(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 982 422 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.03.2000 Bulletin 2000/09

(51) Int. Cl.[7]: **D03D 47/34**, B65H 49/12

(21) Application number: **99202175.8**

(22) Date of filing: **05.07.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **26.08.1998 BE 9800628**

(71) Applicant:
N.V. Michel Van de Wiele
B-8510 Kortrijk (Marke) (BE)

(72) Inventor: **Debaes, Johnny**
8890 Moorslede (BE)

(74) Representative:
Leherte, Georges M.L.M., Dr.
K.O.B. n.v.,
Pres. Kennedypark 31c
8500 Kortrijk (BE)

(54) Weft bobbin arrangement and weft bobbin stand for carpet weaving machines

(57) The invention relates to a weft bobbin arrangement for carpet weaving machines whereby cross-wound spools (bobbins)(6) with conically wound yarns (10,11) are utilised, with a diameter of more than 200 mm and/or a weight of more than 10 kg, and whereby the bobbins (6) are in each case disposed at least per two on at least two turntables (2,3) so that the central axes of the winding bodies of the bobbins (6) on one turntable are in each case directed towards a common guide eye (7,8) for the yarn thread (10,11), from out of which a thread can be guided towards a pre-spooling device of a weaving machine, while each of the turntables (2,3) and each of the guide eyes (7,8) belonging thereto are so disposed that for all bobbins (6) and in all positions of the turntables (2,3) the bending angle of a thread (10,11) coming from a bobbin to the pre-spooling devices at a guide eye is at most 60°.

The invention furthermore relates to a weft bobbin stand (1) (supporting device for the weft bobbins) for a carpet weaving machine, which implements this weft bobbin arrangement.

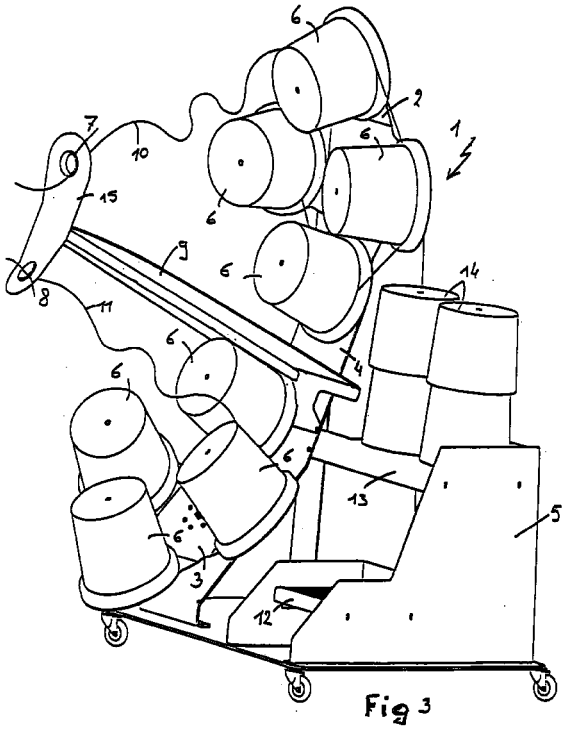

Fig 3

EP 0 982 422 A1

Description

[0001] The invention relates to a specific arrangement of the weft bobbins for a carpet weaving machine, and a supporting device for the weft bobbins on a carpet weaving machine, referred to as weft bobbin stand.

[0002] Jute, polypropylene and cotton yarns are predominantly used for weaving carpets. These yarns are supplied on cross-wound spools which for weaving are placed in a weft bobbin stand. The weaving speed of the present generation of weaving machines is 130 revs/min with 4.20 m weaving width. This signifies an average consumption of weft yarn of 546 m/min per weft insertion channel. With a double rapier weaving machine two weft channels have to be provided with a double weft bobbin frame and with a triple rapier weaving machine a triple frame. Each weft thread is unwound from the bobbin with a pre-spooling device with electric motor, so that the weft insertion means experience no resistance from a varying tensile force necessary for unwinding the yarn from the bobbin.

[0003] When weaving carpets rather coarse weft yarns are used: e.g. jute 2x560 tex or 1.8/2 Nm. In order to maintain the run-off length and therefore also the run-off time of a cross-wound spool sufficiently long, it is attempted to supply cross-wound spools with as great a weight as possible. At present cross-wound spools with a weight of 25 kg are generally in use. Such cross-wound spools are conical with diameters of 400 mm by 350 mm with a winding length of 305 mm. Such large bobbins require a special weft bobbin stand in order to enable an easy handling of the bobbins.

[0004] With carpet weaving machines according to the state-of-the-art weft bobbin stands are for example used as represented in figure 1 and 2. The bobbins are disposed per four on a horizontal turntable so that the central axes of the winding bodies are directed upwards to a common guide eye with vertical axis direction. From this guide eye the weft thread is passed round through 90° and guided towards the pre-spooling devices of the weaving machine. For a double rapier weaving machine two such turntables are provided next to each other or one above the other. For a triple rapier weaving machine two are placed next to each other, of which at least one frame is made double one above the other. The horizontal turntable is disposed rotatably in order to be able to replace the bobbins always in the same most accessible place in the event of run-out.

[0005] The weaving machines for carpets currently in development reach a higher weaving speed of 170 revs/min with 4.20 m weaving width. With this weaving speed the average weft yarn consumption is 714 m/min. With such run-off speeds the frictional resistance in each bending point through 90° becomes so great that the tensile force necessary for unwinding exceeds the tensile strength of the yarn. Furthermore the motor of the pre-spooling device has to be able to supply a greater power. This means a larger motor and the unwinding system therefore becomes less dynamic for being able to accelerate when starting the weaving machine. Furthermore the large bobbins on the turntable at the bottom are not ergonomically replaceable: this operation is only possible in bending position and in view of the heavy weights of 25 kg per bobbin, this can cause back problems. The bobbins in the upper level are above the lifting range: here more effort also needs to be made than necessary when replacing a bobbin.

[0006] From the field of flat weaving machines experts know that the weft feed channel has to be as rectilinear as possible and should lie in the extension of the weft insertion path in the shed. With weaving machines for flat work the weight of the weft bobbins is limited to 5 kg and given that here this predominantly concerns fine yarn numbers there is a sufficient running length on these bobbins. Solutions for flat weaving cannot of course therefore be applied to carpet weaving machines.

[0007] The purpose of this invention is to provide a solution to the problems which are associated with weft bobbin stands for carpet weaving machines, whereby an arrangement is provided which with carpet weaving machines can also bring the bobbins to lie better in the extension of the weft insertion path of the shed.

[0008] For that purpose the invention provides a weft bobbin arrangement for carpet weaving machines whereby cross-wound spools (bobbins) with conically wound yarns are utilised, with a diameter of more than 200 mm and/or a weight of more than 10 kg, and whereby the bobbins are in each case disposed at least per two on at least two turntables so that the central axes of the winding bodies of the bobbins on one turntable are in each case directed towards a common guide eye for the yarn thread, from out of which a thread can be guided towards a pre-spooling device of a weaving machine, while each of the turntables and each of the guide eyes belonging thereto are so disposed that for all bobbins and in all positions of the turntables the bending angle of a thread coming from a bobbin to the pre-spooling devices at a guide eye is at most 60°.

[0009] Moreover the inclination of the bottom turntable is such that the central axes of the cross-wound spools are directed towards guide eyes from out of which the weft threads depart to the pre-spooling devices in almost horizontal direction, whereby the bending angles in the guide eye are maximum 60° i.e. significantly less than 90°, for the most unfavourable position of the cross-wound spool in the weft bobbin frame. For the top turntable these bending angles are even less. Because of this measure the motor power of the pre-spooling device does not have to be increased with higher weaving speeds of the weaving machine.

[0010] According to a further characteristic of the invention the perpendicular line of each turntable is preferably at an angle of at most 60° to the horizontal direction.

A horizontally lying perpendicular line is also included

herein (i.e. which is at an angle of 0° to the horizontal direction).

[0011] According to yet a further characteristic of the invention in the weft bobbin arrangement a first turntable is preferably disposed at an angle of approximately 45° in relation to a horizontal position and a second turntable in predominantly vertical position.

[0012] According to the invention in the weft bobbin arrangement two turntables can very suitably be mounted on a movable support, one at the bottom at an angle of approximately 45° in relation to a horizontal position, and one on top in predominantly vertical position; the invention can however also for example be utilised for at least three turntables on a movable support. Moreover various arrangements can be provided, for example as two arrangements of two turntables placed one above the other mounted next to each other on one support, analogous to the arrangement specified in this paragraph, or the various turntables can be mounted symmetrically round a central axis. Experts will easily be able to distinguish various suitable arrangements within the general scope of this invention.

[0013] The turntables are preferably so provided on the supporting frame that the turntables can easily be brought into and held in a certain position, in order to be able to replace a bobbin comfortably. The means for implementing this comprise for example a hand driven reduction gear with crank, a motor reduction gear with electric drive or a hand driven motor reduction gear, preferably with self-locking.

[0014] According to yet another characteristic of the invention the weft bobbin arrangement comprises a guide eye for each turntable, provided in a plane parallel or almost parallel to the aforementioned turntable.

[0015] The invention furthermore provides a supporting device for weft bobbins or "weft bobbin stand" for carpet weaving machines, comprising:
a supporting frame,
at least two turntables provided on that supporting frame for cross-wound spools (bobbins) with conically wound yarns, with a diameter of more than 200 mm and/or a weight of more than 10 kg, whereby in each case at least two bobbins can be disposed on each turntable such that the central axes of the winding bodies of the bobbins on one turntable are in each case directed towards a common guide eye for the yarn thread, from out of which a thread can be guided towards a pre-spooling device of the weaving machine, whereby each of the turntables and each of the guide eyes belonging thereto are so disposed that for all bobbins and in all positions of the turntables the bending angle of a thread coming from a bobbin to the pre-spooling devices at a guide eye is at most 60°.

[0016] According to a further characteristic of the bobbin stand according to the invention the perpendicular line of each turntable forms an angle of at most 60° with the horizontal direction.
According to yet another characteristic of the invention a first turntable can be provided at an angle of approximately 45° in relation to a horizontal position and a second turntable in predominantly vertical position.

[0017] According to preferred embodiments of the bobbin stand according to the invention two turntables can be mounted on the supporting frame, one at the bottom at an angle of approximately 45° in relation to a horizontal position, and one on top in predominantly vertical position, or at least three turntables whereby various arrangements can be provided, for example as two arrangements of two turntables placed one above the other mounted next to each other on one support, or the various turntables can be mounted symmetrically round a central axis.

[0018] The characteristics and distinctive features of the invention, and the operation thereof are further explained below with reference to the attached drawings which show one preferred embodiment of the invention. It should be noted that the specific aspects of this embodiment are only described as preferred examples of what is intended in the scope of the above general specification of the invention, and may in no way be interpreted as a restriction on the scope of the invention as such and as expressed in the following claims.

[0019] In the attached drawings:

Figure 1: is a side elevation of a weft bobbin stand with turntables for cross-wound spools, according to the state-of-the-art;
Figure 2: is a view from above of a turntable with four cross-wound spools for the bobbin stand according to the state-of-the-art, according to figure 1;
Figure 3: is a total view in perspective of a weft bobbin stand according to the invention;
Figure 4: is a side elevation of a bobbin stand according to figure 3;
Figure 5: is a view according to the direction of arrows A in figure 4, which enables the guide eyes for the weft threads to be seen;
Figure 6: is a bottom view of a turntable with four cross-wound spools for a bobbin stand according to figure 3;
Figure 7: is a side elevation of the turntable according to figure 6.

[0020] In figures 3 and 4 the bobbin stand according to the invention is indicated in its entirety by the reference number (1); two turntables (2) and (3) are provided on a supporting plate (4) of a mobile supporting frame (5). On each turntable (2), (3) four cross-wound spool bobbins (6) are provided, with the central axis (h) of each bobbin respectively directed towards a guide eye (7), (8) for the purpose of each set of bobbins on one turntable (2), (3). The guide eyes (7), (8) are provided on a plate (15) on the extremity of an oblique separating plate (9) which serves to prevent the unwinding weft thread (10) of the top part - turntable (2) from becoming

entangled with the unwinding weft thread (11) of the bottom part - turntable (3).
The plate (15) with the guide yes (7), (8) is shown in greater detail in figure 5, being a view according to the direction of arrows A in figure 4.

[0021] The bottom turntable (3) is disposed at an inclination of approximately 45° in relation to the horizontal plane and the top turntable (2) is disposed approximately vertical. Because of the fact that the central axes (h) of the cross-wound spools (6) on the bottom turntable (3) are directed towards the guide eyes from out of which the weft threads depart towards the pre-spooling devices in almost horizontal direction, the bending angles in the guide eye are maximum 60° - i.e. significantly less than 90° - for the most unfavourable position of the cross-wound spool in the weft bobbin frame. For the top turntable these bending angles are even less.

[0022] As represented more specifically in figures 6 and 7 the turntables (in figures 6 and 7 the turntable is indicated by reference number (2), but with respect to the illustration of these figures the turntables (2) and (3) are of course identical) are disposed rotatably and means are provided for holding and locking these turntables in a specific position. Means are provided for rotating the turntable in order to bring each bobbin (6) to be replaced into a position where it can be replaced most comfortably. This rotation can occur manually with a crank or will preferably be performed with an electric motor reduction gear (16) which is operated by push buttons or foot pedal and a control.

[0023] The bottom revolving table or turntable (3) is easily accessible to the operator from the ground. For better access to the top turntable (2) a mounting step (12) is provided. On the frame (5) a storage plank (13) is provided for placing reserve bobbins (14) for replacement. These bobbins can easily be taken from the mounting step in order to place them on the turntables.
The embodiment according to the figures contains arrangement space for four bobbins, but this can of course for example also be for three or six bobbins.

Claims

1. Weft bobbin arrangement for carpet weaving machines whereby cross-wound spools (bobbins) with conically wound yarns are utilised, with a diameter of more than 200 mm and/or a weight of more than 10 kg, and whereby the bobbins are in each case disposed at least per two on at least two turntables so that the central axes of the winding bodies of the bobbins on one turntable are in each case directed towards a common guide eye for the yarn thread, from out of which a thread can be guided towards a pre-spooling device of a weaving machine, **characterised in that** each of the turntables and each of the guide eyes belonging thereto are so disposed that for all bobbins and in all positions of the turntables the bending angle of a thread coming from a bobbin to the pre-spooling devices at a guide eye is at most 60°.

2. Weft bobbin arrangement according to claim 1, **characterised in that** the perpendicular line of each turntable is at an angle of at most 60° to the horizontal direction.

3. Weft bobbin arrangement according to claim 1, **characterised in that** a first turntable is disposed at an angle of approximately 45° in relation to a horizontal position and a second turntable in predominantly vertical position.

4. Weft bobbin arrangement according to one of the preceding claims, **characterised in that** two turntables are mounted on a movable support, one at the bottom at an angle of approximately 45° in relation to a horizontal position, and one on top in predominantly vertical position.

5. Weft bobbin arrangement according to one of the claims 1 - 3, **characterised in that** at least three turntables are mounted on a movable support.

6. Weft bobbin arrangement according to one of the preceding claims, **characterised in that** means are provided for bringing and holding the turntables in selected positions.

7. Weft bobbin arrangement according to claim 6, **characterised in that** the aforementioned means for bringing and holding the turntables in selected positions comprise a hand driven reduction gear with crank.

8. Weft bobbin arrangement according to claim 6, **characterised in that** the aforementioned means for bringing and holding the turntables in selected positions comprise a motor reduction gear with electric drive.

9. Weft bobbin arrangement according to one of the preceding claims, **characterised in that** for each turntable a guide eye is provided in a plane parallel or almost parallel to the aforementioned turntable.

10. Supporting device for weft bobbins for carpet weaving machines, comprising
a supporting frame,
at least two turntables provided on that supporting frame for cross-wound spools (bobbins) with conically wound yarns, with a diameter of more than 200 mm and/or a weight of more than 10 kg, whereby in each case at least two bobbins can be disposed on each turntable such that the central axes of the winding bodies of the bobbins on one turntable are in each case directed towards a com-

mon guide eye for the yarn thread, from out of which a thread can be guided towards a pre-spooling device of the weaving machine, **characterised in that** each of the turntables and each of the guide eyes belonging thereto are so disposed that for all bobbins and in all positions of the turntables the bending angle of a thread coming from a bobbin to the pre-spooling devices at a guide eye is at most 60°.

11. Supporting device for weft bobbins according to claim 10, **characterised in that** the perpendicular line of each turntable is at an angle of at most 60° to the horizontal direction.

12. Supporting device for weft bobbins according to claim 10, **characterised in that** a first turntable is provided at an angle of approximately 45° in relation to a horizontal position and a second turntable in predominantly vertical position.

13. Supporting device for weft bobbins according to one of the claims 10 - 12, **characterised in that** two turntables are mounted on the supporting frame, one at the bottom at an angle of approximately 45° in relation to a horizontal position, and one on top in predominantly vertical position.

14. Supporting device for weft bobbins according to one of the claims 10 - 12, **characterised in that** at least three turntables are mounted on the supporting frame.

15. Supporting device for weft bobbins according to one of the claims 10 - 14, **characterised in that** the device comprises means for bringing and holding the turntables in selected positions.

16. Supporting device for weft bobbins according to claim 15, **characterised in that** the aforementioned means for bringing and holding the turntables in selected positions comprise a hand driven reduction gear with crank.

17. Supporting device for weft bobbins according to claim 15, **characterised in that** the aforementioned means for bringing and holding the turntables in selected positions comprise a motor reduction gear with electric drive.

18. Supporting device for weft bobbins according to one of the claims 10 - 17, **characterised in that** between the turntables a separating plate is provided on which the guide eyes are mounted, each in a plane parallel or almost parallel to one turntable.

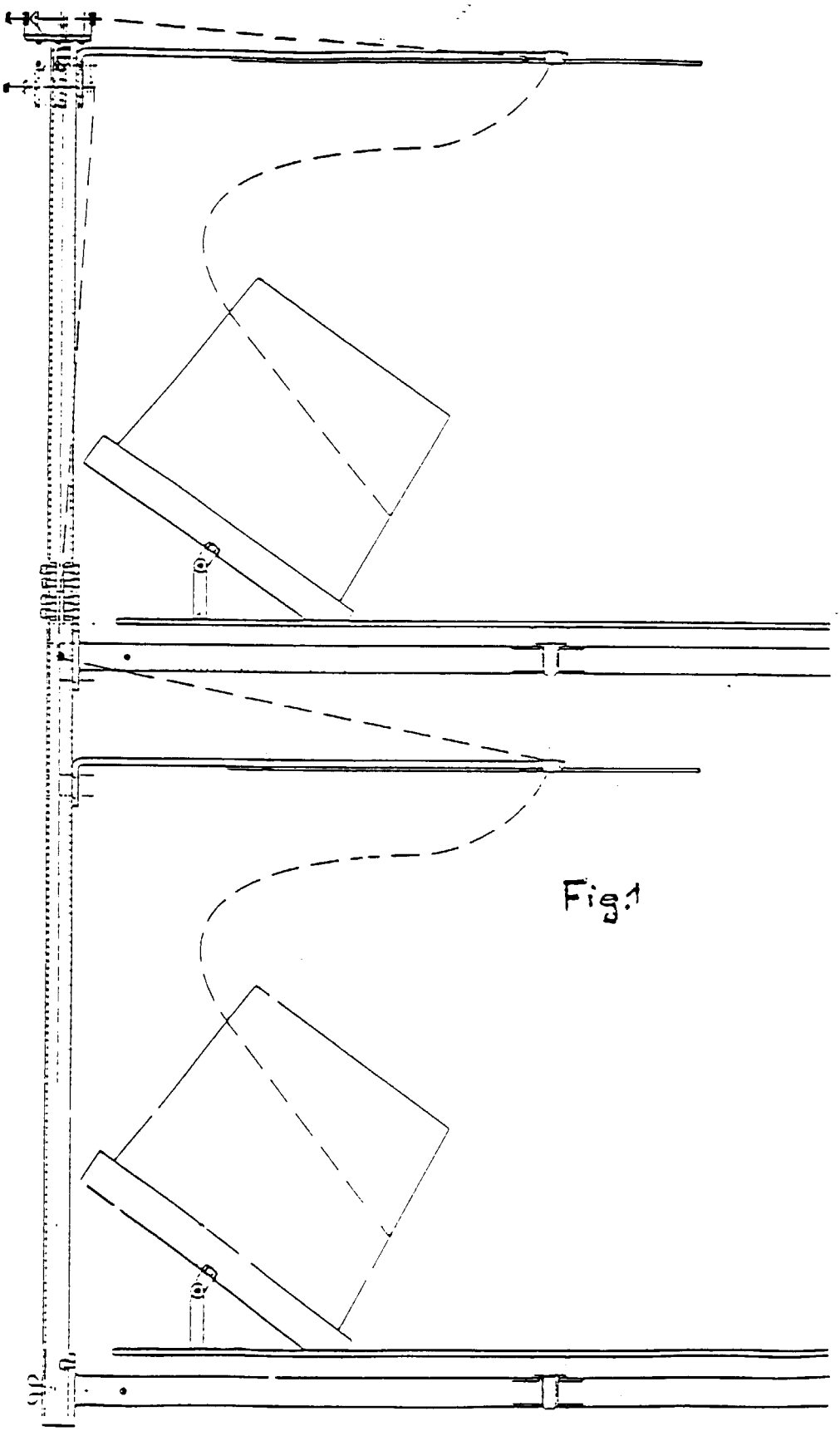

Fig.1

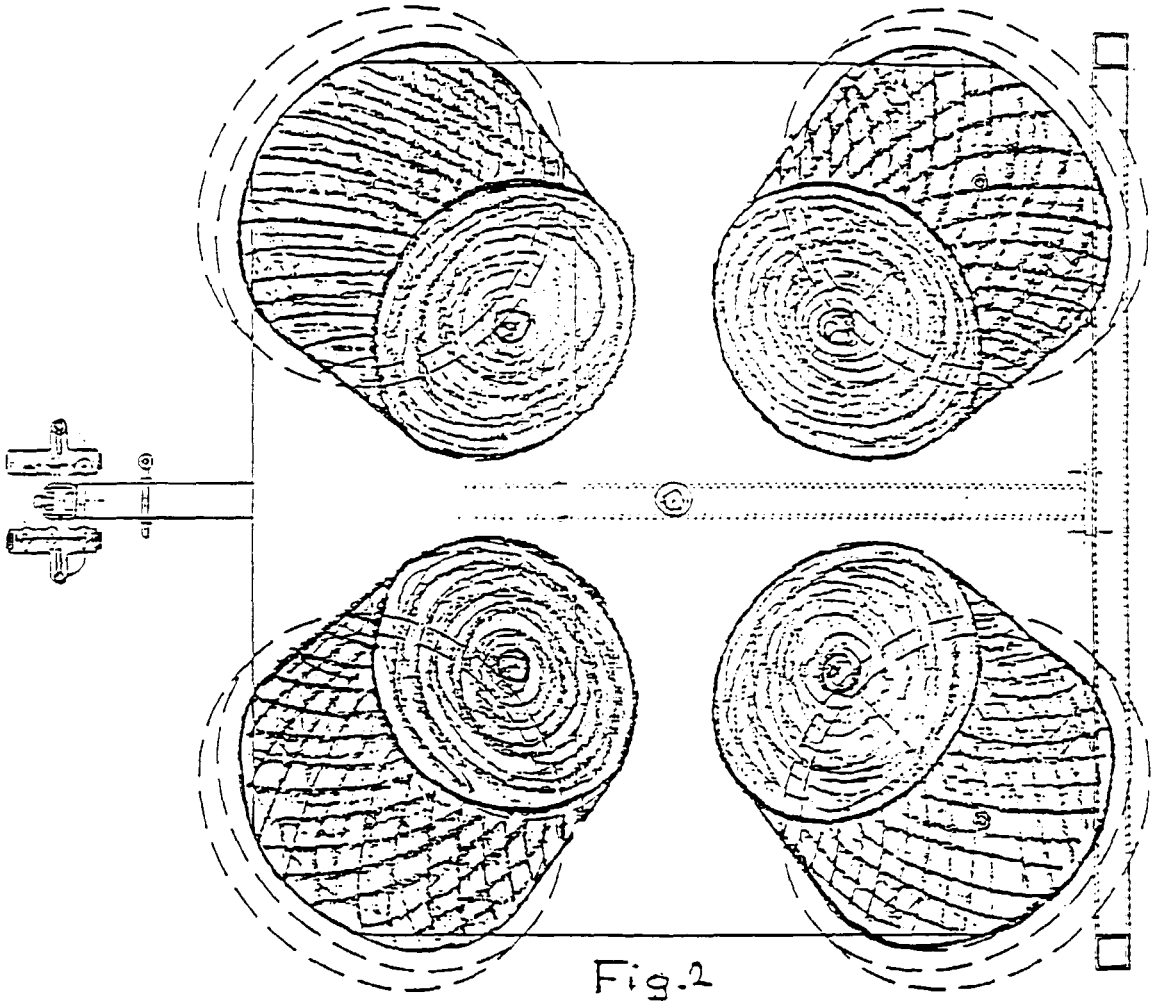

Fig.2

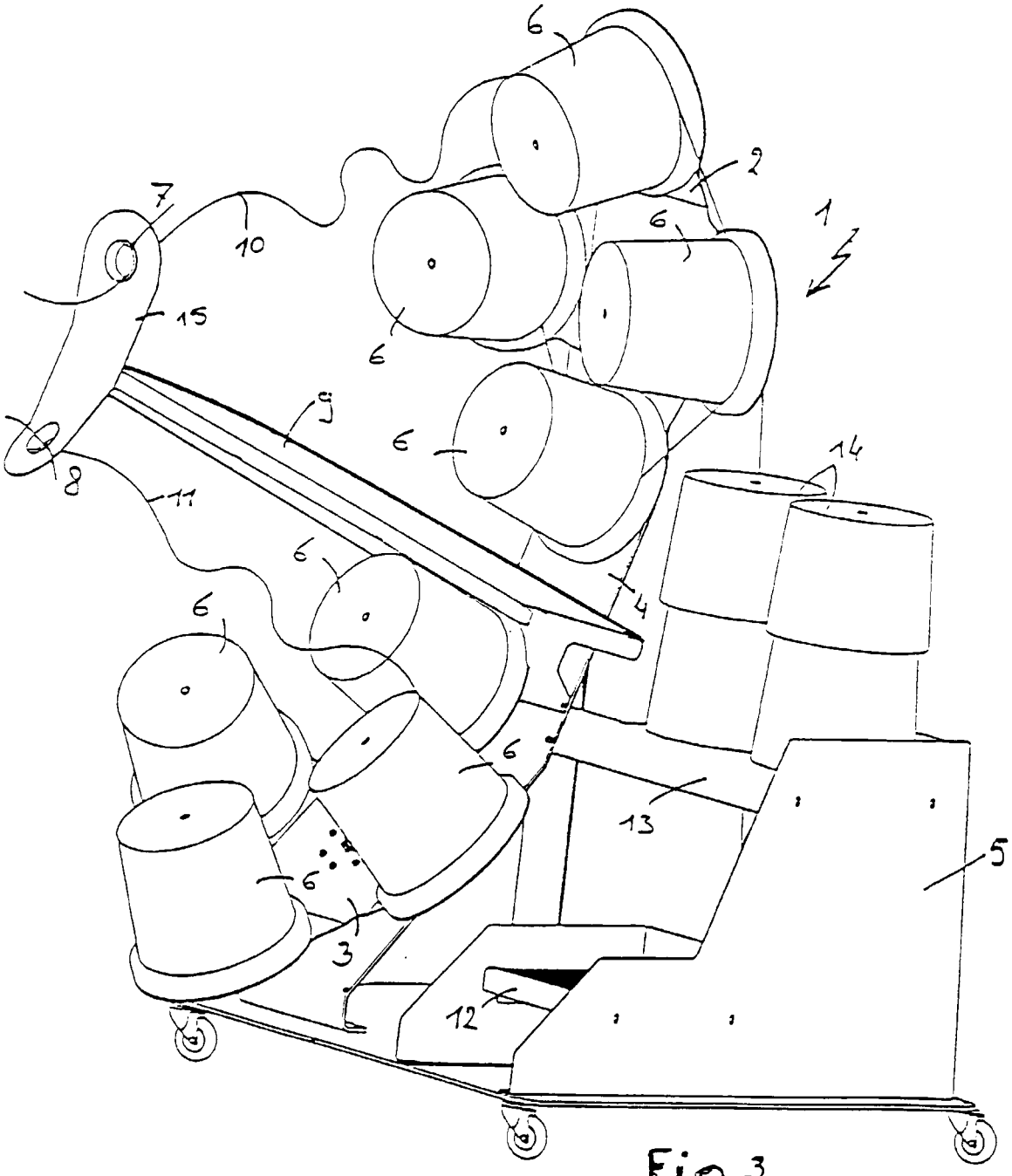

Fig 3

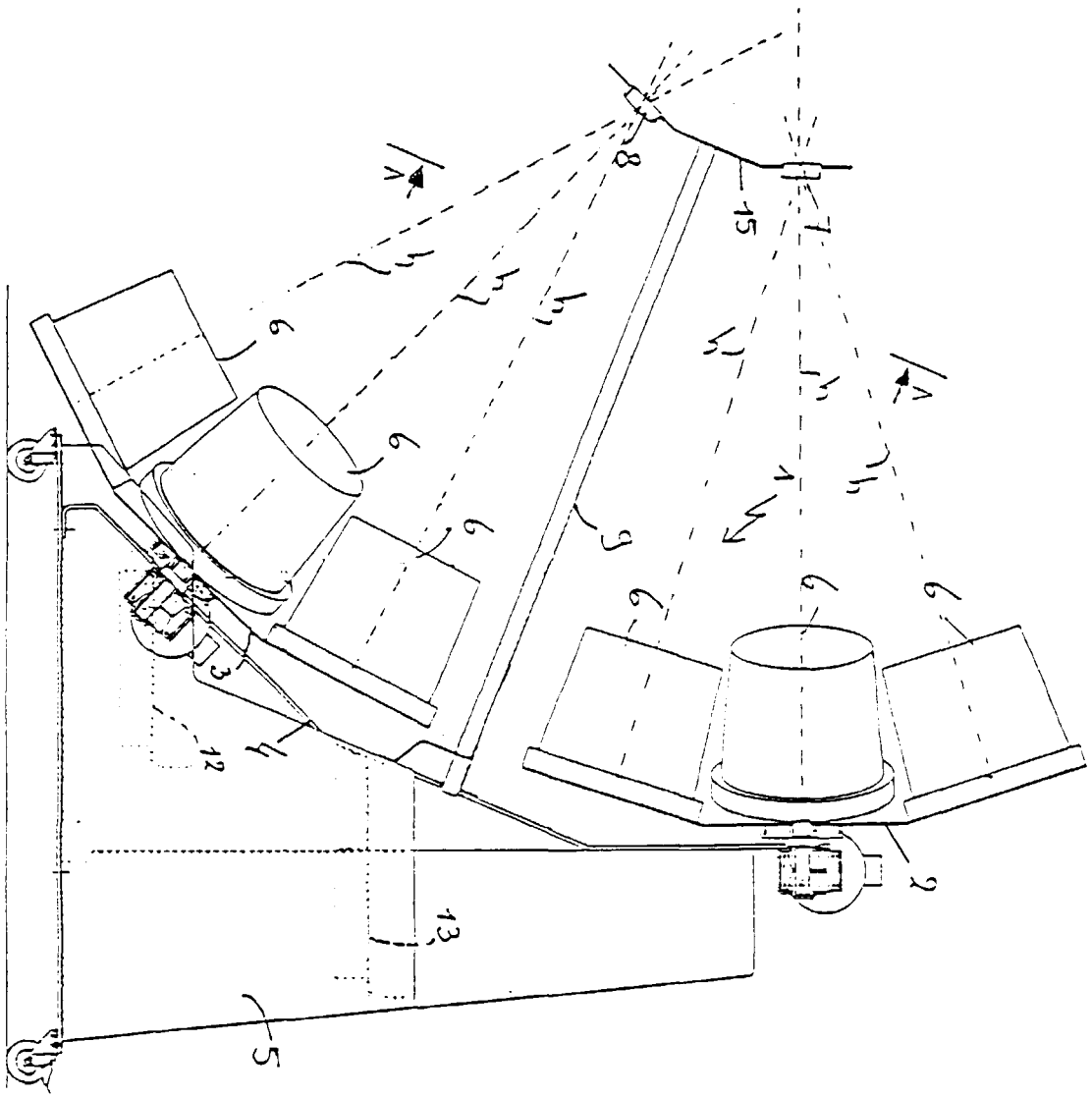

Fig. 4

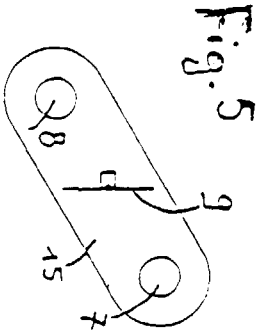

Fig. 5

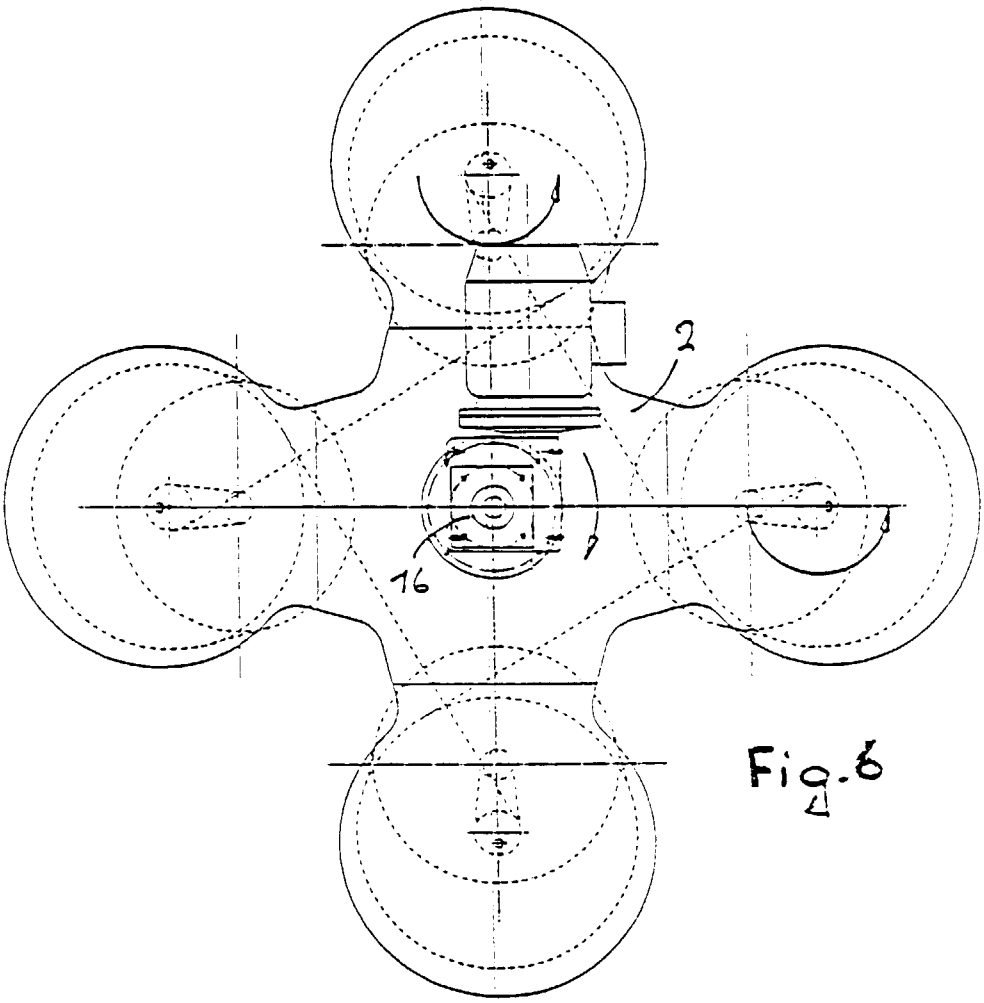

Fig.6

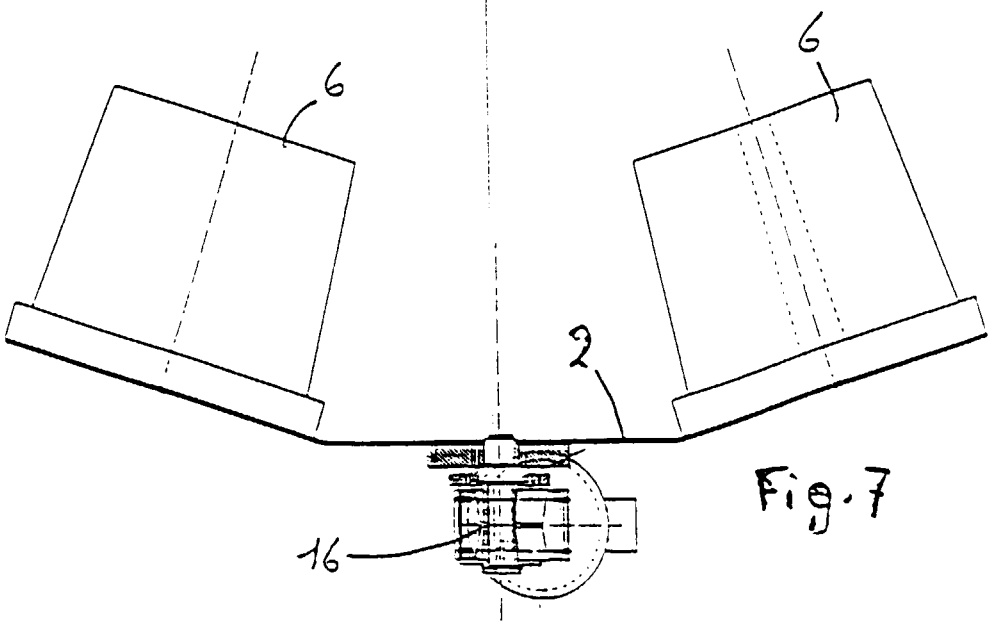

Fig.7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 20 2175

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	EP 0 534 637 A (TSUDAKOMA) 31 March 1993 (1993-03-31) * column 2, line 55 - column 3, line 46; figures 1,2 *	1,6,8,10	D03D47/34 B65H49/12
A	EP 0 656 437 A (PICANOL) 7 June 1995 (1995-06-07) * column 4, line 53 - column 5, line 8; figure 1 *	1,10	
A	EP 0 448 914 A (SULZER) 2 October 1991 (1991-10-02)		
A	US 5 624 082 A (LIGON) 29 April 1997 (1997-04-29)		

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

D03D
B65H
D02H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17 November 1999	Boutelegier, C

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 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 20 2175

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-11-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 534637 A	31-03-1993	JP 5078041 A	30-03-1993
		US 5314139 A	24-05-1994
EP 656437 A	07-06-1995	BE 1007850 A	07-11-1995
		DE 59402743 D	19-06-1997
		US 5544679 A	13-08-1996
EP 448914 A	02-10-1991	NONE	
US 5624082 A	29-04-1997	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82