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(54) A device for forming a yarn coil from a yarn supplied from a yarn package.

(57) The invention relates to a device for forming a yarn coil from a yarn thread supplied from a yarn package, comprising a winding drum (7) floatingly mounted in a support frame (1) and rotatable winding member (5) cooperating therewith, the supporting frame (1) and the drum (7) being provided with magnets (11,12) which are disposed to lie opposite to one another in the rest position of the drum.

The device according to the invention distinguishes from the well-known devices in that at least a number of magnets are surrounded by an electrically conductive material (13,14).

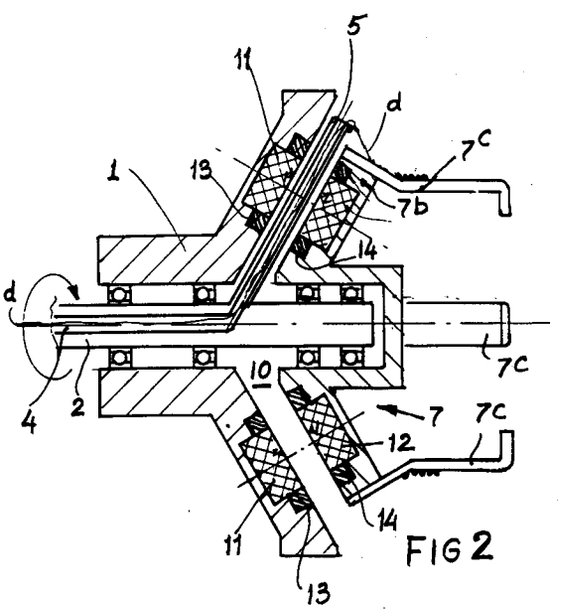

FIG 2

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The invention relates to a device for forming a yarn coil from a yarn thread supplied from a yarn package, comprising a winding drum floatingly mounted in a support frame and a rotatable winding member cooperating therewith, the supporting frame and the drum being provided with magnets which are disposed to lie opposite to one another in the rest position of the drum.

Such a device is known (see e.g. US-A-4 848 417) and is used e.g. for measuring weft yarn lengths which are to be subsequently supplied to the weft inserting device of a shuttleless loom. In such a case the weft yarn supplied in a continuous or semi-continuous manner from a stationary yarn package is wound, by the winding member at the upstream drum end, into a plurality of successive windings onto the drum, while a plurality of windings corresponding with the desired weft yarn length is released at the downstream drum end for delivery to the weft inserting device. Tension variations in the supplied yarn and also variations in the winding speed of the winding member, and particularly the periodical stopping and releasing of the yarn discharge at the downstream drum end may cause the winding drum to "swing" from its floating rest position. The mutually attracting magnets attached to the stationary support frame and carried by the floatingly supported drum respectively are applied to damp such swinging movements.

To obtain an optimal damping of undesired swinging movements a plurality of pairs of cooperating permanent magnets is used in the well-known devices. The magnets are thereby embedded within a body of plastics material.

The invention aims at reducing the number of magnet pairs to a minimum, while maintaining an optimal damping.

In accordance with the invention this aim is achieved in that at least a number of magnets are surrounded by an electrically conductive material.

By having the magnets surrounded by an electrically conductive material the magnetic flux variation within the surrounding body during the swinging movements of the drum will produce a counter electromotive force, creating eddy currents within the surrounding body which currents intensify and attenuate the magnetic flux and thus improve the damping.

Tests have shown that in this manner, while maintaining a predetermined damping, the number of magnets may be reduced to 50-40%.

Because copper is an excellent electrical conductor, a simple and practical embodiment is to be seen therein, that the magnets are provided in the supporting frame or drum body respectively with the intermediary of a ring of copper surrounding each magnet.

Another practical embodiment is to be seen therein, that the magnets are embedded in aluminium. This embodiment is advantageous when the supporting frame of drum respectively are at least partially formed of aluminum, as is well-known per se. In this case use is simply made of the fact, that aluminum is a good electrical conductor. Care should be taken, that the magnets get in good conductive contact with the surrounding aluminum.

In a preferred embodiment a ring of magnetically conductive material is cast into the support frame and/or the drum body concentrically with respect to the axis of the device, said ring connecting the back sides of the magnets provided in the supporting frame and drum body respectively.

In this case a ring of magnetically conductive material, e.g. iron, is embedded into a body of electrically conductive material (aluminum). This ring is engaging the back side (= the side turned away from the magnets in the supporting frame or drum body respectively) of the magnets, so that a substantial portion of the magnetic flux is passing through this ring. Variations in this magnetic flux (in case of swinging movements or vibrations of the drum body) will then result in eddy currents within the electrically conductive material (aluminum) around the ring, which currents in turn tend to counteract the magnetic flux variation in case of vibrations and therewith improve the damping.

Moreover the said ring will increase the attraction between the magnets.

Embodiments of the invention will be hereinafter further explained with reference to the drawing.

Fig. 1 shows a diagrammatic sectional view of the device according to the invention in a first embodiment;

figs. 2 shows a diagrammatic sectional view of the device according to the invention in a second embodiment and

fig. 3 shows a sectional view of a third embodiment of the device according to the present invention.

In fig. 1 and 2 the housing or supporting frame of the device is indicating at 1. The housing has a hub portion 1a, in which a shaft 2 is rotatably supported by means of bearings 3, and a disc portion 1b extending from said hub portion 1a outwardly.

The shaft 2 is provided, in a well-known manner, with a yarn passage 4, that opens at the free end of an outwardly projecting winding arm 5.

As seen in the drawing a winding drum 7 is provided on the right-hand end portion of the shaft 2 with the intermediary of bearings 6, said drum having a hub portion 7a, a disc portion 7b and a plurality of circumferentially distributed winding

rods forming the winding drum proper.

The opposite end faces 8 and 9 of the disc portions 1b and 7b of the supporting frame 1 and of the winding drum 7 are conical surfaces and delimit a correspondingly shaped annular slit 10. In operation the winding arm 5 is rotating within the annular slit 10 and a yarn thread emerging from the free end of the winding arm is wound around the stationary winding drum 7 while (periodically) a number of yarn windings is drawn off at the downstream end of the drum.

One or more permanent magnets 11 and 12 respectively are provided in each of the opposite end faces 8 and 9. In a predetermined relative angular position of the supporting frame and the winding drum the magnets 11 and 12 are arranged in pairs of opposite magnets. The magnetic field between the magnets of each pair tends to hold the supporting frame and the drum in said predetermined relative angular position and has a damping effect on each small angular displacement which the floatingly supported winding (on the end of the shaft 2) tends to perform from this rest position under the influence of the forces exerted on it during the winding and drawing off procedure.

Now the invention seeks to increase the damping force or to obtain said damping force with less magnets.

For this purpose, in the embodiment of fig. 1, the magnets 11 and 12 respectively are embedded in the aluminum, of which the supporting frame 1 and the disc portion 7b of the winding drum 7 are formed. Due to aluminum being a good electrical conductor, a tendency of the winding drum to oscillate about its rest position and the magnetic flux variations caused thereby will result in eddy currents being produced around the magnets, which currents intensify and attenuate respectively the magnetic flux and therewith improve the damping of each pair of cooperating magnets.

In the embodiment of fig. 2 each magnet 11 and 12 respectively is surrounded by a ring 13 and 14 respectively of copper, which is a still better electrical conductor and in which eddy currents will be produced as a response on displacements of the winding drum from its rest position, said eddy currents having also an increased damping effect as described with reference to fig. 1. The remainder of the supporting frame 1 and/or the remainder of (the disc portion 7b and the hub portion 7a) of the winding drum may be formed of e.g. a resinous material.

Fig. 3 shows a particular embodiment of the device according to the invention. In this embodiment the "disc portion" 1'b and the "disc portion" 7'b of the supporting frame 1 and the winding drum 7 respectively are of a heavier structure as compared with the embodiments of fig. 1 and 2, so as to embed a closed ring 5 and 16 respectively therein, said ring being concentric with respect to the winding axis. These rings 15 and 16 respectively consists of a magnetically conductive material, such as iron or steel and connect the rearward end faces of the permanent magnets 11' and 12' respectively embedded in the supporting frame 1' and the winding drum 7' respectively. In this embodiment a portion of the magnetic flux is passing through the rings 14 and 15 and a flux variation - resulting from displacements of the winding drum from its rest position - will create eddy currents going along an annulus around the circular axis of the rings through the aluminum surrounding the rings. These eddy currents in turn result in a strengthening and attenuation respectively of the magnetic flux and thus in a further improvement of the damping.

Claims

1. A device for forming a yarn coil from a yarn thread supplied from a yarn package, comprising a winding drum floatingly mounted in a support frame and a rotatable winding member cooperating therewith, the supporting frame and the drum being provided with magnets which are disposed to lie opposite to one another in the rest position of the drum, characterized in that at least a number of magnets are surrounded by an electrically conductive material.

2. A device according to claim 1, characterized in that at least a part of the magnets is surrounded by a ring of copper.

3. A device according to claim 1, characterized in that at least a part of the magnets is added in a body of aluminum.

4. A device according to claim 3, characterized in that a ring of magnetically conductive material is cast into the support frame and/or the drum body concentrically with respect to the axis of the device, said ring connecting the backsides of the magnets provided in the supporting frame and drum body respectively.

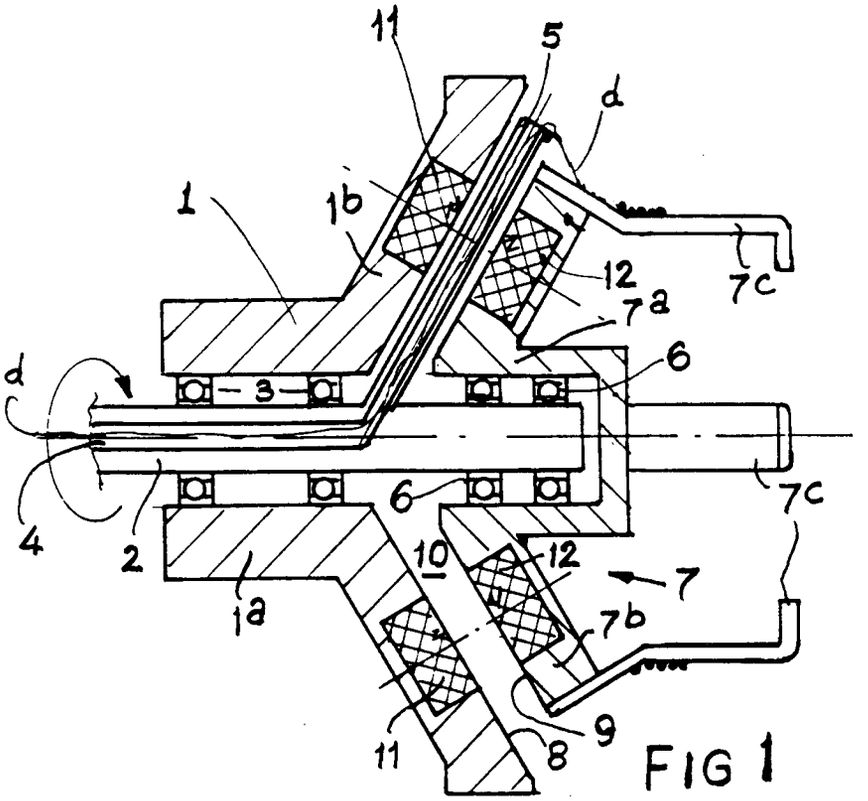
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FIG 1

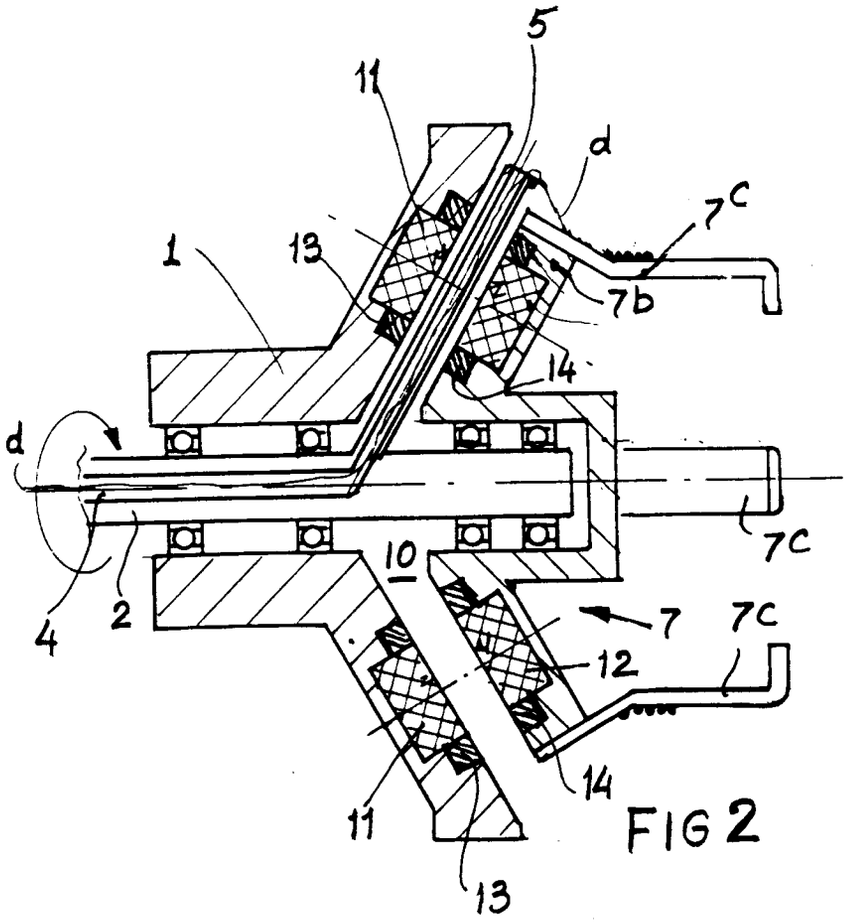
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FIG 2

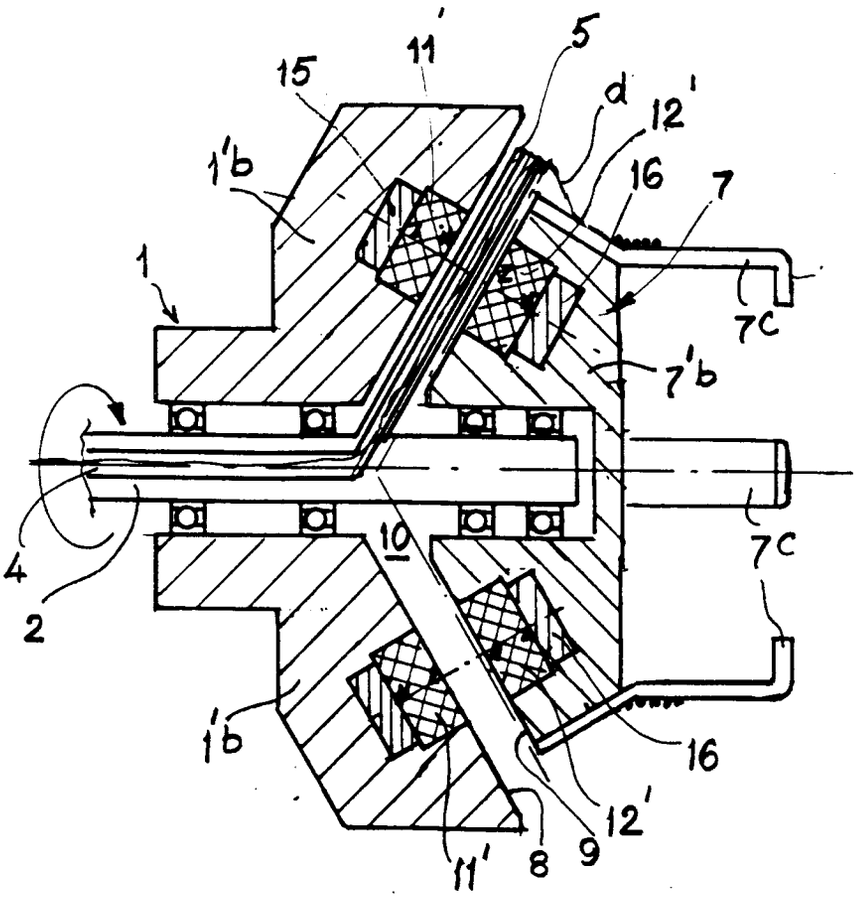

FIG 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 92 20 2337

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.5)
D,Y	US-A-4 848 417 (M. DEKKER; H. ACHTEN; L. HEINEMANS) * column 2, line 59 - line 63; figure 2 *	1-4	B65H51/22 D03D47/36
Y	US-A-3 573 517 (G.E. OSTERSTROM) * the whole document *	1-4	
X	GB-A-2 107 747 (SAURER DIEDERICHS) * page 2, line 61 - line 84 * * page 2, line 130 - page 3, line 78 *	1,3	
A	FR-A-1 547 158 (SULZER FRERES SOCIETE ANONYME)		
A	US-A-4 614 311 (S. KAKINAKA)		
A	CH-A-542 778 (GEBRÜDER SULZER AG)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B65H
D03D
H01F
H02K
F16F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15 OCTOBER 1992	D HULSTER E.W.F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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L : document cited for other reasons

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