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(54) COPYING UNIT FOR ADJUSTING THE FINISHING OF WOODEN PANELS SURFACES AND THE LIKE

(57) The present invention relates to a copying unit (U) for adjusting the machining of at least one surface and or one edge of a panel made of wood and the like for a woodworking machine, provided with a frame, comprising a support (S), which can be fixed to the frame of said woodworking machine, and a copier (C) installed on said support (S), wherein said copier (C) comprises an annular roller (1) capable of rotating around its axis of symmetry (C'), a supporting group (2), arranged within

said annular roller (1), having a circular shape defined by an external surface (20), and a plurality of rollers (3), interposed between said external surface (20) of said supporting group (2) and said annular roller (1), to allow the relative rotation of said annular roller (1) with respect to said supporting group (2), wherein said annular roller (1), when in use, is capable of rolling on the surface of the panel to be machined.

Description

[0001] The present invention relates to a copying unit for adjusting the finishing of wooden panels surfaces and the like.

Field of the invention

[0002] More specifically, the invention relates to a copying unit of the aforesaid type, designed and manufactured in particular to allow a finishing or rounding of the edges of the panels, but which can be used for any application in which working surfaces and edges of wood panels is necessary.

[0003] In the following, the description will be addressed to the machining of the edges of wooden panels, but it is clear that the same should not be considered limited to this specific use.

Prior Art

[0004] As is known, currently wooden panels intended for various applications are often made, for example, with two panels between which chipboard is pressed. Therefore, these panels are generally edge banded by means of a tape, typically made of plastic, applied by glue, which is subsequently finished by means of suitable tools to round the edges.

[0005] Special cutters are used for these edge rounding.

[0006] It is essential, however, that the cutters do not damage the upper and lower surface of the panel and then the so-called noble part of the same. Therefore, it is necessary to correctly position the cutters with respect to the edge to be rounded. As is known, however, the panels hardly have an exactly flat surface and inevitably have surface inaccuracies.

[0007] In light of the above, to allow the correct positioning of a cutter on the edge of the panel, so-called "copying" devices are provided, each of which includes a disk, concentric to the rotation axis of the cutter, which is made to roll or crawl on the surface of the panel so that the cutter follow any surface imperfections of the panel.

[0008] In general, the rounding devices including cutter and copying devices are applied to the sides of a sliding plane, on which the panels to be worked, previously edged by an edging system, are made to slide.

[0009] In fact, after having applied a suitable edge-banding tape on the lateral surfaces of the panels, the latter are moved, through the sliding plane, towards said rounding devices for subsequent finishing.

[0010] In general, the rounding of the edges of the panels involves a rounding of the horizontal edges, vertical edges, and the vertices or cusps of the same.

[0011] More specifically, each copier, by means of the cutter connected to the respective roller, is suitably moved with respect to the lateral surface of the panel, in such a way as to finish the horizontal, vertical edge, and

the vertex of this lateral surface.

[0012] In general, since the horizontal edge has a much larger dimension than the vertical edge, and, considering the fact that in the rounding of the upper longitudinal edge the cutter is located near the noble part of the panel, which does not happen when rounding the vertical edge, to avoid any risk of damaging the surface of the panel, it is desirable to leave a minimum portion of the tape, so as to avoid any risk.

[0013] Subsequently, therefore, the panel is further finished by means of a further machine tool, called in jargon "edge scraper", and arranged downstream of the rounder, which allows removing any residues of the belt from the longitudinal edge of the panel after the rounding phase.

[0014] In order to obtain a different arrangement of the cutter in the rounding phase of the vertical edge with respect to the horizontal one, there are systems with copying devices having a substantially oval shape that are made to crawl on the surface near the edges to be rounded.

[0015] In this way, when the copier moves on the surface near the lower corner, it will tend to keep the rounding cutter closer to the edge, while, when the copier moves along a surface near the longitudinal edge, it will tend to keep the cutter a slightly more distant from the edge to be rounded, so as to limit any risk of damaging the noble upper or lower part of the panel.

[0016] However, one of the main drawbacks of these known solutions is that they do not allow the dimensions of these copiers to be varied during the panel edge rounding operations.

[0017] A further drawback of these known solutions is given by the fact that they do not allow the same copier to roll along the lateral surface of the panel. In fact, the rollers of these copiers do not roll but only crawl along the edge of the panel.

[0018] Therefore, in this way, the lateral surface of the panel could not be correctly rounded or it could be rounded only partially, making further interventions necessary, and, therefore, slowing down machining times.

Scope of the invention

[0019] In the light of the above, it is, therefore, an object of the present invention to overcome the limitations of the prior art set out above by providing a copying unit for adjusting the finish of the surfaces of wooden panels and the like, which allows a copier to roll along the side surface of the panel.

[0020] Another object of the invention is to provide a copying unit that allows, in use, to vary the dimensions of the copier.

[0021] Another object of the invention is to provide a copying unit that is highly reliable, relatively simple to manufacture, and at competitive costs if compared to the prior art.

Object of the invention

[0022] It is, therefore, specific object of the present invention a copying unit for adjusting the machining of at least one surface and or one edge of a panel made of wood and the like for a woodworking machine, provided with a frame, comprising a support, which can be fixed to the frame of said woodworking machine, and a copier installed on said support, wherein said copier comprises an annular roller capable of rotating around its axis of symmetry, a supporting group, arranged within said annular roller, having a circular shape defined by an external surface, and a plurality of rollers, interposed between said external surface of said supporting group and said annular roller, to allow the relative rotation of said annular roller with respect to said supporting group, wherein said annular roller, when in use, is capable of rolling on the surface of the panel to be machined.

[0023] Advantageously according to the invention, said annular roller may be made of a partially deformable material, and said supporting group may be capable of modifying the shape of said annular roller so as to ovalize the shape of said copier, moving said axis of symmetry away from the surface of said panel to be machined, when said copier is in contact with the portion of said annular roller arranged opposite said support.

[0024] Always according to the invention, said annular roller may have a rolling surface and an internal surface, wherein said rolling surface contacts, in use, the surface of the panel to be machined, wherein said surface inner, faced to said the external surface of said supporting group, contacts each roller of said plurality of rollers, and wherein each or said rollers is capable of rolling on said external surface of said supporting group and on said internal surface.

[0025] Still according to the invention, said supporting group may comprise one or more movable portions, and one or more fixed portions opposite said at least two movable portions, wherein each of said one or more movable portions and each of said one or more fixed portions is inserted inside of said external surface, and wherein each movable portion is capable of passing from a rest position, wherein it is at a first distance from said inner surface of said annular roller, to an operative position, wherein it is at a second distance from said internal surface of said annular roller, wherein said second distance is smaller than said first distance.

[0026] Further according to the invention, said supporting group may comprise at least two adjustment elements, wherein each adjusting element is arranged between said one or more mobile portions and said one or more fixed portions, and is capable of rotating around said axis of symmetry and to contact, in use, said respective one or more mobile portions.

[0027] Conveniently according to the invention, each adjustment element may have a lobe capable of contacting, in use, said respective mobile portion, and a base pivoted on a pin.

[0028] Still according to the invention, each adjusting element may be capable of passing from a rest position, wherein each adjusting element is arranged along the direction of an axis perpendicular to said axis of symmetry, and wherein both said adjustment elements are superimposed, to an operating position, wherein each adjustment element is rotated with respect to said pin, on which the base is pivoted, so that said respective lobe comes into contact with said respective mobile portion.

[0029] Always according to the invention, said supporting group may comprise an actuating device connected to each of said at least two adjustment elements, wherein said actuating device comprises a transmitting member, longitudinal and arranged in correspondence with said at least two adjustment elements, and an actuating member connected to said transmitting member.

[0030] Advantageously according to the invention, said actuating device may be capable of passing from a first operating position, wherein said transmitting member and said actuating member are in a first position, at a second operating position, wherein said transmitting member and said actuating member are in a second position different from said first position, so that, when said actuating device is in said first operating position, each adjustment element is in said rest position, and that, when said actuating device is in said second operating position, each adjustment element is in said operating position.

[0031] Conveniently according to the invention, said one or more movable portions may be symmetrical and arranged at a distance from said support, and said one or more fixed portions may be symmetrical, facing said respective one or more mobile portions, and arranged at a further distance from said support, wherein said further distance is less than said distance.

[0032] Always according to the invention, said one or more movable portions may be two movable portions and that said one or more fixed portions are two fixed portions, wherein said two movable portions and said two fixed portions each occupy a quarter of a circumference defined by said external surface.

Brief description of the figures

[0033] The present invention will be now described, for illustrative but not limitative purposes, according to its preferred embodiments, with particular reference to the figures of the enclosed drawings, wherein:

50 figure 1 illustrates, in a perspective view, an embodiment of a copying unit, according to the present invention; and

figure 2 illustrates, in a front view, a detail of the copying unit of figure 1.

[0034] In the various figures, similar parts will be indicated by the same reference numbers.

Detailed description

[0035] With reference to figures 1 and 2, a copying unit according to the present invention is shown, indicated as a whole with the reference letter U, which substantially comprises a copier C and support or frame S, on which said copier C is installed.

[0036] Said copier C, in turn, comprises an annular roller 1, deformable and capable of rotating around an axis C', a support unit 2, arranged within said annular roller 1, and capable of adjusting and modifying the shape of said annular roller 1, and a plurality of rollers 3, interposed between said supporting group 2 and said annular roller 1.

[0037] The annular roller 1, as mentioned, is capable of rotating around the axis C', and, as better described below, when in use, it rolls along a surface, in particular a lateral surface, of a panel (not shown in the figures).

[0038] Said annular roller 1 has a substantially cylindrical section, and has a first outer surface or rolling surface 10, and a second surface or inner surface 11, facing the supporting group 2.

[0039] In particular, said rolling surface 10 contacts, in use, the lateral surface or edge of the panel, while said internal surface 11 is in contact with each roller 3 of said plurality of rollers 3.

[0040] Furthermore, in the embodiment described, said annular roller 1 is made of a partially deformable material, such as steel and the like. In this way, in fact, it is able to deform if subjected to the action of stress.

[0041] In the embodiment described, said supporting group 2 has an external sliding surface 20, two movable or adjustment portions 21, two fixed portions 22 opposite to said movable portions 21, all inserted within said external surface 20, two adjustment elements or cams 4, able to contact, in use, said respective movable portions 21, and an actuating device 5, connected to said two adjusting elements 4.

[0042] Furthermore, said copier C also comprises a plurality of rollers 3, interposed between said external surface 20 and said internal surface 11 of said annular roller 1, arranged to allow relative rotation of said annular roller 1 with respect to said support group 2.

[0043] With particular reference to figure 2, the movable portions 21 are symmetrical with respect to an axis A, perpendicular to the axis C'.

[0044] In the present embodiment, said movable portions 21 are two and each occupies a quarter of the circumference identified by the external surface 20. However, in further embodiments the number of said movable portions 21 can be different from two.

[0045] Each movable portion 21 is able to pass from a rest position, in which it is at a first distance from said internal surface 11 of said annular roller 1, to an operative position, in which it is at a second distance from said internal surface 11 of said annular roller 1, where said second distance is smaller than said first distance.

[0046] More specifically, each movable portion 21 is

able to move along a respective radial direction (in the direction indicated by the arrows F1 and F2 in figure 2), thus distancing itself from each other, decreasing the distance between said external surface 20, and said internal surface 11 of said annular roller 1.

[0047] By way of example, the decrease in said distance is of the order of a few millimeters or tens of millimeters.

[0048] Similarly, to what has been said above, as can be seen from figure 2, the fixed portions 22 are symmetrical with respect to said axis A, and face said respective two movable portions 21 with respect to an axis B, perpendicular to said axis A.

[0049] In other words, in the embodiment that is described, each of said movable portions 21, and each of said fixed portions 22 is arranged in a respective portion delimited by said axis A, said axis B, and said external surface 20.

[0050] Each adjusting element 4, arranged between said movable portions 21 and said fixed portions 22, is able to rotate around the axis C'.

[0051] In particular, each adjusting element 4 has a lobe 40 capable of contacting, in use, said respective mobile portion 21, and a base 41 pivoted on a pin (not shown in the figures).

[0052] More in detail, in the embodiment described, each adjusting element 4 is capable of passing from a rest position, in which it is arranged along the direction of the axis A, and in which both the adjusting elements 4 are superimposed, with said lobe 40 arranged towards the direction of the positive Y (with respect to a reference system XYZ shown in figures 1 and 2), to an operating position, in which each adjusting element 4 is rotated with respect to the pin, on which the base 41 is pivoted so that the respective lobe 40 comes into contact with said respective mobile portion 21.

[0053] The passage of each adjusting element 4 from said rest position to said operating position occurs through the use of suitable movement and actuation members (not shown in the figures), which can be of the electrical, such as electric motors, or mechanical, e.g., by means of worm systems, type.

[0054] Said actuating device 5 comprises a longitudinal transmission member 50, arranged in correspondence with the two adjusting elements 4, and an actuator member 51, connected to said transmission member 50.

[0055] In particular, said transmission member 50 extends longitudinally along the axis A and has a first end 50A, and a second end 50B, opposite to said first end 50A.

[0056] In particular, said first end 50A is connected to the base 41 of each of said adjusting elements 4, and said second end 50B is connected to said actuator member 51.

[0057] Movement and actuation members are provided (not shown in the figures), which allow said actuating device 5 to pass from a first operating position, in which said transmission member 50 and said actuator member

51 are in a first position, to a second operating position, in which said transmission member 50 and said actuator member 51 are in a second position, different from said first position, so that each adjusting element 4 passes respectively from said rest position to said operative position.

[0058] More specifically, when said actuating device 5 is in said first operating position, each adjusting element 4 is in said rest position, that is, it is arranged along the direction of axis A, with the respective lobe 40 arranged towards the positive direction of Y.

[0059] When, on the other hand, said actuating device 5 is in said second operative position, each adjusting element 4 is in said operating position, i.e., it is rotated with respect to the point where the respective base 41 is pivoted, so that the respective lobe 40 contacts with said respective movable portion 21.

[0060] As said, each roller 3 contacts each movable portion 21 of said support group 2 and said internal surface 11 of said annular roller 1.

[0061] Advantageously, each roller 3 is capable of rolling on said external surface 20 and on said internal surface 11 to guide a sliding movement of said internal surface 11 with respect to said external surface 20, along a circumferential direction.

[0062] The operation of the embodiment of said copying unit U described above is as follows.

[0063] A rounding device comprises the copying unit U described above, and a cutter (not shown in the figures), arranged coaxially to said copier C.

[0064] Said rounding device is moved by means of moving members of known type (not shown in the figures) towards the panel to be machined (not shown in the figures), in particular towards a vertical surface of said panel.

[0065] Subsequently, when the copier C is placed on the vertical surface of the panel to mill the edge of the vertical surface with the cutter, said copier C is in a first operating configuration.

[0066] More in detail, with particular reference to figure 2, the copier C contacts said vertical surface by means of a first contact portion P1 or P1'.

[0067] In said first operating configuration, said actuating device 5 is in said first operating position, and each adjusting element 4 is in said rest position, i.e., it is arranged along the direction of the axis A, with the respective lobe 40 arranged towards the direction of the positive Y.

[0068] Therefore, in said first operating configuration, each movable portion 21 of said supporting group 2 is in said rest position, in which it is at a first distance from said internal surface 11 of said roller 1, and said annular roller 1 of said copier C has a substantially cylindrical section.

[0069] Thereafter, in a second operating configuration, different from said first operating configuration, said copier C rests on the horizontal surface (lower or upper) of said panel, to guide the respective cutter and round the

horizontal edge of said panel.

[0070] More in detail, as can be seen from figure 2, it contacts said horizontal surface by means of a second contact portion P2 of said copier C.

5 [0071] In said second operative configuration, said actuating device 5 is brought into said second operative position, and each adjusting element 4 is in said operative position, i.e., it is rotated with respect to the point where the respective base 41 is pivoted, so that the respective lobe 40 comes into contact with a respective movable portion 21.

10 [0072] In fact, as said, suitable movement and actuation members (not shown in the figures) allow said actuating device 5 to pass from said first operating position, to said second operating position, and said adjusting elements 4 respectively from said rest position to said operating position.

15 [0073] Therefore, in said second operating configuration, each movable portion 21 of said supporting group 2 is in said operating position, in which it is at a second distance from said internal surface 11 of said roller 1, where said second distance is smaller than said first distance of said first operating configuration.

20 [0074] In this way, each movable portion 21 moves along a respective radial direction (in the direction indicated by the arrows in figure 2), thus distancing themselves from each other, decreasing the distance between said external surface 20, and said internal surface 11 of said annular roller 1.

25 [0075] Furthermore, the pressure of each movable portion 21 on the rollers 3 interposed between the external surface 20 and the internal surface 11, allows deforming said annular roller 1.

30 [0076] In this second operating configuration, then, said annular roller 1 of said copier C is deformed by a few millimeters or tens of millimeters, or the original substantially cylindrical section changes.

35 [0077] In this way, the annular roller 1 and the external surface 20 are in fact both ovalized, assuming a deformed shape shown in dashed line in figure 2.

40 [0078] In this way, the cutter will be proportionally spaced from the corner to be rounded, which will then be finished by an edge scraper device (not shown in the figures) in a following machining step.

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Advantages

50 [0079] A first advantage of the present invention is that of providing a copying unit equipped with a copier capable of rolling along the side surface of the panel.

[0080] A further advantage of the present invention is that of providing a copying unit that allows the dimensions of the copier to be varied.

55 [0081] The present invention has been described for illustrative but not limitative purposes, according to its preferred embodiments, but it is to be understood that modifications and/or changes can be introduced by those skilled in the art without departing from the relevant scope

as defined in the enclosed claims.

Claims

1. Copying unit (U) for adjusting the machining of at least one surface and or one edge of a panel made of wood and the like for a woodworking machine, provided with a frame, comprising
5 a support (S), which can be fixed to the frame of said woodworking machine, and
a copier (C) installed on said support (S), wherein
said copier (C) comprises
an annular roller (1) capable of rotating around its
axis of symmetry (C'),
a supporting group (2), arranged within said annular
roller (1), having a circular shape defined by an ex-
ternal surface (20), and
a plurality of rollers (3), interposed between said ex-
ternal surface (20) of said supporting group (2) and
said annular roller (1), to allow the relative rotation
of said annular roller (1) with respect to said support-
ing group (2),
wherein said annular roller (1), when in use, is ca-
pable of rolling on the surface of the panel to be ma-
chined.

2. Copying unit (U) according to the preceding claim,
characterized
in that said annular roller (1) is made of a partially
deformable material, and
in that said supporting group (2) is capable of mod-
ifying the shape of said annular roller (1) so as to
ovalize the shape of said copier (C), moving said
axis of symmetry (C') away from the surface of said
panel to be machined, when said copier (C) is in
contact with the portion of said annular roller (1) ar-
ranged opposite said support (S).

3. Copying unit (U) according to any one of the preced-
ing claims, **characterized**
in that said annular roller (1) has a rolling surface
(10) and an internal surface (11),
wherein said rolling surface (10) contacts, in use, the
surface of the panel to be machined,
wherein said surface inner (11), faced to said the
external surface (20) of said supporting group (2),
contacts each roller (3) of said plurality of rollers (3),
and
wherein each or said rollers (3) is capable of rolling
on said external surface (20) of said supporting
group (2) and on said internal surface (11).

4. Copying unit (U) according to the preceding claim,
characterized in that said supporting group (2)
comprises
one or more movable portions (21), and
one or more fixed portions (22) opposite said at least
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two movable portions (21),
wherein each of said one or more movable portions
(21) and each of said one or more fixed portions (22)
is inserted inside of said external surface (20), and
wherein each movable portion (21) is capable of
passing from a rest position, wherein it is at a first
distance from said inner surface (11) of said annular
roller (1), to an operative position, wherein it is at a
second distance from said internal surface (11) of
said annular roller (1), wherein said second distance
is smaller than said first distance.

5. Copying unit (U) according to any one of the preced-
ing claims, **characterized in that** said supporting
group (2) comprises at least two adjustment ele-
ments (4), wherein each adjusting element (4) is ar-
ranged between said one or more mobile portions
(21) and said one or more fixed portions (22), and is
capable of rotating around said axis of symmetry (C')
and to contact, in use, said respective one or more
mobile portions (21).

6. Copying unit (U) according to the preceding claim,
characterized in that each adjusting element (4)
has a lobe (40) capable of contacting, in use, said
respective mobile portion (21), and a base (41) piv-
oted on a pin.

7. Copying unit (U) according to any one of claims 5 or
6, **characterized in that** each adjusting element (4)
is capable of passing from a rest position, wherein
each adjusting element (4) is arranged along the di-
rection of an axis (A) perpendicular to said axis of
symmetry (C'), and wherein both said adjustment
elements (4) are superimposed, to an operating po-
sition, wherein each adjusting element (4) is rotated
with respect to said pin, on which the base (41) is
pivoted, so that said respective lobe (40) comes into
contact with said respective mobile portion (21).

8. Copying unit (U) according to any one of claims 5-7,
characterized in that said supporting group (2)
comprises an actuating device (5) connected to each
of said at least two adjustment elements (4), wherein
said actuating device (5) comprises a transmitting
member (50), longitudinal and arranged in corre-
spondence with said at least two adjustment ele-
ments (4), and an actuating member (51) connected
to said transmitting member (50).

9. Copying unit (U) according to the preceding claim,
when dependent on claim 7, **characterized in that**
said actuating device (5) is capable of passing from
a first operating position, wherein said transmitting
member (50) and said actuating member (51) are in
a first position, at a second operating position,
wherein said transmitting member (50) and said ac-
tuating member (51) are in a second position differ-

ent from said first position, so that, when said actuating device (5) is in said first operating position, each adjusting element (4) is in said rest position, and that, when said actuating device (5) is in said second operating position, each adjusting element (4) is in said 5 operating position.

10. Copying unit (U) according to any one of claims 4-9,

characterized

in that said one or more movable portions (21) are 10 symmetrical and arranged at a distance from said support (S), and

in that said one or more fixed portions (22) are symmetrical, facing said respective one or more mobile portions (21), and arranged at a further distance from 15 said support (S), wherein said further distance is less than said distance.

11. Copying unit (U) according to any one of claims 4-10,

characterized in that said one or more movable portions (21) are two movable portions (21) and that said one or more fixed portions (22) are two fixed portions (22), wherein said two movable portions (21) and said two fixed portions (22) each occupy a quarter of a circumference defined by said external 25 surface (20).

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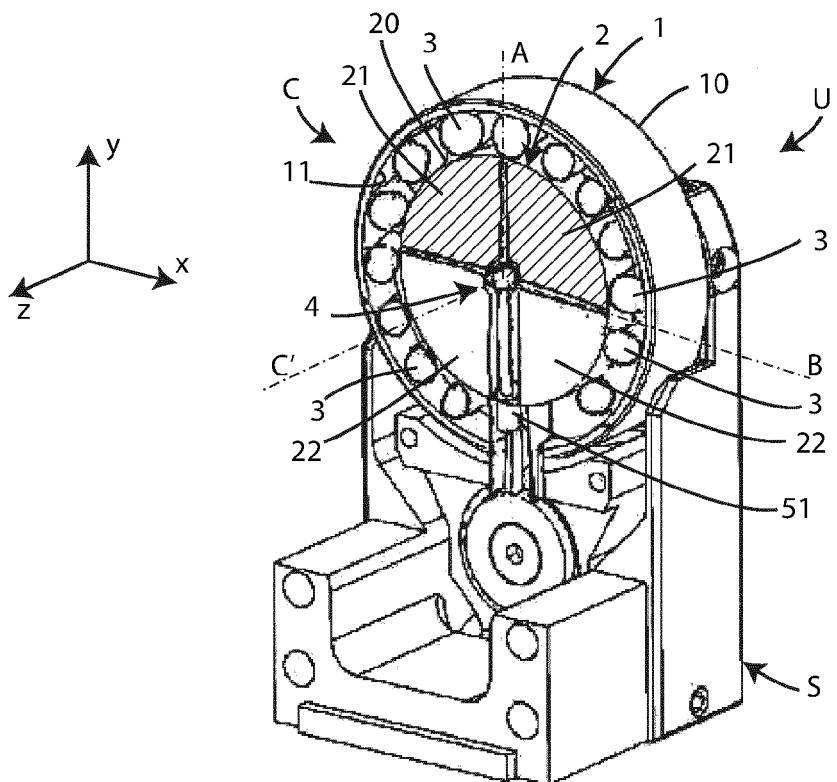


Fig. 1

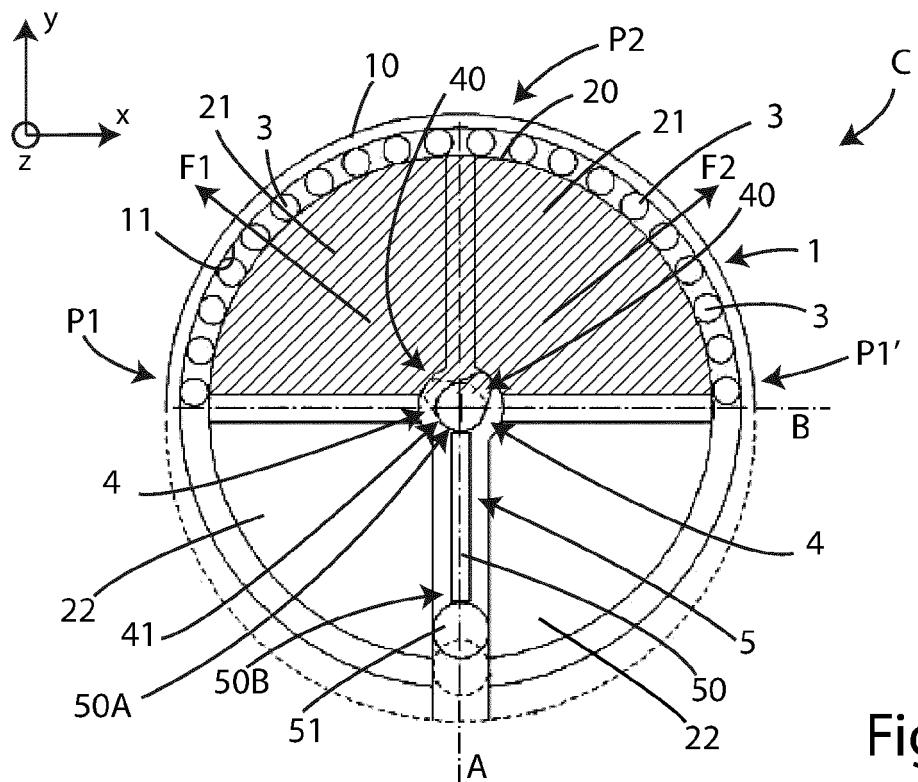


Fig. 2



EUROPEAN SEARCH REPORT

Application Number

EP 20 21 3277

DOCUMENTS CONSIDERED TO BE RELEVANT					
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)		
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			TECHNICAL FIELDS SEARCHED (IPC)		
			B27C B27M		
The present search report has been drawn up for all claims					
Place of search	Date of completion of the search	Examiner			
The Hague	22 April 2021	Mirza, Anita			
CATEGORY OF CITED DOCUMENTS					
X : particularly relevant if taken alone	T : theory or principle underlying the invention				
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P : intermediate document	& : member of the same patent family, corresponding document				

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 21 3277

5 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 The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-04-2021

10	Patent document cited in search report	Publication date		Patent family member(s)	Publication date
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82