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(72) Inventor: **Giurlani, Giovacchino**
Segromigno in Monte
55018 Lucca (IT)

(74) Representative: **Lanzoni, Luciano**
Bugnion S.p.A.
Via dei Rustici, 5
50122 Firenze FI (IT)

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(71) Applicant: **Focus S.r.l.**
55100 Monte San Quirico (IT)

(54) **Winder with protection device**

(57) Winder (1) for continuous web material, comprising: a motor-driven winding cylinder (13), a rod-holder

structure (4), and at least one elastic element (7) for protecting said structure (4) against possible contact pressures greater than a preset value (P).

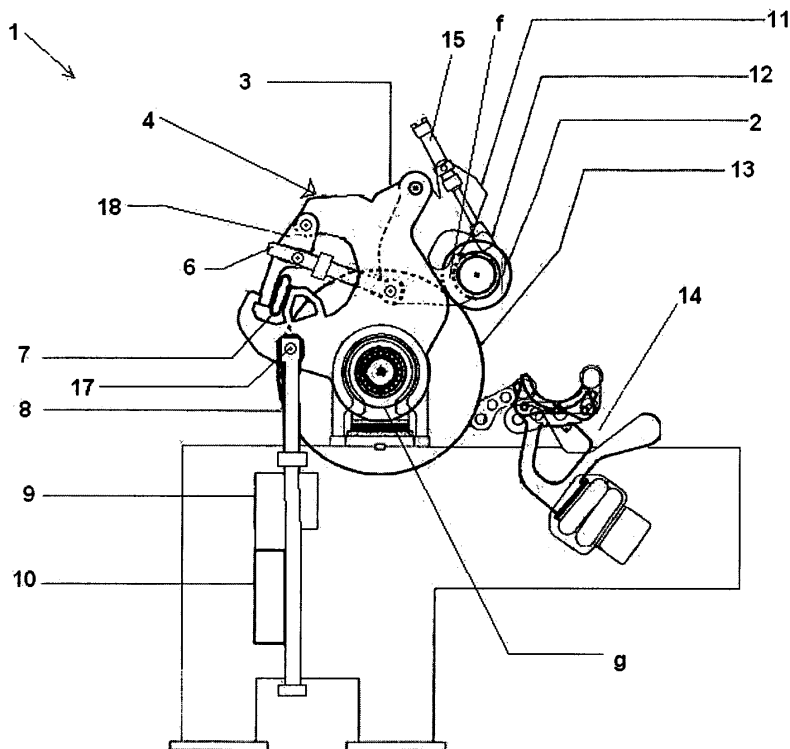


Fig.1

Description

[0001] The present invention refers to a winder for winding continuous web materials into reels, comprising a device for protection of its mechanical components.

[0002] Winders are known in the art which comprise a motor-driven winding cylinder having hinged thereon a so-called "primary arm" support which bears a winding rod brought in contact with the cylinder.

[0003] The rod, as the winding is carried on, moves to a further support, so-called "carriage" or "secondary arm", on which a reel of web material is completed by winding and moved on for storage or subsequent work operations.

[0004] During the winding, the reel is kept pressed in contact with the cylinder and, depending on the value of contact pressure, there is determined the "squeezing", that is, the density and, thus, the softness and quality of the reel in the course of formation.

[0005] The known winders may also comprise kinematic chains for driving the primary arm and/or the secondary arm and which consist of a structure of rigid or semi-rigid type.

[0006] In the present description the wording *rigid* or *semi-rigid structure* relates to a rod-holder structure unable to take up, without damages, accidental impulsive forces higher than the load sustained during the normal work cycle.

[0007] The known winders are not without some drawbacks.

[0008] A first drawback is experienced on use, when external bodies of relatively large dimensions, such as an agglomerate of paper generated by an accidental tear of the feeding web, are made to pass forcedly between the reel in the course of winding and the winding cylinder. In this case, the passage of a foreign body of significant dimension is cause for a sudden displacement of the winding rod with respect to the cylinder and, therefore, for a transfer onto the whole structure of significant loads that may give rise also to breaking events.

[0009] Accordingly, the rod's rigidity or semi-rigidity implies both an impact onto the reel in the course of formation and the risk of a failure of the same support.

[0010] The object of the present invention is therefore to overcome the said drawbacks by providing a winder for winding web material into reels, comprising rigid or semi-rigid driving means associated with a protection device allowing preventing possible damages caused by peaks of loads onto the same means.

[0011] According to the invention, said object is obtained by means of a winder for web material, comprising rigid or semi-rigid driving means and an anti-stress protection device.

[0012] The technical characteristics of the invention, according to the above object, are clearly set forth in the appended claims, and the advantages thereof will result more evident from the detailed description that follows, with reference to the attached drawings, of an embodi-

ment to be considered a non-limiting example thereof. In the drawings:

- Fig. 1 is a side view of a winder according to the present invention;
- Fig. 2 is a front view of the winder in Fig. 1;
- Fig. 3 is a rear view of the winder shown in the preceding figures; and
- Fig 4 shows in detail the kinematic chain interposed between the winding rod and the cylinder.

[0013] With reference to the attached drawings, a winder 1 for reeling continuous web material from a feeding unit comprises a winding cylinder 13 having an axis "X", preferably motor-driven by at least one electric motor and fixed to a bedplate 5, and a rod-holder structure 4 of rigid or semi-rigid type.

[0014] In the described example, the structure 4 comprises an end "f" for engagement with a winding rod 2, and an end "g" hinged to the cylinder 13 for rotation of the arm 3 which carries the rod 2, at least one elastic element 7 being interposed between the engagement end "f" and the hinged end "g" of structure 4.

[0015] The element 7, according to the invention, protects the structure 4 against possible contact pressures greater than a preset value "P" that may occur from accidental events or anomalous operating conditions.

[0016] In a preferred solution, shown in Figs. 1 to 4, the rod-holder structure consists of a primary arm 3, having its fulcrum on the winding cylinder 13 in correspondence of axis "X", and of an oscillating arm 11, these arms being connected to each other via a first rigid or semi-rigid component 6, such as a mechanic connection or a hydraulic jack, and a hinge "c".

[0017] In this exemplary embodiment, the component 6 is linked respectively, to the primary arm 3 via an equalizer 18 having two hinges "a" and "b", and to the oscillating arm 11 via the hinge "d".

[0018] Mounted on one end of the oscillating arm 11 is a locking/unlocking clamp 12 of substantially C-shape intended to retain or release the rod 2 during the winding.

[0019] The clamp 12 is connected to the oscillating arm 11 via a rigid support 15 of cylinder-piston type for the opening/closing of the clamp 12 and the consequent blockage or release of rod 2.

[0020] In this embodiment, the primary arm 3 is connected at a point 17 to a second linear actuator 8, preferably driven by one or more brushless motors 10 connected to one or more reducers 9, to drive into rotation the arm 3 which carries the rod 2.

[0021] In the embodiment illustrated with reference in particular to Fig. 1, the rod-holder structure is a winding carriage 14 located downstream of cylinder 13.

[0022] Formed advantageously in a predetermined region of the primary arm 3 are a first abutment 19 and a second abutment 20, the first 19 causing interference with the elastic element 7 that protects the rod-holder structure 4, and the second 20 causing interference with

the free end of the equilizer 18, this end results resulting therefore interposed between the elastic element 7 and the second abutment 20.

[0023] Preferably, the protective elastic element 7 is an air spring which has the advantage of allowing the user to exactly establish the rigidity of the structure 4 by simply increasing or reducing the internal pressure thereof.

[0024] The elastic element 7 is of basic importance both for absorbing the vibrations generated upon normal use and, in particular, for all those critical situations in which there is occurrence of stress peaks, such as upon a passage of foreign bodies of large dimensions between the cylinder 13 and the reel in the course of formation which, by generating a sudden displacement of the latter, is cause for stress peaks in all the winder.

[0025] The rigidity of the spring 7 shall be evaluated by the user in base of the breaking load of the weaker component, so as to establish a pressure threshold.

[0026] By establishing said pressure threshold, two distinct operating modes of the spring 7 must be verified, in particular, when the latter is subjected to pressures below said threshold, the spring 7 must have a rigid behaviour, whereas for higher pressures it must compress itself by allowing the rod-holder structure 4 to partially accomodate the sudden displacement of the reel in the course of formation.

[0027] This second operating mode occurs, for example, upon all those extraordinary conditions in which the loads transmitted to the structure result greater than the breaking load of the weaker component.

[0028] Advantageously, the primary arm 3 is driven by a second component 8 having a rigid behaviour, at least when subject to bending, such component being preferably a hydraulic jack driven by one or more brushless motors 10 connected to an equal number of reducers 9.

[0029] Shown with reference to Figs. 2 and 3 is a winder 1 according to the present invention in which provision is made for at least a torsion bar 16, disposed below the winding cylinder 13, said bar being made to operate whenever unbalanced stresses are generated on the winder 1.

[0030] The present invention obtains important advantages.

[0031] A first advantage lies in the fact that the use of the elastic element 7 makes it possible to provide a high protection of the mechanical structure under critical operating conditions, such as when the feeding web breaks up.

[0032] In fact, it is well known that during the winding operation of web material at high speed, a tear of the feeding web is likely to occur with consequent formation of a "bundle" of material which, as it is dragged along by the movement of the reel in the course of formation, is squeezed between the same reel and the winding cylinder 13.

[0033] This brings about a sudden displacement of the reel away from the cylinder 13, and the transmission of

high loads on the whole winder 1 through the rod-holder structure 4, which loads, owing to the rigidity of the same structure, overstrain the individual components.

[0034] This possible drawback is likely to cause serious damages to the structure 4 of the winder 1.

[0035] The use of an elastic element 7 which reacts by a compression thereof upon a sudden displacement of the reel in the course of winding, allows preventing any stress peak in the whole winder 1.

[0036] This advantage results more evident if the elastic element 7 is an air spring, since, as previously indicated, the use of this type of elastic element 7 allows the user to accurately regulate its rigidity.

[0037] It will be appreciated that the thus conceived invention is suited for industrial application, numerous modifications and variants being possible within the scope of the inventive idea, and all the parts being possibly replaced with technically equivalent elements.

Claims

1. Winder (1) for winding into reels a continuous web material from a feeding unit, comprising:

a winding cylinder (13) having a motor-driven axis (e), fixed to a bedplate (5), said cylinder (13) having a surface of contact with the incoming web material;

a rod-holder structure (4) of rigid or semi-rigid type comprising an end (f) for engagement with a winding rod (2) and an end (g) hinged to the cylinder (13) to bring said rod (2) in contact with said winding cylinder (13).

at least an elastic element (7) interposed between said engagement end (f) and said hinged end (g) of said rigid or semi-rigid support (4), to protect said structure (4) against possible contact pressures greater than a predetermined value (P).

2. Winder (1) according to claim 1, wherein said rod-holder structure (4) comprises a hinged primary arm (3) and an oscillating arm (11).

3. Winder (1) according to claim 2, wherein said primary arm (3) and said oscillating arm (11) are connected to each other by a first rigid component (6) engaged to an equilizer (18) and a hinge (c).

4. Winder (1) according to claim 2 or 3, wherein said oscillating arm (11) further comprises a locking clamp (12) operable by a rigid support of cylinder-piston type (15) fixed to the same arm (11) to retain said winding rod (2).

5. Winder according to any of the preceding claims, wherein said primary arm (3) is moved by a second

rigid component (8) driven by one or more brushless motors (10) connected to one or more reducers (9).

6. Winder according to any of the preceding claims, wherein said rod-holder structure (4) is a winding carriage (14) located downstream of said cylinder (13). 5
7. Winder according to any of the preceding claims, wherein said elastic element (7) is an air spring. 10
8. Winder according to any of the preceding claims, wherein said elastic element (7) is interposed between one end of said equilizer (18) and an abutment (19) formed directly on a predetermined region of the primary arm (3). 15
9. Winder according to any of the preceding claims, wherein said motorization of said winding cylinder (13) is provided by one or more brushless motors. 20
10. Winder according to any of the preceding claims, further comprising at least a torsion bar (16) for stiffening the winder (1). 25

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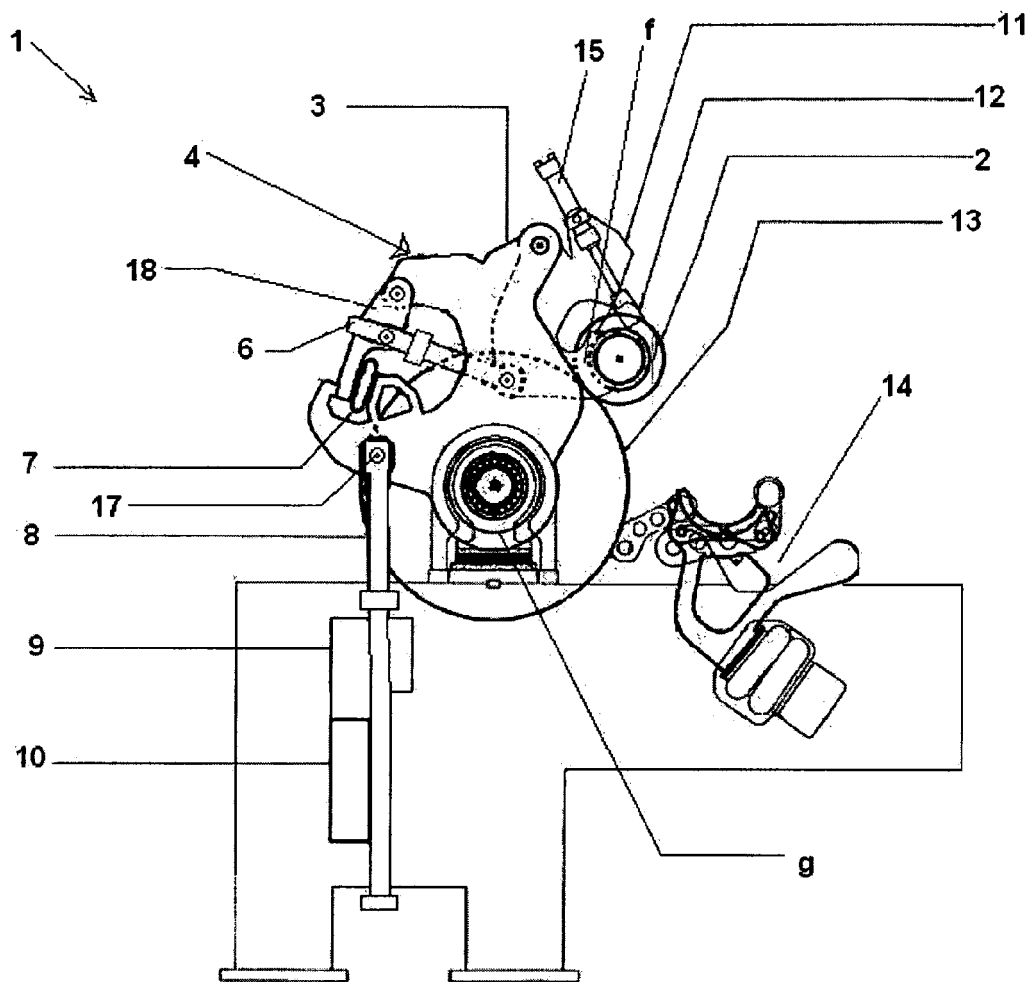


Fig.1

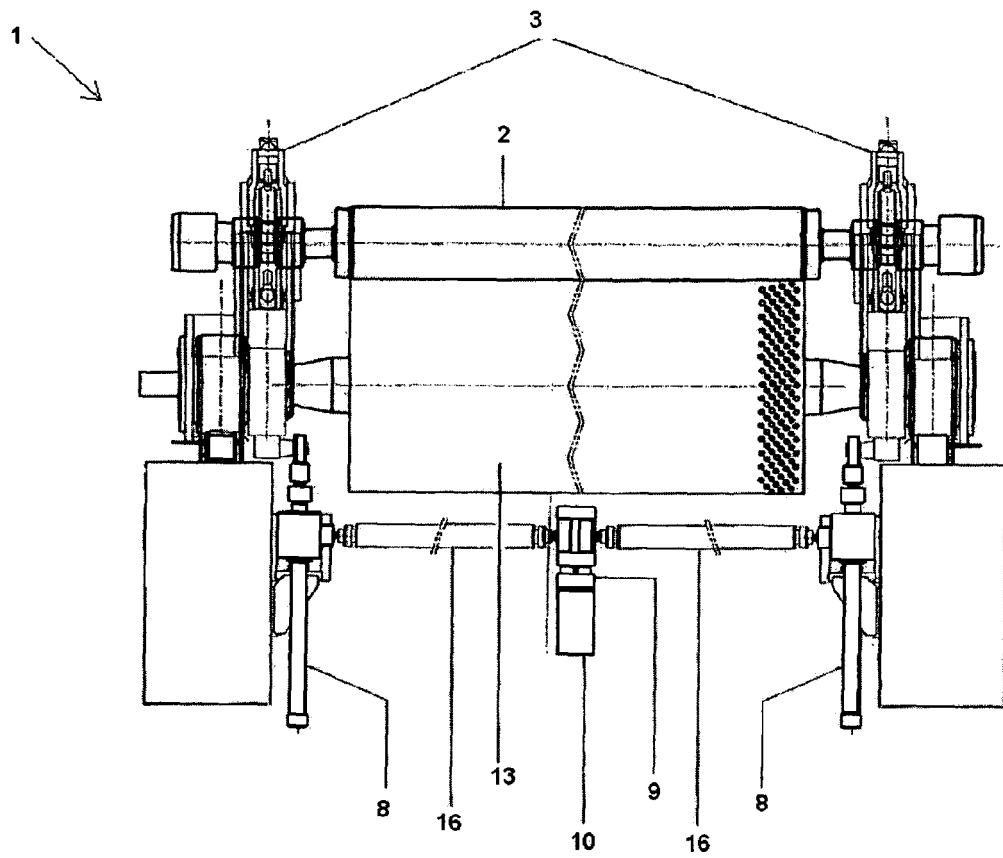


Fig.2

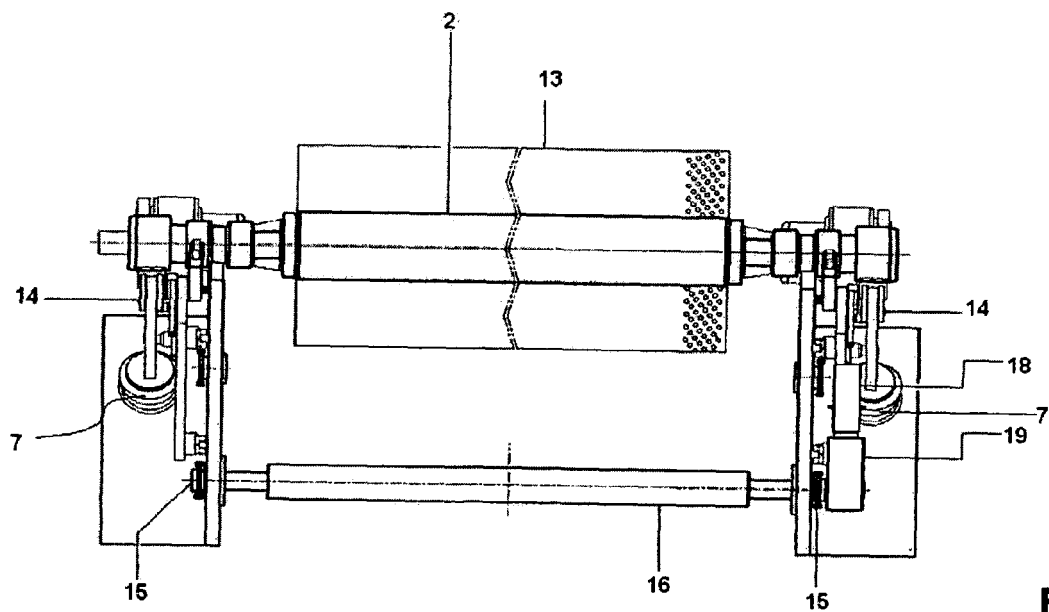


Fig.3

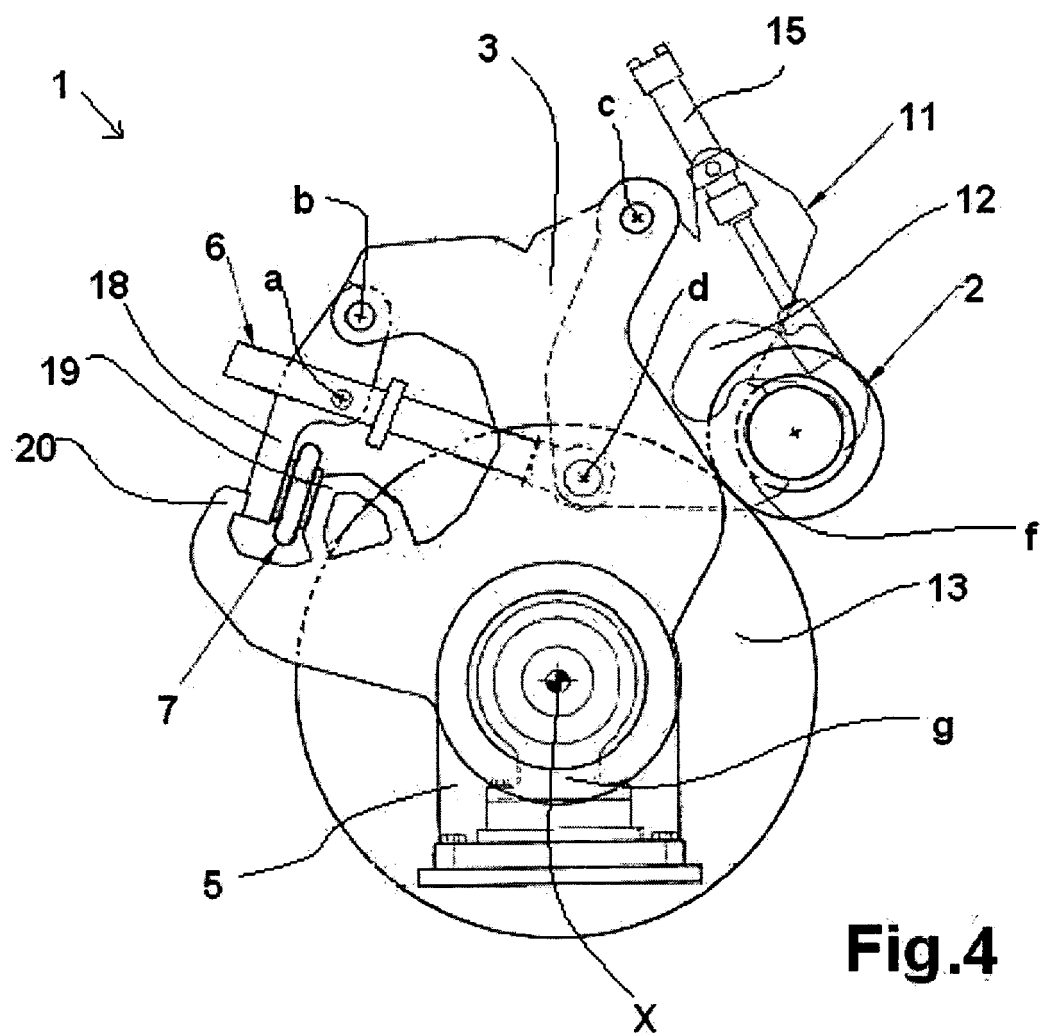


Fig.4