

## How do we name a weave?

- Fabric structure
- Fabric weight
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- Yarn balance
- Finishes

## Weaves

### Basic weaves

- Plain weave
  - Basket weave
- Twill weave
  - even-sided
  - warp-faced
- Satin weave
  - Sateen

### Complex weaves

- Figured weave
  - Lappet, swivel, spot
  - Jacquard
- Pile weave
- Leno weave
- Crepe and crepe effect

## Three Basic Weaves

- **Plain weave** : made by weaving one weft yarn over and under each warp yarn, alternating each row. It is the most common type of weave.
- **Twill weave** :
- **Satin weave** : made by "floating" the warp or weft yarns across several yarns to bring them to the surface.

### Plain Weaves

- Simplest weave, can be made on a loom having only two harnesses.
- Weave provides maximum number of yarn interlacings: each warp goes over one fill then under the next, with odd and even yarns weaving opposite to each other.

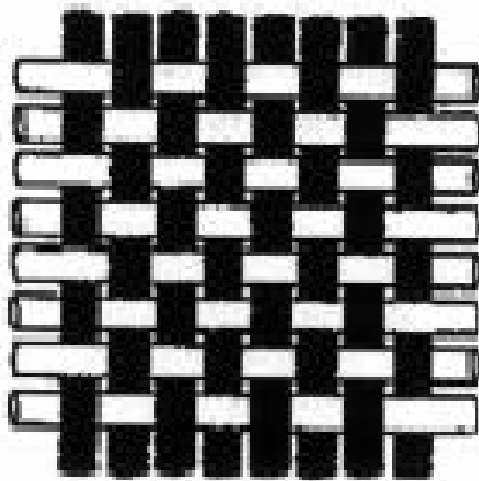
### Characteristics of Plain Weave

- Raveling related to count & yarn cohesiveness
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- Used in apparel, furnishings, & industrial goods
- Weight dictates end use: lighter weights in apparel & curtains; heavier weights in upholstery, draperies, & industrial goods

*Fairchild's Dictionary of Textiles, 7th ed.*

## Plain weaves

- Simplest and most important of the three basic weaves, used in about 80% of all woven fabric
- The plain weave repeats on two ends and two picks. The first end passes over the first pick and under the second pick. The second pick reverses this action, and weaves one down and one up. The weave is executed by passing each filling yarn successively over and under each warp yarn, alternating each row.
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- Broadcloth, Calico, Muslin, Print cloth, Sheeting, Taffeta
- Derivative; Basket weave



## Plain Weaves

- About 90% of all cloth woven is plain weave.
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- Unbalanced plain weaves show horizontal ribs, with the rib

becoming more pronounced as the difference in yarn sizes increases (filling yarns thicker than warp yarns).

## Balanced Plain Weave

- **Plain weave fabric**

- Widest range of end uses; number of warp equals number of filling.
- **Lightweight:** Very thin, light weight, transparent or semi-transparent due to fine combed or filament yarns of strong fibers or low count or both; high count with very fine yarns.

## Balanced Plain Weave (cont.)

- **Lightweight and sheer:**
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- **Lightweight and opaque:** slightly larger yarns; may have higher count; lawn, batiste, china silk, challis
- Low count sheers

## Lightweight Plain Weave

- Lawn
- Voile
- Chiffon

## Balanced Plain Weave

- **Medium weight:** Most common for apparel.
  - Durable: widest range of types and uses and quality levels
  - Medium size yarns
  - Medium count
  - Medium weight range

- Examples: print cloth, percale, plissé, embossed, chintz, polished cotton, true crepe, muslin, flannelette, gingham, chambray, taffeta

## Balanced Plain Weave: Heavy Weight

- **Heavy weight:** Also known as bottom or suiting weight.
  - More durable
  - More resistant to wrinkling
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  - Ravels more if count is low
  - Examples crash, burlap, tweed, suiting, homespun, butcher rayon, osnaburg, flannel

## Heavy Weight Plain Weave Fabrics

- Crash
- Flannel

## Unbalanced Plain Weave

- **Rib or Rep**
  - Balance is 1:2 or 2:1 or more.
  - Count is greater by 2-3 times in one direction.
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  - Slippage may occur with filament yarns; wear concentrates on one set of yarns.

## Unbalanced Plain Weave

- Yarn size often differs between warp and filling.
  - **Light weight:** not common; dimity, crepe de chine
  - **Medium weight:** common; broadcloth, taffeta, shantung
  - **Heavy weight:** common; poplin, faille, flannelette, Bedford cord

# Unbalanced

- **More yarns in one direction than the other**
- **2x more warp yarns creates a rib in the filling directions**
- **Shantung** – silk, irregular due to slubs
- Broadcloth – classic shirting
- Poplin – heavier than broadcloth
- **Faille** –
  
- **Taffeta** – flat filament yarns, warp and fill
- Repp – silk, used for neckties
- Bengaline – pronounced rib, heavy filling yarns
- **Grosgrain** – pronounced rib, silk warp with cotton filling in some, ribbons are often grosgrain

## Unbalanced Plain Weave Fabrics

- Crepe de chine
  
- Taffeta

## Plain Weave Variants

### 1. Basket Weaves

- Basket weaves of any description may be woven on a loom having two harnesses. Common basket weaves are 2x2, 3x2, 3x3, and 4x4.
- A shirting fabric similar to oxford cloth is the 3x2 “matte” weave.
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- Because of the yarn floats, basket weaves tend to be softer and to drape better than comparable plain weaves. More flexible, wrinkle resistant, floats can snag

### • Types:

- Full (basket in both directions)
- Half (basket in warp or filling)
- Partial (occasional basket feature)

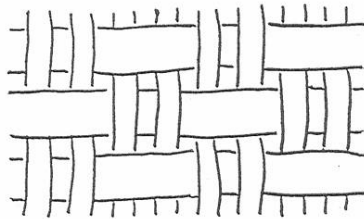
# Plain Weave Variants

## 2. Oxford Weave

- 2x1(half basket) Basket Weave, can be woven on two harnesses, warp yarns are paired.
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- Oxford cloth, a common shirting, is woven with this pattern, using yarn dyed or white warp with white fill. Filling yarns are customarily twice the size of warp yarns. Pin point oxford is a higher count with finer yarns. Duck is also woven this way, while canvas is plain weave.

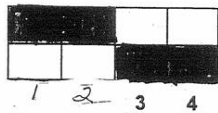
### PLAIN WEAVE VARIANTS

#### OXFORD CLOTH

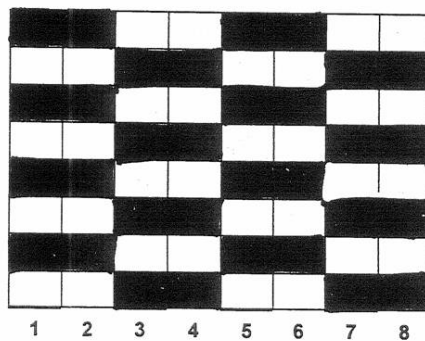


Repeat

ooxx  
xxoo



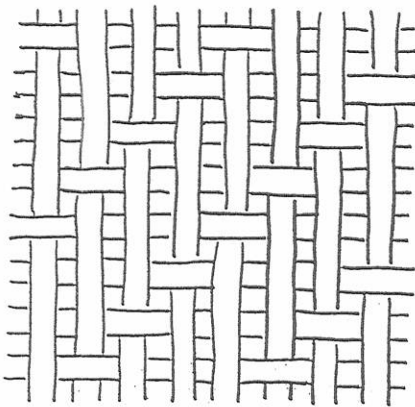
Filling yarns "float" over two warp yarns and under the next two.  
Showing 8 ends and 8 picks:



# Twill Weaves

- Twill weaves are characterized by diagonal ribs caused by staggered floats of yarn on the fabric face. Face and back are different; fabrics are usually used with the warp yarns predominating on the face.
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- Twill fabrics which are balanced in fabric count and in warp and fill yarn sizes show a 45 degree twill angle. Unbalanced twills may show steeper or shallower twill angles.

TWILL WEAVE

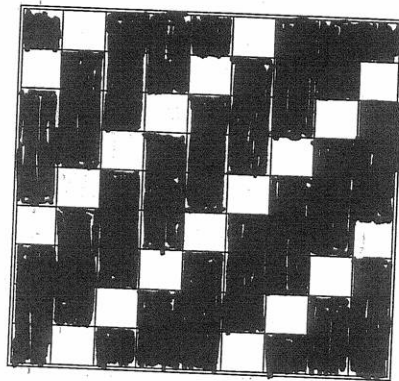


3/1 Right  
Handed

Repeat

○ x x x  
x x x ○  
x x ○ x  
x ○ x x

TWILL WEAVE 3/1 RIGHT HANDED WEAVE



## Characteristics of Twill Weaves

- May have face/back and up/down orientation
- Interesting surface and texture
- Seldom printed

- Soil less evident
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- More pliable
- Better wrinkle recovery
- High counts possible (more durable)
- More expensive
- Wale may be prominent

*Fairchild's Dictionary of Textiles, 7th ed.*

## Twill weave

- A basic weave characterized by a diagonal rib, or twill line, generally running upward from left to right.
- Each end floats over or under at least two consecutive picks, and the points of intersection move one outward and one upward, on succeeding picks, to produce the diagonal line.
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- The smallest twill repeats on three yarns and is known as the *two up and one down (2/1)*.
- One of the most popular weaves in men's wear is the smallest even-sided twill, *two up, two down*.
- Twill weaves are used to produce strong, durable, firm fabrics.
- Broken twill, Corkscrew weave, Entwining twill weave, Figured weave, Herringbone twill.
- Variation: Reclining twill or Steep twill (the greater the difference between the number of warp and filling yarns the steeper the twill line)

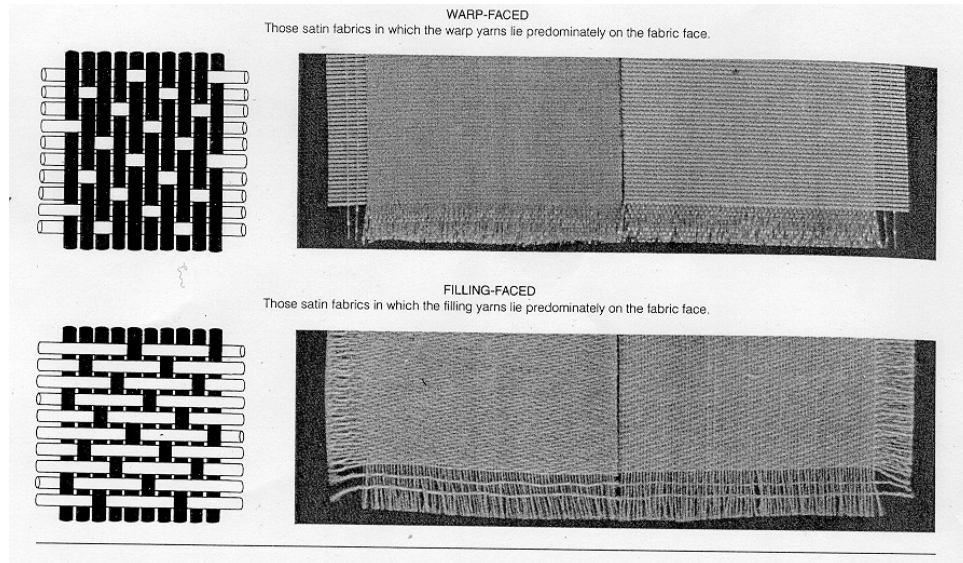
## Twill Weaves

- A loom must have a minimum of three harnesses to weave a twill fabric. Typical pattern repeats are :
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  - Even sided twill – warp floats over same number of yarns it floats under

## Twill Weaves

- Common twill fabrics include:
- Even sided:
  - Serge – Common worsted suiting fabric, 2/2 RH
  - Herringbone – Alternating twill
  - Checks – Color effect weaves, usually 2/2 twill
  - Houndstooth
  - Surah- silk or silky yarns
- warp faced
  - Denim – (Serge de Nimes), Classically 3/1 LH
  - Gabardine – Steep twill, slacks, uniform
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- Twills are not as strong as plain weaves with similar construction.
- Twills show less dirt/stains because of their uneven surface as compared to plain weaves
- Recover better from wrinkles





## Satin Weaves

- A minimum of five harnesses are needed to weave a satin fabric.
- The most common satins are 5-harness and 8-harness.

## Satin Weaves

- Satin fabrics are usually woven with flat continuous filament yarns, and are warp-faced.
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- Flannel backed satins have a flat filament warp and a spun fill; the filling side is napped.

*Fairchild's Dictionary of Textiles, 7th ed.*

## Satin weave

- The face of the fabric is formed almost completely of warp or filling floats produced in the repeat of the weave. This is achieved by spacing the yarn crossover or intersection points as evenly and widely as possible.
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- The weave produces a fabric with a characteristic smooth surface, employing a considerably greater number of yarns in the set that forms the face.

## Characteristics of Satin Weaves

- One set of yarns on face and one set on back
- Requires loom of 5 to 12 harnesses

- Lustrous with long floats
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- **Low count satins:** sleazy and weak

## Characteristics of Satin Weaves

- Satin made with filament yarns - prone to slip
- Definite face and back
- Unbalanced
- Slick; pliable, wrinkle resistant
- Ravels and frays

## Satin Weave- sateen fabric

## Complex Weaves

Combinations of the basic weaves create more patterns

**Fancy fabrics:** Design produced at the same time as the fabric is woven.

–More expensive; more permanent design than applied designs; specialized looms required

## Figured Weaves

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- Small figured weaves are those which repeat on 32 picks or less. A “dobby” attachment to the loom is needed for these weaves. Dobbies enable individual control of up to 32 harnesses.

## Dobby Loom

## Figured Weaves

- The original dobbie was a small boy who sat on top of the loom and raised individual warp yarns so that pattern could be produced. Today, all patterning is done by machine
- Patterns produced by dobbie looms are small and usually geometric.
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- Examples of fabrics produced on a dobbie loom are:
  - Bedford Cord: looks somewhat like corduroy
  - Bird’s-Eye Piqué: raised diamond effect, have stuffer yarns
  - Bull’s-Eye Piqué
  - Waffle Cloth: raised honeycomb effect
  - Shirting Madras: raised vertical stripes
  - Dotted Swiss: swivel, spot, extra warp or fill

## Extra yarn weaves- a type of dobby weave

- Extra yarns are used only in certain areas of the fabric to create a surface design in those areas. These extra yarns may be woven in either warp or fill direction.
  - Examples: Lappet  
Swivel  
clipped spot of clipped dot  
(Dotted Swiss)  
Pique'-

## lappet

## Figured Weaves- Jacquard weaves

- Large figured weaves are produced on a Jacquard loom, which provides individual control for each heddle through the use of punched pattern cards linked to form a pattern chain. (Harnesses are not used.) One pattern card is needed for every pick in the pattern repeat.
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- Patterns are created by combining elements of the three basic weaves-plain, twill and satin-in the same cloth. The figure may be of satin against a background of plain or twill in the simplest cases.

## Jacquard Loom

Example of large figured weaves produced on a Jacquard loom include:

- Brocade: elaborate figures, usually on a satin background, satin or twill floats on plain, ribbed, twill or satin background
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- Matelasse: patterns stand out and give a pouched or quilted effect
- Tapestry: picture fabric, the entire scene is woven into the fabric. No repeat is necessary. More durable if warp and fill yarns are comparable.

## Double Cloth

- Many of the large figured weaves make use of double-cloth design, with two separate warps and a common filling. Many of the fabrics having the larger repeats have long floats of yarn, particularly on the back of the fabric, when a particular end may appear infrequently on the fabric face in the pattern.
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- Matelasse is an example- 2 sets of yarn are regular warp and filling, others are crepe or coarse cotton
- Why cotton or crepe?
- Shrink when washed giving a pouched effect

Double cloth method of producing a pile fabric:

## Pile Weaves

- Pile weaves make use of extra warp or filling yarns to create surface pile of loops or cut ends. Special loom attachments are needed for these weaves.
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- The denser the ground fabric, more yarns per inch the higher quality the fabric

## Pile Weaves

- Examples of warp pile weaves include:
  - Velvet: Short, dense pile always cut, often silk, cotton or rayon. Used in apparel
  - Terry Cloth: Long pile, often on both sides of fabric, may be cut or uncut. Used in towelling, robes.

## Pile Weaves

- Filling pile weaves use extra filling yarns to create the pile. Warp and one filling weave the fabric ground, while the extra filling provides the pile. Pile is almost always cut.
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- When corduroy or terry cloth contain polyester/cotton blends, the blends are always in the ground, never in the pile.

## Pile Weaves

- Examples of filling pile weaves include:
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  - Corduroy: French “corde du roi” – the King’s cords. Vertical ribs, or wales are created by arranging the floats in lengthwise rows. In weaving a second filling floats over the ground and then is cut and brushed to produce pile. Corduroy may be featherwale (18-21 wales per inch), pinwale (16-18), midwale (14), thickset (11), or widewale (2-9).

## Other Weaves

- Leno Weaves-Adjacent warps twisted together with the filling yarns interlaced between. Marquisette, Casement Fabrics.
- Yarns are locked in even though it is an open weave fabric

## Crepe and Crepe Effect Fabrics

- True crepe made with high twist yarns. Fabric is woven smooth and then immersed in water where it shrinks and yarns kink to get characteristic pebbly surface. Wrap or fill crepe has high twist yarn in W or F. Balanced crepe has W or F crepe yarns
  - Chiffon
  - Georgette

## Crepe and Crepe Effect Fabrics

- Matelassé –
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- Seersucker - crepe yarns shrink when placed in water. Result is crosswise puckers, usually striped.

seersucker

## Crepe Effects

- Crepe effect by weaving - crepe weave imitates crepe but no yarns

of high twist are used. Rather fabric has appearance of spots or seeds due to irregular floats. Also granite or momie weave, sand crepe, granite cloth. Moss crepe uses both crepe yarns and crepe weave.

- Crepe effect by slack tension weave - slack yarns create puckered stripes. Seersucker.
- Crepe Weaves - Intricate irregular weave patterns create pebbly or buckled surface effects.  
Examples: Momie, Granite Cloth, Pebble Cloth.
- Momie weave is no distinct pattern in weave but effect is appearance that is uneven- a crepe effect.

## Crepe weave Crepe Effects

Crepe effect by finish

- Caustic soda treatment causes shrinkage in treated areas. Puckers fabric. Plissé
- Embossed crepe press crinkled shape into surface of fabric.

Crepe effect using textured yarns such as low twist false twist textured yarns.

## Narrow fabrics

- Products up to 12 inches wide
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- Narrow-fabric looms weave many fabrics side by side
- Each fabric has its own shuttle
- All weaves are used