

Description

[0001] This invention relates to a weft feeder for textile machines, particularly knitting machines, provided with an improved system for fixing the stationary drum onto the motor housing.

[0002] As is known, weft feeders for knitting machines comprise a stationary drum on which a swivel arm, driven by a motor, winds multiple loops of thread, which constitute a weft reserve. For this purpose, the motor shaft is hollow, so that the thread can pass within it; the thread then exits through a slot provided at an intermediate section of the shaft and is sent to a guide located at the end of the swivel arm for winding on the drum. When requested by the loom, the loops of thread unwind from the drum and are supplied to the loom after passing through a braking means that controls the mechanical tension of the thread in order to maintain it substantially constant.

[0003] Since the swivel arm must be allowed to rotate about an axis common to the drum and the motor shaft, it is not possible to connect the drum to the motor housing by means of rigid elements, such as screws and bolts or the like, because the arm, in its thread-laying motion, rotates between said drum and motor housing. Accordingly, a device for fixing the drum to the motor housing is known having two complementary frustum-shaped rings on which permanent magnets with mutually opposite polarities are agglomerated, one ring being attached at the end of the motor housing, the other ring being attached to the drum. When the drum, with the respective magnetic ring associated to it, is moved close to the motor housing with which the other magnetic ring is associated, with the hub of the arm sandwiched between the rings as a spacer, a steady connection of the parts is achieved, as well as a free volume between them as necessary for the passage of the arm and the winding on the thread onto the drum. According to the known art, permanent magnets, made of ferrite by a sintering process, are agglomerated within the respective frustum-shaped frames and are inserted during the molding cycle together with a ferromagnetic metal plate, having the task of conveying the magnetic flux toward the region of interest where the swivel arm moves.

[0004] This device for fixing the drum to the motor housing has drawbacks, the first of which is that, for example due to temperature variations that occur during molding operations, or due to impacts during assembly/disassembly and maintenance of the device, the magnets may break, be damaged or be partially demagnetized; such accidents necessarily cause replacement of the entire ring, with attendant penalties concerning maintenance times and costs.

[0005] Another accident that necessarily leads to replacement of the magnetic ring occurs when, during the assembly of said ring, mistakes are made in the alternation of the magnet polarities. Such mistakes, if neglected, would cause considerable and unacceptable

reductions in the attraction force between the rings, with consequent risks of unwanted disengagement of the drum, especially during the operation of the feeder.

[0006] Another drawback of known solutions is that they require providing a large number of magnets (generally at least twelve pairs), which moreover have rather large volumetric sizes, with obvious disadvantages in terms of weight and bulk.

[0007] The main object of this invention is therefore to provide a weft feeder equipped with a system for securely fixing the stationary drum to the motor housing, while allowing, in case of damage or incorrect assembly of some of its parts, the replacement of the damaged parts only.

[0008] Another object of the invention is to provide said device so that the system for fixing the drum to the motor housing has a smaller bulk and weight than known systems.

[0009] Another object of the invention is to provide said device so that it can be manufactured easily and at a low cost, by means of equipment that is conventional in the field.

[0010] The above and other objects and advantages, such as will better appear hereinafter, are achieved by a weft feeder having the features recited in claim 1, while the subordinate claims define other advantageous features.

[0011] The invention will now be described in greater detail and illustrated by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a side view of a generic weft feeder;

Figure 2 is a cross-sectional view, taken along line II-II of Figure 1, showing a portion of a fixing system according to the invention, associated with the generic feeder;

Figure 3 is a cross-sectional view, taken along line III-III of Figure 1, of a detail of the fixing system of Figure 2, on an enlarged-scale;

Figure 4 is an exploded perspective view of the weft feeder of Figure 1, showing the fixing system of Figure 2.

[0012] With reference to the figures mentioned above, a generic weft feeder, generally designated by the reference numeral 10, comprises a motor housing 11 and a stationary drum 12, on which a frustum-shaped circular swivel arm 13, keyed on a motor shaft 14 driven by a motor M, winds multiple loops of thread F, which constitute a weft reserve RT. To this purpose, motor shaft 14 is hollow, so that thread F can pass through it; the thread exits through a slot 15 provided at an intermediate section of shaft 14, and is sent to a guiding hole 16 provided in a peripheral region of the disk that constitutes the arm 13 in order to be wound onto the drum 12.

When requested by the loom (not shown), the loops unwind from drum 12 and are fed to the loom, passing through a braking means 17 that controls the mechanical tension of thread F in order to keep it substantially constant.

[0013] Since it is necessary to allow the swivel arm 13 to rotate about the axis H common to drum 12 and motor shaft 14 between which the arm is interposed, a system is provided for fixing the drum to the motor housing. According to the invention, the fixing system has a set of first permanent magnets, such as 18a, which are detachably received in respective first recessed seats such as 19a, provided with a ferromagnetic plate 21a on their bottoms and arranged on a first annular surface 26 which is concave and frustum-shaped and is formed coaxially at the end of motor housing 11. Advantageously, each of the ferromagnetic plates 21a is attached by means of a screw 25a to the first annular surface 26 and is provided with a rim 22, forming the edge of the resting surface of the magnet, in order to retain a bushing 23 made of plastic material, which has, for this purpose, a corresponding inside edge 24 at one axial end, shaped to surround the respective permanent magnet 18a. Second permanent magnets such as 18b, having opposite polarities, are arranged opposite the first magnets and are also received in respective second seats such as 19b, provided with ferromagnetic plates 21b on their bottoms and arranged on a second annular convex frustum-shaped surface 20, which is complementary to surface 26 and is formed on a support 27 which is attached to the base of drum 12. The second seats are preferably formed as cavities 19b made in the second annular surface 20; the ferromagnetic plates 21b are attached to the bottoms of said cavities by means of screws 25b.

[0014] Elongated centering brackets such as 35 and centering/attaching brackets such as 36 extend from support 27, parallelly to axis H, and receive nuts 37 which allow drum 12 to be connected to support 27 by means of screws 38. Swivel arm 13 is keyed to the motor shaft 14 so that its hub 28 is sandwiched between the internal rotating rings of bearings 29, 30a, 30b, which themselves abut on shoulders 31, 32, respectively. Bearings 29, 30a, 30b are received in seats 33, 34 formed respectively within the motor housing 11 and on the internal cylindrical surface of the support 27.

[0015] Neodymium magnets 18a, 18b are particularly suitable for the purposes of the present invention, since they possess, for equal sizes, a magnetic capacity up to ten times greater than the more commonly used ferrite magnets. When bringing drum 12, with associated support 27 and the second magnets 18b, close to the motor housing, which carries the first magnets 18a, a steady connection of the parts is obtained, while a free volume is left between them as required for the passage of the swivel arm and the winding of the thread onto the drum. Ferromagnetic plates 21a and 21b therefore perform the dual function of retaining the respective magnets 18a, 18b in their seats and of conveying their lines

of flux into the region of interest where arm 13 rotates.

[0016] In practice, it has been found that the invention fully achieves the intended aim, by providing a weft feeder having a system for securely attaching the drum to the motor housing, which system also allows each individual magnet to be replaced quickly and independently in case of damage or incorrect assembly, while complying with the required alternation of the polarities. Therefore, with the device according to the invention it is possible, in case of break of a magnet, to recover the remaining ones, with obvious cost advantages.

[0017] Another advantage of the device according to the invention is that it has a smaller bulk and a lower weight than known devices, the high magnetic capacity of neodymium being exploited not only for securely attaching the magnets to the respective seats and for achieving a more stable connection between the drum and the motor housing, but also for reducing the number and sizes of said magnets.

[0018] Another advantage of said device is that it has a low manufacturing cost and is simple to manufacture by means of equipment that is common in the field.

Claims

1. A weft feeder for textile machines, wherein a swivel arm (13) winds a weft thread (F) onto a stationary drum (12) that is supported coaxially and rotatably on the motor shaft (14) of the swivel arm (13), **characterized in that** the drum (12) is kept in a fixed angular position by the mutual attraction between a first set of magnets (18a) received in respective first recessed seats (19a) on a first annular surface (26) of the motor housing (11) which is coaxial to the motor shaft (14), and a second set of magnets (18b) received in respective second recessed seats (19b) on a second annular surface of a support (27) at the base of the drum (12), facing the first annular surface (20), each seat (19a, 19b) of both the first and second sets being provided with a ferromagnetic plate (21a, 21b) in its bottom.
2. The device of claim 1, **characterized in that** said first and second annular surfaces (20, 26) are frustum-shaped surfaces.
3. The device of claim 2, **characterized in that** the recessed seats (19a, 19b) of at least one of said sets comprise bushings (23) surrounding the respective ferromagnetic plates (21a) and attached to the respective annular surface (26).
4. The device of claim 3, **characterized in that** each of said ferromagnetic plates (21a) is fixed to the respective annular surface (26) by means of a screw (25a) and has a rim (22), which forms the edge of the resting surface of the magnet and is adapted to

engage a corresponding inside edge (24) of said bushing (23) in order to attach it to the respective annular surface.

5. The device of anyone of the preceding claims, **characterized in that** said second seats (19b) are formed in said second annular surface (20) as cavities (19b), the ferromagnetic plate (21b) being detachably attached to the bottom of each of said cavities. 5 10
6. The device of anyone of the preceding claims, **characterized in that** elongated centering brackets (35) and centering and fixing brackets (36) protrude from said support (27) parallel to the axis (H) of the drum and accommodate nuts (37) for connecting the drum (12) to the support (27) by means of screws (38). 15
7. The device of anyone of the preceding claims, **characterized in that** said first and second magnets (18a, 18b) are made of neodymium. 20

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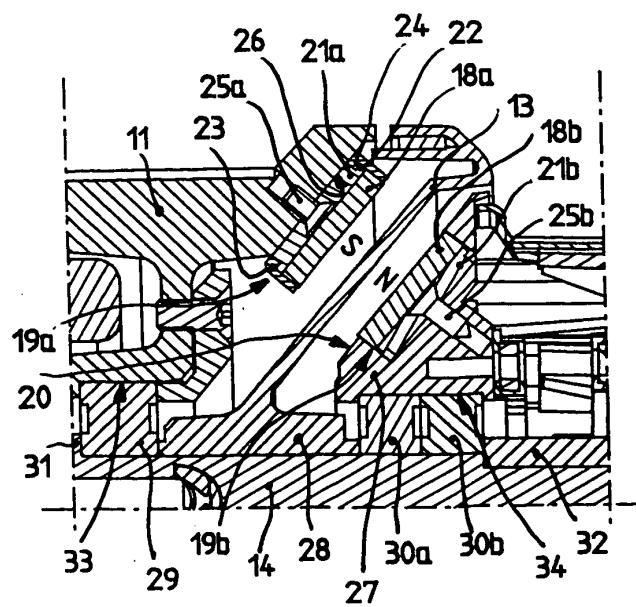
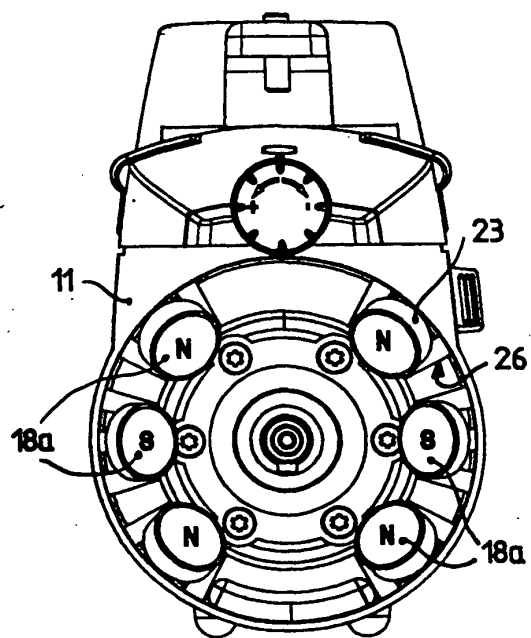
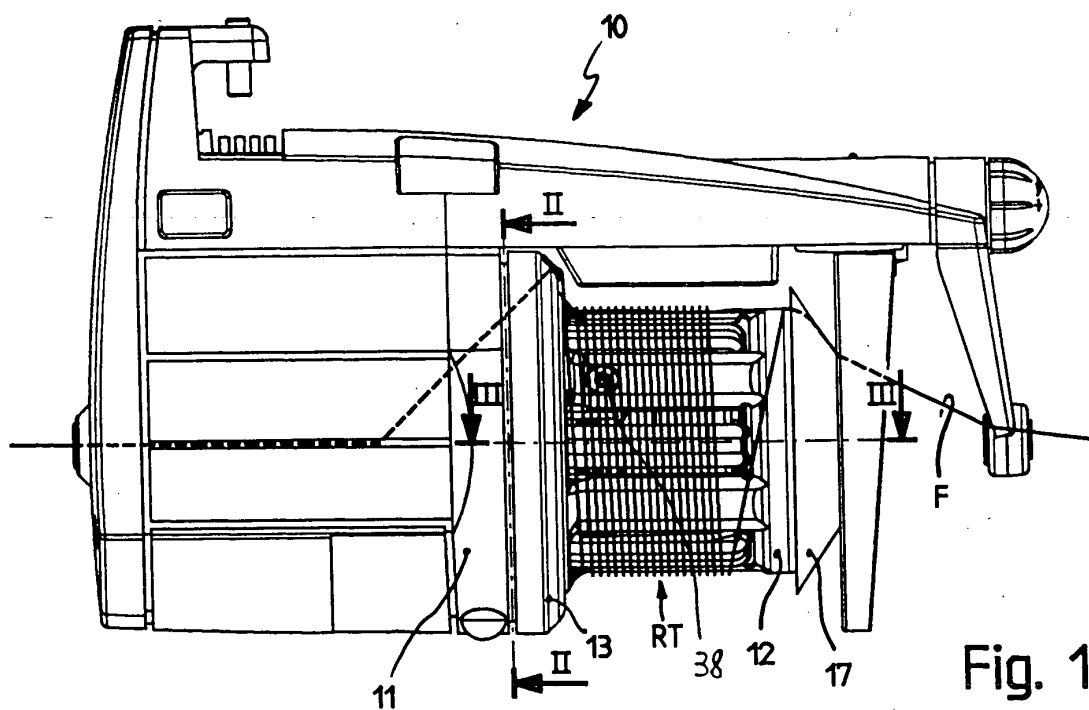
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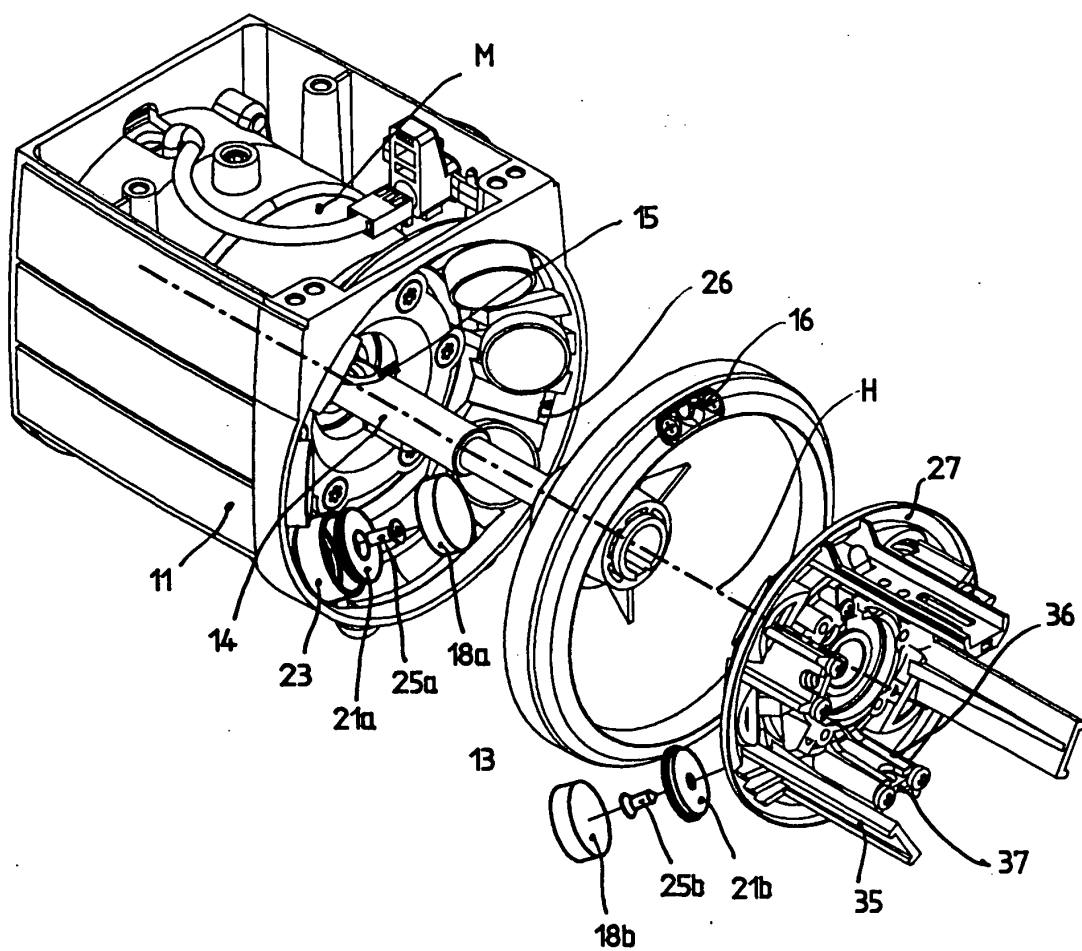


Fig. 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 00 1608

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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A	EP 1 059 375 A (LGL ELECTRONICS SPA) 13 December 2000 (2000-12-13) * column 4, paragraphs 24,25; figure 1 *	7	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			D04B D03D B65H
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 11 March 2003	Examiner Dreyer, 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
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EP 03 00 1608

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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