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(54) **YARN RECOVERY DEVICE FOR TEXTILE APPARATUSES**

(57) A yarn recovery device, comprising a support (14) and a motorized yarn winding spool (18) which is entrained in rotation with respect to the support (14) and is delimited axially between a front end face (18a) and a rear end face (18b), characterized in that said support (14) carries integrally a first yarn guiding bush (20) and a second yarn guiding bush (22) which define a straight path that passes obliquely through the spool (18) with respect to the axis (A) thereof, and in that said spool (18) has at least one radial recess (24) that opens on said front end face (18a) and is adapted to be passed through by the yarn inserted through said first yarn guiding bush (20) and said second yarn guiding bush (22).

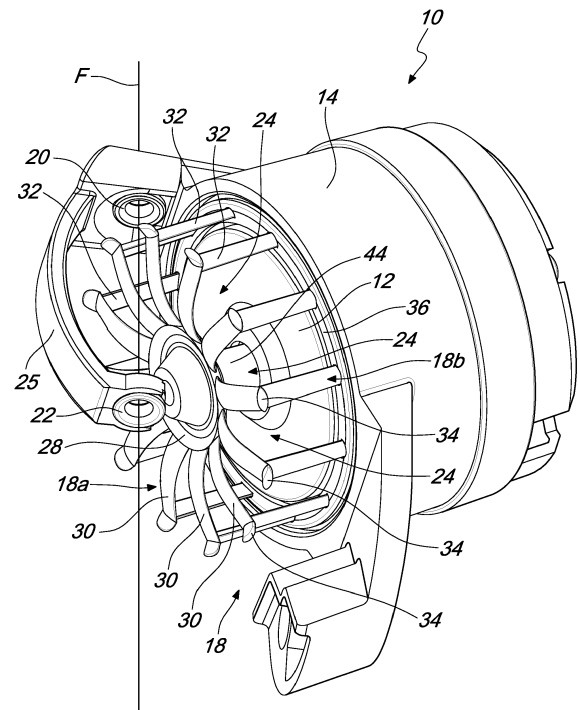


Fig. 1

Description

[0001] The present invention relates to a yarn recovery device for textile apparatuses.

[0002] Yarn recovery devices are known which are adapted to be positioned upstream of a generic textile machine in order to recover part of the yarn that was previously dispensed to the machine and then return it at a later time.

[0003] EP1741817B1 in the name of this same Applicant discloses a recovery device provided with a motorized rotary reel capable of winding thereon the yarn to be recovered. In the document cited above, the reel has a continuous cylindrical outer surface. The yarn passes through a channel that extends obliquely from the outer surface of the reel to a front surface thereof.

[0004] As is well known to the person skilled in the art, in order to optimize the precision of the weaving process, especially with regard to controlling the mechanical tension of the yarn during feeding, it is extremely important that the various devices involved in the process have a high speed of reaction and, as a consequence, that the moving parts offer a low inertia.

[0005] The aim of the present invention is to provide a yarn recovery device that, although based on a principle of operation that is mechanically similar to that of the rotary reel device mentioned above, has a structure that can increase the operating reaction speed thereof.

[0006] This aim and other objects, which will become clearer from the description that follows, are achieved by the yarn recovery device having the characteristics recited in the appended claim 1, while the appended dependent claims define other characteristics of the invention which are advantageous, although secondary.

[0007] Now the invention will be described in greater detail, with reference to a preferred but not exclusive embodiment thereof, which is illustrated for the purposes of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of the yarn recovery device according to the invention;

Figure 2 is a side view of the yarn recovery device of Figure 1;

Figure 3 is a similar view to Figure 2, which shows the yarn recovery device in a different active position.

[0008] With reference to the figures, a yarn recovery device 10 is adapted to be arranged along a yarn feeding line for the purpose of recovering part of the yarn that was previously dispensed to a generic textile machine downstream, e.g., a knitting machine, or a frame, and then return it at a later time. Purely for the purposes of example, the yarn recovery device 10 can be arranged between a yarn feeder (e.g., a storage yarn feeder or a rotary reel yarn feeder) and the textile machine, or also upstream of the yarn feeder.

[0009] The yarn recovery device 10 comprises a motor

12 accommodated in a support 14 and is provided with a driving shaft 16 (Figure 2). A spool 18 is keyed on the driving shaft 16 and can be actuated in order to recover part of the yarn that was previously dispensed to the machine downstream, by winding it thereon.

[0010] The spool 18 is delimited axially between a front end face 18a and a rear end face 18b which faces the motor 12.

[0011] According to the invention, the support 14 carries integrally a first yarn guiding bush 20 and a second yarn guiding bush 22 which define a straight path that passes obliquely through the spool 18 with respect to the axis A thereof, and the spool 18 is provided with a plurality of radial recesses 24 that open on the front end face 18a and are adapted to be passed through by the yarn inserted through the first yarn guiding bush 20 and the second yarn guiding bush 22.

[0012] Preferably, the first yarn guiding bush 20 and the second yarn guiding bush 22 are arranged so that the path defined by them lies on a plane containing the axis A of the spool 18.

[0013] The first yarn guiding bush 20 and the second yarn guiding bush 22 are interconnected by a bridge 25.

[0014] In the implementation described herein, a spool 18 is used which is known per se, since it is used in positive yarn feeders such as that disclosed in EP 2218670 in the name of this same Applicant.

[0015] The spool 18 comprises a frame molded from synthetic material, preferably a thermoplastic material like nylon with the addition of carbon fibers. The frame has a hub 28 and a plurality of spokes 30 that are angularly equally spaced apart and extend radially outward from the hub 28. Preferably, the spokes 30 have an aerodynamic profile in the direction of rotation. Respective arms 32 protrude from the outer ends of the spokes 30 and are substantially parallel to the axis of the hub 28. The arms 32 also advantageously have aerodynamic profile in the direction of rotation.

[0016] Preferably, the spokes 30 have a biconvex cross-sectional profile, while the arms 32 have a cross-sectional profile that is convex on the outer face of the arm and is slightly concave on the inner face.

[0017] Each one of the radial recesses 24 that can be passed through by the yarn is therefore defined between two adjacent spoke-arm pairs.

[0018] A protrusion 34 is defined in the connection region between the spoke 30 and the respective arm 32. The protrusion 34 extends obliquely outward with respect to the axis of the spool 18 in the opposite direction to the arms 32.

[0019] The free ends of the arms 32 are connected to a stiffening ring 36 which delimits the frame 26 on the side of the rear end face 18b.

[0020] Preferably, the stiffening ring 36 is also made of thermoplastic material like nylon with the addition of carbon fibers.

[0021] The spool 18 is keyed to the driving shaft 16 with the interposition of a co-molded bushing insert 44

inserted in the hub 28. The bushing insert 44 is preferably made of aluminum, and makes it possible to clamp the spool 18 on the shaft 16 with force without the spool being deformed.

[0022] When not in use, the recovery device 10 is in the active configuration shown in Figures 1 and 2, with the yarn F being able without interference to travel a straight path that passes through the first yarn guiding bush 20, one of the radial recesses 24 defined between two adjacent spoke-arm pairs, and the second yarn guiding bush 22.

[0023] To recover the yarn, the spool 18 is made to rotate in one direction, as illustrated in Figure 3.

[0024] To return the yarn, the spool 18 is made to rotate in the opposite direction until it returns to the inactive position shown in Figures 1 and 2.

[0025] The system of controlling the rotation of the spool is not covered by the present invention and therefore will not be discussed here in detail. In any case, for the purposes of example, one can use the same control system disclosed in EP1741817B1, which is mentioned in the introduction to the present description.

[0026] The spool 18 according to the invention has a high structural rigidity, a low inertia, and a low aerodynamic resistance by virtue of the aerodynamic profile of the spokes 30 and of the arms 32. Such fact, as the skilled person will easily grasp, favors the speed of reaction of the yarn recovery device to operating commands.

[0027] The purpose of the protrusions 34 is to prevent the yarn loops wound on the spool 18 from falling during the step of recovering or returning the yarn.

[0028] A preferred embodiment of the invention has been described, but obviously the person skilled in the art may make various modifications and variations within the scope of protection of the appended claims.

[0029] In particular, the spool described above, which is known per se from yarn feeder devices is particularly advantageous. However, a specially-designed spool could also be provided, as long as it has at least one radial recess that opens on the front end face, which cooperates with the two fixed bushes in the manner described above in order to allow the winding of the yarn.

[0030] The disclosures in Italian Patent Application No. 102016000007200 (UB2016A000067) from which this application claims priority are incorporated herein by reference.

[0031] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A yarn recovery device, comprising a support (14)

and a motorized yarn winding spool (18) which is entrained in rotation with respect to the support (14) and is delimited axially between a front end face (18a) and a rear end face (18b), **characterized in that** said support (14) carries integrally a first yarn guiding bush (20) and a second yarn guiding bush (22) which define a straight path that passes obliquely through the spool (18) with respect to the axis (A) thereof, and **in that** said spool (18) has at least one radial recess (24) that opens on said front end face (18a) and is adapted to be passed through by the yarn inserted through said first yarn guiding bush (20) and said second yarn guiding bush (22).

2. The yarn recovery device according to claim 1, **characterized in that** said first yarn guiding bush (20) and said second yarn guiding bush (22) are arranged so that said straight path defined by them lies on a plane containing the axis (A) of the spool (18).

3. The yarn recovery device according to claim 1 or 2, **characterized in that** said spool (18) has a plurality of said radial recesses (24) spaced apart at equal angles about its axis.

4. The yarn recovery device according to claim 3, **characterized in that** said spool (18) comprises a frame provided with a hub (28) and a plurality of spokes (30), from the outer ends of which respective arms (32) protrude which are substantially parallel to the axis of the hub (28), each one of said radial recesses (24) being defined between two adjacent spoke-arm pairs.

5. The yarn recovery device according to claim 4, **characterized in that** said spokes (30) and said arms (32) have an aerodynamic profile in the direction of rotation.

6. The yarn recovery device according to claim 5, **characterized in that** said spokes (30) have a biconvex cross-sectional profile and said arms (32) have a cross-sectional profile that is convex on the outer face and is concave on the inner face.

7. The yarn recovery device according to one of claims 4 to 6, **characterized in that** said spool (18) is molded from synthetic material (26).

8. The yarn recovery device according to one of claims 4 to 7, **characterized in that** in the connection region between the spokes (30) and the corresponding arms (32) there are respective protrusions (34) adapted to retain the yarn wound on the spool.

9. The yarn recovery device according to claim 8, **characterized in that** said protrusions (34) project obliquely outward with respect to the axis of the spool

(18) in the opposite direction with respect to said arms (32).

10. The yarn recovery device according to one of claims 4 to 9, **characterized in that** the free ends of said arms (32) are connected to a stiffening ring (36) that delimits the frame (26) on the opposite side with respect to the front end face (18a).

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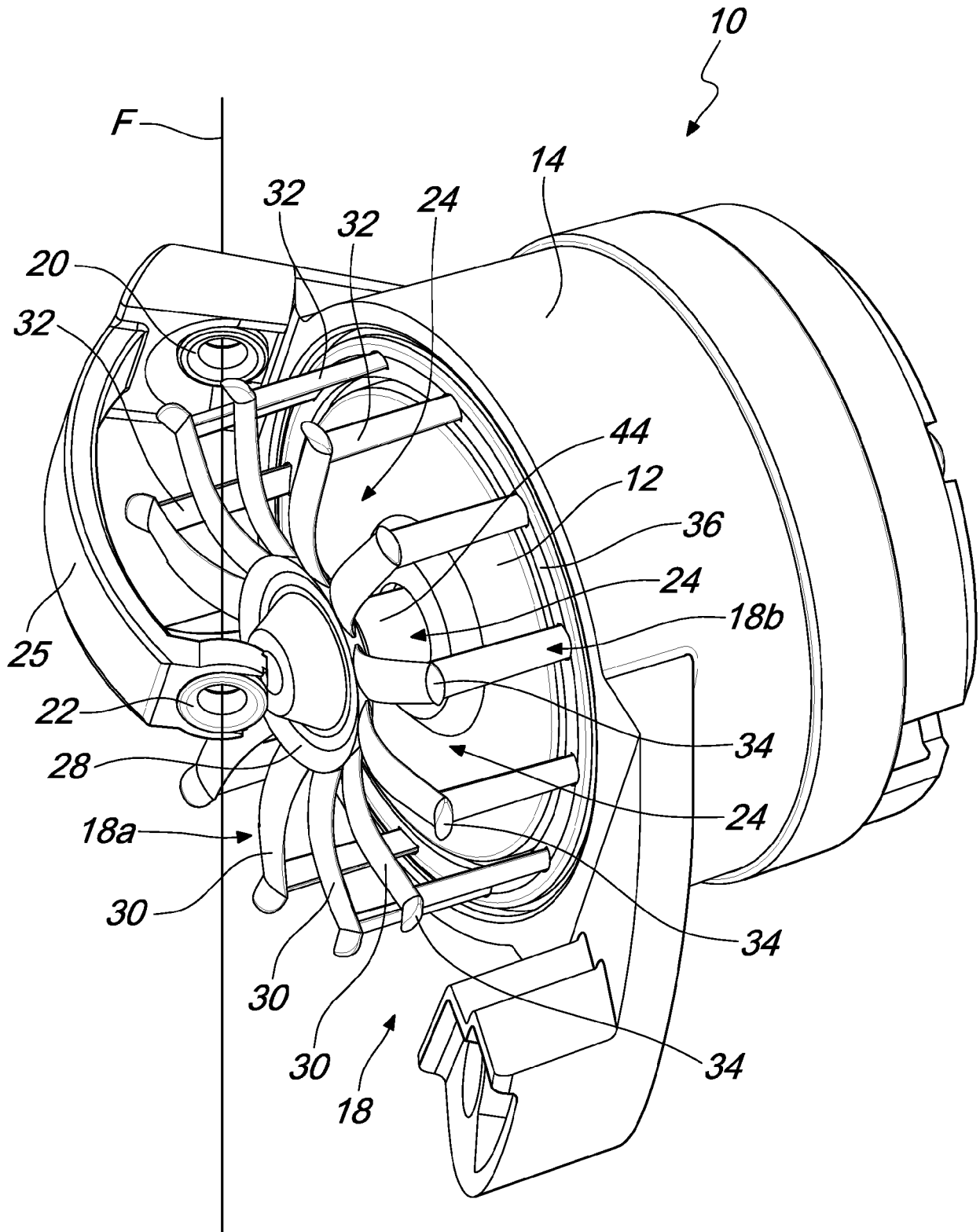


Fig. 1

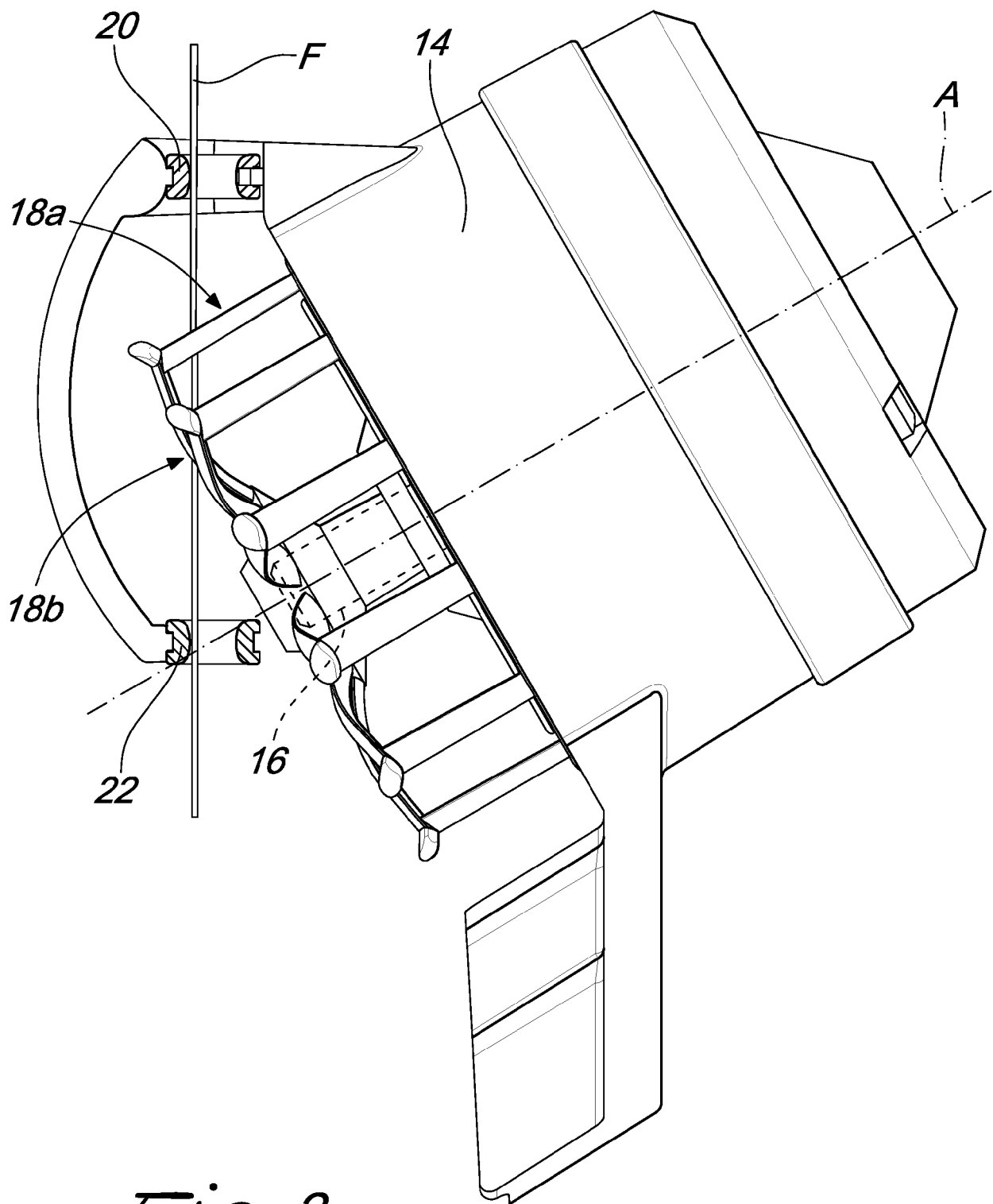


Fig. 2

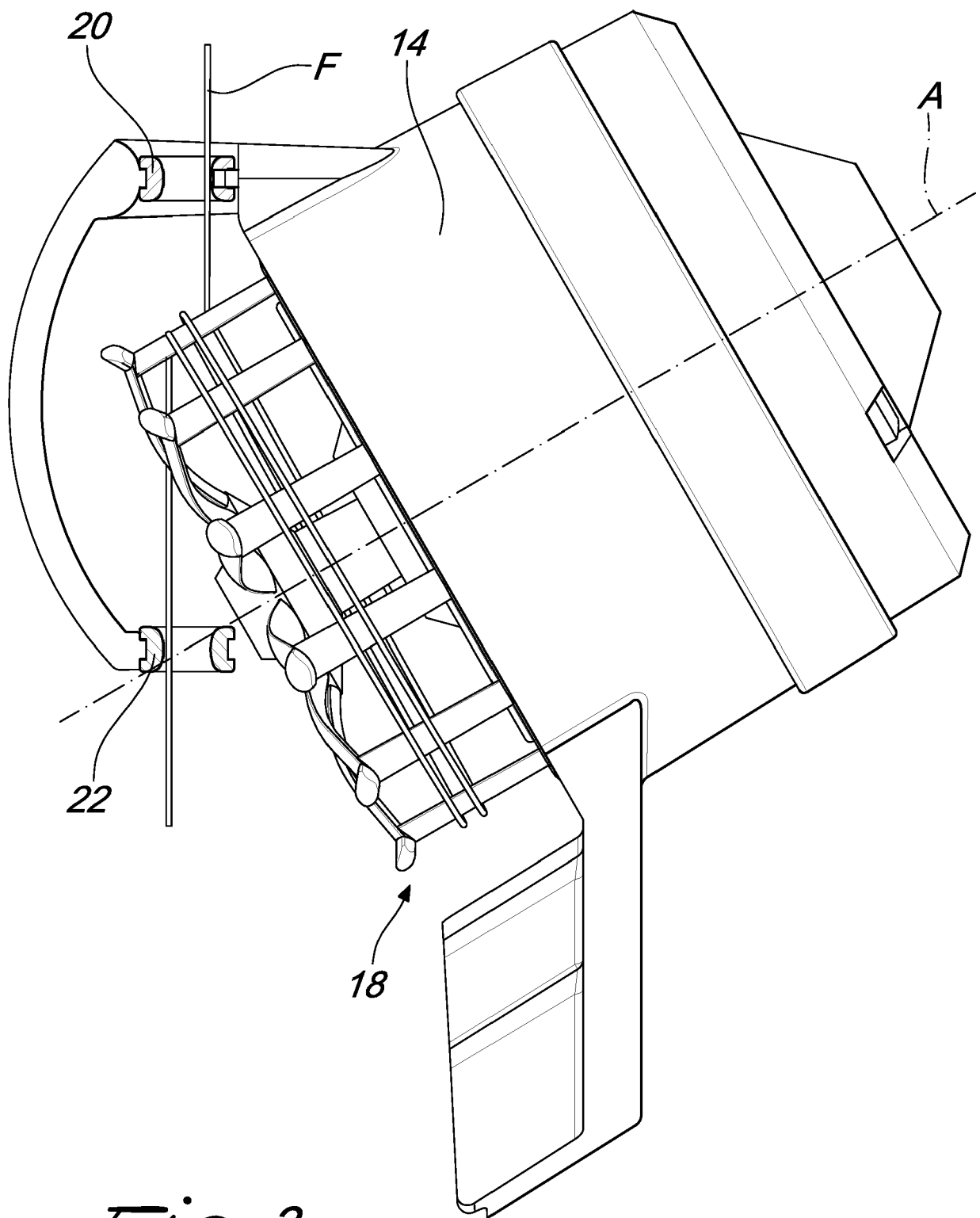


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 17 15 2836

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X	EP 2 642 004 A1 (LGL ELECTRONICS SPA [IT]) 25 September 2013 (2013-09-25) * paragraphs [0001], [0024], [0025]; figure 5 *	1-10	INV. D04B15/48
Y,D	EP 2 218 670 A1 (LGL ELECTRONICS SPA [IT]) 18 August 2010 (2010-08-18) * paragraphs [0011] - [0019]; figure 1 *	1-10	
Y	GB 2 158 107 A (MEMMINGER GUSTAV) 6 November 1985 (1985-11-06) * page 2, line 119 - page 3, line 34; figure 1 *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			D04B B65H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 3 March 2017	Examiner Wendl, Helen
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 17 15 2836

5 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
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