

## SECTION D — TEXTILES; PAPER

## D04 BRAIDING; LACE-MAKING; KNITTING; TRIMMINGS; NON-WOVEN FABRICS

## D04B KNITTING

**Note(s)**

1. In this subclass, groups designating machines, apparatus, devices, or implements include processes characterised by, or dependent on, their use, and the products of such processes.
2. Knitted products, i.e. fabrics, articles, are classified in this subclass only if they have constructional features which are of interest from the knitting aspect.

**Subclass index**

## WEFT KNITTING AND MACHINES THEREFOR

|  |                  |
|--|------------------|
| General processes or knitted articles.....                                     | 1/00             |
| Hand tools or implements; knitting apparatus or machines for domestic use..... | 3/00, 5/00, 7/08 |
| Flat-bed knitting machines:  |                  |
| with independently-movable needles; with fixed needles.....                    | 7/00, 11/00      |
| Circular knitting machines:  |                  |
| with independently-movable needles; with fixed spring or bearded needles.....  | 9/00, 13/00      |
| Details or auxiliary devices incorporated in the machines.....                 | 15/00, 35/00     |

## WARP KNITTING AND MACHINES THEREFOR

|   |       |
|---|-------|
| General processes and knitted articles..... | 21/00 |
| Machines                                    |       |

|  |              |
|--|--------------|
| flat-bed; other types.....                                     | 23/00, 25/00 |
| details or auxiliary devices incorporated in the machines..... | 27/00, 35/00 |

## AUXILIARY APPARATUS USED WITH KNITTING MACHINES.....37/00

## CROCHETING AND APPARATUS THEREFOR

|   |              |
|---|--------------|
| Processes; tools or implements.....                             | 31/00, 33/00 |
| Details or auxiliary devices incorporated in the apparatus..... | 35/00        |

## REPAIRING; UNRAVELLING.....17/00, 19/00

## PROCESSES AND KNITTING MACHINES NOT OTHERWISE PROVIDED FOR.....39/00

**Weft knitting: Machines therefor**

|             |   |
|-------------|---|
| <b>1/00</b> | <b>Weft knitting processes for the production of fabrics or articles not dependent on the use of particular machines; Fabrics or articles defined by such processes</b> |
| 1/02        | • Pile fabrics or articles having similar surface features  |
| 1/04        | • • characterised by thread material  |
| 1/06        | • Non-run fabrics or articles   |
| 1/08        | • • characterised by thread material  |
| 1/10        | • Patterned fabrics or articles   |
| 1/12        | • • characterised by thread material  |
| 1/14        | • Other fabrics or articles characterised primarily by the use of particular thread materials   |
| 1/16        | • • synthetic threads   |
| 1/18        | • • elastic threads   |
| 1/20        | • • • crimped threads   |
| 1/22        | • specially adapted for knitting goods of particular configuration  |
| 1/24        | • • wearing apparel   |
| 1/26        | • • • stockings   |

1/28 • • • gloves

**3/00 Hand tools or implements for weft knitting**

|      |  |
|------|--|
| 3/02 | • Needles                              |
| 3/04 | • Finger protectors; Thread tensioners |
| 3/06 | • Ball holders or receptacles          |

**5/00 Weft knitting apparatus or machines without needles for domestic use (with needles D04B 7/08)****7/00 Flat-bed knitting machines with independently-movable needles (straight-bar machines with fixed needles D04B 11/00)**

|      |   |
|------|---|
| 7/02 | • with one set of needles   |
| 7/04 | • with two sets of needles  |
| 7/06 | • • for purl work or Links-Links loop formation                             |
| 7/08 | • for domestic use  |
| 7/10 | • with provision for narrowing or widening to produce fully-fashioned goods |
| 7/12 | • with provision for incorporating pile threads                             |
| 7/14 | • with provision for incorporating internal threads in laid-in fabrics      |

## D04B

- 7/16 • for producing fabrics consisting of, or incorporating, elastic threads
- 7/18 • • incorporated as weft or inlaid threads
- 7/20 • with provision for changing the fabric construction, e.g. from plain to rib-loop fabric
- 7/22 • with special provision for commencing goods, e.g. with non-run edges
- 7/24 • for producing patterned fabrics
- 7/26 • • with colour patterns
- 7/28 • • with stitch patterns
- 7/30 • specially adapted for knitting goods of particular configuration
- 7/32 • • tubular goods
- 7/34 • • • gloves

### 9/00 **Circular weftknitting machines with independently-movable needles** (with fixed spring or bearded needles D04B 13/00)

- 9/02 • with one set of needles
- 9/04 • • with spring or bearded needles
- 9/06 • with needle cylinder and dial for ribbed goods
- 9/08 • • for interlock goods
- 9/10 • with two needle cylinders for purl work or for Links-Links loop formation
- 9/12 • with provision for incorporating pile threads
- 9/14 • with provision for incorporating loose fibres, e.g. in high-pile fabrics
- 9/16 • with provision for incorporating internal threads in laid-in fabrics
- 9/18 • with provision for splicing by incorporating reinforcing threads
- 9/20 • with provision for narrowing or widening; with reciprocity action, e.g. for knitting of flat portions
- 9/22 • with provision for changing the fabric construction, e.g. from plain to rib-loop fabric
- 9/24 • with special provision for commencing goods, e.g. with non-run edges
- 9/26 • for producing patterned fabrics
- 9/28 • • with colour patterns
- 9/30 • • • by striping
- 9/32 • • • • by wrap striping
- 9/34 • • • by plating
- 9/36 • • • Intarsia work obtained by reciprocity action
- 9/38 • • with stitch patterns
- 9/40 • with provision for transfer of knitted goods from one machine to another
- 9/42 • specially adapted for producing goods of particular configuration
- 9/44 • • elongated tubular articles of small diameter, e.g. coverings for cables (sheathing electric cables H01B 13/22)
- 9/46 • • stockings, or portions thereof
- 9/48 • • • non-run stockings
- 9/50 • • • • micromesh stockings
- 9/52 • • • surgical stockings
- 9/54 • • • welts, e.g. double or turned welts
- 9/56 • • • heel or toe portions
- 9/58 • • gloves

### 11/00 **Straight-bar knitting machines with fixed needles** (flat-bed machines with independently-movable needles D04B 7/00)

- 11/02 • with one set of needles
- 11/04 • with two sets of needles
- 11/06 • with provision for narrowing or widening to produce fully-fashioned goods

- 11/08 • with provision for incorporating pile threads
- 11/10 • with provision for incorporating internal threads in laid-in fabrics
- 11/12 • for producing fabrics from, or incorporating, elastic threads
- 11/14 • with provision for changing the fabric construction, e.g. from plain to rib-loop fabric
- 11/16 • with special provision for commencing goods, e.g. with non-run edges
- 11/18 • for producing patterned fabrics
- 11/20 • • with colour patterns
- 11/22 • • with stitch patterns
- 11/24 • with provision for transfer of knitted goods from one machine to another
- 11/26 • specially adapted for producing goods of particular configuration
- 11/28 • • stockings, or portions thereof
- 11/30 • • • non-run stockings
- 11/32 • • • welts, e.g. double or turned welts
- 11/34 • • • heel or toe portions
- 11/36 • • other wearing apparel

### 13/00 **Circular weft knitting machines with fixed spring or bearded needles, e.g. loop-wheel machines** (with independently-movable needles D04B 9/00)

- 13/02 • with horizontal needles

### 15/00 **Details of, or auxiliary devices incorporated in, weft knitting machines, restricted to machines of this kind** (details or auxiliary devices not so restricted D04B 35/00)

- 15/02 • Loop-transfer points
- 15/04 • • for straight-bar knitting machines
- 15/06 • Sinkers
- 15/08 • Needle latch openers; Brushes
- 15/10 • Needle beds
- 15/12 • • Shogging devices therefor
- 15/14 • Needle cylinders
- 15/16 • • Driving devices for reciprocity action
- 15/18 • Dials
- 15/20 • Needle bars
- 15/22 • • Driving devices therefor
- 15/24 • Sinker heads; Sinker bars
- 15/26 • Slurcocks
- 15/28 • Needle pressers
- 15/30 • Driving devices for thread-carrier rods
- 15/32 • Cam systems or assemblies for operating knitting instruments
- 15/34 • • for dials
- 15/36 • • for flat-bed knitting machines
- 15/38 • Devices for supplying, feeding, or guiding threads to needles
- 15/40 • • Holders or supports for thread packages
- 15/42 • • • Frames for assemblies of two or more reels
- 15/44 • • Tensioning devices for individual threads
- 15/46 • • • for elastic threads
- 15/48 • • Thread-feeding devices
- 15/50 • • • for elastic threads
- 15/52 • • • for straight-bar knitting machines
- 15/54 • • Thread guides
- 15/56 • • • for flat-bed knitting machines
- 15/58 • • • for circular knitting machines; Thread-changing devices
- 15/60 • • • • with thread-clamping or -severing devices
- 15/61 • • • • arranged within needle circle

- 15/62 • • • • with thread knotters
- 15/64 • • • for straight-bar knitting machines
- 15/66 • Devices for determining or controlling patterns
- 15/68 • • characterised by the knitting instruments used
- 15/70 • • • in flat-bed knitting machines
- 15/72 • • • in straight-bar knitting machines
- 15/74 • • • Pattern drums
- 15/76 • • • Pattern wheels
- 15/78 • • • Electrical devices
- 15/80 • • characterised by the thread guides used
- 15/82 • • characterised by the needle cams used
- 15/84 • • Jacquard cards or mechanisms (stamping apparatus therefor D03C)
- 15/86 • • • in flat-bed knitting machines
- 15/88 • Take-up or draw-off devices for knitting products
- 15/90 • • for flat-bed knitting machines
- 15/92 • • pneumatic
- 15/94 • Driving-gear not otherwise provided for
- 15/96 • • in flat-bed knitting machines
- 15/98 • • in straight-bar knitting machines
- 15/99 • • electrically controlled

### **Repairing or unravelling knitted fabrics**

#### **17/00 Repairing knitted fabrics by knitting operations**

- 17/02 • by darning
- 17/04 • by picking-up dropped stitches

#### **19/00 Unravelling knitted fabrics**

### **Warp knitting: Machines therefor**

#### **21/00 Warp knitting processes for the production of fabrics or articles not dependent on the use of particular machines; Fabrics or articles defined by such processes**

- 21/02 • Pile fabrics or articles having similar surface features
- 21/04 • • characterised by thread material
- 21/06 • Patterned fabrics or articles (open-work fabrics D04B 21/10)
- 21/08 • • characterised by thread material
- 21/10 • Open-work fabrics
- 21/12 • • characterised by thread material
- 21/14 • Fabrics characterised by the incorporation by knitting, in one or more thread, fleece, or fabric layers, of reinforcing, binding, or decorative threads; Fabrics incorporating small auxiliary elements, e.g. for decorative purposes (pile fabrics D04B 21/02; non-woven fabrics in general D04H)
- 21/16 • • incorporating synthetic threads
- 21/18 • • incorporating elastic threads
- 21/20 • specially adapted for knitting articles of particular configuration

#### **23/00 Flat warp knitting machines**

- 23/02 • with two sets of needles
- 23/04 • with independently-movable knitting needles
- 23/06 • for producing fabrics consisting of, or incorporating, elastic threads
- 23/08 • with provision for incorporating pile threads
- 23/10 • for knitting through thread, fleece, or fabric layers, or around elongated core material
- 23/12 • with provision for incorporating unlooped wefts extending from selvage to selvage

- 23/14 • with provision for incorporating small auxiliary elements, e.g. for decorative purposes
- 23/16 • specially adapted for producing fabrics, or article blanks, of particular form or configuration
- 23/18 • • with provision for narrowing or widening
- 23/20 • • for producing stocking blanks
- 23/22 • with special thread-guiding means
- 23/24 • with cut needle presser arrangements to produce patterns

#### **25/00 Warp knitting machines not otherwise provided for**

- 25/02 • Tubular machines
- 25/04 • Milanese machines
- 25/06 • Galloon crocheting machines
- 25/08 • • for producing pile fabrics
- 25/10 • • for producing patterned fabrics
- 25/12 • • • with independently-movable weft-thread guides controlled by Jacquard mechanisms
- 25/14 • • specially adapted for producing articles of particular configuration

#### **27/00 Details of, or auxiliary devices incorporated in, warp knitting machines, restricted to machines of this kind (details or auxiliary devices not so restricted D04B 35/00)**

- 27/02 • Warp-thread guides
- 27/04 • Sinkers
- 27/06 • Needle bars; Sinker bars
- 27/08 • • Driving devices therefor
- 27/10 • Devices for supplying, feeding, or guiding threads to needles
- 27/12 • • Tensioning devices for individual threads
- 27/14 • • Thread tensioning rod arrangements
- 27/16 • • Warp beams; Bearings therefor
- 27/18 • • • Warp beam braking devices for thread tensioning
- 27/20 • • • Warp beam driving devices
- 27/22 • • • • electrically controlled
- 27/24 • • Thread guide bar assemblies
- 27/26 • • • Shogging devices therefor
- 27/28 • • • • with arrangements to reduce the number of members of pattern chains
- 27/30 • • • • with driving-gear comprising force-multiplication devices
- 27/32 • • • with independently-movable thread guides controlled by Jacquard mechanisms
- 27/34 • Take-up or draw-off devices for knitted products
- 27/36 • • with temples

### **Crocheting: Apparatus therefor**

#### **31/00 Crocheting processes for the production of fabrics or articles**

- 31/02 • Crocheted strips or threads

#### **33/00 Crocheting tools or apparatus (galloon crocheting machines for warp knitting D04B 25/06)**

- 
- 35/00 **Details of, or auxiliary devices incorporated in, knitting machines, not otherwise provided for**
  - 35/02 • Knitting tools or instruments not provided for in group D04B 15/00 or D04B 27/00 (needle manufacture B21G 1/00)
  - 35/04 • • Latch needles

## D04B

- 35/06 • • Sliding-tongue needles
- 35/08 • • Spring or bearded needles
- 35/10 • Indicating, warning, or safety devices, e.g. stop motions
- 35/12 • • responsive to thread consumption
- 35/14 • • responsive to thread breakage
- 35/16 • • • with detectors associated with a series of threads
- 35/18 • • responsive to breakage, misplacement, or malfunctioning of knitting instruments
- 35/20 • • responsive to defects, e.g. holes in knitted products
- 35/22 • Devices for preparatory treatment of threads
- 35/24 • • by moistening or lubricating
- 35/26 • • by heating
- 35/28 • Devices for lubricating machine parts (in general F16N)
- 35/30 • Devices for controlling temperature of machine parts
- 35/32 • Devices for removing lint or fluff
- 35/34 • Devices for cutting knitted fabrics
- 35/36 • Devices for printing, coating, or napping knitted fabrics
- 37/00 Auxiliary apparatus or devices for use with knitting machines** (Jacquard cards, pattern chains, apparatus for punching same D03C)
  - 37/02 • with weft knitting machines
  - 37/04 • • for inserting or adjusting pattern pins or like elements in pattern drums or wheels
  - 37/06 • with warp knitting machines
- 39/00 Knitting processes, apparatus or machines, not otherwise provided for**
  - 39/02 • with work carrier in screw form
  - 39/04 • adapted for combined weft and warp knitting
  - 39/06 • adapted for combined knitting and weaving
  - 39/08 • Sewing machines modified for knitting

## D04C BRAIDING OR MANUFACTURE OF LACE, INCLUDING BOBBIN-NET OR CARBONISED LACE; BRAIDING MACHINES; BRAID; LACE (machines for making soles from strips of material A43D 29/00; cane working B27J 1/00)

- 1/00 Braid or lace, e.g. pillow-lace; Processes for the manufacture thereof**
  - 1/02 • made from particular materials
  - 1/04 • • Carbonised or like lace
  - 1/06 • Braid or lace serving particular purposes
  - 1/08 • • Tulle fabrics
  - 1/10 • • • Pattern tulle fabrics
  - 1/12 • • Cords, lines, or tows
- 3/00 Braiding or lacing machines**
  - 3/02 • with spool carriers guided by track plates or by bobbin heads exclusively
  - 3/04 • • with spool carriers guided and reciprocating in non-endless paths
  - 3/06 • • with spool carriers moving always in the same direction in endless paths
  - 3/08 • • with means for superimposing threads or braids
  - 3/10 • • with means for forming edge loops, ears, or eyes
  - 3/12 • • with means for introducing core threads
  - 3/14 • • Spool carriers
    - 3/16 • • • for horizontal spools
    - 3/18 • • • for vertical spools
  - 3/20 • • Arrangement of bobbin heads and guides or track plates in the machine
  - 3/22 • • Guides or track plates (with means for controlling spool carriers D04C 3/24)
  - 3/24 • • Devices for controlling spool carriers to obtain patterns, e.g. devices on guides or track plates
    - 3/26 • • • by stopping bobbin heads
    - 3/28 • • • by stopping only the spool carrier
    - 3/30 • • • by controlling switches of guides or track plates
    - 3/32 • • Pattern input
  - 3/34 • • Beater or beat-up mechanisms
  - 3/36 • • Frames
  - 3/38 • • Driving-gear; Starting or stopping mechanisms
  - 3/40 • for making tubular braids by circulating strand supplies around braiding centre at equal distances
  - 3/42 • • with means for forming sheds by controlling guides for individual threads
  - 3/44 • • with means for forming sheds by subsequently diverting various threads using the same guiding means
    - 3/46 • • with thread carriers supported on rolls
    - 3/48 • Auxiliary devices
- 5/00 Twist or bobbin-net lace-making machines** (bobbins B65H 75/02)
  - 5/02 • Net looms for tulle fabrics
  - 5/04 • Net or lace curtain machines
  - 5/06 • Machines for making twist-lace fabrics
  - 5/08 • Bobbin carriages
  - 5/10 • Bobbin-carriage guides; Drives for swinging bobbin carriages
  - 5/12 • Drives for advancing bobbin carriages
  - 5/14 • • Pattern input
  - 5/16 • Warp thread feeding or guiding devices
  - 5/18 • • Guide bars; Guiding means therefor; Pattern input by control thereof
    - 5/20 • • Jacks or pickers; Pattern input by control thereof
    - 5/22 • Delivery devices
    - 5/24 • Driving-gear; Starting or stopping mechanisms
    - 5/26 • Auxiliary devices
- 7/00 Tools or apparatus for braiding or lacing by hand**

## D04D TRIMMINGS; RIBBONS, TAPES, OR BANDS, NOT OTHERWISE PROVIDED FOR (fittings or trimmings for hats, e.g. hat bands, A42C 5/00; decorating art B44; yarns or threads D02G; weaving D03; braid or lace D04C; non-woven fabrics D04H)

### Note(s)

In this subclass, the following term is used with the meaning indicated:

- "trimmings" means decorative or ornamental articles made wholly or partly of textile or analogous material, or strips of textile or analogous material intended to be used for decorative or ornamental purposes, not otherwise provided for.

|  |  |
|--|--|
| <p><b>1/00 Ropes or like decorative or ornamental elongated trimmings made from filamentary material</b> (ropes or cords in general D07B)</p> <p>1/02 • by twisting strands around centrally arranged cores</p> <p>1/04 • by threading or stringing pearls or beads on filamentary material</p> <p><b>3/00 Chenille trimmings</b> (chenille yarns D02G; making chenille trimmings by weaving D03D)</p> <p><b>5/00 Fringes</b> (tasselled D04D 7/08)</p> <p><b>7/00 Decorative or ornamental textile articles</b></p> <p>7/02 • Flat articles</p> <p>7/04 • Three-dimensional articles (ornamental buttons A44B 1/04)</p> | <p>7/06 • • Ball-like tufts, e.g. pompons</p> <p>7/08 • • Tassels or tasselled fringes</p> <p>7/10 • • Decorative bow structures (neckties with ready-made knots or bows A41D 25/02)</p>   |
|  | <p><b>9/00 Ribbons, tapes, welts, bands, beadings, or other decorative or ornamental strips, not otherwise provided for</b> (made by laminating B32B; binders for packaging purposes B65D; adhesive tape C09J 7/02; made by weaving D03; made by braiding D04C)</p> <p>9/02 • made by lengthwise folding of fabric strip</p> <p>9/04 • built-up from several strips or elements</p> <p>9/06 • made by working plastics</p> |
|  | <p><b>11/00 Ribbon-threading apparatus or devices</b> (needles D05B)</p>   |

**D04G MAKING NETS BY KNOTTING OF FILAMENTARY MATERIAL; MAKING KNOTTED CARPETS OR TAPESTRIES; KNOTTING NOT OTHERWISE PROVIDED FOR** (binding knotters for harvesters A01D 59/04; wire netting B21F; tying articles by knotting B65B; knotting in association with winding or unwinding B65H 69/00; knotting in weaving D03J; making nets, carpets, or tapestries by other techniques, see the relevant subclasses)

|  |   |
|--|---|
| <p><b>1/00 Making nets by knotting of filamentary material</b></p> <p>1/02 • in machines</p> <p>1/04 • • using a single thread</p> <p>1/06 • • using a single thread and a series of threads</p> <p>1/08 • • using two series of threads</p> | <p><b>3/00 Making knotted carpets or tapestries</b></p> <p>3/02 • by hand; Tools therefor</p> <p>3/04 • in machines</p> |
|  | <p><b>5/00 Knotting not otherwise provided for</b></p>  |

**D04H MAKING TEXTILE FABRICS, e.g. FROM FIBRES OR FILAMENTARY MATERIAL** (weaving D03; knitting D04B; braiding D04C; net-making D04G; sewing D05B; tufting D05C; finishing non-woven fabrics D06); **FABRICS MADE BY SUCH PROCESSES OR APPARATUS, e.g. FELTS, NON-WOVEN FABRICS; COTTON-WOOL; WADDING** (non-woven fabrics having an intermediate or external layer of a different kind, e.g. of woven fabric, B32B)

#### Note(s)

- In this subclass, the following expression is used with the meaning indicated:
  - "non-woven fabrics" means fabrics formed wholly or partly of textile material by processes comprising operations other than the weaving, knitting, braiding, lacing, or knotting of yarns, threads, or filaments for which provision is made in other subclasses of section D. This expression includes felts, cotton-wool and wadding.
- In this subclass:
  - some of the non-woven fabrics can also be regarded as "layered products" within the meaning of subclass B32B, and further classification in that subclass should be considered in accordance with the notes thereto;
  - in cases where the making of non-woven fabrics involves the use of particular chemical compounds or compositions, e.g. for treating or bonding fibres, filaments, or yarns, further classification in other appropriate subclasses should also be considered.
- By varying the proportions of fibres or threads, and the chemical compounds or compositions, the final products may be given the appearance of paper, cardboard, leather, or the like.

#### Subclass index

TYPES AND CONSTRUCTIONAL FEATURES OF NON-WOVEN FABRICS; APPARATUS AND PROCESSES FOR PRODUCING THEM

|   |                  |
|---|------------------|
| From short fibres; from long fibres; from mixture of short and long fibres..... | 1/00, 3/00, 5/00 |
| Pile fabrics.....   | 11/00            |
| Other non-woven fabrics.....  | 13/00            |
| FELTING APPARATUS; NEEDLING MACHINES.....                                       | 17/00, 18/00     |

**Kinds or types of non-woven fabrics; Apparatus or processes for making such products**

**1/00 Non-woven fabrics formed wholly or mainly of staple fibres or like relatively short fibres**

- 1/02 • Cotton-wool; Wadding (carding D01G)
- 1/04 • from fleeces or layers composed of fibres having existing or potential cohesive properties, e.g. natural fibres, prestretched or fibrillated artificial fibres (felting apparatus D04H 17/00)
- 1/06 • • by treatment to produce shrinking, swelling, crimping, or curling of fibres (curling or crimping of fibres, filaments, or yarns D02G 1/00)
- 1/08 • • and hardened by felting; Felts or felted products
- 1/10 • • • Felts made from mixtures of fibres
- 1/12 • • • • and incorporating artificial organic fibres
- 1/14 • • • • and incorporating inorganic fibres
- 1/16 • • • Laminated felts in which the separate layers are united by a felting process
- 1/20 • • • Felts incorporating inserts or attachments, e.g. for ornamental purposes
- 1/22 • • • Three-dimensional articles formed by felting processes
- 1/24 • • • Covers felted on to three-dimensional articles
- 1/40 • from fleeces or layers composed of fibres without existing or potential cohesive properties
- 1/42 • • characterised by the use of certain kinds of fibres insofar as this use has no preponderant influence on the consolidation of the fleece
- 1/44 • • the fleeces or layers being consolidated by mechanical means, e.g. by rolling
- 1/45 • • • by forming intermeshing loops or stitches from some of the fibres (knitting D04B; sewing D05B) [4]
- 1/46 • • • by needling or like operations to cause entanglement of fibres (D04H 1/45 takes precedence; needling machines D04H 18/00) [4]
- 1/48 • • • • in combination with at least one other method of consolidation, e.g. with application of bonding agents
- 1/50 • • • by treatment to produce shrinking, swelling, crimping, or curling of fibres (curling or crimping of fibres, filaments, or yarns D02G 1/00)
- 1/52 • • • by applying or inserting filamentary binding elements (knitting D04B; sewing D05B)
- 1/54 • • by welding together the fibres, e.g. by partially melting or dissolving (in combination with needling D04H 1/48)
- 1/56 • • • in association with fibre formation, e.g. immediately following extrusion of staple fibres
- 1/58 • • by applying, incorporating, or activating chemical or thermoplastic bonding agents, e.g. adhesives (in combination with needling D04H 1/48)
- 1/60 • • • the bonding agent being applied in dry state, e.g. thermo-activatable agents in solid or molten state, and heat being applied subsequently
- 1/62 • • • • at spaced points or locations
- 1/64 • • • the bonding agent being applied in wet state, e.g. chemical agents in dispersions or solutions
- 1/66 • • • • at spaced points or locations (D04H 1/68 takes precedence)
- 1/68 • • • • the bonding agent being applied in the form of foam

- 1/70 • characterised by the method of forming fleeces or layers, e.g. reorientation of fibres (lap-forming devices D01G 25/00; paper web-making by wet methods D21F, D21H) [4]
- 1/72 • • the fibres being randomly arranged
- 1/74 • • the fibres being orientated, e.g. in parallel

**3/00 Non-woven fabrics formed wholly or mainly of yarns or like filamentary material of substantial length**

- 3/02 • characterised by the method of forming fleeces or layers, e.g. reorientation of yarns or filaments (lap-forming devices D01G 25/00; paper web-making by wet methods D21F, D21H) [4]
- 3/03 • • at random
- 3/04 • • in rectilinear paths, e.g. crossing at right angles
- 3/05 • • in another pattern, e.g. zig-zag, sinusoidal
- 3/07 • • otherwise than in a plane, e.g. in a tubular way
- 3/08 • characterised by the method of strengthening or consolidating
- 3/10 • • with bonds between yarns or filaments made mechanically (needling machines D04H 18/00; knitting D04B; sewing D05B)
- 3/12 • • with filaments or yarns secured together by chemical or thermo-activatable bonding agents, e.g. adhesives, applied or incorporated in liquid or solid form
- 3/14 • • with bonds between thermoplastic yarns or filaments produced by welding
- 3/16 • • • with bonds between thermoplastic filaments produced in association with filament formation, e.g. immediately following extrusion [4]

**5/00 Non-woven fabrics formed of mixtures of relatively-short fibres and yarns or like filamentary material of substantial length**

- 5/02 • strengthened or consolidated by mechanical methods, e.g. needling (needling machines D04H 18/00; knitting D04B; sewing D05B)
- 5/04 • strengthened or consolidated by applying or incorporating chemical or thermo-activatable bonding agents in solid or liquid form
- 5/06 • strengthened or consolidated by welding-together thermoplastic fibres, filaments, or yarns
- 5/08 • characterised by the method of forming fleeces or layers, e.g. reorientation of fibres or yarns (lap-forming devices D01G 25/00; paper web-making by wet methods D21F, D21H) [4]

**11/00 Non-woven pile fabrics** (layered products forming non-woven pile fabrics B32B; woven pile fabrics D03D; tufting D05C)

- 11/04 • formed by zig-zag folding of a fleece or layer of staple fibres, filaments, or yarns, strengthened or consolidated at the folds
- 11/08 • formed by creation of a pile on at least one surface of a non-woven fabric without addition of pile-forming material, e.g. by needling, by differential shrinking (needling machines D04H 18/00)

**13/00 Other non-woven fabrics**

- 13/02 • Production of non-woven fabrics by partial defibrillating of oriented thermoplastics films [4]

**17/00 Felting apparatus**

- 17/10 • for felting between rollers, e.g. heated rollers
- 17/12 • • Multi-roller apparatus

18/00 Needling machines