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(54) A WORKING PLANT OF A SLIDING SURFACE OF A SKI

(57) A working plant of the sliding surface (**S**) of a ski (**C**) comprising: a rotating grinding wheel (**2**) whose operating surface (**3**) has a plurality of projections and depressions to make the grooves for water drainage from the sliding surface of the ski; a tool (**4**) configured to be in contact with the operating surface (**3**) of the grinding wheel (**2**) and make the projections and depressions thereon; a movement unit (**5**) of the tool (**4**) to manoeuvre it on the operating surface (**3**) of the grinding wheel (**2**); a logic control unit (**8**) operatively connected to the movement unit (**5**) and programmed to vary the processing depth of the tool (**4**) on the operating surface (**3**) of the grinding wheel (**2**) as a function of the rotation angle of the grinding wheel (**2**). The plant (**1**) further comprises data entry means (**15**) in the logic control unit (**8**) configured to insert graphic elements, drawings or the like to be reproduced on the sliding surface (**S**) of the ski (**C**) by means of the grinding wheel (**2**), the logic unit (**8**) controlling the movement unit (**5**) so as to vary also the distance along the longitudinal development axis of the grinding wheel (**2**) between the projections so that said projections have variable-pitch helical trajectories.

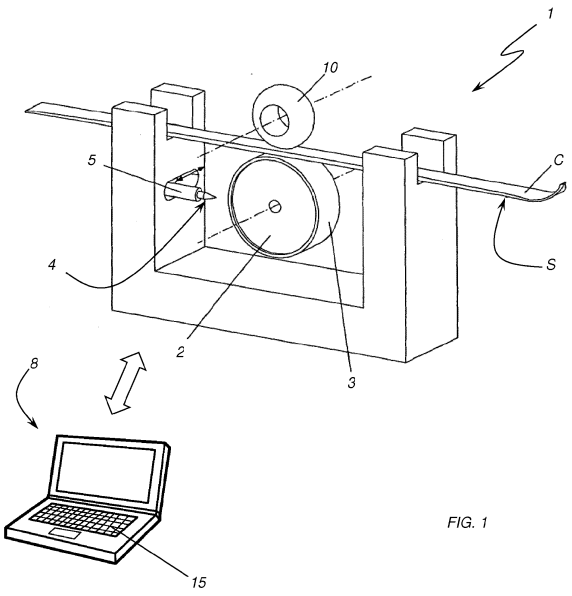

FIG. 1

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Description

Field of application

[0001] The present invention is applicable to the field of sporting equipment and, in particular, relates to skis.

[0002] More in detail, the present invention relates to a working plant of a sliding surface of a ski.

State of the art

[0003] In the field of winter sports, a significant aspect is represented by the sliding ability of the skis on the snow.

[0004] In particular, a thin film of water is typically formed during use between the sliding surface of the skis and the snow, which increases the resistance to the forward movement of the same ski.

[0005] For this reason, the technique of making, on the sliding surface, a plurality of scratches or grooves on the sliding surface of the ski is known. Such grooves facilitate the drain of the water film allowing the same sliding surface to directly contact the snow which reduces the friction during the forward movement.

[0006] In this sense, working plants of the sliding surface of the ski provided with a cylindrical rotating grinding wheel suitable to make such grooves are known.

[0007] However, it is known that the best combination of shape, depth and spacing of the scratches is not constant, but it varies according to the characteristics of the snow cover, the type of materials used to make the ski, the physical characteristics of the user and also the technique and the habit of the skier himself.

[0008] For this reason, a machine is known wherein, in addition to the grinding wheel, there is a tool able to totally smooth the operating surface of the grinding wheel and engrave a new combination of projections and depressions able to provide the desired and most suitable grooves on the ski.

[0009] Typically, on the same sliding surface of the ski, brands, graphic symbols or drawings in general are reproduced. They are printed on the ski edge facing the snow and covered by a transparent base material on which the above-mentioned scratches are made.

[0010] This operation forces to decide which brands, drawings or other reproduce during the construction phase of the ski and leave them unchanged over time. The printing of such graphic symbols on the base material is in fact avoided not only because, due to the scratches, the printing would be at least partially defaced, but also because such printing could ruin the effectiveness of the water film drain.

Presentation of the invention

[0011] The object of the present invention is to overcome at least partially the drawbacks noted above, providing a working plant of the sliding surface of a ski which allows to reproduce on the base material not only the grooves which allow an optimal drain of water from the sliding surface, but also to reproduce brands, drawings and graphic symbols at will and at any time.

[0012] Another object is to provide a working plant of the sliding surface of a ski which allows the aforementioned brands, drawings or graphic symbols to be made on the base material, minimizing the negative effects that they could create on the ski smoothness.

[0013] In particular, an object of the present invention is that such graphic symbols do not compromise, or compromise only marginally, the ability of the grooves to drain water from the sliding surface of the ski.

[0014] A further object of the present invention is that the plant allows to customise at will also such brands, drawings, graphic symbols as well as scratches.

[0015] Such objects, as well as others which will become clearer below, are achieved by a working plant of the sliding surface of a ski according to the following claims, which are to be considered as an integral part of the present disclosure.

[0016] In particular, the implant allows at least a plurality of grooves which facilitate the drain of the water between skis and snow to be made and, in this sense, it comprises at least one substantially cylindrical rotating grinding wheel whose operating surface has a plurality of projections and depressions.

[0017] However, according to an aspect of the invention, the plant also comprises at least one tool configured to be in contact with the operating surface of the grinding wheel and to realize the projections and depressions necessary for the desired processing of the sliding surface of the ski.

[0018] Therefore, there is also at least one movement unit of the tool to manoeuvre it on the operating surface of the grinding wheel and at least one logic control unit operatively connected to the movement unit and programmed at least to vary the processing depth of the tool on the operating surface of the grinding wheel according to the rotation angle of the same grinding wheel.

[0019] In this way, advantageously, the plant can perform a customised processing of the operating surface of the grinding wheel so as to obtain specific grooves on the sliding surface of the ski. Such customisation thus allows to obtain grooves that are optimal for the specific user, for the specific snow and for the specific used materials.

[0020] However, according to another aspect of the invention, the plant also includes data entry means into the logic control unit configured to insert graphic elements, drawings or the like to be reproduced on the sliding surface of the ski by means of the same grinding wheel.

[0021] Since, as mentioned, such drawings could affect the water drain ability from the grooves, according to a further aspect of the invention, the logic unit is programmed to control the movement unit so as to vary not only the depth of the grooves, but also the distance, along

the longitudinal development axis of the cylindrical grinding wheel, between the projections according to the graphic elements, drawings or the like to be reproduced. In other words, it is the pitch of the helical trajectory of the projections to be varied. Therefore, these trajectories have a variable pitch which allows the above mentioned drawings to be made.

[0022] The reproduction of images by means of incisions on the base material, in fact, returns the same images in shades of grey, the shade depending on the depth of the engravings and the distance between the grooves or scratches. In particular, smoothed or glossy lines, as well as less deep grooves, tend to be darker because they are more reflective. The more pronounced a projection is on the grinding wheel, the deeper and therefore "clearer" the groove is. At the same time, the lower the distance between the projections, the "darker" the obtained effect is.

[0023] Since the engraving of images or drawings on the base material corresponds in fact to the addition of engravings which could damage the water drain effect of the grooves, the logic control unit advantageously controls the implementation of the grinding wheel in such a way that the shades of grey that return the image are obtained by a combination of the adjustment of the engravings depth obtained on the base material of the ski and their mutual distance. This advantageously allows to minimize their perturbation effect on the water drain from the sliding surface.

[0024] From the above, it is clear that said objects are also achieved by a cylindrical rotating grinding wheel for processing the sliding surface of a ski and whose operating surface has a plurality of projections and depressions to make grooves on the sliding surface of the ski for water drainage, said projections identifying helical trajectories around said longitudinal development axis of said grinding wheel having a variable height and a variable pitch with the rotation angle of said grinding wheel.

[0025] Similarly, it is clear that said objects are also achieved by a ski comprising a sliding surface provided with a plurality of grooves for water drainage from said sliding surface, and characterized in that said grooves have variable distances from each other and a variable depth both between each of said grooves and also along the development direction of each of said grooves, so that said projections exhibit variable-pitch helical trajectories.

Brief description of the drawings

[0026] Further features and advantages of the invention will be more evident in the light of the detailed description of some preferred, but not exclusive, embodiments of a working plant of the sliding surface of a ski according to the invention, illustrated by way of a non-limiting example with the aid of the accompanying drawing, wherein FIG. 1 represents a plant according to the invention in schematic view.

Detailed description of an exemplary preferred embodiment

[0027] Referring to the above mentioned Figures, and in particular to Fig. 1, a working plant **1** of the sliding surface **S** of a ski **C** is described.

[0028] According to the described embodiment, such sliding surface **S** is composed of the ski **C** base material on which the ski wax is typically placed. However, such aspect must not be considered as limiting for the invention.

[0029] The working plant **1** of the invention is used to make a plurality of grooves which facilitate the water film drain which typically forms between the ski **C** and the snow and which causes the increase of the sliding friction. In this sense, as known and mentioned, on the sliding surface **S** a plurality grooves or scratches are made which typically, but not necessarily, develop according to the longitudinal axis of the same skis **C** with the aim of conveying the water from beneath the sliding surface **S.**

[0030] In this sense, the plant comprises a substantially cylindrical rotating grinding wheel **2** whose operating surface **3** has a plurality of projections and depressions for making the grooves used to drain water.

[0031] In particular, once the grinding wheel **2** is rotating, when the ski **C** comes into contact with it, the aforementioned grooves are dug on the sliding surface **S.**

[0032] According to an aspect of the invention, the plant **1** comprises a tool **4** configured to be in contact with the operating surface **3** of the grinding wheel **2** and to make the projections and depressions therein. In other words, advantageously, projections and depressions, which are responsible for the execution of the grooves on the ski **C,** are implemented by the tool **4** according to the specific needs of the user. This allows a customisation of the scratches or grooves made on the ski **C** according to the materials, snow, habits and style of the user.

[0033] According to another aspect of the invention, the plant **1** also comprises a movement unit **5** of the tool **4** to manoeuvre it on the operating surface **3** of the grinding wheel **2,** and a logic control unit **8** operatively connected to the movement unit **5** and programmed to vary, by controlling the movement unit **5** itself, the processing depth of the tool **4** on the operating surface **3** as a function of the rotation angle of the grinding wheel **2.**

[0034] Advantageously, therefore, the processing of the operating surface **3** of the grinding wheel **2,** to shape it in order to obtain the grooves in the desired positions, with the desired depths and development on the sliding surface **S** of the ski **C,** occurs automatically by controlling the logic unit **8.** Still advantageously, it is sufficient to suitably program the logic unit **8** so as to obtain the desired processing.

[0035] Still advantageously, the same tool **4** can be used to completely smooth the operating surface **3** of the grinding wheel **2** to prepare it for a new engraving corresponding to a different processing of the sliding surface

S. In other words, this allows to be able to automatically vary the processing with the same grinding wheel more than once.

[0036] With regard to the movement unit, it comprises a first motor, not shown herein, connected to the tool **4** to move it according to a first direction parallel to the longitudinal development axis of the grinding wheel **2** and according to a second direction which is incident to the operating surface **3** of the grinding wheel **2** itself. This allows the tool **4** to be manoeuvred against the grinding wheel **2** along its entire operating surface **3.**

[0037] However, at the same time, it is necessary that the grinding wheel **2** is rotating and this is done by means of a second motor, which is not shown in the drawings either and is operatively connected thereto. The same second motor rotates the grinding wheel **2** also during operating when it is placed in contact with the sliding surface **S** of the ski **C** to engrave it.

[0038] At the same time, the plant **1** further comprises a guide unit **10** of the ski **C** configured to move it according to a direction parallel to the longitudinal development axis of the ski **C** itself and which is incident to the longitudinal development axis of the grinding wheel **2.** Furthermore, the same guide unit is configured to maintain the sliding surface **S** in contact with the grinding wheel **2.**

[0039] As evident, this allows to automatically make the desired processing.

[0040] According to a further aspect of the invention, the plant **1** comprises data entry means **15** in the logic control unit **8.** In particular, they allow the insertion of graphic elements, drawings or the like in such logic unit **8** to reproduce them on the sliding surface **S** of the ski by means of the engravings made with the grinding wheel **2.**

[0041] Therefore, advantageously, the plant 1 allows not only to make grooves or scratches for the water drain, but also graphic customisation of the ski **C.** Since one acts on the base material of the latter, it is evident that they are not coloured, but are obtained with a plurality of colouring shades of the same base material. In particular, since the latter is typically black or grey, in this case the graphic customisation is reproduced with a combination of shades of grey.

[0042] Therefore, it is evident that the customisation can be performed much later the execution phase of the ski **C,** also allowing the final client to make it, who can reproduce brands and drawings at will or provide the customisation desired by the user.

[0043] According to another aspect of the invention, the logic unit **8** is programmed to control the movement unit **5** so as to vary not only the depth of the depressions (and therefore the height of the projections) on the grinding wheel, but also the distance along the longitudinal development axis of the grinding wheel **2** itself between the projections. All of this as a function of to the graphic elements, drawings or the like to be reproduced. In other words, since the projections identify helical trajectories, the logic unit **8** controls the movement unit **5** so as to vary the pitch of such trajectories according to the drawings to be reproduced.

[0044] Previously it has been said that the reproduction of images by means of engravings on the base material returns the same shades of grey with shades depending on the depth of the engravings and the distance between the grooves or scratches measured along a direction orthogonal to the longitudinal development axis of the ski **C.** In particular, smoothed or glossy lines, as well as less deep grooves, tend to be darker because they are more reflective. Thus, the more a projection on the grinding wheel **2** is pronounced, the deeper and therefore "clearer" the groove made on the ski **C** is. At the same time, the shorter the distance between the projections on the grinding wheel **2** is, the "darker" the effect obtained by the engraving made on the ski **C is.**

[0045] As mentioned, since the engraving of images or drawings on the base material corresponds in fact to the addition of engravings which could damage the water drain effect of the grooves, the logic control unit **8** advantageously controls the implementation of the grinding wheel **2** in such a way that the shades of grey that return the image are obtained by a combination of the adjustment of the engravings depth on the base material and their mutual distance. This advantageously allows to minimize their perturbation effect on the water drain while obtaining the desired graphic effect.

[0046] Typically, but not necessarily, the projections on the grinding wheel **2** identify helical trajectories around the longitudinal development axis of the grinding wheel **2** itself. Accordingly, the foregoing translates into the fact that the logic unit **8** controls the movement unit **5** so as to vary, also repeatedly, if necessary, the pitch of the helical trajectory and the height of the projection according to the graphic elements, drawings or the like to be reproduced and in such a way that they do not interfere with the water drain from beneath the sliding surface **S.**

[0047] Considering the above, it is evident that the object of the invention is also a cylindrical rotating grinding wheel **2** for processing the sliding surface **S** of a ski **C** having an operating surface **3** provided with a plurality of projections and depressions to make grooves on the sliding surface **S** of the ski **C** to drain water. In this case, the projections identify helical trajectories around the longitudinal development axis of the grinding wheel **2.** Such helical trajectories have a variable height and a variable pitch with the rotation angle of the grinding wheel so as to obtain, at the same time, water drain grooves and graphic customisation of the sliding surface **S** of the ski **C.**

[0048] A complete treatment of the grinding wheel and its advantages are avoided here because it represents a repetition of what has been said for the plant **1** of the invention.

[0049] Considering the above, it is also evident that the object of the invention is also a ski **C** comprising a sliding surface **S** provided with a plurality of grooves for water drainage. The grooves therein have, in pairs, distances which are variable from each other and a variable

depth both between each one of the grooves and the others, and also along the development direction of each groove so as to make water drain grooves and graphic customizations that do not affect such water drainage.

[0050] Here, too, a complete treatment of the ski and its advantages is avoided because it represents a repetition of what has been said for the plant **1** of the invention.

[0051] From the above, it is evident that the working plant of the sliding surface of a ski of the invention, as well as the cylindrical rotating grinding wheel of the plant and the processed ski therefrom, achieve all the intended objects.

[0052] In particular, not only the grooves that allow an optimal drain of water from the sliding surface are reproduced, but also brands, drawings and graphic symbols are reproduced at will on the base material of the ski.

[0053] The latter minimize or eliminate the effects on the smoothness of the ski since they impair minimally or do not impair at all the groove ability to drain water from the sliding surface.

[0054] The invention may be subject to many changes and variations, which are all included in the appended claims. Moreover, all the details may furthermore be replaced by other technically equivalent elements, and the materials may be different depending on the needs, without departing from the scope of protection of the invention defined by the appended claims.

Claims

1. A working plant of a sliding surface (**S**) of a ski (**C**) at least to make a plurality of grooves which facilitate the drain of water between skis (**C**) and snow, said plant (**1**) comprising:

- at least one rotating grinding wheel (**2**) whose operating surface (**3**) has a plurality of projections and depressions to make the grooves for water drainage from the sliding surface of the ski;
- at least one tool (**4**) configured to be in contact with said operating surface (**3**) of said grinding wheel (**2**) to make at least said projections and said depressions thereon;
- at least one movement unit (**5**) of said tool (**4**) to manoeuvre it on said operating surface (**3**) of said grinding wheel (**2**);
- at least one logic control unit (**8**) operatively connected to said movement unit (**5**) and programmed at least to vary the processing depth of said tool (**4**) on said operating surface (**3**) of said grinding wheel (**2**) as a function of the rotation angle of said grinding wheel (**2**),

characterized in comprising data entry means (**15**) in said logic control unit (**8**) configured to insert graphic elements, drawings or the like to be reproduced on the sliding surface (**S**) of the ski (**C**) by means of said grinding wheel (**2**), said logic unit (**8**) controlling said movement unit (**5**) so as to also vary the distance along the longitudinal development axis of said grinding wheel (**2**) between said projections so that said projections have variable-pitch helical trajectories.

2. Working plant according to claim **1**, **characterized in that** said projections identify helical trajectories around said longitudinal development axis of said grinding wheel (**2**), said logic unit (**8**) controlling said movement unit (**5**) so as to vary the pitch of said helical trajectory as a function of said graphic elements, drawings or the like to be reproduced.

3. Working plant according to claim 1 or 2, **characterized in that** said movement unit (**5**) comprises at least one first motor connected to said tool (**4**) to move it according to a first direction parallel to said longitudinal development axis of said grinding wheel (**2**) and according to a second direction which is incident to said operating surface (**3**) of said grinding wheel (**2**).

4. Working plant according to any one of the preceding claims, **characterized in** comprising at least one second motor operatively connected to said grinding wheel (**2**) to rotate it around said longitudinal development axis.

5. Working plant according to any one of the preceding claims, **characterized in** comprising at least one guide unit (**10**) of the ski (**C**) configured to move the ski (**C**) according to a direction parallel to the longitudinal development axis of the ski (**C**) and which is incident to said longitudinal development axis of said grinding wheel (**2**) and configured to maintain the sliding surface (**S**) of the ski (**C**) in contact with said grinding wheel (**2**).

6. A rotating grinding wheel to process the sliding surface (**S**) of a ski (**C**) and whose operating surface (**3**) has a plurality of projections and depressions to make grooves on the sliding surface (**S**) of the ski (**C**) for water drainage, said projections identifying helical trajectories around said longitudinal development axis of said grinding wheel (**2**) having a variable height and a variable pitch with the rotation angle of said grinding wheel (**2**).

7. A ski comprising a sliding surface (**S**) provided with a plurality of grooves for water drainage from said sliding surface (**S**), **characterized in that** said grooves have distances which are variable from each other and a variable depth both between each of said grooves and the others and also along the development direction of each of said grooves so

that said projections exhibit variable-pitch helical trajectories.

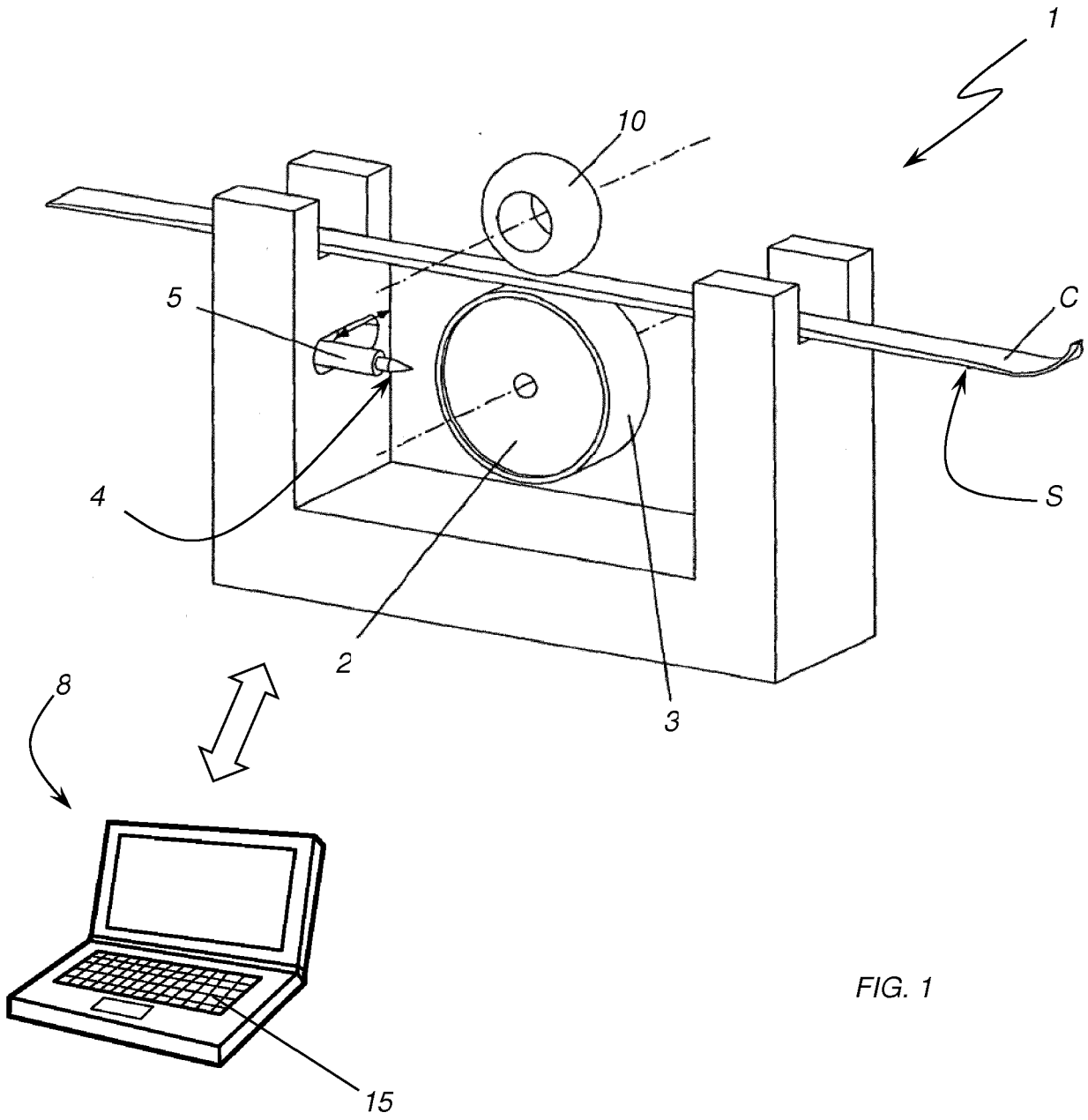

FIG. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 18 17 1675

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2013/156837 A1 (SVECOM P E S R L [IT]) 24 October 2013 (2013-10-24) * page 1 - page 7; figures 1,2 *	1-7	INV. A63C5/044 A63C11/04
X	FR 2 955 280 A1 (PELIZZARI JEAN-LUC [FR]) 22 July 2011 (2011-07-22) * page 1 - page 9; figures 1-8 *	1,6,7	
X	DE 961 335 C (KNEISSL FRANZ) 4 April 1957 (1957-04-04) * figures 2,6,7,8,10 *	7	
X,P	EP 3 257 628 A1 (TECNOPOWER DI CAPELLI PAOLO [IT]) 20 December 2017 (2017-12-20) * column 1 - column 7; figures 1-6d *	1-7	

TECHNICAL FIELDS SEARCHED (IPC)

A63C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 November 2018	Murer, Michael

CATEGORY OF CITED DOCUMENTS

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