

12

EUROPEAN PATENT APPLICATION

21 Application number: **80200839.1**

51 Int. Cl.³: **B 65 H 63/00**

22 Date of filing: **10.09.80**

30 Priority: **13.09.79 BE 197140**

43 Date of publication of application:
13.05.81 Bulletin 81/19

64 Designated Contracting States:
AT CH DE FR LI SE

71 Applicant: **"BARCO ELECTRONIC N.V." abbreviated into "Barco"**
30, Albertpark
B-8500 Kortrijk(BE)

72 Inventor: **Versavel, Joseph**
30, Albertpark
D-8500 Kortrijk(BE)

72 Inventor: **Eggermont, Frans**
41, J. Huyslaan
D-8790 Waregem(BE)

74 Representative: **Pirson, Jean et al,**
c/o Bureau Gevers 7, rue de Livourne, Boîte no 1
B-1050 Bruxelles(BE)

54 **Electronic thread monitor.**

57 In an electronic thread monitor with at least one thread contact member (1) from ceramic material, a sensor element (4) connected thereto which converts the thread friction on said contact member (1) into an electric signal, and an electronic circuit (3) connected to said sensor element (4) to further process the signal from the sensor element (4), said sensor element (4) is mounted on said ceramic thread contact member (1).

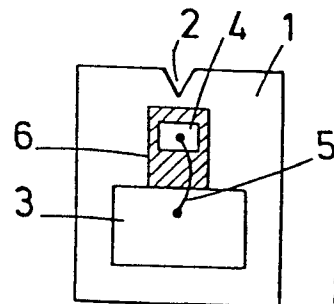


FIG. 1

"Electronic thread monitor"

This invention pertains to an electronic thread monitor which comprises at least one thread contact member from ceramic material, a sensor element connected thereto which converts the thread friction on said contact member into an electric signal, and an electronic circuit connected to said sensor element to further process the signal from the sensor element.

Such thread monitors are notably used in the textile industry to signal the difference between a moving thread on the one hand, and a stationary or missing thread on the other hand. Said thread may for example be the shoot in a weaving machine. The sensor element may be an electrostatic element and sense that electrostatic charge which is caused by the thread friction on the thread contact member, or it may be an acoustic-electric transducer which converts that acoustic energy generated by the thread friction on the thread contact member, into an electric signal.

In the known thread monitors of this kind, said thread contact member from ceramic material is mounted on a metal holder, while the electronic circuit is mounted on a discrete holder from insulating material which is connected vibration-free to the metal holder for said thread contact member. When the sensor element is an acoustic-electric transducer, said transducer is mounted next to the ceramic contact member on the metal holder thereof. When the sensor element operates

electrostatically, said element is generally formed by a thin layer from some noble metal such as silver which is arranged on the ceramic thread contact member and is connected through an electric conductor running over the metal holder for said thread contact member, to said electronic circuit.

Said known thread monitors are relatively large and consequently are not usable for every application. Such monitors are also relatively complex to manufacture and expensive.

The invention has for object to obviate said drawbacks, and to provide an electronic thread monitor which has quite a simple structure and is quite compact.

For this purpose the sensor element is mounted on said ceramic thread contact member.

The metal holder may thus completely be dispensed with.

The ceramic material from the thread contact member forms preferably also the substrate of part at least from said electronic circuit.

In such an embodiment particularly, the electronic thread monitor can be made very compact.

Usefully the electronic circuit is a hybrid micro-electronic circuit.

In an advantageous embodiment of the invention, the ceramic material is comprised of sintered alumina.

Other details and advantages of the invention will stand out from the following description given by way of non limitative example

and with reference to the accompanying drawings, in which :

Figure 1 is a diagrammatic view of an electronic thread monitor according to the invention.

Figure 2 is a diagrammatic view similar to figure 1, but pertaining to another embodiment of the electronic thread monitor according to the invention.

Figure 3 is a view similar to figures 1 and 2, but pertaining to still another embodiment of the electronic thread monitor according to the invention.

In the various figures, the same reference numerals pertain to similar elements.

The electronic thread monitor according to figures 1 and 2 comprises a small plate from ceramic material which forms both the thread contact member for the thread to be monitored and is provided therefor with a notch 2, and the substrate of a hybrid micro-electronic circuit 3.

The notch 2 is so shaped as to obtain a good contact of the thread to be monitored with the small plate 1, but it may also be used as thread guide depending on the conditions. Instead of the V-shaped notch 2 as shown in the figures, said notch may also have a more intricate shape, mostly with a view to suitably guiding the thread.

A particularly suitable ceramic material for embodying the invention is sintered alumina.

Such alumina should not only have the characteristics of that alumina suitable for making

thread guides for the textile industry, but also the characteristics of that alumina used for manufacturing substrates of electronic circuits and particularly of hybrid micro-electronic circuits as used in "thick film" embodiments. The alumina should thus be carefully selected among the commercially available alumina. Attention should be given thereby to the grain size of the sintered alumina which should not have any sharp edge to be suitable as a good thread guide. Attention should also be given to the amount and nature of the additives when the alumina has to be suitable for use as substrate for the electronic circuit. An alumina which is suitable both for guiding threads in the textile industry and as substrate for an electronic circuit is commercially available. Such an alumina is for example an alumina of type KER 708 according to DIN 40,685 dated November 1967, which alumina has been made commercially available notably by the German Company HALDENWANGER under trademark "Alsint 99" and "Alsint 96 A".

The electronic thread monitor according to figure 1 comprises an acoustic-electric sensor element 4. Said element which is known per se, is an acoustic-electric transducer which converts the acoustic energy which is generated due to the friction of a moving thread inside the notch, into an electric signal. Such a transducer is for example a piezo-electric crystal. Said acoustic-electric sensor element 4 is mounted directly adjacent said notch 2, next to electronic circuit 3, on said

small plate 1 from ceramic material. Said sensor element 4 is connected on the one hand through an electric line 5, and on the other hand through an electric lead 6 to said electronic circuit 3. Said electric lead 6 is comprised of a thin metal layer which is provided on said plate 1 between sensor element 4 and said plate 1, and which thus connects directly to the micro-electronic circuit 3.

The acoustic-electric element 4 is very advantageously located relative to the source of cross-wise vibrators. The sensor element electrode may be manufactured in a single working operation together with electronic circuit 3 or anyway a large portion thereof.

The electronic thread monitor according to figure 2 comprises an electrostatically-operating sensor element. In said thread monitor the sensor element 4 is formed by the electric conductor 6 proper. Due to the friction of a moving thread inside notch 2, there appears on small plate 1 an electrostatic charge which is then coupled by lead 6 to the electronic circuit 3. In this embodiment also the sensor element, namely lead 6, may be manufactured in a single working operation together with micro-electronic circuit 3 or a portion thereof.

The electronic thread monitor according to figure 3 is a multiple monitor. The small plate 1 from ceramic material forms the thread contact member for a plurality of, namely three threads. For this purpose the small plate is not provided with one notch 2 but rather with three such notches. Each such notch is so shaped as to obtain a good

contact with the thread and possibly also to be used as thread guide. The small plate 1 is also used as substrate for a hybrid micro-electronic circuit and as substrate for one or a plurality of sensor elements 4, which are connected to a single electronic circuit 3.

The micro-electronic circuit 3 is of a structure known per se and will thus not be described here in detail. Such a circuit comprises for example an amplifier. As usual the circuit is covered by a thin protecting layer. The electronic circuit 3 is shown diagrammatically in figure 1 with the circumference of said protecting layer.

Both the micro-electronic circuit 3 and the sensor element are mounted in the thread monitors shown in the figures, on one and the same substrate, namely the small plate 1 from ceramic material, in such a way that the whole unit may be made very compact. Due to the use of the technics for the manufacturing of hybrid micro-electronic circuits, the unit manufacture is also very simple. When desirable portions of the electronic circuit may be manufactured as discrete electric components on support 1, or even be mounted separately but the major portion of said circuit may still be provided in a single operation together with the sensor element on said small plate 1. The plate 1 itself has a very simple structure. The contacting of the threads and the plate 1 may thus also occur very simply by bringing said thread inside a notch 2.

When required a damping material or a diffusion structure may be provided between the

acoustic-electric sensor element 4 and the electronic circuit 3.

In every case it is preferable to mount the complete thread monitor vibration-free in the machine wherein threads should be monitored, to prevent the machine disturbing the monitor.

The thread monitor has a very high sensitivity particularly due to the sensor element being located very close to that location where the thread slides and directly on the substrate of the micro- electronic circuit. A glued joint as provided for example in the known thread monitors where the contact member from ceramic material is glued on a metal holder, is not present in the above-described thread monitors.

The invention is in no way limited to the above embodiments and many changes may be brought therein without departing from the scope of the invention as defined in the appended claims.

CLAIMS.

1. Electronic thread monitor, with at least one thread contact member from ceramic material, a sensor element connected thereto which converts the thread friction on said contact member into an electric signal, and an electronic circuit connected to said sensor element to further process the signal from the sensor element, in which said sensor element is mounted on said ceramic thread contact member.

2. Electronic thread monitor as defined in claim 1, in which the ceramic material from the thread contact member also forms the substrate of part at least of the electronic circuit.

3. Electronic thread monitor as defined in claim 2, in which the ceramic material from the thread contact member forms the substrate of the complete electronic circuit.

4. Electronic thread monitor as defined in any one of the preceding claims, in which the electronic circuit is a hybrid micro-electronic circuit.

5. Electronic thread monitor as defined in any one of the preceding claims, in which the ceramic material is comprised of sintered alumina.

6. Electronic thread monitor as defined in any one of the preceding claims, in which the thread guide from ceramic material is a small plate which is provided with a recess for at least one thread.

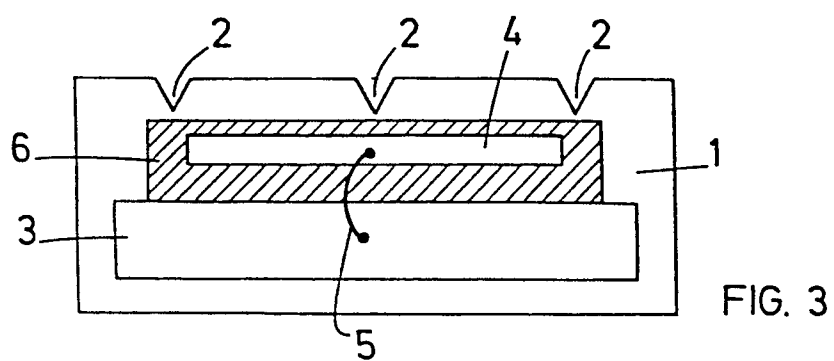
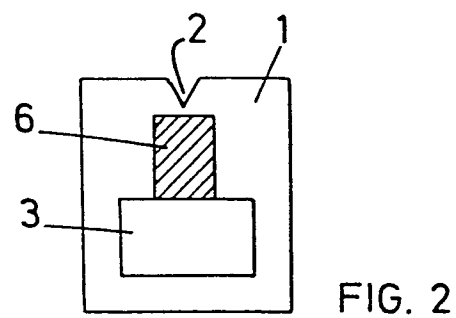
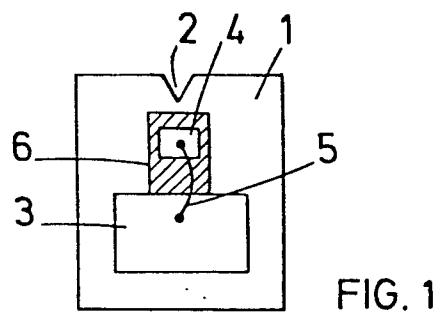
7. Electronic thread monitor as defined in claim 6, in which said recess is a notch.

8. Electronic thread monitor as defined in any one of the preceding claims, in which the sensor element is an electrostatic sensor element which is comprised of an electric conductor which is arranged on the thread contact member from ceramic material.

9. Electronic thread monitor as defined in any one of claims 1 to 7, in which the sensor element is an acoustic-electric sensor element which is mounted on the thread contact member from ceramic material and which is connected through at least one electric conductor to said electronic circuit.

10. Electronic thread monitor as defined in any one of the preceding claims, in which the thread contact member from ceramic material is designed for a plurality of threads.

1/1





European Patent
Office

EUROPEAN SEARCH REPORT

0028425

Application number

EP 80 20 0839.1

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	CH - A - 532 526 (AG GEBRÜDER LOEPFE) * complete document * --	1,6, 7,10	B 65 H 63/00
	CH - A - 479 478 (AG GEBRÜDER LOEPFE) * fig. 2 * --	1,7	
A	US - A - 3 361 314 (W. GITH) --		
A	DE - B2 - 2 526 969 (AG GEBRÜDER LOEPFE) --		TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A	DE - B2 - 2 353 586 (AG GEBRÜDER LOEPFE) ----		B 65 H 63/00
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			&: member of the same patent family, corresponding document
X The present search report has been drawn up for all claims			
Place of search Berlin		Date of completion of the search 10-02-1981	Examiner KLITSCH