

ECLA**EUROPEAN CLASSIFICATION****B23F****MAKING GEARS OR TOOTHED RACKS (by stamping B21D; by rolling B21H; by forging or pressing B21K; by casting B22; arrangements for copying or controlling B23Q; machines or devices for grinding or polishing, in general B24B)****Notes**

1. This subclass covers:
 - the use of methods or apparatus specially designed to produce accurately the shapes of gear teeth which are essential for proper intermeshing of toothed gearing elements to ensure the required relative motions;
 - the use of similar methods or apparatus in the production of other articles of toothed or like form, e.g. dog clutches, splined shafts, milling cutters.
2. This subclass does not cover the production of such other articles of toothed or like form using methods or apparatus other than those mentioned under Note (1) above.
3. In this subclass, the following terms or expressions are used with the meanings indicated:
 - "gear teeth" covers the teeth or lobes of other accurately-intermeshing members having relative movement of a similar kind, such as rotors of rotary pumps and blowers;
 - "profile" may include the outline of both faces or only one face of a tooth, or the opposing faces of adjacent teeth;
 - "straight" means that a tooth as a whole (ignoring any curvature of the tooth-face alone, e.g. crowning) is straight in the direction of its length, for example as seen in the direction of a radius of a spur wheel. It accordingly includes the teeth of helical gears and of the normal type of bevel gear;
 - "broach-milling" means milling with a rotary cutter having a number of teeth of progressively increasing depth or width.

B23F1/00**Making gear teeth by tools of which the profile matches the profile of the required surface (special adaptations for making curved teeth [B23F9/00](#))**

B23F1/02

- . by grinding

B23F1/02A

- . . [N: the tool being a grinding worm]

B23F1/02P

- . . [N: with plural tools]

B23F1/04

- . by planing or slotting

B23F1/06

- . by milling

B23F1/06P

- . . [N: with plural tools]

B23F1/08

- . by broaching; by broach-milling

- B23F1/08B . . [N: by broach-milling]
- B23F1/08C . . [N: Pot broaching]
- B23F3/00** **Making gear teeth involving copying operations controlled by templates having a profile which matches that of the required tooth face or part thereof or a copy thereof to a different scale (copying systems or devices per se [B23Q35/00](#))**
- B23F5/00** **Making straight gear teeth involving moving a tool relatively to a workpiece with a rolling-off or an enveloping motion with respect to the gear teeth to be made**
- B23F5/02 . by grinding
- B23F5/04 . . the tool being a grinding worm
- B23F5/06 . . the tool being a grinding disc with a plane front surface
- B23F5/06B . . . [N: and the grinding disc axis varying angularly with respect to the workpiece axis]
- B23F5/08 . . the tool being a grinding disc having the same profile as the tooth or teeth of a rack
- B23F5/08B . . . [N: and the grinding disc axis varying angularly with respect to the workpiece axis]
- B23F5/10 . . the tool being a grinding disc having the same profile as the tooth or teeth of a crown or bevel wheel
- B23F5/12 . by planing or slotting
- B23F5/12G . . [N: with two single-tooth tools mounted on reciprocating slides]
- B23F5/14 . . the tool having the same profile as a tooth or teeth of a rack
- B23F5/16 . . the tool having a shape similar to that of a spur wheel or part thereof
- B23F5/16B . . . [N: the tool and workpiece being in crossed axis arrangement, e.g. skiving, i.e. "Waelzschaelen"]
- B23F5/16P . . . [N: with plural tools]
- B23F5/18 . . the tool having the same profile as a tooth of a crown wheel
- B23F5/20 . by milling
- B23F5/20B . . [N: the tool having a shape similar to that of a gear or part thereof, with cutting edges situated on the tooth contour lines (tools therefor [B23F21/12B](#))]
- B23F5/20P . . [N: with plural tools]
- B23F5/20P2 . . . [N: the tools being interlocked]
- B23F5/22 . . the tool being a hob for making spur gears
- B23F5/24 . . the tool being a hob for making bevel gears
- B23F5/26 . . the tool having the same profile as a tooth or teeth of a rack, for making spur gears
- B23F5/27 . . the tool having the same profile as a tooth or teeth of a crown or bevel wheel
- B23F5/28 . by broaching; by broach-milling
- B23F5/28B . . [N: broaching with working tools mounted on an endless chain or belt]
- B23F7/00** **Making herringbone gear teeth**
- B23F9/00** **Making gears having teeth curved in their longitudinal direction**

- B23F9/00B . [N: by broaching]
- B23F9/00B1 . . [N: broaching with working tools mounted on an endless chain or belt]
- B23F9/02 . by grinding
- B23F9/02B . . [N: with a face-mill-type, i.e. cup-shaped, grinding wheel]
- B23F9/04 . by planing or slotting with reciprocating cutting tools
- B23F9/06 . . having a shape similar to a spur-wheel or part thereof
- B23F9/07 . . having a shape similar to a crown wheel or a part thereof
- B23F9/08 . by milling, e.g. with helicoidal hob
- B23F9/08B . . [N: with a hob]
- B23F9/08B2 . . . [N: the hob being tapered]
- B23F9/08P . . [N: with two or more tools]
- B23F9/08P2 . . . [N: the tools being interlocked]
- B23F9/10 . . with a face-mill
- B23F9/10B . . . [N: with continuous indexing, i.e. with continuous work rotation]
- B23F9/12 . . . for non-continuous generating processes
- B23F9/14 . . . for continuous generating processes

B23F11/00 Making worm wheels, e.g. by hobbing

B23F13/00 Making worms by methods essentially requiring the use of machines of the gear-cutting type (making screw-thread [B23G](#))

- B23F13/00B . [N: making worms of conical or barrel shape] [N9503]
- B23F13/00B2 . . [N: by grinding] [N9503]
- B23F13/02 . Making worms of cylindrical shape
- B23F13/04 . . by grinding
- B23F13/06 . Making worms of globoidal shape
- B23F13/08 . . by grinding

B23F15/00 Methods or machines for making gear wheels of special kinds not covered by groups [B23F7/00](#) to [B23F13/00](#)

- B23F15/00B . [N: Making sprocket teeth]
- B23F15/02 . Making gear teeth on wheels of varying radius of operation, e.g. on elliptical wheels
- B23F15/04 . Making fine-pitch gear teeth on clock wheels or the like by special machining
- B23F15/06 . Making gear teeth on the front surface of wheels, e.g. for clutches or couplings with toothed faces

- B23F15/08 . Making intermeshing rotors, e.g. of pumps

- B23F17/00** **Special methods or machines for making gear teeth, not covered by the preceding groups**

- B23F17/00B . [N: for making gear pairs]
- B23F17/00D . [N: for dry cutting] [N1111]
- B23F17/00F . [N: for machining tooth fillet or tooth root]
- B23F17/00M . [N: using different machines or machining operations] [N9506]
- B23F17/00M2 . . [N: Features relating to transfer of work gears between different work stations] [N9506]

- B23F19/00** **Finishing gear teeth by other tools than those used for manufacturing gear teeth**

- B23F19/00B . [N: Modifying the theoretical tooth flank form, e.g. crowning ([B23F19/10](#) takes precedence)]
- B23F19/00B2 . . [N: using a face-mill-type tool, e.g. a milling or a grinding tool]
- B23F19/00B4 . . [N: using a gear-shaped tool] [N9503]

- B23F19/02 . Lapping gear teeth
- B23F19/02B . . [N: Lapping bevel gears by making use of a correspondingly shaped counterpart]
- B23F19/04 . . Lapping spur gears by making use of a correspondingly shaped counterpart
- B23F19/04C . . . [N: the counterpart having internal toothing]

- B23F19/05 . Honing gear teeth
- B23F19/05A . . [N: by making use of a tool in the shape of a worm]
- B23F19/05B . . [N: by making use of a tool in the shape of a bevel gear or a crown gear]
- B23F19/05C . . [N: by making use of a tool in the shape of an internal gear]

- B23F19/06 . Shaving the faces of gear teeth
- B23F19/06C . . [N: by making use of a tool in the shape of an internal gear]
- B23F19/06P . . [N: with plural tools]

- B23F19/10 . Chamfering the end edges of gear teeth
- B23F19/10B . . [N: by planing]
- B23F19/10C . . [N: by milling]
- B23F19/10C2 . . . [N: the tool being a hob]
- B23F19/10C4 . . . [N: the tool being an end mill]
- B23F19/10C6 . . . [N: the tool being a fly cutter]
- B23F19/10D . . [N: by brushing]
- B23F19/12 . . by grinding
- B23F19/12B . . . [N: the tool being a grinding worm]

B23F21/00	Tools specially adapted for use in machines for manufacturing gear teeth
B23F21/00B	. [N: with plural tools on a common axis] [N1111]
B23F21/02	. Grinding discs; Grinding worms (truing grinding tools B24B ; grinding tools in general B24D)
B23F21/02B	. . [N: Face-mill-type, i.e. cup-shaped, grinding wheels]
B23F21/02C	. . [N: Grinding worms]
B23F21/03	. Honing tools
B23F21/03C	. . [N: Honing worms]
B23F21/04	. Planing or slotting tools
B23F21/04A	. . [N: with inserted cutting elements]
B23F21/04A2	. . . [N: in exchangeable arrangement]
B23F21/06	. . having a profile which matches a gear tooth profile
B23F21/06A	. . . [N: with inserted cutting elements]
B23F21/06A2 [N: in exchangeable arrangement]
B23F21/08	. . having the same profile as a tooth or teeth of a rack
B23F21/08A	. . . [N: with inserted cutting elements]
B23F21/08A2 [N: in exchangeable arrangement]
B23F21/10	. . Gear-shaper cutters having a shape similar to a spur wheel or part thereof
B23F21/10A	. . . [N: with inserted cutting elements]
B23F21/10A2 [N: in exchangeable arrangement]
B23F21/12	. Milling tools
B23F21/12B	. . [N: having a shape similar to that of a gear or part thereof, with cutting edges situated on the tooth contour lines]
B23F21/12C	. . [N: with cutting teeth disposed on the inner periphery of a ring]
B23F21/12D	. . [N: with inserted cutting elements]
B23F21/12D2	. . . [N: in exchangeable arrangement]
B23F21/14	. . Profile cutters of disc type
B23F21/14A	. . . [N: with inserted cutting elements]
B23F21/14A2 [N: in exchangeable arrangement]
B23F21/16	. . Hobs
B23F21/16B	. . . [N: with inserted cutting elements]
B23F21/16B2 [N: in exchangeable arrangement]
B23F21/18	. . . Taper hobs, e.g. for bevel gears
B23F21/18A [N: with inserted cutting elements]
B23F21/18A2 [N: in exchangeable arrangement]
B23F21/20	. . Fly cutters
B23F21/20A	. . . [N: with inserted cutting elements]
B23F21/20A2 [N: in exchangeable arrangement]

- B23F21/22 . . Face-mills for longitudinally-curved gear teeth
- B23F21/22A . . . [N: with inserted cutting elements]
- B23F21/22A2 [N: in exchangeable arrangement]
- B23F21/23 . . . with cutter teeth arranged on a spiral curve for continuous generating processes
- B23F21/23A [N: with inserted cutting elements]
- B23F21/23A2 [N: in exchangeable arrangement]

- B23F21/24 . Broach-milling tools
- B23F21/24A . . [N: with inserted cutting elements]
- B23F21/24A2 . . . [N: in exchangeable arrangement]
- B23F21/24B . . [N: Face broach mills]
- B23F21/24B2 . . . [N: with inserted cutting elements]
- B23F21/24B2B [N: in exchangeable arrangement]

- B23F21/26 . Broaching tools
- B23F21/26A . . [N: with inserted cutting elements ([B23F21/26B](#) and [B23F21/26C](#) take precedence)]
- B23F21/26A2 . . . [N: in exchangeable arrangement]
- B23F21/26B . . [N: mounted on an endless chain or belt]
- B23F21/26C . . [N: Pot broaches]

- B23F21/28 . Shaving cutters
- B23F21/28B . . [N: with inserted cutting elements]
- B23F21/28B2 . . . [N: in exchangeable arrangement]
- B23F21/28C . . [N: having the shape of an internal gear]
- B23F21/28H . . [N: the cutting edges on consecutive teeth being helically arranged]

- B23F23/00** **Accessories or equipment combined with or arranged in, or specially designed to form part of, gear-cutting machines (tool-guiding mechanisms, see the relevant groups for making gear teeth; accessories or equipment not restricted to gear-cutting machines [B23Q](#))**

- B23F23/00A . [N: Generating mechanisms]

- B23F23/00B . [N: Equipment for synchronising movement of cutting tool and workpiece, the cutting tool and workpiece not being mechanically coupled]

- B23F23/02 . Loading, [N: unloading] or chucking arrangements for workpieces
- B23F23/04 . . Loading [N: or unloading] arrangements
- B23F23/06 . . Chucking arrangements

- B23F23/08 . Index mechanisms
- B23F23/08A . . [N: of the continuous type]

- B23F23/10 . Arrangements for compensating irregularities in drives or indexing mechanisms

- B23F23/12 . Other devices, e.g. tool holders; Checking devices for controlling workpieces in machines for manufacturing gear teeth

- B23F23/12B . . [N: Tool mountings]
- B23F23/12B2 . . . [N: using fluid pressure means] [N9608]
- B23F23/12C . . [N: Checking devices for controlling workpieces in machines for manufacturing gear teeth]
- B23F23/12D . . [N: Arrangements of abrasive wheel dressing devices on gear-cutting machines (dressing devices per se [B24B53/00](#))]
- B23F23/12D2 . . . [N: using a gear-shaped dressing tool] [N9412]
- B23F23/12E . . [N: Tool holders]
- B23F23/12E10 . . . [N: Hob holders]
- B23F23/12E20 . . . [N: Face mill holders]
- B23F23/12E30 . . . [N: Rack cutter holders]
- B23F23/12E40 . . . [N: Grinding disc holders; Disc-type milling-cutter holders]
- B23F23/12E50 . . . [N: Face-mill-type grinding wheel holders]
- B23F23/12E60 . . . [N: Grinding or honing worm holders]
- B23F23/12E70 . . . [N: Honing, shaving or lapping tool holders]
- B23F23/12E80 . . . [N: Pinion shaper cutter holders]
- B23F23/12F . . [N: Workpiece heads]