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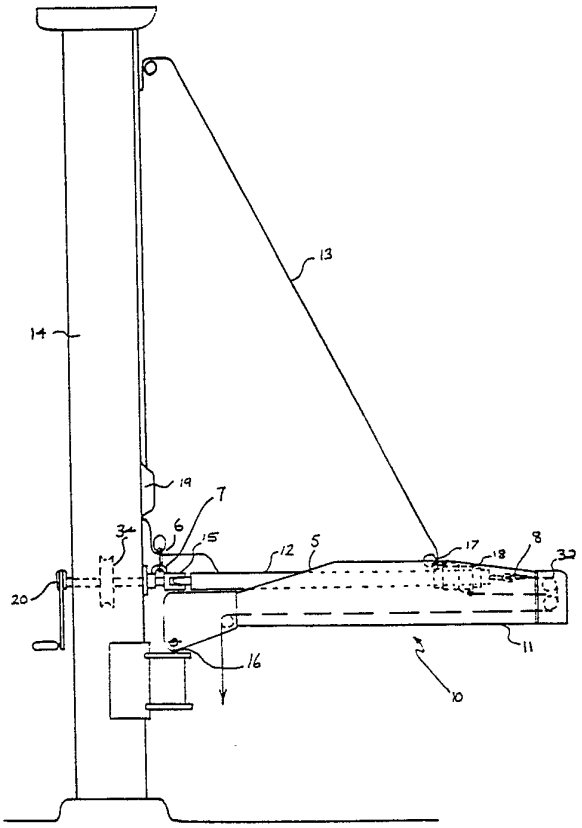
(54) Title: REEFING OR FURLING BOOM



(57) Abstract

A reefing or furling boom (10) comprises a boom (11) connected to the mast (14) by a gooseneck (16), and a roller (12) onto which a sail (13) may be wound connected to the mast by a universal joint (15). The free ends of the boom and roller are interconnected so as to swivel together. The foot (6) of the mast end of the sail is connected to the universal joint such that the mast end of the sail can be wound onto the roller without substantial deviation from the line of the mast.

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REEFING OR FURLING BOOM

The present invention relates to reefing or furling booms for sails.

Prior art reefing or furling booms work on the principle of winding the mainsail onto which is connected to the mast by a pivotal (usually universal) connection. This single connection has been found to be difficult to operate. One modification as shown in U.S. Patent 4 324 192 has required the sailtrack on the back of the mast to be displaced rearwardly by the interposing of a clothweb so that the boltrope of the luff wraps around the rotary member aft of its gooseneck. The mast sailtrack thus simply flaps about when the sail is reefed which is an unsatisfactory situation.

One possible solution would be to use a roller mounted inside a hollow boom, in the manner of self-furling masts such as shown in U.S. Patent 3 835 804. However, since the height of a sail is generally about three times its width the bulk of the wound sail would require a hollow boom of unacceptably great diameter. The construction disclosed in U.S. Patent 4 503 797 attempts to overcome this by providing a sheath of fabric around the boom into which the sail is wound. However, it is still necessary to wind the luff of the sail onto the roller at a point aft of the universal joint. This distorts the foot of the sail and makes winding up more difficult.

It is an object of the present invention to provide a construction which allows the sail to be wound onto the roller without substantial deviation of the luff of the sail from the line of the sailtrack on the mast.

The present invention provides a reefing or furling boom for connection to a mast of a sailing boat, which comprises

a rigid boom adapted to be connected to the mast at one end by a double-acting swivel joint;

a rotatable roller to which the foot of a sail may be attached so as to allow the sail to be wound onto the roller,

a double-acting universal joint being mounted at one end of the roller and being adapted to be connected to the mast at a position spaced above the swivel joint,

tensioning means on the roller for tensioning the foot of the sail,

means interconnecting free ends of the boom and the roller such that the boom and roller are constrained to swivel together, and

rotation means to rotate the roller;

the arrangement being such that the mast end of the sail can be wound onto the roller without substantial deviation from the line of the mast.

The boom is rigid in the sense that it should be able to take the loadings normally placed on a boom. The boom may be hollow and the roller may be partially located within the boom. However to avoid a boom of undue diameter the mast end of the hollow portion should then be cutaway to accommodate the wound luff and boltrope of the sail, which is of considerably greater bulk than the rest of the wound sail.

Generally the tack (i.e. foot of the luff) of the sail will be attached to attachment means mounted on or adjacent to the universal joint. In fact attachment may be to a short spindle between the mast and the universal joint, so as to attach as close to the line of the mast track as practicable.

The tensioning means is preferably a two-part swivel which allows the sail to be wound up without also winding a tensioning cable attached thereto around the roller. Particularly when the roller is located inside the boom, the combination of the boom and the tensioning means may be sufficient to interconnect the free ends of the roller and the boom.

However, when the roller is mounted above the boom it is preferred to also provide at the free end of the boom an upwardly extending member having an aperture into which

the free end of the roller is slidably and rotatably received.

Generally, the rotation means is a manual handle, pulley or motor drive. This will usually be mounted inside the mast or at the other side to the boom, so as to allow the sail luff to be wound up close to the mast.

The invention will now be described by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 shows a reefing or furling boom with the roller inside the boom; and

Fig. 2 shows a reefing or furling boom with the roller outside the boom.

Fig. 1 shows yacht mast 14, mainsail 13 and a reefing or furling boom assembly 10. The boom assembly 10 comprises a boom 11 having a rigid shell structure. Within the boom 11 is a rotatable roller 12 to which the sail 13 is attached. The roller 12 is connected to the mast 14 by way of a universal joint 15 and the boom 11 is connected to the mast 14 by a double-acting swivel or a conventional gooseneck fitting 16. This allows the boom to move in the horizontal and vertical planes about the mast.

On the free end of the roller 12 is a tensioning means to tension the foot of the sail. The tensioning means comprises a two part slidable member 18 on the roller 12 and a pulley system 32 attached thereto. The slidable member 18 is attached to the clew 17 of the sail and the pulley system 32. The inner part 18 is keyed to the roller 12 so that as the roller 12 rotates, it will rotate with it so as to wind the sail around the roller; whilst the second or outer part of the member 18 rotates on the roller 12, so that when the roller rotates it will not wind the tensioning cable around the roller. The free end of the roller is connected to the free end of the boom by a swivel 8.

The mast end foot (the tack 6) of the sail 13 is

attached to a mounting 7 on the mast side of universal joint 15 so as to wind the foot of the sail onto the roller. The sail 13 is fed through a slot (not shown) in the shell of the hollow boom 11, onto the roller 12. The sail is attached to the mast by the conventional mast track and fed through the fast feeder 19. The roller is rotated by a handle 20 or by other suitable rotating means such as a winch system (not shown), connected to a fixed pulley wheel 34. Reduction gearing and motorised power sources may be located within the mast 14.

The top of the mast end of the shell of the hollow boom is provided with a cutaway 5 so that the luff of the sail containing the boltrope is wound up outside the hollow boom since the wound luff is too bulky to be contained within the boom section.

The boom 11 is still capable of performing all conventional operations, and sheeting and boom vang apparatus can be attached to the shell 22 at their normal locations.

Fig. 2 shows another embodiment of the invention in which the roller 21 is outside the boom 22. The roller 21 and boom 22 are interconnected at their free ends remote from the mast 23 by means of a bracket 35 upstanding from the free end of the boom, and which has a bush (not shown) into which the free end of the roller is rotatably and slideably received. The tensioning means comprising the two part slidable member 28 and the pulley system 33, is positioned at the ends of the roller 21 and boom 22 which are remote from the mast 23. The roller 21 is connected to the mast 23 by a universal joint 24 and the boom is connected by a conventional gooseneck joint 25. The sail 26 is attached to the mast 23 by conventional track means and fast feeder 27. As in Fig. 1 the roller is rotated by the handle 20 or by other suitable means such as an internal pulley 34 within the mast 23. Again, the boom 22 is capable of performing all its normal functions.

The embodiments depicted in Figs. 1 and 2 are not to

scale but have been drawn in a manner so as to illustrate the various features of the invention.

The foregoing describes only some embodiments of the present invention and modifications, obvious to those skilled in the art, can be made thereto without departing from the scope of the present invention.

THE CLAIMS

1. A reefing or furling boom for connection to a mast of a sailing boat, which comprises

a rigid boom adapted to be connected to the mast at one end by a double-acting swivel joint;

a rotatable roller to which the foot of a sail may be attached so as to allow the sail to be wound onto the roller,

a double-acting universal joint being mounted at one end of the roller and being adapted to be connected to the mast at a position spaced above the swivel joint,

tensioning means on the roller for tensioning the foot of the sail,

means interconnecting free ends of the boom and the roller such that the boom and roller are constrained to swivel together, and

rotation means to rotate the roller;

the arrangement being such that the mast end of the sail can be wound onto the roller without substantial deviation from the line of the mast.

2. A boom according to claim 1 wherein the boom is hollow and the roller is located partially within the boom, the boom being provided with a longitudinal slot along its upper side through which the sail passes as it is wound onto the roller, and the upper side of the boom being cutaway at the mast end to accommodate the wound luff of the sail.

3. A boom according to claim 1 which further comprises attachment means mounted on or adjacent to the universal joint for attaching the mast end of the sail.

4. A boom according to claim 3 wherein the attachment means are mounted on the mast side of the universal joint.

5. A boom according to any preceding claim wherein the tensioning means comprises

a two-part swivel slideably mounted to the free end of the roller,

a first rotatable part of the swivel having means for attachment to the clew of the sail, and

a second fixed part of the swivel having means for attaching a tensioning cable.

6. A boom according to claim 5 wherein guide means are provided at the free end of the boom and around which the tensioning cable may pass.

7. A boom according to any preceding claim wherein the interconnecting means comprises a member extending upwardly from the free end of the boom, and having an aperture therein into which the free end of the roller is slideably and rotatably received.

8. A boom according to any preceding claim wherein the rotation means comprises a handle adapted to pass through the mast so as to be operable from the other side of the mast to the roller.

9. A sailboat provided with a mast having connected thereto a boom according to any preceding claim.

Fig. 1

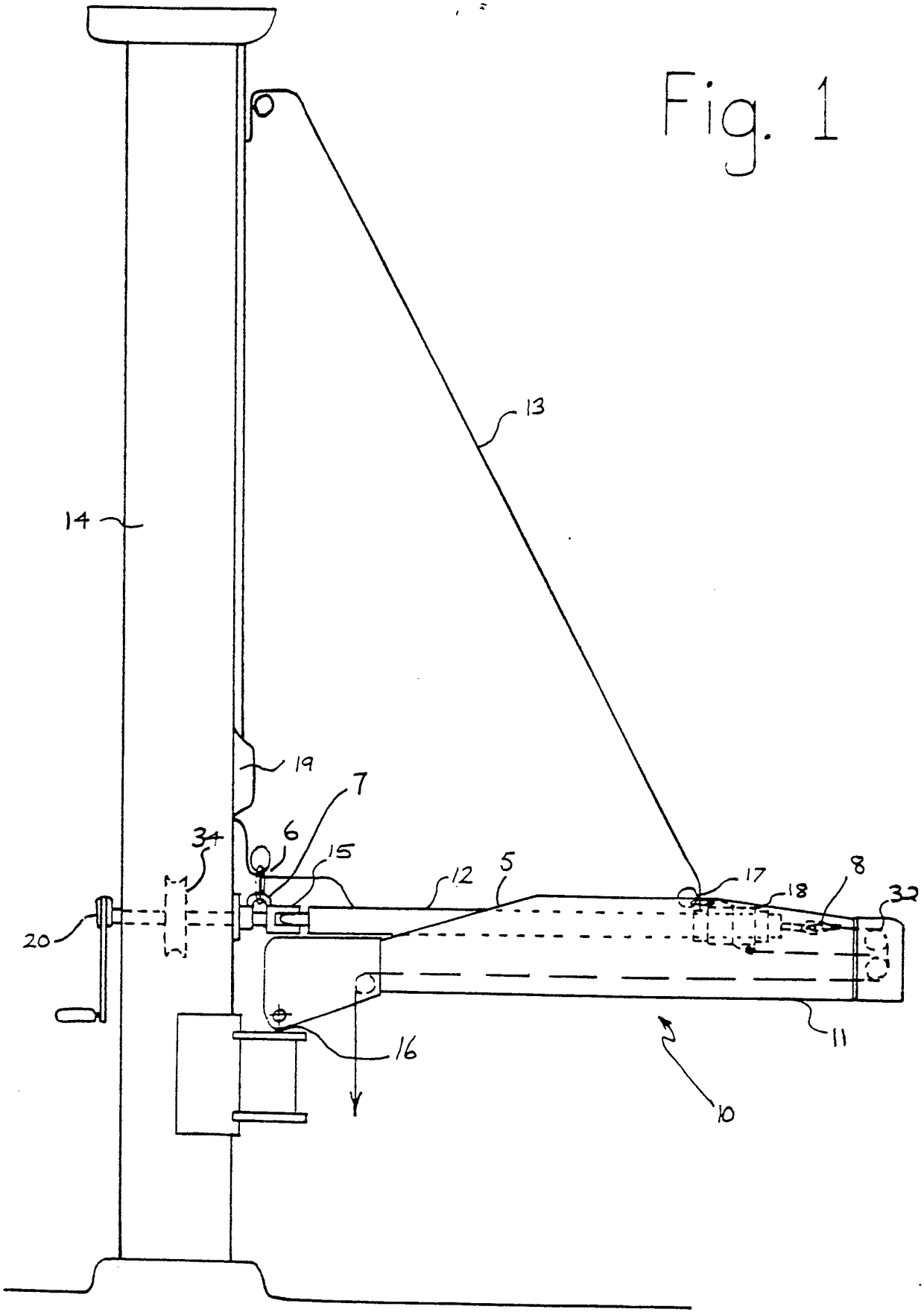
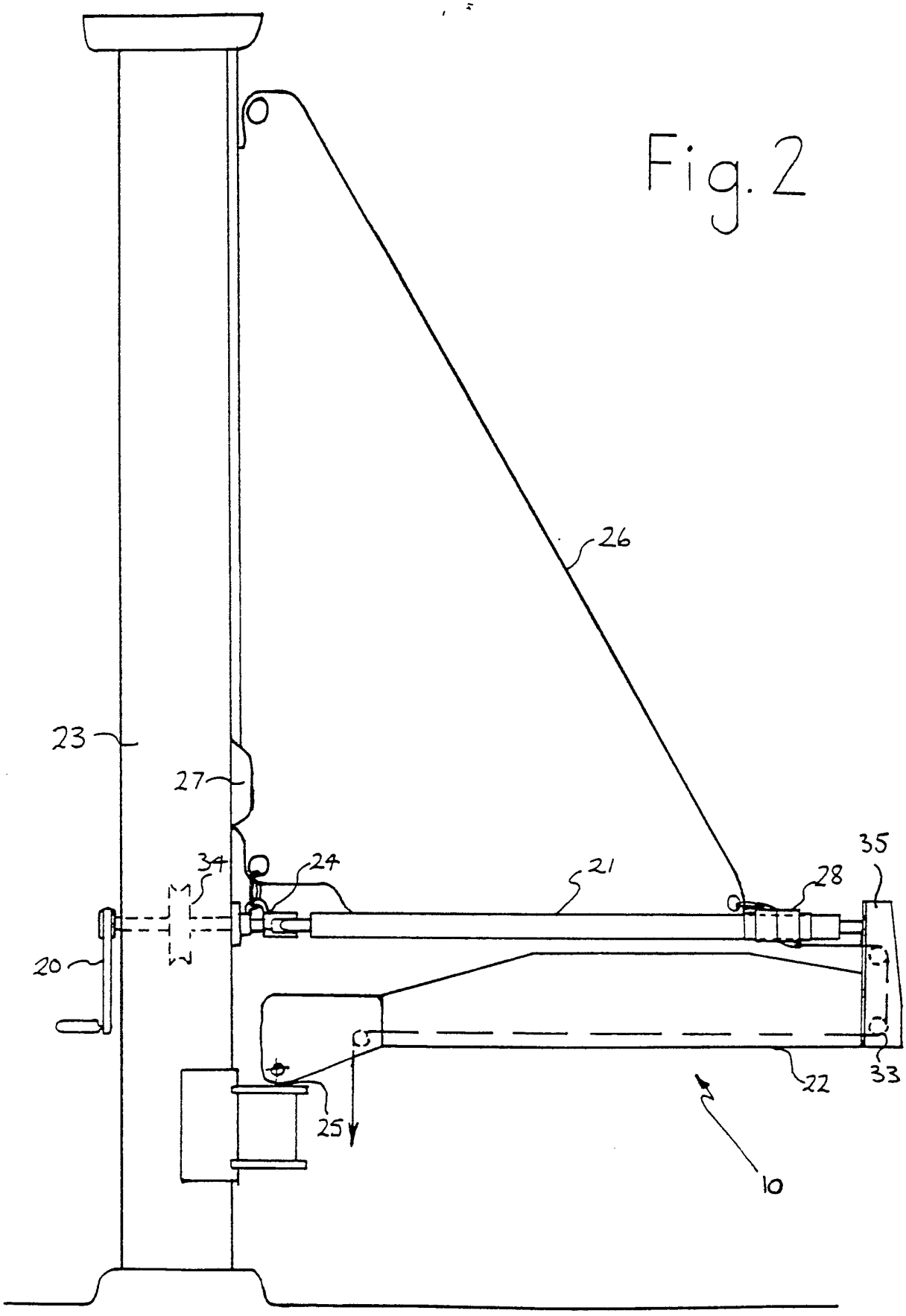


Fig. 2



INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 86/00279

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[4] B63H 9/08, 9/06

II FIELDS SEARCHED

Minimum Documentation Searched

Classification System	Classification Symbols
IPC	B63H 9/06, 9/08

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched

AU : IPC as above

III DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
X	US,A, 3835804 (JACKSON) 17 September 1974 (17.09.74)	(1-9)
X	US,A, 4503797 (MAURIN) 12 March 1985 (12.03.85)	(1-9)
A	US,A, 4324192 (INGOUF) 13 April 1982 (13.04.82)	
A	FR,A, 2537541 (CLAUSIN) 15 June 1984 (15.06.84)	
X	GB, 612193 (WELLS-COATES) 9 November 1948 (09.11.48)	(1,2)

* Special categories of cited documents

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IV CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
21 November 1986 (21.11.86)	(02·12·86) 2 DECEMBER 1986
International Searching Authority: Australian Patent Office	Signature of Authorized Officer: P. WARD

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ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 86/00279

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Members
US 3835804	CA 975621
US 4503797	AU 89632/82, CA 1196531, EP 78230, FR 2515137, JP 58078891
US 4324192	AU 52566/79, EP 11582, FR 2440870, JP 56002290

END OF ANNEX