaves for Fabrics Constructed with Two Systems of Warp and One System of Filling.....		79, 80, 81
15 Complete Weave }		45, 46, 47, 48 Weaves for Double Cloth Fabrics..		82, 83, 84
16 Complete Weave }				
17 Diagram } of the $\frac{3}{3}$ Twill .....	67			
18 Section }				
19 Complete Weave }				
20 Diagram } of the $\frac{2 \ 1 \ 1 \ 1}{1 \ 1 \ 1 \ 1}$ Twill .....	68			
21 Section }				