

CPC**COOPERATIVE PATENT 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](#))

NOTE

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.

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.

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.

B23F 1/00

Making gear teeth by tools of which the profile matches the profile of the required surface (special adaptations for making curved teeth [B23F 9/00](#))

B23F 1/02

. by grinding

B23F 1/023

.. { the tool being a grinding worm }

B23F 1/026

.. { with plural tools }

B23F 1/04

. by planing or slotting

B23F 1/06

. by milling

B23F 1/065

.. { with plural tools }

B23F 1/08

. by broaching; by broach-milling

B23F 1/083

.. { by broach-milling }

B23F 1/086

.. { Pot broaching }

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| B23F 3/00 | 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 B23Q 35/00) |
| B23F 5/00 | 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 |
| B23F 5/02 | . by grinding |
| B23F 5/04 | .. the tool being a grinding worm |
| B23F 5/06 | .. the tool being a grinding disc with a plane front surface |
| B23F 5/065 | ... { and the grinding disc axis varying angularly with respect to the workpiece axis } |
| B23F 5/08 | .. the tool being a grinding disc having the same profile as the tooth or teeth of a rack |
| B23F 5/085 | ... { and the grinding disc axis varying angularly with respect to the workpiece axis } |
| B23F 5/10 | .. the tool being a grinding disc having the same profile as the tooth or teeth of a crown or bevel wheel |
| B23F 5/12 | . by planing or slotting |
| B23F 5/125 | .. { with two single-tooth tools mounted on reciprocating slides } |
| B23F 5/14 | .. the tool having the same profile as a tooth or teeth of a rack |
| B23F 5/16 | .. the tool having a shape similar to that of a spur wheel or part thereof |
| B23F 5/163 | ... { the tool and workpiece being in crossed axis arrangement, e.g. skiving, i.e. "Waelzschaelen" } |
| B23F 5/166 | ... { with plural tools } |
| B23F 5/18 | .. the tool having the same profile as a tooth of a crown wheel |
| B23F 5/20 | . by milling |
| B23F 5/202 | .. { 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 B23F 21/122) } |
| B23F 5/205 | .. { with plural tools } |
| B23F 5/207 | ... { the tools being interlocked } |
| B23F 5/22 | .. the tool being a hob for making spur gears |
| B23F 5/24 | .. the tool being a hob for making bevel gears |
| B23F 5/26 | .. the tool having the same profile as a tooth or teeth of a rack, for making spur gears |
| B23F 5/27 | .. the tool having the same profile as a tooth or teeth of a crown or bevel wheel |
| B23F 5/28 | . by broaching; by broach-milling |
| B23F 5/285 | .. { broaching with working tools mounted on an endless chain or belt } |
| B23F 7/00 | Making herringbone gear teeth |
| B23F 9/00 | Making gears having teeth curved in their longitudinal direction |
| B23F 9/003 | . { by broaching } |

B23F 9/006 . . { broaching with working tools mounted on an endless chain or belt }

B23F 9/02 . by grinding

B23F 9/025 . . { with a face-mill-type, i.e. cup-shaped, grinding wheel }

B23F 9/04 . by planing or slotting with reciprocating cutting tools

B23F 9/06 . . having a shape similar to a spur-wheel or part thereof

B23F 9/07 . . having a shape similar to a crown wheel or a part thereof

B23F 9/08 . by milling, e.g. with helicoidal hob

B23F 9/082 . . { with a hob }

B23F 9/084 . . . { the hob being tapered }

B23F 9/086 . . { with two or more tools }

B23F 9/088 . . . { the tools being interlocked }

B23F 9/10 . . with a face-mill

B23F 9/105 . . . { with continuous indexing, i.e. with continuous work rotation }

B23F 9/12 . . . for non-continuous generating processes

B23F 9/14 . . . for continuous generating processes

B23F 11/00 Making worm wheels, e.g. by hobbing

B23F 13/00 Making worms by methods essentially requiring the use of machines of the gear-cutting type ([making screw-thread B23G](#))

B23F 13/003 . { making worms of conical or barrel shape }

B23F 13/006 . . { by grinding }

B23F 13/02 . Making worms of cylindrical shape

B23F 13/04 . . by grinding

B23F 13/06 . Making worms of globoidal shape

B23F 13/08 . . by grinding

B23F 15/00 Methods or machines for making gear wheels of special kinds not covered by groups [B23F 7/00](#) to [B23F 13/00](#)

B23F 15/005 . { Making sprocket teeth }

B23F 15/02 . Making gear teeth on wheels of varying radius of operation, e.g. on elliptical wheels

B23F 15/04 . Making fine-pitch gear teeth on clock wheels or the like by special machining

B23F 15/06 . Making gear teeth on the front surface of wheels, e.g. for clutches or couplings with toothed faces

B23F 15/08 . Making intermeshing rotors, e.g. of pumps

B23F 17/00 **Special methods or machines for making gear teeth, not covered by the preceding groups**

- B23F 17/001 . { for making gear pairs }
- B23F 17/003 . { for dry cutting }
- B23F 17/005 . { for machining tooth fillet or tooth root }
- B23F 17/006 . { using different machines or machining operations }
- B23F 17/008 .. { Features relating to transfer of work gears between different work stations }

B23F 19/00 **Finishing gear teeth by other tools than those used for manufacturing gear teeth**

- B23F 19/002 . { Modifying the theoretical tooth flank form, e.g. crowning ([B23F 19/10](#) takes precedence) }
- B23F 19/005 .. { using a face-mill-type tool, e.g. a milling or a grinding tool }
- B23F 19/007 .. { using a gear-shaped tool }
- B23F 19/02 . Lapping gear teeth
- B23F 19/025 .. { Lapping bevel gears by making use of a correspondingly shaped counterpart }
- B23F 19/04 .. Lapping spur gears by making use of a correspondingly shaped counterpart
- B23F 19/045 ... { the counterpart having internal toothing }
- B23F 19/05 . Honing gear teeth
- B23F 19/052 .. { by making use of a tool in the shape of a worm }
- B23F 19/055 .. { by making use of a tool in the shape of a bevel gear or a crown gear }
- B23F 19/057 .. { by making use of a tool in the shape of an internal gear }
- B23F 19/06 . Shaving the faces of gear teeth
- B23F 19/063 .. { by making use of a tool in the shape of an internal gear }
- B23F 19/066 .. { with plural tools }
- B23F 19/10 . Chamfering the end edges of gear teeth
- B23F 19/101 .. { by planing }
- B23F 19/102 .. { by milling }
- B23F 19/104 ... { the tool being a hob }
- B23F 19/105 ... { the tool being an end mill }
- B23F 19/107 ... { the tool being a fly cutter }
- B23F 19/108 .. { by brushing }
- B23F 19/12 .. by grinding
- B23F 19/125 ... { the tool being a grinding worm }

B23F 21/00 **Tools specially adapted for use in machines for manufacturing gear teeth**

- B23F 21/005 . { with plural tools on a common axis }
- B23F 21/02 . Grinding discs; Grinding worms ([truing grinding tools B24B](#); grinding tools in general [B24D](#))
- B23F 21/023 .. { Face-mill-type, i.e. cup-shaped, grinding wheels }
- B23F 21/026 .. { Grinding worms }
- B23F 21/03 . Honing tools
- B23F 21/035 .. { Honing worms }
- B23F 21/04 . Planing or slotting tools
- B23F 21/043 .. { with inserted cutting elements }
- B23F 21/046 ... { in exchangeable arrangement }
- B23F 21/06 .. having a profile which matches a gear tooth profile
- B23F 21/063 ... { with inserted cutting elements }
- B23F 21/066 { in exchangeable arrangement }
- B23F 21/08 .. having the same profile as a tooth or teeth of a rack
- B23F 21/083 ... { with inserted cutting elements }
- B23F 21/086 { in exchangeable arrangement }
- B23F 21/10 .. Gear-shaper cutters having a shape similar to a spur wheel or part thereof
- B23F 21/103 ... { with inserted cutting elements }
- B23F 21/106 { in exchangeable arrangement }
- B23F 21/12 . Milling tools
- B23F 21/122 .. { having a shape similar to that of a gear or part thereof, with cutting edges situated on the tooth contour lines }
- B23F 21/124 .. { with cutting teeth disposed on the inner periphery of a ring }
- B23F 21/126 .. { with inserted cutting elements }
- B23F 21/128 ... { in exchangeable arrangement }
- B23F 21/14 .. Profile cutters of disc type
- B23F 21/143 ... { with inserted cutting elements }
- B23F 21/146 { in exchangeable arrangement }
- B23F 21/16 .. Hobs
- B23F 21/163 ... { with inserted cutting elements }
- B23F 21/166 { in exchangeable arrangement }
- B23F 21/18 ... Taper hobs, e.g. for bevel gears
- B23F 21/183 { with inserted cutting elements }
- B23F 21/186 { in exchangeable arrangement }
- B23F 21/20 .. Fly cutters
- B23F 21/203 ... { with inserted cutting elements }
- B23F 21/206 { in exchangeable arrangement }
- B23F 21/22 .. Face-mills for longitudinally-curved gear teeth
- B23F 21/223 ... { with inserted cutting elements }
- B23F 21/226 { in exchangeable arrangement }

- B23F 21/23 . . . with cutter teeth arranged on a spiral curve for continuous generating processes
- B23F 21/233 { with inserted cutting elements }
- B23F 21/236 { in exchangeable arrangement }

- B23F 21/24 . Broach-milling tools
- B23F 21/241 . . { with inserted cutting elements }
- B23F 21/243 . . . { in exchangeable arrangement }
- B23F 21/245 . . { Face broach mills }
- B23F 21/246 . . . { with inserted cutting elements }
- B23F 21/248 { in exchangeable arrangement }

- B23F 21/26 . Broaching tools
- B23F 21/262 . . { with inserted cutting elements ([B23F 21/266](#) and [B23F 21/268](#) take precedence) }
- B23F 21/264 . . . { in exchangeable arrangement }
- B23F 21/266 . . { mounted on an endless chain or belt }
- B23F 21/268 . . { Pot broaches }

- B23F 21/28 . Shaving cutters
- B23F 21/282 . . { with inserted cutting elements }
- B23F 21/284 . . . { in exchangeable arrangement }
- B23F 21/286 . . { having the shape of an internal gear }
- B23F 21/288 . . { the cutting edges on consecutive teeth being helically arranged }

- B23F 23/00** **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](#))**

- B23F 23/003 . { Generating mechanisms }

- B23F 23/006 . { Equipment for synchronising movement of cutting tool and workpiece, the cutting tool and workpiece not being mechanically coupled }

- B23F 23/02 . Loading, { unloading } or chucking arrangements for workpieces
- B23F 23/04 . . Loading { or unloading } arrangements
- B23F 23/06 . . Chucking arrangements

- B23F 23/08 . Index mechanisms
- B23F 23/085 . . { of the continuous type }

- B23F 23/10 . Arrangements for compensating irregularities in drives or indexing mechanisms

- B23F 23/12 . Other devices, e.g. tool holders; Checking devices for controlling workpieces in machines for manufacturing gear teeth
- B23F 23/1206 . . { Tool mountings }
- B23F 23/1212 . . . { using fluid pressure means }

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| B23F 23/1218 | .. | { Checking devices for controlling workpieces in machines for manufacturing gear teeth } |
| B23F 23/1225 | .. | { Arrangements of abrasive wheel dressing devices on gear-cutting machines (dressing devices per se B24B 53/00) } |
| B23F 23/1231 | ... | { using a gear-shaped dressing tool } |
| B23F 23/1237 | .. | { Tool holders } |
| B23F 23/1243 | ... | { Hob holders } |
| B23F 23/125 | ... | { Face mill holders } |
| B23F 23/1256 | ... | { Rack cutter holders } |
| B23F 23/1262 | ... | { Grinding disc holders; Disc-type milling-cutter holders } |
| B23F 23/1268 | ... | { Face-mill-type grinding wheel holders } |
| B23F 23/1275 | ... | { Grinding or honing worm holders } |
| B23F 23/1281 | ... | { Honing, shaving or lapping tool holders } |
| B23F 23/1287 | ... | { Pinion shaper cutter holders } |
| B23F 23/1293 | .. | { Workpiece heads } |