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GB 2225407 A **US 4584958 A** **US 4343258 A**

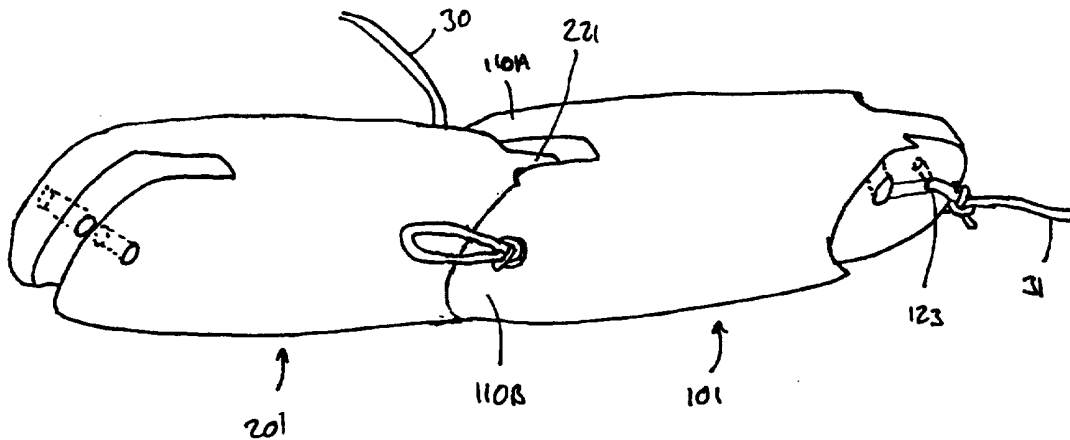
(58) Field of Search

UK CL (Edition O) F2S SCF
INT CL⁶ B63B 59/02, E02B 3/26

(54) **Boat fender**

(57) A boat fender comprises a series of fenders joined by pivoted male/female connections, as shown. The fenders may be inflatable.

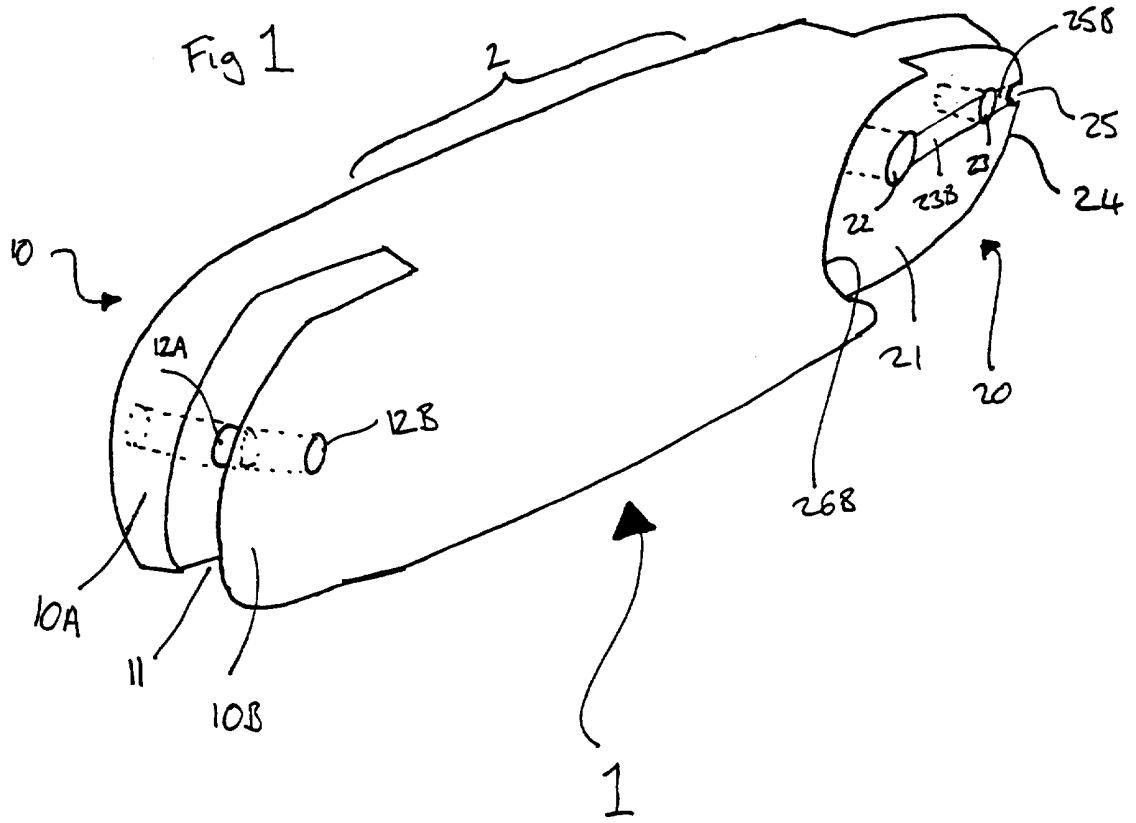
Fig 3b

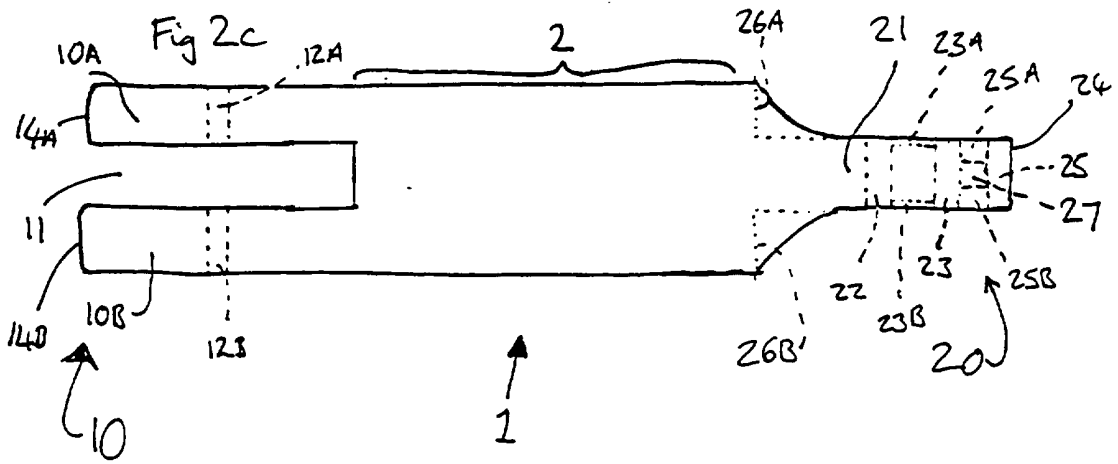
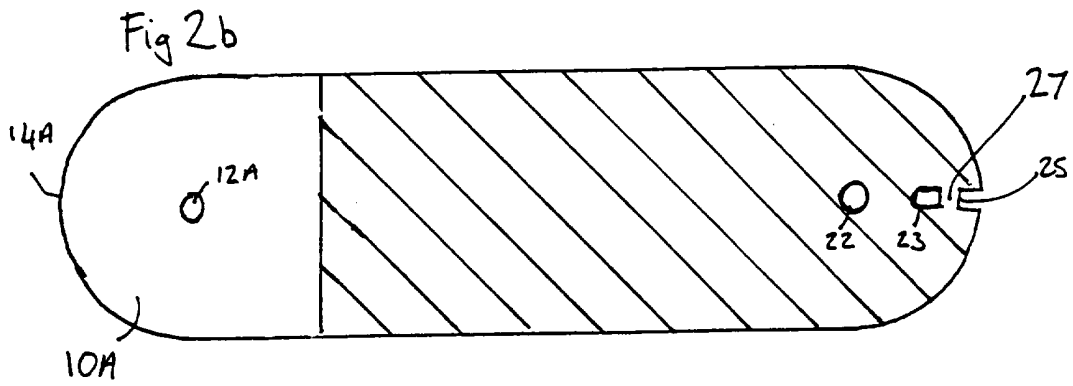
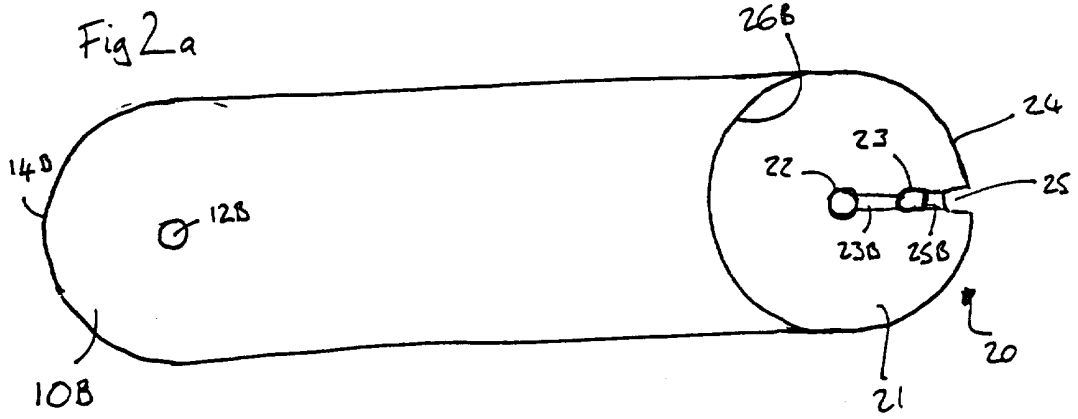


At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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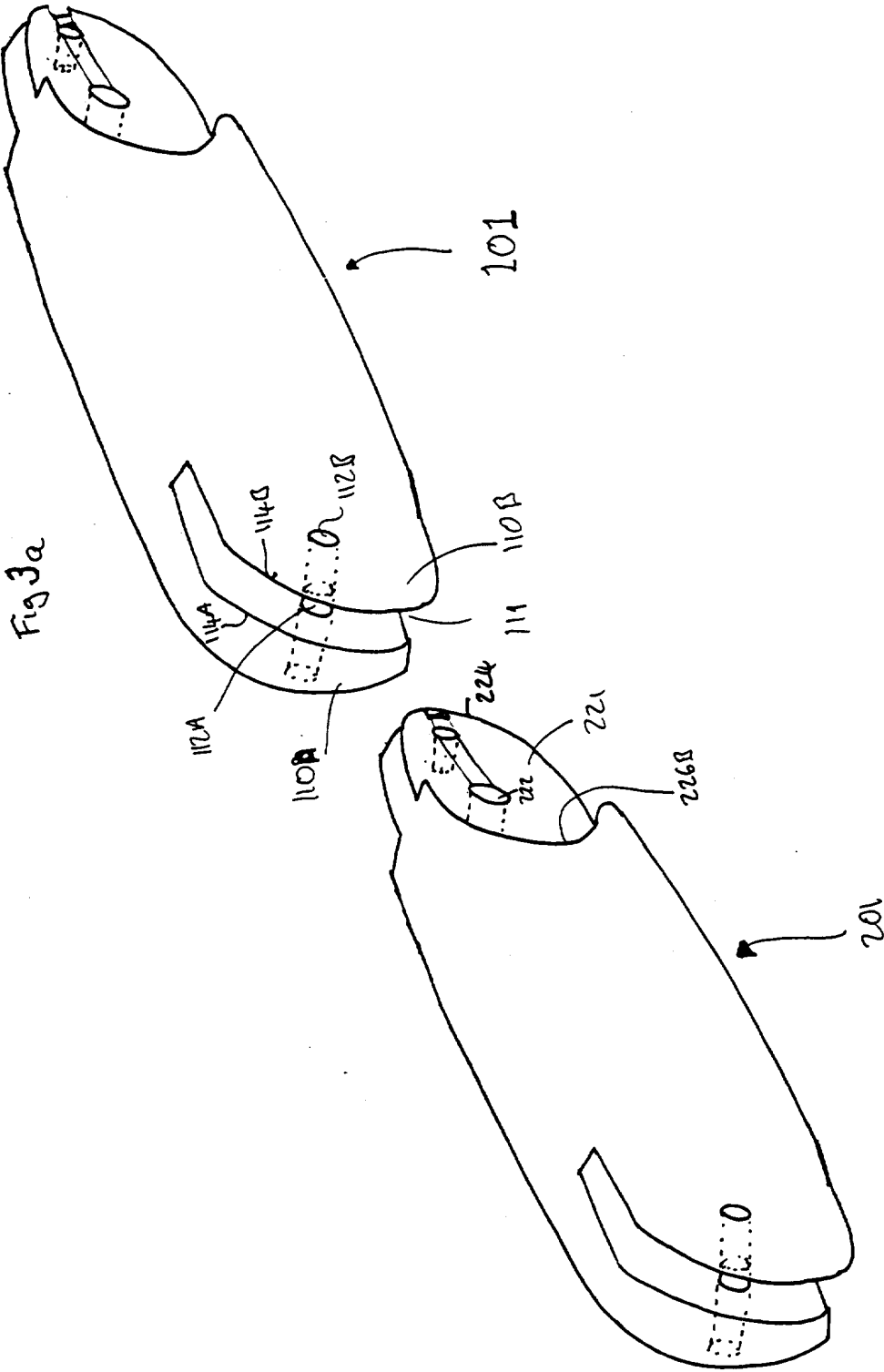


Fig 3b

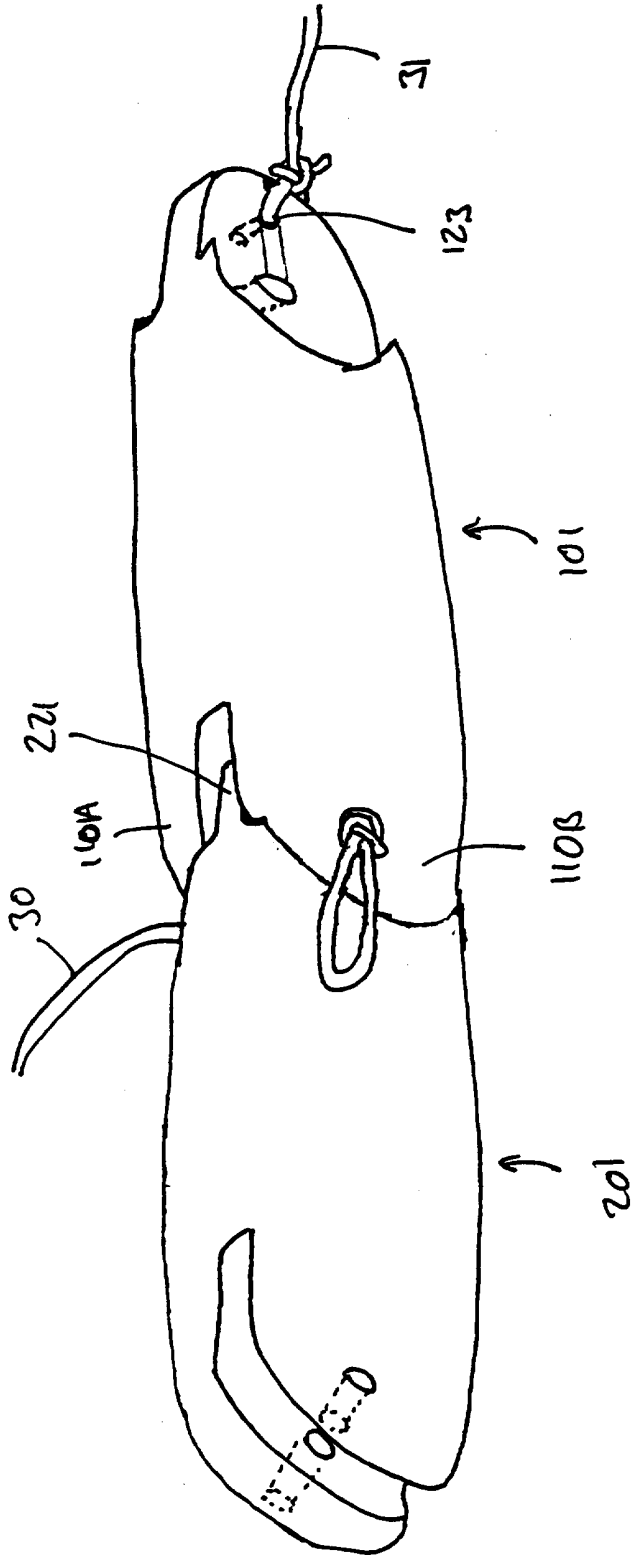
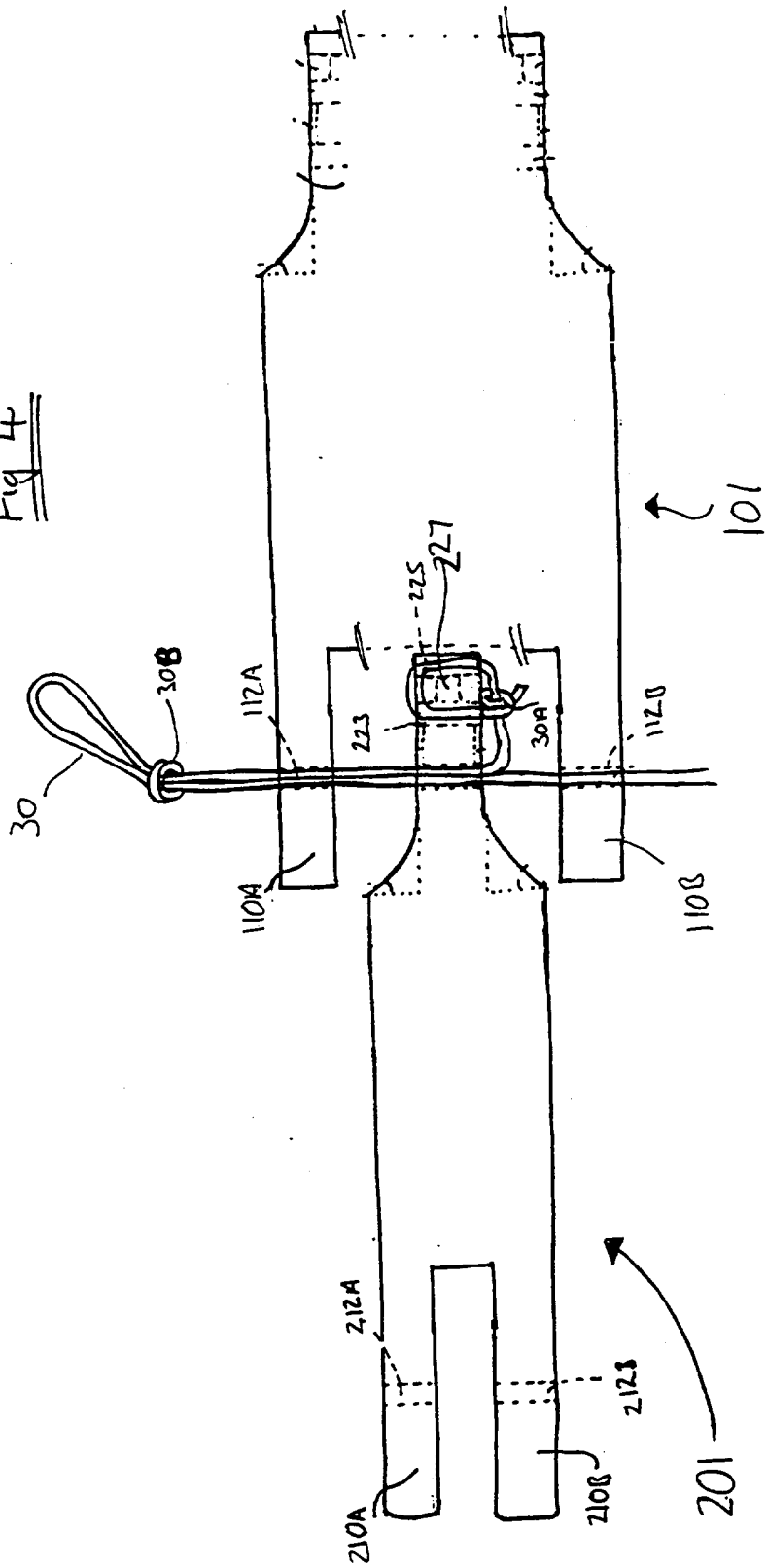


Fig 4



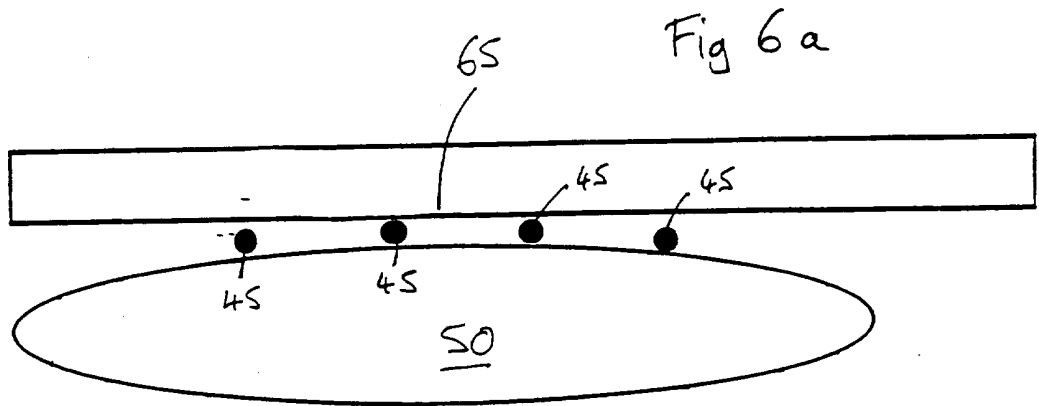
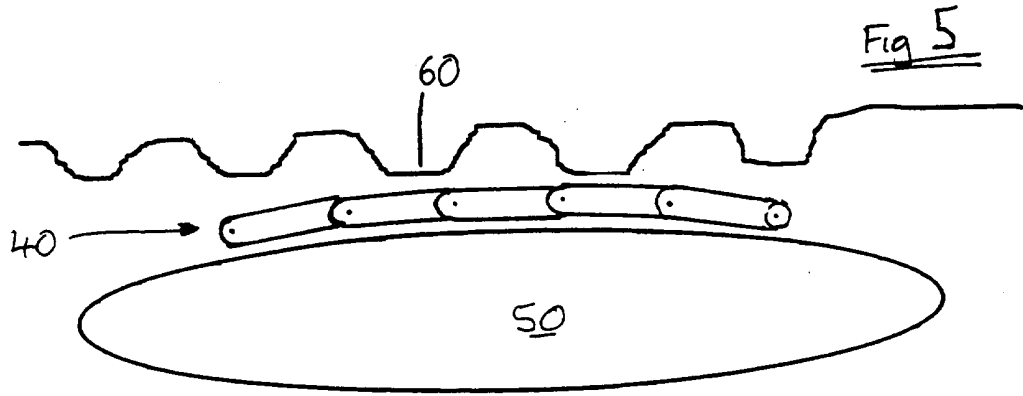


Fig 6b

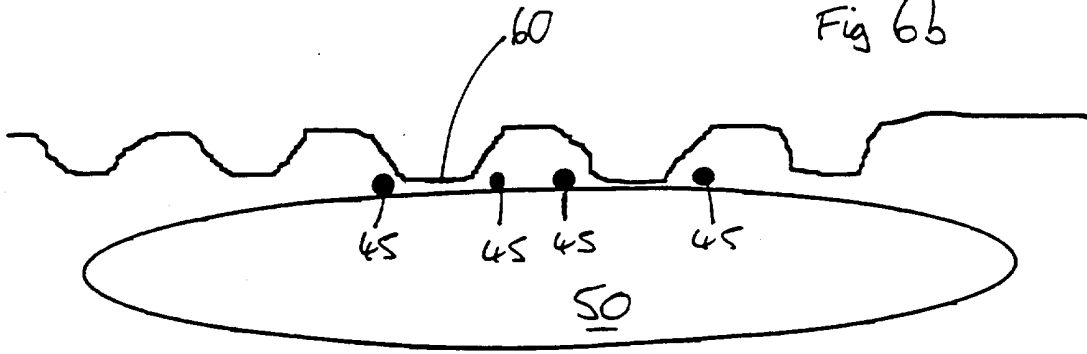
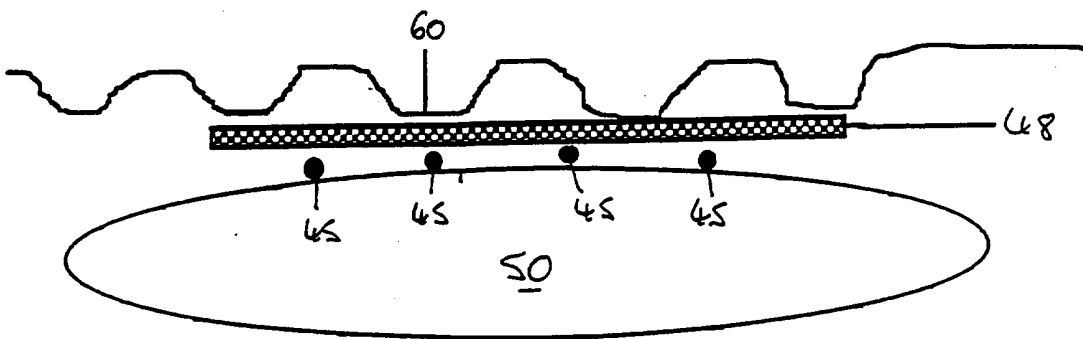


Fig 6c.



1 **FENDER**

2

3 This information relates to a fender particularly but
4 not exclusively for use in protecting boats, and to a
5 fender system including such a fender.

6

7 A known commonly used type of boat fender is generally
8 cylindrical with an eyelet at one end for attaching a
9 rope. Such a fender is adapted, in use, to hang
10 generally vertically against the hull of the boat in
11 order to protect the hull against contact with other
12 objects such as harbour or marina walls. Each fender,
13 individually, therefore protects only a small length of
14 the hull. Providing a number of spaced apart,
15 vertically hanging fenders along the length of the hull
16 generally provides adequate protection to boats moored
17 against a long, straight, regular surface, such as may
18 be provided by a harbour wall. This arrangement is
19 shown schematically in Fig. 6a.

20

21 Frequently, especially within the cruising fraternity,
22 it is desired to moor a boat against a mooring surface
23 which is irregular, such as a piled sheet pier. Known
24 fenders alone offer inadequate protection in such
25 circumstances, since irregularities in the mooring
26 surface may protrude between the fenders, contacting

1 and damaging the hull. This arrangement is shown
2 schematically in Fig. 6b.

3
4 A known solution to this problem is to provide a plank
5 between the fenders and the uneven mooring surface in
6 order to prevent irregularities in the mooring surface
7 from protruding between the fenders. Such an
8 arrangement is shown schematically in Fig. 6c. Many
9 boats carry a plank as a matter of routine to avoid the
10 necessity of searching for a suitable length of timber
11 when mooring against an uneven mooring surface away
12 from their normal berth. However, if a plank is
13 carried, storage of the plank may be cumbersome, since
14 such planks may be of considerable length and space is
15 often at a premium. If a plank is not carried, it may
16 be difficult to find a suitable plank when required.
17 It is therefore desirable to provide a fender or fender
18 system which eliminates or mitigates the need for a
19 plank when mooring against an irregular mooring
20 surface.

21
22 According to a first aspect of the present invention
23 there is provided a fender for a boat wherein said
24 fender includes at least two connection portions
25 adapted to allow the fender to be coupled to other
26 similar fenders so that a number of similar fenders can
27 be connected to form a connected row of fenders,
28 wherein the connection portions are configured so that
29 each of the connection portions of the fender is
30 adapted to overlap longitudinally with a connection
31 portion of an adjacent connected fender.

32
33 Preferably at least one connection portion of said
34 fender includes one or more connection apertures
35 enabling connection to a similar fender by insertion of
36 a securing member through the respective connection

1 apertures of connection portions of each of the
2 fenders.

3

4 Preferably said apertures are adapted to receive rope
5 as a securing member.

6

7 Preferably said connection portions are adapted to
8 allow pivotal motion of the fender, with respect to an
9 adjacent connected fender.

10

11 Preferably at least one of the connection portions
12 includes an arcuate portion in order to allow relative
13 pivotal motion of connected fenders.

14

15 Preferably said connection portions are adapted to
16 allow pivotal motion of the fender, with respect to an
17 adjacent connected fender, in a first plane but to
18 restrict or substantially prevent pivotal motion in a
19 second, substantially orthogonal, plane.

20

21 Preferably said connection portions include faces
22 adapted to co-operate with faces of adjacent connected
23 fenders so that the faces slidingly engage each other
24 to allow relative pivotal motion of connected fenders.

25

26 Preferably at least one of said faces includes at least
27 one groove in order to allow a connection member to be
28 recessed therein.

29

30 Preferably the fender includes a connection portion
31 having a male connection part adapted to be received in
32 a female connection part of an adjacent fender.

33

34 Preferably the fender includes a connection portion
35 having a female connection part adapted to receive a
36 male connection part of an adjacent fender.

1 Preferably at least one connection portion includes at
2 least one of a female connection portion in the form of
3 a mortise-like part and a male connection portion in
4 the form of a tenon-like part.

5
6 Preferably the fender is adapted for use as a
7 vertically hanging fender.

8
9 According to a second aspect of the present invention
10 there is provided a fender system comprising a number
11 of elongate fenders which are adapted to be connected
12 end to end in order to form a composite elongate
13 fender.

14
15 Preferably the composite elongate fender is adapted to
16 be suspended by both ends thereof and to be relatively
17 flexible in a first plane but relatively inflexible in
18 a second, substantially orthogonal, plane.

19
20 Preferably the composite elongate fender is adapted to
21 provide protection along substantially its entire
22 length.

23
24 Preferably at least one of the fender elements has a
25 female connection part and wherein there is provided a
26 closing member for closing off said female connection
27 part.

28
29 Preferably at least one of the fender elements is a
30 fender in accordance with any of Claims 1 to 12.

31
32 According to a third aspect of the present invention
33 there is provided a closing member for closing off a
34 female connection part of a fender according to Claim
35 10.

36

1 Embodiments of the invention will be described, by way
2 of example, with reference to the accompanying drawings
3 in which:

4

5 Fig. 1 is a perspective view of a preferred embodiment
6 of a fender in accordance with the present invention;

7

8 Figs. 2a, 2b and 2c are respectively side, plan and
9 cross sectional views of an embodiment similar to the
10 embodiment of Fig. 1;

11

12 Fig. 3a shows an embodiment of a fender system,
13 comprising two fenders of the type shown in Fig. 1,
14 prior to fitting together;

15

16 Fig. 3b shows the embodiment of Fig. 3 with the fenders
17 fitted together, and secured with a rope, to form a
18 composite elongate fender;

19

20 Fig. 4 shows an exploded view of a first fender and a
21 schematic plan view of a second fender connected by a
22 rope to the first fender, each fender corresponding the
23 fender of Fig. 2;

24

25 Fig. 5 illustrates schematically the use of an
26 embodiment of a fender system in accordance with the
27 present invention in protecting a boat moored against
28 an irregular mooring surface;

29

30 Fig. 6a illustrates schematically the use of prior art
31 fenders in protecting a boat moored against a regular
32 mooring surface;

33

34 Fig. 6b illustrates schematically the use of prior art
35 fenders in protecting a boat moored against an
36 irregular mooring surface; and

1 Fig. 6c illustrates schematically the use of prior art
2 fenders and a plank in protecting a boat moored against
3 an irregular mooring surface.

4
5 With reference to Fig. 1 an embodiment of a fender,
6 generally designated 1, in accordance with the present
7 invention comprises a generally cylindrical main body
8 2. Although generally cylindrical, the embodiment of
9 Fig. 1 has a slightly oval radial cross section, and
10 bulges slightly in the axially central portion, so that
11 a circumference taken at an axial centre of the fender
12 is slightly greater than the circumference nearer the
13 ends. The embodiment of Figs. 2 to 2c differs in shape
14 from the embodiment of Fig. 1 in that it is cylindrical
15 and there is no central bulge. However, because the
16 embodiments of Fig. 1 and of Figs. 2 to 2c are similar,
17 except for the variation in shape, corresponding
18 reference numerals will be used to designate
19 corresponding parts.

20
21 The fender 1 has a first, mortise-like, connection
22 portion 10 at a first end thereof. The first
23 connection portion 10 comprises a female connection
24 portion in the form of a slot 11 defined by first and
25 second arm portions 10A, 10B. The first arm portion
26 10A is provided with a first-arm aperture 12A which
27 extends therethrough connecting the slot 11 with an
28 outer surface of the fender. The second arm portion
29 10B is provided with a second-arm aperture 12B, co-
30 axial with the first-arm aperture 12A, therethrough.

31
32 The first and second arm portions 10A, 10B have axially
33 outermost ends 14A, 14B which are arcuate in form. The
34 axis of the first and second arm apertures is located
35 to pass through the respective centres of curvature of
36 the arcuate axially outermost ends 14A, 14B.

1 The fender 1 has a second, tenon-like, connection
2 portion 20 at a second end thereof. The second
3 connection portion 20 comprises a male connection
4 portion in the form of a tongue 21 which is continuous
5 with the main portion of the body of the fender 1 and
6 which extends axially therefrom. In the embodiment of
7 Figs 2a, 2b and 2c the tongue has a thickness
8 equivalent to approximately one third of the diameter
9 of the fender 1. Extending through the tongue 21 is a
10 tongue connection aperture 22. Also extending through
11 the tongue 21 is an eyelet aperture 23. The tongue has
12 an outermost end 24 which is arcuate in form.
13 A tongue notch 25 which extends towards the eyelet
14 aperture 23 is provided at the centre of arcuate
15 surface of the end 24. The tongue notch extends
16 through the thickness of the tongue 21. The tongue
17 notch 25 is separated from the eyelet aperture 23 by a
18 tying member 27 (shown best in Fig. 2b). First and
19 second notch-eyelet grooves 25A, 25B are formed in the
20 tying member 27 and run along the surfaces of the
21 tongue between the tongue notch 25 and the eyelet
22 aperture 23. First and second aperture-eyelet grooves
23 23A, 23B run along the surfaces of the tongue between
24 the eyelet aperture 23 and the tongue connection
25 aperture. The grooves 23A, 23B, 25A, 25B form recessed
26 channels in which ropes may run without extending
27 beyond the surfaces of the tongue 21.

28
29 The tongue 21 has an innermost end where it connects to
30 the main body 2 of the fender 1. The change in
31 thickness between the innermost end of the tongue 21
32 and the main body 2 occurs at first and second arcuate
33 shoulders 26A, 26B. The axis of the tongue connection
34 aperture 22 passes through the centres of curvature of
35 the first and second arcuate shoulders 26A, 26B.
36

1 Fig. 3a shows a first fender 101 and a second similar
2 fender 201 immediately prior to connecting together in
3 order to form a longer continuous composite fender.
4 Fig. 3b shows the fenders connected by a rope to form a
5 longer continuous composite fender. The first fender
6 101 and second fender 201 are each generally similar to
7 the fender 1 or Fig. 1 and similar elements are
8 designated by similar reference numerals prefixed by
9 the numerals 1 or 2 respectively.

10
11 In order to connect the first fender 101 to the second
12 fender 201 the tongue 221 of the second fender 201 is
13 inserted into the slot 111 of the first fender 101.
14 The tongue 221 is thus located between the first arm
15 portion 110A and the second arm portion 110B of the
16 first fender 101. The outer, generally planar,
17 surfaces of the tongue 221, engage the inner, generally
18 planar surfaces of the first arm portion 110A and
19 second arm portion 110B. In order to secure the first
20 fender 101 and second fender 201 together, a securing
21 member, shown in the form of a rope 30 in Fig. 3b, is
22 passed through the first arm aperture 112A of the first
23 fender, the tongue connection aperture 222 of the
24 second fender and the second arm aperture 112B of the
25 first fender.

26
27 It will be appreciated that the tongue connection
28 aperture 222 is substantially at the centre of the
29 radius of curvature of the first arcuate shoulder (not
30 shown) and second arcuate shoulder 226B, and the first
31 and second arm apertures 112A, 112B are substantially
32 at the centre of the radius of curvature of the first
33 and second arcuate outermost ends 114A, 114B of the arm
34 members 110A, 110B. Thus when a securing member, such
35 as a rope 30, is passed through the apertures 112A,
36 222, 112B in order to align those apertures, the first

1 outermost end 114A engages the first arcuate shoulder
2 (not shown) and the second outermost end 114B engages
3 the second arcuate shoulder 226B. When secured, the
4 first and second fenders 101, 201 are thus able to
5 pivot relative to each other about the aligned
6 apertures 112A, 222, 112B in the plane substantially
7 co-planar with the tongue 221. In this embodiment, the
8 fenders are unable to pivot substantially, relative to
9 each other, in other planes.

10

11 Although, in this embodiment, the tongue member 221 is
12 of approximately the same thickness as the slot 111,
13 and the distance between the tongue aperture 222 and
14 the arcuate shoulders 226B is approximately the same as
15 the distance between the arm apertures 112A, 112B and
16 the outermost ends 114A, 114B of the arms, these
17 distances may, of course, be varied in order to provide
18 any desired degree of play required. Different degrees
19 of play will be desired according to, for example, the
20 coefficient of friction of the material from which the
21 connecting portions are made, the degree to which the
22 material might expand in the presence of moisture, etc.

23

24 As can be seen in Fig. 3b, a hanging member 31 in the
25 form of a rope, can be tied through the eyelet aperture
26 123, around the tying member 127. This enables the
27 composite fender to be supported at its end. A hanging
28 member can be used in a similar way to hang a fender
29 123, when it is not connected to another fender, for
30 use as a conventional vertically hanging fender.

31

32 Fig. 4 illustrates schematically a preferred way of
33 using a rope 30 as a securing member to secure first
34 and second fenders 101, 102. The first fender 101 is
35 shown exploded along a mid-line thereof but otherwise
36 generally corresponds to the fender 1 as illustrated in

1 Fig. 2c and similar reference numerals are used to
2 designate similar elements, but are prefixed by the
3 numeral 1. The second fender 201 generally corresponds
4 to the fender as illustrated in Fig. 2c and similar
5 reference numerals are used to designate similar
6 elements but are prefixed by the numeral 2.

7
8 As illustrated in Fig. 4, a preferred method of
9 securing the first and second fenders 101, 201 together
10 includes using a rope 30 as a securing member. The
11 rope passes through the eyelet aperture 223 of the
12 second fender 201 and is tied around the tying member
13 227 to form a first knot 30A thus securing the rope to
14 the second fender 201. The rope 30 then passes through
15 the tongue connection aperture 222 of the second fender
16 201, and through the first-arm aperture 112A of the
17 first fender 101 where it is tied off to form a second
18 knot 30B. The rope then passes back through the first-
19 arm aperture 112A of the first fender 101, through the
20 tongue connection aperture 222 of the second fender 201
21 and through the second-arm aperture 112B of the first
22 fender 101, thus effectively securing the two fenders
23 together.

24
25 Although, for illustrative purposes, the section of the
26 rope adjacent the tongue 221 is shown as standing proud
27 of the tongue 221 it will be appreciated that in use
28 this section of the rope, including the first knot 30A,
29 will be located in the end notch 225 grooves 23A, 23B,
30 25A, 25B (see Fig. 2c) and will therefore not stand
31 proud of the tongue surface. This allows the planar
32 surfaces of the tongue 221, in use, to slide over the
33 planar surfaces of the arms 110A, 110B to allow
34 pivoting of the first and second fenders.

35
36 The described embodiments thus provide a fender which

1 can be used as a conventional cylindrical fender by
2 tying a rope around the tying member 27 using the
3 eyelet aperture 23 and hanging in the conventional way.
4 The described embodiments also provide a fender system
5 in which each fender can be connected and secured to
6 one or more similar fenders in order to provide a
7 secured elongate row of fenders. The connection
8 portions of the secured fenders overlap so that the row
9 forms an elongate continuous composite fender which
10 eliminates the need for use of a plank in many
11 situations where a plank would be necessary if
12 conventional fenders were used. The overlapping of the
13 connection portions is an important feature of
14 preferred embodiments, since this prevents
15 irregularities in a mooring surface working their way
16 between the connected fenders due to the constant
17 motion of the moored boat.

18
19 Fig. 5 illustrates use of an elongate composite fender
20 40 formed from five connected and secured fenders of
21 the type illustrated in Figs. 2a, 2b and 2c in
22 protecting a boat 50 moored against an irregular
23 mooring surface 60.

24
25 Fig. 6a illustrates the use of prior art fenders 45 in
26 protecting a boat 50 moored against a regular mooring
27 surface 65.

28
29 Fig. 6b illustrates the use (and inadequacy) of prior
30 art fenders 45 in protecting a boat 50 moored against
31 an irregular mooring surface 60.

32
33 Fig. 6c illustrates a prior art method of protecting a
34 boat 50 moored against an irregular mooring surface 60
35 by using a number of prior art fenders 45 in
36 conjunction with a plank 48.

1 Variations and modifications may be provided without
2 departing from the scope of the invention. For
3 example, in the illustrated embodiments each fender is
4 shown to have a female (mortise-like in the
5 embodiments) connection portion and a male (tenon-like)
6 connection portion to enable each fender to be
7 connected to at least one similar fender. However, it
8 would be possible to provide a fender system in which a
9 first type of fender includes two connection portions,
10 each having a male part, and a second type of fender
11 includes two connection portions each having a female
12 part. In this case, a row of fenders can be connected
13 by alternating the first and second types of fender.
14 (It is intended that the term "similar fender" used
15 herein should include such varying types.)
16

17 Fenders in accordance with the present invention may be
18 provided in any of a number of sizes according to the
19 size of boat for which they are intended. Typical
20 dimensions might include diameters of about 6 to 12
21 inches (15 to 30 cm) and lengths of about 12 to 36
22 inches (30 to 90 cm).
23

24 In use it may not be desirable to have a fender in
25 which the arm portions 10A, 10B have nothing between
26 them, because if the arm portions are forced together,
27 they may be deformed and/or damaged. A preferred
28 embodiment of a fender system in accordance with the
29 present invention thus includes a number of closing
30 members, each preferably generally similar in shape to
31 a male connection portion or tongue. The closing
32 members are adapted to be connected and secured to a
33 female connection portion of a fender in order to
34 'close off' and support the female connection portion.
35 Such a closing member could be connected and secured by
36 similar means to those used to connect and secure the

1 fenders together or, because a less secure connection
2 might be required, an alternative securing means, such
3 as a hook and loop fastener, could be used.

4

5 The securing member used in the illustrated embodiments
6 is in the form of a rope. However, other forms of
7 securing members could be used, for example resilient
8 plastic or rubber bolts or rods are envisaged.

9

10 Fenders in accordance with the present invention may be
11 of inflatable type, further increasing the ease with
12 which they can be stored when not in use. A preferred
13 embodiment of an inflatable fender in accordance with
14 the present invention is formed from a plastic material
15 approximately 2 mm thick and includes a non-return
16 valve to facilitate inflation and reduce the risk of
17 inadvertent deflation. Connection portions of
18 inflatable fenders could be formed from generally the
19 same thickness and type of the material as the
20 remainder of the fender, or could be reinforced with
21 additional material of the same, or of a different
22 type. The closing member, as discussed above, could
23 also be inflatable.

1 **CLAIMS**

2

3 1. A fender for a boat wherein said fender includes
4 at least two connection portions adapted to allow the
5 fender to be coupled to other similar fenders so that a
6 number of similar fenders can be connected to form a
7 connected row of fenders, wherein the connection
8 portions are configured so that each of the connection
9 portions of the fender is adapted to overlap
10 longitudinally with a connection portion of an adjacent
11 connected fender.

12

13 2. A fender as claimed in Claim 1 wherein at least
14 one connection portion of said fender includes one or
15 more connection apertures enabling connection to a
16 similar fender by insertion of a securing member
17 through the respective connection apertures of
18 connection portions of each of the fenders.

19

20 3. A fender as claimed in Claim 2 wherein said
21 apertures are adapted to receive rope as a securing
22 member.

23

24 4. A fender as claimed in any preceding Claim wherein
25 said connection portions are adapted to allow pivotal
26 motion of the fender, with respect to an adjacent
27 connected fender.

28

29 5. A fender as claimed in Claim 4 wherein at least
30 one of the connection portions includes an arcuate
31 portion in order to allow relative pivotal motion of
32 connected fenders.

33

34 6. A fender as claimed in either of Claims 4 or 5
35 wherein said connection portions are adapted to allow
36 pivotal motion of the fender, with respect to an

1 adjacent connected fender, in a first plane but to
2 restrict or substantially prevent pivotal motion in a
3 second, substantially orthogonal, plane.
4

5 7. A fender as claimed in any of Claims 4 to 6
6 wherein said connection portions include faces adapted
7 to co-operate with faces of adjacent connected fenders
8 so that the faces slidingly engage each other to allow
9 relative pivotal motion of connected fenders.
10

11 8. A fender as claimed in Claim 7 wherein at least
12 one of said faces includes at least one groove in order
13 to allow a connection member to be recessed therein.
14

15 9. A fender as claimed in any preceding claim wherein
16 the fender includes a connection portion having a male
17 connection part adapted to be received in a female
18 connection part of an adjacent fender.
19

20 10. A fender as claimed in any preceding claim wherein
21 the fender includes a connection portion having a
22 female connection part adapted to receive a male
23 connection part of an adjacent fender.
24

25 11. A fender as claimed in either of Claims 9 or 10
26 wherein at least one connection portion includes at
27 least one of a female connection portion in the form of
28 a mortise-like part and a male connection portion in
29 the form of a tenon-like part.
30

31 12. A fender as claimed in any preceding claim wherein
32 the fender is adapted for use as a vertically hanging
33 fender.
34

35 13. A fender system comprising a number of elongate
36 fenders which are adapted to be connected end to end in

1 order to form a composite elongate fender.

2

3 14. A fender system as claimed in Claim 13 wherein the
4 composite elongate fender is adapted to be suspended by
5 both ends thereof and to be relatively flexible in a
6 first plane but relatively inflexible in a second,
7 substantially orthogonal, plane.

8

9 15. A fender system as claimed in either of Claims 13
10 or 14 wherein the composite elongate fender is adapted
11 to provide protection along substantially its entire
12 length.

13

14 16. A fender system as claimed in any of Claims 13 to
15 15 wherein at least one of the fender elements has a
16 female connection part and wherein there is provided a
17 closing member for closing off said female connection
18 part.

19

20 17. A fender system as claimed in any of Claims 13 to
21 16 wherein at least one of the fender elements is a
22 fender in accordance with any of Claims 1 to 12.

23

24 18. A closing member for closing off a female
25 connection part of a fender according to Claim 10.

26

27 19. A fender substantially as hereinbefore described
28 with reference to or as shown in the accompanying
29 drawings.

30

31 20. A fender system substantially as hereinbefore
32 described with reference to or as shown in the
33 accompanying drawings.

34

35



Application No: GB 9718961.7
Claims searched: 1, 13

Examiner: Howard Reeve
Date of search: 20 October 1997

**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.O): F2S (SCF)

Int Cl (Ed.6): B63B 59/02, E02B 3/26

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2225407 (ALAN PRITCHARD), whole document	13 - 15 at least
X	US 4584958 (DAVID GREEN), whole document	1-10, 12-13, 15, 17
X	US 4343258 (MARK BELVEDERE), whole document	1-4, 6-15, 17

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