(12) UK Patent Application (19) GB (11) 2 359 723 (13) A

(43) Date of A Publication 05.09.2001

(21) Application No 0102573.3

(22) Date of Filing 01.02.2001

(30) Priority Data
(31) 0001409 (32) 04.02.2000 (33) FR

(51) INT CL[7]
A01D 34/00

(52) UK CL (Edition S)
A1F FDH F161

(56) Documents Cited
GB 1451674 A GB 1053875 A DE 003611511 A1

(58) Field of Search
UK CL (Edition S) A1F FDH
INT CL[7] A01D 34/00
On-line: WPI, EPODOC, PAJ

(71) Applicant(s)
Noremat
(Incorporated in France)
166 rue Ampère, F-54710 Ludres, France

(72) Inventor(s)
Jacques Bachmann

(74) Agent and/or Address for Service
Lloyd Wise, Tregear & Co
Commonwealth House, 1-19 New Oxford Street,
LONDON, WC1A 1LW, United Kingdom

(54) Abstract Title
Process for mounting flails,flail and clevis

(57) A process for hooking flails for grass-chopping or cutting apparatus consists in providing each flail 10 with a hook 11 the central part 12 of which has practically the same shape as the lower working part 16 of the clevis 14 and the opening of which comprises a narrowed section 13 such that the flail 10 cannot come unhooked, and providing said clevis 14, at least on one of its non-working sides, with a thinned part 15 making it possible to insert the hook 11 of the flail 10 onto the clevis 14 without the use of tools.

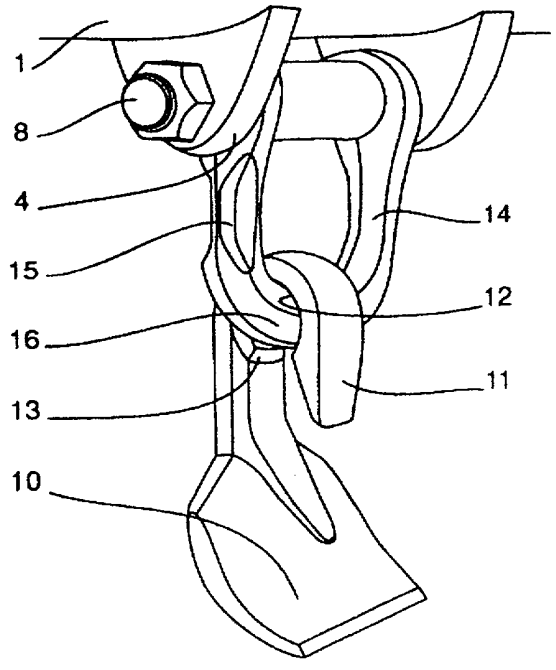

FIG. 3

GB 2 359 723 A

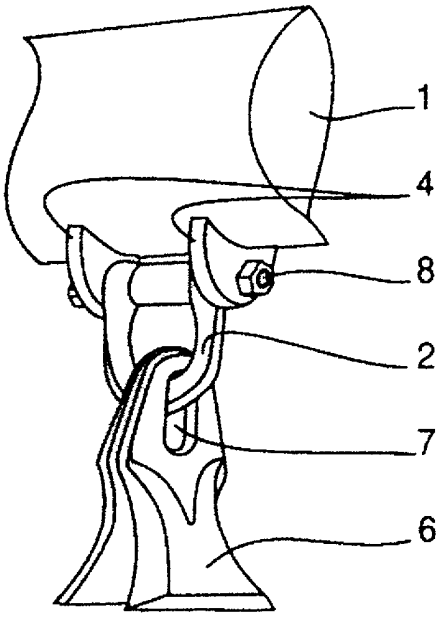

FIG. 1

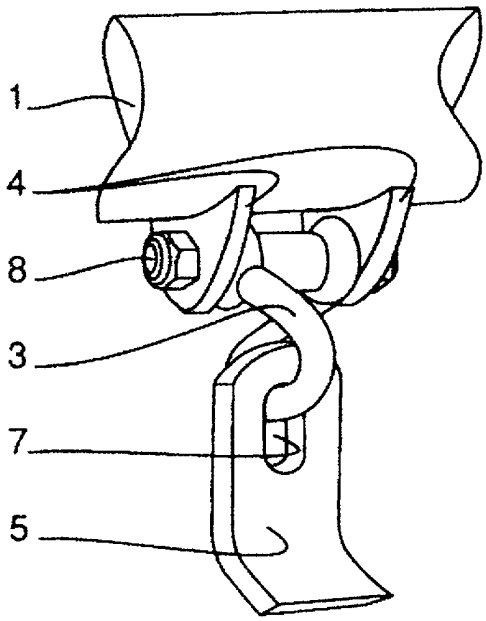

FIG. 2

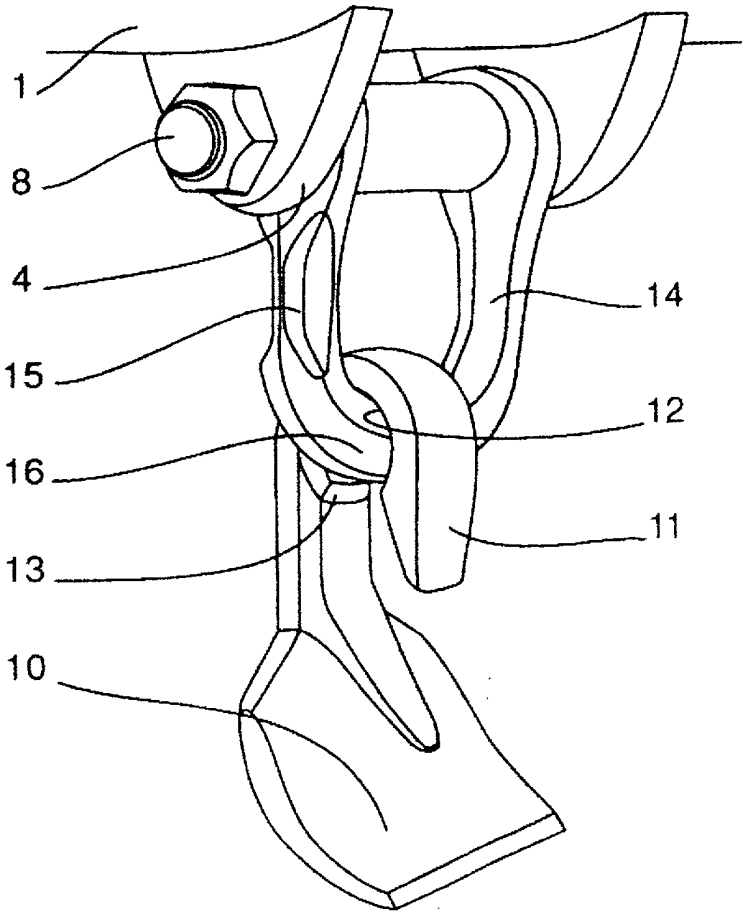

FIG. 3

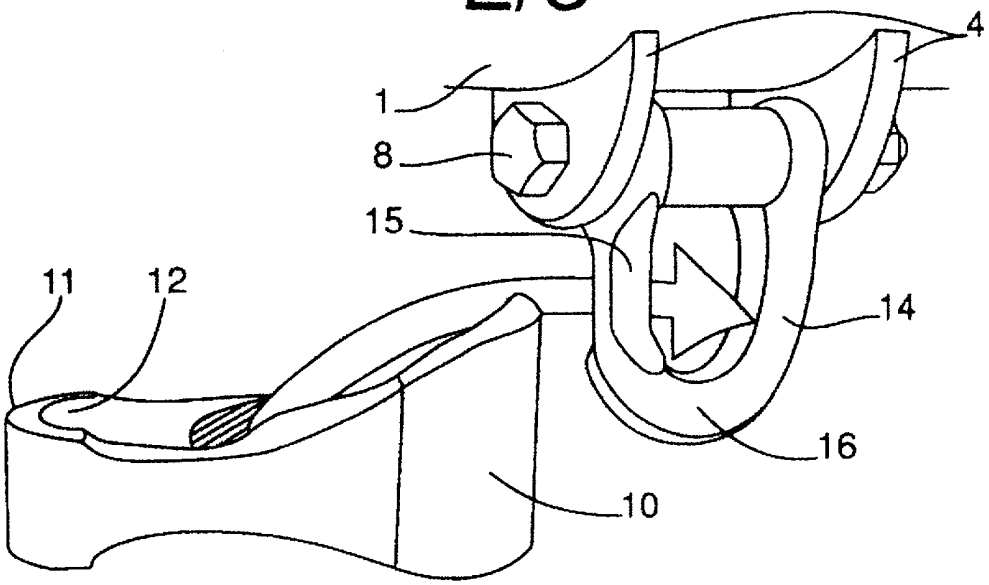

FIG. 4a

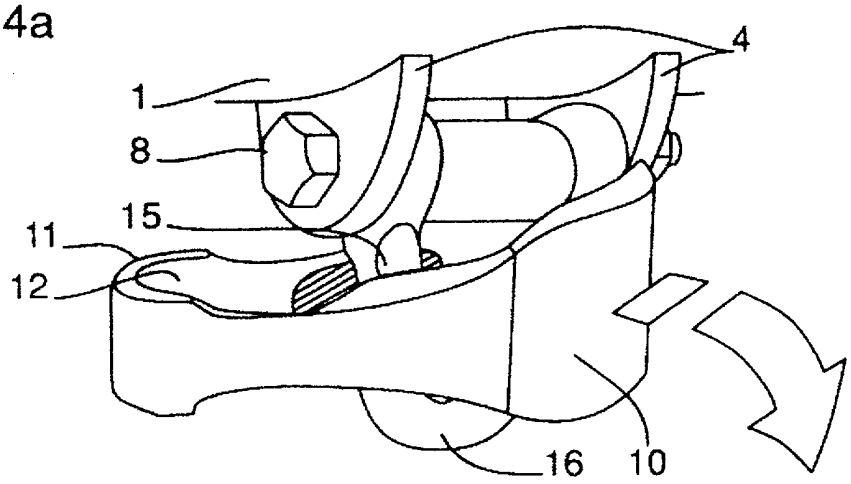

FIG. 4b

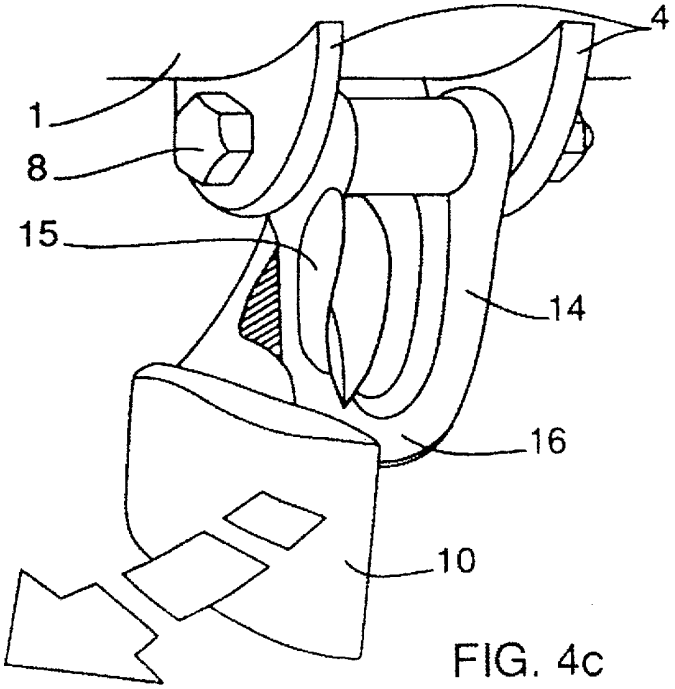

FIG. 4c

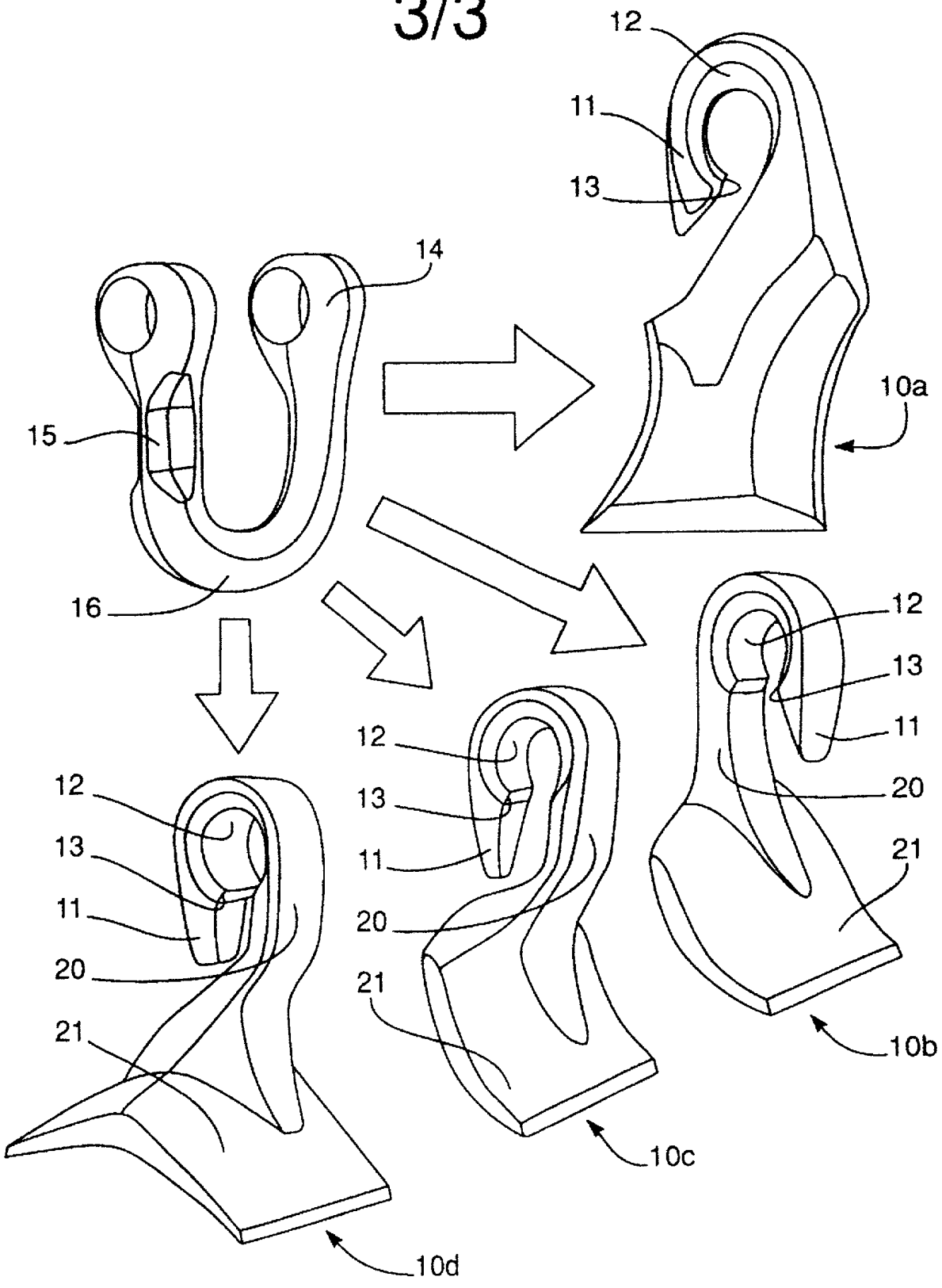
12
11
13
14
15
16
10a
12
13
11
20
21
10b
12
13
11
20
21
10c
12
13
11
20
21
10d

FIG. 5

PROCESS FOR MOUNTING FLAILS, FLAIL AND CLEVIS

The present invention relates to a process for hooking or mounting flails for chopping or cutting apparatus such as cutters for chopping climbing stems, straw or maize stalks, and also to flails and clevises for implementing this process.

In known apparatus, flails comprise an eye which is threaded onto a clevis, such that when the flails are to be replaced, each clevis which bears a flail has to be dismantled. This takes a lot of time.

The process according to the invention consists of providing each flail with a hook, the central part of which has practically the same diameter as the working part of the clevis, and the opening of which is of a smaller dimension so that it cannot escape therefrom, and providing at least one, non-working, side of the clevis with a thinned part making it possible to insert the hook into the clevis.

The invention also relates to a clevis and a flail which can be used to implement this process.

The present invention will now be described by way of non-limitative examples with reference to the attached drawings, in which:

Figures 1 and 2 show perspective views of the known prior arrangements;

Figure 3 shows an example of embodiment of the hooked flail and the clevis;

Figures 4a to 4c shows the hooked flail of Figure 3 being put in place; and,

Figure 5 shows four examples of embodiment of the hooked flail which can be put in place in the clevis.

Referring to Figures 1 and 2, it will be seen that the known chopping or cutting apparatus comprises a shaft 1, which is driven in rotation at high speed, which by means of lugs 4 bears clevises such as 2 or 3 on which are threaded the eyes 7 of flails such as 5 or 6.

It will be understood that to change the flails such as 5 or 6 it is necessary to dismantle each clevis 2 or 3 by unscrewing the bolt/nut assembly 8.

When all the flails 5 or 6 borne by a shaft 1 have to be changed, this operation can take a very long time.

An example of the present invention is shown in Figure 3. It can be seen that the flail 10 does not include an eye, such as the eye 7 of Figures 1 and 2, threaded onto the clevis, but a hook 11.

This hook 11 comprises a central part 12, of generally circular section, the shape of which corresponds closely or exactly to that of the working part 16 of the clevis 14 and a narrowed section 13, the effect of which is that the flail 10 cannot come unhooked from the clevis 14.

In order to make it possible to hook the hook 11 onto the clevis 14, the latter comprises on at least one of its sides a thinned part 15 such that at this point the thickness of the clevis 14 is slightly less than the dimension of the opening of the hook at the narrowed section 13.

Figures 4a to 4c show how the hook 11 is hooked onto the clevis 14 by passing via the thinned part 15 thereof.

In Figure 5, it can be seen that several types of flails 10, four in the example illustrated, can be arranged on one and the same clevis 14.

The flail 10a is a flail of conventional shape corresponding to Figure 1.

The flails 10b, 10c and 10d correspond to the cutting flail of Figure 2: flail 10b with a hook 11 turned towards the front, flail 10c with a hook 11 turned towards the back, and flail 10d being a double-reversible flail.

These three flails 10b, 10c and 10d have a specific shape: their hooks 11 are placed at one end of a shank 20 which bears at its other end a cutting piece 21 having a substantially rectangular shape; the cutting piece 21 of the flails 10b and 10c being slightly curved in the manner of a spoon, the cutting piece 21 of the flail 10d being double so as to be reversible.

The front part of the piece 21, which effects the cutting, may be bevelled either in a single bevel or a double bevel.

Furthermore, in the case of the flails 10a and 10d, the position of the flail may be reversed depending on whether the hook 11 is turned towards the front or towards the back. It is then necessary to balance the flail such that its centre of gravity passes through the median plane of the hook 11.

In the case of the flail 10d, when the flail is inverted, the opposite side to the side which performs the cutting is subjected to a self-sharpening effect.

According to a variant embodiment, the thinned section 15 may be produced by forging by pushing back the material towards the inside of the clevis, which causes a bead to appear which reinforces the holding in place of the flail.

Of course, the present invention covers not only the process consisting of replacing the eye 7 with a hook 11, but also the products by means of which said process is implemented, that is to say a hooked flail 11 provided with a narrowed opening 13 and the clevis 14 provided with a thinned section 15 which makes it possible to make the hook 11 penetrate into the clevis 14.

During operation, the hook 12 rests on the working part 16 of the clevis 14, whereas the thinned section 15 is formed on at least one of the non-working sides of the clevis.

CLAIMS

1. A process for mounting a flail on a clevis, consisting of providing the flail with a hook, the central part of which has substantially the same shape as the working part of the clevis and the opening part of which includes a narrowed section such that the flail cannot come unhooked from the working part of this clevis, and providing the clevis with a thinned part on one of its non-working parts making it possible to insert the hook of the flail into the clevis.

2. A clevis for implementing the process according to Claim 1 for a flail bearing a hook the clevis comprising on at least one of its sides, a thinned part.

3. A flail for implementing the process according to Claim 1, the flail including a hook adapted to be hooked to a clevis according to Claim 2.

4. A flail comprising a cutting piece, a shank extending from the cutting piece and a hook provided on the shank remote from the cutting piece, the entrance to the opening of the hook having a smaller dimension than the opening.

5. A flail according to Claim 3 or Claim 4, in which the hook comprises a central part having a shape which corresponds closely to that of the working part of a clevis to which it is to be mounted and a narrowed section, such that the opening of the hook is slightly greater than the thickness of the thinned part of the clevis.

6. A flail according to any one of Claims 3 to 5, the working part of which is of conventional shape.

7. A flail according to any one of Claims 3 to 6, in which the cutting part has a substantially rectangular shape and is connected to the hook by a shank.

8. A flail according to any one of Claims 3 to 7, in which the front part of the cutting piece is bevelled.

9. A flail according to any one of Claims 3 to 8, the cutting part of which is slightly curved.

10. A flail according to any one of Claims 3 to 6, the cutting part of which is double such that the blade is reversible, its centre of gravity being located in the median plane of the hook.

11. A flail according to any one of Claims 3 to 9, in which the hook is turned either towards the front or towards the back.

12. A process of mounting a flail on a clevis, substantially as described with respect to Figures 3 to 5 of the accompanying drawings.

13. A clevis substantially as shown in or as described with respect to Figures 3 to 5 of the accompanying drawings.

14. A flail substantially as shown in or as described with respect to Figures 3 to 5 of the accompanying drawings.

Application No:	GB 0102573.3	**Examiner:**	Rhys Williams
Claims searched:	1-14	**Date of search:**	29 June 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): A1F (FDH)

Int Cl (Ed.7): A01D (34/00)

Other: On-line: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	GB 1451674	(MATHEWS) Whole document relevant.	-
A	GB 1053875	(BOMFORD) See Figure 1.	-
X	DE 3611511 A1	(AMAZONEN) See figures 2-12	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.