SECTION F — MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

F16 ENGINEERING ELEMENTS OR UNITS; GENERAL MEASURES FOR PRODUCING AND MAINTAINING EFFECTIVE FUNCTIONING OF MACHINES OR INSTALLATIONS; THERMAL INSULATION IN GENERAL

F16B DEVICES FOR FASTENING OR SECURING CONSTRUCTIONAL ELEMENTS OR MACHINE PARTS TOGETHER, e.g. NAILS, BOLTS, CIRCLIPS, CLAMPS, CLIPS OR WEDGES; JOINTS OR JOINTING (couplings for transmitting rotation F16D)

Note(s) [5, 2006.01]

Attention is drawn to:

a. the Note following group E04B 1/38;
b. the following places:

A44B.....Buckles, slide fasteners
A47G 3/00.....Ornamental heads for nails, screws, or the like
B42F 3/00.....Means, not using staples, for attaching sheets temporarily together
E01B 9/10.....Screws or bolts for railway sleepers
E01B 11/00.....Rail joints
E04.....Connections for building
E04D 13/08.....Clamping means for down pipes for roof drainage
E04F 13/21.....Fastening means specially adapted for covering or lining elements for buildings
E04G 5/04.....Fastening scaffolds against buildings
E04G 7/00.....Scaffolding couplings
E05C.....Bolts or fasteners for wings, specially for doors or windows
F16C 29/10.....Locking bearings for parts moving only linearly
F16G 17/00.....Hooks as integral parts of chains
F16L.....Pipe joints
F16L 3/00.....Supports for pipes, cables or protective tubing, e.g. hangers, holders, clamps, cleats, clips, brackets
F16L 33/02.....Clips for connecting hoses to rigid members
H01F 7/00.....Magnetic holding devices
H02N 13/00.....Electrostatic holding devices.

Subclass index

TYPES OF FASTENING
By: clamping, wedging.....2/00, 3/00
By: shrinking or force fit; sticking or pressing together; penetration of one member into a hole in another.....4/00, 11/00, 17/00
Fastening of plates, strips, bars, or tubes together or to flat surfaces.....5/00, 7/00, 9/00
For specific applications
for furniture.....12/00
for fixing in walls.....13/00
by screw-thread modified in view of tensile load.....31/00
FASTENING MEANS
General
clamps; clips; wedges, keys.....2/00, 3/00
dowels.....13/00
other fastening means.....1/00, 45/00, 47/00
Without screw-thread
nails, staples; bolts, pins, or rivets.....15/00, 19/00
locking stud-and-socket fastenings against axial movement.....21/00
With screw-thread
screws; bolts, break-bolts, nuts.....25/00, 15/06, 27/00, 27/00, 31/00, 35/00, 37/00
features common to bolts and screws.....23/00, 27/00, 33/00
deformation of nut or equivalent while fastening; locking of screws, bolts, or nuts.....29/00, 39/00
Accessories for fastening means.....41/00, 43/00

1/00 **Devices for securing together, or preventing relative movement between, constructional elements or machine parts [1, 2006.01]**

Note(s) [2]

Groups F16B 2/00-F16B 47/00 take precedence over group F16B 1/00.

1/02 • Means for securing elements of mechanisms after operation (means for bringing members to rest F16D) **[1, 2006.01]**

1/04 • • disengaged by movement of the actuating member of the element (locking of actuators G05G, e.g. G05G 5/00) **[1, 2006.01]**

Fastenings for constructional elements or machine parts in general

2/00 **Friction-grip releasable fastenings** (for cables or ropes, e.g. cleats, F16G 11/00; supports for pipes, cables or protective tubing F16L 3/00) **[1, 2006.01]**

2/02 • Clamps, i.e. with gripping action effected by positive means other than the inherent resistance to deformation of the material of the fastening **[1, 2006.01]**

2/04 • • internal, i.e. with spreading action (F16B 2/14-F16B 2/18 take precedence) **[1, 2006.01]**

2/06 • • external, i.e. with contracting action (F16B 2/14-F16B 2/18 take precedence) **[1, 2006.01]**

2/08 • • • using bands (clips for connecting hoses to rigid members F16L 33/02) **[1, 2006.01]**

2/10 • • • using pivoting jaws **[1, 2006.01]**

2/12 • • • using sliding jaws **[1, 2006.01]**

2/14 • • using wedges **[1, 2006.01]**

2/16 • • using rollers or balls **[1, 2006.01]**

2/18 • • using cams, levers, eccentrics, or toggles **[1, 2006.01]**

2/20 • Clips, i.e. with gripping action effected solely by the inherent resistance to deformation of the material of the fastening **[1, 2006.01]**

2/22 • • of resilient material, e.g. rubbery material **[1, 2006.01]**

2/24 • • • of metal **[1, 2006.01]**

2/26 • • of pliable non-resilient material, e.g. plant tie **[1, 2006.01]**

3/00 **Key-type connections; Keys** (F16B 2/00 takes precedence; for rods or tubes mutually F16B 7/00) **[1, 2006.01]**

3/04 • using keys formed of wire or other flexible material, to be inserted through an opening giving access to grooves in the adjacent surfaces of the parts to be connected **[1, 2006.01]**

3/06 • using taper sleeves **[1, 2006.01]**

4/00 **Shrinkage connection, e.g. assembled with the parts at different temperature; Force fits** (restricted to metal parts or objects B23P 11/02)**; Non-releasable friction-grip fastenings** (F16B 2/00 takes precedence) **[1, 2006.01]**

5/00 **Joining sheets or plates to one another or to strips or bars parallel to them** (by sticking together F16B 11/00; dowel connections F16B 13/00; pins, including deformable elements F16B 19/00; covering of walls E04F 13/00; fastening signs, plates, panels, or boards to a supporting structure, fastening readily-detachable elements, e.g. letters, to signs, plates, panels, or boards, G09F 7/00) **[1, 2006.01]**

5/01 • by means of fastening elements specially adapted for honeycomb panels **[1, 2006.01]**

5/02 • by means of fastening members using screw-thread (construction of screw-threaded connections F16B 25/00-F16B 39/00) **[1, 2006.01]**

5/04 • by means of riveting (rivets F16B 19/04) **[1, 2006.01]**

5/06 • by means of clamps or clips (friction-grip releasable fastenings in general F16B 2/00) **[1, 2006.01]**

5/07 • by means of multiple interengaging protrusions on the surfaces, e.g. hooks, coils **[1, 2006.01]**

5/08 • by means of welds or the like (welding B23K) **[1, 2006.01]**

5/10 • by means of bayonet connections (fastening devices locking by rotation F16B 21/02) **[1, 2006.01]**

5/12 • Fastening strips or bars to sheets or plates, e.g. rubber strips, decorative strips for motor vehicles, by means of clips (friction-grip releasable fastenings in general F16B 2/00; fastening rods or tubular parts to flat surfaces at an angle F16B 9/00; clips for connecting hoses to rigid members F16L 33/02) **[1, 2006.01]**

7/00 **Connections of rods or tubes, e.g. of non-circular section, mutually, including resilient connections** (umbrella frames A45B 25/02; welding or soldering of connections B23K; vehicle connections in general B60D; railway couplings B61G; bicycle frames B62K; couplings for transmitting rotation F16D; couplings for tubes conveying fluid F16L) **[1, 2006.01]**

7/02 • with conical parts **[1, 2006.01]**

7/04 • Clamping or clipping connections (friction-grip releasable fastenings in general F16B 2/00) **[1, 2006.01]**

7/06 • Turnbuckles (for cables, ropes, or wire F16G 11/12) **[1, 2006.01]**

7/08 • Pipe saddles (friction-grip releasable fastenings in general F16B 2/00) **[1, 2006.01]**

7/10 • Telescoping systems (for scaffolding E04G 25/04; telescope props for mining E21D 15/14-E21D 15/46; stands or trestles as supports for apparatus or articles placed thereon F16M 11/00) **[1, 2006.01]**

7/12 • • locking only in extreme extended position **[1, 2006.01]**

7/14 • • locking in intermediate positions **[1, 2006.01]**

7/16 • • • locking only against movement in one direction **[1, 2006.01]**

7/18 • using screw-thread elements **[1, 2006.01]**

7/20 • using bayonet connections **[1, 2006.01]**

7/22 • using hooks or like elements **[1, 2006.01]**

9/00 **Connections of rods or tubular parts to flat surfaces at an angle** (friction-grip releasable fastenings in general F16B 2/00; making press-fit connections B23P 11/00, B23P 19/00; fluid-tight connecting of pipes to reservoirs, sheets, or the like F16L, e.g. joining pipes to walls F16L 41/00; supports for pipes, cables or protective tubing F16L 3/00) **[1, 2006.01]**

9/02 • Detachable connections **[1, 2006.01]**

11/00 **Connecting constructional elements or machine parts by sticking or pressing them together, e.g. cold pressure welding** (non-electric welding in general B23K; methods of using adhesives independently of the form of the surfaces joined C09J 5/00) **[1, 2006.01]**

12/00 **Jointing of furniture or the like, e.g. hidden from exterior** (F16B 2/00-F16B 11/00 take precedence; fastening means per se F16B 13/00-F16B 47/00; wood-working B27) **[1, 2006.01]**

12/02 • Joints between panels and corner posts **[1, 2006.01]**

12/04 • Non-loosenable joints for non-metal furniture parts, e.g. glued **[1, 2006.01]**

12/06 • Non-loosenable joints for metal furniture parts **[1, 2006.01]**

12/08 • • without use of separate connecting elements **[1, 2006.01]**

12/10 • using pegs, bolts, tenons, clamps, clips, or the like (glued F16B 12/04; fastening means per se F16B 15/00-F16B 47/00) **[1, 2006.01]**

12/12 • • for non-metal furniture parts, e.g. made of wood, of plastics **[1, 2006.01]**

12/14 • • • using threaded bolts or screws **[1, 2006.01]**

12/16 • • • • using self-tapping screws **[1, 2006.01]**

12/18 • • • • using drawing bars **[1, 2006.01]**

12/20 • • • using clamps, clips, wedges, sliding bolts, or the like **[1, 2006.01]**

12/22 • • • using keyhole-shaped slots and pins **[1, 2006.01]**

12/24 • • • using separate pins, dowels, or the like **[1, 2006.01]**

12/26 • • • using snap-action elements **[1, 2006.01]**

12/28 • • for metal furniture parts **[1, 2006.01]**

12/30 • • • using threaded bolts **[1, 2006.01]**

12/32 • • • using clamps, clips, wedges, sliding bolts, or the like **[1, 2006.01]**

12/34 • • • using keyhole-shaped slots and pins **[1, 2006.01]**

12/36 • • • using separate pins, dowels, or the like **[1, 2006.01]**

12/38 • • • using snap-action elements **[1, 2006.01]**

12/40 • Joints for furniture tubing **[1, 2006.01]**

12/42 • • connecting furniture tubing to non-tubular parts **[1, 2006.01]**

12/44 • Leg joints; Corner joints **[1, 2006.01]**

12/46 • • Non-metal corner connections **[1, 2006.01]**

12/48 • • Non-metal leg connections (F16B 12/46 takes precedence) **[1, 2006.01]**

12/50 • • Metal corner connections **[1, 2006.01]**

12/52 • • Metal leg connections (F16B 12/50 takes precedence) **[1, 2006.01]**

12/54 • Fittings for bedsteads or the like **[1, 2006.01]**

12/56 • • Brackets for bedsteads; Coupling joints consisting of bolts or the like; Latches therefor **[1, 2006.01]**

12/58 • • Tapered connectors for bed rails **[1, 2006.01]**

12/60 • • Fittings for detachable side panels **[1, 2006.01]**

13/00 **Dowels or other devices fastened in walls or the like by inserting them in holes made therein for that purpose** (nails F16B 15/00; self-locking pins or bolts in general, stud-and-socket releasable fastenings F16B 21/00; dowels or bolts for railroad sleepers E01B 9/00; means for anchoring structural elements or bulkheads specially adapted to foundation engineering E02D 5/74; bolts or dowels used while laying bricks or casting concrete E04B 1/38; setting anchoring bolts in shafts, tunnels or galleries E21D 20/00; anchoring bolts for shafts, tunnels or galleries E21D 21/00) **[1, 5, 2006.01]**

13/02 • in one piece with protrusions or ridges on the shaft **[1, 2006.01]**

13/04 • with parts gripping in the hole or behind the reverse side of the wall after inserting from the front (friction-grip releasable fastenings in general F16B 2/00) **[1, 2006.01]**

13/06 • • combined with expanding sleeve **[1, 2006.01]**

13/08 • • with separate gripping parts moved into their final position in relation to the body of the device without further manual operation **[1, 2006.01]**

13/10 • • with separate gripping parts moved into their final position in relation to the body of the device by a separate operation (F16B 13/06 takes precedence) **[1, 2006.01]**

13/12 • Separate metal dowel sleeves fastened by inserting the screw, nail, or the like **[1, 2006.01]**

13/13 • • self-cutting **[2, 2006.01]**

13/14 • Non-metallic plugs or sleeves; Use of liquid, loose solid or kneadable material therefor **[1, 5, 2006.01]**

Fastening means without screw-thread

15/00 **Nails; Staples** (surgical staples A61B 17/064; manufacture of nails or staples B21G; railway spikes E01B 9/06) **[1, 2006.01]**

15/02 • with specially shaped heads, e.g. with enlarged surfaces (ornaments for furniture A47B 95/04; removable ornamental heads for nails A47G 3/00) **[1, 2006.01]**

15/04 • with spreading shaft **[1, 2006.01]**

15/06 • with barbs, e.g. for metal parts; Drive screws **[1, 2006.01]**

15/08 • formed in integral series but easily separable **[1, 2006.01]**

17/00 **Fastening means without screw-thread for connecting constructional elements or machine parts by a part of or on one member entering a hole in the other** (construction of bolts, pins, or rivets F16B 19/00; riveting F16B 19/04; means for preventing withdrawal of a pin, spigot, or the like from its operative position, stud-and-socket releasable fastenings F16B 21/00) **[1, 2006.01]**

19/00 **Bolts without screw-thread; Pins, including deformable elements** (in screwed connections F16B 29/00)**; Rivets** (means for preventing withdrawal F16B 21/00) **[1, 2006.01]**

19/02 • Bolts or sleeves for positioning of machine parts, e.g. notched taper pins, fitting pins, sleeves, eccentric positioning rings **[1, 2006.01]**

19/04 • Rivets; Spigots or the like fastened by riveting (lead seals G09F 3/00) **[1, 2006.01]**

19/05 • • Bolts fastening by swaged-on collars (F16B 19/08 takes precedence) **[1, 2006.01]**

19/06 • • Solid rivets made in one piece **[1, 2006.01]**

19/08 • • Hollow rivets; Multi-part rivets **[1, 2006.01]**
19/10 • • • fastened by expanding mechanically **[1, 2006.01]**
19/12 • • • fastened by fluid pressure, including by explosion (bolts shot by means of detonation-operated nailing tools into concrete constructions, metal walls, or the like F16B 19/14) **[1, 2006.01]**
19/14 • Bolts or the like for shooting into concrete constructions, metal walls, or the like by means of detonation-operated nailing tools (tools therefor B25C, B27F) **[1, 2006.01]**

21/00 Means without screw-thread for preventing relative axial movement of a pin, spigot, shaft, or the like and a member surrounding it (riveted or deformable spigots F16B 19/04; for gudgeon pins F16J 1/18)**; Stud-and-socket releasable fastenings without screw-thread [1, 2006.01]**
21/02 • Releasable fastening devices locking by rotation (with snap action F16B 21/06; studs or coupling-pins with resilient protrusions F16B 21/08) **[1, 2006.01]**
21/04 • • with bayonet catch **[1, 2006.01]**
21/06 • Releasable fastening devices with snap action **[1, 2006.01]**
21/07 • • in which the socket has a resilient part **[1, 2006.01]**
21/08 • • in which the stud, pin, or spigot has a resilient part (wall-dowels F16B 13/00) **[1, 2006.01]**
21/09 • Releasable fastening devices with a stud engaging a keyhole slot **[1, 2006.01]**
21/10 • by separate parts (key-type connection F16B 3/00; locking screws or nuts against rotation by such means F16B 39/04) **[1, 2006.01]**
21/12 • • with locking-pins or split-pins thrust into holes **[1, 2006.01]**
21/14 • • • Details of locking-pins or split-pins **[1, 2006.01]**
21/16 • • with grooves or notches in the pin or shaft **[1, 2006.01]**
21/18 • • • with circlips or like resilient retaining devices; Details (spring-washers for locking nuts F16B 39/24; adjusting-rings F16B 43/00) **[1, 2006.01]**
21/20 • • for bolts or shafts without holes, grooves, or notches for locking members **[1, 2006.01]**

Fastening means using screw-thread

23/00 Specially-shaped heads of bolts or screws for rotations by a tool [1, 2006.01]

25/00 Screws that form threads in the body into which they are screwed, e.g. wood screws, self-tapping screws [1, 4, 2006.01]
25/02 • by a cutting and material removing action, e.g. fluted self-tapping screws **[4, 2006.01]**
25/04 • by a slicing and material displacing action, e.g. wood screws with sharp thread crests **[4, 2006.01]**
25/06 • by swaging, i.e. material deforming action **[4, 2006.01]**
25/08 • by a combination of any two or all of the actions provided for in groups F16B 25/02-F16B 25/06 **[4, 2006.01]**
25/10 • Screws performing an additional function to thread-forming, e.g. drill screws **[4, 2006.01]**

27/00 Bolts, screws, or nuts formed in integral series but easily separable, particularly for use in automatic machines [1, 2006.01]

29/00 Screwed connection with deformation of nut or auxiliary member while fastening (wall-dowels F16B 13/00; members deformed for locking screws, bolts or nuts F16B 39/22) **[1, 2006.01]**

31/00 Screwed connections specially modified in view of tensile load; Break-bolts (shape of thread F16B 33/04) **[1, 2006.01]**
31/02 • for indicating or limiting tensile load **[1, 2006.01]**
31/04 • for maintaining constant tensile load **[1, 2006.01]**
31/06 • having regard to possibility of fatigue rupture **[1, 2006.01]**

33/00 Features common to bolt and nut (wall-dowels F16B 13/00) **[1, 2006.01]**
33/02 • Shape of thread; Special thread-forms (used as screw-locking device F16B 39/30) **[1, 2006.01]**
33/04 • • in view of tensile load **[1, 2006.01]**
33/06 • Surface treatment of parts furnished with screw-thread, e.g. for preventing seizure **[1, 2006.01]**

35/00 Screw-bolts; Stay bolts; Screw-threaded studs; Screws; Set screws (wall-dowels F16B 13/00; thread-cutting screws F16B 25/00) **[1, 2006.01]**
35/02 • divided longitudinally **[1, 2006.01]**
35/04 • with specially-shaped head or shaft in order to fix the bolt on or in an object (locking the bolt against turning in the object by the use of accessory parts F16B 39/00) **[1, 2006.01]**
35/06 • • Specially-shaped heads (special shape in order to rotate the bolt F16B 23/00) **[1, 2006.01]**

37/00 Nuts or like thread-engaging members (wall-dowels F16B 13/00) **[1, 2006.01]**
37/02 • made of thin sheet material (fastening to surfaces F16B 37/04) **[1, 2006.01]**
37/04 • Devices for fastening nuts to surfaces, e.g. sheets, plates **[1, 2006.01]**
37/06 • • by means of welding or riveting **[1, 2006.01]**
37/08 • Quickly-detachable nuts, e.g. consisting of two or more parts; Nuts movable along the bolt after tilting the nut **[1, 2006.01]**
37/10 • • divided parallel or about parallel to the bolt axis **[1, 2006.01]**
37/12 • with thread-engaging surfaces formed by inserted coil-springs, discs, or the like; Independent pieces of wound wire used as nuts; Threaded inserts for holes **[1, 2006.01]**
37/14 • Cap nuts; Nut caps or bolt caps **[1, 2006.01]**
37/16 • Wing nuts (F16B 37/14 takes precedence) **[1, 2006.01]**

39/00 Locking of screws, bolts, or nuts (wall-dowels F16B 13/00; locking of bottle closures B65D; locking of rail-fastening bolts for permanent ways E01B 9/12; locking of fastening means for railway fishplates E01B 11/38; locking devices for valves or cocks F16K) **[1, 2006.01]**

Note(s)

In this group, heads of screws or bolts are put on a par with nuts as far as pertains to locking; an object into which a screw is threaded is put on a par with a nut.

39/01 • specially adapted to prevent loosening at extreme temperatures **[1, 2006.01]**

39/02 • in which the locking takes place after screwing down (F16B 39/01 takes precedence; split-pins, circlips, or the like for preventing relative axial movement only F16B 21/10; fastening nuts by welding or riveting F16B 37/06) **[1, 2006.01]**

39/04 • • with a member penetrating the screw-threaded surface of at least one part, e.g. a pin, wedge, cotter-pin, screw **[1, 2006.01]**

39/06 • • • with a pin or staple parallel to the bolt axis **[1, 2006.01]**

39/08 • • with a cap interacting with the nut, connected to the bolt by a pin or cotter-pin **[1, 2006.01]**

39/10 • • by a plate or ring immovable with regard to the bolt or object (F16B 39/08 takes precedence) **[1, 2006.01]**

39/12 • • by means of locknuts **[1, 2006.01]**

39/14 • • • made of thin sheet material or formed as spring washers (locknuts per se made of thin sheet material F16B 37/02) **[1, 2006.01]**

39/16 • • • in which the screw-thread of the locknut differs from that of the nut **[1, 2006.01]**

39/18 • • • • in which the locknut grips with screw-thread in the nuts as well as on the bolt **[1, 2006.01]**

39/20 • • by means of steel wire or the like (F16B 39/10 takes precedence) **[1, 2006.01]**

39/22 • in which the locking takes place during screwing down or tightening (F16B 39/01 takes precedence) **[1, 2006.01]**

39/24 • • by means of washers, spring washers, or resilient plates that lock against the object (locking to the screw-thread F16B 39/14, F16B 39/36) **[1, 2006.01]**

39/26 • • • with spring washers fastened to the nut or bolt-head **[1, 2006.01]**

39/28 • • by special members on, or shape of, the nut or bolt (F16B 39/26 takes precedence; locknuts F16B 39/12) **[1, 2006.01]**

39/282 • • • Locking by means of special shape of work-engaging surfaces, e.g. notched or toothed nuts **[1, 2006.01]**

39/284 • • • Locking by means of elastic deformation (F16B 39/38 takes precedence) **[1, 2006.01]**

39/286 • • • • caused by saw cuts **[1, 2006.01]**

39/30 • • • Locking exclusively by special shape of the screw-thread **[1, 2006.01]**

39/32 • • • Locking by means of a pawl or pawl-like tongue **[1, 2006.01]**

39/34 • • • Locking by deformable inserts or like parts **[1, 2006.01]**

39/36 • • • with conical locking parts, which may be split, including use of separate rings co-operating therewith **[1, 2006.01]**

39/38 • • • with a second part of the screw-thread which may be resiliently mounted (F16B 39/30 takes precedence) **[1, 2006.01]**

41/00 Measures against loss of bolts, nuts, or pins; Measures against unauthorised operation of bolts, nuts, or pins (seals G09F 3/00) **[1, 2006.01]**

43/00 Washers or equivalent devices; Other devices for supporting bolt-heads or nuts (circlips F16B 21/18; with special means for locking bolts or nuts F16B 39/10, F16B 39/24) **[1, 2006.01]**

43/02 • with special provisions for engaging surfaces which are not perpendicular to a bolt axis or do not surround the bolt **[1, 2006.01]**

45/00 Hooks; Eyes (if the attaching parts or means are concerned, groups F16B 13/00, F16B 15/00, F16B 19/00, F16B 25/00, F16B 35/00, F16B 47/00 take precedence; for hanging pictures or the like A47G 1/16; towing hooks for ships B63B 21/58; for hoisting or hauling purposes B66C; hooks or eyes with integral parts designed to facilitate quick attachment to cables or ropes at any point F16G 11/14) **[1, 2006.01]**

45/02 • Hooks with pivoting closing member **[1, 2006.01]**

45/04 • Hooks with sliding closing member **[1, 2006.01]**

45/06 • Hooks with two symmetrically-pivoting hook parts **[1, 2006.01]**

47/00 Suction cups for attaching purposes; Equivalent means using adhesives [1, 2006.01]