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(54) **Negative yarn feeder with weft-braking device**

(57) Yarn loops are unwound from a stationary weft-winding drum (12) during a weft insertion. A weft-braking device locks the yarn (F) unwinding from the drum (12) at the end of the insertion, and comprises at least one braking member (34) which is arranged by side of the drum (12) near its delivery end (12a) and is movable un-

der control of actuator means (37) between a resting position in which it is spaced from the outer surface of the drum (12) and does not interfere with the unwinding yarn (F), and an operative position in which it engages the outer surface of the drum (12) and cooperates with it to brake the yarn (F).

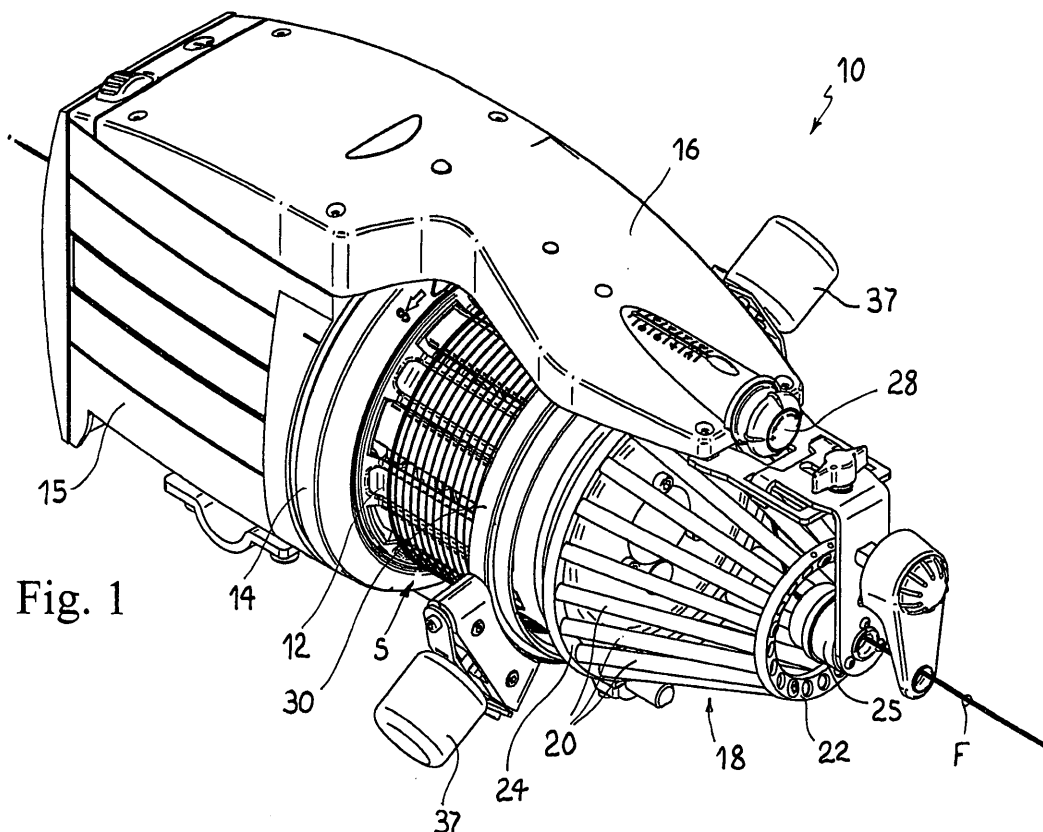


Fig. 1

Description

[0001] The present invention relates to a negative yarn feeder provided with a weft-braking device for locking the unwinding loops of yarn at the final step of the insertion of the yarn into the loom, which step is particularly critical in the case of projectile looms.

[0002] As known, the so-called "negative" yarn feeders comprise a stationary drum on which a motorized fly-wheel winds a plurality of yarn loops forming a weft reserve. Upon request from the loom, the loops are unwound from the drum, then pass through a device for controlling the tension of the yarn, and finally are fed to the loom. The yarn feeders of the above type have the essential aim of maintaining the amount of loops substantially constant on the drum, thereby minimizing the tension of the yarn coming from the drum.

[0003] Mainly in the case of projectile looms, the yarn feeder is generally provided with an "anti-balloon" device, which essentially consists of a funnel having the aim of containing the balloon which forms while the yarn is unwound from the feeder. Devices of this type are disclosed, e.g., in EP0719354, EP1094138, and EP1149793. Particularly, in EP1149793 the anti-balloon funnel has a frustoconical profile defined by a plurality of equally-spaced rods arranged along the generatrices of a frustum of cone, whereby the deposit of dust and the friction against the inner surface of the funnel are reduced.

[0004] As known, during the final step of the insertion, yarn loops in excess are liable to unwind from the drum by inertia. In order to contrast this drawback, it is known from US3834635 to provide the feeder with stationary brushes which are arranged in contact with the inner surface of the anti-balloon funnel. The unwinding yarn passes between the brushes and the funnel and, at the end of the insertion, when the loom has finished drawing yarn, it is braked by friction and consequently retained from further unwinding.

[0005] A drawback of the above device is that the brushes also brake the yarn during the insertion, when no braking action is required but, on the contrary, the yarn should run as freely as possible. This circumstance affects the smoothness of the yarn-feeding process and leads to a growth of dust generating by friction between the yarn and the brushes, which dust is liable to deposit within the funnel thereby affecting its operation.

[0006] US3834635 also discloses the use of air streams for braking the yarn. However, this solution is very complicated and expensive, because air-feeding means must pass through the swivelling, yarn-winding flywheel.

[0007] Therefore, it is a main object of the present invention to provide a yarn feeder having a weft-braking device which overcomes the above-cited drawbacks of the known brush-based devices, but which is simpler and cheaper to be manufactured than the pneumatic devices.

[0008] The above object and other advantages, which will better appear below, are achieved by the yarn feeder

having the features recited in claim 1, while the dependent claims state other advantageous, though secondary features of the invention.

[0009] The invention will be now described in more detail with reference to a preferred, non-exclusive embodiment shown by way of non-limiting example in the attached drawings, wherein:

Fig. 1 is a perspective view of a negative yarn feeder provided with a weft-braking device according to the invention;

Fig. 2 is a front view of the yarn feeder of Fig. 1;

Fig. 3 is a partial view in cross-section of Fig. 2 along line III-III;

Fig. 4 is a longitudinal view of a portion of Fig. 1;

Fig. 5 is a view in cross-section of Fig. 4 along line V-V, showing a detail to an enlarged scale of the weft-braking device of the invention.

[0010] With reference to the above Figures, a negative yarn feeder 10 comprises a stationary drum 12 and a swivel flywheel 14 which is coaxially supported at one end of drum 12 and is driven by a motor 15 for winding loops of yarn F on the drum, thereby forming a stock S. Yarn F is unwound from drum 12 upon request from the loom, which in the present invention is preferably a projectile loom (not shown).

[0011] A stationary drum 16 longitudinally projects from the motor housing and supports an anti-balloon funnel 18. Anti-balloon funnel 18 consists of a plurality of equally-spaced rods 20 which are arranged along the generatrices of a frustum of cone and have one end attached to a smaller ring 22 defining the smaller base of the frustum of cone, and the opposite end attached to a larger ring 24 defining the larger base of the frustum of cone. A yarn-guide delivery eyelet 25 is arranged at the delivery end of the anti-balloon funnel.

[0012] Funnel 18 is coaxially arranged in front of drum 12 with its larger base facing the delivery end 12a of the drum. The inner surfaces of both smaller ring 22 and larger ring 24 are bevelled, and the innermost circumference of larger ring 24 advantageously has a diameter D_a smaller than the yarn-winding diameter D_t of drum 12 (Fig. 3). Funnel 18 is attached to a slide 26 (Fig. 4) which is slidable along stationary drum 16 under control of a screw mechanism (not shown) operable by a knob 28, whereby the axial gap between anti-balloon funnel 18 and drum 12 may be changed. By adjusting knob 28, the gap L between the larger base of anti-balloon funnel 18 and the delivery end 12a of the drum may be minimized as a function of the yarn count. This possibility of adjustment partly deriving from the above-defined dimensional relation between the diameter of the drum and the diameter of the innermost circumference of larger ring 24, al-

lows the balloon forming upstream of the funnel to be reduced or even eliminated even without providing anti-balloon funnel 18 with a cylindrical portion surrounding an ending portion of drum 12.

[0013] An annular support 30 surrounding drum 12 near its delivery end 12a is attached to stationary drum 16 and holds a pair of movable braking members at diametrically opposite positions (Fig. 5). Each braking member consists of an angular sector of a bristle brush (below, brush 34) which is anchored to the operating rod 36 of a linear, electro-magnetic actuator 37 driven by a microprocessor (not shown). Preferably, the microprocessor which controls the actuators also controls the feeder or the loom. Brush 34 is movable between a resting position spaced from the drum, in which it is received in a respective seat 38 of annular support 30 so that it does not interfere with the unwinding yarn, and an operative position, in which it juts out of seat 38 and engages the outer surface of the drum with the tips of its bristles. The microprocessor is programmed for activating the brushes at a predetermined instant, e.g., as a function of the position degrees of the loom. Programming the times of intervention of the brushes falls within the normal knowledge of the person skilled in the art, therefore no further description will be given about it.

[0014] In the operation, during the insertion the brushes 34 are received in the respective seats 38 and do not interfere with the yarn, which consequently may be freely unwound from the drum without coming into contact with them. Funnel 18 adjusted as above prevents the formation of the balloon. During the final step of the insertion, but a few instants before a predetermined ending time, the microprocessor enables the brushes. The latter engage the outer surface of the drum with their tips, brake the unwinding yarn (which yarn runs between the brushes and the outer surface of the drum) by friction, and finally lock it, thereby preventing loops in excess from unwinding from the drum by inertia.

[0015] As the person skilled in the art will appreciate, with the device according to the invention the braking action is applied only when required, i.e., at the end of the insertion. Therefore, a smooth insertion is obtained and the formation of dust is limited.

[0016] A preferred embodiment of the invention has been described herein, but of course many changes may be made by a person skilled in the art within the scope of the claims. In particular, though the above-described assembly including the anti-balloon funnel and the bristle-based braking system effectively prevents both the formation of the balloon and the unwinding of loops in excess at the end of the insertion, which phenomena are strictly correlated, of course the braking system is capable of operating in association with other conventional anti-balloon funnels. Moreover, although the above-described embodiment is only provided with two braking brushes held by the annular support at diametrically opposite positions, of course a higher number of brushes may be installed, e.g., three or four brushes spaced at

equal angles; on the contrary, in certain cases a sole brush could be sufficient. Nevertheless, as will be obvious to the person skilled in the art, the brushes can be operated by conventional actuators of a different type, e.g., electrical actuators.

Claims

1. A negative yarn feeder, comprising a stationary weft-winding drum (12) from which yarn loops are unwound during a weft insertion, and a weft-braking device for locking the yarn (F) unwinding from the drum (12) at the end of said insertion, **characterized in that** said weft-braking device comprises at least one braking member (34) which is arranged by side of the drum (12) near its delivery end (12a) and is movable under control of actuator means (37) between a resting position, in which it is spaced from the outer surface of the drum (12) and does not interfere with the unwinding yarn (F), and an operative position, in which it engages the outer surface of the drum (12) and cooperates with it to brake the yarn (F).
2. The negative yarn feeder of claim 1, **characterized in that** said actuator means consist of a linear actuator (37) provided with an operating rod (36), to which said braking member (34) is anchored, which is movable in a radial direction with respect to the drum (12) between said resting position and said operative position.
3. The negative yarn feeder of claim 1 or 2, **characterized in that** said at least one braking member (34) is mounted to a support (30) integral with the feeder and, in said resting position, is received in a respective seat (38) of said support (30).
4. The negative yarn feeder of claim 3, **characterized in that** said support (30) is shaped as a ring surrounding the drum (12) and supports at least two of said braking members (34) spaced at equal angles.
5. The negative yarn feeder of any of claims 1 to 4, **characterized in that** said braking member is a bristle brush (34).
6. The negative yarn feeder of claim 5, **characterized in that** said bristle brush (34) is shaped as an angular sector.
7. The negative yarn feeder of any of claims 1 to 6, **characterized in that** it also comprises a substantially frustoconical anti-balloon funnel (18), which is coaxially arranged in front of the drum (12) with its larger base facing the delivery end (12a) of the drum, and **in that** the innermost edge of the larger base of

the funnel is smaller in diameter than the winding diameter of the drum (12).

8. The negative yarn feeder of claim 7, **characterized in that** said anti-balloon funnel (18) is supported at an axially adjustable position in relation to the drum (12). 5
9. The negative yarn feeder of claim 7 or 8, **characterized in that** said anti-balloon funnel (18) consists of a plurality of equally-spaced rods (20) arranged along the generatrices of a trunk of cone and having one end attached to a smaller ring (22) defining the smaller base of the trunk of cone, and the opposite end attached to the larger ring (24) defining said larger base of the frustum of cone. 10 15
10. A weft-braking device installable on a negative yarn feeder (10) provided with a weft-winding drum (12) for locking the yarn (F) unwinding from the drum at the end of an insertion, **characterized in that** it comprises at least one braking member (34) connectable to the feeder (10) by side of the drum (12) and movable under control of actuator means (37) between a resting position in which it is spaced from the drum (12) and does not interfere with the unwinding yarn (F), and an operative position in which it engages the outer surface of the drum (12) near its delivery end (12a) and cooperates with it to brake the unwinding yarn. 20 25 30

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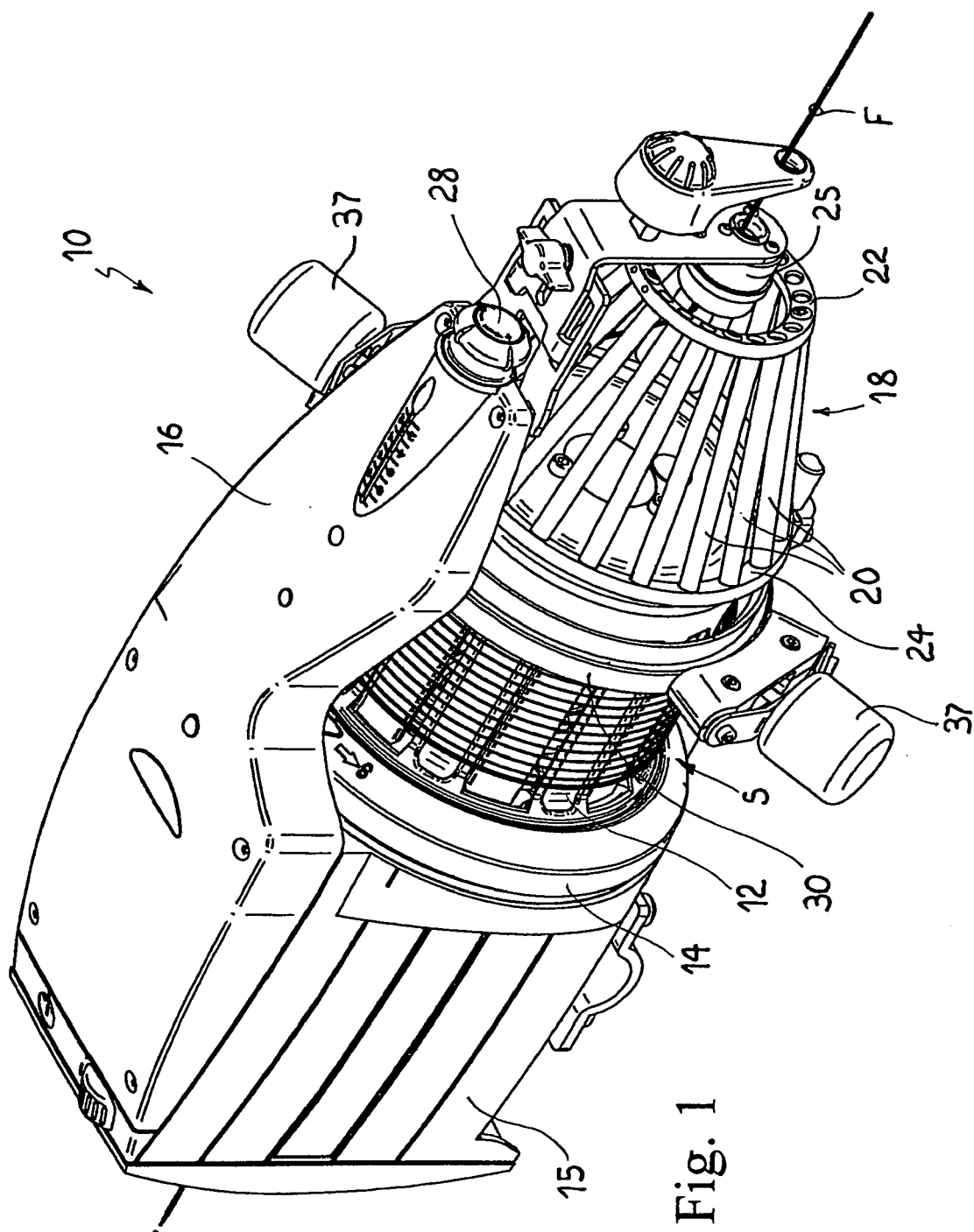


Fig. 1

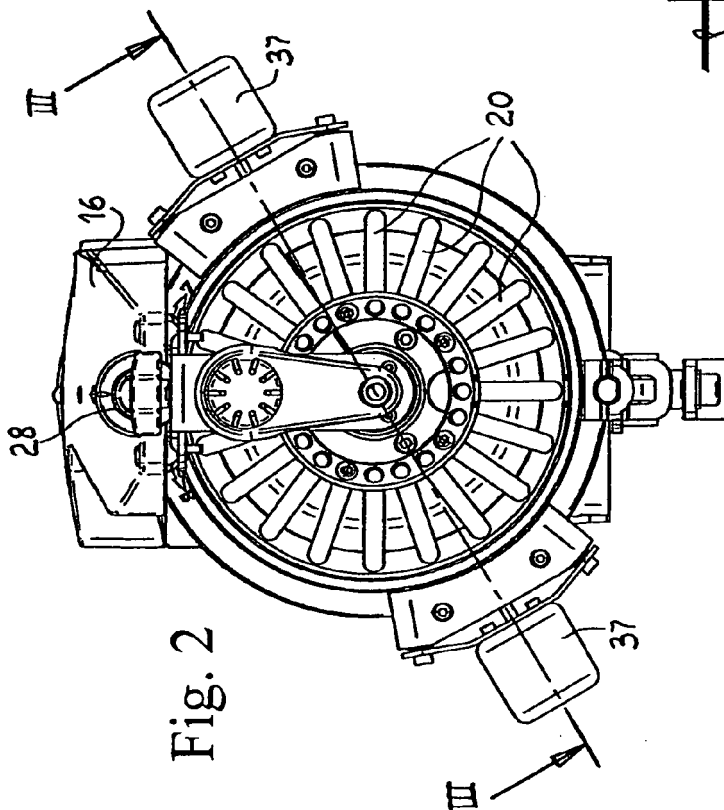


Fig. 2

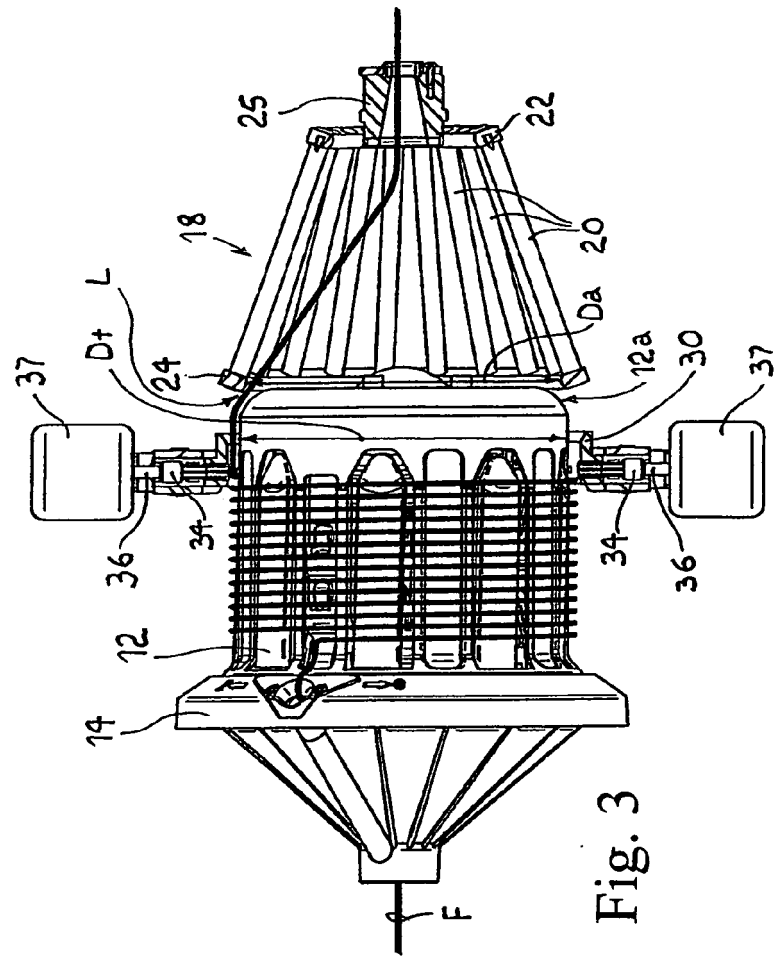
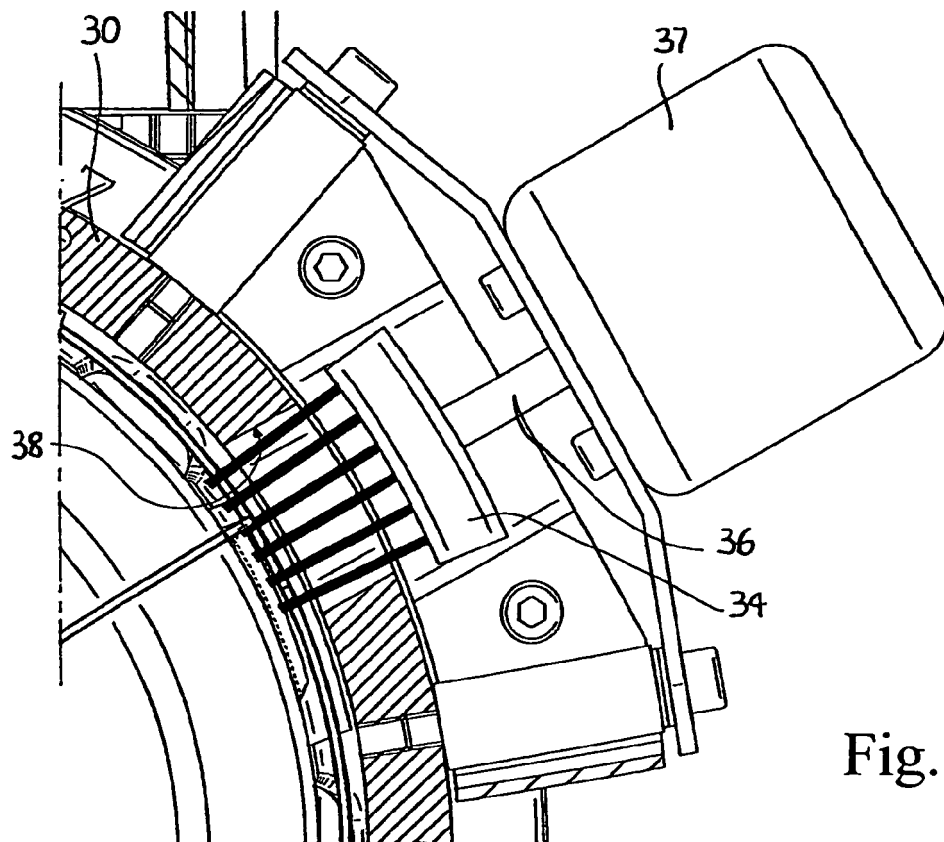
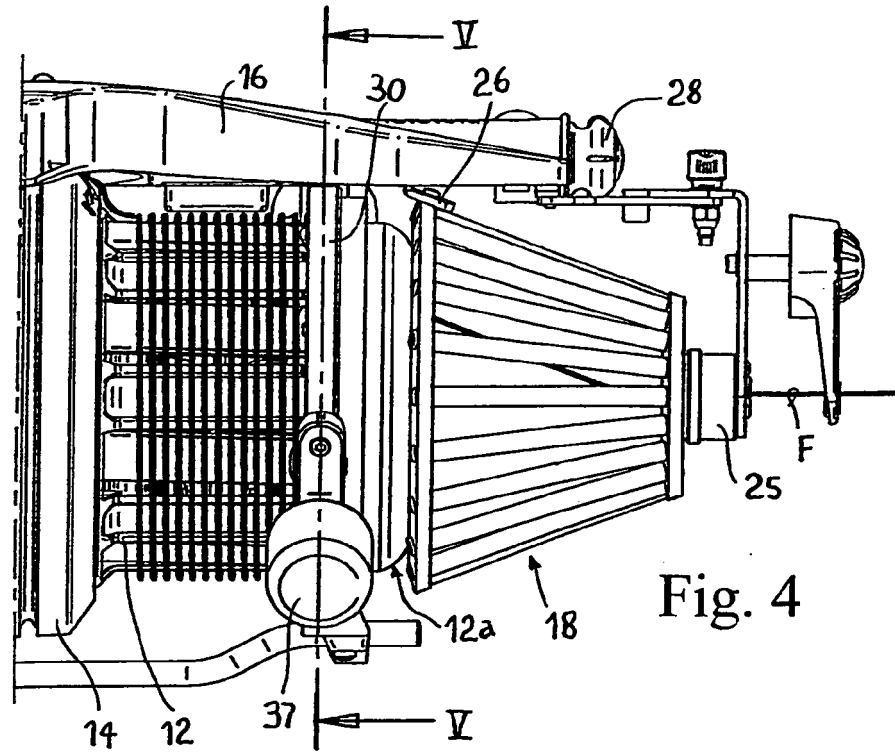


Fig. 3





EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5630

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 778 943 A (THOLANDER LARS HELGE GOTTFRID [SE]) 14 July 1998 (1998-07-14) * column 5, line 52 - column 11, line 12; claim 1; figures 1-3 *	1-10	INV. D03D47/36 B65H57/22
X	EP 0 436 197 A (ROY ELECTROTEX SPA [IT]) 10 July 1991 (1991-07-10) * column 3, line 43 - column 5, line 51; claim 1; figures 1-4 *	1,2,10	
X	US 5 462 096 A (SVANSTROEM ANDERS [SE] ET AL) 31 October 1995 (1995-10-31) * column 2, lines 48-65; claim 1; figures 1,6A,6B * * column 4, line 63 - column 5, line 40 *	1-3,10	
D,X	EP 1 149 793 A (LGL ELECTRONICS SPA [IT]) 31 October 2001 (2001-10-31) * paragraphs [0021] - [0027]; claim 1; figure 1 *	1,10	
A	EP 0 707 102 A (LGL ELECTRONICS SPA [IT]) 17 April 1996 (1996-04-17) * figures 1-6 *	1,10	
A	GB 1 116 486 A (SULZER AG) 6 June 1968 (1968-06-06) * pages 2-3; figures 1,2 *	1-10	TECHNICAL FIELDS SEARCHED (IPC) D03D B65H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 20 February 2009	Examiner Iamandi, Daniela
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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 42 5630

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20-02-2009

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5778943	A	14-07-1998	CN 1139963 A	08-01-1997
			CZ 9602183 A3	15-01-1997
			DE 59508564 D1	17-08-2000
			WO 9520700 A2	03-08-1995
			EP 0741808 A1	13-11-1996
			ES 2149967 T3	16-11-2000
			JP 9508182 T	19-08-1997
			RU 2135657 C1	27-08-1999
EP 0436197	A	10-07-1991	CS 9006944 A3	18-03-1992
			DE 69018228 D1	04-05-1995
			DE 69018228 T2	31-08-1995
			JP 2828783 B2	25-11-1998
			JP 7018543 A	20-01-1995
US 5462096	A	31-10-1995	CZ 9400405 A3	18-05-1994
			DE 4127798 A1	25-02-1993
			WO 9304225 A1	04-03-1993
			EP 0599930 A1	08-06-1994
			JP 3282038 B2	13-05-2002
			JP 7500802 T	26-01-1995
			KR 100251563 B1	15-04-2000
EP 1149793	A	31-10-2001	CN 1321800 A	14-11-2001
			DE 60129764 T2	05-06-2008
			IT T020000400 A1	29-10-2001
			JP 2001355149 A	26-12-2001
			US 2001035227 A1	01-11-2001
EP 0707102	A	17-04-1996	DE 69514069 D1	27-01-2000
			DE 69514069 T2	20-04-2000
			IT T0940805 A1	10-04-1996
			JP 8113851 A	07-05-1996
			US 5553641 A	10-09-1996
GB 1116486	A	06-06-1968	AT 280912 B	27-04-1970
			CH 459913 A	15-07-1968
			DE 1535642 B1	17-12-1970

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 0719354 A [0003]
- EP 1094138 A [0003]
- EP 1149793 A [0003]
- US 3834635 A [0004] [0006]