



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 0 748 757 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.12.1996 Bulletin 1996/51

(51) Int. Cl.⁶: **B65H 75/14**

(21) Application number: **96301640.7**

(22) Date of filing: **11.03.1996**

(84) Designated Contracting States:
BE DE FI FR GB NL

(30) Priority: **17.06.1995 GB 9512378**

(71) Applicant: **Pentre Group Limited**
Knowsley, Merseyside L34 9HX (GB)

(72) Inventor: **Siipola, Jorma**
Haukipudas (FI)

(74) Representative: **Cardwell, Stuart Martin et al**
Roystons
Tower Building
Water Street
Liverpool, Merseyside L3 1BA (GB)

(54) **Reel and method of manufacturing same**

(57) A reel comprising a pair of wooden flanges (1) and a metal core (2). The improvement comprising providing each end of the metal core with a plurality of axially extending teeth (7) and wherein assembly of the flanges to the core is performed by applying axial force to the flanges, conveniently in a pressing operation, causing the teeth to penetrate into the material of the flanges and to undergo deformation of the teeth in a manner which serves to anchor the core to the opposed flanges.

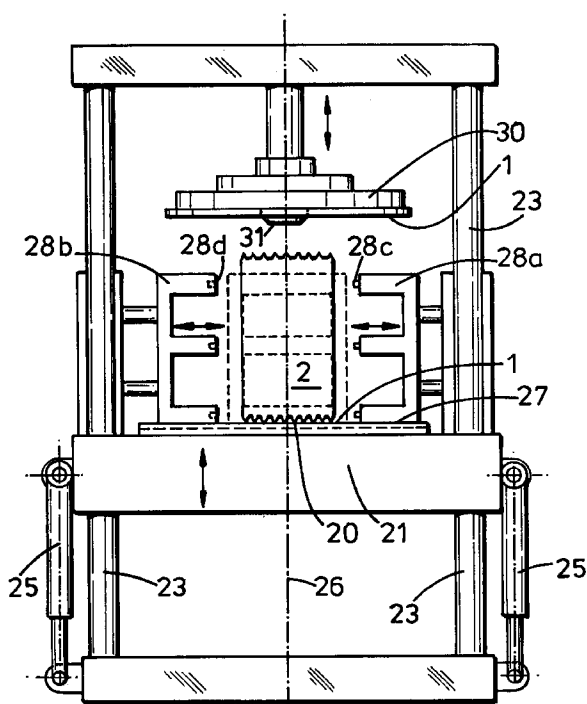


FIG. 3

EP 0 748 757 A1

Description

The present invention relates to a reel and in particular to reels with wooden flanges, especially plywood but not exclusively so, and to a method of manufacturing a reel.

Filamentary material, be it cable or otherwise is conveniently stored on a so-called reel or cable drum.

Plywood reels are widely used and comprise two plywood flanges (usually circular), and a core usually termed a barrel of relatively thin ply sheet which is rolled up, the ends secured together (usually by nailing into a batten on the inside circumference), thereby forming a barrel which is approximately circular. The capacity of the reels will determine the relative sizes of the flanges and especially the barrel diameter. The flanges have to be connected together and the barrel has to be supported. It is conventional practice to do this using a plurality of metal tubes which extend between the flanges (actually passing through holes in the flanges) and which are positioned to back up the inner surface of the barrel at prescribed locations. The number of tubes employed will vary, primarily according to the diameter of the barrel. Thus a plurality of holes have to be drilled into the flanges, corresponding in number to the number of tubes to be employed. Furthermore, the ends of the tubes have to be pierced over to secure the flanges in place. A special press tool is required for each barrel design to reflect the number and spacing of the barrel tube supports required in that design.

Another design of reel utilises a metal barrel usually formed as a hollow cylinder and having axially extending tabs which are arcuate and interspaced with recessing thereby providing a castleated end configuration to the barrel. The flanges are machined with corresponding arcuate slots to receive the tabs which, when the flanges are placed in position, are turned over to hold the flanges in position. Again the flanges have to be machined to suit the particular size of barrel with which they are to be used.

It will be understood that a specific diameter of flange may be used with several alternative diameters of core, hence the need for specific machining of the flange to suit the required size of barrel for the particular application.

The resulting barrel is time-consuming to manufacture and the present invention aims to provide a solution.

According to a first aspect of the invention, there is provided a method of constructing a reel comprising a metal core and a pair of opposed flanges made of wood or other cellulosic material, the method comprising centralising the metal core with respect to the flanges, said metal core having to its opposite ends a plurality of axially extending teeth, applying pressure to the opposed flanges to move the flanges together and to cause the teeth to penetrate into the material of the flanges and deforming the teeth to anchor the barrel to the opposed flanges.

By constructing the teeth to penetrate the flanges under pressure and deforming same, the need to form holes in the flanges as required in the prior art designs to receive the core tabs or the afore-described supports tubes is avoided. Thus, a flange can be used with any specified size of core. Furthermore, the plurality of teeth gives an improved torsional connection between the flanges thereby and reducing torsional deflection of the reel.

Conveniently pressure is applied to the flanges by a pair of opposed platens. It is preferred that the teeth are longer than the thickness of the flange so that they contact the respective platens, which contact acts to deform the teeth. Deformation will include lateral movement or upsetting of the material. At least one of the opposed platens is movable, at least for the purpose of applying pressure to the flanges. Preferably both are movable, one to cater for different axial sizes of reel and the other to perform the assembly operation.

According to another aspect of the invention there is provided apparatus to construct a reel from a metal core and a pair of flanges made from wood or other cellulose material, the apparatus comprising a pair of opposed platens, at least one of which is axially movable towards and away from the other, and which platens are adapted to contact a respective one of the flanges, means for applying pressure to the flanges via the platens, and means for centralising the core with respect to the pair of flanges, the opposite ends of the core as made having a plurality of circumferentially spaced axially extending teeth, and wherein relative movement of the platens towards one another causes the teeth to penetrate the material of the flanges and to deform same to locate the flanges axially with respect to the core.

In a preferred embodiment, the platens comprise discs, generally planar, and preferably having a coaxial spigot to receive as a light interference fit a respective flanges which are in the form of an annulus. Preferably the axis of the platens is vertical.

In the preferred method with the platens moved apart, a flange is placed on each of the platens so that one faces upwardly and the other downwardly and facing it. The spigot assures that the two flanges are in axial alignment. A core which has previously been constructed to the required size is placed on the lower flange. Centralising means comprising a pair of arcuate (semi-circular) support members are moved laterally to contact the core and position it coaxially with respect to the flanges.

The arcuate members are preferably configured to conform to the cross-sectional shape of the core to support same against radial outward movement under pressure as described further hereinafter. Thereafter, the upper platen is lowered, causing the uppermost flange to impinge on the upwardly projecting lengths of the core. The platen moves by a controlled distance to bring the flanges into contact with end abutment edges of the core between the root of the teeth. Meanwhile,

the teeth have penetrated the flange, contacted the respective platens and been deformed.

According to another aspect of the invention there is provided a reel comprising a pair of opposed flanges constructed from wood and a core formed of metal and disposed between the opposed flanges and wherein the core has its opposite ends formed with a plurality of circumferentially spaced axially extending teeth which are constructed to penetrate the wood of the respective flanges and which are deformed to locate the flanges axially with respect to the core.

By relying on this deformation of the teeth, no other securing elements is required, whilst the ability to penetrate the material of the flanges avoids the need for specific machining of the flanges. The core is preferably a hollow cylindrical member and in one embodiment is formed by rolling up from sheet material and its longitudinal edges secured together, conveniently by seam welding. A perfectly circular core can be formed by this method which is advantageous.

Where additional longitudinal strength is required, the core may be formed by a bending and pressing operation to introduce longitudinal ribs to the core. Alternatively intermediate reinforcing means may be incorporated, be they longitudinal or radial. The teeth are conveniently formed on the ends of the sheet prior to forming into the cylindrical shape. A blank of the desired shape is conveniently formed by a pressing operation, which pressing operation forms said teeth.

The flanges are preferably made from plywood, but other materials are possible providing they can be penetrated by the teeth and have sufficient strength to resist pulling out of the teeth after deformation.

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

Figure 1 is a plan view of one plywood flange for use in making a reel according to the present invention,

Figure 2a is a side view of a barrel for use in the present invention,

Figure 2b is a developed plan view of the barrel of Figure 2a prior to rolling up,

Figure 3 is a side view showing one embodiment of machine for use in manufacturing a reel, and

Figure 4 is a cross-section view through one embodiment of reel according to the present invention.

Referring to the drawings, a reel according to the present invention comprises two plywood flanges 1 which are annular and have a central hole 3 and at least one of flanges may have an outwardly directed slot 5. A barrel of the reel is formed from sheet metal which has its ends cut to form a plurality of teeth 7 which are generally triangular and spaced apart to define between adjacent roots of the teeth respective aligned end abutment surfaces 9. An access hole 10 is conveniently

formed in the sheet. The barrel is formed by rolling up the sheet metal and seam welding together the opposite end edges 11, 13. The length of the teeth from the end abutment 9 is greater than the thickness of the flanges 1.

Assembly of the components is carried out using a pressing machine of any suitable design and conveniently comprising a lower platen 21, conveniently slidably guided on support pillars 23 and adjustable for height using any convenient means such as hydraulic rams or otherwise. The platen has a central spigot 20 dimensioned to receive as a light interference fit the central hole 3 of flange 1. The platen carries guide rails 27 on which are slidably movable centralising/support means 28 and conveniently comprising two semi-circular cradles 28a, 28b each reciprocally movable in a direction normal to the axis 26 of the pressing machine. The cradles are dimensioned to have at least a part thereof closely conforming to the circumference of the barrel. An upper platen comprising a disc 30 having a coaxial spigot 31 is reciprocally movable along axis 26 using any convenient means of applying pressure. Conveniently a hydraulic ram is employed. The platen is carried from an upper support (not illustrated), which itself is slidably received or supported by the pillars 23.

In use, the lower platen 21 is set to the prescribed height for the given size of barrel to be inserted and the upper platen withdrawn. The centralising/support means are moved laterally outwardly and a respective flange placed on each of the platens. The platens cooperate as a light interference fit with the respective spigots 20, 31. Thereafter, a prefabricated hollow cylindrical barrel is loosely placed on the lower flange, approximately centrally, and the two halves of the centralising/support means moved towards one another whereby the contact surfaces act to centralise the barrel with respect to the flange. End regions of the centralising/support cradle, ie. the two halves thereof have respective spigots 28c and recesses 28d which are brought into cooperating engagement on bringing together of the two halves to provide a peripheral support for the barrel, at axially spaced positions in the illustrated embodiment.

Thereafter the upper platen is lowered bringing the upper flange into contact with the teeth 7 of the upper end of the barrel and the teeth from both ends pierced into the respective flanges. Since the flanges are longer than the thickness of the flanges there will be contact with the platens, and continued movement of the platens towards one another will cause the teeth to be deformed laterally. The flanges are moved until they just contact the end abutments 9. The deformation ensures that the flanges are retained axially on the opposite ends of the barrel.

The upper platen is then raised and the centralising/support cradle withdrawn whereupon the completed reel can be removed. The central bore 3 is standardised for most reels, thus the only alteration required to accommodate a different diameter of barrel is to change

the cradle, and it is envisaged that adapters will be provided to reduce down from the largest possible size barrel to the minimum anticipated size.

Claims

1. A reel comprising a pair of opposed flanges (1) constructed from wood and a core (2) formed of metal disposed between the opposed flanges characterised in that, as made, the core has its opposite ends formed with a plurality of circumferentially spaced axially extending teeth (7), which in assembling the flanges penetrate the wood of the respective flanges and undergo deformation which serves to locate the flanges axially with respect to the core. 5 10 15
2. A reel as claimed in claim 1 in which the core is a hollow cylindrical member which is rolled up from sheet material and has its longitudinal edges (11, 13) secured together. 20
3. A reel as claimed in claim 1 in which the core has a plurality of longitudinal ribs which are circumferentially spaced. 25
4. A reel as claimed in claim 1, 2 or 3 in which the teeth, as made, are substantially triangular. 30
5. A reel as claimed in any one of claims 1 to 4 in which the teeth are deformed radially inwardly and/or outwardly displacing the material of the flange. 35
6. A reel as claimed in any one of claims 1 to 5 further comprising longitudinal and/or radial core reinforcing means. 40
7. A method of constructing a reel comprising a metal core (2) and a pair of opposed flanges (1) made of wood or other cellulosic material, the method comprising centralising the metal core with respect to the flanges, said metal core having to its opposite ends a plurality of axially extending teeth, applying pressure to the opposed flanges to move the flanges together and to cause the teeth to penetrate into the material of the flanges and deforming the teeth to anchor the core to the opposed flanges. 45
8. A method as claimed in claim 7 in which the pressure is applied to the flanges by a pair of opposed platens (21, 30). 50
9. A method as claimed in claim 8 in which the teeth are longer than the thickness of the flange so that they contact the respective platens, which contact acts to deform the teeth. 55
10. A method as claimed in claim 9 in which the deformation of the teeth will include lateral movement or

upsetting of the material.

11. A method as claimed in any one of claims 7 to 10 further comprising forming the core by rolling up from sheet material and securing together its longitudinal edges.
12. A method as claimed in any one of claims 7 to 10 further comprising forming the core by bending sheet material to introduce longitudinal ribs to the core.
13. A method as claimed in any one of claims 11 or 12 comprising forming the teeth on the ends of the sheet material prior to forming into a cylindrical configuration.
14. A method as claimed in any one of claims 1 to 13 further comprising supporting the core against radial outward movement during the application of axial pressure to the flanges.
15. Apparatus to construct a reel from a metal core (2) and a pair of flanges (1) made from wood or other cellulose material, the apparatus comprising a pair of opposed platens (21, 30) at least one of which is axially movable towards and away from the other, and which platens are adapted to contact a respective one of the flanges, means for applying pressure to the flanges via the platens, and means (28a, 28b) for centralising the core with respect of the pair of flanges, the opposite ends of the core as made having a plurality of circumferentially spaced axially extending teeth, and wherein relative movement at the platens towards one another causes the teeth to penetrate the material of the flanges and to deform same to locate the flanges axially with respect to the core.
16. Apparatus as claimed in claim 15 in which both platens are movable, one to cater for different axial sizes of reel and the other to perform the assembly operation.
17. Apparatus as claimed in claims 15 or 16 in which the platens comprise discs, generally planar, and having a coaxial spigot (31) to receive as a light interference fit a respective flange, each of which is in the form of an annulus.
18. Apparatus as claimed in any one of claims 15 to 17 in which the axis of movement of the platens is vertical.
19. Apparatus as claimed in any one of claims 15 to 18 in which the centralising means comprises a pair of arcuate support members (28a, 28b).
20. Apparatus as claimed in claim 19 in which the arcu-

ate members are preferably configured to conform to the cross-sectional shape of the core to support same against radial outward movement.

5

10

15

20

25

30

35

40

45

50

55

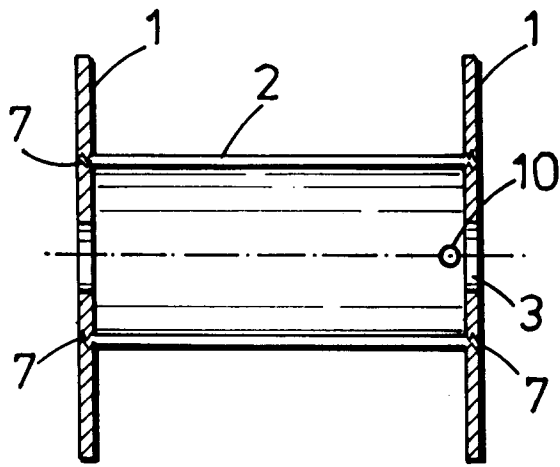


FIG. 4

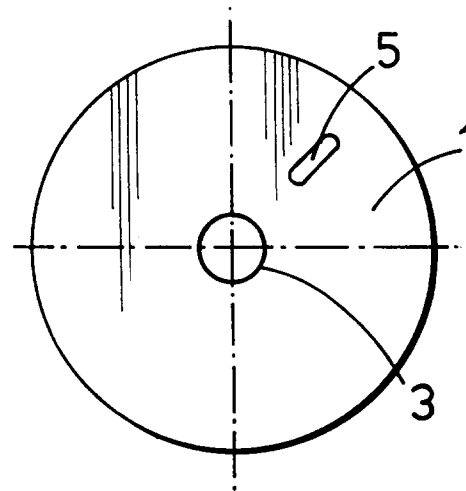


FIG. 1

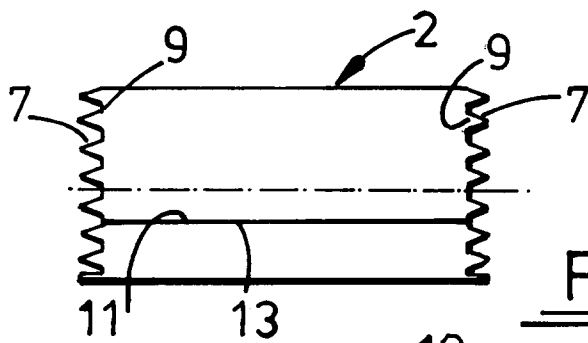


FIG. 2a

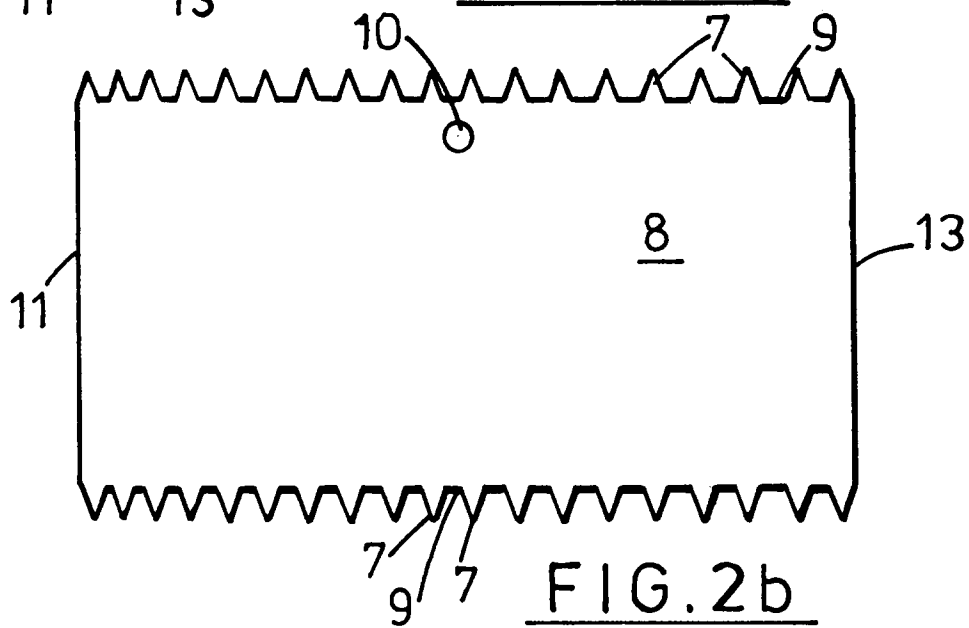


FIG. 2b

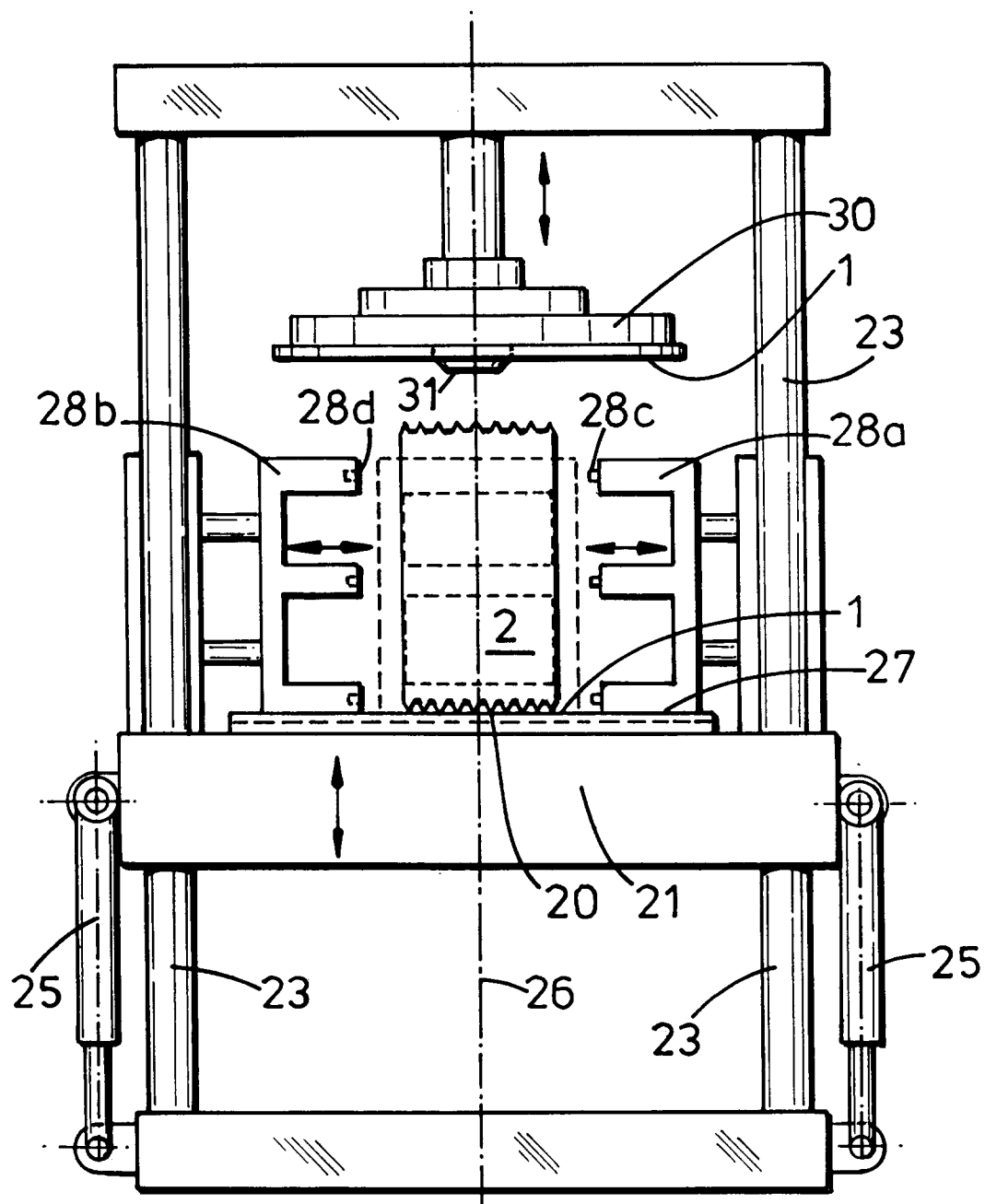


FIG. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 96301640.7
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 6)
A	WO - A - 94/22 755 (AUPEL S.A. et al.) * Fig. 1,2,5; claims 1,9,10 *	1,2,7	B 65 H 75/14
A	US - A - 3 552 677 (H.H. HACKER) * Fig. 1-3; claim *	1,7	
A	EP - A - 0 264 930 (SOC. NOUVELLE EUROCABLE P.) * Fig. 1,2; claim 1 *	1,7	
A	CH - A - 548 341 (F. BÜTTNER) * Fig. 1; page 2, lines 7-14 *	1,7	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 6)
			B 65 H 75/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 22-08-1996	Examiner JASICEK
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P0401)