

# Technical drawing — Conventional representation of gears

ICS 01.100.20; 21.200

# National foreword

This British Standard is the English language version of EN ISO 2203:1997. It is identical with ISO 2203:1973. It partially supersedes BS 308-1:1993. It is envisaged that when the full range of European Standards on technical drawing is implemented BS 308 will be withdrawn.

The UK participation in its preparation was entrusted to Technical Committee TDE/4, Engineering drawing, Metrology, Precision measurement and all related documentation, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

### Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN ISO title page, page 2, the ISO title page, page ii, pages 1 to 7 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

### Amendments issued since publication

Amd. No.	Date	Comments

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 December 1997

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English version

# Technical drawings — Conventional representation of gears

(ISO 2203:1973)

Dessins techniques — Représentation  
conventionnelle des engrenages  
(ISO 2203:1973)

Technische Zeichnungen — Darstellung von  
Zahnradern  
(ISO 2203:1973)

This European Standard was approved by CEN on 12 September 1997.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

**Central Secretariat: rue de Stassart 36, B-1050 Brussels**

Foreword

The text of the International Standard from Technical Committee ISO/TC 10 “Technical drawings, product definition and related documentation” of the International Organization for Standardization (ISO) has been taken over as an European Standard by CEN/CS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 1998, and conflicting national standards shall be withdrawn at the latest by April 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 2203:1973 has been approved by CEN as a European Standard without any modification.

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# INTERNATIONAL STANDARD 2203

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Technical drawings — Conventional representation of gears

First edition — 1973-03-15

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2203 was drawn up by Technical Committee ISO/TC 10, *Technical drawings*, and circulated to the Member Bodies in January 1971.

It has been approved by the Member Bodies of the following countries:

Australia	Hungary	Portugal
Austria	India	Romania
Belgium	Ireland	South Africa, Rep. of
Canada	Israel	Sweden
Chile	Italy	Switzerland
Czechoslovakia	Japan	Turkey
Denmark	Korea, Dem.P. Rep. of	United Kingdom
Egypt, Arab Rep. of	Korea, Rep. of	U.S.A.
France	Netherlands	U.S.S.R.
Germany	New Zealand	
Greece	Norway	

No Member Body expressed disapproval of the document.

**Descriptors:** Drawings, engineering drawings, gears, chain wheels, representation.



## 1 Scope and field of application

This International Standard establishes the conventional representation of the toothed portion of gears including worm gearing and chain wheels. It is applicable to detail drawings and assembly drawings.

As a fundamental principle a gear is represented (except in axial section) as a solid part without teeth, but with the addition of the pitch surface in a thin long chain line.

NOTE For uniformity all figures in this International Standard are in first angle projection (Method E). It should be understood that the third angle projection (Method A) could equally well have been used without prejudice to the principles established.

## 2 Detail drawings (individual gears)

### 2.1 Contours and edges

Represent the contours and the edges of each gear (see Figure 1, Figure 2 and Figure 3), as if they were,

- in an unsectioned view, a solid gear bounded by the tip surface;
- in an axial section, a spur gear having two diametrically opposed teeth, represented unsectioned, even in the case of a gear that does not have spur teeth or that has an odd number of teeth.

### 2.2 Pitch surface

Draw the pitch surface with a thin, long chain line, even in concealed portions and sectional views, and represent it,

- in a projection normal to the axis, by its pitch circle (external pitch circle in the case of a bevel gear and the median pitch circle in the case of a worm wheel) (see Figure 1, Figure 2 and Figure 3);
- in a projection parallel to the axis, by its apparent contour, extending the line beyond the gear contour on each side (see Figure 1, Figure 2 and Figure 3).

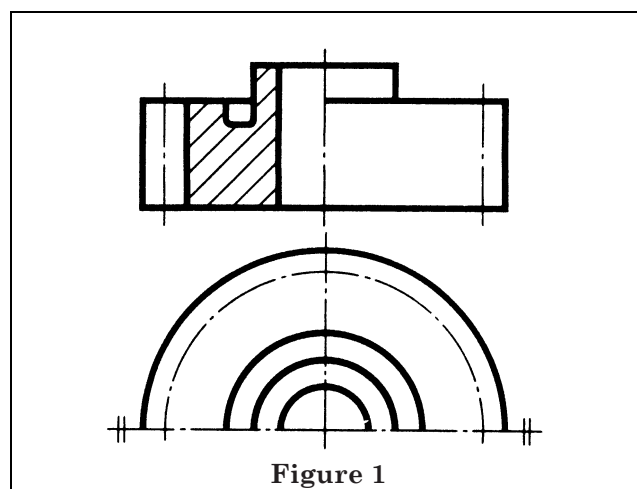


Figure 1

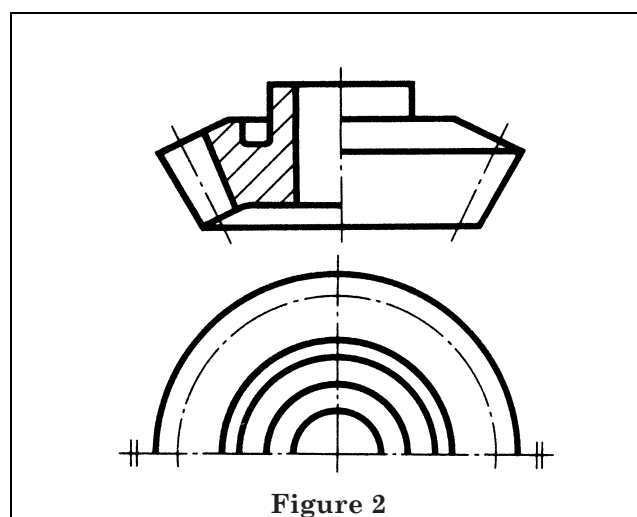


Figure 2

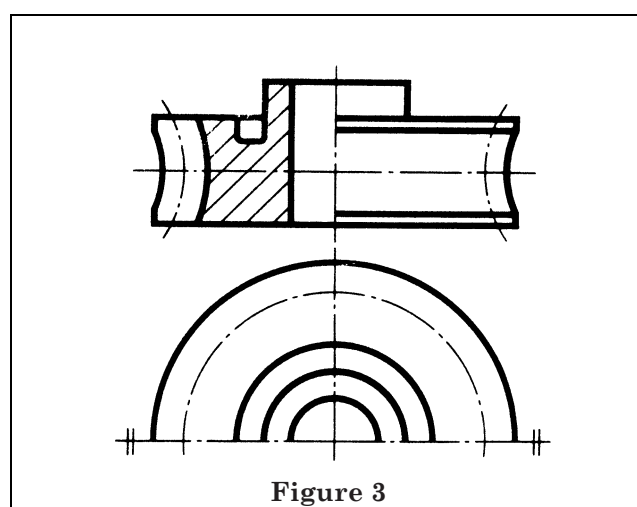


Figure 3

2.3 Root surface

As a general rule, do not represent the root surface except in sectional views.  
However, if it seems helpful to show it also on unsectioned views, always draw it, in this case, as a thin continuous line (see Figure 4, Figure 5 and Figure 6).

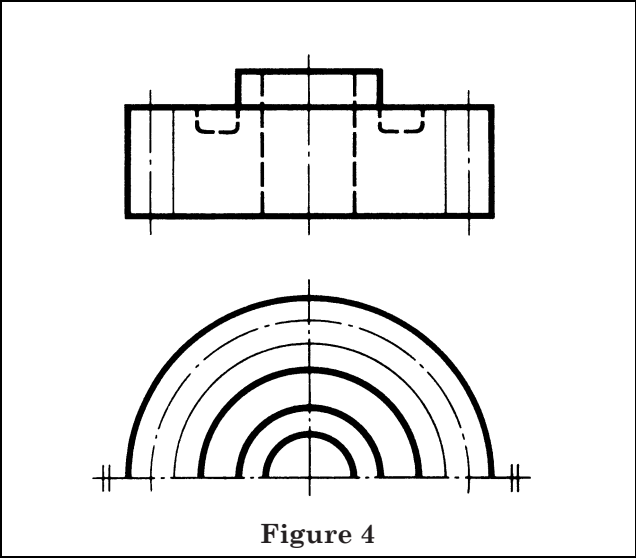


Figure 4

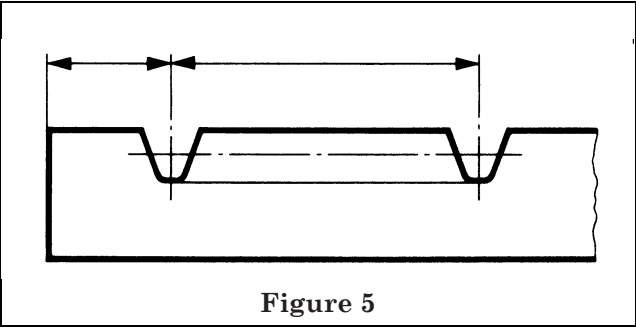


Figure 5

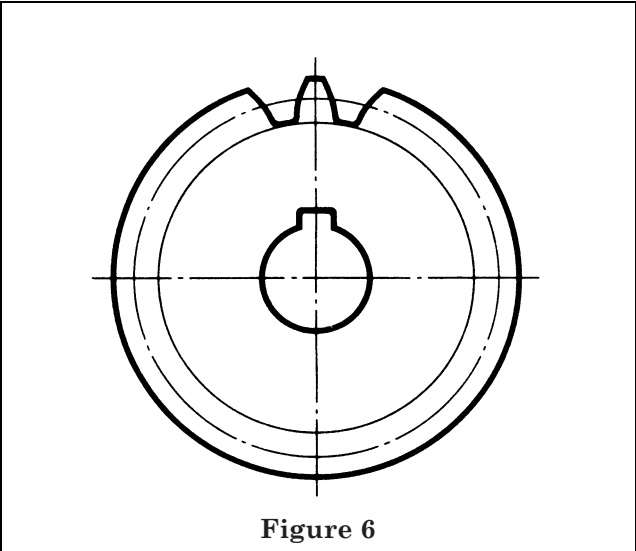


Figure 6

2.4 Teeth

Specify the teeth profile either by reference to a standard or by a drawing to a suitable scale.  
If it is essential to show one or two teeth on the drawing itself (either to define the ends of a toothed portion or rack, or in order to specify the position of the teeth in relation to a given axial plane), draw them as thick continuous lines (see Figure 5 and Figure 6).

It is necessary to indicate the direction of the teeth of a gear or rack on the view of the tooth surface in a projection parallel to the gear axes, three thin continuous lines of the corresponding form and direction should be shown (see Table and Figure 7).

Table

Tooth system	Symbol
Helical to the right	
Helical to the left	
Double helical	
Spiral	

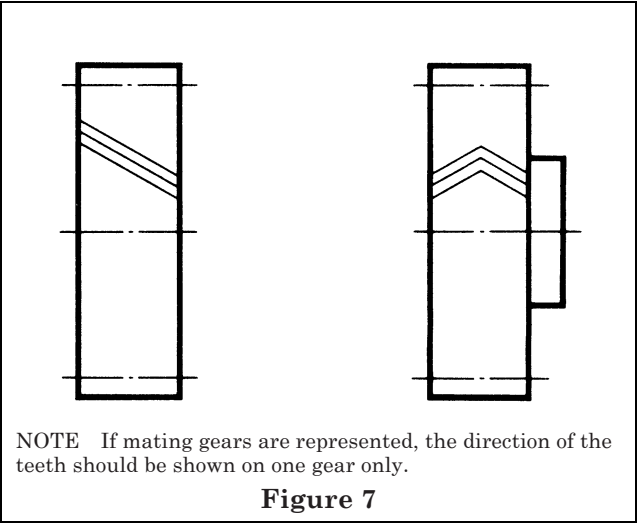


Figure 7

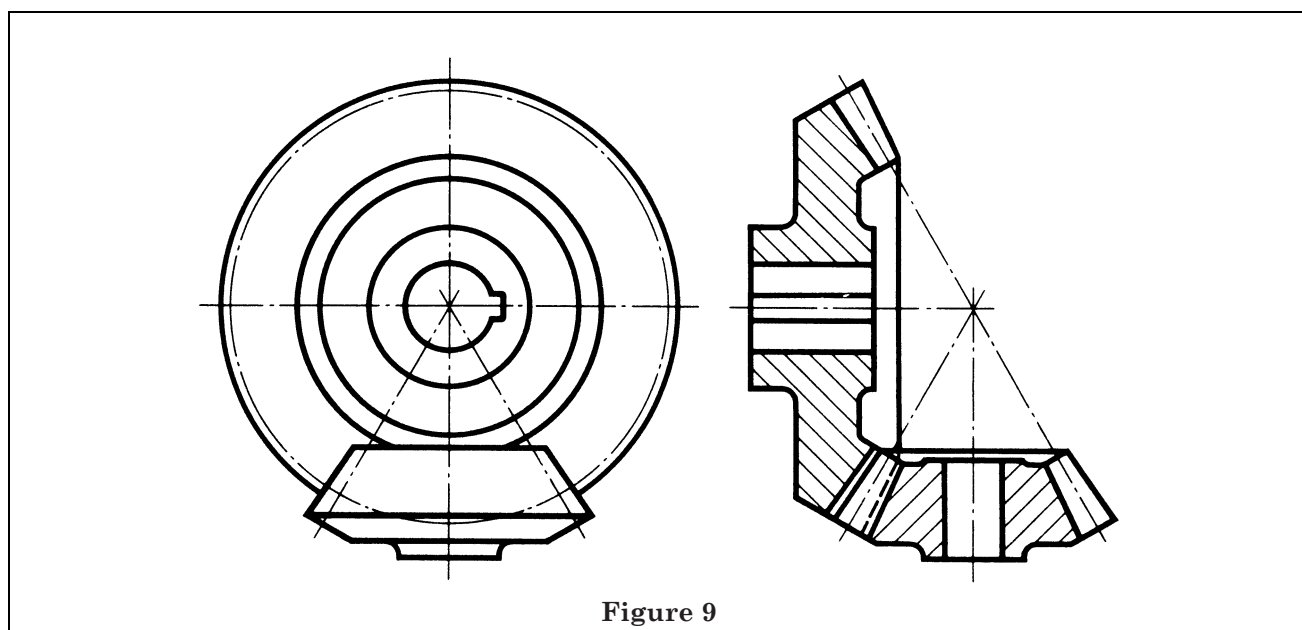
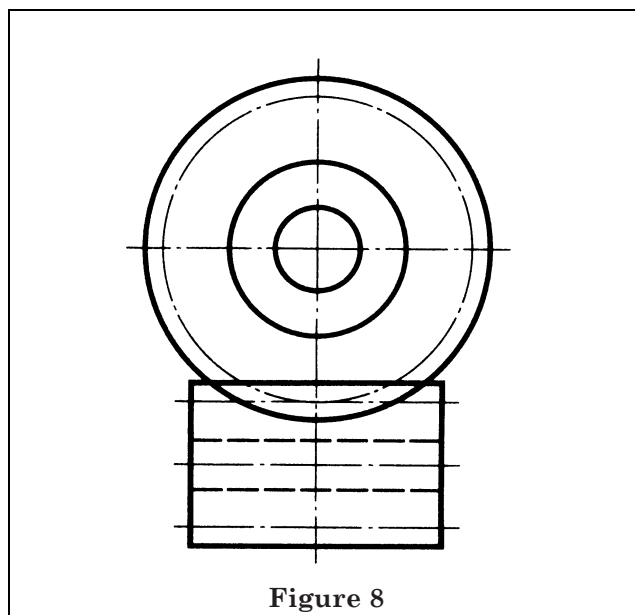
### 3 Assembly drawings (gear pairs)

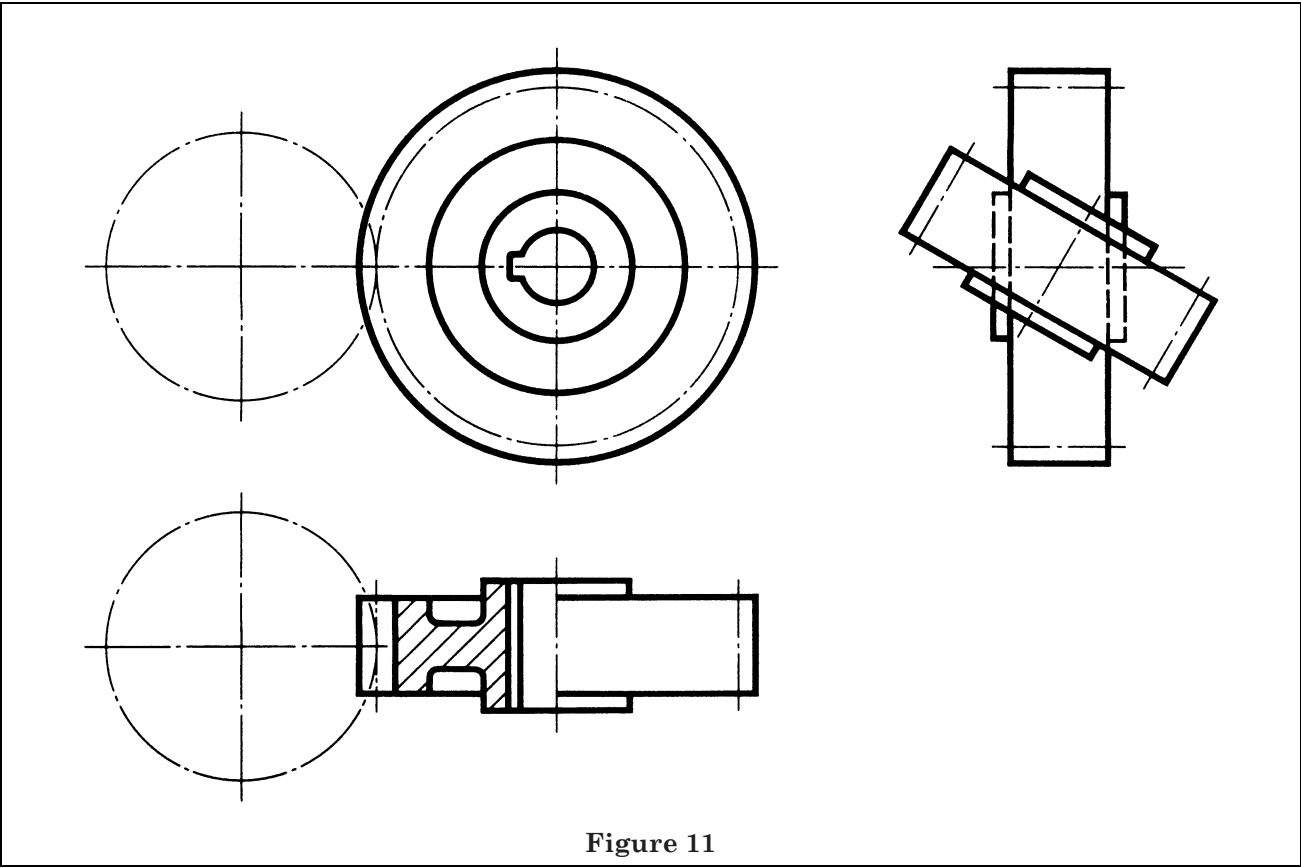
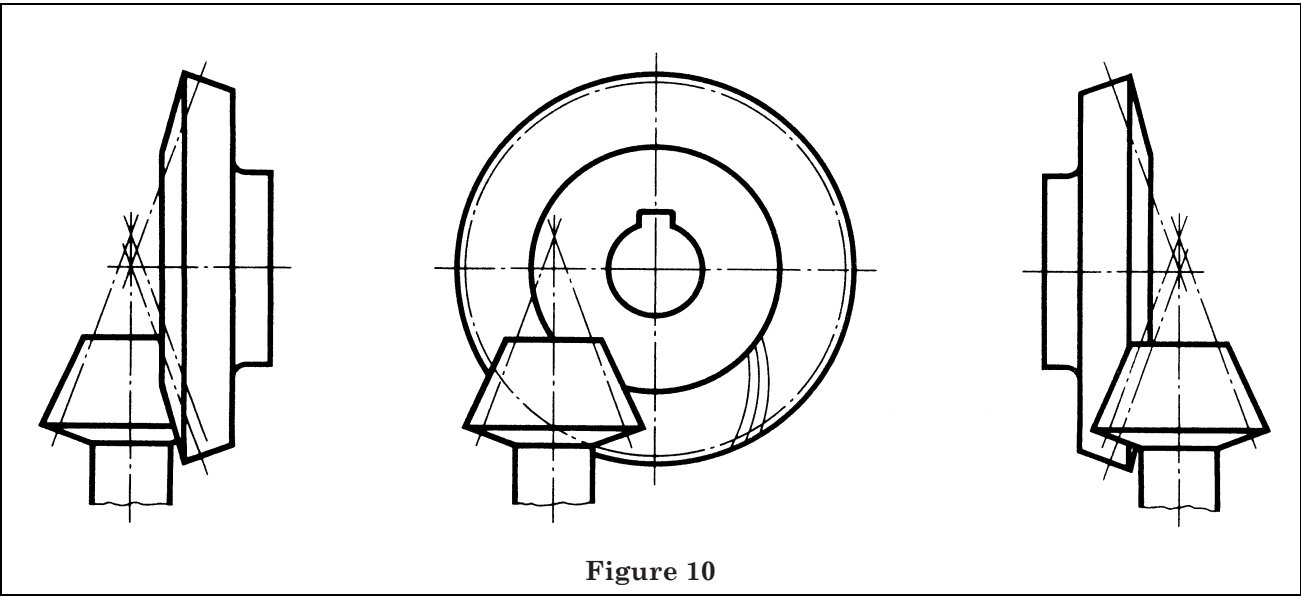
The specified rules for the representation of gears on detail drawings are equally applicable to assembly drawings. However, for a pair of bevel gears in projection parallel to the axis, extend the line drawn for the pitch surface to the point where the axes meet (see Figure 9 and Figure 10).

Neither of the two gears of a gear pair is assumed to be hidden by the other in the portion in mesh (see Figure 8), except in the following two cases:

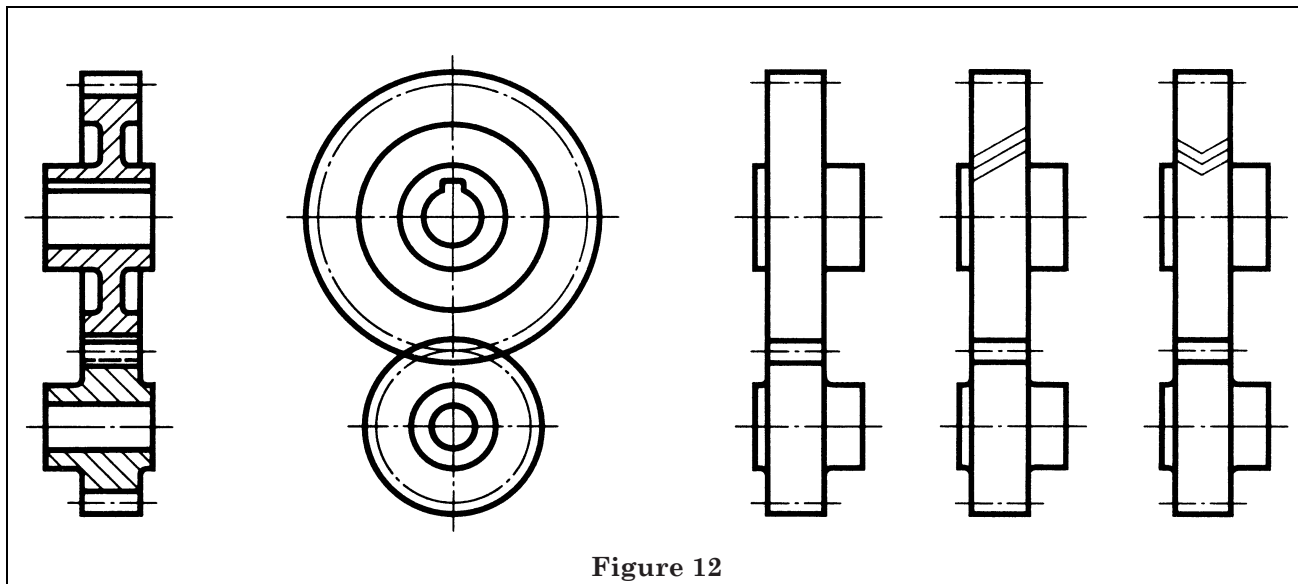
- 1) if one of the gears, the whole of which is located in front of the other, effectively conceals part of it (see Figure 9, Figure 10 and Figure 11);
- 2) if both gears are represented in axial section, in which case one of the two gears, chosen arbitrarily, is assumed to be partly concealed by the other (see Figure 9).

In these two cases, concealed contour edges need not be represented if they are not essential to the clarity of the drawing (see Figure 9 and Figure 10).

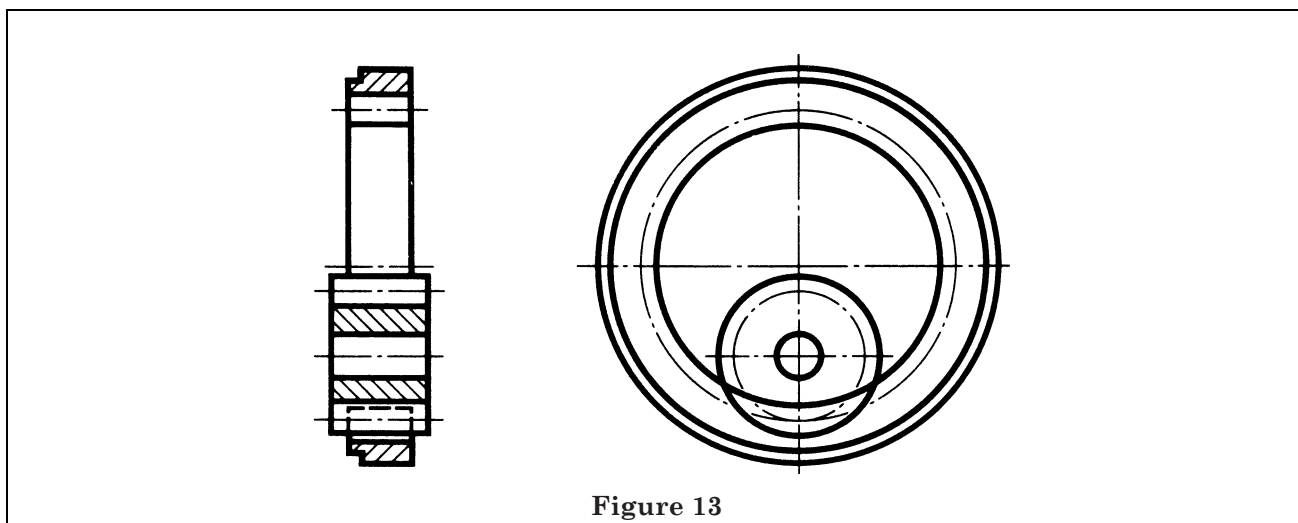




### 3.1 External engagement of cylindrical gears



### 3.2 Internal engagement of cylindrical gears



### 3.4 Engagement of bevel gears, axis intersection at any angle



### 3.6 Chain wheels



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